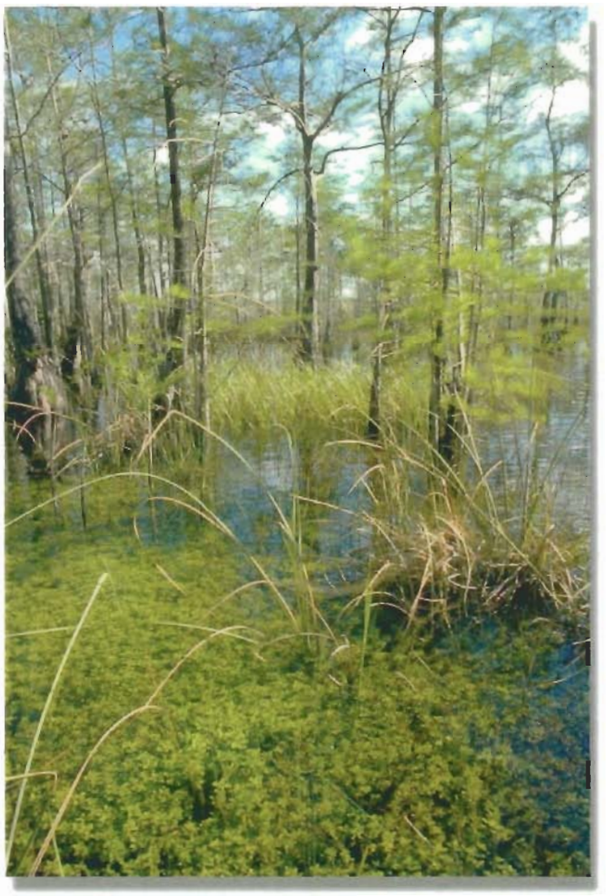
CYPRESS CREEK
WATERSHED MANAGEMENT PLAN

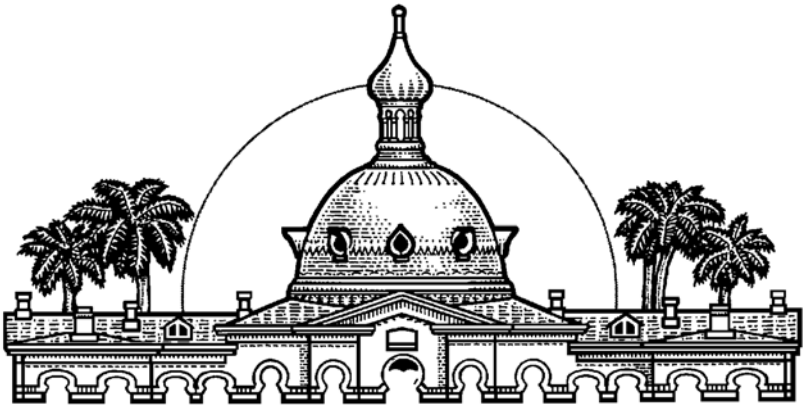


Prepared for the
Hillsborough County Board of Commissioners

Prepared by:
URS Corporation Southern

December 2000

Hillsborough County
Florida



CYPRESS CREEK

WATERSHED MANAGEMENT PLAN
FINAL MILESTONE REPORT (CHAPTERS 1-18)

Prepared for the
Hillsborough County Board of County Commissioners

By

URS Corporation Southern

December, 2000

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EXECUTIVE SUMMARY

The Cypress Creek Watershed is located in northern Hillsborough County in an area in which a number of land and water management issues are currently being addressed by citizen's action groups and state, regional and local government agencies. The URS Corporation Team was retained by Hillsborough County to prepare the Cypress Creek Watershed Management Plan as a part of the County's overall watershed management program. The objectives of the plan were to describe the existing drainage, flooding, water quality, natural systems and water supply conditions within the watershed and to develop alternatives to improve areas not currently meeting the County's level of service.

The watershed in Hillsborough County is characterized as rural and contains approximately 33 square miles or about 21,000 acres. It is generally bordered on the east by I-75, U.S. 41 on the west, by Pasco County on the north and by Bruce B. Downs Boulevard (S.R. 551) on the south. The total Cypress Creek Watershed including areas within Pasco and Hillsborough Counties is approximately 160 square miles.

The watershed in Hillsborough County includes ten outfalls that discharge into the Cypress Creek main channel that discharges into the Hillsborough River. These outfalls include the: Cypress Creek Main Channel, County Line Drainage System (Hillsborough/Pasco County Line), Country Oaks System, Ridge Lake System, Sherry Brook System, Hanna Lake System, Blind Pond Avenue System, Thirteen Mile Run System, Flynn Lake Outfall System, Silver Lake Outfall System, 149th Avenue Outfall System, and Bruce B. Downs System.

Topography varies from a high of 75 feet National Geodetic Vertical Datum (NGVD) in the northwestern portion of the watershed to a low of 25 feet NGVD at its outfall at the Hillsborough River. Land uses within the watershed boundaries are diverse and include large wetland/lake areas, major and minor roadways, old residential subdivisions with little or no stormwater management systems, and some agricultural activities. Flooding in several areas of the watershed was reported during the El NiZo rainfall events during late 1997 and early 1998.

The Cypress Creek Watershed is approximately 20,922 acres in size and is comprised of urban and developed (approximately 4668 acres), agricultural (914 acres), pasture (approximately 1760 acres), recreation (approximately 47 acres), open and disturbed land (approximately 1186 acres), transportation (approximately 810 acres) and natural (approximately 11749 acres) areas. The majority of the area west of I-275 is residential. The southern half of the section of Cypress Creek Watershed located between I-75 and I-275, along Bruce B. Downs Boulevard, contains an area known as the Tampa Palms region. In the Tampa Palms region, uplands are rapidly being developed with houses and commercial businesses. The northern half of the section of Cypress Creek Watershed located between I-275 and I-75 is primarily undeveloped and has retained its somewhat natural state. Hillsborough County has bought approximately 1517 acres of this section of the Cypress Creek Watershed through the Environmental Land Acquisition Protection Program (ELAPP). This area includes land located between I-75 and I-275 and land located directly east of I-275. Approximately 75% of the lands acquired by the County consist of forested wetland, while the remaining 25% are upland.

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Several state and federal listed threatened and endangered species occur in the Cypress Creek Watershed including: Southern three-awned grass (*Aristida simpliciflora*), Tampa vervain (*Glandularia tampensis*), woodstork (*Mycteria americana*), eastern indigo snake (*Drymachon corais couperi*), short-tailed snake (*Stilosoma extenuatum*), Florida sandhill crane (*Grus canadensis pratensis*) and bald eagles (*Haliaeetus leucocephalus*) auricled spleenwort (*Asplenium auritum),* hand fern (*Chionanthus pygmaeus),* chaffseed (*Schwalbea americana),* broad-leaved nodding-caps (*Triphora latifolia),* wild coco (*Pteroglossaspis ecristata*), rain lilly (*Zephyranthes simpsonii),* and South American kestrel (*Falco sparverius paulus).*

One purpose of the study was to develop a computer simulation model of the Cypress Creek watershed under current conditions. Runoff parameters for the watershed were developed from land use, soils and topographic maps. Hydraulic input data for the County SWMM stormwater model was developed from survey data, topographic maps and permit data. The model was calibrated to historical storm events to ensure the accuracy of the model. The calibrated model was then used to calculate the location and degree of flooding within the watershed for the 2.33-year, 5-year, 10-year, 25-year, 50-year and 100-year design storm events. The model was then used to determine the level of service based on County criteria for the watershed.

Pollutant loads for several selected pollutants (chemicals, parameters) were estimated using the Hillsborough County supplied spreadsheet model, the Pollutant loading and Removal Model (PLRM). Pollutants considered include 12 parameters: BOD, TSS, oil/grease, TN, Nox, TKN, TP, TDP, Cd, Cu, Pb, and Zn. The water quality level of service (LOS) was calculated by comparing the actual net load to the load for a low-density single family residential land use without treatment of the same areas. Five levels of LOSs were considered (A, B, C, D, and F). Depending upon the difference in these loads, LOS designation ranging from A through F was determined for each subbasin in the watershed.

Upon completion of the existing conditions analysis, an analysis of alternatives to reduce flooding, water quality, and natural systems problems was performed. Many projects were recommended for the Cypress Creek Watershed to address flood control and water quality/ natural system improvements. The construction or implementation of the these projects will be dependant on funding availability, right-of-way availability, permitting, and other related issues.

Hillsborough County has taken a positive step forward in the implementation of the recommended projects by coordinating the alternatives with SWFWMD and HCEPC and by obtaining public input by holding three public meetings throughout the development of the watershed management plan.

The listing of final recommended projects in the Cypress Creek watershed include:

- Cleanup 149th Street ditch between Livingston Ave. and 149th Street outfall detention basin. Cleanup Lake Forest ditches from B.B. Downs Boulevard to Lake Forest Drive. Increase the weir width at the 149th Street detention pond from 79 feet to 150 feet. Construct new weir structure north of Lake Forest Avenue pond. Estimated cost $44,560.

EXECUTIVE SUMMARY

- Construct Hillsborough County projects: CIP 47005, CIP 47117, CIP 47251 and CIP 47014.

- Construct new storm sewer system from 18th Street/143rd Avenue to the existing storm sewer along 143rd Avenue. Upgrade existing storm sewer system on 143rd Avenue from 20th Street to existing ditch east of 22nd Street. Upgrade ditch from east of 22nd Street to B.B. Downs Boulevard. Upgrade existing pipes which cross from west to east and then from south to north under B.B. Downs Boulevard. Estimated cost $2,065,090.

- Construct Hillsborough County projects: CIP 47137 and CIP 47251.

- Improve Flynn Lake outfall to two existing cross drains (STR-3 and STR-6) at Livingston Ave. Construct ditch from Flynn Lake to these two cross drains. Upgrade cross drains sizes at STR-3 and STR-6 at Livingston Ave. Improve outfall from the cross drains to Cypress Creek. Estimated cost $91,410.

- Improve ditch to connect from Blind Pond sub-division to Clement Road roadside ditch. Construct ditch to connect to existing cross drain at Livingston Avenue (STR-15). Estimated cost $56,100.

- Regrade existing ditch at northside of the basin. Construct roadside ditch along Wein Range Lane. Connect the roadside ditch of Wein Range Lane to north swale through existing low area. Replace crushed pipe at Livingston Ave. (STR-19). Estimated cost $65,970.

- Construct roadside ditch from the intersection of Newburger Road and Livingston Ave. to connect to the existing cross drain (STR-38). Increase culvert size of STR-38. Estimated cost $41,140.

- Construct a positive outfall from Newburger Road to the pond/wetland in Rhodes Wood Acre subdivision. Install a 30-inch cross drain, two ditch bottom inlets, and pipes at Newburger Road. Convey stormwater to wetland south of Newburger Road. Estimated cost $29,300.

- Construct 400 feet of force main from Hog Island Lake west to Lake Kell. Use portable pump unit to release extra water to Lake Kell. Upgrade the existing culvert at County Line Road at Basin 541140. Coordinate with Pasco County to improve Hog Island Lake outflow through Willow Bend Subdivision culverts. Estimated cost $32,190.

- Remove invasive species located throughout Cypress Creek Basin in ditches and along right-of-ways (e.g. cogongrass along right-of-ways, skunkvine and air potato in ditches). Continue public education on the importance of controlling invasive species in yards. Cost will vary.

- Utilize grassed swales or detention areas where feasible, for water quality treatment for proposed CIP projects.

EXECUTIVE SUMMARY

- Coordinate with Pasco County to improve water quality from areas coming into Hillsborough County from Pasco County and the City of Tampa.

- Regrade, stabilize and vegetate the channel banks and keep cattle out of the channel by fencing at outfall channels east of Livingston Avenue and south of Max Smith Road and Clement Road. Construct energy dissipaters or riprap to reduce velocities from Livingston Avenue culverts. Estimated cost $ 127,000.

Several general recommendations can also be made regarding the Cypress Creek Watershed which include:

- It is recommended that the existing conditions model be updated with as-built information as improvements are constructed within the watershed.

- Hillsborough County should periodically review and update the watershed plan to reflect new development conditions and to identify potential new areas of concern from a flood control, water quality and natural systems perspective.

- It is recommended that maintenance activities be integrated into the GIS database of the watershed. This would include maintenance problem areas, frequency of maintenance inspections, and maintenance activities.

- Regulatory agencies such as SWFWMD, USACOE, FDEP, FDOT and the City of Tampa should be advised of the availability of the watershed management plan for future project review and implementation.

- Hillsborough County should provide the Cypress Creek Watershed Management Plan on the County website to provide consultants, agencies and the public with access to the study.

CHAPTER ONE Introduction

1.1 OVERVIEW

The Cypress Creek Watershed lies in the northern portion of Hillsborough County. The watershed area can be classified as rural and encompasses approximately 33 square miles or about 21,000 acres within Hillsborough County. The total Cypress Creek Watershed including areas within Pasco and Hillsborough Counties is approximately 160 square miles. The watershed includes ten outfalls that discharge into the Cypress Creek main channel which flows into the Hillsborough River. The Cypress Creek drainage area is generally bordered by I-75 on the east, U.S. 41 on the west, Pasco County on the north, and Bruce B. Downs Blvd. (S.R. 581) on the south. The location of the CCW is shown on Figure 1-1.

The climate in the watershed, and for Hillsborough County in general, can be characterized as subtropical. The average annual rainfall is approximately 50 inches. The wet season is approximately four months long during the summer, usually beginning in June and ending in September. The summer is generally hot and humid with daily high temperatures in the low 90's. Afternoon thunderstorms of high intensity and short duration are common during the wet season. The majority of the basin's soils are designated as well drained by the classification system developed by the United States Soil Conservation Service (SCS). The CCW is contained within the Polk Upland portion of the Mid-peninsular Zone, which is one of the three geomorphic divisions of Florida (White, 1970).

Land uses within the watershed boundaries are diverse and include large wetland/lake areas, major and minor roadways, residential subdivisions and some agricultural activities. Given the nature of the area, not many land use changes will be anticipated for the future. Any changes will center primarily around the conversion of the remaining amount of agricultural areas in the northwest portion of the watershed into mixed urban residential and commercial uses.

1.2 PROJECT OBJECTIVES

The objectives of this study are to develop an existing condition model for the CCW and to develop a Watershed Management Plan. This plan shows Level-of-Service analysis for existing flood conditions, water quality, and evaluates potential improvements for these Levels-of-Service.

The scope of the project includes establishing the existing conditions for the CCW stormwater management infrastructure in terms of computed water surface elevations and discharge rates. A computer model of the major physical characteristics of the stormwater conveyance/storage system has been developed to determine the existing conditions for the 2.33-year, 5-year, 10-year, 25-year, 50-year and 100-year design storm events.

Water surface profiles showing computed water surface elevations in the major conveyance systems for CCW have been included. Computed water surface elevations in channels and/or waterways are frequently slightly higher than the expected flood elevations at adjacent or offline sites due to the inclusion of conservative entrance and exit headloss within the drainage system. There is frequently a significant gradient between the computed data point and the remote site.

Water surface elevations at points outside the immediate flood plain of a channel where computed water surface elevations are reported should be evaluated by a registered professional engineer before being used for design or construction purposes which may require more detailed hydraulic analysis.

Based on the results of the existing conditions 25-year design storm event, there are several areas of focus for recommended improvements. These improvements may include structural upgrades and non-structural improvements. All of these efforts will lead to achievement of the Level-of-Service (LOS), Level B in the Cypress Creek Area, (a 25-year/24-hour event).

CHAPTER TWO Watershed Description

2.1 OVERVIEW

The CCW drains an area of approximately 33 square miles or 21,000 acres in northern Hillsborough County. The Watershed is primarily suburban, and drains into the Hillsborough River. The basin is roughly bounded on its north side by the Pasco County, to its east side by I-75, along its south side by Bruce B. Downs Boulevard and on its west side by U.S. 41. Additionally, several major roads, including Livingston Avenue, Sunset Lane, Hanna Road, Debuel Road, Whitaker Road, and Sinclair Hills Road bisect the watershed. The Basin, shown in **Figure 2-1**, is composed of 105 smaller units or sub-basins ranging in size from approximately 10 to 400 acres. Topography varies from a high of 75 feet National Geodetic Vertical Datum (NGVD) in the northwestern portion of the watershed to a low of 25 feet NGVD at its outfall at the Hillsborough River. **Figure 2-2** presents the basin topography.

2.2 CLIMATE

The climate of the CCW, and for Hillsborough County as a whole, can be classified as humid subtropical. Annual average precipitation is around 52 inches and almost 60% of this total falls during the four-month rainy season that extends from June through September. This time frame coincides with the occurrence of most tropical storms and hurricanes and the conditions are ripe for regular, convective afternoon and evening thunderstorms. These summer events, which can be very localized, are highly variable in both intensity and volume. The larger, normal summer storm events and those associated with tropical systems can cause flooding problems in areas where there are deficiencies in existing stormwater systems.

Winter rainfalls is, historically, relatively light and is generally associated with the weak cold fronts that descend from the northern part of the country and travel south through the region. However, in late 1997 and early 1998, some of the largest rain events occurred in the winter months, and this is especially true in El NiZo years.

The annual mean temperature in Hillsborough County is about 72/F (Fahrenheit). The mean monthly temperature ranges from a low of approximately 60/F in January to a high of approximately 82/F in August. Typically, summer temperatures range from morning lows in the high 70's and low 80's to afternoon highs that routinely reach into the mid-90's, but rarely do they exceed 100/F. Summer humidity that ranges into the mid to upper 90's can further exacerbate the situation. Conversely, typical winter low temperatures generally range above freezing into the 40's; only occasionally dropping into the low 20's and teens. High temperatures generally reach into the upper 60's or low 70's for most of the season, especially between passages of the cold fronts.

According to the National Weather Service in Ruskin, humidity does not vary as seasonally as temperature and rainfall. The Service keeps daily records for 1 and 7 o'clock A.M. and 1 and 7 o'clock P.M. The 7 A.M. time period generally records the highest humidity with the annual average at 88% with the 1 P.M. time period recording the lowest at an average of 58%.

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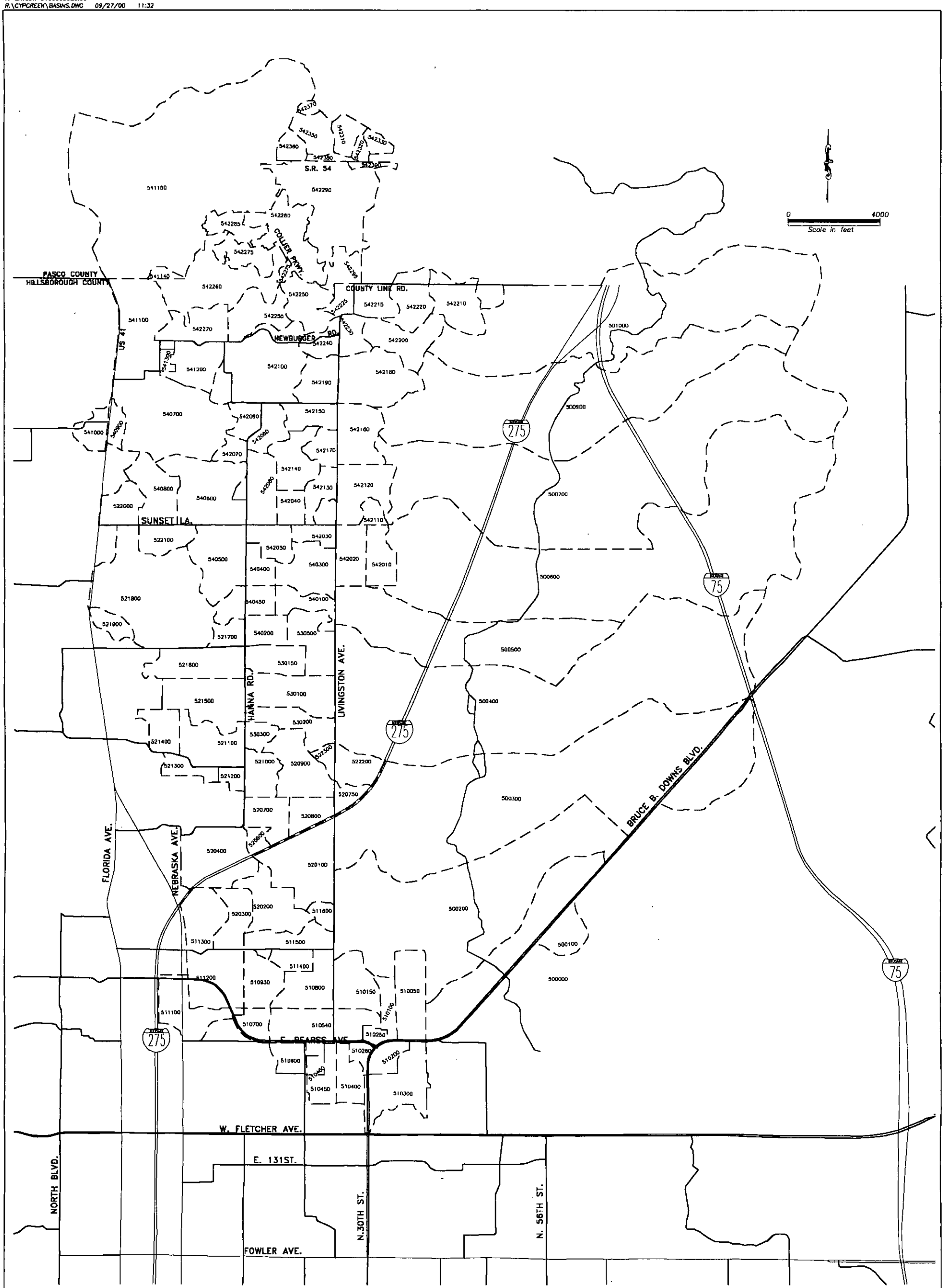
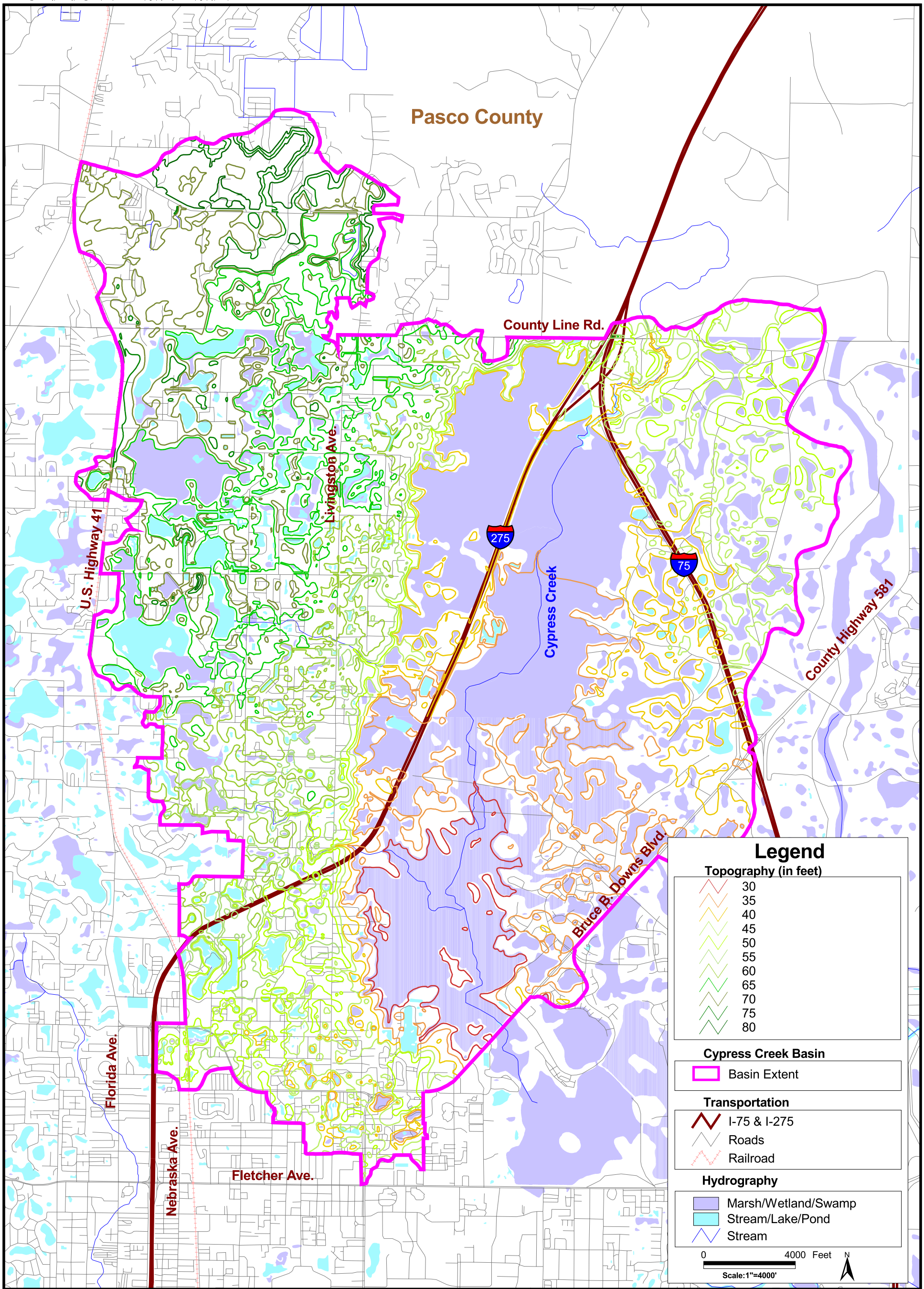


Cypress Creek
Watershed Management Plan

AREA MAP

Figure 2-1



Hillsborough County Florida

Cypress Creek Watershed Management Plan

URS Greiner Woodward Clyde

Topography

Figure 2-2

Date:09/28/00

Evapotranspiration rates vary, and limited data are available for analysis. Estimates of 39 inches per year have been reported. Viessman, et al. (1977) reports the figure to be closer to 48 inches per year. Lake evaporation data often quoted for use in Hillsborough County are those reported from Lake Alfred in Polk County, supplemented by scattered data available from the Lake Padgett weather station. Studies conducted by Tampa Bay Water estimate the lake evaporation rate to average approximately 56 inches per year in the study area.

2.3 SOILS

Soil distribution by type is shown in **Figure 2-3**. This information was developed based on Geographical Information Systems (GIS) coverages developed by SWFWMD. Much useful information, such as drainage classification, percent slope, water table depth, permeability, natural vegetation and potential uses for development and agriculture, can be obtained by consulting the SCS Manual for Hillsborough County for each particular soil type.

These soil types can be arranged into four groups based on their runoff-potential; these types are shown in **Figure 2-4**. The hydrologic groups are commonly used in watershed planning to estimate infiltration rates and moisture capacity. Soil properties that influence the minimum rate of infiltration obtained for a bare soil after prolonged wetting are: a) depth to seasonally high water table, b) intake rate and permeability, and c) depth to a layer or layers that slow or impede water movement. The major soil hydrologic groups are:

- Group A (low runoff potential) soils have high infiltration rates and a high rate of water transmission even when thoroughly wetted. They have typical infiltration rates of 10 in./hr when dry and 0.50 in./hr when saturated. Soil types found in the CCW that fall into this group include the Candler fine sands, Orsino fine sand, and the Tavares-Millhopper fine sands.

- Group B (moderately runoff potential) soils have moderate infiltration rates when thoroughly wetted and a moderate rate of water transmission. They have typical infiltration rates of 8 in./hr when dry and 0.40 in./hr when saturated.

- Group C (moderately high runoff potential) soils have low infiltration rates when thoroughly wetted and a low rate of water transmission. They have typical infiltration rates of 5 in./hr when dry and 0.25 in./hr when saturated. Soil types found in the CCW that fall into this group includes Seffner fine sand, and Zolfo fine sand.

- Group D (high runoff potential) soils have very slow infiltration rates when thoroughly wetted and a very low rate of water transmission. They have typical infiltration rates of 3 in./hr when dry and 0. 10 in./hr when saturated. Soil types found in the CCW that fall within this group include Basinger, Holopaw and Samsula, Chobee muck.

Legend

Soils

- Adamsville fine sand
- Archbold fine sand
- Arents, nearly level
- Basinger, Holopaw, Samsula
- Broward-Urban land complex
- Candler fine sand 0-5% slope
- Candler fine sand 5-12% slope
- Candler-Urban land complex
- Chobee loamy fine sand
- Chobee muck, depress.
- Chobee sandy loam
- Eaton fine sand
- Eaton mucky sand
- Felda fine sand
- Felda fine sand
- Floridana fine sand
- Ft. Meade loamy fine sand
- Gainesville loamy fine sand
- Gypsum land
- Immokalee fine sand
- Immokalee-Urban land complex
- Kendrick fine sand
- Kesson muck
- Lake fine sand
- Lochloosa-Micanopy fine sands
- Malabar fine sand
- Myakka fine sand
- Myakka fine sand, freq. flooded
- Myakka-Urban land complex
- Ona fine sand
- Orlando fine sand
- Orsino fine sand
- Paisley fine sand
- Pinellas fine sand
- Arents, very steep
- Pomello fine sand
- Pomello-Urban land complex
- Quartzipsamments
- St. Augustine fine sand
- St Augustine-Urban land complex
- St Johns fine sand
- Seffner fine sand
- Slickens
- Haplaquents
- Smyrna fine sand
- Tavares-Millhopper fine sands 0-5% slope
- Tavares-Millhopper fine sands 5-8% slope
- Urban land
- Wabasso fine sand
- Wabasso-Urban land complex
- Winder fine sand
- Winder fine sand, freq. flooded
- Zolfo fine sand
- Water

Pasco County

County Line Rd.

U.S. Highway 41

Livingston Ave.

275

75

Cypress Creek

County Highway 581

Bruce B. Downs Blvd.

Florida Ave.

Nebraska Ave.

Fletcher Ave.

Legend

Cypress Creek Basin

- Basin Extent

Transportation

- I-75 & I-275
- Roads
- Railroad

Hydrography

- Stream

0 4000 Feet N

Scale:1"=4000'

Hillsborough County Florida

Cypress Creek Watershed Management Plan

URS Greiner Woodward Clyde

Soil Classification Map

Figure 2-3

Date:09/28/00

Pasco County

County Line Rd.

Livingston Ave.

U.S. Highway 41

275

75

Cypress Creek

County Highway 581

Bruce B. Downs Blvd.

Florida Ave.

Nebraska Ave.

Fletcher Ave.

Legend

Hydrologic Soils Group

- A
- B/D
- C
- D
- W

Cypress Creek Basin

- Basin Extent

Transportation

- I-75 & I-275
- Roads
- Railroad

Hydrography

- Stream

0 4000 Feet N

Scale:1"=4000'

Hillsborough County Florida

Cypress Creek Watershed Management Plan

URS Greiner Woodward Clyde

Hydrologic Soils Group

Figure 2-4

Date:09/28/00

- Dual classifications (e.g. A/D or B/D) can be assigned to soils that exhibit substantially different hydrologic characteristics during the wet and dry seasons. During the wet season, these soils become saturated throughout much of the soil column due to elevated water table conditions. Infiltration is thus impeded and the soils exhibit Group D infiltration and runoff rates. During the dry season when the water levels recede, infiltration rates increase and runoff rates decline to Group A or Group B levels. Soil types that fall within the B/D classification found within the CCW are Chobee loamy fine sand, Felda fine sand, Floridana fine sand, Immokalee fine sand, Malabar fine sand, Myakka fine sand, Myakka-Urban land complex, Ona fine sand, St. Johns fine sand, Wabasso-Urban land complex and Winder fine sand.

Soils can also be classified as either hydric or non-hydric, which relates to whether the soils had wetland or upland origins, respectively. Those soils designated as hydric develop under anaerobic conditions in wetland areas and generally contain a large amount of organics, are poorly to very poorly drained or depressional in nature, and are associated with a high seasonal water table. Those soils, which are non-hydric, lack these characteristics and are associated with upland or transitional areas. Soil types with the hydric classification found within the CCW are Basinger, Holopaw and Samsula, Chobee loamy fine sand, Chobee muck, Eaton mucky sand, Felda fine sand, Floridana fine sand, Malabar fine sand, St. Johns fine sand and Winder fine sand. All of the other types would be considered non-hydric.

2.4 PHYSIOGRAPHY AND HYDROLOGY

The CCW lies within the Polk Upland physiographic unit as defined by White. This unit is part of the Central or Mid-Peninsular physiographic zone, one of three in Florida. This zone is characterized by discontinuous highlands formed by sub-parallel ridges that are separated by broad valleys. Land elevations in the CCW vary between a high of about 75 feet NGVD in the northwest portions of the watershed to a low of around 25 feet NGVD at the Cypress Creek outfall to the Hillsborough River. These elevations are shown on **Figure 2-2**. The watershed has twelve major outfalls. These include the Cypress Creek Main Channel, County Line Drainage System, Country Oaks System, Ridge Lake System, Sherry Brook System, Hanna Lake System, Blind Pond Avenue System, Thirteen Mile Run System, Flynn Lake System, Silver Lake System, 149th Street Outfall System, and Bruce B. Downs System. The County Line Drainage System outfalls north to Pasco County and then drains east to Cypress Creek and includes Hog Island and Hart Lake. The remainder of the outfalls discharge west to east to the Cypress Creek main channel floodplain. These systems in conjunction handle the majority of the stormwater conveyance within the watershed.

There are many lakes, wetland areas and depressions located within the watershed. The numerous lakes and other depressional features in the area have been formed by sinkhole formation and other processes associated with the dissolution of the underlying limestone formations. Small lakes tend to be round, the most common expression of a sinkhole or solution

feature. Larger lakes usually are formed by the coalescence of several or many solution features and do not express a characteristic shape.

Surface flows are generally from the west to the east or southeast toward the Cypress Creek Main channel. The Cypress Creek Main channel flows north to south from Pasco County to the Hillsborough County. Hydrologically, surface flows originate for the most part through stormwater runoff with some influence from groundwater flows from lake seepage.

2.5 GEOLOGY AND HYDROGEOLOGY

The area is underlain by a thick sequence of sedimentary strata divided into an upper zone of unconsolidated sediments and lower zone of consolidated carbonate rock.

At land surface, undifferentiated sediments including silt, sand, and clay form surficial deposits which vary in thickness from less than 10 feet in coastal areas to over 100 feet in paleokarst depression or in sand ridges. Typical thickness of the surficial deposits varies from 20-to 50 feet. In low-lying areas near lakes and streams, thin layers of organic material mix with the surficial deposits. Pleistocene-aged silts and clays form the base of the undifferentiated sediments.

Underlying the unconsolidated material is a series of Tertiary-aged limestones and dolomites that form the carbonate platform of peninsular Florida. The sequence of carbonate rocks includes, in descending order, the following formations: Tampa Member of the Hawthorn Group, Suwannee Limestone, Ocala Group, Avon Park, Oldsmar, and Cedar Key Formations. A lithographic change from limestone and dolomite to a sequence of gypsiferous dolomite begins in the lower portion of the Avon Park Formation and continues into the Oldsmar and Cedar Key Formations. The top of this lithologic change marks the middle confining unit of the Floridan aquifer system. The middle confining unit is generally considered the base of the freshwater production zone of the Upper Floridan aquifer.

The Tampa Member of the Hawthorn Group is a tan-colored carbonate and sand mixture, which can contain variable amounts of clay. The Tampa Member can be fossiliferous and may also contain phosphate grains and chert. The Tampa Member ranges from 50 to 150 feet in thickness. The Suwannee Limestone consists of two rock types; the upper portion is a tan-colored, crystalline limestone containing prominent gastropod and pelecypod molds, and the lower portion is a cream-colored limestone containing foraminifers and pellets of micrite in a finely crystalline limestone matrix. The Suwannee Limestone varies from 150 to 300 feet in thickness.

The Ocala Group contains a series of limestones that are generally soft, friable, porous and fossiliferous. This unit is late Eocene in age and ranges in thickness from 90 to 300 feet. The Avon Park Formation comprises brown, highly fossiliferous, soft to well-indurated, chalky limestone and a gray to brown, very fine microcrystalline dolomite. The Avon Park Formation ranges from 300 to 500 feet in thickness.

The hydrogeologic flow system of the Tampa Bay region contains two distinct groundwater reservoirs: the unconfined surficial aquifer and the semi-confined Upper Floridan aquifer. The Upper Floridan aquifer is under water table conditions in areas where the clay confining layer is discontinuous or absent. A general hydrogeologic cross-section of the Tampa Bay region is shown in **Figure 2-5**.

Surficial Aquifer

The surficial aquifer is comprised primarily of unconsolidated deposits of fine-grained sand with an average thickness of 30 feet. Due to the karst geology of the region, thickness of the sand is highly variable. The depth of the water table ranges from near land surface to several tens of feet below land surface. Water table elevation is primarily influenced by rainfall; annual highs n most years occur during the end of the wet season (in Sept.- Oct.), and annual lows occur near the end of the dry season (in May-June). The direction of groundwater flow varies locally and is significantly influenced by the topography of the land surface. The hydraulic gradient (change of elevation per unit length) in the area typically ranges from a few feet per mile to about ten feet per mile. The permeability of the surficial aquifer is generally low and water withdrawn from this aquifer is used most often for lawn irrigation and watering livestock. Surficial aquifer wells typically yield less than 20 gallons per minute.

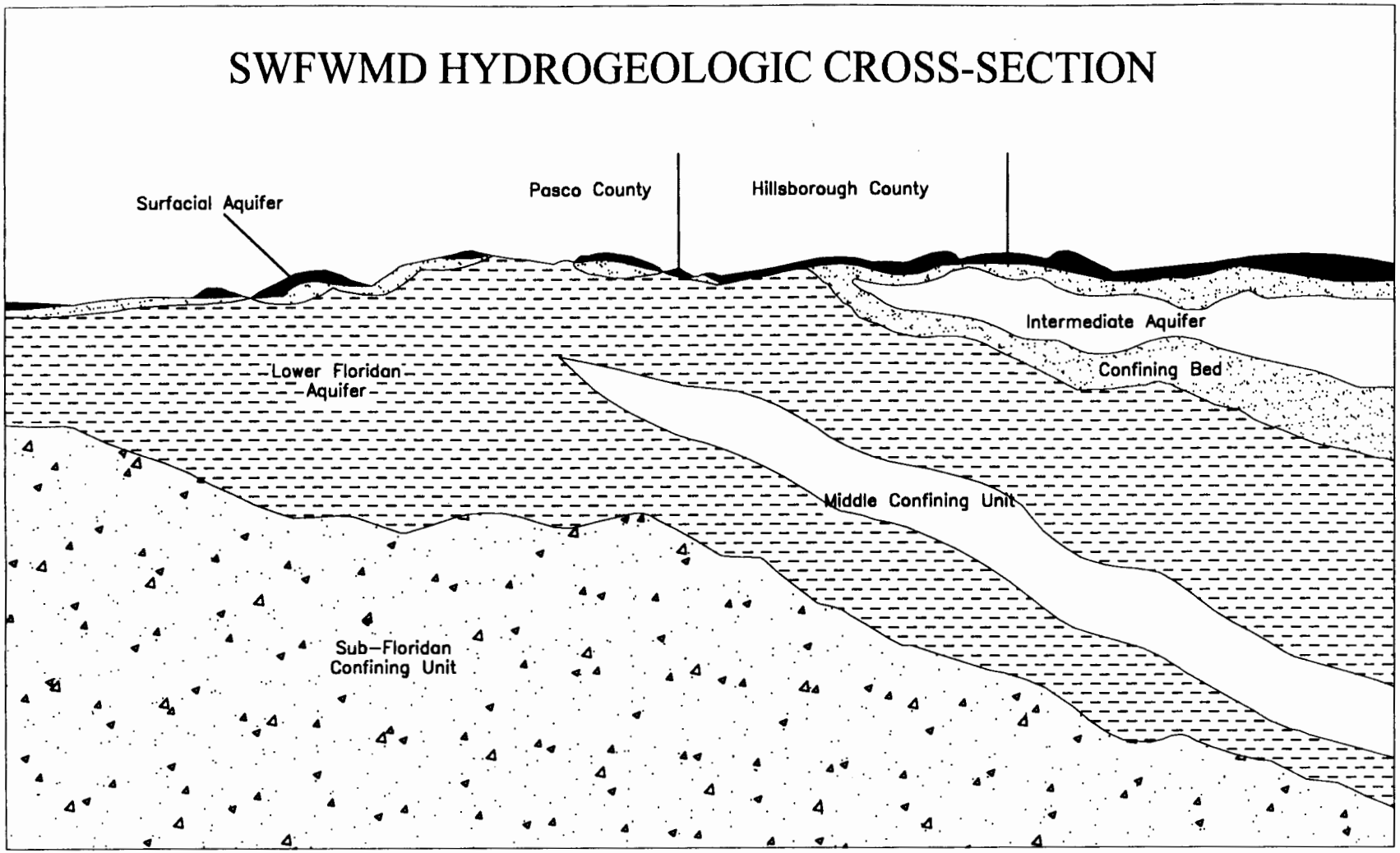
Semi-Confining Zone

Below the surficial aquifer is a semi-confining unit comprised of clay, silt and sandy clay that somewhat retards the movement of water between the overlying surficial aquifer and the underlying Floridan Aquifer. The confining materials are comprised of blue-green to gray, plastic, sandy clay and clay. The upper portion of the Arcadia Formation (Hawthorn Group) typically forms the semi-confining layer.

Leakage from the surficial aquifer into the Floridan aquifer occurs by infiltration across the semi-confining layer or through fractures or secondary openings in the semi-confining unit caused by chemical dissolution of the underlying limestone. Due to the highly karstic nature of the geologic system, the clay semi-confining layer can be absent in one area but tens of feet thick a short distance away. These localized karst features, in which the clay semi-confining layer is breached or missing, significantly increases hydraulic connection between the two aquifers (Hancock and Smith 1996).

Upper Floridan Aquifer

The Upper Floridan aquifer consists of a continuous series of carbonate units that include portions of the Tamar Member of the Hawthorn Group, Suwannee Limestone, Ocala Limestone and Avon Park Formation. Groundwater within the Upper Floridan aquifer is typically under artesian conditions within the project area.



Cypress Creek Watershed Management Plan

URS Greiner Woodward Clyde

SWFWMD HYDROGEOLOGIC CROSS-SECTION

Figure 2-5

Date: 12/10/99

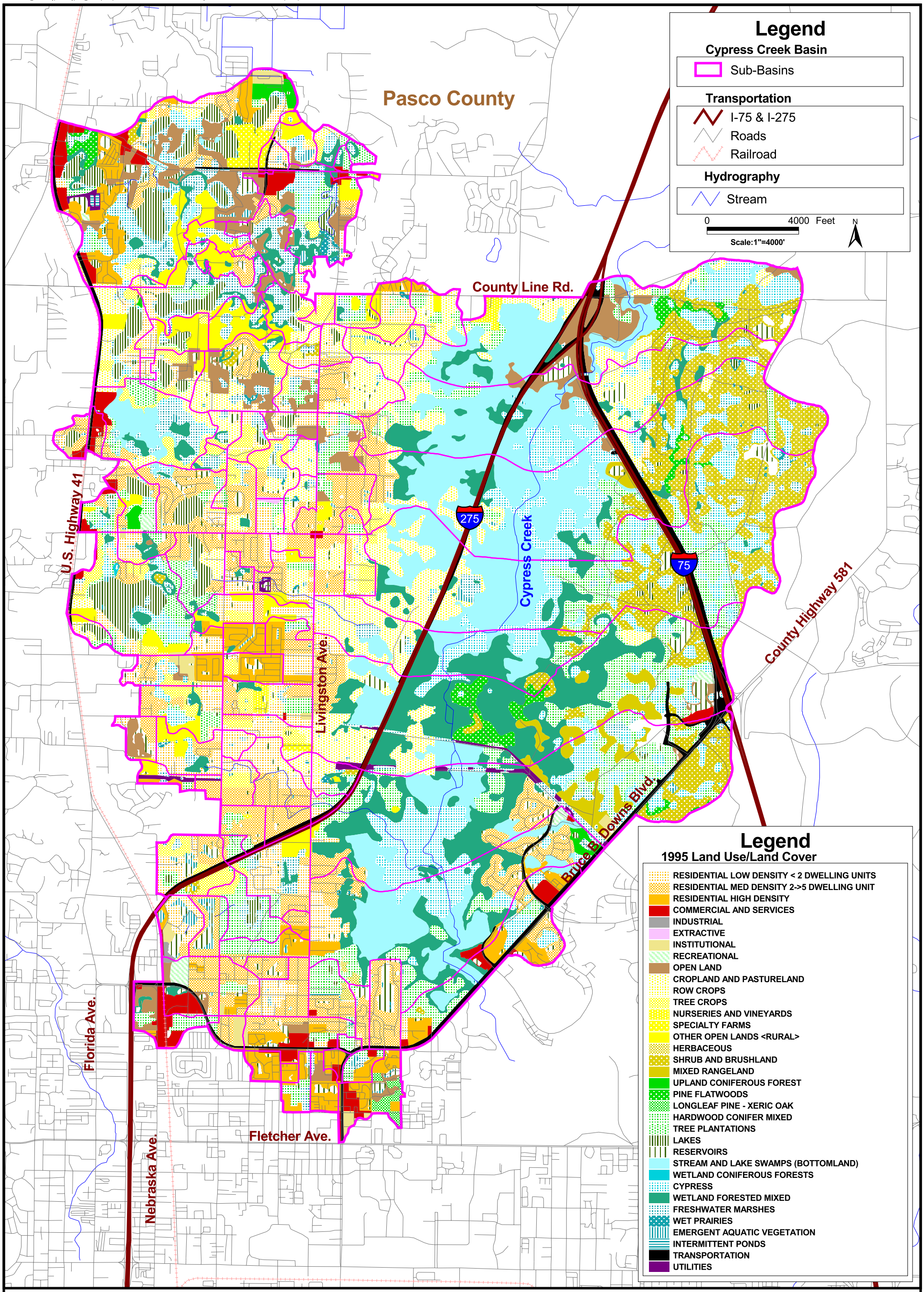
Near the base of the Avon Park Formation lies the middle confining unit of the Floridan aquifer, an evaporate sequence of very low permeability that is composed of gypsiferous dolomite and dolomitic limestone. The middle confining unit generally delineates the boundary between the freshwater Upper Floridan aquifer and the brine-saturated Lower Floridan aquifer. The evaporites function as a lower confining unit and retard vertical flow across the boundary. In general, the permeability of the Upper Floridan aquifer is moderate in the Tampa Member and Suwannee Limestone, low in the Ocala Limestone and very high in portions of the Avon Park Formation. The limestone and dolomite beds produce significant quantities of water due largely to numerous solution openings along bedding planes and fractures. The Ocala Limestone yields limited amounts of water and may be considered a semi-confining layer within the Upper Floridan aquifer. Overall, the Ocala Limestone tends to act as a semi-confining zone between the overlying Tampa/Suwannee Formations and the underlying Avon Park Formation. Transmissivity of the Avon Park Formation is very high due to the fractured nature of the dolomite zones.

Ground water flow in the Floridan aquifer originates as rainfall that percolates downward from the surficial aquifer. In areas where the Upper Floridan aquifer outcrops, this recharge can be direct. Recharge rates are generally higher in the northern portion of the County. Recharge can be highly variable throughout the area, however, due to karst ecology and induced leakage caused by ground-water withdrawals. The regional hydraulic gradient and direction of flow in the Upper Floridan aquifer is generally toward the south and west.

2.6 EXISTING AND FUTURE LAND USE

Existing Land Uses

As stated previously, the CCW encompasses a wide variety of land uses. The Southwest Florida Water Management District's 1995 Land Use/Land Cover Map is shown in **Figure 2-6**. Additional existing land use information provided by the County's Property Appraiser's Office is illustrated in **Figure 2-7**. **Figure 2-8** shows the Planning Commission's projected land use for the year 2015. As shown in Figure **2-9**, there are only two vested projects and no Development of Regional Impact (DRI) projects within the watershed. There are several areas of Significant or Essential Upland Wildlife Habitat which exist within the watershed area which are associated with the Cypress Creek floodplain and other large lake and wetland areas. Residential areas are concentrated around many of the lakes with other subdivisions scattered throughout the western portion of the watershed. The majority of these residential areas tend to be older subdivisions with little or no stormwater treatment being provided.



Hillsborough County Florida

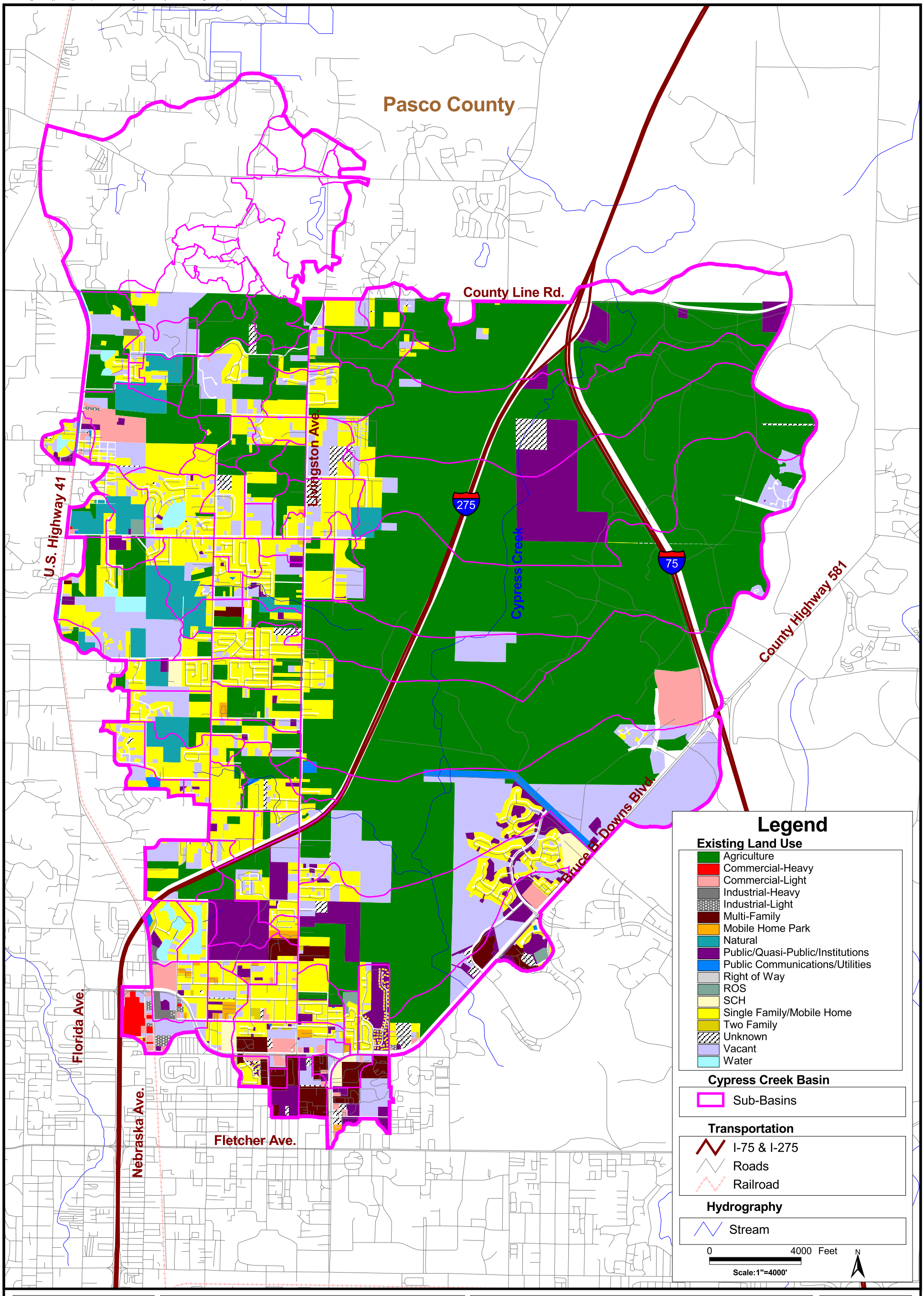
Cypress Creek Watershed Management Plan

URS Greiner Woodward Clyde

1995 Land Use/Land Cover

Figure 2-6

Date:09/28/00



Hillsborough County Florida

Cypress Creek Watershed Management Plan

URS Greiner Woodward Clyde

Existing Land Use

Figure 2-7

Date:09/28/00

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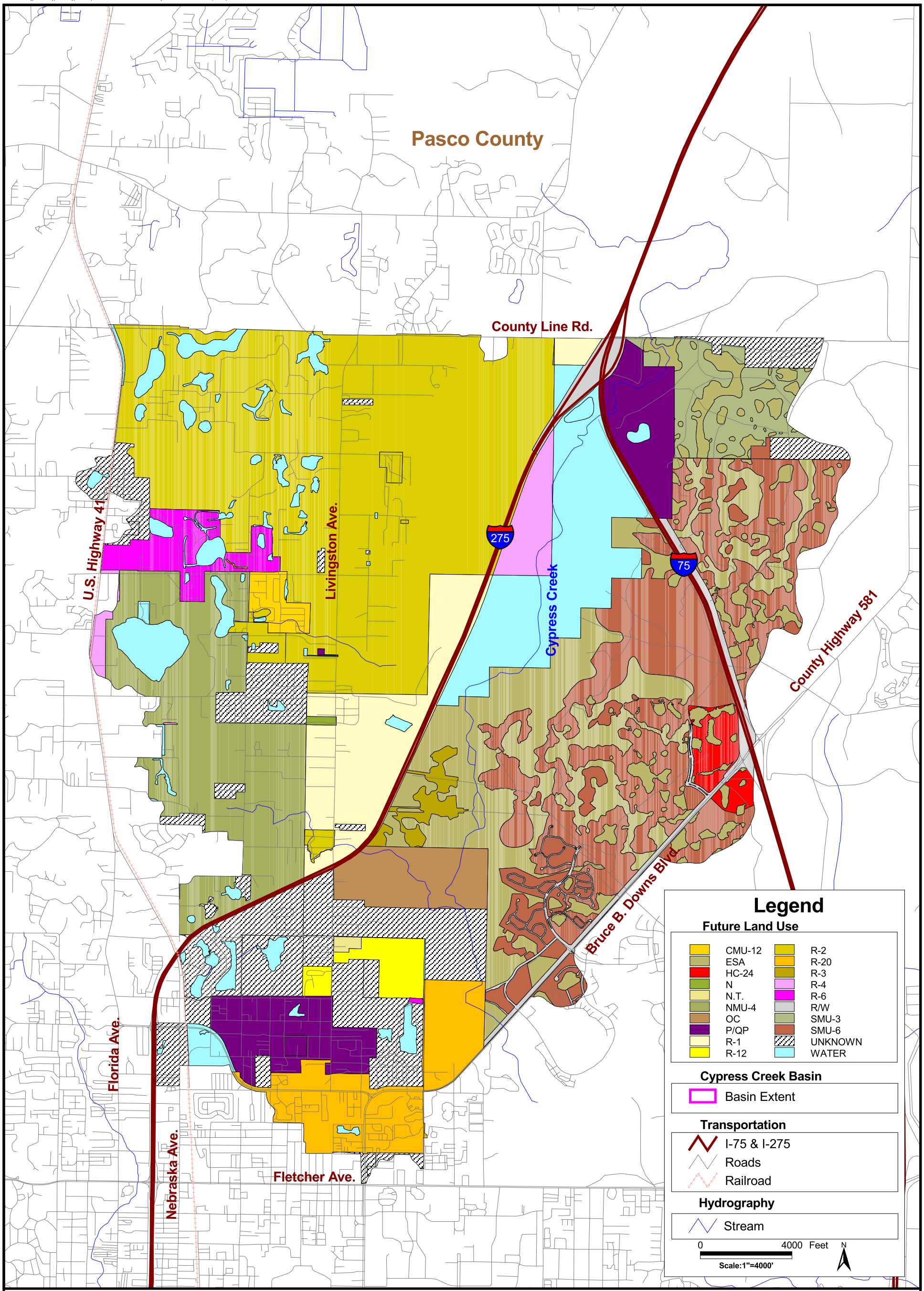

Hillsborough County Florida

Cypress Creek Watershed Management Plan

URS Greiner Woodward Clyde

Future Land Use

Figure 2-8

Date:12/08/99

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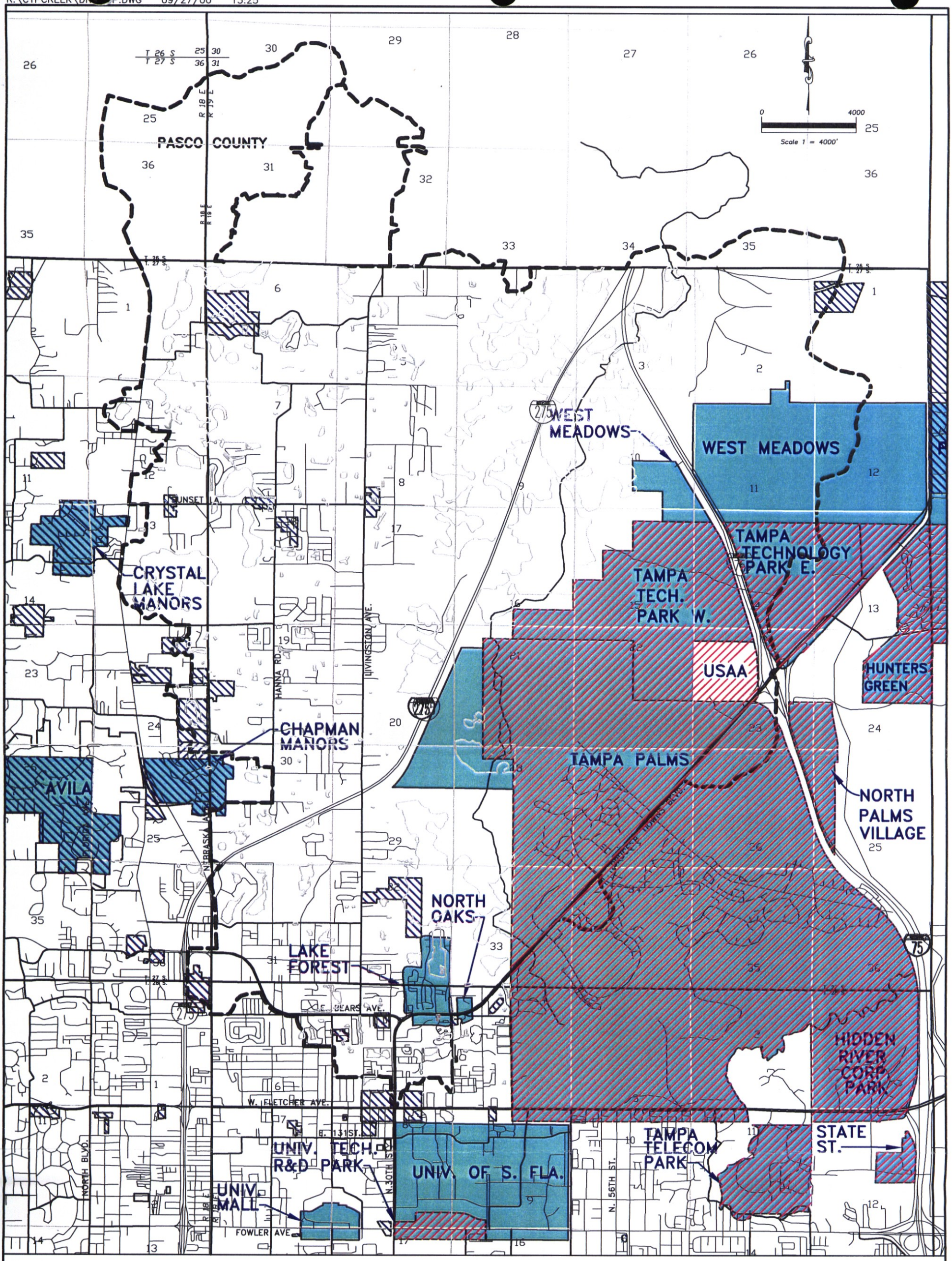

LEGEND

- Major Projects
- City DRI's
- Vested Projects (unincorporated areas) (100 acres & larger)

Hillsborough County Florida

Cypress Creek
Watershed Management Plan
URS Greiner Woodward Clyde

MAJOR PROJECTS, DRIs & VESTED PROJECTS

Figure 2-9

Date: 9-27-00

TABLE 2-1
EXISTING LAND USES (1995) - CYPRESS CREEK WATERSHED

LAND USE CATEGORY	TOTAL ACREAGE	PERCENT OF TOTAL
Low / Medium Density Residential	3,369.0	16.1
High Density Residential	788.9	3.8
Light Industrial	6.7	–0
Agricultural	3,026.1	14.5
Commercial	303.5	1.5
Institutional	98.4	0.5
Highway / Utility	644.1	3.2
Recreational	47.0	0.2
Open Land	2,431.7	11.6
Extractive (Mining) / Disturbed	5.3	–0
Upland Forested	2,179.2	10.4
Wetland Forested	3,602.5	17.2
Wetland Non-Forested	3,375.3	16.1
Water	1,023.4	4.9
TOTAL	20,901.1	100.0

Future Land Uses

Due to the large lake and wetland areas in the CCW, not many changes in land use are predicted by the Hillsborough County Comprehensive Plan. The majority of predicted changes will be in the western portion of the watershed as this largely agricultural area is changed over to a mixed urban use of residential and light commercial.

CHAPTER THREE Major Conveyance Systems

3.1 INTRODUCTION

This chapter contains a general description of the major conveyance systems in the Cypress Creek Watershed. The existing conditions system performance for the major conveyance systems is contained in Chapter 4.

The description of major conveyance systems in the Cypress Creek watershed has been segmented into discussion areas as follows:

- Cypress Creek Main Channel
- County Line Drainage System (Hillsborough/Pasco County Line)
- Country Oaks System
- Ridge Lake System
- Sherry Brook System
- Hanna Lake System
- Blind Pond Avenue System
- Thirteen Mile Run System
- Flynn Lake Outfall System
- Silver Lake Outfall System
- 149th Avenue Outfall System
- Bruce B. Downs System
- Cypress Creek Lake Chain

Each discussion area represents a distinct outfall, system, or lateral. The outfalls are listed from north to south within the watershed. **Figure 3-1** identifies locations of major outfalls, as well as other existing conditions features within the Cypress Creek project area.

3.2 CYPRESS CREEK MAIN CHANNEL

The Cypress Creek Main Channel is the largest tributary to the Hillsborough River. Flow originates from low sand hills and karst areas in Northern Pasco County and travels south through large wetland systems toward the Hillsborough River. The total Cypress Creek Watershed is approximately 160 square miles, and is mostly undeveloped or agricultural land. The portion of the watershed in Hillsborough County is approximately 33 square miles. Like many creek systems in the area, several reaches exhibit no flow during the dry season, but unlike most other creek systems, it is estimated that the Upper Floridan Aquifer contributes about 20 percent of the total flow of the creek in the middle reaches of the system (Cheery and others, 1970).

The Cypress Creek main channel enters northern Hillsborough County from Pasco County just north of the Interstate 75/275 interchange. The Creek channel then flows south along the east side of I-275 to SR 581 (Bruce B, Downs Boulevard). The channel continues to the south and joins the Hillsborough River. The channel is poorly defined throughout most of the area. The floodplain

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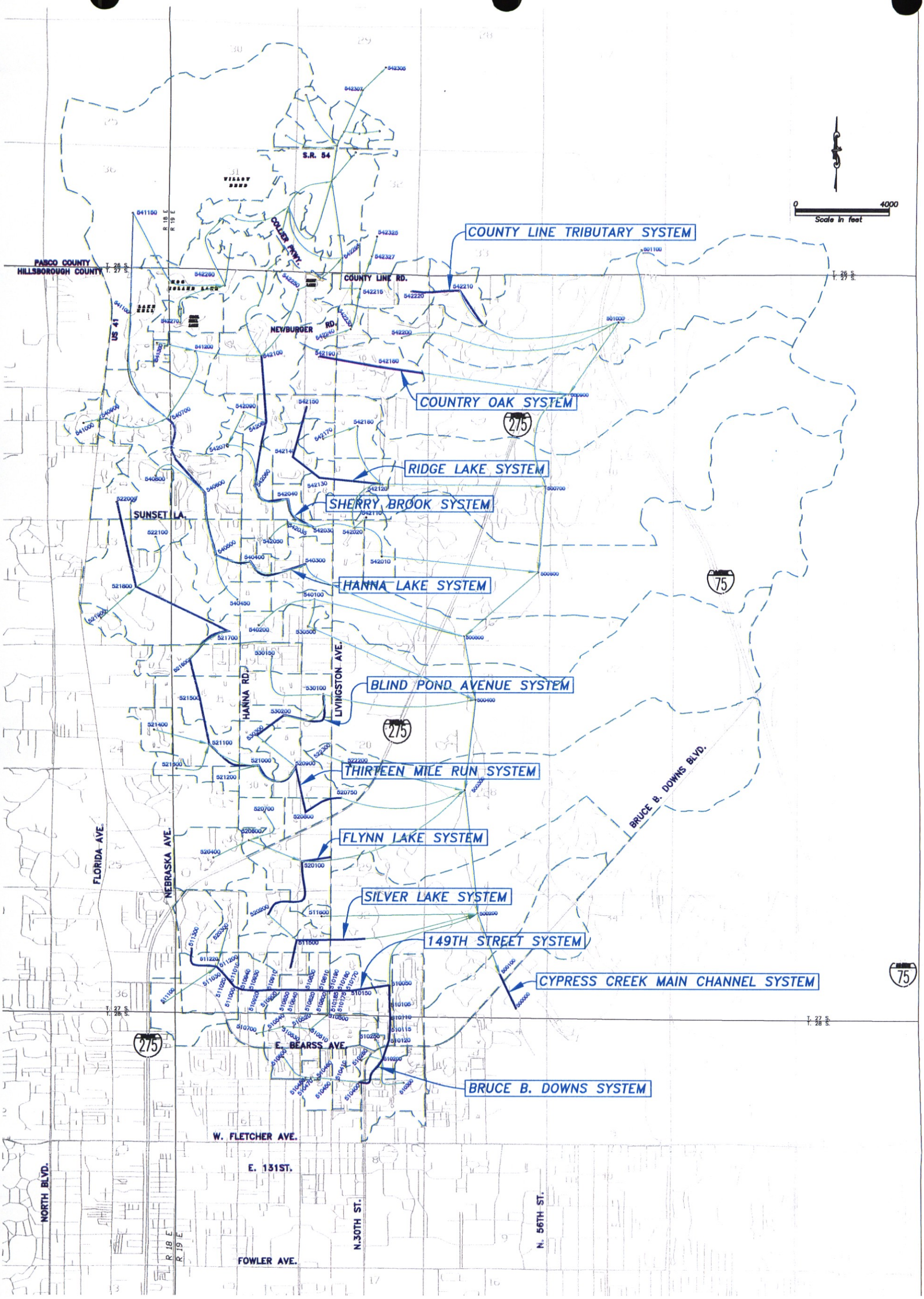

Hillsborough County Florida	**Cypress Creek Watershed Management Plan** *URS Greiner Woodward Clyde*	**MAJOR CONVEYANCE SYSTEM MAP**	**Figure 3-1** Date: 09-27-00

characteristics of Cypress Creek include large storage, wide overflow floodplains and small topographic relief.

There are several major cross drain structures along I-275 which connect the Cypress Creek floodplain on the east and west sides of I-275.

3.3 COUNTY LINE DRAINAGE SYSTEM

Several drainage basins adjacent to the Hillsborough/ Pasco County line drain directly to the Cypress Creek Main channel. Several other basins and Lakes in Hillsborough County drain north to Pasco County. The areas eventually flow to the east into Cypress Creek. These areas include Cool Kell Lake, Hog Island Lake, Hart Lake and several unnamed lakes and wetlands. The Hog Island Lake area was studied in detail in the Stormwater Management Report for Hog Island Lake, URS Corporation, May 2000.

3.4 COUNTRY OAKS SYSTEM

The Country Oaks system originates west of Livingston Avenue and north of Wallace Road. Runoff flows east under Livingston Avenue through the Country Oaks Subdivision and ultimately discharges to the Cypress Creek Main channel floodplain west of I-275.

3.5 RIDGE LAKE SYSTEM

The Ridge Lake system originates in Ridge Lake within the Ridge Lake subdivision located west of Livingston Avenue and south of Wallace Road. Runoff flows to the south through a large wetland area and open pasture and turns east to Livingston Avenue. Past Livingston, the flow continues east under 30th Street and Carr Drive before discharging to the Cypress Creek main channel floodplain west of I-275. An additional tributary channel ties into the Ridge Lake main channel from the north between 30th Street and Carr Drive.

3.6 SHERRY BROOK SYSTEM

The Sherry Brook system originates in a large wetland/lake area located between the Eagle Crest and Rhodes Woods subdivisions south of Newberger Road. Runoff flows south through several lake areas in the Hanna Pond Estates and San Remo subdivisions. The channel within this area is not well defined. Runoff from several areas west of Hanna Road combine with the Sherry Brook main channel north of Sunset Lane. This runoff then flows east under Walker Road, Sunset Road and Livingston Avenue in a well-defined channel. Runoff from the Meadowlands, Windemere Unit 1 and Timberlane subdivisions flow east into Sherry Brook. The channel widens and continues east to 30th Street and then winds south through the Sherry Brook Estates subdivision and ultimately discharges to the Cypress Creek main channel floodplain west of I-275.

3.7 HANNA LAKE SYSTEM

The Hanna Lake system is one of the largest tributaries within the study area. This system originates in Pasco County and flows south into Hillsborough County at County Line Road near U.S. 41 at Lake Kell. The flow then passes south under Newberger Road to Swamp Lake and Keene Lake. Lake Keene is developed around its shoreline. Runoff from Lake Commston and Little Hobbs Lake also flows into Keene Lake from the west. Keene Lake discharges south under Sunset Lane to Hanna Lake. Hanna Lake then discharges east to Hanna Road. A detailed discussion of the lakes in this system is described below in Section 3.2. The channel is well defined but not well maintained. The channel flows east through the Cooper's Pond, Windemere and Livingston Acres subdivisions crossing under Swan Lake Drive and Livingston Avenue. Inflow from the south joins the main channel from the Barrington and Livingston Unit 4 subdivisions. The flow then travels east in a steep channel through pasture area and flows into the Cypress Creek main channel floodplain west of I-275.

3.8 BLIND POND AVENUE SYSTEM

The Blind Pond Avenue system originates in a wetland area located west of Hanna Road and south of Clement Road. Runoff then flows northeast under Green Meadow Drive and Clement Road. Runoff from the Pond Eddy and Livingston Units 2A and 3A subdivisions flow south under Blind Pond Avenue to combine with the area south of Clement Road. These combined areas flow east through the Prairie View Acres subdivision to Livingston Avenue. The flow then travels east in a steep channel through pasture area and flows into the Cypress Creek main channel floodplain west of I-275.

3.9 THIRTEEN MILE RUN SYSTEM

The Thirteen Mile Run system is one of the other larger tributaries within the study area. This system originates at the western portion of the study area in a large wetland located east of U.S. 41 and north of Sunset Lane. Runoff flows south under Sunset Lane adjacent to the Post Office and Commercial areas at Sunset and U.S. 41 to Lake Stemper. Lake Stemper discharges through large wetland areas and outfalls to Dubuel Road. The channel at this location is well defined and flows south between the Maniscalco Elementary School and the Willow Pond subdivision. The channel continues south through several wetland areas to Whitaker Road. At Whitaker Road the channel turns east and flows to Hanna Road. Past Hanna Road the channel continues east then south to Vandervort Road. The channel crosses Vandervort Road and meanders through the Park Forest subdivision to Livingston Avenue. The flow then travels east and flows into the Cypress Creek main channel floodplain west of I-275.

3.10 FLYNN LAKE SYSTEM

The Flynn Lake System originates in several lake areas located north of I-275 and south of Hanna Road. The lakes discharge south under I-275 to other wetland areas adjacent to the Curry Cove subdivision west of Livingston Avenue. Flynn Lake and the lake located west of north 15th street also drain to these wetland areas. These wetland areas then discharge to the east to Livingston Avenue and ultimately discharge to the Cypress Creek main channel floodplain.

3.11 SILVER LAKE OUTFALL SYSTEM

The Silver Lake outfall is located north of Sinclair Hills Road and west of Livingston Avenue. Areas draining to this outfall include the Silver Lake subdivision and the Palms of Livingston apartment complex. In addition, several areas just south of Sinclair Hills Road also drain to the outfall. The outfall crosses east under Livingston Avenue and ultimately discharges to the Cypress Creek main channel floodplain.

3.12 149TH STREET OUTFALL SYSTEM

The 149th Street outfall is the only previously improved outfall in the study area. This outfall was improved by Hillsborough County in 1983. The system originates at Burrell Lake at Apex Lakes Estates subdivision located south of I-275 and East of Nebraska Avenue and the CSX railroad. Burrell Lake outfalls at South Barrel Drive to the southeast to a maintained channel. The channel flows south along North 12th Street to Bearss Avenue. The flow crosses Bearss Avenue and drains south to a low wetland area. Runoff from industrial areas to the south and commercial areas along Nebraska Avenue to the west also drain to the low area. This low area then discharges to the east under Bearss Avenue to the 149th Street outfall. The 149th Street outfall system is a series of pipes, channels and ponds which flow to the east to Livingston Avenue. Areas to the north of Sinclair Hills Road and to the south to Skipper Road drain to the 149th Street outfall via overland flow or swales.

At Livingston Avenue, the 149th Street outfall combines with an inflow pipe which drains a portion of Skipper Road and Livingston Avenue. This system then flows east in a channel/ pipe system to a lake at the Lake Forest subdivision. This lake then discharges north to the Cypress Creek floodplain.

3.13 BRUCE B. DOWNS SYSTEM

The Bruce B. Downs system is located at the southern portion of the watershed. The system originates at a lake in the Pine Lake subdivision located south of Skipper Road and east of 19th Street. The lake drains east to a channel and low area at 142nd Street and 22nd Street. This channel flows east to Bruce B. Downs Boulevard. Runoff from several apartment complexes and commercial areas also drain to the channel. The channel crosses under Bruce B. Downs Boulevard and drains to a wetland area on the east side of the Bruce B. Downs and Skipper Road intersection. Runoff from several apartment complexes located north of University Hospital and east of Bruce B.

Downs Boulevard drain to, or are pumped to, this wetland area. This area then flows north under Bruce B. Downs Boulevard to a channel in the Lake Forest subdivision. This channel flows north to the lake at Lake Forest and combines with the 149th Street outfall system. This lake then discharges north to the Cypress Creek floodplain.

3.14 CYPRESS CREEK LAKE CHAIN

The Cypress Creek Lake chain in the project area extends from southwest Pasco County to Lutz in northwest Hillsborough County. These lakes are interconnected, forming chains of lakes. Lake chains represent surface water conveyance systems similar to streams, but water at the head of the chain flows from lake to lake through a mostly ill-defined slough- way during high-flow conditions instead of within a confined stream channel. The lakes included in a chain are those that currently are or appear to be hydraulically connected to the main flow-way through the chain.

Hydraulic connections between lakes within a chain help stabilize lake water surface elevations by increasing the distribution of inflows to lakes within the chain. However, lakes within the study area have experienced extended periods of below-normal water levels in recent years. The failure of many of these lakes to return to previous levels has led lakefront property owners to be concerned that some event or process has disrupted normal hydrologic conditions. In 1998 however, El NiZo rainfall caused flooding conditions in several of the lakes.

Drainage in the western portion of the Cypress Creek watershed is unusual in that almost all drainage is to lakes and wetlands rather than to networks of streams. The combination of relatively flat topography and a high water table results in lakes between which water can flow according to the general topographic gradient in the area, which is approximately north to south. These chains of lakes appear to generally take the place of streams in the watershed.

The numerous lakes and other depressional features in the study area have been formed by sinkhole formation and other processes associated with the dissolution of the underlying limestone formations. Small lakes tend to be round, the most common expression of a sinkhole or solution feature. Larger lakes usually are formed by the coalescence of several or many solution features and do not express a characteristic shape.

The surface materials settling into the solution cavity initially may cause a breach in the confining layer that may enhance the connection between the surface water and the Floridan Aquifer. Subsequent transport of sand, silt, and clay into the depression typically restores the seal between the surficial aquifer or lake and the underlying Floridan Aquifer (Sinclair, et al., 1985).

The degree of connection between lakes in the study area is highly variable. Some lakes are connected by a deep channel or culvert that provides a continuous connection during most lake level conditions. In this case, connected lakes act as a single water body. Other lakes have outfalls that are controlled by natural low-lying sills, road crossings with culverts, or outfall control weirs that hold water in the lakes until lake levels rise enough to flow over or through the outfall. The

elevations at which most culverts and structures are placed allow flow during periods of high water levels and hold water in the lakes during periods of low water levels. Natural sills are usually high enough that water flows out of the lakes only during periods of high water levels.

The outfall control weirs that are in place at lakes within the study area are constructed of concrete, with broad, flat bottom sections that are usually 10 to 12 feet wide and side sections that rise 2 to 3 feet. This results in a rectangular orifice, open at the top, through which the lake discharges. Large planks called *stop logs* can be inserted across the bottom of the opening to raise the effective elevation of the weir in order to hold more water in the lake. The stop logs are usually 10 to 12 inches high and are long enough (10 to 12 feet) to completely fill the bottom of the weir opening. The Southwest Florida Water Management District (SWFWMD) manages the installation and removal of stop logs based on the season and the lake level conditions. During wet seasons or when heavy storm events are expected, stop logs often are removed to allow more flow through the lake system and to decrease the possibility or magnitude of flooding. The logs also may be managed in order to allow the lake levels to fluctuate in a manner similar to natural lake systems.

Lakes are the surface expressions of the surficial aquifer where the ground surface is below the level of the groundwater table. The water level within the surficial aquifer fluctuates with changes in inflows and outflows. At a specific lake, inflows include direct rainfall, surface water runoff within the watershed, inflows from other lakes, and in some cases artificial augmentation. Outflows include evaporation from the lake surface, transpiration from the plants within the watershed, downward leakage through the lake bottom and the confining layer to the Floridan Aquifer, and outflows to other lakes or streams (Henderson, 1983).

The single most important influence on lake level fluctuations in the northwest Hillsborough County and South Pasco area is rainfall (Henderson, 1983; LBG Inc. and Greeley & Hansen, 1994). Another important variable is the degree of downward leakage. This second variable becomes more important in times of extended drought because water exits the lake through infiltration but is not replenished by rainfall.

Development within the study area has occurred over a long period of time, beginning in the early 1900s and continuing to the present. Over this period, drainage patterns and lake connections for these lake chains have been altered to various degrees to suit agriculture and other development. Alterations have included ditching for draining low-lying lands, dredging to increase lake area or to build up surrounding lands, digging canals to connect lakes or to control lake levels, and constructing dams or roads that act as flow barriers between lakes. These alterations have occurred at different stages of development. Some major alterations occurred in the early stages of development in the study area.

Aerial photography was used to determine alterations in drainage patterns during development of the study area. The earliest available aerial photographs are from 1938. By 1938, the area already had been significantly altered to suit citrus farming. Large canals had been excavated between and from some of the lakes for water management purposes.

The following section describes the major lakes in the study area, including the establishment of the watershed and lakes included in the chains, an overview of development history, an analyses of lake level data, and descriptions of structures, channels, and sills that control the lake connections.

CYPRESS CREEK LAKES

The Cypress Creek chain of lakes extends from, approximately 2 miles north of the Hillsborough-Pasco County line, to Lake Stemper, which lies approximately 3.5 miles south of the Hillsborough-Pasco County line.

The 1938 aerial photographs show major drainage alterations in the Cypress Creek chain of lakes. Dubuel Road was in place, and the connections between Keene Lake and Lakes Hanna and Stemper (including a ditch between these lakes) appear to have been channelized. A number of roads crossed the area, often over lake connections, but no major alterations other than the drainage canals had been made to the lakes.

In the 1950s and 1960s, the land around several of the Cypress Creek lakes was developed considerably to residential land use. The area was dredged extensively to create canals and presumably to obtain fill to raise the adjacent land surface. Lake Keene was affected significantly by this activity. The Cypress Creek lakes have not changed much since the early 1970s with respect to lake shoreline and roadway configurations, but housing density have continued to increase.

Lake Stemper is considered the end of the chain, and discharge from this lake to Thirteen-Mile Run is considered an outflow from the chain. Hanna Lake competes to some degree with Lake Stemper for position at the end of the chain since it also receives outflow from Keene Lake. Hanna Lake also represents outflow from the chain by way of a small intermittent stream, which flows east toward Cypress Creek.

Hog Island Lake, Cool Kell Lake and Dupree Lake were initially thought to be linked hydrologically with the Cypress Creek Lake chain. However, they were found to have no direct connection except possibly during extreme flood events. Hog Island Lake and Cool Kell Lake discharge north to Pasco County and then east towards Cypress Creek through a series of swamps and sloughs. Dupree Lake was found to have no outflow, even for the predicted 100-year flood elevation.

Lake Jo Ann

Lake Jo Ann is approximately 13 acres in surface area and is located in south Pasco County. This flow-through lake receives inflow from Lakes Catfish and Myrtle. Discharge from Lake Jo Ann flows over a low (66.1 feet msl) sill and through a low area to reach Lake Toni.

Myrtle Lake

Myrtle Lake is approximately 17 acres in surface area and is located in Pasco County. The outlet is a natural sill, possibly channelized to some degree, with an estimated controlling elevation of 66.20 feet msl (SWFWMD 1988). Outflow is to Lake Jo Ann, and inflow to the lake occurs only from watershed runoff. Average water level for the period of record (February 1988 to March 1996) was 66.14 feet msl, with a range of 63.90 feet msl to 69.08 feet msl.

Catfish Lake

Catfish Lake is 23 acres in surface area and is located in Pasco County. The outlet is a natural sill, possibly channelized to some degree, with an estimated controlling elevation of 66.20 feet msl (SWFWMD, 1988). The outflow channel to Lake Jo Ann is shared by Lakes Catfish and Myrtle, and inflow to the lake occurs only from watershed runoff. The average water level for the period of record (February 1988 to November 1994) is 65.95 feet msl, with a range of 63.80 feet msl to 68.16 feet msl.

Lake Toni

Lake Toni is approximately 17 acres in surface area and is located in Pasco County. This contributing lake receives inflow from Lakes Jo Ann, Catfish, and Myrtle. Outflow is to the west, under a dirt road (with unknown culvert size and elevation), through a swampy area, and through a 30-inch culvert under SR 54. The controlling elevation (culvert invert) is 63.90 feet msl (SWFWMD, 1988). The average water level for the period of record (February 1988 to March 1996) was 65.70 feet msl, with a range of 63.58 feet msl to 69.13 feet msl. The average water level is considerably higher than the culvert invert elevation, indicating that the outlet control from this lake is not the culvert under SR 54 but somewhere in the channel downstream (south) of SR 54.

Lake 26

Lake 26 is approximately 12 acres in surface area and is located in Pasco County. This is the last flow-through lake in the Cypress Creek chain north of SR 54. A survey for a 1988 SWFWMD flood study indicated that the controlling elevation for the channel that conveys the flow south of Carson Road is approximately 68.10 feet msl. The outflow crosses SR 54 primarily through a 4' x 14' box culvert with an invert elevation of 64.18 feet msl (SWFWMD 1988). Several other culverts exist along this highway, the lowest of which is at 64.28 feet msl. The average water level for the period of record (February 1988 to March 1996) was 66.26 feet msl, with a range of 63.10 feet msl to 69.06 feet msl. The fact that the average water level is considerably higher than the culvert invert elevation indicates the outlet control from this lake is not the culvert under SR 54 but some other location between Lake 26 and Bird Lake, south of SR 54.

Lake Floyd

Lake Floyd is 53 acres in surface area and is located in Pasco County. This contributing lake receives inflow only from its watershed and discharges to Bird Lake. The size of the culvert was not determined, but the controlling elevation is 66.58 feet msl (SWFWMD, 1988). The average water level for the period of record (March 1978 to March 1996) was 66.90 feet msl with a range of 65.34 feet msl to 68.81 feet msl.

Bird Lake

Bird Lake is approximately 150 acres in surface area and is located in Pasco County just north of County Line Road. The lake receives inflow from Lakes 26 and Toni through their outlets under SR 54, and from Lake Floyd. This lake discharges through an outlet channel south to Lake Kell. The channel has been excavated through the swampy area south of Bird Lake. Where the outflow crosses County Line road, the channel invert elevation is 63.68 feet msl (SWFWMD 1996). Average water level for the period of record (February 1978 to March 1996) was 65.58 feet msl, with a range of 62.57 feet msl to 68.40 feet msl. The fact that the average water level is considerably higher than the culvert invert elevations indicates the outlet control from this lake is not the culvert under County Line Road, but at some other location between Bird Lake and Lake Kell.

Hog Island Lake

Hog Island Lake is 47 acres in surface area and is located in Hillsborough County. This lake actually is not part of the Cypress Creek Lake chain, since under normal conditions it neither receives flow from nor discharges to the group. Inflow is from its watershed and from Cool Kell Lake just to the south. Outflow is north to Pasco County then east toward Cypress Creek through a series of swampy areas. The average water level for the period of record (March 1978 to March 1996) is 63.37 feet msl, with a range of 61.18 feet msl to 66.48 feet msl. During periods of very high water, some water may flow from the chain into Hog Island Lake. The lake elevation is lower than those of the flow-through lakes both upstream (Bird Lake) and downstream (Lake Kell) of this lake, further indicating that it is not part of the chain. The Hog Island Lake area was studied in detail in the Stormwater Management Report for Hog Island Lake, URS Corporation, May 2000.

Lake Kell

Lake Kell is 31 acres in surface area and is located in Hillsborough County just south of County Line Road. Inflow is from Bird Lake in Pasco County through swampy areas both north and south of County Line Road. Outflow from this lake is over a SWFWMD weir, through a small lake (Lake Nell), and through Swamp Lake to Keene Lake. This weir has two concrete bays (openings) for stop logs. No stop logs were in place during the field visit on September 4, 1999. The weir invert is 65.1 feet msl according to the SWFWMD structure data sheets, which corresponds with the 65.3 feet msl estimate from field measurements. The controlling elevation with no stop logs is assumed to be 65.1 feet msl. The average water level for the period of record (February 1978 to March 1996) was 64.92 feet msl, with a range of 62.26 feet msl to 67.13 feet msl. This indicates that the lake regularly discharges over the structure probably not more than 1 foot above the outlet elevation because of

continual flow over the structure. Occasional periods of water level below the outlet elevation bring the average down below the outlet elevation.

Commston Lake

Commston Lake is 15 acres in surface area and is a contributing lake. Inflow is from only its watershed, and outflow is to Keene Lake by way of a wetland area south of Swamp Lake. The culvert at the outfall of the lake is 36 inches in diameter and has a controlling (invert) elevation of 60.1 feet msl, based on the field investigation and aerial photographs. The average water level for the period of record (September 1989 to June 1996) is 59.41 feet msl, with a range of 56.87 feet msl to 62.52 feet msl.

Swamp Lake

Swamp Lake is identified on the USGS topographic map as a small body of water located inside a large wetland area between Lakes Kell and Keene. For the purposes of this study, Swamp Lake will refer to the entire wetland area, which is a flow-through portion of the chain. No data is collected for this lake by SWFWMD or other agencies. No water level information or outlet controlling elevations are available. Inflow is from Lake Kell and Commston Lake. Outflow is to Keene Lake and also to Sherrys Brook.

Aerial photography indicates that water in Swamp Lake must rise to approximately 63.5 feet msl before it flows south to Keene Lake. Since the outfall to Sherrys Brook is located further north (i.e., further upgradient), if the controlling elevation for the outflow to Sherrys Brook is lower than the outflow to Keene Lake, water can be diverted from the swamp, preventing flow to Keene Lake. SWFWMD aerial photography indicates that the outfall to Sherrys Brook is on the southeast shore of Swamp Lake and has a dirt road over it. The road surface is approximately 65.2 feet msl. with a 12- or 15-inch culvert under the road, the controlling elevation would be approximately 63.5 to 64.0 feet msl.

Keene Lake

Keene Lake has an area of 31 acres and is a flow-through lake. Inflows are from the Swamp Lake area and Commston Lake. Outflow from Keene Lake is controlled by two weir structures at different locations. One structure discharges to Hanna Lake (Keene Structure, 2), and the other discharges to Lake Stemper (Keene Structure 1). The outfall to Lake Stemper flows through a small pond south of Sunset Lane. The outflow from this pond into Lake Stemper is controlled by Keene Structure 3.

All of these structures have stop logs to allow some control of the outfall elevation. At the time of the field investigation, stop logs were installed in the weirs. The controlling elevations were determined to be 62.49 feet msl (Structure 1), 62.63 feet msl (Structure 2), and 61.70 feet msl (Structure 3). Structure 2 is higher than the others are, so outflow will flow first towards Lake Stemper; if levels rise higher than 62.63 feet msl, then water also would flow to Hanna Lake. Since

Structure 1 is higher than Structure 3, continued flow over Structure 1 would fill the small pond and discharge onward to Lake Stemper. The elevations of the weirs could be altered by removing the stop logs, possibly changing the primary flow to Hanna Lake instead of Lake Stemper.

Hanna Lake

Hanna Lake is approximately 30 acres in surface area. This lake is considered a diversion of water from the chain since it competes with Lake Stemper for outflow from Keene Lake. Outflow from Keene Structure 2 is the only significant inflow to Hanna Lake other than watershed runoff. Outflow from Hanna Lake is via an 11-foot-wide weir. During the field investigation, one log was in place and the controlling elevation was estimated to be 61.28 feet msl. No flow was observed at this time, nor was inflow from Keene Lake observed. The average water level for the period of record (June 1946 to June 1996) was 60.43 feet msl, with a range of 57.45 feet msl to 62.90 feet msl.

The outflow from this lake is the source of an intermittent stream that discharges to Cypress Creek. A ditch or canal was dug between Lakes Hanna and Stemper prior to the 1938 aerial photography. Water appears to be in this ditch in the 1938 aerials, but more recent aerial topography indicates that water levels would have to rise to at least approximately 63 feet msl for water to flow from one lake to the other. The lake hydrographs indicate that this level of water no longer occurs in either lake, so it is not known in which direction water flowed when this ditch was dredged.

Lake Stemper

Lake Stemper is approximately 126 acres in area and represents the last lake in the Cypress Creek chain. Inflow is from Keene Lake through Structures 1 and 3. Outflow, which is controlled by an 11-foot weir, discharges to the remainder of Thirteen-Mile Run, which flows generally south-southeast to Cypress Creek. At the time of the field investigation, two logs were in place at the weir, and the controlling elevation was estimated to be 61.18 feet msl. No flow or standing water was observed near the weir, and no inflow to Lake Stemper was observed from Keene Lake.

The period-of-record (May 1946 to June 1996) average water level is 59.59 feet msl, with a range of 55.60 feet msl to 62.30 feet msl. The period-of-record hydrograph indicates that water frequently has been high enough to discharge over the weir, but two extended periods of low water levels have occurred, one from 1970 to 1977 and one from 1989 to September 1995. The levels during these periods were low enough that virtually no flow would have occurred over the structure.

CHAPTER FOUR Methodology

Several computer software products and analysis techniques have been used to develop the Cypress Creek existing conditions model. This chapter provides a general description of these methods and approaches.

4.1 GENERAL METHODOLOGY AND DATABASE DEVELOPMENT

The U.S. Soil Conservation Service (SCS) Runoff Curve Number (CN) method has been used to generate runoff hydrographs from rainfall data and watershed parameters. This method estimates expected storm water runoff on the basis of soil and land cover characteristics. Runoff hydrographs have been developed by the U.S. Soil Conservation Service Dimensionless Unit Hydrograph method. A modification of the HEC-1 computer program (U.S. Army Corps of Engineers) was used to generate runoff hydrographs.

Inflow hydrographs have been generated at nodes. Discharges have been routed through the system using a modified version of the EPA Storm Water Management Model v. 4.31 (SWMM). The EXTRAN block of SWMM provides a hydrodynamic channel routing model.

Inflow hydrographs for the Cypress Creek main channel which flows into the study area from Pasco County were developed from the flows used in the *Floodplain Information on Cypress Creek, Hillsborough and Pasco Counties, Florida, SWFWMD (June 1986)* which was adopted by FEMA.

4.2 HYDROLOGY

The U.S. Army Corps of Engineers hydrologic computer model HEC-1 was modified to account for the relatively flat terrain of Hillsborough County. The modifications included altering the "shape factor" and the corresponding dimensionless unit hydrograph ordinates. The Hillsborough County Storm Water Management Technical Manual indicates that a value of 256 with a corresponding dimensionless unit hydrograph is appropriate for the County. Therefore the program was modified to use the "256" shape factor and the recommended dimensionless unit hydrograph. An initial abstraction coefficient of 0.2 was used throughout this study. Initial abstraction is computed by HEC-1 as the initial abstraction coefficient multiplied by the soil storage depth. The soil storage depth(s) is computed from the runoff curve number (CN) by HEC-1 on the basis of the SCS methodology.

Rainfall depths were estimated from isohyetal maps shown in the Southwest Florida Water Management District's Environmental Resource Permitting Information Manual. The rainfall depths for the 1-Day (24 hours) storm event used in the model simulation are as follows:

STORM EVENT PRECIPITATION	24-HOUR DEPTH (in.)
Mean Annual	4.50
5-year	5.50
10-year	7.00
25-year	8.00
50-year	10.5
100-year	11.5

The design storm rainfall distribution used is the SCS 24-Hour Type II Florida Modified as required by SWFWMD and Hillsborough County.

4.2.1 Soil Data

SWFWMD GIS soil coverage was used to obtain soil information for the Cypress Creek watershed. The SWFWMD coverage was developed from data in the SCS *Soil Survey of Hillsborough County, Florida*, 1989. Each soil polygon in the GIS coverage is associated with an attribute that designates its soil identification number. A database table was used to associate soil identification numbers with their corresponding hydrologic soil group (HSG). Hydrologic soil groups in the CCW watershed consist of five designations- A, B, C, D, B/D, and Water. The HSG A soils have a high infiltration rate and low runoff potential. HSG B soils are moderately well-drained and have a moderate infiltration rate. HSG C soils have slow infiltration rates and may contain a layer of fine texture soil which impedes the downward movement of water. HSG D soils include poorly-drained, very silty/clayey/organic soils or soils with high groundwater tables. Dual hydrologic classifications (B/D) includes soils which have a seasonal high water table but can be drained; the first hydrologic soil group designates the drained condition and the second hydrologic soil group designates the undrained condition of the soil. **Figure 2-4** shows the hydrologic soil groups used in the analysis. It is based on the SWFWMD GIS soil coverage.

4.2.2 Land Use

The SWFWMD GIS Land Use coverage (1995) was used to represent existing conditions land use. Each land use polygon in the GIS coverage is associated with an attribute that designates a classification from the Florida Land Use Classification System (FLUCCS). There has been development in the Cypress Creek Watershed since 1995 that would not be represented in the SWFWMD coverage. As impervious area increases, runoff usually increases. However, SWFWMD has been regulating quantity of storm water runoff since 1985. The objective of regulation has been to prevent peak runoff rates under developed conditions from exceeding peak runoff rates associated with predevelopment conditions. **Figure 2-5** shows the Land Use/ Land Cover data used in the analysis. It is based on the SWFWMD GIS coverage for land use/ land cover. The SWFWMD land use coverage is based on 1995 aerial infrared photography.

4.2.3 Runoff Curve Numbers

The Soil Conservation Service (SCS) Runoff Curve Number method was used to compute rainfall excess values. Runoff Curve number calculations were based on a GIS intersection of the SWFWMD land use coverage with the SWFWMD soil coverage and with the Cypress Creek Watershed subbasin map. The subbasin map was prepared in AutoCAD and exported in DXF format. It was then imported to the GIS system for overlay with the soil and land use coverages. The resulting GIS polygons are associated with attributes of soil type and FLUCCS code as represented in the SWFWMD GIS coverages. Each soil type was then associated with a hydrologic soil group (A, B, C, or D), and each FLUCCS code was associated with an SCS land use category. A CN value was then assigned to each polygon based on the specific hydrologic soil group and land cover classification. Table 4-1 shows the database lookup table that was used to associate each FLUCCS code with an SCS land use category for purpose of computing runoff numbers (CN). The average area weighted CN value was then computed for each subbasin.

4.2.4 Time-of-Concentration

Time-of-concentration estimates were made by adding the travel time for segments of appropriate flow paths. The methods used for calculating travel times are based on that shown in the Hillsborough County Stormwater Technical Manual, and are summarized as follows:

	Table 4-1 Land Use and Curve Number Lookup Table							
	DESCRIPTION	FLUCSID	A	B	C	D	B_D	W
1	RESIDENTIAL LOW DENSITY <2 DWELLING UNITS	1100	50	68	79	84	81.5	100
2	RESIDENTIAL MED DENSITY 2->5 DWELLING UNIT	1200	57	72	81	86	83.5	100
3	RESIDENTIAL HIGH DENSITY	1300	77	85	90	92	91	100
4	COMMERCIAL AND SERVICES	1400	89	92	94	95	94.5	100
5	INDUSTRIAL	1500	81	88	91	93	92	100
6	EXTRACTIVE	1600	77	86	91	94	92.5	100
7	INSTITUTIONAL	1700	69	81	87	90	88.5	100
8	RECREATIONAL	1800	49	69	79	84	81.5	100
9	OPEN LAND	1900	39	61	74	80	77	100
10	CROPLAND AND PASTURELAND	2100	49	69	79	84	81.5	100
11	ROW CROPS	2140	49	69	79	84	81.5	100
12	TREE CROPS	2200	44	65	77	82	79.5	100
13	FEEDING OPERATIONS	2300	73	83	89	92	90.5	100
14	NURSERIES AND VINEYARDS	2400	57	73	82	86	84	100
15	SPECIALTY FARMS	2500	59	74	82	86	84	100
16	TROPICAL FISH FARMS	2550	59	74	82	86	84	100
17	OTHER OPEN LANDS (RURAL)	2600	30	58	71	78	74.5	100
18	HERBACEOUS	3100	63	71	81	89	85	100
19	SHRUB AND BRUSHLAND	3200	35	56	70	77	73.5	100
20	MIXED RANGELAND	3300	49	69	79	84	81.5	100
21	UPLAND CONIFEROUS FOREST	4100	45	66	77	83	80	100
22	PINE FLATWOODS	4110	57	73	82	86	84	100
23	LONGLEAF PINE - XERIC OAK	4120	43	65	76	82	79	100
24	UPLAND HARDWOOD FORESTS - PART1	4200	36	60	73	79	76	100
25	HARDWOOD CONIFER MIXED	4340	36	60	73	79	76	100
26	TREE PLANTATIONS	4400	36	60	73	79	76	100
27	STREAMS AND WATERWAYS	5100	100	100	100	100	100	100
28	LAKES	5200	100	100	100	100	100	100
29	RESERVOIRS	5300	100	100	100	100	100	100
30	BAYS AND ESTUARIES	5400	100	100	100	100	100	100
31	WETLAND HARDWOOD FORESTS	6100	98	98	98	98	98	98
32	BAY SWAMPS	6110	98	98	98	98	98	98
33	MANGROVE SWAMPS	6120	98	98	98	98	98	98
34	STREAM AND LAKE SWAMPS (BOTTOMLAND)	6150	98	98	98	98	98	98
35	WETLAND CONIFEROUS FORESTS	6200	98	98	98	98	98	98
36	CYPRESS	6210	98	98	98	98	98	98
37	WETLAND FORESTS MIXED	6300	98	98	98	98	98	98
38	VEGETATED NON-FORESTED WETLANDS	6400	98	98	98	98	98	98
39	FRESHWATER MARSHES	6410	98	98	98	98	98	98
40	SALTWATER MARSHES	6420	98	98	98	98	98	98
41	WET PRAIRIES	6430	98	98	98	98	98	98
42	EMERGENT AQUATIC VEGETATION	6440	98	98	98	98	98	98
43	NON - VEGETATED	6500	98	98	98	98	98	98
44	TIDAL FLATS / SUBMERGED SHALLOW PLATFORM	6510	98	98	98	98	98	98
45	SHORELINES	6520	98	98	98	98	98	98
46	INTERMITTENT PONDS	6530	98	98	98	98	98	98
47	BEACHES OTHER THAN SWIMMING BEACHES	7100	77	86	91	94	92.5	100
48	DISTURBED LAND	7400	77	86	91	94	92.5	100
49	TRANSPORTATION	8100	81	88	91	93	92	100
50	COMMUNICATIONS	8200	81	88	91	93	92	100
51	UTILITIES	8300	81	88	91	93	92	100

Overland Flow:	Kinematic Wave Equation
Shallow Concentrated Paved:	SCS equations relating velocity to watercourse slope
Shallow Concentrated UnPaved:	SCS equations relating velocity to watercourse slope
Channel Flow:	Assumed velocity 2 ft/sec
Pipe Flow:	Assumed velocity 3 ft/sec

4.3 HYDRAULICS

A modification of the U.S. EPA SWMM 4.31 model was used to compute water surface elevations and discharges at links and nodes shown on the reach/junction schematic diagram. The SWMM EXTRAN block was used for hydraulic routing. The most significant modifications to EPA SWMM 4.31 included directly integrating the SCS method to generate runoff hydrographs, entrance and exit headloss coefficient, and conduit stretch factor.

Other minor changes included the increase of dimensions of a number of key parameters, enhancements to the inputs and the outputs and error trapping. Input enhancements included a provision for specifying reach numbers for orifices and weirs and another for using elevations rather than depths above invert for weir data. Several output enhancements have been provided including a provision for printing a summary file showing computed peak discharge values and computed peak water surface elevations.

Elliptical and arch pipes are included in the County's current version of the SWMM model. Natural channels are represented in EXTRAN as conduits with irregular cross section data. The cross section data is input as ground shots (elevations, and stations across the channel) in a format similar to that of HEC-2 (U.S. Army Corps of Engineers) cross section data. EXTRAN uses the cross section data only to obtain the shape geometry. It uses invert elevations input on the conduit records to determine the channel slope. Therefore, a natural channel is treated as a prismatic conduit with an irregular shape.

4.4 BOUNDARY CONDITIONS

The Cypress Creek main channel discharges into the Hillsborough River south of Bruce B. Downs Boulevard (SR 581). The boundary conditions used in the SWMM model for Cypress Creek was obtained from the *Floodplain Information on Cypress Creek, Hillsborough and Pasco Counties, Florida, SWFWMD (June 1986)* which was adopted by FEMA.

There is some flow across the watershed boundaries at the north end of the watershed between Hillsborough and Pasco Counties. For purposes of this analysis, the boundary conditions for these areas were obtained from SWFWMD lake data.

4.5 OVERFLOW WEIRS

At some roadway crossings, weirs were used to simulate the overtopping of the road. Broad crested weirs were also used to simulate overland flow connections. In some cases, overland flow weirs were used to convey overbank flow which was modeled as re-entering the channel at a downstream junction point.

4.6 ROUGHNESS COEFFICIENTS

The roughness coefficients for the right, left, and center portion of channel sections were evaluated separately. In many cases, overbank areas were considered to be storage elements and not considered to have conveyance capability. Manning coefficients for channel sections were taken from several sources including but not limited to the HEC-2 water surface profile printouts obtained from FEMA for the Cypress Creek Main Channel. The values have been adjusted on the basis of photographs, site visits, and general knowledge of the area. The roughness coefficients may be adjusted as more reliable field information becomes available or as refinements in model calibration occurs. Higher roughness values sometimes result in smaller computed discharge values in downstream locations and larger computed water surface elevations in upstream locations. The roughness values are adjusted as part of the calibration efforts in Chapter 5.

For some conduits, roughness coefficients were adjusted internally by providing the entrance and exit losses coefficient externally. Pipe lengths and roughness values were also adjusted externally to achieve numerical stability. This procedure is explained in the SWMM User's Manual Version 4; Extran Addendum, Feb. 1989.

The equivalent pipe formula used to calculate the adjustments is as follows:

$$n_e = n_p L_p^{1/2} / L_e^{1/2}$$

where;

n_e = Manning roughness of equivalent pipe
L_e = Computed equivalent length
n_p = Actual Manning roughness of the pipe
L_p = Actual length of the pipe

Additional storage was added at some junctions. This was done to achieve numerical stability at these junctions.

4.7 NUMERICAL INSTABILITY

The EXTRAN model is based on an explicit solution algorithm used to solve the St. Vennant equations that describe unsteady flow in channels. Explicit solution algorithms are subject to numerical instability caused by accumulated round-off error. It is difficult to predict the conditions that cause numerical instability; however, short conduit lengths (less than 100 feet), steep bottom slopes for conduits, and low storage at nodes are frequently associated with numerical instability. Achieving numerical stability requires numerous adjustments to the model input data. Such adjustments include the use of equivalent pipes with longer lengths and lower roughness than the actual pipe dimensions, and the addition of storage at the junctions.

4.8 DATA SOURCES

Survey data was obtained from Hillsborough County and from other private sources. Cross section data for the main Cypress Creek channel was obtained from the United States Geological Survey (USGS), the Federal Emergency Management Agency (FEMA) and from County survey data.

Many elevations were taken from SWFWMD aerial topographic maps. Most are to a scale of 1"=200' and show contours on a one foot interval. Elevations taken from the maps include, but are not limited to, tops of roads, stage/area data for lakes, wetlands and other storage areas, inverts of channels, control elevations for overland flow evaluation, site and road elevations for level-of-service determinations.

Information from existing permits from SWFWMD was also used for areas where field survey's were not available. The permit information was used for pipe sizes and inverts, initial water elevations, and permitted design high water and flow rate information. This permit information was used for areas in Pasco County in the Willow Bend subdivision and Collier Parkway areas.

CHAPTER FIVE Calibration and Verification

The calibration process includes simulating a measured event by first adjusting the hydrologic input parameters according to the measured rainfall depth and distribution and then comparing computed water surface elevations and flows to the measured values. The hydrodynamic model is then adjusted so that computed and measured values more closely match.

The model is considered well calibrated when the results of stage, flow, and volume are in reasonable agreement with the recorded data at the established gauge stations. The model is then adjusted with specific parameters and verified with another storm event's data.

5.1 BOUNDARY CONDITIONS

The Cypress Creek project area has two outfalls, one to the Hillsborough River to the south at Bruce B. Downs Boulevard and one to Pasco County to the north. For model calibration, the Hillsborough River at Bruce B. Downs was set with a variable tailwater using information obtained from the USGS gauge at Bruce B. Downs Boulevard and Cypress Creek. The Pasco County outfall to the north was set as a free fall outfall.

5.2 DATA COLLECTION

There are three storm events with a dramatic impact on Cypress Creek Watershed, which occurred within a 3-month period prior to January 1998. The selected storm events used in this study for model calibration and verification are as follows:

- September 26-27, 1997
- December 10-13, 1997
- December 25-28, 1997

Rainfall records were collected from three gauges in or near the Cypress Creek Watershed. The gauges are owned and operated by SWFWMD, which maintains an extensive network throughout the region. A summarized table of these rainfall gauges stations recorded data, with the appropriate total rainfall intensities which occurred during the storm events used for calibration and verification, is provided in Table 5-1. **Figure 5-1** shows the locations where the rainfall data was collected. A graphical representation of rainfall data for hourly operating gauge stations is shown in **Figures 5-2** to **5-10.**

There are two operating streamflow gauge stations operated by the USGS located on the Cypress Creek main channel in the project vicinity. These gauge stations are:

- USGS gauge station number 02303800 (Sulphur Springs), is located at Cypress Creek and Bruce B. Downs Boulevard.
- USGS gauge station number 02303420 located at Worthington Gardens, approximately 2500 feet upstream of the project area in Pasco County.

Streamflow data includes recorded values of stages and discharge during the storm events used for

TABLE 5 - 1

RAINFALL GAUGE DATA SUMMARY

	RECORDED STORM EVENT	RAINFALL STATION NAME		
		LAKE ALLEN	BAY LAKE	MORRIS BRIDGE
TOTAL RAINFALL INTESITY (INCHES)	SEPTEMBER 26TH & 27TH	7.01"	10.10"	9.69"
	DECEMBER 10TH TO 14TH	4.98"	8.11"	8.80"
	DECEMBER 25TH TO 28TH	4.25"	5.64"	5.75"
Hourly recording data		x	x	x
Daily recording data				

C1_629 - e:\cypress - cypress_final report.apr - View:5-1 Guage Station Map - Layout:5-1 Guage Station Map(11x17)

Pasco County

02303420

Hog Island Lake

Lake Kell

County Line Rd.

Livingston Ave.

Lake Commiston

Lake Keene

U.S. Highway 41

Lake Hanna

Lake Stemper

275

75

Cypress Creek

County Highway 581

Bruce B. Downs Blvd.

Burrell Lake

02303800

Florida Ave.

Nebraska Ave.

Fletcher Ave.

Legend

Guage Stations

- SWFWMD Lake Level Gauge
- URSGWC Monitor Station
- USGS Gauge Station

Cypress Creek Basin

- Sub-Basins

Transportation

- I-75 & I-275
- Roads
- Railroad

Hydrography

- Marsh/Wetland/Swamp
- Stream/Lake/Pond
- Stream

0 4000 Feet N

Scale:1"=4000'

Hillsborough County Florida

Cypress Creek Watershed Management Plan

URS Greiner Woodward Clyde

Guage Station Map

Figure 5-1

Date:09/28/00

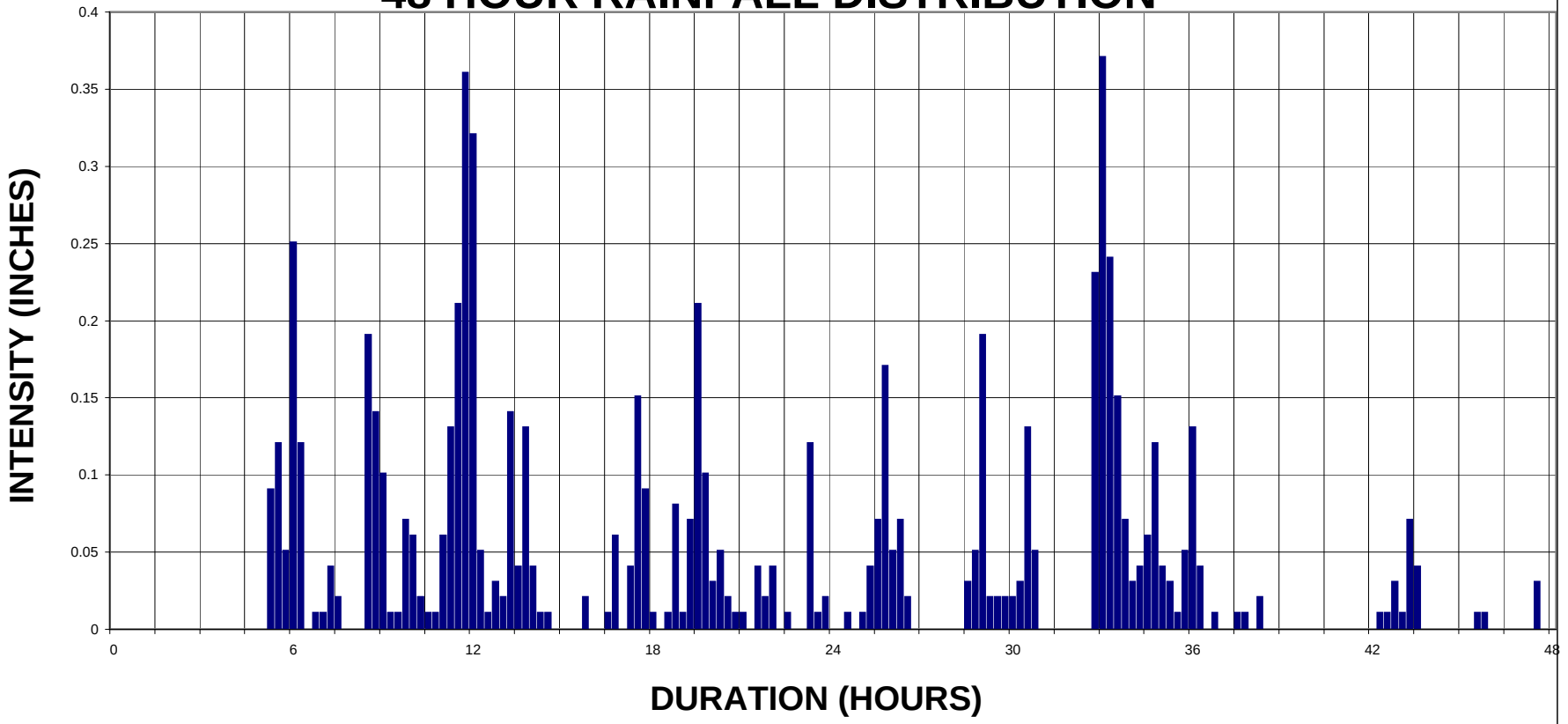
LAKE ALLEN SEPTEMBER 26TH AND 27TH
48 HOUR RAINFALL DISTRIBUTION
INTENSITY (INCHES)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0
6
12
18
24
30
36
42
48
DURATION (HOURS)

Figure 5-2

LAKE ALLEN DECEMBER 10TH THRU 13TH
96 HOUR RAINFALL DISTRIBUTION

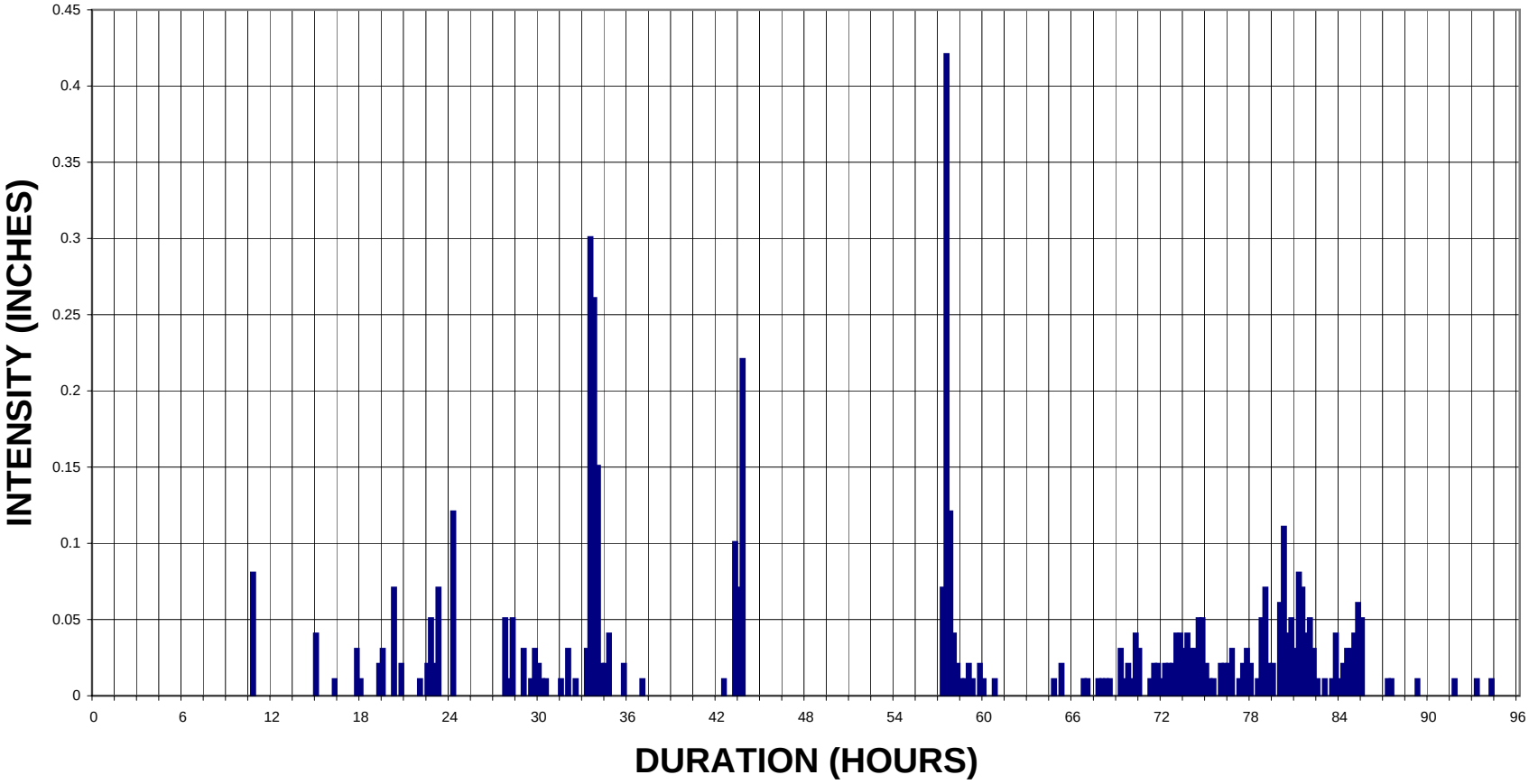

Figure 5-3

LAKE ALLEN DECEMBER 25TH THRU 28TH
96 HOUR RAINFALL DISTRIBUTION

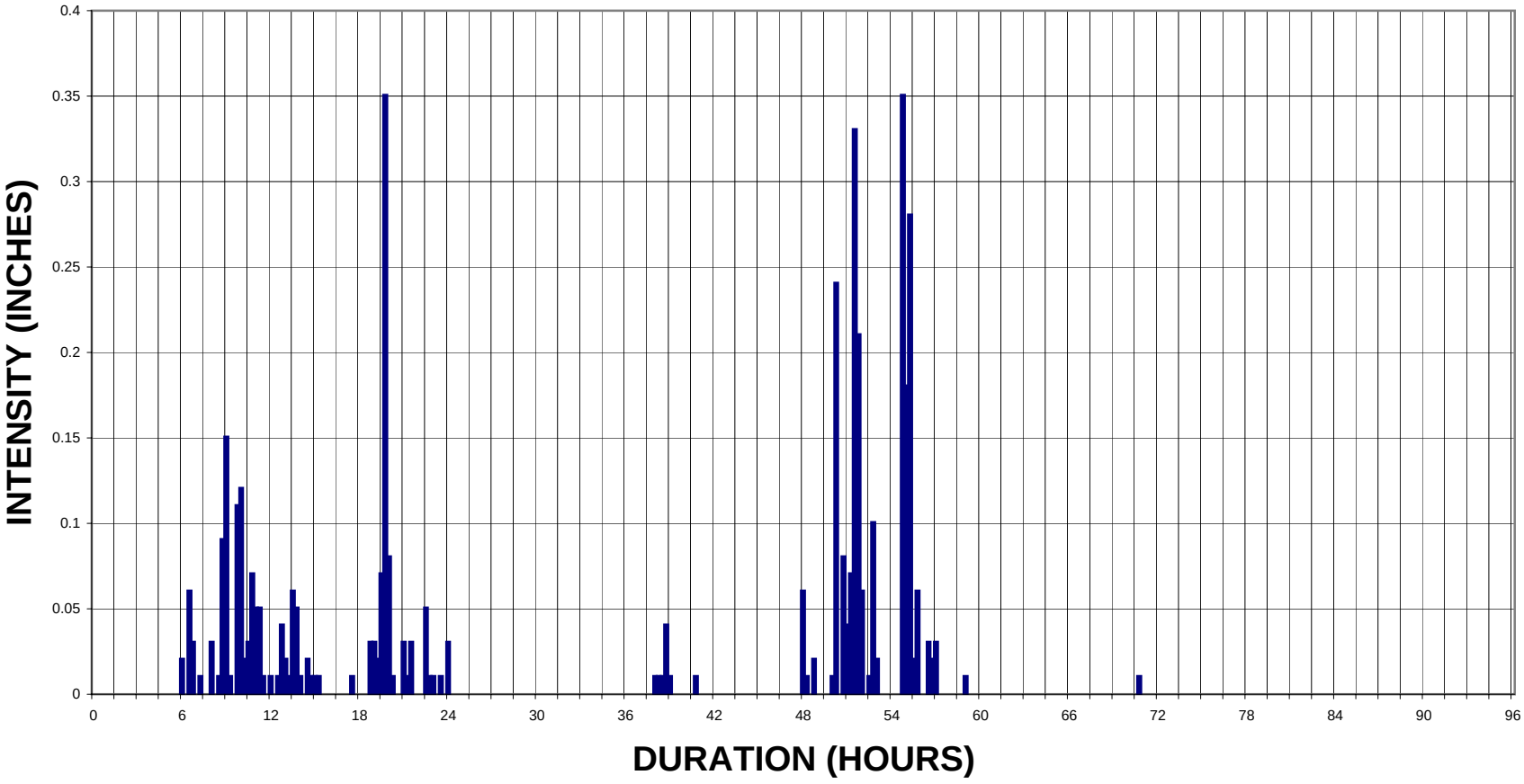

Figure 5-4

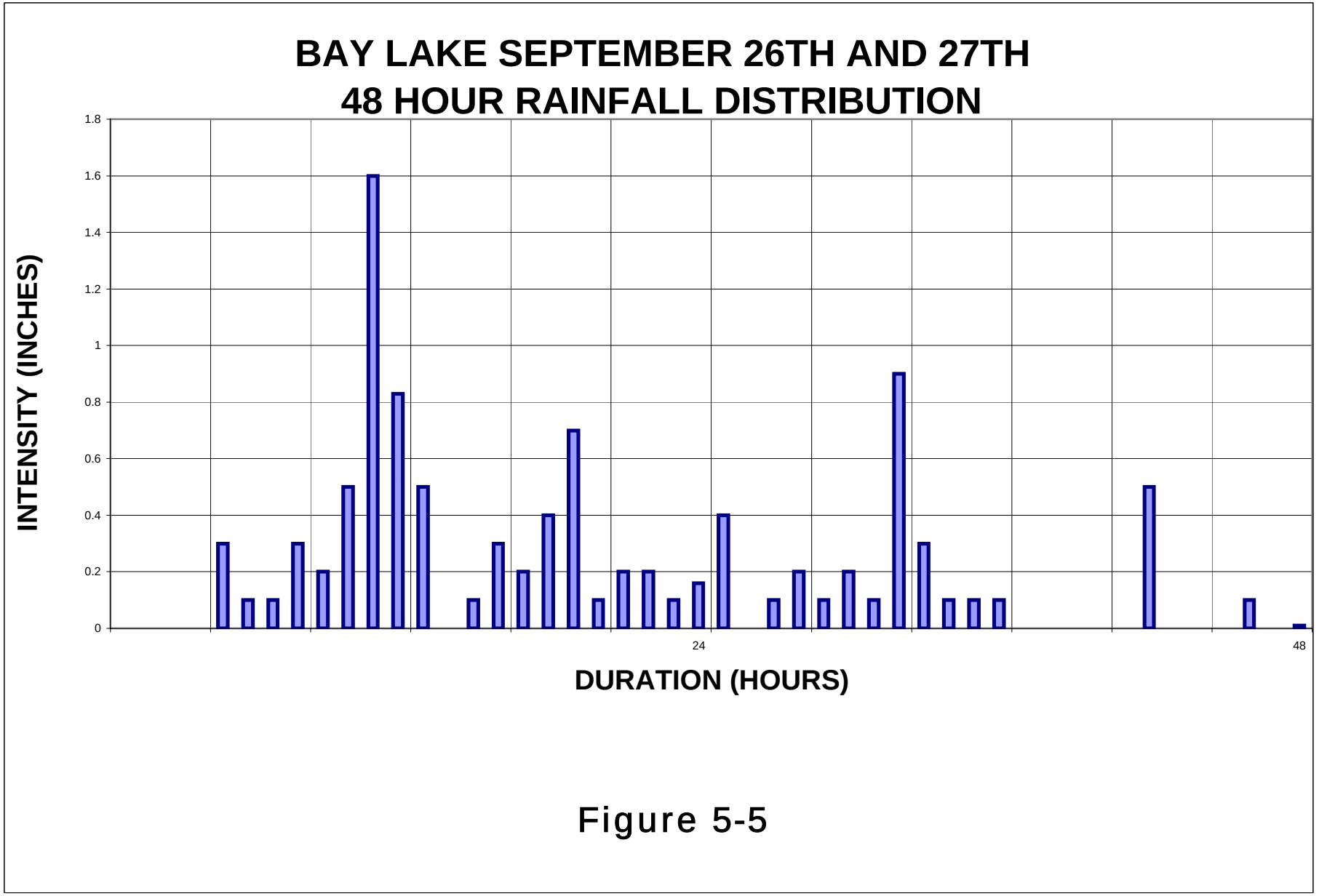
BAY LAKE SEPTEMBER 26TH AND 27TH
48 HOUR RAINFALL DISTRIBUTION
INTENSITY (INCHES)
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
24
48
DURATION (HOURS)

Figure 5-5

BAY LAKE DECEMBER 10TH THRU 13TH
96 HOUR RAINFALL DISTRIBUTION

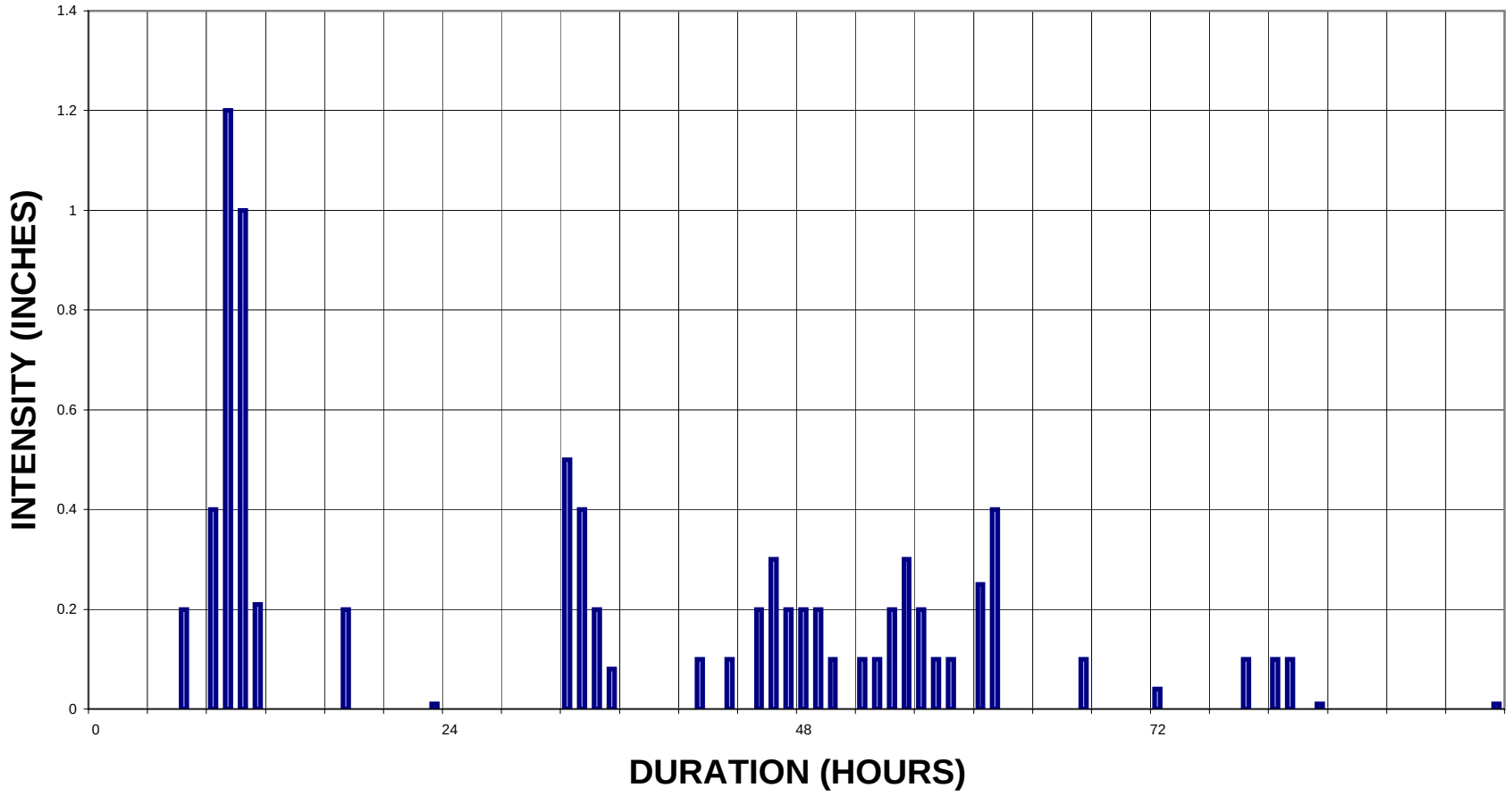

Figure 5-6

BAY LAKE DECEMBER 25TH THRU 28TH
96 HOUR RAINFALL DISTRIBUTION

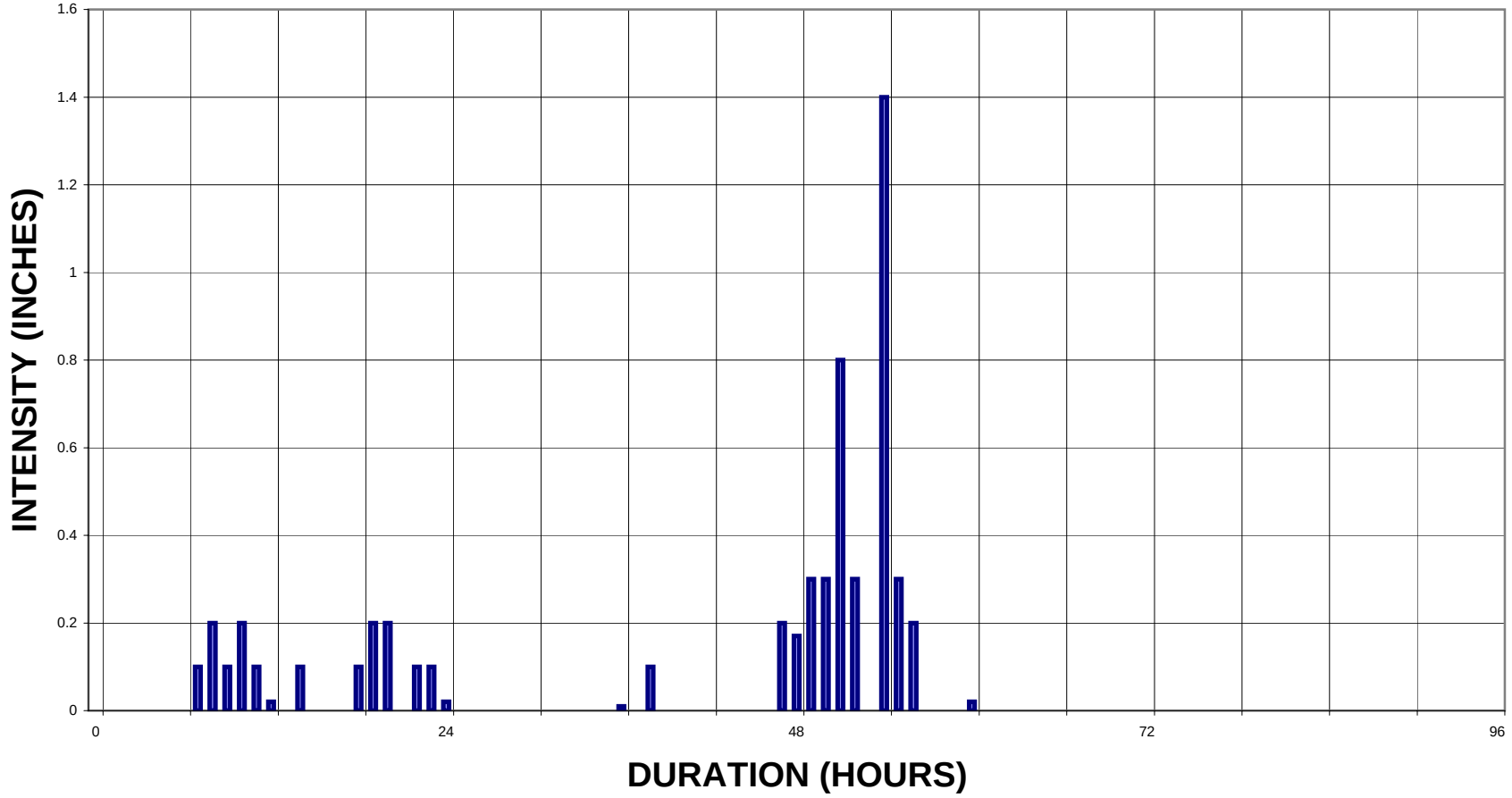

Figure 5-7

MORRIS BRIDGE SEPTEMBER 26TH AND 27TH
48 HOUR RAINFALL DISTRIBUTION

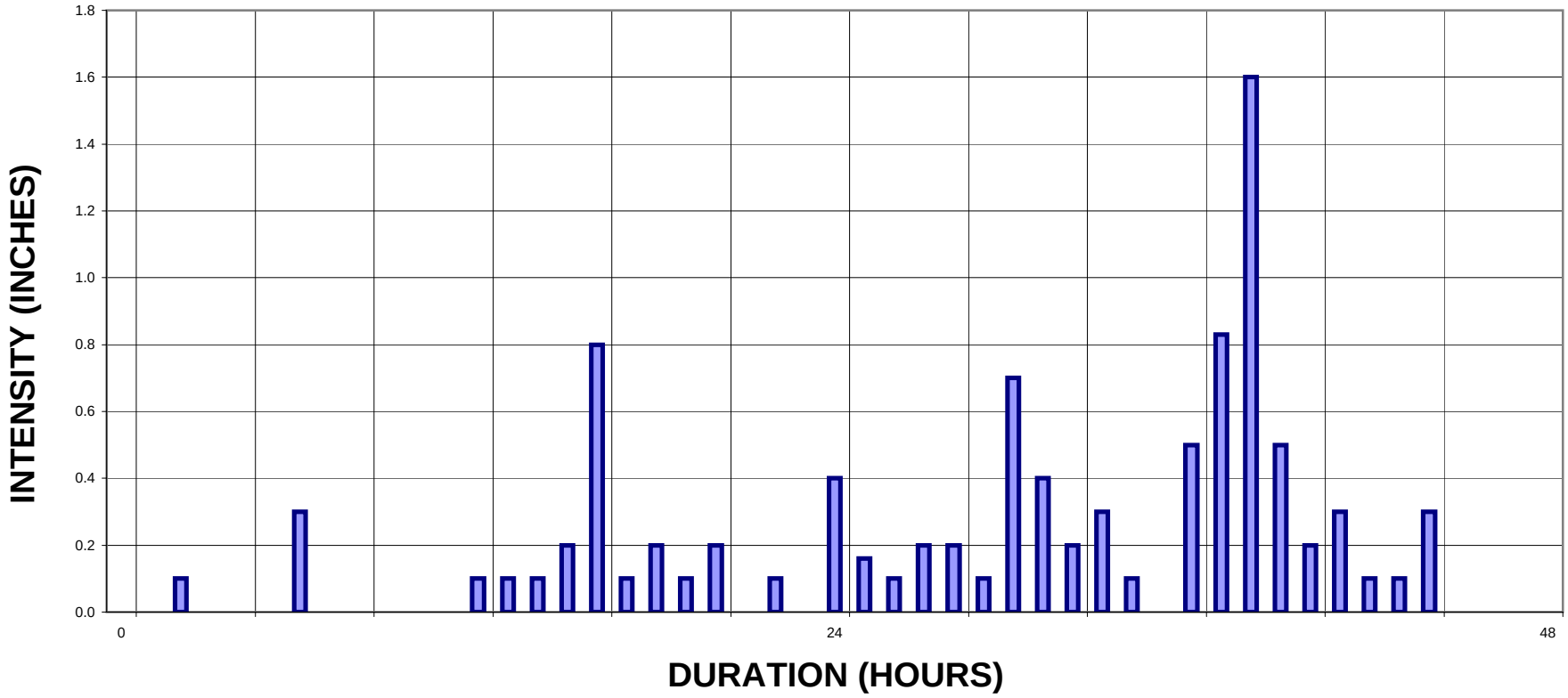

Figure 5-8

MORRIS BRIDGE DECEMBER 10TH THRU 13TH
96 HOUR RAINFALL DISTRIBUTION

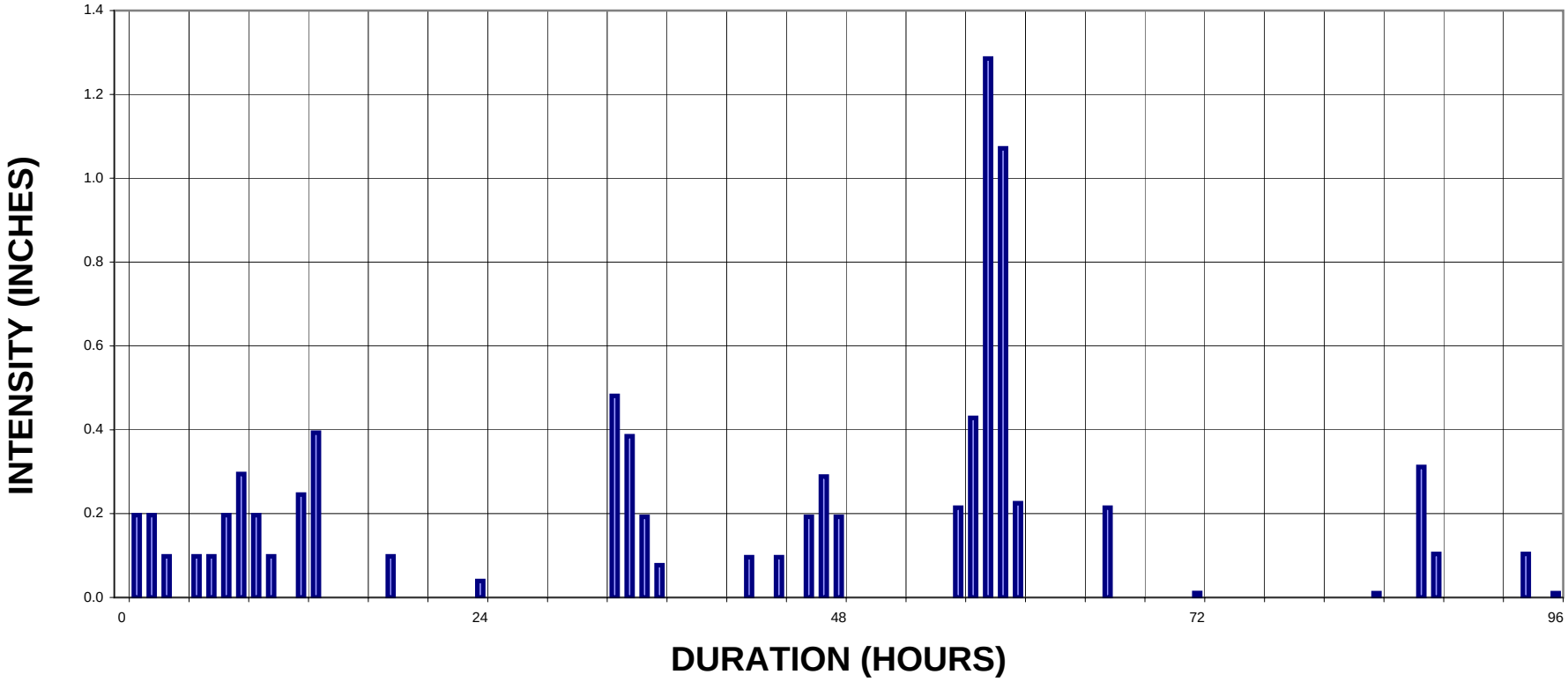

Figure 5-9

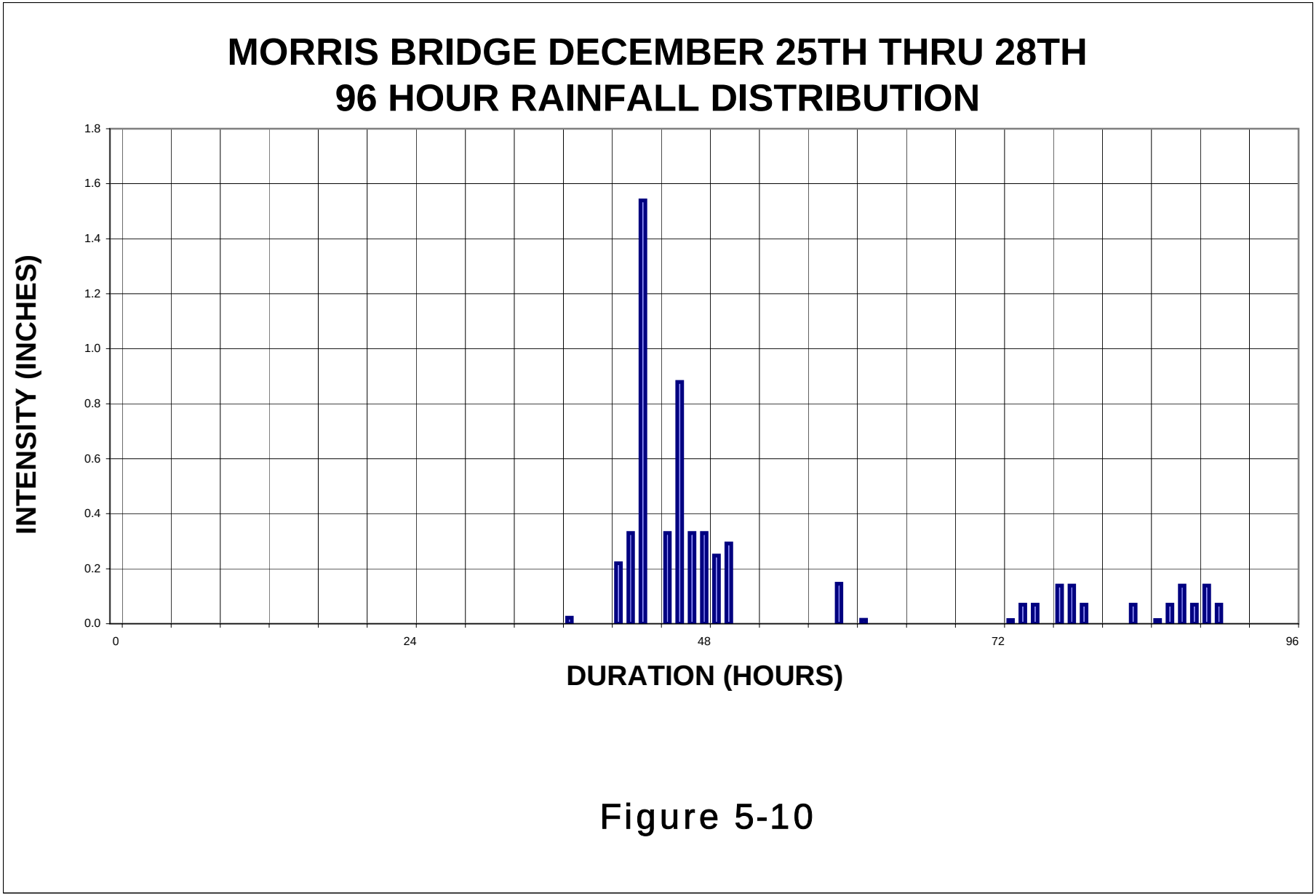
MORRIS BRIDGE DECEMBER 25TH THRU 28TH
96 HOUR RAINFALL DISTRIBUTION
INTENSITY (INCHES)
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
24
48
72
96
DURATION (HOURS)

Figure 5-10

calibration and verification. Table 5-2 contains data collected from these USGS gauges for storm events for the calibration and verification. Figure 5-1 shows the location where the calibration information was collected.

In addition, lake water surface elevations from SWFWMD for selected lakes, was used for the time period in the model calibration and verification. SWFWMD has developed a wide network of lake stage recording gauges within the Cypress Creek watershed.

5.3 EXISTING CONDITIONS MODEL CALIBRATION

In the modified EPA SWMM model, most of the required input data simply describes the geometry and size of the hydraulic and hydrologic units of the subdivided study area. These data, such as the sub-basin areas, channel widths; lengths and cross drain dimensions, are known quantities and are subject to very little interpretation. A few of the input requirements, however, are not derived from measurable qualities of the subattachments. These data are referred to as calibration parameters and include:

- X The maximum and minimum infiltration rates for pervious areas
- X The pervious and impervious depression storage volumes
- X The channel and overland flow roughness coefficients

These parameters are first approximated with values derived from local data (e.g., aerial topographic photographs and soil surveys), but their final values are ultimately determined through model calibration.

After a fundamental hydrologic and hydraulic check, a calibration process is conducted to evaluate the general reliability of the model for producing reasonable results.

The December 10-13, 1997 event was selected for calibrating the existing conditions model due to the availability of recorded data, and the magnitude and flooding which occurred during this storm event. December 10-13 recorded data also contained above average rainfall and stage/discharge values. An average of 6.18 inches of total rainfall was recorded in the Cypress Creek watershed during the December 10-13, 1997 storm event.

The Cypress Creek watershed covers a wide area of approximately 33 square miles. The total rainfall during the December 10-13 storm was not uniformly distributed. Rainfall amounts ranged from 4.98 inches at the Lake Allen gauge station in the northern part of the watershed to 8.11 inches at the Bay Lake gauge station located west of the Cypress Creek watershed (see Table 5-1). For improved model calibration, a graphical Thiessen method has been selected to determine the radius of influence for each rainfall gauge over the Cypress Creek watershed. Based on the Thiessen method, a defined number of sub-basins are assigned for each rainfall gauge intensity and distribution by dividing the watershed area into unequal polygons. The practical use of the Thiessen graphical method is provided in Appendix A Exhibit 1.

TABLE 5 - 2

USGS GAUGE DATA SUMMARY

RECORDED STORM EVENT	USGS STATION NAME			
	SULFER SPRINGS 02303801		WORTHINGTON GARDENS 02303420	
	DISCHARGE [CFS]	STAGE [FT-NGVD]	DISCHARGE [CFS]	STAGE [FT-NGVD]
SEPTEMBER 26TH & 27TH	124	28.07	30	44.37
DECEMBER 10TH TO 14TH	188	28.63	80	45.94
DECEMBER 25TH TO 28TH	648	29.67	382	48.6

* No two decimal accuracy data available

NOTE: Above data represents peak values during the appropriate storm event.

Lake Water Surface Elevations and USGS streamflow gauge data is used as initial water elevation input and flow input from Pasco County, for the model calibration. The initial model junction elevations were calculated with linear interpolation between the elevation values where recorded data was available.

A summary of initial stages with SWFWMD and USGS recorded data is shown in Table 5-3 through Table 5-5, respectively, for the December 10-13 calibration storm event.

The objectives of the calibration are to better match stage and discharge, of the calculated hydrographs with the recorded data. Adjustments to the infiltration rates increase or decrease flow rates during the time period of runoff. Similarly, adjustments to the total infiltration capacity affect runoff volume, shift the time of the runoff, and alter the recession limb of the hydrograph. Based on a given set of calibration parameters, the model is adequately calibrated when the observed and calculated hydrograph agree for December 10-13 storm. The model is then ready for further verification using different storm events.

The maximum computed water surface elevations at selected lakes in the watershed was found to be generally higher than the collected gauge data for the December 10-13, 1997 events but within 0.1 to 1.0 feet. **Figures 5-11(a) to 5-11(f)** contain the graphical representation of this comparison.

5.4 Existing Conditions Model Verification

Model verification is an important step which ensures that adjustments made to the model during calibration are appropriate and that the model will produce reliable results.

The September 26-27, 1997 rainfall event was selected as one of the verification events. This storm event occurred near the beginning of a weather pattern known as El Nino which brought heavier than normal rainfall for the 1997-1998 winter. This event was selected due to the availability of gage data and the magnitude of the storm. The December 25-28 rainfall event was also selected for verification due to the high discharge/stage recorded data at the USGS gauges. Total rainfall recorded data at SWFWMD stations during the September 26-27 and December 25-28 storm events are summarized in Table 5-1.

Lake Water Surface Elevations and USGS streamflow gauge recorded data collected prior to and following the verification storm event(s) is also considered in the verification process. The procedure of calculating initial elevations for the two verification storm events, September 26-27 and December 25-28 is similar to the one described for the December 10-13 storm.

The verification event's hydrologic input file was developed using the same SWFWMD and USGS source data for the appropriate storm events.

TABLE 5 - 3

LAKE INITIAL ELEVATION SUMMARY
SEPTEMBER 26-27 STORM EVENT

LAKE NAME	JUNCTION #	SWFWMD DATA					MODEL *	
		INITIAL ELEV.	RECORD DATE	FINAL ELEV.	RECORD DATE	MIN. LOW	INPUT ELEV.	OUTPUT ELEV.
Hog Island Lake	542260	64.76	26-Sep-97	64.77	27-Sep-97	66.00	64.76	65.77
Cool Kell Lake	542270						67.00	67.47
Lake Kell	541100	65.44	26-Sep-97	65.45	27-Sep-97	66.00	65.44	64.59
Feinsinger Lake	541200						63.10	63.74
Swamp Lake	540700						64.00	64.50
Lake Commiston	540800	61.83	26-Sep-97	61.85	27-Sep-97	63.00	61.83	62.15
Keene Lake	540600	62.53	26-Sep-97	62.53	27-Sep-97	63.00	62.53	61.30
Hanna Lake	540500	59.86	26-Sep-97	59.89	27-Sep-97	62.50	59.86	60.51
Lake Stemper	521800	58.62	26-Sep-97	58.67	27-Sep-97	62.00	58.62	59.10
Burrell Lake	520300	46.38	26-Sep-97	46.42	27-Sep-97	50.00	46.38	47.09
Flynn Lake	520200						45.01	45.82
Lake Forest Subd.	510100						32.00	34.66

NOTE: The blank cell represents no available data.

* Represents elevation at 24 hrs.

TABLE 5 - 4

LAKE INITIAL ELEVATION SUMMARY
DECEMBER 10-13 STORM EVENT

LAKE NAME	JUNCTION #	SWFWMD DATA					MODEL	
		INITIAL ELEV.	RECORD DATE	FINAL ELEV.	RECORD DATE	MIN. LOW	INPUT ELEV.	OUTPUT ELEV.
Hog Island Lake	542260	66.86	10-Dec-97	66.99	13-Dec-97	66.00	66.86	67.01
Cool Kell Lake	542270						67.00	67.62
Lake Kell	541100	66.88	10-Dec-97	66.37	13-Dec-97	66.00	66.88	64.82
Feinsinger Lake	541200						64.10	64.14
Swamp Lake	540700						65.00	64.68
Lake Commiston	540800	62.54	10-Dec-97	62.58	13-Dec-97	63.00	62.54	62.11
Keene Lake	540600	61.80	10-Dec-97	61.73	13-Dec-97	63.00	61.80	61.32
Hanna Lake	540500	61.88	10-Dec-97	61.96	13-Dec-97	62.50	61.88	60.42
Lake Stemper	521800	60.99	10-Dec-97	61.08	13-Dec-97	62.00	60.99	59.85
Burrell Lake	520300	49.94	10-Dec-97	50.15	13-Dec-97	50.00	49.94	51.06
Flynn Lake	520200						46.10	46.56
Lake Forest Subd.	510100						33.00	33.34

NOTE: The blank cell represents no available data.

* Represents elevation at 72 hrs.

TABLE 5 - 5

LAKE INITIAL ELEVATION SUMMARY
DECEMBER 25-28 STORM EVENT

LAKE NAME	JUNCTION #	SWFWMD DATA					MODEL	
		INITIAL ELEV.	RECORD DATE	FINAL ELEV.	RECORD DATE	MIN. LOW	INPUT ELEV.	OUTPUT ELEV.
Hog Island Lake	542260	67.17	10-Dec-97	67.18	13-Dec-97	66.00	67.17	67.80
Cool Kell Lake	542270						67.00	67.28
Lake Kell	541100	66.40	10-Dec-97	66.37	13-Dec-97	66.00	66.40	65.16
Feinsinger Lake	541200						64.10	65.37
Swamp Lake	540700						65.00	62.25
Lake Commiston	540800	62.58	10-Dec-97	62.56	13-Dec-97	63.00	62.58	65.09
Keene Lake	540600	61.78	10-Dec-97	61.83	13-Dec-97	63.00	61.78	61.64
Hanna Lake	540500	62.01	10-Dec-97	61.99	13-Dec-97	62.50	62.01	60.74
Lake Stemper	521800	61.20	10-Dec-97	61.20	13-Dec-97	62.00	61.20	60.07
Burrell Lake	520300	50.30	10-Dec-97	50.25	13-Dec-97	50.00	50.30	51.31
Flynn Lake	520200						46.10	47.15
Lake Forest Subd.	510100						33.00	34.33

NOTE: The blank cell represents no available data.

* Represents elevation at 72 hrs.

An important aspect of the hydrologic model that evolved during the calibration process was the establishment of antecedent soil moisture conditions. The numerous lakes, wetlands and ponds are not the only storage elements which retain precipitation and runoff during storm events. The unsaturated portion of the soil profile acts as a storage reservoir for the water which infiltrates the ground. In Florida, where the water table is usually very shallow, the available soil moisture holding capacity can vary over a wide range depending on the seasonal elevation of the water table. It is apparent in model calibration that the antecedent water table elevation (elevation at the beginning of the storm event) is an important factor, which determines the resultant magnitude of runoff.

Rainfalls in antecedent periods of 5 to 30 or more days prior to a storm are commonly used as indices of watershed wetness. An increase in an index means an increase in the runoff potential. Such indices are only rough approximations because they do no include the effects of evapotranspiration and infiltration on watershed wetness. Therefore, it is not worthwhile to attempt great accuracy in computing the index described below. The index of watershed wetness used with the runoff estimation method is Antecedent Moisture Condition (AMC). Three levels of AMC are used:

- AMC-I Lowest runoff potential. The watershed soils are dry enough for satisfactory plowing or cultivation to take place
- AMC-II The average condition
- AMC-III Highest runoff potential. The watershed is practically saturated from antecedent rains

Using the traditional method the AMC can be estimated from 5-day antecedent rainfall by the use of the table below, which gives the rainfall limits by season categories.

TOTAL 5-DAY ANTECEDENT RAINFALL		
AMC Group	Dormant Season	Growing Season
AMC-I	Less than 0.50"	Less than 1.40"
AMC-II	0.50" to 1.10"	1.40" to 2.10"
AMC-III	over 1.10"	over 2.10"

Due to variable rainfall and antecedent moisture conditions, different Antecedent Moisture Conditions for each storm event were used for calibration and verification purposes. AMC-II based on the lake water surface elevations is used for the December 10-13 storm. For the September 26-27 storm, AMC-I is selected. Finally, AMC-III is used for the December 25-28 storm event,

respectively. A table of the curve number adjustments is provided below.

CN Adjustment lookup table F.3 in Stormwater Management (Wanielista, Yousef, 1993)

AMC 2	AMC 1	AMC 3
100	100	100
95	87	98
90	78	96
85	70	94
80	63	91
75	57	88
70	51	85
65	45	82
60	40	78
55	35	74
50	31	70
45	26	65
40	22	60
35	18	55
30	15	50

The maximum computed water surface elevations at selected lakes in the watershed was found to be generally higher than the gauge data for the verification storm events, but was within 0.1 to 1.0 feet**.** **Figures 5-12(a) to 5-12(f) and 5-13(a) to 5-13(f)** contain the graphical representation of this comparison.

5.5 CONCLUSIONS

Based on selected calibration and verification storm events, the model represents the existing conditions for the period from September 1997 to January 1998.

Comparison of computed stages with the Lake Water Surface Elevation data provided by SWFWMD along Cypress Creek and by the USGS gauges reveals that the computed stages are generally slightly higher (0.1 to 1.0 feet) than the actual peak stages, but are within acceptable ranges. Therefore, it is observed that the model produces reliable results. In general, this model is considered calibrated and verified. The model is capable of simulating design storm events in the Cypress Creek Watershed.

CYPRESS CREEK GJH 5/7/2000
CALIB DEC. 10, 1997

		Lake Kell	Lake Commiston	Keene Lake	Hanna Lake	Lake Stemper	Burrell Lake
	Junction	541100	540800	40600	540500	521800	520300
	Time Hr	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
Observed	0	66.29	62.54	61.80	61.88	60.99	49.94
	24	65.32	62.28	61.13	61.23	60.67	50.22
	48	65.30	61.57	61.02	61.31	60.35	50.35
	72	64.58	62.57	61.77	61.27	59.85	50.72
	96	64.26	62.31	61.76	60.67	60.25	50.30
Model	1	66.45	62.49	61.83	61.69	60.94	49.94
	2	66.06	62.44	61.81	61.58	60.90	49.94
	3	65.73	62.40	61.79	61.48	60.85	49.94
	4	65.46	62.36	61.77	61.39	60.81	49.94
	5	65.26	62.32	61.76	61.31	60.76	49.94
	6	65.14	62.28	61.74	61.23	60.73	49.94
	7	65.11	62.24	61.72	61.16	60.69	49.94
	8	65.10	62.21	61.71	61.10	60.65	49.94
	9	65.08	62.18	61.69	61.04	60.62	49.94
	10	65.07	62.15	61.67	60.99	60.58	49.94
	11	65.06	62.12	61.65	60.95	60.55	49.94
	12	65.04	62.09	61.64	60.90	60.51	49.94
	13	65.03	62.06	61.62	60.87	60.48	49.94
	14	65.02	62.03	61.60	60.83	60.45	49.94
	15	65.01	62.01	61.59	60.80	60.42	49.94
	16	65.00	61.99	61.58	60.77	60.38	49.94
	17	64.99	61.97	61.56	60.74	60.35	49.95
	18	64.98	61.95	61.55	60.72	60.33	49.95
	19	64.97	61.93	61.54	60.70	60.30	49.98
	20	64.96	61.92	61.53	60.68	60.27	50.02
	21	64.96	61.90	61.52	60.66	60.24	50.02
	22	64.95	61.89	61.51	60.64	60.22	50.06
	23	64.94	61.88	61.50	60.64	60.19	50.15
	24	64.94	61.91	61.52	60.67	60.17	50.20
	25	64.95	61.94	61.54	60.69	60.14	50.20
	26	64.95	61.96	61.56	60.68	60.12	50.21
	27	64.96	61.97	61.56	60.67	60.10	50.21
	28	64.95	61.97	61.56	60.65	60.08	50.21
	29	64.95	61.96	61.56	60.64	60.06	50.21
	30	64.94	61.94	61.54	60.63	60.03	50.21
	31	64.93	61.92	61.52	60.62	60.01	50.22
	32	64.92	61.90	61.51	60.60	59.99	50.28
	33	64.91	61.89	61.50	60.61	59.97	50.37
	34	64.91	61.91	61.50	60.63	59.96	50.39
	35	64.91	61.92	61.51	60.63	59.94	50.39
	36	64.90	61.93	61.51	60.62	59.92	50.39
	37	64.90	61.92	61.50	60.60	59.90	50.39
	38	64.90	61.92	61.49	60.59	59.88	50.40
	39	64.89	61.90	61.48	60.57	59.87	50.40
	40	64.88	61.88	61.47	60.56	59.85	50.40
	41	64.87	61.86	61.45	60.54	59.83	50.40
	42	64.86	61.85	61.43	60.53	59.82	50.40
	43	64.85	61.83	61.42	60.52	59.80	50.40
	44	64.85	61.81	61.40	60.50	59.79	50.40

	Lake Kell	Lake Commiston	Keene Lake	Hanna Lake	Lake Stemper	Burrell Lake
Junction	541100	540800	40600	540500	521800	520300
Time						
Hr	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
45	64.84	61.80	61.39	60.49	59.77	50.40
46	64.83	61.78	61.38	60.47	59.76	50.43
47	64.82	61.79	61.37	60.49	59.74	50.48
48	64.82	61.83	61.40	60.55	59.73	50.50
49	64.83	61.88	61.43	60.57	59.72	50.51
50	64.84	61.92	61.45	60.56	59.70	50.52
51	64.85	61.94	61.46	60.56	59.69	50.52
52	64.85	61.94	61.47	60.54	59.68	50.52
53	64.84	61.93	61.46	60.53	59.67	50.52
54	64.84	61.92	61.45	60.52	59.66	50.52
55	64.83	61.90	61.43	60.51	59.65	50.52
56	64.82	61.89	61.42	60.51	59.64	50.52
57	64.81	61.87	61.40	60.50	59.63	50.53
58	64.81	61.86	61.39	60.49	59.62	50.55
59	64.80	61.85	61.38	60.48	59.61	50.56
60	64.79	61.85	61.38	60.48	59.60	50.57
61	64.79	61.85	61.38	60.48	59.59	50.59
62	64.79	61.86	61.38	60.48	59.58	50.62
63	64.79	61.87	61.38	60.49	59.57	50.65
64	64.79	61.89	61.39	60.51	59.56	50.68
65	64.79	61.91	61.40	60.52	59.56	50.70
66	64.79	61.94	61.42	60.53	59.55	50.71
67	64.80	61.95	61.42	60.53	59.54	50.73
68	64.80	61.97	61.43	60.53	59.54	50.76
69	64.80	61.98	61.44	60.54	59.53	50.81
70	64.80	62.00	61.45	60.56	59.53	50.86
71	64.80	62.03	61.47	60.60	59.53	50.90
72	64.81	62.08	61.49	60.63	59.53	50.92
73	64.82	62.11	61.51	60.64	59.53	50.95
74	64.82	62.14	61.53	60.65	59.53	50.98
75	64.83	62.16	61.54	60.65	59.53	50.99
76	64.83	62.17	61.55	60.66	59.52	51.00
77	64.82	62.17	61.55	60.66	59.52	51.00
78	64.82	62.16	61.54	60.65	59.52	51.00
79	64.81	62.14	61.52	60.63	59.51	51.01
80	64.81	62.12	61.51	60.62	59.50	51.01
81	64.80	62.10	61.49	60.60	59.50	51.01
82	64.79	62.07	61.47	60.59	59.49	51.01
83	64.78	62.05	61.45	60.57	59.49	51.01
84	64.77	62.03	61.43	60.55	59.48	51.01
85	64.76	62.01	61.41	60.54	59.47	51.02
86	64.76	61.98	61.40	60.52	59.46	51.02
87	64.75	61.96	61.38	60.50	59.46	51.02
88	64.74	61.94	61.36	60.48	59.45	51.02
89	64.74	61.92	61.35	60.46	59.44	51.02
90	64.73	61.90	61.33	60.45	59.44	51.02
91	64.72	61.88	61.32	60.43	59.43	51.03
92	64.72	61.87	61.30	60.41	59.42	51.04
93	64.71	61.85	61.29	60.40	59.41	51.05
94	64.70	61.84	61.28	60.39	59.41	51.07
95	64.70	61.83	61.28	60.39	59.40	51.08
96	64.70	61.83	61.27	60.39	59.40	51.09

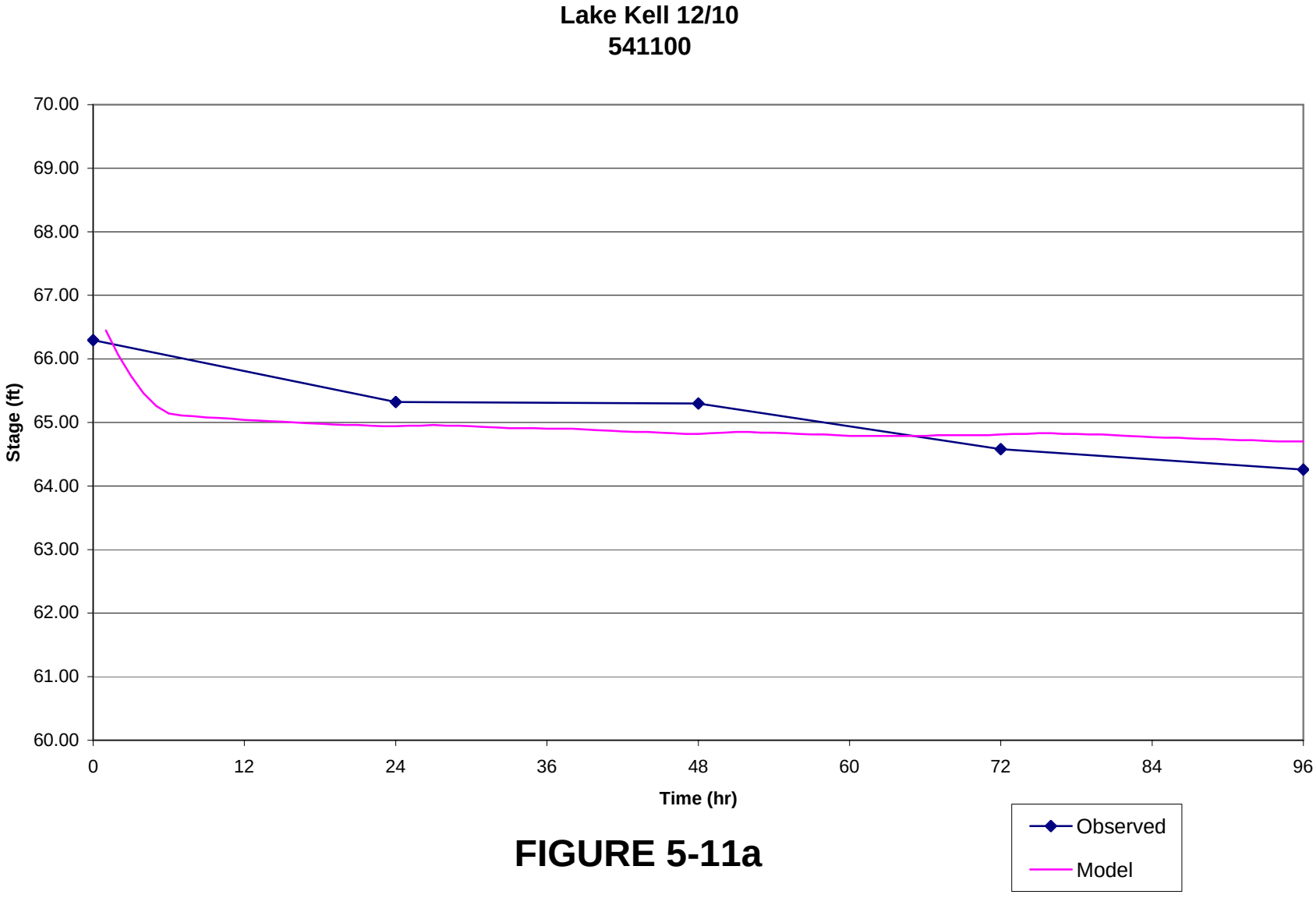
Lake Kell 12/10
541100
70.00
69.00
68.00
67.00
66.00
65.00
64.00
63.00
62.00
61.00
60.00
Stage (ft)
0
12
24
36
48
60
72
84
96
Time (hr)
Observed
Model

FIGURE 5-11a

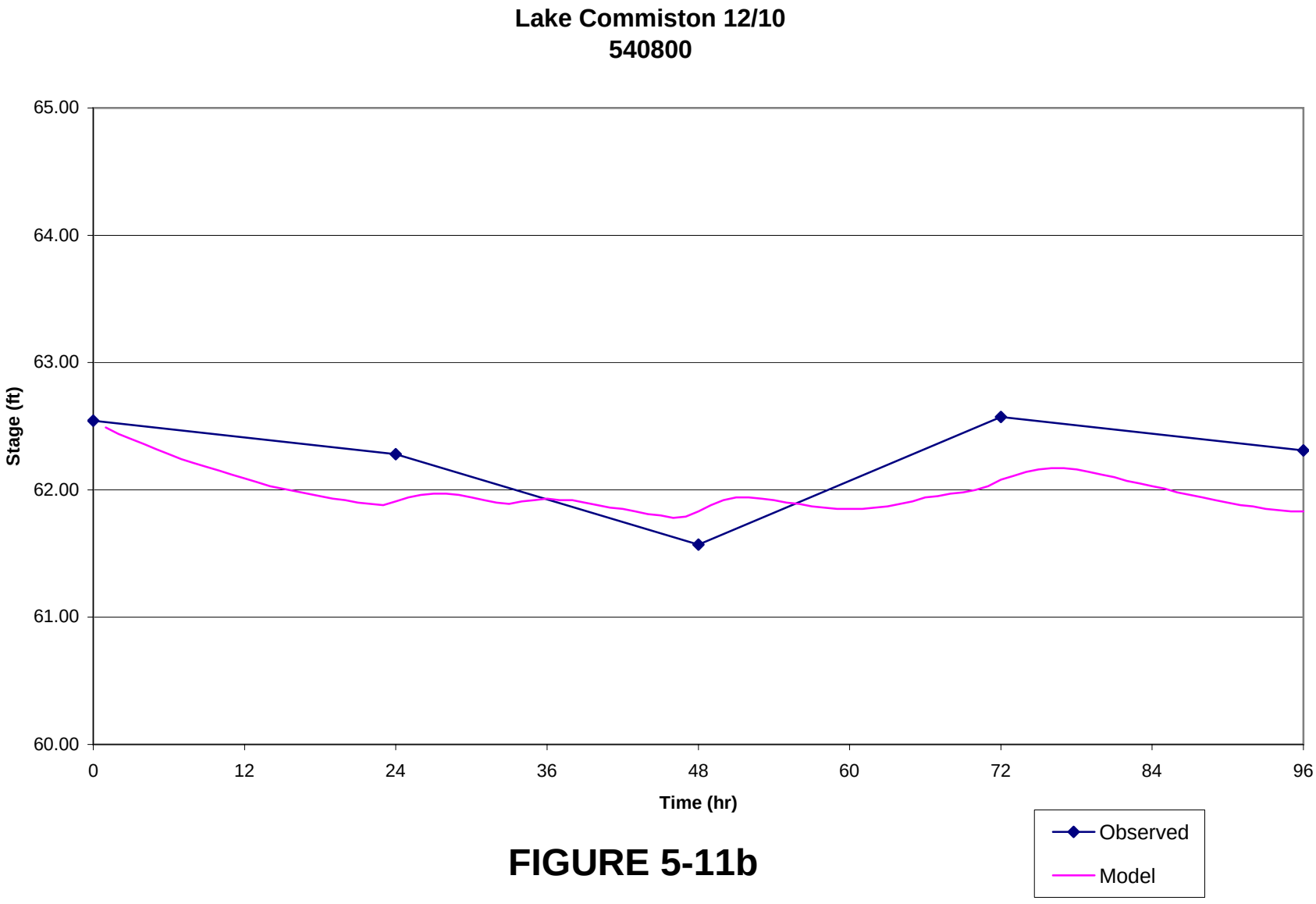
Lake Commiston 12/10
540800
65.00
64.00
63.00
62.00
61.00
60.00
Stage (ft)
0
12
24
36
48
60
72
84
96
Time (hr)
Observed
Model

FIGURE 5-11b

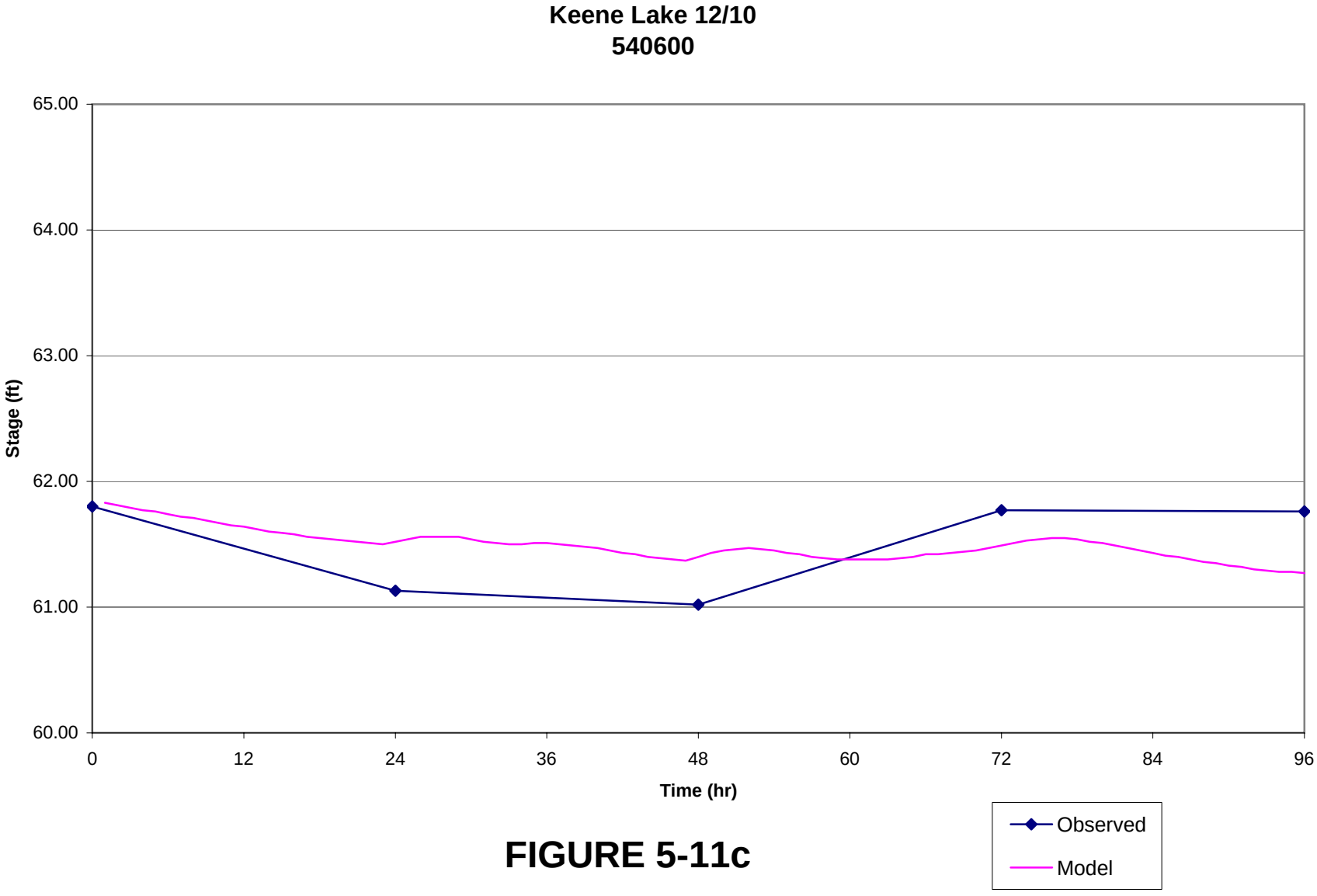
Keene Lake 12/10
540600
65.00
64.00
63.00
62.00
61.00
60.00
Stage (ft)
0
12
24
36
48
60
72
84
96
Time (hr)
Observed
Model

FIGURE 5-11c

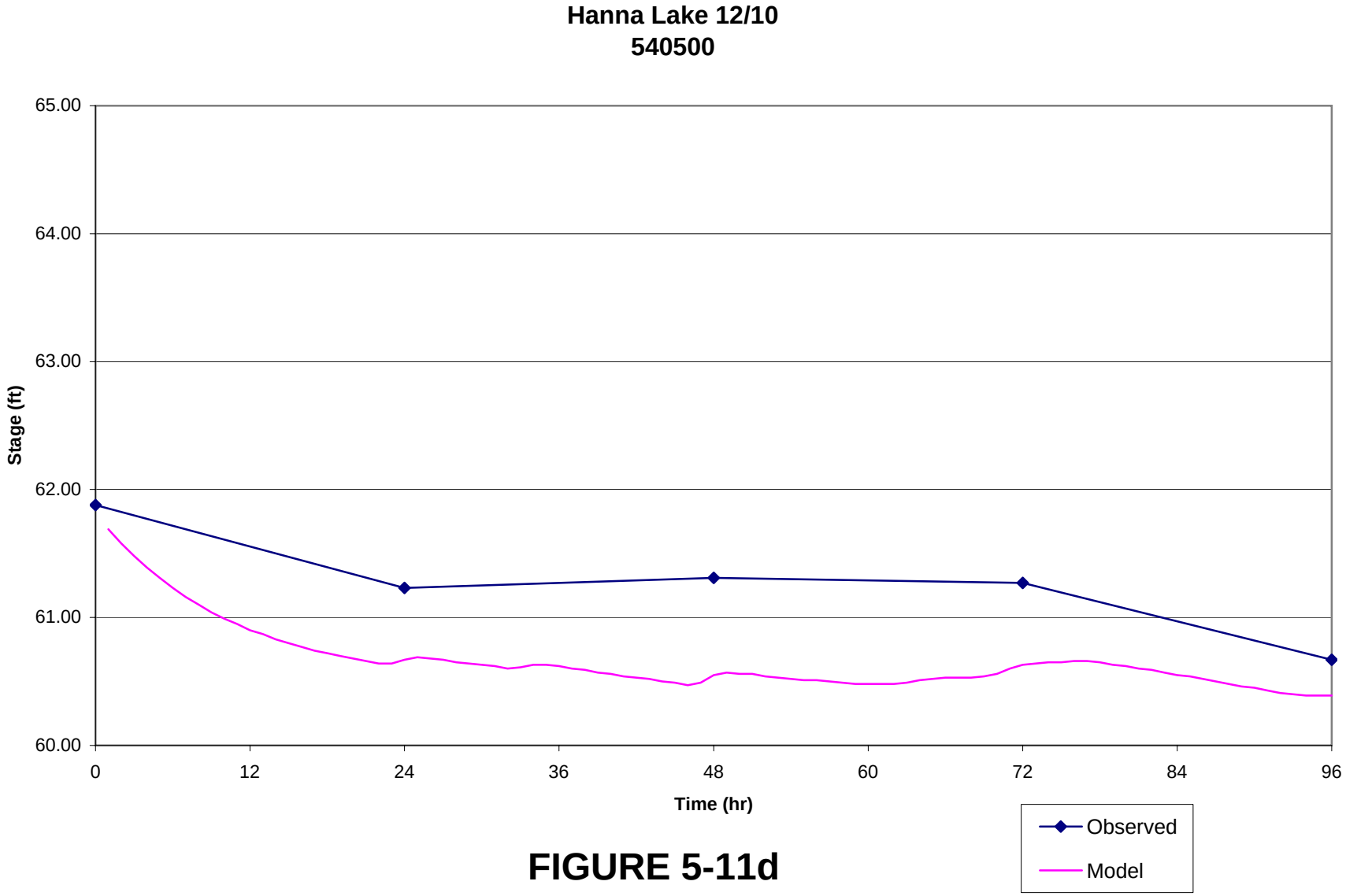
Hanna Lake 12/10
540500
65.00
64.00
63.00
62.00
61.00
60.00
Stage (ft)
0
12
24
36
48
60
72
84
96
Time (hr)
Observed
Model

FIGURE 5-11d

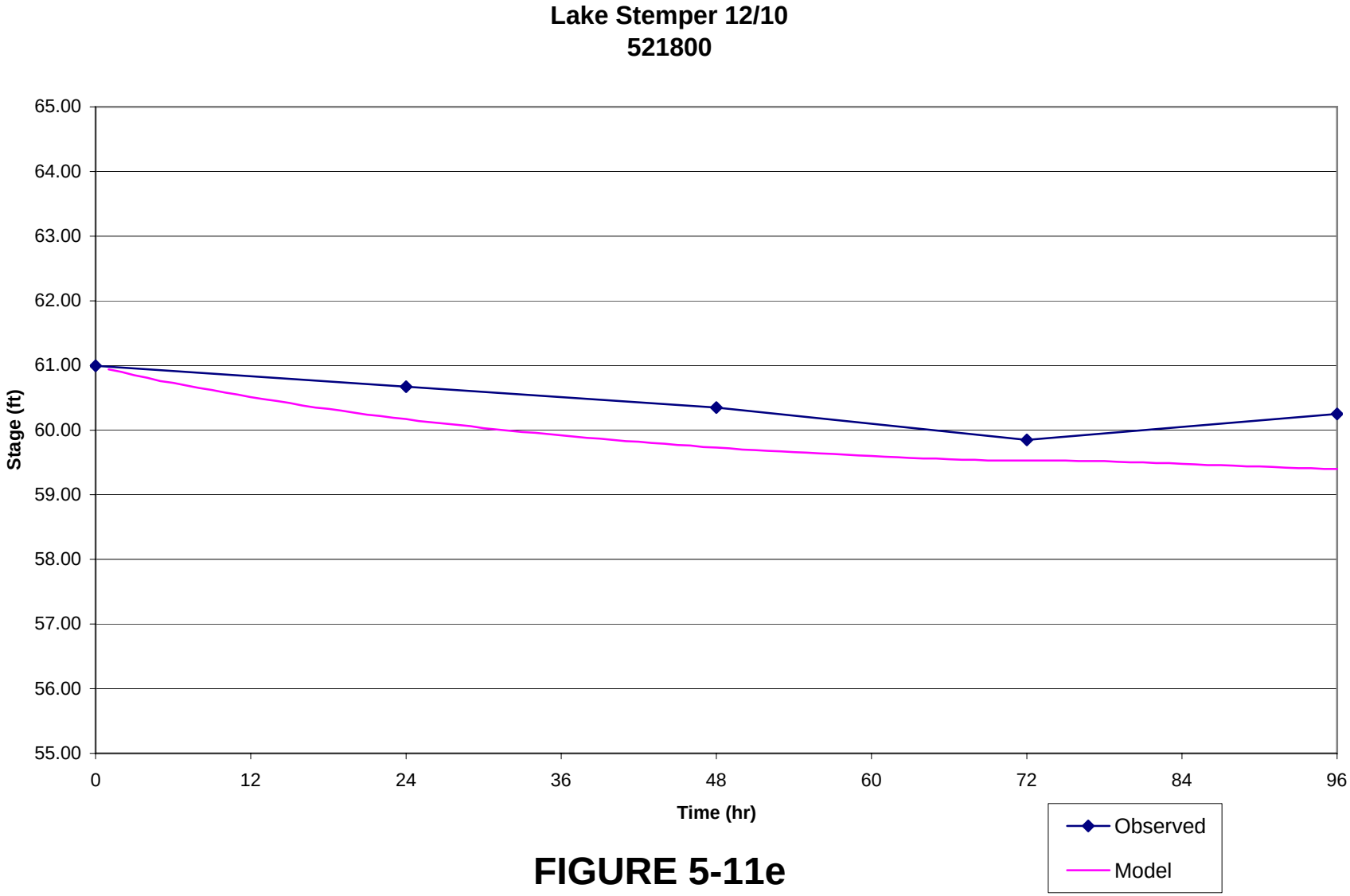
Lake Stemper 12/10
521800
65.00
64.00
63.00
62.00
61.00
60.00
59.00
58.00
57.00
56.00
55.00
Stage (ft)
0
12
24
36
48
60
72
84
96
Time (hr)
Observed
Model

FIGURE 5-11e

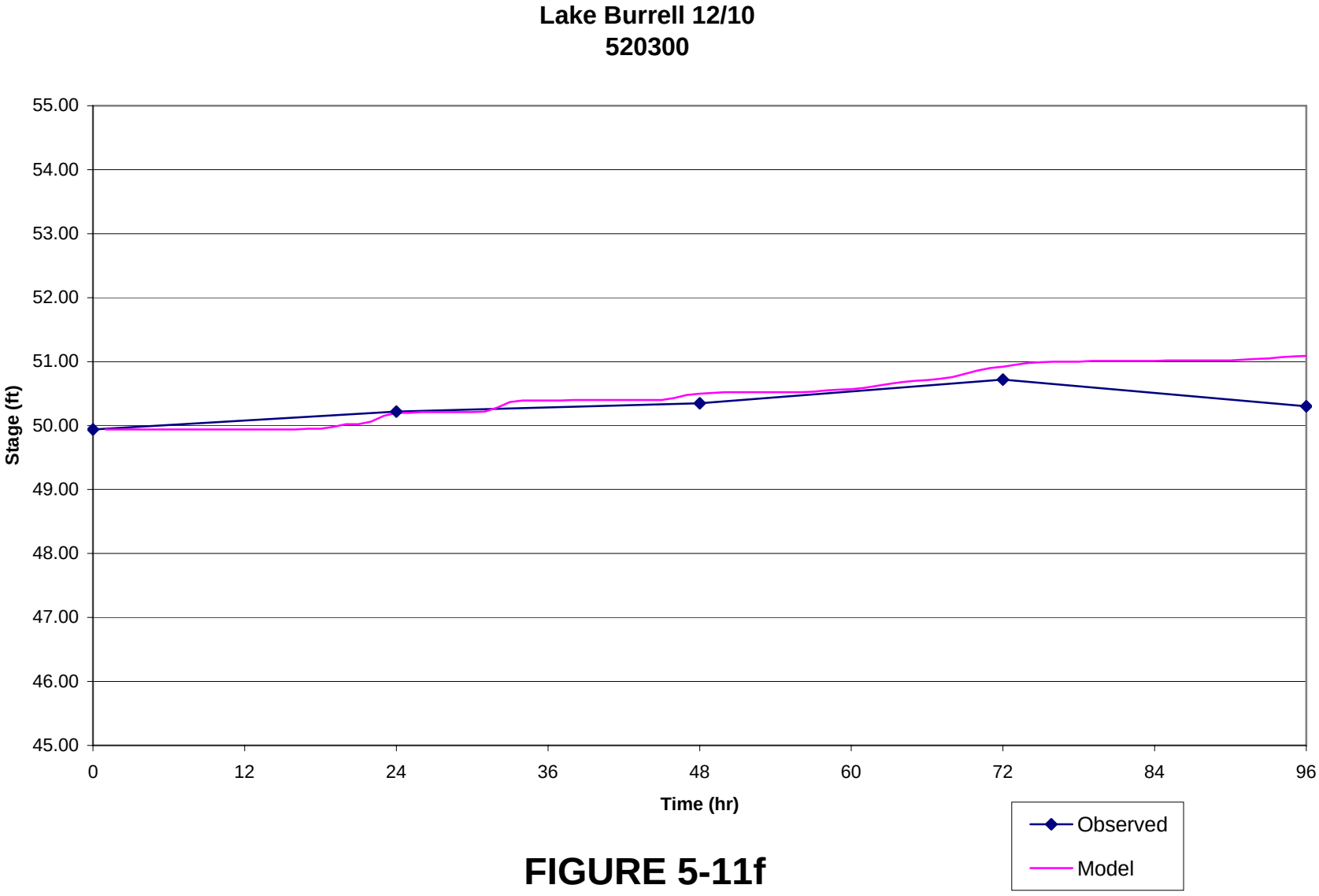
Lake Burrell 12/10
520300
55.00
54.00
53.00
52.00
51.00
50.00
49.00
48.00
47.00
46.00
45.00
Stage (ft)
0
12
24
36
48
60
72
84
96
Time (hr)
Observed
Model

FIGURE 5-11f

CYPRESS CREEK GJH 5/7/2000
CALIBRATION Sep. 26, 1997

		Lake Kell	Lake Commiston	Keene Lake	Hanna Lake	Lake Stemper	Burrell Lake
	Junction:	541100	540800	540600	540500	521800	520300
	Time Hr	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
Observed							
	0.00	65.44	61.83	62.53	59.84	58.62	46.38
	24.00	64.74	62.09	61.57	60.22	58.80	46.84
	48.00	65.17	62.02	61.83	60.24	59.10	47.24
	72.00	64.67	61.81	61.23	60.10	58.82	46.74
	96.00	64.71	61.65	61.13	59.64	58.77	46.46
Model							
	1.00	65.33	61.87	62.30	60.13	58.62	46.38
	2.00	65.23	61.90	62.11	60.31	58.62	46.38
	3.00	65.12	61.92	61.95	60.43	58.62	46.38
	4.00	65.02	61.91	61.81	60.51	58.62	46.38
	5.00	64.92	61.90	61.70	60.55	58.62	46.38
	6.00	64.82	61.88	61.61	60.57	58.62	46.40
	7.00	64.74	61.86	61.53	60.58	58.62	46.42
	8.00	64.65	61.86	61.46	60.58	58.62	46.45
	9.00	64.58	61.89	61.43	60.62	58.62	46.49
	10.00	64.51	61.93	61.41	60.64	58.62	46.53
	11.00	64.46	61.97	61.40	60.63	58.62	46.56
	12.00	64.41	62.00	61.38	60.61	58.62	46.59
	13.00	64.37	62.01	61.36	60.58	58.63	46.62
	14.00	64.35	62.01	61.34	60.57	58.63	46.65
	15.00	64.35	62.02	61.33	60.56	58.63	46.69
	16.00	64.35	62.04	61.31	60.57	58.63	46.72
	17.00	64.36	62.07	61.32	60.58	58.64	46.76
	18.00	64.38	62.10	61.32	60.57	58.64	46.79
	19.00	64.39	62.12	61.32	60.55	58.65	46.83
	20.00	64.41	62.13	61.31	60.53	58.65	46.88
	21.00	64.42	62.13	61.31	60.51	58.66	46.92
	22.00	64.42	62.13	61.29	60.50	58.66	46.96
	23.00	64.43	62.14	61.29	60.52	58.67	46.99
	24.00	64.44	62.15	61.29	60.51	58.67	47.03
	25.00	64.45	62.16	61.29	60.49	58.68	47.06
	26.00	64.46	62.17	61.29	60.49	58.69	47.09
	27.00	64.47	62.18	61.30	60.51	58.70	47.12
	28.00	64.48	62.20	61.31	60.51	58.71	47.15
	29.00	64.49	62.21	61.31	60.50	58.71	47.19
	30.00	64.51	62.26	61.35	60.59	58.73	47.22
	31.00	64.54	62.35	61.40	60.66	58.76	47.25
	32.00	64.57	62.42	61.46	60.69	58.78	47.28
	33.00	64.61	62.48	61.51	60.70	58.80	47.32
	34.00	64.64	62.51	61.54	60.70	58.82	47.36
	35.00	64.66	62.52	61.55	60.69	58.84	47.39
	36.00	64.66	62.49	61.54	60.67	58.85	47.43
	37.00	64.65	62.46	61.52	60.65	58.85	47.45
	38.00	64.64	62.42	61.49	60.63	58.86	47.47
	39.00	64.63	62.38	61.47	60.61	58.86	47.50
	40.00	64.62	62.35	61.44	60.61	58.87	47.53
	41.00	64.62	62.33	61.43	60.60	58.87	47.56
	42.00	64.61	62.30	61.41	60.58	58.88	47.59
	43.00	64.61	62.28	61.39	60.56	58.88	47.62
	44.00	64.60	62.25	61.38	60.53	58.89	47.65
	45.00	64.59	62.22	61.36	60.51	58.89	47.67
	46.00	64.58	62.19	61.34	60.49	58.89	47.68
	47.00	64.57	62.16	61.32	60.47	58.89	47.69
	48.00	64.56	62.13	61.30	60.45	58.90	47.71
	49.00	64.55	62.10	61.28	60.42	58.90	47.73
	50.00	64.54	62.08	61.26	60.40	58.90	47.74
	51.00	64.53	62.05	61.24	60.38	58.90	47.75
	52.00	64.52	62.03	61.22	60.36	58.90	47.75
	53.00	64.51	62.00	61.20	60.34	58.90	47.75
	54.00	64.50	61.98	61.19	60.32	58.90	47.75

	Lake Kell	Lake Commiston	Keene Lake	Hanna Lake	Lake Stemper	Burrell Lake
Junction:	541100	540800	540600	540500	521800	520300
Time Hr	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
55.00	64.49	61.96	61.17	60.30	58.90	47.75
56.00	64.49	61.94	61.15	60.28	58.90	47.75
57.00	64.48	61.92	61.14	60.27	58.90	47.75
58.00	64.47	61.90	61.13	60.25	58.89	47.75
59.00	64.46	61.88	61.11	60.23	58.89	47.75
60.00	64.46	61.86	61.10	60.22	58.89	47.75
61.00	64.45	61.84	61.08	60.20	58.89	47.75
62.00	64.44	61.83	61.07	60.19	58.89	47.75
63.00	64.43	61.81	61.06	60.17	58.89	47.75
64.00	64.43	61.80	61.05	60.16	58.89	47.75
65.00	64.42	61.78	61.04	60.14	58.89	47.75
66.00	64.42	61.77	61.03	60.13	58.89	47.75
67.00	64.41	61.76	61.01	60.12	58.89	47.75
68.00	64.40	61.74	61.00	60.11	58.89	47.75
69.00	64.40	61.73	60.99	60.09	58.89	47.75
70.00	64.39	61.72	60.98	60.08	58.89	47.75
71.00	64.39	61.71	60.97	60.07	58.89	47.75
72.00	64.38	61.69	60.96	60.06	58.89	47.75
73.00	64.38	61.68	60.96	60.05	58.89	47.75
74.00	64.38	61.67	60.95	60.04	58.88	47.75
75.00	64.37	61.66	60.94	60.03	58.88	47.75
76.00	64.37	61.65	60.93	60.02	58.88	47.75
77.00	64.37	61.64	60.92	60.01	58.88	47.75
78.00	64.36	61.63	60.91	60.00	58.88	47.75
79.00	64.36	61.62	60.90	59.99	58.88	47.75
80.00	64.36	61.62	60.90	59.98	58.88	47.75
81.00	64.36	61.61	60.89	59.97	58.88	47.75
82.00	64.35	61.60	60.88	59.97	58.88	47.75
83.00	64.35	61.59	60.88	59.96	58.88	47.75
84.00	64.35	61.58	60.87	59.95	58.88	47.75
85.00	64.34	61.57	60.86	59.94	58.88	47.75
86.00	64.34	61.57	60.86	59.94	58.88	47.75
87.00	64.34	61.56	60.85	59.93	58.88	47.75
88.00	64.34	61.55	60.85	59.92	58.88	47.75
89.00	64.33	61.55	60.84	59.92	58.88	47.75
90.00	64.33	61.54	60.83	59.91	58.87	47.75
91.00	64.33	61.53	60.83	59.90	58.87	47.75
92.00	64.33	61.53	60.83	59.90	58.87	47.75
93.00	64.32	61.52	60.82	59.89	58.87	47.75
94.00	64.32	61.51	60.81	59.88	58.87	47.75
95.00	64.32	61.51	60.81	59.88	58.87	47.75
96.00	64.32	61.50	60.81	59.87	58.87	47.75

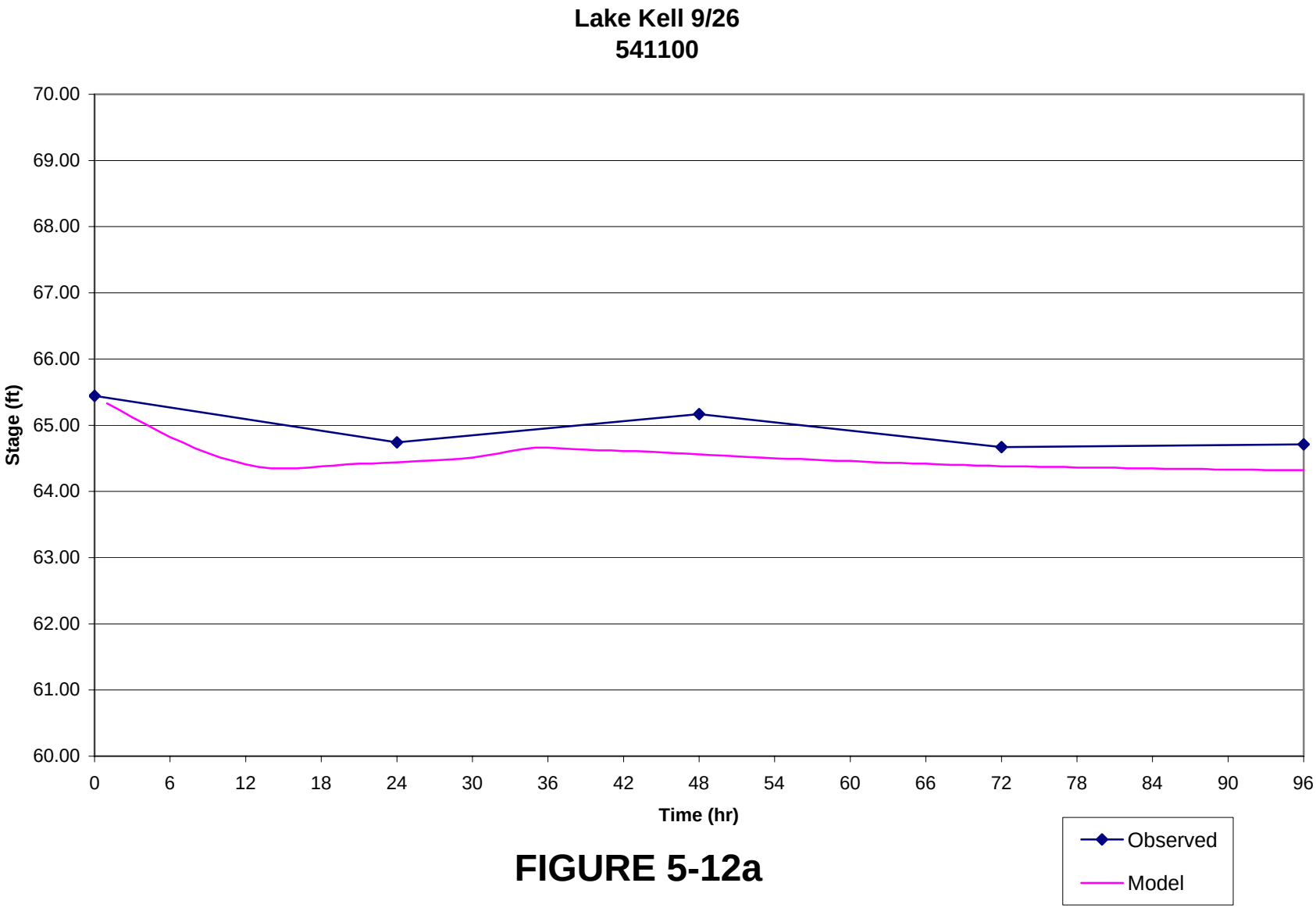
Lake Kell 9/26
541100
70.00
69.00
68.00
67.00
66.00
65.00
64.00
63.00
62.00
61.00
60.00
Stage (ft)
0
6
12
18
24
30
36
42
48
54
60
66
72
78
84
90
96
Time (hr)
Observed
Model

FIGURE 5-12a

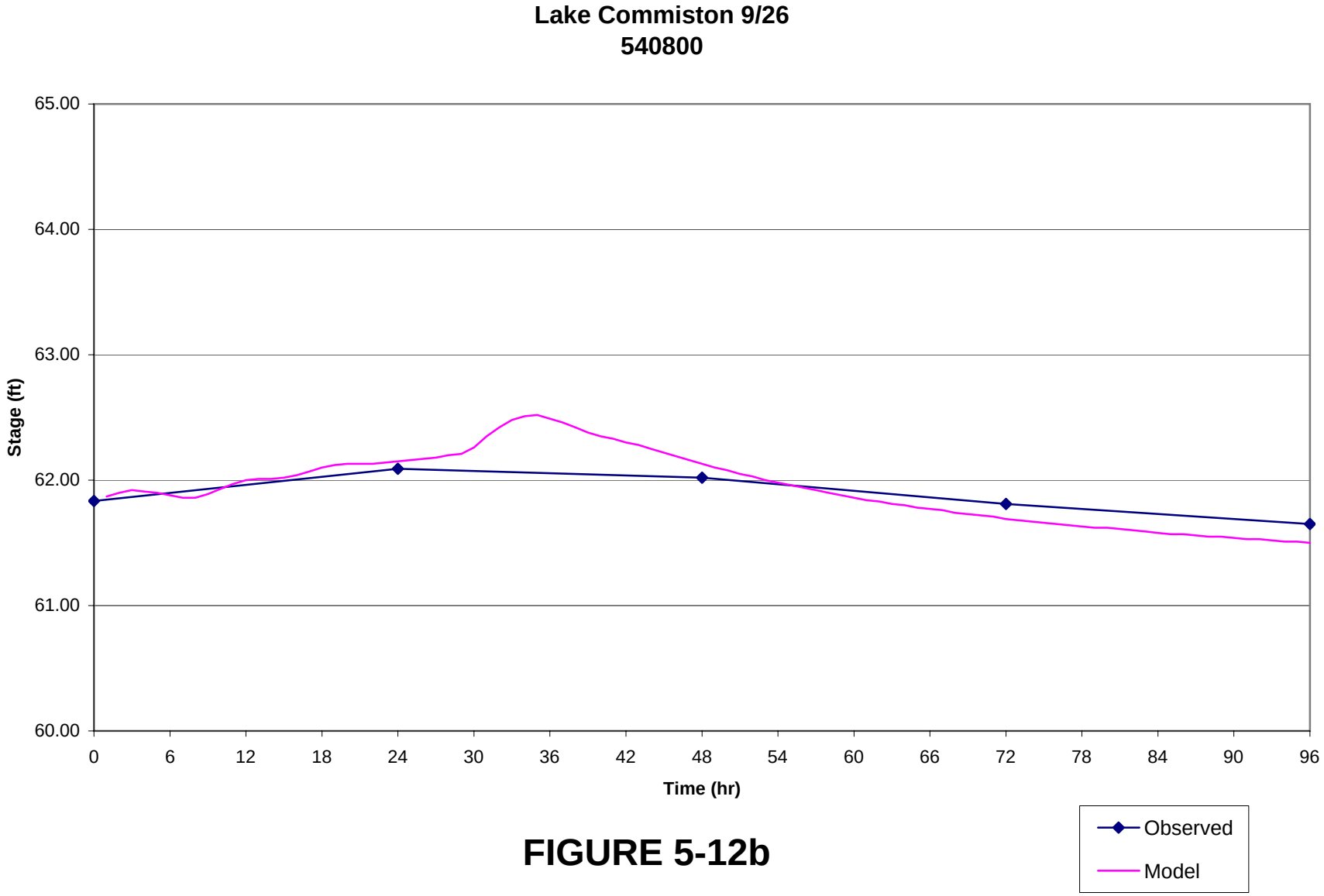
Lake Commiston 9/26
540800
65.00
64.00
63.00
62.00
61.00
60.00
Stage (ft)
0
6
12
18
24
30
36
42
48
54
60
66
72
78
84
90
96
Time (hr)
Observed
Model

FIGURE 5-12b

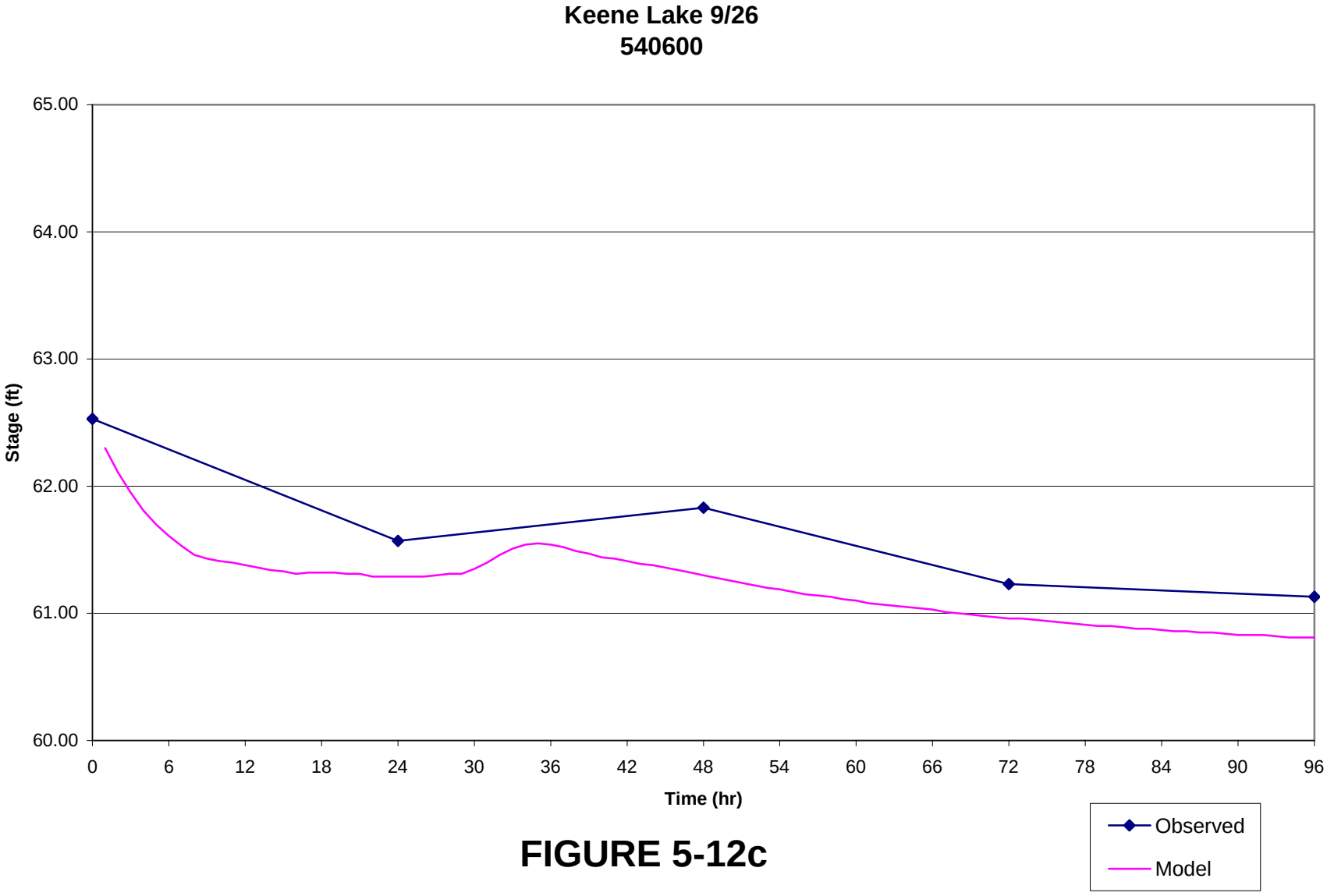
Keene Lake 9/26
540600
65.00
64.00
63.00
62.00
61.00
60.00
Stage (ft)
0
6
12
18
24
30
36
42
48
54
60
66
72
78
84
90
96
Time (hr)
Observed
Model

FIGURE 5-12c

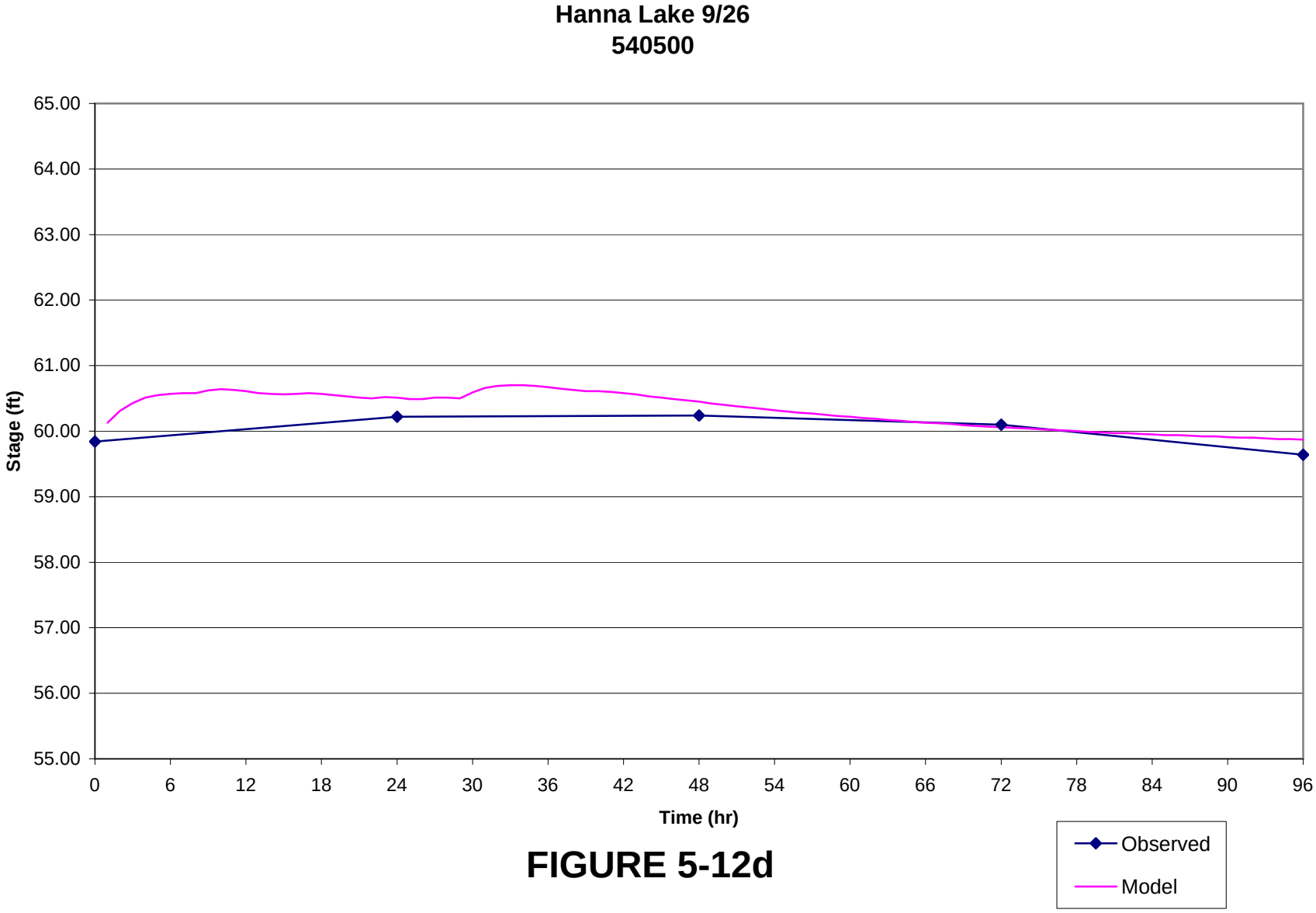
Hanna Lake 9/26
540500
65.00
64.00
63.00
62.00
61.00
60.00
59.00
58.00
57.00
56.00
55.00
Stage (ft)
0
6
12
18
24
30
36
42
48
54
60
66
72
78
84
90
96
Time (hr)
Observed
Model

FIGURE 5-12d

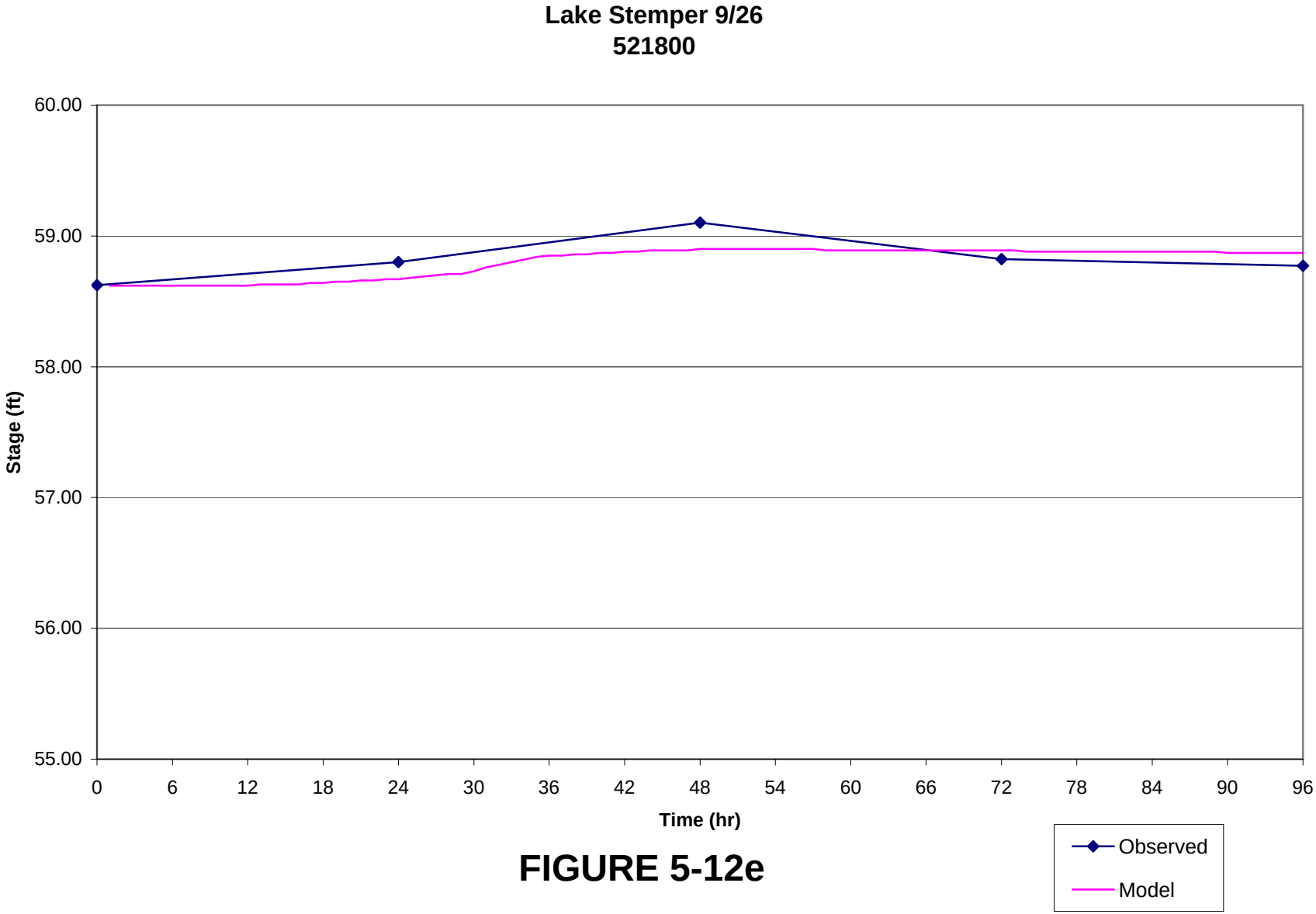
Lake Stemper 9/26
521800
60.00
59.00
58.00
57.00
56.00
55.00
Stage (ft)
0
6
12
18
24
30
36
42
48
54
60
66
72
78
84
90
96
Time (hr)
Observed
Model

FIGURE 5-12e

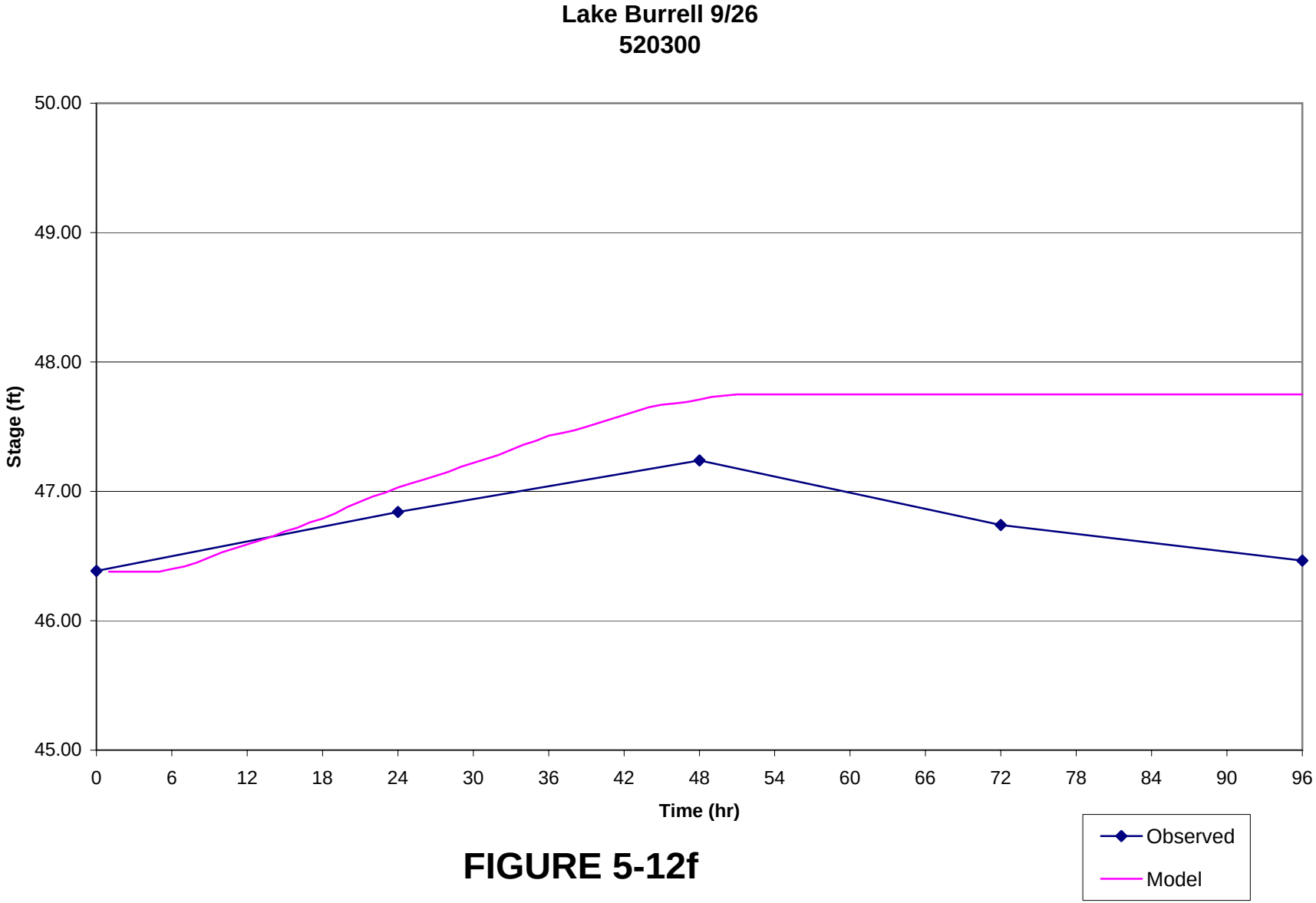
Lake Burrell 9/26
520300
50.00
49.00
48.00
47.00
46.00
45.00
Stage (ft)
0
6
12
18
24
30
36
42
48
54
60
66
72
78
84
90
96
Time (hr)
Observed
Model

FIGURE 5-12f

CYPRESS CREEK GJH 5/7/2000
CALIBRATION Dec. 25, 1997

		Lake Kell	Lake Commiston	Keene Lake	Hanna Lake	Lake Stemper	Burrell Lake
	Junction	541100	540800	40600	540500	521800	520300
	Time Hr	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
Observed							
	0	66.13	62.58	61.91	61.87	61.20	50.30
	24	65.62	62.26	61.79	61.41	60.72	50.55
	48	65.81	62.11	61.54	61.06	60.13	50.70
	72	65.88	62.73	62.09	61.30	60.52	50.87
	96	65.46	62.24	61.82	60.88	60.25	50.58
Model							
	1	66.03	62.53	61.86	61.75	61.15	50.30
	2	65.71	62.48	61.84	61.63	61.10	50.30
	3	65.43	62.43	61.82	61.53	61.05	50.30
	4	65.23	62.39	61.79	61.44	61.00	50.30
	5	65.11	62.35	61.76	61.35	60.95	50.30
	6	65.07	62.31	61.74	61.27	60.91	50.30
	7	65.06	62.27	61.72	61.20	60.87	50.30
	8	65.04	62.24	61.69	61.13	60.83	50.30
	9	65.03	62.20	61.68	61.08	60.79	50.31
	10	65.02	62.18	61.67	61.03	60.75	50.32
	11	65.02	62.17	61.66	61.00	60.71	50.34
	12	65.01	62.17	61.66	60.97	60.68	50.35
	13	65.01	62.16	61.66	60.93	60.64	50.35
	14	65.00	62.14	61.65	60.90	60.61	50.36
	15	65.00	62.13	61.64	60.87	60.57	50.36
	16	64.99	62.11	61.63	60.84	60.54	50.37
	17	64.98	62.09	61.62	60.81	60.51	50.37
	18	64.97	62.07	61.60	60.79	60.47	50.37
	19	64.96	62.06	61.59	60.78	60.44	50.39
	20	64.96	62.07	61.59	60.79	60.41	50.42
	21	64.96	62.09	61.60	60.80	60.38	50.44
	22	64.96	62.10	61.61	60.79	60.35	50.45
	23	64.96	62.11	61.62	60.78	60.33	50.46
	24	64.96	62.12	61.62	60.78	60.30	50.47
	25	64.95	62.12	61.62	60.76	60.27	50.48
	26	64.95	62.11	61.61	60.75	60.25	50.48
	27	64.94	62.09	61.59	60.73	60.22	50.48
	28	64.93	62.06	61.58	60.71	60.20	50.48
	29	64.92	62.04	61.56	60.69	60.17	50.48
	30	64.91	62.02	61.54	60.67	60.15	50.48
	31	64.90	61.99	61.52	60.65	60.12	50.48
	32	64.89	61.97	61.50	60.63	60.10	50.48
	33	64.89	61.95	61.48	60.61	60.08	50.48
	34	64.88	61.93	61.47	60.59	60.06	50.48
	35	64.87	61.91	61.45	60.57	60.03	50.48
	36	64.86	61.89	61.43	60.55	60.01	50.48
	37	64.85	61.87	61.42	60.54	59.99	50.48
	38	64.84	61.86	61.41	60.53	59.97	50.48
	39	64.84	61.85	61.40	60.52	59.95	50.49
	40	64.83	61.85	61.40	60.51	59.93	50.50
	41	64.83	61.84	61.39	60.49	59.91	50.50
	42	64.82	61.83	61.38	60.48	59.89	50.50
	43	64.82	61.82	61.37	60.46	59.88	50.50
	44	64.81	61.80	61.36	60.45	59.86	50.50
	45	64.80	61.79	61.35	60.44	59.84	50.50
	46	64.79	61.77	61.33	60.42	59.83	50.50
	47	64.79	61.77	61.33	60.42	59.81	50.51
	48	64.78	61.78	61.33	60.44	59.79	50.53
	49	64.79	61.82	61.35	60.48	59.78	50.57
	50	64.79	61.88	61.38	60.54	59.76	50.62
	51	64.83	62.05	61.48	60.78	59.76	50.82
	52	64.91	62.43	61.71	61.17	59.76	51.10
	53	65.00	62.74	61.93	61.30	59.78	51.16
	54	65.08	62.93	62.08	61.29	59.80	51.16

	Lake Kell	Lake Commiston	Keene Lake	Hanna Lake	Lake Stemper	Burrell Lake
Junction	541100	540800	40600	540500	521800	520300
Time						
Hr	Elevation	Elevation	Elevation	Elevation	Elevation	Elevation
55	65.14	63.02	62.16	61.29	59.82	51.16
56	65.16	63.03	62.18	61.30	59.83	51.16
57	65.14	62.97	62.16	61.31	59.83	51.16
58	65.13	62.90	62.11	61.31	59.83	51.16
59	65.13	62.83	62.05	61.29	59.83	51.16
60	65.12	62.76	62.00	61.27	59.82	51.16
61	65.12	62.70	61.95	61.24	59.81	51.16
62	65.11	62.64	61.91	61.21	59.80	51.16
63	65.10	62.59	61.87	61.17	59.79	51.16
64	65.09	62.53	61.83	61.14	59.78	51.16
65	65.07	62.49	61.80	61.10	59.77	51.16
66	65.06	62.44	61.77	61.06	59.76	51.16
67	65.05	62.39	61.74	61.02	59.75	51.16
68	65.04	62.35	61.71	60.98	59.74	51.16
69	65.03	62.31	61.69	60.94	59.72	51.16
70	65.02	62.28	61.66	60.91	59.71	51.16
71	65.01	62.24	61.64	60.88	59.70	51.16
72	65.00	62.21	61.62	60.84	59.69	51.16
73	64.99	62.17	61.60	60.81	59.67	51.16
74	64.99	62.14	61.58	60.78	59.66	51.16
75	64.98	62.11	61.56	60.75	59.65	51.16
76	64.97	62.08	61.54	60.72	59.64	51.16
77	64.96	62.06	61.53	60.70	59.63	51.16
78	64.95	62.03	61.51	60.67	59.61	51.16
79	64.94	62.01	61.50	60.65	59.60	51.16
80	64.94	61.99	61.48	60.63	59.59	51.16
81	64.93	61.96	61.47	60.61	59.58	51.16
82	64.92	61.94	61.46	60.59	59.57	51.16
83	64.91	61.92	61.44	60.57	59.56	51.16
84	64.90	61.90	61.43	60.55	59.55	51.16
85	64.90	61.88	61.42	60.53	59.54	51.16
86	64.89	61.87	61.41	60.52	59.53	51.16
87	64.88	61.85	61.40	60.50	59.52	51.16
88	64.88	61.83	61.39	60.49	59.51	51.16
89	64.87	61.82	61.38	60.47	59.50	51.16
90	64.86	61.80	61.37	60.46	59.49	51.16
91	64.86	61.79	61.36	60.45	59.48	51.16
92	64.85	61.77	61.35	60.43	59.47	51.16
93	64.84	61.76	61.34	60.42	59.47	51.16
94	64.84	61.74	61.33	60.41	59.46	51.16
95	64.83	61.73	61.32	60.40	59.45	51.16
96	64.82	61.72	61.31	60.39	59.44	51.16

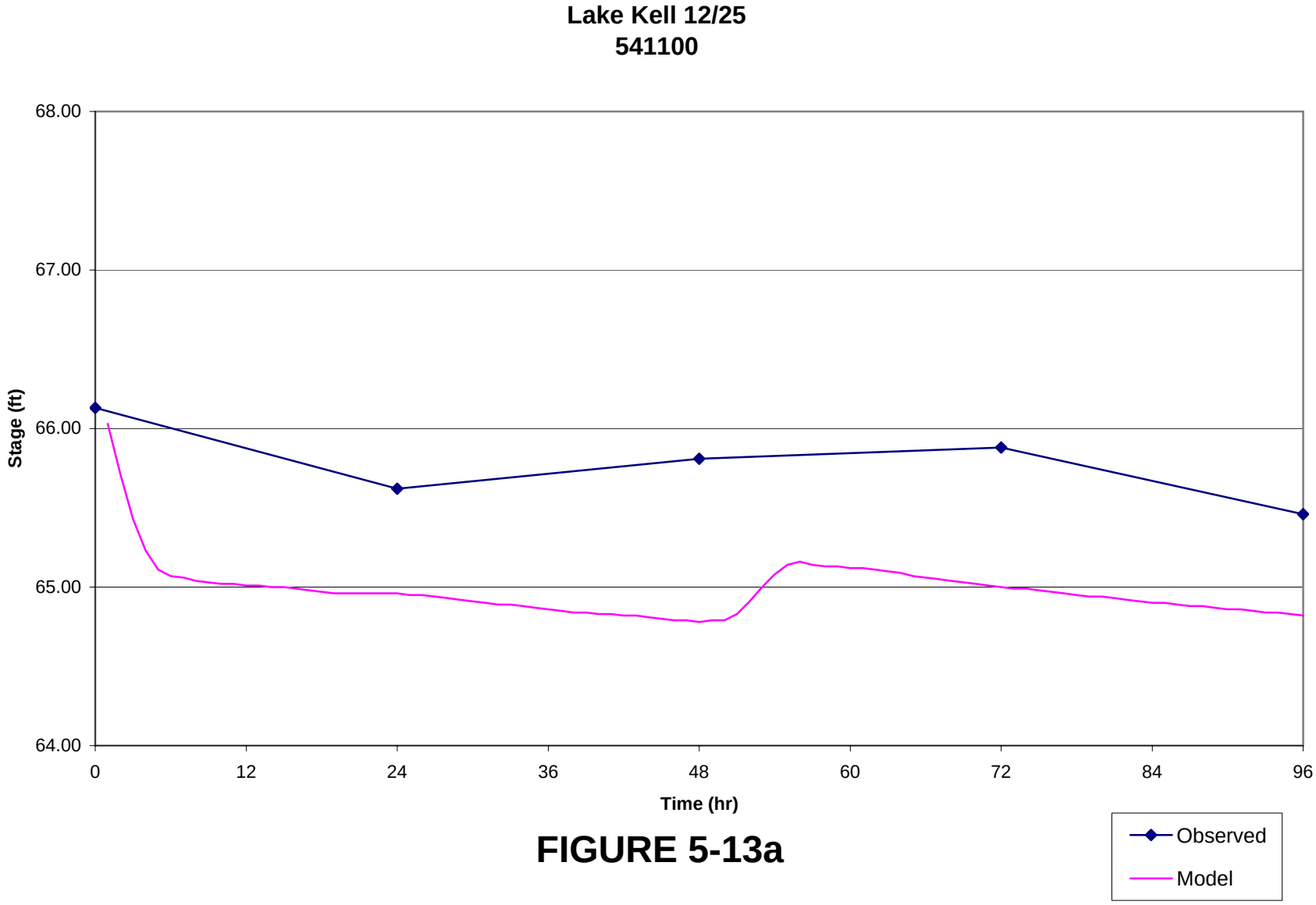
Lake Kell 12/25
541100
68.00
67.00
66.00
65.00
64.00
Stage (ft)
0
12
24
36
48
60
72
84
96
Time (hr)
Observed
Model

FIGURE 5-13a

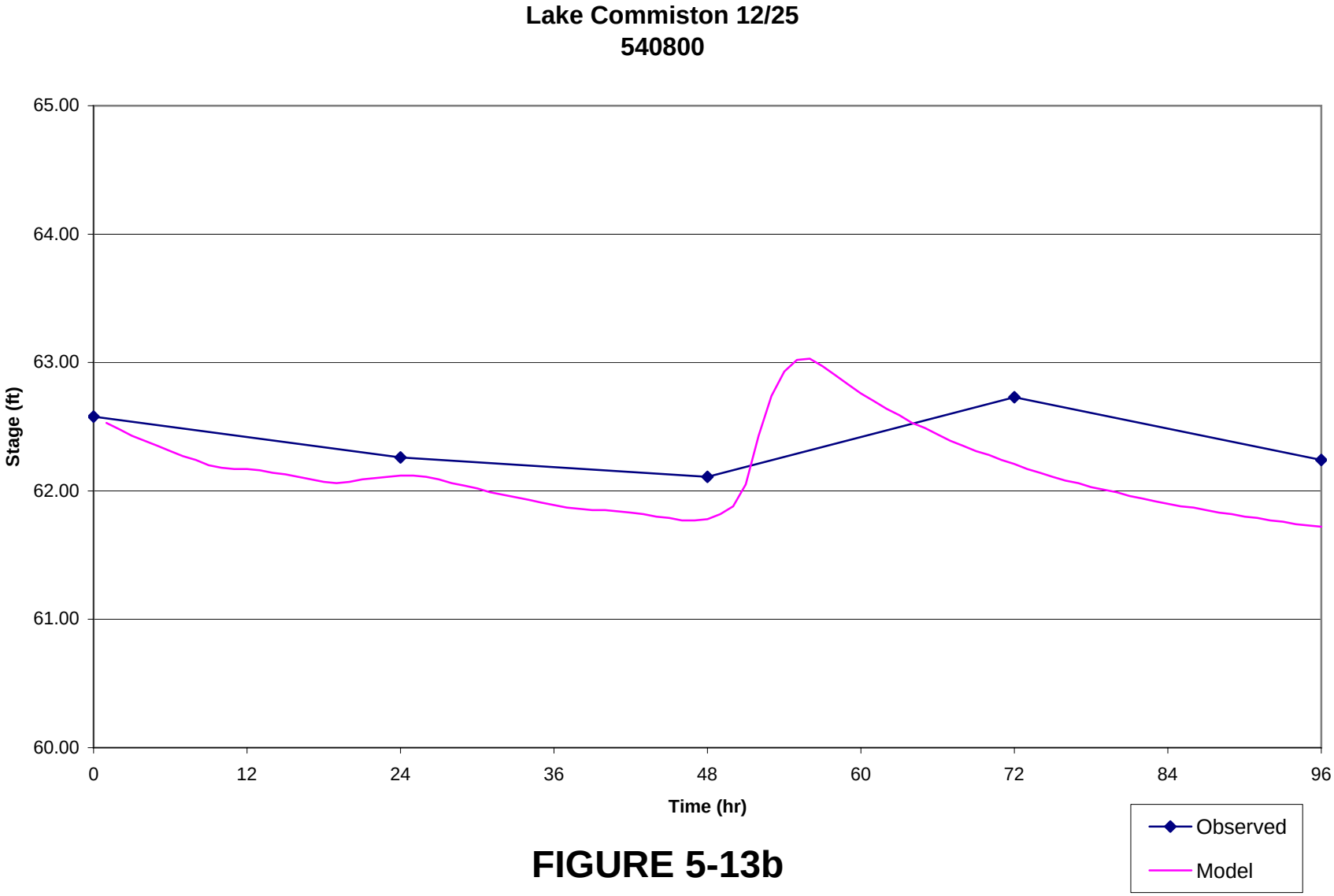
Lake Commiston 12/25
540800
65.00
64.00
63.00
62.00
61.00
60.00
Stage (ft)
0
12
24
36
48
60
72
84
96
Time (hr)
Observed
Model

FIGURE 5-13b

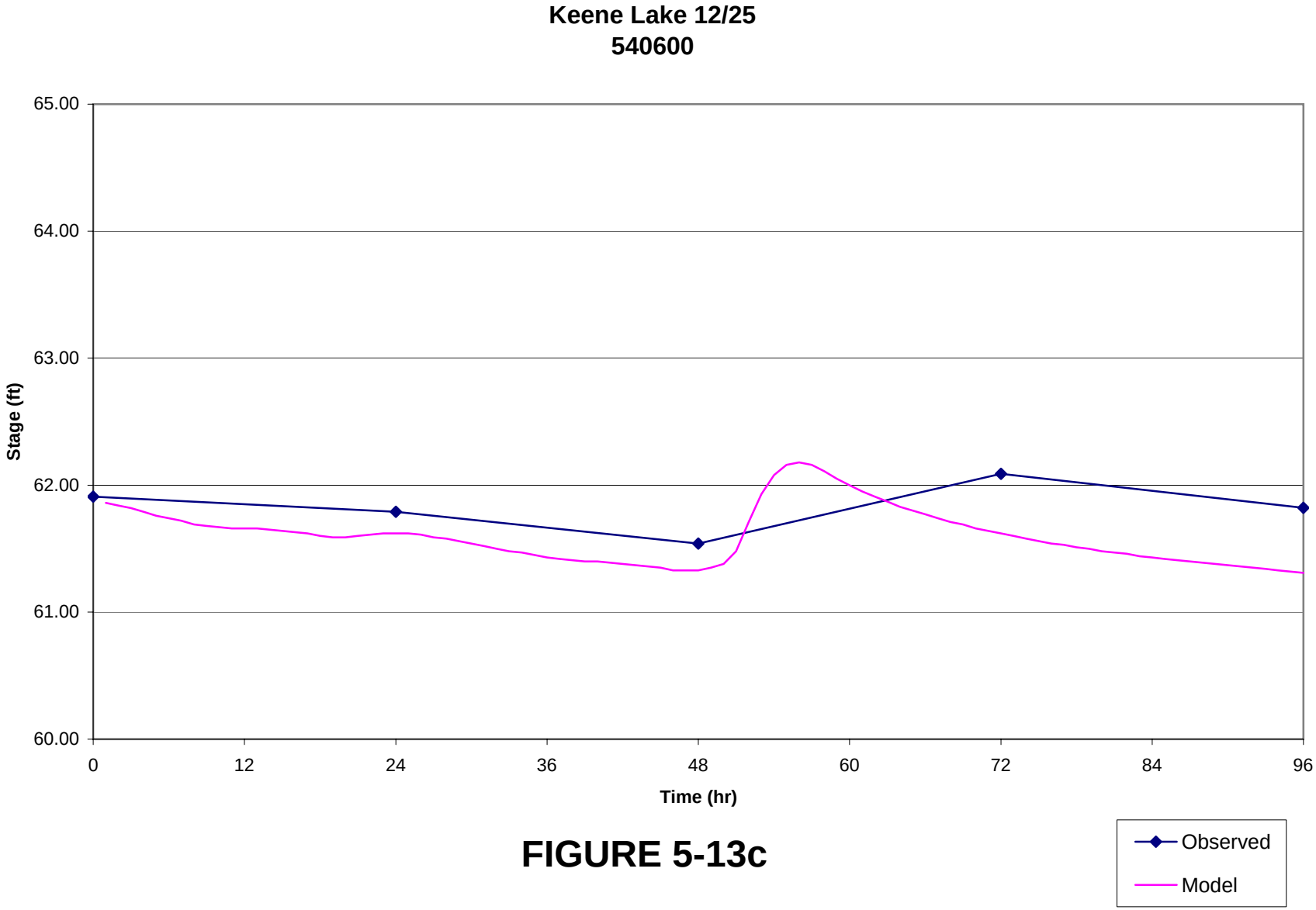
Keene Lake 12/25
540600
65.00
64.00
63.00
62.00
61.00
60.00
Stage (ft)
0
12
24
36
48
60
72
84
96
Time (hr)
Observed
Model

FIGURE 5-13c

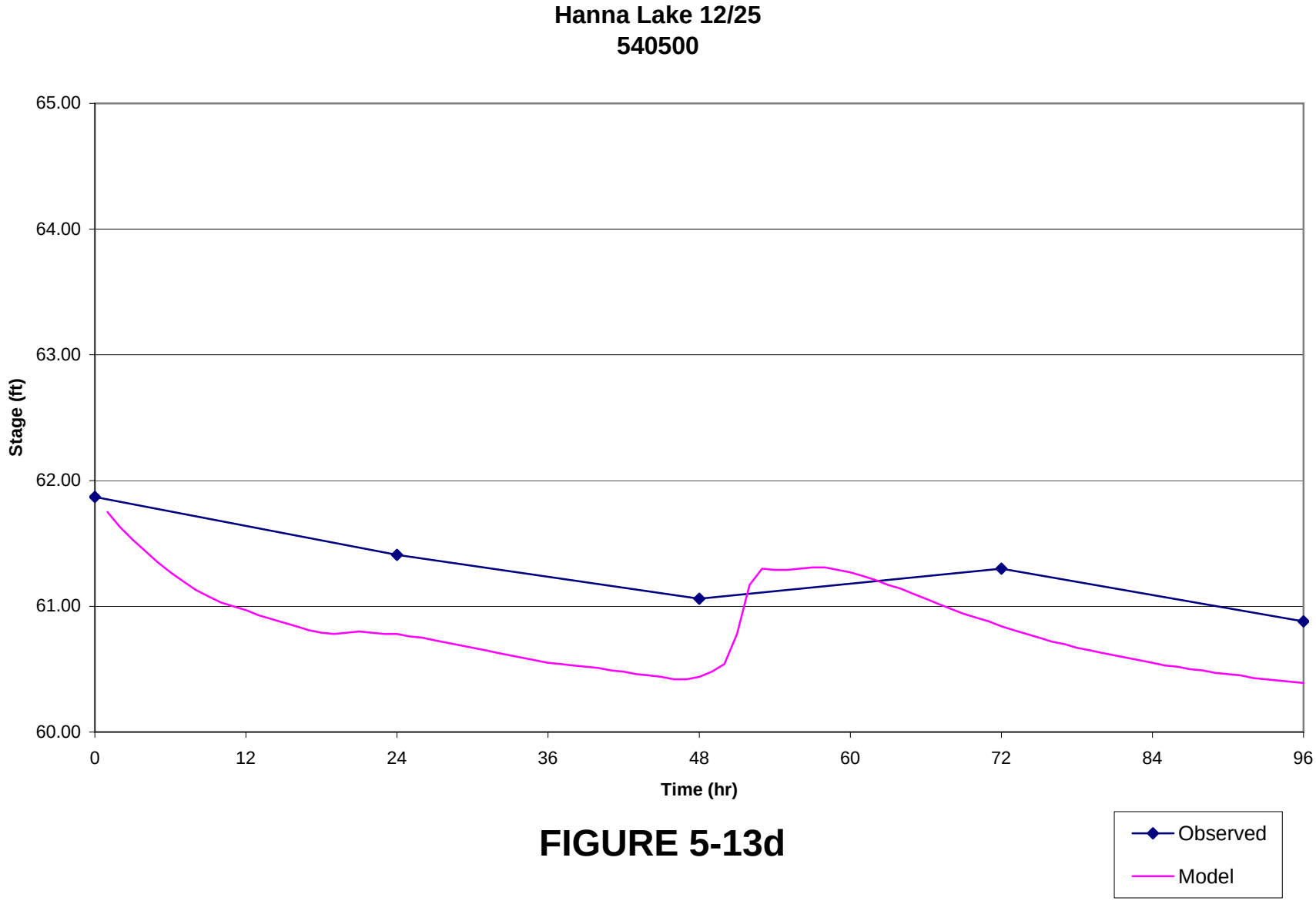
Hanna Lake 12/25
540500
65.00
64.00
63.00
62.00
61.00
60.00
Stage (ft)
0
12
24
36
48
60
72
84
96
Time (hr)
Observed
Model

FIGURE 5-13d

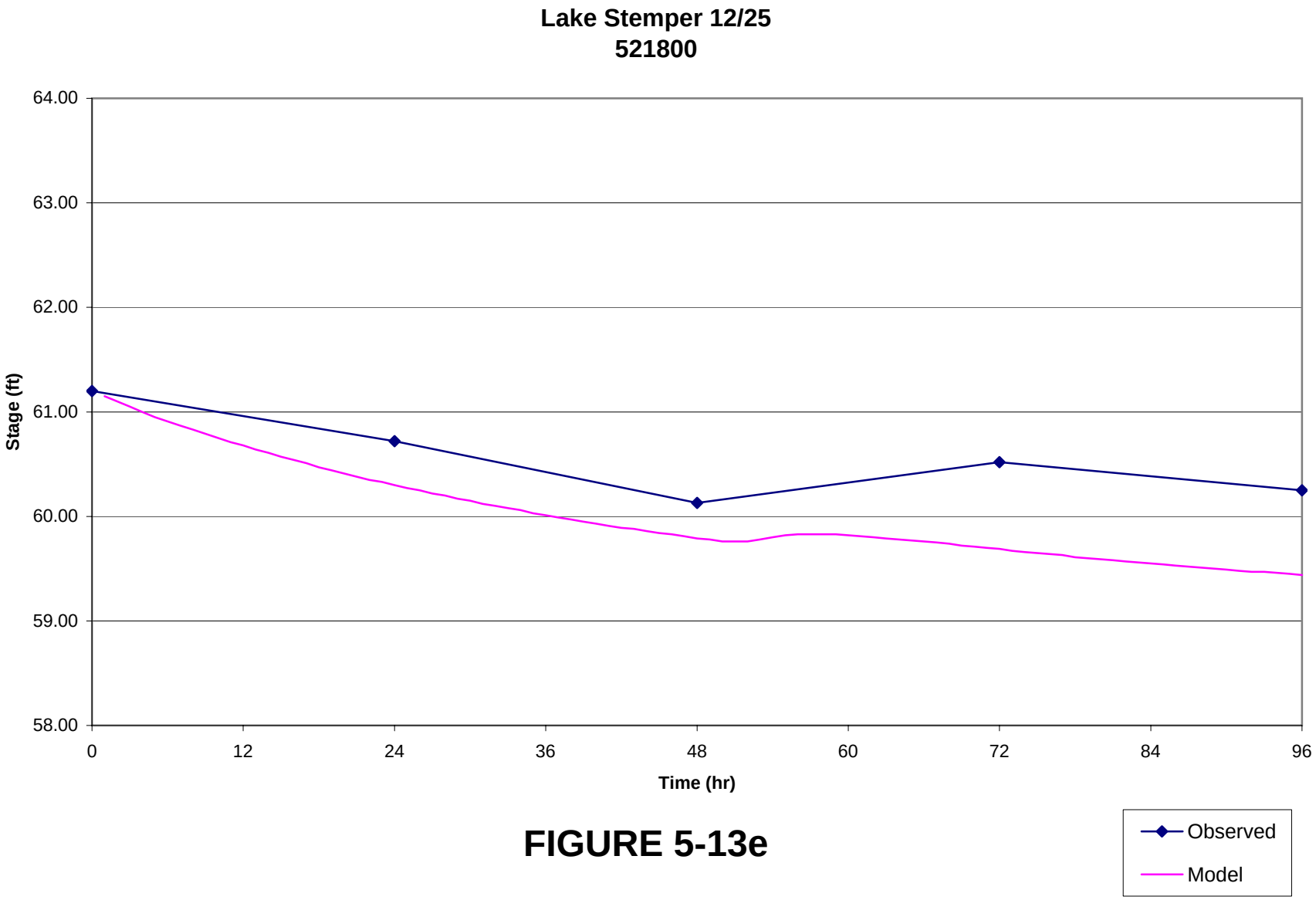
Lake Stemper 12/25
521800
64.00
63.00
62.00
61.00
60.00
59.00
58.00
Stage (ft)
0
12
24
36
48
60
72
84
96
Time (hr)
Observed
Model

FIGURE 5-13e

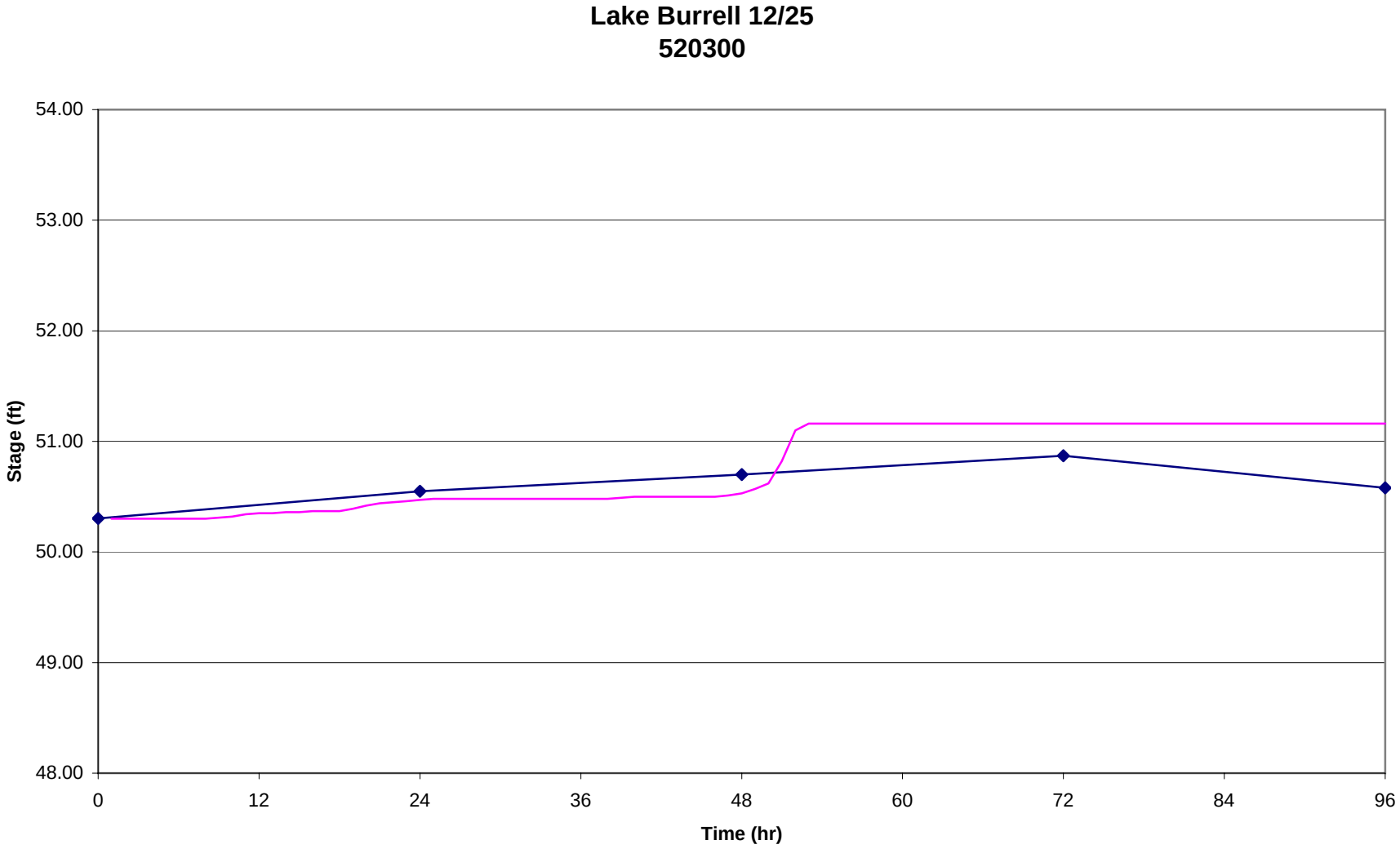
Lake Burrell 12/25
520300
54.00
53.00
52.00
51.00
50.00
49.00
48.00
Stage (ft)
0
12
24
36
48
60
72
84
96
Time (hr)
Observed
Model

FIGURE 5-13f

CHAPTER SIX Existing Conditions – Level of Service

6.1 EXISTING CONDITIONS AND STANDARD DESIGN STORM EVENTS

Based on the Hillsborough County Stormwater Drainage Manual and Southwest Florida Water Management District (SWFWMD) Environmental Resource Permitting (ERP) Manual, a standard design storm is defined by duration, rainfall depth, distribution, for a specific return period.

There are 6 standard design storms used to analyze the flooding impact in the Cypress Creek watershed. The standard design storms used in this study are:100yr, 50yr, 25yr, 10yr, 5yr and 2.33yr (mean annual). The duration and distribution set by SWFWMD criteria, are 24 hours, and SCS-type II Florida Modified respectively. Antecedent moisture conditions (AMC-II) are also set by the same SWFWMD criteria.

The total amount of rainfall for a particular frequency was determined based on SWFWMD rainfall map, which may vary with physical location of watershed.

The total rainfall used for each design storm event is as follows:

100yr/24hr	=	11.50 inches
50yr/24hr	=	10.50 inches
25yr/24hr	=	8.00 inches
10yr/24hr	=	7.00 inches
5yr/24hr	=	5.50 inches
2.33yr/24hr	=	4.50 inches

In a watershed such as Cypress Creek, with a large amount of storage available in numerous lakes, wetlands, depressions, and ponds development of a design storm event must be closely coordinated with the determination of initial conditions of lake levels and antecedent soil moisture infiltration capacity.

Initial lake elevations used in the stormwater management model at the start of the design storm event were determined by the recorded lake data provided by SWFWMD, the Hillsborough County Lake Atlas or from SWFWMD aerial topographic maps. For those lakes with no available gage data, initial elevations were selected based on nearby lake relationships, Minimum Low Water Elevation set by SWFWMD or from the SWFWMD aerial maps.

The rest of junction initial elevations were calculated with linear interpolation between the elevation values where (lakes and streamflow gages) recorded data was available.

6.2 EXISTING CONDITIONS MODEL SIMULATION RESULTS

CHAPTER SIX Existing Conditions – Level of Service

The Cypress Creek stormwater management model results for the 2.33-, 5-, 10-, 25-, 50-year, and 100-year design storm events are listed in Table 6-1. This table presents peak flood elevations in the main channel network.

Each sub-basin hydrograph is generated by the hydrologic model and routes (for Connectivity Map see Exhibit 5-1) through the hydrodynamic model, to calculate stages and discharges. These main channel profiles are presented in Exhibits 6-1(a) through 6-1(l) in Appendix B. The following sections discuss the individual problems areas predicted by EXTRAN model.

The Cypress Creek Watershed is divided into 12 main channel systems or tributaries, which are listed below:

- X Cypress Creek Main Channel
- X County Line Drainage System (Hillsborough/Pasco County)
- X Country Oaks System
- X Ridge Lake System
- X Sherry Brook System
- X Hanna Lake System
- X Blind Pond Avenue System
- X Thirteen Mile Run System
- X Flynn Lake Outfall System
- X Silver Lake Outfall System
- X 149th Avenue Outfall System
- X Bruce B. Downs System

The objective of this section is to present both the areas and major structures where the computer model indicated that insufficient channel capacity exists and flooding occurs along the Cypress Creek watershed main channel alignments.

6.2.1 Cypress Creek Main Channel

The Cypress Creek main channel enters northern Hillsborough County from Pasco County just north of the Interstate 75/275 interchange. The Creek channel then flows south along the east side of I-275 to SR 581 (Bruce B, Downs Boulevard). The channel continues to the south and joins the Hillsborough River. The channel is poorly defined throughout most of the area. The floodplain characteristics of Cypress Creek include large storage, wide overflow floodplains and small topographic relief. There are several major cross drain structures along I-275 which connect the Cypress Creek floodplain on the east and west sides of I-275.

Table 6.1

DESIGN STORM EVENT STAGE ON MAIN CHANNELS

ROAD / LAKE NAME	MODEL JUNCTION ID	CHANNEL ALIGNMENT (STATION)	DESIGN STORM EVENT ELEVATION						OVERTOP AT 25YR
			100YR	50YR	25YR	10YR	5YR	2.33YR	
Main Channel									
	500000	0	34	33.6	33.2	32.5	31.8	30.8	-
0	500100	1600	33.98	33.57	33.16	32.46	31.77	30.78	-
0	500200	4600	33.97	33.56	33.15	32.46	31.76	30.77	-
0	500450	14530	40.6	40.06	39.28	38.61	37.89	37.25	-
0	500475	16500	40.6	40.06	39.28	38.61	37.9	37.25	-
0	500700	25100	40.61	40.07	39.3	38.63	37.92	37.27	-
0	500800	27700	40.66	40.12	39.39	38.75	38.13	37.56	-
0	500900	33300	40.76	40.25	39.62	39.06	38.64	38.32	-
0	500950	35900	40.87	40.39	39.86	39.38	39.05	38.71	-
0	501000	41500	42.43	42.17	41.78	41.4	40.99	40.52	-
0	501100	47700	49.89	49.34	48.88	48.17	47.57	46.72	-
County Line Drainage Tributary									
	501000		42.43	42.17	41.78	41.4	40.99	40.52	-
	542210	2900	#N/A	60	60	60	60	60	Yes
	542220	3000	#N/A	64.38	64.06	63.93	63.71	63.55	Yes
Country Oak Tributary									-
	500900		40.76	40.25	39.62	39.06	38.64	38.32	-
	542180	0	60.49	60.31	60	60	60	60	Yes
Livingston Ave.	542190	3800	64	63.77	63.19	62.95	62.6	62.38	No
Ridge Lake Tributary									
	500700		40.61	40.07	39.3	38.63	37.92	37.27	-
Livingston Ave.	542120	0	54.86	54.3	51.81	50.81	49.36	48.49	No
	542130	2300	59.12	58.87	58.19	57.89	57.41	57.08	-
	542140	3300	62.67	62.46	61.89	61.65	61.27	61	-
Ridge Lake	542150	6000	63.1	62.79	61.99	61.68	61.22	60.94	-
Sherry Brook Tributary									
	500600		40.6	40.06	39.29	38.61	37.9	37.25	-
	542010	0	48.06	47.98	47.7	47.54	47.2	46.86	-
30th St.	542020	2500	57.07	56.74	55.82	55.38	54.58	54	Yes
Livingston Ave.	542030	5600	58.14	57.71	56.92	56.66	56.27	56	No
Sunset Ln.	542040	7200	61.04	60.79	60.11	59.82	59.37	59.07	Yes
Walker Rd.	542060	8800	61.95	61.71	61.12	60.86	60.44	60.15	No
Dirt Road	542080	11600	63.12	62.85	62.11	61.78	61.23	60.77	No
Wallace Rd.	542100	13800	65.54	65.26	64.54	64.27	63.81	63.45	No
Hanna Lake Tributary									
	500500		40.6	40.06	39.28	38.61	37.9	37.25	-
Livingston Ave.	540300	0	57.72	57.13	55.49	54.69	53.43	52.62	No
Swan Lake Dr.	540400	300	60.27	59.98	59.23	58.91	58.41	58.09	No
Hanna Rd. / Hanna Lake	540500	1800	61.7	61.36	60.73	60.53	60.17	59.85	No
Sunset Ln. / Keene Lake	540600	4000	62.31	62.13	61.72	61.56	61.25	60.97	Yes
Swamp Lake	540700	7200	65.71	65.59	65.29	65.13	64.85	64.65	Yes
Newberger Rd. / Lake Kell	541100	11300	66.26	66.09	65.67	65.46	65.12	64.87	No
County Line Rd.	541150	15600	67.45	67.17	66.45	66.15	65.68	65.34	No

Blind Pond Tributary									
	500400		35.29	35.13	34.72	34.54	34.18	33.92	-
Livingston Ave.	530100	0	55.18	54.83	53.87	53.45	52.87	52.48	No
	530200	1300	57.78	57.62	57.15	56.98	56.7	56.51	-
	530300	2800	59.65	59.53	59.15	59.09	58.17	57.45	Yes
Thirteen Mile Run Tributary									
	500300		33.97	33.56	33.15	32.46	31.76	30.77	-
I-275	520750	0	36.88	36.57	35.69	35.32	35.15	35.15	No
Livingston Ave.	520800	1000	41.4	41.15	41	41	41	41	No
Vandervort Rd.	520900	3000	49.9	49.59	48.71	48.31	47.67	47.18	No
	521000	5600	52.47	52.28	51.74	51.51	51.14	50.89	-
Hanna Rd.	521100	7500	56.35	55.85	54.64	54.17	53.43	52.92	No
	521500	10100	57.51	57.15	56.32	55.99	55.48	55.16	-
	521600	12100	58.6	58.47	58.08	57.9	57.6	57.37	-
Debuel Rd.	521700	13600	59.93	59.7	59.09	58.83	58.44	58.2	No
Country Elm Rd. Lake Stemper	521800	15800	60.48	60.32	59.93	59.77	59.51	59.33	No
Sunset Ln.	522000	22200	62.73	62.52	61.93	61.68	61.25	60.96	No
Silver Lake Tributary									
	500300		33.97	33.56	33.15	32.46	31.76	30.77	-
Livingston Ave.	520100	0	49.01	48.55	47.53	47.17	46.7	46.41	No
I-75	520600	3000	52.52	52.07	50.97	50.78	50.53	50.35	No
September Dr.	520400	4200	53.58	53.38	52.56	52.18	51.61	51.23	No
Lake Flynn Tributary									-
	500300		33.97	33.56	33.15	32.46	31.76	30.77	-
Livingston Ave.	520100	0	49.01	48.55	47.53	47.17	46.7	46.41	No
	520200	2900	48.4	48.13	47.41	47.1	46.61	46.26	-
149th St. Outfall Tributary									
	500200		33.97	33.56	33.15	32.46	31.76	30.77	-
Lake Forest	510100	0	35.94	35.78	35.28	35.05	34.73	34.49	-
Livingston Lake	510150	800	36.67	36.34	35.44	35.14	34.75	34.5	-
Livingston Ave.	510800	2700	43.07	42.84	41.81	41.37	40.61	39.92	No
N 20th St	510900	4900	43.95	43.67	42.47	42.02	41.47	41.13	No
15th St	511200	6600	50.86	50.37	48.95	48.29	47.51	46.57	No
Sinclair Hills Rd	511300	9300	50.86	50.52	49.81	49.59	49.25	49.02	-
Bruce B. Downs Tributary									
	500200		33.97	33.56	33.15	32.46	31.76	30.77	-
Lake Forest	510100	0	35.94	35.78	35.28	35.05	34.73	34.49	-
581	510200	2800	40.27	39.97	39.2	38.91	38.53	38.23	No
581	510400	4500	42.88	42.64	41.81	41.45	40.71	40.2	No
	510450	6100	43.06	42.82	42.25	41.97	41.45	40.96	-
143rd Ave	510451	6600	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	No
22nd St	510600	7400	44.17	43.7	43.26	43.1	42.82	42.55	No

The Cypress Creek Main Channel was modeled using information from the previous Cypress Creek Flood Study completed for FEMA. The starting elevations at Bruce B. Downs Boulevard, the peak discharge inflows at Pasco County, and the channel cross-sections, roughness values and stationing were taken from the report. The peak stages calculated by the model compare well to the previous Flood Study for the selected storm events. The Cypress Creek Main Channel has wide floodplains and has significant storage. No flooding problems were identified. A graphical representation of the water surface profile for all six standard storm events is provided in Exhibit 6-1 (a).

6.2.2 County Line Drainage System

Several drainage basins adjacent to the Hillsborough/ Pasco County line drain directly to the Cypress Creek Main channel. Several other basins and Lakes in Hillsborough County drain north to Pasco County. The areas eventually flow to the east into Cypress Creek. These areas include Cool Kell Lake, Hog Island Lake, Hart Lake and several unnamed lakes and wetlands.

No flooding of the drainage basins, which drain directly to Cypress Creek, was identified. Several of the Lakes which drain to the north to Pasco County do have limited outfalls and have limited ability to recover following long term rainfall events. A graphical representation of the water surface profile for all six standard storm events is provided in Exhibit 6-1 (b).

6.2.3 Country Oaks System

The Country Oaks system originates west of Livingston Avenue and north of Wallace Road. Runoff flows east under Livingston Avenue through the Country Oaks Subdivision and ultimately discharges to the Cypress Creek Main channel floodplain west of I-275.

No flooding was identified in the Country Oaks System. A graphical representation of the water surface profile for all six standard storm events is provided in Exhibit 6-1 (c).

6.2.4 Ridge Lake System

The Ridge Lake system originates in Ridge Lake within the Ridge Lake subdivision located west of Livingston Avenue and south of Wallace Road. Runoff flows to the south through a large wetland area and open pasture and turns east to Livingston Avenue. Past Livingston, the flow continues east under 30th Street and Carr Drive before discharging to the Cypress Creek main channel floodplain west of I-275. An additional tributary channel ties into the Ridge Lake main channel from the north between 30th Street and Carr Drive.

No flooding was identified in the Ridge Lake System. A graphical representation of the water surface profile for all six standard storm events is provided in Exhibit 6-1 (d).

6.2.5 Sherry Brook System

The Sherry Brook system originates in a large wetland/lake area located between the Eagle Crest and Rhodes Woods subdivisions south of Newberger Road. Runoff flows south through several lake areas in the Hanna Pond Estates and San Remo subdivisions. The channel within this area is not well defined. Runoff from several areas west of Hanna Road combine with the Sherry Brook main channel north of Sunset Lane. This runoff then flows east under Walker Road, Sunset Road and Livingston Avenue in a well-defined channel. Runoff from the Meadowlands, Windemere Unit 1 and Timberlane subdivisions flow east into Sherry Brook. The channel widens and continues east to 30th Street and then winds south through the Sherry Brook Estates subdivision and ultimately discharges to the Cypress Creek main channel floodplain west of I-275. A graphical representation of the water surface profile for all six standard storm events is provided in Exhibit 6-1 (e).

The EXTRAN Model predicts overtopping along the main channel alignment as follows:

30th street – approximate station 2400 at 100 year storm event

6.2.6 Hanna Lake System

The Hanna Lake system originates in Pasco County and flows south into Hillsborough County at County Line Road near US 41 at Lake Kell. The flow then passes south under Newberger Road to Swamp Lake and Keene Lake. Runoff from Lake Commston and Little Hobbs Lake also flows into Keene Lake from the west. Keene Lake discharges south under Sunset Lane to Hanna Lake. Hanna Lake then discharges east to Hanna Road. The channel is well defined but not well maintained. The channel flows east through the Cooper's Pond, Windemere and Livingston Acres

subdivisions crossing under Swan Lake Drive and Livingston Avenue. Inflow from the south joins the main channel from the Barrington and Livingston Unit 4 subdivisions. The flow then travels east in a steep channel through pasture area and flows into the Cypress Creek main channel floodplain west of I-275. A graphical representation of the water surface profile for all six standard storm events is provided in Exhibit 6-1 (f).
The EXTRAN Model predicts overtopping along the main channel alignment as follows:

Hanna Road – approximate station 1800 at the 100 year storm event

6.2.7 Blind Pond Avenue System

The Blind Pond Avenue system originates in a wetland area located west of Hanna Road and south of Clement Road. Runoff then flows northeast under Green Meadow Drive and Clement Road. Runoff from the Pond Eddy and Livingston Units 2A and 3A subdivisions flow south under Blind Pond Avenue to combine with the area south of Clement Road. These combined areas flow east through the Prairie View Acres subdivision to Livingston Avenue. The flow then travels east in a steep channel through pasture area and flows into the Cypress Creek main channel floodplain west of I-275. A graphical representation of the water surface profile for all six standard storm events is provided in Exhibit 6-1 (g).

The EXTRAN Model predicts overtopping along the main channel alignment as follows:

Green Meadows Drive– approximate station 2800 at the 50 and 100-year storm events

6.2.8 Thirteen Mile Run System

The Thirteen-Mile Run system originates at the western portion of the study area in a large wetland located east of US 41 and north of Sunset Lane. Runoff flows south under Sunset Lane adjacent to the Post Office and Commercial areas at Sunset and US 41 to Lake Stemper. Lake Stemper discharges through large wetland areas and outfalls to Dubuel Road. The channel at this location is well defined and flows south between the Maniscalco Elementary School and the Willow Pond subdivision. The channel continues south through several wetland areas to Whitaker Road. At Whitaker Road the channel turns east and flows to Hanna Road. Past Hanna Road the channel continues east then south to Vandervort Road. The channel crosses Vandervort Road and meanders through the Park Forest subdivision to Livingston

Avenue. The flow then travels east and flows into the Cypress Creek main channel floodplain west of I-275. A graphical representation of the water surface profile for all six standard storm events is provided in Exhibit 6-1 (h).

The EXTRAN Model predicts overtopping along the main channel alignment as follows:
Hanna Road – approximate station 7500 at the 100 year storm events

6.2.9 Flynn Lake System

The Flynn Lake System originates in several lake areas located north of I-275 and south of Hanna Road. The lakes discharge south under I-275 to other wetland areas adjacent to the Curry Cove subdivision west of Livingston Avenue. Flynn Lake and the lake located west of north 15th street also drain to these wetland areas. These wetland areas then discharge to the east to Livingston Avenue and ultimately discharge to the Cypress Creek main channel floodplain. A graphical representation of the water surface profile for all six standard storm events is provided in Exhibit 6-1 (i).

The EXTRAN Model predicts overtopping along the main channel alignment as follows:

Livingston Avenue – approximate station 200 at the 100 year storm event

6.2.10 Silver Lake Outfall System

The Silver Lake outfall is located north of Sinclair Hills Road and west of Livingston Avenue. Areas draining to this outfall include the Silver Lake subdivision and the Palms of Livingston apartment complex. In addition, several areas just south of Sinclair Hills Road also drain to the outfall. The outfall crosses east under Livingston Avenue and ultimately discharges to the Cypress Creek main channel floodplain. A graphical representation of the water surface profile for all six standard storm events is provided in Exhibit 6-1 (j).

The EXTRAN Model predicts overtopping along the main channel alignment as follows:
Livingston Avenue – approximate station 200 at the 100 year storm event
September Drive- approximate station 4200 at the 50 and 100 year storm event

6.2.11 149th Street Outfall System

The 149th Street outfall is the only previously improved outfall in the study area. This outfall was improved by Hillsborough County in 1983. The system originates at Burrell Lake at Apex Lakes Estates subdivision located south of I-275 and East of Nebraska Avenue and the CSX railroad. Burrell Lake outfalls at South Barrel Drive to the southeast to a maintained channel. The channel flows south along North 12th Street to Bearss Avenue. The flow crosses Bearss Avenue and drains south to a low wetland area. Runoff from industrial areas to the south and commercial areas along Nebraska Avenue to the west also drain to the low area. This low area then discharges to the east under Bearss Avenue to the 149th Street outfall. The 149th Street outfall system is a series of pipes, channel and ponds which flow to the east to Livingston Avenue. Areas to the north to Sinclair Hills Road and to the south to Skipper Road drain to the 149th Street outfall via overland flow or swales.

At Livingston Avenue, the 149th Street outfall combines with an inflow pipe which drains a portion of Skipper Road and Livingston Avenue. This system then flows east in a channel/ pipe system to a lake at the Lake Forest subdivision. This lake then discharges north to the Cypress Creek floodplain. A graphical representation of the water surface profile for all six standard storm events is provided in Exhibit 6-1 (k).

The EXTRAN Model predicts overtopping along the main channel alignment as follows:

Channel near Sinclair Hills Drive – approximate station 9000 at the 100-year storm event.

6.2.12 Bruce B. Downs System

The Bruce B. Downs system is located at the southern portion of the watershed. The system originates at a lake in the Pine Lake subdivision located south of Skipper Road and east of 19th Street. The lake drains east to a channel and low area at 142nd Street and 22nd Street. This channel flows east to Bruce B. Downs Boulevard. Runoff from several apartment complexes and commercial areas also drain to the channel. The channel crosses under Bruce B. Downs Boulevard and drains to a wetland area on the east side of the Bruce B. Downs and Skipper Road intersection. Runoff from several apartment complexes located north of University Hospital and east of Bruce B. Downs Boulevard drain to or are pumped to this wetland area. This area then flows north under Bruce B. Downs Boulevard to a channel in the Lake Forest subdivision. This channel flows north to the lake at Lake Forest and combines with the 149th Street outfall system. This lake then discharges north to the Cypress

Creek floodplain. A graphical representation of the water surface profile for all six standard storm events is provided in Exhibit 6-1 (l).

The EXTRAN Model predicts overtopping along the main channel alignment as follows:

143rd Avenue – approximate station 6600 at all the storm events.

Channel near 143rd Avenue- approximate station 6000 for 25, 50, 100 year storm events.

6.3 LEVEL OF SERVICE

This section briefly describes the level of service (LOS) methodology used to analyze the Cypress Creek Watershed (CCW) and then discusses existing conditions LOS deficiencies within the study area.

Discussion areas include the following topics below:

X Level of Service Methodology
X Level of Service Designations

The LOS designations are discussed for the CCW systems listed below:

X Cypress Creek Main Channel
X County Line Drainage System (Hillsborough/Pasco County)
X Country Oaks System
X Ridge Lake System
X Sherry Brook System
X Hanna Lake System
X Blind Pond Avenue System
X Thirteen Mile Run System
X Flynn Lake Outfall System
X Silver Lake Outfall System
X 149th Avenue Outfall System
X Bruce B. Downs System

6.4 LEVEL OF SERVICE METHODOLOGY

The Hillsborough County Comprehensive Plan, Stormwater Management Element contains definitions for level of service flood protection designations. According to these definitions, a storm

return period and duration (i.e. 25-year/24-hour) and letter designation (i.e. B) are needed to define the level of flood protection (i.e. 25-year/24-hour level B). The flood level designations contained in the Comprehensive Plan are A, B, C and D, A being the highest level and D being the lowest. However, these criteria are somewhat subjective. Therefore, it is necessary to establish quantitative criteria by which to assign LOS designations. An allowable tolerance that is demographically representative for Hillsborough County before flooding can be classified was assigned to LOS designations A-D as shown in Table 6.2 below. This table contains the interpretation of the Comprehensive Plan definitions used in the LOS analysis herein.

TABLE 6-2
LEVEL OF SERVICE DEFINITION INTERPRETATIONS

LEVEL	HC COMPREHENSIVE PLAN DEFINITIONS	WATERSHED PLAN INTERPRETATIONS
A	No significant street flooding	No flooding
B	No major residential yard flooding	Street flooding is 3" or more above the crown
C	No significant structure flooding	Site flooding is 6" or more
D	No limitation on flooding	Structure flooding

The LOS designations contained in the Comprehensive Plan contain the assumption that sites are higher than roads and structures are higher than sites as shown in **Figure 6-1.** However, this is not always the case. The LOS analysis methodology used herein evaluates road, site and structure landmark elevations independently.

The Comprehensive Plan contains estimated Adopted (existing conditions) and Ultimate (proposed) LOS designations for several watersheds in Hillsborough County. According to the Comprehensive Plan, the 10-year/24-hour level B is the target LOS for all areas of Hillsborough County for the Cypress Creek Area. However, this is very conservative. In many areas of CCW, the 25-year/24-hour level B LOS can be achieved.

One goal of this report is to update the LOS designation for the CCW with the results of a formal LOS analysis for this watershed. The LOS analysis for Adopted (or existing conditions) is contained in this chapter.

During the flooding conditions of 1997 to 1998, flood complaint locations in the watershed were documented by Hillsborough County. These flood complaint locations are shown on **Figure 6-2**.

Existing flood locations within watershed identified by FEMA in the FEMA Flood Insurance Rate maps (FIRM) are shown in **Figure 6-4.**

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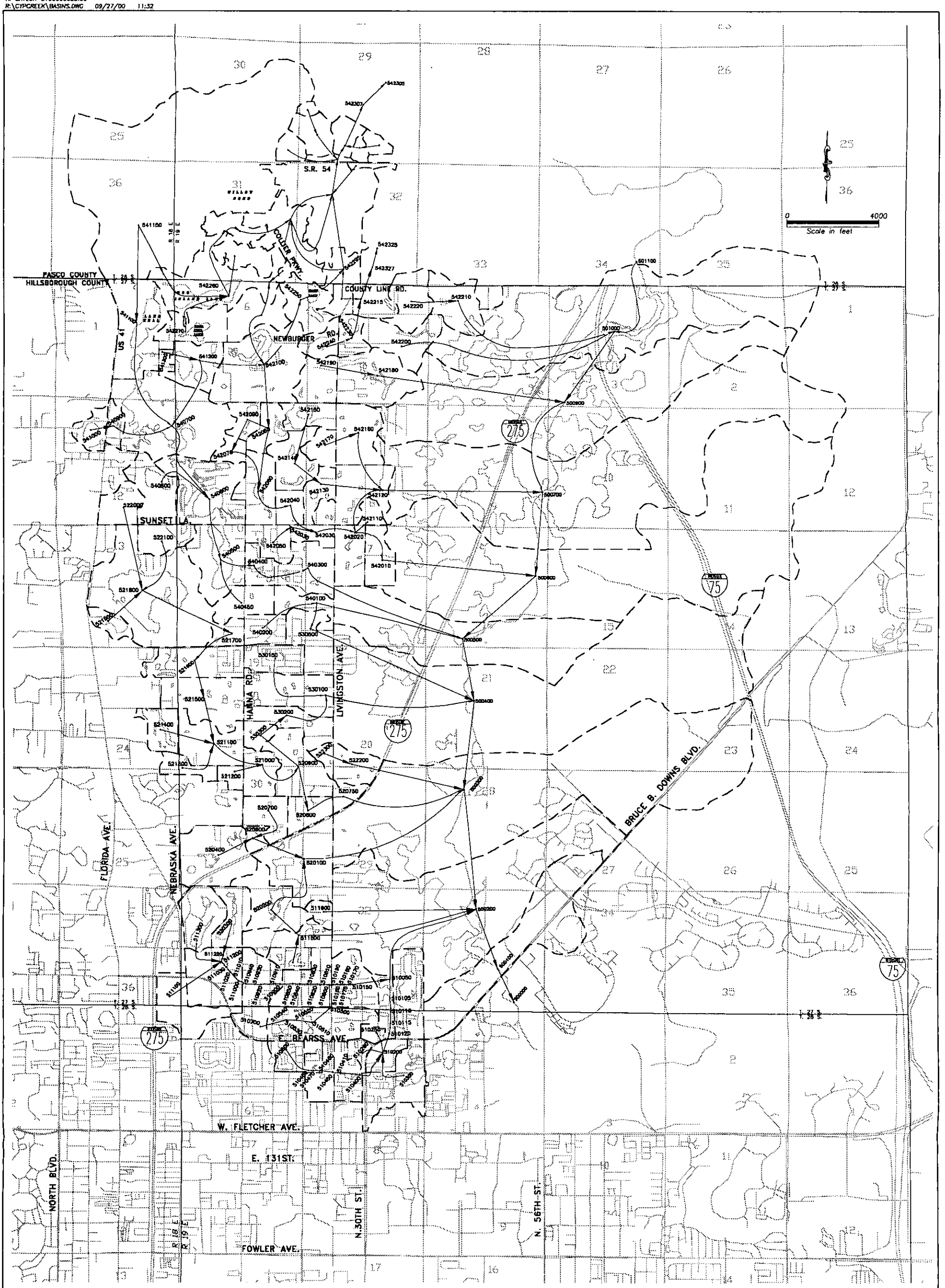

Hillsborough County Florida	**Cypress Creek Watershed Management Plan** *URS Greiner Woodward Clyde*	EXISTING CONNECTIVITY DIAGRAM	**Figure 6-1** Date: 09-27-00

Level of Service Model

Level of Service Assumptions:
1. Finish floor elevation is higher than site and centerline of road.
2. Site elevation is higher than centerline of road.

(H > S > R)

ROAD CENTERLINE ELEV. = R

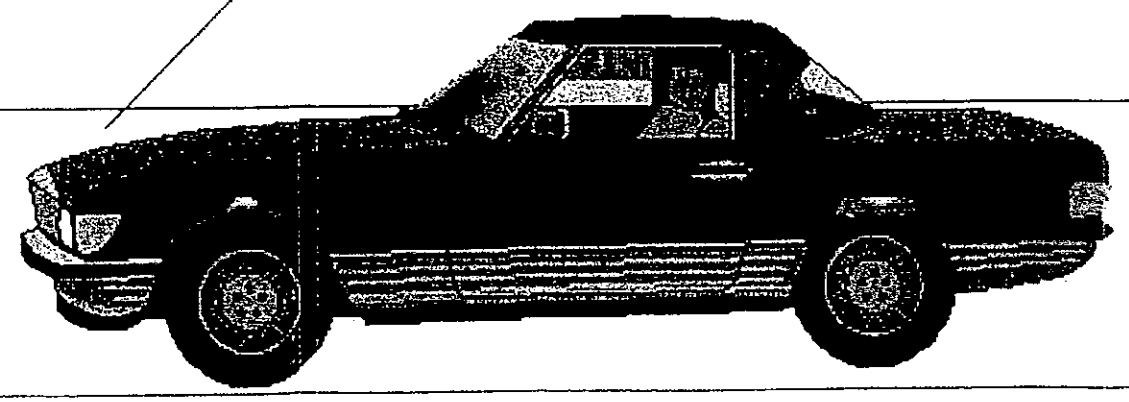

Figure 6-1A

Date: 06-17-00

LEVEL OF SERVICE DIAGRAM MAP

Cypress Creek Watershed Management Plan

URS Greiner Woodward Clyde

Hillsborough County Florida

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Pasco County

County Line Rd.

Livingston Ave.

U.S. Highway 41

275

75

Cypress Creek

County Highway 581

Bruce B. Downs Blvd.

Florida Ave.

Nebraska Ave.

Fletcher Ave.

Legend

Historic Flooding Complaints

- January 1998 Complaints

Cypress Creek Basin

- Sub-Basins

Transportation

- I-75 & I-275
- Roads
- Railroad

Hydrography

- Marsh/Wetland/Swamp
- Stream/Lake/Pond
- Stream

0 4000 Feet N

Scale:1"=4000'

Hillsborough County Florida

Cypress Creek Watershed Management Plan

URS Greiner Woodward Clyde

Historic Flooding Complaints

Figure 6-2

Date:09/28/00

Table 6.3 EXISTING CONDITIONS LEVEL OF SERVICE - 9/1/00

Cypress Creek Area (Existing Conditions) Level of Service Analysis											Flood Level Designations						
		Landmark Elev's			Water Surface Elev's												
Story Board	Basin	Site	Struct	Road	2.33yr	5yr	10 yr	25yr	50yr	100yr	2.33yr	5yr	10yr	25yr	50yr	100yr	Predicted Flood Locations (road / site / structure)
MAIN CHANNEL																	LOS 25 yr/24 hr A
	500000	36.40	37.40	37.40	30.80	31.80	32.50	33.20	33.60	34.00	A	A	A	A	A	A	
	500100	36.40	37.40	37.40	30.78	31.77	32.46	33.16	33.57	33.98	A	A	A	A	A	A	
	500200	36.50	37.50	37.50	30.77	31.76	32.46	33.15	33.56	33.97	A	A	A	A	A	A	
	500300	41.00	42.00	42.00	30.77	31.76	32.46	33.15	33.56	33.97	A	A	A	A	A	A	
	500400	39.50	40.50	40.50	33.92	34.18	34.54	34.72	35.13	35.29	A	A	A	A	A	A	
	500700	41.00	42.00	41.00	37.25	37.90	38.61	39.28	40.06	40.60	A	A	A	A	A	A	
	500800	42.50	43.50	43.50	37.25	37.90	38.61	39.29	40.06	40.60	A	A	A	A	A	A	
	500900	43.50	44.50	44.50	37.27	37.92	38.63	39.30	40.07	40.61	A	A	A	A	A	A	
	501000	43.30	44.30	44.30	38.32	38.64	39.06	39.62	40.25	40.76	A	A	A	A	A	A	
	501900	47.00	48.00	48.00	40.52	40.99	41.40	41.78	42.17	42.43	A	A	A	A	A	A	
USF Area - B.B. Downs System																	LOS 25 yr/24 hr B
	510200	43.70	47.00	45.50	38.23	38.53	38.91	39.20	39.97	40.27	A	A	A	A	A	A	
	510250	45.00	46.00	44.10	39.00	39.00	39.18	39.41	40.01	40.29	A	A	A	A	A	A	
	510260	45.10	46.10	44.70	41.03	41.34	41.78	42.08	42.70	42.95	A	A	A	A	A	A	
	510300	38.00	39.00	41.80	35.16	36.06	37.13	37.73	39.02	39.48	A	A	A	A	C	C	
	510400	44.30	45.30	43.00	40.20	40.71	41.45	41.81	42.64	42.88	A	A	A	A	A	A	W. of BB Downs and S. of 143rd Ave.
	510450	43.10	44.10	41.00	40.96	41.45	41.97	42.25	42.82	43.06	A	B	B	B	B	B	E. of 22nd St and S. of 143rd Ave.
	510460	44.80	45.80	44.30	40.96	41.46	41.97	42.25	42.83	43.09	A	A	A	A	A	A	
	510600	45.00	46.00	43.30	42.55	42.82	43.10	43.26	43.70	44.17	A	A	A	A	B	B	
149TH STREET OUTFALL																	LOS 25 yr/25 hr C
	510050	45.10	46.10	45.80	33.09	33.30	33.62	33.84	34.19	34.34	A	A	A	A	A	A	
	510100	45.00	46.00	43.40	34.49	34.73	35.05	35.28	35.78	35.94	A	A	A	A	A	A	
	510150	45.10	46.10	43.10	34.50	34.75	35.14	35.44	36.34	36.67	A	A	A	A	A	A	
	510540	45.50	46.50	45.30	44.63	46.17	46.84	47.16	47.81	48.05	A	C	D	D	D	D	148th Ave. near Bearss Ave.
	510700	47.70	48.70	47.00	45.95	46.18	46.42	46.53	47.08	47.38	A	A	A	A	B	B	
	510800	45.00	46.00	45.80	39.92	40.61	41.37	41.81	42.84	43.07	A	A	A	A	A	A	
	510930	47.20	48.20	47.50	43.05	43.51	44.10	44.45	45.28	45.51	A	A	A	A	A	A	
	511000	52.50	53.50	52.19	44.14	44.60	44.87	45.02	45.44	45.66	A	A	A	A	A	A	
	511200	49.00	50.00	48.00	46.57	47.51	48.29	48.95	50.37	50.86	A	A	B	B	D	D	N. 12th St. and 149th Ave.
	511300	53.00	54.00	52.40	49.02	49.25	49.59	49.81	50.52	50.86	A	A	A	A	A	A	
	511600	48.00	49.00	47.40	44.42	44.57	44.79	44.92	45.28	45.42	A	A	A	A	A	A	

Cypress Creek Area (Existing Conditions) Level of Service Analysis											Flood Level Designations						
		Landmark Elev's			Water Surface Elev's												
Story Board	Basin	Site	Struct	Road	2.33yr	5yr	10 yr	25yr	50yr	100yr	2.33yr	5yr	10yr	25yr	50yr	100yr	Predicted Flood Locations (road / site / structure)
SILVER LAKE																	LOS 25 yr/24 hr A
	511400	48.00	49.00	48.60	41.75	42.54	43.43	43.60	44.93	45.44	A	A	A	A	A	A	
	511500	48.00	49.00	48.60	46.32	46.59	47.02	47.33	47.93	48.18	A	A	A	A	A	C	Silver Lake Apts.
FLYNN LAKE																	LOS 25 yr/24 hr B
	520100	49.00	50.00	47.30	46.41	46.70	47.17	47.53	48.55	49.01	A	A	A	B	B	C	
	520200	52.00	53.00	53.70	46.26	46.61	47.10	47.41	48.13	48.40	A	A	A	A	A	A	
	520300	52.10	53.10	52.10	45.85	46.09	46.46	46.70	47.31	47.55	A	A	A	A	A	A	
	520400	54.00	55.00	53.10	51.23	51.61	52.18	52.56	53.38	53.58	A	A	A	A	B	B	September Dr.
	520600	54.20	55.20	53.10	50.35	50.53	50.78	50.97	52.07	52.52	A	A	A	A	A	A	
	520700	57.80	58.80	57.50	54.09	54.50	55.08	55.24	55.58	55.74	A	A	A	A	A	A	
THIRTEEN MILE RUN																	LOS 25 yr/24 hr A
	520750	45.50	46.50	42.50	35.15	35.15	35.32	35.69	36.57	36.88	A	A	A	A	A	A	
	520800	50.10	51.10	48.20	41.00	41.00	41.00	41.00	41.15	41.40	A	A	A	A	A	A	
	520900	52.10	53.10	49.50	47.18	47.67	48.31	48.71	49.59	49.90	A	A	A	A	B	B	
	521000	58.00	59.00	56.00	50.89	51.14	51.51	51.74	52.28	52.47	A	A	A	A	A	A	
	521100	58.50	59.50	57.30	52.92	53.43	54.17	54.64	55.85	56.35	A	A	A	A	A	A	
	521200	59.70	60.70	58.00	55.76	55.97	56.25	56.43	56.85	57.00	A	A	A	A	A	A	
	521300	61.20	62.20	60.10	54.69	55.21	55.84	56.16	56.65	56.80	A	A	A	A	A	A	
	521400	59.70	60.70	59.50	55.20	55.59	56.18	56.57	57.52	57.89	A	A	A	A	A	A	
	521500	59.50	60.50	59.10	55.16	55.48	55.99	56.32	57.15	57.51	A	A	A	A	A	A	
	521600	60.90	61.90	60.20	57.37	57.60	57.90	58.08	58.47	58.60	A	A	A	A	A	A	
	521700	61.80	62.80	61.70	58.20	58.44	58.83	59.09	59.70	59.93	A	A	A	A	A	A	
	521800	64.50	65.50	63.20	59.33	59.51	59.77	59.93	60.32	60.48	A	A	A	A	A	A	
	521900	63.80	64.80	64.40	60.79	61.00	61.31	61.52	62.03	62.23	A	A	A	A	A	A	
	522000	67.50	68.50	63.50	60.96	61.25	61.68	61.93	62.52	62.73	A	A	A	A	A	A	
	522100	64.70	65.70	65.20	61.78	62.10	62.53	62.79	63.24	63.33	A	A	A	A	A	A	
	522200	55.00	56.00	42.90	34.76	35.10	35.45	35.64	36.03	36.16	A	A	A	A	A	A	
	522300	55.30	56.30	55.20	51.30	51.72	52.31	52.69	53.57	53.90	A	A	A	A	A	A	
BLIND POND																	LOS 25 yr/24 hr C
	530100	57.10	58.10	56.50	52.48	52.87	53.45	53.87	54.83	55.18	A	A	A	A	A	A	
	530150	60.10	61.10	59.20	56.27	56.79	57.56	58.08	59.31	59.74	A	A	A	A	B	B	
	530200	56.20	57.20	56.40	56.51	56.70	56.98	57.15	57.62	57.78	C	C	C	C	D	D	Live Oaks Sub., Clement Road
	530300	59.20	60.20	59.00	57.45	58.17	59.09	59.15	59.53	59.65	A	A	B	B	C	C	Hanna & Green Meadows Dr. Heather Manor, Regalwood
	530500	57.70	58.70	57.80	57.25	57.43	58.03	58.31	58.80	58.96	A	A	C	C	C	D	Livingston Ave., N. of Clement Road

Cypress Creek Area (Existing Conditions) Level of Service Analysis											Flood Level Designations						
		Landmark Elev's			Water Surface Elev's												
Story Board	Basin	Site	Struct	Road	2.33yr	5yr	10 yr	25yr	50yr	100yr	2.33yr	5yr	10yr	25yr	50yr	100yr	Predicted Flood Locations (road / site / structure)
HANNA LAKE																	LOS 25 yr/24 hr C
	540100	57.40	58.40	56.70	56.38	57.36	58.01	58.31	58.81	58.97	A	B	C	C	D	D	E. of Oak and Windermere
	540200	61.20	62.20	60.30	58.18	58.59	59.01	59.25	59.87	60.10	A	A	A	A	A	A	
	540300	60.10	61.10	58.50	52.62	53.43	54.69	55.49	57.13	57.72	A	A	A	A	A	A	
	540400	61.80	62.80	64.50	58.09	58.41	58.91	59.23	59.98	60.27	A	A	A	A	A	A	
	540450	68.20	69.20	64.10	62.15	62.65	63.29	63.52	63.87	64.04	A	A	A	A	A	A	
	540500	63.20	64.20	64.50	59.85	60.17	60.53	60.73	61.36	61.70	A	A	A	A	A	A	
	540600	64.70	65.70	64.40	60.97	61.25	61.56	61.72	62.13	62.31	A	A	A	A	A	A	
	540700	65.50	66.50	65.10	64.65	64.85	65.13	65.29	65.59	65.71	A	A	B	B	C	C	W. of Swamp Lake
	540800	64.80	65.80	65.00	61.69	62.03	62.48	62.77	63.43	63.66	A	A	A	A	A	A	
	540900	69.00	70.00	68.50	66.51	66.93	67.51	67.85	68.68	68.98	A	A	A	A	B	B	
	541000	68.00	69.00	69.90	65.77	66.21	66.84	67.24	68.13	68.43	A	A	A	A	C	C	Lutz Lake Area
	541100	69.20	70.00	68.40	64.87	65.12	65.46	65.67	66.09	66.26	A	A	A	A	A	A	
	541140	69.00	70.00	68.00	67.33	67.55	67.85	68.05	68.33	68.40	A	A	A	B	B	B	Fernandez Property
	541150	70.00	71.00	69.00	65.34	65.68	66.15	66.45	67.17	67.45	A	A	A	A	A	A	
	541200	69.90	70.90	69.40	64.32	64.70	65.28	65.65	66.57	66.92	A	A	A	A	A	A	
	541300	72.20	73.20	72.20	69.97	70.10	70.28	70.39	70.65	70.74	A	A	A	A	A	A	
SHERRY'S BROOKE																	LOS 25 yr/24 hr A
	542010	56.90	57.90	57.60	46.86	47.20	47.54	47.70	47.98	48.06	A	A	A	A	A	A	
	542020	58.00	59.00	57.60	54.00	54.58	55.38	55.82	56.74	57.07	A	A	A	A	A	A	
	542030	60.60	61.60	60.10	56.00	56.27	56.66	56.92	57.71	58.14	A	A	A	A	A	A	
	542040	62.40	63.40	63.20	59.07	59.37	59.82	60.11	60.79	61.04	A	A	A	A	A	A	
	542050	65.30	66.30	64.50	62.25	62.76	63.46	63.89	64.87	65.13	A	A	A	A	B	B	
	542060	62.90	63.90	62.50	60.15	60.44	60.86	61.12	61.71	61.95	A	A	A	A	A	A	
	542070	65.40	66.40	66.00	61.13	61.28	61.49	61.61	61.89	61.98	A	A	A	A	A	A	
	542080	64.90	65.90	64.00	60.77	61.23	61.78	62.11	62.85	63.12	A	A	A	A	A	A	
	542090	66.10	67.10	64.40	61.35	61.63	62.04	62.27	62.76	62.93	A	A	A	A	A	A	
	542100	66.30	67.30	65.80	63.45	63.81	64.27	64.54	65.26	65.54	A	A	A	A	A	A	
	542110	58.70	59.70	58.10	56.19	56.48	56.86	57.09	57.68	57.91	A	A	A	A	A	A	
RIDGE LAKE																	LOS 25 yr/24 hr A
	542120	59.80	60.80	60.20	48.49	49.36	50.81	51.81	54.30	54.86	A	A	A	A	A	A	
	542130	61.20	62.20	61.70	57.08	57.41	57.89	58.19	58.87	59.12	A	A	A	A	A	A	
	542140	65.20	66.20	65.00	61.00	61.27	61.65	61.89	62.46	62.67	A	A	A	A	A	A	
	542150	66.60	67.60	66.20	60.94	61.22	61.68	61.99	62.79	63.10	A	A	A	A	A	A	
	542160	62.40	63.40	61.90	58.74	59.27	59.94	60.33	61.13	61.41	A	A	A	A	A	A	
	542170	63.50	64.50	61.90	59.19	59.81	60.66	61.11	62.07	62.37	A	A	A	A	B	B	

Cypress Creek Area (Existing Conditions) Level of Service Analysis											Flood Level Designations						
		Landmark Elev's			Water Surface Elev's												
Story Board	Basin	Site	Struct	Road	2.33yr	5yr	10 yr	25yr	50yr	100yr	2.33yr	5yr	10yr	25yr	50yr	100yr	Predicted Flood Locations (road / site / structure)
COUNTY LINE ROAD																	LOS 25 yr/24 hr A
	542180	63.60	64.60	63.10	60.00	60.00	60.00	60.00	60.31	60.49	A	A	A	A	A	A	
	542190	65.80	66.80	65.30	62.38	62.60	62.95	63.19	63.77	64.00	A	A	A	A	A	A	
	542200	65.00	66.00	64.50	61.28	61.65	61.88	62.07	62.54	62.70	A	A	A	A	A	A	
	542210	67.00	68.00	66.50	60.00	60.00	60.00	60.00	60.00	60.00	A	A	A	A	A	A	
	542220	65.20	66.20	64.40	63.55	63.71	63.93	64.06	64.38	64.50	A	A	A	A	A	B	
WILLOW BEND (Pasco County)																	LOS 25 yr/24 hr C
	542230	66.20	67.20	66.50	66.19	66.19	66.19	66.19	66.51	66.66	C	C	C	C	C	C	Panther Path Road
	542240	66.60	67.60	66.90	65.60	65.83	66.19	66.42	66.95	67.04	A	A	A	A	C	C	S. of Newberger
	542250	68.00	69.00	67.50	67.22	67.30	67.42	67.50	67.69	67.76	A	A	A	B	B	B	
	542260	67.50	68.50	67.30	67.17	67.26	67.41	67.51	67.76	67.87	A	A	B	C	C	C	Hog Island Lake
	542270	69.70	70.70	69.40	67.75	67.95	68.25	68.45	68.94	69.13	A	A	A	A	A	A	Cool Kell Lake

NOTE :

A - NO FLOODING
B - ROAD FLOODING
C - SITE FLOODING
D - STRUCTURE FLOODING
E - NO FACILITY
F - SECONDARY SYSTEM

NOTE : Only Primary Junctions within each Basin are shown

6.4.1 Establishment of Landmark Elevations

In order to evaluate the LOS for a watershed, landmark elevations must first be determined. These elevations refer to landmarks contained in the LOS definitions, including roads, sites and structures. Landmark elevations are established for every subbasin in the watershed. These landmarks then serve as a tool for determining the level of service for the subbasin and on a broader scale, the system and the watershed. The landmark elevations established for LOS analysis are the critical or lowest landmark elevations in a subbasin. The critical landmark elevations are reflective of the worst case flooding that could occur in a subbasin. These are obtained from survey data and from topographic analysis. Every subbasin in the watershed is examined for the critical structure, site and road elevation. Table 6.3 contains landmark elevations determined for each CCW subbasin in the unincorporated portion of Hillsborough County. These landmark elevations reflect the flood depth tolerance contained in Table 6.2.

6.4.2 Comparison of Computed Results and Landmark Elevations

Using flood protection LOS designation criteria contained in Table 6.1, the landmark elevations for each subbasin are compared to the computed results of the hydraulic model. In general, the computed result for the most downstream junction was used for comparison with landmark elevations. Table 6.3 contains the difference between established landmark elevations and computed water surface elevations for the 2.33-yr/24-hr, 5-yr/24-hr, 10-yr/24-hr, and 25-yr/24-hr storm events.

6.5 LEVEL OF SERVICE DESIGNATIONS

LOS designations are assigned in three levels of detail: subbasin, system and watershed.

Subbasins were aggregated into twelve areas according to general drainage patterns. For each return period storm event, the LOS designation is first determined for the subbasin. Then the LOS is determined for the individual systems based on the aggregated subbasins comprising the system. Finally, the LOS designation is determined for the overall watershed. The LOS of the CCW watershed is reflective of the worst case system and the LOS of the system is reflective of the worst case subbasin. **Figures 6-3** (Appendix D) contains a graphical representation of the CCW level of service analysis for the 5-yr/24-hr, 10-yr/24-hr, and 25-yr/24-hr storm events.

It is important to be aware of the limits of the methodology used in the LOS analysis. Most landmark elevation information was taken from SWFWMD topographic maps, some of which are approximately 20 years old. In addition, the LOS analysis does not identify flood protection

Pasco County

County Line Rd.

U.S. Highway 41

275

75

Cypress Creek

County Highway 581

Livingston Ave.

Bruce B. Downs Blvd.

Florida Ave.

Nebraska Ave.

Fletcher Ave.

Legend

100-year Floodplain

- A -100 yr flood inundation - no BFE's determined
- AE - 100 yr flood inundation - BFE's determined
- X - Outside flood hazard zone
- X500 - 500 yr flood inundation

Cypress Creek Basin

- Basin Extent

Transportation

- I-75 & I-275
- Roads
- Railroad

Hydrography

- Stream

0 4000 Feet N

Scale:1"=4000'

Hillsborough County Florida

Cypress Creek Watershed Management Plan

URS Greiner Woodward Clyde

100-year Floodplain

Figure 6-4

Date:01/10/01

Table 6.3 EXISTING CONDITIONS LEVEL OF SERVICE - 9/1/00

Cypress Creek Area (Existing Conditions) Level of Service Analysis											Flood Level Designations						
		Landmark Elev's			Water Surface Elev's												
Story Board	Basin	Site	Struct	Road	2.33yr	5yr	10 yr	25yr	50yr	100yr	2.33yr	5yr	10yr	25yr	50yr	100yr	Predicted Flood Locations (road / site / structure)
MAIN CHANNEL																	LOS 25 yr/24 hr A
	500000	36.40	37.40	37.40	30.80	31.80	32.50	33.20	33.60	34.00	A	A	A	A	A	A	
	500100	36.40	37.40	37.40	30.97	32.05	32.85	33.69	34.22	34.79	A	A	A	A	A	A	
	500200	36.50	37.50	37.50	96.00	32.11	32.93	33.78	34.34	34.92	A	A	A	A	A	A	
	500300	41.00	42.00	42.00	31.03	32.13	32.95	33.81	34.37	34.96	A	A	A	A	A	A	
	500400	39.50	40.50	40.50	34.45	34.86	35.21	35.59	35.84	36.13	A	A	A	A	A	A	
	500500	40.00	41.00	41.00	36.54	37.14	37.55	38.04	38.39	38.70	A	A	A	A	A	A	
	500600	42.50	43.50	43.50	36.58	37.19	37.62	38.13	38.50	38.83	A	A	A	A	A	A	
	500700	43.50	44.50	44.50	36.97	37.30	37.74	38.24	38.61	38.94	A	A	A	A	A	A	
	500900	43.30	44.30	44.30	38.09	38.50	38.84	39.20	39.47	39.78	A	A	A	A	A	A	
	501000	47.00	48.00	48.00	40.69	41.24	41.72	42.11	42.34	42.62	A	A	A	A	A	A	
USF Area																	LOS 25 yr/24 hr B
	510200	43.70	47.00	45.50	37.94	38.26	38.66	38.88	40.02	40.53	A	A	A	A	A	A	
	510250	45.00	46.00	44.10	39.00	39.00	39.00	39.00	40.02	40.53	A	A	A	A	A	A	
	510260	45.10	46.10	44.70	39.44	39.66	40.03	40.27	40.87	41.10	A	A	A	A	A	A	
	510300	38.00	39.00	41.80	30.38	31.40	32.69	33.48	35.29	35.89	A	A	A	A	A	A	
	510400	44.30	45.30	43.00	41.75	42.18	42.71	43.03	43.68	43.91	A	A	A	B	B	B	W. of BB Downs and S. of 143rd Ave.
	510450	43.10	44.10	41.00	41.25	41.79	42.42	42.79	43.56	43.85	B	B	B	B	C	C	E. of 22nd St and S. of 143rd Ave.
	510460	44.80	45.80	44.30	41.25	41.79	42.42	42.80	43.57	43.86	A	A	A	A	A	A	
	510600	45.00	46.00	43.30	42.56	42.82	43.11	43.27	43.86	44.40	A	A	A	A	B	B	
149TH STREET OUTFALL																	LOS 25 yr/25 hr C
	510050	45.10	46.10	45.80	34.06	34.06	34.08	34.10	34.34	34.93	A	A	A	A	A	A	
	510100	45.00	46.00	43.40	34.26	34.46	34.74	34.92	35.35	35.50	A	A	A	A	A	A	
	510150	45.10	46.10	43.10	34.26	34.48	34.80	35.03	35.78	36.13	A	A	A	A	A	A	
	510540	45.50	46.50	45.30	41.41	42.89	45.42	46.11	46.82	47.02	A	A	B	C	D	D	148th Ave. near Bearss Ave.
	510700	47.70	48.70	47.00	45.97	46.19	46.35	46.44	46.66	46.74	A	A	A	A	A	A	
	510800	45.00	46.00	45.80	38.97	39.89	40.80	41.33	42.29	42.61	A	A	A	A	A	A	
	510930	47.20	48.20	47.50	43.15	43.63	44.23	44.58	45.32	45.54	A	A	A	A	A	A	
	511000	52.50	53.50	52.19	43.29	43.77	44.32	44.60	45.31	45.53	A	A	A	A	A	A	
	511200	49.00	50.00	48.00	45.49	46.03	46.87	47.47	48.48	48.89	A	A	A	A	B	B	N. 12th St. and 149th Ave.
	511300	53.00	54.00	52.40	49.02	49.25	49.59	49.82	50.36	50.57	A	A	A	A	A	A	
	511600	48.00	49.00	47.40	44.41	44.56	44.78	44.91	45.27	45.41	A	A	A	A	A	A	
SILVER LAKE																	LOS 25 yr/24 hr A
	511400	48.00	49.00	48.60	41.98	42.54	43.43	44.05	45.52	46.05	A	A	A	A	A	A	
	511500	48.00	49.00	48.60	46.29	46.59	47.02	47.30	47.90	48.15	A	A	A	A	A	C	Silver Lake Apts.

Cypress Creek Area (Existing Conditions) Level of Service Analysis											Flood Level Designations						
		Landmark Elev's			Water Surface Elev's												
Story Board	Basin	Site	Struct	Road	2.33yr	5yr	10 yr	25yr	50yr	100yr	2.33yr	5yr	10yr	25yr	50yr	100yr	Predicted Flood Locations (road / site / structure)
FLYNN LAKE																	LOS 25 yr/24 hr B
	520100	49.00	50.00	47.30	46.74	47.08	47.60	47.96	48.99	49.26	A	A	B	B	B	C	
	520200	52.00	53.00	53.70	46.20	46.53	47.00	47.30	47.99	48.25	A	A	A	A	A	A	
	520300	52.10	53.10	52.10	45.77	45.97	46.28	46.48	47.00	47.20	A	A	A	A	A	A	
	520400	54.00	55.00	53.10	51.23	51.61	52.18	52.56	53.38	53.58	A	A	A	A	B	B	September Dr.
	520600	54.20	55.20	53.10	50.34	50.52	50.77	50.96	52.06	52.51	A	A	A	A	A	A	
	520700	57.80	58.80	57.50	54.09	54.50	55.08	55.24	55.57	55.74	A	A	A	A	A	A	
THIRTEEN MILE RUN																	LOS 25 yr/24 hr A
	520750	45.50	46.50	42.50	35.15	35.15	35.15	35.15	35.49	35.74	A	A	A	A	A	A	
	520800	50.10	51.10	48.20	41.00	41.00	41.00	41.00	41.00	41.00	A	A	A	A	A	A	
	520900	52.10	53.10	49.50	46.44	46.82	47.39	47.76	48.59	48.88	A	A	A	A	A	A	
	521000	58.00	59.00	56.00	50.82	51.02	51.29	51.47	51.90	52.06	A	A	A	A	A	A	
	521100	58.50	59.50	57.30	52.56	53.04	53.70	54.12	55.18	55.60	A	A	A	A	A	A	
	521200	59.70	60.70	58.00	55.77	55.98	56.27	56.45	56.87	57.03	A	A	A	A	A	A	
	521300	61.20	62.20	60.10	54.86	55.37	55.97	56.26	56.70	56.86	A	A	A	A	A	A	
	521400	59.70	60.70	59.50	55.20	55.59	56.18	56.57	57.52	57.89	A	A	A	A	A	A	
	521500	59.50	60.50	59.10	55.17	55.50	56.01	56.35	57.20	57.56	A	A	A	A	A	A	
	521600	60.90	61.90	60.20	57.38	57.61	57.91	58.10	58.49	58.62	A	A	A	A	A	A	
	521700	61.80	62.80	61.70	58.21	58.44	58.85	59.11	59.73	59.96	A	A	A	A	A	A	
	521800	64.50	65.50	63.20	59.33	59.51	59.77	59.93	60.33	60.48	A	A	A	A	A	A	
	521900	63.80	64.80	64.40	60.79	61.00	61.31	61.52	62.03	62.23	A	A	A	A	A	A	
	522000	67.50	68.50	63.50	60.95	61.25	61.67	61.92	62.51	62.72	A	A	A	A	A	A	
	522100	64.70	65.70	65.20	61.78	62.11	62.54	62.80	63.24	63.63	A	A	A	A	A	A	
	522200	55.00	56.00	42.90	33.21	33.40	34.07	35.52	35.79	36.10	A	A	A	A	A	A	
	522300	55.30	56.30	55.20	51.12	51.48	52.00	52.33	53.11	53.40	A	A	A	A	A	A	
BLIND POND																	LOS 25 yr/24 hr C
	530100	57.10	58.10	56.50	52.46	52.85	53.43	53.85	54.82	55.18	A	A	A	A	A	A	
D	530150	60.10	61.10	59.20	56.00	56.51	57.29	57.82	59.11	59.58	A	A	A	A	A	B	
	530200	56.20	57.20	56.40	56.51	56.70	56.98	57.15	57.62	57.78	C	C	C	C	D	D	Live Oaks Sub., Clement Road
	530300	59.20	60.20	59.00	57.44	58.18	59.08	59.15	59.52	59.65	A	A	B	B	C	C	Hanna & Green Meadows Dr. Heather Manor, Regalwood
	530500	57.70	58.70	57.80	57.18	57.35	57.86	58.17	58.68	58.83	A	A	C	C	C	D	Livingston Ave., N. of Clement Road
HANNA LAKE																	LOS 25 yr/24 hr C
	540100	57.40	58.40	56.70	56.07	57.13	57.85	58.17	58.68	58.84	A	B	C	C	D	D	E. of Oak and Windermere
	540200	61.20	62.20	60.30	58.15	58.57	59.00	59.24	59.86	60.09	A	A	A	A	A	A	
	540300	60.10	61.10	58.50	52.68	53.48	54.75	55.54	57.17	57.76	A	A	A	A	A	A	
	540400	61.80	62.80	64.50	58.09	58.42	58.91	59.23	59.98	60.27	A	A	A	A	A	A	
	540450	68.20	69.20	64.10	62.14	62.64	63.29	63.52	63.86	64.03	A	A	A	A	A	A	
	540500	63.20	64.20	64.50	59.77	59.95	60.31	60.59	61.32	61.65	A	A	A	A	A	A	

Cypress Creek Area (Existing Conditions) Level of Service Analysis											Flood Level Designations						
		Landmark Elev's			Water Surface Elev's												
Story Board	Basin	Site	Struct	Road	2.33yr	5yr	10 yr	25yr	50yr	100yr	2.33yr	5yr	10yr	25yr	50yr	100yr	Predicted Flood Locations (road / site / structure)
	540600	64.70	65.70	64.40	60.69	60.93	61.30	61.51	62.01	62.21	A	A	A	A	A	A	
	540700	65.50	66.50	65.10	64.44	64.56	64.73	64.84	65.11	65.21	A	A	A	A	B	B	W. of Swamp Lake
	540800	64.80	65.80	65.00	61.63	61.95	62.38	62.65	63.30	63.51	A	A	A	A	A	A	
	540900	69.00	70.00	68.50	66.44	66.84	67.41	67.75	68.54	68.88	A	A	A	A	B	B	
	541000	68.00	69.00	69.90	65.74	66.18	66.81	67.21	68.10	68.42	A	A	A	A	C	C	Lutz Lake Area
	541100	69.20	70.00	68.40	64.33	64.45	64.63	64.74	65.01	65.11	A	A	A	A	A	A	
	541140	69.00	70.00	68.00	67.42	67.66	68.00	68.20	68.43	68.49	A	A	B	B	B	B	Fernandez Property
	541150	70.00	71.00	69.00	64.04	64.05	64.09	64.15	64.39	64.52	A	A	A	A	A	A	
	541200	69.90	70.90	69.40	64.37	64.76	65.36	65.75	66.70	67.06	A	A	A	A	A	A	
	541300	72.20	73.20	72.20	70.12	70.28	70.51	70.65	70.98	71.10	A	A	A	A	A	A	
SHERRY'S BROOKE																	LOS 25 yr/24 hr A
	542010	56.90	57.90	57.60	46.85	47.19	47.54	47.69	47.98	48.06	A	A	A	A	A	A	
	542020	58.00	59.00	57.60	54.01	54.58	55.38	55.82	56.74	57.07	A	A	A	A	A	A	
	542030	60.60	61.60	60.10	56.00	56.27	56.66	56.92	57.70	58.13	A	A	A	A	A	A	
	542040	62.40	63.40	63.20	59.06	59.37	59.82	60.11	60.79	61.04	A	A	A	A	A	A	
	542050	65.30	66.30	64.50	62.25	62.76	63.47	63.90	64.88	65.16	A	A	A	A	B	B	
	542060	62.90	63.90	62.50	60.14	60.43	60.86	61.11	61.71	61.94	A	A	A	A	A	A	
	542070	65.40	66.40	66.00	61.12	61.28	61.48	61.60	61.88	61.98	A	A	A	A	A	A	
	542080	64.90	65.90	64.00	60.79	61.22	61.78	62.15	62.95	63.13	A	A	A	A	A	A	
	542090	66.10	67.10	64.40	61.34	61.63	62.03	62.26	62.75	63.05	A	A	A	A	A	A	
	542100	66.30	67.30	65.80	63.45	63.81	64.28	64.60	65.45	65.78	A	A	A	A	A	A	
	542110	58.70	59.70	58.10	56.19	56.47	56.85	57.08	57.65	57.88	A	A	A	A	A	A	
RIDGE LAKE																	LOS 25 yr/24 hr A
	542120	59.80	60.80	60.20	47.01	47.41	47.98	48.39	49.69	50.41	A	A	A	A	A	A	
	542130	61.20	62.20	61.70	57.03	57.35	57.81	58.10	58.76	59.01	A	A	A	A	A	A	
	542140	65.20	66.20	65.00	61.01	61.28	61.66	61.91	62.47	62.69	A	A	A	A	A	A	
	542150	66.60	67.60	66.20	60.98	61.28	61.76	62.08	62.90	63.22	A	A	A	A	A	A	
	542160	62.40	63.40	61.90	58.74	59.27	59.93	60.00	61.13	61.41	A	A	A	A	A	A	
	542170	63.50	64.50	61.90	59.18	59.80	60.64	61.10	62.05	62.35	A	A	A	A	B	B	
COUNTY LINE ROAD																	LOS 25 yr/24 hr A
	542180	63.60	64.60	63.10	60.00	60.00	60.00	60.00	60.00	60.00	A	A	A	A	A	A	
	542190	65.80	66.80	65.30	62.65	62.98	63.50	63.85	64.63	64.92	A	A	A	A	A	A	
	542200	65.00	66.00	64.50	60.02	60.13	60.00	60.69	61.43	61.66	A	A	A	A	A	A	
	542210	67.00	68.00	66.50	60.00	60.00	60.43	60.00	60.00	60.00	A	A	A	A	A	A	
	542220	65.20	66.20	64.40	63.02	63.07	63.16	63.24	63.45	63.54	A	A	A	A	A	A	
WILLOW BEND (Pasco County)																	LOS 25 yr/24 hr C
	542215				67.00	67.00	67.00	67.00	67.00	67.00	A	A	A	A	A	A	
	542225				67.00	67.00	67.00	67.00	67.10	67.20	A	A	A	A	A	A	
	542230	66.20	67.20	66.50	67.00	67.00	67.00	67.00	67.00	67.02	C	C	C	C	C	C	Panther Path Road

Cypress Creek Area (Existing Conditions) Level of Service Analysis											Flood Level Designations						
Story Board	Basin	Landmark Elev's Site	Struct	Road	Water Surface Elev's 2.33yr	5yr	10 yr	25yr	50yr	100yr	2.33yr	5yr	10yr	25yr	50yr	100yr	Predicted Flood Locations (road / site / structure)
	542240	66.60	67.60	66.90	65.70	65.94	66.28	66.49	66.97	67.04	A	A	A	A	C	C	S. of Newberger
	542250	68.00	69.00	67.50	67.28	67.37	67.50	67.58	67.78	67.85	A	A	A	A	A	A	
	542255				67.33	67.44	67.59	67.69	67.92	68.01	A	A	A	A	A	A	
	542260	67.50	68.50	67.30	67.22	67.34	67.52	67.64	67.92	68.03	A	B	C	C	C	C	Hog Island Lake
	542270	69.70	70.70	69.40	67.75	67.95	68.25	68.45	68.94	69.13	A	A	A	A	A	A	Cool Kell Lake
	542275				68.12	68.94	70.95	73.57	87.06	96.12	A	A	A	A	A	A	
	542280				67.14	67.20	67.29	67.34	67.46	67.53	A	A	A	A	A	A	
	542285				67.15	67.23	67.34	67.40	67.57	67.65	A	A	A	A	A	A	
	542290				66.76	66.76	66.83	66.97	67.29	67.40	A	A	A	A	A	A	
	542295				67.00	67.00	67.00	67.00	67.25	67.36	A	A	A	A	A	A	
	542310				65.65	65.05	66.17	66.44	67.45	67.84	A	A	A	A	A	A	
	542320				67.85	68.05	68.52	68.57	68.70	68.76	A	A	A	A	A	A	
	542330				68.89	69.18	69.40	69.47	69.75	69.88	A	A	A	A	A	A	
	542350				67.54	67.81	68.20	68.33	68.60	68.72	A	A	A	A	A	A	
	542360				67.50	67.61	67.77	67.87	68.32	68.56	A	A	A	A	A	A	
	542370				78.00	78.00	78.00	78.00	78.00	78.00	A	A	A	A	A	A	
	542380				66.98	67.21	67.53	67.71	68.31	68.55	A	A	A	A	A	A	
	542390				66.76	66.76	66.83	66.97	67.29	67.40	A	A	A	A	A	A	

NOTE :

A - NO FLOODING
B - ROAD FLOODING
C - SITE FLOODING
D - STRUCTURE FLOODING
E - NO FACILITY
F - SECONDARY SYSTEM

deficiencies for secondary systems contained in a subbasin since only the major systems are contained in the hydraulic model. Conversely, since only the critical landmark elevations were identified in each subbasin, areas within a subbasin may contain a higher LOS than that assigned.

6.5.1 Cypress Creek Main Channel

The Cypress Creek main channel has a LOS A for the 25-year / 24-hour design storm simulation. This area includes the Cypress Creek main channel and it's associated floodplain. The EXTRAN model predicts no major street, site, or structural flooding is expected to occur during the 25-year / 24 hour storm event. Since this area has previously been identified as flood prone area, no development has occurred in the area. Therefore, no flooding problems have been identified.

6.5.2 County Line Drainage System

The County Line Drainage System and Willow Bend area has an LOS C for the 25-year/24-hour storm event. The Hillsborough County Modified EXTRAN model predicts that during the 25-year/24-hour storm event, localized site and street flooding will occur in the area. Detailed locations where flooding is predicted to occur for the 25-year/24-hour storm event is shown in Exhibit 6-3. General locations where the EXTRAN model predicts LOS deficiencies are summarized below.

Site flooding during the 25-year/24 hour storm event:

- Cool Kell Lake
- South of Newberger Road on Livingston Avenue

Road flooding during the 25-year/24 hour storm event:

- Panther Path Road just south of County Line Road

6.5.3 Country Oaks System

The Country Oaks system has a LOS A for the 25-year/24-hour design storm simulation. The EXTRAN model predicts no major street, site, or structural flooding is expected to occur during the 25-year/24 hour storm event.

6.5.4 Ridge Lake System

The Ridge Lake system has a LOS A for the 25-year/24-hour design storm simulation. The EXTRAN model predicts no major street, site, or structural flooding is expected to occur during the 25-year / 24 hour storm event.

6.5.5 Sherry Brook System

The Sherry Brook system has a LOS A for the 25-year / 24-hour design storm simulation. The EXTRAN model predicts no major street, site, or structural flooding is expected to occur during the 25-year / 24 hour storm event.

6.5.6 Hanna Lake System

The Hanna Lake system has a LOS C for the 25-year / 24-hour storm event. The Hillsborough County Modified EXTRAN model predicts that during the 25-year/24-hour storm event, localized site and street flooding will occur in the area. Detailed locations where flooding is predicted to occur for the 25-year / 24-hour storm event is shown in Exhibit 6-3. General locations where the EXTRAN model predicts LOS deficiencies are summarized below.

Site flooding during the 25-year/24 hour storm event:

- East of Oaks at Windermere complex on the west side of Livingston Avenue

Road flooding during the 25-year/24 hour storm event:

- Residential roadway adjacent to Swamp Lake

6.5.7 Blind Pond Avenue System

The Blind Pond Avenue system has a LOS C for the 25-year/24-hour storm event. The Hillsborough County Modified EXTRAN model predicts that during the 25-year/24-hour storm event, localized structure, site and street flooding will occur in the area. Detailed locations where flooding is predicted to occur for the 25-year/24-hour storm event is shown in Exhibit 6-3. General locations where the EXTRAN model predicts LOS deficiencies are summarized below.

Site flooding during the 25-year/24 hour storm event:

- Area adjacent to Hanna Road to the west, Green Meadows Drive to the north, and Touchton Road to the south

- Area near Heather Manor, Regalwood and Livingston Unit IV subdivisions located west of Livingston Avenue

Structure flooding during the 25-year/24-hour storm event:

- Live Oak Subdivision and Structures along Clement Road

6.5.8 Thirteen Mile Run System

The Thirteen Mile Run system has a LOS A for the 25-year/24-hour design storm simulation. The EXTRAN model predicts no major street, site, or structural flooding is expected to occur during the 25-year / 24 hour storm event.

6.5.9 Flynn Lake System

The Flynn Lake System has a LOS B for the 25-year/24-hour storm event. The Hillsborough County Modified EXTRAN model predicts that during the 25-year/24-hour storm event, localized street flooding will occur in the area. Detailed locations where flooding is predicted to occur for the 25-year / 24-hour storm event is shown in Exhibit 6-3. General locations where the EXTRAN model predicts LOS deficiencies are summarized below.

Road flooding during the 25-year/ 24 hour storm event:

- Livingston Avenue south of I-275

6.5.10 Silver Lake Outfall System

The Silver Lake outfall system has a LOS A for the 25-year/24-hour storm event. The Hillsborough County Modified EXTRAN model predicts that during the 25-year/24-hour storm event, localized site and street flooding will occur in the area. Detailed locations where flooding is predicted to occur for the 25-year/24-hour storm event is shown in Exhibit 6-3. General locations where the EXTRAN model predicts LOS deficiencies are summarized below.

Site flooding during the 25-year/24 hour storm event:

- Silver Lake Apartments

6.5.11 149th Street Outfall System

The 149th Street outfall system has a LOS C for the 25-year/24-hour storm event. The Hillsborough County Modified EXTRAN model predicts that during the 25-year/24-hour storm event, localized street flooding will occur in the area. Detailed locations where flooding is predicted to occur for the 25-year/24-hour storm event is shown in

Exhibit 6-3. General locations where the EXTRAN model predicts LOS deficiencies are summarized below.

Road flooding during the 25-year/ 24 hour storm event:

- 148th Avenue near Bearss Avenue

6.5.12 Bruce B. Downs System

The Bruce B. Downs system has a LOS B for the 25-year/24-hour storm event. The Hillsborough County Modified EXTRAN model predicts that during the 25-year/24-hour storm event, localized site and street flooding will occur in the area. Detailed locations where flooding is predicted to occur for the 25-year/24-hour storm event is shown in Exhibit 6-3. General locations where the EXTRAN model predicts LOS deficiencies are summarized below.

Site flooding during the 25-year/24 hour storm event:

- Area east of Bruce B. Downs Boulevard and west of 30th Street
- Area west of Bruce B. Downs Boulevard and south of 143rd Avenue
- Area east of 22nd Street and south of 143rd Avenue (University Area Community Center)
- Area east of 22nd Street and north of 143rd Avenue

CHAPTER SEVEN Existing Water Quality Conditions

7.1 OVERVIEW

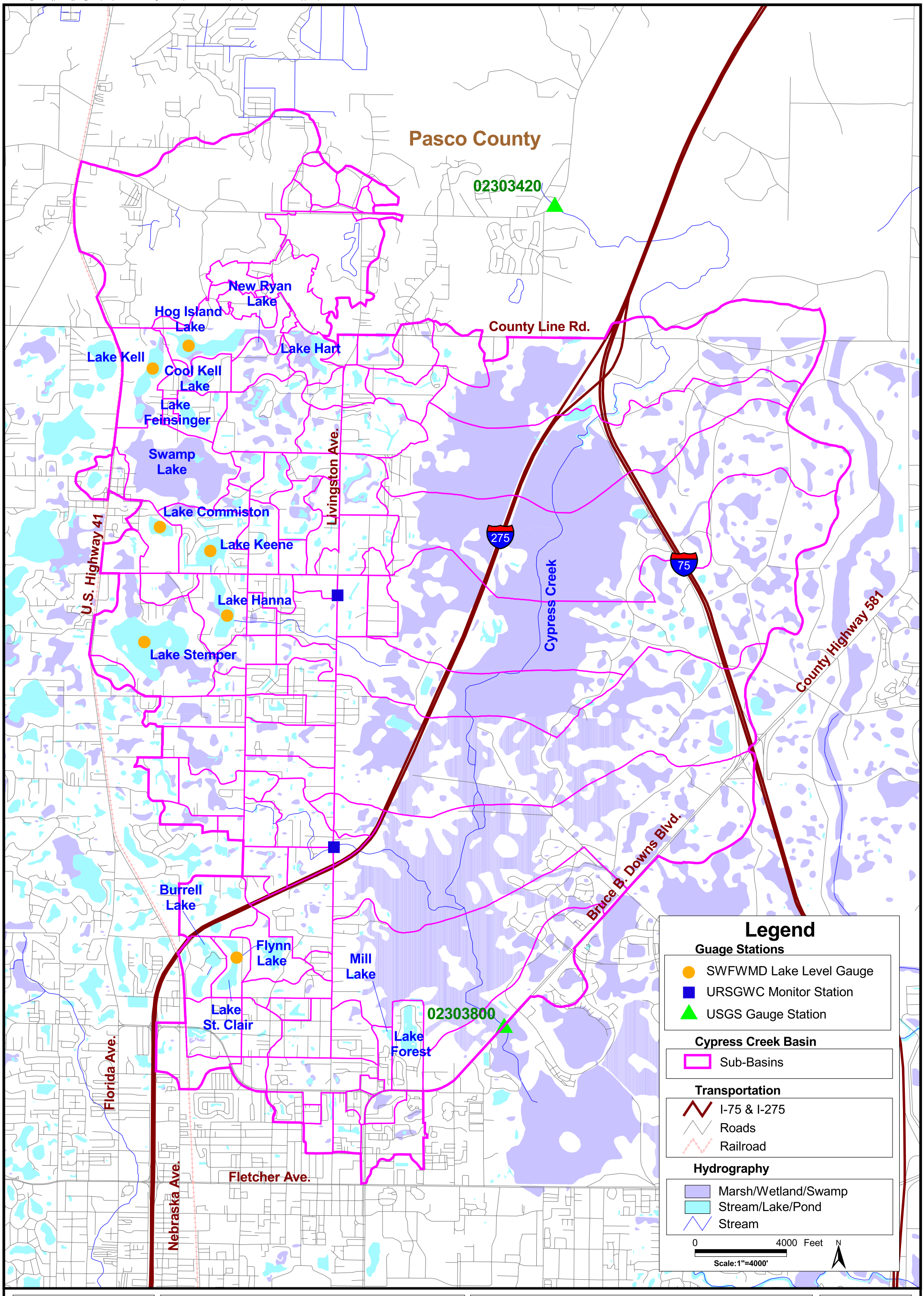
Historic and existing condition water quality data for the lakes and Cypress Creek in the Cypress Creek watershed were assembled and reviewed. Water quality variations were analyzed and monthly and annual summaries provided. The Cypress Creek Watershed has 16 lakes, and water quality data exists for 11 of the lakes. The only major creek in the watershed is Cypress Creek, for which water quality data exists only at one location within the Hillsborough County portion of the Cypress Creek watershed, i.e. at CR 581 (Bruce B. Downs Boulevard). Available historic water quality data also exists for the portion of Cypress Creek in Pasco County at Worthington Gardens (SR 54). No data exists for other smaller creeks including the Sherry Brook and Thirteen-Mile Creeks. The data at CR 581 and SR 54 were used to provide a comparison of water quality between the upstream and downstream portion of the creek through Hillsborough County. The location of lakes and creeks and the monitoring stations on Cypress Creek are shown in **Figure 7-1**.

Historic and existing condition lake water quality and trophic state indices were computed and analyzed. Historic and existing condition Cypress Creek water quality data were analyzed and the WQI and TSI calculated for the upstream station at SR 54 and the downstream station at CR 581. A comparison is made between the two Cypress Creek stations using data from the EPC, the USGS, the FDEP 305(b) Report, and STORET.

7.2 WATERSHED CHARACTERISTICS

Lake water quality data from the Lake Atlas were also used. The basin has 16 major lakes out of which 11 have water quality and water level monthly data since 1997. Stream flow and water quality data available from the USGS, HCEPC, FDEP 305(b) Report, and STORET databases were also used. The USGS has collected monthly data for the two stations at CR 581 (USGS Station Cypress Creek at Sulphur Springs, Station No. 02303800) and SR 54 (USGS Station Cypress Creek at Worthington Gardens, Station No. 02303420) since 1964. EPC has collected monthly data for the station at CR 581 (EPC Station 120) since 1976. FDEP uses the STORET data for the station at CR 581 in the 305(b) report.

The Cypress Creek Watershed is located in Hillsborough and Pasco Counties and drains to Hillsborough River. The watershed is bounded to the north by County line Road, to the east by I-75 and Bruce B. Downs Blvd., to the south by Bruce B. Downs Blvd. and Bearss Avenue and to the west by US 41. The total watershed area is approximately 150 square miles with the southern 33 square miles in north central Hillsborough County. The basin has over 104 subbasins whose area ranges from 10 acres to 400 acres. There are 10 outfalls into the Cypress Creek of which the Thirteen Mile, Sherry Brook, Bayou Branch, Bee Tee Branch, and Stanley Branch are major creeks. No water flow or water quality data exists for the creeks except for Cypress Creek main channel. The basin is moderately developed and becomes more urbanized in the southern portions within Hillsborough County. The lower Cypress Creek Basin appears to be impaired by urban construction. The upper Cypress Creek Basin is undergoing residential development and has low DO levels and high nutrient levels. The watershed also contains two large well fields known as the Cypress Creek and Cypress Bridge well fields. The primary land



Hillsborough County Florida

Cypress Creek Watershed Management Plan

URS Greiner Woodward Clyde

Water Resources Map

Figure 7-1

Date:09/28/00

use is residential. Other land uses in the basin include agricultural with small orange groves in the northern part and commercial development in the southern part. The 1995, existing, and future land use data are summarized in Table 7-1 of Appendix E. Land use and FLUCCS codes are presented in Table 7-2 of Appendix E.

In general, the Cypress Creek water quality is poor, high in color, and low in DO although it has low turbidity and low P levels. Low DO is attributed to the nature of the system itself rather than to pollution sources. The creek is the deepest portion of a swampy floodplain with low flow rates and considerable amount of natural vegetative decomposition occurring along the watercourse. The water quality of most lakes appears to be good to fair based on the TSI data although extensive hydrilla infestation has been observed in Lake Hanna in recent years.

7.3 LAND USE LAND COVER

7.3.1 1995 Land Use Land Cover

The Land Use Land Cover layer, provided by the Southwest Florida Water Management District, is the result of photo-interpretation of 1:24,000 and 1:40,000 scale, color infrared, aerial photography. The Florida Department of Transportation's Florida Land Use and Cover Classification Cover System (FLUCCS) is used to denote types of land cover. The most generalized level of this classification system, denoted as "Level 1", was used to formulate the distribution of land cover for each watershed subbasin.

The "Urban & Built-Up" category refers to regions that are residential (low, medium, and high densities), commercial and service, industrial, extractive, institutional, recreational, and open land. "Agriculture" is comprised of cropland and pastureland, tree crops, feeding operations, nurseries and vineyards, specialty farms, and other rural lands. "Rangeland" is herbaceous, shrub/ brush land, and mixed rangeland. "Upland Forests" are coniferous forests (including pine flatwoods), upland hardwood forests, and mixed coniferous/ hardwood forests. "Water" includes streams and waterways, lakes, reservoirs, bays and estuaries. The "Wetlands" category includes wetland hardwood forests such as bay swamp, mangrove swamp, and river or lake swamp; wetland coniferous or cypress forests; and mixed forested wetlands. Non-forested wetlands include freshwater and saltwater marshes, wet prairies, and aquatic vegetation.

Thus, in 1995, urban and built-out, wetlands, agricultural, and upland forests were the main land uses (Figure 7-2 of Appendix E).

7.3.2 Existing Land Use

Existing Land Use data (Figure 7-3 of Appendix E), circa 1997-1998, was provided by the Hillsborough County City-County Planning Commission based upon parcel and tax role data from the Hillsborough County Property Appraiser.

The Existing Land Use classifications do not correspond to, or imply a correlation with, land zoning classifications.

Some land use codes were generalized by the Florida Center staff using logical comparison relationships. The "Residential" category comprises single, two, and multi-family dwellings as well as mobile home parks. "Public/Public Institutional" includes utilities and communications facilities. "R/W" denotes right-of-way, but does not include federal highways. Mining is included in the "Industrial" category.

7.3.3 Future Land Use

Future Land Use, as projected by county planners for the year 2015, is provided by the Hillsborough County City-County Planning Commission. The Future Land Use map was originally adopted 10/27/94, with the last revision occurring 10/05/98. Broad generalizations may be developed in regards to relationships between the Existing and the Future Land Use maps, in that the codes used in each are not directly correlative.

"Agriculture" includes mining, rural, and agricultural estate regions. There are eleven different classifications appertaining to the "Residential" category. "Commercial" includes office commercial and research corporate parks. "Mixed Use" comprises community, neighborhood, regional, suburban, and urban mixed uses.

7.4 LAKE WATER QUALITY

7.4.1 Introduction

The Hillsborough County Lake Atlas Website was used as the source of the lake water quality data. There are 16 lakes in the Cypress Creek Watershed out of which lake water quality data exists for 11 lakes. A map of the location of the lakes and watershed subbasins is shown in **Figure 7-1**. Water quality samples are collected by a network of volunteers and are analyzed by the UF for temperature, pH, Chla, TN, TP, and SD. In addition to water quality data, biomass data (emergent, floating, and submersed plants) also exists. The Lake Atlas computes the TSI using the FDEP procedure and TN, TP, and Chla as discussed later in this section. It may be noted that the TSI calculation does not use the Secchi Depth value because the use of Secchi Depth for dark or black, tannin waters may mislead the TSI value. The equations used in the calculation of TSI is the same as the one used by FDEP in the 305(b) report.

Lake data including the lake volume, surface area, depth, and biomass and length of water quality data record are provided in Table 7-3 of Appendix E. Based on the volume, Hog Island Lake, Commiston Lake, Lake Kell and Lake Stemper are the largest and Lake Burrell is the smallest. Based on lake surface area, Lake New

Ryan, Hog Island Lake, Hanna Lake, Lake Kell and Lake Keene are the larger lakes in that order, and Lutz Lake and Lake New Ryan are the smallest lakes. Depthwise, Lake Kell, Lake New Ryan and Commiston Lake are the deepest, and Lake Forest has the shallowest depth. In terms of biomass, Lake Hanna, Lake Keene and Commiston Lake rank highest with Lake Kell and Lake Stemper having the lowest biomass.

7.4.2 TSI and WQI

The TSI is a relative measurement and does not measure pollutant or bacteria levels. It represents one aspect of water quality – eutrophication. The process of aging of a lake is called eutrophication. Lakes can be classified into oligotrophic (O), mesotrophic (M), eutrophic (E), and hypereutrophic (H) depending on their evolution or aging. An oligotrophic lake is typically a young lake with few dissolved nutrients, little or no organic matter, and the lack of littoral vegetation. The water clarity is high and there are no suspended solids or algal blooms. Biological productivity is low therefore fish and other aquatic organisms are present. This is the type of lake people like to have for swimming and water skiing. An eutrophic lake is an older, biologically productive water body. Eutrophic lakes in their final stages will convert to a swamp, wetland, or bog if natural conditions persist. These have high nutrients, a thick layer of organic sediments and poor light penetration. The littoral zone is heavily covered with vegetation and there may be frequent algal blooms. Fish and other aquatic life may be in abundance. Recreation, because of aesthetic reasons, may be limited to fishing and hunting. A mesotrophic lake is the relative middle stage between oligotrophic and eutrophic.

Trophic state represents the degree of biological productivity of a water body. The Florida LAKEWATCH base trophic state relies primarily on CHLA, although aquatic plant abundance might also be included in its determination. The LAKEWATCH does not use any TSI calculations; instead it utilizes individual values of four measured parameters (TN, TP, SD, CHLA) without transforming them into TSI values. Water clarity depends on the free-floating phytoplankton, dissolved organic compounds, and sediments suspended in the water either stirred up from the bottom or washed in from the shore. Water clarity determines water use and aquatic plant growth. Conversely, increasing the plant growth can increase water clarity. Submersed plants will consume most of the nutrients thus depriving the floating algae of nutrients. Submersed plants anchor the nutrient-rich bottom sediments from releasing the nutrients by buffering it from the action of wind, wave, rainfall, and human effects. Water clarity determines the available sun light for plant growth and the depth of growth.

The different methods of WQI/TSI calculations are as follows:

1) The FDEP WQI calculation procedure.

2) The FDEP procedure to calculate TSI value using TN, TP, and Chla and without using the Secchi depth data.

3) The Forseberg and Ryding (1980) method of classification of lakes into one of four states based on individual parameters, Oligotrophic, Mesotrophic, Eutrophic, and Hypereutrophic.

4) Canfield and Jones (1983) method to consider the effect of aquatic macrophytes on chlorophyll and hence the TSI value using the percent volume infestation (PVI).

Water Quality Index

The FDEP equation to calculate water quality index is:

WQI = 1.5(4/DO + 0.001) + 0.05TURB + 7.5NH3N + TN/1.5 + TP/O.05 + CHLA/20

All parameters are in mg/l, except TURBIDITY, which is in NTU.

Baseline = 6.50 which closely approximates Florida Class III criteria for surface water quality. WQI values over 6.5 do not meet the criteria; values under 6.5 meet or exceed the criteria.

An FDEP WQI could not be calculated for the lakes in the Cypress Creek Watershed since no data exist for its calculation.

TSI Calculation

TSI is calculated in the Lake Atlas and by FDEP in the 305(b) report using the following equations:

TSI CHLA = 16.8 + 14.4 Ln(CHLA)
TSI TN = 56 + 19.8 Ln (TN))
TSI TN2 = 10(5.96 + 2.15 Ln (TN+0.0001)
TSI TP = 18.6 Ln(1000TP)-18.4
TSI TP2 = 10(2.36 Ln(1000TP) –2.38

TSI NUTR = TSI TP2; IF TN/TP>30
TSI NUTR = TSI TN2; IF TN/TP<10
TSI NUTR = (TSI TP + TSI TN)/2; IF 10<TN/TP<30

OVERALL TSI = (TSI CHLA + TSI NUTR)/2

TSI 0-59 Good, 60-69 fair, 70-100 poor, >100 a problem lake

Figure 7-4 of Appendix E presents monthly raw data and monthly average plots for TN, TP, SD, Chla, and TSI. Figure 7-5 of Appendix E plots the monthly TSI values. Figure 7-6 of Appendix E plots the annual data and annual water quality parameters. Table 7-3 of Appendix E includes some statistics on the TSI value. Tables 7-4 and 7-5 of Appendix E summarize annual and monthly TSI averages.

Referring to Table 7-3 of Appendix E, the one-year TSI values are less than or equal to 59, meaning the lake trophic state is good to fair. Lake Forest, Keene, and Kell have a TSI higher than 50 but less than 59. As far as TSI minimums are concerned, the pattern follows the one-year average pattern and is less than 49 for all lakes meaning the condition is fair. If maximums are analyzed, except for lakes Burrell, Lutz, Flynn, and Hog Island, the TSI values are higher than 59. For Lakes Forest, Keene, and Hanna, the maximums are greater than 69 indicating a poor condition. The latest values (year 1999) show all lakes have a TSI close to 59.

For most lakes, no pattern can be established in the variation of the water quality parameters with time (months) for the duration of the data record (Figure 7-4 of Appendix E). However for Lake Stemper and Commiston Lake, the TSI varies little and is within a narrow range over the period of record.

Variation of TSI with the period of record are also shown in Figure 7-5 of Appendix E. For all lakes the variation of TSI is rather within a narrow range, but for Lake Stemper in 1994-1996, the variation is rather high but has stabilized since 1997.

The annual data variation (Table 7-5 of Appendix E) indicates that the TSI is slightly higher than 59 for Lake Forest. Monthly averages (Table 7-4 of Appendix E) also indicate a higher than 59 TSI for Keene. The monthly and annual averages of TN/TP ratios vary from 20 to 50 for most lakes, but values higher than 50 are evident for Flynn Lake and values are between 10 and 20 for Lake Forest.

Lake Classification Using Forseberg and Ryding (1980) Criteria

The two original methods, one based on TSI and the other maximum allowable or critical N and P loading rates are useful. Based on biological productivity, lakes can be classified into one of 4 trophic states:

- Oligotrophic – unproductive,
- Mesotrophic - moderately productive,
- Eutrophic - productive, and
- Hypereutrophic - highly productive.

General criteria for lake classification into trophic state categories are summarized in Table 7-6 of Appendix E. TSI is determined by considering individually the values of Chla, TN, TP, and SD. When nutrients are not the factor limiting lake productivity or phytoplankton is not the major primary producer, then problems arise using the conventional TSI method. However, this conceptual classification scheme was used to rank lakes only according to their productivity, not on their overall quality for various human activities; thus, an O lake is not necessarily inherently better than a eutrophic lake.

The results of the above analysis are summarized in Table 7-5 of Appendix E by letters O, M, E, and H for the four classes of trophic states. Based on TN, only Burrell Lake is oligotrophic and all others are eutrophic. Based on TP, Burrell and Lutz are mesotrophic and all others are eutrophic. Based on Chla, Lakes Burrell and Lutz are mesotrophic and all others are eutrophic or hypereutrophic. Based on SD, all lakes except Lake Forest are oligotrophic or mesotrophic and Lake Forest is eutrophic.

Comparing the results of this analysis with the TSI method, the Forseberg-Ryding method is a better method of lake classification as it looks at individual water quality parameters rather than averaging as in the TSI method. It must be noted that this method however, does not consider the effect of aquatic macrophytes on Chla (the more aquatic plants the lower will be the Chla) and hence the effect on the TSI value and subsequent lake classification.

Percent Volume Infestation (PVI) Inclusion in TSI Calculation

The TSI of lakes having growths of aquatic macrophytes may be assessed by using the total nutrient concentration in the water column (nutrients contained in the macrophytes plus those in the water) in conjunction with existing classification systems. The nutrients, plant biomass, or organic production associated with macrophytes has been shown to influence the TSI and water quality. Canfield and Jones (1983) developed the following equation to calculate Chla considering the effect of aquatic macrophytes. It can be seen in the equation below that the larger the PVI the lower the Chla, which will result in a lower TSI and hence the lake may be classified differently than using the TSI calculated without using the PVI value.

Log CHLA = -2.08 + 0.28 log TP + 1.02 log TN –0.005 PVI
Use this CHLA in calculating the TSI. The above equation is valid for Chla between 0.6 to 159 mg/m3.

A discussion with USF Staff member Tim Foret, indicated that the PVI data is available only for Lake Hanna in the watershed. This value is 63%. The results are summarized for the monthly averages and annual data in Table 7-7 of Appendix E for Lake Hanna. The results are inconclusive. The large PVI reduces

the Chla value to a small value and thus the overall TSI turns out to be negative. Another reason for this situation is that the above equation may not be valid for low values of Chla.

7.4.3 FDEP 305(b) Report

Lake Hanna, Lake Stemper, Lake Keene and Lake Kell have also been analyzed by the FDEP and found to fully meet the requirements of the overall support, water chemistry and nonpoint source assessment categories. However, no data is available to assess the other requirements of the analysis which are biology, fish advisories, and water quality standards exceedances (see Tables 7-8 and 7-9 of Appendix E).

7.4.4 Lake Water Quality Summary

The N/P ratios for the lakes are between 10 and 30 so the lakes are nutrient balanced and the lake TSIs indicate that their trophic states are in fair to good condition. Recently, Lake Hanna has had extensive hydrilla problems as indicated by the PVI and large biomass data. Some of the lakes are improving as indicated in lowered TSI values with time. The Forseberg-Ryding method of lake classification will add valuable information to the TSI method in determining the lake trophic state. There is not much data, however, to validate the results of the PVI method. It is not clear if the Canfield and Jones equation is valid outside the range of Chla used to derive the equation. This equation is valid for Chla between 0.6 and 159 mg/m3.

7.5 STREAM WATER QUALITY

Water quality data and/or the analysis results available from the USGS, EPC and FDEP were evaluated to assess the water quality of Cypress Creek. The USGS data is useful in assessing the creek water quality upstream at SR 54 in Pasco County (Station 02303420) and downstream at CR 581 (Station 02303800) in Hillsborough County. Data goes back to 1964 for these two stations. The EPC Station No. 120 is at CR 581 and the data goes back to 1976. The FDEP uses the STORET data, which includes the USGS, EPC, and other agency data, if available. The station locations are shown in Figure 7-1 of Appendix E. There are several smaller creeks, many of these discontinuous or terminating in wetlands (e.g. Hanna Creek) with the exception of the Thirteen-Mile Creek and Sherry Brook Creeks which directly joins Cypress Creek. These water courses or smaller creeks are also shown in Figure 7-1 of Appendix E.

7.5.1 FDEP 305(b) Report

The 305(b) report includes data tables identifying water quality and trends, and causes of water quality problems. STORET data for 1980 to 1995 include water quality indices of biological and chemical data, exceedances of water quality standards, fish consumption advisories, the analysis of statistical trends,

information from special studies, and interviews with local agencies and experts. This report was originally produced in 1974 and is updated every two years. The five years from 1990-1995 were used as current data and 1980-1989 as historic data. Trends were based on ten years of the most recent data, 1986-1995. Water quality is assessed based on new components, which are the chemistry (aquatic life use support (ALUS)), biology (macroinvertebrates or bottom dwelling organisms), and fish consumption advisories, and the previous components of water quality indices.

Water quality problems generally fall into five categories: urban stormwater, agricultural runoff, domestic wastewater, industrial wastewater, and hydrological modifications. Urban stormwater carries a variety of nutrients and silts, agricultural runoff carries nutrients, turbidity, BOD, bacteria, and pesticides. Domestic wastewater has significantly reduced pollution because of upgraded treatment plants, wetland treatment, and water reuse. Industrial wastewater (mainly phosphate and fertilizer industries) contributes to water body pollution, and in the case of phosphate mining, it also changes the hydrologic regime. Hydrologic modifications include dredging and filling which destroy habitat, including wetlands, thus reducing the buffering and filtering capacity.

In the report, water quality indices based on six categories of water quality measures involving 13 parameters are used: (1) water clarity, (2) DO, (3) oxygen-demanding substances, (4) nutrients, (5) bacteria, and (6) macroinvertebrate diversity for streams and TSI based on TN, TP, and Chla as a measure of the potential for algal weed growth for lakes and estuaries. A screening level analysis involving the indices and ten-year trends was performed to indicate water quality problems. Also considered are the priority pollutants (metals and conventional pollutants) for compliance with the state's water quality standards, and developed criteria for diversity index and taxa data using biological data and whether the water bodies supported their intended designated uses including fish consumption advisories.

Cypress Creek is a Class III, freshwater creek supporting recreation, wildlife and fish. The Water Quality Index computation is based on water quality measures by six categories. The 13 parameter raw data (annual averages) is converted into values ranging from 0 to 99 for the six categories and parameter index values corresponding to the percentile distribution of stream water quality data in Florida. For each parameter of the six categories, an average index is computed and the overall index values over the 6 categories is the WQI value. A criteria of 0 to 45 as good, 45 to <60 as fair, and 60 to 99 as poor was used.

The Florida TSI classifies lakes based on TN, TP, and Chla concentrations. Use of Secchi depth is deemed not appropriate for dark water bodies since their lower transparency is caused by the dark waters rather than algae. A unit change in the

TSI value represents a doubling or halving of algal biomass. The overall TSI is calculated as the average of Chla and nutrient TSIs as previously discussed.

Water quality problems were identified using screening levels on 219 water quality parameters. Levels were based on the upper criteria for streams, lakes and estuaries. Trends were analyzed using 12 measurements and the overall WQI and TSI. For streams, 9 parameters (bacteria, turbidity, TSS, BOD DO, SD, N, P and overall TSI) and for lakes/estuaries, 5 parameters (Chla, SD, N, P, and the overall TSI) were used. Also, chemical pollutants in waters were assessed using metals, conventional pollutants, pesticides, PAHs, and phenols data for 1993-1995 from the STORET database. Exceeded screening levels were used to warn of a problem. Florida water quality standards were used to determine if a pollutant level was elevated. Measured hardness was used to calculate metal standards.

As discussed in the FDEP 305 (b) Report, determination of the support for a designated use was based on 6 assessment values: the chemistry (WQI or TSI), biology, nonpoint source pollution, exceeded standards for conventional pollutants, exceeded standards for metals, and fish consumption advisories. Each assessment was given a score of 1 for good quality, 3 for fair, and 5 for poor. An overall average was then calculated from the components, with a break point set at 1 to 2 for good, 2 to 4 for fair, and 4 to 5 for poor. However, if the average of the WQI and the biological assessment indicates that the water body does not meet its designated use, then this is the final determination. If the average WQI, biological and nonpoint source pollution assessments indicate that the water body does not meet its designated use, then this is the final determination, otherwise, the determination was based on the average of all six assessments results.

Table 7-8 of Appendix E indicates that Cypress Creek (Class III Waters) does not meet the criteria for overall use support, does not meet water chemistry criteria, partially meets nonpoint source assessment criteria, and partially meets the FDEP water quality standards exceedances for both conventional pollutants and metals. No data is available to assess FDEP biology data assessment and fish advisories. As indicated in Table 7-9 of Appendix E the basin seems to have a stable trend in water chemistry. As noted in Table 7-10 of Appendix E, the basin also does not meet the use support requirement of DO, partially meets the total and fecal coliform requirements, and fully meets the requirements of all other parameters.

Table 7-11 of Appendix E provides the FDEP parameters for water clarity, DO, oxygen demand, pH alkalinity, trophic states, coliform bacteria, conductivity and water quality indices. The WQI value is 71 for the basin, classifying the watershed as poor (60 - 90). DO, TOC, and TN exceeds the screening criteria. Detailed trend results for water quality parameters are however not available for the basin. The screening criteria is provided in Table 7-12 of Appendix E. Water quality standards are presented in Table 7-13 of Appendix E.

7.5.2 EPC Data

The EPC data for the Cypress Creek at CR 581 (Station 120) covers the period from 1976 to the present. Raw monthly data of several water quality parameters are plotted in Figure 7-6 of Appendix E. Monthly averages of parameters are shown in Figure 7-7 of Appendix E. As expected, some seasonality appears in DO, Chla, TN, TP, and BOD with months in a year. Monthly averages are also summarized in Table 7-14 of Appendix E. Low DO (<4.0) appears in February through November. High BOD is noted from April through August. TOC does not vary from month to month and is high. High TP (>0.08) occurs in 10 months of a year and high TN (>1.42) occurs in 6 months of a year. The values of 0.24 and 0.20 mg/l are the screening levels of TP and TN, and not the water quality standards. Chla varies from about 9 to 15 during April through July and up to 8 during the rest of the months in a year.

The WQI and TSI values computed using the FDEP procedure are summarized for each month in Table 7-15 of Appendix E. The WQI value is higher than the base value of 6.5 from April through November and hence does not meet Class III criteria for these months or for annual average parameter values. TSI value is higher than 59 in May through July and hence in fair trophic state condition during these months; in all other months the TSI value is lower than 59 indicating the trophic state is good.

Annual water quality data are presented in Table 7-16 and Figure 7-8 of Appendix E. The WQI and TSI results for the annual data are summarized in Table 7-17 of Appendix E. WQI exceeds the baseline value of 6.5 for several years of data as well as for the overall annual average. For the most part, N/P ratio is between 10 and 30.The overall TSI exceeds 59, 4 out of the 16 years, but the average over all the years is less than 59.

Annual data trend lines are shown in Figure 7-9 of Appendix E. A slightly decreasing trend for TP and insignificant trend for TN is observed. A slightly increasing trend for DO and no trend for Chla are shown. An increasing trend for TSS is seen. The data for these parameters is rather a mixture of trend, seasonal and random terms. The trend term explains a smaller part of the data variation as seen by their R-Square values.

Several statistics including the mean, standard deviation, median, minimum, and maximum were calculated and are summarized in Table 7-17a of Appendix E. In general, because of large variations in the data, the median value is a better indicator of central tendency rather than the mean or average value. The DO has a minimum and median value of less than 2.50 indicating the low DO problem in comparison with the Class III standard of 5 mg/l. Statistical values for TSS are low, which is good. The TP median value of 0.08 mg/l is much less than its screening level of 0.24 mg/l and the TN median value of 1.42 is much higher than

its screening level of 0.2 mg/l. This analysis qualitatively confirms that the Cypress Creek has lower DO and higher TN as noted in other studies.

7.5.3 USGS Data

The USGS water quality data for Cypress Creek at Worthington Gardens (upstream in Pasco county at SR 54) and at Sulphur Springs in Hillsborough County (at Bruce B. Downs Blvd. or CR 581) from 1964 to the present were used. Average monthly and annual concentrations of DO, TP, and TN are listed in Tables 7-18 and 7-19 of Appendix E for the two stations. The observed monthly data and monthly average data are plotted in Figure 7-10 of Appendix E for the two stations. Comparing the monthly data for the two stations, DO falls from February through November every year at both stations to lower than 5 mg/l. From March through December; TN and TP are at approximately the same level at both stations except that at CR 581, there is some increase during June through August.

Annual data at the two stations are provided in Table 7-19 and in Figure 7-11 of Appendix E. TP is approximately the same at the two stations. The TN pattern is nearly the same at the two stations but higher at SR 54 since 1985. TN is higher than its screening level of 0.20 mg/l at SR 54 in 1985, and 1990 through 1996, and in 1989 through 1992, and in 1994 and 1999 at CR581. There appears to be some seasonality in TN and DO during these years. DO falls below 4 mg/l more often at CR581 than at SR54 almost cyclically. For example, at CR581 DO is lower than 4.0 mg/l 22 times out of the 29 years of data (1970 - 1999) and at SR54 it is 16 times in the same data period.

Annual data trend lines are shown in Figure 7-12 of Appendix E. A slightly increasing trend for DO is seen at both stations. TP is without any trend (almost constant) at SR 54 and has an increasing trend at CR 581. TN has an increasing trend at both SR 54 and CR 581. These trends may not be significant as indicated by their R-square values. The data for these parameters is rather a mixture of trend, seasonal and random terms. The trend term explains a smaller part of the data variation as seen by their R-Square values.

Several statistics including the mean, standard deviation, median, minimum, and maximum were calculated and are summarized in Table 7-20 and 7-21 of Appendix E respectively, for the station at CR581 and at SR 54. In general, because of the large variations in the data, median values are a better indicator of central tendency rather than the mean or average values. DO has a minimum, median and mean value of 1.80, 3.35 and 3.44 at CR581 and 2.38, 3.72 and 4.09 at SR 54. The median values are approximately the same at the two stations but less than the standard of 5.0 mg/l. In some years, the DO level at CR 581 falls below its value at SR 54. On the average, it is 20% lower at CR581 in comparison with its value at SR54. The TP median value is approximately the

same at the two stations at about 0.5 mg/l and less than its standard of 0.8 mg/l. A TN median value is 1.30 at CR581 and is higher than its values of 1.25 at SR54. It is slightly lower than its standard of 1.42 at CR581 and slightly higher than its standard at SR54. This analysis qualitatively confirms that Cypress Creek has lower DO and higher TN values than as noted in other studies.

In addition to the above analyses, the following analyses were performed to detect the correlation and relationship between DO, TN and TP at the two stations:

- Regression analysis of parameters at two stations.

The results shown in Figure 7-13 of Appendix E indicate DO at CR 581 decreases with increasing values at SR 54 and no significant relationship is seen for TN and TP at the two stations. As far as DO is concerned, this may be happening as a result of the activities within the Hillsborough County portion of the Cypress Creek Basin. Again it must be noted that the regression accounts for a small percentage of the variation in the data as seen by its R-square value shown in Figure 7-13 of Appendix E.

- Single mass curves (plot of cumulative parameter values with time) for DO, TN, and TP are shown for the two stations in Figures 7-14 of Appendix E.

At CR 581, no perceptible slope change occurs in the plot, meaning no significant change has occurred in the trend; the curve shifts upward around 1990 but with approximately the same slope before and after 1990 indicating perhaps a change in the station location or measurement or analysis of data. Three distinct periods are evident for TP at about 1986 and 1991. It does not appear that the slopes in the three periods are statistically significantly different but the curve shifts upward for similar reasons in the case of TN.

At SR 54, no change in slope or presence of breaks are evident for DO and TN, however TP seems to have a smaller slope after 1990 indicating TP values may be decreasing with time.

- Double mass curves (plot of cumulative parameter value at one station against the cumulative value of DO at another Station) are shown in Figure 7-15 of Appendix E. No change of slope in DO is seen. There is clearly a change in slope for TN and TP indicating that the data between the two stations are different.

CHAPTER EIGHT Existing Natural System Conditions

8.1 OVERVIEW

As part of the Cypress Creek Watershed Management Plan, the historical and current land-use and condition of natural areas were assessed. The presence of wildlife and existence of state and federal listed species within the Cypress Creek Watershed were also evaluated. To accomplish these tasks, site-specific information was obtained and reviewed prior to field reviews. Information initially reviewed included:

- Sulfur Springs and Lutz US Geological Survey quadrangle maps,
- 1997 1"=200' blueline Hillsborough County aerials,
- 1973 and 1977 1"=200' Southwest Florida Water Management District
- 1938 1"=66' black and white Hillsborough County aerials,
- Natural Wetlands Inventory maps (US Fish & Wildlife Service),
- Florida Land Use, Cover Forms and Classification System (FLUCFCS) GIS coverage maps,
- Southwest Florida Water Management District Historic Vegetation Communities (ECOL Code data-from Hillsborough and Pasco county NRCS, August 1, 1996), and
- Hillsborough and Pasco County Natural Resource Conservation Service Soil Survey Maps.

An analysis of the existing land-uses in the Cypress Creek Watershed indicated that there are seven primary land use cover types present (Urban and Developed, Recreational, Transportation, Agriculture and Nurseries, Open and Disturbed Land, Pasture, and Natural Uplands and Wetlands). Cover types or coverage's are areas of land or water that have been defined according to distinct features (e.g. lakes and forests). Natural upland and wetland cover types are further divided into community types according to dominant vegetation or the presence of open water. There are three primary community types for natural uplands (i.e., Shrub and Brushland, Oak Hammock, Pinelands / Flatwoods) and four primary community types for wetlands (i.e. Cypress Swamp, Hardwood Swamp, Marsh, and Open Water) within the Cypress Creek Watershed.

Land-Use History

Land-use in Florida and Hillsborough County has changed with the needs and growth of the human population. Natural upland and wetland habitats have been altered with the introduction of agriculture, logging, mining and urban development. Historically, upland areas were easier to utilize than wetlands due to better drainage and lack of standing water. However, technological development enabled settlers in Florida to drain wetlands and alter natural water flow using canals and reservoirs in order to meet their needs.

The Spanish were the first Europeans to introduce citrus in Florida. The Spanish brought several varieties of sweet and sour oranges with them to eat while traveling. Seeds that were discarded in the campsites resulted in scattered orange groves. Cuban fishermen were another medium for the introduction and spread of oranges. Limes and key limes were first brought to the New World by the British Royal Navy. They were used to prevent outbreaks of scurvy among their sailors and then discarded. Because the primary mode of transportation during this time was by boat along existing waterways, this resulted in citrus trees growing near waterways. Early settlers utilized these trees and furthered the spread of limes and Key limes with their move inland.

Grapefruit was originally brought to Florida by Count Odet Phillippe of France who first lived in the Keys and then moved to the Safety Harbor area of Hillsborough County.

The citrus industry was introduced to the north Tampa region in the early part of the 19th century. The citrus industry grew rapidly in Tampa and by 1938, the western section of the Cypress Creek Watershed in Hillsborough County contained approximately 1600 acres of citrus groves. At this time, the eastern section of this watershed was almost entirely natural with the exception of a few dirt roads. By 1973, development and agriculture had increased in Cypress Creek Watershed; approximately 2800 acres of the western section of the watershed had been converted to citrus. In addition, urban development had become prevalent in the southern section of the watershed (approximately 4668 acres) and in the early 1960's construction of I-275 was completed on the eastern side of the watershed.

Today, the Cypress Creek Watershed is approximately 20,922 acres in size (approximately 33 square miles) and is comprised of urban and developed (approximately 4668 acres), agricultural (914 acres), pasture (approximately 1760 acres), recreation (approximately 47 acres), open and disturbed land (approximately 1186 acres), transportation (approximately 810 acres) and natural (approximately 11749 acres) areas. The majority of the area west of I-275 is residential. The southern half of the section of Cypress Creek Watershed located between I-75 and I-275, along Bruce B. Downs Boulevard, contains an area known as the Tampa Palms region. In the Tampa Palms region, uplands are rapidly being developed with houses and commercial businesses. The northern half of the section of Cypress Creek Watershed located between I-275 and I-75 is primarily undeveloped and has retained its somewhat natural state. Hillsborough County has bought approximately 1517 acres of this section of the Cypress Creek Watershed through the Environmental Land Acquisition Protection Program (ELAPP). This area includes land located between I-75 and I-275 and land located directly east of I-275 (**see Figure 8-1**). Approximately 75% of the lands acquired by the County consist of forested wetland, while the remaining 25% are upland.

8.2 EXISTING COVER TYPES

The following sections provide descriptions of each of the primary land cover types (1995) found within the Cypress Creek Watershed. The acreage and general location (see Figure 8-1) of each cover type is also discussed. Table 8-1 provides a summary of acreage for each cover type. The dominant plant species, wildlife associates, and condition of each of the natural communities are also provided.

8.2.1 Man-Made Systems

Urban and Developed Land (FLUCFCS-110, 120, 130, 140, 150, 160, 170, 830)

Urban and developed land (as previously mentioned) is located primarily west of I-275 and along the southern section of the watershed. There is approximately 4188 acres of residential development (110- less than 2 dwellings per acre, 120-

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54

75

COUNTY LINE RD

WALLACE RD

SUNSET LANE

DEBOER LN RD

LIVINGSTON RD

41

581

BRUCE B DOWNS BLVD

E BEARSS AVE

FLETCHER AVE

LEGEND

Environmental Land Acquisition Protection Program

- Acquired Site Area
- Approved Site Area
- Other Preservation
- Other Public Land

Land Use Classification

- Agriculture
- Cypress
- Mixed Hardwood/ Cypress Swamp
- Marsh
- Oak Hammock
- Open Land
- Open Water
- Pine Land/Flatwoods
- Recreational
- Shrub & Brushland
- Transportation
- Urban & Developed
- Cropland & Pastureland

Bald Eagle Nest Sites

4000 0 4000 Feet

Scale: 1" = 4000'

N

Hillsborough County Florida

Cypress Creek Watershed Management Plan

URS Greiner Woodward Clyde

Natural Systems Map

Figure 8-1

Date: 9/28/00

TABLE 8-1

CYPRESS CREEK WATERSHED
LAND COVERAGE ACREAGE (1995)

LAND COVERAGE TYPE	FLUCFCS	AREA (Acres)
URBAN AND DEVELOPED	110, 120, 130, 140, 150, 160, 170, 830	4668
RECREATIONAL	180	47
AGRICULTURE AND NURSERIES	214, 220, 240, 250	914
OPEN AND DISTURBED LAND	190, 740	1186
TRANSPORTATION	810	598
CROPLAND AND PASTURE	210	1760
SHRUB AND BRUSHLAND	320	1738
PINELAND / FLATWOODS	410, 411	247
OAK HAMMOCK	427	1773
CYPRESS SWAMP	621	1830
HARDWOOD/CYPRESS SWAMP	610	4159
OPEN WATER	520, 530, 653	1023
MARSH	641, 643, 644	979
TOTAL		20921

2-5 dwellings per acre, and 130- greater than 6 dwellings per acre), 7 acres of industrial development (150), 5 acres of extractive (160, e.g. mining), 304 acres of commercial services (140), 98 acres of institutional development (170- schools and churches) and 66 acres of utilities (830) present within the watershed.

Recreational (FLUCFCS - 180)

There is approximately 47 acres (golf courses and parks) of recreational land located in the western developed section of the watershed.

Open and Disturbed Land (FLUCFCS – 190, 740)

There is approximately 1186 acres of open and disturbed land with the Cypress Creek Watershed. Open land (190) refers to undeveloped lands located within urban areas (190). At the time the FLUCFCS map was produced there was approximately 1141 acres of open land in the Cypress Creek Watershed. Most of these areas were cleared for development. Disturbed land (740) refers to areas of land that have been changed primarily due to human activities other than mining such as borrow areas, spoil mounds, fill areas and cleared and burned areas. Disturbed land cover types tend to be located outside of urban areas. There is approximately 45 acres of disturbed land in this watershed.

Agriculture and Nurseries (FLUCFCS - 214, 220, 240, 250)

These cover types include tree crops (220, approximately 665 acres), row crops (214, approximately 5 acres), nurseries and vineyards (240, approximately 43 acres), tree plantations (246, approximately 129 acres), specialty farms such as horse or dairy farms (250, approximately 72 acres), and tree plantations. Within the Cypress Creek Watershed, orange groves are the primary component of this cover type.

Improved Pasture (FLUCFCS - 210)

There is Improved pasture (210) located within the north east section of the Cypress Creek watershed. These areas have been cleared, tilled, and reseeded with pasture grasses such as bahia (*Paspalum notatum)* and Bermuda grass (*Cynodon dactylon*) and are actively managed as pasture. There is approximately 1760 acres of Improved Pasture in Cypress Creek Watershed.

8.2.2 Upland Natural Systems

Pinelands / Flatwoods (FLUCFCS - 410, 411)

Pinelands / Flatwoods are one of the most common upland communities in Florida, however, in the Cypress Creek Watershed there is only 247 acres of this

community type. According to the SWFWMD historic vegetation coverage map there has been over 6900 acres lost of pine flatwoods in Cypress Creek Watershed. This is < 4% of the original acreage is left. Much of the historic Pineland / Flatwood areas of the watershed have been logged or developed. Large sections of pineland that were reviewed in the field as part of this study are currently slated for development. Pine dominated areas of the watershed ranged from flatwood (411) habitats with sparse open canopies to denser stands of pinelands (410) with greater than 60% canopy cover. Pineland / Flatwoods communities have deep, acidic, poorly to somewhat poorly drained soils that are coarse texture and poorly drained. The topography, seasonal precipitation, soils, and fire cycle effect the hydrology and vegetation make-up in flatwoods and pinelands. Flatwoods and pinelands that have a lower elevation can become saturated for up to two months during the rainy season. Areas that have not been burned retain higher moisture levels than burned areas. The pinelands and flatwoods are dominated by slash pine (*Pinus elliottii)* with longleaf pine (*Pinus palustris)* also occurring in the canopy. In some areas, lack of fire has resulted in a dense shrub layer with minimal species growing in the herbaceous layer. Saw palmetto (*Serenoa repens*) dominates the shrub layer with wax myrtle (*Myrica cerifera),* gallberry (*Ilex glabra),* sparkle berry (*Vaccinium arboream*), runner oak (*Quercus minima*), St. John's wort (*Hypericum* spp.) and fetterbush (*Lyonia lucida)* also occurring. Wire grass (*Aristida stricta*), dog fennel (*Eupatorium caprifollium*) and broomsedge (*Andropogon virginicus*) exist in the herbaceous stratum. Typical wildlife species associated with this community type include armadillo (*Dasypus novemcinctus),* feral pig, eastern cottontail rabbit (*Sus scrofa),* deer (*Odocoileus virginianus),* skunk (*Mephitis mephitis),* raccoon (*Procyon otor),* opossum (*Didelphis marsupilis),* bobwhite (*Colinus virginianus),* meadowlark (*Sturnella magna),* rufous-sided towhee (*Pipilo erythropthalmus),* eastern diamond back rattlesnake (*Crotalus adamanteus)* and oak toad (*Bufo quercious).*

Shrub and Brushland (320)

The land coverages of Cypress Creek that were designated as shrub and brushland consist of sandy uplands with low-lying scattered live oaks and Chapman's oak (*Quercus chapmanii*). The Shrub and Brushland community type is primarily located on the east side of the Cypress Creek Watershed near I-75. There are approximately 1738 acres of Shrub and Brushland in the Cypress Creek Watershed. The species associated with the shrub and herbaceous layer of this community type are similar to those found in the pinelands and flatwoods communities. The Shrub and Brushland areas have a dense shrub layer that is dominated with saw palmetto. Other species that grow in the shrub layer include wax myrtle, sparkleberry and gallberry. The sparse herbaceous layer is colonized with species such as broomsedge and dog fennel. The shrub and brushland communities are probably logged flatwood and oak hammocks.

Oak Hammock (FLUCFCS-427)

Oak hammocks are a minor upland community within the Cypress Creek Watershed. There is approximately 1773 acres of this community type located in transitional areas along the forested swamp associated with Cypress Creek. This is an approximate 1290-acre decrease in acreage of oak hammock. This habitat type has a closed canopy of low-lying live oaks (*Quercus virginiana*) and laurel oaks (*Quercus laurifolia*). Under normal circumstances the shrub and herbaceous layers are sparse, however sections of the oak hammock areas within this watershed have a dense saw palmetto shrub layer. Other shrub and herbaceous layer species found in the oak hammock communities include American beauty (*Callicarpa americana),* poison ivy (*Toxicodendron radicans*), resurrection fern (*Polypodium polypodioides*) and panicum grasses (*Panicum* spp.). Oak hammock soils are gently sloping, deep and somewhat poorly to poorly drained. Oak hammocks provide good habitat for small mammals, deer, turkey (*Meleagris gallopavo),* squirrel (*Sciurus carolinensis),* numerous song birds, woodpeckers, bobwhite, raccoon and opossum. This habitat type is marginal for reptiles and not adequate for amphibians.

8.2.3 Wetland Natural Systems and Open Water Bodies

Open Water (FLUCFCS – 520, 530, 653)

Using FLUFCFS (Florida Department of Transportation, 1985) and the US Fish and Wildlife Service Classification system (Cowardin et. al., 1979) open water areas within the watershed were is defined as lakes (520), reservoirs (530) and intermittent ponds (653). There is approximately 1023 acres of open water within the Cypress Creek Watershed. This is an approximate increase by 186 acres since 1958 to compensate for wetland loss.

Lakes (520)

Lakes are natural inland bodies of water that contain standing water year round. There are palustrine and lacustrine lake systems located in Cypress Creek Watershed. Palustrine are defined as less than 20 acres and lacustrine are defined as greater than 20 acres according to the Fish and Wildlife Service Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et. al., 1979). A number of the lakes have emergent littoral shelves dominated with species such as cattail (*Typha* spp.*),* pickerelweed (*Pontedaria chordata)* and arrowhead (*Sagittaria* spp.). Lake systems are primarily located in the west section of the Cypress Creek Watershed (west of I-275). There are approximately 597 acres of lakes located within the Cypress Creek Watershed. For the purpose of this study, Hillsborough County requested the following five lacustrine lakes be evaluated; Lake Stemper, Lake Hanna, Keene Lake, Lake Kell and Hog Island Lake.

Information on the current condition of all lakes in Hillsborough County has been compiled by the Hillsborough County Lake Atlas Project. Hillsborough County Lake Atlas is a joint project between Hillsborough County, University of South Florida and Southwest Florida Water Management District. Historical information and management practices (i.e. invasive/problem species control) have also been compiled by the Lake Atlas project for lakes that have available records. Information collected from the Hillsborough County Lake Atlas Project and lake field reviews was used for the following discussion on Lake Stemper, Lake Hanna, Keene Lake, Lake Kell and Hog Island Lake. The water quality, dominant plant species, invasive plant species, development, and any information on history and management practices that was found is provided in the discussion below. For water quality the trophic state index (TSI) is given for each lake. The TSI describes the quality of a water body based on turbidity and nutrient concentrations. TSI measurements usually range from 0-100 with, 0-59 is being considered good, 60-69 fair, and 70-100 poor.

Lake Stemper

Lake Stemper is approximately 126.0 acres in size and is located northeast of the Nebraska Avenue and Dubuel Road intersection. Lake Stemper has an average TSI value of 46.2 which indicates its water quality is good. Areas adjacent to this lake are about 50% developed and 50% undeveloped. Land surrounding the southeastern portion of the lake consists of forested swamp that is dominated by cypress and hardwoods and such species as sweet bay (*Magnolia virginiana)*, red maple (*Acer rubrum)* and dahoon holly (*Ilex cassine*). There are 32 different herb, shrub and tree species associated with Lake Stemper. Of these 32 species 7 are considered to be exotic. Dominant invasive species noted during field reviews include Melaleuca (*Melaleuca quinquenervia*), torpedo grass (*Panicum repens*) and primrose willow (*Ludwigia peruviana*). The lake experienced a bout of hydrilla (*Hydrilla verticillata)* in the early 1980's, but the problem was addressed by stocking the lake with grass carp which eat this invasive exotic.

A historical narrative of the lake was provided by John Crilly in May 1998. Mr. Crilly was a childhood resident in the twenties and regular visitor to Lake Stemper since that time. Lake Stemper is a natural lake that is not spring-fed. The lake relies on run-off from other lakes to maintain water levels. Runoff from other lakes and the surrounding swamp has given the lake its rusty color. According to Mr. Crilly, the lake has dried up three times since 1981, the last time being six years ago. Prior to 1981, Mr. Crilly has no memory of the lake drying up. The level of the lake was low at the time of the field review. A discussion with one local resident supported Mr. Crilly's observations. The lake's water level has apparently been low for the last two years and during this time it has not reached seasonal high water levels (i.e. lichen lines noted on cypress trees). In addition, Mr. Crilly commented that there has been a decrease in wildlife such as alligators, otters, snakes and wading birds that were plentiful in the recent past.

Lake Hanna

Lake Hanna is approximately 36 acres in size and is located south of Sunset Lane. Lake Hanna has an average TSI value of 43.5 which indicates its water quality is good. The land surrounding Lake Hanna is approximately 50% developed and 50% citrus grove. Cypress trees colonize the transition area located between the groves and the edge of the lake. There are 41 different plant species associated with Lake Hanna. Of these 41 species, 8 are considered to be exotic and/or pest species. Primrose willow and cattail are dominant around the edge of the lake and Hydrilla is currently expanding its limits within the lake.

Lake Keene

Lake Keene is approximately 30 acres in size and is located north of North of Sunset Lane. Lake Keene has an average TSI value of 61.3 which indicates its water quality is fair. Approximately 85% of the land surrounding Lake Keene is developed with the remaining 15% consisting of citrus grove. There are 33 different plant species associated with Lake Keene. Of these 33 species, 6 are considered to be exotic and/or pest species. Dominant species around the edge of the lake include cattail, pennywort (*Hydrocotyl* spp.*)*, torpedo grass and primrose willow.

Lake Kell

Lake Kell is approximately 34 acres in size and is located southwest of the Nebraska Avenue and County Line Road intersection. Lake Kell has an average TSI value of 51.0 which indicates its water quality is good. Lands surrounding Lake Kell are 30% developed and 70% undeveloped. The undeveloped area is primarily citrus groves. Minor sections of cypress swamp with swamp fern (*Blechnum serrulatum*) in the herb layer exist on the land surrounding Lake Kell. There are 50 different plant species associated with the lake. Of these 50 species, 7 are considered to be exotic and/or pest species. Primrose willow and cattail were dominant along the edge of the lake. An osprey (*Pandion haliaetus)* was observed and a species of owl was heard during the field review.

Hog Island Lake

Hog Island Lake is approximately 54 acres in size and is located west of Lake Kell and US 41 and south of County Line Road. Hog Island Lake has an average TSI value of 50 which indicates its water quality is good. The land surrounding this lake is approximately 40% developed and 60% undeveloped. The undeveloped land is primarily marshy improved pasture which is utilized for cattle grazing in some areas. There are 42 different plant species associated within Hog Island Lake. Of these 42 species, 6 are considered to be exotic pest species.

Marshy areas surrounding the lake are colonized with species such as cattail, pickerelweed, soft rush (*Juncus effusus*), and primrose willow, with primrose willow being the dominant species around the edge of the lake. Melaleuca is also another prominent invasive species associated with Hog Island Lake.

Reservoir (530)

Reservoirs are considered to be artificial impoundments of water such as detention ponds that are used for irrigation, flood control, municipal and rural water supplies, and recreation. There are approximately 416 acres of reservoirs within the Cypress Creek Watershed, with the majority of the impoundments located in the western section of the watershed west of Livingston Avenue.

Intermittent Ponds (653)

Intermittent ponds are shallow ponds that are typically dry or contain water during various seasons of the year. This is a minor cover type in the Cypress Creek Watershed (approximately 10 acres).

Marsh (FLUCFCS- 641, 643, and 644)

Marsh communities are a minor component of the wetlands in Cypress Creek watershed. This cover type includes scrub-shrub marshes (640), herbaceous emergent marshes (641) and wet prairies (643). There is approximately 979 acres of marsh community located within the Cypress Creek Watershed. Marsh communities have been depleted by approximately 57 acres. Marshes and wet prairies are both palustrine habitats but differ in hydroperiod. Wet prairies have a shorter hydroperiod (50-150 days) which results in a more diverse habitat. Marshes have a 6-9 month hydroperiod and tend to be less diverse than wet prairies. The majority of the marshes located within the Cypress Creek Watershed have formed as a result of disturbance. There is a large section of marsh located in two borrow pits adjacent to I-275 and another section of marsh located along the utility line road which intersects Bruce B. Downs Boulevard. Herbaceous emergent marsh areas are colonized with species such as cattail, pickerelweed, blue maidencaine (*Amphicarpum muhlenbergianum*), flat sedge (*Cyperus* spp.), rushes (*Juncus* spp.) and arrowhead. Woody emergent marsh areas are dominated by species such as primrose willow, wax myrtle, and Carolina willow (*Salix nigra*). Wet prairies are dominated by maidencane, cordgrass (*Spartina bakerii),* beakrush (*Rhinchospora* spp.) and muhly grass (*Muhlenbergia capillaris).* Emergent marshes with open water provide better habitat than scrub shrub marshes. Scrub shrub marshes with dense vegetation hinder wildlife mobility and the ability of wildlife to forage for food. Wildlife species such as otters, turtles, snakes, frogs, and numerous wading birds utilize these areas for food and shelter.

Cypress Swamp (FLUCFCS – 621)

Within the Cypress Creek Watershed, cypress swamp strands are interspersed among hardwood swamps and uplands located between I-275 and I-75. These strands of bald cypress are associated with Cypress Creek floodplain. The cypress swamp strand communities are predominantly cypress (>90%) with an open understory and sparse ground cover. Red maple (*Acer rubrum*), elm (*Ulmus* spp.), cabbage palm (*Sabal palmetto*) and laurel oak are sparsely interspersed within and located along the edge of these strands. Isolated cypress domes that are colonized with pond cypress (*Taxodium ascendens)* are scattered throughout the northeast section of the watershed. These cypress domes have red maple, sabal palm, and laurel oak growing in the canopy while shrubs include species such as dahoon holly, fetterbush (*Lyonia lucida)*, and myrtle. In the herbaceous layer of cypress domes are chain fern (*Osmunda woodwardia*), cinnamon fern (*Osmunda cinnamomea*), royal fern (*Osmunda regalis*), pennywort, and lizard tail (*Saururus cernus).* The average dbh (diameter at breast height) of cypress trees in the domes indicates that these areas have been logged within the last 50 to 100 years. There is less evidence of logging in the cypress strands. Cypress strands and domes comprise approximately 1830 acres of this watershed. According to the SWFWMD Historic Vegetation Coverge map (see Figure 8-2) and the FLUCFCS map (see Figure 8-1) there has been a decrease in cypress by 4615 approximate acres. However, the hardwood/cypress swamp coverage has increased by approximately 3155 acres. This general trend in cypress decrease and hardwood increase is due to a couple of factors. Cypress swamps were directly impacted by drainage for development. Drier conditions and lack of fire promotes hardwood succession in Florida swamp communities. Lastly, the historic data is interpolated from soils coverage rather than aerial, therefore it is impossible to decipher whether hardwoods may have been present in the cypress coverage, but not dominant. Wildlife species known to utilize cypress communities include deer, raccoon, otter, egret, heron, wood duck (*Aix sponsa)*, wood stork (*Mycteria americana)*, turtles, frogs and alligator (*Alligator mississippiensis)*.

Hardwood Swamp (FLUFCFS - 610)

Hardwood swamps associated with Cypress Creek are interspersed among cypress strands and upland areas located between I-275 and I-75. Wetland hardwood swamps have a crown coverage of >66% hardwood. The hardwood swamps within the Cypress Creek Watershed are spatially diverse with different hardwood tree species dominating in different areas. Hardwood species that are prevalent in the canopy of these swamp communities include laurel oaks, red maple, elms, pop ash (*Fraxinus americana*) and black gum (*Nyssa sylvatica*). Cypress and slash pine also exist in sections of the hardwood swamp communities. The understory and shrub layer is composed of the same species as the canopy with cabbage palm and sweet gum (*Liquidambar styraciflua*) also occurring. Grapevine (*Vitis* spp.), poison ivy, catbrier (*Smilax* spp.) are prominent vine species within the hardwood

swamps. Herbaceous species are variable with species such as cinnamon fern, chain fern, lizard tail, pennywort, and coinwort (*Centilla asiatica)* often occurring. Saw palmetto is prevalent along the edge of the hardwood swamps. There is approximately 4159 acres of hardwood swamp located within this watershed. Hardwood swamp communities provide habitat for a wide variety of wildlife species including bobcat (*Lynx rufus)*, deer, squirrels, raccoons, otters, barred owls (*Strix varia)*, hawks, pileated woodpecker (*Dryocophus pilatus)*, turkey, turtles and alligators.

8.3 LISTED SPECIES WITHIN THE WATERSHED

The potential existence of federal and state listed species found in Cypress Creek watershed has been assessed. Federal listed species are those plant and animal species protected by the federal government pursuant to the Endangered Species Act of 1973, as amended. Federal listed species can be classified as endangered or threatened. The state has similar regulations and classifies species as endangered, threatened or species of special concern. Cypress Creek Watershed is on Hillsborough County land and City of Tampa land, both of which have local regulations. Hillsborough County Land Development Code, Article 4, provides protection for all listed species. The City of Tampa, Upland Habitat Protection Ordinance, Article 5, regulates upland usage and protects listed species associated with those uplands.

Documentation on the occurrence of listed species in Hillsborough County was obtained from the Florida Natural Areas Inventory (FNAI), Florida Fish and Wildlife Conservation Commission (FFWCC), the US Fish & Wildlife Service, and Hillsborough County Cypress Creek Resource Management Plan. Table 8-2 summarizes the listed species that have the potential to occur within the Cypress Creek Watershed. The state and federal status, preferred habitat using FLUCFCS code, and potential for species occurrence is provided for each listed species. Listed species are ranked as having high, medium, low or no potential of occurrence. Species with high potential of occurrence had preferred habitat present and had been documented within two miles of the Cypress Creek Watershed. Species with a moderate potential of occurrence had preferred habitat present but no documentation of occurrence. Species with a low potential of occurrence did not have preferred habitat present in the watershed and no documentation of occurrence, species with “no” potential of occurrence had no viable habitat present (e.g. marine habitat).

There are 52 state and federal listed species that are known to occur in Hillsborough County. Of these 52 species, 16 have a high potential of occurrence, 11 have a moderate potential of occurrence, 21 have a low potential of occurrence and 4 have no potential of occurrence within the Cypress Creek Watershed. For species with a high potential of occurrence, 3 species listed as state endangered: Southern three-awned grass (*Aristida simpliciflora*), Tampa vervain (*Glandularia tampensis*) and woodstork (*Mycteria americana*), 4 are listed as state threatened; eastern indigo snake (*Drymachon corais couperi*), short-tailed snake (*Stilosoma extenuatum*), Florida sandhill crane (*Grus canadensis pratensis*) and bald eagles (*Haliaeetus leucocephalus*) and 9 are listed as species of special concern (See Table 8-2). The woodstork is listed as federally endangered and the Eastern indigo snake and bald eagle are listed as federally

TABLE 8-2
POTENTIAL FOR OCCURRENCE OF THREATENED AND ENDANGERED FLORA AND FAUNA
CYPRESS CREEK WATERSHED, HILLSBOROUGH COUNTY

SPECIES	DESIGNATED STATUS			PREFERRED HABITAT	FLUCFCFS CLASSIFICATION	POTENTIAL FOR OCCURRENCE ON SITE
	US	FL	FDA			
VASCULAR PLANTS						
Brittle Maidenhair Fern *Adiantum tenerum*			E	Limestone sinkholes and rocky hammocks.	427	Low
Southern Three-Awned Grass *Aristida simpliciflora*			E	Saw palm field.	321	Low
Curtiss Milkweed *Asclepia curtissii*			E	Scrub.	432	Moderate
Auricled Spleenwort *Asplenium auritum*			E	Wet hammocks and swamps.	425	Moderate
Florida bonamia *Bonamia granidflora*	T		E	Sand pine scrub.	413	Moderate
Hand Fern *Cheiroglossa palmata*			E	Hammocks.	427	Moderate
Pygmy Fringe Tree *Chionanthus pygmaeus*	E		E	Sand pine scrub.	413	Moderate
Florida Golden Astor *Chrysopsis floridana*	E		E	Scrub and rarely oak hammocks.	413	Moderate
Tampa Vervain *Glandularia tampensis*			E	Clearings in moist hammocks.	432, 425	High
Nodding Pinweed *Lechea cernua*			T	Scrub.	425	Low
Pine Pinweed *Lechea divaricata*			E	Flatwoods.	432	Low
Wild Coco *Pteroglossaspis ecristata*			T	Sandhills, pinelands, oak hammocks.	411	Moderate
Chaffseed *Schwalbea americana*	E		E	Open hammocks, Flatwoods.	413, 421, 425	Moderate
Broad-Leaved Nodding-Caps *Triphora latifolia*			E	Hardwood hammocks.	425, 411	Moderate
Rain Lilly *Zephyranthes simpsonii*			T	Wet flatwoods and meadows.	411, 643	Moderate

SPECIES	DESIGNATED STATUS			PREFERRED HABITAT	FLUCFCFS CLASSIFICATION	POTENTIAL FOR OCCURRENCE ON SITE
	US	FL	FDA			
AMPHIBIANS						
Gopher Frog *Rana capito*			S	Flatwoods.	411	High
REPTILES						
American alligator *Alligator mississippiensis*	T (S/A)	S		Rivers, swamps lakes, ponds, and marshes.	610, 620, 630, 640, 641	Moderate
Loggerhead *Caretta caretta*	T	T		Marine.	540	Low
Green Turtle *Chelonia mydas*	E	E		Marine.	540	Low
American Crocodile *Crocodylus acutus*	E	E		Coastal estuarine swamps.	540	Low
Leatherback *Dermochelys coriacea*	E	E		Marine.	540	Low
Eastern Indigo Snake *Drymachon corais couperi*	T	T		Dry sand areas, moist flatwoods, and citrus groves.	411, 221	High
Gopher tortoise *Gopherus polyphemus*		S		Beach scrub, sand pine, live oak, turkey oak, and oak scrub.	413, 322	High
Kemp's Ridley *Lepidochelys kempii*	E	E		Marine.	540	Low
Florida Pine Snake *Pituophis melanoleucus mugitus*		S		Longleaf pine, turkey oak sandhill, pine flatwoods, sand pine.	411, 412	Moderate
Suwannee cooter *Pseudemys concinna suwanniensis*		S		Rivers and spring runs.	510	Moderate
Short-tailed Snake *Stilosoma extenuatum*		T		Longleaf pine turkey oak, or occasionally upland hammock and sand pine scrub.	412, 413, 421	High
BIRDS						
Roseate Spoonbill *Ajaia ajaja*		S		Mangroves, saltwater lagoons and freshwater marshes.	612, 651, 652, 641	Moderate
Florida scrub-jay *Aphelocoma coerulescens*	T	T		Pine scrub.	421, 412	Low
Limpkin *Aramus guarauna*		S		Hardwood Swamps, Cypress Swamps, wet prairies, and marshes.	610, 621, 630, 643, 640, 641	High
Snowy Plover *Charadrius alexandrinus*		T		Flat sandy beaches, salt flats, and sandy areas with little vegetation.	652, 651	Low
Piping Plover *Charadrius melodus*	T	T		Bare, dry, sandy areas, both inland and on the coast.	652, 651, 650	Low

SPECIES	DESIGNATED STATUS			PREFERRED HABITAT	FLUCFCFS CLASSIFICATION	POTENTIAL FOR OCCURRENCE ON SITE
	US	FL	FDA			
Little Blue Heron *Egretta caerulea*		S		Shallow brackish freshwater and salt water habitats, freshwater and coastal hammocks.	641, 643	High
Reddish Egret *Egretta rufescens*		S		Salt and brackish waters, breeding in shallow bays, lagoons, and mangroves.	540	Low
Snowy Egret *Egretta thula*		S		Freshwater and coastal hammocks.	641, 643	High
Tricolored Heron *Egretta tricolor*		S		Marshes and swamps.	641, 643	High
White Ibis *Eudocimus albus*		S		Freshwater marshes, shallow lakes, estuaries.	641, 540	High
Peregrine Falcon *Falco peregrinus*	E S/A	E		Open terrain-coastal barrier islands, lake and river margins, prairies, coastal ponds, sloughs, urban areas.	650, 643, 620	Low
South American Kestrel *Falco sparverius paulus*		T		Open areas with longleaf pine, sand pine, and small turkey oaks, live oaks, and open country.	411, 211	Moderate
Florida Sandhill Crane *Grus canadensis pratensis*		T		Wet prairies, marsh lake margins.	520, 640, 641, 643	High
American Oystercatcher *Haematopus palliatus*		S		Sandy and pebbly beaches, mudflats, and borders of the salt marsh.	651, 652, 710, 642	Low
Bald Eagle *Haliaeetus leucocephalus*	T	T		Close to large water bodies, habitat can be variable.	520, 652, 641	High
Wood Stork *Mycteria americana*	E	E		Woody vegetation over standing water or on island surrounded by ocean water.	641, 621, 642	High
Osprey *Pandion haliaetus*		S		Coastal beaches, salt marshes, open saltwater, open freshwater, mangrove, wet prairies, freshwater marshes, lake margins, and farmland.	710, 642, 641, 612, 643, 710, 200, 260, 640	High
Brown Pelican *Pelecanus occidentalis*		S		Sandy coastal beaches and lagoons; waterfronts and pilings.	710, 731, 652	Low
Red-cockaded Woodpecker *Picoides borealis*	E	E		Pine flatwoods.	411	Low
Black Skimmer *Rynchops niger*		S		Coastal beaches and salt marshes.	710, 642	Low
Florida Burrowing Owl *Speotyto cunicularia floridana*		S		Very open areas such as prairies, sandhills, and farmland.	260, 421	Low
Least Tern *Sterna antillarum*		T		Sandy and pebbly beaches, sand bars in large rivers.	710, 652, 651	Low
MAMMALS						
Florida Mouse *Podomys floridanus*		S		Pine flatwoods, hammocks, cypress swamps.	411, 621	High

SPECIES	DESIGNATED STATUS			PREFERRED HABITAT	FLUCFCFS CLASSIFICATION	POTENTIAL FOR OCCURRENCE ON SITE
	US	FL	FDA			
Sherman's Fox Squirrel *Sciurus niger shermani*		S		Mature, fire maintained longleaf pine-turkey oak sandhills and flatwoods.	411,412, 432	High
Florida Black Bear *Ursus americanus floridanus*		S		Pine flatwoods, hardwood swamp, cypress swamp, cabbage palm forest, sand pine scrub and mixed hardwoods.	411, 615, 621, 624, 413, 438	Low

Legend

US	=	United States Fish and Wildlife Service	E	=	Endangered
FL	=	Florida Fish and Wildlife Conservation Commission	T	=	Threatened
FDA	=	Florida Department of Agriculture	S	=	Special Concern
LOW	=	No preferred habitat	T S/A	=	Threatened/Similarity of Appearance
MODERATE	=	Preferred habitat exists on site			
HIGH	=	Preferred Habitat and Species observed within 4 miles of site			

threatened. For species with a moderate potential of occurrence, there are 4 species listed as state endangered; auricled spleenwort (*Asplenium auritum),* hand fern (*Chionanthus pygmaeus),* chaffseed (*Schwalbea americana),* broad-leaved nodding-caps (*Triphora latifolia),* 3 species listed as state threatened; wild coco (*Pteroglossaspis ecristata*), rain lilly (*Zephyranthes simpsonii),* South American kestrel (*Falco sparverius paulus)*; and 4 species listed as species of special concern (See Table 8-2). In addition, chaffseed is listed as federally endangered. FFWCC have monitored two bald eagles nests that are located in the Cypress Creek Watershed area. Nest HLO11 has been active since 1984 and is located approximately 1 mile southeast of Bruce B. Downs Boulevard 0outside of the project area (latitude / longitude coordinates are 28^o 04.80 / 82^o 23.00). Nest HL014 was active from 1986 to 1992 and is located approximately 1.5 miles west US41 outside of the northeast side of the project boundary (latitude / longitude coordinates are 28^o 09.80 / 82^o 29.30.

8.4 NATURAL SYSTEMS ISSUES / AREAS OF CONCERN

The land coverages in Cypress Creek watershed have gone through vast changes due to human intervention. The following sections will focus on the effects of those changes on natural systems in Cypress Creek Watershed.

8.4.1 Habitat Loss, Degradation, and Fragmentation

The Southwest Florida Water Management District completed a study in August 1996 on potential historic natural community types that were present in Hillsborough and Pasco counties prior to European settlement. The Natural Resource Conservation Service's Hillsborough and Pasco county soils maps were used to generate a community coverage map. The approximate boundaries for each natural community type were determined using the soil type boundaries typically associated with each community type. Soil type boundaries were interpolated using the soil surveys and were therefore very generalized. **Figure 8-2** shows the Potential Habitat Based on SCS Soils Classifications found within the Cypress Creek Watershed study area boundary.

There are eight community cover types depicted in **Figure 8-2**; cypress swamp, hardwood swamp, marshes, pine flatwoods, scrub, longleaf pine – turkey oak sandhill, oak hammock and open water. Open water includes natural lakes and ponds and any man-made reservoirs that existed at the time of the soil survey was taken in 1958. Areas that had been impacted beyond soil type recognition prior to 1958 (e.g. burrow pits) were designated as "no community defined".

See Sections 8.2.2 and 8.2.3 for descriptions of cypress swamp, hardwood swamp, marsh, pine flatwood and oak hammock community types. Table 8-3 shows the approximate historical and present day acreages for cypress swamp, hardwood swamp, marsh, pine flatwood, oak hammock and open water community cover types. The historic acreages are rough estimates since they were

c1_516//f:\cypress\cypcreek.apr(Layout: Fig. 8-2: Potential Habitat Based on SCS Soils Classification), RPF 12/08/00

COUNTY LINE RD
WALLACE RD
SUNSET LN
DEBUELL RD
BARNARD RD
LIVINGSTON AVE
E BEARSS AV
BRUCE B DOWNS BLVD
FLETCHER AVE.
Cypress Creek
75
54
41
581
275

LEGEND

Community Types
- Cypress Swamp
- Hardwood Swamp
- Herbaceous Wetlands
- Longleaf Pine - Turkey Oak Sandhills
- Pine Flatwoods
- Scrub
- Upland Hardwood Hammock
- Water
- No Community Defined

Cypress Creek Basin
- Cypress Creek Sub-Basin Boundaries
- Cypress Creek Basin Boundary

Transportation
- Interstate Highways
- Major Highways
- Other Roads
- Railroad

4000 0 4000 Feet

Scale: 1" = 4000'

N

Hillsborough County Florida

Cypress Creek Watershed Management Plan

URS Greiner Woodward Clyde

Potential Habitat Based on SCS Soils Classification

Figure 8-2

Date: 12/08/00

generated from the SWFWMD historic vegetation community coverage map (see Figure 8-2).

To generate the approximate present day acreages for the cypress swamp, hardwood swamp, marsh, pine flatwood, oak hammock and open water community cover types a FLUCFCS code map of the Cypress Creek Watershed (see Figure 8-1) was used. Acreages generated using this map are also rough estimates of the actual acreages since the FLUCFCS code map was created in 1995 and is based on an aerial interpolation. Based on this map, over 10,000 acres of natural communities have been depleted by man-induced changes. This includes the longleaf pine-turkey oak sandhill and scrub communities which are essentially non-existent within the Cypress Creek Watershed. These areas have been converted to citrus or urban development. However, some of these depleted areas have retained wildlife value, for example gopher tortoises (*Gopherus polyphemus)* and commensals are often found in abandoned orange groves. Approximately 1700 acres of the forested upland areas is shrub and brush land which does provide habitat for wildlife.

Wetland Loss

Changes in land use in Hillsborough County have caused wetland loss. As a part of this study, trends in wetland depletion were assessed. In addition to filling and draining, there are a number of factors that have the potential to alter the hydrology of, and impact, wetlands. Wells that pump ground water have the potential to lower the water table within the vicinity of their associated well field. There are no well fields located within the project study area, however there are two well fields within the vicinity of the study area that may have the potential to affect the hydrology of natural wetlands with the Cypress Creek Watershed. The Cypress Creek well-field is located in the northern section of the Cypress Creek Watershed in central Pasco County and the Cypress Bridge well-field is located adjacent to the eastern boundary of the watershed just inside the Pasco County line. The Cypress Creek well field is located upstream of the study area and therefore may decrease the amount of surface and groundwater flow into the study area. The proximity of the Cypress Bridge well field to the study area suggests that water may be pumped from within the Cypress Creek Watershed during the dry season and/or during drought conditions. Ditches and detention ponds also have the capacity to alter the natural hydrology of wetlands. In addition, alteration of conveyance between wetlands can cause some wetlands to flood during storms and other wetlands to dry during dry periods.

Wetlands that have decreased hydroperiods are subject to various long-term effects that can impact a wetland over time. Wetland plant species can be replaced by “terrestrial opportunists” such as dog fennel (*Eupatorium* spp.), broomsedge (*Andropogan virginicus),* blackberry (*Rubus* spp.) and blue-maidencane (*Amphicarpum muhlenbergianum).* Cypress domes that become drier succeed into

TABLE 8-3

CYPRESS CREEK COVERAGES

LAND COVERAGE TYPE	Historic Acreages	FLUCFCS Acreages	Change in Acreage (% change*)
LONGLEAF PINE-TURKEY OAK SANDHILL	1519	0	1519 (100%)
SCRUB	65	0	65 (100%)
PINELAND / FLATWOODS	6960	247	6713 (96%)
OAK HAMMOCK	3063	1773	1290 (42%)
CYPRESS SWAMP	6446	1830	4615 (72%)
HARDWOOD/CYPRESS SWAMP	1004	4159	3155 (314%)
OPEN WATER	837	1023	186 (22%)
MARSH	922	979	57 (6%)
NO COMMUNITY DEFINED	107		-
OTHER COVERAGE TYPES**		10911	-
TOTAL	20922	20922	20922

*** Percent change = Change in Acreage/Historic Acreages**
****Other Coverage types for FLUCFCS Acreages include Developed, Agricultural and Shrub and Brushland acreages.**

hardwood-pine swamps dominated by slash pine (*Pinus elliottii*), red maple (*Acer rubrum*), sweet gum (*Liquidambar styraciflua*) and laural oak (*Quercus laurifolia*). Excessive dryness in forested wetlands can potentially result in oxidation, shrinkage, and subsidence of organic soils.

The data generated from the SWFWMD historic vegetation coverage (Figure 8-2) and the FLUCFCS code coverage (Figure 8-1) were used to determine approximate loss of wetland acreage (see Table 8-3) within the Cypress Creek Watershed. General trends and potential causes of wetland loss were determined by comparing a series of corresponding aerials for different years to each other and the NRCS Hillsborough County soils map. The aerials reviewed for this assessment included 1938, 1947 and 1957 1"=66' black and white Hillsborough County aerials, 1974 and 1977 1"=200' blueline Southwest Florida Water Management District aerials and 1997 Hillsborough County black and white ready aerials (Redi-maps were 1"=300', 1"=600' or 1"=900' scale).

In comparison with the SWFWMD study on historic vegetation, there has been a 1400 acreage loss in vegetated wetlands (swamps and marshes). There has also been an increase in open water of approximately 186 acres since 1958. This increase is primarily due to the number of man-made detention ponds constructed during the last 40 years. Aerial interpretation indicated that most wetland loss has occurred west of I-275 in the section of Cypress Creek Watershed that had been developed for agricultural use. Wetland loss was typically associated with ditching that was constructed to drain land originally used for citrus farming. Additional wetlands were altered after the 70's as a result of development and the construction of I-75.

8.4.2 Exotic Species

There has been an increase of exotic species in the western section of Cypress Creek Watershed. Natural lakes, man-made detention ponds, streams, and ditches have all provided habitat for exotic species colonization. Hog Island Lake, as stated earlier, has a particularly noticeable problem with exotic species such as primrose willow. Disturbance from development and alterations in hydrology has enabled exotic species to establish. Lawn fertilizer promotes the establishment of exotic species in ponds and lakes and also increases algal blooms.

CHAPTER NINE Water Supply

9.1 OVERVIEW

Water is supplied in the Tampa Bay area through both ground and surface water sources. Of the two, groundwater provides the main supply for the areas of the Hillsborough County within the Cypress Creek watershed. Groundwater is supplied to the public through private and public wells. The public groundwater supply is managed in Hillsborough County and the Tampa Bay area by Tampa Bay Water (TBW), formerly the West Coast Regional Water Supply Authority. Groundwater withdrawal permits are issued by the Southwest Florida Water Management District (SWFWMD).

Water use in northwest Hillsborough, northeast Pinellas and Pasco counties has significantly increased since the 1930s. The majority of this use is derived from ground water, which is currently withdrawn at the rate of approximately 225 million gallons per day (mgd). These withdrawals are predominantly from the Upper Floridan aquifer, the principal aquifer in the Southwest Florida Water Management District (SWFWMD). Consequently, the potentiometric levels of the Upper Floridan aquifer and the water table of the overlying surficial aquifer have declined in the areas of large ground-water withdrawals.

The majority of ground-water use in this area is the public supply, with at least 75 percent of the public supply use derived from concentrated regional well fields. In the vicinity of these regional well fields, observed impacts include lowering of lake levels, reduction in streamflow, and destruction of wetland habitat. In some areas along the coast, lowered ground-water levels have caused water quality degradation.

In response to these observed impacts, the Governing Board of the SWFWMD directed staff to conduct a detailed Water Resource Assessment Project (WRAP) to provide the technical foundation required to address the issue of safe yield in the Northern Tampa Bay area. The Northern Tampa Bay WRAP area includes the Cypress Creek watershed and was delineated based on a number of factors, including hydrogeologic regime, types of hydrologic effects observed, and regional water use and projected growth.

The surface-water environment within the Northern Tampa Bay WRAP area is highly interconnected with ground water. Due to the karst geology throughout the Northern Tampa Bay WRAP area, a discontinuous or leaky confining layer provides this relatively good hydraulic connection between the surficial aquifer and underlying Upper Floridan aquifer. Leaky confinement allows water levels of the surficial and Upper Floridan aquifers to fluctuate similarly, and provides the potential for water-level variations in one aquifer to be reflected in the other. Because adequate surface water is necessary to maintain healthy wetlands and lakes, sufficiently high ground-water levels are required to maintain adequate surface-water in these areas of poor confinement.

As in other portions of the SWFWMD, growth in the Northern Tampa Bay WRAP area has accelerated since the 1950s. Agriculture, residential and commercial development, mining, and public water supply development have all had effects on water resources. Conflicting needs for the water have created competition and even confrontation between the different users.

Throughout the Northern Tampa Bay WRAP area, problems and concerns have developed over water resource issues due to the large amount of water development.

9.2 PERMITTED WATER USE

In the Northern Tampa Bay WRAP area, the 1993 annual-average quantity of water withdrawn for all users was estimated to be 334 million gallons per day (mgd), including 246 mgd of ground-water and 88 mgd of surface-water. Most water withdrawn is for public supply. Public supply accounted for 75 percent of the estimated total water use and 74 percent of the estimated ground-water use in the Northern Tampa Bay WRAP area in 1993. Public supply ground-water withdrawals are almost entirely derived from the Upper Floridan aquifer. SWFWMD Water Use permit points within the Cypress Creek Watershed are shown in **Figure 9-1**.

Approximately 27 percent of the total public supply water use in 1993 was derived from two surface-water sources: the City of Tampa reservoir on the Hillsborough River and the City of Tampa withdrawals from the Tampa Bypass Canal. The remainder of public supply water in the WRAP area is derived from the Upper Floridan aquifer. Agricultural irrigation water use, the second largest water use in the WRAP area, accounts for approximately 10 percent of the total water withdrawn, and is also derived almost entirely from the Upper Floridan aquifer.

As of November 1994, there were 1,213 water use permits in the Northern Tampa Bay WRAP area. The 1994 annual-average permitted use equals approximately 505 mgd. As shown in Table 9-1, public supply accounts for 70 percent of the permitted quantity. The agriculture permitted water use accounts for 13 percent of the total permitted use. All other uses combined add up to the remaining 17 percent.

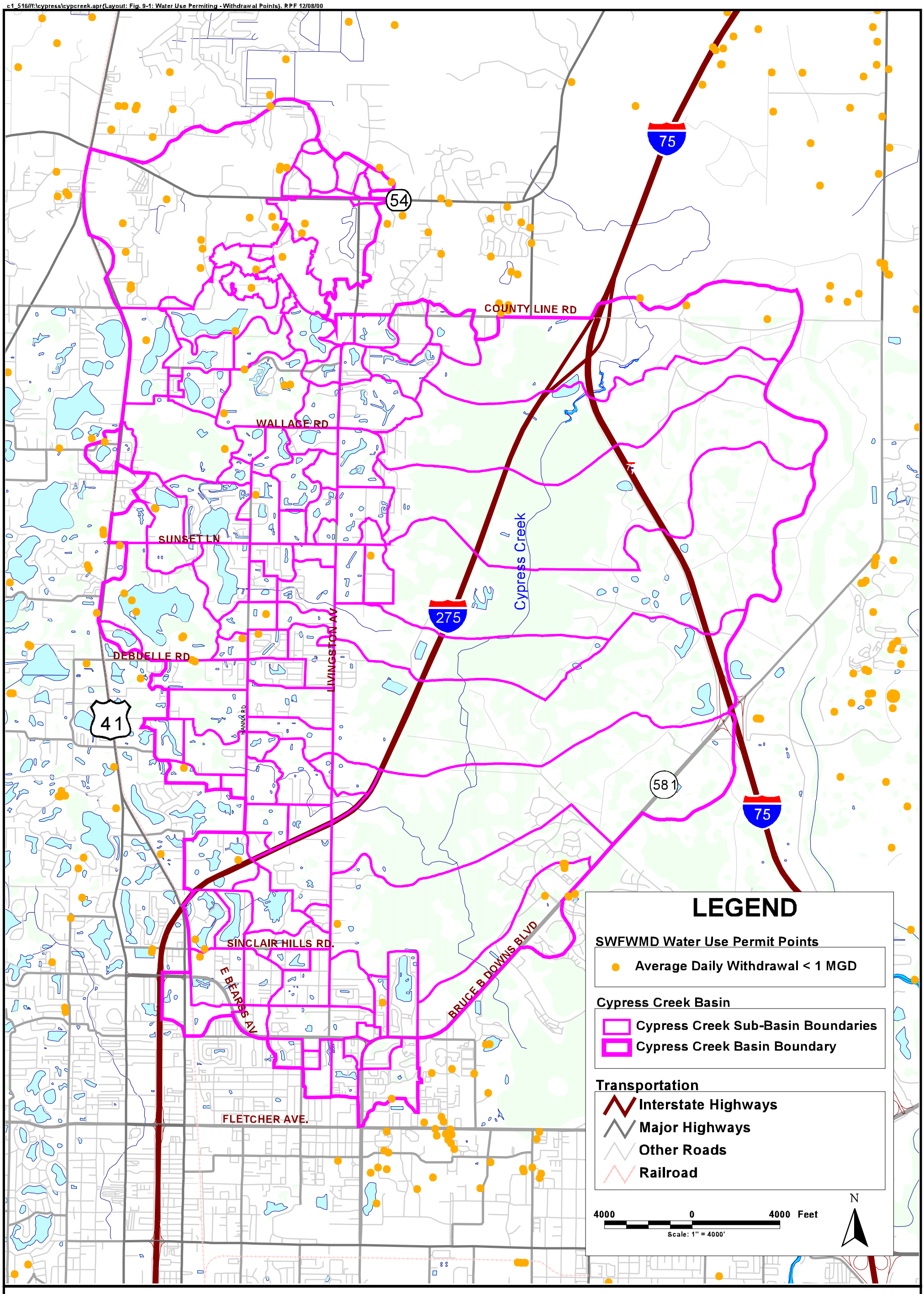
Most of the permitted water use in the study area is derived from ground water. Ground-water withdrawals are permitted for 375 mgd, or approximately 74 percent of the total permitted quantities. Public supply and agriculture permitted ground water use is 263 mgd and 61 mgd, respectively.

Most of the permitted water use in the Northern Tampa Bay WRAP area is associated with individual users that are permitted for at least 0.5 mgd. These 65 permittees represent approximately 82 percent (416 mgd) of the total permitted water use. Conversely, most of the users (148 or 95 percent of the total) are permitted for less than 0.5 mgd. Together, these smaller users comprise only about 89 mgd, or 18 percent of the total permitted use.

9.3 ESTIMATED WATER USE

The quantity of water that is being used in the Northern Tampa Bay WRAP area is estimated to be approximately 34 percent less than the permitted quantity (Table 9-2). The most current estimates of actual water use are for calendar year 1993. Estimated water use in the Northern Tampa Bay WRAP area in 1993 is 334 mgd, with 74 percent of the use from ground-water withdrawals.

c1_516//f:\cypress\cypcreek.apr{Layout: Fig. 9-1: Water Use Permiting - Withdrawal Points}, RPF 12/08/00



Hillsborough County Florida

Cypress Creek Watershed Management Plan

URS Greiner Woodward Clyde

SWFWMD Water Use Permit Points

Figure 9-1

Date: 12/08/00

TABLE 9-1

PERMITTED WATER WITHDRAWALS IN THE NORTHERN TAMPA BAY WRAP AREA AS OF NOVEMBER 1994 (MGD)

DESCRIPTION	HILLSBOROUGH	PINELLAS	PASCO	HERNANDO	POLK	TOTAL
Agriculture	22.0	0.7	34.8	3.7	2.2	63.4
Industry	9.3	0.3	17.7	0.0	0.0	27.3
Mining	1.5	0.2	11.2	7.0	5.0	24.9
Public Supply	150.6	56.3	129.3	18.2	0.8	355.2
Recreation	14.3	7.7	6.9	4.7	0.3	33.9
TOTAL	**197.7**	**65.2**	**199.9**	**33.6**	**8.3**	**504.7**

TABLE 9-2

PERMITTED AND ESTIMATED WATER WITHDRAWALS IN THE NORTHERN TAMPA BAY WRAP AREA (MGD)

DESCRIPTION	1994 PERMITTED			1993 ESTIMATED		
	SW	GW	TOTAL	SW	GW	TOTAL
Agriculture	2.5	60.9	63.4	1.3	31.6	32.9
Industry	0.5	26.8	27.3	0.2	18.9	19.1
Mining	24.6	0.3	24.9	11.1	0.3	11.4
Public Supply	102.0	262.6	355.2 [1]	67.8	183.3	251.1
Recreation	9.5	24.4	33.9	7.5	12.0	19.5
TOTAL	**139.1**	**375.0**	**504.7**	**87.9**	**246.1**	**334.0**

[1] adjusted for the Hillsborough River complex. The complex consists of ground-water withdrawals at the Morris Bridge wellfield, as well as surface-water withdrawals from the Hillsborough River. Although the wellfield is permitted with an annual average of 15.5 mgd, and the river is permitted with an annual average of 82.0 mgd, the combined total can not exceed 88.1 mgd. Therefore, the individual permitted surface-water and ground-water uses do not equal the total permitted amount.

There are many reasons why actual use can be significantly less than permitted use. One reason is the fact that permitted quantities are issued for water use that is expected to occur within the six or 10-year duration of a permit. For many permits, the need for the water use may not have occurred as of 1993 (or any given year). For agricultural uses, permitted amounts are often determined on the basis of a 2 in 10-year drought, and on seasonal crops, so the permitted use would not be expected to be applied on an annual basis. In addition, withdrawal quantities on all permits are controlled by water quality and environmental parameters, and, in some cases, minimum Upper Floridan aquifer levels (regulatory levels) that are established in the permits. Therefore, depending on hydrologic and other conditions, permitted quantities may not always be achievable.

Much of the public supply water withdrawals in Pasco, Hillsborough, and Pinellas Counties enter a regional system of intercounty transfers. Therefore, a significant amount of water withdrawn from Pasco and Hillsborough Counties is not actually consumed in those counties. In 1993, approximately 174 mgd entered the regional public supply system (Tsai, 1995). Nearly 108 mgd was derived from Pasco County, nearly 30 mgd was derived from Hillsborough County (including from areas outside of the Northern Tampa Bay WRAP area), and over 37 mgd was derived from Pinellas County. In return, approximately 47 mgd was distributed to Pasco County, 17 mgd was distributed to Hillsborough County, and nearly 110 mgd was distributed to Pinellas County.

Agriculture represents the second largest permitted use type. There are 758 permits in the Northern Tampa Bay WRAP area that list agriculture as the primary use. Annual-average permitted use for agriculture in the Northern Tampa Bay WRAP area totals 63.4 mgd. By county, this use is distributed with 0.7 mgd in Pinellas, 22.0 mgd in Hillsborough, 34.8 mgd in Pasco, 3.7 mgd in Hernando, and 2.2 mgd in Polk County. Approximately 96 percent of the permitted agricultural use is derived from ground-water withdrawals. Estimated agricultural water use in 1993 was 32.9 mgd. The percentage of estimated actual agricultural withdrawals in 1993 versus permitted amounts was approximately 52 percent. The crop type with the largest estimated use is citrus, estimated to use about 14 mgd.

There are 55 permits in the Northern Tampa Bay WRAP area that list industry as the primary use, totaling 27.3 mgd. Within the Northern Tampa Bay WRAP area, permitted use is 0.3 mgd in Pinellas, 9.3 mgd in Hillsborough, 17.7 mgd in Pasco, and near zero mgd in both Hernando and Polk Counties. Estimated industrial use within the Northern Tampa Bay WRAP area was 19.1 mgd in 1993. The percentage of estimated actual industrial withdrawals in 1993 versus permitted amounts was approximately 70 percent.

There are 15 permits in the Northern Tampa Bay WRAP area with mining as the primary use type. All of the mining permitted use is for sand, limestone, or peat mining, and most of the water use consists of dewatering with onsite discharge. Total permitted mining use is 25.1 mgd. Within the Northern Tampa Bay WRAP area, permitted use is 0.2 mgd in Pinellas, 1.5 mgd in Hillsborough, 11.4 mgd in Pasco, 7.0 mgd in Hernando, and 5.0 mgd in Polk County. Estimated mining use in the Northern Tampa Bay WRAP area for 1993 was 11.4 mgd, of which nearly all

consisted of surface-water withdrawals. The percentage of estimated actual mining withdrawals in 1993 versus permitted amounts was approximately 46 percent.

There are 175 permits in the Northern Tampa Bay WRAP area with recreation as the primary use type. Total permitted recreational use is 33.9 mgd. Within the Northern Tampa Bay WRAP area, permitted use is 7.7 mgd in Pinellas County, 14.3 mgd in Hillsborough, 6.9 mgd in Pasco, and 4.7 mgd in Hernando, and 0.3 mgd in Polk County. Estimated recreational use in the Northern Tampa Bay WRAP area for 1993 was 19.5 mgd. The percentage of estimated actual recreational withdrawals in 1993 versus permitted amounts was approximately 58 percent.

9.4 WATER SUPPLY AREAS OF CONCERN

Ground-water withdrawals throughout the Northern Tampa Bay WRAP area have been increasing since the 1930s. The increasing trend is projected to continue. The increase is largely the result of increased demands by public supply use. Significant declines in the potentiometric surface of the Upper Floridan aquifer, and in many cases the surficial aquifer and surficial features, have been observed in several large sections of the Northern Tampa Bay WRAP area. The decline of water levels in the surficial aquifer and surface waters, and the decline of wetland health, are associated with declines in water levels of the potentiometric surface. The declines originate as localized areas within the Northern Tampa Bay WRAP area, but, due to the large number of localized declines, have become subregional in nature. Additionally, impacts to surface-water features have been observed to be increasing throughout the study area.

Several water resource concerns have been identified within the Northern Tampa Bay WRAP area: 1) the lowering of average water levels and increased fluctuations in lakes and wetlands; 2) reduced streamflow in some river systems; 3) declining ecological health, and 4) the threat of seawater intrusion, resulting in deteriorating water quality. Upper Floridan aquifer water levels in the Northern Tampa Bay WRAP area have been declining in some areas since the 1940s, while seasonal fluctuations in the water levels have increased as much as 20 feet. Additionally, water levels in many observed wetlands and lakes, as well as some water-table observation points, have declined by varying degrees. These lowered water levels have resulted in declines in the biological health of many lakes and wetlands.

Because the hydrologic conditions of the Northern Tampa Bay WRAP area contain several highly interrelated components, these trends could be caused, directly or indirectly, by variations in any one component. Possible causes of water-level decline include changes in rainfall, evapotranspiration, runoff (either as overland flow, streamflow, or unsaturated flow), ground-water inflows and outflows, or man-induced causes, such as drainage systems and ground-water withdrawals. Water-level declines in an aquifer, no matter what the cause, can in turn cause reductions in spring discharge and streamflow, lowering of water levels and biological health in surficial features, reductions in freshwater discharge to the Gulf of Mexico, and induced seawater intrusions.

Water Levels

Water levels of the ground-water system in the Northern Tampa Bay WRAP area have been a major concern for over thirty years. Declining water levels in the Upper Floridan aquifer indicate lowered hydraulic potentials which cause decreased well efficiencies, intrusion of saline water, and increased recharge potential from the overlying surficial aquifer. Lowered water levels in the surficial aquifer are reflected as declining water levels in water bodies, decreases in streamflow, and decreasing wetland health.

Declines in ground-water levels can affect lake and wetland levels, spring and stream flow, and vertical flow between aquifers, depending on the degree of hydraulic connection between aquifers. Water-level declines can also provide an indication of changes in flow through the aquifer, which in turn can control seawater intrusion.

Because flow in streams fed by the surficial aquifer within the Northern Tampa Bay WRAP area is highly dependent on rainfall and antecedent conditions, and therefore highly variable, correlation analysis between streamflow and potentiometric water levels is difficult. Flow in the coastal streams of the Northern Tampa Bay WRAP area is highly dependent on rainfall intensity, antecedent conditions, and water-table elevations. Because rainfall intensity is often much higher than soil infiltration rates, and surficial aquifer discharge to streams is generally more rapid than downward leakage to the Upper Floridan aquifer, some stream flow can be expected to occur during high rainfall events regardless of the effect of the potentiometric surface on the water table.

Cypress Creek receives substantial flow contribution from the Upper Floridan aquifer in some reaches. Its flow has been found to be affected by Upper Floridan aquifer drawdowns. Although much of the Cypress Creek Basin has been previously identified as a discharge area (Aucott, 1988), parts of the basin have become a recharge area in the last 15 years in the vicinity of the Cypress Creek wellfield due to lowering of the Upper Floridan aquifer levels.

Due to the variability of the confining unit, recharge from the surficial aquifer to the Upper Floridan aquifer is also variable. Because of these localized recharge conditions within the Northern Tampa Bay WRAP area, drawdown in the potentiometric surface of the Upper Floridan aquifer is largely attenuated and more localized than in the southern half of the SWFWMD, where the Upper Floridan aquifer is more confined. The degree of drawdown, as well as the response time of the water table to Upper Floridan aquifer withdrawals, is highly dependent on rainfall conditions, withdrawal amounts, and most importantly, local geologic conditions.

Ground Water

The annual-average potentiometric levels of the Upper Floridan aquifer have declined significantly in several sections of the Northern Tampa Bay WRAP area, and seasonal fluctuations in Upper Floridan aquifer water levels have increased. Similarly, some portions of the Northern Tampa Bay WRAP area have shown significant declines in water-table elevations.

Upper Floridan Aquifer - In areas of heavy Upper Floridan aquifer ground-water withdrawal, there have been long-term sustained declines in the potentiometric surface. The period of this decline corresponds to the period of localized pumping. Additionally, the amplitude of seasonal fluctuations has increased in magnitude during the period of ground-water withdrawal. These trends are observed in long-term Upper Floridan aquifer monitor wells analyzed in this study.

Surficial Aquifer - Similar to the Upper Floridan aquifer, water levels in the surficial aquifer have also declined in some areas. The observed declines in surficial aquifer water levels are often associated with corresponding Upper Floridan aquifer water-level declines. Increases in seasonal fluctuations are observed in some of the areas of Upper Floridan and surficial aquifer water level declines.

Lakes and Wetlands

Lakes within the Northern Tampa Bay WRAP area are subject to many influences that alter water levels. These influences are both natural (rainfall, evaporation, sinkhole formation) and man-made (control structures, augmentation, drainage alterations, water withdrawals). All of these influences must be considered when analyzing water-level trends in lakes.

The impact of localized geology is most evident in the case of lakes and wetlands. Many of the lakes and wetlands throughout the Northern Tampa Bay area have been similarly formed. Cherry and others (1970) state that these features are formed by either; 1) shallow depressions in the surficial deposits or, 2) depressions caused by the collapse of solution features in the underlying limestone aquifers. The difference between lakes and wetlands in the Northern Tampa Bay area is usually determined by vegetation and depth; hydrologically they function similarly.

The connection between the water within a lake or wetland and the surficial and Upper Floridan aquifers is determined by the level of confinement within or below the waterbody. If a lake or wetland contains a consistent clay or organic layer covering its bottom, the waterbody may be completely perched and have little or no relationship with the underlying aquifers. Within the Northern Tampa Bay WRAP area, this local confining layer may allow almost no connection between the water-body and the Upper Floridan aquifer, and may limit interaction with the surficial aquifer.

If there is a collapsed solution feature below the wetland, a direct connection to the Upper Floridan aquifer may exist. The characteristic of the connection will then be determined by the condition of the sediments that have infilled the solution feature over the years. Silts or clay may inhibit this connection, while sands may do little to impede flow. With variable levels of stress, either natural or man-made, this level of impedance can change. As sediments settle to the bottom of the lake, the connection may be blocked. With increased stress, or if a lake is dredged, as is the case in some lakes within the study area, this blockage can be removed.

Most lakes were found to have multiple solution features any or all of which can control the level of connection between the lake level and water levels, in the underlying aquifers. Many lakes

within the Northern Tampa Bay WRAP area have also been subject to dredging activities (Reichenbaugh, 1977; Jones, 1978, Henderson, 1986; Lopez and Fretw 1992), which can breach or alter the confining layer of a lake. Dredging was performed along the shores of several lakes to provide additional lakefront property, to provide fill for lakefront homes, and to deepen lakes in the area of docks. Once confinement is removed, the dredged area can function similarly to a sink, and render the 1ake more susceptible to drawdowns in the Upper Floridan aquifer. This phenomenon not only pertains to surface-water elevations, but also to surficial aquifer water elevations.

9.5 MINIMUM FLOWS AND LEVELS

In 1996, the Florida Legislature directed the states five water management districts to set schedules to "establish minimum flows and levels (MFL) for watercourses in their respective districts".

The SWFWMD was required to set minimum flows and levels for watercourses, surface waters and aquifers in Hillsborough, Pasco and Pinellas Counties "below which significant harm to the water resources or ecology of the state or region would occur". The SWFWMD adopted an MFL rule in November 1998, but due to challenges by various parties, the rule has not yet gone into effect.

Minimum flows and levels have not yet been set by SWFWMD for Cypress Creek or the Hillsborough River watersheds. The Hillsborough River system, which includes Cypress Creek, must have MFL's established by the year 2005.

CHAPTER TEN Public Input (Meeting 1)

10.1 OVERVIEW

The Meeting number 1 was held on February 9, 2000, from 6:30 p.m. to 8:30 p.m. at the Lutz Community Center in Lutz, Florida. The purpose of the meeting was to solicit comments from the public on existing flooding or water quality problems within their area. The public meeting was advertised by Hillsborough County in the local newspaper and homeowners groups within the watershed were informed of the meeting. A total of 20 people signed the attendance sheets, but it was estimated that 30-35 people were in attendance. The public meeting was conducted in an informal format with a short presentation of the project, and representatives present to answer questions and receive comments. Aerial photographs and other project graphics were on display. Each attendee was given a handout which contained specific information about the project such as the project description, public meeting description, project contact and website list, project schedule and public comment sheet. A copy of the handout and attendees list is included in Appendix F.

10.2 COMMENTS RECEIVED

Two written comments were received at the Public Meeting and four E-mail comments were received as of February 23, 2000. The written comments and verbal comments received at the Public Meeting dealt with: flooding conditions experienced during El Nino, concerns over potential water quantity and water quality impacts from the proposed "East-West" road, water supply and groundwater quality issues, flooding conditions at Hog Island Lake, flooding conditions at Sinclair Hills Road, and development and growth issues. According to the verbal comments, the majority of the attendees were favorable of the Watershed Study being implemented by the County. A copy of the comments received is included in Appendix F.

CHAPTER ELEVEN Pollutant Loading Model

11.1 OVERVIEW

Pollutant loads for several selected pollutants (chemicals, parameters) were estimated using the Hillsborough County supplied spreadsheet model, the Pollutant loading and Removal Model (PLRM). Pollutants considered include 12 parameters: BOD, TSS, oil/grease, TN, Nox, TKN, TP, TDP, Cd, Cu, Pb, and Zn. The model utilizes rainfall values for a specified time period (e.g. annual or seasonal), subbasin land use category, and hydrologic soil type and look up table of runoff coefficients to determine the runoff coefficient with land use and soil type as input variables. Using the EMC for a selected pollutant, the model then estimates average pollutant loads using rainfall, runoff coefficient, and EMC values. The built in tables may be used or user specified values may be inputted. The EMCs have been derived based on a number of studies including the EPA NURP, Florida Water Management Districts, Hillsborough County, and Pinellas County. These EMC values have been included in the County's NPDES Stormwater Discharge Permit application and the permit.

First, gross loads without existing condition BMPs were calculated for each land use and for each subbasin. Then the existing condition BMPs information (type of BMP and land use area draining to each BMP) were obtained from the County, SWFWMD, FDOT and FDEP permit files. Four types of BMPs have been included: wet detention, dry detention, percolation, and grassy swales. The model selects treatment efficiencies from a built-in table of treatment or pollutant removal efficiencies corresponding to each of these BMPs and pollutants. The model then computes the net loads i.e., existing condition loads with BMPs by applying the removal efficiencies to the gross load. Finally, the water quality level of service (LOS) is calculated by comparing the actual net load to the load for a low-density single family residential land use without treatment of the same areas. Five levels of LOSs are considered (A, B, C, D, and F). Depending upon the difference in these loads, LOS designation ranging from A through F is determined in the model for each land use and for the overall subbasin.

11.2 EXISTING CONDITION GROSS LOADS

The PLRM Model

The PLRM model used to calculate pollutant loads is referred to as the EPA simple method (EPA 1992). Loads are calculated using:

$$L = 0.227 * P * CF * RV * C * A$$

Where:
- L = annual or seasonal pollutant load per basin (lb/year or season)
- P = annual or seasonal average precipitation (inch/year)
- RV = weighted runoff coefficient
- C = event mean concentration of pollutant (mg/l)
- A = basin area (acres)
- CF = correction factor for storms that produce runoff, default of 1 indicates 100% of storms produce runoff

The model default assumes 100% of storms produce runoff. To account for small events not producing runoff, the correction factor can be specified. In Hillsborough County, approximately 10% of events do not produce runoff, so CF is specified as 0.90. The runoff coefficients used are based on soil hydrologic group and land use as in FDOT (1987), and are obtained from NPDES permit studies conducted in Hillsborough County.

As seen above, pollutant load calculation uses the rainfall, runoff coefficient, and event mean concentration data as discussed later in this section. The runoff coefficient depends on the land use and hydrologic soil group. A schematic of the PLRM model is shown in **Figure 11-1** of Appendix G. Each of these variables is discussed below.

11.2.1 Rainfall Data

Average annual and average seasonal rainfall data was obtained by averaging the SWFWMD rainfall data for the Northwest Hillsborough and Hillsborough River Basins as shown in Table 11-1 of Appendix G. The wet season was taken to be May through September and the dry season was taken to October through April. The mean annual rainfall used in this report is 52.59, 33.94, and 18.56 inches, respectively. A correction factor of 0.90 was used.

11.2.2 Land Use

Major land uses in the basin considered in the model include:

- Low/medium density residential
- High density residential
- Light industrial
- Agriculture
- Commercial
- Institutional
- Highway/Utility
- Recreational
- Open land
- Extractive (Mining)/Disturbed

11.2.3 Soil Characteristics

Soil characteristics are specified by hydrologic soil group A through D as follows:

- Group A (Low runoff potential): high infiltration rates even when thoroughly wetted and a high rate of water transmission; typical maximum infiltration rate of 10 inch/hour when dry and 0.5 inch/hour when saturated.

- Group B (Moderately low runoff potential): Moderate infiltration rates even when thoroughly wetted and a moderate rate of water transmission; typical

maximum infiltration rate of 8 inch/hour when dry and 0.4 inch/hour when saturated.

- Group C (Moderately high runoff potential): slow infiltration rate when wetted and slow water transmission rate; typical maximum infiltration rate of 5 inch/hour when wetted and 0.25 inch/hour when saturated.

- Group D (high runoff potential): very slow infiltration rate when wetted and a very slow rate of water transmission rate; typical maximum infiltration rate of 3 inch/hour when dry and 0.10 when saturated.

In many instances in Florida, during wet season because of high water table the infiltration rate will be low and hence soil group D but during dry season the water table will be low and the infiltration rate will be high and hence soil group A or B thus the soil will be classified as A/D or B/D.

Runoff coefficients used are listed in Table 11-2 of Appendix G.

11.2.4 EMC

The event mean concentration (EMC) data for different pollutants and land uses are summarized in Table 11-3 of Appendix G. Th EMC data was derived from a number of studies including the EPA NURP, Hillsborough and Pinellas County and other studies in Florida.

Existing condition gross pollutant loads were calculated using the model by inputting the land use, soil type, and the corresponding drainage area. A rainfall of 47.16, 44, and 44 inch was used as the average annual, average wet season, and average dry season rainfall values (Table 11-1 of Appendix G).

11.3 EXISTING CONDITION LOADS WITH BMPs

Stormwater treatment facilities may include wet detention, dry detention, grassy swales, and exfiltration trenches. In addition to the four standard BMPs, other BMPs can be modeled using this model. These measures remove pollutants to varying degrees and are referred to as the BMPs. BMP data needs to be developed for each land use and for each subbasin. The type of BMP and proportion of the drainage area being treated need to be specified.

The existing condition BMPs were determined using permit information included in Table 11-4 of Appendix G. The BMPs considered in this study include wet detention, dry detention (percolation), infiltration trench (under drains) and grass swale. BMP or treatment efficiencies for each pollutant of concern are summarized in Table 11-5 of Appendix G. The BMP data for each land use and subbasin was prepared in the format acceptable to the model for each land use and subbasin (Table 11-6 of Appendix G). The model was run with the BMPs and the loads were again calculated.

The annual, wet season, and dry season gross loads are summarized in Tables 11-7, 11-8, and 11-9 of Appendix G. The annual, wet season, and dry period net loads are provided in Tables 11-10, 11-11, and 11-12 of Appendix G.

To compare the basins and to rank them based on loadings, the unit area loads (lb/acre) were computed by dividing the loads by the subbasin drainage area. The unit loads are summarized in Tables 11-13, 11-14, and 11-15 of Appendix G. Subbasin ranking based on the unit area loads is summarized in Tables 11-16, 11-17, and 11-18 of Appendix G with rank 99 indicating the highest unit loads and rank 1 the lowest. The ranking tables can be used to determine problem subbasins by choosing a cut off unit load or the ranks can be used select the top ten subbasins that have the highest unit loads.

Tables 11-19, 11-20, and 11-21 of Appendix G summarize the top ten subbasins that have the highest unit loads of BOD, TSS, TN, TP, Oil and Grease, Cd, Cu, Pb, Zn, and the composite or average of 9 parameters. The weights for each of the parameters in the composite unit load equal to 1/9 implying that all the nine parameters are equally important in the overall water quality of subbasins.

CHAPTER TWELVE Water Quality Level of Service

12.1 OVERVIEW

For each subbasin, the water quality level of service was determined by comparing the existing condition pollutant loads computed in Chapter 10 to a low density single family residential (SFR) development without treatment and classifying into levels A through F depending upon the deviation between the existing condition and the assumed SFR base. This analysis compares the loads in existing condition land use and a benchmark SFR land use and determines the water quality level of service. The LOS is indicative of the degree of treatment already in place in the subbasin in the existing condition. It cannot be used to interpret the basin water quality (excellent, good, fair, bad) of the subbasin as is done using a WQI and/or the TSI for a water body.

12.2 DEFINITION OF LEVEL OF SERVICE

To establish water quality level of service in each land use, Hillsborough County uses single family residential (low/medium density) land use as the standard for comparison, thus pollutant loads from any given land use is compared with the load from a SFR area of equal size. This standard of comparison is similar to the standard residential unit (SRU) used for stormwater utility assessments. The ratio of the loads are then computed and compared with the criteria described below to determine the LOS.

LOS A requires a net load of 20% or less of untreated SFR load - indicative of the presence of undisturbed natural systems or treatment systems capable of removing loads to level of natural systems. Also this represents the case of typical land uses (residential) receiving stormwater treatment levels above the minimum required per Rule 62-40.432(5) F.A.C.

LOS B requires a net load of 20 to 40% of untreated SFR load - and indicates the presence of treatment systems showing removal efficiencies consistent with those representing adequately designed and maintained conditions:

LOS C requires a net load of 40 to 70% of untreated SFR load - indicative of average to poorly maintained conditions:

LOS D requires a net load of 70% to 100% of untreated SFR - load indicative of minimal treatment.

LOS F requires a net load of equal to or greater than 100% of untreated SFR loads - indicative of no treatment or extensive areas of land uses producing larger loads per unit area than typical residential land uses.

12.3 RESULTS

The runoff coefficients and EMC values used in this level of service analysis are given in Tables 12-1 and 12-2 in Appendix H. The gross loads for the SFR benchmark are summarized in Tables 12-3, 12-4 and 12-5 in Appendix H for the annual, wet season, and dry season scenarios. The

water quality LOS's are summarized in Tables 12-6, 12-7, and 12-8 in Appendix H for the annual, wet season, and dry season scenarios. The results indicated that there are numerous subbasins that have a LOS of F for many water quality parameters considered in this study. There are many subbasins that have a LOS of D and C as well.

As expected, most subbasins have different LOS's for different pollutants. Table 12-9 in Appendix H summarizes the subbasins that have an LOS of F for all pollutants, and an LOS of D for all pollutants, and an LOS of F and D only for all pollutants. The results are the same for average, wet and dry season rainfall. These potentially "problem" basins are shown in **Figure 12-1**.

It is interesting to compare the above listing of subbasins determined to be problem subbasins type with the subbasins determined to be problem subbasins using the unit area approach summarized in Tables 11-19, 11-20 and 11-21 in Appendix G. Out of the top ten priority basins based on the average load of all parameters using the unit area approach, except for two subbasins 530500 and 540900, the other 8 subbasins also appear in LOS of F, or D or F and D.

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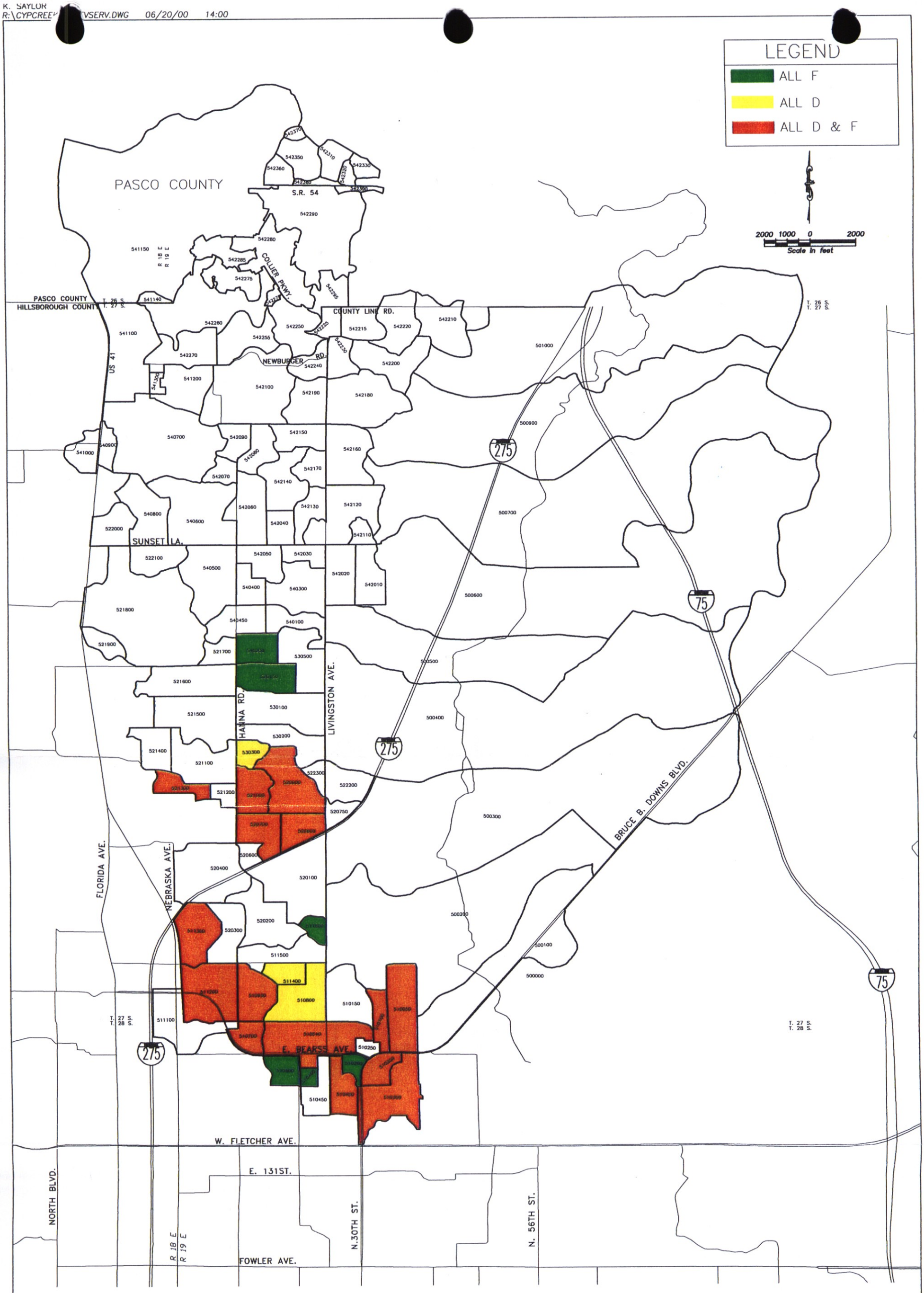


Hillsborough County Florida

Cypress Creek
Watershed Management Plan

URS Greiner Woodward Clyde

LEVEL OF SERVICE DIAGRAM WATER QUALITY

Figure 12-1

Date: 06-20-00

CHAPTER THIRTEEN Alternatives Analysis

13.1 FLOOD CONTROL ALTERNATIVES

This chapter describes the existing condition performance of major conveyance systems with potential and documented flood protection level of service deficiencies and contains an alternative analysis to determine improvements.

The potential problem area analysis for alternative improvements is shown in **Figure 13-1**. These areas include the:

- Cypress Creek Main Channel System
- County Line Drainage System (Hillsborough/Pasco County)
- County Oaks System
- Ridge Lake System
- Sherry's Brook System
- Hanna Lake System
- Blind Pond System
- Thirteen Mile Run System
- Flynn Lake Outfall System
- Silver Lake Outfall System
- 149th Avenue Outfall System
- Bruce B. Downs System

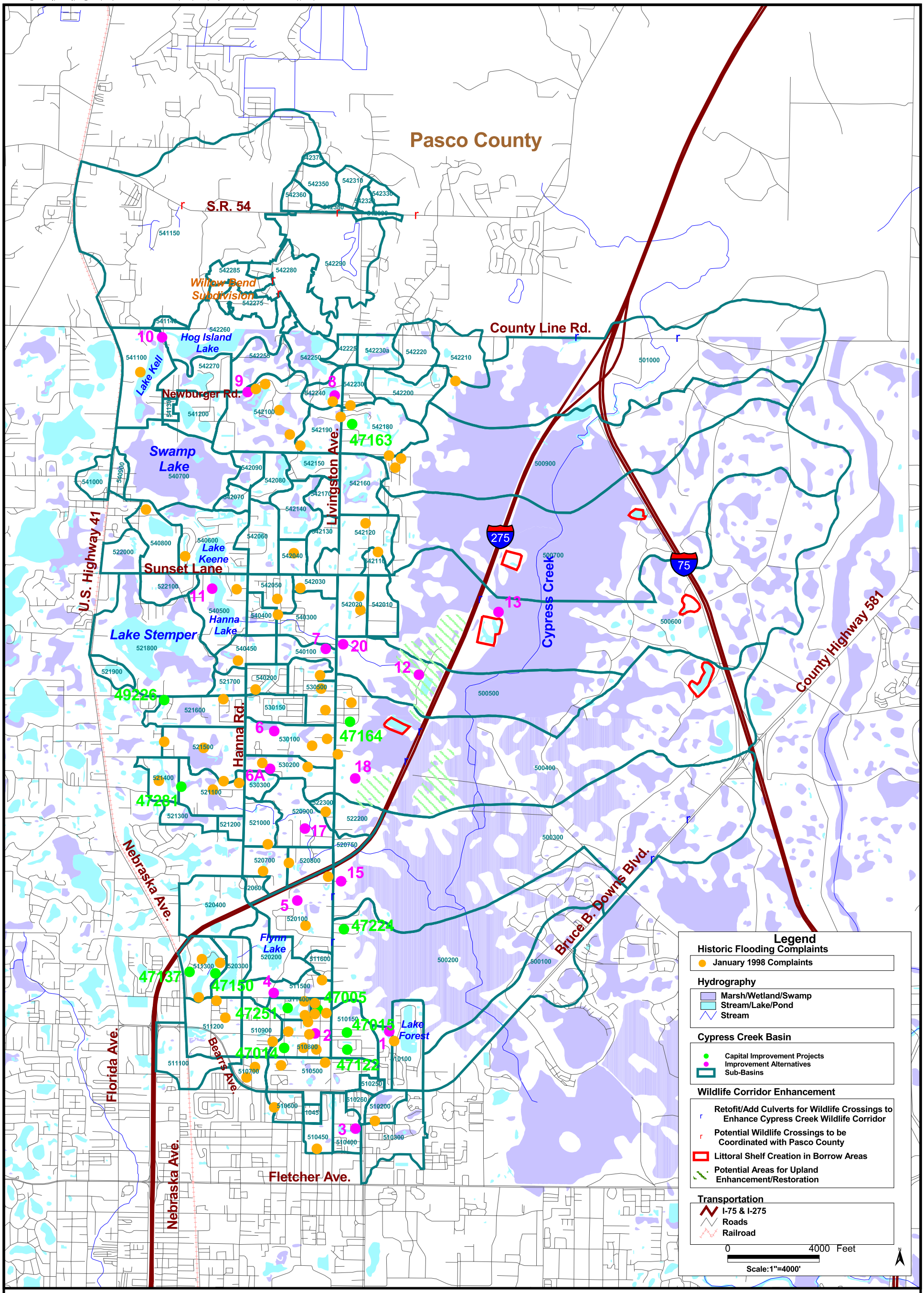
Each discussion area represents a sub-watershed conveyance system as described and identified in Chapter 3 Major Conveyance Systems, as well as other existing conditions features within the study area. Existing condition profiles for each discussion area are contained in Chapter 6. Potential problem area locations identified in the alternative analysis for the 25-year design event are contained in the Existing Condition Level of Service Analysis, Chapter 6.

- The following criteria were used to evaluate the technical feasibility of each of the proposed projects:

- Only known (observed or documented) problem areas will be considered for improvement.

- Projects are proposed for problem areas mainly within County right-of-way. However, in order to provide a better LOS, some private infrastructure or structures adjacent to County right-of-way are also included.

- Potential problem areas were identified with the most current (1973-77) Southwest Florida Water Management District (SWFWMD) aerial photography maps with one-foot contours. Road elevations were estimated by corresponding contours or spot elevations. Survey data was available at limited locations in the watershed.



Hillsborough County Florida

Cypress Creek Watershed Management Plan

URS Greiner Woodward Clyde

Improvement Alternatives Map

Figure 13-1

Date:09/28/00

	Table 13-1 Cypress Creek Watershed Management Plan Improvement Alternatives		
Improvement Alternative	**Problem Area Location/ Basin #**	**Problem Description**	**Improvement Alternatives**
1	149th Street Outfall Lake Forest Outlet Structure Basin 510100, 510050	Heavy vegetation in 149th Street ditch and Lake Forest ditch. 149th Street Pond weir has deteriorated.	Option 1-1. Cleanup 149th Street ditch between Livingston Ave. and 149th Street outfall detention basin. Cleanup Lake Forest ditch from B. B. Downs Blvd to Lake Forest Dr. Increase weir width at 149th Street detention pond from 79 feet to 150 feet. Construct new weir structure north of Lake Forest Avenue pond. Option 1-2. Increase size of culvert connection between the 149th Street pond and the Lake Forest pond.
2	149th Street Outfall Basin 510150, 510800, 510900, 511200, 511100	Inadequate secondary drainage system and lateral ditches along 19th, 20th, 23rd, and 24th Streets.	See CIP 47005, CIP 47251 and CIP 47014.
3	B. B. Downs System Basin 510200, 510250, 510260, 510400, 510460, 510600	Inadequate drainage and conveyance capacity.	Construct new storm sewer system from 18th Street/143rd Avenue to existing storm sewer along 143rd Avenue. Upgrade existing storm sewer system on 143rd Avenue from 20th street to existing ditch east of 22nd Street. Upgrade ditch from east of 22nd Street to B. B. Downs Blvd. Upgrade existing pipes which cross from west to east and then from south to north under B. B. Downs Blvd.
4	Silver Lake Basin 511400, 511500	Flooding along Sinclair Hills Road. Inadequate drainage to 149th Street outfall system.	See CIP 47137 and CIP 47251.
5	Flynn Lake Basin 520100	Flooding in Flynn Lake area. Inadequate drainage outfall.	Option 5-1- Improve Flynn Lake outfall to two existing cross drains (STR-3 and STR-6) at Livingston Avenue. Construct ditch from Flynn Lake to these two cross drains. Upgrade cross drains sizes at STR-3 and STR-6 at Livingston Avenue. Improve outfall from the cross drains to Cypress Creek. Option 5-2- Construct ditches or pipes from Flynn Lake southward to Sinclair Hills Road, then connect to 24th Street project (CIP 47005).
6	Blind Pond Avenue Basin 530100, 530200	Flooding in Blind Pond Avenue. Inadequate drainage to Livingston Avenue cross drain.	Option 6-1- Improve ditch to connect from Blind Pond sub-division to Clement Road roadside ditch. Construct ditch to connect to existing cross drain at Livingston Avenue (STR-15). Option 6-2- Construct a pipe along Blind Pond Avenue to Livingston Avenue. Construct a new cross drain under Livingston Avenue to Cypress Creek.
7	Hanna Lake Basin 540100, 530500	Flooding occurred at Wein Range Lane. Inadequate conveyance and cross drain at Livingston Avenue.	Regrade existing ditch at northside of the basin. Construct roadside ditch along Wein Range Lane. Connect the roadside ditch of Wein Range Lane to north swale through existing low area. Replace crushed pipe at Livingston Avenue (STR-19).
8	County Line Road Basin 542240, 542190	No outlet at the intersection of Newburger Road and Livingston Avenue.	Construct roadside ditch from the intersection of Newburger Road and Livingston Avenue to connect to the existing cross drain (STR-38). Increase culvert size of STR-38. Coordinate these improvements with Mobilaire and Livingston project (CIP 47163).
9	County Line Road Basin 542250	Road flooding at Newburger Road and Rhodes Woods.	Construct a positive outfall from Newburger Road to the pond/wetland in Rhodes Wood Acres subdivision. Install a 30-inch cross drain, two ditch bottom inlets, and pipes at Newburger Road. Convey stormwater to wetland south of Newburger Road.
10	County Line Road Basin 542260 541140	High water levels at Hog Island Lake and Road flooding at County Line Road northwest of	Option 10-1- Construct 400 feet of force main from Hog Island Lake west to Lake Kell. Use portable pump unit to release extra water to Lake Kell. Upgrade the existing culvert at County Line Road at Basin 541140. Option 10-2- Improve Hog Island Lake

		Hog Island Lake.	outflow through Willow Bend Subdivision culverts.
11	Lakes in Cypress Creek Basin	Cypress Creek Basin lakes are eutrophic and have invasive species establishment.	Slow eutrophication process in basin lakes by reducing nitrogen and phosphorous loading through point source location and public education. Remove invasive species located in and around edges of lakes (e.g. primrose willow, cattail, melaleucha, torpedo grass).
12	Upland Restoration Areas in Cypress Creek Basin	Upland pasture / shrub and brushland have been disturbed. These areas provide minimal habitat for wildlife.	Restore upland pasture / shrub and brushland areas located west of I-275, if being acquired. Provide invasive species removal and native species plantings. Refer to Figure 13-1 for potential upland restoration area locations.
13	Borrow Pits in Cypress Creek Basin	Borrow pits are disturbed areas that provide minimal wildlife habitat.	Create/enhance littoral shelf areas in borrow pit areas located near I-275 and I-75 to provide water quality treatment and wildlife habitat. Refer to Figure 13-1 for borrow pit locations.
14	Invasive Species Control in Cypress Creek Basin	Invasive species have established along roads, in ditches, yards, and natural areas. Invasives outcompete native species.	Remove invasive species located throughout Cypress Creek Basin in ditches and along right-of-ways (e.g. cogongrass along right-of-ways, skunkvine and air potato in ditches). Continue public education on the importance of controlling invasive species in yards.
15	Wildlife Corridor Enhancement in Cypress Creek Basin	Cypress Creek Watershed is a part of the Cypress Creek greenway which is an important wildlife corridor. Major roads have fragmented this section of the corridor.	Cypress Creek greenway corridor has the potential to be enhanced through retrofitting culverts or creating wildlife crossing that will accommodate small mammals, reptiles and amphibians. See Figure 13-1 for wildlife crossing improvement locations.
16	New CIP Projects in Basin	Water Quality Treatment for Proposed CIP projects in the Cypress Creek Basin	Utilize grassed swales or detention areas where feasible, for water quality treatment for proposed CIP projects.
17	Wet Detention Pond in Thirteen Mile Run	Water Quality Treatment for areas in the Thirteen Mile Run Basin	Create wet detention area to provide water quality treatment of areas within the Thirteen Mile Run basins upstream of Vandervort Road.
18	Wet Detention Pond in Blind Pond Avenue Basin	Water Quality Treatment for areas in the Blind Pond Avenue Basin	Create wet detention area to provide water quality treatment of areas within the Blind Pond Basin east of Livingston Avenue.
19	Coordinate With Pasco County for upper watershed water quality improvements	Improve water quality from areas coming into Hillsborough County from Pasco County and the City of Tampa.	Coordinate with Pasco County to improve water quality from areas coming into Hillsborough County from Pasco County and the City of Tampa.
20	Erosion Control for channels east of Livingston Avenue and south of Max Smith Road and Clement Road	Existing channels have severely eroding banks which could impact the Cypress Creek main channel	Regrade, stabilize and vegetate the channel banks and keep cattle out of channel by fencing. Construct energy dissipators or riprap to reduce velocities from Livingston Avenue culverts.

Table 13.1-1 Hillsborough County Upcoming Capital Improvement Projects in the Cypress Creek Watershed

CIP #	LOCATION	PROJECT DESCRIPTION	STATUS
CIP 47014	148th and 20th Street Outfall	Reconstruct the existing drainage conveyance system between 19th Street and Livingston Avenue and between Sinclair Hills Road and 148th Avenue. Construct a retention/detention pond to reduce the frequency of street and structure flooding.	To be designed in 2001
CIP 49226	Debuel Road Stormsewer (CIT)	Replace culvert and construct drainage structure.	In House project, to be designed 2001
CIP 47224	Regal Oaks Lane/Underdrain construction	Due to high ground water elevation, the pavement at the eastern end of Regal Oaks Lane and High Oaks Lane is cracking and pumping occurs during heavy rainfall events. An underdrain system is required along both sides of Regal Oaks Lane and High Oaks Lane. All underdrain can be tied into existing DBI in the stormwater drainage system.	In House project, design 2002
CIP 47163	Livingston Ave. & Mobilaire (General vicinity)	Local street flooding.	60% design plan
CIP47137	Lake Burrell Drive West Drainage Improvements	Construct a series of ditch bottom inlets on West Lake Burrel Drive	90% design plan.
CIP 47122	Irene Street & Livingston Avenue Outfall	Construct a positive outfall to allow stormwater to drain into the existing stormwater system on Livingston Ave. Project will require the construction of a series of ditch bottom inlets, cross drain and junction box to connect into existing 48" outfall system on Livingston Ave.	Design completed. Construction to start July 2000.
CIP 47005	24th Street North/Sinclair Hills Drainage	Construct drainage improvements with pipes of adequate size, length and grade at intersecting roads and driveways. Project begins on 24th Street at Sinclair Hills Road southward to 149th Street.	Design completed. Construction to start July 2000.
CIP 47150	Lake St. Clair Outfall Construction	Construct enclosed pipe drainage system to provide positive outfall for Lake St. Clair and improved roadway drainage for East Lake Burrel Drive. The new drainage system will be piped through a series of structures to a cross drains under Sinclair Hills Road and into the 149th St. outfall system. All disturbed area shall be restored.	30% to 60% design.
CIP 47251	Sinclair Hills Road Outfall System Drainage	Conservation area overtops road due to absence of positive outfall. Design an outfall system from the conservation area south to Lake Sinclair then to the existing ditch on the south side of 151st Street. Clean existing ditch system southward to 149th Street.	Design in 2001
CIP 47015	148th Avenue and Ranch Lake Circle Drainage	Reconstruct the existing drainage conveyance system to meet Hillsborough County minimum standards.	To be designed in 2001.
CIP 47164	Livingston Ave. at Bulrush Avenue Drainage Outfall	Construct a cross drain under Livingston Avenue with required mitered end section and ditch bottom inlets. Excavate a swale or install an 18" RCP outfall for approximately 500 feet south along the right of way on Livingston Ave. Construct an outfall system to the east of discharging into a large bayhead	To be designed in 2001.
CIP 47137	Lake Burrel Drive West Drainage Improvements	Construct a series of ditch bottom inlets on West Lake Burrel Drive: install pipes of adequate size, lengt and grade and replace and upgrade the cross under Sinclair Hills Road. The driveway pipes under the driveways on the 12th Street need to be replaced with structures of adequate size and length. Install a series of monitoring underdrains along West Burrel Drive.	To be designed in 2001.
CIP 47281	Tiffany Lake Drainage Improvements	Construct inlet and pipes at the basin boundary of Lake Tiffany and east of this basin.	60% design plan (in house project)

- Computed water surface elevations for proposed conditions must not be significantly greater than existing conditions for the 25-year and 100-year events both upstream and downstream of the proposed project.

- Both environmental and water quality impacts were considerations in developing alternative solution scenarios.

Several of the problem areas and alternative improvements are located on Livingston Avenue currently a two lane roadway. If Livingston Avenue is to be upgraded in the future, several of the proposed alternatives at Livingston Avenue could be implemented during the roadway improvements. Schematic Plans of the proposed flood control alternatives (Alternatives 1-10) are included in Appendix J.

13.1.1 CYPRESS CREEK MAIN CHANNEL

The Cypress Creek main channel has a LOS A for the 25-year /24-hour design storm event. Since this area has been defined as flood-prone area by FEMA (Federal Emergency Management Administration, 1977), limited development has occurred in this area. Therefore, no structure, site, and road flooding problems have been identified. Since no problem areas were identified, no alternative analysis was conducted in this area.

13.1.2 COUNTY LINE DRAINAGE SYSTEM (HILLSBOROUGH/PASCO COUNTY)

The County Line Drainage System has a LOS C for 25-year /24-hour storm event. The 25-year design storm event computed water surface elevations for the County Line Drainage System indicates high water at:

Panther Path Road (Basin 542230),
Newburger Road (Basin 542240), and
East of Hog Island Lake (Basin 542250).

13.1.1.1 Newburger Road and Livingston Avenue

The first problem area (Improvement Alternative 8) is near Newburger Road and Livingston Avenue as shown in Figure 13-1 and Table 13-1. Since there is no existing outlet at the intersection of Newburger Road and Livingston Avenue, the improvement alternative is to construct a graded and sodded roadside ditch from the intersection of Newburger Road and Livingston Avenue to connect to the existing cross drains located south of this intersection. The size of the existing culvert structure will be increased from an 18” RCP to a 48” RCP. These improvements should be coordinated with the Mobilaire and Livingston Avenue Project (CIP 47163).

The alternative was analyzed. The results are shown in Table 13-2. The results indicate that, under the 25-year storm event, the maximum water surface elevation of the existing condition

Table 13-2 Newburger Road and Livinsgon Road Improvement (Alternative 8)

25-year 24-hour Storm Event (Max. Stages)

Location	Model Junction	Existing Condition (ft, NGVD)	Proposed Condition (ft, NGVD)	Stage Reduction Comparison (ft)
Intersection of Newburger Road and Livingston Ave.	542240	66.49	66.22	0.27
East of Livingston and south of Panther Path	542230	67.00	65.14	1.86
West of Livingston and south of Newburger Rd.	542190	63.85	63.27	0.58

100-year 24-hour Storm Event (Stages)

Location	Junction	Existing Condition (ft, NGVD)	Proposed Condition (ft, NGVD)	Stage Reduction Comparison (ft)
Intersection of Newburger Road and Livingston Ave.	542240	67.03	66.73	0.30
East of Livingston and south of Panther Path	542230	67	65.93	1.07
West of Livingston and south of Newburger Rd.	542190	64.92	64.16	0.76

was reduced from 66.42 ft NGVD to 66.17 ft NGVD at the intersection of Newburger Road and Livingston Avenue. The LOS was changed from C to A after the improvement was simulated.

13.1.1.2 Newburger Road at Rhodes Woods Acres

The second problem area (Improvement Alternative 9) is located at Newburger Road near Rhodes Wood Acres as shown in Figure 13-1 and Table 13-1. The improvement includes constructing a drop inlet structure with oil/grease skimmer north of Newburger Road, and tying into the Rhodes Wood Acres Lake to the south with a 36" pipe.

The alternative was analyzed. The results are shown in Table 13-3. The results indicate that, under the 25-year storm event, the maximum water surface elevation of the existing condition was reduced from 67.46 ft NGVD to 67.00 ft NGVD at Newburger near Rhodes Wood Acres. The LOS was changed from B to A after the improvement was simulated.

13.1.1.3 Hog Island Lake

The third problem area (Improvement Alternative 10) is located at Hog Island Lake. The proposed improvement (alternative 10-1) includes constructing 400 feet of force main from Hog Island Lake west to Lake Kell. A portable pump unit will be connected to the force main during periods of high water in Hog Island Lake. The existing culvert at County Line Road to Basin 541140 will also be upgraded from a 19”x 30” ERCP to a 24” x 38” ERCP.

A second option (alternative 10-2) is to improve Hog Island Lake outflow through Willow Bend Subdivision culverts and lowering the channel north of SR 54.

The alternatives were analyzed. The results are shown in Table 13-4. The result indicated that, under the 25-year storm event, the maximum water surface elevation of the existing condition was reduced from 68.05 ft NGVD to 67.53 ft NGVD at County Line Road north of Hog Island Lake. The LOS was did not change from C after the improvement was simulated.

13.1.3 COUNTRY OAKS SYSTEM

The Country Oaks System has a LOS A for the 25-year /24-hour design storm event. No structure, site, and road flooding problems have been identified. Since no problem areas were identified, no alternative analysis was conducted in this area.

13.1.4 RIDGE LAKE SYSTEM

The Ridge Lake System has a LOS A for the 25-year /24-hour design storm event. No structure, site, and road flooding problems have been identified. Since no problem areas were identified, no alternative analysis was conducted in this area.

Table 13-3 Rhodes Wood Acres Improvement (Alternative 9)

25-year 24-hour Storm Event (Stages)

Location	Junction	Existing Condition (ft, NGVD)	Proposed Condition (ft, NGVD)	Stage Reduction Comparison (ft)
Intersection of Newburger Road and Livingston Ave.	542255	67.69	67.20	0.49
East of Livingston and south of Panther Path	542210	60.00	60.24	-0.24
West of Livingston and south of Newburger Rd.	542260	67.64	67.51	0.13

100-year 24-hour Storm Event (Stages)

Location	Junction	Existing Condition (ft, NGVD)	Proposed Condition (ft, NGVD)	Stage Reduction Comparison (ft)
Intersection of Newburger Road and Livingston Ave.	542255	68.01	67.60	0.41
East of Livingston and south of Panther Path	542210	60.58	60.58	0.00
West of Livingston and south of Newburger Rd.	542260	68.03	67.90	0.13

Table 13-4 Hog Island Lake Basin Improvement (Alternative 10)

25-year 24-hour Storm Event (Stages)

Location	Junction	Existing Condition (ft, NGVD)	Proposed Condition (ft, NGVD)	Stage Reduction Comparison ft
County Line Road north of Hog Island Lake	541140	68.20	67.67	0.53
Hog Island Lake Basin	542260	67.64	67.51	0.13
Basin north of Newburger Road	542255	67.69	67.2	0.49

100-year 24-hour Storm Event (Stages)

Location	Junction	Existing Condition (ft, NGVD)	Proposed Condition (ft, NGVD)	Stage Reduction Comparison ft
County Line Road north of Hog Island Lake	541140	68.49	68.24	0.25
Hog Island Lake Basin	542260	68.03	67.90	0.13
Basin north of Newburger Road	542255	68.01	67.6	0.41

13.1.5 SHERRY'S BROOK SYSTEM

The Sherry's Brook System has a LOS A for the 25-year /24-hour design storm event. No structure, site, and road flooding problems have been identified. However, for 50- and 100-year storm event, Basin 542050 (Sterling Silver Circle) has LOS B. Since no problem areas were identified, no alternative analysis was conducted in this area.

13.1.6 HANNA LAKE SYSTEM

The Hanna Lake System has a LOS C for 25-year /24-hour storm event. The Hillsborough County Modified EXTRAN model predicts high water during the 25-year design storm event for the Hanna Lake System at:

Wein Ranch Lane (Basin 540100),
Pinecrest Road (Basin 540300), and
Swamp Lake (Basin 540700).

13.6.1.1 Wein Ranch Lane and Livingston Avenue

The problem area (Improvement Alternative 7) is near Wein Ranch Lane and Livingston Avenue as shown in Figure 13-1 and Table 13-1. Since there is inadequate conveyance at the existing cross drain at Livingston Avenue, the improvement alternatives include regrading the ditch behind homes to the pond at STR-19 (cross drain of Livingston Ave near Max Smith Road), cleaning the pond at STR-19, and upgrading STR-19 to (2) 29" x 45" ERCP. Also, constructing a graded, sodded ditch from Basin 530500 (Pinecrest Avenue) to STR-19.

The alternative was analyzed. The results are shown in Table 13-5. The results indicate that, under the 25-year storm event, the maximum water surface elevation of the existing condition was reduced from 58.31 ft NGVD to 56.62 ft NGVD at Wein Ranch Lane (Basin 540100). The LOS was changed from B to A after the improvement was simulated.

13.1.7 BLIND POND AVENUE SYSTEM

The Blind Pond Avenue System has a LOS C for 25-year /24-hour storm event. The Hillsborough County Modified EXTRAN model predicts high water during the 25-year design storm event for the Blind Pond Avenue System at:

Clement Avenue (Basin 530200)
Hanna & Green Meadows Dr. (Basin 530300), and
Blind Pond Avenue and north of Clement Road (Basin 530500).

13.7.1.1 Blind Pond Avenue and Livingston Avenue

The first problem area (Improvement Alternative 6) is near Blind Pond Avenue and Livingston Avenue as shown in Figure 13-1 and Table 13-1. Since the existing culvert at Livingston Avenue is undersized, the improvement alternative is to construct a storm sewer system eastward along

Table 13-5 Wein Ranch Lane Basin Improvement (Alternative 7)

25-year 24-hour Storm Event (Stages)

Location	Junction	Existing Condition (ft, NGVD)	Proposed Condition (ft, NGVD)	Stage Reduction Comparison (ft)
Wein Ranch Lane	540100	58.27	57.1	1.17
Pinecrest Drive	530500	58.27	57.14	1.13
Burrington Sub-division	540200	60.09	59.76	0.33

100-year 24-hour Storm Event (Stages)

Location	Junction	Existing Condition (ft, NGVD)	Proposed Condition (ft, NGVD)	Stage Reduction Comparison (ft)
Wein Ranch Lane	540100	58.99	57.79	1.20
Pinecrest Drive	530500	58.96	57.84	1.12
Burrington Sub-division	540200	60.69	60.21	0.48

Blind Pond Avenue to Livingston Avenue and then construct graded, sodded roadside ditch southward to STR-15 (a cross drain of Livingston Avenue south of Clement Road). STR-15 will be upgraded from one 29"x 45" ERCP to (2) 29"x 45" ERCP.

The alternative was analyzed. The results are shown in Table 13-6. The results indicate that, under the 25-year storm event, the maximum water surface elevation of the existing condition was reduced from 58.31 ft NGVD to 56.98 ft NGVD at Green Meadow Drive (Basin 530200). The LOS was changed from C to A after the improvement was simulated.

13.7.1.2 South of Clement Road and Livingston Avenue

The second problem area (Improvement Alternative 6A) is south of Clement Road and Livingston Avenue as shown in Figure 13-1 and Table 13-1. Since there is a lack of a main conveyance system and inadequate drainage to Livingston Avenue, the improvement alternative is to construct a graded, sodded ditch eastward along the south side of Clement Road and then tie into STR-15 (cross drain of Livingston Avenue near Max Smith Road). A second ditch will be constructed to flow eastward along the north side of the Live Oak Sub-division. These two ditches are to join at an existing 29 x 45-inch culvert (STR-15). The culvert size of STR-15 will be increased to (2) 29 x 45-inch pipes.

The alternative was analyzed. The results are shown in Table 13-7. The result indicate that, under the 25-year storm event, the maximum water surface elevation of the existing condition was reduced from 59.15 ft NGVD to 57.77 ft NGVD at Live Oak Subdivision (Basin 530300). The LOS was changed from C to A after the improvement was simulated.

13.1.8 THIRTEEN MILE RUN SYSTEM

The Thirteen Mile Run System has a LOS A for the 25-year /24-hour design storm event. No structure, site, and road flooding problems have been identified. Since no problem areas were identified, no alternative analysis was conducted in this area.

13.1.9 FLYNN LAKE OUTFALL SYSTEM

The Flynn Lake Outfall System has a LOS B for 25-year /24-hour storm event. The Hillsborough County Modified EXTRAN model predicts high water during the 25-year design event for the Flynn Lake Outfall System at:

Curry Road (Basin 520100)
Lake Palm Drive (Basin 520400), and
September Drive (Basin 520600).

13.9.1.1 Curry Road and Livingston Avenue

The problem area (Improvement Alternative 5) is located at Curry Road and Livingston Avenue as shown in Figure 13-1 and in Table 13-1. Since there is an inadequate drainage outfall at

Table 13-6 Blind Pond Avenue Basin Improvement (Alternative 6)

25-year 24-hour Storm Event (Stages)

Location	Junction	Existing Condition (ft, NGVD)	Proposed Condition (ft, NGVD)	Stage Reduction Comparison (ft)
Blind Pond Avenue	530500	58.27	57.14	1.13
Clement Road	530100	53.68	54.06	-0.38
Green Meadow Drive	530200	57.15	55.78	1.37

100-year 24-hour Storm Event (Stages)

Location	Junction	Existing Condition (ft, NGVD)	Proposed Condition (ft, NGVD)	Stage Reduction Comparison (ft)
Blind Pond Avenue	530500	58.96	57.84	1.12
Clement Road	530100	55.01	55.01	0.00
Green Meadow Drive	530200	57.78	56.26	1.52

Table 13-7 Live Oak Sub-division Basin Improvement (Alternative 6a)

25-year 24-hour Storm Event (Stages)

Location	Junction	Existing Condition (ft,NGVD)	Proposed Condition (ft,NGVD)	Stage Reduction Comparison (ft)
Clement Road	530200	57.15	55.78	1.37
Live Oak Sub-division	530300	59.15	57.77	1.38
North of Andre Dr.	520900	50.00	49.18	0.82

100-year 24-hour Storm Event (Stages)

Location	Junction	Existing Condition (ft,NGVD)	Proposed Condition (ft,NGVD)	Stage Reduction Comparison (ft)
Clement Road	530200	57.78	56.26	1.52
Live Oak Sub-division	530300	59.65	58.03	1.62
North of Andre Dr.	520900	50.00	49.70	0.30

Livingston Avenue, the improvement alternative (alternative 5-1) includes improve the Flynn Lake Outfall (at the Violet Curry Preserve) to two existing cross drains (STR-3 and STR-6) at Livingston Avenue. Construct a new ditch from Flynn Lake to these two cross drains. Upgrade the cross drains to (2) 42-inch RCP's and construct a graded, sodded ditch to the southeast to Cypress Creek.

The alternative was analyzed. The results are shown in Table 13-8. The results indicate that, under the 25-year storm event, the maximum water surface elevation of the existing condition was decreased from 47.53 ft NGVD to 46.87 ft NGVD at Flynn Lake outfall near at the Curry Road. The LOS remains as B after the improvement was simulated.

A second option (alternative 5-2) is to construct ditches or pipes from Flynn Lake southward to Sinclair Hills Road, then connect to the 24th street project (CIP 47005).

The alternative was analyzed. The results are shown in Table 13-8.1. The results indicate that, under the 25-year storm event, the maximum water surface elevation of the existing condition was decreased from 47.53 ft NGVD to 46.87 ft NGVD at Flynn Lake outfall near at the Curry Road. The LOS remains as B after the improvement was simulated.

13.1.10 SILVER LAKE OUTFALL SYSTEM

The Silver Lake Outfall System has a LOS C for 25-year /24-hour storm event. The Hillsborough County Modified EXTRAN model predicts high water during the 25-year design storm event for the Blind Pond Avenue System at:

North of Sinclair Hills Road (Basin 521400), and
South of Sinclair Hills Road (Basin 521500)

13.10.1.1 Sinclair Hills Road

The problem area (Improvement Alternative 4) is located north and south of Sinclair Hills Road and is identified in Table 13.1. Since there is inadequate lateral drainage to the 149th Street outfall, three on-going Hillsborough County CIP projects are being implemented in this area.

CIP 47137 - Construct a series of ditch bottom inlets on West Lake Burrell Drive.

CIP 47150 - Construct enclosed pipe drainage system to provide positive outfall for Lake St. Claire and improved roadway drainage for East Lake Burrell Drive. The new drainage system will be piped through a series of structures to a cross drains under Sinclair Hills Road and into the 149th Street outfall system.

CIP 47251 - Conservation area overtops road due to absence of positive outfall. Design an outfall system from the conservation area south to Lake Sinclair then to the existing ditch on the south side of 151st Street. Clean existing ditch system southward to 149th Street.

Table 13-8 Flynn Lake Outfall Basin Improvement (Alternative 5-1)

25-year 24-hour Storm Event (Stages)

Location	Junction	Existing Condition (ft,NGVD)	Proposed Condition (ft,NGVD)	Stage Reduction Comparison (ft)
Curry Road	520100	48.34	48.31	0.03
Lake Palm Drive	520400	52.56	52.56	0.00
September Drive	520600	52.42	52.42	0.00

100-year 24-hour Storm Event (Stages)

Location	Junction	Existing Condition (ft,NGVD)	Proposed Condition (ft,NGVD)	Stage Reduction Comparison (ft)
Curry Road	520100	49.4	49.39	0.01
Lake Palm Drive	520400	53.61	53.61	0.00
September Drive	520600	53.47	53.47	0.00

Table 13-8.1 Flynn Lake Outfall Basin Improvement (Alternative 5-2)
25-year 24-hour Storm Event (Stages)

Location	Junction	Existing Condition (ft,NGVD)	Proposed Condition (ft,NGVD)	Stage Reduction Comparison (ft)
Curry Road	520100	48.34	47.28	1.06
Lake Palm Drive	520400	52.56	52.56	0.00
September Drive	520600	52.42	52.42	0.00

100-year 24-hour Storm Event (Stages)

Location	Junction	Existing Condition (ft,NGVD)	Proposed Condition (ft,NGVD)	Stage Reduction Comparison (ft)
Curry Road	520100	49.4	48.41	0.99
Lake Palm Drive	520400	53.61	53.61	0.00
September Drive	520600	53.47	53.47	0.00

Since numerous on-going Hillsborough County CIPs projects are being designed, no additional alternatives were analyzed.

13.1.11 149TH AVENUE OUTFALL SYSTEM

The 149th Avenue Outfall System has a LOS C for 25-year /24-hour storm event. The Hillsborough County Modified EXTRAN model predicts high water during the 25-year design storm event for the 149th Avenue System at:

Stormwater Detention Pond at Forest Lake (Basin 510100 and 510050)
Skipper and Livingston Avenue (Basin 510540),
149th Avenue at 23rd Street (Basin 510800), and
149th Avenue at 15th street (Basin 511200).

13.11.1.1 149th Street and Lake Forest

Since there is heavy vegetation in the 149th Street and Lake Forest outfall channels, and the 149th Street ponds weir has deteriorated, the improvements alternatives (Improvement Alternative 1-1) includes clearing and grubbing the channels, regrading and planting the side slopes and increasing the 149th Street pond weir length from 78.6 feet to 150 feet. In addition, the improvements also include reconstruction of the existing control structure and outfall pipe from the Lake Forest Pond to Cypress Creek.

The alternative was analyzed. The results are shown in Table 13-9. The results indicate that, under the 25-year storm event, the maximum water surface elevation of the existing condition was decreased from 35.28 ft NGVD to 35.00 ft NGVD at the 149th Avenue detention Pond. The LOS was changed from C to A after the improvement was simulated.

A second option (alternative 1-2) is to construct new (2) 36-inch pipes from the 149th Street pond to the Lake Forest pond to provide additional stormwater treatment and peak attenuation capacity.

The alternative was analyzed. The results are shown in Table 13-9.1. The results indicate that, under the 25-year storm event, the maximum water surface elevation of the existing condition was decreased from 35.07 ft NGVD to 34.95 ft NGVD at the 149th Avenue detention Pond. The LOS was changed from C to A after the improvement was simulated.

A third option (alternative 1-3) is to construct a combination of options one and two.

The alternative was analyzed. The results are shown in Table 13-9.2. The results indicate that, under the 25-year storm event, the maximum water surface elevation of the existing condition was decreased from 35.07 ft NGVD to 34.65 ft NGVD at the 149th Avenue detention Pond. The LOS was changed from C to A after the improvement was simulated.

Table 13-9 Lake Forest Outfall Improvement (Alternative 1-1)

25-year 24-hour Storm Event (Stages)

Location	Junction	Existing Condition (ft, NGVD)	Proposed Condition (ft, NGVD)	Stage Reduction Comparison (ft)
149th Avenue Detention Pond	510100	35.07	34.69	0.38
Lake Forest	510050	33.99	33.95	0.04
149th Avenue at 30th Street	510150	35.28	34.93	0.35

100-year 24-hour Storm Event (Stages)

Location	Junction	Existing Condition (ft, NGVD)	Proposed Condition (ft, NGVD)	Stage Reduction Comparison (ft)
149th Avenue Detention Pond	510100	35.6	35.1	0.50
Lake Forest	510050	34.92	34.87	0.05
149th Avenue at 30th Street	510150	36.41	36.22	0.19

Table 13-9.1 Lake Forest Outfall Improvement (Alternative 1-2)

25-year 24-hour Storm Event (Stages)

Location	Junction	Existing Condition (ft, NGVD)	Proposed Condition (ft, NGVD)	Stage Reduction Comparison (ft)
149th Avenue Detention Pond	510100	35.07	34.95	0.12
Lake Forest	510050	33.99	34.32	-0.33
149th Avenue at 30th Street	510150	35.28	35.14	0.14

100-year 24-hour Storm Event (Stages)

Location	Junction	Existing Condition (ft, NGVD)	Proposed Condition (ft, NGVD)	Stage Reduction Comparison (ft)
149th Avenue Detention Pond	510100	35.6	35.52	0.08
Lake Forest	510050	34.92	34.88	0.04
149th Avenue at 30th Street	510150	36.41	36.29	0.12

Table 13-9.2 Lake Forest Outfall Improvement (Alternative 1-3)
25-year 24-hour Storm Event (Stages)

Location	Junction	Existing Condition (ft, NGVD)	Proposed Condition (ft, NGVD)	Stage Reduction Comparison (ft)
149th Avenue Detention Pond	510100	35.07	34.65	0.42
Lake Forest	510050	33.99	34.28	-0.29
149th Avenue at 30th Street	510150	35.28	34.91	0.37

100-year 24-hour Storm Event (Stages)

Location	Junction	Existing Condition (ft, NGVD)	Proposed Condition (ft, NGVD)	Stage Reduction Comparison (ft)
149th Avenue Detention Pond	510100	35.6	35.07	0.53
Lake Forest	510050	34.92	34.87	0.05
149th Avenue at 30th Street	510150	36.41	36.24	0.17

Since there is inadequate lateral drainage to the 149th Street outfall, three on-going Hillsborough County CIP projects are being proposed or implemented in this system.

CIP 47015 - Reconstruct the existing drainage conveyance system to meet Hillsborough County minimum standards.

CIP 47122 - Construct a positive outfall to allow stormwater to drain into the existing stormwater system on Livingston Avenue. Project will require the construction of a series of ditch bottom inlets, cross drain and junction box to connect into an existing 48" outfall system on Livingston Avenue.

CIP47014 - Reconstruct the existing drainage conveyance system between 19th Street and Livingston Avenue and between Sinclair Hills Road and 148th Avenue. Construct a retention/detention pond to reduce the frequency of street and structure flooding.

13.1.12 BRUCE B. DOWNS SYSTEM

Bruce B. Down System has a LOS C for 25-year /24-hour storm event. The Hillsborough County Modified EXTRAN model predicts high water during the 25-year design storm event for the Bruce B. Down System at:

139th Avenue at Livingston Avenue (Basin 510450),
139th Avenue at 30th Street (Basin 510400), and
143rd Avenue at 22nd Street (Basin 510600).

13.12.1.1 143rd Avenue Outfall

The improvement alternative (alternative 3) includes upgrading the main conveyance system outfall ditch along 143rd Avenue and the pipes at Bruce B. Downs Boulevard and the Lake Forest drainage ditch. The Bruce B. Downs Boulevard culverts were increased from (2) 34”x 53” pipes to a 10’x 5’ box culvert.

The alternative was analyzed. The results are shown in Table 13-10. The result indicate that, for the 25-year storm event, the maximum water surface elevation of the existing condition was decreased from 41.81 ft NGVD to 39.96 ft NGVD east of 22nd Street and south of 143rd Avenue. However, the water surface elevation downstream at north of B. B. Downs will increase from 38.59 ft, NGVD to 39.12 ft NGVD. The LOS changes from C to A after the improvement was simulated.

Table 13-10 USF Area Pipe Improvement (Alternative 3)

25-year 24-hour Storm Event (Stages)

Location	Junction	Existing Condition (ft, NGVD)	Proposed Condition (ft, NGVD)	Stage Reduction Comparison (ft)
North of B. B. Downs	510115	38.32	39.62	-1.30
South of B. B. Downs	510200	38.92	40.34	-1.42
143th Avenue at B. B. Downs	510400	43.05	40.58	2.47

100-year 24-hour Storm Event (Stages)

Location	Junction	Existing Condition (ft, NGVD)	Proposed Condition (ft, NGVD)	Stage Reduction Comparison (ft)
North of B. B. Downs	510115	39.11	40.54	-1.43
South of B. B. Downs	510200	40.72	41.47	-0.75
143th Avenue at B. B. Downs	510400	43.93	41.7	2.23

13.2 WATER QUALITY ALTERNATIVES

13.2.1 Introduction

Both structural and non-structural alternatives for improving water quality in the Cypress Creek Watershed were evaluated. These improvements included regional stormwater treatment facilities, pollutant source control measures (street sweeping, catch basin cleaning), biofiltration and filter strips, stormwater retrofitting of existing developments, establishment of stream buffer zones, chemical treatment and other frequently used best management practices (BMP's).

The improvements selected for the Cypress Creek watershed include: improving water quality by providing stormwater treatment where currently minimal stormwater treatment is being provided (regional stormwater treatment facilities), recommending stormwater treatment for future County projects, channel erosion control improvements, and coordination with Pasco County, City of Tampa and SWFWMD for upper watershed water quality improvements.

13.2.2 Regional Wet Detention Ponds

Normally stormwater treatment occurs on the particular parcel of land that generates the runoff. Regional stormwater ponds treat stormwater from more than one site, which is transported to the facility through a series of pipes or channels. Regional facilities can be designed to allow for multiple uses such as green space, recreation, groundwater recharge and wildlife habitat. Wet detention ponds should be designed to comply with SWFWMD "conservation wet detention criteria" and to utilize planted littoral zones for pollutant uptake and wildlife habitat. Regional wet detention ponds with littoral zones are proposed in several locations (See Figure 13-1) to provide water quality treatment for upstream drainage areas prior to the runoff entering the Cypress Creek main channel.

Blind Pond Avenue Pond

Provide offline wet detention pond with planted littoral zone areas to provide water quality treatment of drainage areas within the Blind Pond basin (Alternative 18). The pond is proposed to be located east of Livingston Avenue. For the approximately 342 acre contributing basin, a pond area of 29 acres or 14 acres would be required to provide one inch or one-half inch of treatment, respectively. The exact size of pond will be dependent on soil conditions, water table elevations and land area available.

Thirteen Mile Run Pond

Provide offline wet detention pond with planted littoral zone areas to provide water quality treatment of drainage areas within the Thirteen-Mile Run basin (Alternative 17). The pond is proposed to be located north of Vandervort Road west of Livingston Avenue. For the approximately 732 acre contributing basin, a pond area of 41 acres or 20 acres would be required

to provide one inch or one-half inch of treatment, respectively. The exact size of pond will be dependent on soil conditions, water table elevations and land area available.

149th Avenue Pond

Increase the size of the existing 149th Avenue pond (if possible) and add additional littoral zone for water quality treatment (Alternative 1-1). Another option would be to increase the connection culvert size from the 149th Avenue pond to Lake Forest and expand the Lake Forest littoral area to provide additional water quality treatment. For the approximately 1233 acre contributing basin, a pond area of 69 acres or 34 acres would be required to provide one inch or one-half inch of treatment, respectively.

13.2.3 Provide Water Quality Treatment for New CIP Projects

Utilize grass swales, vegetated ditches or detention areas where feasible, for water quality treatment for proposed County CIP projects (Alternative 16). Grassed swales can be used to slow runoff velocities to allow particulates such as sediments and metals to drop out of the runoff and to increase residence time to allow increased nutrient uptake.

13.2.4 Erosion Control Alternatives

The majority of the existing ditches and channels within the Cypress Creek watershed are well vegetated and have little erosion potential. However, the existing channels located: east of Livingston Avenue and south of Max Smith Road (Lake Hanna Outfall) and the channel east of Livingston Avenue and south of Clement Road (Alternative 20), have severely eroded banks. This erosion could create turbidity problems in the Cypress Creek main channel located downstream of these tributaries. The existing channels currently flows through private property. The erosion problems appear to be due to high velocities from the existing culverts under Livingston Avenue, poor soil conditions, and cattle activities destabilizing the channel banks. The channel banks should be flattened and vegetated and the cattle kept out of the channel by fencing. Energy dissipaters and /or riprap should also be used at the Livingston Avenue culverts to reduce downstream velocities.

13.2.5 Coordination with Pasco County, City of Tampa and SWFWMD

Coordination with Pasco County, City of Tampa and SWFWMD to improve water quality from areas draining into Hillsborough County from Pasco County and the City of Tampa (Alternative 19) should be undertaken. Water quality samples from stations at the Hillsborough/ Pasco County line indicates that water quality could be improved from upstream areas of the Cypress Creek basin located outside of the Hillsborough County Cypress Creek study area. Additional studies would be required to identify specific water quality improvements which could be conducted upstream of the Hillsborough County line to improve the water quality in Cypress Creek.

13.3 NATURAL SYSTEM ALTERNATIVES

13.3.1 Introduction

Potential management alternatives that would benefit and improve the natural habitat and wildlife communities of Cypress Creek Watershed were identified and evaluated. Alternatives that were considered include land acquisition and management, lake water quality improvement, removal of invasive plant species associated with lake littoral zones, upland habitat restoration, borrow pit enhancement, invasive species control through education, county maintenance of road sides and ditches, and wildlife corridor enhancement through retrofitting culverts and adding wildlife crossings. Table 13-1 summarizes the Cypress Creek management alternatives and Figure 13-1 shows the location of each alternative where applicable.

13.3.2 Land Acquisition and Management

There are several ELAPP preservation areas located within the Cypress Creek Watershed. In addition, several additional large parcels have been targeted by ELAPP for acquisition. These additional parcels should be obtained when possible and managed to provide wildlife, water quality and floodplain benefits.

13.3.3 Lake Management

Lake Eutrophication

Phosphorous and nitrogen are both important nutrients needed for plant productivity. Unnatural phosphorous loading from stormwater runoff and lawn fertilization can result in alga blooms that accelerate the natural eutrophication process of a lake. Chlorophyll measurements can be used to determine if the lake's phytoplankton levels are increasing or decreasing. High chlorophyll content generally means there is a large amount of phytoplankton present within the lake. Increasing levels of chlorophyll typically indicates an increase in the level of eutrophication. Clarity typically decreases with the accelerated eutrophication process due, in part, to the high algal content and dissolved organic compounds in a lake system.

A standard used for determining the trophic level of lakes was developed in Sweden in 1980 and adapted for Florida. This standard was used to define the trophic level of lakes in Florida. Lakes are typically defined as oligotrophic (low level of biological activity), mesotrophic (moderate level of biological activity), eutrophic (high level of biological activity) or hypereutrophic (highest level of biological activity). The following Table shows the method for classifying lakes into these trophic levels.

Table 13-11
TROPHIC LEVELS OF LAKES

TROPHIC LEVEL	TP (µg/L)	TN (µg/L)	CHL (µg/L)	SECCHI (ft)
Oligotrophic	<15	<400	<3	>13 feet
Mesotrophic	15-25	400-600	3-7	8-13 feet
Eutrophic	25-100	600-1500	7-40	3-8 feet
Hypereutrophic	>100	>1500	>40	<3 feet

TP (µg/L) = Long-term total phosphorous concentration
TN (µg/L) = Long-term total nitrogen concentration
CHL (µg/L) = Long-term total chlorophyll concentration
SECCHI = Long-term Secchi depth (ft)- Clarity

The Hillsborough County Lake Management Program (LQMP) has monitored water quality in ten Cypress Creek Watershed lakes located within and adjacent to the project area. These lakes include Burrell, Commston, Flynn, Hanna, Hog Island, Keene, Kell and Stemper in Hillsborough County and Bird and Floyd in Pasco County. Within each of these lakes, total phosphorous, total nitrogen, chlorophyll a and Secchi depth were measured. Most measurements were taken between 1996 and 1999, however Keene Lake has measurements recorded from 1991-99 and Floyd Lake has measurements only from 1990-94.

The ten lakes assessed by the LQMP exhibited eutrophic readings for total phosphorous, total nitrogen, chlorophyll a and clarity during most of the years the lakes were tested (see Table 14-2). Bird Lake and Flynn Lake were eutrophic for all categories for the year each was monitored, 1998 and 1999 respectively. Hog Island (1996, 97, 98) and Keene (1991-92, 94-99) were also eutrophic for all categories during all years monitored. In comparison with other Cypress Creek Watershed Lakes, Keene exhibited the highest levels of all parameters measured for 5 years and for 2 parameters for 2 years (it was the only lake sampled in 1995). While lakes naturally go through the eutrophication process, it is likely that man induced nutrient loadings have accelerated the eutrophication process in Cypress Creek Watershed lakes.

Sources of excessive nitrogen and phosphorus entering the Cypress Creek Watershed Lakes include septic systems, lawn fertilizers, and by-products of agricultural activities. Runoff from areas in the watershed may contain high nutrient content that flow to streams and canals that ultimately drain into the lakes. Further education of landowners in the watershed on alternative landscaping and lawn care methods can potentially decrease nutrient loading and the rate of eutrophication within lakes. The identification and removal of point source discharges within the watershed can also potentially decrease nutrient loading and the rate of eutrophication.

Lake Invasive Species Control

The eutrophic state of the lakes within the Cypress Creek Watershed has accelerated invasive species establishment. As a result, active management of invasive species is needed for the lakes located in Cypress Creek Watershed. Five major lakes within Cypress Creek Watershed (i.e., Lake Stemper, Hanna Lake, Keene Lake, Lake Kell and Hog Island Lake) were assessed by the Hillsborough County Lake Atlas Project in an attempt to determine the vegetative composition of their littoral zones. From these assessments, it was determined that each of these lakes had 33 to 50 plant species present, with 6-8 of those plants species being exotic and/or invasives. Notable invasive species included torpedo grass (*Panicum repens*), primrose willow (*Ludwigia peruviana*), cattail (*Typha* spp.), hydrilla, and melaleucha (*Melaleucha quinquenervia*). Invasive species typically out compete native species, which results in reduced diversity and a decreased wildlife value of the lake and its littoral zone.

Control of invasive species thorough their reduction and removal is the best management approach (Alternative 11) for the lakes in the watershed. Most woody species can be treated by a direct basal application of herbicide and most herbaceous species can be treated by a folier application. The use of backpack pumps, rather than broadcast spray methods, provides the best method of treating invasive species directly.

Continued education of lake front property owners is an additional important step. Property owners that can recognize invasive species can either remove them or alert the county. Property owners can remove some invasive species, such as primrose willow, by hand when the population is small. Other invasive species, such as torpedo grass and cattail may require spray application. Controlling the invasives before the population gets too large is the key to proper management. This is the most cost-effective approach and avoids the use of large chemical applications, which has the potential to be damaging to aquatic systems.

13.3.4 Land Restoration

Upland Shrub and Brush Areas

Open upland areas located near I-275 and I-75 are potential candidates for upland habitat restoration activities(Alternative 12). These areas are primarily pasture (FLUCFCS-210) with some shrub and brushland (FLUCFCS – 320) also present. They are located on Myakka fine sand and were historically flatwoods habitat. Restoration and management of these areas can return them to flatwoods. The removal and continued maintenance of exotics such as bahia grass (*Paspalum notatum)* that are out competing native species establishment is the first step. The planting of such species as wire grass and longleaf would help accelerate the process of reestablishing natural habitats within these areas.

Borrow Pits

Existing borrow pits located along I-75 and I-275 that can be improved through the creation of littoral shelves (Alternative 13) along their banks. Littoral shelves will help provide food and habitat for waterfowl and other wildlife, as well as increase the water quality within these openwater areas. The establishment and management of upland buffers around these pits would also improve the wildlife value and water quality of these pit areas.

13.3.5 Invasive Species Control

Cogongrass Control

Cogongrass (*Imperta cylindrica)* is a highly aggressive invasive species that commonly occurs in and near roadway right-of-ways within the Cypress Creek Watershed. Cogongrass grows in dense stands within areas that have been disturbed, such as old phosphate mines, golf courses, ditch banks, pastures and roadway sideslopes. Within the project area, it is typically not found in agricultural areas. However, it is beginning to spread into many natural habitats. It was originally introduced as a potential forage plant and for soil stabilization, but has proved to be of little use to cattle or wildlife. Cogongrass is considered to be a noxious pest and it is now illegal to plant this species. It has spread by illegal plantings and accidental transport in forage and in soil. Simply mowing cogongrass, as is currently the practice along I-275 and I-75, accelerates the spread of the species. Cogongrass is difficult to control for a number of reasons. This grass is a perennial with thick dense growing rhizomes that can grow as deep as four feet, although the majority of these roots grow in the top six inches of the soil. In addition, some research has shown the rhizomes of the species exude allopathic substances which inhibit the growth of other plants. Seed formation is sporadic and appears to be induced by burning, mowing and fertilization.

One method of cogongrass treatment that has proved to be effective is a cultivation and herbicide combination treatment (Alternative 14). Deep plowing or disking to at least 6 inches during the dry season cuts the rhizome and causes the plant to desiccate. Pramitol, Spike, and Arsenal are three herbicides that have proved effective at removing cogongrass, however these herbicides are non-selective and will also remove all other vegetation and will leave the treated area un-vegetated for 6-12 months. Burning in the early spring or burning and mowing followed by herbicide applications has also proved to be effective.

Maintained Ditches

Many of the ditches within the Cypress Creek watershed are heavily colonized with cattail and other invasive species. Maintenance of these ditches via herbicide spray application or manual controls and planting of native plant species and will help deter further spread of invasive species. Forested ditches are likely candidates for the spread of air potato (*Dioscorea bulbifero)* and skunkvine (*Paederia foetida)*. Both these species can be treated with a direct herbicide application. Air potato can be removed with basal application of Garlon 4,or for better results, a basal cut surface application of Garlon 4 or Garlon 3A. Skunkvine is becoming more prevalent

within the Cypress Creek Watershed. This species has the ability to form a dense canopy; thereby suppressing established native plant communities. Direct folier applications of Garlon, Escort, Krenite, Rodeo, Vanquish, Weedar and Weedone have proved to be effective in the control of this species. The ditch that runs from the Violet Curry Preserve east to Livingston Avenue is forested and has a notable infestation of both airpotato and skunkvine.

Public Education

Furthering public education on the importance of removing exotic and invasive species from homeowner yards will help to deter the spread of these species. Public education via workshops, pamphlets, newspaper articles, the Internet and county representation at wildlife fairs or other environmental functions are good public education methods.

13.3.6 Wildlife Corridor Enhancement

Enhancement of wildlife corridors by retrofitting conveyance pipes to sizes which may also be used by wildlife as crossings is a wildlife management procedure that could potentially be applied to the Cypress Creek Watershed (Alternative 15). Roads and development continuously fragment the landscape and separate natural habitats into smaller and more isolated units. Small isolated habitats result in wildlife populations that are smaller, less diverse, and less likely to survive. Fragmented habitats provide fewer food sources and isolation causes wildlife to be more susceptible to inbreeding, which can cause a decrease in the gene pool and result in genetic defects. Carnivores are at higher risk due their naturally smaller populations and their dependence on herbivores as a food source. Creating usable wildlife corridors between natural areas is critical in order to maintain healthy wildlife populations. Wildlife crossings along highways are also safer for vehicle usage; each year thousands of car accidents occur nationwide due to wildlife/car impacts.

A number of projects have been undertaken in Florida to improve habitat connectivity. Wildlife crossings for animals ranging from small reptiles to cougars and bears have been successful throughout the state. One of the earliest projects undertaken in Florida was the establishment of underpasses for the Florida Panther along Alligator Alley in the Everglades. More recently, bear underpasses were created along S.R. 46 in the Wekiva River Basin in Lake County. Other species have been found to use these underpasses including whitetail deer, bobcats and gray foxes. An additional project, specifically for reptiles, was completed along a short section of U.S. 441 in central Florida. This short section of road was documented as having the highest number of animal roadkills of any road segment in the state. As part of the animal crossing for this project, a low wall with a lip was built to direct animals to a constructed culvert crossing and to stop them from crossing at any location along the road.

The Florida Fish and Wildlife Conservation Commission has developed a set of guidelines for designing wildlife crossings. The specific guidelines used depend upon the target species that will potentially be using the crossing. Small mammals and reptiles would be the principal target species within the Cypress Creek Watershed. As a result of this, box culverts or pipes that have at least 3 feet of open space above the seasonal high water elevation should be utilized. Fencing

along the roadway within the area of the box culvert should be used to direct the animals to the crossing.

Forested wetlands within the Cypress Creek Watershed and located between I-75 and I-275 and north of the I-75/I-275 interchange comprise a section of Cypress Creek greenway corridor. This is a significant wildlife corridor that continues to the northeast into Pasco County and to the south where it connects with the Hillsborough River corridor. This upper forested section of Hillsborough River which Cypress Creek connects to become the Green Swamp corridor. As stated above, I-275, I-75 and C.R. 54 bisect the Cypress Creek greenway corridor. Sections of these roads have usable wildlife crossings, while other sections have the potential to be improved. Figure 13-1 shows potential locations for wildlife crossing improvements. Small-forested fragments also exist west of Livingston Avenue that provide habitat for small mammals and reptiles. Violet Curry Preserve, Lake Stemper and Swamp Lake are three of the larger forest fragments. Wildlife species such as raccoons, opossums, and turtles are known to cross Livingston Road near Violet Curry Preserve. Other wildlife species also migrating between Violet Curry Preserve and the natural areas associated with Cypress Creek. The cross-drain located south of the Silver Forest sub-division along Livingston is approximately half filled with debris. This cross-drain has the potential to accommodate small mammals if it is cleaned out. Cross-drains within the Cypress Creek watershed should be periodically maintenanced to improve flow and to provide wildlife crossings. Retrofitting the culvert, located near Victarra Circle along Livingston Avenue will improve the habitat connectivity in this area (see Figure 13-1). Additionally, water will be drained out from the south east side of Violet Curry Preserve through a cross-drain located under Sinclair Hills Road near 20th Street (See Alternative 4, Table 13-1). The water will be drained to the 149th Street outfall. Water will be routed through a culvert across Sinclair Road south to 149th Street and than east towards Cypress Creek. It will be important to insure that the proper hydrological function of the Violet Curry wetlands are maintained since the culvert that crosses Sinclair Road carries water into and out of a natural area. The seasonal high and low levels of the marsh areas associated with Lake Flynn will need to be determined for the final culvert design and elevation.

The University of Florida identified the I-75, I-275 and S. R. 54 through the Cypress Creek and Hillsborough River Corridors as one of thirty-six highly ranked highway-ecological interface zones. These roads were chosen due to the presence of 3 criteria; a riparian system, a greenway corridor and public lands (Cypress Creek Preserve is part of the Hillsborough County ELAPP Land -Environmental Land Acquisition Properties Project).

There are a number of useable wildlife crossings along I-275, I-75, County Line Road, and S.R. 54. I-75 has numerous crossings along the 3.6-mile stretch from Bruce B. Downs to the I-275/S.R. 54 intersection. There are four bridges, two box culverts (sizes 12'x5' and 4'x4') and twenty-four culverts (size ranges from 15" to 42") located along this section of I-75. There are fewer available wildlife crossings located along the 4.9 mile stretch of I-275 from the Livingston Avenue overpass north to the I-75/County Line Road intersection. There are three bridge crossings located at approximately 1.1, 1.5, and 1.7 miles south of the I-275/ County Line Road intersection; however, there are no crossings located for the next three miles south to the Livingston Avenue overpass. Additional wildlife crossings north of theI-275/ Livingston

overpass will connect natural areas and allow for greater mobility of wildlife species (see Figure 13-1).

Additional crossings could be constructed along County Line Road and S.R. 54 (see Figure 13-1). There is one 18" culvert located to the east of the I-275 and I-75 interchange along County Line Road that should be upgraded to accommodate wildlife. Another 48" culvert located west of the I-275 and I-75 interchange along County Line Road is more than half filled with debris at its south end. This culvert should be cleaned and adjusted to avoid build-up that would hinder wildlife utilization. Along S. R. 54 there is a box-culvert located just east of the Daquiri Lane intersection that also needs to be cleaned to accommodate wildlife utilization. An additional 30" culvert, located east of the Collier Parkway/SR54 intersection, should also be increased in size. The addition of another crossing west of the Foggy Ridge Parkway intersection would also aid the movement of wildlife in this area (see Figure 13-1).

Numerous culverts are interspersed throughout the western section of Cypress Creek Watershed, however many of these are too small for wildlife or are blocked by gratings. In areas where the culverts will be replaced as a result of roadway improvements or maintenance, the use of culvert sizes which are useable as wildlife crossings should be considered. There are four concrete culverts along Collier Parkway that are too low and small in diameter (18"-30") to be utilized by wildlife during the rainy season. Three of these culverts are located north of Sonoma Lane and south Magnolia Trace, while the fourth is located north of Magnolia Trace. One of these culverts should be upgraded to meet the FFWCC wildlife crossing standards (see Figure 13-1).

Table 13-12
Cypress Creek Watershed Lakes
Florida Lakewatch Data

County	Lake	Year	TP (µg/L)	TN (µg/L)	CHL A (µg/L)	SECCHI (ft)
Hillsborough	Burrell	97	**14.19**	**627.31**	**4.26**	**6.60**
Hillsborough	Burrell	98	**21.94**	**580.28**	**14.00**	**5.77**
Hillsborough	Burrell	99	**14.56**	**522.78**	**5.03**	**6.24**
Hillsborough	Combustion	98	**26.94**	**860.28**	**18.53**	**6.01**
Hillsborough	Commston	97	**32.33**	**1011.67**	**9.67**	**5.33**
Pasco	Floyd	90	**11.67**	**874.17**	**2.50**	**8.08**
Pasco	Floyd	91	**12.95**	**791.82**	**3.61**	**6.95**
Pasco	Floyd	92	**14.41**	**805.88**	**3.26**	**6.68**
Pasco	Floyd	93	**11.40**	**884.00**	**4.31**	**8.18**
Pasco	Floyd	94	**12**	**1050**	**3.75**	
Hillsborough	Flynn	99	**9.97**	**725.14**	**4.56**	**5.23**
Hillsborough	Hanna	96	**26.33**	**810.00**	**9.00**	**4.93**
Hillsborough	Hanna	97	**36.32**	**1164.71**	**28.64**	**3.36**
Hillsborough	Hanna	98	**35.8**	**732**	**9**	**4.7**
Hillsborough	Hanna	99	**15.91**	**736.86**	**10.26**	**4.25**
Hillsborough	Hog Island	96	**26.22**	**1082.22**	**10.00**	**6.00**
Hillsborough	Hog Island	97	**35.67**	**996.67**	**17.00**	**5.33**
Hillsborough	Hog Island	99	**28.00**	**993.33**	**11.33**	**5.50**
Hillsborough	Keene	91	**54.18**	**1465.88**	**19.17**	**3.47**
Hillsborough	Keene	92	**36.23**	**1149.67**	**12.33**	**5.10**
Hillsborough	Keene	94	**27.33**	**1193.33**	**20.00**	**3.50**
Hillsborough	Keene	95	**38.27**	**1546.36**	**36.82**	**2.52**
Hillsborough	Keene	96	**40.86**	**1184.76**	**37.52**	**2.97**
Hillsborough	Keene	97	**35.33**	**1185.33**	**21.67**	**2.62**
Hillsborough	Keene	98	**36.22**	**1073.33**	**13.86**	**3.40**
Hillsborough	Keene	99	**33.78**	**1084.44**	**19.56**	**2.61**
Hillsborough	Kell	97	**25.42**	**771.67**	**12.33**	**6.32**
Hillsborough	Kell	98	**27.85**	**735.56**	**15.04**	**6.39**
Hillsborough	Kell	99	**23.18**	**852.12**	**15.64**	**4.94**
Hillsborough	Stemper	96	**31.67**	**1143.33**	**24.33**	**3.50**
Hillsborough	Stemper	97	**25.21**	**1109.74**	**13.95**	**3.82**
Hillsborough	Stemper	98	**20.72**	**847.50**	**10.25**	**3.98**
Hillsborough	Stemper	99	**19.97**	**934.00**	**11.23**	**3.89**

TP (µg/L) = Long-term total phosphorous concentration
TN (µg/L) = Long-term total nitrogen concentration
CHL (µg/L) = Long-term total chlorophyll concentration
SECCHI = Long-term Secchi depth (ft)- Clarity

CHAPTER FOURTEEN Public Input (Meeting 2)

14.1 OVERVIEW

The Public Input Meeting number 2 was held on June 1, 2000, from 6:30 p.m. to 8:30 p.m. at the Lutz Community Center in Lutz, Florida. The purpose of the meeting was to solicit comments from the public on proposed alternative improvements to existing flooding or water quality problems within their area. The public meeting was advertised by Hillsborough County in the local newspaper and homeowners groups within the watershed were informed of the meeting. A total of 26 people signed the attendance sheets, but it was estimated that 35-40 people were in attendance. The public meeting was conducted in an informal format with a short presentation of the project and project alternatives and included project representatives to answer questions and receive comments. Aerial photographs and other project graphics were on display. Each attendee was given a handout which contained specific information about the project such as the project description, public meeting description, improvement alternatives listing, project contact and website list, project schedule and public comment sheet. A copy of the handout and attendees list is included in Appendix I.

14.2 COMMENTS RECEIVED

Six written comments were received at the Public Meeting and one E-mail comment was received. The written comments and verbal comments received at the Public Meeting dealt with: flooding conditions experienced during El Nino, water supply and groundwater quality issues, flooding conditions at Hog Island Lake, flooding conditions at Sinclair Hills Road, Lake Levels on Lake Stemper and development and growth issues. According to the verbal comments, the majority of the attendees were favorable of the proposed improvement alternatives and that the Watershed Study be implemented by the County. A copy of the comments received is included in Appendix I.

CHAPTER FIFTEEN Preferred Alternatives and Level of Service

15.1 PREFERRED ALTERNATIVES ANALYSIS

This section ranks the possible solutions and improvements that were described in Chapter 13. The various alternative evaluations were conducted to produce a list of recommendations for the watershed management plan.

The following factors were considered in the development of the flood control, water quality and natural system recommendations.

Flood Control: Alternatives impact on reducing flooding conditions and improving the Flood Level of Service (LOS).

Water Quality: Alternatives impact on improving water quality and reducing pollutant loadings. Pollutant load reductions could be accomplished either through a structural stormwater BMP or by non-structural BMP's.

Operation/Maintenance Requirements: Alternatives impact on operation and maintenance requirements.

Easement / Right-of Way Requirements: Alternatives requirement for additional easement or right-of-way acquisition.

Recreational Benefits: Alternatives availability to provide recreational benefits.

Regulatory Constraints: Alternatives degree of difficulty in obtaining regulatory permits for construction.

Water Supply Benefits: Alternatives ability to provide water supply benefits through groundwater recharge or reuse.

Natural Systems Enhancement: Potential of alternative for improving (through restoration) or preservation of natural systems.

15.1.1 ALTERNATIVES ANALYSIS DECISION MATRIX

An alternatives analysis decision matrix was developed to rank the alternatives based on the above factors. Scores for each alternative was based on hydraulic model results, water quality data, site-specific field data, and engineering judgement. The alternatives analysis decision matrix is shown in Table 15-1. Schematic Plans for the flood control alternatives (Alternatives 1-10) are included in Appendix J. The criteria for scoring the alternatives were as follows:

Flood Control
+3 = significant reduction in flooding on Public roads. No flooding for design event.

Table 15-1
Cypress Creek Watershed Management Plan
Alternatives Analysis Decision Matrix

Alternative No.	Project Description	Flood Protection Improvement	Level of Service (LOS) Benefit	Water Quality Benefits	Operation/Maint. Requirements	Easement/ROW Requirements	Recreational Benefits	Regulatory Constraints	Water Supply Benefits	Natural System Enhancement	Overall Score
1-1	Cleanup 149th Street ditch between Livingston Ave. and 149th Street outfall detention basin. Cleanup Lake Forest ditch from B.B. Downs Blvd. to Lake Forest Dr. Increase weir width at 149th Street detention pond from 79 feet to 150 feet. Construct new weir structure north of Lake Forest Ave. pond.	3	1	2	1	0	1	2	0	-1	9
1-2	Increase size of culvert connection between the 149th St. pond and Lake Forest pond.	2	1	2	0	0	0	3	0	0	8
2	See CIP 47005, CIP 47251 and CIP 47014	1	1	1	0	0	0	2	0	0	5
3	Construct new storm sewer system from 18th Street/143rd Ave. to existing storm sewer along 143rd Ave. Upgrade existing storm sewer system on 143rd Ave. from 20th Street to existing ditch east of 22nd Street. Upgrade ditch from east of 22nd Street to B.B. Downs Blvd. Upgrade existing pipes which cross from west to east and then from south to north under B.B. Downs Blvd.	3	1	0	0	0	0	1	0	-1	4
4	See CIP 47137 and CIP 47251	2	1	1	0	0	0	2	0	0	6
5-1	Improve Flynn Lake outfall to two existing cross drains (STR-3 and STR-6) at Livingston Ave. Construct ditch from Flynn Lake to these two cross drains. Upgrade cross drains sizes at STR-3 and STR-6 at Livingston Ave. Improve outfall from the cross drains to Cypress Creek.	3	1	-1	-1	-1	1	1	0	-1	2
5-2	Construct ditches or pipes from Flynn Lake southward to Sinclair Hills Road, then connect to 24th Street project (CIP 47005). D57	3	1	-1	-1	-1	1	1	0	-1	2
6-1	Improve ditch to connect from Blind Pond sub-division to Clement Road roadside ditch. Construct ditch to connect to existing cross drain at Livingston Ave. (STR-15).	3	2	0	0	-1	0	2	0	0	6
6-2	Construct a pipe along Blind Pond Ave. to Livingston Ave. Construct a new cross drain under Livngston Ave. to Cypress Creek.	3	2	-1	0	-1	0	2	0	0	5
7	Regrade existing ditch at northside of the basin. Construct roadside ditch along Wein Range Lane. Connect the roadside ditch of Wein Range Lane to north swale through existing low area. Replace crushed pipe at Livingston Ave. (STR-19)	3	1	0	1	0	0	2	0	-1	6
8	Construct roadside ditch from the intersection of Newburger Road and Livingston Ave. to connect to the existing cross drain (STR-38). Increase culvert size of STR	3	1	0	0	0	0	2	0	0	6

8	Construct roadside ditch from the intersection of Newburger Road and Livingston Ave. to connect to the existing cross drain (STR-38). Increase culvert size of STR	3	1	0	0	0	0	2	0	0	6
9	Construct a positive outfall from Newburger Road to the pond/wetland in Rhodes Wood Acre subdivision. Install a 30-inch cross drain, two ditch bottom inlets, and pipes at Newburger Road. Convey stormwater to wetland south of Newburger Road.	3	1	-1	0	-1	0	1	0	-1	2
10-1	Construct 400 feet of force main from Hog Island Lake west to Lake Kell. Use portable pump unit to release extra water to Lake Kell. Upgrade the existing culvert at County Line Road at Basin 541140.	2	1	0	-1	0	0	2	0	0	4
10-2	Improve Hog Island Lake outflow through Willow Bend Subdivision culverts.	2	1	0	-1	-1	0	2	0	0	3
11	Slow eutrophication process in basin lakes by reducing nitrogen and phosphorus loading through point source location and public education. Remove invasive species located in and around edges of lakes (e.g. primrose willow, cattail, melaleucha, torpedo grass).	0	0	2	-2	-1	1	0	0	2	2
12	Restore upland pasture/shrub and brushland areas located west of I-275, if being acquired. Provide invasive species removal and native species plantings.	0	0	0	-2	-1	0	0	1	3	1
13	Create/enhance littoral shelf areas in borrow pit areas located near I-275 and I-75 to provide water quality treatment and wildlife habitat.	0	0	2	-2	-1	0	0	0	3	2
14	Remove invasive species located throughout Cypress Creek Basin in ditches and along right-of-ways (e.g. cogongrass along right-of-ways, skunkvine and air potato in ditches). Continue public education on the importance of controlling invasive species in yards.	0	0	0	-2	-1	0	0	0	3	0
15	Cypress Creek greenway has the potential to be enhanced through retrofitting culverts or creating wildlife crossing that will accommodate small mammals, reptiles and amphibians.	0	0	0	-1	-1	0	0	0	2	0
16	Utilize grassed swales or detention areas where feasible, for water quality treatment for proposed CIP projects.	0	0	2	-1	0	0	0	1	0	2
17	Create wet detention area to provide water quality treatment of areas within the Thirteen Mile Run basins upstream of Vandervort Road.	0	0	2	-2	-3	0	0	1	1	-1
18	Create wet detention area to provide water quality treatment of areas within the Blind Pond Basin east of Livingston Avenue.	0	0	2	-2	-3	0	0	1	1	-1
19	Coordinate with Pasco County to improve water quality from areas coming into Hillsborough County from Pasco County and the City of Tampa.	0	0	2	0	0	0	0	1	0	3

20	Regrade, stabilize and vegetate the channel banks and keep cattle out of the channel by fencing. Construct energy dissipators or riprap to reduce velocities from Livingston Avenue culverts.	0	0	2	-1	-3	0	1	0	3	2
Note: -3 - Highest Negative Impact											
0 - No Impact											
3 - Highest Positive Impact											

+2 = moderate reduction in flooding on public roads. Roadway overtops less than 3 inches during the design event.
+1 = small reduction in flooding. Roadway overtops more than 3 inches but less than existing conditions.
0 = no change in roadway overtopping.

Level of Service
+3 = significant change in level of service expected
+2 = moderate change in level of service expected
+1 = small change in level of service expected
0 = no change in level of service expected

Water Quality
+3 = significant reduction in pollutant expected
+2 = moderate reduction in pollutants expected
+1 = small reduction in pollutants expected
0 = no reduction in pollutants expected
-1 = small increase in pollutants expected
-2 = moderate increase in pollutants expected
-3 = significant increase in pollutants expected

Natural Systems
+3 = significant protection/preservation/restoration of natural systems expected
+2 = moderate protection/preservation/restoration of natural systems expected
+1 = small protection/preservation/restoration of natural systems expected
0 = no reduction in protection/preservation/restoration of natural systems expected
-1 = small impact to protection/preservation/restoration of natural systems expected
-2 = moderate impact to protection/preservation/restoration of natural systems expected
-3 = significant impact to protection/preservation/restoration of natural systems expected

Operation and Maintenance Requirements
+3 = operation and maintenance will be significantly less than existing conditions
+2 = operation and maintenance will be moderately less than existing conditions
+1 = operation and maintenance will be slightly less than existing conditions
0 = no change in operation and maintenance from existing conditions
-1 = operation and maintenance will be slightly higher than existing conditions
-2 = operation and maintenance will be moderately higher than existing conditions
-3 = operation and maintenance will be significantly higher than existing conditions

Easement/ Right-of Way Requirements
0 = no change in easement/ right-of way requirements
-1 = small increase in easement/ right-of way requirements expected
-2 = moderate increase in easement/ right-of way requirements expected

-3 = significant increase in easement/ right-of way requirements expected

Recreational Benefits
+3 = significant increase in recreational benefits expected
+2 = moderate increase in recreational benefits expected
+1 = small increase in recreational benefits expected
0 = no change in recreational benefits expected

Regulatory Constraints
+3 = permitting is anticipated to be highly feasible
+2 = permitting is anticipated to be moderately feasible
+1 = permitting is anticipated to be somewhat feasible
0 = no change in ability to obtain permits

Water Supply Benefits
+3 = significant potential for groundwater recharge or reuse expected
+2 = moderate potential for groundwater recharge or reuse expected
+1 = small potential for groundwater recharge or reuse expected
0 = no reduction in potential for groundwater recharge or reuse expected
-1 = small impact to potential for groundwater recharge or reuse expected
-2 = moderate impact to potential for groundwater recharge or reuse expected
-3 = significant impact to potential for groundwater recharge or reuse expected

15.1.2 PREFERRED ALTERNATIVES

Based on the alternatives analysis decision matrix scoring, the preferred alternatives based on the highest scores would be as follows:

Alternative No.	Project Description
1-1	Cleanup 149th Street ditch between Livingston Ave. and 149th Street outfall detention basin. Cleanup Lake Forest ditch from B.B. Downs Blvd. to Lake Forest Dr. Increase weir width at 149th Street detention pond from 79 feet to 150 feet. Construct new weir structure north of Lake Forest Ave. pond.
1-2	Increase size of culvert connection between the 149th St. pond and Lake Forest pond.
4	See CIP 47137 and CIP 47251
6-1	Improve ditch to connect from Blind Pond sub-division to Clement Road roadside ditch. Construct ditch to connect to existing cross drain at Livingston Ave. (STR-15).
7	Regrade existing ditch at northside of the basin. Construct roadside ditch along Wein Range Lane. Connect the roadside ditch of Wein Range Lane to north swale through existing low area. Replace crushed pipe at Livingston Ave. (STR-19)
8	Construct roadside ditch from the intersection of Newburger Road and Livingston Ave. to connect to the existing cross drain (STR-38). Increase culvert size of STR
2	See CIP 47005, CIP 47251 and CIP 47014

6-2	Construct a pipe along Blind Pond Ave. to Livingston Ave. Construct a new cross drain under Livingston Ave. to Cypress Creek.
3	Construct new storm sewer system from 18th Street/143rd Ave. to existing storm sewer along 143rd Ave. Upgrade existing storm sewer system on 143rd Ave. from 20th Street to existing ditch east of 22nd Street. Upgrade ditch from east of 22nd Street to B.B. Downs Blvd. Upgrade existing pipes which cross from west to east and then from south to north under B.B. Downs Blvd.
19	Coordinate with Pasco County to improve water quality from areas coming into Hillsborough County from Pasco County and the City of Tampa.
5-1	Improve Flynn Lake outfall to two existing cross drains (STR-3 and STR-6) at Livingston Ave. Construct ditch from Flynn Lake to these two cross drains. Upgrade cross drains sizes at STR-3 and STR-6 at Livingston Ave. Improve outfall from the cross drains to Cypress Creek.
5-2	Construct ditches or pipes from Flynn Lake southward to Sinclair Hills Road, then connect to 24th Street project (CIP 47005). D57
9	Construct a positive outfall from Newburger Road to the pond/wetland in Rhodes Wood Acre subdivision. Install a 30-inch cross drain, two ditch bottom inlets, and pipes at Newburger Road. Convey stormwater to wetland south of Newburger Road.
11	Slow eutrophication process in basin lakes by reducing nitrogen and phosphorus loading through point source location and public education. Remove invasive species located in and around edges of lakes (e.g. primrose willow, cattail, melaleucha, torpedo grass).
13	Create/enhance littoral shelf areas in borrow pit areas located near I-275 and I-75 to provide water quality treatment and wildlife habitat.
16	Utilize grassed swales or detention areas where feasible, for water quality treatment for proposed CIP projects.
20	Regrade, stabilize and vegetate the channel banks and keep cattle out of the channel by fencing. Construct energy dissipators or riprap to reduce velocities from Livingston Avenue culverts.
10-1	Construct 400 feet of force main from Hog Island Lake west to Lake Kell. Use portable pump unit to release extra water to Lake Kell. Upgrade the existing culvert at County Line Road at Basin 541140.
12	Restore upland pasture/shrub and brushland areas located west of I-275, if being acquired. Provide invasive species removal and native species plantings.
14	Remove invasive species located throughout Cypress Creek Basin in ditches and along right-of-ways (e.g. cogongrass along right-of-ways, skunkvine and air potato in ditches). Continue public education on the importance of controlling invasive species in yards.
15	Cypress Creek greenway has the potential to be enhanced through retrofitting culverts or creating wildlife crossing that will accommodate small mammals, reptiles and amphibians.
17	Create wet detention area to provide water quality treatment of areas within the Thirteen Mile Run basins upstream of Vandervort Road.
18	Create wet detention area to provide water quality treatment of areas within the Blind Pond Basin east of Livingston Avenue.
10-2	Improve Hog Island Lake outflow through Willow Bend Subdivision culverts.

15.2 PROPOSED FLOOD CONTROL LEVEL OF SERVICE

The recommended alternatives described in Chapter 13 were evaluated for the improvements to the flood control level of service (LOS). The flood control level of service is described in Chapter 6. As defined in the Hillsborough County Comprehensive Plan, Stormwater Management Element, one of the goals of this study is to achieve an ultimate flood protection LOS for the Cypress Creek Watershed of LOS B (25-year/ 24-hour storm event). Although this is the ultimate goal of the Cypress Creek Watershed Management Plan, certain limitations have to be taken into consideration. For example, not all subdivisions and facilities discharging into the major conveyance systems have adequate stormwater management or conveyance systems. Also, both physical and environmental constraints affect the proposed channel alterations. This limits the recommendations and thus limits the flood protection LOS achieved with the implementation of the proposed improvements.

The proposed flood control level of service (LOS) for the Cypress Creek Watershed is shown in Table 15-1A. The level of service with the proposed improvements is LOS A for the watershed 25-year / 24- hour storm event.

15.3 PROPOSED WATER QUALITY LEVEL OF SERVICE

15.3.1 Overview

The proposed condition water quality level of service (LOS) is determined by calculating the proposed water quality pollutant loading and comparing with the benchmark single family residential (SFR) loading as was done for the existing condition using the Pollutant Load Reduction Model (PLRM) discussed in Chapter 11. The LOS is evaluated for the proposed condition water quality improvement alternatives described in Chapter 13. The alternatives include modifying the existing ponds with a littoral zone and the addition of grassy ditches and improving existing ditches infested with sedimentation, erosion and vegetation. The effect of wet detention ponds on water quality is quantified using the PLRM but the effects on water quality of adding swales or ditch improvement is difficult to quantify because of the limited extent of swales. However the swale effect is quantified to some extent by assuming certain amount of swale. The pollutant loads and LOS are determined for those subbasins whose runoff will be treated in the proposed conditions.

15.3.2 Summary of Proposed Conditions

The proposed condition water quality improvement alternatives are discussed in detail in Chapter 13. The alternatives can be broadly classified into four categories:

1. Regional Wet Detention Ponds and swales
2. Potential Water Quality Treatment in CIP Projects
3. Erosion Control Projects

Table 15-1A PROPOSED CONDITIONS LEVEL OF SERVICE - 9/2/00

Cypress Creek Area (Existing Conditions) Level of Service Analysis											Flood Level Designations						
		Landmark Elev's			Water Surface Elev's												
Story Board	Basin	Site	Struct	Road	2.33yr	5yr	10 yr	25yr	50yr	100yr	2.33yr	5yr	10yr	25yr	50yr	100yr	Predicted Flood Locations (road / site / structure)
MAIN CHANNEL																	LOS 25 yr/24 hr A
	500000	36.40	37.40	37.40	30.80	31.80	32.50	33.20	33.60	34.00	A	A	A	A	A	A	
	500100	36.40	37.40	37.40	30.93	31.94	32.73	33.51	34.16	34.72	A	A	A	A	A	A	
	500200	36.50	37.50	37.50	30.97	31.98	32.79	33.59	34.27	34.84	A	A	A	A	A	A	
	500300	41.00	42.00	42.00	30.99	32.00	32.82	33.62	34.31	34.88	A	A	A	A	A	A	
	500400	39.50	40.50	40.50	34.60	34.94	35.33	35.66	36.03	36.30	A	A	A	A	A	A	
	500700	40.00	41.00	41.00	36.77	37.22	37.67	38.11	38.59	38.87	A	A	A	A	A	A	
	500800	42.50	43.50	43.50	36.81	37.27	37.74	38.20	38.70	38.99	A	A	A	A	A	A	
	500900	43.50	44.50	44.50	37.29	37.55	37.85	38.31	38.80	39.10	A	A	A	A	A	A	
	501000	43.30	44.30	44.30	38.40	38.75	39.10	39.42	39.83	40.06	A	A	A	A	A	A	
	501900	47.00	48.00	48.00	41.04	41.46	41.90	42.22	42.57	42.79	A	A	A	A	A	A	
USF Area - B.B. Downs System																	LOS 25 yr/24 hr B
	510200	43.70	47.00	45.50	38.69	39.02	39.49	39.78	40.46	40.72	A	A	A	A	A	A	
	510250	45.00	46.00	44.10	39.00	39.02	39.49	39.78	40.47	40.73	A	A	A	A	A	A	
	510260	45.10	46.10	44.70	41.03	41.34	41.78	42.08	42.70	42.95	A	A	A	A	A	A	
	510300	38.00	39.00	41.80	35.16	36.06	37.13	37.73	39.02	39.48	A	A	A	A	A	A	
	510400	44.30	45.30	43.00	38.90	39.21	39.67	39.96	40.64	40.90	A	A	A	B	B	B	W. of BB Downs and S. of 143rd Ave.
	510450	43.10	44.10	41.00	39.86	40.09	40.40	40.59	41.21	41.43	A	A	A	A	B	B	E. of 22nd St and S. of 143rd Ave.
	510460	44.80	45.80	44.30	40.67	40.77	40.92	41.00	41.25	41.46	A	A	A	A	A	A	
	510600	45.00	46.00	43.30	42.54	42.79	43.04	43.18	43.47	43.58	A	A	A	A	B	B	
149TH STREET OUTFALL																	LOS 25 yr/25 hr C
	510050	45.10	46.10	45.80	33.10	33.30	33.60	33.80	34.19	34.77	A	A	A	A	A	A	
	510100	45.00	46.00	43.40	34.52	34.64	34.85	35.00	35.34	35.45	A	A	A	A	A	A	
	510150	45.10	46.10	43.10	34.53	34.66	34.99	35.30	36.37	36.80	A	A	A	A	A	A	
	510540	45.50	46.50	45.30	41.19	42.19	44.21	45.68	47.02	47.32	A	A	A	C	D	D	148th Ave. near Bearss Ave.
	510700	47.70	48.70	47.00	45.95	46.17	46.34	46.43	46.66	46.75	A	A	A	A	A	A	
	510800	45.00	46.00	45.80	39.98	40.61	41.40	41.95	43.01	43.29	A	A	A	A	A	A	
	510930	47.20	48.20	47.50	42.89	43.21	43.83	44.22	45.09	45.36	A	A	A	A	A	A	
	511000	52.50	53.50	52.19	43.99	44.32	44.59	44.76	45.23	45.48	A	A	A	A	A	A	
	511200	49.00	50.00	48.00	46.43	47.40	48.25	48.90	50.34	50.83	A	A	B	B	D	D	N. 12th St. and 149th Ave.
	511300	53.00	54.00	52.40	49.02	49.25	49.59	49.81	50.51	50.85	A	A	A	A	A	A	
	511600	48.00	49.00	47.40	44.33	44.44	44.58	44.66	44.85	44.92	A	A	A	A	A	A	
	511650	48.00	49.00	47.40	45.00	45.00	45.00	45.00	45.00	45.00	A	A	A	A	A	A	
SILVER LAKE																	LOS 25 yr/24 hr A

Cypress Creek Area (Existing Conditions) Level of Service Analysis											Flood Level Designations						
Story		Landmark Elev's			Water Surface Elev's												
Board	Basin	Site	Struct	Road	2.33yr	5yr	10 yr	25yr	50yr	100yr	2.33yr	5yr	10yr	25yr	50yr	100yr	Predicted Flood Locations (road / site / structure)
	511400	48.00	49.00	48.60	41.75	42.23	43.04	43.60	44.93	45.44	A	A	A	A	A	A	
	511500	48.00	49.00	48.60	46.32	46.62	47.05	47.33	47.93	48.18	A	A	A	A	A	C	Silver Lake Apts.
FLYNN LAKE																	LOS 25 yr/24 hr B
	520100	49.00	50.00	47.30	46.00	46.07	46.53	46.87	47.71	48.06	A	A	A	A	B	B	
	520200	52.00	53.00	53.70	46.17	46.36	46.68	46.95	47.74	48.09	A	A	A	A	A	A	
	520300	52.10	53.10	52.10	45.85	46.09	46.46	46.70	47.31	47.55	A	A	A	A	A	A	
	520400	54.00	55.00	53.10	51.23	51.61	52.18	52.56	53.38	53.58	A	A	A	A	B	B	September Dr.
	520600	54.20	55.20	53.10	50.35	50.53	50.78	50.97	52.07	52.52	A	A	A	A	A	A	
	520700	57.80	58.80	57.50	54.09	54.50	55.08	55.24	55.58	55.74	A	A	A	A	A	A	
THIRTEEN MILE RUN																	LOS 25 yr/24 hr A
	520750	45.50	46.50	42.50	34.35	34.35	34.35	34.35	34.80	35.28	A	A	A	A	A	A	
	520800	50.10	51.10	48.20	41.00	41.00	41.00	41.00	41.15	41.40	A	A	A	A	A	A	
	520900	52.10	53.10	49.50	47.17	47.65	48.30	48.69	49.58	49.89	A	A	A	A	B	B	
	521000	58.00	59.00	56.00	50.89	51.13	51.50	51.73	52.27	52.46	A	A	A	A	A	A	
	521100	58.50	59.50	57.30	52.90	53.41	54.15	54.62	55.83	56.33	A	A	A	A	A	A	
	521200	59.70	60.70	58.00	55.76	55.97	56.25	56.43	56.85	57.00	A	A	A	A	A	A	
	521300	61.20	62.20	60.10	54.69	55.21	55.84	56.16	56.65	56.80	A	A	A	A	A	A	
	521400	59.70	60.70	59.50	55.20	55.59	56.18	56.57	57.52	57.89	A	A	A	A	A	A	
	521500	59.50	60.50	59.10	55.17	55.50	56.01	56.35	57.19	57.54	A	A	A	A	A	A	
	521600	60.90	61.90	60.20	57.37	57.60	57.90	58.08	58.47	58.60	A	A	A	A	A	A	
	521700	61.80	62.80	61.70	58.20	58.44	58.83	59.09	59.70	59.93	A	A	A	A	A	A	
	521800	64.50	65.50	63.20	59.33	59.51	59.77	59.93	60.32	60.48	A	A	A	A	A	A	
	521900	63.80	64.80	64.40	60.79	61.00	61.31	61.52	62.03	62.23	A	A	A	A	A	A	
	522000	67.50	68.50	63.50	60.96	61.25	61.68	61.93	62.52	62.73	A	A	A	A	A	A	
	522100	64.70	65.70	65.20	61.78	62.10	62.53	62.79	63.24	63.33	A	A	A	A	A	A	
	522200	55.00	56.00	42.90	34.76	35.10	35.45	35.64	36.03	36.26	A	A	A	A	A	A	
	522300	55.30	56.30	55.20	51.30	51.72	52.31	52.69	53.57	53.90	A	A	A	A	A	A	
BLIND POND																	LOS 25 yr/24 hr C
	530100	57.10	58.10	56.50	52.83	53.27	53.82	54.14	54.86	55.11	A	A	A	A	A	A	
	530150	60.10	61.10	59.20	56.84	57.23	57.91	58.38	59.54	59.95	A	A	A	A	B	B	
	530200	56.20	57.20	56.40	55.20	55.38	55.63	55.78	56.13	56.26	A	A	A	A	A	C	Live Oaks Sub., Clement Road
	530300	59.20	60.20	59.00	56.57	57.07	57.57	57.76	57.89	57.89	A	A	A	A	A	A	Hanna & Green Meadows Dr. Heather Manor, Regalwood
	530500	57.70	58.70	57.80	56.58	56.71	56.88	56.98	57.41	57.70	A	A	A	A	A	A	Livingston Ave., N. of Clement Road
HANNA LAKE																	LOS 25 yr/24 hr C
	540050				52.65	53.30	54.17	54.84	56.52	57.01							
	540100	57.40	58.40	56.70	55.10	55.64	56.27	56.62	57.35	57.66	A	A	A	A	B	C	E. of Oak and Windermere

Cypress Creek Area (Existing Conditions) Level of Service Analysis											Flood Level Designations						
		Landmark Elev's			Water Surface Elev's												
Story Board	Basin	Site	Struct	Road	2.33yr	5yr	10 yr	25yr	50yr	100yr	2.33yr	5yr	10yr	25yr	50yr	100yr	Predicted Flood Locations (road / site / structure)
	540200	61.20	62.20	60.30	58.18	58.59	59.01	59.17	59.62	59.78	A	A	A	A	A	A	
	540300	60.10	61.10	58.50	52.40	53.12	54.20	54.93	56.30	56.87	A	A	A	A	A	A	
	540400	61.80	62.80	64.50	58.00	58.32	58.78	59.09	59.31	60.08	A	A	A	A	A	A	
	540450	68.20	69.20	64.10	62.15	62.65	63.29	63.52	63.87	64.04	A	A	A	A	A	A	
	540500	63.20	64.20	64.50	59.85	60.16	60.52	60.72	61.35	61.69	A	A	A	A	A	A	
	540600	64.70	65.70	64.40	60.97	61.24	61.55	61.71	62.13	62.31	A	A	A	A	A	A	
	540700	65.50	66.50	65.10	64.65	64.84	65.12	65.27	65.56	65.68	A	A	B	B	C	C	W. of Swamp Lake
	540800	64.80	65.80	65.00	61.69	62.03	62.48	62.77	63.43	63.66	A	A	A	A	A	A	
	540900	69.00	70.00	68.50	66.51	66.93	67.51	67.85	68.68	68.98	A	A	A	A	B	B	
	541000	68.00	69.00	69.90	65.77	66.21	66.84	67.24	68.13	68.43	A	A	A	A	C	C	Lutz Lake Area
	541100	69.20	70.00	68.40	64.87	65.12	65.46	65.67	66.09	66.26	A	A	A	A	A	A	
	541140	69.00	70.00	68.00	67.15	67.24	67.39	67.53	67.91	68.06	A	A	A	A	A	B	Fernandez Property
	541150	70.00	71.00	69.00	65.34	65.68	66.15	66.45	67.17	67.45	A	A	A	A	A	A	
	541200	69.90	70.90	69.40	64.32	64.70	65.28	65.65	66.57	66.92	A	A	A	A	A	A	
	541300	72.20	73.20	72.20	69.97	70.10	70.28	70.39	70.65	70.74	A	A	A	A	A	A	
SHERRY'S BROOKE																	LOS 25 yr/24 hr A
	542010	56.90	57.90	57.60	46.90	47.23	47.58	47.74	48.04	48.13	A	A	A	A	A	A	
	542020	58.00	59.00	57.60	53.94	54.50	55.29	55.72	56.60	56.91	A	A	A	A	A	A	
	542030	60.60	61.60	60.10	56.04	56.31	56.71	56.98	57.86	58.33	A	A	A	A	A	A	
	542040	62.40	63.40	63.20	59.04	59.34	59.78	60.07	60.74	60.99	A	A	A	A	A	A	
	542050	65.30	66.30	64.50	62.25	62.76	63.46	63.89	64.87	65.15	A	A	A	A	B	B	
	542060	62.90	63.90	62.50	60.11	60.39	60.81	61.07	61.65	61.87	A	A	A	A	A	A	
	542070	65.40	66.40	66.00	61.13	61.28	61.49	61.61	61.89	61.98	A	A	A	A	A	A	
	542080	64.90	65.90	64.00	61.54	61.93	62.36	62.67	63.24	63.42	A	A	A	A	A	A	
	542090	66.10	67.10	64.40	61.35	61.65	62.22	62.53	63.24	63.42	A	A	A	A	A	A	
	542100	66.30	67.30	65.80	64.03	64.30	64.70	64.96	65.62	65.87	A	A	A	A	A	A	
	542110	58.70	59.70	58.10	56.19	56.48	56.86	57.09	57.68	57.91	A	A	A	A	A	A	
RIDGE LAKE																	LOS 25 yr/24 hr A
	542115				66.56	66.56	66.56	66.56	66.56	66.59							
	542120	59.80	60.80	60.20	48.50	49.38	50.82	51.81	54.29	54.85	A	A	A	A	A	A	
	542130	61.20	62.20	61.70	57.08	57.41	57.89	58.19	58.87	59.12	A	A	A	A	A	A	
	542140	65.20	66.20	65.00	61.00	61.27	61.65	61.89	62.46	62.67	A	A	A	A	A	A	
	542150	66.60	67.60	66.20	60.94	61.22	61.68	61.99	62.79	63.10	A	A	A	A	A	A	
	542160	62.40	63.40	61.90	58.79	59.32	59.98	60.36	61.16	61.44	A	A	A	A	A	A	
	542170	63.50	64.50	61.90	59.19	59.83	60.67	61.13	62.08	62.37	A	A	A	A	B	B	
COUNTY LINE ROAD																	LOS 25 yr/24 hr A
	542180	63.60	64.60	63.10	60.00	60.00	60.00	60.00	60.41	60.59	A	A	A	A	A	A	

Cypress Creek Area (Existing Conditions) Level of Service Analysis											Flood Level Designations						
		Landmark Elev's			Water Surface Elev's												
Story Board	Basin	Site	Struct	Road	2.33yr	5yr	10 yr	25yr	50yr	100yr	2.33yr	5yr	10yr	25yr	50yr	100yr	Predicted Flood Locations (road / site / structure)
	542190	65.80	66.80	65.30	62.09	62.28	62.95	62.78	63.26	63.45	A	A	A	A	A	A	
	542200	65.00	66.00	64.50	61.28	61.65	61.88	62.07	62.54	62.70	A	A	A	A	A	A	
	542210	67.00	68.00	66.50	60.00	60.00	60.00	60.00	60.00	60.00	A	A	A	A	A	A	
	542220	65.20	66.20	64.40	63.55	63.71	63.93	64.06	64.38	64.50	A	A	A	A	A	A	
WILLOW BEND (Pasco County)																	LOS 25 yr/24 hr C
	542230	66.20	67.20	66.50	65.71	65.71	65.71	65.71	65.74	65.95	B	B	B	B	B	B	Panther Path Road
	542240	66.60	67.60	66.90	65.54	65.73	66.01	66.17	66.57	66.72	A	A	A	A	C	C	S. of Newberger
	542250	68.00	69.00	67.50	67.00	67.03	67.15	67.23	67.44	67.52	A	A	A	A	A	A	
	542260	67.50	68.50	67.30	67.15	67.24	67.39	67.50	67.76	67.86	A	A	B	B	C	C	Hog Island Lake
	542270	69.70	70.70	69.40	67.74	67.95	68.25	68.45	68.94	69.13	A	A	A	A	A	A	Cool Kell Lake

NOTE : A - NO FLOODING
B - ROAD FLOODING
C - SITE FLOODING
D - STRUCTURE FLOODING
E - NO FACILITY
F - SECONDARY SYSTEM

NOTE : Only Primary Junctions within each Basin are shown

4. Projects Requiring coordination with City of Tampa, Pasco County, Hillsborough County and SWFWMD

The effect of a wet detention pond on water quality can be analyzed assuming the pond will treat the first 1" of runoff. Analysis of the effect of swale is however difficult because the proposed swale serves primarily flood control and provide much less than 1" of runoff treatment. Therefore, an approximation is made on the extent of swale to quantitatively evaluate the effect of the swale.

The alternative projects of the second, third, and fourth categories above are difficult to quantify now because they are yet to be determined. Limitation may exist to incorporate water quality treatment in the CIP projects because typically CIP projects provide flood control with storm sewer construction. Erosion control projects, if constructed in accordance with the requirements of the existing County and SWFWMD/FDEP regulations coupled with NPDES Construction Stormwater Discharge permits can be effective in improving water quality. Projects that require coordination with the entities mentioned above will require extensive planning. For these reasons, the effects of water quality improvements under these categories are difficult to analyze at this time. However, a certain amount of swale treatment is assumed under these categories, which is added to the swale under the proposed condition. Even then, the amount of swale available will be small in comparison with what is required for 1" of runoff treatment.

15.3.3 Wet Detention Ponds

Regional wet detention ponds with littoral zone capable of serving several subbasins can be effective in water quality improvement and are analyzed quantitatively. For the Cypress Creek Watershed, three alternatives of wet detention ponds with littoral zones are proposed. These include:

- 149th Street Outfall Pond
- Vandervort Area (or Thirteen Mile Run) Pond
- Blind Pond Avenue Pond

These ponds respectively drain 16, 8 and 4 subbasins. For simplicity, the ponds will be assumed to be located at the downstream end of the downstream subbasin. One way to evaluate the impact on water quality, is to assume that the ponds will provide for treating the first 1" of runoff with a bleeddown mechanism. As is well known, treatment of the first 1" of runoff will retain up to 85% of the pollutants and may account for up to 90 percent of the storm runoff events. Consideration of the different time lag and its effect on pollutant load from upstream subbasins to the pond will require detailed analysis and is not presented here.

15.3.4 Swale Treatment

The proposed condition alternatives provide for some swale addition and/or improvement of the existing ones. Future CIP projects and erosion control projects may involve some additional swale construction. These factors were considered in the evaluation of the effects of swale on water quality treatment. Even then, the swale would be inadequate to treat the first 1" runoff because of limited swale volume and absence of information on the retention mechanism (ditch bottom or ditch block inlets (DBIs)). Therefore full swale treatment efficiency is not applicable. However, based on the extent of the available swale, it was assumed that the swale would provide a 5% treatment for all pollutant parameters that have potential for treatment by swale (see BMP Efficiency Table in the PLRM Model Documentation). This assumption is conservatively low and is valid.

15.3.5 Procedure

The following procedure was employed using the PLRM model to evaluate pollutant loading and LOS for each affected subbasin the proposed condition:

1. Run the model for the selected basins for gross loads and then apply the existing condition BMP's and determine the net load.
2. Apply treatment efficiency for the wet detention and then swale treatment BMP to the net load to obtain the proposed condition net load.
3. Run the model to determine the SFR loads for the same basins without any BMP's
4. Determine the proposed condition LOS using the proposed condition net load and SFR load and compare with the existing condition LOS discussed in Chapter 11.
5. The proposed or existing condition LOS may be different for different parameters for each subbasin and it may be convenient to develop an overall LOS. The following procedure was used for computing an overall LOS for each subbasin:

    - Assign a score of 1, 2, 3, 4 and 5, respectively for LOS A, B, C, D and F for each pollutant parameter. Calculate an overall score as the average score for all parameters (which is the same as the weighted average with equal weights for each parameter). Then use the following criteria to revert the overall score to overall LOS.

        - Overall LOS is A if the overall score is between 0 to 1.5
        - Overall LOS is B if the overall score is between 0 to 1.5
        - Overall LOS is C if the overall score is between 0 to 1.5
        - Overall LOS is D if the overall score is between 0 to 1.5
        - Overall LOS is F if the overall score is between 0 to 1.5

    - Perform the above analysis for both the existing and proposed conditions.

6. Repeat Steps 1 through 5 for wet detention and wet detention/swale BMP's. Steps 1 through may also be repeated for any partial wet detention or swale BMP. For example, if the required pond size may be too large to retrofit for water quality improvement with wet detention of 1" of runoff, then wet detention of 0.5" of runoff may be considered. This analysis was also performed for this study.

15.3.6 Analysis and Results

The net pollutant loads (in pounds) and LOS for the proposed condition are summarized by subbasin in Tables 15-2, 15-3 and 15-4, respectively for the annual average, dry season and wet season rainfall for the wet detention pond treatment alternatives and in Tables 15-5, 15-6 and 15-7 for the wet detention and swale alternatives. As expected, the LOS for the annual, dry or wet season is the same. Also as expected, the proposed condition loads are lower and LOS is higher than in the existing condition in all cases. It is interesting to note from these calculations that for wet detention, the LOS improves considerably, for example from F to A or B. There are still several subbasins with LOS of D or F. The improvement in LOS with wet detention/swale combination is marginal in comparison with wet detention alone. For example, LOS B changes to A, C changes to B, D changes C, etc. Again it is noted that only marginal amount of swale (in relation to that required for 1" of runoff retention in the swale) were assumed to occur as a result of the proposed condition as well as planned CIPs, erosion control projects and interagency projects.

The proposed condition overall LOS was calculated for each subbasin following the procedure discussed in Section 15.2.5 above. Table 15-7 summarizes the overall score and overall LOS for each subbasin for the existing and proposed condition. A comparison indicates that the overall LOS improves in the proposed condition. For example, most of the Fs change to D, C, or B and Ds change to B or C. There are fewer Ds and Fs. Again, the overall LOS improvement between the wet detention and wet detention with swale is marginal.

The analysis of 0.5" runoff treatment is considered only for the wet detention case since the marginal swale provision considered in this study results only in marginal LOS improvement. The results for a 0.5" of runoff wet detention are summarized for the annual average rainfall condition case in Tables 15-8 for loads and LOS for each parameter and Table 15-9 for overall LOS. As expected, the individual parameter load is twice the load for 1" runoff wet detention (see Table 15-2) and obviously the LOS gets poorer in comparison with the 1" runoff wet detention (see Table 15.7). There are many more Ds and Fs for individual parameters compared to 1" wet detention but more Ds than for 1" wet detention and several Fs compared with no Fs for 1" wet detention.

Table 15-10 provides the average pond area below the control elevation for 1" and 0.5" of runoff for wet detention treatment with bleeddown assuming a maximum allowable treatment depth of

Table 15.2. Proposed Condition Average Annual Rainfall Pollutant Load and LOS Wet Detention Treatment (1.0” Runoff)

Subbasin ID		BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
510100	Proposed Condition Load	512.0	1763.9	389.5	31.1	499.6	61.8	26.1	305.6	0.5	3.2	3.4	2.3
	Proposed Condition LOS	D	A	C	A	C	B	A	C	D	B	C	A
	Existing Condition LOS	F	F	D	D	D	D	D	D	F	F	F	F
510150	Proposed Condition Load	98.1	515.1	154.1	11.2	193.4	23.5	9.6	123.1	0.0	0.8	0.3	0.6
	Proposed Condition LOS	B	A	B	A	B	A	A	B	A	A	A	A
	Existing Condition LOS	D	C	C	C	C	C	C	C	C	C	C	C
510800	Proposed Condition Load	153.9	1092.5	290.6	21.6	366.0	53.7	21.6	268.7	0.1	1.7	0.8	1.3
	Proposed Condition LOS	B	A	C	A	C	B	A	C	A	B	A	A
	Existing Condition LOS	D	D	D	D	D	D	D	D	D	D	D	D
510930	Proposed Condition Load	177.9	964.6	247.0	22.8	326.8	64.1	20.1	202.3	0.1	2.2	0.5	1.4
	Proposed Condition LOS	C	A	D	B	D	C	A	C	A	C	A	A
	Existing Condition LOS	F	F	F	F	F	F	F	D	D	F	D	F
511200	Proposed Condition Load	920.5	2331.8	645.4	48.6	817.3	65.5	26.3	347.2	0.7	5.2	4.2	3.2
	Proposed Condition LOS	F	A	F	B	F	B	A	C	F	C	C	B
	Existing Condition LOS	F	F	F	F	F	D	D	D	F	F	F	F
511100	Proposed Condition Load	780.6	1677.0	417.3	37.8	551.4	56.9	18.4	167.3	0.5	4.0	3.7	2.5
	Proposed Condition LOS	F	A	D	B	F	B	A	B	F	D	F	B
	Existing Condition LOS	F	F	F	F	F	F	D	C	F	F	F	F
511300	Proposed Condition Load	276.4	1137.8	332.7	24.5	418.4	57.8	19.3	279.1	0.1	2.5	0.8	1.9
	Proposed Condition LOS	C	A	D	A	D	B	A	C	B	C	B	A
	Existing Condition LOS	F	F	F	F	F	F	D	F	F	F	F	F
520300	Proposed Condition Load	55.8	396.7	105.5	7.8	132.9	19.5	7.9	97.7	0.0	0.6	0.3	0.5
	Proposed Condition LOS	A	A	B	A	B	A	A	B	A	A	A	A
	Existing Condition LOS	C	C	C	C	C	C	C	C	C	C	C	C
510200	Proposed Condition Load	178.2	625.2	148.5	17.5	213.7	55.1	13.3	90.0	0.1	2.1	0.8	1.2
	Proposed Condition LOS	D	A	D	B	D	D	B	C	B	D	C	B
	Existing Condition LOS	F	F	F	F	F	F	F	D	F	F	F	F
510300	Proposed Condition Load	704.2	2164.0	589.9	57.8	809.8	152.2	38.5	300.7	0.2	6.3	3.2	3.6
	Proposed Condition LOS	F	A	F	B	F	D	B	C	C	D	C	B
	Existing Condition LOS	F	F	F	F	F	F	F	D	F	F	F	F
510250	Proposed Condition Load	233.0	958.5	63.7	6.4	85.9	3.1	2.2	16.4	0.2	0.9	5.6	1.5
	Proposed Condition LOS	F	D	D	B	D	A	A	A	F	F	F	F
	Existing Condition LOS	F	F	F	F	F	B	C	B	F	F	F	F
510260	Proposed Condition Load	244.7	696.3	171.1	17.1	242.1	49.4	12.2	86.5	0.1	2.2	1.9	1.2
	Proposed Condition LOS	F	B	F	C	F	F	C	D	F	F	F	C
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
510400	Proposed Condition Load	307.5	1125.0	288.1	36.1	414.4	111.1	27.0	187.6	0.1	3.9	0.4	2.1
	Proposed Condition LOS	F	B	F	C	F	F	B	C	B	F	A	B
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	D	F
510450	Proposed Condition Load	163.5	681.3	150.6	21.3	225.1	73.2	17.3	109.4	0.0	2.6	0.2	1.4
	Proposed Condition LOS	D	A	C	B	D	D	B	C	A	D	A	B
	Existing Condition LOS	F	F	D	F	F	F	F	D	D	F	C	F

Table 15.2. Proposed Condition Average Annual Rainfall Pollutant Load and LOS Wet Detention Treatment (1.0” Runoff) (Continued.)

Subbasin ID		BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
510460	Proposed Condition Load	98.6	412.6	90.8	12.9	135.9	44.4	10.5	66.1	0.0	1.6	0.1	0.8
	Proposed Condition LOS	F	B	F	D	F	F	C	D	B	F	B	C
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
510600	Proposed Condition Load	283.1	1171.0	262.8	36.2	389.4	122.5	29.0	186.1	0.1	4.3	0.4	2.3
	Proposed Condition LOS	F	B	F	C	F	F	C	D	B	F	B	C
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
520900	Proposed Condition Load	303.6	1351.8	375.6	28.6	475.8	78.3	30.1	330.6	0.2	2.3	0.9	1.6
	Proposed Condition LOS	C	A	C	A	C	B	A	C	B	B	A	A
	Existing Condition LOS	F	D	D	F	F	F	F	D	F	F	D	D
521000	Proposed Condition Load	521.4	637.5	227.0	19.8	296.3	74.9	24.9	143.7	0.2	1.7	0.5	0.8
	Proposed Condition LOS	F	A	D	B	D	C	B	C	D	C	A	A
	Existing Condition LOS	F	D	F	F	F	F	F	D	F	F	D	D
521100	Proposed Condition Load	741.8	862.6	318.2	27.8	415.6	106.6	35.3	199.8	0.3	2.4	0.5	1.0
	Proposed Condition LOS	F	A	C	A	C	C	B	B	D	B	A	A
	Existing Condition LOS	F	C	D	F	D	F	F	C	F	F	C	C
521200	Proposed Condition Load	206.9	878.8	64.3	6.3	86.2	4.9	2.8	25.4	0.2	0.9	4.9	1.3
	Proposed Condition LOS	F	C	C	A	C	A	A	B	F	C	F	C
	Existing Condition LOS	F	F	D	F	D	B	C	B	F	F	F	F
521300	Proposed Condition Load	1059.0	3395.6	283.0	31.6	393.6	59.1	20.2	85.3	0.9	4.2	18.7	5.4
	Proposed Condition LOS	F	D	F	C	F	D	B	C	F	F	F	F
	Existing Condition LOS	F	F	F	F	F	F	F	D	F	F	F	F
521400	Proposed Condition Load	146.9	304.7	144.4	10.7	181.9	18.8	8.0	94.7	0.1	0.5	0.2	0.3
	Proposed Condition LOS	C	A	C	A	C	A	A	B	A	A	A	A
	Existing Condition LOS	F	C	D	D	D	C	C	C	D	C	C	C
521500	Proposed Condition Load	939.7	577.4	319.2	26.5	422.4	119.0	36.6	162.2	0.4	2.4	0.3	0.7
	Proposed Condition LOS	F	A	C	A	C	C	A	B	C	B	A	A
	Existing Condition LOS	F	B	D	D	D	F	F	B	F	D	B	B
521600	Proposed Condition Load	679.6	1093.2	507.1	52.3	690.3	101.0	44.3	312.3	0.2	5.4	0.5	1.6
	Proposed Condition LOS	F	A	D	B	F	C	B	C	C	D	A	A
	Existing Condition LOS	F	D	F	F	F	F	F	D	F	F	C	F
530100	Proposed Condition Load	979.5	1048.4	399.4	35.6	524.1	136.2	43.8	226.2	0.4	3.1	0.6	1.3
	Proposed Condition LOS	F	A	C	A	C	C	B	B	D	B	A	A
	Existing Condition LOS	F	C	D	F	F	F	F	C	F	F	C	D
530150	Proposed Condition Load	615.3	1574.3	386.9	52.3	570.0	189.1	46.7	256.1	0.2	6.1	0.6	3.1
	Proposed Condition LOS	F	B	F	C	F	F	C	D	C	F	B	C
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
530200	Proposed Condition Load	1047.7	713.2	325.3	30.6	432.4	133.0	41.9	156.3	0.5	2.7	0.4	0.9
	Proposed Condition LOS	F	A	D	B	D	D	B	B	F	C	A	A
	Existing Condition LOS	F	D	F	F	F	F	F	C	F	F	C	D
530300	Proposed Condition Load	48.9	348.7	92.7	6.9	116.7	17.2	6.9	85.9	0.0	0.6	0.2	0.4
	Proposed Condition LOS	B	A	C	A	C	B	A	C	A	B	A	A
	Existing Condition LOS	D	D	D	D	D	D	D	D	D	D	D	D

Table 15.3. Proposed Condition Average Dry Season Rainfall Pollutant Load and LOS Wet Detention Treatment (1.0” Runoff)

Subbasin ID		BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
510100	Proposed Condition Load	181.3	624.6	137.9	11.0	176.9	21.9	9.3	108.2	0.2	1.1	1.2	0.8
	Proposed Condition LOS	D	A	C	A	C	B	A	C	D	B	C	A
	Existing Condition LOS	F	F	D	D	D	D	D	D	F	F	F	F
510150	Proposed Condition Load	34.8	182.4	54.6	4.0	68.5	8.3	3.4	43.6	0.0	0.3	0.1	0.2
	Proposed Condition LOS	B	A	B	A	B	A	A	B	A	A	A	A
	Existing Condition LOS	D	C	C	C	C	C	C	C	C	C	C	C
510800	Proposed Condition Load	54.5	386.9	102.9	7.6	129.6	19.0	7.6	95.1	0.0	0.6	0.3	0.4
	Proposed Condition LOS	B	A	C	A	C	B	A	C	A	B	A	A
	Existing Condition LOS	D	D	D	D	D	D	D	D	D	D	D	D
510930	Proposed Condition Load	63.0	341.6	87.5	8.1	115.7	22.7	7.1	71.6	0.0	0.8	0.2	0.5
	Proposed Condition LOS	C	A	D	B	D	C	A	C	A	C	A	A
	Existing Condition LOS	F	F	F	F	F	F	F	D	D	F	D	F
511200	Proposed Condition Load	326.0	825.7	228.6	17.2	289.4	23.2	9.3	122.9	0.2	1.8	1.5	1.1
	Proposed Condition LOS	F	A	F	B	F	B	A	C	F	C	D	B
	Existing Condition LOS	F	F	F	F	F	D	D	D	F	F	F	F
511100	Proposed Condition Load	276.4	593.9	147.8	13.4	195.2	20.2	6.5	59.2	0.2	1.4	1.3	0.9
	Proposed Condition LOS	F	A	D	B	F	B	A	B	F	D	F	B
	Existing Condition LOS	F	F	F	F	F	F	D	C	F	F	F	F
511300	Proposed Condition Load	97.9	402.9	117.8	8.7	148.2	20.5	6.8	98.8	0.0	0.9	0.3	0.7
	Proposed Condition LOS	C	A	D	A	D	B	A	C	B	C	B	A
	Existing Condition LOS	F	F	F	F	F	F	D	F	F	F	F	F
520300	Proposed Condition Load	19.8	140.5	37.4	2.8	47.1	6.9	2.8	34.6	0.0	0.2	0.1	0.2
	Proposed Condition LOS	A	A	B	A	B	A	A	B	A	A	A	A
	Existing Condition LOS	C	C	C	C	C	C	C	C	C	C	C	C
510200	Proposed Condition Load	63.1	221.4	52.6	6.2	75.7	19.5	4.7	31.9	0.0	0.7	0.3	0.4
	Proposed Condition LOS	D	A	D	B	D	D	B	C	B	D	C	B
	Existing Condition LOS	F	F	F	F	F	F	F	D	F	F	F	F
510300	Proposed Condition Load	249.4	766.3	208.9	20.5	286.8	53.9	13.6	106.5	0.1	2.2	1.1	1.3
	Proposed Condition LOS	F	A	F	B	F	D	B	C	C	D	D	B
	Existing Condition LOS	F	F	F	F	F	F	F	D	F	F	F	F
510250	Proposed Condition Load	82.5	339.4	22.5	2.3	30.4	1.1	0.8	5.8	0.1	0.3	2.0	0.5
	Proposed Condition LOS	F	D	D	B	D	A	A	A	F	F	F	F
	Existing Condition LOS	F	F	F	F	F	B	C	B	F	F	F	F
510260	Proposed Condition Load	86.7	246.6	60.6	6.0	85.7	17.5	4.3	30.6	0.0	0.8	0.7	0.4
	Proposed Condition LOS	F	B	F	C	F	F	C	D	F	F	F	C
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
510400	Proposed Condition Load	108.9	398.4	102.0	12.8	146.7	39.3	9.6	66.4	0.0	1.4	0.1	0.8
	Proposed Condition LOS	F	B	F	C	F	F	B	C	B	F	A	B
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	D	F
510450	Proposed Condition Load	57.9	241.3	53.3	7.5	79.7	25.9	6.1	38.7	0.0	0.9	0.1	0.5
	Proposed Condition LOS	D	A	C	B	D	D	B	C	A	D	A	B
	Existing Condition LOS	F	F	D	F	F	F	F	D	D	F	C	F

Table 15.3. Proposed Condition Average Dry Season Rainfall Pollutant Load and LOS Wet Detention Treatment (1.0” Runoff) (Continued.)

Subbasin ID		BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
510460	Proposed Condition Load	34.9	146.1	32.2	4.6	48.1	15.7	3.7	23.4	0.0	0.6	0.1	0.3
	Proposed Condition LOS	F	B	F	D	F	F	C	D	B	F	B	C
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
510600	Proposed Condition Load	100.2	414.7	93.1	12.8	137.9	43.4	10.3	65.9	0.0	1.5	0.1	0.8
	Proposed Condition LOS	F	B	F	C	F	F	C	D	B	F	B	C
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
520900	Proposed Condition Load	107.5	478.7	133.0	10.1	168.5	27.7	10.7	117.1	0.1	0.8	0.3	0.6
	Proposed Condition LOS	C	A	C	A	C	B	A	C	B	B	A	A
	Existing Condition LOS	F	D	D	F	F	F	F	D	F	F	D	D
521000	Proposed Condition Load	184.6	225.7	80.4	7.0	104.9	26.5	8.8	50.9	0.1	0.6	0.2	0.3
	Proposed Condition LOS	F	A	D	B	D	C	B	C	D	C	A	A
	Existing Condition LOS	F	D	F	F	F	F	F	D	F	F	D	D
521100	Proposed Condition Load	262.7	305.4	112.7	9.9	147.2	37.7	12.5	70.7	0.1	0.8	0.2	0.4
	Proposed Condition LOS	F	A	C	A	C	C	B	B	D	B	A	A
	Existing Condition LOS	F	C	D	F	D	F	F	C	F	F	C	C
521200	Proposed Condition Load	73.3	311.2	22.8	2.2	30.5	1.7	1.0	9.0	0.1	0.3	1.8	0.5
	Proposed Condition LOS	F	C	C	A	C	A	A	B	F	C	F	C
	Existing Condition LOS	F	F	D	F	D	B	C	B	F	F	F	F
521300	Proposed Condition Load	375.0	1202.4	100.2	11.2	139.4	20.9	7.1	30.2	0.3	1.5	6.6	1.9
	Proposed Condition LOS	F	D	F	C	F	D	B	C	F	F	F	F
	Existing Condition LOS	F	F	F	F	F	F	F	D	F	F	F	F
521400	Proposed Condition Load	52.0	107.9	51.1	3.8	64.4	6.6	2.8	33.5	0.0	0.2	0.1	0.1
	Proposed Condition LOS	C	A	C	A	C	A	A	B	A	A	A	A
	Existing Condition LOS	F	C	D	D	D	C	C	C	D	C	C	C
521500	Proposed Condition Load	332.8	204.5	113.0	9.4	149.6	42.1	13.0	57.4	0.2	0.8	0.1	0.3
	Proposed Condition LOS	F	A	C	A	C	C	A	B	C	B	A	A
	Existing Condition LOS	F	B	D	D	D	F	F	B	F	D	B	B
521600	Proposed Condition Load	240.7	387.1	179.6	18.5	244.4	35.8	15.7	110.6	0.1	1.9	0.2	0.6
	Proposed Condition LOS	F	A	D	B	F	C	B	C	C	D	A	A
	Existing Condition LOS	F	D	F	F	F	F	F	D	F	F	C	F
530100	Proposed Condition Load	346.8	371.3	141.4	12.6	185.6	48.2	15.5	80.1	0.2	1.1	0.2	0.5
	Proposed Condition LOS	F	A	C	A	C	C	B	B	D	B	A	A
	Existing Condition LOS	F	C	D	F	F	F	F	C	F	F	C	D
530150	Proposed Condition Load	217.9	557.5	137.0	18.5	201.9	67.0	16.5	90.7	0.1	2.2	0.2	1.1
	Proposed Condition LOS	F	B	F	C	F	F	C	D	C	F	B	C
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
530200	Proposed Condition Load	371.0	252.6	115.2	10.8	153.1	47.1	14.8	55.3	0.2	0.9	0.1	0.3
	Proposed Condition LOS	F	A	D	B	D	D	B	B	F	C	A	A
	Existing Condition LOS	F	D	F	F	F	F	F	C	F	F	C	D
530300	Proposed Condition Load	17.3	123.5	32.8	2.4	41.3	6.1	2.4	30.4	0.0	0.2	0.1	0.1
	Proposed Condition LOS	B	A	C	A	C	B	A	C	A	B	A	A
	Existing Condition LOS	D	D	D	D	D	D	D	D	D	D	D	D

Table 15.4. Proposed Condition Average Wet Season Rainfall Pollutant Load and LOS Wet Detention Treatment (1.0” Runoff)

Subbasin ID		BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
510100	Proposed Condition Load	331.7	1142.6	252.3	20.1	323.7	40.1	16.9	198.0	0.3	2.1	2.2	1.5
	Proposed Condition LOS	D	A	C	A	C	B	A	C	D	B	C	A
	Existing Condition LOS	F	F	D	D	D	D	D	D	F	F	F	F
510150	Proposed Condition Load	63.6	333.7	99.8	7.3	125.3	15.2	6.2	79.7	0.0	0.5	0.2	0.4
	Proposed Condition LOS	B	A	B	A	B	A	A	B	A	A	A	A
	Existing Condition LOS	D	C	C	C	C	C	C	C	C	C	C	C
510800	Proposed Condition Load	99.7	707.7	188.2	14.0	237.1	34.8	14.0	174.0	0.1	1.1	0.5	0.8
	Proposed Condition LOS	B	A	C	A	C	B	A	C	A	B	A	A
	Existing Condition LOS	D	D	D	D	D	D	D	D	D	D	D	D
510930	Proposed Condition Load	115.2	624.9	160.0	14.8	211.7	41.6	13.0	131.1	0.0	1.4	0.3	0.9
	Proposed Condition LOS	C	A	D	B	D	C	A	C	A	C	A	A
	Existing Condition LOS	F	F	F	F	F	F	F	D	D	F	D	F
511200	Proposed Condition Load	596.3	1510.6	418.1	31.5	529.4	42.4	17.1	224.9	0.4	3.4	2.7	2.0
	Proposed Condition LOS	F	A	F	B	F	B	A	C	F	C	D	B
	Existing Condition LOS	F	F	F	F	F	D	D	D	F	F	F	F
511100	Proposed Condition Load	505.7	1086.4	270.3	24.5	357.2	36.9	11.9	108.3	0.4	2.6	2.4	1.6
	Proposed Condition LOS	F	A	D	B	F	B	A	B	F	D	F	B
	Existing Condition LOS	F	F	F	F	F	F	D	C	F	F	F	F
511300	Proposed Condition Load	179.0	737.1	215.5	15.8	271.1	37.5	12.5	180.8	0.1	1.6	0.5	1.2
	Proposed Condition LOS	C	A	D	A	D	B	A	C	B	C	B	A
	Existing Condition LOS	F	F	F	F	F	F	D	F	F	F	F	F
520300	Proposed Condition Load	36.1	257.0	68.4	5.1	86.1	12.7	5.1	63.3	0.0	0.4	0.2	0.3
	Proposed Condition LOS	A	A	B	A	B	A	A	B	A	A	A	A
	Existing Condition LOS	C	C	C	C	C	C	C	C	C	C	C	C
510200	Proposed Condition Load	115.4	405.0	96.2	11.4	138.4	35.7	8.6	58.3	0.0	1.4	0.5	0.7
	Proposed Condition LOS	D	A	D	B	D	D	B	C	B	D	C	B
	Existing Condition LOS	F	F	F	F	F	F	F	D	F	F	F	F
510300	Proposed Condition Load	456.2	1401.8	382.1	37.5	524.6	98.6	24.9	194.8	0.2	4.1	2.1	2.3
	Proposed Condition LOS	F	A	F	B	F	D	B	C	C	D	D	B
	Existing Condition LOS	F	F	F	F	F	F	F	D	F	F	F	F
510250	Proposed Condition Load	150.9	620.9	41.2	4.1	55.7	2.0	1.4	10.6	0.2	0.6	3.6	1.0
	Proposed Condition LOS	F	D	D	B	D	A	A	A	F	F	F	F
	Existing Condition LOS	F	F	F	F	F	B	C	B	F	F	F	F
510260	Proposed Condition Load	158.5	451.1	110.8	11.0	156.9	32.0	7.9	56.0	0.1	1.4	1.2	0.8
	Proposed Condition LOS	F	B	F	C	F	F	C	D	F	F	F	C
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
510400	Proposed Condition Load	199.2	728.8	186.7	23.4	268.4	72.0	17.5	121.5	0.0	2.6	0.2	1.4
	Proposed Condition LOS	F	B	F	C	F	F	B	C	B	F	A	B
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	D	F
510450	Proposed Condition Load	105.9	441.4	97.5	13.8	145.8	47.4	11.2	70.9	0.0	1.7	0.2	0.9
	Proposed Condition LOS	D	A	C	B	D	D	B	C	A	D	A	B
	Existing Condition LOS	F	F	D	F	F	F	F	D	D	F	C	F

Table 15.4. Proposed Condition Average Wet Season Rainfall Pollutant Load and LOS Wet Detention Treatment (1.0” Runoff) (Continued.)

Subbasin ID		BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
510460	Proposed Condition Load	63.9	267.3	58.8	8.3	88.0	28.8	6.8	42.9	0.0	1.0	0.1	0.5
	Proposed Condition LOS	F	B	F	D	F	F	C	D	B	F	B	C
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
510600	Proposed Condition Load	183.4	758.6	170.2	23.4	252.3	79.4	18.8	120.6	0.0	2.8	0.3	1.5
	Proposed Condition LOS	F	B	F	C	F	F	C	D	B	F	B	C
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
520900	Proposed Condition Load	196.7	875.7	243.3	18.6	308.2	50.7	19.5	214.2	0.1	1.5	0.6	1.0
	Proposed Condition LOS	C	A	C	A	C	B	A	C	B	B	A	A
	Existing Condition LOS	F	D	D	F	F	F	F	D	F	F	D	D
521000	Proposed Condition Load	337.8	413.0	147.0	12.8	192.0	48.5	16.1	93.1	0.2	1.1	0.3	0.5
	Proposed Condition LOS	F	A	D	B	D	C	B	C	D	C	A	A
	Existing Condition LOS	F	D	F	F	F	F	F	D	F	F	D	D
521100	Proposed Condition Load	480.6	558.8	206.1	18.0	269.2	69.0	22.9	129.4	0.2	1.5	0.4	0.7
	Proposed Condition LOS	F	A	C	A	C	C	B	B	D	B	A	A
	Existing Condition LOS	F	C	D	F	D	F	F	C	F	F	C	C
521200	Proposed Condition Load	134.1	569.3	41.6	4.0	55.8	3.2	1.8	16.4	0.1	0.6	3.2	0.9
	Proposed Condition LOS	F	C	C	A	C	A	A	B	F	C	F	C
	Existing Condition LOS	F	F	D	F	D	B	C	B	F	F	F	F
521300	Proposed Condition Load	686.0	2199.6	183.3	20.5	254.9	38.3	13.1	55.2	0.6	2.8	12.1	3.5
	Proposed Condition LOS	F	D	F	C	F	D	B	C	F	F	F	F
	Existing Condition LOS	F	F	F	F	F	F	F	D	F	F	F	F
521400	Proposed Condition Load	95.1	197.4	93.5	6.9	117.8	12.2	5.2	61.3	0.0	0.4	0.1	0.2
	Proposed Condition LOS	C	A	C	A	C	A	A	B	A	A	A	A
	Existing Condition LOS	F	C	D	D	D	C	C	C	D	C	C	C
521500	Proposed Condition Load	608.7	374.0	206.8	17.2	273.6	77.1	23.7	105.1	0.3	1.5	0.2	0.5
	Proposed Condition LOS	F	A	C	A	C	C	A	B	C	B	A	A
	Existing Condition LOS	F	B	D	D	D	F	F	B	F	D	B	B
521600	Proposed Condition Load	440.3	708.2	328.5	33.9	447.2	65.4	28.7	202.3	0.2	3.5	0.3	1.1
	Proposed Condition LOS	F	A	D	B	F	C	B	C	C	D	A	A
	Existing Condition LOS	F	D	F	F	F	F	F	D	F	F	C	F
530100	Proposed Condition Load	634.5	679.2	258.7	23.1	339.5	88.2	28.4	146.5	0.3	2.0	0.4	0.8
	Proposed Condition LOS	F	A	C	A	C	C	B	B	D	B	A	A
	Existing Condition LOS	F	C	D	F	F	F	F	C	F	F	C	D
530150	Proposed Condition Load	398.6	1019.8	250.6	33.9	369.3	122.5	30.2	165.9	0.1	4.0	0.4	2.0
	Proposed Condition LOS	F	B	F	C	F	F	C	D	C	F	B	C
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
530200	Proposed Condition Load	678.7	462.0	210.8	19.8	280.1	86.1	27.2	101.3	0.3	1.7	0.3	0.6
	Proposed Condition LOS	F	A	D	B	D	D	B	B	F	C	A	A
	Existing Condition LOS	F	D	F	F	F	F	F	C	F	F	C	D
530300	Proposed Condition Load	31.7	225.9	60.0	4.5	75.6	11.1	4.5	55.6	0.0	0.4	0.2	0.3
	Proposed Condition LOS	B	A	C	A	C	B	A	C	A	B	A	A
	Existing Condition LOS	D	D	D	D	D	D	D	D	D	D	D	D

Table 15.5. Proposed Condition Average Annual Rainfall Pollutant Load and LOS Wet Detention and Swale Treatment (1.0” Runoff)

Subbasin ID		BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
510100	Proposed Condition Load	512.0	1175.9	361.7	23.3	463.9	53.0	26.1	305.6	0.5	3.2	2.7	1.5
	Proposed Condition LOS	D	A	C	A	C	A	A	C	D	B	C	A
	Existing Condition LOS	F	F	D	D	D	D	D	D	F	F	F	F
510150	Proposed Condition Load	98.1	343.4	143.1	8.4	179.6	20.1	9.6	123.1	0.0	0.8	0.3	0.4
	Proposed Condition LOS	B	A	B	A	B	A	A	B	A	A	A	A
	Existing Condition LOS	D	C	C	C	C	C	C	C	C	C	C	C
510800	Proposed Condition Load	233.0	639.0	59.1	4.8	79.8	2.7	2.2	16.4	0.2	0.9	4.5	1.0
	Proposed Condition LOS	B	A	C	A	C	B	A	C	A	B	A	A
	Existing Condition LOS	D	D	D	D	D	D	D	D	D	D	D	D
510930	Proposed Condition Load	244.7	464.2	158.9	12.8	224.9	42.3	12.2	86.5	0.1	2.2	1.5	0.8
	Proposed Condition LOS	C	A	C	A	C	C	A	C	A	C	A	A
	Existing Condition LOS	F	F	F	F	F	F	F	D	D	F	D	F
511200	Proposed Condition Load	163.5	454.2	139.8	16.0	209.0	62.7	17.3	109.4	0.0	2.6	0.2	0.9
	Proposed Condition LOS	F	A	D	A	D	B	A	C	F	C	D	A
	Existing Condition LOS	F	F	F	F	F	D	D	D	F	F	F	F
511100	Proposed Condition Load	307.5	750.0	267.6	27.1	384.8	95.2	27.0	187.6	0.1	3.9	0.3	1.4
	Proposed Condition LOS	F	A	D	B	D	B	A	B	F	D	D	A
	Existing Condition LOS	F	F	F	F	F	F	D	C	F	F	F	F
511300	Proposed Condition Load	98.6	275.0	84.3	9.7	126.2	38.0	10.5	66.1	0.0	1.6	0.1	0.6
	Proposed Condition LOS	C	A	C	A	C	B	A	C	B	C	A	A
	Existing Condition LOS	F	F	F	F	F	F	D	F	F	F	F	F
520300	Proposed Condition Load	283.1	780.7	244.0	27.1	361.6	105.0	29.0	186.1	0.1	4.3	0.3	1.5
	Proposed Condition LOS	A	A	B	A	B	A	A	B	A	A	A	A
	Existing Condition LOS	C	C	C	C	C	C	C	C	C	C	C	C
510200	Proposed Condition Load	153.9	728.3	269.8	16.2	339.9	46.1	21.6	268.7	0.1	1.7	0.6	0.8
	Proposed Condition LOS	D	A	C	B	D	C	B	C	B	D	B	A
	Existing Condition LOS	F	F	F	F	F	F	F	D	F	F	F	F
510300	Proposed Condition Load	780.6	1118.0	387.5	28.3	512.0	48.8	18.4	167.3	0.5	4.0	2.9	1.7
	Proposed Condition LOS	F	A	D	B	F	C	B	C	C	D	C	A
	Existing Condition LOS	F	F	F	F	F	F	F	D	F	F	F	F
510250	Proposed Condition Load	177.9	643.1	229.4	17.1	303.4	55.0	20.1	202.3	0.1	2.2	0.4	0.9
	Proposed Condition LOS	F	C	D	B	D	A	A	A	F	F	F	C
	Existing Condition LOS	F	F	F	F	F	B	C	B	F	F	F	F
510260	Proposed Condition Load	920.5	1554.6	599.3	36.4	758.9	56.1	26.3	347.2	0.7	5.2	3.3	2.1
	Proposed Condition LOS	F	B	F	C	F	F	C	D	F	F	F	B
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
510400	Proposed Condition Load	276.4	758.5	308.9	18.3	388.6	49.6	19.3	279.1	0.1	2.5	0.6	1.2
	Proposed Condition LOS	F	A	F	B	F	D	B	C	B	F	A	B
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	D	F
510450	Proposed Condition Load	55.8	264.5	98.0	5.9	123.4	16.7	7.9	97.7	0.0	0.6	0.2	0.3
	Proposed Condition LOS	D	A	C	B	C	C	B	C	A	D	A	A
	Existing Condition LOS	F	F	D	F	F	F	F	D	D	F	C	F

Table 15.5. Proposed Condition Average Annual Rainfall Pollutant Load and LOS Wet Detention and Swale Treatment (1.0” Runoff) (Continued.)

Subbasin ID		BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
510460	Proposed Condition Load	178.2	416.8	137.9	13.2	198.4	47.3	13.3	90.0	0.1	2.1	0.6	0.8
	Proposed Condition LOS	F	A	F	C	F	F	C	D	B	F	A	B
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
510600	Proposed Condition Load	704.2	1442.7	547.8	43.4	752.0	130.5	38.5	300.7	0.2	6.3	2.6	2.4
	Proposed Condition LOS	F	A	F	C	F	F	C	D	B	F	A	B
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
520900	Proposed Condition Load	303.6	901.2	348.7	21.5	441.8	67.1	30.1	330.6	0.2	2.3	0.7	1.0
	Proposed Condition LOS	C	A	C	A	C	B	A	C	B	B	A	A
	Existing Condition LOS	F	D	D	F	F	F	F	D	F	F	D	D
521000	Proposed Condition Load	521.4	425.0	210.8	14.9	275.2	64.2	24.9	143.7	0.2	1.7	0.4	0.5
	Proposed Condition LOS	F	A	D	A	D	C	B	C	D	C	A	A
	Existing Condition LOS	F	D	F	F	F	F	F	D	F	F	D	D
521100	Proposed Condition Load	741.8	575.0	295.5	20.9	385.9	91.4	35.3	199.8	0.3	2.4	0.4	0.7
	Proposed Condition LOS	F	A	C	A	C	C	B	B	D	B	A	A
	Existing Condition LOS	F	C	D	F	D	F	F	C	F	F	C	C
521200	Proposed Condition Load	206.9	585.8	59.7	4.7	80.0	4.2	2.8	25.4	0.2	0.9	4.0	0.9
	Proposed Condition LOS	F	B	C	A	C	A	A	B	F	C	F	B
	Existing Condition LOS	F	F	D	F	D	B	C	B	F	F	F	F
521300	Proposed Condition Load	1059.0	2263.7	262.8	23.7	365.4	50.6	20.2	85.3	0.9	4.2	15.0	3.6
	Proposed Condition LOS	F	C	F	C	F	C	B	C	F	F	F	D
	Existing Condition LOS	F	F	F	F	F	F	F	D	F	F	F	F
521400	Proposed Condition Load	146.9	203.1	134.1	8.0	168.9	16.1	8.0	94.7	0.1	0.5	0.2	0.2
	Proposed Condition LOS	C	A	C	A	C	A	A	B	A	A	A	A
	Existing Condition LOS	F	C	D	D	D	C	C	C	D	C	C	C
521500	Proposed Condition Load	939.7	384.9	296.4	19.9	392.2	102.0	36.6	162.2	0.4	2.4	0.3	0.5
	Proposed Condition LOS	F	A	C	A	C	B	A	B	C	B	A	A
	Existing Condition LOS	F	B	D	D	D	F	F	B	F	D	B	B
521600	Proposed Condition Load	679.6	728.8	470.9	39.2	641.0	86.5	44.3	312.3	0.2	5.4	0.4	1.1
	Proposed Condition LOS	F	A	D	B	D	C	B	C	C	D	A	A
	Existing Condition LOS	F	D	F	F	F	F	F	D	F	F	C	F
530100	Proposed Condition Load	979.5	699.0	370.9	26.7	486.6	116.7	43.8	226.2	0.4	3.1	0.5	0.9
	Proposed Condition LOS	F	A	C	A	C	C	B	B	D	B	A	A
	Existing Condition LOS	F	C	D	F	F	F	F	C	F	F	C	D
530150	Proposed Condition Load	615.3	1049.5	359.3	39.2	529.3	162.1	46.7	256.1	0.2	6.1	0.4	2.0
	Proposed Condition LOS	F	A	F	C	F	F	C	D	C	F	A	B
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
530200	Proposed Condition Load	1047.7	475.5	302.1	22.9	401.5	114.0	41.9	156.3	0.5	2.7	0.3	0.6
	Proposed Condition LOS	F	A	D	A	D	D	B	B	F	C	A	A
	Existing Condition LOS	F	D	F	F	F	F	F	C	F	F	C	D
530300	Proposed Condition Load	48.9	232.5	86.1	5.2	108.4	14.7	6.9	85.9	0.0	0.6	0.2	0.3
	Proposed Condition LOS	B	A	C	A	C	B	A	C	A	B	A	A
	Existing Condition LOS	D	D	D	D	D	D	D	D	D	D	D	D

Table 15.6. Proposed Condition Average Dry Season Rainfall Pollutant Load and LOS Wet Detention and Swale Treatment (1.0” Runoff)

Subbasin ID		BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
510100	Proposed Condition Load	181.3	416.4	128.1	8.2	164.3	18.8	9.3	108.2	0.2	1.1	1.0	0.5
	Proposed Condition LOS	D	A	C	A	C	A	A	C	D	B	C	A
	Existing Condition LOS	F	F	D	D	D	D	D	D	F	F	F	F
510150	Proposed Condition Load	34.8	121.6	50.7	3.0	63.6	7.1	3.4	43.6	0.0	0.3	0.1	0.1
	Proposed Condition LOS	B	A	B	A	B	A	A	B	A	A	A	A
	Existing Condition LOS	D	C	C	C	C	C	C	C	C	C	C	C
510800	Proposed Condition Load	54.5	257.9	95.5	5.7	120.3	16.3	7.6	95.1	0.0	0.6	0.2	0.3
	Proposed Condition LOS	B	A	C	A	C	B	A	C	A	B	A	A
	Existing Condition LOS	D	D	D	D	D	D	D	D	D	D	D	D
510930	Proposed Condition Load	63.0	227.7	81.2	6.1	107.4	19.5	7.1	71.6	0.0	0.8	0.2	0.3
	Proposed Condition LOS	C	A	C	A	C	C	A	C	A	C	A	A
	Existing Condition LOS	F	F	F	F	F	F	F	D	D	F	D	F
511200	Proposed Condition Load	326.0	550.5	212.2	12.9	268.7	19.9	9.3	122.9	0.2	1.8	1.2	0.7
	Proposed Condition LOS	F	A	D	A	D	B	A	C	F	C	D	A
	Existing Condition LOS	F	F	F	F	F	D	D	D	F	F	F	F
511100	Proposed Condition Load	276.4	395.9	137.2	10.0	181.3	17.3	6.5	59.2	0.2	1.4	1.0	0.6
	Proposed Condition LOS	F	A	D	A	D	B	A	B	F	D	D	A
	Existing Condition LOS	F	F	F	F	F	F	D	C	F	F	F	F
511300	Proposed Condition Load	97.9	268.6	109.4	6.5	137.6	17.5	6.8	98.8	0.0	0.9	0.2	0.4
	Proposed Condition LOS	C	A	C	A	C	B	A	C	B	C	A	A
	Existing Condition LOS	F	F	F	F	F	F	D	F	F	F	F	F
520300	Proposed Condition Load	19.8	93.7	34.7	2.1	43.7	5.9	2.8	34.6	0.0	0.2	0.1	0.1
	Proposed Condition LOS	A	A	B	A	B	A	A	B	A	A	A	A
	Existing Condition LOS	C	C	C	C	C	C	C	C	C	C	C	C
510200	Proposed Condition Load	63.1	147.6	48.8	4.7	70.3	16.7	4.7	31.9	0.0	0.7	0.2	0.3
	Proposed Condition LOS	D	A	C	B	D	C	B	C	B	D	B	A
	Existing Condition LOS	F	F	F	F	F	F	F	D	F	F	F	F
510300	Proposed Condition Load	249.4	510.9	194.0	15.4	266.3	46.2	13.6	106.5	0.1	2.2	0.9	0.8
	Proposed Condition LOS	F	A	D	B	F	C	B	C	C	D	C	A
	Existing Condition LOS	F	F	F	F	F	F	F	D	F	F	F	F
510250	Proposed Condition Load	82.5	226.3	20.9	1.7	28.3	1.0	0.8	5.8	0.1	0.3	1.6	0.4
	Proposed Condition LOS	F	C	D	B	D	A	A	A	F	F	F	D
	Existing Condition LOS	F	F	F	F	F	B	C	B	F	F	F	F
510260	Proposed Condition Load	86.7	164.4	56.3	4.5	79.6	15.0	4.3	30.6	0.0	0.8	0.5	0.3
	Proposed Condition LOS	F	B	F	C	F	F	C	D	F	F	F	B
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
510400	Proposed Condition Load	108.9	265.6	94.7	9.6	136.3	33.7	9.6	66.4	0.0	1.4	0.1	0.5
	Proposed Condition LOS	F	A	F	B	F	D	B	C	B	F	A	B
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	D	F
510450	Proposed Condition Load	57.9	160.8	49.5	5.7	74.0	22.2	6.1	38.7	0.0	0.9	0.1	0.3
	Proposed Condition LOS	D	A	C	B	C	C	B	C	A	D	A	A
	Existing Condition LOS	F	F	D	F	F	F	F	D	D	F	C	F

Table 15.6. Proposed Condition Average Dry Season Rainfall Pollutant Load and LOS Wet Detention and Swale Treatment (1.0” Runoff) (Continued.)

Subbasin ID		BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
510460	Proposed Condition Load	34.9	97.4	29.9	3.4	44.7	13.5	3.7	23.4	0.0	0.6	0.0	0.2
	Proposed Condition LOS	F	A	F	C	F	F	C	D	B	F	A	B
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
510600	Proposed Condition Load	100.2	276.4	86.4	9.6	128.0	37.2	10.3	65.9	0.0	1.5	0.1	0.5
	Proposed Condition LOS	F	A	F	C	F	F	C	D	B	F	A	B
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
520900	Proposed Condition Load	107.5	319.1	123.5	7.6	156.5	23.8	10.7	117.1	0.1	0.8	0.3	0.4
	Proposed Condition LOS	C	A	C	A	C	B	A	C	B	B	A	A
	Existing Condition LOS	F	D	D	F	F	F	F	D	F	F	D	D
521000	Proposed Condition Load	184.6	150.5	74.6	5.3	97.4	22.7	8.8	50.9	0.1	0.6	0.1	0.2
	Proposed Condition LOS	F	A	D	A	D	C	B	C	D	C	A	A
	Existing Condition LOS	F	D	F	F	F	F	F	D	F	F	D	D
521100	Proposed Condition Load	262.7	203.6	104.6	7.4	136.7	32.4	12.5	70.7	0.1	0.8	0.2	0.2
	Proposed Condition LOS	F	A	C	A	C	C	B	B	D	B	A	A
	Existing Condition LOS	F	C	D	F	D	F	F	C	F	F	C	C
521200	Proposed Condition Load	73.3	207.5	21.1	1.7	28.3	1.5	1.0	9.0	0.1	0.3	1.4	0.3
	Proposed Condition LOS	F	B	C	A	C	A	A	B	F	C	F	B
	Existing Condition LOS	F	F	D	F	D	B	C	B	F	F	F	F
521300	Proposed Condition Load	375.0	801.6	93.1	8.4	129.4	17.9	7.1	30.2	0.3	1.5	5.3	1.3
	Proposed Condition LOS	F	C	F	C	F	C	B	C	F	F	F	D
	Existing Condition LOS	F	F	F	F	F	F	F	D	F	F	F	F
521400	Proposed Condition Load	52.0	71.9	47.5	2.8	59.8	5.7	2.8	33.5	0.0	0.2	0.1	0.1
	Proposed Condition LOS	C	A	C	A	C	A	A	B	A	A	A	A
	Existing Condition LOS	F	C	D	D	D	C	C	C	D	C	C	C
521500	Proposed Condition Load	332.8	136.3	105.0	7.0	138.9	36.1	13.0	57.4	0.2	0.8	0.1	0.2
	Proposed Condition LOS	F	A	C	A	C	B	A	B	C	B	A	A
	Existing Condition LOS	F	B	D	D	D	F	F	B	F	D	B	B
52600	Proposed Condition Load	240.7	258.1	166.7	13.9	227.0	30.6	15.7	110.6	0.1	1.9	0.1	0.4
	Proposed Condition LOS	F	A	D	B	D	C	B	C	C	D	A	A
	Existing Condition LOS	F	D	F	F	F	F	F	D	F	F	C	F
530100	Proposed Condition Load	346.8	247.5	131.3	9.5	172.3	41.3	15.5	80.1	0.2	1.1	0.2	0.3
	Proposed Condition LOS	F	A	C	A	C	C	B	B	D	B	A	A
	Existing Condition LOS	F	C	D	F	F	F	F	C	F	F	C	D
530150	Proposed Condition Load	217.9	371.7	127.2	13.9	187.4	57.4	16.5	90.7	0.1	2.2	0.2	0.7
	Proposed Condition LOS	F	A	F	C	F	F	C	D	C	F	A	B
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
530200	Proposed Condition Load	371.0	168.4	107.0	8.1	142.2	40.4	14.8	55.3	0.2	0.9	0.1	0.2
	Proposed Condition LOS	F	A	D	A	D	D	B	B	F	C	A	A
	Existing Condition LOS	F	D	F	F	F	F	F	C	F	F	C	D
530300	Proposed Condition Load	17.3	82.3	30.5	1.8	38.4	5.2	2.4	30.4	0.0	0.2	0.1	0.1
	Proposed Condition LOS	B	A	C	A	C	B	A	C	A	B	A	A
	Existing Condition LOS	D	D	D	D	D	D	D	D	D	D	D	D

Table 15.7. Proposed Condition Average Wet Season Rainfall Pollutant Load and LOS Wet Detention and Swale Treatment (1.0” Runoff)

Subbasin ID		BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
510100	Proposed Condition Load	331.7	761.8	234.3	15.1	300.5	34.3	16.9	198.0	0.3	2.1	1.7	1.0
	Proposed Condition LOS	D	A	C	A	C	A	A	C	D	B	C	A
	Existing Condition LOS	F	F	D	D	D	D	D	D	F	F	F	F
510150	Proposed Condition Load	63.6	222.5	92.7	5.5	116.3	13.0	6.2	79.7	0.0	0.5	0.2	0.3
	Proposed Condition LOS	B	A	B	A	B	A	A	B	A	A	A	A
	Existing Condition LOS	D	C	C	C	C	C	C	C	C	C	C	C
510800	Proposed Condition Load	99.7	471.8	174.8	10.5	220.2	29.8	14.0	174.0	0.1	1.1	0.4	0.5
	Proposed Condition LOS	B	A	C	A	C	B	A	C	A	B	A	A
	Existing Condition LOS	D	D	D	D	D	D	D	D	D	D	D	D
510930	Proposed Condition Load	115.2	416.6	148.6	11.1	196.6	35.6	13.0	131.1	0.0	1.4	0.3	0.6
	Proposed Condition LOS	C	A	C	A	C	C	A	C	A	C	A	A
	Existing Condition LOS	F	F	F	F	F	F	F	D	D	F	D	F
511200	Proposed Condition Load	596.3	1007.0	388.3	23.6	491.6	36.4	17.1	224.9	0.4	3.4	2.2	1.4
	Proposed Condition LOS	F	A	D	A	D	B	A	C	F	C	D	A
	Existing Condition LOS	F	F	F	F	F	D	D	D	F	F	F	F
511100	Proposed Condition Load	505.7	724.2	251.0	18.3	331.7	31.6	11.9	108.3	0.4	2.6	1.9	1.1
	Proposed Condition LOS	F	A	D	B	D	B	A	B	F	D	D	A
	Existing Condition LOS	F	F	F	F	F	F	D	C	F	F	F	F
511300	Proposed Condition Load	179.0	491.4	200.1	11.9	251.7	32.1	12.5	180.8	0.1	1.6	0.4	0.8
	Proposed Condition LOS	C	A	C	A	C	B	A	C	B	C	A	A
	Existing Condition LOS	F	F	F	F	F	F	D	F	F	F	F	F
520300	Proposed Condition Load	36.1	171.3	63.5	3.8	80.0	10.8	5.1	63.3	0.0	0.4	0.1	0.2
	Proposed Condition LOS	A	A	B	A	B	A	A	B	A	A	A	A
	Existing Condition LOS	C	C	C	C	C	C	C	C	C	C	C	C
510200	Proposed Condition Load	115.4	270.0	89.3	8.5	128.5	30.6	8.6	58.3	0.0	1.4	0.4	0.5
	Proposed Condition LOS	D	A	C	B	D	C	B	C	B	D	B	A
	Existing Condition LOS	F	F	F	F	F	F	F	D	F	F	F	F
510300	Proposed Condition Load	456.2	934.6	354.8	28.1	487.1	84.5	24.9	194.8	0.2	4.1	1.7	1.6
	Proposed Condition LOS	F	A	D	B	F	C	B	C	C	D	C	A
	Existing Condition LOS	F	F	F	F	F	F	F	D	F	F	F	F
510250	Proposed Condition Load	150.9	413.9	38.3	3.1	51.7	1.7	1.4	10.6	0.2	0.6	2.9	0.6
	Proposed Condition LOS	F	C	D	B	D	A	A	A	F	F	F	C
	Existing Condition LOS	F	F	F	F	F	B	C	B	F	F	F	F
510260	Proposed Condition Load	158.5	300.7	102.9	8.3	145.7	27.4	7.9	56.0	0.1	1.4	1.0	0.5
	Proposed Condition LOS	F	B	F	C	F	F	C	D	F	F	F	B
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
510400	Proposed Condition Load	199.2	485.9	173.3	17.5	249.3	61.7	17.5	121.5	0.0	2.6	0.2	0.9
	Proposed Condition LOS	F	A	F	B	F	D	B	C	B	F	A	B
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	D	F
510450	Proposed Condition Load	105.9	294.2	90.6	10.3	135.4	40.6	11.2	70.9	0.0	1.7	0.1	0.6
	Proposed Condition LOS	D	A	C	B	C	C	B	C	A	D	A	A
	Existing Condition LOS	F	F	D	F	F	F	F	D	D	F	C	F

Table 15.7. Proposed Condition Average Wet Season Rainfall Pollutant Load and LOS Wet Detention and Swale Treatment (1.0" Runoff) (Continued.)

Subbasin ID		BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
510460	Proposed Condition Load	63.9	178.2	54.6	6.3	81.7	24.6	6.8	42.9	0.0	1.0	0.1	0.4
	Proposed Condition LOS	F	A	F	C	F	F	C	D	B	F	A	B
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
510600	Proposed Condition Load	183.4	505.7	158.1	17.6	234.2	68.0	18.8	120.6	0.0	2.8	0.2	1.0
	Proposed Condition LOS	F	A	F	C	F	F	C	D	B	F	A	B
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
520900	Proposed Condition Load	196.7	583.8	225.9	13.9	286.2	43.5	19.5	214.2	0.1	1.5	0.5	0.7
	Proposed Condition LOS	C	A	C	A	C	B	A	C	B	B	A	A
	Existing Condition LOS	F	D	D	F	F	F	F	D	F	F	D	D
521000	Proposed Condition Load	337.8	275.3	136.5	9.6	178.2	41.6	16.1	93.1	0.2	1.1	0.3	0.3
	Proposed Condition LOS	F	A	D	A	D	C	B	C	D	C	A	A
	Existing Condition LOS	F	D	F	F	F	F	F	D	F	F	D	D
521100	Proposed Condition Load	480.6	372.5	191.4	13.5	250.0	59.2	22.9	129.4	0.2	1.5	0.3	0.4
	Proposed Condition LOS	F	A	C	A	C	C	B	B	D	B	A	A
	Existing Condition LOS	F	C	D	F	D	F	F	C	F	F	C	C
521200	Proposed Condition Load	134.1	379.5	38.7	3.0	51.8	2.7	1.8	16.4	0.1	0.6	2.6	0.6
	Proposed Condition LOS	F	B	C	A	C	A	A	B	F	C	F	B
	Existing Condition LOS	F	F	D	F	D	B	C	B	F	F	F	F
521300	Proposed Condition Load	686.0	1466.4	170.2	15.3	236.7	32.8	13.1	55.2	0.6	2.8	9.7	2.3
	Proposed Condition LOS	F	C	F	C	F	C	B	C	F	F	F	D
	Existing Condition LOS	F	F	F	F	F	F	F	D	F	F	F	F
521400	Proposed Condition Load	95.1	131.6	86.9	5.2	109.4	10.4	5.2	61.3	0.0	0.4	0.1	0.2
	Proposed Condition LOS	C	A	C	A	C	A	A	B	A	A	A	A
	Existing Condition LOS	F	C	D	D	D	C	C	C	D	C	C	C
521500	Proposed Condition Load	608.7	249.4	192.0	12.9	254.1	66.1	23.7	105.1	0.3	1.5	0.2	0.3
	Proposed Condition LOS	F	A	C	A	C	B	A	B	C	B	A	A
	Existing Condition LOS	F	B	D	D	D	F	F	B	F	D	B	B
521600	Proposed Condition Load	440.3	472.1	305.0	25.4	415.2	56.1	28.7	202.3	0.2	3.5	0.3	0.7
	Proposed Condition LOS	F	A	D	B	D	C	B	C	C	D	A	A
	Existing Condition LOS	F	D	F	F	F	F	F	D	F	F	C	F
530100	Proposed Condition Load	634.5	452.8	240.2	17.3	315.2	75.6	28.4	146.5	0.3	2.0	0.3	0.6
	Proposed Condition LOS	F	A	C	A	C	C	B	B	D	B	A	A
	Existing Condition LOS	F	C	D	F	F	F	F	C	F	F	C	D
530150	Proposed Condition Load	398.6	679.9	232.7	25.4	342.9	105.0	30.2	165.9	0.1	4.0	0.3	1.3
	Proposed Condition LOS	F	A	F	C	F	F	C	D	C	F	A	B
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
530200	Proposed Condition Load	678.7	308.0	195.7	14.9	260.1	73.8	27.2	101.3	0.3	1.7	0.2	0.4
	Proposed Condition LOS	F	A	D	A	D	D	B	B	F	C	A	A
	Existing Condition LOS	F	D	F	F	F	F	F	C	F	F	C	D
530300	Proposed Condition Load	31.7	150.6	55.7	3.3	70.2	9.5	4.5	55.6	0.0	0.4	0.1	0.2
	Proposed Condition LOS	B	A	C	A	C	B	A	C	A	B	A	A
	Existing Condition LOS	D	D	D	D	D	D	D	D	D	D	D	D

TABLE 15-8. PROPOSED CONDITION AVERAGE ANNUAL RAINFALL POLLUTANT LOAD AND LOS WET DETENTION TREATMENT (0.5" RUNOFF)

Subbasin ID		BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
510100	Proposed Condition Load	1024.1	3527.8	779.0	62.1	999.2	123.7	52.3	611.3	0.9	6.5	6.7	4.6
	Proposed Condition LOS	F	B	F	B	F	C	B	D	F	D	F	B
	Existing Condition LOS	F	F	D	D	D	D	D	D	F	F	F	F
510150	Proposed Condition Load	196.3	1030.2	308.2	22.4	386.8	46.9	19.1	246.1	0.1	1.6	0.7	1.2
	Proposed Condition LOS	C	A	D	A	D	B	A	C	B	B	A	A
	Existing Condition LOS	D	C	C	C	C	C	C	C	C	C	C	C
510800	Proposed Condition Load	307.8	2184.9	581.1	43.1	732.0	107.5	43.2	537.4	0.2	3.5	1.5	2.5
	Proposed Condition LOS	D	A	C	B	D	C	A	B	B	D	C	B
	Existing Condition LOS	D	D	D	D	D	D	D	D	D	D	D	D
510930	Proposed Condition Load	355.7	1929.2	494.0	45.6	653.5	128.3	40.2	404.6	0.1	4.5	1.1	2.7
	Proposed Condition LOS	F	B	B	A	B	A	A	A	F	C	F	B
	Existing Condition LOS	F	F	F	F	F	F	F	D	D	F	D	F
511200	Proposed Condition Load	1841.1	4663.7	1290.9	97.1	1634.6	131.0	52.7	694.4	1.4	10.3	8.4	6.3
	Proposed Condition LOS	D	A	C	A	C	C	A	B	B	C	D	A
	Existing Condition LOS	F	F	F	F	F	D	D	D	F	F	F	F
511100	Proposed Condition Load	1561.3	3354.0	834.6	75.5	1102.7	113.9	36.8	334.5	1.1	7.9	7.3	5.0
	Proposed Condition LOS	F	C	F	F	F	F	C	F	F	F	F	D
	Existing Condition LOS	F	F	F	F	F	F	D	C	F	F	F	F
511300	Proposed Condition Load	552.7	2275.6	665.4	48.9	836.9	115.6	38.5	558.2	0.2	4.9	1.6	3.7
	Proposed Condition LOS	F	B	F	C	F	F	C	D	B	F	A	C
	Existing Condition LOS	F	F	F	F	F	F	D	F	F	F	F	F
520300	Proposed Condition Load	111.6	793.5	211.0	15.7	265.8	39.1	15.7	195.5	0.1	1.3	0.6	0.9
	Proposed Condition LOS	F	B	D	C	F	F	B	C	B	F	A	B
	Existing Condition LOS	C	C	C	C	C	C	C	C	C	C	C	C
510200	Proposed Condition Load	356.4	1250.4	297.1	35.1	427.3	110.3	26.6	180.1	0.1	4.2	1.5	2.3
	Proposed Condition LOS	F	A	D	C	F	F	B	C	B	F	A	B
	Existing Condition LOS	F	F	F	F	F	F	F	D	F	F	F	F
510300	Proposed Condition Load	1408.3	4328.0	1179.8	115.7	1619.6	304.4	77.0	601.5	0.5	12.7	6.5	7.2
	Proposed Condition LOS	F	A	D	C	F	F	B	C	B	F	A	B
	Existing Condition LOS	F	F	F	F	F	F	F	D	F	F	F	F
510250	Proposed Condition Load	465.9	1916.9	127.3	12.7	171.9	6.3	4.4	32.7	0.5	1.8	11.2	3.0
	Proposed Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
	Existing Condition LOS	F	F	F	F	F	B	C	B	F	F	F	F
510260	Proposed Condition Load	489.4	1392.6	342.2	34.1	484.3	98.8	24.3	173.0	0.2	4.3	3.8	2.5
	Proposed Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
510400	Proposed Condition Load	614.9	2250.0	576.3	72.1	828.8	222.2	54.1	375.3	0.1	7.9	0.7	4.2
	Proposed Condition LOS	F	D	F	F	F	F	C	F	F	F	F	D
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	D	F
510450	Proposed Condition Load	327.0	1362.6	301.1	42.6	450.2	146.4	34.6	218.8	0.1	5.1	0.5	2.7
	Proposed Condition LOS	F	F	F	F	F	F	D	F	F	F	F	F
	Existing Condition LOS	F	F	D	F	F	F	F	D	D	F	C	F

TABLE 15-8. PROPOSED CONDITION AVERAGE ANNUAL RAINFALL POLLUTANT LOAD AND LOS WET DETENTION TREATMENT (0.5” RUNOFF)

Subbasin ID		BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
510460	Proposed Condition Load	197.3	825.1	181.6	25.8	271.8	88.8	20.9	132.3	0.0	3.1	0.3	1.7
	Proposed Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
510600	Proposed Condition Load	566.2	2342.0	525.6	72.4	778.8	245.1	58.0	372.3	0.1	8.7	0.8	4.6
	Proposed Condition LOS	C	A	F	B	F	C	B	F	B	C	B	A
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
520900	Proposed Condition Load	607.2	2703.6	751.1	57.3	951.6	156.7	60.2	661.3	0.3	4.7	1.9	3.1
	Proposed Condition LOS	F	B	F	B	F	D	B	F	C	C	C	B
	Existing Condition LOS	F	D	D	F	F	F	F	D	F	F	D	D
521000	Proposed Condition Load	1042.9	1275.0	454.0	39.6	592.6	149.8	49.8	287.3	0.5	3.4	1.0	1.5
	Proposed Condition LOS	F	B	F	C	F	F	C	D	F	D	C	B
	Existing Condition LOS	F	D	F	F	F	F	F	D	F	F	D	D
521100	Proposed Condition Load	1483.7	1725.1	636.4	55.7	831.2	213.2	70.6	399.5	0.7	4.7	1.1	2.1
	Proposed Condition LOS	F	A	F	B	F	F	C	D	F	D	B	A
	Existing Condition LOS	F	C	D	F	D	F	F	C	F	F	C	C
521200	Proposed Condition Load	413.9	1757.5	128.6	12.5	172.3	9.7	5.7	50.7	0.4	1.7	9.9	2.7
	Proposed Condition LOS	F	D	F	C	F	B	A	C	F	F	F	F
	Existing Condition LOS	F	F	D	F	D	B	C	B	F	F	F	F
521300	Proposed Condition Load	2117.9	6791.2	566.0	63.2	787.1	118.1	40.3	170.5	1.8	8.5	37.5	10.8
	Proposed Condition LOS	F	F	F	F	F	F	D	D	F	F	F	F
	Existing Condition LOS	F	F	F	F	F	F	F	D	F	F	F	F
521400	Proposed Condition Load	293.7	609.4	288.8	21.4	363.7	37.6	16.0	189.3	0.1	1.1	0.4	0.7
	Proposed Condition LOS	F	A	F	B	F	B	B	D	C	B	A	A
	Existing Condition LOS	F	C	D	D	D	C	C	C	D	C	C	C
521500	Proposed Condition Load	1879.4	1154.8	638.5	53.0	844.7	238.0	73.2	324.4	0.8	4.8	0.7	1.4
	Proposed Condition LOS	F	A	D	B	D	D	B	C	F	C	A	A
	Existing Condition LOS	F	B	D	D	D	F	F	B	F	D	B	B
521600	Proposed Condition Load	1359.3	2186.4	1014.2	104.7	1380.5	201.9	88.6	624.6	0.5	10.7	1.1	3.3
	Proposed Condition LOS	F	A	F	D	F	F	C	F	D	F	B	B
	Existing Condition LOS	F	D	F	F	F	F	F	D	F	F	C	F
530100	Proposed Condition Load	1959.0	2096.9	798.8	71.2	1048.2	272.3	87.6	452.3	0.9	6.2	1.2	2.6
	Proposed Condition LOS	F	A	F	C	F	F	C	D	F	D	B	A
	Existing Condition LOS	F	C	D	F	F	F	F	C	F	F	C	D
530150	Proposed Condition Load	1230.6	3148.6	773.8	104.6	1140.0	378.2	93.4	512.3	0.4	12.3	1.1	6.1
	Proposed Condition LOS	F	C	F	F	F	F	F	F	F	F	C	D
	Existing Condition LOS	F	F	F	F	F	F	F	F	F	F	F	F
530200	Proposed Condition Load	2095.5	1426.5	650.7	61.2	864.9	266.0	83.8	312.6	1.0	5.3	0.8	1.7
	Proposed Condition LOS	F	A	F	C	F	F	D	D	F	F	B	A
	Existing Condition LOS	F	D	F	F	F	F	F	C	F	F	C	D
530300	Proposed Condition Load	97.9	697.4	185.3	13.8	233.5	34.3	13.8	171.8	0.1	1.1	0.5	0.8
	Proposed Condition LOS	C	B	F	B	F	C	B	F	C	C	C	B
	Existing Condition LOS	D	D	D	D	D	D	D	D	D	D	D	D

TABLE 15-9. COMPARISON OF PROPOSED AND EXISTING OVERALL WATER QUALITY LOS FOR ½" OF RUNOFF WET DETENTION TREATMENT

Subbasin ID	Proposed Overall LOS Score With Wet Detention	Proposed Overall LOS With Wet Detention	Existing Overall LOS Score	Existing Overall LOS
510100	2.1	B	4.5	F
510150	2.8	C	3.1	C
510800	2.9	C	4.0	D
510930	2.8	C	4.8	F
511200	3.5	D	4.8	F
511100	3.6	D	4.8	F
511300	3.8	D	4.9	F
520300	2.3	B	3.0	C
510200	3.2	C	4.9	F
510300	3.2	C	4.9	F
510250	3.3	C	4.3	D
510260	3.8	D	5.0	F
510400	3.2	C	4.9	F
510450	3.4	C	4.6	F
510460	2.6	C	5.0	F
510600	3.8	D	5.0	F
520900	2.5	C	4.6	F
521000	3.7	D	4.7	F
521100	3.6	D	4.2	D
521200	4.6	F	4.3	D
521300	4.6	F	4.9	F
521400	4.7	F	3.5	D
521500	4.0	D	3.7	D
521600	4.8	F	4.7	F
530100	4.9	F	4.3	D
530150	5.0	F	5.0	F
530200	5.0	F	4.5	F
530300	5.0	F	4.0	D

This table was prepared by:

1. Examining three cases (a) annual average rainfall tables for wet detention proposed conditions (b) annual average rainfall tables for wet detention and swale proposed conditions and (c) annual average rainfall tables for existing conditions.
2. For each case, for each subbasin, a score of 1,2,3,4,5 for LOS of A, B, C, D, F was assigned for to each of the pollutant parameters.
3. The scores were averaged for each subbasin to obtain an overall score.
4. Letter designation LOS was obtained from each overall score as follows:

    - Overall score less than 1.5, it is A
    - Overall score greater than or equal to 1.5 but less than 2.5, it is B
    - Overall score greater than or equal to 2.5 but less than 3.5, it is C
    - Overall score greater than or equal to 3.5 but less than 4.5, it is D
    - Overall score greater than or equal to 4.5, it is F

18 inches (SWFWMD Criteria). As expected the pond area for 0.5" runoff treatment is half of the area required for 1" treatment.

The proposed condition water quality LOS is shown in Figure 15-2 for the wet detention case of 1" runoff treatment. These figures can be compared with Figure 11-1 for the existing condition to note the improvement in water quality in the proposed condition for the subbasins to be treated in the proposed condition.

The County may consider the 0.5" runoff treatment option if enough land area or funds or both are both limited and if the LOS with 0.5" runoff treatment is acceptable.

TABLE 15-10. APPROXIMATE POND AREA REQUIREMENT FOR WET DETENTION

Pond Location	Total Contributing Area (Acres)	Average Pond Area Required for 1" Runoff (Acres)	Average Pond Area Required for 0.5" Runoff (Acres)
149th Street Outfall	1233	69	34
Vandervort Area Pond	732	41	20
Blind Pond Avenue Pond	342	29	14

Average pond area in acres assuming the maximum allowable depth of 18" treatment depth (SWFWMD Criteria)

CHAPTER SIXTEEN Proposed Recommendations

16.1 FLOOD CONTROL

Based on the information obtained from the previous chapters, the proposed flood control improvement recommendations have been developed and are shown in Figure 13-1. The proposed project information includes planning level analysis and preliminary cost estimates based on non-detailed quantity estimates which is included in Appendix J. All estimates are based primarily on SWFWMD contour maps, aerial maps, and limited survey data. Unit costs utilized in developing planning level costs were taken from Construction Contract History, FDOT State Estimates Office, Engineering Support Services.

16.2 COUNTY LINE DRAINAGE SYSTEM (HILLSBOROUGH/PASCO COUNTY)

16.2.1 Newburger Road and Livingston Avenue

The first area (Improvement Alternative 8) is near Newburger Road and Livingston Avenue. Since there is no existing outlet at the intersection of Newburger Road and Livingston Avenue, the improvement alternative is to construct a roadside ditch from the intersection of Newburger Road and Livingston Avenue to connect to the existing cross drains located south of this intersection. The size of the existing culvert structure will be increased from an 18” RCP to a 48” RCP. These improvements should be coordinated with the Mobilaire and Livingston Avenue Project (CIP 47163).

16.2.2 Newburger Road at Rhodes Woods Acres

The second area (Improvement Alternative 9) is located at Newburger Road near Rhodes Wood Acres. The improvement includes constructing a drop inlet structure north of Newburger Road, and tying into the Rhodes Wood Acres Lake to the south with a 36" pipe.

16.2.3 Hog Island Lake

The third area (Improvement Alternative 10) is located at Hog Island Lake. The proposed improvement includes constructing 400 feet of force main from Hog Island Lake west to Lake Kell. A portable pump unit will be connected to the force main during periods of high water in Hog Island Lake. The existing culvert at County Line Road to Basin 541140 will also be upgraded from a 19”x 30” ERCP to a 24” x 38” ERCP.

In addition coordination with Pasco County and SWFWMD is recommended to improve the Hog Island Lake outflow through the Willow Bend Subdivision culverts and lowering the channel north of SR 54 in Pasco County.

16.3 HANNA LAKE SYSTEM

16.3.1 Wein Ranch Lane and Livingston Avenue

This area (Improvement Alternative 7) is near Wein Ranch Lane and Livingston Avenue. Since there is inadequate conveyance at the existing cross drain at Livingston Avenue, the improvement alternatives include regrading the ditch behind homes to the pond at STR-19 (cross drain of Livingston Ave near Max Smith Road), cleaning the pond at STR-19, and upgrading STR-19 to (2) 29" x 45" ERCP. Also, constructing a ditch from Basin 530500 (Pinecrest Avenue) to STR-19.

16.4 BLIND POND AVENUE SYSTEM

16.4.1 Blind Pond Avenue and Livingston Avenue

This area (Improvement Alternative 6) is near Blind Pond Avenue and Livingston Avenue. Since the existing culvert at Livingston Avenue is undersized, the improvement alternatives is to construct a storm sewer system eastward along Blind Pond Avenue to Livingston Avenue and then construct roadside ditch southward to STR-15 (a cross drain of Livingston Avenue south of Clement Road). STR-15 will be upgraded from one 29"x 45" ERCP to (2) 29"x 45" ERCP.

16.4.2 South of Clement Road and Livingston Avenue

This area (Improvement Alternative 6A) is south of Clement Road and Livingston Avenue. Since there is a lack of a main conveyance system and inadequate drainage to Livingston Avenue, the improvement alternative is to construct a ditch eastward along the south side of Clement Road and then tie into STR-15 (cross drain of Livingston Avenue near Max Smith Road). A second ditch will be constructed to flow eastward along the north side of the Live Oak Sub-division. These two ditches are to join at an existing 29 x 45-inch culvert (STR-15). The culvert size of STR-15 will be increased to (2) 29 x 45-inch pipes.

16.5 FLYNN LAKE OUTFALL SYSTEM

16.5.1 Curry Road and Livingston Avenue

This area (Improvement Alternative 5) is located at Curry Road and Livingston Avenue. Since there is an inadequate drainage outfall at Livingston Avenue, the improvement alternative (alternative 5-1) includes improving the Flynn Lake Outfall (at the Violet Curry Preserve) to two existing cross drains (STR-3 and STR-6) at Livingston Avenue. Construct a new ditch from Flynn Lake to these two cross drains. Upgrade the cross drains to (2) 42-inch RCP's and construct a ditch to the southeast to Cypress Creek.

16.6 SILVER LAKE OUTFALL SYSTEM

16.6.1 Sinclair Hills Road

This area (Improvement Alternative 4) is located north and south of Sinclair Hills Road. Since there is inadequate lateral drainage to the 149th Street outfall, three on-going Hillsborough County CIP projects are being implemented in this area.

CIP 47137 - Construct a series of ditch bottom inlets on West Lake Burrell Drive.

CIP 47150 - Construct enclosed pipe drainage system to provide positive outfall for Lake St. Claire and improved roadway drainage for East Lake Burrell Drive. The new drainage system will be piped through a series of structures to a cross drains under Sinclair Hills Road and into the 149th Street outfall system.

CIP 47251 - Conservation area overtops road due to absence of positive outfall. Design an outfall system from the conservation area south to Lake Sinclair then to the existing ditch on the south side of 151st Street. Clean existing ditch system southward to 149th Street.

16.7 149TH AVENUE OUTFALL SYSTEM

16.7.1 149th Street and Lake Forest

Since there is heavy vegetation in the 149th Street and Lake Forest outfall channels, and the 149th Street ponds weir has deteriorated, the improvements alternatives (Improvement Alternative 1-1) includes clearing and grubbing the channels and increasing the 149th Street pond weir length from 78.6 ft to 150 ft. In addition, the improvements also include reconstruction of the existing control structure and outfall pipe from the Lake Forest Pond to Cypress Creek.

Since there is inadequate lateral drainage to the 149th Street outfall, three on-going Hillsborough County CIP projects are also being proposed or implemented in this system.

CIP 47015 - Reconstruct the existing drainage conveyance system to meet Hillsborough County minimum standards.

CIP 47122 - Construct a positive outfall to allow stormwater to drain into the existing stormwater system on Livingston Avenue. Project will require the construction of a series of ditch bottom inlets, cross drain and junction box to connect into an existing 48" outfall system on Livingston Avenue.

CIP47014 - Reconstruct the existing drainage conveyance system between 19th Street and Livingston Avenue and between Sinclair Hills Road and 148th Avenue. Construct a retention/detention pond to reduce the frequency of street and structure flooding.

16.8 BRUCE B. DOWNS SYSTEM

16.8.1 143rd Avenue Outfall

The improvement alternative (alternative 3) includes upgrading the main conveyance system outfall ditch along 143rd Avenue and the pipes at Bruce B. Downs Boulevard and the Lake Forest drainage ditch. The Bruce B. Downs Boulevard culverts were increased from (2) 34"x 53" pipes to a 10'x 5' box culvert.

16.9 WATER QUALITY

Based on the information obtained from the previous chapters, the proposed water quality improvement recommendations have been developed and are shown in Figure 13-1 The proposed project information includes planning level analysis and preliminary cost estimates based on non-detailed quantity estimates. All estimates are based primarily on SWFWMD contour maps, aerial maps, soil survey maps and limited survey data. Unit costs utilized in developing planning level costs were taken from Construction Contract History, FDOT State Estimates Office, Engineering Support Services.

16.9.1 Regional Wet Detention Ponds

16.9.1.1 Blind Pond Avenue Pond

Provide offline wet detention pond with planted littoral zone areas to provide water quality treatment of drainage areas within the Blind Pond basin (Alternative 18). Pond proposed to be located east of Livingston Avenue. Exact size of pond will be dependent on soil conditions, water table elevations and land area available.

16.9.1.2 Thirteen Mile Run Pond

Provide offline wet detention pond with planted littoral zone areas to provide water quality treatment of drainage areas within the Thirteen-Mile Run basin (Alternative 17). Pond proposed to be located north of Vandervort Road west of Livingston Avenue. Exact size of pond will be dependent on soil conditions, water table elevations and land area available.

16.9.1.3 149th Avenue Pond

Increase the size of the existing 149th Avenue pond (if possible) and add additional littoral zone for water quality treatment (Alternative 1-1). Another option would be to increase the connection culvert size from the 149th Avenue pond to Lake Forest and expand the Lake Forest littoral area to provide additional water quality treatment.

16.9.2 Provide Water Quality Treatment for New CIP Projects

Utilize grass swales or detention areas where feasible, for water quality treatment for proposed County CIP projects (Alternative 16). Grassed swales can be used to slow runoff velocities to

allow particulates such as sediments and metals to drop out of the runoff and to increase residence time to allow increased nutrient uptake.

16.9.3 Erosion Control Alternatives

The majority of the existing ditches and channels within the Cypress Creek watershed are well vegetated and have little erosion potential. However, the existing channels located: east of Livingston Avenue and south of Max Smith Road (Lake Hanna Outfall) and the channel east of Livingston Avenue and south of Clement Road (Alternative 20), have severely eroded banks. This erosion could create turbidity problems in the Cypress Creek main channel located downstream of these tributaries. The existing channels currently flows through private property. The erosion problems appear to be due to high velocities from the existing culverts under Livingston Avenue, poor soil conditions, and cattle activities destabilizing the channel banks. The channel banks should be flattened and vegetated and the cattle kept out of the channel by fencing. Energy dissipaters and /or riprap should also be used at the Livingston Avenue culverts to reduce downstream velocities.

16.9.4 Coordination with Pasco County, City of Tampa and SWFWMD

Coordination with Pasco County, City of Tampa and SWFWMD to improve water quality from areas draining into Hillsborough County from Pasco County and the City of Tampa (Alternative 19) should be undertaken. Water quality samples from stations at the Hillsborough/ Pasco County line indicates that water quality could be improved from upstream areas of the Cypress Creek basin located outside of the Hillsborough County Cypress Creek study area. Additional studies would be required to identify specific water quality improvements which could be conducted upstream of the Hillsborough County line to improve the water quality in Cypress Creek.

16.10 NATURAL SYSTEM ALTERNATIVES

16.10.1 Land Acquisition and Management

There are several ELAP preservation areas located within the Cypress Creek Watershed. In addition, several additional large parcels have been targeted by ELAP for acquisition. These additional parcels should be obtained when possible and managed to provide wildlife, water quality and floodplain benefits.

16.10.2 Lake Management

16.10.2.1 Lake Eutrophication

Sources of excessive nitrogen and phosphorus entering the Cypress Creek Watershed Lakes include septic systems, lawn fertilizers, and by-products of agricultural activities. Runoff from lake front property and property along streams and canals that drain into lakes may also contain high nutrient content. Further education of landowners on alternative landscaping and lawn care

methods can potentially decrease nutrient loading and the rate of eutrophication within lakes. The location and removal of point source discharges within the watershed can also potentially decrease nutrient loading and the rate of eutrophication.

16.10.2.2 Lake Invasive Species Control

Control of invasive species thorough their reduction and removal is the best management approach (Alternative 11). Most woody species can be treated by a direct basal application of herbicide and most herbaceous species can be treated by a folier application. The use of backpack pumps, rather than broadcast spray methods, provides the best method of treating invasive species directly.

Continued education of lake front property owners is an additional important step. Property owners that can recognize invasive species can either remove them or alert the county. Property owners can remove some invasive species, such as primrose willow, by hand when the population is small. Other invasive species, such as torpedo grass and cattail may require spray application. Controlling the invasives before the population gets too large is the key to proper management. This is the most cost-effective approach and avoids the use of large chemical applications, which has the potential to be damaging to aquatic systems.

16.10.3 Land Restoration

Existing borrow pits located along I-75 and I-275 that can be improved through the creation of littoral shelves (Alternative 13) along their banks. Littoral shelves will help provide food and habitat for waterfowl and other wildlife; as well as increase the water quality within these open water areas. The establishment and management of upland buffers around these pits would also improve the wildlife value and water quality of these pit areas.

16.10.4 Invasive Species Control

16.10.4.1 Cogongrass Control

Cogongrass (*Imperta cylindrica)* is a highly aggressive invasive species that commonly occurs in and near roadway right-of-ways within the Cypress Creek Watershed. Cogongrass grows in dense stands within areas that have been disturbed, such as old phosphate mines, golf courses, ditch banks, pastures and roadway side slopes. Within the project area, it is typically not found in agricultural areas. However, it is beginning to spread into many natural habitats. One method of cogongrass treatment that has proved to be effective is a cultivation and herbicide combination treatment (Alternative 14). Deep plowing or disking to at least 6 inches during the dry season cuts the rhizome and causes the plant to desiccate. Pramitol, Spike, and Arsenal are three herbicides that have proved effective at removing cogongrass, however these herbicides are non-selective and will also remove all other vegetation and will leave the treated area un-vegetated for 6-12 months. Burning in the early spring or burning and mowing followed by herbicide applications has also proved to be effective.

16.10.4.2 Public Education

Furthering public education on the importance of removing exotic and invasive species from homeowner yards will help to deter the spread of these species. Public education via workshops, pamphlets, newspaper articles, the Internet and county representation at wildlife fairs or other environmental functions are good public education methods.

16.10.5 Wildlife Corridor Enhancement

Forested wetlands within the Cypress Creek Watershed and located between I-75 and I-275 and north of the I-75/I-275 interchange comprise a section of Cypress Creek greenway corridor. This is a significant wildlife corridor that continues to the northeast into Pasco County and to the south where it connects with the Hillsborough River corridor.

There are a number of useable wildlife crossings along I-275, I-75, County Line Road, and S.R. 54. Additional crossings could be constructed along County Line Road and S.R. 54. There is one 18" culvert located to the east of the I-275 and I-75 interchange along County Line Road that should be upgraded to accommodate wildlife. Another 48" culvert located west of the I-275 and I-75 interchange along County Line Road is more than half filled with debris at its south end. This culvert should be cleaned and adjusted to avoid build-up that would hinder wildlife utilization. Along S. R. 54 there is a box-culvert located just east of the Daiquiri Lane intersection that also needs to be cleaned to accommodate wildlife utilization. An additional 30" culvert, located east of the Collier Parkway/SR54 intersection, should also be increased in size. The addition of another crossing west of the Foggy Ridge Parkway intersection would also aid the movement of wildlife in this area.

16.11 GENERAL RECOMMENDATIONS

Several general recommendations can be made regarding the Cypress Creek Watershed. These include:

- It is recommended that the existing conditions model be updated with as-built information as improvements are constructed within the watershed.

- Hillsborough County should periodically review and update the watershed plan to reflect new development conditions and to identify potential new areas of concern from a flood control, water quality and natural systems perspective.

- It is recommended that maintenance activities be integrated into the GIS database of the watershed. This would include maintenance problem areas, frequency of maintenance inspections, and maintenance activities.

- Regulatory agencies such as SWFWMD, USACOE, FDEP, FDOT and the City of Tampa should be advised of the availability of the watershed management plan for future project review and implementation.

- Hillsborough County should provide the Cypress Creek Watershed Management Plan on the County website to provide consultants, agencies and the public with access to the study.

CHAPTER SEVENTEEN Public Input (3RD Meeting)

17.1 OVERVIEW

The Public Input meeting number 3 was held on August 22, 2000, from 6:30 p.m. to 8:30 p.m. at the Lutz Community Center in Lutz, Florida. The purpose of the meeting was to solicit comments from the public on proposed alternative improvements to existing flooding or water quality problems within their area. The public meeting was advertised by Hillsborough County in the local newspaper and homeowners groups within the watershed were informed of the meeting. A total of ? people signed the attendance sheets, but it was estimated that ? people were in attendance. The public meeting was conducted in an informal format with a short presentation of the project and project alternatives and included project representatives to answer questions and receive comments. Aerial photographs and other project graphics were on display. Each attendee was given a handout which contained specific information about the project such as the project description, public meeting description, improvement alternatives listing, project contact and website list, project schedule and public comment sheet. A copy of the handout and attendees list is included in Appendix K.

17.2 COMMENTS RECEIVED

Two written comments were received at the Public Meeting. The written comments and verbal comments received at the Public Meeting dealt with: flooding conditions experienced during El Nino, water supply and groundwater quality issues, flooding conditions at Hog Island Lake, flooding conditions at Sinclair Hills Road, Lake Levels on Lake Stemper and development and growth issues. According to the verbal comments, the majority of the attendees were favorable of the proposed improvement alternatives and that the Watershed Study be implemented by the County. A copy of the comments received is included in Appendix K.

CHAPTER EIGHTEEN Final Recommendations

Many projects were recommended for the Cypress Creek Watershed to address flood control and water quality/ natural system improvements. The construction or implementation of the these projects will be dependant on funding availability, right-of-way availability, permitting, and other related issues. Hillsborough County has taken a positive step forward in the implementation of the recommended projects by coordinating with SWFWMD and HCEPC and by allowing public input throughout the development of the watershed management plan. Hillsborough County has met with the Southwest Florida Water Management District (SWFWMD) to develop a Watershed Management Plan Memorandum of Understanding (MOU) for the County Watershed Management Plans. A draft copy of the MOU is included in Appendix L. Additional funding for project construction or implementation may be available from grants or joint agreements with SWFWMD, FDEP, EPA, Pasco County and the City of Tampa. As development continues in the watershed, additional flood control and water quality / natural system improvements may be required in the future.

A maintenance plan for the Cypress Creek Watershed has been developed and is included in Appendix M.

A monitoring plan for the Cypress Creek Watershed has also been developed and is included in Appendix N.

The listing of final recommended projects in the Cypress Creek watershed include:

- Cleanup 149th Street ditch between Livingston Ave. and 149th Street outfall detention basin. Cleanup Lake Forest ditches from B.B. Downs Boulevard to Lake Forest Drive. Increase the weir width at the 149th Street detention pond from 79 feet to 150 feet. Construct new weir structure north of Lake Forest Avenue pond. Estimated cost $44,560.

- Construct Hillsborough County projects: CIP 47005, CIP 47251 and CIP 47014.

- Construct new storm sewer system from 18th Street/143rd Avenue to the existing storm sewer along 143rd Avenue. Upgrade existing storm sewer system on 143rd Avenue from 20th Street to existing ditch east of 22nd Street. Upgrade ditch from east of 22nd Street to B.B. Downs Boulevard Upgrade existing pipes which cross from west to east and then from south to north under B.B. Downs Boulevard. Estimated cost $2,065,090.

- Construct Hillsborough County projects: CIP 47137, CIP 47117 and CIP 47251.

- Improve Flynn Lake outfall to two existing cross drains (STR-3 and STR-6) at Livingston Ave. Construct ditch from Flynn Lake to these two cross drains. Upgrade cross drains sizes at STR-3 and STR-6 at Livingston Ave. Improve outfall from the cross drains to Cypress Creek. Estimated cost $91,410.

- Improve ditch to connect from Blind Pond sub-division to Clement Road roadside ditch. Construct ditch to connect to existing cross drain at Livingston Avenue (STR-15). Estimated cost $56,100.

- Regrade existing ditch at northside of the basin. Construct roadside ditch along Wein Range Lane. Connect the roadside ditch of Wein Range Lane to north swale through existing low area. Replace crushed pipe at Livingston Ave. (STR-19). Estimated cost $ 65,970.

- Construct roadside ditch from the intersection of Newburger Road and Livingston Ave. to connect to the existing cross drain (STR-38). Increase culvert size of STR-38. Estimated cost $41,140.

- Construct a positive outfall from Newburger Road to the pond/wetland in Rhodes Wood Acre subdivision. Install a 30-inch cross drain, two ditch bottom inlets, and pipes at Newburger Road. Convey stormwater to wetland south of Newburger Road. Estimated cost $29,300.

- Construct 400 feet of force main from Hog Island Lake west to Lake Kell. Use portable pump unit to release extra water to Lake Kell. Upgrade the existing culvert at County Line Road at Basin 541140. Coordinate with Pasco County to improve Hog Island Lake outflow through Willow Bend Subdivision culverts. Estimated cost $32,190.

- Remove invasive species located throughout Cypress Creek Basin in ditches and along right-of-ways (e.g. cogongrass along right-of-ways, skunkvine and air potato in ditches). Continue public education on the importance of controlling invasive species in yards. Cost will vary.

- Utilize grassed swales or detention areas where feasible, for water quality treatment for proposed CIP projects.

- Coordinate with Pasco County to improve water quality from areas coming into Hillsborough County from Pasco County and the City of Tampa.

- Regrade, stabilize and vegetate the channel banks and keep cattle out of the channel by fencing at outfall channels east of Livingston Avenue and south of Max Smith Road and Clement Road. Construct energy dissipaters or riprap to reduce velocities from the Livingston Avenue culverts. Estimated cost $127,000.

Appendix A
Rainfall Distribution

K. SAYLOR
R:\CYPCREEK\THIESSEN 09/27/00 13:53

RAINFALL DISTRIBUTION MAP
CREATED WITH THIESSEN METHOD

LEGEND
- ONE DIMENSION BOUNDARY LINE
- SWFWMD RAINFALL GAGE
- HILLSBOROUGH CO. RAINFALL GAGE

PASCO COUNTY

STATION "LAKE ALLEN"
ID # 287
DATA–15 MIN. INCREMENT
SEPTEMBER 26TH & 27TH
RAINFALL INTENSITY (INCHES) 7.01"
DECEMBER 10TH TO 14TH
RAINFALL INTENSITY (INCHES) 4.98"
DECEMBER 25TH TO 28TH
RAINFALL INTENSITY (INCHES) 4.25"

STATION "MORRIS BRIDGE"
ID # 135
DATA–DAILY
SEPTEMBER 26TH & 27TH
RAINFALL INTENSITY (INCHES) 9.69"
DECEMBER 10TH TO 14TH
RAINFALL INTENSITY (INCHES) 8.24"
DECEMBER 25TH TO 28TH
RAINFALL INTENSITY (INCHES) 5.75"

STATION "BAY LAKE"
ID # 395
DATA–HOURLY
SEPTEMBER 26TH & 27TH
RAINFALL INTENSITY (INCHES) 10.10"
DECEMBER 10TH TO 14TH
RAINFALL INTENSITY (INCHES) 8.11"
DECEMBER 25TH TO 28TH
RAINFALL INTENSITY (INCHES) 5.64"

SUNSET LA.
HANNA RD.
LIVINGSTON AVE.
BRUCE B. DOWNS BLVD.
E. BEARSS AVE.
FLORIDA AVE.
NEBRASKA AVE.
W. FLETCHER AVE.
E. 131ST.
NORTH BLVD.
N.30TH ST.
N. 56TH ST.
FOWLER AVE.

0 4000
Scale in feet

Hillsborough County Florida

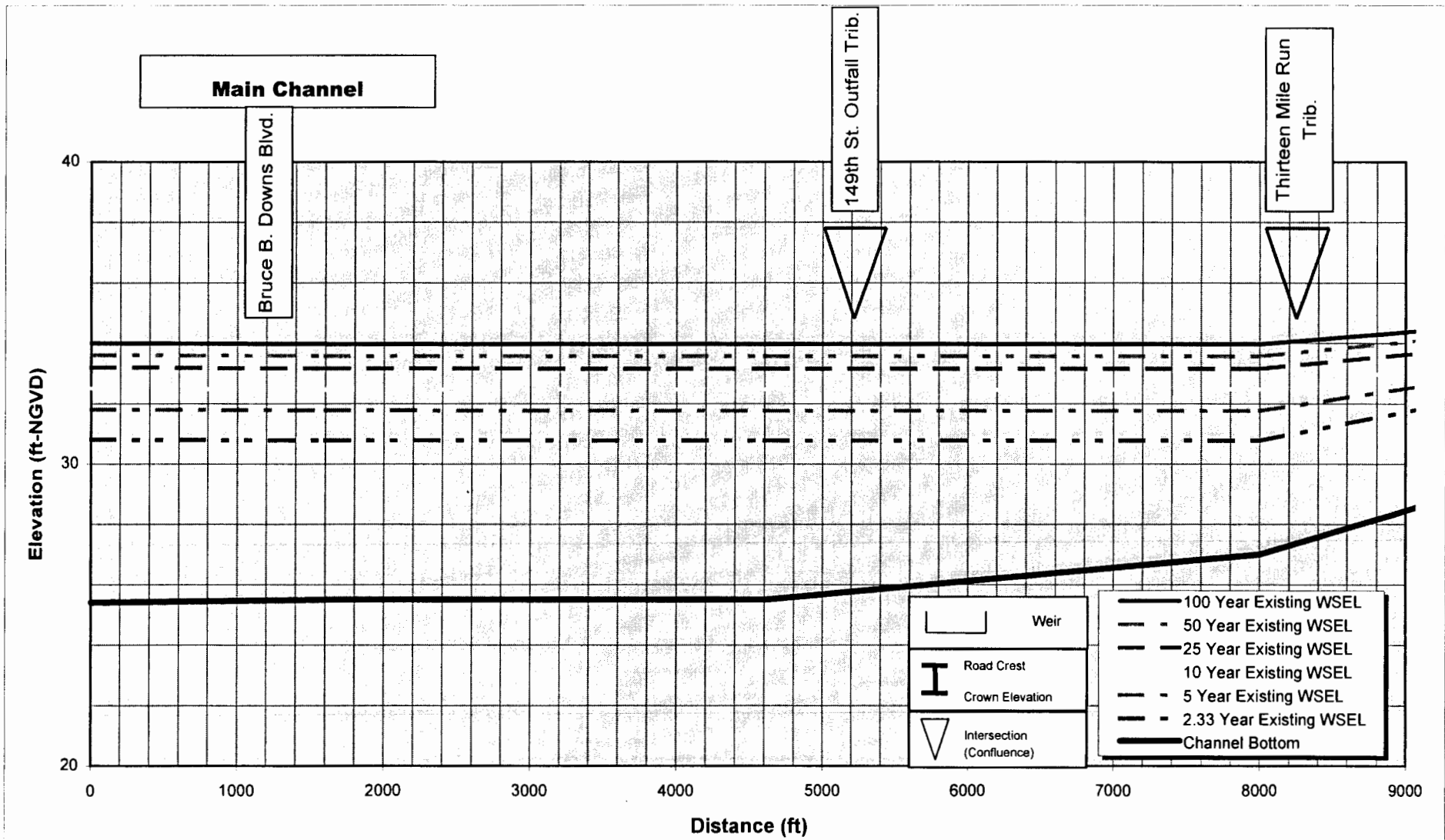
DEPARTMENT OF PUBLIC WORKS
STORMWATER MANAGEMENT
SECTION

CYPRESS CREEK
STORMWATER MANAGEMENT MASTER PLAN
URS Greiner Woodward Clyde

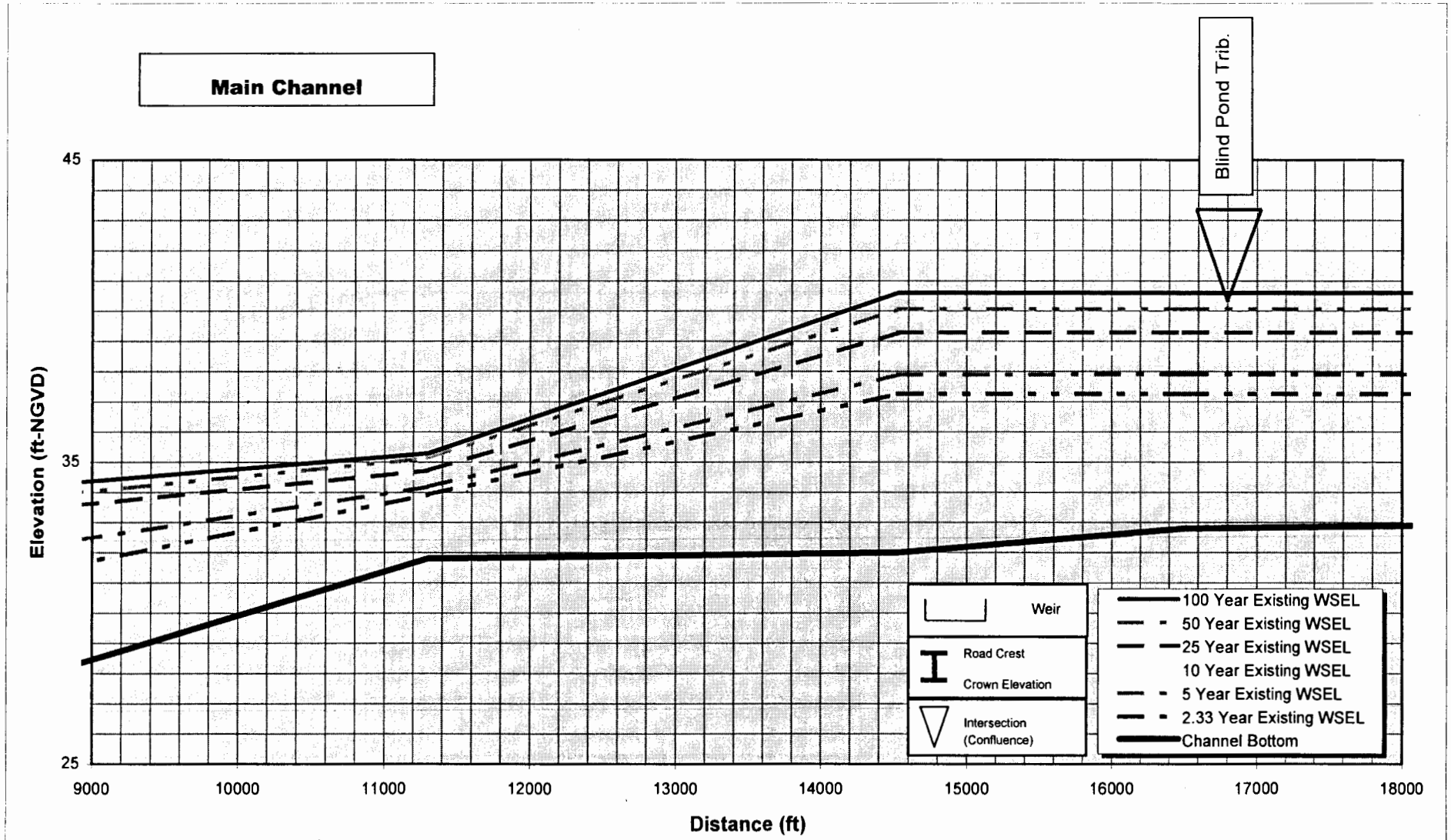
FIGURE 5–2

CYPRESS CREEK BASIN
THEISSEN METHOD RAINFALL DISTRIBUTION

Appendix B
Existing Conditions Water Surface Profiles

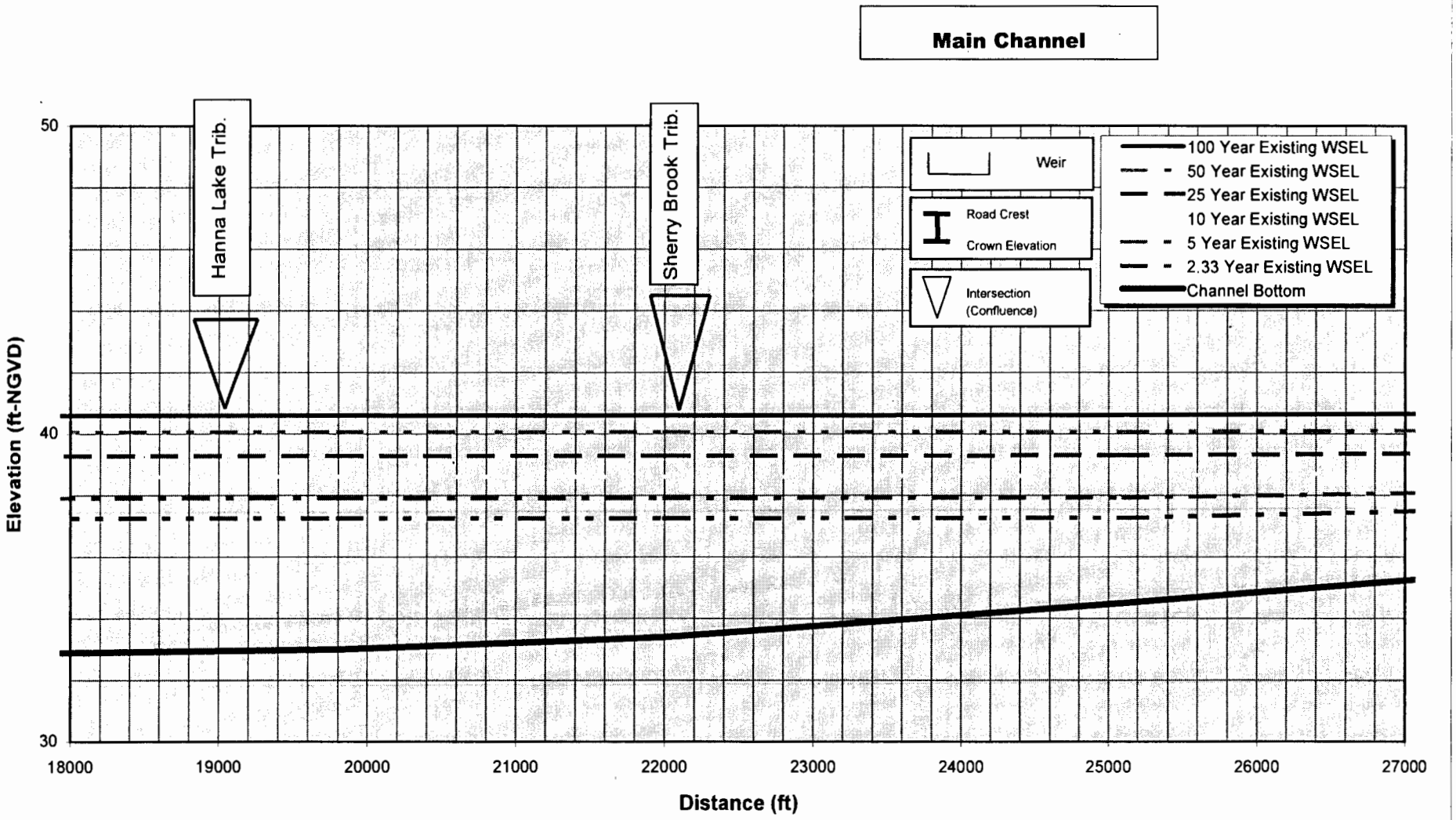


Cypress Creek Computed Water Surface Profiles	**Exhibit 6.1(a)** **Main Channel From Junction 500000 to 501100** Existing Conditions Model Sheet 1 of 5



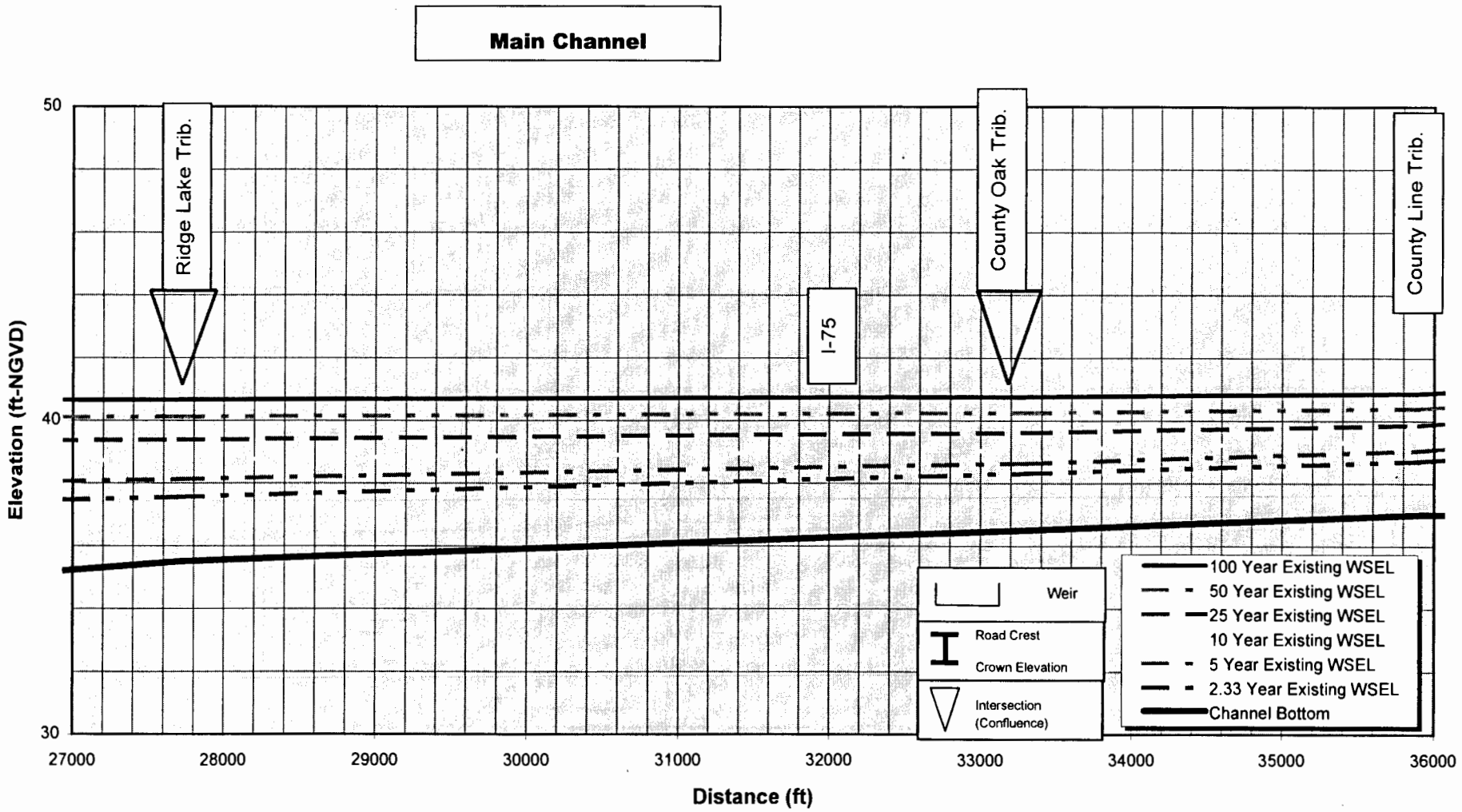
Cypress Creek
Computed Water Surface Profiles

Exhibit 6.1(a)
Main Channel From Junction 500000 to 501100
Existing Conditions Model
Sheet 2 of 5

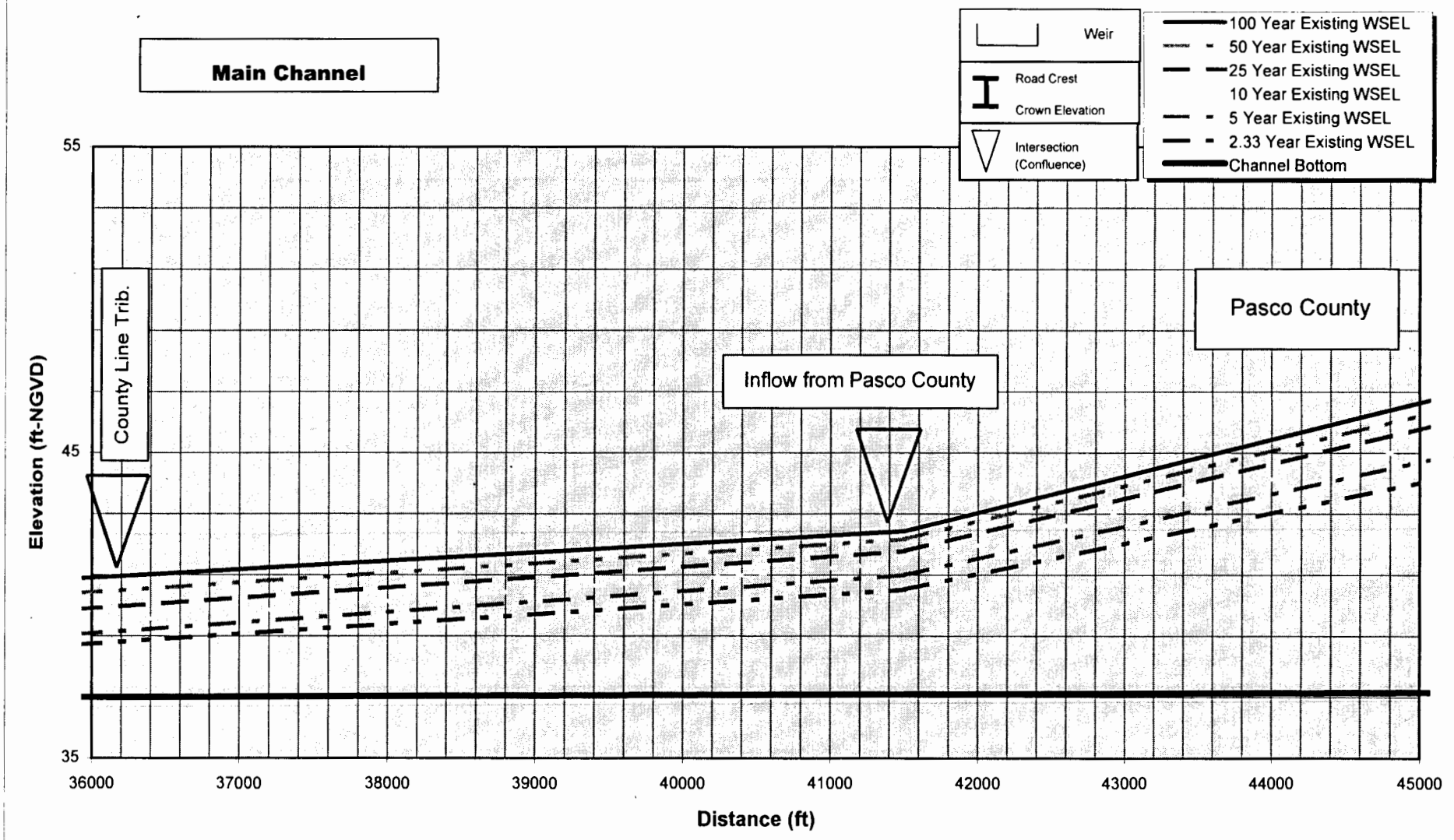


Cypress Creek
Computed Water Surface Profiles

Exhibit 6.1(a)
Main Channel From Junction 500000 to 501100
Existing Conditions Model
Sheet 3 of 5



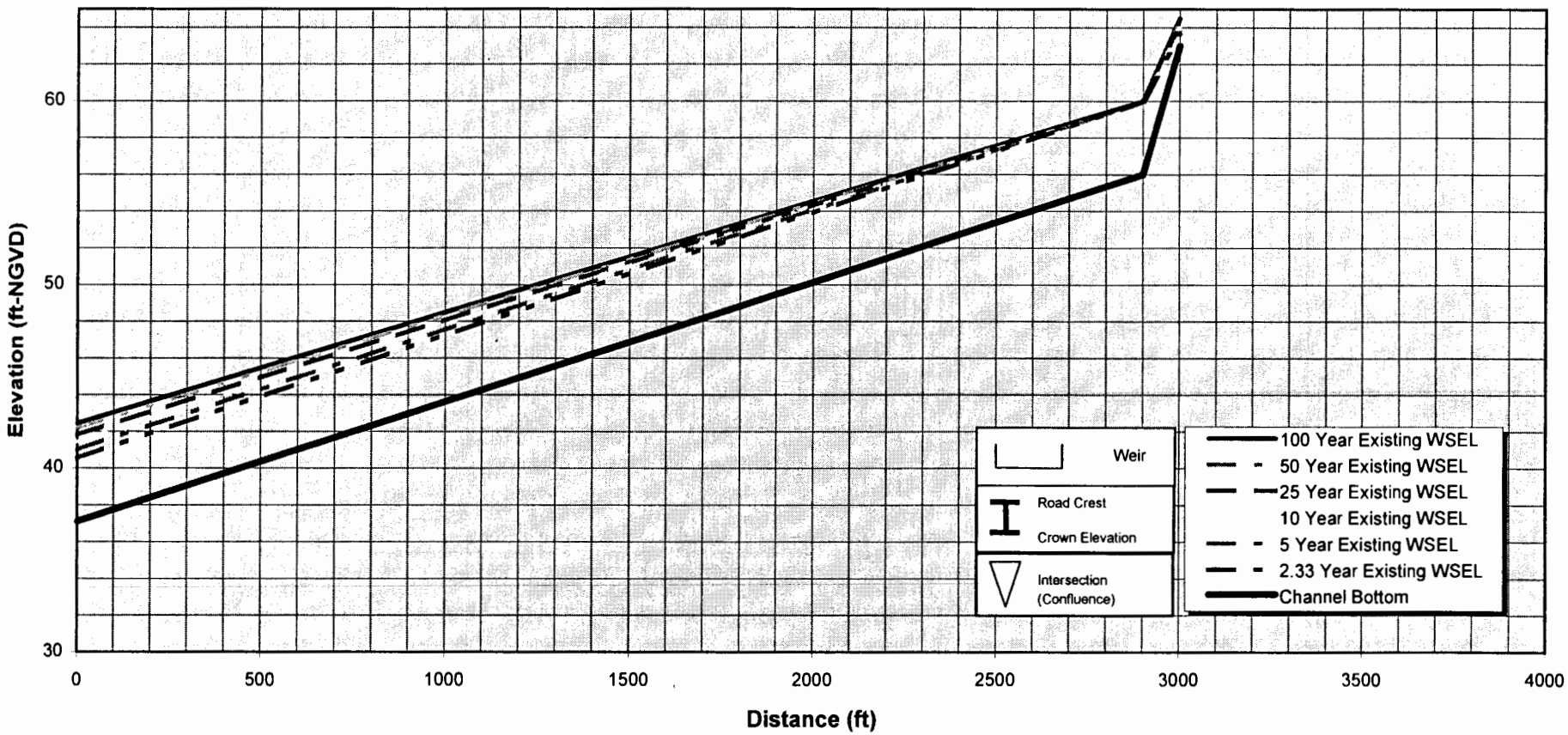
Cypress Creek Computed Water Surface Profiles	**Exhibit 6.1(a)** **Channel From Junction 500000 to 501100** Existing Conditions Model Sheet 4 of 5



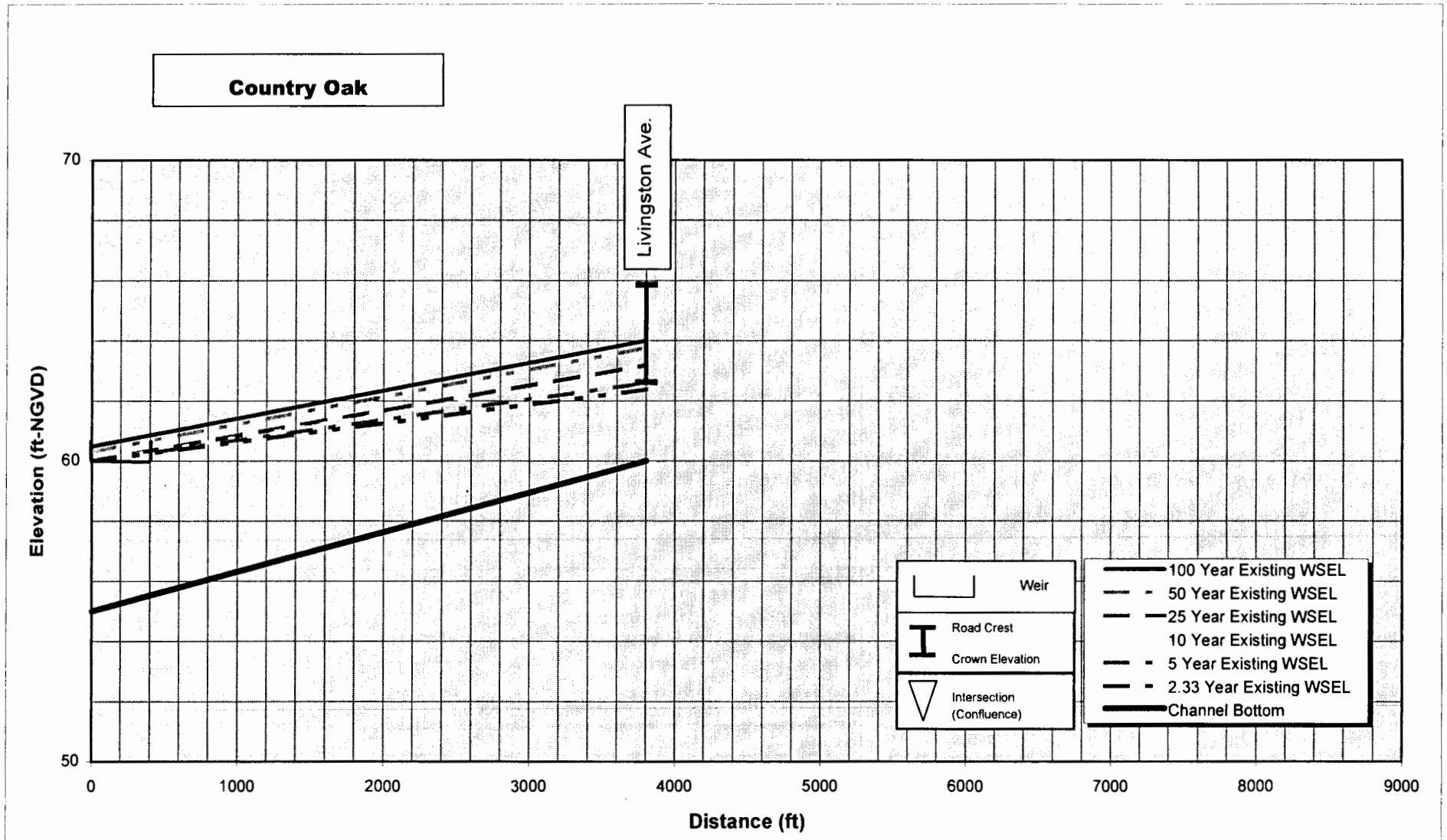
Cypress Creek
Computed Water Surface Profiles

Exhibit 6.1(a)
Main Channel From Junction 500000 to 501100
Existing Conditions Model
Sheet 5 of 5

County Line Drainage

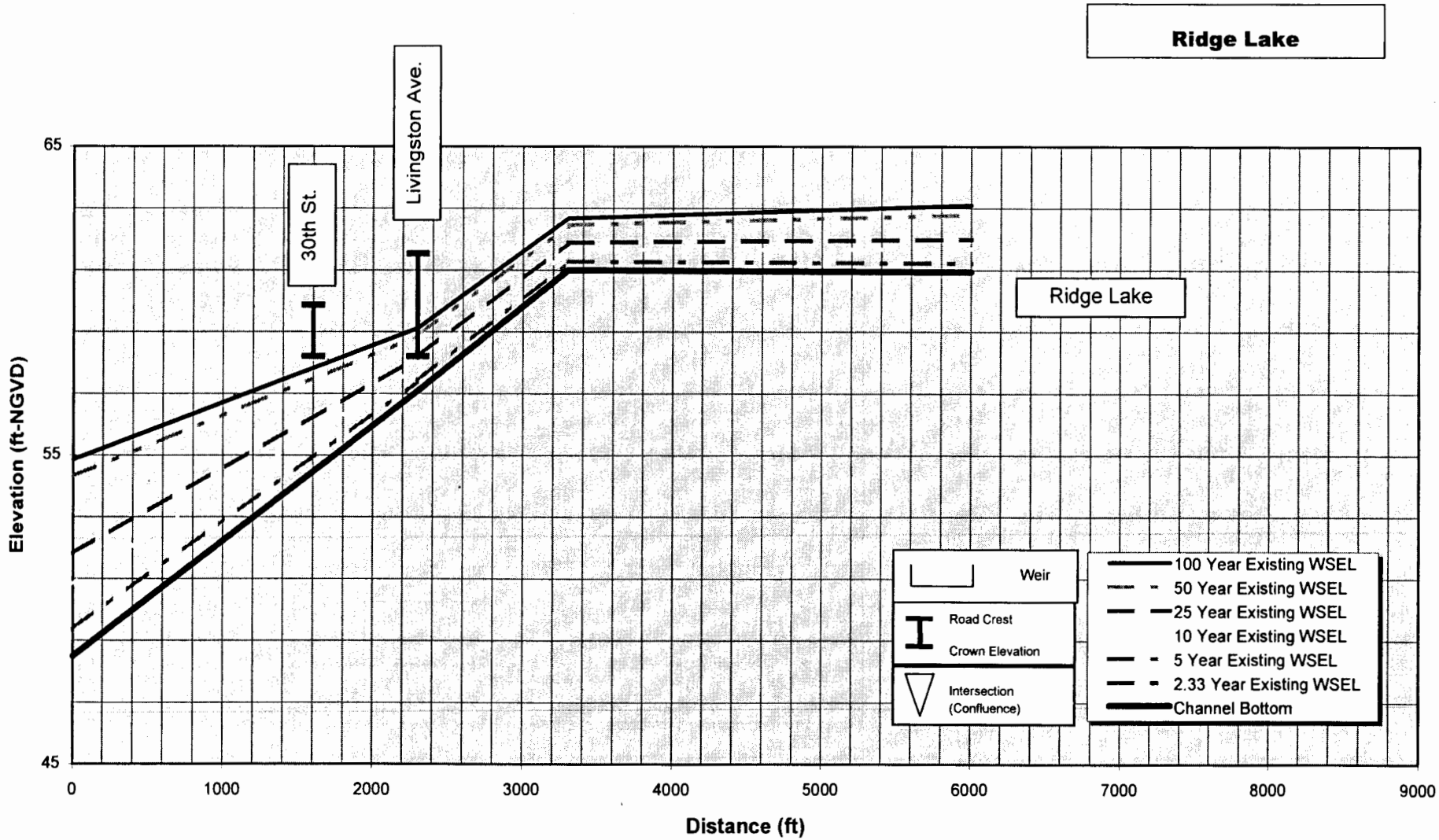


Cypress Creek Computed Water Surface Profiles	**Exhibit 6.1(b)** **County Line Drainage From Junction 501000 to 542220** Existing Conditions Model Sheet 1 of 1

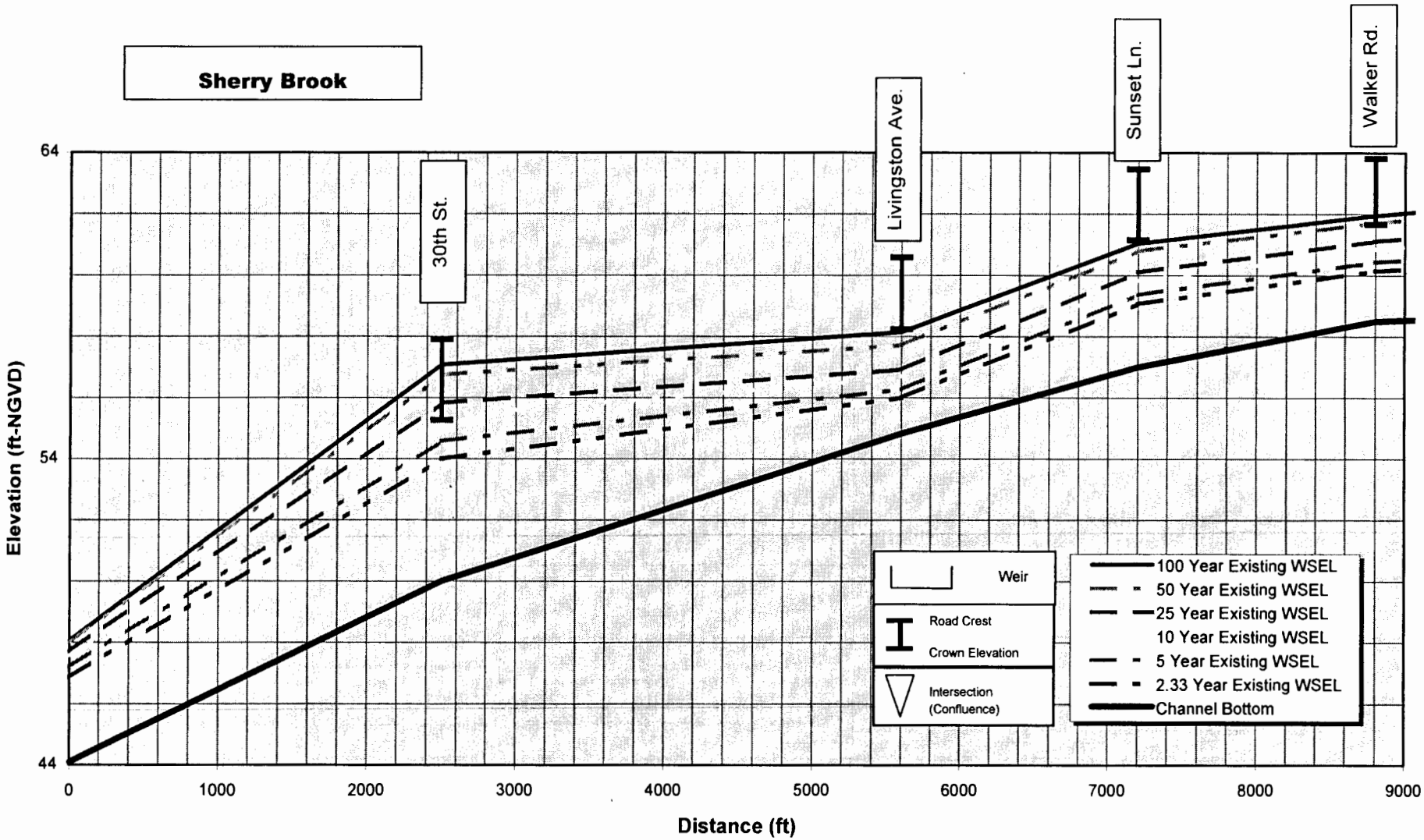


Cypress Creek
Computed Water Surface Profiles

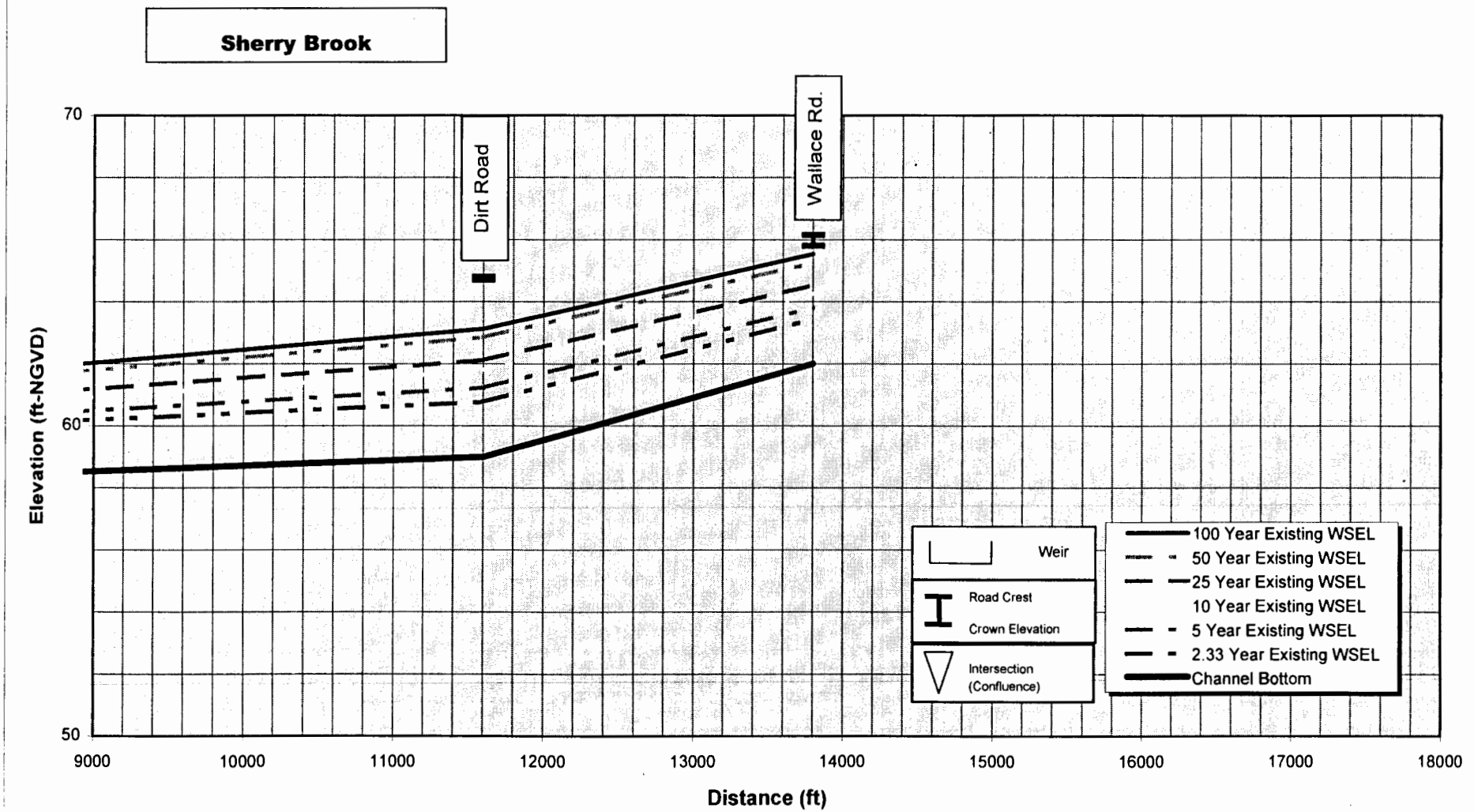
Exhibit 6.1(c)
Country Oak From Junction 500900 to 542150
Existing Conditions Model
Sheet 1 of 1



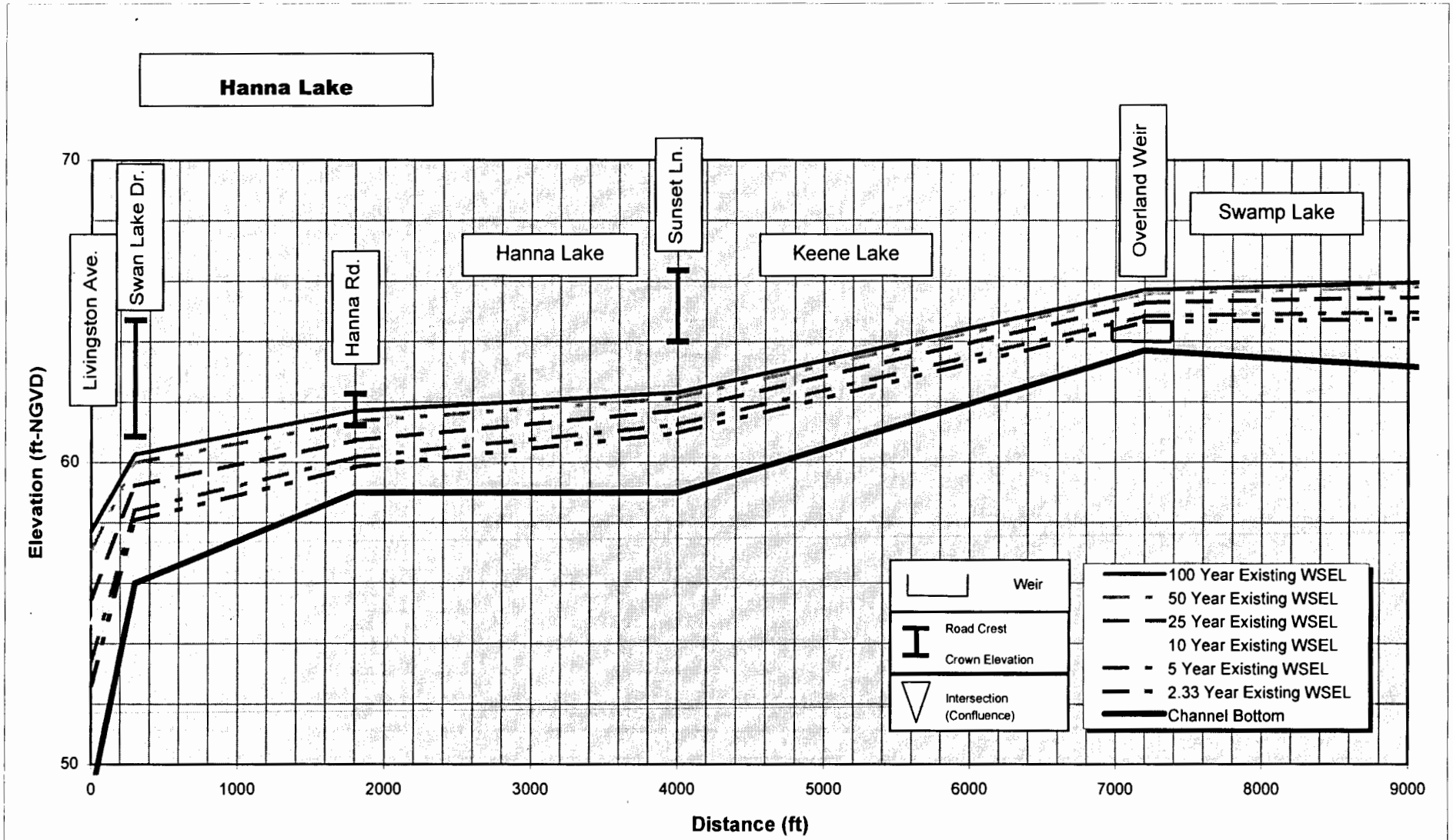
Cypress Creek Computed Water Surface Profiles	**Exhibit 6.1(d)** **Ridge Lake From Junction 500700 to 5542150** Existing Conditions Model Sheet 1 of 1



Cypress Creek Computed Water Surface Profiles	**Exhibit 6.1(e)** **Sherry Brook From Junction 500600 to 5542100** Existing Conditions Model Sheet 1 of 2

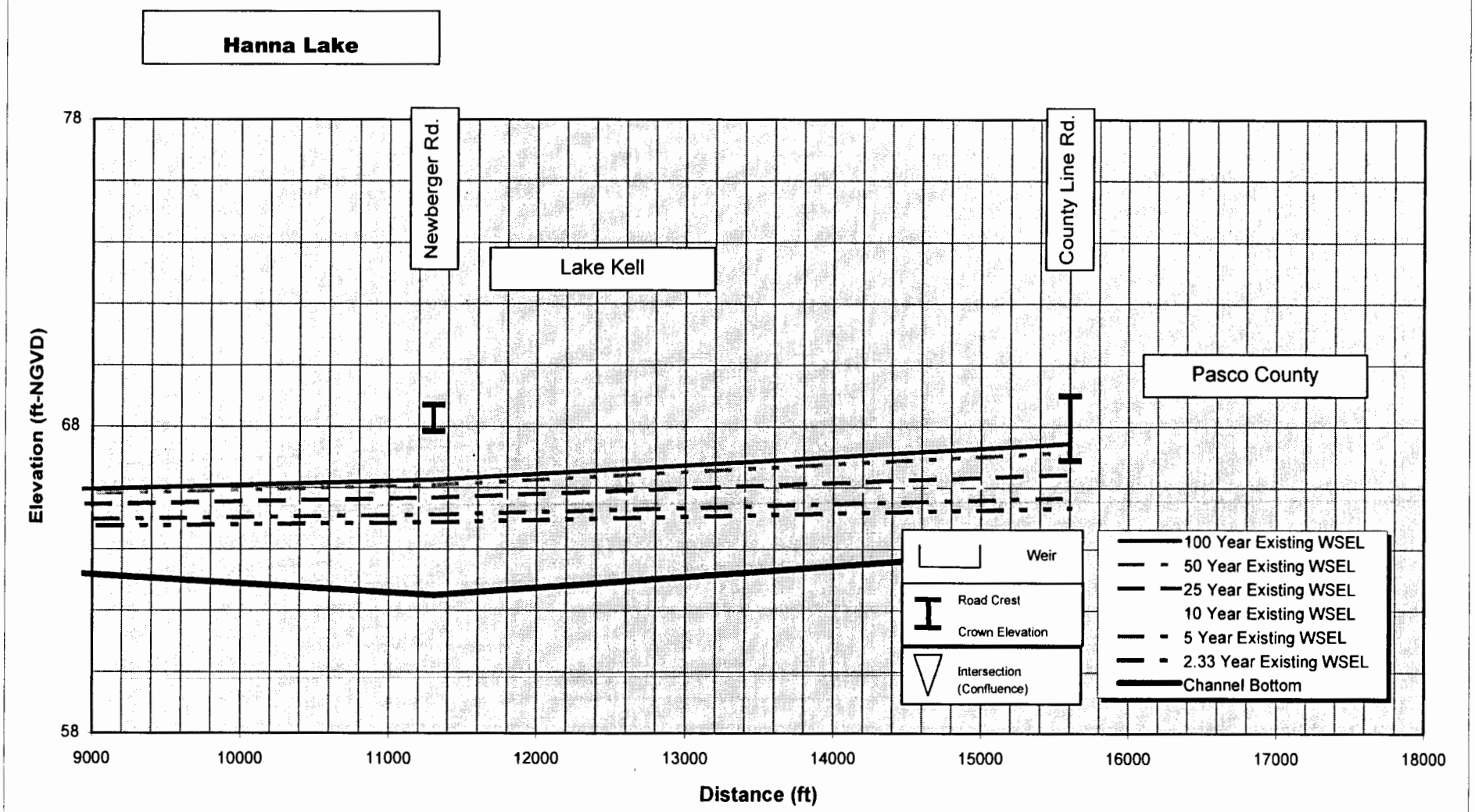


Cypress Creek Computed Water Surface Profiles	**Exhibit 6.1(e)** **Sherry Brook From Junction 500600 to 5542100** Existing Conditions Model Sheet 2 of 2



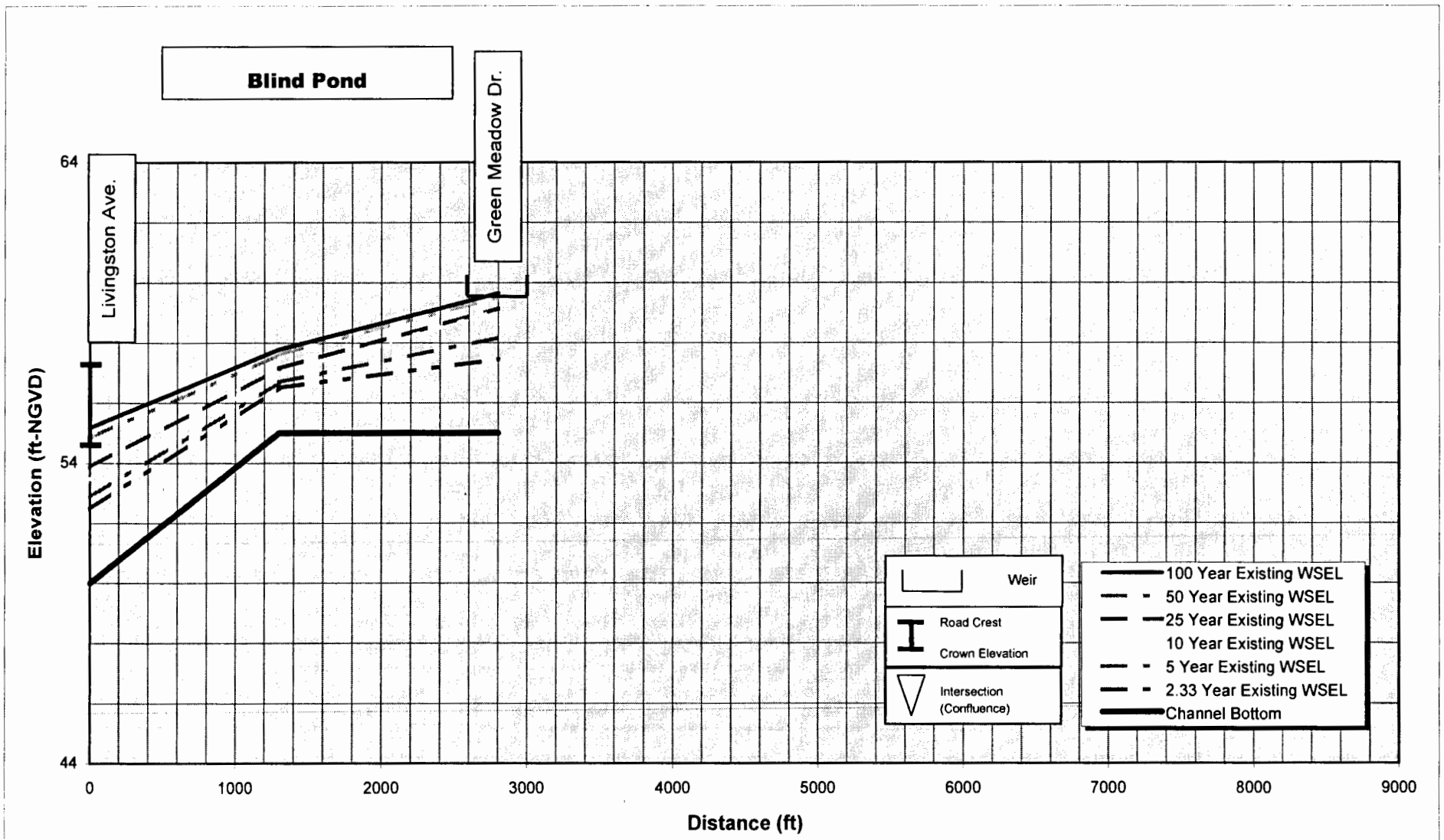
Cypress Creek
Computed Water Surface Profiles

Exhibit 6.1(f)
Hanna Lake From Junction 500500 to 541150
Existing Conditions Model
Sheet 1 of 2

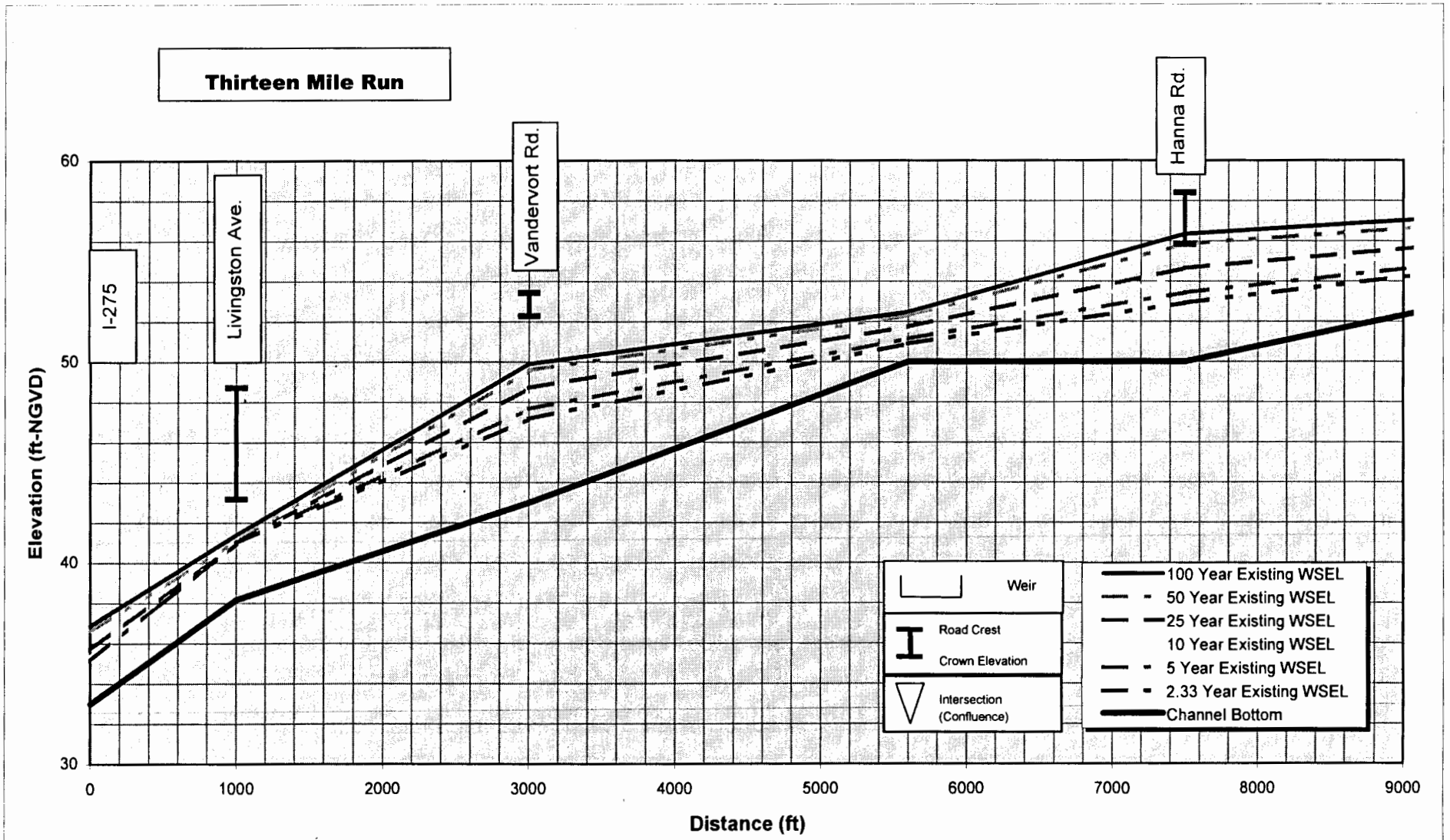


Cypress Creek
Computed Water Surface Profiles

Exhibit 6.1(f)
Hanna Lake From Junction 500500 to 541150
Existing Conditions Model
Sheet 2 of 2

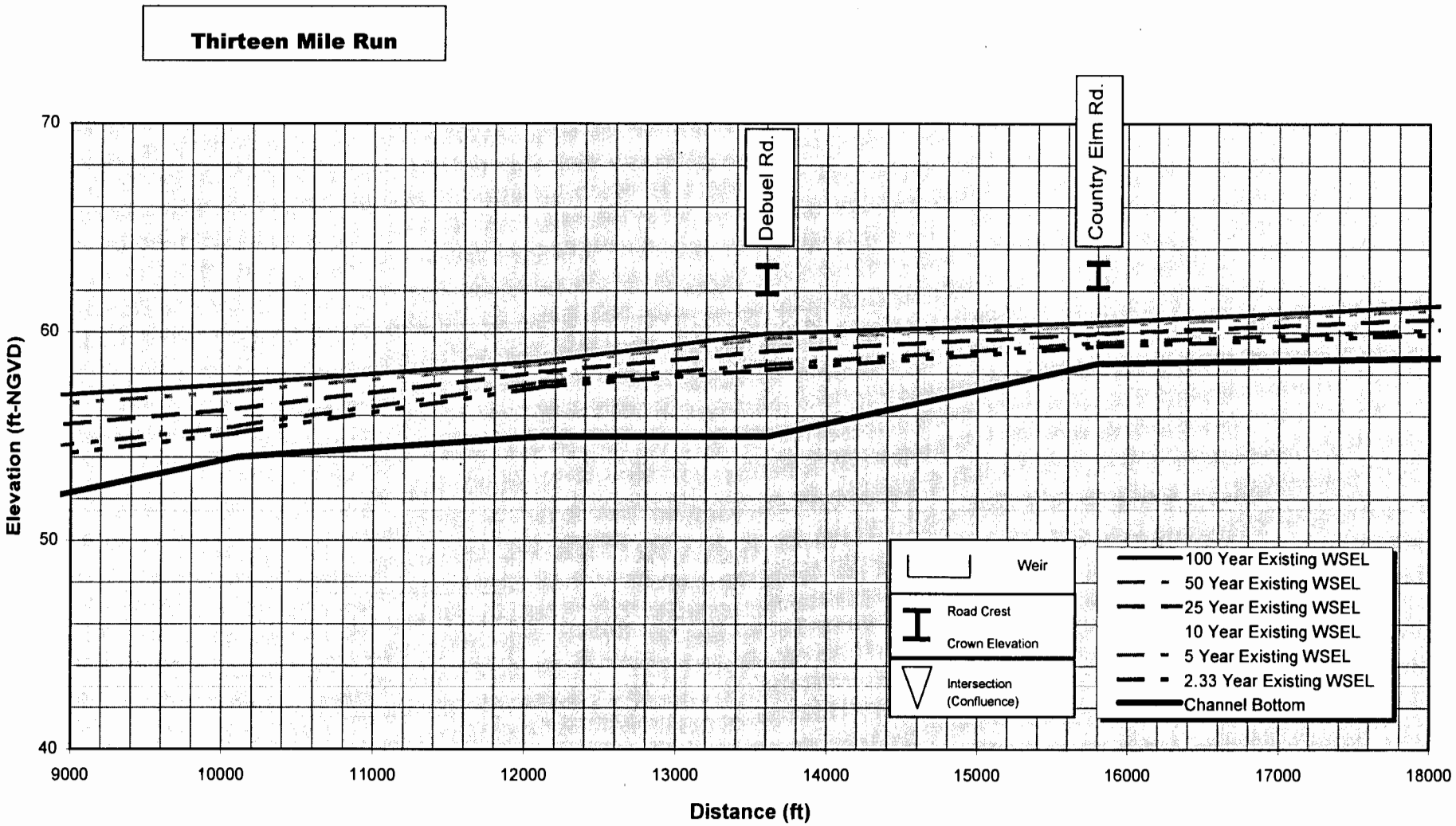


Cypress Creek Computed Water Surface Profiles	**Exhibit 6.1(g)** **Blind Pond From Junction 500400 to 530300** Existing Conditions Model Sheet 1 of 1

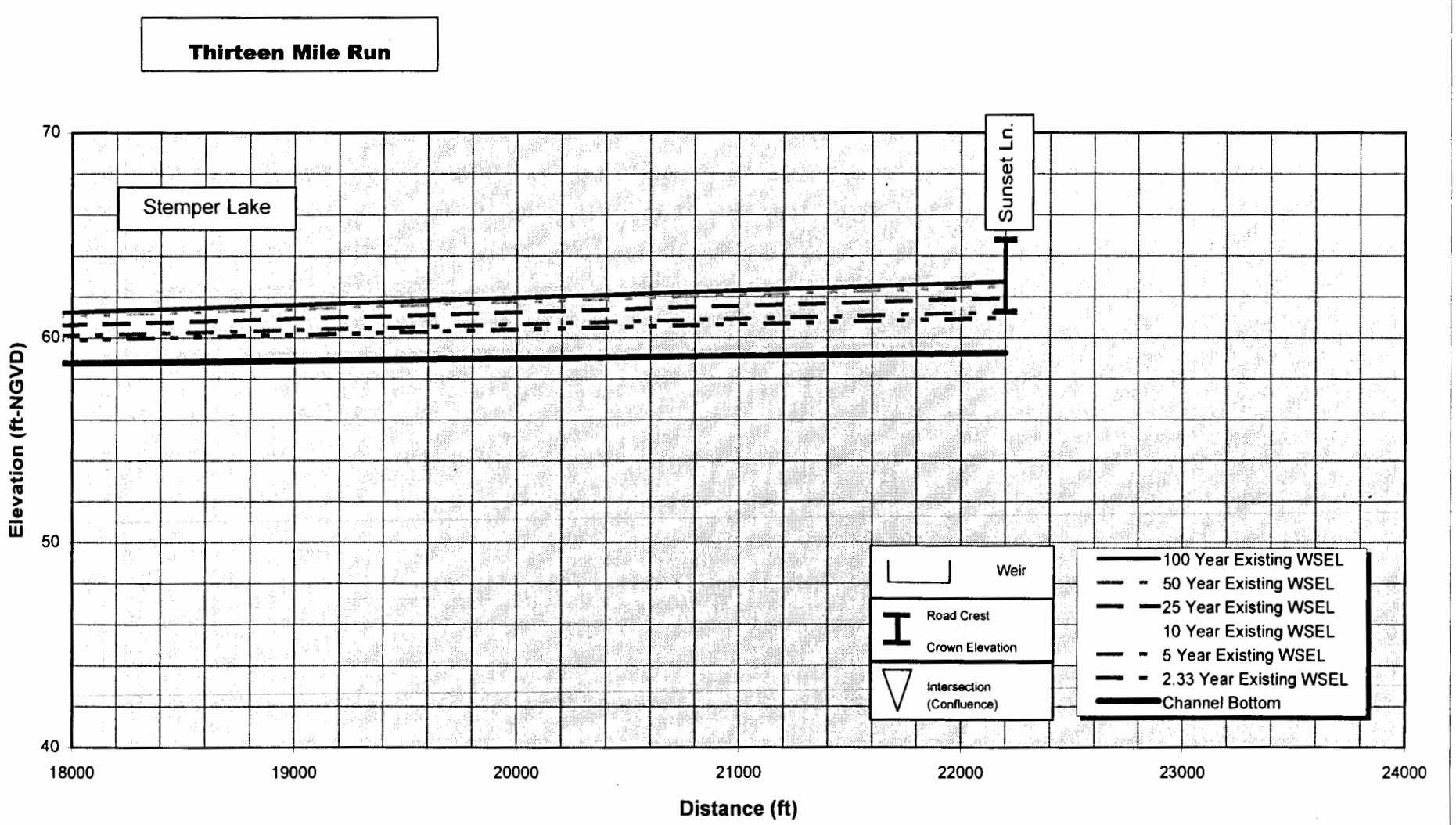


Cypress Creek
Computed Water Surface Profiles

Exhibit 6.1(h)
Thirteen Mile Run From Junction 500300 to 522000
Existing Conditions Model
Sheet 1 of 3



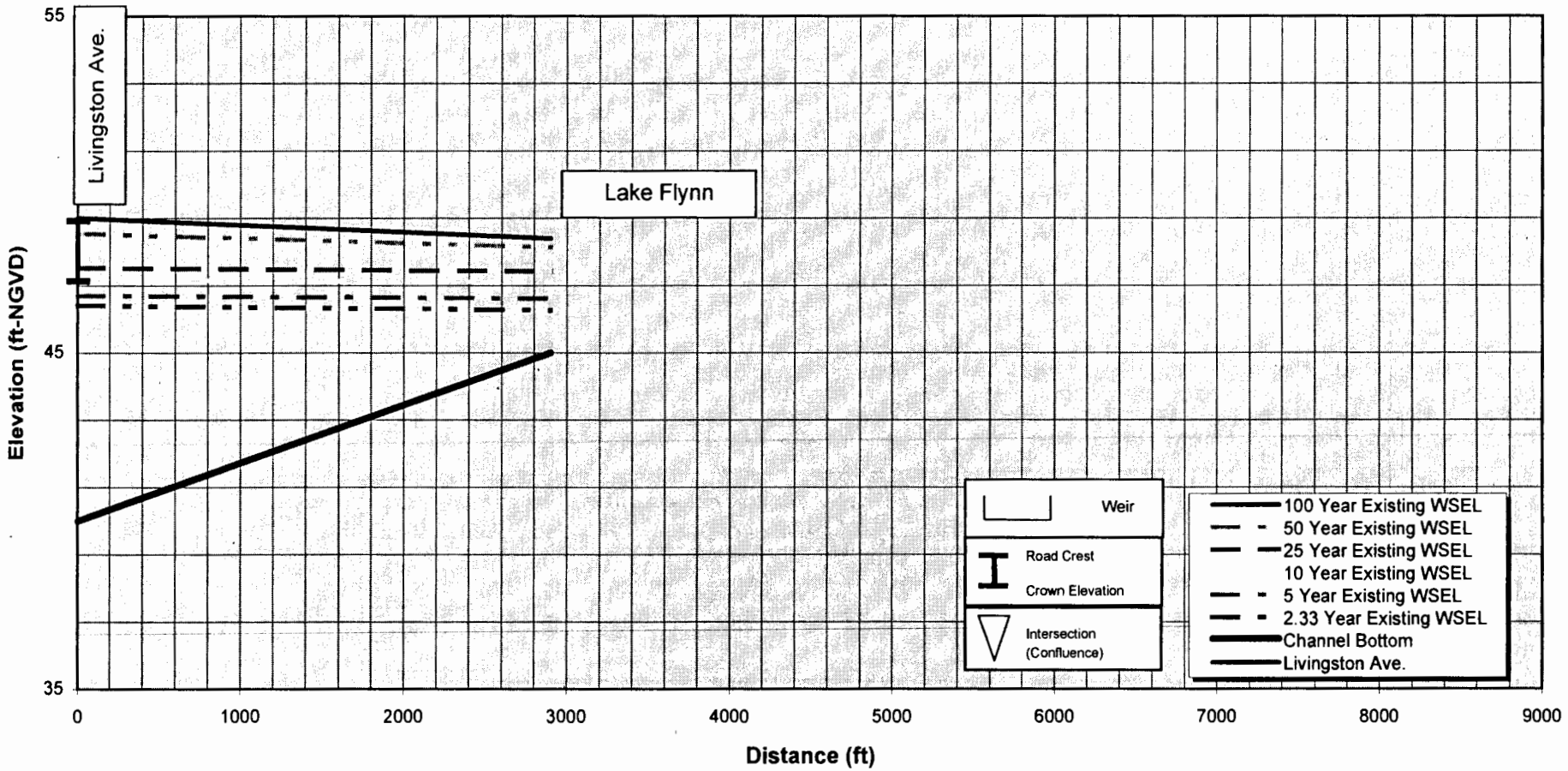
Cypress Creek Computed Water Surface Profiles	**Exhibit 6.1(h)** **Thirteen Mile Run From Junction 500300 to 522000** Existing Conditions Model Sheet 2 of 3



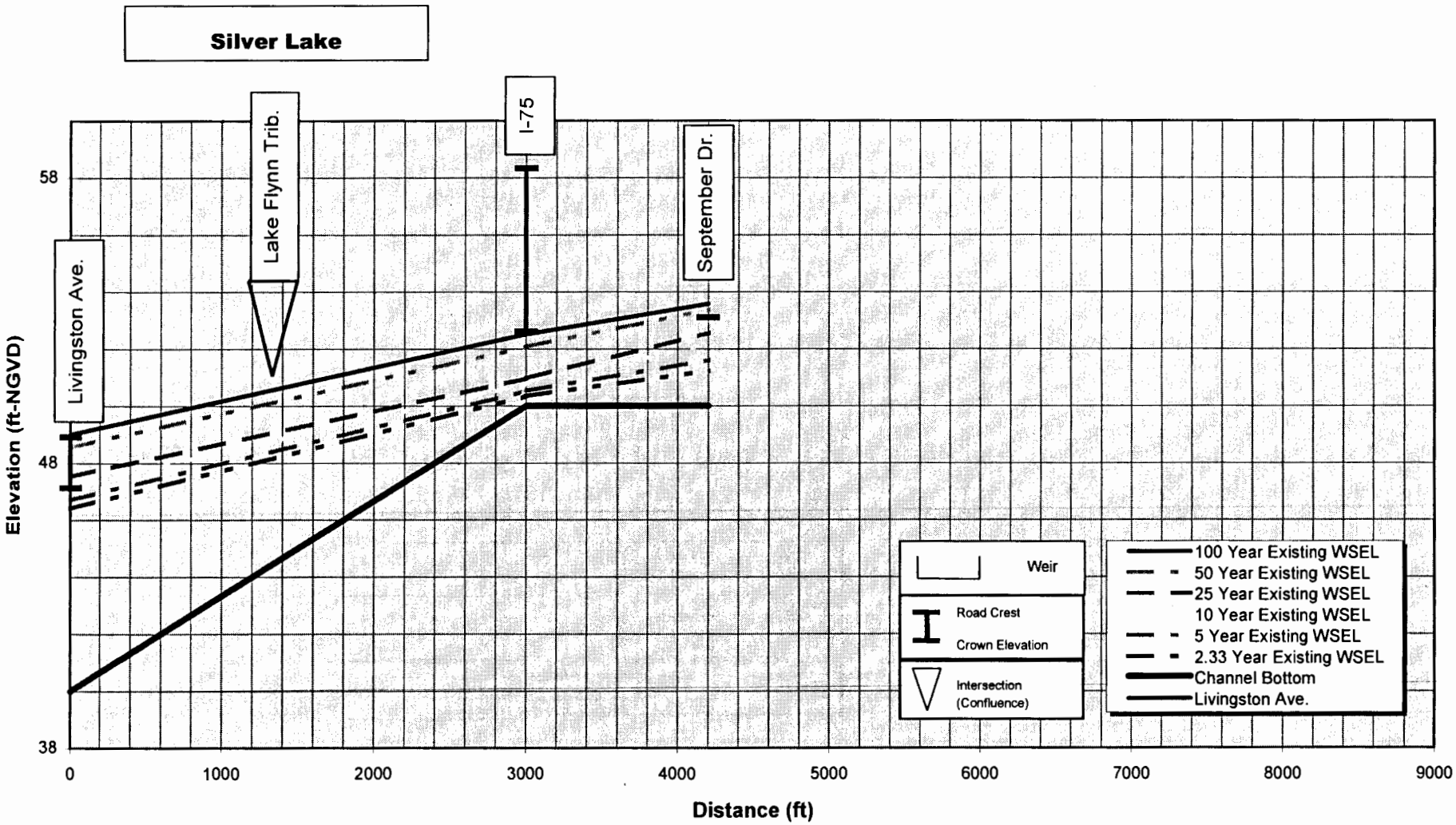
Cypress Creek
Computed Water Surface Profiles

Exhibit 6.1(h)
Thirteen Mile Run From Junction 500300 to 522000
Existing Conditions Model
Sheet 3 of 3

Lake Flynn

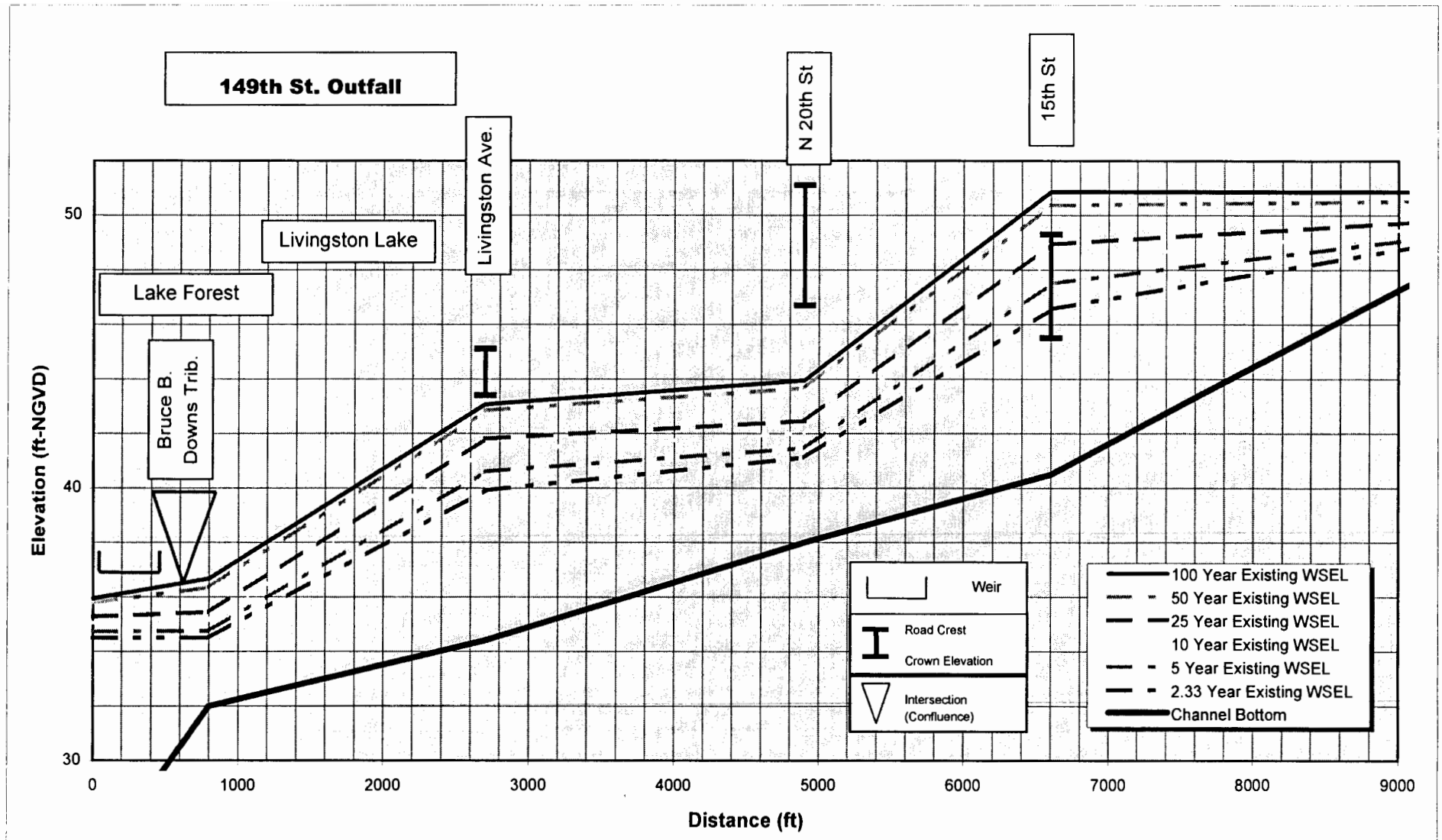


Cypress Creek Computed Water Surface Profiles	**Exhibit 6.1(i)** **Lake Flynn From Junction 500300 to 520200** Existing Conditions Model Sheet 1 of 1



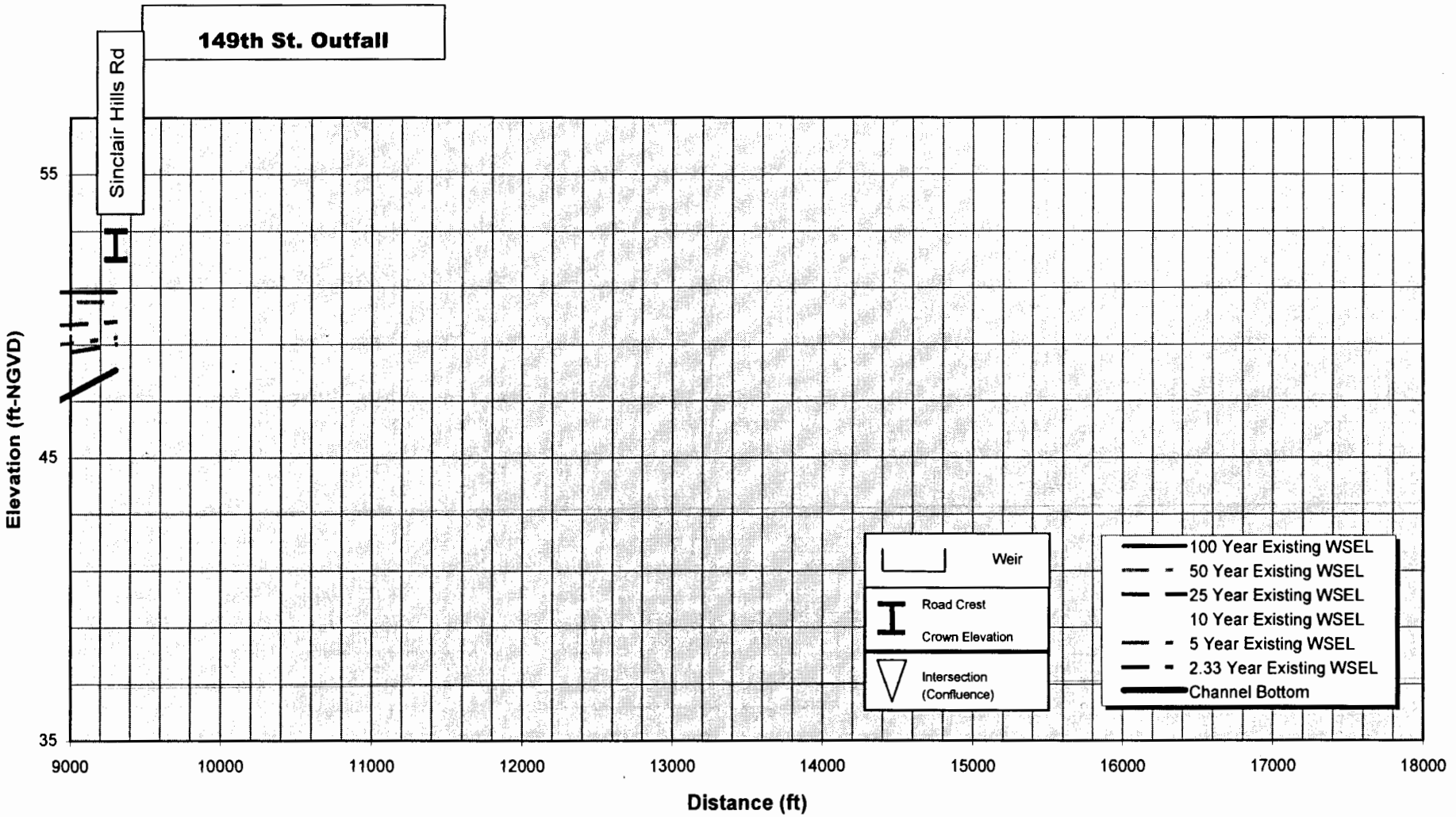
Cypress Creek
Computed Water Surface Profiles

Exhibit 6.1(j)
Silver Lake From Junction 500300 to 520400
Existing Conditions Model
Sheet 1 of 1



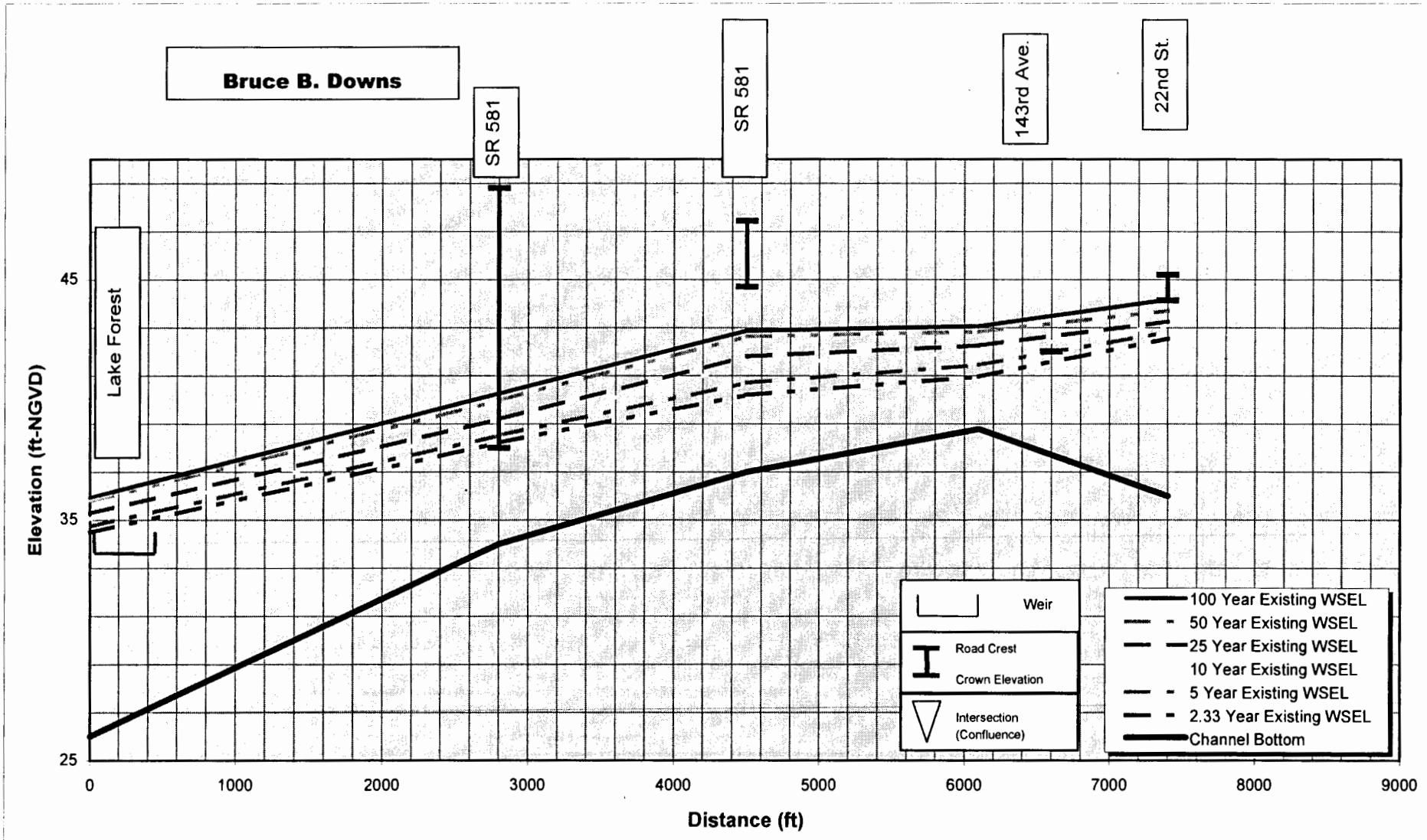
Cypress Creek
Computed Water Surface Profiles

Exhibit 6.1(k)
149th St. Outfall From Junction 500200 to 511300
Existing Conditions Model
Sheet 1 of 2



Cypress Creek
Computed Water Surface Profiles

Exhibit 6.1(k)
149th St. Outfall From Junction 500200 to 511300
Existing Conditions Model
Sheet 2 of 2



Cypress Creek
Computed Water Surface Profiles

Exhibit 6.1(l)
Bruce B. Downs From Junction 500100 to 510600
Existing Conditions Model
Sheet 1 of 1

Appendix C
Summary Output – Existing Conditions

2.33 yr - Existing Conditions

Peak Stages

	Junction ID	Junc. Invert	Peak Stage	Time to Peak
		(ft)	(ft)	(hr)
ZMAX	500000	20.50	30.80	48.00
ZMAX	500100	20.60	31.03	96.10
ZMAX	500200	25.80	31.04	96.20
ZMAX	500300	25.50	31.04	96.30
ZMAX	500400	27.00	31.07	96.80
ZMAX	500500	25.20	34.10	115.00
ZMAX	500600	31.80	34.10	115.00
ZMAX	500700	32.80	35.31	92.40
ZMAX	500800	33.00	35.39	92.40
ZMAX	500900	33.40	35.67	92.40
ZMAX	501000	34.50	36.44	77.50
ZMAX	501100	35.50	37.21	77.50
ZMAX	501200	36.50	37.98	77.50
ZMAX	501300	29.80	39.50	95.50
ZMAX	501400	25.00	39.79	64.50
ZMAX	501500	28.00	39.81	85.30
ZMAX	501600	25.00	39.65	82.60
ZMAX	501700	29.00	40.28	91.30
ZMAX	501800	30.00	40.34	91.30
ZMAX	501900	27.90	42.64	91.30
ZMAX	502000	26.10	43.41	91.40
ZMAX	502100	28.00	43.62	91.30
ZMAX	502200	32.00	43.70	91.40
ZMAX	510050	30.00	34.03	144.00
ZMAX	510070	31.71	34.12	18.90
ZMAX	510100	26.00	34.49	18.70
ZMAX	510105	33.00	34.73	18.40
ZMAX	510110	34.00	35.51	17.00
ZMAX	510115	35.00	36.52	16.90
ZMAX	510120	36.00	37.52	16.80
ZMAX	510150	32.00	34.50	18.70
ZMAX	510170	33.28	35.90	27.30
ZMAX	510175	33.57	36.25	27.10
ZMAX	510180	33.85	38.98	26.50
ZMAX	510185	34.03	39.58	26.10
ZMAX	510190	34.20	39.92	25.60
ZMAX	510200	34.00	38.23	15.80
ZMAX	510250	37.05	39.00	0.00
ZMAX	510260	39.00	41.03	13.20
ZMAX	510300	30.00	35.16	28.50
ZMAX	510400	37.00	40.20	33.20
ZMAX	510410	38.00	40.20	47.70
ZMAX	510450	38.78	40.98	144.00
ZMAX	510460	38.90	40.98	143.90
ZMAX	510470	39.70	40.98	143.80
ZMAX	510480	40.90	41.45	18.50
ZMAX	510500	34.84	39.92	25.60
ZMAX	510510	35.28	39.92	25.60
ZMAX	510520	35.71	40.52	14.60
ZMAX	510530	36.15	42.36	14.50
ZMAX	510540	36.58	44.63	14.00
ZMAX	510600	36.00	42.55	18.40

	Junction ID	Junc. Invert	Peak Stage	Time to Peak
		(ft)	(ft)	(hr)
ZMAX	510700	40.00	45.95	37.20
ZMAX	510800	34.40	39.92	25.60
ZMAX	510810	35.50	39.94	25.60
ZMAX	510820	36.00	39.98	25.60
ZMAX	510830	36.50	40.03	25.60
ZMAX	510840	37.00	40.15	25.40
ZMAX	510850	37.50	40.94	23.00
ZMAX	510900	38.00	41.13	22.60
ZMAX	510910	38.50	41.77	22.30
ZMAX	510920	39.00	42.05	22.00
ZMAX	510930	40.60	43.05	13.40
ZMAX	510940	41.00	44.12	20.60
ZMAX	511000	41.60	44.14	20.60
ZMAX	511010	42.20	44.32	20.50
ZMAX	511020	42.60	45.09	19.80
ZMAX	511030	43.40	46.18	19.70
ZMAX	511100	43.70	46.96	15.10
ZMAX	511200	43.40	46.57	19.70
ZMAX	511220	48.00	48.00	0.00
ZMAX	511300	48.10	49.02	25.20
ZMAX	511400	40.00	41.75	27.40
ZMAX	511500	45.00	46.32	20.00
ZMAX	511600	43.60	44.42	14.10
ZMAX	520100	40.00	46.41	21.10
ZMAX	520200	45.00	46.26	34.90
ZMAX	520300	45.00	45.85	26.10
ZMAX	520400	50.00	51.23	30.50
ZMAX	520600	50.00	50.35	17.60
ZMAX	520700	50.00	54.09	27.00
ZMAX	520750	33.00	35.15	0.20
ZMAX	520800	38.17	41.00	0.00
ZMAX	520900	43.00	47.18	26.00
ZMAX	521000	50.00	50.89	15.00
ZMAX	521100	50.00	52.92	25.40
ZMAX	521200	55.00	55.76	15.70
ZMAX	521300	52.00	54.69	29.40
ZMAX	521400	54.00	55.20	32.00
ZMAX	521500	54.00	55.16	14.50
ZMAX	521600	55.00	57.37	32.20
ZMAX	521700	55.00	58.20	25.80
ZMAX	521800	58.50	59.33	26.50
ZMAX	521900	60.00	60.79	28.80
ZMAX	522000	59.25	60.96	19.30
ZMAX	522100	60.00	61.78	28.30
ZMAX	522200	32.90	34.76	13.40
ZMAX	522300	50.00	51.30	26.10
ZMAX	530100	50.00	52.48	26.20
ZMAX	530150	50.00	56.27	15.20
ZMAX	530200	55.00	56.51	21.80
ZMAX	530300	55.00	57.45	26.90
ZMAX	530500	55.00	57.25	16.40
ZMAX	540100	53.60	56.38	17.60
ZMAX	540200	55.00	58.18	27.00
ZMAX	540300	48.83	52.62	14.50
ZMAX	540400	56.00	58.09	14.30
ZMAX	540450	60.00	62.15	28.10
ZMAX	540500	59.00	60.08	82.90
ZMAX	540600	59.00	61.09	71.60
ZMAX	540700	63.70	64.66	58.10
ZMAX	540800	60.00	61.69	26.60

	Junction ID	Junc. Invert	Peak Stage	Time to Peak
		(ft)	(ft)	(hr)
ZMAX	540900	64.00	66.51	16.00
ZMAX	541000	64.00	65.77	28.40
ZMAX	541100	62.50	64.87	32.50
ZMAX	541140	65.71	67.33	13.30
ZMAX	541150	64.00	65.34	33.20
ZMAX	541200	63.00	64.32	28.90
ZMAX	541300	69.00	69.97	12.70
ZMAX	542010	44.10	46.86	14.40
ZMAX	542020	50.00	54.00	14.50
ZMAX	542030	54.83	56.00	14.60
ZMAX	542035	58.50	58.60	0.00
ZMAX	542040	57.00	59.07	17.50
ZMAX	542050	60.00	62.25	27.90
ZMAX	542060	58.50	60.15	17.60
ZMAX	542070	60.20	61.13	14.00
ZMAX	542080	59.00	60.79	98.70
ZMAX	542090	60.00	61.35	27.20
ZMAX	542100	62.00	63.45	29.70
ZMAX	542110	55.00	56.19	29.70
ZMAX	542120	45.40	48.49	15.90
ZMAX	542130	55.00	57.08	20.80
ZMAX	542140	60.00	61.00	28.30
ZMAX	542150	60.00	60.94	28.10
ZMAX	542160	56.70	58.74	18.80
ZMAX	542170	57.90	59.19	15.50
ZMAX	542180	55.00	60.00	0.00
ZMAX	542190	60.00	62.38	21.10
ZMAX	542200	58.00	61.28	28.20
ZMAX	542210	56.00	60.00	0.00
ZMAX	542215	60.00	67.00	0.00
ZMAX	542220	63.00	63.55	16.20
ZMAX	542225	60.00	67.00	0.00
ZMAX	542230	60.00	66.19	1.60
ZMAX	542240	60.00	65.60	26.30
ZMAX	542250	62.50	67.22	17.50
ZMAX	542255	64.50	67.12	28.10
ZMAX	542260	63.00	67.16	19.00
ZMAX	542265	64.00	68.21	18.80
ZMAX	542270	63.50	67.92	45.80
ZMAX	542275	67.00	68.12	12.80
ZMAX	542280	63.45	67.09	26.30
ZMAX	542285	63.00	67.10	25.00
ZMAX	542290	63.07	66.76	1.00
ZMAX	542295	63.00	67.00	0.00
ZMAX	542305	63.20	64.00	24.00
ZMAX	542310	64.50	65.64	16.40
ZMAX	542320	67.00	67.85	25.30
ZMAX	542325	59.80	62.60	24.00
ZMAX	542327	60.00	62.66	24.00
ZMAX	542330	68.00	68.89	25.30
ZMAX	542350	66.06	67.54	18.10
ZMAX	542360	67.20	67.50	13.00
ZMAX	542370	76.50	78.00	0.00
ZMAX	542380	62.98	66.96	13.30
ZMAX	542390	64.50	66.76	1.00

2.33 yr - Existing Conditions

Conduit Flows

	Junction ID	Conduit Height	U/S Inv.	U/S Peak Stage	D/S Inv.	D/S Peak Stage	Peak Flow	Time to Peak
		(in.)	(ft)	(ft)	(ft)	(ft)	(cfs)	(hr)
QMAX	1510070	24.00	31.71	34.12	29.21	34.49	-9.00	17.80
QMAX	1510071	18.00	31.71	34.12	30.51	34.03	9.00	17.80
QMAX	1510180	30.00	33.85	38.98	33.57	36.25	30.00	26.38
QMAX	1510185	30.00	34.03	39.58	33.85	38.98	24.70	17.32
QMAX	1510190	30.00	34.20	39.92	34.03	39.58	26.80	15.33
QMAX	1510200	36.00	37.60	38.23	36.00	37.52	7.40	15.77
QMAX	1510201	36.00	37.60	38.23	36.00	37.52	7.40	15.77
QMAX	1510400	34.00	40.70	40.20	40.50	38.23	0.00	0.00
QMAX	1510401	34.00	40.70	40.20	40.50	38.23	0.00	0.00
QMAX	1510460	38.00	38.90	40.98	38.78	40.98	15.30	12.65
QMAX	1510461	38.00	38.90	40.98	38.78	40.98	15.30	12.65
QMAX	1510470	36.00	39.70	40.98	38.90	40.98	2.80	18.47
QMAX	1510471	36.00	39.70	40.98	38.90	40.98	2.80	18.47
QMAX	1510480	36.00	40.90	41.45	39.70	40.98	2.80	18.45
QMAX	1510481	36.00	40.90	41.45	39.70	40.98	2.80	18.45
QMAX	1510500	54.00	34.84	39.92	34.40	39.92	56.60	15.37
QMAX	1510510	54.00	35.28	39.92	34.84	39.92	92.20	14.72
QMAX	1510520	54.00	35.71	40.52	35.28	39.92	91.90	14.68
QMAX	1510530	48.00	36.15	42.36	35.71	40.52	94.30	14.13
QMAX	1510540	48.00	36.58	44.63	36.15	42.36	109.80	13.23
QMAX	1510600	24.00	42.13	42.55	40.85	41.45	2.80	18.43
QMAX	1510601	24.00	42.13	42.55	40.85	41.45	2.80	18.43
QMAX	1510810	84.00	34.80	39.94	34.50	39.92	35.40	24.35
QMAX	1510820	78.00	36.10	39.98	35.30	39.94	36.10	24.27
QMAX	1510830	78.00	36.60	40.03	36.10	39.98	36.60	24.25
QMAX	1510840	72.00	37.60	40.15	37.10	40.03	37.30	24.10
QMAX	1510850	66.00	38.80	40.94	38.10	40.15	39.10	23.95
QMAX	1510900	66.00	38.90	41.13	38.80	40.94	35.80	22.65
QMAX	1510910	66.00	39.60	41.77	38.90	41.13	35.80	22.33
QMAX	1510920	60.00	40.20	42.05	39.60	41.77	35.90	21.90
QMAX	1511000	60.00	41.60	44.14	41.00	44.12	32.20	19.82
QMAX	1511010	60.00	42.20	44.32	41.60	44.14	32.20	19.80
QMAX	1511020	48.00	42.60	45.09	42.20	44.32	32.20	19.77
QMAX	1511030	42.00	43.40	46.18	43.00	45.09	32.20	19.73
QMAX	1511100	36.00	44.80	46.96	44.70	46.57	23.50	15.07
QMAX	1511200	36.00	43.70	46.57	43.40	46.18	32.20	19.72
QMAX	1511300	18.00	48.10	49.02	48.00	46.57	3.20	25.22
QMAX	1511400	12.00	46.20	41.75	46.20	46.32	0.00	20.05
QMAX	1511500	24.00	45.00	46.32	44.50	31.04	13.60	20.05
QMAX	1511600	36.00	43.60	44.42	42.46	31.04	10.70	14.13
QMAX	1520100	24.00	45.13	46.41	44.43	31.04	9.60	21.10
QMAX	1520600	36.00	49.60	50.35	49.59	46.41	1.80	17.65
QMAX	1521100	54.00	51.32	52.92	50.87	50.89	18.40	25.37
QMAX	1521200	30.00	54.50	55.76	54.40	50.89	7.20	15.70
QMAX	1521400	18.00	58.15	55.20	57.62	52.92	0.00	0.00
QMAX	1521700	54.00	57.35	58.20	55.47	57.37	13.00	25.82
QMAX	1522200	30.00	32.90	34.76	32.19	31.04	20.20	13.45
QMAX	1530100	29.00	51.44	52.48	50.58	31.07	11.20	26.25
QMAX	1530150	30.00	54.50	56.27	54.40	52.48	11.50	15.22
QMAX	1540100	24.00	54.13	56.38	53.60	34.10	21.50	17.65
QMAX	1540200	24.00	58.00	58.18	57.90	56.38	0.10	27.00
QMAX	1540300	60.00	48.83	52.62	48.80	34.10	82.70	14.50
QMAX	1540400	54.00	56.35	58.09	56.21	52.62	17.00	14.27
QMAX	1540401	54.00	56.45	58.09	56.26	52.62	15.60	14.27
QMAX	1540500	36.00	59.23	60.08	58.60	58.09	8.70	82.92
QMAX	1540502	36.00	59.23	60.08	58.60	58.09	8.70	82.92
QMAX	1540503	36.00	59.23	60.08	58.60	58.09	8.70	82.92
QMAX	1540600	48.00	59.99	61.09	59.72	60.08	8.90	71.63
QMAX	1540602	48.00	59.99	61.09	59.99	60.08	6.00	71.63
QMAX	1540603	48.00	60.02	61.09	59.98	60.08	6.00	71.63

	Junction ID	Conduit Height	U/S Inv.	U/S Peak Stage	D/S Inv.	D/S Peak Stage	Peak Flow	Time to Peak
		(in.)	(ft)	(ft)	(ft)	(ft)	(cfs)	(hr)
QMAX	1540604	30.00	60.42	61.09	59.49	60.08	5.70	71.63
QMAX	1540700	36.00	64.31	64.66	64.30	61.13	0.40	58.15
QMAX	1540701	36.00	64.31	64.66	64.30	61.13	0.40	58.15
QMAX	1540800	30.00	61.00	61.69	60.90	61.09	2.20	26.60
QMAX	1541000	24.00	65.10	65.77	63.40	66.51	-7.20	16.03
QMAX	1542020	42.00	51.75	54.00	51.48	46.86	29.60	14.47
QMAX	1542021	42.00	51.75	54.00	51.48	46.86	29.60	14.47
QMAX	1542030	42.00	54.85	56.00	53.92	54.00	17.80	14.65
QMAX	1542031	42.00	54.85	56.00	53.92	54.00	17.80	14.65
QMAX	1542035	24.00	58.50	58.60	58.33	56.00	0.00	0.00
QMAX	1542040	42.00	57.65	59.07	57.46	56.00	11.50	17.47
QMAX	1542041	42.00	57.65	59.07	57.46	56.00	11.50	17.47
QMAX	1542060	36.00	58.70	60.15	58.63	59.07	9.80	17.58
QMAX	1542061	36.00	58.70	60.15	58.63	59.07	9.80	17.58
QMAX	1542090	18.00	61.64	61.35	61.63	60.79	0.00	0.00
QMAX	1542100	30.00	63.30	63.45	62.40	60.79	0.20	29.70
QMAX	1542120	30.00	45.40	48.49	45.32	35.31	39.80	15.93
QMAX	1542122	18.00	55.00	48.49	54.90	54.00	0.00	0.00
QMAX	1542130	24.00	56.20	57.08	56.15	48.49	3.20	20.80
QMAX	1542160	18.00	56.70	58.74	56.60	48.49	10.80	18.82
QMAX	1542170	16.00	57.90	59.19	57.41	58.74	7.40	15.47
QMAX	1542190	18.00	61.11	62.38	60.97	60.00	3.40	21.15
QMAX	1542215	30.00	60.40	67.00	60.00	62.66	73.20	0.03
QMAX	1542216	30.00	60.40	67.00	60.00	62.66	73.20	0.03
QMAX	1542225	30.00	61.50	67.00	61.40	67.00	54.60	20.40
QMAX	1542230	24.00	63.00	66.19	62.90	67.00	20.20	6.05
QMAX	1542255	12.00	65.23	67.12	65.10	67.16	-1.20	17.83
QMAX	1542256	12.00	65.77	67.12	65.54	67.22	-1.70	14.98
QMAX	1542260	24.00	63.00	67.16	63.00	67.10	8.30	0.05
QMAX	1542261	18.00	64.68	67.16	64.42	67.09	5.40	0.05
QMAX	1542262	18.00	64.63	67.16	64.48	67.09	5.40	0.05
QMAX	1542263	30.00	63.64	67.16	63.49	67.09	18.20	0.05
QMAX	1542265	48.00	64.00	68.21	63.80	67.16	23.50	71.58
QMAX	1542275	30.00	67.00	68.12	66.80	67.16	6.10	12.83
QMAX	1542280	24.00	66.27	67.09	66.27	66.76	2.00	26.30
QMAX	1542285	30.00	63.78	67.10	63.45	67.09	9.80	0.08
QMAX	1542290	30.00	63.07	66.76	62.98	66.96	-21.20	13.23
QMAX	1542310	29.00	64.85	65.64	63.20	64.00	7.70	21.57
QMAX	1542350	15.00	66.06	67.54	65.94	66.96	4.60	18.07
QMAX	2510150	84.00	32.00	34.50	31.19	34.49	42.00	26.50
QMAX	2510800	108.00	34.50	39.92	34.20	39.92	41.40	16.33
QMAX	2520750	60.00	33.00	35.15	32.80	31.04	93.90	0.17
QMAX	2520800	60.00	38.17	41.00	37.98	35.15	184.90	0.00
QMAX	2541100	38.00	63.80	64.87	63.70	64.66	39.50	31.57
QMAX	2541150	36.00	64.00	65.34	63.90	64.87	37.50	33.28
QMAX	3510250	34.00	37.05	39.00	36.85	38.23	24.90	0.02
QMAX	3510260	29.00	39.10	41.03	39.00	38.23	25.40	13.17
QMAX	3520900	84.00	45.27	47.18	44.81	41.00	36.30	25.97
QMAX	3521300	36.00	55.81	54.69	55.18	52.92	0.00	0.00
QMAX	3521500	36.00	54.00	55.16	53.85	52.92	12.30	14.52
QMAX	3521501	36.00	54.00	55.16	53.85	52.92	12.30	14.52
QMAX	3521800	36.00	58.61	59.33	57.85	58.20	7.60	26.50
QMAX	3521801	36.00	58.66	59.33	58.21	58.20	4.20	26.48
QMAX	3522000	24.00	59.25	60.96	58.99	59.33	13.90	19.27
QMAX	3541140	14.00	65.71	67.33	65.65	67.16	3.90	13.15
QMAX	3542080	29.00	60.59	60.79	60.55	60.15	0.10	98.73
QMAX	6542327	240.00	60.00	62.66	59.80	62.60	177.40	0.05
QMAX	9500100	473.00	20.60	31.03	20.50	30.80	935.20	17.80
QMAX	9500200	410.00	25.80	31.04	20.60	31.03	892.30	18.03
QMAX	9500300	414.00	25.80	31.04	25.50	31.04	-821.10	15.53
QMAX	9500400	396.00	27.00	31.07	25.50	31.04	879.30	14.27
QMAX	9500500	298.00	27.00	31.07	25.20	34.10	-655.60	117.93
QMAX	9500600	218.00	31.80	34.10	25.20	34.10	1271.60	14.65
QMAX	9500700	326.00	32.80	35.31	31.80	34.10	657.90	105.27
QMAX	9500800	324.00	33.00	35.39	32.80	35.31	644.90	103.73
QMAX	9500900	319.00	33.40	35.67	33.00	35.39	637.20	98.58
QMAX	9501000	186.00	34.50	36.44	33.40	35.67	635.00	77.48

	Junction ID	Conduit Height	U/S Inv.	U/S Peak Stage	D/S Inv.	D/S Peak Stage	Peak Flow	Time to Peak
		(in.)	(ft)	(ft)	(ft)	(ft)	(cfs)	(hr)
QMAX	9501100	294.00	35.50	37.21	34.50	36.44	636.00	77.47
QMAX	9501200	282.00	36.50	37.98	35.50	37.21	637.00	77.45
QMAX	9501300	362.00	36.50	37.98	29.80	39.50	-639.10	95.45
QMAX	9501400	228.00	29.80	39.50	25.00	39.79	-839.50	59.78
QMAX	9501500	228.00	28.00	39.81	25.00	39.79	1139.30	95.07
QMAX	9501600	234.00	28.00	39.81	25.00	39.65	-814.00	65.28
QMAX	9501700	264.00	29.00	40.28	25.00	39.65	639.90	94.53
QMAX	9501800	276.00	30.00	40.34	29.00	40.28	638.60	94.88
QMAX	9501900	289.00	30.00	40.34	27.90	42.64	-638.00	96.02
QMAX	9502000	299.00	27.90	42.64	26.10	43.41	-637.90	95.98
QMAX	9502100	288.00	28.00	43.62	26.10	43.41	638.00	58.73
QMAX	9502200	276.00	32.00	43.70	28.00	43.62	638.00	56.77
QMAX	9510105	150.00	33.00	34.73	32.00	34.49	13.50	16.93
QMAX	9510110	150.00	34.00	35.51	33.00	34.73	14.00	17.03
QMAX	9510115	150.00	35.00	36.52	34.00	35.51	14.00	16.90
QMAX	9510120	150.00	36.00	37.52	35.00	36.52	14.00	16.77
QMAX	9510170	240.00	33.33	35.90	33.08	34.50	40.10	27.27
QMAX	9510175	240.00	33.57	36.25	33.28	35.90	40.20	26.90
QMAX	9510180	240.00	37.36	38.98	37.07	36.25	10.30	26.55
QMAX	9510185	240.00	37.53	39.58	37.36	38.98	22.50	26.12
QMAX	9510190	240.00	37.70	39.92	37.53	39.58	27.00	25.65
QMAX	9510410	240.00	39.70	40.20	34.40	40.20	-20.40	20.25
QMAX	9510450	240.00	41.50	40.98	39.70	40.20	0.00	0.00
QMAX	9510930	240.00	40.60	43.05	40.20	42.05	37.20	13.38
QMAX	9510940	240.00	41.00	44.12	40.60	43.05	32.10	20.57
QMAX	9511220	240.00	48.00	48.00	47.80	46.57	0.00	0.00
QMAX	9542010	1188.00	44.10	46.86	44.00	34.10	90.20	14.33
QMAX	9542070	60.00	60.20	61.13	59.50	60.15	15.10	13.97
QMAX	9542380	120.00	65.30	66.96	65.20	65.64	4.90	13.27

2.33 yr - Existing Conditions

Weir Flows

	Weir ID	U/S Jcn.	D/S Jcn.	U/S Inv.	D/S Inv.	Weir Elev	U/S Peak Stage	Peak Flow	D/S Peak Stage	Time to Peak
				(ft)	(ft)	(ft)	(ft)	(cfs)	(ft)	(hr)
QWEIR	90410	510300	510200	30.00	30.00	34.00	35.16	1.00	38.23	10.90
QWEIR	90411	500000	0	25.40	25.40	0.00	30.80	1059.60	0.00	17.60
QWEIR	90412	542305	0	63.20	63.20	0.00	64.00	7.70	0.00	21.60
QWEIR	90413	542325	0	59.80	59.80	0.00	62.60	177.40	0.00	0.10
QWEIR	6521000	521000	520900	50.00	50.00	43.00	50.89	41.90	47.18	15.00
QWEIR	6521600	521600	521500	55.00	57.00	54.00	57.37	11.40	55.16	32.20
QWEIR	6530200	530200	530100	55.00	56.30	50.00	56.51	4.80	52.48	21.80
QWEIR	6530500	530500	540100	55.00	57.00	53.60	57.25	19.30	56.38	16.40
QWEIR	6540700	540700	540600	63.70	64.00	59.00	64.65	26.20	60.97	48.00
QWEIR	6542180	542180	500900	55.00	58.00	36.50	60.00	141.40	38.32	0.00
QWEIR	6542220	542220	542210	63.00	63.00	56.00	63.55	20.30	60.00	16.20
QWEIR	6542227	542225	542295	60.00	65.00	63.00	67.00	-51.80	67.00	21.40
QWEIR	6542250	542250	542295	62.50	67.00	63.00	67.22	5.30	67.00	17.50
QWEIR	6542255	542255	542260	64.50	67.00	63.00	67.14	-3.40	67.17	19.10
QWEIR	6542281	542280	542290	63.45	66.70	63.07	67.10	12.50	66.76	27.30
QWEIR	6542296	542295	542290	63.00	66.50	63.07	67.00	17.30	66.76	0.00
QWEIR	6542297	542295	542290	63.00	64.30	63.07	67.00	142.70	66.76	0.00
QWEIR	6542298	542295	542290	63.00	65.50	63.07	67.00	78.00	66.76	0.00
QWEIR	6542360	542360	542380	67.20	67.20	62.98	67.50	16.20	66.96	13.00
QWEIR	6542370	542370	542350	76.50	76.50	66.06	78.00	90.90	67.54	0.00
QWEIR	6542390	542390	542290	64.50	66.00	63.07	66.76	5.60	66.76	12.50
QWEIR	7542225	542225	542215	60.00	66.50	60.00	67.00	23.60	67.00	0.20
QWEIR	7542230	542230	542215	60.00	66.50	60.00	66.19	-35.30	67.00	0.00
QWEIR	8510100	510100	500200	26.00	34.05	25.50	34.49	58.80	30.77	18.70
QWEIR	8541300	541300	541200	69.00	69.43	63.00	69.97	16.30	64.32	12.70
QWEIR	8542270	542270	542265	63.50	67.00	64.00	67.75	3.80	67.69	22.10

5 yr - Existing Conditions

Peak Stages

	Junction ID	Junc. Invert	Peak Stage	Time to Peak
		(ft)	(ft)	(hr)
ZMAX	500000	20.50	31.80	48.00
ZMAX	500100	20.60	32.25	87.10
ZMAX	500200	25.80	32.26	87.00
ZMAX	500300	25.50	32.26	87.10
ZMAX	500400	27.00	32.30	86.80
ZMAX	500500	25.20	34.73	87.60
ZMAX	500600	31.80	34.73	87.70
ZMAX	500700	32.80	35.51	46.80
ZMAX	500800	33.00	35.62	48.70
ZMAX	500900	33.40	36.02	52.90
ZMAX	501000	34.50	36.85	57.20
ZMAX	501100	35.50	37.64	48.70
ZMAX	501200	36.50	38.38	35.40
ZMAX	501300	29.80	40.16	35.40
ZMAX	501400	25.00	40.32	35.40
ZMAX	501500	28.00	40.34	35.40
ZMAX	501600	25.00	40.46	35.40
ZMAX	501700	29.00	41.41	35.40
ZMAX	501800	30.00	41.50	35.40
ZMAX	501900	27.90	44.49	35.40
ZMAX	502000	26.10	45.59	35.40
ZMAX	502100	28.00	45.88	35.40
ZMAX	502200	32.00	45.91	35.40
ZMAX	510050	30.00	34.07	143.90
ZMAX	510070	31.71	34.31	17.50
ZMAX	510100	26.00	34.73	17.20
ZMAX	510105	33.00	35.31	16.40
ZMAX	510110	34.00	36.27	15.90
ZMAX	510115	35.00	37.27	15.80
ZMAX	510120	36.00	38.27	15.70
ZMAX	510150	32.00	34.75	17.30
ZMAX	510170	33.28	36.44	25.10
ZMAX	510175	33.57	36.87	25.00
ZMAX	510180	33.85	40.02	24.60
ZMAX	510185	34.03	40.38	24.40
ZMAX	510190	34.20	40.61	24.20
ZMAX	510200	34.00	38.53	15.10
ZMAX	510250	37.05	39.00	0.00
ZMAX	510260	39.00	41.34	13.10
ZMAX	510300	30.00	36.06	28.80
ZMAX	510400	37.00	40.71	33.40
ZMAX	510410	38.00	40.71	45.60
ZMAX	510450	38.78	41.47	144.00
ZMAX	510460	38.90	41.48	136.40
ZMAX	510470	39.70	41.50	143.90
ZMAX	510480	40.90	41.78	17.20
ZMAX	510500	34.84	40.63	24.60
ZMAX	510510	35.28	40.64	24.60
ZMAX	510520	35.71	41.88	14.50
ZMAX	510530	36.15	44.88	14.10
ZMAX	510540	36.58	46.17	13.90
ZMAX	510600	36.00	42.82	17.20

	Junction ID	Junc. Invert	Peak Stage	Time to Peak
		(ft)	(ft)	(hr)
ZMAX	510700	40.00	46.18	26.80
ZMAX	510800	34.40	40.61	24.20
ZMAX	510810	35.50	40.64	23.80
ZMAX	510820	36.00	40.70	23.50
ZMAX	510830	36.50	40.75	23.30
ZMAX	510840	37.00	40.87	23.10
ZMAX	510850	37.50	41.28	22.70
ZMAX	510900	38.00	41.47	22.10
ZMAX	510910	38.50	42.18	14.30
ZMAX	510920	39.00	42.52	13.70
ZMAX	510930	40.60	43.51	13.30
ZMAX	510940	41.00	44.57	20.50
ZMAX	511000	41.60	44.60	20.50
ZMAX	511010	42.20	44.80	20.40
ZMAX	511020	42.60	45.59	19.90
ZMAX	511030	43.40	46.79	19.70
ZMAX	511100	43.70	47.47	14.90
ZMAX	511200	43.40	47.51	19.70
ZMAX	511220	48.00	48.00	0.00
ZMAX	511300	48.10	49.25	24.90
ZMAX	511400	40.00	42.23	27.30
ZMAX	511500	45.00	46.62	20.10
ZMAX	511600	43.60	44.57	14.00
ZMAX	520100	40.00	46.70	21.50
ZMAX	520200	45.00	46.61	35.00
ZMAX	520300	45.00	46.09	26.10
ZMAX	520400	50.00	51.61	30.50
ZMAX	520600	50.00	50.53	17.40
ZMAX	520700	50.00	54.50	27.10
ZMAX	520750	33.00	35.15	0.20
ZMAX	520800	38.17	41.00	0.00
ZMAX	520900	43.00	47.67	24.90
ZMAX	521000	50.00	51.14	15.10
ZMAX	521100	50.00	53.43	25.80
ZMAX	521200	55.00	55.97	15.60
ZMAX	521300	52.00	55.21	29.50
ZMAX	521400	54.00	55.59	32.10
ZMAX	521500	54.00	55.48	14.10
ZMAX	521600	55.00	57.60	24.80
ZMAX	521700	55.00	58.44	25.40
ZMAX	521800	58.50	59.51	26.00
ZMAX	521900	60.00	61.00	28.60
ZMAX	522000	59.25	61.25	19.40
ZMAX	522100	60.00	62.10	28.10
ZMAX	522200	32.90	35.10	13.40
ZMAX	522300	50.00	51.72	26.10
ZMAX	530100	50.00	52.87	25.50
ZMAX	530150	50.00	56.79	14.80
ZMAX	530200	55.00	56.70	17.90
ZMAX	530300	55.00	58.17	26.90
ZMAX	530500	55.00	57.43	15.70
ZMAX	540100	53.60	57.36	16.90
ZMAX	540200	55.00	58.59	25.60
ZMAX	540300	48.83	53.43	14.40
ZMAX	540400	56.00	58.41	14.30
ZMAX	540450	60.00	62.65	28.10
ZMAX	540500	59.00	60.28	70.90
ZMAX	540600	59.00	61.29	62.00
ZMAX	540700	63.70	64.86	53.80
ZMAX	540800	60.00	62.03	25.30

	Junction ID	Junc. Invert	Peak Stage	Time to Peak
		(ft)	(ft)	(hr)
ZMAX	540900	64.00	66.93	15.90
ZMAX	541000	64.00	66.21	27.60
ZMAX	541100	62.50	65.12	32.80
ZMAX	541140	65.71	67.55	13.30
ZMAX	541150	64.00	65.68	32.80
ZMAX	541200	63.00	64.70	28.90
ZMAX	541300	69.00	70.10	12.60
ZMAX	542010	44.10	47.20	14.20
ZMAX	542020	50.00	54.58	14.40
ZMAX	542030	54.83	56.27	14.50
ZMAX	542035	58.50	58.60	0.00
ZMAX	542040	57.00	59.37	15.90
ZMAX	542050	60.00	62.76	28.00
ZMAX	542060	58.50	60.44	17.20
ZMAX	542070	60.20	61.28	13.90
ZMAX	542080	59.00	61.24	50.30
ZMAX	542090	60.00	61.63	27.30
ZMAX	542100	62.00	63.81	28.10
ZMAX	542110	55.00	56.48	29.80
ZMAX	542120	45.40	49.36	15.90
ZMAX	542130	55.00	57.41	18.10
ZMAX	542140	60.00	61.27	28.30
ZMAX	542150	60.00	61.22	28.00
ZMAX	542160	56.70	59.27	19.50
ZMAX	542170	57.90	59.81	16.00
ZMAX	542180	55.00	60.00	0.00
ZMAX	542190	60.00	62.60	21.60
ZMAX	542200	58.00	61.65	25.50
ZMAX	542210	56.00	60.00	0.00
ZMAX	542215	60.00	67.00	0.00
ZMAX	542220	63.00	63.71	16.10
ZMAX	542225	60.00	67.00	0.00
ZMAX	542230	60.00	66.19	1.60
ZMAX	542240	60.00	65.83	26.40
ZMAX	542250	62.50	67.30	16.80
ZMAX	542255	64.50	67.22	28.50
ZMAX	542260	63.00	67.26	19.30
ZMAX	542265	64.00	67.84	20.40
ZMAX	542270	63.50	67.95	20.90
ZMAX	542275	67.00	68.94	12.70
ZMAX	542280	63.45	67.16	27.50
ZMAX	542285	63.00	67.17	26.40
ZMAX	542290	63.07	66.76	1.00
ZMAX	542295	63.00	67.00	0.00
ZMAX	542305	63.20	64.00	24.00
ZMAX	542310	64.50	65.85	16.70
ZMAX	542320	67.00	68.05	25.30
ZMAX	542325	59.80	62.60	24.00
ZMAX	542327	60.00	62.67	24.00
ZMAX	542330	68.00	69.18	25.30
ZMAX	542350	66.06	67.81	18.40
ZMAX	542360	67.20	67.61	12.90
ZMAX	542370	76.50	78.00	0.00
ZMAX	542380	62.98	67.20	13.30
ZMAX	542390	64.50	66.76	1.00

5 yr - Existing Conditions

Conduit Flows

	Junction ID	Conduit Height	U/S Inv.	U/S Peak Stage	D/S Inv.	D/S Peak Stage	Peak Flow	Time to Peak
		(in.)	(ft)	(ft)	(ft)	(ft)	(cfs)	(hr)
QMAX	1510070	24.00	31.71	34.31	29.21	34.73	-9.20	16.75
QMAX	1510071	18.00	31.71	34.31	30.51	34.07	9.20	16.75
QMAX	1510180	30.00	33.85	40.02	33.57	36.87	32.60	18.47
QMAX	1510185	30.00	34.03	40.38	33.85	40.02	27.50	16.45
QMAX	1510190	30.00	34.20	40.61	34.03	40.38	28.70	14.72
QMAX	1510200	36.00	37.60	38.53	36.00	38.27	15.80	15.07
QMAX	1510201	36.00	37.60	38.53	36.00	38.27	15.80	15.07
QMAX	1510400	34.00	40.70	40.71	40.50	38.53	0.00	33.42
QMAX	1510401	34.00	40.70	40.71	40.50	38.53	0.00	33.42
QMAX	1510460	38.00	38.90	41.48	38.78	41.47	19.40	12.62
QMAX	1510461	38.00	38.90	41.48	38.78	41.47	19.40	12.62
QMAX	1510470	36.00	39.70	41.50	38.90	41.48	7.20	17.25
QMAX	1510471	36.00	39.70	41.50	38.90	41.48	7.20	17.25
QMAX	1510480	36.00	40.90	41.78	39.70	41.50	7.20	17.23
QMAX	1510481	36.00	40.90	41.78	39.70	41.50	7.20	17.23
QMAX	1510500	54.00	34.84	40.63	34.40	40.61	62.50	14.93
QMAX	1510510	54.00	35.28	40.64	34.84	40.63	113.60	14.55
QMAX	1510520	54.00	35.71	41.88	35.28	40.64	118.10	14.33
QMAX	1510530	48.00	36.15	44.88	35.71	41.88	125.70	13.82
QMAX	1510540	48.00	36.58	46.17	36.15	44.88	132.50	13.13
QMAX	1510600	24.00	42.13	42.82	40.85	41.78	7.20	17.22
QMAX	1510601	24.00	42.13	42.82	40.85	41.78	7.20	17.22
QMAX	1510810	84.00	34.80	40.64	34.50	40.61	48.20	23.13
QMAX	1510820	78.00	36.10	40.70	35.30	40.64	48.30	23.05
QMAX	1510830	78.00	36.60	40.75	36.10	40.70	48.30	22.87
QMAX	1510840	72.00	37.60	40.87	37.10	40.75	48.40	22.68
QMAX	1510850	66.00	38.80	41.28	38.10	40.87	48.50	22.48
QMAX	1510900	66.00	38.90	41.47	38.80	41.28	48.60	22.15
QMAX	1510910	66.00	39.60	42.18	38.90	41.47	48.60	21.82
QMAX	1510920	60.00	40.20	42.52	39.60	42.18	53.70	13.75
QMAX	1511000	60.00	41.60	44.60	41.00	44.57	43.70	19.78
QMAX	1511010	60.00	42.20	44.80	41.60	44.60	43.70	19.75
QMAX	1511020	48.00	42.60	45.59	42.20	44.80	43.70	19.70
QMAX	1511030	42.00	43.40	46.79	43.00	45.59	43.70	19.68
QMAX	1511100	36.00	44.80	47.47	44.70	47.51	34.30	14.95
QMAX	1511200	36.00	43.70	47.51	43.40	46.79	43.70	19.67
QMAX	1511300	18.00	48.10	49.25	48.00	47.51	4.90	24.88
QMAX	1511400	12.00	46.20	42.23	46.20	46.62	-0.40	20.17
QMAX	1511500	24.00	45.00	46.62	44.50	32.26	17.10	20.17
QMAX	1511600	36.00	43.60	44.57	42.46	32.26	15.10	14.03
QMAX	1520100	24.00	45.13	46.70	44.43	32.26	12.70	21.82
QMAX	1520600	36.00	49.60	50.53	49.59	46.70	3.00	17.40
QMAX	1521100	54.00	51.32	53.43	50.87	51.14	32.10	25.80
QMAX	1521200	30.00	54.50	55.97	54.40	51.14	9.80	15.63
QMAX	1521400	18.00	58.15	55.59	57.62	53.43	0.00	0.00
QMAX	1521700	54.00	57.35	58.44	55.47	57.60	21.10	25.37
QMAX	1522200	30.00	32.90	35.10	32.19	32.26	25.30	13.40
QMAX	1530100	29.00	51.44	52.87	50.58	32.30	19.20	25.53
QMAX	1530150	30.00	54.50	56.79	54.40	52.87	18.20	14.77
QMAX	1540100	24.00	54.13	57.36	53.60	34.73	30.50	16.90
QMAX	1540200	24.00	58.00	58.59	57.90	57.36	1.40	25.65
QMAX	1540300	60.00	48.83	53.43	48.80	34.73	117.00	14.45
QMAX	1540400	54.00	56.35	58.41	56.21	53.43	24.60	14.33
QMAX	1540401	54.00	56.45	58.41	56.26	53.43	23.10	14.33
QMAX	1540500	36.00	59.23	60.28	58.60	58.41	13.20	70.88
QMAX	1540502	36.00	59.23	60.28	58.60	58.41	13.20	70.88
QMAX	1540503	36.00	59.23	60.28	58.60	58.41	13.20	70.88
QMAX	1540600	48.00	59.99	61.29	59.72	60.28	12.70	61.98
QMAX	1540602	48.00	59.99	61.29	59.99	60.28	9.00	62.00
QMAX	1540603	48.00	60.02	61.29	59.98	60.28	9.00	62.00

	Junction ID	Conduit Height	U/S Inv.	U/S Peak Stage	D/S Inv.	D/S Peak Stage	Peak Flow	Time to Peak
		(in.)	(ft)	(ft)	(ft)	(ft)	(cfs)	(hr)
QMAX	1540604	30.00	60.42	61.29	59.49	60.28	9.60	62.02
QMAX	1540700	36.00	64.31	64.86	64.30	61.28	1.10	53.80
QMAX	1540701	36.00	64.31	64.86	64.30	61.28	1.10	53.80
QMAX	1540800	30.00	61.00	62.03	60.90	61.29	5.20	25.25
QMAX	1541000	24.00	65.10	66.21	63.40	66.93	-10.30	15.90
QMAX	1542020	42.00	51.75	54.58	51.48	47.20	44.10	14.37
QMAX	1542021	42.00	51.75	54.58	51.48	47.20	44.10	14.37
QMAX	1542030	42.00	54.85	56.27	53.92	54.58	26.50	14.50
QMAX	1542031	42.00	54.85	56.27	53.92	54.58	26.50	14.50
QMAX	1542035	24.00	58.50	58.60	58.33	56.27	0.00	0.00
QMAX	1542040	42.00	57.65	59.37	57.46	56.27	17.20	15.90
QMAX	1542041	42.00	57.65	59.37	57.46	56.27	17.20	15.90
QMAX	1542060	36.00	58.70	60.44	58.63	59.37	14.30	17.23
QMAX	1542061	36.00	58.70	60.44	58.63	59.37	14.30	17.23
QMAX	1542090	18.00	61.64	61.63	61.63	61.24	0.00	0.00
QMAX	1542100	30.00	63.30	63.81	62.40	61.24	2.60	28.07
QMAX	1542120	30.00	45.40	49.36	45.32	35.51	55.60	15.93
QMAX	1542122	18.00	55.00	49.36	54.90	54.58	0.00	0.00
QMAX	1542130	24.00	56.20	57.41	56.15	49.36	6.20	18.10
QMAX	1542160	18.00	56.70	59.27	56.60	49.36	13.60	19.55
QMAX	1542170	16.00	57.90	59.81	57.41	59.27	8.80	14.30
QMAX	1542190	18.00	61.11	62.60	60.97	60.00	4.20	21.63
QMAX	1542215	30.00	60.40	67.00	60.00	62.67	73.20	0.03
QMAX	1542216	30.00	60.40	67.00	60.00	62.67	73.20	0.03
QMAX	1542225	30.00	61.50	67.00	61.40	67.00	55.40	23.67
QMAX	1542230	24.00	63.00	66.19	62.90	67.00	20.20	6.05
QMAX	1542255	12.00	65.23	67.22	65.10	67.26	-1.50	17.70
QMAX	1542256	12.00	65.77	67.22	65.54	67.30	-1.90	14.70
QMAX	1542260	24.00	63.00	67.26	63.00	67.17	8.30	0.05
QMAX	1542261	18.00	64.68	67.26	64.42	67.16	5.40	0.05
QMAX	1542262	18.00	64.63	67.26	64.48	67.16	5.40	0.05
QMAX	1542263	30.00	63.64	67.26	63.49	67.16	18.20	0.05
QMAX	1542265	48.00	64.00	67.84	63.80	67.26	17.70	16.62
QMAX	1542275	30.00	67.00	68.94	66.80	67.26	17.40	12.67
QMAX	1542280	24.00	66.27	67.16	66.27	66.76	2.50	27.52
QMAX	1542285	30.00	63.78	67.17	63.45	67.16	9.80	0.08
QMAX	1542290	30.00	63.07	66.76	62.98	67.20	-25.70	13.28
QMAX	1542310	29.00	64.85	65.85	63.20	64.00	9.70	24.00
QMAX	1542350	15.00	66.06	67.81	65.94	67.20	5.50	18.35
QMAX	2510150	84.00	32.00	34.75	31.19	34.73	68.90	23.17
QMAX	2510800	108.00	34.50	40.61	34.20	40.61	63.80	24.02
QMAX	2520750	60.00	33.00	35.15	32.80	32.26	93.90	0.17
QMAX	2520800	60.00	38.17	41.00	37.98	35.15	184.90	0.00
QMAX	2541100	38.00	63.80	65.12	63.70	64.86	58.10	31.77
QMAX	2541150	36.00	64.00	65.68	63.90	65.12	55.80	32.75
QMAX	3510250	34.00	37.05	39.00	36.85	38.53	24.90	0.02
QMAX	3510260	29.00	39.10	41.34	39.00	38.53	32.70	13.15
QMAX	3520900	84.00	45.27	47.67	44.81	41.00	59.00	24.88
QMAX	3521300	36.00	55.81	55.21	55.18	53.43	0.00	0.00
QMAX	3521500	36.00	54.00	55.48	53.85	53.43	20.70	14.15
QMAX	3521501	36.00	54.00	55.48	53.85	53.43	20.70	14.15
QMAX	3521800	36.00	58.61	59.51	57.85	58.44	12.00	26.05
QMAX	3521801	36.00	58.66	59.51	58.21	58.44	7.30	26.03
QMAX	3522000	24.00	59.25	61.25	58.99	59.51	17.20	19.40
QMAX	3541140	14.00	65.71	67.55	65.65	67.26	4.70	13.17
QMAX	3542080	29.00	60.59	61.24	60.55	60.44	1.80	50.30
QMAX	6542327	240.00	60.00	62.67	59.80	62.60	177.40	0.05
QMAX	9500100	473.00	20.60	32.25	20.50	31.80	1346.30	114.83
QMAX	9500200	410.00	25.80	32.26	20.60	32.25	1333.10	114.83
QMAX	9500300	414.00	25.80	32.26	25.50	32.26	-1261.00	111.15
QMAX	9500400	396.00	27.00	32.30	25.50	32.26	1156.90	108.30
QMAX	9500500	298.00	27.00	32.30	25.20	34.73	-1123.10	106.67
QMAX	9500600	218.00	31.80	34.73	25.20	34.73	1642.90	14.77
QMAX	9500700	326.00	32.80	35.51	31.80	34.73	1112.10	53.42
QMAX	9500800	324.00	33.00	35.62	32.80	35.51	1083.20	53.77
QMAX	9500900	319.00	33.40	36.02	33.00	35.62	1075.50	57.32
QMAX	9501000	186.00	34.50	36.85	33.40	36.02	1071.50	57.23

	Junction ID	Conduit Height	U/S Inv.	U/S Peak Stage	D/S Inv.	D/S Peak Stage	Peak Flow	Time to Peak
		(in.)	(ft)	(ft)	(ft)	(ft)	(cfs)	(hr)
QMAX	9501100	294.00	35.50	37.64	34.50	36.85	1073.60	48.73
QMAX	9501200	282.00	36.50	38.38	35.50	37.64	1076.10	35.43
QMAX	9501300	362.00	36.50	38.38	29.80	40.16	-1076.50	32.18
QMAX	9501400	228.00	29.80	40.16	25.00	40.32	-1077.40	32.17
QMAX	9501500	228.00	28.00	40.34	25.00	40.32	1096.70	143.88
QMAX	9501600	234.00	28.00	40.34	25.00	40.46	-1077.40	31.80
QMAX	9501700	264.00	29.00	41.41	25.00	40.46	1077.80	32.02
QMAX	9501800	276.00	30.00	41.50	29.00	41.41	1078.20	32.05
QMAX	9501900	289.00	30.00	41.50	27.90	44.49	-1078.40	28.85
QMAX	9502000	299.00	27.90	44.49	26.10	45.59	-1078.80	28.85
QMAX	9502100	288.00	28.00	45.88	26.10	45.59	1078.90	28.87
QMAX	9502200	276.00	32.00	45.91	28.00	45.88	1079.00	28.85
QMAX	9510105	150.00	33.00	35.31	32.00	34.73	28.80	16.02
QMAX	9510110	150.00	34.00	36.27	33.00	35.31	29.20	15.92
QMAX	9510115	150.00	35.00	37.27	34.00	36.27	29.30	15.82
QMAX	9510120	150.00	36.00	38.27	35.00	37.27	29.40	15.70
QMAX	9510170	240.00	33.33	36.44	33.08	34.75	63.70	25.08
QMAX	9510175	240.00	33.57	36.87	33.28	36.44	63.70	24.87
QMAX	9510180	240.00	37.36	40.02	37.07	36.87	32.30	24.62
QMAX	9510185	240.00	37.53	40.38	37.36	40.02	49.90	24.38
QMAX	9510190	240.00	37.70	40.61	37.53	40.38	52.50	24.20
QMAX	9510410	240.00	39.70	40.71	34.40	40.71	-12.30	18.22
QMAX	9510450	240.00	41.50	41.47	39.70	40.71	0.00	0.00
QMAX	9510930	240.00	40.60	43.51	40.20	42.52	54.80	13.32
QMAX	9510940	240.00	41.00	44.57	40.60	43.51	43.60	20.43
QMAX	9511220	240.00	48.00	48.00	47.80	47.51	0.00	0.00
QMAX	9542010	1188.00	44.10	47.20	44.00	34.73	132.30	14.20
QMAX	9542070	60.00	60.20	61.28	59.50	60.44	22.70	15.18
QMAX	9542380	120.00	65.30	67.20	65.20	65.85	7.10	13.35

5 yr - Existing Conditions

Weir Flows

	Weir ID	U/S Jcn.	D/S Jcn.	U/S Inv.	D/S Inv.	Weir Elev	U/S Peak Stage	Peak Flow	D/S Peak Stage	Time to Peak
				(ft)	(ft)	(ft)	(ft)	(cfs)	(ft)	(hr)
QWEIR	90411	500000	0	25.40	25.40	0.00	31.80	1370.90	0.00	17.60
QWEIR	8510100	510100	500200	26.00	34.05	25.50	34.73	114.40	31.76	17.20
QWEIR	90410	510300	510200	30.00	30.00	34.00	36.06	1.00	38.53	9.90
QWEIR	6510530	510530	510520	36.15	44.50	35.71	44.88	11.80	41.88	14.10
QWEIR	6510540	510540	510530	36.58	45.00	36.15	46.17	63.10	44.88	13.90
QWEIR	6510700	510700	510540	40.00	46.00	36.58	46.18	3.80	46.17	26.80
QWEIR	6521000	521000	520900	50.00	50.00	43.00	51.14	60.70	47.67	15.10
QWEIR	6521600	521600	521500	55.00	57.00	54.00	57.60	23.20	55.48	24.80
QWEIR	7522202	522200	500400	32.90	35.00	31.80	35.10	3.20	34.18	13.40
QWEIR	6530200	530200	530100	55.00	56.30	50.00	56.70	12.50	52.87	17.90
QWEIR	6530500	530500	540100	55.00	57.00	53.60	57.43	42.90	57.36	15.70
QWEIR	6540700	540700	540600	63.70	64.00	59.00	64.85	39.20	61.25	48.00
QWEIR	8541300	541300	541200	69.00	69.43	63.00	70.10	22.80	64.70	12.60
QWEIR	6542180	542180	500900	55.00	58.00	36.50	60.00	141.40	38.64	0.00
QWEIR	6542200	542200	501000	58.00	61.50	37.10	61.65	2.90	40.99	25.50
QWEIR	6542220	542220	542210	63.00	63.00	56.00	63.71	29.70	60.00	16.10
QWEIR	7542225	542225	542215	60.00	66.50	60.00	67.00	23.60	67.00	0.20
QWEIR	6542227	542225	542295	60.00	65.00	63.00	67.00	-53.20	67.00	25.20
QWEIR	7542230	542230	542215	60.00	66.50	60.00	66.19	-35.30	67.00	0.00
QWEIR	6542250	542250	542295	62.50	67.00	63.00	67.30	8.30	67.00	16.80
QWEIR	6542255	542255	542260	64.50	67.00	63.00	67.22	-6.60	67.26	19.00
QWEIR	8542270	542270	542265	63.50	67.00	64.00	67.95	5.50	67.84	20.90
QWEIR	6542281	542280	542290	63.45	66.70	63.07	67.16	15.40	66.76	27.50
QWEIR	6542280	542280	542290	63.45	67.10	63.07	67.16	0.70	66.76	27.50
QWEIR	6542297	542295	542290	63.00	64.30	63.07	67.00	142.70	66.76	0.00
QWEIR	6542298	542295	542290	63.00	65.50	63.07	67.00	78.00	66.76	0.00
QWEIR	6542296	542295	542290	63.00	66.50	63.07	67.00	17.30	66.76	0.00
QWEIR	90412	542305	0	63.20	63.20	0.00	64.00	9.70	0.00	24.00
QWEIR	90413	542325	0	59.80	59.80	0.00	62.60	177.40	0.00	0.10
QWEIR	6542360	542360	542380	67.20	67.20	62.98	67.61	25.90	67.20	12.90
QWEIR	6542370	542370	542350	76.50	76.50	66.06	78.00	90.90	67.81	0.00
QWEIR	6542390	542390	542290	64.50	66.00	63.07	66.76	9.20	66.76	12.50

10 yr - Existing Conditions

Peak Stages

	Junction ID	Junc. Invert	Peak Stage	Time to Peak
		(ft)	(ft)	(hr)
ZMAX	500000	20.50	32.50	48.00
ZMAX	500100	20.60	33.13	86.20
ZMAX	500200	25.80	33.15	86.30
ZMAX	500300	25.50	33.15	86.40
ZMAX	500400	27.00	33.18	86.20
ZMAX	500500	25.20	35.27	86.20
ZMAX	500600	31.80	35.28	86.10
ZMAX	500700	32.80	35.71	83.10
ZMAX	500800	33.00	35.86	82.80
ZMAX	500900	33.40	36.32	82.80
ZMAX	501000	34.50	37.17	82.30
ZMAX	501100	35.50	37.96	79.60
ZMAX	501200	36.50	38.61	77.60
ZMAX	501300	29.80	40.71	54.20
ZMAX	501400	25.00	40.98	53.60
ZMAX	501500	28.00	41.01	54.20
ZMAX	501600	25.00	41.20	53.60
ZMAX	501700	29.00	43.27	33.10
ZMAX	501800	30.00	43.35	33.10
ZMAX	501900	27.90	45.93	33.20
ZMAX	502000	26.10	47.24	33.20
ZMAX	502100	28.00	47.60	33.20
ZMAX	502200	32.00	47.61	33.20
ZMAX	510050	30.00	34.08	107.30
ZMAX	510070	31.71	34.62	17.70
ZMAX	510100	26.00	35.05	16.40
ZMAX	510105	33.00	36.14	15.40
ZMAX	510110	34.00	37.18	15.30
ZMAX	510115	35.00	38.19	15.20
ZMAX	510120	36.00	39.20	15.10
ZMAX	510150	32.00	35.14	17.80
ZMAX	510170	33.28	36.82	21.20
ZMAX	510175	33.57	37.47	20.80
ZMAX	510180	33.85	40.95	20.20
ZMAX	510185	34.03	41.18	19.90
ZMAX	510190	34.20	41.37	19.60
ZMAX	510200	34.00	38.91	14.60
ZMAX	510250	37.05	39.18	12.70
ZMAX	510260	39.00	41.78	13.10
ZMAX	510300	30.00	37.13	29.10
ZMAX	510400	37.00	41.45	28.10
ZMAX	510410	38.00	41.45	28.20
ZMAX	510450	38.78	41.97	26.50
ZMAX	510460	38.90	41.97	26.50
ZMAX	510470	39.70	41.97	26.20
ZMAX	510480	40.90	42.13	16.30
ZMAX	510500	34.84	41.48	20.80
ZMAX	510510	35.28	41.83	15.00
ZMAX	510520	35.71	44.16	14.30
ZMAX	510530	36.15	45.80	13.90
ZMAX	510540	36.58	46.84	13.40
ZMAX	510600	36.00	43.10	16.30

	Junction ID	Junc. Invert	Peak Stage	Time to Peak
		(ft)	(ft)	(hr)
ZMAX	510700	40.00	46.42	22.00
ZMAX	510800	34.40	41.37	19.60
ZMAX	510810	35.50	41.43	19.90
ZMAX	510820	36.00	41.50	19.90
ZMAX	510830	36.50	41.56	19.90
ZMAX	510840	37.00	41.66	19.90
ZMAX	510850	37.50	41.93	19.90
ZMAX	510900	38.00	42.02	14.50
ZMAX	510910	38.50	42.93	14.00
ZMAX	510920	39.00	43.24	13.90
ZMAX	510930	40.60	44.10	13.30
ZMAX	510940	41.00	44.82	18.90
ZMAX	511000	41.60	44.87	18.90
ZMAX	511010	42.20	45.07	18.80
ZMAX	511020	42.60	45.91	18.60
ZMAX	511030	43.40	47.20	18.50
ZMAX	511100	43.70	48.33	19.10
ZMAX	511200	43.40	48.29	18.50
ZMAX	511220	48.00	48.14	21.80
ZMAX	511300	48.10	49.59	24.50
ZMAX	511400	40.00	43.04	28.70
ZMAX	511500	45.00	47.05	20.30
ZMAX	511600	43.60	44.79	13.90
ZMAX	520100	40.00	47.17	22.30
ZMAX	520200	45.00	47.10	34.70
ZMAX	520300	45.00	46.46	26.10
ZMAX	520400	50.00	52.18	30.40
ZMAX	520600	50.00	50.78	17.20
ZMAX	520700	50.00	55.08	26.00
ZMAX	520750	33.00	35.32	21.30
ZMAX	520800	38.17	41.00	0.00
ZMAX	520900	43.00	48.31	23.50
ZMAX	521000	50.00	51.51	15.20
ZMAX	521100	50.00	54.17	25.70
ZMAX	521200	55.00	56.25	15.60
ZMAX	521300	52.00	55.84	29.40
ZMAX	521400	54.00	56.18	31.90
ZMAX	521500	54.00	55.99	14.00
ZMAX	521600	55.00	57.90	24.30
ZMAX	521700	55.00	58.83	17.90
ZMAX	521800	58.50	59.77	25.60
ZMAX	521900	60.00	61.31	28.70
ZMAX	522000	59.25	61.68	19.60
ZMAX	522100	60.00	62.53	28.20
ZMAX	522200	32.90	35.45	13.20
ZMAX	522300	50.00	52.31	26.10
ZMAX	530100	50.00	53.45	25.50
ZMAX	530150	50.00	57.56	14.60
ZMAX	530200	55.00	56.98	17.10
ZMAX	530300	55.00	59.09	24.30
ZMAX	530500	55.00	58.03	16.80
ZMAX	540100	53.60	58.01	16.70
ZMAX	540200	55.00	59.01	24.40
ZMAX	540300	48.83	54.69	14.50
ZMAX	540400	56.00	58.91	14.40
ZMAX	540450	60.00	63.29	28.10
ZMAX	540500	59.00	60.57	61.10
ZMAX	540600	59.00	61.57	53.80
ZMAX	540700	63.70	65.13	49.50
ZMAX	540800	60.00	62.48	21.80

	Junction ID	Junc. Invert	Peak Stage	Time to Peak
		(ft)	(ft)	(hr)
ZMAX	540900	64.00	67.51	15.80
ZMAX	541000	64.00	66.84	27.70
ZMAX	541100	62.50	65.46	33.00
ZMAX	541140	65.71	67.85	13.40
ZMAX	541150	64.00	66.15	32.30
ZMAX	541200	63.00	65.28	28.80
ZMAX	541300	69.00	70.28	12.60
ZMAX	542010	44.10	47.54	14.10
ZMAX	542020	50.00	55.38	14.40
ZMAX	542030	54.83	56.66	14.40
ZMAX	542035	58.50	58.60	0.00
ZMAX	542040	57.00	59.82	15.80
ZMAX	542050	60.00	63.46	28.00
ZMAX	542060	58.50	60.86	16.90
ZMAX	542070	60.20	61.49	13.90
ZMAX	542080	59.00	61.78	36.10
ZMAX	542090	60.00	62.04	26.50
ZMAX	542100	62.00	64.27	26.50
ZMAX	542110	55.00	56.86	29.80
ZMAX	542120	45.40	50.81	16.00
ZMAX	542130	55.00	57.89	17.10
ZMAX	542140	60.00	61.65	28.30
ZMAX	542150	60.00	61.68	28.10
ZMAX	542160	56.70	59.94	20.70
ZMAX	542170	57.90	60.66	16.30
ZMAX	542180	55.00	60.00	0.00
ZMAX	542190	60.00	62.95	22.30
ZMAX	542200	58.00	61.88	19.00
ZMAX	542210	56.00	60.00	0.00
ZMAX	542215	60.00	67.00	0.00
ZMAX	542220	63.00	63.93	16.00
ZMAX	542225	60.00	67.00	0.00
ZMAX	542230	60.00	66.19	1.60
ZMAX	542240	60.00	66.19	26.50
ZMAX	542250	62.50	67.42	15.90
ZMAX	542255	64.50	67.36	27.90
ZMAX	542260	63.00	67.41	19.50
ZMAX	542265	64.00	68.20	16.50
ZMAX	542270	63.50	68.25	19.60
ZMAX	542275	67.00	70.95	12.50
ZMAX	542280	63.45	67.24	27.40
ZMAX	542285	63.00	67.27	25.90
ZMAX	542290	63.07	66.76	20.50
ZMAX	542295	63.00	67.00	0.00
ZMAX	542305	63.20	64.00	24.00
ZMAX	542310	64.50	66.16	17.10
ZMAX	542320	67.00	68.52	26.70
ZMAX	542325	59.80	62.60	24.00
ZMAX	542327	60.00	62.68	24.00
ZMAX	542330	68.00	69.40	20.10
ZMAX	542350	66.06	68.19	18.80
ZMAX	542360	67.20	67.77	12.90
ZMAX	542370	76.50	78.00	0.00
ZMAX	542380	62.98	67.52	13.40
ZMAX	542390	64.50	66.77	20.50

10 yr - Existing Conditions

Conduit Flows

	Junction ID	Conduit Height	U/S Inv.	U/S Peak Stage	D/S Inv.	D/S Peak Stage	Peak Flow	Time to Peak
		(in.)	(ft)	(ft)	(ft)	(ft)	(cfs)	(hr)
QMAX	1510070	24.00	31.71	34.62	29.21	35.05	-9.60	15.65
QMAX	1510071	18.00	31.71	34.62	30.51	34.08	9.60	15.67
QMAX	1510180	30.00	33.85	40.95	33.57	37.47	35.10	16.63
QMAX	1510185	30.00	34.03	41.18	33.85	40.95	30.20	15.52
QMAX	1510190	30.00	34.20	41.37	34.03	41.18	30.50	14.10
QMAX	1510200	36.00	37.60	38.91	36.00	39.20	29.80	14.58
QMAX	1510201	36.00	37.60	38.91	36.00	39.20	29.80	14.58
QMAX	1510400	34.00	40.70	41.45	40.50	38.91	2.60	28.17
QMAX	1510401	34.00	40.70	41.45	40.50	38.91	2.60	28.17
QMAX	1510460	38.00	38.90	41.97	38.78	41.97	25.50	12.60
QMAX	1510461	38.00	38.90	41.97	38.78	41.97	25.50	12.60
QMAX	1510470	36.00	39.70	41.97	38.90	41.97	13.40	16.32
QMAX	1510471	36.00	39.70	41.97	38.90	41.97	13.40	16.32
QMAX	1510480	36.00	40.90	42.13	39.70	41.97	13.50	16.32
QMAX	1510481	36.00	40.90	42.13	39.70	41.97	13.50	16.32
QMAX	1510500	54.00	34.84	41.48	34.40	41.37	67.90	14.70
QMAX	1510510	54.00	35.28	41.83	34.84	41.48	140.10	14.15
QMAX	1510520	54.00	35.71	44.16	35.28	41.83	150.90	14.05
QMAX	1510530	48.00	36.15	45.80	35.71	44.16	145.20	13.15
QMAX	1510540	48.00	36.58	46.84	36.15	45.80	144.30	12.75
QMAX	1510600	24.00	42.13	43.10	40.85	42.13	13.50	16.30
QMAX	1510601	24.00	42.13	43.10	40.85	42.13	13.50	16.30
QMAX	1510810	84.00	34.80	41.43	34.50	41.37	60.10	20.83
QMAX	1510820	78.00	36.10	41.50	35.30	41.43	60.10	20.43
QMAX	1510830	78.00	36.60	41.56	36.10	41.50	60.00	20.30
QMAX	1510840	72.00	37.60	41.66	37.10	41.56	61.10	15.08
QMAX	1510850	66.00	38.80	41.93	38.10	41.66	69.20	15.02
QMAX	1510900	66.00	38.90	42.02	38.80	41.93	72.20	14.50
QMAX	1510910	66.00	39.60	42.93	38.90	42.02	74.90	14.05
QMAX	1510920	60.00	40.20	43.24	39.60	42.93	83.50	13.50
QMAX	1511000	60.00	41.60	44.87	41.00	44.82	50.80	18.55
QMAX	1511010	60.00	42.20	45.07	41.60	44.87	50.80	18.55
QMAX	1511020	48.00	42.60	45.91	42.20	45.07	50.80	18.53
QMAX	1511030	42.00	43.40	47.20	43.00	45.91	50.80	18.52
QMAX	1511100	36.00	44.80	48.33	44.70	48.29	50.10	14.88
QMAX	1511200	36.00	43.70	48.29	43.40	47.20	50.80	18.50
QMAX	1511300	18.00	48.10	49.59	48.00	48.29	7.30	24.50
QMAX	1511400	12.00	46.20	43.04	46.20	47.05	-1.70	20.25
QMAX	1511500	24.00	45.00	47.05	44.50	33.15	21.60	20.25
QMAX	1511600	36.00	43.60	44.79	42.46	33.15	21.90	13.97
QMAX	1520100	24.00	45.13	47.17	44.43	33.15	16.80	22.28
QMAX	1520600	36.00	49.60	50.78	49.59	47.17	5.30	17.17
QMAX	1521100	54.00	51.32	54.17	50.87	51.51	56.40	25.72
QMAX	1521200	30.00	54.50	56.25	54.40	51.51	13.90	15.55
QMAX	1521400	18.00	58.15	56.18	57.62	54.17	0.00	0.00
QMAX	1521700	54.00	57.35	58.83	55.47	57.90	38.40	17.90
QMAX	1522200	30.00	32.90	35.45	32.19	33.15	29.40	13.20
QMAX	1530100	29.00	51.44	53.45	50.58	33.18	28.70	25.45
QMAX	1530150	30.00	54.50	57.56	54.40	53.45	27.40	14.55
QMAX	1540100	24.00	54.13	58.01	53.60	35.27	35.10	16.73
QMAX	1540200	24.00	58.00	59.01	57.90	58.01	4.30	24.40
QMAX	1540300	60.00	48.83	54.69	48.80	35.27	170.90	14.48
QMAX	1540400	54.00	56.35	58.91	56.21	54.69	38.30	14.45
QMAX	1540401	54.00	56.45	58.91	56.26	54.69	36.50	14.45
QMAX	1540500	36.00	59.23	60.57	58.60	58.91	20.50	61.13
QMAX	1540502	36.00	59.23	60.57	58.60	58.91	20.50	61.13
QMAX	1540503	36.00	59.23	60.57	58.60	58.91	20.50	61.13
QMAX	1540600	48.00	59.99	61.57	59.72	60.57	18.80	53.82
QMAX	1540602	48.00	59.99	61.57	59.99	60.57	13.70	53.82
QMAX	1540603	48.00	60.02	61.57	59.98	60.57	13.80	53.82

	Junction ID	Conduit Height	U/S Inv.	U/S Peak Stage	D/S Inv.	D/S Peak Stage	Peak Flow	Time to Peak
		(in.)	(ft)	(ft)	(ft)	(ft)	(cfs)	(hr)
QMAX	1540604	30.00	60.42	61.57	59.49	60.57	15.80	53.83
QMAX	1540700	36.00	64.31	65.13	64.30	61.49	2.90	49.55
QMAX	1540701	36.00	64.31	65.13	64.30	61.49	2.90	49.55
QMAX	1540800	30.00	61.00	62.48	60.90	61.57	10.70	21.80
QMAX	1541000	24.00	65.10	66.84	63.40	67.51	-14.20	15.83
QMAX	1542020	42.00	51.75	55.38	51.48	47.54	64.50	14.35
QMAX	1542021	42.00	51.75	55.38	51.48	47.54	64.50	14.35
QMAX	1542030	42.00	54.85	56.66	53.92	55.38	40.40	14.37
QMAX	1542031	42.00	54.85	56.66	53.92	55.38	40.40	14.37
QMAX	1542035	24.00	58.50	58.60	58.33	56.66	0.00	0.00
QMAX	1542040	42.00	57.65	59.82	57.46	56.66	27.10	15.78
QMAX	1542041	42.00	57.65	59.82	57.46	56.66	27.10	15.78
QMAX	1542060	36.00	58.70	60.86	58.63	59.82	22.00	16.88
QMAX	1542061	36.00	58.70	60.86	58.63	59.82	22.00	16.88
QMAX	1542090	18.00	61.64	62.04	61.63	61.78	0.30	26.48
QMAX	1542100	30.00	63.30	64.27	62.40	61.78	9.20	26.52
QMAX	1542120	30.00	45.40	50.81	45.32	35.71	74.70	16.03
QMAX	1542122	18.00	55.00	50.81	54.90	55.38	-0.40	14.35
QMAX	1542130	24.00	56.20	57.89	56.15	50.81	11.60	17.08
QMAX	1542160	18.00	56.70	59.94	56.60	50.81	16.80	20.73
QMAX	1542170	16.00	57.90	60.66	57.41	59.94	9.60	13.45
QMAX	1542190	18.00	61.11	62.95	60.97	60.00	5.60	22.28
QMAX	1542215	30.00	60.40	67.00	60.00	62.68	73.20	0.03
QMAX	1542216	30.00	60.40	67.00	60.00	62.68	73.20	0.03
QMAX	1542225	30.00	61.50	67.00	61.40	67.00	57.10	28.50
QMAX	1542230	24.00	63.00	66.19	62.90	67.00	21.20	14.15
QMAX	1542255	12.00	65.23	67.36	65.10	67.41	-1.80	17.40
QMAX	1542256	12.00	65.77	67.36	65.54	67.42	-2.20	14.38
QMAX	1542260	24.00	63.00	67.41	63.00	67.27	9.20	17.63
QMAX	1542261	18.00	64.68	67.41	64.42	67.24	5.40	0.05
QMAX	1542262	18.00	64.63	67.41	64.48	67.24	5.40	0.05
QMAX	1542263	30.00	63.64	67.41	63.49	67.24	18.20	0.05
QMAX	1542265	48.00	64.00	68.20	63.80	67.41	22.30	16.28
QMAX	1542275	30.00	67.00	70.95	66.80	67.41	45.00	12.50
QMAX	1542280	24.00	66.27	67.24	66.27	66.76	3.00	27.45
QMAX	1542285	30.00	63.78	67.27	63.45	67.24	9.80	0.08
QMAX	1542290	30.00	63.07	66.76	62.98	67.52	-30.40	13.30
QMAX	1542310	29.00	64.85	66.16	63.20	64.00	11.90	24.00
QMAX	1542350	15.00	66.06	68.19	65.94	67.52	6.60	16.07
QMAX	2510150	84.00	32.00	35.14	31.19	35.05	115.80	18.52
QMAX	2510800	108.00	34.50	41.37	34.20	41.37	101.00	19.02
QMAX	2520750	60.00	33.00	35.32	32.80	33.15	106.80	21.27
QMAX	2520800	60.00	38.17	41.00	37.98	35.32	184.90	0.00
QMAX	2541100	38.00	63.80	65.46	63.70	65.13	89.00	31.85
QMAX	2541150	36.00	64.00	66.15	63.90	65.46	86.10	32.43
QMAX	3510250	34.00	37.05	39.18	36.85	38.91	34.20	12.70
QMAX	3510260	29.00	39.10	41.78	39.00	38.91	42.70	13.15
QMAX	3520900	84.00	45.27	48.31	44.81	41.00	97.10	23.47
QMAX	3521300	36.00	55.81	55.84	55.18	54.17	0.00	29.42
QMAX	3521500	36.00	54.00	55.99	53.85	54.17	37.20	14.03
QMAX	3521501	36.00	54.00	55.99	53.85	54.17	37.20	14.03
QMAX	3521800	36.00	58.61	59.77	57.85	58.83	19.80	25.60
QMAX	3521801	36.00	58.66	59.77	58.21	58.83	12.70	25.58
QMAX	3522000	24.00	59.25	61.68	58.99	59.77	21.30	19.65
QMAX	3541140	14.00	65.71	67.85	65.65	67.41	5.60	13.17
QMAX	3542080	29.00	60.59	61.78	60.55	60.86	7.60	36.10
QMAX	6542327	240.00	60.00	62.68	59.80	62.60	177.40	0.05
QMAX	9500100	473.00	20.60	33.13	20.50	32.50	1848.40	115.53
QMAX	9500200	410.00	25.80	33.15	20.60	33.13	1833.40	113.38
QMAX	9500300	414.00	25.80	33.15	25.50	33.15	-1747.40	113.37
QMAX	9500400	396.00	27.00	33.18	25.50	33.15	1622.40	111.05
QMAX	9500500	298.00	27.00	33.18	25.20	35.27	-1576.20	110.20
QMAX	9500600	218.00	31.80	35.28	25.20	35.27	2165.50	14.88
QMAX	9500700	326.00	32.80	35.71	31.80	35.28	1503.00	103.38
QMAX	9500800	324.00	33.00	35.86	32.80	35.71	1500.90	76.75
QMAX	9500900	319.00	33.40	36.32	33.00	35.86	1502.90	69.00
QMAX	9501000	186.00	34.50	37.17	33.40	36.32	1501.80	58.43

	Junction ID	Conduit Height	U/S Inv.	U/S Peak Stage	D/S Inv.	D/S Peak Stage	Peak Flow	Time to Peak
		(in.)	(ft)	(ft)	(ft)	(ft)	(cfs)	(hr)
QMAX	9501100	294.00	35.50	37.96	34.50	37.17	1504.10	54.32
QMAX	9501200	282.00	36.50	38.61	35.50	37.96	1506.70	51.30
QMAX	9501300	362.00	36.50	38.61	29.80	40.71	-1507.60	51.28
QMAX	9501400	228.00	29.80	40.71	25.00	40.98	-1508.70	35.63
QMAX	9501500	228.00	28.00	41.01	25.00	40.98	1508.70	51.28
QMAX	9501600	234.00	28.00	41.01	25.00	41.20	-1508.70	34.05
QMAX	9501700	264.00	29.00	43.27	25.00	41.20	1510.20	33.13
QMAX	9501800	276.00	30.00	43.35	29.00	43.27	1510.80	33.13
QMAX	9501900	289.00	30.00	43.35	27.90	45.93	-1511.20	33.20
QMAX	9502000	299.00	27.90	45.93	26.10	47.24	-1511.60	33.22
QMAX	9502100	288.00	28.00	47.60	26.10	47.24	1511.90	33.23
QMAX	9502200	276.00	32.00	47.61	28.00	47.60	1512.10	31.68
QMAX	9510105	150.00	33.00	36.14	32.00	35.05	55.60	15.38
QMAX	9510110	150.00	34.00	37.18	33.00	36.14	55.90	15.28
QMAX	9510115	150.00	35.00	38.19	34.00	37.18	56.10	15.20
QMAX	9510120	150.00	36.00	39.20	35.00	38.19	56.30	15.08
QMAX	9510170	240.00	33.33	36.82	33.08	35.14	100.70	20.87
QMAX	9510175	240.00	33.57	37.47	33.28	36.82	100.80	20.57
QMAX	9510180	240.00	37.36	40.95	37.07	37.47	67.60	20.18
QMAX	9510185	240.00	37.53	41.18	37.36	40.95	89.80	19.92
QMAX	9510190	240.00	37.70	41.37	37.53	41.18	90.70	19.63
QMAX	9510410	240.00	39.70	41.45	34.40	41.45	-16.40	16.73
QMAX	9510450	240.00	41.50	41.97	39.70	41.45	3.10	26.48
QMAX	9510930	240.00	40.60	44.10	40.20	43.24	85.10	13.25
QMAX	9510940	240.00	41.00	44.82	40.60	44.10	50.70	19.00
QMAX	9511220	240.00	48.00	48.14	47.80	48.29	-0.20	18.57
QMAX	9542010	1188.00	44.10	47.54	44.00	35.28	193.10	14.07
QMAX	9542070	60.00	60.20	61.49	59.50	60.86	35.50	14.65
QMAX	9542380	120.00	65.30	67.52	65.20	66.16	10.50	13.43

10 yr - Existing Conditions

Weir Flows

	Weir ID	U/S Jcn.	D/S Jcn.	U/S Inv.	D/S Inv.	Weir Elev	U/S Peak Stage	Peak Flow	D/S Peak Stage	Time to Peak
				(ft)	(ft)	(ft)	(ft)	(cfs)	(ft)	(hr)
QWEIR	90411	500000	0	25.40	25.40	0.00	32.50	1858.20	0.00	17.70
QWEIR	8510100	510100	500200	26.00	34.05	25.50	35.05	204.20	32.46	16.40
QWEIR	90410	510300	510200	30.00	30.00	34.00	37.13	1.00	38.91	8.70
QWEIR	6510520	510520	510510	35.71	44.00	35.28	44.16	3.30	41.83	14.30
QWEIR	6510530	510530	510520	36.15	44.50	35.71	45.80	73.70	44.16	13.90
QWEIR	6510540	510540	510530	36.58	45.00	36.15	46.84	124.00	45.80	13.30
QWEIR	6510700	510700	510540	40.00	46.00	36.58	46.42	-38.50	46.84	13.40
QWEIR	6520700	520700	520600	50.00	55.00	50.00	55.08	1.20	50.78	26.00
QWEIR	6521000	521000	520900	50.00	50.00	43.00	51.51	92.40	48.31	15.20
QWEIR	6521600	521600	521500	55.00	57.00	54.00	57.90	42.90	55.99	24.30
QWEIR	7522202	522200	500400	32.90	35.00	31.80	35.45	30.20	34.54	13.20
QWEIR	6530200	530200	530100	55.00	56.30	50.00	56.98	27.70	53.45	17.10
QWEIR	7530300	530300	530200	55.00	59.00	55.00	59.09	2.50	56.98	24.30
QWEIR	6530500	530500	540100	55.00	57.00	53.60	58.03	68.70	58.01	14.70
QWEIR	7530500	530500	500400	55.00	57.80	31.80	58.03	10.70	34.54	16.80
QWEIR	6540700	540700	540600	63.70	64.00	59.00	65.13	60.00	61.56	48.00
QWEIR	6540701	540700	542070	63.70	65.00	60.20	65.13	2.30	61.49	48.00
QWEIR	8541300	541300	541200	69.00	69.43	63.00	70.28	32.60	65.28	12.60
QWEIR	6542180	542180	500900	55.00	58.00	36.50	60.00	141.40	39.06	0.00
QWEIR	6542200	542200	501000	58.00	61.50	37.10	61.88	11.80	41.40	19.00
QWEIR	6542220	542220	542210	63.00	63.00	56.00	63.93	44.60	60.00	16.00
QWEIR	7542225	542225	542215	60.00	66.50	60.00	67.00	23.60	67.00	0.20
QWEIR	6542227	542225	542295	60.00	65.00	63.00	67.00	-56.70	67.00	28.80
QWEIR	7542230	542230	542215	60.00	66.50	60.00	66.19	-35.30	67.00	0.00
QWEIR	6542250	542250	542295	62.50	67.00	63.00	67.42	13.70	67.00	15.90
QWEIR	6542255	542255	542260	64.50	67.00	63.00	67.36	-12.90	67.41	18.90
QWEIR	8542270	542270	542265	63.50	67.00	64.00	68.25	8.40	68.20	19.60
QWEIR	6542281	542280	542290	63.45	66.70	63.07	67.24	19.70	66.76	27.40
QWEIR	6542280	542280	542290	63.45	67.10	63.07	67.24	2.50	66.76	27.40
QWEIR	6542297	542295	542290	63.00	64.30	63.07	67.00	142.70	66.76	0.00
QWEIR	6542298	542295	542290	63.00	65.50	63.07	67.00	78.00	66.76	0.00
QWEIR	6542296	542295	542290	63.00	66.50	63.07	67.00	17.30	66.76	0.00
QWEIR	90412	542305	0	63.20	63.20	0.00	64.00	11.90	0.00	24.00
QWEIR	7542320	542320	542310	67.00	68.50	64.50	68.52	0.50	66.16	26.70
QWEIR	90413	542325	0	59.80	59.80	0.00	62.60	177.40	0.00	0.10
QWEIR	6542330	542330	542320	68.00	69.30	67.00	69.40	1.60	68.52	20.10
QWEIR	6542360	542360	542380	67.20	67.20	62.98	67.77	42.20	67.52	12.90
QWEIR	6542370	542370	542350	76.50	76.50	66.06	78.00	90.90	68.19	0.00
QWEIR	6542390	542390	542290	64.50	66.00	63.07	66.77	14.90	66.76	12.50

25 yr - Existing Conditions

Peak Stages

	Junction ID	Junc. Invert	Peak Stage	Time to Peak
		(ft)	(ft)	(hr)
ZMAX	500000	20.50	33.20	48.00
ZMAX	500100	20.60	34.10	92.50
ZMAX	500200	25.80	34.11	92.40
ZMAX	500300	25.50	34.12	92.50
ZMAX	500400	27.00	34.15	92.40
ZMAX	500500	25.20	35.88	92.50
ZMAX	500600	31.80	35.89	92.40
ZMAX	500700	32.80	36.19	92.30
ZMAX	500800	33.00	36.32	92.30
ZMAX	500900	33.40	36.76	92.30
ZMAX	501000	34.50	37.57	92.20
ZMAX	501100	35.50	38.37	92.10
ZMAX	501200	36.50	38.97	91.70
ZMAX	501300	29.80	41.19	82.80
ZMAX	501400	25.00	41.65	82.80
ZMAX	501500	28.00	41.70	82.80
ZMAX	501600	25.00	42.01	82.80
ZMAX	501700	29.00	45.01	34.20
ZMAX	501800	30.00	45.08	34.20
ZMAX	501900	27.90	47.46	34.30
ZMAX	502000	26.10	48.91	34.30
ZMAX	502100	28.00	49.35	34.30
ZMAX	502200	32.00	49.38	34.30
ZMAX	510050	30.00	34.13	93.80
ZMAX	510070	31.71	34.83	17.30
ZMAX	510100	26.00	35.28	17.00
ZMAX	510105	33.00	36.46	15.20
ZMAX	510110	34.00	37.53	15.20
ZMAX	510115	35.00	38.59	14.60
ZMAX	510120	36.00	39.63	14.60
ZMAX	510150	32.00	35.44	17.40
ZMAX	510170	33.28	37.20	20.00
ZMAX	510175	33.57	37.90	19.50
ZMAX	510180	33.85	41.49	19.00
ZMAX	510185	34.03	41.64	18.80
ZMAX	510190	34.20	41.80	18.60
ZMAX	510200	34.00	39.20	14.70
ZMAX	510250	37.05	39.41	12.70
ZMAX	510260	39.00	42.08	13.20
ZMAX	510300	30.00	37.73	29.20
ZMAX	510400	37.00	41.81	25.60
ZMAX	510410	38.00	41.82	25.60
ZMAX	510450	38.78	42.25	24.90
ZMAX	510460	38.90	42.25	24.90
ZMAX	510470	39.70	42.25	24.80
ZMAX	510480	40.90	42.32	15.90
ZMAX	510500	34.84	42.04	19.80
ZMAX	510510	35.28	43.00	14.70
ZMAX	510520	35.71	44.87	14.10
ZMAX	510530	36.15	46.22	13.70
ZMAX	510540	36.58	47.16	13.20
ZMAX	510600	36.00	43.26	15.90

	Junction ID	Junc. Invert	Peak Stage	Time to Peak
		(ft)	(ft)	(hr)
ZMAX	510700	40.00	46.53	20.00
ZMAX	510800	34.40	41.81	18.60
ZMAX	510810	35.50	41.88	18.60
ZMAX	510820	36.00	41.98	18.60
ZMAX	510830	36.50	42.05	18.60
ZMAX	510840	37.00	42.16	18.50
ZMAX	510850	37.50	42.40	18.40
ZMAX	510900	38.00	42.47	14.30
ZMAX	510910	38.50	43.43	13.90
ZMAX	510920	39.00	43.82	13.80
ZMAX	510930	40.60	44.45	13.40
ZMAX	510940	41.00	44.96	18.80
ZMAX	511000	41.60	45.02	18.80
ZMAX	511010	42.20	45.23	18.70
ZMAX	511020	42.60	46.12	18.60
ZMAX	511030	43.40	47.67	18.60
ZMAX	511100	43.70	49.00	19.50
ZMAX	511200	43.40	48.95	18.60
ZMAX	511220	48.00	48.91	19.80
ZMAX	511300	48.10	49.81	24.20
ZMAX	511400	40.00	43.60	30.60
ZMAX	511500	45.00	47.33	20.40
ZMAX	511600	43.60	44.92	13.90
ZMAX	520100	40.00	47.53	25.00
ZMAX	520200	45.00	47.41	34.80
ZMAX	520300	45.00	46.70	26.10
ZMAX	520400	50.00	52.56	30.40
ZMAX	520600	50.00	50.97	24.30
ZMAX	520700	50.00	55.24	24.30
ZMAX	520750	33.00	35.69	20.60
ZMAX	520800	38.17	41.00	0.00
ZMAX	520900	43.00	48.71	22.90
ZMAX	521000	50.00	51.74	15.20
ZMAX	521100	50.00	54.64	25.70
ZMAX	521200	55.00	56.43	15.50
ZMAX	521300	52.00	56.16	27.60
ZMAX	521400	54.00	56.57	31.90
ZMAX	521500	54.00	56.32	14.00
ZMAX	521600	55.00	58.08	20.70
ZMAX	521700	55.00	59.09	17.50
ZMAX	521800	58.50	59.93	25.30
ZMAX	521900	60.00	61.52	28.70
ZMAX	522000	59.25	61.93	19.60
ZMAX	522100	60.00	62.79	28.20
ZMAX	522200	32.90	35.64	13.10
ZMAX	522300	50.00	52.69	26.10
ZMAX	530100	50.00	53.87	25.70
ZMAX	530150	50.00	58.08	14.50
ZMAX	530200	55.00	57.15	17.00
ZMAX	530300	55.00	59.15	17.50
ZMAX	530500	55.00	58.31	16.30
ZMAX	540100	53.60	58.31	16.30
ZMAX	540200	55.00	59.25	20.80
ZMAX	540300	48.83	55.49	14.60
ZMAX	540400	56.00	59.23	14.50
ZMAX	540450	60.00	63.52	25.00
ZMAX	540500	59.00	60.75	54.70
ZMAX	540600	59.00	61.72	49.10
ZMAX	540700	63.70	65.29	46.90
ZMAX	540800	60.00	62.77	20.40

	Junction ID	Junc. Invert	Peak Stage	Time to Peak
		(ft)	(ft)	(hr)
ZMAX	540900	64.00	67.85	15.80
ZMAX	541000	64.00	67.24	27.80
ZMAX	541100	62.50	65.67	33.00
ZMAX	541140	65.71	68.05	13.60
ZMAX	541150	64.00	66.45	32.20
ZMAX	541200	63.00	65.65	28.80
ZMAX	541300	69.00	70.39	12.60
ZMAX	542010	44.10	47.70	14.00
ZMAX	542020	50.00	55.82	14.40
ZMAX	542030	54.83	56.92	14.30
ZMAX	542035	58.50	58.60	0.00
ZMAX	542040	57.00	60.11	15.70
ZMAX	542050	60.00	63.89	28.00
ZMAX	542060	58.50	61.12	16.70
ZMAX	542070	60.20	61.61	13.80
ZMAX	542080	59.00	62.11	33.10
ZMAX	542090	60.00	62.27	25.90
ZMAX	542100	62.00	64.54	25.90
ZMAX	542110	55.00	57.09	29.60
ZMAX	542120	45.40	51.81	16.10
ZMAX	542130	55.00	58.19	16.90
ZMAX	542140	60.00	61.89	28.40
ZMAX	542150	60.00	61.99	28.10
ZMAX	542160	56.70	60.33	21.50
ZMAX	542170	57.90	61.11	16.60
ZMAX	542180	55.00	60.00	0.00
ZMAX	542190	60.00	63.19	24.30
ZMAX	542200	58.00	62.07	17.00
ZMAX	542210	56.00	60.00	0.00
ZMAX	542215	60.00	67.00	0.00
ZMAX	542220	63.00	64.06	15.90
ZMAX	542225	60.00	67.00	0.00
ZMAX	542230	60.00	66.19	1.60
ZMAX	542240	60.00	66.42	26.50
ZMAX	542250	62.50	67.50	15.60
ZMAX	542255	64.50	67.46	27.70
ZMAX	542260	63.00	67.51	19.50
ZMAX	542265	64.00	68.41	16.60
ZMAX	542270	63.50	68.45	18.90
ZMAX	542275	67.00	73.57	12.50
ZMAX	542280	63.45	67.29	27.00
ZMAX	542285	63.00	67.33	25.10
ZMAX	542290	63.07	66.91	24.30
ZMAX	542295	63.00	67.00	0.00
ZMAX	542305	63.20	64.00	24.00
ZMAX	542310	64.50	66.43	20.30
ZMAX	542320	67.00	68.57	19.90
ZMAX	542325	59.80	62.60	24.00
ZMAX	542327	60.00	62.70	24.00
ZMAX	542330	68.00	69.47	15.50
ZMAX	542350	66.06	68.33	15.10
ZMAX	542360	67.20	67.87	12.90
ZMAX	542370	76.50	78.00	0.00
ZMAX	542380	62.98	67.70	13.40
ZMAX	542390	64.50	66.91	24.30

25 yr - Existing Conditions

Conduit Flows

	Junction ID	Conduit Height	U/S Inv.	U/S Peak Stage	D/S Inv.	D/S Peak Stage	Peak Flow	Time to Peak
		(in.)	(ft)	(ft)	(ft)	(ft)	(cfs)	(hr)
QMAX	1510070	24.00	31.71	34.83	29.21	35.28	-9.80	15.25
QMAX	1510071	18.00	31.71	34.83	30.51	34.13	9.80	15.23
QMAX	1510180	30.00	33.85	41.49	33.57	37.90	35.80	15.97
QMAX	1510185	30.00	34.03	41.64	33.85	41.49	31.60	15.12
QMAX	1510190	30.00	34.20	41.80	34.03	41.64	31.20	13.80
QMAX	1510200	36.00	37.60	39.20	36.00	39.63	41.90	14.68
QMAX	1510201	36.00	37.60	39.20	36.00	39.63	41.90	14.68
QMAX	1510400	34.00	40.70	41.81	40.50	39.20	6.10	25.60
QMAX	1510401	34.00	40.70	41.81	40.50	39.20	6.10	25.60
QMAX	1510460	38.00	38.90	42.25	38.78	42.25	29.50	12.57
QMAX	1510461	38.00	38.90	42.25	38.78	42.25	29.50	12.57
QMAX	1510470	36.00	39.70	42.25	38.90	42.25	17.40	15.97
QMAX	1510471	36.00	39.70	42.25	38.90	42.25	17.40	15.97
QMAX	1510480	36.00	40.90	42.32	39.70	42.25	17.40	15.95
QMAX	1510481	36.00	40.90	42.32	39.70	42.25	17.40	15.95
QMAX	1510500	54.00	34.84	42.04	34.40	41.81	72.20	14.40
QMAX	1510510	54.00	35.28	43.00	34.84	42.04	160.90	14.18
QMAX	1510520	54.00	35.71	44.87	35.28	43.00	161.70	13.60
QMAX	1510530	48.00	36.15	46.22	35.71	44.87	151.40	12.98
QMAX	1510540	48.00	36.58	47.16	36.15	46.22	148.30	12.63
QMAX	1510600	24.00	42.13	43.26	40.85	42.32	17.40	15.93
QMAX	1510601	24.00	42.13	43.26	40.85	42.32	17.40	15.93
QMAX	1510810	84.00	34.80	41.88	34.50	41.81	67.70	19.25
QMAX	1510820	78.00	36.10	41.98	35.30	41.88	67.70	18.95
QMAX	1510830	78.00	36.60	42.05	36.10	41.98	67.70	18.43
QMAX	1510840	72.00	37.60	42.16	37.10	42.05	81.40	14.72
QMAX	1510850	66.00	38.80	42.40	38.10	42.16	90.40	14.75
QMAX	1510900	66.00	38.90	42.47	38.80	42.40	93.90	14.32
QMAX	1510910	66.00	39.60	43.43	38.90	42.47	96.60	13.95
QMAX	1510920	60.00	40.20	43.82	39.60	43.43	102.90	13.42
QMAX	1511000	60.00	41.60	45.02	41.00	44.96	55.10	18.60
QMAX	1511010	60.00	42.20	45.23	41.60	45.02	55.10	18.58
QMAX	1511020	48.00	42.60	46.12	42.20	45.23	55.10	18.57
QMAX	1511030	42.00	43.40	47.67	43.00	46.12	55.10	18.57
QMAX	1511100	36.00	44.80	49.00	44.70	48.95	60.80	14.85
QMAX	1511200	36.00	43.70	48.95	43.40	47.67	55.10	18.55
QMAX	1511300	18.00	48.10	49.81	48.00	48.95	8.90	24.20
QMAX	1511400	12.00	46.20	43.60	46.20	47.33	-2.60	20.37
QMAX	1511500	24.00	45.00	47.33	44.50	34.11	23.90	20.35
QMAX	1511600	36.00	43.60	44.92	42.46	34.11	26.80	13.98
QMAX	1520100	24.00	45.13	47.53	44.43	34.12	19.00	25.02
QMAX	1520600	36.00	49.60	50.97	49.59	47.53	7.40	24.25
QMAX	1521100	54.00	51.32	54.64	50.87	51.74	73.80	25.75
QMAX	1521200	30.00	54.50	56.43	54.40	51.74	16.60	15.52
QMAX	1521400	18.00	58.15	56.57	57.62	54.64	0.00	0.00
QMAX	1521700	54.00	57.35	59.09	55.47	58.08	51.90	17.48
QMAX	1522200	30.00	32.90	35.64	32.19	34.12	31.60	13.13
QMAX	1530100	29.00	51.44	53.87	50.58	34.15	33.50	25.72
QMAX	1530150	30.00	54.50	58.08	54.40	53.87	32.70	14.50
QMAX	1540100	24.00	54.13	58.31	53.60	35.88	36.60	16.32
QMAX	1540200	24.00	58.00	59.25	57.90	58.31	6.50	20.75
QMAX	1540300	60.00	48.83	55.49	48.80	35.88	205.70	14.58
QMAX	1540400	54.00	56.35	59.23	56.21	55.49	48.40	14.47
QMAX	1540401	54.00	56.45	59.23	56.26	55.49	46.60	14.47
QMAX	1540500	36.00	59.23	60.75	58.60	59.23	25.40	54.67
QMAX	1540502	36.00	59.23	60.75	58.60	59.23	25.40	54.67
QMAX	1540503	36.00	59.23	60.75	58.60	59.23	25.40	54.67
QMAX	1540600	48.00	59.99	61.72	59.72	60.75	22.70	49.13
QMAX	1540602	48.00	59.99	61.72	59.99	60.75	16.90	49.13
QMAX	1540603	48.00	60.02	61.72	59.98	60.75	17.00	49.13

	Junction ID	Conduit Height	U/S Inv.	U/S Peak Stage	D/S Inv.	D/S Peak Stage	Peak Flow	Time to Peak
		(in.)	(ft)	(ft)	(ft)	(ft)	(cfs)	(hr)
QMAX	1540604	30.00	60.42	61.72	59.49	60.75	19.80	49.13
QMAX	1540700	36.00	64.31	65.29	64.30	61.61	4.30	46.90
QMAX	1540701	36.00	64.31	65.29	64.30	61.61	4.30	46.90
QMAX	1540800	30.00	61.00	62.77	60.90	61.72	15.10	20.43
QMAX	1541000	24.00	65.10	67.24	63.40	67.85	-16.60	15.82
QMAX	1542020	42.00	51.75	55.82	51.48	47.70	75.00	14.42
QMAX	1542021	42.00	51.75	55.82	51.48	47.70	75.00	14.42
QMAX	1542030	42.00	54.85	56.92	53.92	55.82	50.20	14.35
QMAX	1542031	42.00	54.85	56.92	53.92	55.82	50.20	14.35
QMAX	1542035	24.00	58.50	58.60	58.33	56.92	0.00	0.00
QMAX	1542040	42.00	57.65	60.11	57.46	56.92	34.20	15.72
QMAX	1542041	42.00	57.65	60.11	57.46	56.92	34.20	15.72
QMAX	1542060	36.00	58.70	61.12	58.63	60.11	27.10	16.68
QMAX	1542061	36.00	58.70	61.12	58.63	60.11	27.10	16.68
QMAX	1542090	18.00	61.64	62.27	61.63	62.11	1.00	25.93
QMAX	1542100	30.00	63.30	64.54	62.40	62.11	14.30	25.88
QMAX	1542120	30.00	45.40	51.81	45.32	36.19	86.10	16.10
QMAX	1542122	18.00	55.00	51.81	54.90	55.82	-2.00	14.42
QMAX	1542130	24.00	56.20	58.19	56.15	51.81	15.10	16.92
QMAX	1542160	18.00	56.70	60.33	56.60	51.81	18.10	21.47
QMAX	1542170	16.00	57.90	61.11	57.41	60.33	9.70	13.17
QMAX	1542190	18.00	61.11	63.19	60.97	60.00	6.00	24.30
QMAX	1542215	30.00	60.40	67.00	60.00	62.70	73.20	0.03
QMAX	1542216	30.00	60.40	67.00	60.00	62.70	73.20	0.03
QMAX	1542225	30.00	61.50	67.00	61.40	67.00	57.90	33.55
QMAX	1542230	24.00	63.00	66.19	62.90	67.00	22.70	14.22
QMAX	1542255	12.00	65.23	67.46	65.10	67.51	-2.00	17.23
QMAX	1542256	12.00	65.77	67.46	65.54	67.50	-2.40	14.27
QMAX	1542260	24.00	63.00	67.51	63.00	67.33	10.00	17.80
QMAX	1542261	18.00	64.68	67.51	64.42	67.29	5.60	17.82
QMAX	1542262	18.00	64.63	67.51	64.48	67.29	5.60	17.82
QMAX	1542263	30.00	63.64	67.51	63.49	67.29	19.10	17.82
QMAX	1542265	48.00	64.00	68.41	63.80	67.51	25.10	16.23
QMAX	1542275	30.00	67.00	73.57	66.80	67.51	68.40	12.50
QMAX	1542280	24.00	66.27	67.29	66.27	66.91	3.30	26.98
QMAX	1542285	30.00	63.78	67.33	63.45	67.29	9.80	0.08
QMAX	1542290	30.00	63.07	66.91	62.98	67.70	-32.60	13.28
QMAX	1542310	29.00	64.85	66.43	63.20	64.00	14.70	24.00
QMAX	1542350	15.00	66.06	68.33	65.94	67.70	6.90	19.02
QMAX	2510150	84.00	32.00	35.44	31.19	35.28	154.30	17.88
QMAX	2510800	108.00	34.50	41.81	34.20	41.80	127.50	17.47
QMAX	2520750	60.00	33.00	35.69	32.80	34.12	138.20	20.57
QMAX	2520800	60.00	38.17	41.00	37.98	35.69	184.90	0.00
QMAX	2541100	38.00	63.80	65.67	63.70	65.29	111.00	32.00
QMAX	2541150	36.00	64.00	66.45	63.90	65.67	107.80	32.22
QMAX	3510250	34.00	37.05	39.41	36.85	39.20	41.00	12.70
QMAX	3510260	29.00	39.10	42.08	39.00	39.20	48.20	13.17
QMAX	3520900	84.00	45.27	48.71	44.81	41.00	123.80	22.87
QMAX	3521300	36.00	55.81	56.16	55.18	54.64	0.70	27.58
QMAX	3521500	36.00	54.00	56.32	53.85	54.64	49.60	13.98
QMAX	3521501	36.00	54.00	56.32	53.85	54.64	49.60	13.98
QMAX	3521800	36.00	58.61	59.93	57.85	59.09	25.60	25.32
QMAX	3521801	36.00	58.66	59.93	58.21	59.09	16.70	25.30
QMAX	3522000	24.00	59.25	61.93	58.99	59.93	24.70	19.65
QMAX	3541140	14.00	65.71	68.05	65.65	67.51	6.10	13.13
QMAX	3542080	29.00	60.59	62.11	60.55	61.12	13.00	33.10
QMAX	6542327	240.00	60.00	62.70	59.80	62.60	177.40	0.05
QMAX	9500100	473.00	20.60	34.10	20.50	33.20	2526.10	115.27
QMAX	9500200	410.00	25.80	34.11	20.60	34.10	2510.00	115.25
QMAX	9500300	414.00	25.80	34.11	25.50	34.12	-2415.30	111.55
QMAX	9500400	396.00	27.00	34.15	25.50	34.12	2275.50	108.08
QMAX	9500500	298.00	27.00	34.15	25.20	35.88	-2222.00	108.10
QMAX	9500600	218.00	31.80	35.89	25.20	35.88	2506.50	15.07
QMAX	9500700	326.00	32.80	36.19	31.80	35.89	2128.70	103.48
QMAX	9500800	324.00	33.00	36.32	32.80	36.19	2124.80	102.13
QMAX	9500900	319.00	33.40	36.76	33.00	36.32	2126.10	84.98
QMAX	9501000	186.00	34.50	37.57	33.40	36.76	2125.40	66.23

	Junction ID	Conduit Height	U/S Inv.	U/S Peak Stage	D/S Inv.	D/S Peak Stage	Peak Flow	Time to Peak
		(in.)	(ft)	(ft)	(ft)	(ft)	(cfs)	(hr)
QMAX	9501100	294.00	35.50	38.37	34.50	37.57	2127.90	62.53
QMAX	9501200	282.00	36.50	38.97	35.50	38.37	2130.80	50.20
QMAX	9501300	362.00	36.50	38.97	29.80	41.19	-2131.70	42.17
QMAX	9501400	228.00	29.80	41.19	25.00	41.65	-2133.00	42.12
QMAX	9501500	228.00	28.00	41.70	25.00	41.65	2133.00	46.92
QMAX	9501600	234.00	28.00	41.70	25.00	42.01	-2133.00	46.47
QMAX	9501700	264.00	29.00	45.01	25.00	42.01	2135.30	34.23
QMAX	9501800	276.00	30.00	45.08	29.00	45.01	2138.10	34.23
QMAX	9501900	289.00	30.00	45.08	27.90	47.46	-2138.50	34.32
QMAX	9502000	299.00	27.90	47.46	26.10	48.91	-2139.20	34.32
QMAX	9502100	288.00	28.00	49.35	26.10	48.91	2139.80	34.35
QMAX	9502200	276.00	32.00	49.38	28.00	49.35	2140.00	34.35
QMAX	9510105	150.00	33.00	36.46	32.00	35.28	68.00	15.22
QMAX	9510110	150.00	34.00	37.53	33.00	36.46	69.30	15.18
QMAX	9510115	150.00	35.00	38.59	34.00	37.53	71.10	14.57
QMAX	9510120	150.00	36.00	39.63	35.00	38.59	72.70	14.55
QMAX	9510170	240.00	33.33	37.20	33.08	35.44	127.00	19.48
QMAX	9510175	240.00	33.57	37.90	33.28	37.20	127.10	19.30
QMAX	9510180	240.00	37.36	41.49	37.07	37.90	93.40	18.97
QMAX	9510185	240.00	37.53	41.64	37.36	41.49	118.40	18.78
QMAX	9510190	240.00	37.70	41.80	37.53	41.64	117.80	18.60
QMAX	9510410	240.00	39.70	41.82	34.40	41.81	-18.10	16.12
QMAX	9510450	240.00	41.50	42.25	39.70	41.82	6.80	24.90
QMAX	9510930	240.00	40.60	44.45	40.20	43.82	108.00	13.40
QMAX	9510940	240.00	41.00	44.96	40.60	44.45	55.10	19.02
QMAX	9511220	240.00	48.00	48.91	47.80	48.95	-1.80	18.15
QMAX	9542010	1188.00	44.10	47.70	44.00	35.89	228.20	14.00
QMAX	9542070	60.00	60.20	61.61	59.50	61.12	44.60	14.42
QMAX	9542380	120.00	65.30	67.70	65.20	66.43	13.00	13.35

25 yr - Existing Conditions

Weir Flows

	Weir ID	U/S Jcn.	D/S Jcn.	U/S Inv.	D/S Inv.	Weir Elev	U/S Peak Stage	Peak Flow	D/S Peak Stage	Time to Peak
				(ft)	(ft)	(ft)	(ft)	(cfs)	(ft)	(hr)
QWEIR	90411	500000	0	25.40	25.40	0.00	33.20	2204.00	0.00	17.80
QWEIR	8510100	510100	500200	26.00	34.05	25.50	35.28	277.70	33.15	17.00
QWEIR	90410	510300	510200	30.00	30.00	34.00	37.73	1.00	39.20	8.00
QWEIR	6510520	510520	510510	35.71	44.00	35.28	44.87	40.50	43.00	14.10
QWEIR	6510530	510530	510520	36.15	44.50	35.71	46.22	112.40	44.87	13.70
QWEIR	6510540	510540	510530	36.58	45.00	36.15	47.16	154.10	46.22	13.10
QWEIR	6510700	510700	510540	40.00	46.00	36.58	46.53	-62.20	47.16	13.20
QWEIR	6520700	520700	520600	50.00	55.00	50.00	55.24	5.80	50.97	24.30
QWEIR	6521000	521000	520900	50.00	50.00	43.00	51.74	114.90	48.71	15.20
QWEIR	6521600	521600	521500	55.00	57.00	54.00	58.08	56.20	56.32	20.70
QWEIR	6521601	521600	521500	55.00	58.00	54.00	58.08	1.10	56.32	20.70
QWEIR	7522202	522200	500400	32.90	35.00	31.80	35.64	50.60	34.72	13.10
QWEIR	6530200	530200	530100	55.00	56.30	50.00	57.15	39.30	53.87	17.00
QWEIR	7530300	530300	530200	55.00	59.00	55.00	59.15	5.80	57.15	17.50
QWEIR	6530500	530500	540100	55.00	57.00	53.60	58.31	82.60	58.31	14.20
QWEIR	7530500	530500	500400	55.00	57.80	31.80	58.31	36.70	34.72	16.30
QWEIR	7540100	540100	500500	53.60	58.13	33.00	58.31	3.00	39.28	16.30
QWEIR	6540450	540450	540500	60.00	63.30	59.00	63.52	5.30	60.73	25.00
QWEIR	6540700	540700	540600	63.70	64.00	59.00	65.29	72.90	61.72	46.90
QWEIR	6540701	540700	542070	63.70	65.00	60.20	65.29	7.60	61.61	46.90
QWEIR	8541300	541300	541200	69.00	69.43	63.00	70.39	39.20	65.65	12.60
QWEIR	6542180	542180	500900	55.00	58.00	36.50	60.00	141.40	39.62	0.00
QWEIR	6542200	542200	501000	58.00	61.50	37.10	62.07	21.70	41.78	17.00
QWEIR	6542220	542220	542210	63.00	63.00	56.00	64.06	54.90	60.00	15.90
QWEIR	7542225	542225	542215	60.00	66.50	60.00	67.00	23.60	67.00	0.20
QWEIR	6542227	542225	542295	60.00	65.00	63.00	67.00	-64.00	67.00	26.00
QWEIR	7542230	542230	542215	60.00	66.50	60.00	66.19	-35.30	67.00	0.00
QWEIR	6542250	542250	542295	62.50	67.00	63.00	67.50	17.90	67.00	15.60
QWEIR	6542255	542255	542260	64.50	67.00	63.00	67.46	-17.80	67.51	18.90
QWEIR	8542270	542270	542265	63.50	67.00	64.00	68.45	10.40	68.41	18.60
QWEIR	6542281	542280	542290	63.45	66.70	63.07	67.29	22.50	66.91	27.90
QWEIR	6542280	542280	542290	63.45	67.10	63.07	67.29	4.00	66.91	27.00
QWEIR	6542297	542295	542290	63.00	64.30	63.07	67.00	142.70	66.91	0.00
QWEIR	6542298	542295	542290	63.00	65.50	63.07	67.00	78.00	66.91	0.00
QWEIR	6542296	542295	542290	63.00	66.50	63.07	67.00	17.30	66.91	0.00
QWEIR	90412	542305	0	63.20	63.20	0.00	64.00	14.70	0.00	24.00
QWEIR	7542320	542320	542310	67.00	68.50	64.50	68.57	3.90	66.43	19.90
QWEIR	90413	542325	0	59.80	59.80	0.00	62.60	177.40	0.00	0.10
QWEIR	6542330	542330	542320	68.00	69.30	67.00	69.47	3.40	68.57	15.50
QWEIR	7542352	542350	542380	66.06	68.20	62.98	68.33	8.80	67.70	15.10
QWEIR	6542360	542360	542380	67.20	67.20	62.98	67.87	52.20	67.70	12.80
QWEIR	6542370	542370	542350	76.50	76.50	66.06	78.00	90.90	68.33	0.00
QWEIR	6542390	542390	542290	64.50	66.00	63.07	66.91	18.90	66.91	12.50

50 yr - Existing Conditions

Peak Stages

	Junction ID	Junc. Invert	Peak Stage	Time to Peak
		(ft)	(ft)	(hr)
ZMAX	500000	20.50	33.60	48.00
ZMAX	500100	20.60	34.74	89.10
ZMAX	500200	25.80	34.76	89.10
ZMAX	500300	25.50	34.77	89.00
ZMAX	500400	27.00	34.79	89.00
ZMAX	500500	25.20	36.33	89.10
ZMAX	500600	31.80	36.34	89.10
ZMAX	500700	32.80	36.58	89.10
ZMAX	500800	33.00	36.69	89.00
ZMAX	500900	33.40	37.09	89.00
ZMAX	501000	34.50	37.84	89.00
ZMAX	501100	35.50	38.63	89.00
ZMAX	501200	36.50	39.20	89.00
ZMAX	501300	29.80	41.50	86.00
ZMAX	501400	25.00	42.11	86.00
ZMAX	501500	28.00	42.18	86.10
ZMAX	501600	25.00	42.59	86.10
ZMAX	501700	29.00	45.27	28.00
ZMAX	501800	30.00	45.37	28.00
ZMAX	501900	27.90	48.11	28.00
ZMAX	502000	26.10	49.67	28.00
ZMAX	502100	28.00	50.19	28.00
ZMAX	502200	32.00	50.23	28.00
ZMAX	510050	30.00	34.76	90.10
ZMAX	510070	31.71	35.12	122.70
ZMAX	510100	26.00	35.78	16.70
ZMAX	510105	33.00	36.70	15.50
ZMAX	510110	34.00	37.72	15.10
ZMAX	510115	35.00	38.73	15.00
ZMAX	510120	36.00	39.74	14.90
ZMAX	510150	32.00	36.34	17.00
ZMAX	510170	33.28	38.15	17.30
ZMAX	510175	33.57	38.98	17.20
ZMAX	510180	33.85	42.71	16.90
ZMAX	510185	34.03	42.71	16.90
ZMAX	510190	34.20	42.81	16.70
ZMAX	510200	34.00	39.97	14.90
ZMAX	510250	37.05	40.01	12.70
ZMAX	510260	39.00	42.70	13.20
ZMAX	510300	30.00	39.02	29.30
ZMAX	510400	37.00	42.64	20.80
ZMAX	510410	38.00	42.65	20.90
ZMAX	510450	38.78	42.82	22.40
ZMAX	510460	38.90	42.83	23.30
ZMAX	510470	39.70	43.05	23.30
ZMAX	510480	40.90	43.32	17.40
ZMAX	510500	34.84	43.29	18.70
ZMAX	510510	35.28	44.58	13.90
ZMAX	510520	35.71	45.93	13.70
ZMAX	510530	36.15	46.98	13.40
ZMAX	510540	36.58	47.81	13.00
ZMAX	510600	36.00	43.70	15.80

	Junction ID	Junc. Invert	Peak Stage	Time to Peak
		(ft)	(ft)	(hr)
ZMAX	510700	40.00	47.08	15.00
ZMAX	510800	34.40	42.84	16.70
ZMAX	510810	35.50	42.97	16.80
ZMAX	510820	36.00	43.17	16.80
ZMAX	510830	36.50	43.33	16.80
ZMAX	510840	37.00	43.53	16.80
ZMAX	510850	37.50	43.88	16.60
ZMAX	510900	38.00	43.67	13.90
ZMAX	510910	38.50	44.55	13.60
ZMAX	510920	39.00	45.04	13.50
ZMAX	510930	40.60	45.28	13.30
ZMAX	510940	41.00	45.33	13.50
ZMAX	511000	41.60	45.44	13.40
ZMAX	511010	42.20	45.53	18.40
ZMAX	511020	42.60	46.62	18.50
ZMAX	511030	43.40	48.68	18.60
ZMAX	511100	43.70	50.45	19.90
ZMAX	511200	43.40	50.37	18.60
ZMAX	511220	48.00	50.37	18.60
ZMAX	511300	48.10	50.52	25.00
ZMAX	511400	40.00	44.93	33.60
ZMAX	511500	45.00	47.93	20.40
ZMAX	511600	43.60	45.28	14.00
ZMAX	520100	40.00	48.55	26.50
ZMAX	520200	45.00	48.13	34.90
ZMAX	520300	45.00	47.31	26.10
ZMAX	520400	50.00	53.38	27.20
ZMAX	520600	50.00	52.07	18.70
ZMAX	520700	50.00	55.58	16.30
ZMAX	520750	33.00	36.57	19.00
ZMAX	520800	38.17	41.15	19.90
ZMAX	520900	43.00	49.59	22.00
ZMAX	521000	50.00	52.28	15.20
ZMAX	521100	50.00	55.85	26.00
ZMAX	521200	55.00	56.85	15.50
ZMAX	521300	52.00	56.65	24.40
ZMAX	521400	54.00	57.52	32.00
ZMAX	521500	54.00	57.15	14.00
ZMAX	521600	55.00	58.47	18.50
ZMAX	521700	55.00	59.70	17.00
ZMAX	521800	58.50	60.32	25.10
ZMAX	521900	60.00	62.03	28.60
ZMAX	522000	59.25	62.52	20.00
ZMAX	522100	60.00	63.24	25.00
ZMAX	522200	32.90	36.03	13.10
ZMAX	522300	50.00	53.57	26.10
ZMAX	530100	50.00	54.83	26.00
ZMAX	530150	50.00	59.31	14.40
ZMAX	530200	55.00	57.62	16.50
ZMAX	530300	55.00	59.53	14.50
ZMAX	530500	55.00	58.80	15.60
ZMAX	540100	53.60	58.81	15.60
ZMAX	540200	55.00	59.87	17.80
ZMAX	540300	48.83	57.13	15.10
ZMAX	540400	56.00	59.98	14.50
ZMAX	540450	60.00	63.87	17.30
ZMAX	540500	59.00	61.36	26.50
ZMAX	540600	59.00	62.13	27.30
ZMAX	540700	63.70	65.59	42.70
ZMAX	540800	60.00	63.43	18.90

	Junction ID	Junc. Invert	Peak Stage	Time to Peak
		(ft)	(ft)	(hr)
ZMAX	540900	64.00	68.68	15.90
ZMAX	541000	64.00	68.13	27.50
ZMAX	541100	62.50	66.09	26.90
ZMAX	541140	65.71	68.33	13.10
ZMAX	541150	64.00	67.17	32.00
ZMAX	541200	63.00	66.57	28.90
ZMAX	541300	69.00	70.65	12.60
ZMAX	542010	44.10	47.98	13.90
ZMAX	542020	50.00	56.74	14.60
ZMAX	542030	54.83	57.71	14.40
ZMAX	542035	58.50	58.60	0.00
ZMAX	542040	57.00	60.79	15.50
ZMAX	542050	60.00	64.87	27.90
ZMAX	542060	58.50	61.71	16.80
ZMAX	542070	60.20	61.89	13.80
ZMAX	542080	59.00	62.85	31.30
ZMAX	542090	60.00	62.76	25.00
ZMAX	542100	62.00	65.26	25.60
ZMAX	542110	55.00	57.68	29.70
ZMAX	542120	45.40	54.30	16.20
ZMAX	542130	55.00	58.87	16.70
ZMAX	542140	60.00	62.46	28.20
ZMAX	542150	60.00	62.79	28.00
ZMAX	542160	56.70	61.13	24.10
ZMAX	542170	57.90	62.07	17.50
ZMAX	542180	55.00	60.31	15.10
ZMAX	542190	60.00	63.77	24.60
ZMAX	542200	58.00	62.54	16.20
ZMAX	542210	56.00	60.00	0.00
ZMAX	542215	60.00	67.00	0.00
ZMAX	542220	63.00	64.38	15.90
ZMAX	542225	60.00	67.04	24.50
ZMAX	542230	60.00	66.51	14.80
ZMAX	542240	60.00	66.95	25.60
ZMAX	542250	62.50	67.69	14.80
ZMAX	542255	64.50	67.70	26.90
ZMAX	542260	63.00	67.76	19.50
ZMAX	542265	64.00	68.52	14.60
ZMAX	542270	63.50	68.94	18.10
ZMAX	542275	67.00	87.06	12.50
ZMAX	542280	63.45	67.41	25.20
ZMAX	542285	63.00	67.50	24.80
ZMAX	542290	63.07	67.23	24.50
ZMAX	542295	63.00	67.19	24.60
ZMAX	542305	63.20	64.00	24.00
ZMAX	542310	64.50	67.43	22.00
ZMAX	542320	67.00	68.70	14.40
ZMAX	542325	59.80	62.60	24.00
ZMAX	542327	60.00	62.74	24.00
ZMAX	542330	68.00	69.75	13.40
ZMAX	542350	66.06	68.60	13.40
ZMAX	542360	67.20	68.31	14.50
ZMAX	542370	76.50	78.00	0.00
ZMAX	542380	62.98	68.30	14.50
ZMAX	542390	64.50	67.23	24.50

50 yr - Existing Conditions

Conduit Flows

	Junction ID	Conduit Height	U/S Inv.	U/S Peak Stage	D/S Inv.	D/S Peak Stage	Peak Flow	Time to Peak
		(in.)	(ft)	(ft)	(ft)	(ft)	(cfs)	(hr)
QMAX	1510070	24.00	31.71	35.12	29.21	35.78	-11.40	16.63
QMAX	1510071	18.00	31.71	35.12	30.51	34.76	10.20	14.50
QMAX	1510180	30.00	33.85	42.71	33.57	38.98	36.80	15.27
QMAX	1510185	30.00	34.03	42.71	33.85	42.71	34.00	14.43
QMAX	1510190	30.00	34.20	42.81	34.03	42.71	31.90	13.65
QMAX	1510200	36.00	37.60	39.97	36.00	39.74	58.70	13.72
QMAX	1510201	36.00	37.60	39.97	36.00	39.74	58.70	13.72
QMAX	1510400	34.00	40.70	42.64	40.50	39.97	18.30	20.83
QMAX	1510401	34.00	40.70	42.64	40.50	39.97	18.30	20.83
QMAX	1510460	38.00	38.90	42.83	38.78	42.82	39.10	12.53
QMAX	1510461	38.00	38.90	42.83	38.78	42.82	39.10	12.53
QMAX	1510470	36.00	39.70	43.05	38.90	42.83	25.70	15.02
QMAX	1510471	36.00	39.70	43.05	38.90	42.83	25.70	15.02
QMAX	1510480	36.00	40.90	43.32	39.70	43.05	25.80	15.00
QMAX	1510481	36.00	40.90	43.32	39.70	43.05	25.80	15.00
QMAX	1510500	54.00	34.84	43.29	34.40	42.84	75.40	20.47
QMAX	1510510	54.00	35.28	44.58	34.84	43.29	197.50	13.58
QMAX	1510520	54.00	35.71	45.93	35.28	44.58	186.20	13.08
QMAX	1510530	48.00	36.15	46.98	35.71	45.93	158.30	12.73
QMAX	1510540	48.00	36.58	47.81	36.15	46.98	149.70	12.45
QMAX	1510600	24.00	42.13	43.70	40.85	43.32	25.80	14.98
QMAX	1510601	24.00	42.13	43.70	40.85	43.32	25.80	14.98
QMAX	1510810	84.00	34.80	42.97	34.50	42.84	95.50	17.67
QMAX	1510820	78.00	36.10	43.17	35.30	42.97	97.60	14.92
QMAX	1510830	78.00	36.60	43.33	36.10	43.17	110.00	14.83
QMAX	1510840	72.00	37.60	43.53	37.10	43.33	134.00	14.35
QMAX	1510850	66.00	38.80	43.88	38.10	43.53	153.70	14.25
QMAX	1510900	66.00	38.90	43.67	38.80	43.88	161.20	13.93
QMAX	1510910	66.00	39.60	44.55	38.90	43.67	146.80	13.67
QMAX	1510920	60.00	40.20	45.04	39.60	44.55	169.00	13.52
QMAX	1511000	60.00	41.60	45.44	41.00	45.33	63.40	18.65
QMAX	1511010	60.00	42.20	45.53	41.60	45.44	63.40	18.63
QMAX	1511020	48.00	42.60	46.62	42.20	45.53	63.40	18.60
QMAX	1511030	42.00	43.40	48.68	43.00	46.62	63.40	18.60
QMAX	1511100	36.00	44.80	50.45	44.70	50.37	77.00	14.17
QMAX	1511200	36.00	43.70	50.37	43.40	48.68	63.40	18.60
QMAX	1511300	18.00	48.10	50.52	48.00	50.37	13.00	30.45
QMAX	1511400	12.00	46.20	44.93	46.20	47.93	-4.40	20.42
QMAX	1511500	24.00	45.00	47.93	44.50	34.76	31.50	20.42
QMAX	1511600	36.00	43.60	45.28	42.46	34.76	37.40	14.03
QMAX	1520100	24.00	45.13	48.55	44.43	34.77	25.20	26.45
QMAX	1520600	36.00	49.60	52.07	49.59	48.55	24.70	18.73
QMAX	1521100	54.00	51.32	55.85	50.87	52.28	118.80	26.07
QMAX	1521200	30.00	54.50	56.85	54.40	52.28	23.10	15.48
QMAX	1521400	18.00	58.15	57.52	57.62	55.85	0.00	0.00
QMAX	1521700	54.00	57.35	59.70	55.47	58.47	88.20	17.02
QMAX	1522200	30.00	32.90	36.03	32.19	34.77	35.40	13.07
QMAX	1530100	29.00	51.44	54.83	50.58	34.79	45.30	25.98
QMAX	1530150	30.00	54.50	59.31	54.40	54.83	43.30	14.43
QMAX	1540100	24.00	54.13	58.81	53.60	36.33	39.80	15.65
QMAX	1540200	24.00	58.00	59.87	57.90	58.81	13.30	17.77
QMAX	1540300	60.00	48.83	57.13	48.80	36.33	264.60	15.10
QMAX	1540400	54.00	56.35	59.98	56.21	57.13	75.20	14.48
QMAX	1540401	54.00	56.45	59.98	56.26	57.13	73.20	14.48
QMAX	1540500	36.00	59.23	61.36	58.60	59.98	42.40	26.47
QMAX	1540502	36.00	59.23	61.36	58.60	59.98	42.40	26.47
QMAX	1540503	36.00	59.23	61.36	58.60	59.98	42.40	26.47
QMAX	1540600	48.00	59.99	62.13	59.72	61.36	34.00	27.33
QMAX	1540602	48.00	59.99	62.13	59.99	61.36	26.50	27.33
QMAX	1540603	48.00	60.02	62.13	59.98	61.36	26.70	27.33

	Junction ID	Conduit Height	U/S Inv.	U/S Peak Stage	D/S Inv.	D/S Peak Stage	Peak Flow	Time to Peak
		(in.)	(ft)	(ft)	(ft)	(ft)	(cfs)	(hr)
QMAX	1540604	30.00	60.42	62.13	59.49	61.36	30.00	27.33
QMAX	1540700	36.00	64.31	65.59	64.30	61.89	7.80	42.70
QMAX	1540701	36.00	64.31	65.59	64.30	61.89	7.80	42.70
QMAX	1540800	30.00	61.00	63.43	60.90	62.13	26.20	18.95
QMAX	1541000	24.00	65.10	68.13	63.40	68.68	-21.50	15.18
QMAX	1542020	42.00	51.75	56.74	51.48	47.98	98.50	14.60
QMAX	1542021	42.00	51.75	56.74	51.48	47.98	98.50	14.60
QMAX	1542030	42.00	54.85	57.71	53.92	56.74	76.00	14.40
QMAX	1542031	42.00	54.85	57.71	53.92	56.74	76.00	14.40
QMAX	1542035	24.00	58.50	58.60	58.33	57.71	0.00	0.00
QMAX	1542040	42.00	57.65	60.79	57.46	57.71	52.30	15.47
QMAX	1542041	42.00	57.65	60.79	57.46	57.71	52.30	15.47
QMAX	1542060	36.00	58.70	61.71	58.63	60.79	39.00	16.80
QMAX	1542061	36.00	58.70	61.71	58.63	60.79	39.00	16.80
QMAX	1542090	18.00	61.64	62.76	61.63	62.85	3.50	25.00
QMAX	1542100	30.00	63.30	65.26	62.40	62.85	26.50	25.58
QMAX	1542120	30.00	45.40	54.30	45.32	36.58	109.20	16.20
QMAX	1542122	18.00	55.00	54.30	54.90	56.74	-7.50	14.60
QMAX	1542130	24.00	56.20	58.87	56.15	54.30	24.00	16.72
QMAX	1542160	18.00	56.70	61.13	56.60	54.30	21.10	24.12
QMAX	1542170	16.00	57.90	62.07	57.41	61.13	9.90	16.22
QMAX	1542190	18.00	61.11	63.77	60.97	60.31	7.50	24.65
QMAX	1542215	30.00	60.40	67.00	60.00	62.74	73.20	0.03
QMAX	1542216	30.00	60.40	67.00	60.00	62.74	73.20	0.03
QMAX	1542225	30.00	61.50	67.04	61.40	67.00	59.00	47.08
QMAX	1542230	24.00	63.00	66.51	62.90	67.00	23.10	13.00
QMAX	1542255	12.00	65.23	67.70	65.10	67.76	-2.40	16.90
QMAX	1542256	12.00	65.77	67.70	65.54	67.69	-2.80	14.18
QMAX	1542260	24.00	63.00	67.76	63.00	67.50	11.50	18.00
QMAX	1542261	18.00	64.68	67.76	64.42	67.41	6.60	18.12
QMAX	1542262	18.00	64.63	67.76	64.48	67.41	6.60	18.12
QMAX	1542263	30.00	63.64	67.76	63.49	67.41	22.50	18.12
QMAX	1542265	48.00	64.00	68.52	63.80	67.76	28.00	14.63
QMAX	1542275	30.00	67.00	87.06	66.80	67.76	138.90	12.50
QMAX	1542280	24.00	66.27	67.41	66.27	67.23	4.20	25.23
QMAX	1542285	30.00	63.78	67.50	63.45	67.41	11.10	13.08
QMAX	1542290	30.00	63.07	67.23	62.98	68.30	-37.50	13.68
QMAX	1542310	29.00	64.85	67.43	63.20	64.00	20.10	24.00
QMAX	1542350	15.00	66.06	68.60	65.94	68.30	6.30	24.95
QMAX	2510150	84.00	32.00	36.34	31.19	35.78	267.00	17.05
QMAX	2510800	108.00	34.50	42.84	34.20	42.81	209.00	16.57
QMAX	2520750	60.00	33.00	36.57	32.80	34.77	221.60	19.05
QMAX	2520800	60.00	38.17	41.15	37.98	36.57	212.20	19.88
QMAX	2541100	38.00	63.80	66.09	63.70	65.59	161.90	26.62
QMAX	2541150	36.00	64.00	67.17	63.90	66.09	151.30	32.03
QMAX	3510250	34.00	37.05	40.01	36.85	39.97	57.40	12.72
QMAX	3510260	29.00	39.10	42.70	39.00	39.97	63.00	13.20
QMAX	3520900	84.00	45.27	49.59	44.81	41.15	192.10	22.05
QMAX	3521300	36.00	55.81	56.65	55.18	55.85	5.00	24.38
QMAX	3521500	36.00	54.00	57.15	53.85	55.85	81.80	14.03
QMAX	3521501	36.00	54.00	57.15	53.85	55.85	81.80	14.03
QMAX	3521800	36.00	58.61	60.32	57.85	59.70	40.50	25.07
QMAX	3521801	36.00	58.66	60.32	58.21	59.70	27.70	25.07
QMAX	3522000	24.00	59.25	62.52	58.99	60.32	29.80	19.98
QMAX	3541140	14.00	65.71	68.33	65.65	67.76	6.70	12.97
QMAX	3542080	29.00	60.59	62.85	60.55	61.71	27.70	31.28
QMAX	6542327	240.00	60.00	62.74	59.80	62.60	177.40	0.05
QMAX	9500100	473.00	20.60	34.74	20.50	33.60	3054.80	113.50
QMAX	9500200	410.00	25.80	34.76	20.60	34.74	3038.70	113.28
QMAX	9500300	414.00	25.80	34.76	25.50	34.77	-2927.70	111.12
QMAX	9500400	396.00	27.00	34.79	25.50	34.77	2783.20	107.90
QMAX	9500500	298.00	27.00	34.79	25.20	36.33	-2722.80	106.50
QMAX	9500600	218.00	31.80	36.34	25.20	36.33	3345.80	14.78
QMAX	9500700	326.00	32.80	36.58	31.80	36.34	2595.40	103.05
QMAX	9500800	324.00	33.00	36.69	32.80	36.58	2586.00	100.67
QMAX	9500900	319.00	33.40	37.09	33.00	36.69	2584.20	100.65
QMAX	9501000	186.00	34.50	37.84	33.40	37.09	2582.00	86.87

	Junction ID	Conduit Height	U/S Inv.	U/S Peak Stage	D/S Inv.	D/S Peak Stage	Peak Flow	Time to Peak
		(in.)	(ft)	(ft)	(ft)	(ft)	(cfs)	(hr)
QMAX	9501100	294.00	35.50	38.63	34.50	37.84	2584.70	70.05
QMAX	9501200	282.00	36.50	39.20	35.50	38.63	2587.80	69.88
QMAX	9501300	362.00	36.50	39.20	29.80	41.50	-2588.70	69.87
QMAX	9501400	228.00	29.80	41.50	25.00	42.11	-2590.10	69.87
QMAX	9501500	228.00	28.00	42.18	25.00	42.11	2590.10	47.15
QMAX	9501600	234.00	28.00	42.18	25.00	42.59	-2590.10	39.62
QMAX	9501700	264.00	29.00	45.27	25.00	42.59	2592.80	28.02
QMAX	9501800	276.00	30.00	45.37	29.00	45.27	2595.70	28.02
QMAX	9501900	289.00	30.00	45.37	27.90	48.11	-2596.20	28.02
QMAX	9502000	299.00	27.90	48.11	26.10	49.67	-2597.10	28.00
QMAX	9502100	288.00	28.00	50.19	26.10	49.67	2597.80	28.00
QMAX	9502200	276.00	32.00	50.23	28.00	50.19	2598.00	28.00
QMAX	9510105	150.00	33.00	36.70	32.00	35.78	75.90	15.12
QMAX	9510110	150.00	34.00	37.72	33.00	36.70	76.00	15.07
QMAX	9510115	150.00	35.00	38.73	34.00	37.72	76.10	14.98
QMAX	9510120	150.00	36.00	39.74	35.00	38.73	76.40	13.60
QMAX	9510170	240.00	33.33	38.15	33.08	36.34	207.20	17.33
QMAX	9510175	240.00	33.57	38.98	33.28	38.15	207.40	17.13
QMAX	9510180	240.00	37.36	42.71	37.07	38.98	173.50	16.93
QMAX	9510185	240.00	37.53	42.71	37.36	42.71	207.10	16.92
QMAX	9510190	240.00	37.70	42.81	37.53	42.71	200.90	16.75
QMAX	9510410	240.00	39.70	42.65	34.40	42.64	-21.70	15.07
QMAX	9510450	240.00	41.50	42.82	39.70	42.65	17.60	24.77
QMAX	9510930	240.00	40.60	45.28	40.20	45.04	172.50	13.30
QMAX	9510940	240.00	41.00	45.33	40.60	45.28	63.40	18.97
QMAX	9511220	240.00	48.00	50.37	47.80	50.37	-11.00	16.37
QMAX	9542010	1188.00	44.10	47.98	44.00	36.34	307.50	13.88
QMAX	9542070	60.00	60.20	61.89	59.50	61.71	67.30	14.02
QMAX	9542380	120.00	65.30	68.30	65.20	67.43	23.60	14.47

50 yr - Existing Conditions

Weir Flows

	Weir ID	U/S Jcn.	D/S Jcn.	U/S Inv.	D/S Inv.	Weir Elev	U/S Peak Stage	Peak Flow	D/S Peak Stage	Time to Peak
				(ft)	(ft)	(ft)	(ft)	(cfs)	(ft)	(hr)
QWEIR	90411	500000	0	25.40	25.40	0.00	33.60	3053.20	0.00	17.90
QWEIR	6510050	510050	500200	30.00	34.00	25.50	34.19	4.20	33.56	34.00
QWEIR	7510070	510070	510050	31.71	35.03	30.00	35.11	2.50	34.19	17.10
QWEIR	8510100	510100	500200	26.00	34.05	25.50	35.78	463.60	33.56	16.70
QWEIR	90410	510300	510200	30.00	30.00	34.00	39.02	1.00	39.97	6.70
QWEIR	6510510	510510	510500	35.28	43.50	34.84	44.58	56.00	43.29	13.90
QWEIR	6510520	510520	510510	35.71	44.00	35.28	45.93	134.10	44.58	13.70
QWEIR	6510530	510530	510520	36.15	44.50	35.71	46.98	188.00	45.93	13.30
QWEIR	6510540	510540	510530	36.58	45.00	36.15	47.81	220.50	46.98	12.90
QWEIR	6510700	510700	510540	40.00	46.00	36.58	47.08	-121.90	47.81	13.00
QWEIR	6510910	510910	510900	38.50	44.00	38.00	44.55	20.50	43.67	13.70
QWEIR	7510920	510920	510910	39.00	45.00	38.50	45.04	0.80	44.55	13.50
QWEIR	6510930	510930	510920	40.60	45.10	39.00	45.28	3.70	45.04	13.30
QWEIR	6510940	510940	510930	41.00	45.20	40.60	45.33	2.50	45.28	13.50
QWEIR	6520400	520400	520600	50.00	53.10	50.00	53.38	7.50	52.07	27.20
QWEIR	6520700	520700	520600	50.00	55.00	50.00	55.58	21.90	52.07	16.30
QWEIR	6521000	521000	520900	50.00	50.00	43.00	52.28	172.00	49.59	15.20
QWEIR	6521601	521600	521500	55.00	58.00	54.00	58.47	15.90	57.15	18.50
QWEIR	6521600	521600	521500	55.00	57.00	54.00	58.47	88.70	57.15	18.50
QWEIR	6522100	522100	521800	60.00	63.00	58.50	63.24	5.90	60.32	25.00
QWEIR	7522202	522200	500400	32.90	35.00	31.80	36.03	103.90	35.13	13.10
QWEIR	7530150	530150	530100	50.00	59.00	50.00	59.31	3.50	54.83	14.40
QWEIR	6530200	530200	530100	55.00	56.30	50.00	57.62	75.70	54.83	16.50
QWEIR	7530300	530300	530200	55.00	59.00	55.00	59.53	38.30	57.62	14.50
QWEIR	7530500	530500	500400	55.00	57.80	31.80	58.80	100.70	35.13	15.60
QWEIR	6530500	530500	540100	55.00	57.00	53.60	58.80	111.60	58.81	13.60
QWEIR	7540100	540100	500500	53.60	58.13	33.00	58.81	22.40	40.06	15.70
QWEIR	6540450	540450	540500	60.00	63.30	59.00	63.87	21.30	61.36	17.30
QWEIR	6540701	540700	542070	63.70	65.00	60.20	65.59	22.80	61.89	42.70
QWEIR	6540700	540700	540600	63.70	64.00	59.00	65.59	100.50	62.13	42.70
QWEIR	7541140	541140	542260	65.71	68.13	63.00	68.33	9.20	67.76	13.10
QWEIR	6541151	541150	541140	64.00	68.10	65.71	67.17	-5.60	68.33	13.10

	Weir ID	U/S Jcn.	D/S Jcn.	U/S Inv.	D/S Inv.	Weir Elev	U/S Peak Stage	Peak Flow	D/S Peak Stage	Time to Peak
				(ft)	(ft)	(ft)	(ft)	(cfs)	(ft)	(hr)
QWEIR	8541300	541300	541200	69.00	69.43	63.00	70.65	55.90	66.57	12.60
QWEIR	6542100	542100	542250	62.00	67.50	62.50	65.26	-8.30	67.69	14.80
QWEIR	6542120	542120	500700	45.40	54.00	34.50	54.30	8.20	40.07	16.20
QWEIR	6542180	542180	500900	55.00	58.00	36.50	60.31	175.60	40.25	15.10
QWEIR	6542200	542200	501000	58.00	61.50	37.10	62.54	52.80	42.17	16.20
QWEIR	6542220	542220	542210	63.00	63.00	56.00	64.38	81.00	60.00	15.90
QWEIR	6542227	542225	542295	60.00	65.00	63.00	67.04	-78.60	67.19	25.40
QWEIR	6542226	542225	542295	60.00	67.00	63.00	67.04	-4.30	67.19	24.60
QWEIR	7542225	542225	542215	60.00	66.50	60.00	67.04	39.50	67.00	24.50
QWEIR	7542230	542230	542215	60.00	66.50	60.00	66.51	-35.30	67.00	0.00
QWEIR	7542240	542240	542230	60.00	66.90	60.00	66.95	1.20	66.51	25.60
QWEIR	6542250	542250	542295	62.50	67.00	63.00	67.69	28.70	67.19	14.80
QWEIR	6542255	542255	542260	64.50	67.00	63.00	67.70	-32.20	67.76	18.80
QWEIR	6542256	542255	542100	64.50	67.50	62.00	67.70	4.60	65.26	26.90
QWEIR	8542270	542270	542265	63.50	67.00	64.00	68.94	15.80	68.52	17.70
QWEIR	6542280	542280	542290	63.45	67.10	63.07	67.41	8.50	67.23	27.20
QWEIR	6542281	542280	542290	63.45	66.70	63.07	67.41	27.10	67.23	28.50
QWEIR	6542296	542295	542290	63.00	66.50	63.07	67.19	17.30	67.23	0.00
QWEIR	6542298	542295	542290	63.00	65.50	63.07	67.19	78.00	67.23	0.00
QWEIR	6542297	542295	542290	63.00	64.30	63.07	67.19	142.70	67.23	0.00
QWEIR	90412	542305	0	63.20	63.20	0.00	64.00	20.10	0.00	24.00
QWEIR	7542320	542320	542310	67.00	68.50	64.50	68.70	17.50	67.43	14.40
QWEIR	90413	542325	0	59.80	59.80	0.00	62.60	177.40	0.00	0.10
QWEIR	6542330	542330	542320	68.00	69.30	67.00	69.75	15.20	68.70	13.40
QWEIR	7542352	542350	542380	66.06	68.20	62.98	68.60	50.70	68.30	13.50
QWEIR	6542360	542360	542380	67.20	67.20	62.98	68.31	78.40	68.30	12.80
QWEIR	6542370	542370	542350	76.50	76.50	66.06	78.00	90.90	68.60	0.00
QWEIR	6542390	542390	542290	64.50	66.00	63.07	67.23	29.40	67.23	12.50

100 yr - Existing Conditions

Peak Stages

	Junction ID	Junc. Invert	Peak Stage	Time to Peak
		(ft)	(ft)	(hr)
ZMAX	500000	20.50	34.00	48.00
ZMAX	500100	20.60	35.40	96.00
ZMAX	500200	25.80	35.43	96.00
ZMAX	500300	25.50	35.43	96.10
ZMAX	500400	27.00	35.46	96.30
ZMAX	500500	25.20	36.89	96.60
ZMAX	500600	31.80	36.90	96.70
ZMAX	500700	32.80	37.09	96.50
ZMAX	500800	33.00	37.19	96.60
ZMAX	500900	33.40	37.53	96.50
ZMAX	501000	34.50	38.19	96.40
ZMAX	501100	35.50	38.95	96.40
ZMAX	501200	36.50	39.49	96.30
ZMAX	501300	29.80	41.89	95.60
ZMAX	501400	25.00	42.71	95.50
ZMAX	501500	28.00	42.80	95.60
ZMAX	501600	25.00	43.33	95.60
ZMAX	501700	29.00	45.59	28.80
ZMAX	501800	30.00	45.73	28.80
ZMAX	501900	27.90	48.87	28.80
ZMAX	502000	26.10	50.55	28.80
ZMAX	502100	28.00	51.21	28.90
ZMAX	502200	32.00	51.25	28.90
ZMAX	510050	30.00	35.43	97.00
ZMAX	510070	31.71	35.83	73.60
ZMAX	510100	26.00	35.94	16.40
ZMAX	510105	33.00	36.87	15.60
ZMAX	510110	34.00	37.88	15.20
ZMAX	510115	35.00	38.89	15.10
ZMAX	510120	36.00	39.90	15.00
ZMAX	510150	32.00	36.67	16.60
ZMAX	510170	33.28	38.37	16.80
ZMAX	510175	33.57	39.20	16.70
ZMAX	510180	33.85	42.94	16.00
ZMAX	510185	34.03	42.93	16.20
ZMAX	510190	34.20	43.04	15.90
ZMAX	510200	34.00	40.27	14.90
ZMAX	510250	37.05	40.29	14.90
ZMAX	510260	39.00	42.95	13.20
ZMAX	510300	30.00	39.48	29.40
ZMAX	510400	37.00	42.88	20.40
ZMAX	510410	38.00	42.89	20.40
ZMAX	510450	38.78	43.06	21.30
ZMAX	510460	38.90	43.09	21.40
ZMAX	510470	39.70	43.74	22.60
ZMAX	510480	40.90	43.90	19.60
ZMAX	510500	34.84	43.70	18.50
ZMAX	510510	35.28	44.88	13.70
ZMAX	510520	35.71	46.22	13.60
ZMAX	510530	36.15	47.24	13.40
ZMAX	510540	36.58	48.05	13.00
ZMAX	510600	36.00	44.17	16.40

	Junction ID	Junc. Invert	Peak Stage	Time to Peak
		(ft)	(ft)	(hr)
ZMAX	510700	40.00	47.38	14.90
ZMAX	510800	34.40	43.07	15.90
ZMAX	510810	35.50	43.19	15.80
ZMAX	510820	36.00	43.38	15.80
ZMAX	510830	36.50	43.54	15.70
ZMAX	510840	37.00	43.78	15.70
ZMAX	510850	37.50	44.30	15.70
ZMAX	510900	38.00	43.95	17.40
ZMAX	510910	38.50	44.72	13.50
ZMAX	510920	39.00	45.54	13.40
ZMAX	510930	40.60	45.51	13.30
ZMAX	510940	41.00	45.56	13.40
ZMAX	511000	41.60	45.66	13.30
ZMAX	511010	42.20	45.77	18.50
ZMAX	511020	42.60	46.92	18.40
ZMAX	511030	43.40	49.20	18.40
ZMAX	511100	43.70	50.94	19.70
ZMAX	511200	43.40	50.86	18.40
ZMAX	511220	48.00	50.86	18.40
ZMAX	511300	48.10	50.86	25.30
ZMAX	511400	40.00	45.44	34.90
ZMAX	511500	45.00	48.18	20.50
ZMAX	511600	43.60	45.42	14.00
ZMAX	520100	40.00	49.01	27.70
ZMAX	520200	45.00	48.40	34.90
ZMAX	520300	45.00	47.55	26.10
ZMAX	520400	50.00	53.58	25.70
ZMAX	520600	50.00	52.52	21.90
ZMAX	520700	50.00	55.74	15.70
ZMAX	520750	33.00	36.88	18.80
ZMAX	520800	38.17	41.40	19.60
ZMAX	520900	43.00	49.90	21.80
ZMAX	521000	50.00	52.47	15.20
ZMAX	521100	50.00	56.35	26.30
ZMAX	521200	55.00	57.00	15.50
ZMAX	521300	52.00	56.80	21.50
ZMAX	521400	54.00	57.89	32.10
ZMAX	521500	54.00	57.51	14.20
ZMAX	521600	55.00	58.60	18.20
ZMAX	521700	55.00	59.93	16.90
ZMAX	521800	58.50	60.48	25.00
ZMAX	521900	60.00	62.23	28.60
ZMAX	522000	59.25	62.73	20.10
ZMAX	522100	60.00	63.33	22.50
ZMAX	522200	32.90	36.16	13.00
ZMAX	522300	50.00	53.90	26.10
ZMAX	530100	50.00	55.18	26.10
ZMAX	530150	50.00	59.74	14.30
ZMAX	530200	55.00	57.78	16.40
ZMAX	530300	55.00	59.65	14.30
ZMAX	530500	55.00	58.96	15.50
ZMAX	540100	53.60	58.97	15.50
ZMAX	540200	55.00	60.10	16.90
ZMAX	540300	48.83	57.72	15.30
ZMAX	540400	56.00	60.27	14.50
ZMAX	540450	60.00	64.04	16.50
ZMAX	540500	59.00	61.70	26.50
ZMAX	540600	59.00	62.31	26.60
ZMAX	540700	63.70	65.71	41.10
ZMAX	540800	60.00	63.66	18.80

	Junction ID	Junc. Invert	Peak Stage	Time to Peak
		(ft)	(ft)	(hr)
ZMAX	540900	64.00	68.98	15.80
ZMAX	541000	64.00	68.43	27.50
ZMAX	541100	62.50	66.26	30.80
ZMAX	541140	65.71	68.40	13.00
ZMAX	541150	64.00	67.45	31.90
ZMAX	541200	63.00	66.92	28.90
ZMAX	541300	69.00	70.74	12.60
ZMAX	542010	44.10	48.06	13.80
ZMAX	542020	50.00	57.07	14.70
ZMAX	542030	54.83	58.14	14.40
ZMAX	542035	58.50	58.60	0.00
ZMAX	542040	57.00	61.04	15.40
ZMAX	542050	60.00	65.13	25.30
ZMAX	542060	58.50	61.95	16.90
ZMAX	542070	60.20	61.98	13.80
ZMAX	542080	59.00	63.12	31.50
ZMAX	542090	60.00	62.93	24.80
ZMAX	542100	62.00	65.54	25.80
ZMAX	542110	55.00	57.91	29.70
ZMAX	542120	45.40	54.86	15.90
ZMAX	542130	55.00	59.12	16.70
ZMAX	542140	60.00	62.67	28.30
ZMAX	542150	60.00	63.10	28.10
ZMAX	542160	56.70	61.41	24.40
ZMAX	542170	57.90	62.37	17.00
ZMAX	542180	55.00	60.49	15.10
ZMAX	542190	60.00	64.00	24.70
ZMAX	542200	58.00	62.70	16.10
ZMAX	542210	56.00	60.00	0.00
ZMAX	542215	60.00	67.00	0.00
ZMAX	542220	63.00	64.50	15.90
ZMAX	542225	60.00	67.15	24.50
ZMAX	542230	60.00	66.66	14.50
ZMAX	542240	60.00	67.04	24.40
ZMAX	542250	62.50	67.76	14.60
ZMAX	542255	64.50	67.80	26.80
ZMAX	542260	63.00	67.87	19.50
ZMAX	542265	64.00	68.48	14.10
ZMAX	542270	63.50	69.13	17.70
ZMAX	542275	67.00	96.12	12.50
ZMAX	542280	63.45	67.47	25.00
ZMAX	542285	63.00	67.57	24.80
ZMAX	542290	63.07	67.35	24.50
ZMAX	542295	63.00	67.31	24.60
ZMAX	542305	63.20	64.00	24.00
ZMAX	542310	64.50	67.83	23.00
ZMAX	542320	67.00	68.76	13.90
ZMAX	542325	59.80	62.60	24.00
ZMAX	542327	60.00	62.76	24.00
ZMAX	542330	68.00	69.88	13.30
ZMAX	542350	66.06	68.72	13.30
ZMAX	542360	67.20	68.56	14.50
ZMAX	542370	76.50	78.00	0.00
ZMAX	542380	62.98	68.54	14.40
ZMAX	542390	64.50	67.35	24.50

100 yr - Existing Conditions

Conduit Flows

	Junction ID	Conduit Height	U/S Inv.	U/S Peak Stage	D/S Inv.	D/S Peak Stage	Peak Flow	Time to Peak
		(in.)	(ft)	(ft)	(ft)	(ft)	(cfs)	(hr)
QMAX	1510070	24.00	31.71	35.83	29.21	35.94	-12.70	16.37
QMAX	1510071	18.00	31.71	35.83	30.51	35.43	10.30	14.28
QMAX	1510180	30.00	33.85	42.94	33.57	39.20	37.20	15.00
QMAX	1510185	30.00	34.03	42.93	33.85	42.94	34.50	14.23
QMAX	1510190	30.00	34.20	43.04	34.03	42.93	32.20	13.50
QMAX	1510200	36.00	37.60	40.27	36.00	39.90	59.10	13.38
QMAX	1510201	36.00	37.60	40.27	36.00	39.90	59.10	13.38
QMAX	1510400	34.00	40.70	42.88	40.50	40.27	22.70	20.38
QMAX	1510401	34.00	40.70	42.88	40.50	40.27	22.70	20.38
QMAX	1510460	38.00	38.90	43.09	38.78	43.06	42.90	12.53
QMAX	1510461	38.00	38.90	43.09	38.78	43.06	42.90	12.53
QMAX	1510470	36.00	39.70	43.74	38.90	43.09	25.30	14.35
QMAX	1510471	36.00	39.70	43.74	38.90	43.09	25.30	14.35
QMAX	1510480	36.00	40.90	43.90	39.70	43.74	25.40	14.33
QMAX	1510481	36.00	40.90	43.90	39.70	43.74	25.40	14.33
QMAX	1510500	54.00	34.84	43.70	34.40	43.07	85.60	19.63
QMAX	1510510	54.00	35.28	44.88	34.84	43.70	203.50	13.42
QMAX	1510520	54.00	35.71	46.22	35.28	44.88	191.60	12.98
QMAX	1510530	48.00	36.15	47.24	35.71	46.22	159.00	12.67
QMAX	1510540	48.00	36.58	48.05	36.15	47.24	148.60	12.40
QMAX	1510600	24.00	42.13	44.17	40.85	43.90	25.40	14.32
QMAX	1510601	24.00	42.13	44.17	40.85	43.90	25.40	14.32
QMAX	1510810	84.00	34.80	43.19	34.50	43.07	-95.00	13.63
QMAX	1510820	78.00	36.10	43.38	35.30	43.19	104.40	14.82
QMAX	1510830	78.00	36.60	43.54	36.10	43.38	117.10	14.55
QMAX	1510840	72.00	37.60	43.78	37.10	43.54	145.50	14.18
QMAX	1510850	66.00	38.80	44.30	38.10	43.78	169.10	14.15
QMAX	1510900	66.00	38.90	43.95	38.80	44.30	177.00	13.78
QMAX	1510910	66.00	39.60	44.72	38.90	43.95	153.80	13.52
QMAX	1510920	60.00	40.20	45.54	39.60	44.72	181.40	13.22
QMAX	1511000	60.00	41.60	45.66	41.00	45.56	68.30	18.45
QMAX	1511010	60.00	42.20	45.77	41.60	45.66	68.30	18.43
QMAX	1511020	48.00	42.60	46.92	42.20	45.77	68.30	18.43
QMAX	1511030	42.00	43.40	49.20	43.00	46.92	68.30	18.42
QMAX	1511100	36.00	44.80	50.94	44.70	50.86	80.30	13.93
QMAX	1511200	36.00	43.70	50.86	43.40	49.20	64.90	22.60
QMAX	1511300	18.00	48.10	50.86	48.00	50.86	14.50	33.32
QMAX	1511400	12.00	46.20	45.44	46.20	48.18	-5.00	20.53
QMAX	1511500	24.00	45.00	48.18	44.50	35.43	33.30	20.53
QMAX	1511600	36.00	43.60	45.42	42.46	35.43	41.90	14.05
QMAX	1520100	24.00	45.13	49.01	44.43	35.43	27.70	27.67
QMAX	1520600	36.00	49.60	52.52	49.59	49.01	32.90	21.93
QMAX	1521100	54.00	51.32	56.35	50.87	52.47	136.60	26.28
QMAX	1521200	30.00	54.50	57.00	54.40	52.47	25.50	15.50
QMAX	1521400	18.00	58.15	57.89	57.62	56.35	0.00	0.00
QMAX	1521700	54.00	57.35	59.93	55.47	58.60	103.10	16.90
QMAX	1522200	30.00	32.90	36.16	32.19	35.43	37.00	13.03
QMAX	1530100	29.00	51.44	55.18	50.58	35.46	48.30	26.15
QMAX	1530150	30.00	54.50	59.74	54.40	55.18	46.70	14.32
QMAX	1540100	24.00	54.13	58.97	53.60	36.89	40.80	15.50
QMAX	1540200	24.00	58.00	60.10	57.90	58.97	15.80	16.88
QMAX	1540300	60.00	48.83	57.72	48.80	36.89	284.90	15.25
QMAX	1540400	54.00	56.35	60.27	56.21	57.72	85.70	14.48
QMAX	1540401	54.00	56.45	60.27	56.26	57.72	83.70	14.48
QMAX	1540500	36.00	59.23	61.70	58.60	60.27	49.40	26.55
QMAX	1540502	36.00	59.23	61.70	58.60	60.27	49.40	26.55
QMAX	1540503	36.00	59.23	61.70	58.60	60.27	49.40	26.55
QMAX	1540600	48.00	59.99	62.31	59.72	61.70	39.70	26.58
QMAX	1540602	48.00	59.99	62.31	59.99	61.70	31.50	26.58
QMAX	1540603	48.00	60.02	62.31	59.98	61.70	31.70	26.58

	Junction ID	Conduit Height	U/S Inv.	U/S Peak Stage	D/S Inv.	D/S Peak Stage	Peak Flow	Time to Peak
		(in.)	(ft)	(ft)	(ft)	(ft)	(cfs)	(hr)
QMAX	1540604	30.00	60.42	62.31	59.49	61.70	34.10	26.58
QMAX	1540700	36.00	64.31	65.71	64.30	61.98	9.50	41.07
QMAX	1540701	36.00	64.31	65.71	64.30	61.98	9.50	41.07
QMAX	1540800	30.00	61.00	63.66	60.90	62.31	30.00	18.80
QMAX	1541000	24.00	65.10	68.43	63.40	68.98	-22.00	15.32
QMAX	1542020	42.00	51.75	57.07	51.48	48.06	105.10	14.72
QMAX	1542021	42.00	51.75	57.07	51.48	48.06	105.10	14.72
QMAX	1542030	42.00	54.85	58.14	53.92	57.07	85.20	14.42
QMAX	1542031	42.00	54.85	58.14	53.92	57.07	85.20	14.42
QMAX	1542035	24.00	58.50	58.60	58.33	58.14	0.00	0.00
QMAX	1542040	42.00	57.65	61.04	57.46	58.14	59.10	15.40
QMAX	1542041	42.00	57.65	61.04	57.46	58.14	59.10	15.40
QMAX	1542060	36.00	58.70	61.95	58.63	61.04	43.80	16.92
QMAX	1542061	36.00	58.70	61.95	58.63	61.04	43.80	16.92
QMAX	1542090	18.00	61.64	62.93	61.63	63.12	4.60	24.77
QMAX	1542100	30.00	63.30	65.54	62.40	63.12	30.60	25.82
QMAX	1542120	30.00	45.40	54.86	45.32	37.09	113.70	15.92
QMAX	1542122	18.00	55.00	54.86	54.90	57.07	-9.40	14.72
QMAX	1542130	24.00	56.20	59.12	56.15	54.86	27.10	16.70
QMAX	1542160	18.00	56.70	61.41	56.60	54.86	22.00	24.37
QMAX	1542170	16.00	57.90	62.37	57.41	61.41	10.20	16.18
QMAX	1542190	18.00	61.11	64.00	60.97	60.49	8.00	24.73
QMAX	1542215	30.00	60.40	67.00	60.00	62.76	73.20	0.03
QMAX	1542216	30.00	60.40	67.00	60.00	62.76	73.20	0.03
QMAX	1542225	30.00	61.50	67.15	61.40	67.00	59.10	54.78
QMAX	1542230	24.00	63.00	66.66	62.90	67.00	23.10	12.85
QMAX	1542255	12.00	65.23	67.80	65.10	67.87	-2.50	16.75
QMAX	1542256	12.00	65.77	67.80	65.54	67.76	-2.90	14.12
QMAX	1542260	24.00	63.00	67.87	63.00	67.57	12.00	18.05
QMAX	1542261	18.00	64.68	67.87	64.42	67.47	7.00	18.15
QMAX	1542262	18.00	64.63	67.87	64.48	67.47	7.00	18.15
QMAX	1542263	30.00	63.64	67.87	63.49	67.47	23.60	18.15
QMAX	1542265	48.00	64.00	68.48	63.80	67.87	27.20	14.13
QMAX	1542275	30.00	67.00	96.12	66.80	67.87	170.10	12.50
QMAX	1542280	24.00	66.27	67.47	66.27	67.35	4.70	24.97
QMAX	1542285	30.00	63.78	67.57	63.45	67.47	12.10	13.10
QMAX	1542290	30.00	63.07	67.35	62.98	68.54	-39.60	13.82
QMAX	1542310	29.00	64.85	67.83	63.20	64.00	21.20	24.00
QMAX	1542350	15.00	66.06	68.72	65.94	68.54	6.00	25.32
QMAX	2510150	84.00	32.00	36.67	31.19	35.94	302.80	16.67
QMAX	2510800	108.00	34.50	43.07	34.20	43.04	232.50	15.82
QMAX	2520750	60.00	33.00	36.88	32.80	35.43	255.00	18.80
QMAX	2520800	60.00	38.17	41.40	37.98	36.88	243.00	19.60
QMAX	2541100	38.00	63.80	66.26	63.70	65.71	182.10	29.72
QMAX	2541150	36.00	64.00	67.45	63.90	66.26	172.70	31.92
QMAX	3510250	34.00	37.05	40.29	36.85	40.27	63.50	12.73
QMAX	3510260	29.00	39.10	42.95	39.00	40.27	66.70	13.23
QMAX	3520900	84.00	45.27	49.90	44.81	41.40	218.10	21.80
QMAX	3521300	36.00	55.81	56.80	55.18	56.35	8.10	22.27
QMAX	3521500	36.00	54.00	57.51	53.85	56.35	93.10	14.18
QMAX	3521501	36.00	54.00	57.51	53.85	56.35	93.10	14.18
QMAX	3521800	36.00	58.61	60.48	57.85	59.93	46.60	25.00
QMAX	3521801	36.00	58.66	60.48	58.21	59.93	32.60	25.00
QMAX	3522000	24.00	59.25	62.73	58.99	60.48	31.70	20.10
QMAX	3541140	14.00	65.71	68.40	65.65	67.87	6.80	12.88
QMAX	3542080	29.00	60.59	63.12	60.55	61.95	32.70	31.52
QMAX	6542327	240.00	60.00	62.76	59.80	62.60	177.40	0.05
QMAX	9500100	473.00	20.60	35.40	20.50	34.00	3686.20	113.35
QMAX	9500200	410.00	25.80	35.43	20.60	35.40	3671.80	112.77
QMAX	9500300	414.00	25.80	35.43	25.50	35.43	-3562.80	110.02
QMAX	9500400	396.00	27.00	35.46	25.50	35.43	3414.30	107.42
QMAX	9500500	298.00	27.00	35.46	25.20	36.89	-3356.90	107.80
QMAX	9500600	218.00	31.80	36.90	25.20	36.89	3633.20	14.58
QMAX	9500700	326.00	32.80	37.09	31.80	36.90	3203.10	103.00
QMAX	9500800	324.00	33.00	37.19	32.80	37.09	3191.10	101.43
QMAX	9500900	319.00	33.40	37.53	33.00	37.19	3191.00	91.67
QMAX	9501000	186.00	34.50	38.19	33.40	37.53	3190.40	95.77

	Junction ID	Conduit Height	U/S Inv.	U/S Peak Stage	D/S Inv.	D/S Peak Stage	Peak Flow	Time to Peak
		(in.)	(ft)	(ft)	(ft)	(ft)	(cfs)	(hr)
QMAX	9501100	294.00	35.50	38.95	34.50	38.19	3193.30	82.60
QMAX	9501200	282.00	36.50	39.49	35.50	38.95	3196.50	64.83
QMAX	9501300	362.00	36.50	39.49	29.80	41.89	-3197.60	64.82
QMAX	9501400	228.00	29.80	41.89	25.00	42.71	-3199.20	56.40
QMAX	9501500	228.00	28.00	42.80	25.00	42.71	3199.20	56.40
QMAX	9501600	234.00	28.00	42.80	25.00	43.33	-3199.20	45.48
QMAX	9501700	264.00	29.00	45.59	25.00	43.33	3202.30	28.77
QMAX	9501800	276.00	30.00	45.73	29.00	45.59	3205.40	28.80
QMAX	9501900	289.00	30.00	45.73	27.90	48.87	-3206.00	28.77
QMAX	9502000	299.00	27.90	48.87	26.10	50.55	-3207.10	28.83
QMAX	9502100	288.00	28.00	51.21	26.10	50.55	3208.60	28.88
QMAX	9502200	276.00	32.00	51.25	28.00	51.21	3209.00	28.95
QMAX	9510105	150.00	33.00	36.87	32.00	35.94	82.40	15.17
QMAX	9510110	150.00	34.00	37.88	33.00	36.87	82.60	15.12
QMAX	9510115	150.00	35.00	38.89	34.00	37.88	82.60	15.05
QMAX	9510120	150.00	36.00	39.90	35.00	38.89	82.70	14.97
QMAX	9510170	240.00	33.33	38.37	33.08	36.67	226.00	16.88
QMAX	9510175	240.00	33.57	39.20	33.28	38.37	226.10	16.65
QMAX	9510180	240.00	37.36	42.94	37.07	39.20	192.40	16.03
QMAX	9510185	240.00	37.53	42.93	37.36	42.94	228.60	16.22
QMAX	9510190	240.00	37.70	43.04	37.53	42.93	222.30	15.88
QMAX	9510410	240.00	39.70	42.89	34.40	42.88	22.90	24.47
QMAX	9510450	240.00	41.50	43.06	39.70	42.89	22.00	24.50
QMAX	9510930	240.00	40.60	45.51	40.20	45.54	195.10	13.32
QMAX	9510940	240.00	41.00	45.56	40.60	45.51	63.50	25.92
QMAX	9511220	240.00	48.00	50.86	47.80	50.86	-16.00	15.98
QMAX	9542010	1188.00	44.10	48.06	44.00	36.90	335.50	13.82
QMAX	9542070	60.00	60.20	61.98	59.50	61.95	75.80	13.90
QMAX	9542380	120.00	65.30	68.54	65.20	67.83	29.10	14.43

100 yr - Existing Conditions

Weir Flows

	Weir ID	U/S Jcn.	D/S Jcn.	U/S Inv.	D/S Inv.	Weir Elev	U/S Peak Stage	Peak Flow	D/S Peak Stage	Time to Peak
				(ft)	(ft)	(ft)	(ft)	(cfs)	(ft)	(hr)
QWEIR	90411	500000	0	25.40	25.40	0.00	34.00	3411.90	0.00	17.80
QWEIR	6510050	510050	500200	30.00	34.00	25.50	34.34	9.80	33.97	27.50
QWEIR	7510070	510070	510050	31.71	35.03	30.00	35.23	7.00	34.34	16.90
QWEIR	8510100	510100	500200	26.00	34.05	25.50	35.94	532.60	33.97	16.40
QWEIR	90410	510300	510200	30.00	30.00	34.00	39.48	1.00	40.27	6.30
QWEIR	6510510	510510	510500	35.28	43.50	34.84	44.88	81.10	43.70	13.70
QWEIR	6510520	510520	510510	35.71	44.00	35.28	46.22	163.10	44.88	13.50
QWEIR	6510530	510530	510520	36.15	44.50	35.71	47.24	214.80	46.22	13.20
QWEIR	6510540	510540	510530	36.58	45.00	36.15	48.05	245.50	47.24	12.90
QWEIR	6510700	510700	510540	40.00	46.00	36.58	47.38	-146.30	48.05	13.00
QWEIR	6510910	510910	510900	38.50	44.00	38.00	44.72	30.30	43.95	13.50
QWEIR	7510920	510920	510910	39.00	45.00	38.50	45.54	39.90	44.72	13.40
QWEIR	6510930	510930	510920	40.60	45.10	39.00	45.51	12.40	45.54	13.20
QWEIR	6510940	510940	510930	41.00	45.20	40.60	45.56	9.10	45.51	13.60
QWEIR	7511200	511200	511030	43.40	50.60	43.40	50.86	5.30	49.20	18.40
QWEIR	7520100	520100	500300	40.00	48.92	27.00	49.01	2.90	33.97	27.70
QWEIR	6520400	520400	520600	50.00	53.10	50.00	53.58	16.50	52.52	25.70
QWEIR	6520700	520700	520600	50.00	55.00	50.00	55.74	32.00	52.52	15.70
QWEIR	6521000	521000	520900	50.00	50.00	43.00	52.47	194.20	49.90	15.20
QWEIR	6521600	521600	521500	55.00	57.00	54.00	58.60	101.20	57.51	18.20
QWEIR	6521601	521600	521500	55.00	58.00	54.00	58.60	23.20	57.51	18.20
QWEIR	6522100	522100	521800	60.00	63.00	58.50	63.33	9.30	60.48	22.50
QWEIR	7522202	522200	500400	32.90	35.00	31.80	36.16	125.30	35.29	13.00
QWEIR	7530150	530150	530100	50.00	59.00	50.00	59.74	12.70	55.18	14.30
QWEIR	6530200	530200	530100	55.00	56.30	50.00	57.78	89.70	55.18	16.40
QWEIR	7530300	530300	530200	55.00	59.00	55.00	59.65	52.30	57.78	14.30
QWEIR	7530500	530500	500400	55.00	57.80	31.80	58.96	125.60	35.29	15.50
QWEIR	6530500	530500	540100	55.00	57.00	53.60	58.96	121.90	58.97	13.40
QWEIR	7540100	540100	500500	53.60	58.13	33.00	58.97	30.90	40.60	15.50
QWEIR	6540200	540200	540100	55.00	60.00	53.60	60.10	1.60	58.97	16.90
QWEIR	6540450	540450	540500	60.00	63.30	59.00	64.04	31.80	61.70	16.50
QWEIR	6540700	540700	540600	63.70	64.00	59.00	65.71	112.00	62.31	41.10

	Weir ID	U/S Jcn.	D/S Jcn.	U/S Inv.	D/S Inv.	Weir Elev	U/S Peak Stage	Peak Flow	D/S Peak Stage	Time to Peak
				(ft)	(ft)	(ft)	(ft)	(cfs)	(ft)	(hr)
QWEIR	6540701	540700	542070	63.70	65.00	60.20	65.71	30.10	61.98	41.10
QWEIR	6540900	540900	540700	64.00	68.80	63.70	68.98	3.90	65.71	15.80
QWEIR	7541140	541140	542260	65.71	68.13	63.00	68.40	14.10	67.87	13.00
QWEIR	6541151	541150	541140	64.00	68.10	65.71	67.45	-8.30	68.40	13.00
QWEIR	8541300	541300	541200	69.00	69.43	63.00	70.74	62.60	66.92	12.60
QWEIR	7542050	542050	542030	60.00	65.00	54.83	65.13	4.80	58.14	25.30
QWEIR	6542100	542100	542250	62.00	67.50	62.50	65.54	-13.30	67.76	14.60
QWEIR	6542120	542120	500700	45.40	54.00	34.50	54.86	39.60	40.61	15.90
QWEIR	7542170	542170	542160	57.90	62.22	56.70	62.37	2.30	61.41	17.00
QWEIR	6542180	542180	500900	55.00	58.00	36.50	60.49	196.00	40.76	15.10
QWEIR	6542200	542200	501000	58.00	61.50	37.10	62.70	65.90	42.43	16.10
QWEIR	6542220	542220	542210	63.00	63.00	56.00	64.50	91.60	60.00	15.90
QWEIR	7542225	542225	542215	60.00	66.50	60.00	67.15	51.90	67.00	24.50
QWEIR	6542226	542225	542295	60.00	67.00	63.00	67.15	-8.10	67.31	24.70
QWEIR	6542227	542225	542295	60.00	65.00	63.00	67.15	-83.60	67.31	25.10
QWEIR	7542230	542230	542215	60.00	66.50	60.00	66.66	-35.30	67.00	0.00
QWEIR	7542240	542240	542230	60.00	66.90	60.00	67.04	5.00	66.66	24.40
QWEIR	6542250	542250	542295	62.50	67.00	63.00	67.76	33.30	67.31	14.60
QWEIR	6542256	542255	542100	64.50	67.50	62.00	67.80	8.00	65.54	26.80
QWEIR	6542255	542255	542260	64.50	67.00	63.00	67.80	-38.80	67.87	18.80
QWEIR	8542270	542270	542265	63.50	67.00	64.00	69.13	18.10	68.48	17.20
QWEIR	8542271	542270	542265	63.50	69.10	64.00	69.13	0.60	68.48	17.70
QWEIR	6542281	542280	542290	63.45	66.70	63.07	67.47	28.70	67.35	33.70
QWEIR	6542280	542280	542290	63.45	67.10	63.07	67.47	10.40	67.35	25.50
QWEIR	6542297	542295	542290	63.00	64.30	63.07	67.31	142.70	67.35	0.00
QWEIR	6542298	542295	542290	63.00	65.50	63.07	67.31	78.00	67.35	0.00
QWEIR	6542296	542295	542290	63.00	66.50	63.07	67.31	17.30	67.35	0.00
QWEIR	90412	542305	0	63.20	63.20	0.00	64.00	21.20	0.00	24.00
QWEIR	7542320	542320	542310	67.00	68.50	64.50	68.76	26.80	67.83	13.90
QWEIR	90413	542325	0	59.80	59.80	0.00	62.60	177.40	0.00	0.10
QWEIR	6542330	542330	542320	68.00	69.30	67.00	69.88	22.20	68.76	13.30
QWEIR	7542352	542350	542380	66.06	68.20	62.98	68.72	72.60	68.54	13.30
QWEIR	6542360	542360	542380	67.20	67.20	62.98	68.56	88.90	68.54	12.80
QWEIR	6542370	542370	542350	76.50	76.50	66.06	78.00	90.90	68.72	0.00
QWEIR	6542390	542390	542290	64.50	66.00	63.07	67.35	33.60	67.35	12.50

Appendix D
Level of Service Maps

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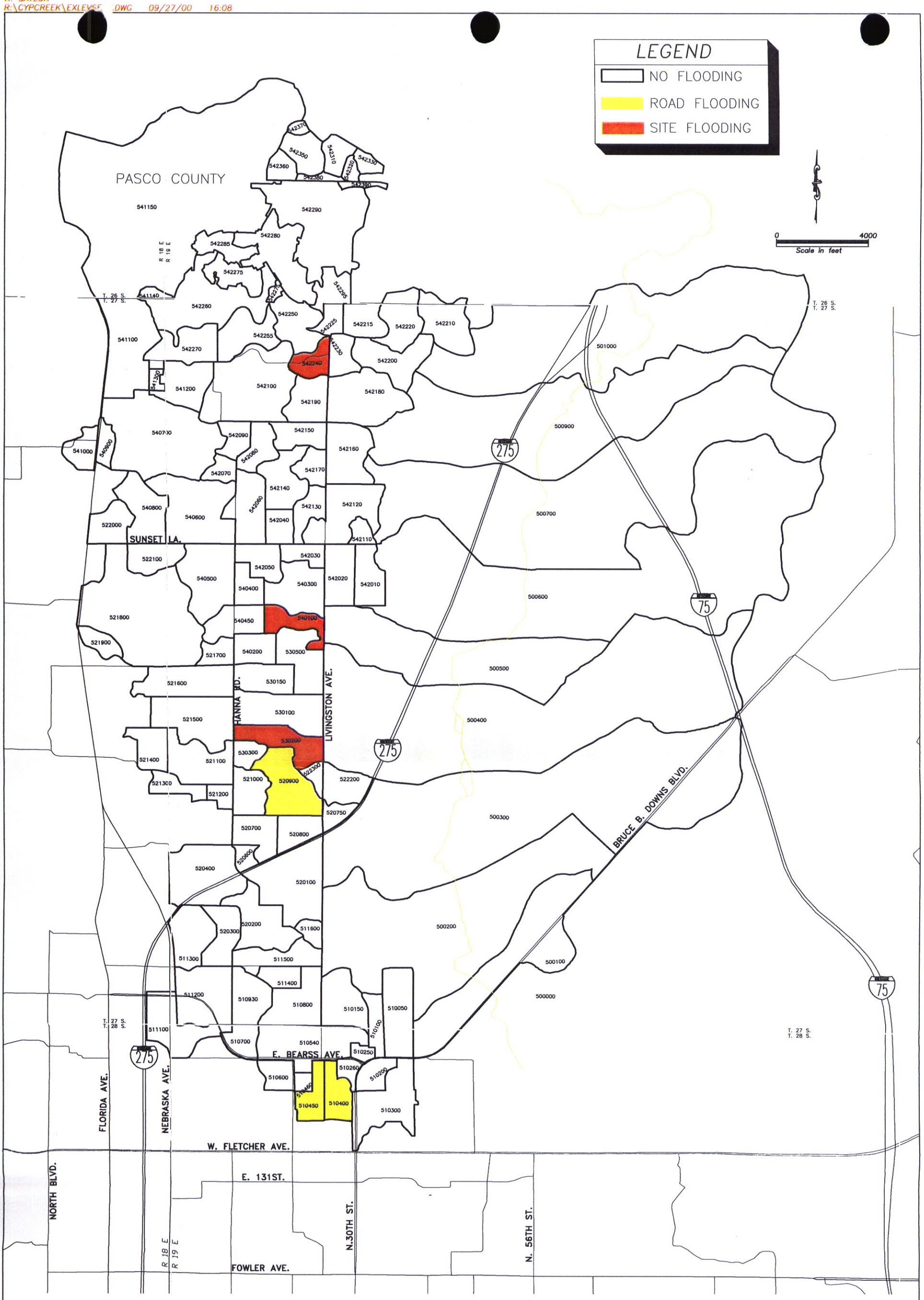

Cypress Creek
Watershed Management Plan
URS Greiner Woodward Clyde

Hillsborough County Florida

LEVEL OF SERVICE DIAGRAM 5 Yr/24 Hr

Figure 6-3A

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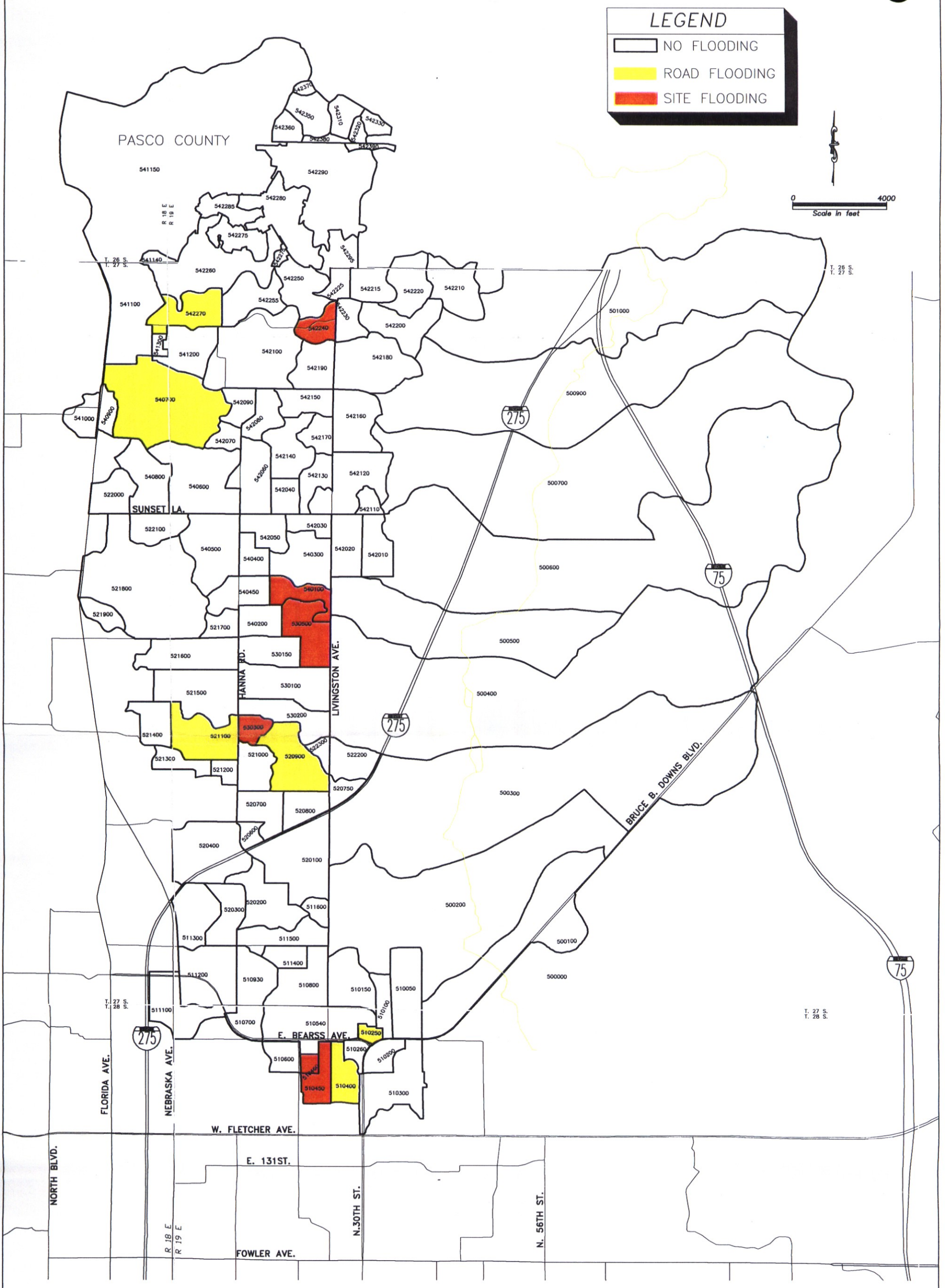

Hillsborough County Florida	**Cypress Creek** Watershed Management Plan *URS Greiner Woodward Clyde*	LEVEL OF SERVICE DIAGRAM 10 Yr/24 Hr	Figure 6-3B Date: 9-27-00

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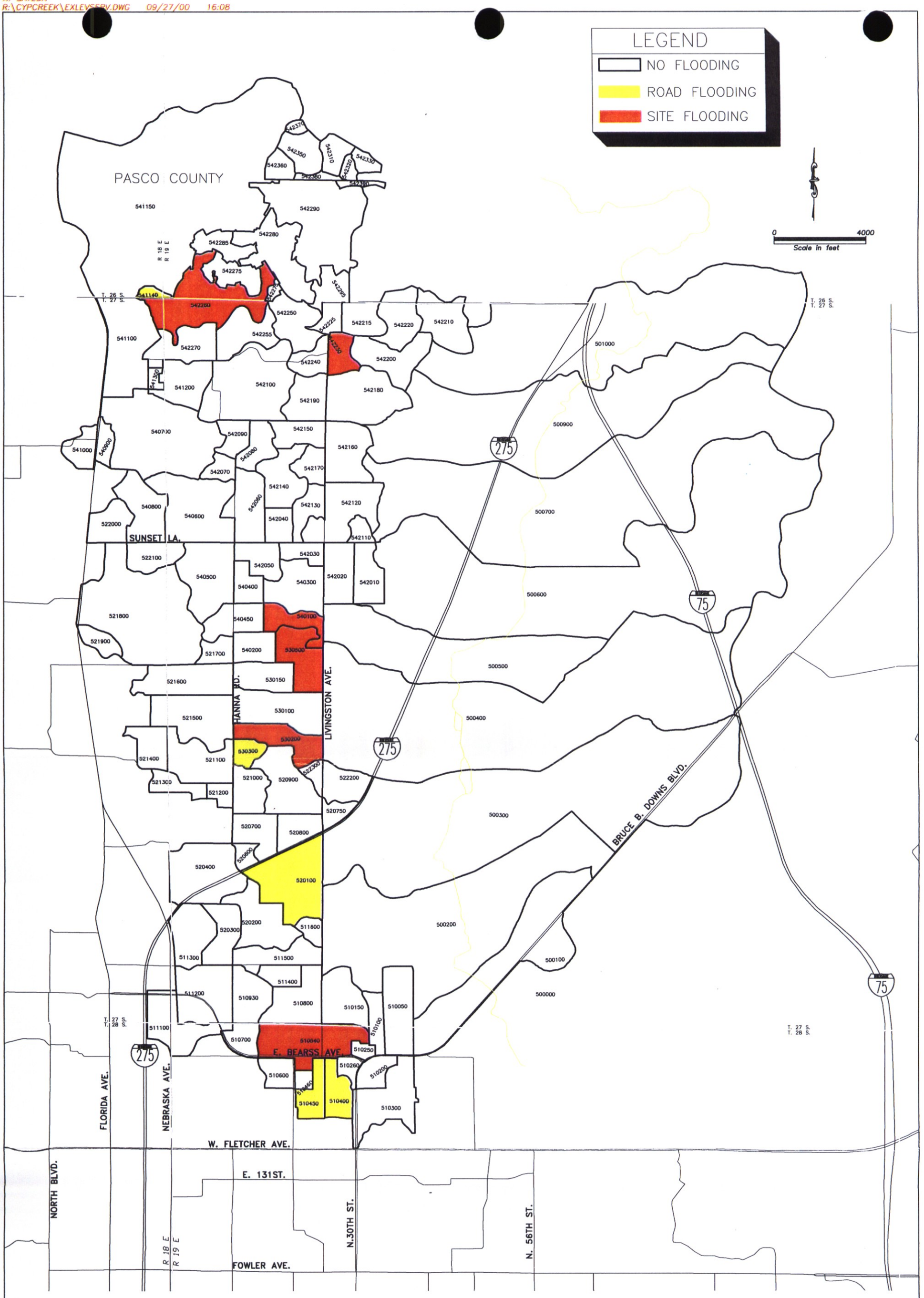

Hillsborough County Florida	**Cypress Creek** Watershed Management Plan *URS Greiner Woodward Clyde*	LEVEL OF SERVICE DIAGRAM 25 Yr/24 Hr	Figure 6-3C Date: 9-27-00

APPENDIX E
Chapter Seven Tables & Figures

APPENDIX E

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TABLE 7-1 LAND USE DATA

1995 Land Use Land Cover	
Urban & Built-Up:	31.2%
Agriculture:	19.8%
Rangeland:	2.2%
Upland Forests:	8.3%
Water:	4.7%
Wetlands:	31.3%
Barren Land:	0.0%
Transportation, Communication, & Utilities:	2.5%

Existing Land Use	
Agricultural:	49.2%
Commercial:	1.6%
Industrial:	0.1%
Residential:	24.3%
Natural:	3.6%
Public/Public Institutional:	7.5%
R/W:	0.1%
Recreation/ Open Space:	0.1%
Vacant/ Unknown:	12.7%
Water:	0.8%

Future Land Use	
Agricultural:	0.0%
Residential:	78.5%
Natural:	11.3%
Commercial:	0.5%
Public:	1.2%
Water:	4.7%
Mixed Use:	3.8%
Industrial:	0.0%

Source: Hillsborough County Lake Atlas

TABLE 7-2 LAND USE AND FLUCCS CODES

	DESCRIPTION	FLUCSID
1	RESIDENTIAL LOW DENSITY <2 DWELLING UNITS	1100
2	RESIDENTIAL MED DENSITY 2->5 DWELLING UNIT	1200
3	RESIDENTIAL HIGH DENSITY	1300
4	COMMERCIAL AND SERVICES	1400
5	INDUSTRIAL	1500
6	EXTRACTIVE	1600
7	INSTITUTIONAL	1700
8	RECREATIONAL	1800
9	OPEN LAND	1900
10	CROPLAND AND PASTURELAND	2100
11	ROW CROPS	2140
12	TREE CROPS	2200
13	FEEDING OPERATIONS	2300
14	NURSERIES AND VINEYARDS	2400
15	SPECIALTY FARMS	2500
16	TROPICAL FISH FARMS	2550
17	OTHER OPEN LANDS (RURAL)	2600
18	HERBACEOUS	3100
19	SHRUB AND BRUSHLAND	3200
20	MIXED RANGELAND	3300
21	UPLAND CONIFEROUS FOREST	4100
22	PINE FLATWOODS	4110
23	LONGLEAF PINE - XERIC OAK	4120
24	UPLAND HARDWOOD FORESTS - PART1	4200
25	HARDWOOD CONIFER MIXED	4340
26	TREE PLANTATIONS	4400
27	STREAMS AND WATERWAYS	5100
28	LAKES	5200
29	RESERVOIRS	5300
30	BAYS AND ESTUARIES	5400
31	WETLAND HARDWOOD FORESTS	6100
32	BAY SWAMPS	6110
33	MANGROVE SWAMPS	6120
34	STREAM AND LAKE SWAMPS (BOTTOMLAND)	6150
35	WETLAND CONIFEROUS FORESTS	6200
36	CYPRESS	6210
37	WETLAND FORESTS MIXED	6300
38	VEGETATED NON-FORESTED WETLANDS	6400
39	FRESHWATER MARSHES	6410
40	SALTWATER MARSHES	6420
41	WET PRAIRIES	6430
42	EMERGENT AQUATIC VEGETATION	6440
43	NON - VEGETATED	6500
44	TIDAL FLATS / SUBMERGED SHALLOW PLATFORM	6510
45	SHORELINES	6520
46	INTERMITTENT PONDS	6530
47	BEACHES OTHER THAN SWIMMING BEACHES	7100
48	DISTURBED LAND	7400
49	TRANSPORTATION	8100
50	COMMUNICATIONS	8200
51	UTILITIES	8300

Table 7.3 Lake Physical Data and TSI Statistics

LAKE	Drainage Area (sq mi)	Surface Area (ac)	Lake Vol Ac-ft	Mean Depth(ft)	Max Depth (ft)	Min TSI	1-Year Avg TSI	Max TSI	Latest TSI	I Biomass (lbs/ft2)	PVI %	Length of Record
Lake Forest	-	25.6	-	4.7	13	49	59	70	61	-	-	97 - '99
Lake Keene	0.4	30.1	119.03	8.5	24.2	49	55	73	52	3.05	-	94 - '99
Lake Kell	8.9	34.2	257.2	11.7	24.9	41	51	56	51	0.33	-	97 - '99
Commiston Lake		15.4	401.91	9.7	26.4	44	50	63	47	1.85	-	97 - '99
Hanna Lake	0.6	35.3	149.76	7.2	22	41	47	70	44	3.1	63.0	97 - '99
Lake Stemper	0.7	126	255.72	-	-	22	46	74	46	0.87	-	94 - '99
Lake New Ryan	-	9.1		11.2	25.2	30	46	64	42	1.85		97 - '99
Burrell Lake	-	25	102.55	-	-	29	45	57	44	-	-	97 - '99
Lutz Lake	-	9	-	-	-	25	39	46	46	-	-	97 - '99
Flynn Lake	-	-	-	-	-	24	31	34	34	-	-	99 only
Mill Lake	-	-	-	-	-	-	-	-	-	-	-	-
Hog Island Lake	-	54.6	460.81	8.4	20.7	31	-	56	50	1.85	-	96 - '98
Hart Lake	-	47	-	-	-	-	-	-	-	-	-	-
Feinsinger Lake	-	-	-	-	-	-	-	-	-	-	-	-
Cool Kell Lake	-	-	-	-	-	-	-	-	-	-	-	-
St. Clair Lake	-	-	-	-	-	-	-	-	-	-	-	-

Note: - = No Data

Table 7.4 Monthly Average Lake Water Quality Parameters

Burrell Lake

Averages per month	N TOTAL mg/l	P TOTAL mg/l	CHL A µg/l	SECCHI feet	Total TSI	TN/TP
January	0.52	0.02	3.83	7.98	36.59	30.59
February	0.50	0.01	4.50	8.50	36.02	37.85
March	0.52	0.02	3.17	6.77	35.66	23.46
April	0.50	0.02	4.17	7.37	36.90	32.97
May	0.59	0.01	5.67	5.83	40.90	45.64
June	0.60	0.02	6.50	5.19	41.07	33.09
July	0.53	0.02	6.67	5.85	41.28	31.68
August	0.58	0.02	7.17	5.10	43.14	32.86
September	0.60	0.02	15.67	5.02	46.00	29.59
October	0.57	0.02	20.67	5.72	46.53	25.76
November	0.52	0.02	14.67	6.63	44.36	25.28
December	0.51	0.02	15.18	7.38	41.83	24.83

Commiston Lake

Averages per month	N TOTAL mg/l	P TOTAL mg/l	CHL A µg/l	SECCHI feet	Total TSI	TN/TP
January	0.86	0.03	17.67	5.88	51.30	32.06
February	0.89	0.03	10.50	5.87	49.94	34.71
March	0.91	0.03	16.50	5.47	52.05	34.13
April	0.89	0.02	18.33	5.17	55.39	42.22
May	0.80	0.02	11.67	6.83	49.92	41.84
June	0.82	0.02	15.13	6.55	51.81	37.65
July	0.83	0.02	12.86	6.49	50.88	35.70
August	0.82	0.02	9.48	6.72	48.60	37.20
September	0.80	0.02	11.91	6.67	50.77	35.28
October	0.78	0.03	39.99	5.08	57.35	27.63
November	0.98	0.03	12.83	5.63	53.78	35.76
December	0.91	0.03	4.83	6.30	45.20	32.75
yearly averages	**0.86**	**0.02**	**15.14**	**6.05**	**51.42**	**35.58**

Flynn Lake

Averages per month	N TOTAL mg/l	P TOTAL mg/l	CHL A µg/l	SECCHI feet	Total TSI	TN/TP
January	0.68	0.01	2.67	6.43	24.28	112.78
February	0.91	0.01	5.67	4.00	33.44	80.29
March	1.06	0.05	n/a	n/a	n/a	21.27
April	0.97	0.01	8.00	3.33	33.97	116.40
May	0.73	0.01	n/a	n/a	n/a	66.36
June	n/a	n/a	n/a	n/a	n/a	n/a
July	n/a	n/a	n/a	n/a	n/a	n/a
August	n/a	n/a	n/a	n/a	n/a	n/a
September	n/a	n/a	n/a	n/a	n/a	n/a
October	n/a	n/a	n/a	n/a	n/a	n/a
November	n/a	n/a	n/a	n/a	n/a	n/a
December	n/a	n/a	n/a	n/a	n/a	n/a
yearly averages	**0.87**	**0.02**	**5.44**	**4.59**	**30.56**	**79.42**

Table 7.4 Monthly Average Lake Water Quality Parameters

Lake Forest

Averages per month	N.TOTAL mg/l	P.TOTAL mg/l	CHL.A µg/l	SECCHI Feet	Total TSI	TN/TP
January	0.88	0.08	42.67	2.20	63.31	11.63
February	n/a	n/a	n/a	n/a	n/a	n/a
March	0.96	0.07	48.33	2.60	65.29	13.70
April	0.78	0.06	n/a	2.17	n/a	13.35
May	1.06	0.06	33.00	2.00	60.27	17.57
June	1.05	0.05	31.33	2.00	61.38	19.44
July	0.60	0.03	11.33	3.00	49.15	17.38
August	0.65	0.04	27.00	2.43	56.45	16.39
September	0.94	0.04	34.33	2.00	60.59	20.97
October	1.03	0.05	53.00	2.20	64.68	20.26
November	0.83	0.06	36.00	1.87	61.40	14.67
December	0.67	0.07	44.67	2.53	61.58	10.20
yearly averages	**0.86**	**0.06**	**36.17**	**2.27**	**60.41**	**15.96**

Hanna Lake

Averages per month	N.TOTAL mg/l	P.TOTAL mg/l	CHL.A µg/l	SECCHI Feet	Total TSI	TN/TP
January	0.79	0.03	7.56	4.61	46.38	29.86
February	0.76	0.02	12.00	4.00	50.30	30.95
March	0.95	0.03	21.24	3.57	54.47	33.01
April	0.96	0.03	25.00	3.58	56.90	29.49
May	0.89	0.03	20.50	3.90	58.43	32.41
June	1.04	0.03	14.67	3.50	51.89	37.65
July	1.54	0.08	57.33	2.50	69.64	19.56
August	1.33	0.03	42.00	3.00	64.54	40.61
September	1.56	0.03	44.50	2.80	65.43	45.34
October	1.34	0.03	36.67	3.00	64.26	38.56
November	0.92	0.03	18.20	3.97	54.26	30.74
December	0.84	0.04	7.67	3.97	48.51	19.57
yearly averages	**1.07**	**0.04**	**25.61**	**3.53**	**57.08**	**32.31**

Hog Island Lake

Averages per month	N.TOTAL mg/l	P.TOTAL mg/l	CHL.A µg/l	SECCHI Feet	Total TSI	TN/TP
January	0.63	0.03	6.65	5.74	40.40	20.66
February	n/a	n/a	n/a	n/a	n/a	n/a
March	1.00	0.04	17.00	5.33	55.65	27.94
April	n/a	n/a	n/a	n/a	n/a	n/a
May	n/a	n/a	n/a	n/a	n/a	n/a
June	n/a	n/a	n/a	n/a	n/a	n/a
July	1.10	0.02	8.33	5.00	49.08	46.34
August	1.11	0.02	6.15	4.92	44.65	53.90
September	n/a	n/a	n/a	n/a	n/a	n/a
October	1.15	0.03	16.67	6.00	56.32	40.00
November	1.00	0.03	5.00	7.00	46.63	38.10
December	n/a	n/a	n/a	n/a	n/a	n/a
yearly averages	**1.00**	**0.03**	**9.97**	**5.67**	**48.79**	**37.82**

Table 7.4 Monthly Average Lake Water Quality Parameters

Lake Keene

Averages per month	N-TOTAL mg/L	P-TOTAL mg/L	CHL-A µg/l	SECCHI feet	TOTAL TSI	TN/TP
January	1.21	0.04	19.92	3.54	57.28	29.32
February	1.15	0.04	17.00	3.48	56.62	29.01
March	1.23	0.04	18.75	3.16	57.43	31.50
April	1.38	0.03	27.22	3.38	60.29	39.65
May	1.41	0.04	46.42	3.14	62.79	36.37
June	1.32	0.03	20.00	4.18	55.17	45.63
July	1.30	0.02	17.83	4.59	53.94	52.58
August	1.48	0.06	23.17	2.42	61.20	26.08
September	1.47	0.05	39.42	3.08	64.29	31.86
October	1.49	0.06	52.17	2.83	65.94	22.98
November	1.18	0.03	17.83	3.63	56.84	38.10
December	1.17	0.04	15.56	3.67	55.57	30.33
yearly averages	**1.32**	**0.04**	**26.27**	**3.42**	**58.95**	**34.45**

Lake Kell

Averages per month	N-TOTAL mg/L	P-TOTAL mg/l	CHL-A µg/l	SECCHI feet	TOTAL TSI	TN/TP
January	0.63	0.02	10.17	6.85	45.75	26.50
February	0.71	0.03	24.83	5.30	53.65	27.20
March	0.74	0.03	9.17	7.92	47.98	27.35
April	0.78	0.02	8.33	5.43	48.92	32.42
May	0.94	0.02	n/a	n/a	n/a	40.72
June	1.22	0.03	10.00	5.23	51.03	48.80
July	0.57	0.03	9.67	6.60	46.46	21.77
August	0.73	0.03	9.67	5.17	47.65	28.57
September	0.79	0.02	8.67	5.00	48.80	34.85
October	0.77	0.03	26.50	5.70	55.25	23.57
November	0.71	0.03	14.67	5.07	50.20	27.31
December	0.68	0.03	16.00	8.00	49.84	27.15
yearly averages	**0.77**	**0.03**	**13.42**	**6.02**	**49.59**	**30.52**

Lutz Lake

Averages per month	N-TOTAL mg/L	P-TOTAL mg/l	CHL-A µg/l	SECCHI feet	TOTAL TSI	TN/TP
January	n/a	n/a	n/a	n/a	n/a	n/a
February	0.40	0.01	2.00	11.17	24.90	55.00
March	0.53	0.01	3.33	8.50	32.99	49.69
April	n/a	n/a	n/a	n/a	n/a	n/a
May	0.51	0.01	2.39	10.92	32.23	39.44
June	n/a	0.03	8.33	5.17	n/a	n/a
July	0.54	0.01	n/a	6.33	n/a	44.05
August	0.53	0.01	4.00	9.50	34.27	43.56
September	0.62	0.03	6.67	n/a	45.46	19.08
October	n/a	n/a	n/a	n/a	n/a	n/a
November	n/a	n/a	n/a	n/a	n/a	n/a
December	n/a	n/a	n/a	n/a	n/a	n/a
yearly averages	**0.52**	**0.02**	**4.45**	**8.60**	**33.97**	**41.80**

Table 7.4 Monthly Average Lake Water Quality Parameters

Lake New Ryan

Averages per month	N TOTAL mg/L	P TOTAL mg/L	CHL A µg/L	SECCHI feet	Total TSI	TN/TP
January	0.97	0.05	22.50	7.50	47.05	21.40
February	0.78	0.03	19.67	5.33	47.78	24.61
March	0.79	0.04	23.50	5.50	51.64	22.16
April	0.90	0.03	32.00	5.33	61.12	26.95
May	0.94	0.03	36.67	4.83	59.96	29.48
June	0.89	0.02	8.67	7.17	48.37	39.70
July	0.84	0.02	4.33	7.67	43.45	37.95
August	0.85	0.03	13.67	5.67	52.53	32.84
September	0.95	0.03	16.00	5.47	53.09	37.62
October	0.97	0.03	13.83	5.92	51.77	31.34
November	0.95	0.02	7.83	6.17	46.20	43.66
December	0.89	0.03	29.00	7.58	59.23	26.67
yearly averages	**0.89**	**0.03**	**18.97**	**6.18**	**51.85**	**31.20**

Lake Stemper

Averages per month	N TOTAL mg/L	P TOTAL mg/L	CHL A µg/L	SECCHI feet	Total TSI	TN/TP
January	1.09	0.02	13.17	4.17	50.77	44.78
February	0.98	0.02	10.68	4.46	49.74	43.50
March	0.95	0.02	7.67	4.11	46.52	46.00
April	1.29	0.03	12.63	3.15	51.66	48.12
May	1.00	0.02	9.67	4.00	50.31	42.95
June	1.40	0.03	24.13	3.05	55.42	47.04
July	1.41	0.02	10.67	2.97	48.33	58.68
August	0.96	0.02	14.40	3.75	49.92	48.06
September	1.21	0.02	11.00	3.98	46.31	65.81
October	1.26	0.02	13.79	3.91	49.68	66.95
November	0.97	0.02	15.67	4.00	51.94	44.17
December	1.04	0.02	17.11	3.83	53.10	42.75
yearly averages	**1.13**	**0.02**	**13.38**	**3.78**	**50.31**	**49.90**

Table 7.5 Annual Lake Water Quality Statistics

O=Oligotrophic; M=Mesotrophic; E=Eutrophic; H=Hypereutrophic Classifications using F&R(1980) TSI from Lake Atlas

NAME	DATE	pH				T-N				T-P				CHL-A				SECCHI (ft)				Total TSI			
		Min.	Max	Avg	No.	Min.	Max	Avg	No.	Min.	Max	Avg	No.	Min.	Max	Avg	No.	Min.	Max	Avg	No.	Min.	Max	Avg	No.
Burrell Lake	1997	7.6	8.8	8.2	2	0.29	0.7	0.513043	23	0.01	0.024	0.014739	23	2	8	4.265217	23	4.5	8.5	6.709524	21	28.5902	44.18853	37.00024	23
								O				O								M				O	
Burrell Lake	1998	0	0	0	0	0.43	0.89	0.580278	36	0.009	0.041	0.021944	36	2	62	0	35	3.5	10	5.872222	36	27.41791	62.73482	45.08525	35
								O				M				-				O					
Burrell Lake	1999	0	0	0	0	0.36	0.64	0.522778	18	0.009	0.021	0.0145	18	2	10	4.533333	15	5	9.5	7.32	15	28.66116	45.03351	36.95015	15
								O				O				M				O					
	OVERALL	7.6	8.8	7.6	3	0.29	0.89	0.5387	3	0.009	0.041	0.017061	3	2	62	2.93285	3	3.5	10	6.633915	3	27.41791	62.73482	39.67855	3
								O				M				O				O					
Commiston Lake	1997					0.85	1.09	0.995	4	0.031	0.036	0.0335	4	5.1	11	6.5	4	5.1	6.3	5.55	4	44.98106	54.28589	48.62856	4
								E				E				M				O					
Commiston Lake	1998					0.64	1.02	0.860278	36	0.02	0.039	0.026944	36	4	74	18.52778	36	3.2	8.3	6.005556	36	41.83096	64.05862	52.51121	36
								E				E				E				O					
Commiston Lake	1999					0.72	0.93	0.820667	15	0.009	0.022	0.017467	15	7	13	9.555556	9	5	7.5	6.133333	9	43.2271	50.893	47.48127	9
								M				M				E				O					
	OVERALL					0.64	1.09	0.891981	3	0.009	0.039	0.02597	3	4	74	11.52778	3	3.2	8.3	5.896296	3	41.83096	64.05862	49.54035	3
								E				E				E				O					
Flynn Lake	1999					0.54	1.39	0.87	15	0	0.05	0.01	13	2	12	5.44	9	3	7	4.59	9	20.48	50.32	30.56	9
								E				O				M				O					
Lake Forest	1997					0.64	1.06	0.88	9	0.044	0.071	0.053778	9	32	69	44	9	2	3	2.244444	9	60.25221	66.5745	62.2834	9
								E				E				H				E					
Lake Forest	1998					0.52	1.13	0.792	30	0.032	0.074	0.051433	30	11	93	36.7037	27	1.5	3.3	2.293333	30	48.56874	70.9204	59.61164	27
								E				E				E				E					
Lake Forest	1999					1	1.19	1.1075	12	0.051	0.107	0.069091	11	30	56	42.5	6	1.8	2	1.9	6	60.99199	69.24587	64.75387	6
								E				E				H				E					
	OVERALL					0.52	1.19	0.9265	3	0.032	0.107	0.058101	3	11	93	41.0679	3	1.5	3.3	2.145926	3	48.56874	70.9204	62.2163	3
								E				E				H				E					
Hanna Lake	1997					0.67	1.77	1.170392	34	0.027	0.049	0.036637	34	5	58	29.11212	33	2.5	5	3.311765	34	46.73053	70.65381	59.75818	33
								E				E				E				M					
Hanna Lake	1998					0.69	0.77	0.732	5	0.03	0.041	0.0358	5	4	11	9	6	4.5	5	4.716667	6	42.82043	50.30346	48.10609	5
								E				E				E				O					
Hanna Lake	1999					0.61	0.93	0.780556	18	0.016	0.023	0.020167	18	3	21	9.933333	15	3	5	3.866667	15	40.33537	53.7702	46.556	15
								E				M				E				M					
	OVERALL					0.61	1.77	0.894316	3	0.016	0.049	0.030868	3	3	58	18.01515	3	2.5	5	3.965033	3	40.33537	70.65381	51.47342	3
								E				E				E				M					
Hog Island Lake	1996					1	1.24	1.082222	9	0.023	0.03	0.026222	9	5	17	10	9	5	7	6	9	45.08678	57.03327	50.67853	9
								E				E				E				O					
Hog Island Lake	1997	6.5				0.8	1.02	0.9475	4	0.018	0.041	0.03125	4	3.99	23	13.7475	4	4.265083	6	5.066271	4	40.56968	57.74169	51.87969	4
								E				E				E				O					
Hog Island Lake	1998	6.4				0.59	0.59	0.59	1	0.034	0.034	0.034	1	12.3	12.3	12.3	1	4.92	4.92	4.92	1	49.65	49.65	49.65	1
								M				E				E				O					
	OVERALL					0.59	1.24	0.873241	3	0.018	0.041	0.030491	3	3.99	23	12.01583	3	4.265083	7	5.328757	3	40.56968	57.74169	50.73607	3
								E				E				E				O					
Lake Keene	1994					1.12	1.32	1.182857	7	0.023	0.032	0.027286	7	17	23	20.42857	7	3	4	3.571429	7	54.69879	59.31625	57.10405	7
								E				E				E				M					
Lake Keene	1995					1.12	2.18	1.546364	33	0.022	0.079	0.038267	30	14	152	36.81818	33	1.5	4	2.521212	33	55.777	75.64257	62.13306	30
								E				E				E				M					
Lake Keene	1996					0.94	1.42	1.184762	21	0.027	0.068	0.040857	21	12	175	37.52381	21	2.3	3.5	2.966667	21	53.82051	76.34292	61.11402	21
								E				E				E				M					
Lake Keene	1997					1.02	1.5	1.185333	15	0.03	0.04	0.035333	15	7	34	21.66667	15	2	3.3	2.62	15	49.78314	64.81331	58.88079	15
								E				E				E				M					
Lake Keene	1998					0.76	1.39	1.073333	9	0.028	0.043	0.036222	9	5	20	13.85714	7	2.3	5.5	3.4	9	43.68742	62.45143	55.54387	7
								E				E				E				M					
Lake Keene	1999					1.33	1.35	1.34	2	0.034	0.036	0.035333	3												
								E				E													
	OVERALL					0.76	2.18	1.252108	6	0.022	0.079	0.03555	6	5	175	26.05887	5	1.5	5.5	3.015861	5	43.68742	76.34292	58.95516	5
								E				E				E				M					
Lutz Lake	1997					0.37	0.59	0.495	16	0.006	0.014	0.010375	16	2	4	3.053846	13	5	13	7.833333	15	22.63342	35.74772	31.18457	13
								M				O				M				O					
Lutz Lake	1998					0.47	0.73	0.567778	9	0.013	0.058	0.020667	9	1	7	4.166667	6	12	15	13.83333	6	30.60639	49.13379	38.84524	6
								M				M				M				O					
Lutz Lake	1999					0	0	0	0	0.023	0.031	0.0206	3	8	9	5.6	3	4.5	5.5	8	3			0	0
								-				M				M				O					
	OVERALL	8.1				0.37	0.73	0.354259	3	0.006	0.058	0.017214	3	1	9	4.273504	3	4.5	15	9.888889	3	22.63342	49.13379	23.34327	3
								O				M				M				O					
Lake New Ryan	1997					0.85	1.08	0.98	15	0.014	0.055	0.03	15	4	40	16.8	15	4	7	5.45	15	42.40668	63.37499	55.51	14
								E				E				E				O					
Lake New Ryan	1998					0.66	1.67	0.95	35	0.014	0.129	0.04	35	4	91	22.51	33	3.5	11	6.13	36	41.51987	75.41479	55	32
								E				E				E				O					
Lake New Ryan	1999					0.6	0.83	0.6	15	0.012	0.028	0.02	15	1	7	3.3	9	5	11	7.56	9	25.8219	42.46555	35.85	9
								E				M				M				O					
	OVERALL					0.6	1.67	0.843333	3	0.012	0.129	0.03	3	1	91	14.23667	3	3.5	11	6.38	3	25.8219	75.41479	48.78667	3

Table 7.5 Annual Lake Water Quality Statistics

NAME	DATE	pH				T-N				T-P				CHL-A				SECCHI (ft)				Total TSI			
		Min.	Max	Avg	No.	Min.	Max	Avg	No.	Min.	Max	Avg	No.	Min.	Max	Avg	No.	Min.	Max	Avg	No.	Min.	Max	Avg	No.
Lake Stemper	1994					2 88	3 08	2 98	2	0 016	0 045	0 0305	2	1	87 8	44 4	2	0 820208	1 9685	1 394354	2	29 21655	73 63906	51 4278	2
								††				E				H				E					
Lake Stemper	1995					1 96	3 42	3 018	5	0 017	0 042333	0 033067	5	1	35 03333	18 68667	5	0 9843	1 9685	1 509193	5	39 10883	66 30314	54 71362	5
								††				E				E				E					
Lake Stemper	1996					0 82	1 61	1 184286	7	0 009	0 035	0 023143	7	1	26	14 95714	7	3 5	5 905499	4 312143	7	22 42725	60 85398	47 42987	7
								E				M				E				O					
Lake Stemper	1997					0 8	1 42	1 109302	43	0 013	0 038	0 024791	43	4 8	27	13 38605	43	3	5 5	3 826439	41	41 55609	58 92148	52 20538	43
								E				M				E				M					
Lake Stemper	1998	6 6				0 58	1 02	0 841622	37	0 015	0 031	0 020675	37	6	19	10 35135	37	3	5	3 973171	37	42 83259	58 22101	48 5451	37
								E				M				E				M					
Lake Stemper	1999					0 76	1 07	0 905333	15	0 015	0 023	0 0196	15	6	30	11 22222	9	4	5	4 666667	9	44 61694	54 42054	47 27788	9
								E				M				E				O					
	OVERALL					0 58	3 42	1 67309	6	0 009	0 045	0 025296	6	1	87 8	18 8339	6	0 820208	5 905499	3 280328	6	22 42725	73 63906	50 2666	6
								H				E				E				M					
Lake Kell	1997					0 67	0 91	0 771667	12	0 019	0 036	0 025417	12	4	35	12 33333	12	4 3	9 5	6 316667	12	41 2257	59 48503	49 51622	12
								E				E				E				O					
Lake Kell	1998					0 5	1 24	0 735556	27	0 022	0 049	0 027852	27	3	62	15 03704	27	4 7	9 5	6 385185	27	38 50559	64 63	50 13249	27
								E				E				E				O					
Lake Kell	1999					0 64	0 98	0 776429	14	0 016	0 032	0 0228	15	4	66	16 55556	9	3 5	7 5	5 766667	9	39 91324	62 97663	49 58882	9
								E				M				E				O					
	OVERALL					0 5	1 24	0 751217	3	0 016	0 049	0 025356	3	3	66	14 84198	3	3 5	9 5	6 155173	3	38 50559	64 63	49 74584	3
								E				E				E				O					

Table 7.6 Forsberg and Ryding Lake Classification Criteria

TROPHIC STATE	TOTAL N mg/l	TOTAL P mg/l	CHLOROPHYLL mg/m^3	SECCHI m
Oligotrophic	< 0.4	< 0.015	< 3	>4
Mesotrophic	0.4 - 0.6	0.015 - 0.025	3 - 7	2.5 - 4
Eutrophic	0.6 - 1.5	0.025 - 0.1	7 - 40	1 - 2.5
Hypereutrophic	> 1.5	>0.1	>40	< 1

Table 7.7 : Hanna Lake Monthy & Annual TSI Caculation using PVI

Annual

PVI= 0.63

Averages per month	N.TOTAL mg/L	P.TOTAL mg/l	TN/TP	LOG CHLA	CHLA	TSI CHLA	TSI TN	TSI TN2	TSI TP	TSI TP2	TSI NUTR	Overall TSI
1997	1.17	0.04	29.25	-2.40	0.00396	-62.84	59.12	62.98	50.21	63.26	63.26	0.42
1998	0.73	0.04	18.25	-2.61	0.00245	-69.77	49.74	52.84	50.21	63.26	63.26	-6.51
1999	0.78	0.02	39.00	-2.67	0.00216	-71.59	51.06	54.26	37.32	46.90	44.19	-27.40
yearly averages	**0.89**	**0.03**	**26.80**	**-2.54**	**0.00286**	**-67.54**	**53.76**	**57.18**	**46.82**	**58.95**	**58.95**	**-8.58**

Monthly

PVI= 0.63

Averages per month	N.TOTAL mg/l	P.TOTAL mg/l	CHL.A µg/l	SECCHI feet	Total TSI	STN/TP	LOG CHLA	CHLA	TSI CHLA	TSI-PVI	TSI TN	TSI TN2	TSI TP	TSI TP2	TSI NUTR	Overall TSI
January	0.79	0.03	7.56	4.61	46.38	29.86	-2.63	0.00236	-70.33	0.10	51.25	54.47	42.47	53.43	46.86	-23.48
February	0.76	0.02	12.00	4.00	50.30	30.95	-2.65	0.00224	-71.06	0.08	50.63	53.80	41.22	51.85	51.85	-19.21
March	0.95	0.03	21.24	3.57	54.47	33.01	-2.54	0.00291	-67.30	0.07	54.90	58.41	44.02	55.40	55.40	-11.91
April	0.96	0.03	25.00	3.58	56.90	29.49	-2.52	0.00305	-66.61	0.06	55.15	58.69	46.35	58.36	50.75	-15.86
May	0.89	0.03	20.50	3.90	58.43	32.41	-2.57	0.00269	-68.42	0.07	53.64	57.05	43.18	54.33	54.33	-14.09
June	1.04	0.03	14.67	3.50	51.89	37.65	-2.50	0.00318	-66.03	0.07	56.81	60.48	43.36	54.56	54.56	-11.47
July	1.54	0.08	57.33	2.50	69.64	19.56	-2.20	0.00634	-56.07	0.04	64.59	68.88	62.81	79.24	63.70	7.63
August	1.33	0.03	42.00	3.00	64.54	40.61	-2.37	0.00426	-61.81	0.05	61.63	65.68	46.45	58.48	58.48	-3.33
September	1.56	0.03	44.50	2.80	65.43	45.34	-2.29	0.00508	-59.26	0.04	64.81	69.12	47.37	59.65	59.65	0.39
October	1.34	0.03	36.67	3.00	64.26	38.56	-2.36	0.00436	-61.46	0.05	61.77	65.84	47.55	59.88	59.88	-1.58
November	0.92	0.03	18.20	3.97	54.26	30.74	-2.55	0.00284	-67.62	0.07	54.25	57.72	44.74	56.31	56.31	-11.31
December	0.84	0.04	7.67	3.97	48.51	19.57	-2.54	0.00288	-67.46	0.08	52.49	55.81	51.49	64.87	51.99	-15.47
yearly averages	**1.07**	**0.04**	**25.61**	**3.53**	**57.08**	**32.31**	**-2.48**	**0.0035**	**-65.29**	**0.06**	**56.83**	**60.49**	**46.75**	**58.86**	**55.31**	**-9.97**

TABLE 7-8 SURFACE WATER QUALITY USE SUPPORT SUMMARY REPORT

**USGS HYDROLOGI UNIT: 03100205 HILLSBOROUGH RIVER

SURFACE WATER QUALITY USE SUPPORT SUMMARY REPORT

WATER CHEMISTRY, BIOLOGY, FISH ADVISORIES, BATHING AREA CLOSURES, AND WATER QUALITY STANDARDS EXCEEDENCE

WATERSHED ID	NAME	OVERALL USE SUPPORT	WATER CHEMISTRY INDEX	WATER CHEMISTRY TREND	FDEP BIOLOGY DATA ASSESSMENT	NONPOINT SOURCE ASSESSMENT	FISH ADVISORIES	FDEP WATER QUALITY STANDARDS EXCEEDENCES	
								CONVENTIONALS	METALS
*WATER BODY TYPE: LAKE									
3	MOORE LAKE DRAIN	PARTIAL	.		.	PARTIAL	.	.	.
7	LAKE HUNTER	DOESNOT	DOESNOT	0	.	.	.	FULLY	.
8	TWIN LAKE OUTLET	PARTIAL	.		.	PARTIAL	.	.	.
16	LAKE THONOTOSASSA	DOESNOT	DOESNOT	0	.	PARTIAL	.	PARTIAL	PARTIAL
23	LAKE HANNA OUTLET	FULLY	.		.	FULLY	.	.	.
24	LAKE STEMPER	FULLY	.		.	FULLY	.	.	.
28	KEENE LAKE	FULLY	.		.	FULLY	.	.	.
31	LAKE KELL	FULLY	.		.	FULLY	.	.	.
34	LAKE PADGETT	FULLY	FULLY		.	FULLY	.	FULLY	.
40	BAYOU LAKE OUTLET	FULLY	.		.	FULLY	.	.	.
42	LAK PASADENA	FULLY	FULLY		.	.	.	.	.
*WATER BODY TYPE: SPRING									
9	SULPHUR SPRINGS	FULLY	FULLY	.	.	FULLY	.	PARTIAL	.
36	CRYSTAL SPRINGS	DOESNOT	DOESNOT	0	.	.	.	PARTIAL	.
*WATER BODY TYPE: STREAM									
1	SEFFNER CANAL	FULLY	FULLY		.	PARTIAL	.	.	.
2	SPARKMAN BRANCH	DOESNOT	DOESNOT	.	.	PARTIAL	.	DOESNOT	.
4	MILL CREEK	PARTIAL	PARTIAL	0	.	PARTIAL	.	DOESNOT	DOESNOT
5	HILLSBOROUGH RIVER	PARTIAL	PARTIAL	0	FULLY	PARTIAL	PARTIAL	PARTIAL	PARTIAL
6	HILLSBOROUGH RIVER	PARTIAL	PARTIAL	0	.	PARTIAL	PARTIAL	PARTIAL	.
10	BAKER CREEK	DOESNOT	DOESNOT	+	.	PARTIAL	.	DOESNOT	PARTIAL
11	PEMBERTON CREEK	PARTIAL	FULLY	+	.	PARTIAL	.	PARTIAL	PARTIAL
12	BAKER CREEK TRIBUTARY	PARTIAL	.		.	PARTIAL	.	.	.
13	CURIOSITY CREEK	FULLY	FULLY	.	.	FULLY	.	.	.
14	CAMPBELL BRANCH	PARTIAL	.		.	PARTIAL	.	.	.
15	EAST CANAL	FULLY	.		.	FULLY	.	.	.
17	COW HOUSE CREEK	DOESNOT	DOESNOT	.	.	PARTIAL	.	DOESNOT	.
18	FLINT CREEK	DOESNOT	DOESNOT	+	.	PARTIAL	.	DOESNOT	DOESNOT
19	HILLSBOROUGH RIVER	DOESNOT	DOESNOT	.	.	PARTIAL	PARTIAL	PARTIAL	.
20	THIRTEEN MILE CREEK	FULLY	.		.	FULLY	.	.	.
[illegible]	ITCHEPACKASASSA CREEK	FULLY	FULLY		.	.	.	.	.
	HILLSBOROUGH RIVER	PARTIAL	.		.	PARTIAL	.	.	.
	SHERRYS BROOK	FULLY	.		.	FULLY	.	.	.
[illegible]6	HILLSBOROUGH RIVER	PARTIAL	FULLY	0	FULLY	PARTIAL	PARTIAL	PARTIAL	PARTIAL
27	BLACKWATER CREEK	PARTIAL	PARTIAL	+	.	FULLY	.	PARTIAL	PARTIAL
29	CYPRESS CREEK	DOESNOT	DOESNOT	0	.	FULLY	.	PARTIAL	PARTIAL
30	BIG DITCH	PARTIAL	PARTIAL	.	.	FULLY	.	PARTIAL	.
32	TROUT CREEK	PARTIAL	PARTIAL	0	.	FULLY	.	PARTIAL	.
33	BASSET BRANCH	DOESNOT	.		.	DOESNOT	.	.	.
35	FISH HATCHERY DRAIN	FULLY	FULLY	.	.	.	.	.	.
37	INDIAN CREEK	FULLY	.		.	FULLY	.	.	.
38	NEW RIVER	DOESNOT	DOESNOT	.	.	DOESNOT	.	DOESNOT	.
39	SOUTHSIDE BRANCH	DOESNOT	.		.	DOESNOT	.	.	.
41	DRAIN	FULLY	.		.	FULLY	.	.	.

FOOTNOTE: 'x' = DEGRADING TREND 'o' = STABLE TREND '+' = IMPROVING TREND '.' = MISSING DATA

TABLE 7-9: SURFACE WATER QUALITY STANADARDS EXCEEDENCE FOR WATERSHEDS WITH EXCEEDENCES OF CONVENTIONAL OR METAL POLLUTANTS

		WQ CRITERIA	USER SUPPORT BASED ON SURFACE WATER QUALITY CRITERIA: CH 62-302.530 F.A.C.																					
		WATER	F=Fully Supporting P=Partially Supporting N=Not Supporting																					
MID	BASIN NAME	CLASS	DO	TC	FC	CH	AM	FL	RC	CY	AS	AL	CD	CR6	CRJ	CU	FE	PB	HG	NI	SE	AG	TL	ZN
*WATER BODY TYPE: LAKE																								
16	LAKE THONOTOSASSA	CLASS 3	P	P	P	.	N	F	.	.	.	.	.	.	.	.	F	N	.	.	.	.	.	.
*WATER BODY TYPE: SPRING																								
9	SULPHUR SPRINGS	CLASS 3	.	P	P	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
36	CRYSTAL SPRINGS	CLASS 3	N	.	.	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
*WATER BODY TYPE: STREAM																								
2	SPARKMAN BRANCH	CLASS 3	N	.	N	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	MILL CREEK	CLASS 3	N	N	N	.	P	F	.	.	.	.	.	.	.	.	.	N	.	.	.	.	.	.
5	HILLSBOROUGH RIVER	CLASS 1	N	P	P	F	F	F	.	.	F	.	F	.	F	F	F	F	N	F	.	.	.	F
6	HILLSBOROUGH RIVER	CLASS 3	F	.	N	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
10	BAKER CREEK	CLASS 3	N	N	N	.	F	F	.	.	F	.	F	.	F	F	F	N	N	F	.	.	.	F
11	PEMBERTON CREEK	CLASS 3	N	.	.	.	F	F	.	.	F	.	F	.	F	F	F	F	N	F	.	.	.	F
17	COW HOUSE CREEK	CLASS 3	N	.	N	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
18	FLINT CREEK	CLASS 3	N	N	N	.	F	F	.	.	.	.	.	.	.	.	.	N	.	.	.	.	.	.
19	HILLSBOROUGH RIVER	CLASS 3	N	.	N	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26	HILLSBOROUGH RIVER	CLASS 3	F	N	P	.	F	F	.	.	F	.	F	.	F	F	F	F	N	F	.	.	.	F
27	BLACKWATER CREEK	CLASS 3	P	N	N	.	F	F	.	.	F	.	F	.	F	F	F	F	N	F	.	.	.	F
29	CYPRESS CREEK	CLASS 3	N	P	P	.	F	F	.	.	F	.	F	.	F	F	F	F	N	F	.	.	.	F
30	BIG DITCH	CLASS 3	F	.	N	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
32	TROUT CREEK	CLASS 3	N	N	P	.	F	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
38	NEW RIVER	CLASS 3	N	.	N	.	.	F	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

LEGEND:

DO-DISSOLVED OXYGEN	HG-MERCURY	CD-CADMIUM	FL-FLUORIDE	TL-THALLIUM
CY-CYANIDE	FC-FECAL COLIFORM BACTERIA	NI-NICKEL	CRJ-CHROMIUM+3	ZN-ZINC
FE-IRON	AL-ALUMINUM	AM-UNIONIZED AMMONIA	AG-SILVER	
TC-TOTAL COLIFORM BACTERIA	PB-LEAD	CR6-CHROMIUM+6	RC-RESIDUAL CHLORINE	
AS-ARSENIC	CH-CHLORIDE	SE-SELENIUM	CU-COPPER	

TEN YEAR TREND INFORMATION FOR WATERSHEDS WHICH SHOW IMPROVING (+) OR DEGRADING (x) TRENDS

'x'=DEGRADING TREND
'0'=STABLE TRND
'+'=IMPROVING TREND
'.'=MISSING DATA

			1986 - 1995 TRENDS																	
		OVER-ALL TREND	INDEX TREND (WQIor TSI)	TN	TP	CHLA	SD	PH	AMMONIA	TURB	TSS	BOD	TOC	DOSAT	DO	TCOLI	FCOLI	TEMP	FLOW	WQI
MAPID	BASIN NAME																			
* WATER BODY TYPE: STREAM																				
10	BAKER CREEK	+	0	+	+	0	0	0	.	0	.	+	.	0	0	0	0	0	.	
11	PEMBERTON CREEK	+	0	+	+	.	.	0	.	.	.	.	0	0	0	.	.	x	.	
18	FLINT CREEK	+	0	0	+	0	0	x	.	+	.	+	0	x	x	0	0	0	0	
27	BLACKWATER CREEK	+	0	+	+	0	0	0	.	0	.	0	x	0	0	0	0	x	0	

LEGEND:

ALK-ALKALINITY	DOSAT-DO SATURATION	TCOLI-TOTAL COLIFORM	TSS-TOTAL SUSPENDED SOLIDS
BOD-BIOCHEM. OXYGEN DEMAND	FCOLI-FECAL COLIFORM	TEMP-TEMPERATURE	TSI-WATER QUALITY INDEX:LAKES, ESTUARIES
CHLA-CHLOROPHYLL	FLOW-FLOW	TN-NITROGEN	WQI-WATER QUALITY INDEX:STREAMS,
DO-DISSOLVED OXYGEN	PH-PH	TOC-T.ORGANIC CARBON	SPRINGS, AND BLACKWATER
	SD-SECCHI DISC METERS	TP-PHOSPHORUS	

SURFACE WATER QUALITY DATA FOR 1980-1995
MEDIAN VALUES FOR EACH WATERSHED
SCREENING LEVEL EXCEEDENCES (*)
CURRENT PERIOD OF RECORD (1990-1995) USED WHERE AVAILABLE
PERIOD PRIOR TO 1990 IS EVALUATED AS HISTORICAL INFORMATION

TABLE 7-10 – Surface Water Quality Data for 1980 – 1995

INDEX	GOOD	FAIR	POOR
WQI-RIVER	0-44	45-59	60-90
TSI-ESTUARY	0-49	50-59	60-100
TSI-LAKE	0-59	60-69	70-100

WATERSHED ID	NAME	WATERSHED DATA RECORD MAX #OBS	BEG YR	END YR	DATA PERIOD	WATER CLARITY TURB*	TSS*	SD	COLOR	DISSOLVED OXYGEN DO*	DOSAT	OXYGEN DEMAND BOD*	COD*	TOC*	PH	ALKALINITY ALK	TROPHIC STATUS NITRO*	PHOS*	CHLA*	COLIFORM BACTERIA TOTAL*	FECL*	COND	WATER QUALITY INDICES WQI	TSI
* WATER BODY TYPE: LAKE																								
7	LAKE HUNTER	11	91	94	Current	22.0	.	0.3	18	9.0	104	.	.	.	8.4	.	2.38*	0.22*	91*	.	.	195	.	80
16	LAKE THONOTOSASSA	375	90	95	Current	12.9	19	0.5	53	8.2	92	5.8	.	.	9.0	.	1.87	0.52*	73*	119	63	812	.	76
34	LAKE PADGETT	28	80	80	Historical	3.0	.	.	8	.	.	1.1	.	11	6.8	.	0.85	0.03	.	6	3	153	.	49
42	LAK PASADENA	3	80	80	Historical	.	.	1.2	60	.	.	.	.	.	6.4	6	0.84	0.03	9	.	.	94	.	51
* WATER BODY TYPE: SPRING																								
9	SULPHUR SPRINGS	691	90	92	Current	0.7	.	.	.	.	.	.	.	.	7.2	.	0.90*	0.06	.	150	40	2030	34	.
16	CRYSTAL SPRINGS	5	92	92	Current	.	.	.	3	3.0	34	.	.	.	7.7	.	2.35*	0.05	.	.	.	337	90	.
* WATER BODY TYPE: STREAM																								
1	SEFFNER CANAL	4	80	80	Historical	2.0	.	.	.	.	.	.	24	.	7.4	.	4.19*	0.12	.	.	.	318	34	.
2	SPARKMAN BRANCH	8	93	93	Current	12.0	13*	0.1	150	3.7*	44	.	.	23*	6.1	22	1.31	0.74*	.	.	300*	172	74	.
4	MILL CREEK	147	90	95	Current	5.1	1	0.2	13	5.9	72	1.4	.	9	7.4	169	1.07	0.29*	2	7125*	2650*	622	54	.
5	HILLSBOROUGH RIVER	656	90	95	Current	3.1	7	1.3	49	4.0*	45	1.4	.	8	7.3	133	1.08	0.28*	4	580	175	375	54	.
6	HILLSBOROUGH RIVER	573	90	94	Current	5.1	8	0.4	106	4.6*	52	.	.	10	7.3	91	1.78*	0.53*	5	.	214*	374	53	.
10	BAKER CREEK	130	90	95	Current	6.2	.	0.6	60	4.7*	53	1.0	.	.	7.2	.	1.21	0.58*	2	1800*	575*	563	61	.
11	PEMBERTON CREEK	20	90	94	Current	.	.	.	270	7.5	82	.	.	8	7.8	.	1.29	0.57*	.	.	.	583	42	.
13	CURIOSITY CREEK	19	80	84	Historical	1.0	.	.	.	5.4	60	1.3	.	9	6.7	61	0.69	0.27*	.	1500	240*	235	41	.
17	COW HOUSE CREEK	10	92	92	Current	9.5	21*	0.6	120	2.2*	22	.	.	15	7.0	131	1.12	0.49*	0	.	74	401	66	.
18	FLINT CREEK	196	90	95	Current	11.8	.	0.5	57	4.5*	52	3.2*	.	14	7.3	.	1.86*	0.52*	38	1275	360*	411	70	.
19	HILLSBOROUGH RIVER	36	92	94	Current	4.9	2	0.6	110	5.6	59	.	.	16	7.4	102	1.50	0.46*	0	.	414*	319	62	.
21	ITCHEPACKASASSA CREEK	23	80	83	Historical	.	.	.	.	8.1	89	.	.	.	7.5	.	.	.	.	.	.	304	10	.
26	HILLSBOROUGH RIVER	223	90	95	Current	3.1	5	1.0	38	6.4	71	0.8	.	.	7.5	72	1.65*	0.22	1	595	101	345	44	.
27	BLACKWATER CREEK	294	90	95	Current	7.1	1	0.6	115	5.9	68	1.9	.	21	7.4	72	1.30	0.56*	10	360	200*	330	57	.
29	CYPRESS CREEK	180	90	95	Current	2.7	.	0.6	190	2.5*	27	1.2	.	38*	6.8	.	1.66*	0.06	1	625	75	312	71	.
30	BIG DITCH	17	92	93	Current	6.3	3	0.5	210	6.0	68	.	.	19	7.2	101	1.41	0.85*	0	.	156	303	57	.
32	TROUT CREEK	94	90	95	Current	3.7	.	0.6	119	4.2*	47	1.4	.	.	7.0	.	0.97	0.32*	2	740	230*	305	56	.
35	FISH HATCHERY DRAIN	36	80	87	Historical	.	.	.	.	6.2	77	1.8	.	18	6.6	.	.	.	.	.	.	275	42	.
38	NEW RIVER	9	93	93	Current	18.0*	8	0.4	200	2.2*	25	.	.	26*	6.7	27	1.77*	0.52*	.	.	540*	221	80	.

LEGEND:
ALK-ALKALINITY MG/L
BEG YR-BEGINNING SAMPLING YEAR
BOD-BIOCHEMICAL OXY DEMAND MG/L
CHLA-CHLOROPHYLL UG/L
COD-CHEMICAL OXY DEMAND MG/L
COLOR-COLOR PCU
COND-CONDUCTIVITY UMHOS
DO-DISSOLVED OXYGEN MG/L
DOSAT-DO % SATURATION
END YR-ENDING YEAR
FECL-FECAL COLIFORM MPN/100ML
MAX #OBS-MAXIMUM NUMBER OF SAMPLES
NITRO-TOTAL NITROGEN MG/L
PH-PH STANDARD UNITS
PHOS-TOTAL PHOSPHORUS MG/L
SD-SECCHI DISC METERS
TOC-TOTAL ORGANIC CARBON MG/L
TOTAL-TOTAL COLIFORM MPN/100ML
TSI-TROPHIC STATE INDEX
TSS-TOTAL SUSPENDED SOLIDS MG/L
TURB-TURBIDITY MG/L
WQI-WATER QUALITY INDEX

(*) SCREENING LEVELS ARE PRESENTED IN TABLE 10, INTRODUCTION AND METHODS: '*'=EXCEEDS SCREENING CRITERIA

** USGS HYDROLOGIC UNIT : 03100205 HILLSBOROUGH RIVER
BIOLOGY MONITORING ASSESSMENT

WATERSHED INFORMATION	BIOLOGY DATA ASSESSMENT OVERALL RATING	HESTER DENDY DIVERSITY INDEX*	HESTER DENDY DIVERSITY TAXA*	HESTER DENDY DIVERSITY #OBS	PONAR DREDGE DIVERSITY INDEX*	PONAR DREDGE DIVERSITY TAXA*	PONAR DREDGE DIVERSITY #OBS	EKMAN DREDGE DIVERSITY INDEX*	EKMAN DREDGE DIVERSITY TAXA*	EKMAN DREDGE DIVERSITY #OBS	PHYTOPLANKTON DIVERSITY INDEX*	PHYTOPLANKTON DIVERSITY TAXA*	PHYTOPLANKTON DIVERSITY #OBS	DATA RECORD BEG YEAR	DATA RECORD END YEAR	ECOREGION STREAM BIOASSESSMENT OVERALL RATING	STREAM CONDITION INDEX RATING SUMMER 1992	WINTER 1993	SUMMER 1993	WINTER 1994	SUMMER 1994	BIOREGION
*WATER BODY TYPE: STREAM																							
26 HILLSBOROUGH RIVER	GOOD	4.46	47.00	1	.	.	0	.	.	0	.	.	0	1994	1994	GOOD	GOOD	GOOD	.	GOOD	GOOD	PENINSULA

LEGEND: '*' INDICATES THAT THE DATA VALUE EXCEEDS POOR WATER QUALITY ASSESSMENT CRITERIA

Table 7-11

Water quality–assessment parameters for Florida streams, lakes, and estuaries

Parameter	Units	Screening level	Typical values 10%	(Median)	90%	Florida criteria (Chapter 62302) Class III
Waterbody type: STREAM						
Alkalinity	$CaCO^3$ mg/l		13	(75)	150	20.0 mg/l min.
Beck's Biotic Index	Index #		4	(14)	32	
BOD 5 day	mg/l	>2.3	0.8	(1.5)	5.1	Not cause DO<5 mg/l
Chlorophyll	µg/l		1	(6)	30	
COD	mg/l	>72	16	(46)	146	
Coliform-fecal	#/100 ml	>190	10	(75)	960	200/100 ml
Coliform-total	#/100 ml	>1600	100	(600)	7600	1000/100 ml
Color	Platinum Color Units		21	(71)	235	No nuisance conditions
Conductivity	micromho	>1275	100	(335)	1300	1275 or 50% above background
Dissolved oxygen	mg/l	<4.8	3.1	(5.8)	8.0	5.0 mg/l
Diversity artificial sub	index		1.4	(2.9)	3.6	min. 75% of DI
Diversity natural sub	index		1.2	(2.4)	3.5	min. 75% of DI (marine)
DO % saturation	%		36	(68)	90	
Fecal strep	#/100 ml		20	(15)	1700	
Fluoride	mg/l		0.1	(0.2)	0.8	10.0 mg/l
Nitrate nitrogen	mg/l	0.2	0.01	(0.1)	0.64	Not cause imbalance
Nitrogen-total	mg/l as N	>1.6	0.5	(1.2)	2.7	Not cause imbalance
pH	standard units		6.1	(7.1)	7.9	<6.0 >8.5
Phosphorus-total	mg/l as P	>0.24	0.02	(0.09)	0.89	Not cause imbalance
Secchi disc depth	meters		0.4	(0.8)	1.7	Min. 90% background
Temperature	centigrade		19	(23)	28	No nuisance conditions
Total organic carbon	mg/l	>21.0	5	(14)	37	
Total suspended solids	mg/l	>12.5	2	(7)	26	
Turbidity	JTU FTU	>12.2	1.5	(5)	21	29 NTUs above background
Waterbody type: LAKE						
Alkalinity	$CaCO^3$ mg/l		2	(28)	116	20.0 mg/l min.
Chlorophyll	µg/l	>20.	1	(12)	70	
Nitrogen-total	mg/l as N	>2.0	0.4	(1.1)	2.5	Not cause imbalance
Phosphorus-total	mg/l as P	>0.12	0.01	(0.05)	0.29	Not cause imbalance
Waterbody type: ESTUARY						
Chlorophyll	µg/l	>20	1	(9)	36	
Nitrogen-total	mg/l as N	>1.22	0.3	(0.8)	1.6	Not cause imbalance
Phosphorus-total	mg/l as P	>0.07	0.01	(0.07)	0.20	Not cause imbalance

Table 7-12
Florida standards

	Units of measurement	Class I: Drinking water	Class II: Shellfish	Class III: Freshwater wildlife and recreation	Class III: Marine wildlife and recreation	Class IV: Agriculture
Metals						
arsenic	µg/l	50	50	50	50	50
aluminum	µg/l	-	1.5	-	1.5	-
cadmium	µg/l	*	9.3	*	9.3	-
chromium +6	µg/l	11	50	11	50	11
chromium +3	µg/l	*	-	*	-	*
copper	µg/l	*	2.9	*	2.9	500
iron	mg/l	0.3	0.3	1.0	0.3	1.0
lead	µg/l	*	5.6	*	5.6	50
mercury	µg/l	.012	.025	.012	.025	0.2
nickel	µg/l	*	8.3	*	8.3	100
selenium	µg/l	5.0	71	5.0	71	-
silver	µg/l	.07	.05	.07	.05	-
thallium	µg/l	1.7	6.3	6.3	6.3	-
zinc	µg/l	*	86	*	86	1000
Conventional pollutants						
dissolved oxygen	mg/l	5.0	4.0	5.0	4.0	3.0
chlorides	mg/l	250	-	1500	-	-
ammonia	mg/l	.02	-	.02	-	-
residual chlorine	mg/l	.01	.01	.01	.01	-
cyanide	µg/l	5.2	1.0	5.2	1.0	5.0
[illegible]ide	mg/l	1.5	1.5	10.	5.0	10.
total coliform	mpn	2400	70	2400	2400	-
fecal coliform	mpn	800	800	800	800	-
Pesticides						
aldrin	µg/l	3.0	1.3	3.0	1.3	-
chlordane	µg/l	.0043	.004	.0043	.004	-
ddt	µg/l	.001	.001	.001	001	-
dieldrin	µg/l	.0019	.0019	.0019	.0019	-
endosulfin	µg/l	.056	.0087	.056	.0087	-
endrin	µg/l	.0023	.0023	.0023	.0023	-
guthion	µg/l	.01	.01	.01	.01	-
heptachlor	µg/l	.0038	.0036	.0038	.0036	-
lindane	µg/l	.08	.16	.08	.16	-
malathion	µg/l	0.1	0.1	0.1	0.1	-
methoxychlor	µg/l	.03	.03	.03	.03	-
mirex	µg/l	.001	.001	.001	.001	-
parathion	µg/l	.04	.04	.04	.04	-
toxaphene	µg/l	.0002	.0002	.0002	.0002	-
Polyaromatic hydrocarbons and phenols						
2-chlorophenol	µg/l	120	400	400	400	400
2,4-dichlorophenol	µg/l	93	790	790	790	790
pentachlorophenol	µg/l	30	7.9	30	7.9	30
2,4-dinitrophenol	µg/l	.0697	14.26	14.26	14.26	14.26
acenapthrene	µg/l	1.2	2.7	2.7	2.7	-
anthracene	µg/l	9.6	110	110	110	-
fluoranthene	µg/l	0.3	0.370	0.370	0.370	-
[illegible]ene	µg/l	1.3	14	14	14	-
[illegible]ol	µg/l	.3	.3	.3	.3	-

*and states that the standard is based on an equation which uses the measure of hardness

Table 7.13

62-302.530, Criteria for Surface Water Quality Classifications							
				Class III: Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife			
Parameter	Units	Class I: Potable Water Supply	Class II: Shellfish Propagation or Harvesting	Predominantly Fresh Waters	Predominantly Marine Waters	Class IV: Agricultural Water Supplies	Class V: Navigation, Utility, and Industrial Use
(1) Alkalinity	Milligrams/L as $CaCO_3$	Shall not be depressed below 20		Shall not be depressed below 20		≤ 600	
(2) Aluminum	Milligrams/L		≤ 1.5		≤ 1.5		
(3) Ammonia (un-ionized)	Milligrams/L as NH_3	≤ 0.02		≤ 0.02			
(4) Antimony	Micrograms/L	≤ 14.0	≤ 4,300	≤ 4,300	≤ 4,300		
(5) (a) Arsenic (total)	Micrograms/L	≤ 50	≤ 50	≤ 50	≤ 50	≤ 50	≤ 50
(5) (b) Arsenic (trivalent)	Micrograms/L measured as total recoverable Arsenic		≤ 36		≤ 36		
(6) Bacteriological Quality (Fecal Coliform Bacteria)	Number per 100 ml (Most Probable Number (MPN) or Membrane Filter (MF))	MPN or MF counts shall not exceed a monthly average of 200, nor exceed 400 in 10% of the samples, nor exceed 800 on any one day. Monthly averages shall be expressed as geometric means based on a minimum of 5 samples taken over a 30 day period.	MPN shall not exceed a median value of 14 with not more than 10% of the samples exceeding 43, nor exceed 800 on any one day.	MPN or MF counts shall not exceed a monthly average of 200, nor exceed 400 in 10% of the samples, nor exceed 800 on any one day. Monthly averages shall be expressed as geometric means based on a minimum of 10 samples taken over a 30 day period.	MPN or MF counts shall not exceed a monthly average of 200, nor exceed 400 in 10% of the samples, nor exceed 800 on any one day. Monthly averages shall be expressed as geometric means based on a minimum of 10 samples taken over a 30 day period.		

Notes: (1) "Annual avg." means the maximum concentration at average annual flow conditions (see Section 62-4.020(1), F.A.C.); (2) "Max" means the maximum not to be exceeded at any time; (3) "ln H" means the natural logarithm of total hardness expressed as milligrams/L of $CaCO_3$. For metals criteria involving equations with hardness, the hardness shall be set at 25 mg/L if actual hardness is < 25 mg/L and set at 400 mg/L if actual hardness is > 400 mg/L; (4) Criteria are protective of human health not of aquatic life.

Table 7.13Continued

Parameter	Units	Class I	Class II	Class III: Fresh	Class III: Marine	Class IV	Class V
(7) Bacteriological Quality (Total Coliform Bacteria)	Number per 100 ml (Most Probable Number (MPN) or Membrane Filter (MF))	≤ 1,000 as a monthly avg., nor exceed 1,000 in more than 20% of samples examined during any month, nor exceed 2,400 at any time, using either MPN or MF counts.	Median MPN shall not exceed 70, and not more than 10% of the samples shall exceed an MPN of 230.	≤ 1,000 as a monthly average; nor exceed 1,000 in more than 20% of the samples examined during any month; ≤ 2,400 at any time. Monthly averages shall be expressed as geometric means based on a minimum of 10 samples taken over a 30 day period, using either the MPN or MF counts.	≤ 1,000 as a monthly average; nor exceed 1,000 in more than 20% of the samples examined during any month; ≤ 2,400 at any time. Monthly averages shall be expressed as geometric means based on a minimum of 10 samples taken over a 30 day period, using either the MPN or MF counts.		
(8) Barium	Milligrams/L	≤ 1					
(9) Benzene	Micrograms/L	≤ 1.18	≤ 71.28 annual avg.	≤ 71.28 annual avg.	≤ 71.28 annual avg.		
(10) Beryllium	Micrograms/L	≤ 0.0077 annual avg.	≤ 0.13 annual avg.	≤ 0.13 annual avg.	≤ 0.13 annual avg.	≤ 100 in waters with a hardness in mg/L of $CaCO_3$ of less than 250 and shall not exceed 500 in harder waters	
(11) Biological Integrity	Percent reduction of Shannon-Weaver Diversity Index	The Index for benthic macroinvertebrates shall not be reduced to less than 75% of background levels as measured using organisms retained by a U. S. Standard No. 30 sieve and collected and composited from a minimum of three Hester-Dendy type artificial substrate samplers of 0.10 to 0.15 m^2 area each, incubated for a period of four weeks.	The Index for benthic macroinvertebrates shall not be reduced to less than 75% of established background levels as measured using organisms retained by a U. S. Standard No. 30 sieve and collected and composited from a minimum of three natural substrate samples, taken with Ponar type samplers with minimum sampling area of 225 cm^2.	The Index for benthic macroinvertebrates shall not be reduced to less than 75% of established background levels as measured using organisms retained by a U. S. Standard No. 30 sieve and collected and composited from a minimum of three Hester-Dendy type artificial substrate samplers of 0.10 to 0.15 m^2 area each, incubated for a period of four weeks.	The Index for benthic macroinvertebrates shall not be reduced to less than 75% of established background levels as measured using organisms retained by a U. S. Standard No. 30 sieve and collected and composited from a minimum of three natural substrate samples, taken with Ponar type samplers with minimum sampling area of 225 cm^2.		

Notes: (1) "Annual avg." means the maximum concentration at average annual flow conditions (see Section 62-4.020(1), F.A.C.); (2) "Max" means the maximum not to be exceeded at any time; (3) "ln H" means the natural logarithm of total hardness expressed as milligrams/L of $CaCO_3$. For metals criteria involving equations with hardness, the hardness shall be set at 25 mg/L if actual hardness is < 25 mg/L and set at 400 mg/L if actual hardness is > 400 mg/L; (4) Criteria are protective of human health not of aquatic life.

Table 7.13 Continued

Parameter	Units	Class I	Class II	Class III: Fresh	Class III: Marine	Class IV	Class V
(12) BOD (Biochemical Oxygen Demand)		Shall not be increased to exceed values which would cause dissolved oxygen to be depressed below the limit established for each class and, in no case, shall it be great enough to produce nuisance conditions.					
(13) Boron	Milligrams/L					≤ 0.75	
(14) Bromates	Milligrams/L		≤ 100		≤ 100		
(15) Bromine (free molecular)	Milligrams/L		≤ 0.1		≤ 0.1		
(16) Cadmium	Micrograms/L See Note (3).	Cd ≤ $e^{(0.7852[\ln H]-3.49)}$	≤ 9.3	Cd ≤ $e^{(0.7852[\ln H]-3.49)}$	≤ 9.3		
(17) Carbon tetrachloride	Micrograms/L	≤ 0.25 annual avg.; 3.0 max	≤ 4.42 annual avg.	≤ 4.42 annual avg.	≤ 4.42 annual avg.		
(18) Chlorides	Milligrams/L	≤ 250	Not increased more than 10% above normal background. Normal daily and seasonal fluctuations shall be maintained.		Not increased more than 10% above normal background. Normal daily and seasonal fluctuations shall be maintained.		In predominantly marine waters, not increased more than 10% above normal background. Normal daily and seasonal fluctuations shall be maintained.
(19) Chlorine (total residual)	Milligrams/L	≤ 0.01	≤ 0.01	≤ 0.01	≤ 0.01		
(20) (a) Chromium (trivalent)	Micrograms/L measured as total recoverable Chromium See Note (3).	Cr (III) ≤ $e^{(0.819[\ln H]+1.561)}$		Cr (III) ≤ $e^{(0.819[\ln H]+1.561)}$		Cr (III) ≤ $e^{(0.819[\ln H]+1.561)}$	In predominantly fresh waters, ≤ $e^{(0.819[\ln H]+1.561)}$.
(20) (b) Chromium (hexavalent)	Micrograms/L	≤ 11	≤ 50	≤ 11	≤ 50	≤ 11	In predominantly fresh waters, ≤ 11. In predominantly marine waters, ≤ 50
(21) Chronic Toxicity (see definition in Section 62-302.200(3) F.A.C. and also see below, "Substances in concentrations which...")							

Notes: (1) "Annual avg." means the maximum concentration at average annual flow conditions (see Section 62-4.020(1), F.A.C.); (2) "Max" means the maximum not to be exceeded at any time; (3) "ln H" means the natural logarithm of total hardness expressed as milligrams/L of $CaCO_3$. For metals criteria involving equations with hardness, the hardness shall be set at 25 mg/L if actual hardness is < 25 mg/L and set at 400 mg/L if actual hardness is > 400 mg/L; (4) Criteria are protective of human health not of aquatic life.

Table 7.13 Continued

Parameter	Units	Class I	Class II	Class III: Fresh	Class III: Marine	Class IV	Class V
(22) Color, etc. (see also Minimum Criteria, Odor, Phenols, etc.)	Color, odor, and taste producing substances and other deleterious substances, including other chemical compounds attributable to domestic wastes, industrial wastes, and other wastes					Only such amounts as will not render the waters unsuitable for agricultural irrigation, livestock watering, industrial cooling, industrial process water supply purposes, or fish survival.	
(23) Conductance, Specific	Micromhos/cm	Shall not be increased more than 50% above background or to 1275, whichever is greater		Shall not be increased more than 50% above background or to 1275, whichever is greater		Shall not be increased more than 50% above background or to 1275, whichever is greater	Shall not exceed 4,000
(24) Copper	Micrograms/L See Note (3).	Cu ≤ $e^{(0.8545[\ln H]-1.465)}$	≤ 2.9	Cu ≤ $e^{(0.8545[\ln H]-1.465)}$	≤ 2.9	≤ 500	≤ 500
(25) Cyanide	Micrograms/L	≤ 5.2	≤ 1.0	≤ 5.2	≤ 1.0	≤ 5.0	≤ 5.0
(26) Definitions (see Section 62-302.200, F.A.C.)							
(27) Detergents	Milligrams/L	≤ 0.5	≤ 0.5	≤ 0.5	≤ 0.5	≤ 0.5	≤ 0.5
(28) 1,1-Dichloro-ethylene (1,1-di-chloroethene)	Micrograms/L	≤ 0.057 annual avg.; ≤ 7.0 max	≤ 3.2 annual avg.	≤ 3.2 annual avg.	≤ 3.2 annual avg.		
(29) Dichloromethane (methylene chloride)	Micrograms/L	≤ 4.65 annual avg.	≤ 1,580 annual avg.	≤ 1,580 annual avg.	≤ 1,580 annual avg.		
(30) 2,4-Dinitrotoluene	Micrograms/L	≤ 0.11 annual avg.	≤ 9.1 annual avg.	≤ 9.1 annual avg.	≤ 9.1 annual avg.		
(31) Dissolved Oxygen	Milligrams/L	Shall not be less than 5.0. Normal daily and seasonal fluctuations above this level shall be maintained.	Shall not average less than 5.0 in a 24-hour period and shall never be less than 4.0. Normal daily and seasonal fluctuations above these levels shall be maintained.	Shall not be less than 5.0. Normal daily and seasonal fluctuations above these levels shall be maintained.	Shall not average less than 5.0 in a 24-hour period and shall never be less than 4.0. Normal daily and seasonal fluctuations above these levels shall be maintained.	Shall not average less than 4.0 in a 24-hour period and shall never be less than 3.0.	Shall not be less than 0.3, fifty percent of the time on an annual basis for flows greater than or equal to 250 cubic feet per second and shall never be less than 0.1. Normal daily and seasonal fluctuations above these levels shall be maintained.

Notes: (1) "Annual avg." means the maximum concentration at average annual flow conditions (see Section 62-4.020(1), F.A.C.); (2) "Max" means the maximum not to be exceeded at any time; (3) "ln H" means the natural logarithm of total hardness expressed as milligrams/L of $CaCO_3$. For metals criteria involving equations with hardness, the hardness shall be set at 25 mg/L if actual hardness is < 25 mg/L and set at 400 mg/L if actual hardness is > 400 mg/L; (4) Criteria are protective of human health not of aquatic life.

Table 7.13 Continued

Parameter	Units	Class I	Class II	Class III: Fresh	Class III: Marine	Class IV	Class V
(32) Dissolved Solids	Milligrams/L	≤ 500 as a monthly avg.; ≤ 1,000 max					
(33) Fluorides	Milligrams/L	≤ 1.5	≤ 1.5	≤ 10.0	≤ 5.0	≤ 10.0	≤ 10.0
(34) "Free Froms" (see Minimum Criteria in Section 62-302.500, F.A.C.)							
(35) "General Criteria" (see Section 62-302.510, F.A.C. and individual criteria)							
(36) (a) Halomethanes (Total trihalo-methanes) (total of bromoform, chloro-dibromomethane, dichlorobromo-methane, and chloroform). Individual halomethanes shall not exceed (b)1. to (b)5. below.	Micrograms/L	≤ 100					
(36) (b) 1. Halometh-anes (individual): Bromoform	Micrograms/L	≤ 4.3 annual avg.	≤ 360 annual avg.	≤ 360 annual avg.	≤ 360 annual avg.		
(36) (b) 2. Halometh-anes (individual): Chlorodibromo-methane	Micrograms/L	≤ 0.41 annual avg.	≤ 34 annual avg.	≤ 34 annual avg.	≤ 34 annual avg.		
(36) (b) 3. Halometh-anes (individual): Chloroform	Micrograms/L	≤ 5.67 annual avg.	≤ 470.8 annual avg.	≤ 470.8 annual avg.	≤ 470.8 annual avg.		
(36) (b) 4. Halometh-anes (individual): Chloromethane (methyl chloride)	Micrograms/L	≤ 5.67 annual avg.	≤ 470.8 annual avg.	≤ 470.8 annual avg.	≤ 470.8 annual avg.		
(36) (b) 5. Halometh-anes (individual): Dichlorobromo-methane	Micrograms/L	≤ 0.27 annual avg.	≤ 22 annual avg.	≤ 22 annual avg.	≤ 22 annual avg.		

Notes: (1) "Annual avg." means the maximum concentration at average annual flow conditions (see Section 62-4.020(1), F.A.C.); (2) "Max" means the maximum not to be exceeded at any time; (3) "ln H" means the natural logarithm of total hardness expressed as milligrams/L of $CaCO_3$. For metals criteria involving equations with hardness, the hardness shall be set at 25 mg/L if actual hardness is < 25 mg/L and set at 400 mg/L if actual hardness is > 400 mg/L; (4) Criteria are protective of human health not of aquatic life.

Table 7.13 Continued

Parameter	Units	Class I	Class II	Class III: Fresh	Class III: Marine	Class IV	Class V
(37) Hexachlorobuta-diene	Micrograms/L	≤ 0.45 annual avg.	≤ 49.7 annual avg.	≤ 49.7 annual avg.	≤ 49.7 annual avg.		
(38) Imbalance (see Nutrients)							
(39) Iron	Milligrams/L	≤ 0.3	≤ 0.3	≤ 1.0	≤ 0.3	≤ 1.0	
(40) Lead	Micrograms/L See Note (3).	Pb ≤ $e^{(1.273[\ln H]-4.705)}$	≤ 5.6	Pb ≤ $e^{(1.273[\ln H]-4.705)}$	≤ 5.6	≤ 50	≤ 50
(41) Manganese	Milligrams/L		≤ 0.1				
(42) Mercury	Micrograms/L	≤ 0.012	≤ 0.025	≤ 0.012	≤ 0.025	≤ 0.2	≤ 0.2
(43) Minimum Criteria (see Section 62-302. 500, F.A.C.)							
(44) Mixing Zones (See Section 62-4.246, F.A.C.)							
(45) Nickel	Micrograms/L See Note (3).	Ni ≤ $e^{(0.846 [\ln H]+1.1645)}$	≤ 8.3	Ni ≤ $e^{(0.846[\ln H]+1.1645)}$	≤ 8.3	≤ 100	
(46) Nitrate	Milligrams/L as N	≤ 10 or that concentration that exceeds the nutrient criteria					
(47) Nuisance Species		Substances in concentrations which result in the dominance of nuisance species: none shall be present.					
(48) (a) Nutrients		The discharge of nutrients shall continue to be limited as needed to prevent violations of other standards contained in this chapter. Man-induced nutrient enrichment (total nitrogen or total phosphorus) shall be considered degradation in relation to the provisions of Sections 62-302.300, 62-302.700, and 62-4.242, F.A.C.					
(48) (b) Nutrients		In no case shall nutrient concentrations of a body of water be altered so as to cause an imbalance in natural populations of aquatic flora or fauna.					
(49) Odor (also see Color, Minimum Criteria, Phenolic Compounds, etc.)	Threshold odor number		Shall not exceed 24 at 60 degrees C as a daily average.				Odor producing substances: only in such amounts as will not unreasonably interfere with use of the water for the designated purpose of this classification.

Notes: (1) "Annual avg." means the maximum concentration at average annual flow conditions (see Section 62-4.020(1), F.A.C.); (2) "Max" means the maximum not to be exceeded at any time; (3) "ln H" means the natural logarithm of total hardness expressed as milligrams/L of $CaCO_3$. For metals criteria involving equations with hardness, the hardness shall be set at 25 mg/L if actual hardness is < 25 mg/L and set at 400 mg/L if actual hardness is > 400 mg/L; (4) Criteria are protective of human health not of aquatic life.

Table 7.13 Continued

Parameter	Units	Class I	Class II	Class III: Fresh	Class III: Marine	Class IV	Class V
(50) (a) Oils and Greases	Milligrams/L	Dissolved or emulsified oils and greases shall not exceed 5.0	Dissolved or emulsified oils and greases shall not exceed 5.0	Dissolved or emulsified oils and greases shall not exceed 5.0	Dissolved or emulsified oils and greases shall not exceed 5.0	Dissolved or emulsified oils and greases shall not exceed 5.0	Dissolved or emulsified oils and greases shall not exceed 10.0
(50) (b) Oils and Greases		No undissolved oil, or visible oil defined as iridescence, shall be present so as to cause taste or odor, or otherwise interfere with the beneficial use of waters.					
(51) Pesticides and Herbicides							
(51) (a) 2,4,5-TP	Micrograms/L	≤ 10					
(51) (b) 2-4-D	Micrograms/L	≤ 100					
(51) (c) Aldrin	Micrograms/L	≤ .00013 annual avg.; 3.0 max	≤ .00014 annual avg.; 1.3 max	≤ .00014 annual avg.; 3.0 max	≤ .00014 annual avg.; 1.3 max		
(51) (d) Beta-hexachlorocyclo-hexane (b-BHC)	Micrograms/L	≤ 0.014 annual avg.	≤ 0.046 annual avg.	≤ 0.046 annual avg.	≤ 0.046 annual avg.		
(51) (e) Chlordane	Micrograms/L	≤ 0.00058 annual avg.; 0.0043 max	≤ 0.00059 annual avg.; 0.004 max	≤ 0.00059 annual avg.; 0.0043 max	≤ 0.00059 annual avg.; 0.004 max		
(51) (f) DDT	Micrograms/L	≤ 0.00059 annual avg.; 0.001 max	≤ 0.00059 annual avg.; 0.001 max	≤ 0.00059 annual avg.; 0.001 max	≤ 0.00059 annual avg.; 0.001 max		
(51) (g) Demeton	Micrograms/L	≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.1		
(51) (h) Dieldrin	Micrograms/L	≤ 0.00014 annual avg.; 0.0019 max	≤ 0.00014 annual avg.; 0.0019 max	≤ 0.00014 annual avg.; 0.0019 max	≤ 0.00014 annual avg.; 0.0019 max		
(51) (i) Endosulfan	Micrograms/L	≤ 0.056	≤ 0.0087	≤ 0.056	≤ 0.0087		
(51) (j) Endrin	Micrograms/L	≤ 0.0023	≤ 0.0023	≤ 0.0023	≤ 0.0023		
(51) (k) Guthion	Micrograms/L	≤ 0.01	≤ 0.01	≤ 0.01	≤ 0.01		
(51) (l) Heptachlor	Micrograms/L	≤ 0.00021 annual avg.; 0.0038 max	≤ 0.00021 annual avg.; 0.0036 max	≤ 0.00021 annual avg.; 0.0038 max	≤ 0.00021 annual avg.; 0.0036 max		
(51) (m) Lindane (g-benzene hexachloride)	Micrograms/L	≤ 0.019 annual avg.; 0.08 max	≤ 0.063 annual avg.; 0.16 max	≤ 0.063 annual avg.; 0.08 max	≤ 0.063. annual avg.; 0.16 max		
(51) (n) Malathion	Micrograms/L	≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.1		
(51) (o) Methoxychlor	Micrograms/L	≤ 0.03	≤ 0.03	≤ 0.03	≤ 0.03		
(51) (p) Mirex	Micrograms/L	≤ 0.001	≤ 0.001	≤ 0.001	≤ 0.001		

Notes: (1) "Annual avg." means the maximum concentration at average annual flow conditions (see Section 62-4.020(1), F.A.C.); (2) "Max" means the maximum not to be exceeded at any time; (3) "ln H" means the natural logarithm of total hardness expressed as milligrams/L of $CaCO_3$. For metals criteria involving equations with hardness, the hardness shall be set at 25 mg/L if actual hardness is < 25 mg/L and set at 400 mg/L if actual hardness is > 400 mg/L; (4) Criteria are protective of human health not of aquatic life.

Table 7.13 Continued

Parameter	Units	Class I	Class II	Class III: Fresh	Class III: Marine	Class IV	Class V
(51) (q) Parathion	Micrograms/L	≤ 0.04	≤ 0.04	≤ 0.04	≤ 0.04		
(51) (r) Toxaphene	Micrograms/L	≤ 0.0002	≤ 0.0002	≤ 0.0002	≤ 0.0002		
(52) (a) pH (Class I and Class IV Waters)	Standard Units	Shall not vary more than one unit above or below natural background provided that the pH is not lowered to less than 6 units or raised above 8.5 units. If natural background is less than 6 units, the pH shall not vary below natural background or vary more than one unit above natural background. If natural background is higher than 8.5 units, the pH shall not vary above natural background or vary more than one unit below background.					
(52) (b) pH (Class II Waters)	Standard Units	Shall not vary more than one unit above or below natural background of coastal waters as defined in Section 62-302.520(3)(b), F.A.C., or more than two-tenths unit above or below natural background of open waters as defined in Section 62-302.520(3)(f), F.A.C., provided that the pH is not lowered to less than 6.5 units or raised above 8.5 units. If natural background is less than 6.5 units, the pH shall not vary below natural background or vary more than one unit above natural background for coastal waters or more than two-tenths unit above natural background for open waters. If natural background is higher than 8.5 units, the pH shall not vary above natural background or vary more than one unit below natural background of coastal waters or more than two-tenths unit below natural background of open waters.					
(52) (c) pH (Class III Waters)	Standard Units	Shall not vary more than one unit above or below natural background of predominantly fresh waters and coastal waters as defined in Section 62-302.520(3)(b), F.A.C. or more than two-tenths unit above or below natural background of open waters as defined in Section 62-302.520(3)(f), F.A.C., provided that the pH is not lowered to less than 6 units in predominantly fresh waters, or less than 6.5 units in predominantly marine waters, or raised above 8.5 units. If natural background is less than 6 units, in predominantly fresh waters or 6.5 units in predominantly marine waters, the pH shall not vary below natural background or vary more than one unit above natural background of predominantly fresh waters and coastal waters, or more than two-tenths unit above natural background of open waters. If natural background is higher than 8.5 units, the pH shall not vary above natural background or vary more than one unit below natural background of predominantly fresh waters and coastal waters, or more than two-tenths unit below natural background of open waters.					
(52) (d) pH (Class V Waters)	Standard Units	Not lower than 5.0 nor greater than 9.5 except certain swamp waters which may be as low as 4.5.					
(53)(a) Phenolic Compounds: Total		Phenolic compounds other than those produced by the natural decay of plant material, listed or unlisted, shall not taint the flesh of edible fish or shellfish or produce objectionable taste or odor in a drinking water supply.					
(53) (b) Phenolic Compounds: Total	Micrograms/L	1. The total of all chlorinated phenols, and chlorinated cresols, except as set forth in (c) 1. to (c) 4. below, shall not exceed 1.0 unless higher values are shown not to be chronically toxic. Such higher values shall be approved in writing by the Secretary. 2. The compounds listed in (c) 1. to (c) 6. below shall not exceed the limits specified for each compound.					1. The total of the following Phenolic compounds shall not exceed 50: a) Chlorinated phenols; b) Chlorinated cresols; and c) 2,4-dinitrophenol.
(53) (c) 1. Phenolic Compound: 2-chloro-phenol	Micrograms/L	≤ 120	< 400 See Note (4).	< 400 See Note (4).	< 400 See Note (4).	< 400 See Note (4).	
(53) (c) 2. Phenolic Compound: 2,4-dichlorophenol	Micrograms/L	< 93 See Note (4).	< 790 See Note (4).	< 790 See Note (4).	< 790 See Note (4).	< 790 See Note (4).	

Notes: (1) "Annual avg." means the maximum concentration at average annual flow conditions (see Section 62-4.020(1), F.A.C.); (2) "Max" means the maximum not to be exceeded at any time; (3) "ln H" means the natural logarithm of total hardness expressed as milligrams/L of $CaCO_3$. For metals criteria involving equations with hardness, the hardness shall be set at 25 mg/L if actual hardness is < 25 mg/L and set at 400 mg/L if actual hardness is > 400 mg/L; (4) Criteria are protective of human health not of aquatic life.

Table 7.13 Continued

Parameter	Units	Class I	Class II	Class III: Fresh	Class III: Marine	Class IV	Class V
(53) (c) 3. Phenolic Compound: Pentachlorophenol	Micrograms/L	≤ 30 max; ≤ 0.28 annual avg; ≤ $e^{(1.005[pH]-5.29)}$	≤ 7.9	≤ 30 max; ≤ 8.2 annual avg; ≤ $e^{(1.005[pH]-5.29)}$	≤ 7.9	≤ 30	
(53) (c) 4. Phenolic Compound: 2,4,6-trichlorophenol	Micrograms/L	≤ 2.1 annual avg.	≤ 6.5 annual avg.	≤ 6.5 annual avg.	≤ 6.5 annual avg.	≤ 6.5 annual avg.	
(53) (c) 5. Phenolic Compound: 2,4-dinitrophenol	Milligrams/L	≤ 0.0697 See Note (4).	≤ 14.26 See Note (4).	≤ 14.26 See Note (4).	≤ 14.26 See Note (4).	≤ 14.26 See Note (4).	
(53) (c) 6. Phenolic Compound: Phenol	Milligrams/L	≤ 0.3	≤ 0.3	≤ 0.3	≤ 0.3	≤ 0.3	≤ 0.3
(54) Phosphorus (Elemental)	Micrograms/L		≤ 0.1		≤ 0.1		
(55) Phthalate Esters	Micrograms/L	≤ 3.0		≤ 3.0			
(56) Polychlorinated Biphenyls (PCBs)	Micrograms/L	≤ 0.000044 annual avg.; 0.014 max	≤ 0.000045 annual avg.; 0.03 max	≤ 0.000045 annual avg.; 0.014 max	≤ 0.000045 annual avg.; 0.03 max		
(57) (a) Polycyclic Aromatic Hydrocarbons (PAHs). Total of: Acenaphthylene; Benzo(a)anthracene; Benzo(a)pyrene; Benzo(b)fluoranthene; Benzo(ghi)perylene; Benzo(k)fluoranthene; Chrysene; Dibenzo-(a,h)anthracene; Indeno(1,2,3-cd)-pyrene; and Phenanthrene	Micrograms/L	≤ 0.0028 annual avg.	≤ 0.031 annual avg.	≤ 0.031annual avg.	≤ 0.031 annual avg.		
(57) (b) 1. (Individual PAHs): Acenaphthene	Milligrams/L	< 1.2 See Note (4).	< 2.7 See Note (4).	< 2.7 See Note (4).	< 2.7 See Note (4).		
(57) (b) 2. (Individual PAHs): Anthracene	Milligrams/L	< 9.6 See Note (4).	< 110 See Note (4).	< 110 See Note (4).	< 110 See Note (4).		
(57) (b) 3. (Individual PAHs): Fluoranthene	Milligrams/L	< 0.3 See Note (4).	< 0.370 See Note (4).	< 0.370 See Note (4).	< 0.370 See Note (4).		

Notes: (1) "Annual avg." means the maximum concentration at average annual flow conditions (see Section 62-4.020(1), F.A.C.); (2) "Max" means the maximum not to be exceeded at any time; (3) "ln H" means the natural logarithm of total hardness expressed as milligrams/L of $CaCO_3$. For metals criteria involving equations with hardness, the hardness shall be set at 25 mg/L if actual hardness is < 25 mg/L and set at 400 mg/L if actual hardness is > 400 mg/L; (4) Criteria are protective of human health not of aquatic life.

Table 7.13 Continued

Parameter	Units	Class I	Class II	Class III: Fresh	Class III: Marine	Class IV	Class V
(57) (b) 4. (Individual PAHs): Fluorene	Milligrams/L	< 1.3 See Note (4).	< 14 See Note (4).	< 14 See Note (4).	< 14 See Note (4).		
(57) (b) 5. (Individual PAHs): Pyrene	Milligrams/L	< 0.96 See Note (4).	< 11 See Note (4).	< 11 See Note (4).	< 11 See Note (4).		
(58) (a) Radioactive substances (Combined radium 226 and 228)	Picocuries/L	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5
(58) (b) Radioactive substances (Gross alpha particle activity including radium 226, but excluding radon and uranium)	Picocuries/L	≤ 15	≤ 15	≤ 15	≤ 15	≤ 15	≤ 15
(59) Selenium	Micrograms/L	≤ 5.0	≤ 71	≤ 5.0	≤ 71		
(60) Silver	Micrograms/L	≤ 0.07	See Minimum criteria in Section 62-302.500	≤ 0.07	See Minimum criteria in Section 62-302.500		
(61) Specific Conductance (see Conductance, Specific, above)							
(62) Substances in concentrations which injure, are chronically toxic to, or produce adverse physiological or behavioral response in humans, plants, or animals		None shall be present.					
(63) 1,1,2,2-Tetra-chloroethane	Micrograms/L	≤ 0.17 annual avg.	≤ 10.8 annual avg.	≤ 10.8 annual avg.	≤ 10.8 annual avg.		
(64) Tetrachloroethyl-ene (1,1,2,2-tetrachloroethene)	Micrograms/L	≤ 0.8 annual avg., ≤ 3.0 max	≤ 8.85 annual avg.	≤ 8.85 annual avg.	≤ 8.85 annual avg.		
(65) Thallium	Micrograms/L	< 1.7	< 6.3	< 6.3	< 6.3		
(66) Thermal Criteria (See Section 62-302.520)							

Notes: (1) "Annual avg." means the maximum concentration at average annual flow conditions (see Section 62-4.020(1), F.A.C.); (2) "Max" means the maximum not to be exceeded at any time; (3) "ln H" means the natural logarithm of total hardness expressed as milligrams/L of $CaCO_3$. For metals criteria involving equations with hardness, the hardness shall be set at 25 mg/L if actual hardness is < 25 mg/L and set at 400 mg/L if actual hardness is > 400 mg/L; (4) Criteria are protective of human health not of aquatic life.

Table 7.13 Continued

Parameter	Units	Class I	Class II	Class III: Fresh	Class III: Marine	Class IV	Class V
(67) Total Dissolved Gases	Percent of the saturation value for gases at the existing atmospheric and hydrostatic pressures	≤ 110% of saturation value	≤ 110% of saturation value	≤ 110% of saturation value	≤ 110% of saturation value		
(68) Transparency	Depth of the compensation point for photosynthetic activity	Shall not be reduced by more than 10% as compared to the natural background value.	Shall not be reduced by more than 10% as compared to the natural background value.	Shall not be reduced by more than 10% as compared to the natural background value.	Shall not be reduced by more than 10% as compared to the natural background value.		
(69) Trichloroethylene (trichloroethene)	Micrograms/L	≤ 2.7 annual avg., ≤ 3.0 max	≤ 80.7 annual avg.	≤ 80.7 annual avg.	≤ 80.7 annual avg.		
(70) Turbidity	Nephelometric Turbidity Units (NTU)	≤ 29 above natural background conditions	≤ 29 above natural background conditions	≤ 29 above natural background conditions	≤ 29 above natural background conditions	≤ 29 above natural background conditions	≤ 29 above natural background conditions
(71) Zinc	Micrograms/L See Note (3).	Zn ≤ $e^{(0.8473[\ln H]+0.7614)}$	≤ 86	Zn ≤ $e^{(0.8473[\ln H]+0.7614)}$	≤ 86	≤ 1,000	≤ 1,000

Notes: (1) "Annual avg." means the maximum concentration at average annual flow conditions (see Section 62-4.020(1), F.A.C.); (2) "Max" means the maximum not to be exceeded at any time; (3) "ln H" means the natural logarithm of total hardness expressed as milligrams/L of $CaCO_3$. For metals criteria involving equations with hardness, the hardness shall be set at 25 mg/L if actual hardness is < 25 mg/L and set at 400 mg/L if actual hardness is > 400 mg/L; (4) Criteria are protective of human health not of aquatic life.

Table 7.14 EPC Monthly Average Water Quality Parameters

Averages per Month	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
January	**46.16**	1.00	18.17	4.81	**0.06**	**1.20**	**2.05**	161.05	1.00
February	**43.80**	1.67	20.84	3.92	**0.09**	**1.08**	**7.24**	215.00	1.04
March	**37.04**	13.00	21.50	3.57	**0.08**	**1.14**	**3.79**	223.33	1.26
April	**35.68**	1.50	18.58	2.31	**0.12**	**1.35**	**8.77**	1233.68	1.83
May	**30.75**	7.25	20.20	2.23	**0.15**	**1.91**	**35.71**	862.50	3.94
June	**31.67**	4.67	25.45	2.72	**0.15**	**1.75**	**37.13**	405.56	3.71
July	**33.71**	7.33	26.02	2.36	**0.11**	**1.50**	**14.73**	289.52	1.84
August	**32.45**	1.75	28.43	1.37	**0.16**	**1.77**	**7.50**	548.18	2.31
September	**27.27**	1.75	26.54	1.73	**0.09**	**1.55**	**1.74**	281.90	1.39
October	**31.83**	2.80	26.64	1.24	**0.09**	**1.39**	**1.98**	307.27	1.44
November	**34.29**	3.67	24.60	1.96	**0.10**	**1.27**	**5.86**	752.38	1.73
December	**39.95**	3.25	19.03	4.19	**0.06**	**1.11**	**1.95**	163.00	1.25

Averages per Month	Turbidity NTU	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
January	2.26	289.16	7.26	0.03	1.08	1.12	0.05	0.02	0.12	5.88	552.63
February	2.50	293.90	7.27	0.03	0.92	0.97	0.05	0.03	0.04	20.97	760.00
March	2.50	294.33	7.10	0.05	0.93	1.01	0.08	0.05	0.05	10.97	4599.17
April	3.79	300.47	7.25	0.07	1.09	1.17	0.11	0.09	0.09	16.79	1645.26
May	6.63	293.56	7.43	0.12	1.40	1.64	0.32	0.11	0.07	50.71	2356.25
June	6.17	331.11	7.27	0.09	1.39	1.49	0.18	0.08	0.05	52.64	1338.89
July	4.76	365.05	6.98	0.11	1.31	1.31	0.07	0.04	0.06	21.08	1340.95
August	3.91	276.95	6.93	0.05	1.57	1.59	0.09	0.03	0.07	16.05	2325.45
September	2.05	276.23	6.90	0.16	1.30	1.39	0.14	0.03	0.17	7.94	1005.45
October	2.43	337.00	7.05	0.06	1.18	1.23	0.13	0.02	0.19	8.15	982.61
November	2.71	389.38	7.12	0.06	1.18	1.20	0.07	0.02	0.22	10.85	1157.14
December	2.00	544.85	7.20	0.04	0.98	0.99	0.05	0.02	0.05	6.55	745.00

Table 7.15 Monthly WQI and TSI Calculations using EPC data

Averaged per Month	WQI Index	TSI CHLA	TSI TN	TSI TN2	TSI TP	TSI TP2	TSI SD	TSI 1	TSI 2
January	3.74	27.14	59.65	63.54	56.40	71.11	21.53	58.02	42.58
February	4.84	45.31	57.53	61.26	64.56	81.46	12.49	61.05	53.18
March	5.02	35.97	58.54	62.34	63.68	80.34	13.77	61.11	48.54
April	7.36	48.07	61.95	66.03	70.97	89.60	11.04	66.46	57.26
May	11.35	68.29	68.87	73.51	74.17	93.65	13.17	71.52	69.90
June	9.86	68.85	67.16	71.66	74.73	94.36	11.72	70.94	69.90
July	7.33	55.53	64.08	68.33	69.74	88.03	13.13	66.91	61.22
August	9.94	45.82	67.37	71.88	75.52	95.36	11.36	71.44	58.63
September	7.63	24.75	64.74	69.05	65.94	83.22	16.65	65.34	45.05
October	8.77	26.62	62.61	66.74	65.21	82.28	15.56	63.91	45.26
November	6.87	42.27	60.73	64.71	67.52	85.22	12.51	64.13	53.20
December	3.89	26.42	58.15	61.93	56.80	71.62	19.55	57.48	41.95

NOTE: TSI based on PVI could not be calculated since no PVI data was available.

Table 7.16 EPC Annual Water Quality Parameters

Averages per year	SECCHI inches	TSS mg/l	TOC mg/l	DO, M mg/l	P, TOTAL mg/l	N, TOTAL mg/l	CHL. A µg/l	M.FECAL	ECOLI
1976	**39.00**	3.13	14.95	3.24	**0.08**	**N/A**	**3.30**	100.00	1.50
1977	**20.00**	21.33	N/A	N/A	**0.02**	**N/A**	**24.73**	100.00	1.97
1979	**29.40**	3.10	21.01	2.59	**0.07**	**N/A**	**3.80**	340.00	1.28
1980	**28.67**	3.75	23.33	2.81	**0.22**	**N/A**	**11.15**	200.00	2.78
1981	**34.78**	3.00	28.34	2.30	**0.14**	**1.31**	**7.17**	266.67	1.93
1982	**37.09**	N/A	29.81	1.35	**0.17**	**1.55**	**4.51**	100.00	1.56
1983	**37.50**	N/A	20.94	2.94	**0.19**	**1.58**	**2.06**	233.33	1.40
1984	**43.00**	N/A	18.19	2.63	**0.11**	**1.25**	**13.08**	1041.67	1.50
1985	**33.00**	N/A	26.86	2.30	**0.07**	**1.28**	**6.68**	140.00	1.51
1986	**37.64**	N/A	N/A	2.95	**0.07**	**1.26**	**5.60**	143.64	1.59
1987	**44.50**	N/A	N/A	4.67	**0.06**	**1.86**	**2.31**	108.33	1.59
1988	**43.50**	N/A	N/A	3.13	**0.11**	**1.45**	**19.54**	166.67	2.65
1989	**43.50**	N/A	N/A	2.69	**0.06**	**1.26**	**13.13**	675.00	2.14
1990	**37.50**	N/A	N/A	2.34	**0.11**	**1.32**	**25.75**	618.33	1.74
1991	**36.55**	N/A	N/A	2.20	**0.08**	**1.46**	**2.44**	1636.36	1.27
1992	**28.00**	N/A	N/A	1.94	**0.11**	**1.46**	**7.41**	2511.11	1.40
1993	**36.50**	N/A	N/A	2.44	**0.10**	**1.54**	**42.32**	438.33	3.45
1994	**25.80**	N/A	N/A	2.08	**0.07**	**1.55**	**17.67**	134.00	1.75
1995	**29.45**	N/A	N/A	2.23	**0.05**	**1.29**	**2.03**	94.55	1.39
1996	**34.00**	N/A	N/A	2.48	**0.07**	**1.02**	**1.57**	108.33	0.97
1997	**34.50**	N/A	N/A	3.20	**0.13**	**1.48**	**1.32**	246.67	2.29
1998	**30.00**	N/A	N/A	2.99	**0.14**	**1.32**	**1.34**	131.67	2.43
1999	**33.00**	N/A	N/A	2.45	**0.07**	**1.42**	**8.10**	576.00	1.65

Averages per year	Turbidity NTU	COND.M mmho/cm	pH mid units	P,ORTHO mg/l	N,ORG mg/l	N,KJEL mg/l	[illegible] mg/l	NO2+NO3 mg/l	[illegible] mg/l	[illegible]	[illegible]
1976	2.63	209.29	7.25	0.06	N/A	0.21	0.24	N/A	0.10	15.66	2137.50
1977	1.67	474.00	7.30	0.01	0.21	0.36	0.15	N/A	0.03	38.40	25600.00
1979	1.40	194.10	7.71	0.05	0.04	0.10	0.06	N/A	0.08	17.64	3800.00
1980	2.17	248.92	7.93	0.29	1.03	1.25	0.22	N/A	0.20	24.39	1350.00
1981	2.22	420.00	7.94	0.09	1.16	1.25	0.10	N/A	0.06	16.90	1100.00
1982	2.27	416.55	7.37	N/A	1.32	1.49	0.17	N/A	0.05	11.64	454.55
1983	1.67	693.92	7.23	N/A	1.46	1.52	0.12	0.06	0.03	9.49	533.33
1984	2.92	202.17	6.59	N/A	1.04	1.20	0.16	0.06	N/A	28.42	2550.00
1985	4.30	305.80	7.39	N/A	1.17	1.26	0.09	0.02	N/A	11.21	520.00
1986	1.91	298.36	7.27	N/A	1.12	1.20	0.08	0.06	N/A	9.40	367.27
1987	1.75	220.00	7.48	N/A	1.74	1.83	0.09	0.03	N/A	5.15	733.33
1988	5.75	317.50	7.49	N/A	1.20	1.38	0.18	0.07	N/A	24.12	883.33
1989	5.08	296.17	6.98	N/A	1.13	1.22	0.09	0.05	N/A	22.42	1241.67
1990	6.17	352.67	6.78	0.04	1.21	1.28	0.07	0.03	N/A	39.41	833.33
1991	7.27	367.00	6.93	0.05	1.33	1.42	0.09	0.04	N/A	3.27	1927.27
1992	4.89	380.67	7.00	0.03	1.41	1.44	0.04	0.02	N/A	10.42	2911.11
1993	6.67	387.00	6.98	0.04	1.43	1.50	0.08	0.04	N/A	50.43	861.67
1994	2.40	512.70	6.69	0.03	1.45	1.50	0.06	0.05	N/A	24.34	1100.00
1995	2.09	280.82	6.70	0.03	1.22	1.25	0.03	0.04	N/A	2.98	718.18
1996	1.25	273.67	6.90	0.05	0.96	0.99	0.03	0.03	N/A	4.40	1116.67
1997	3.42	333.75	6.95	0.07	1.24	1.44	0.20	0.04	N/A	2.90	1141.67
1998	3.00	218.50	6.57	0.10	1.21	1.27	0.06	0.05	N/A	3.23	650.00
1999	2.80	344.60	6.94	0.04	1.30	1.39	0.09	0.03	N/A	10.10	2730.00

Table 7.17 Annual WQI and TSI Calculations using EPC Data

Averages per month	WQ Index	TSI CHLA	TSI TN	TSI TN2	TSI TP	TSI TP2	TN/TP	TSI AVG	TSI AVG 2
1976	n/a	33.99	n/a	n/a	63.39	79.98	n/a	n/a	n/a
1977	n/a	63.00	n/a	n/a	33.93	42.60	n/a	n/a	n/a
1979	n/a	36.02	n/a	n/a	60.35	76.12	n/a	n/a	n/a
1980	n/a	51.52	n/a	n/a	81.64	103.13	n/a	n/a	n/a
1981	7.49	45.16	61.37	65.41	73.51	92.82	9.36	67.44	56.30
1982	10.45	38.49	64.66	68.96	76.72	96.89	9.29	70.69	54.59
1983	8.03	27.20	65.05	69.38	79.28	100.13	8.26	72.16	49.68
1984	7.39	53.83	60.48	64.44	69.58	87.84	11.05	65.03	59.43
1985	6.12	44.15	60.90	64.89	61.40	77.45	17.52	61.15	52.65
1986	5.18	41.61	60.57	64.54	59.37	74.88	19.22	59.97	50.79
1987	4.59	28.85	68.32	72.91	57.49	72.50	31.39	62.91	45.88
1988	7.65	59.60	63.41	67.60	68.74	86.77	13.39	66.08	62.84
1989	5.86	53.87	60.65	64.63	57.49	72.50	21.35	59.07	56.47
1990	7.73	63.58	61.46	65.50	68.74	86.77	12.15	65.10	64.34
1991	6.39	29.64	63.56	67.76	62.02	78.24	19.37	62.79	46.21
1992	7.14	45.64	63.49	67.69	68.46	86.41	13.66	65.97	55.81
1993	8.60	70.73	64.55	68.84	68.02	85.85	14.75	66.28	68.51
1994	6.73	58.16	64.75	69.05	60.35	76.12	22.49	62.55	60.35
1995	5.06	27.00	61.10	65.11	55.98	70.58	23.68	58.54	42.77
1996	4.88	23.34	56.35	59.98	60.62	76.46	14.54	58.48	40.91
1997	7.24	20.76	63.86	68.09	72.37	91.37	11.27	68.12	44.44
1998	6.30	20.96	61.56	65.61	72.95	92.11	9.74	67.26	44.11
1999	6.10	46.92	62.96	67.13	61.40	77.45	19.44	62.18	54.55
yearly averages	**6.79**	49.77	62.73	66.88	67.16	84.76	14.10	64.95	57.36

NOTE: TSI based on PVI could not be calculated since PVI data was not available.

Table 7.17a Statistics of Annual EPC Data

Averages per month	DO_M mg/l	P_TOTAL mg/l	N_TOTAL mg/l	CHL_A µg/l	S_TSS mg/l
1976	3.24	0.08	N/A	3.30	3.13
1977	N/A	0.02	N/A	24.73	21.33
1979	2.59	0.07	N/A	3.80	3.10
1980	2.81	0.22	N/A	11.15	3.75
1981	2.30	0.14	1.31	7.17	3.00
1982	1.35	0.17	1.55	4.51	N/A
1983	2.94	0.19	1.58	2.06	N/A
1984	2.63	0.11	1.25	13.08	N/A
1985	2.30	0.07	1.28	6.68	N/A
1986	2.95	0.07	1.26	5.60	N/A
1987	4.67	0.06	1.86	2.31	N/A
1988	3.13	0.11	1.45	19.54	N/A
1989	2.69	0.06	1.26	13.13	N/A
1990	2.34	0.11	1.32	25.75	N/A
1991	2.20	0.08	1.46	2.44	N/A
1992	1.94	0.11	1.46	7.41	N/A
1993	2.44	0.10	1.54	42.32	N/A
1994	2.08	0.07	1.55	17.67	N/A
1995	2.23	0.05	1.29	2.03	N/A
1996	2.48	0.07	1.02	1.57	N/A
1997	3.20	0.13	1.48	1.32	N/A
1998	2.99	0.14	1.32	1.34	N/A
1999	2.45	0.07	1.42	8.10	N/A
Means	37.28	6.96	24.33	12.50	6.96
Medians	2.53	0.08	1.42	6.68	3.13
St, Diviations	0.64	0.05	0.18	10.24	8.10
Min	1.35	0.02	1.02	1.32	3.00
Max	4.67	0.22	1.86	42.32	21.33

Table 7.18 Monthly Average USGS Water Quality Data

Station 2303420 At Washington Gardens

Average per month	DO mg/l	P mg/l	N mg/l	TN/TP
January	6.44	0.10	1.24	13.07
February	5.79	0.04	1.53	38.61
March	4.93	0.07	1.28	18.25
April	4.33	0.10	1.40	14.29
May	3.96	0.11	1.84	16.71
June	3.48	0.08	1.45	18.24
July	3.81	0.07	1.72	25.52
August	2.52	0.06	1.90	32.62
September	2.36	0.06	1.67	27.91
October	2.71	0.06	1.80	31.03
November	4.61	0.05	1.44	27.02
December	5.21	0.03	1.37	42.23

Station 2303800 At Bruce B-Down

Average per month	DO mg/l	P mg/l	N mg/l	TN/TP
January	5.26	0.06	0.94	16.86
February	5.16	0.04	1.16	29.87
March	4.17	0.04	1.17	27.09
April	3.63	0.08	1.27	16.68
May	3.12	0.09	1.42	16.71
June	3.18	0.06	1.32	23.29
July	3.36	0.35	2.28	6.46
August	2.24	0.06	1.54	25.39
September	2.44	0.07	1.55	21.31
October	1.85	0.07	1.62	23.10
November	2.54	0.06	1.21	20.08
December	3.82	0.10	1.64	16.65

Table 7.19 Annual USGS Water Quality Data

Station 2303420 At Washington Gardens

Averages	DOFM	NITOTAL		
	mg/l	mg/l		
1970	6.21	N/A	N/A	N/A
1971	5.40	N/A	N/A	N/A
1972	4.11	N/A	N/A	N/A
1973	3.65	N/A	N/A	N/A
1974	3.38	N/A	N/A	N/A
1975	6.92	N/A	N/A	N/A
1976	4.51	1.40	0.02	93.33
1977	3.17	1.08	0.04	28.37
1978	3.10	N/A	N/A	N/A
1979	5.98	N/A	N/A	N/A
1980	5.32	N/A	N/A	N/A
1981	3.69	N/A	N/A	N/A
1982	3.90	1.08	0.06	18.00
1983	3.30	0.89	0.07	13.03
1984	2.38	2.03	0.21	9.84
1985	3.33	1.80	0.11	16.62
1986	3.81	1.08	0.09	12.18
1987	4.46	1.30	0.05	26.08
1988	4.53	1.73	0.04	49.29
1989	3.24	2.26	0.11	20.18
1990	2.57	1.53	0.09	17.04
1991	3.26	1.80	0.04	40.91
1992	6.30	N/A	N/A	N/A
1993	3.72	2.54	0.05	50.80
1994	2.90	1.68	0.04	38.53
1995	3.65	1.43	0.04	37.89
1996	4.74	1.56	0.05	32.77
1997	3.10	1.31	0.08	16.31
1998	3.37	1.70	0.04	39.23
1999	0.00	0.00	0.00	N/A

Station 2303800 At Bruce B-Down

Averages	DOFM	NITOTAL		
	mg/l	mg/l		
1970	7.30	N/A	N/A	N/A
1972	N/A	N/A	N/A	N/A
1973	4.20	N/A	N/A	N/A
1974	2.39	N/A	N/A	N/A
1975	2.87	N/A	N/A	N/A
1976	4.53	N/A	N/A	N/A
1977	6.58	N/A	N/A	N/A
1978	3.84	1.52	0.02	0.01
1979	2.81	1.11	0.04	0.03
1980	3.34	1.18	0.05	0.04
1981	3.94	1.06	0.06	0.06
1982	3.81	1.13	0.04	0.04
1983	2.78	1.24	0.05	0.04
1984	4.35	0.99	0.06	0.06
1985	2.40	1.02	0.09	0.09
1986	2.00	1.70	0.10	0.06
1987	2.61	1.45	0.27	0.19
1988	3.24	0.99	0.08	0.08
1989	3.73	1.12	0.05	0.04
1990	3.68	3.70	0.04	0.01
1991	1.80	2.00	0.04	0.02
1992	1.93	2.08	0.14	0.07
1993	3.36	1.72	0.07	0.04
1994	4.43	1.30	0.06	0.04
1995	3.46	1.72	0.05	0.03
1996	2.80	1.34	0.06	0.04
1997	2.73	1.18	0.58	0.49
1999	3.95	1.40	0.04	0.03

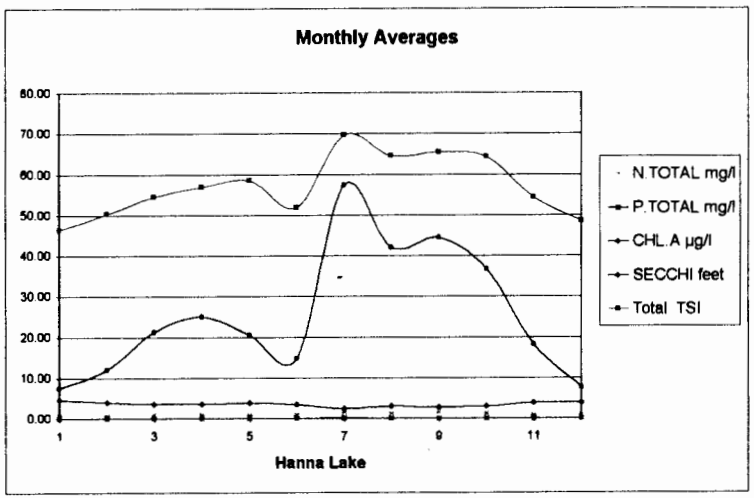
Table 7.20 Statistics of Annual USGS Water Quality Data

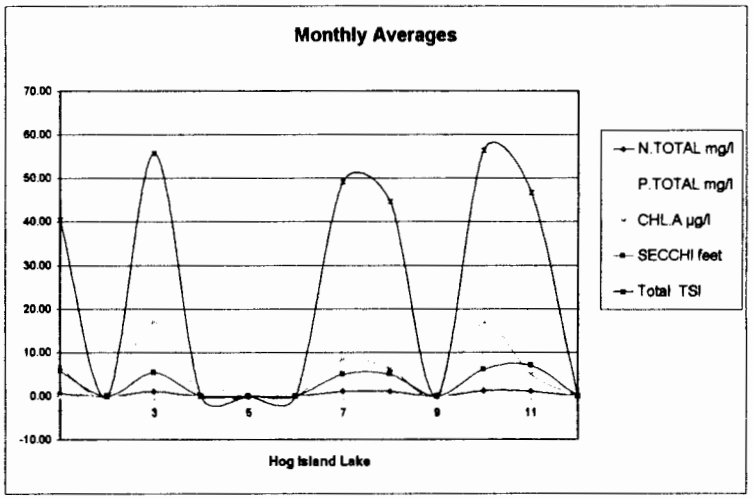
Station 2303420

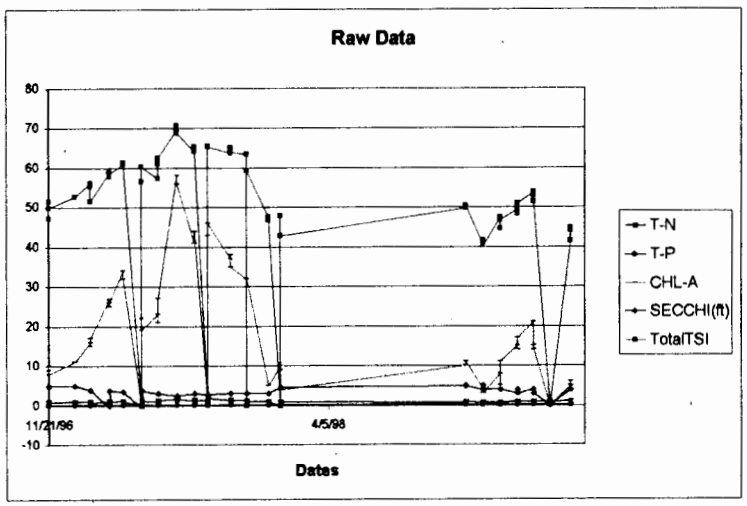
Mean	3.93	1.48	0.06	31.13
Median	3.67	1.53	0.05	27.22
St Deviations	1.38	0.55	0.05	20.21
Min	0.00	0.00	0.00	9.84
Max	6.92	2.54	0.21	93.33

Station 2303800

Mean	3.51	1.47	0.09	0.07
Median	3.36	1.30	0.06	0.04
St Deviations	1.26	0.60	0.12	0.10
Min	1.80	0.99	0.02	0.01
Max	7.30	3.70	0.58	0.49







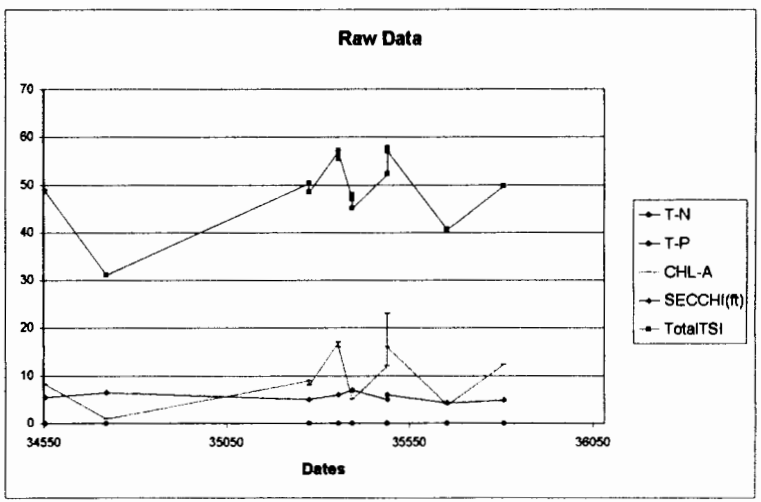


Figure 7.4 Hillsborough County Lake Data

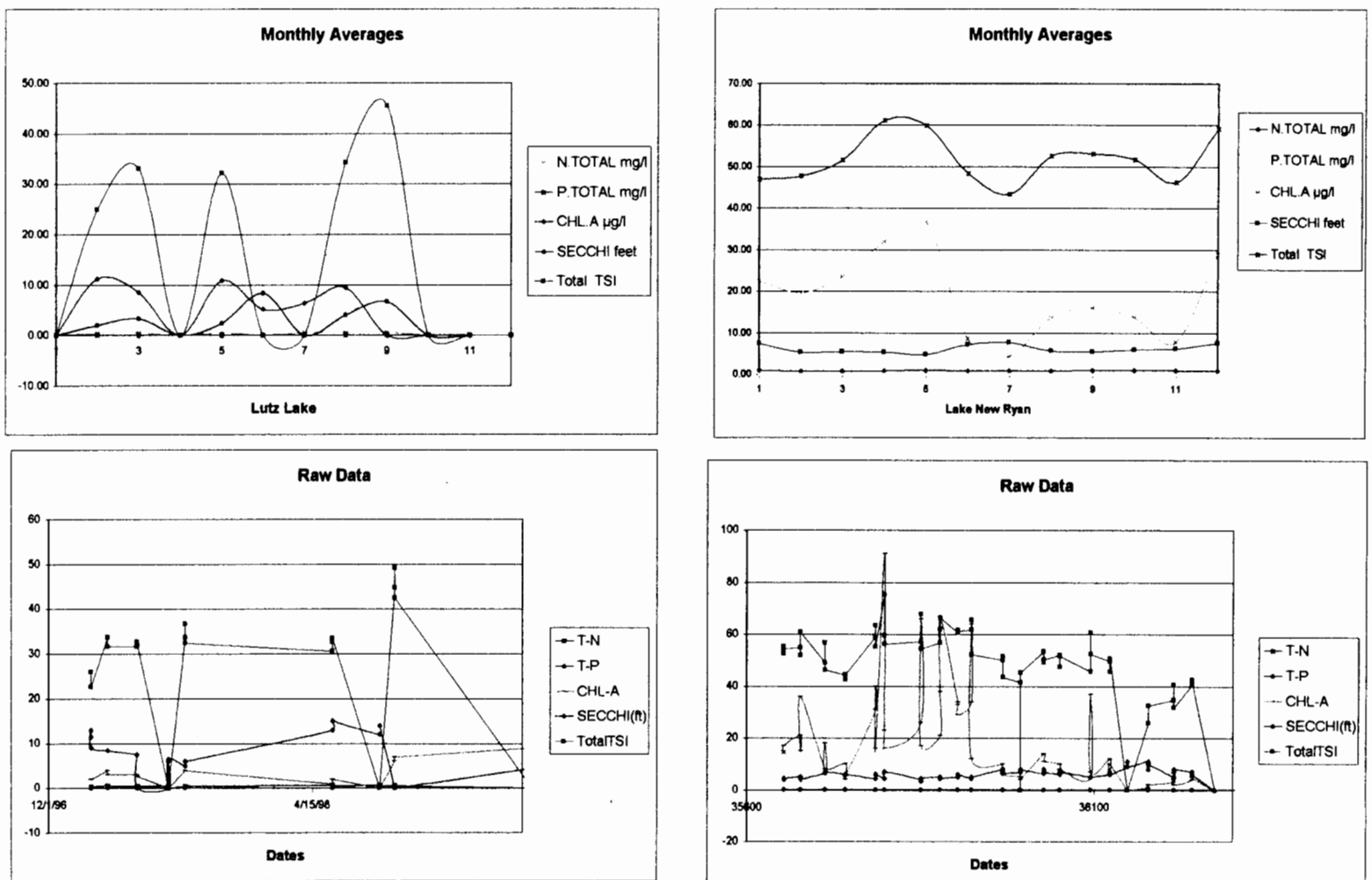


Figure 7.4 Hillsborough County Lake Data

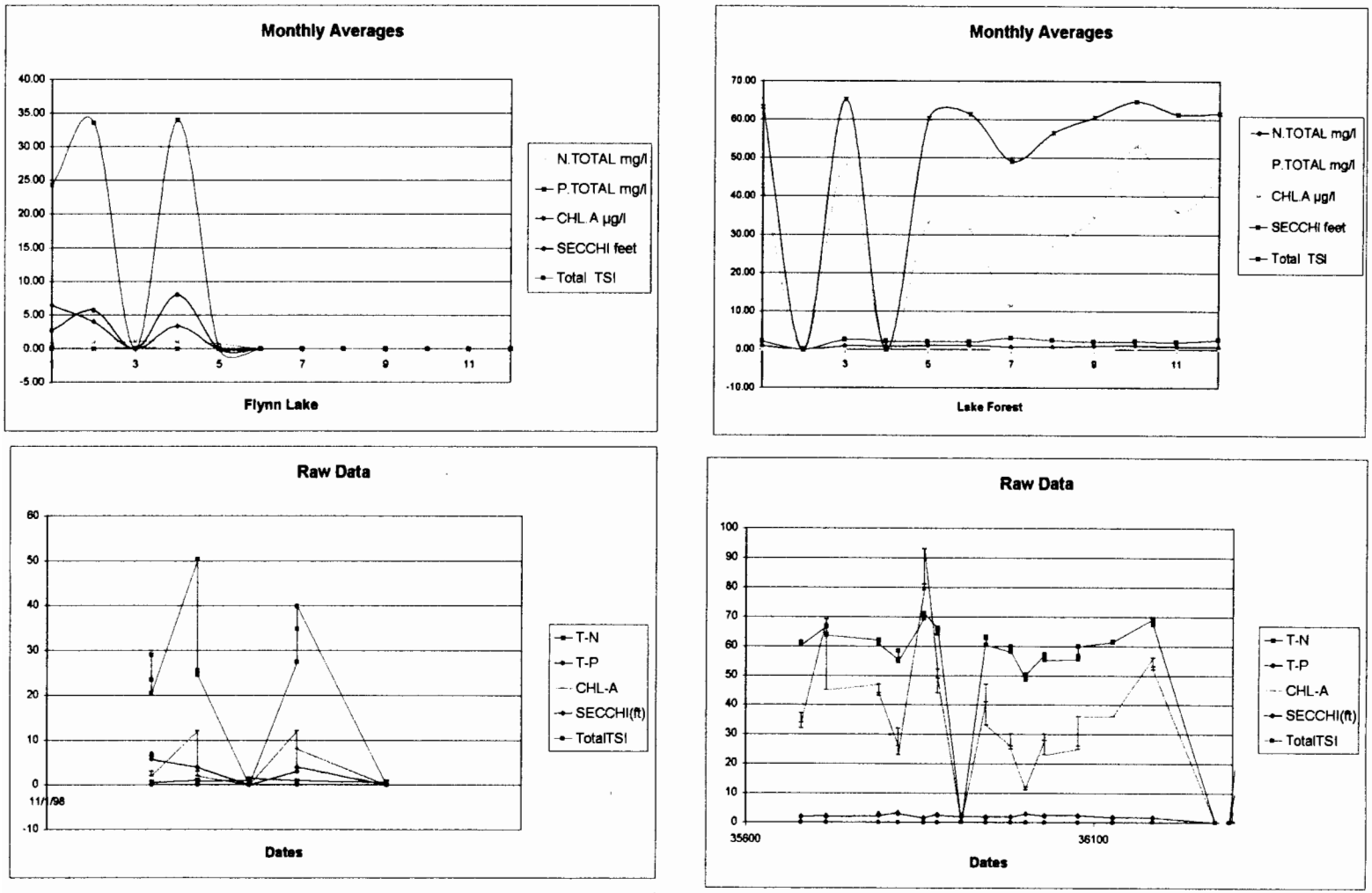
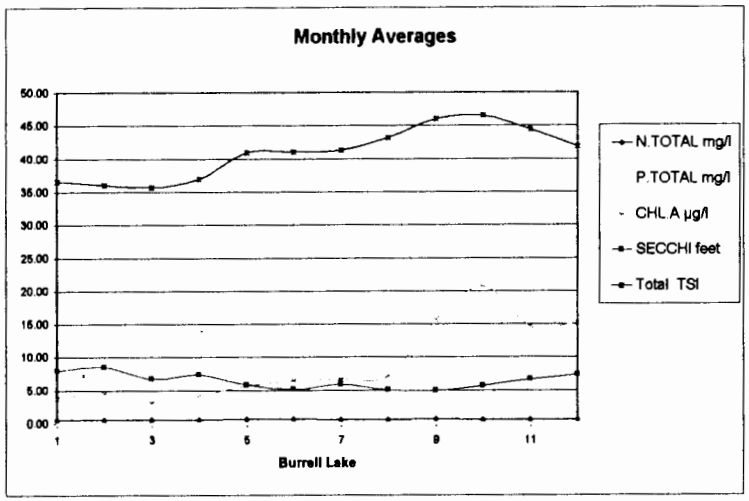
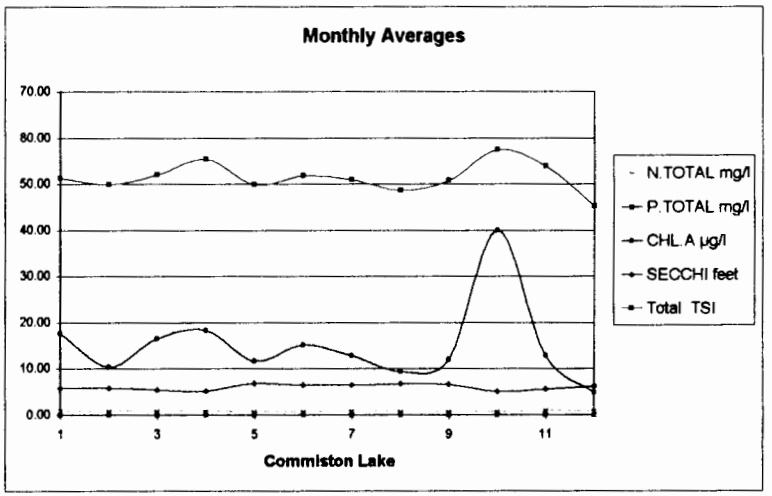
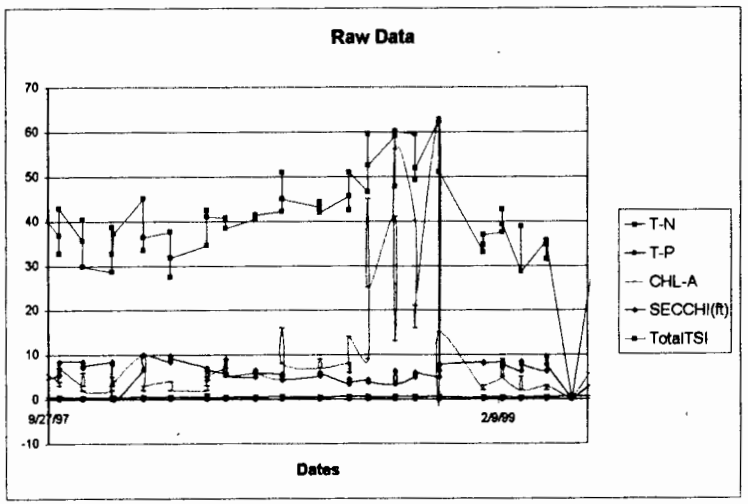


Figure 7.4 Hillsborough County Lake Data







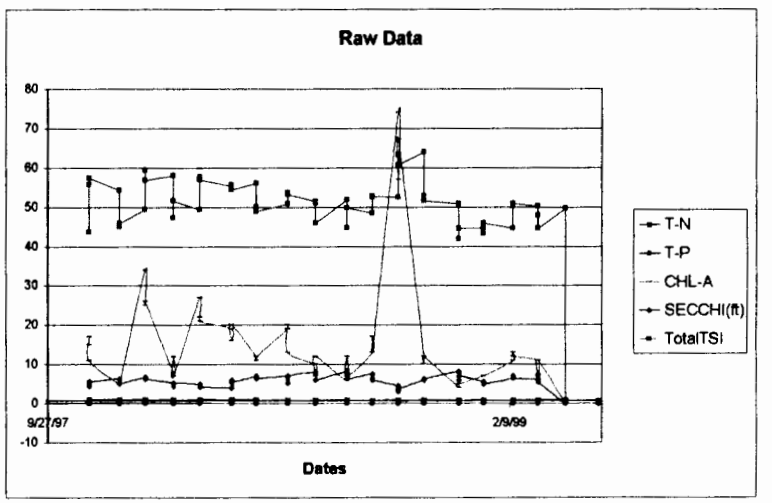
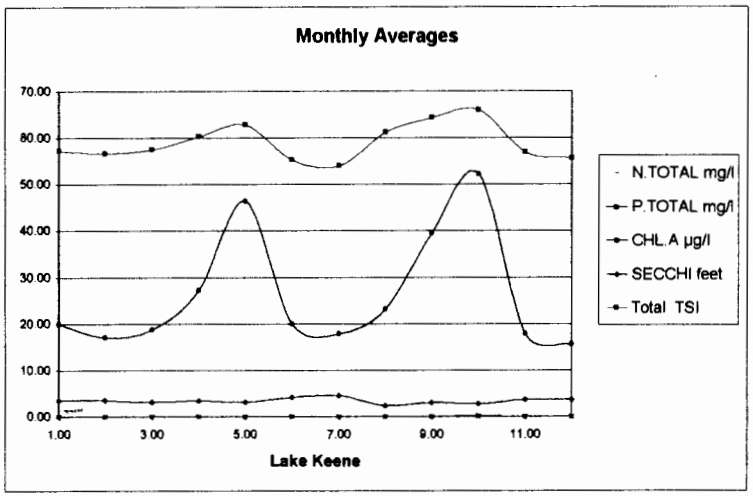
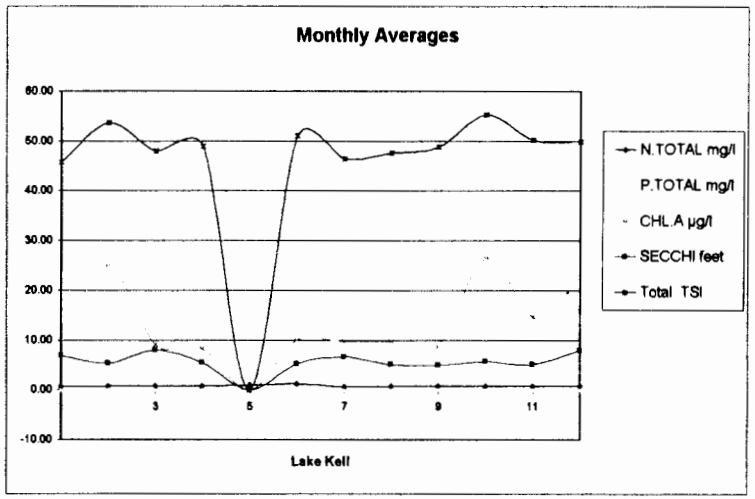
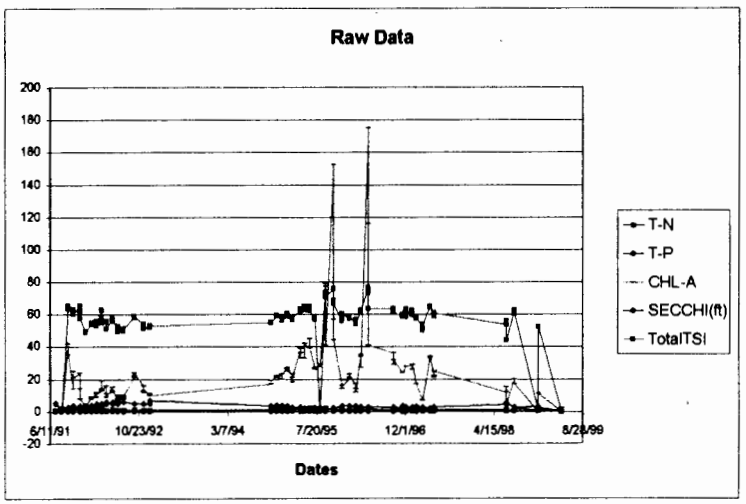


Figure 7.4 Hillsborough County Lake Data







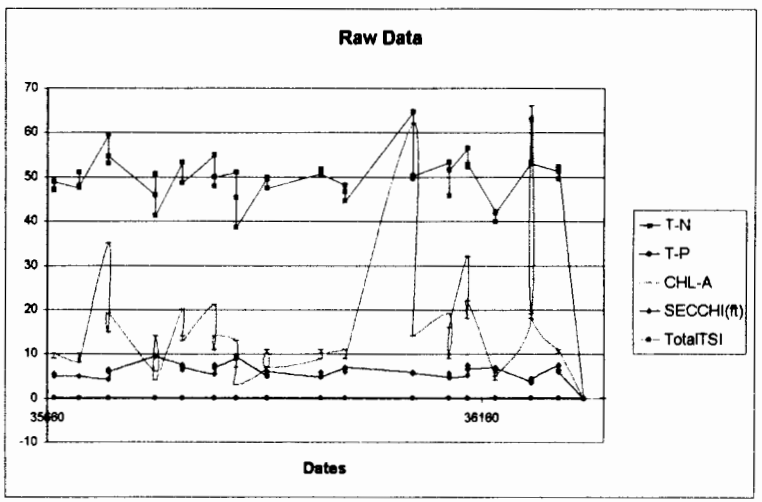
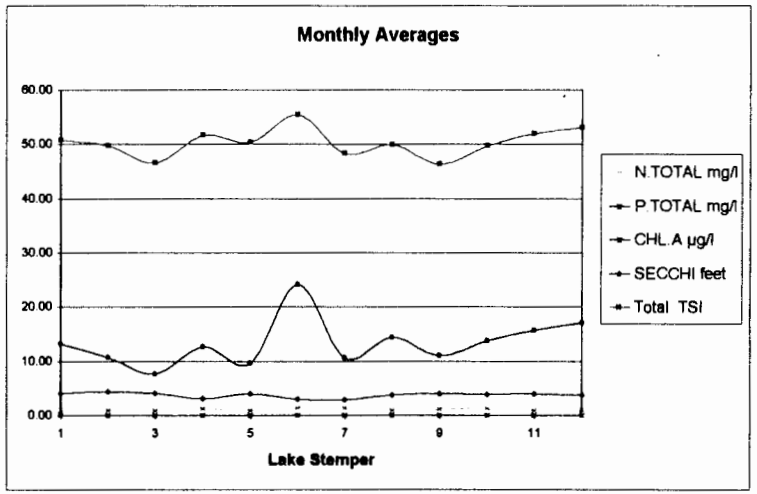


Figure 7.4 Hillsborough County Lake Data



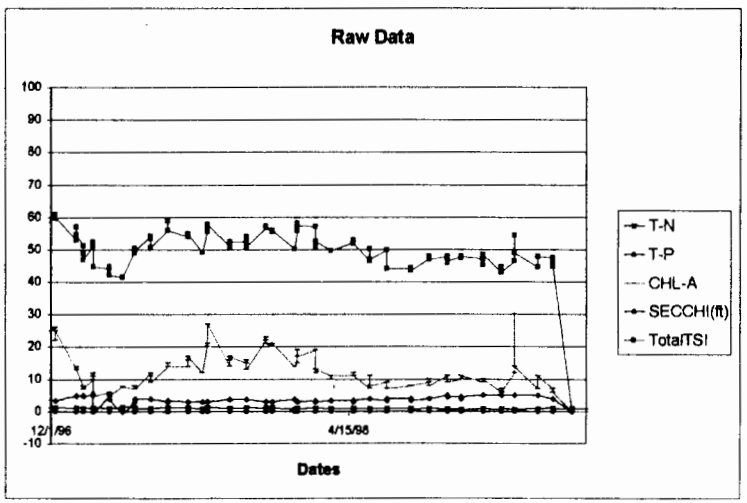
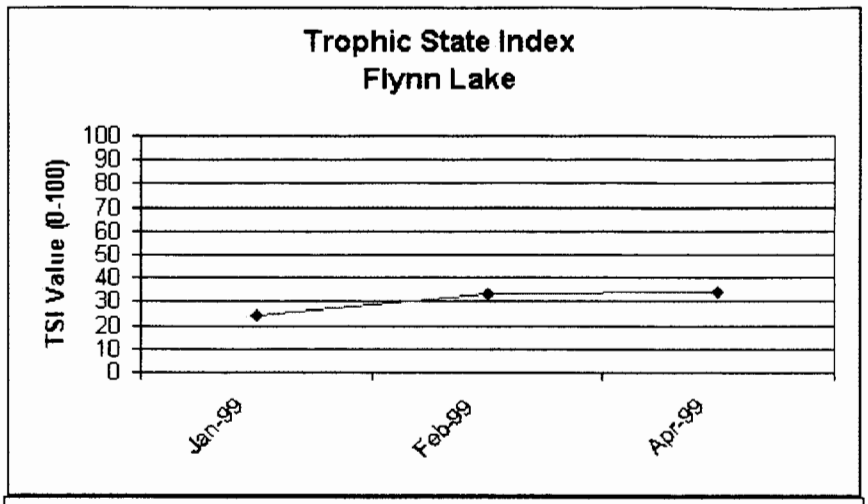
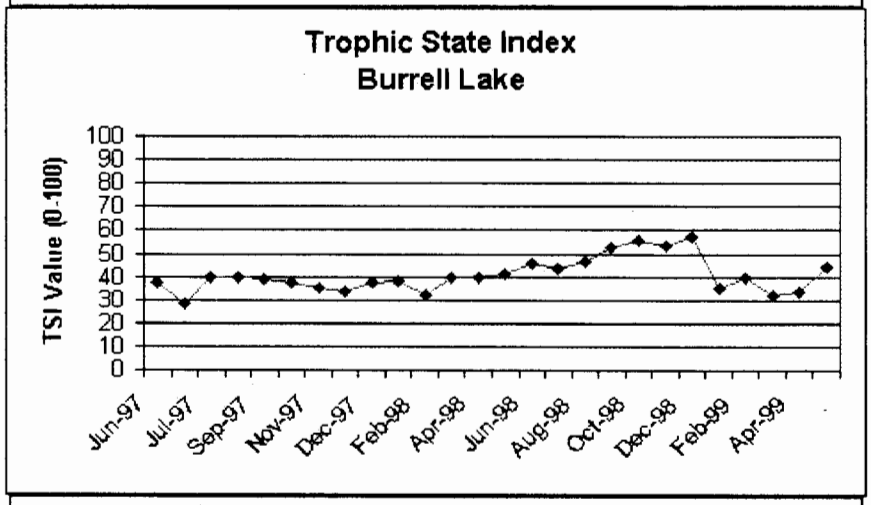


Figure 7.4 Hillsborough County Lake Data

Figure 7.5


Trophic State Index
Flynn Lake
TSI Value (0-100)
100
90
80
70
60
50
40
30
20
10
0
Jan-99
Feb-99
Apr-99


Trophic State Index
Burrell Lake
TSI Value (0-100)
100
90
80
70
60
50
40
30
20
10
0
Jun-97
Jul-97
Sep-97
Nov-97
Dec-97
Feb-98
Apr-98
Jun-98
Aug-98
Oct-98
Dec-98
Feb-99
Apr-99

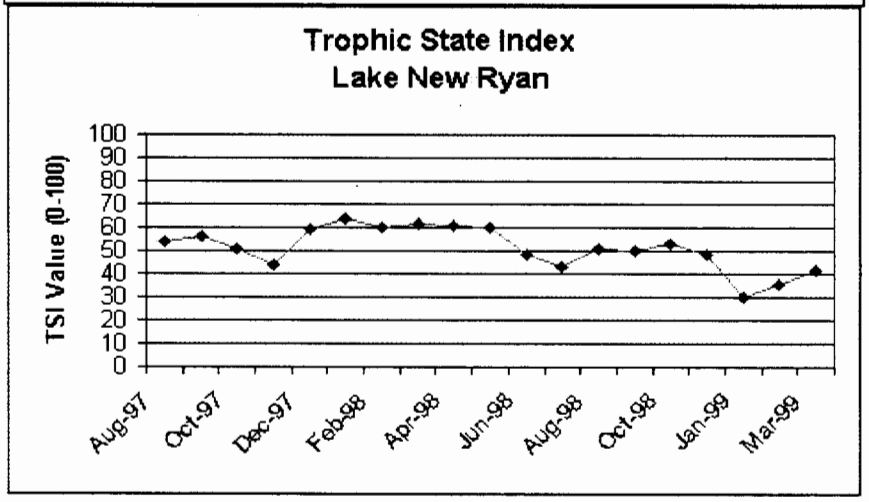
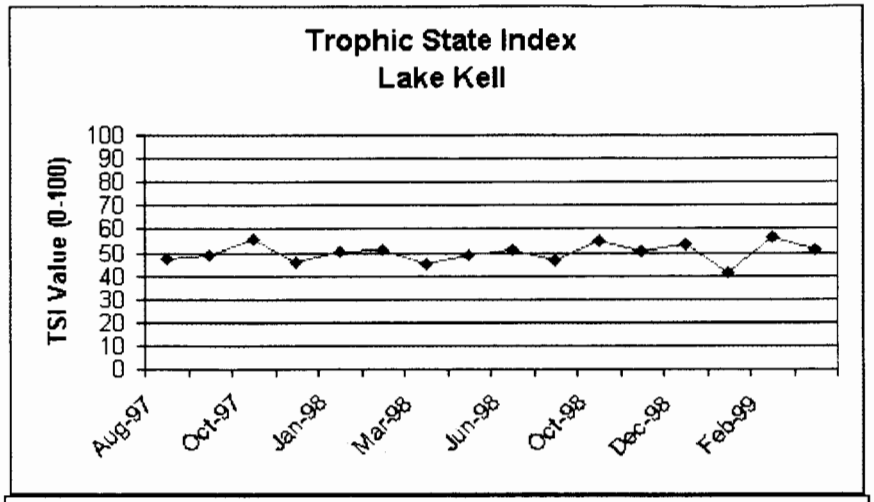

Trophic State Index
Lake New Ryan
TSI Value (0-100)
100
90
80
70
60
50
40
30
20
10
0
Aug-97
Oct-97
Dec-97
Feb-98
Apr-98
Jun-98
Aug-98
Oct-98
Jan-99
Mar-99

Figure 7.5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Lake Kell
TSI Value (0-100)
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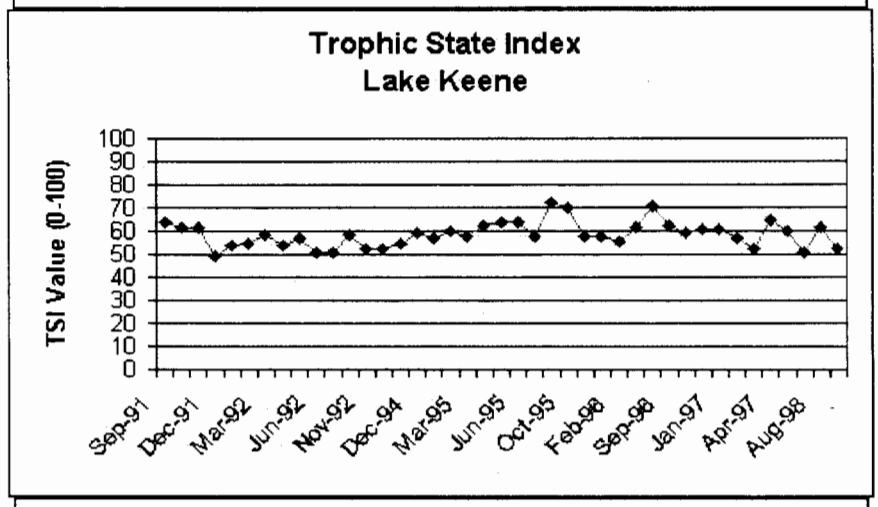
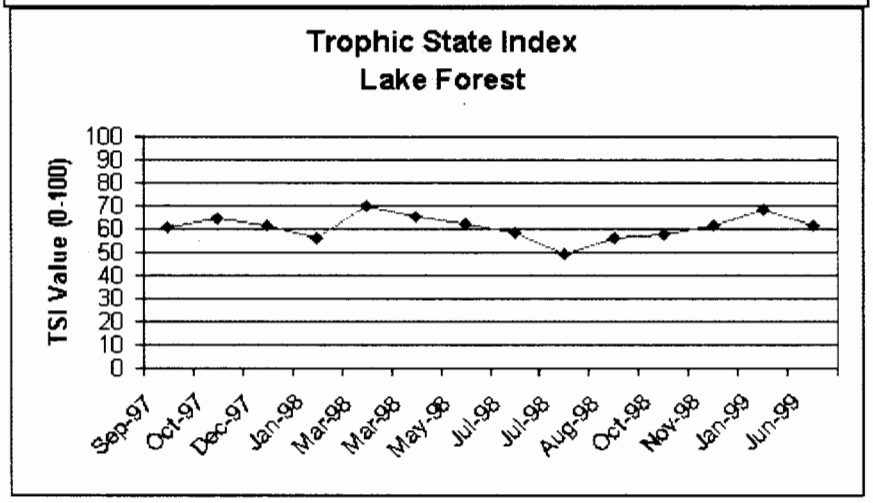
90
80
70
60
50
40
30
20
10
0
Aug-97
Oct-97
Jan-98
Mar-98
Jun-98
Oct-98
Dec-98
Feb-99


Trophic State Index
Lake Keene
TSI Value (0-100)
100
90
80
70
60
50
40
30
20
10
0
Sep-91
Dec-91
Mar-92
Jun-92
Nov-92
Dec-94
Mar-95
Jun-95
Oct-95
Feb-96
Sep-96
Jan-97
Apr-97
Aug-98


Trophic State Index
Lake Forest
TSI Value (0-100)
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90
80
70
60
50
40
30
20
10
0
Sep-97
Oct-97
Dec-97
Jan-98
Mar-98
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May-98
Jul-98
Jul-98
Aug-98
Oct-98
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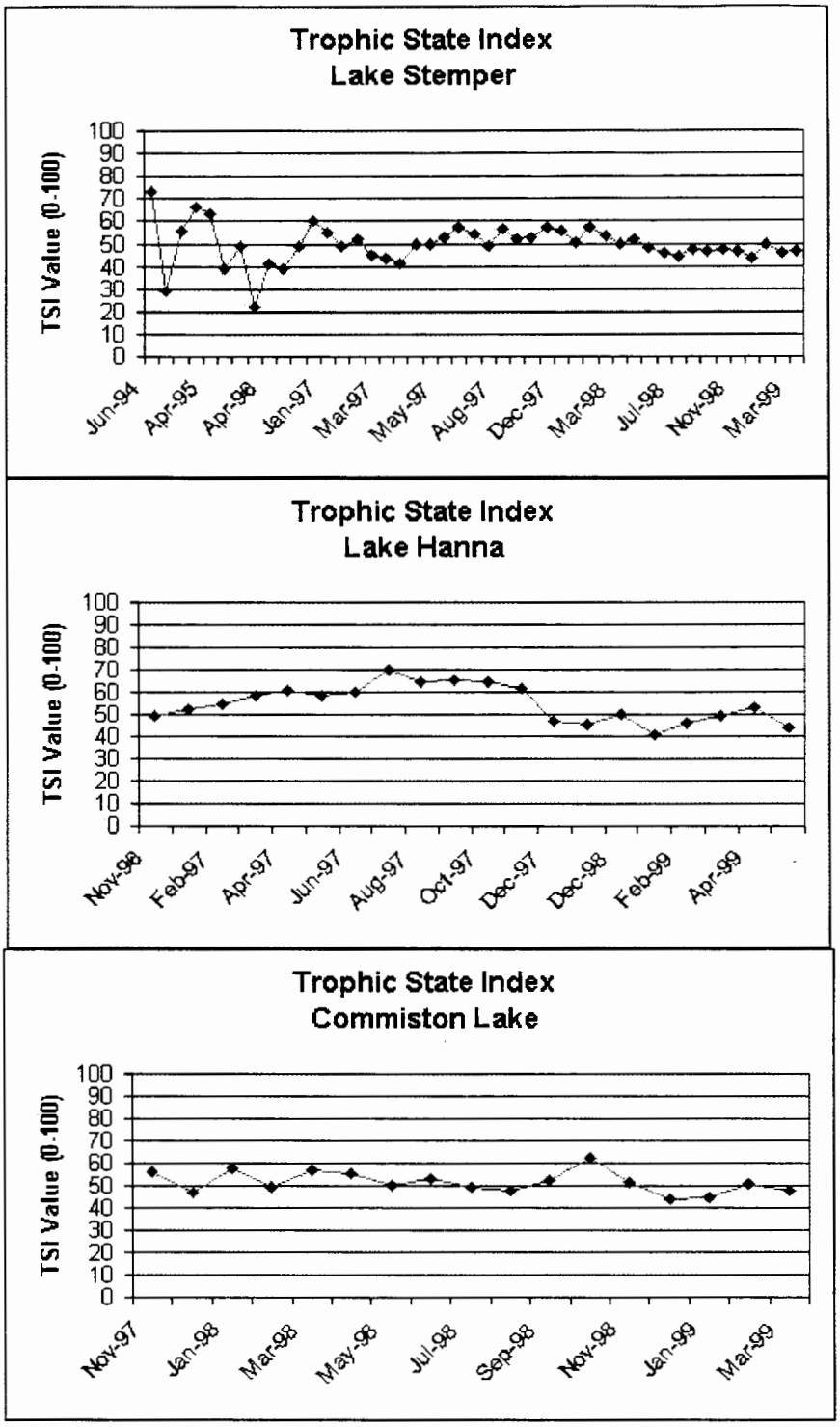
Jan-99
Jun-99

Figure 7.5


Trophic State Index
Lake Stemper
TSI Value (0-100)
100
90
80
70
60
50
40
30
20
10
0
Jun-94
Apr-95
Apr-96
Jan-97
Mar-97
May-97
Aug-97
Dec-97
Mar-98
Jul-98
Nov-98
Mar-99
Trophic State Index
Lake Hanna
TSI Value (0-100)
100
90
80
70
60
50
40
30
20
10
0
Nov-96
Feb-97
Apr-97
Jun-97
Aug-97
Oct-97
Dec-97
Dec-98
Feb-99
Apr-99
Trophic State Index
Commiston Lake
TSI Value (0-100)
100
90
80
70
60
50
40
30
20
10
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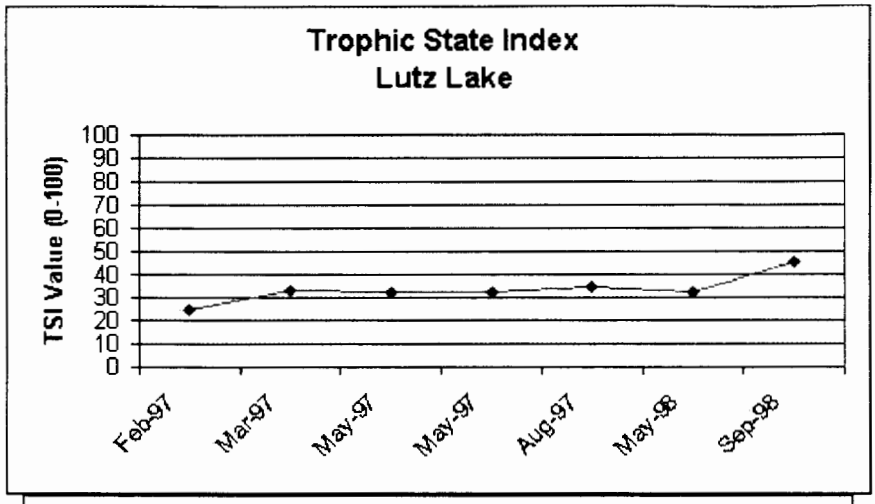
Nov-97
Jan-98
Mar-98
May-98
Jul-98
Sep-98
Nov-98
Jan-99
Mar-99

Figure 7.5


Trophic State Index
Lutz Lake
TSI Value (0-100)
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90
80
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30
20
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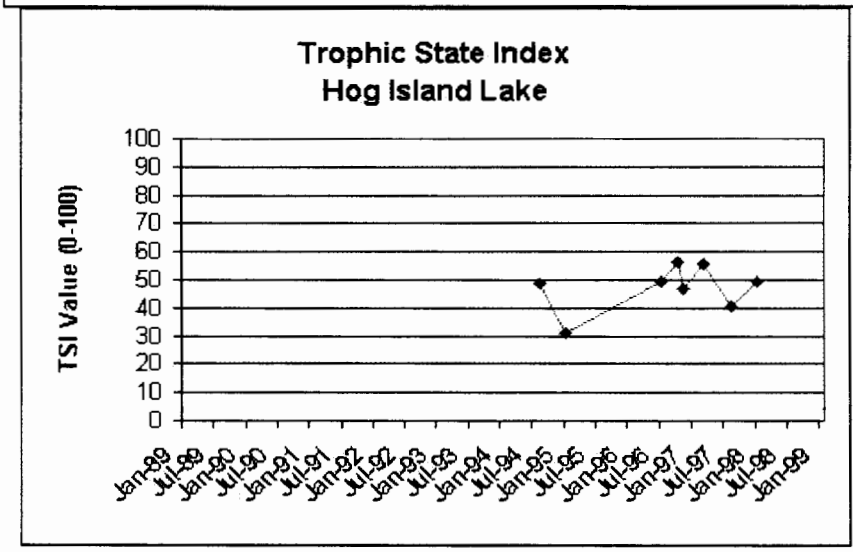
Feb-97
Mar-97
May-97
May-97
Aug-97
May-98
Sep-98


Trophic State Index
Hog Island Lake
TSI Value (0-100)
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30
20
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Jul-89
Jan-90
Jul-90
Jan-91
Jul-91
Jan-92
Jul-92
Jan-93
Jul-93
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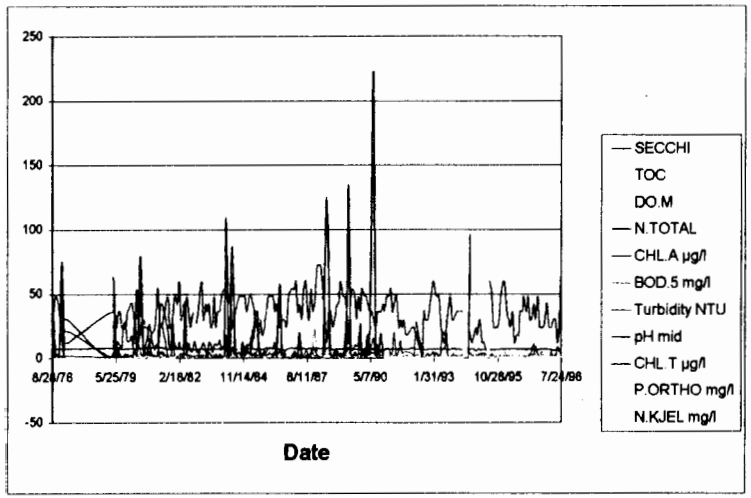
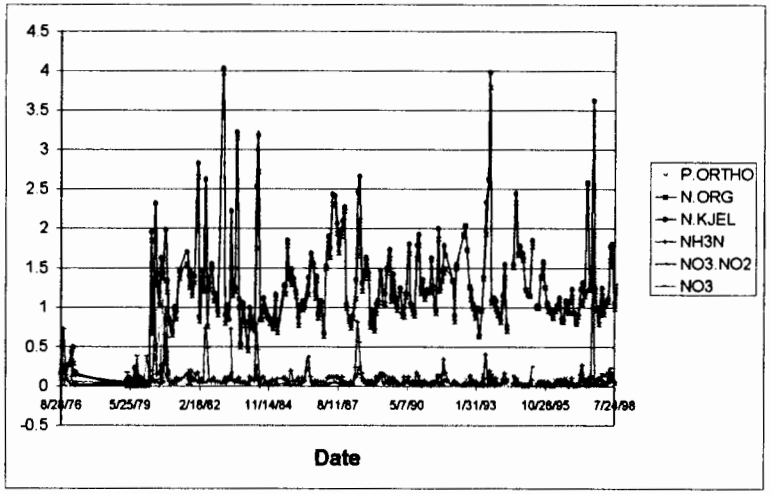
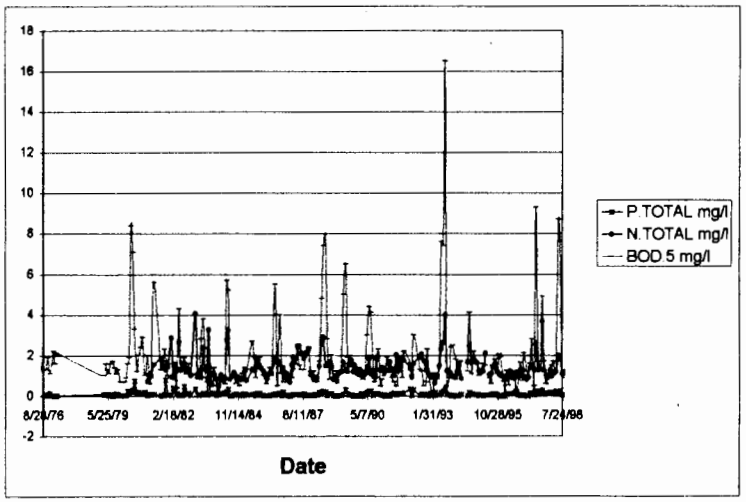
Jan-98
Jul-98
Jan-99







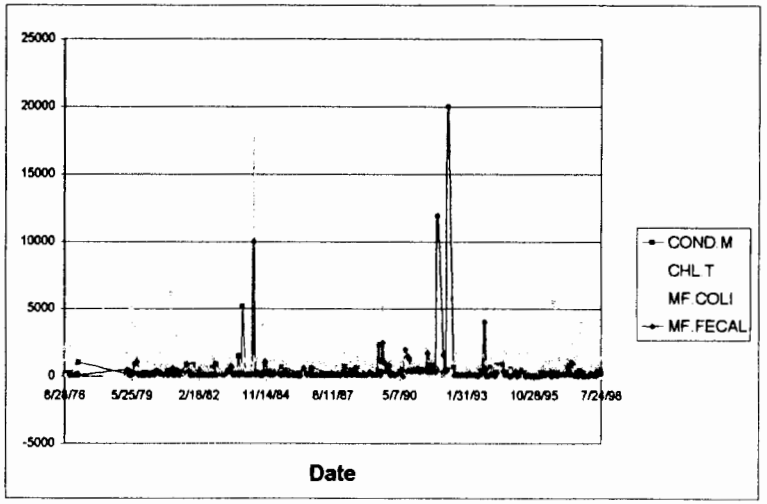
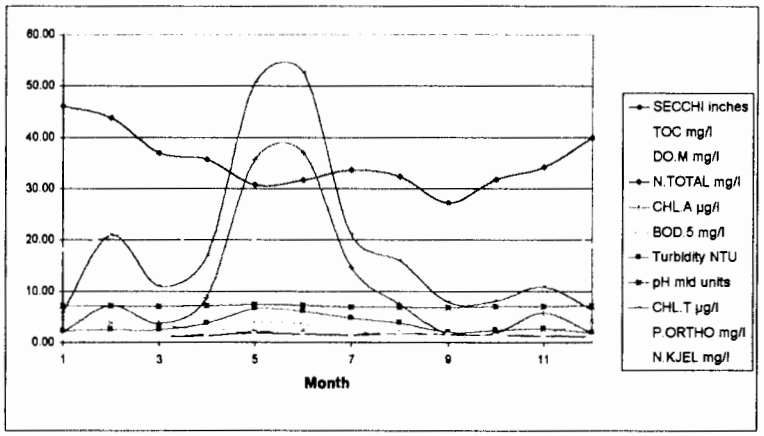
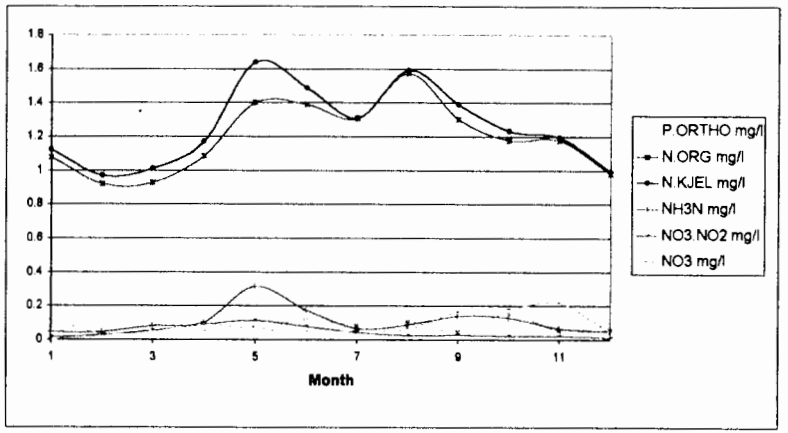
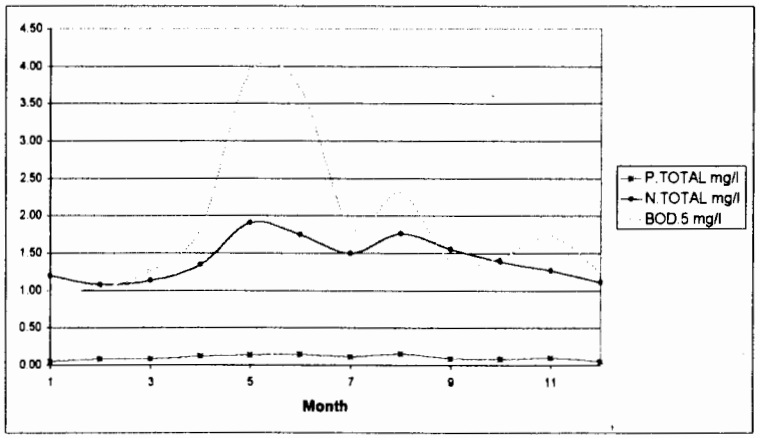


Figure 7.6 - Raw Monthly EPC Data







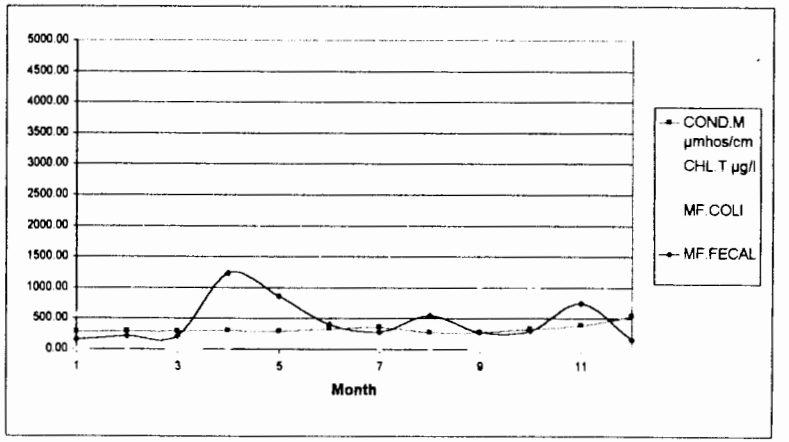


Figure 7.7 EPC Monthly Average Data

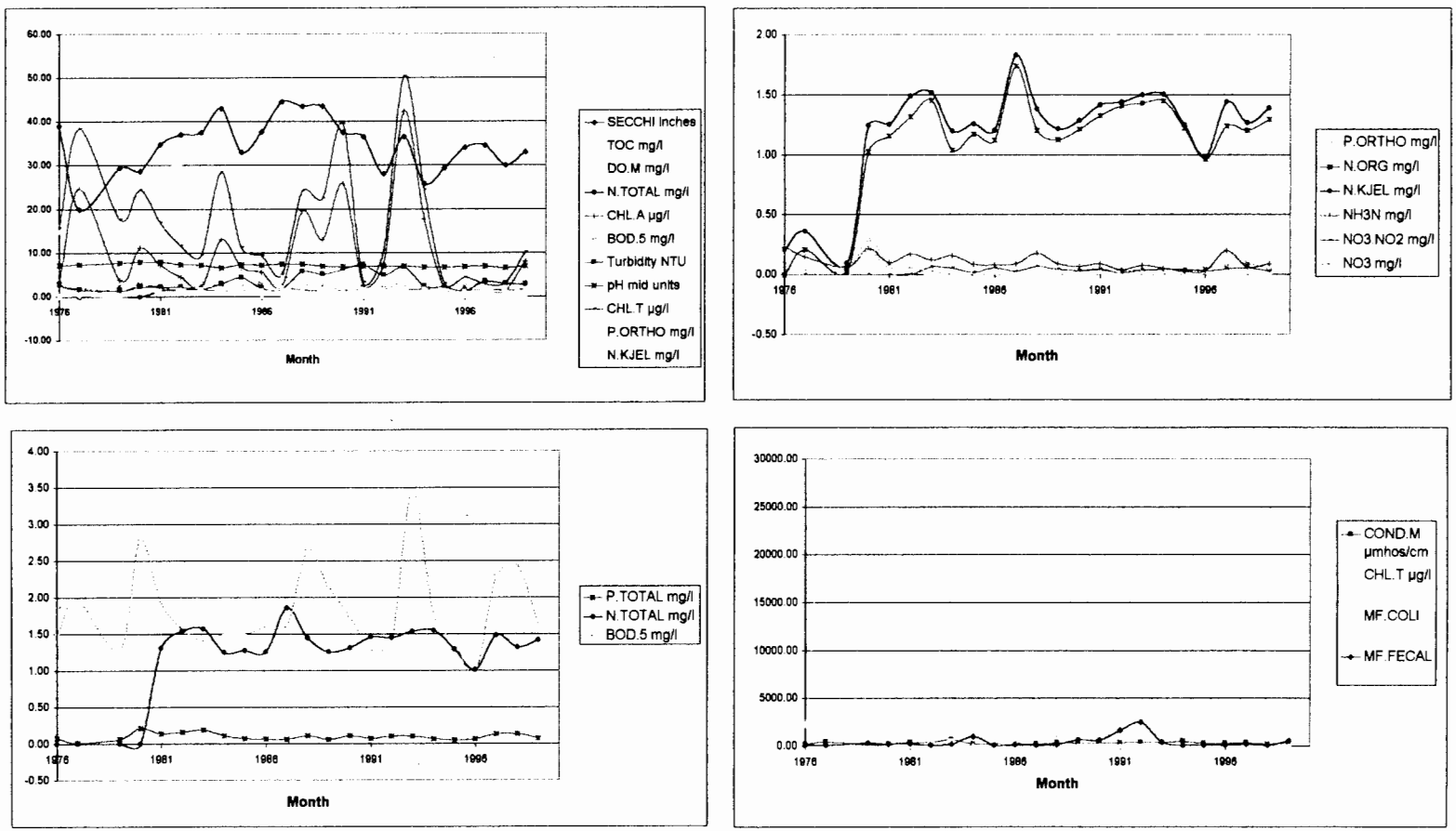


Figure 7.8 EPC Yearly Average Data

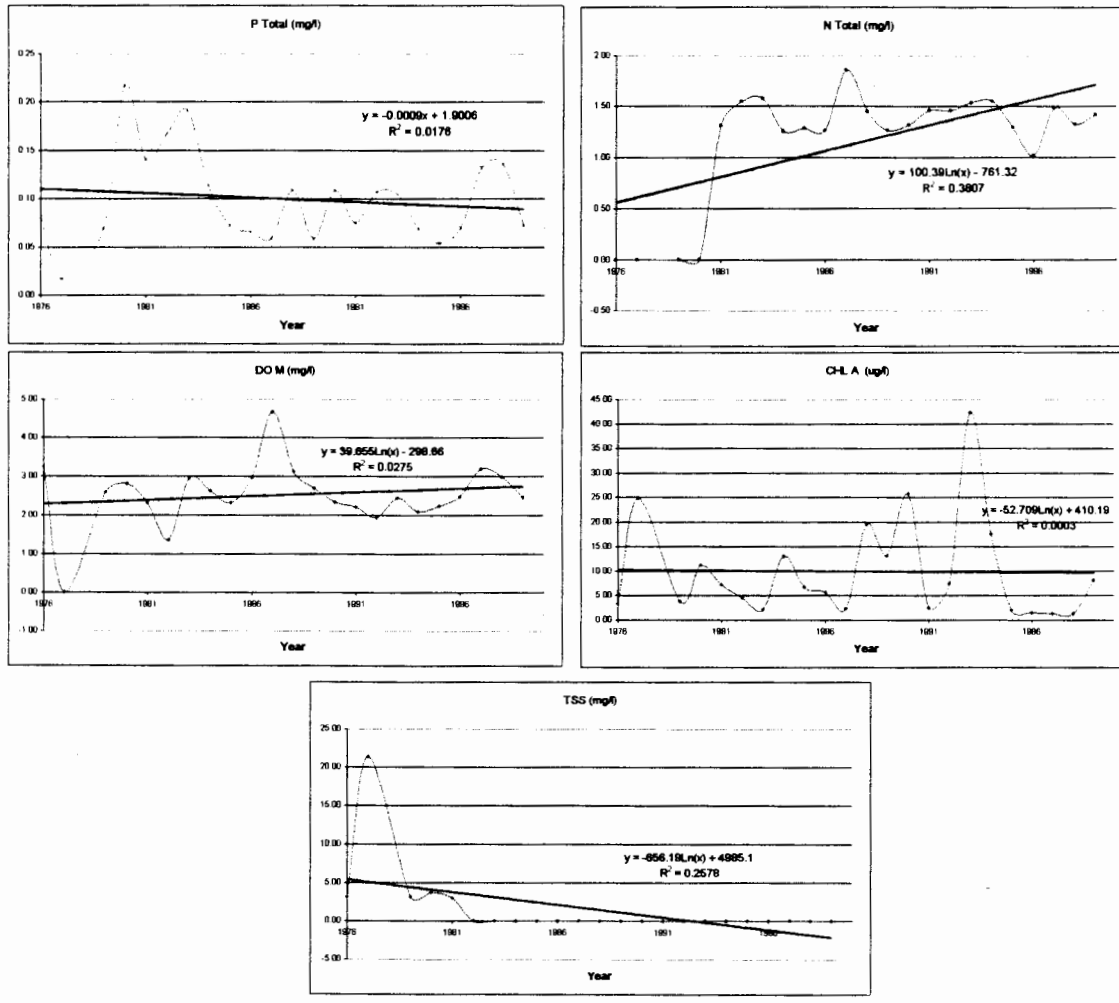


Figure 7.9 EPC Annual Data Trends

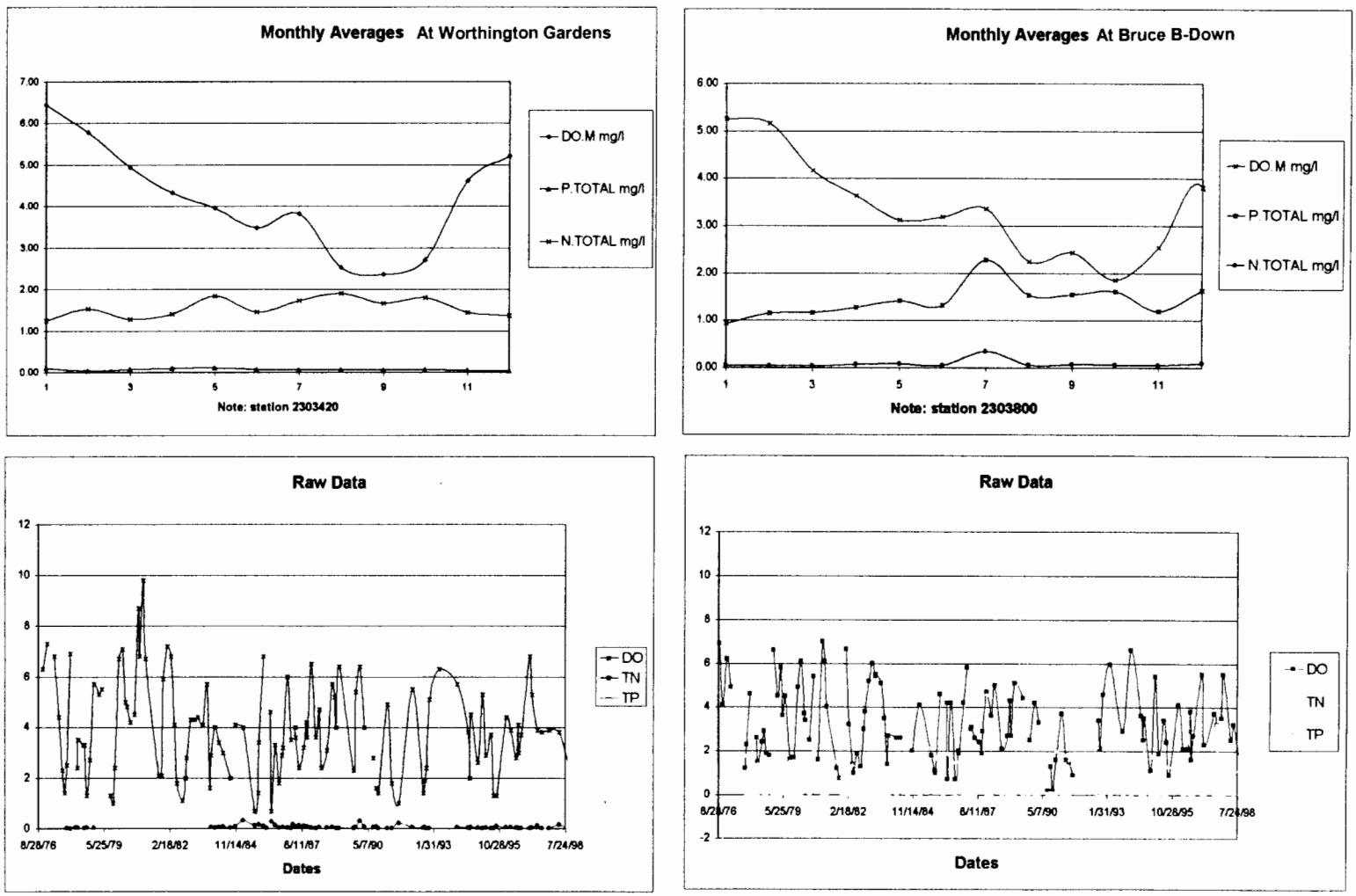
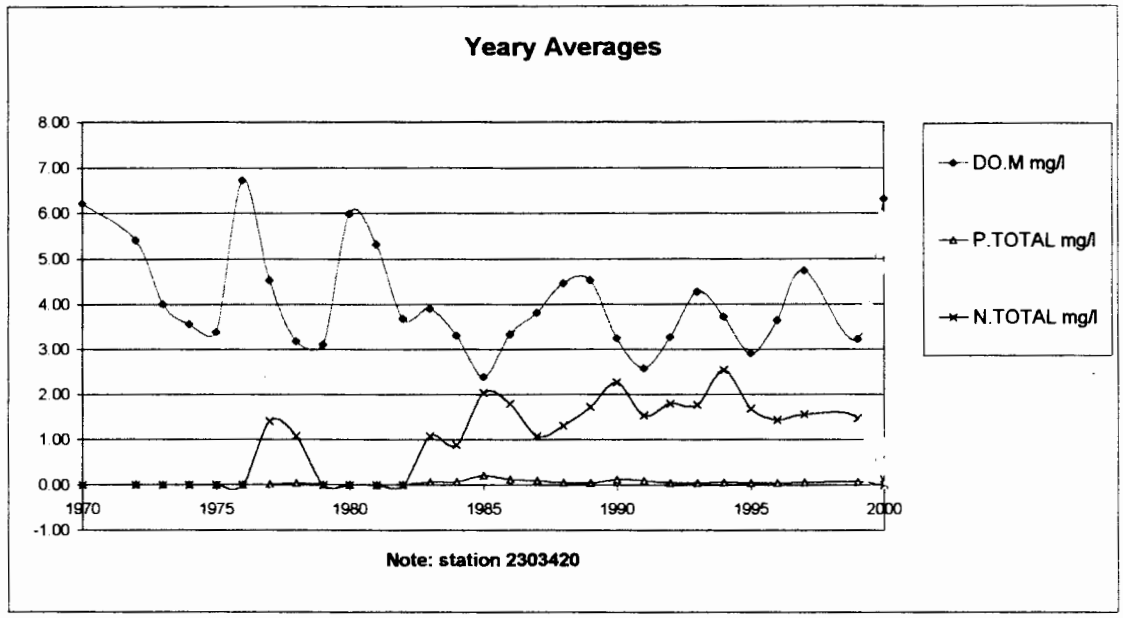


Figure 7.10 USGS Monthy Average & Raw Data



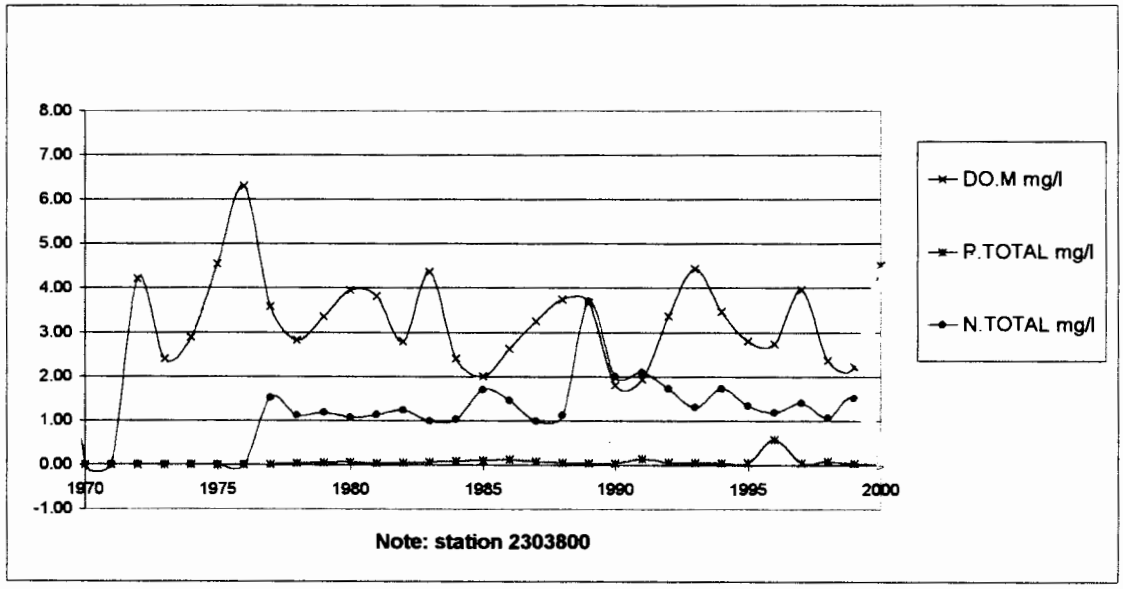


Figure 7.11USGS Annual Data

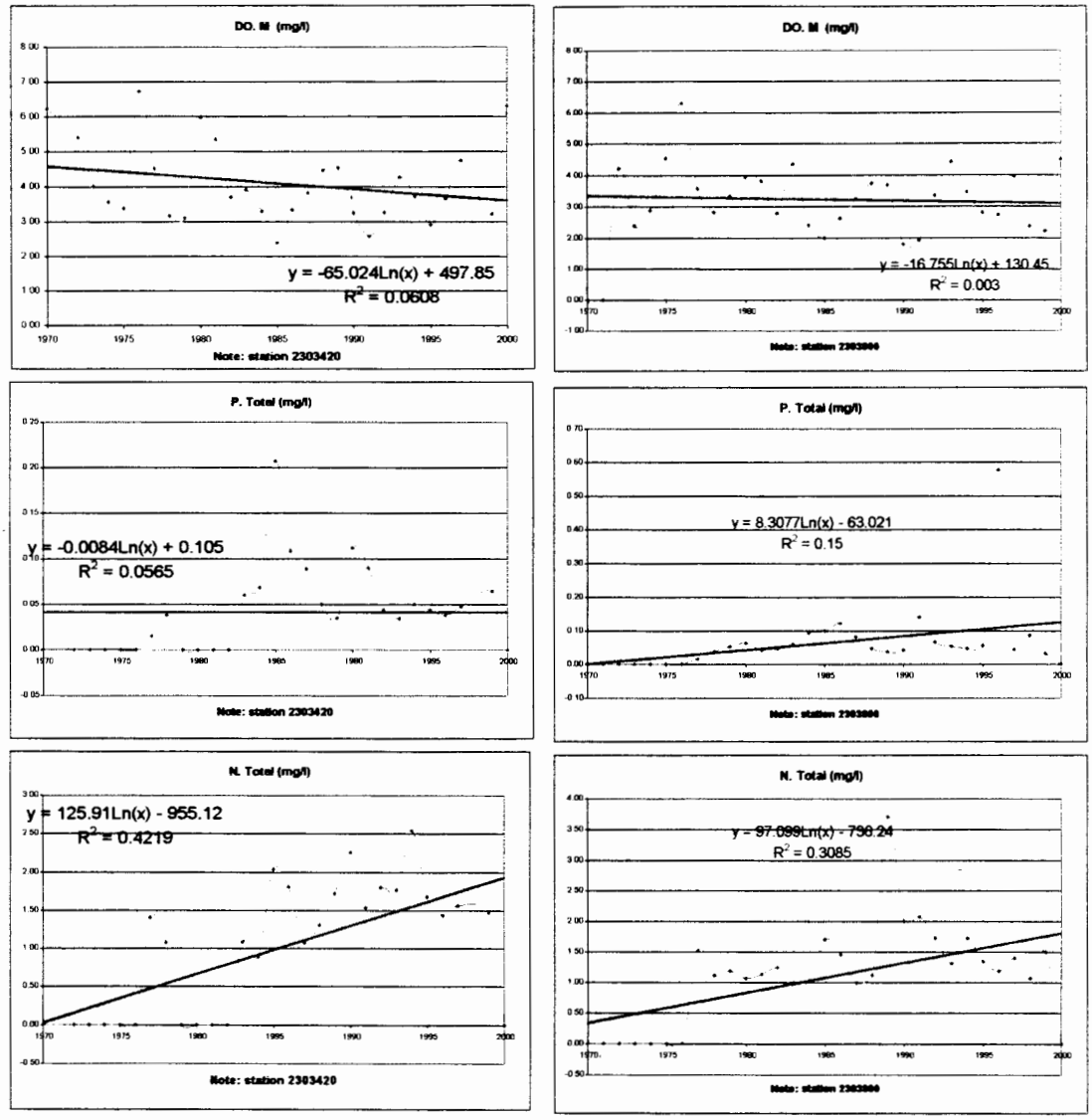
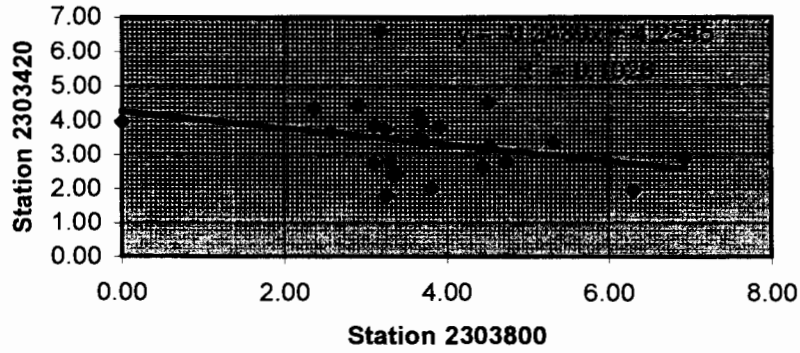
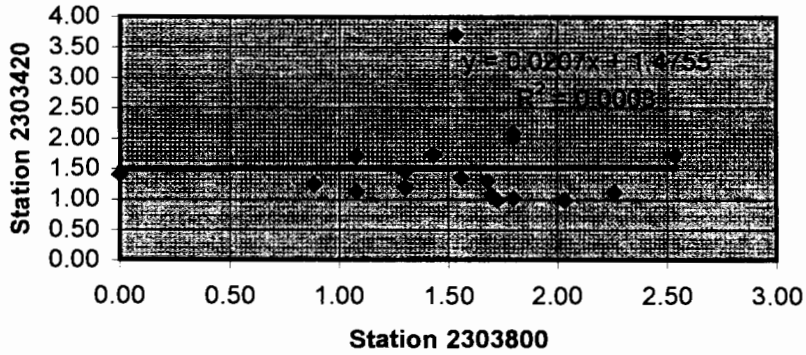


Figure 7.12 USGS Annual Data

Fig. 7.13 Linear Regression Analysis of Upstream and Downstream DO.M (mg/l)



Linear Regression Analysis of Upstream and Downstream TN (mg/l)



Linear Regression Analysis of Upstream and Downstream TP (mg/l)

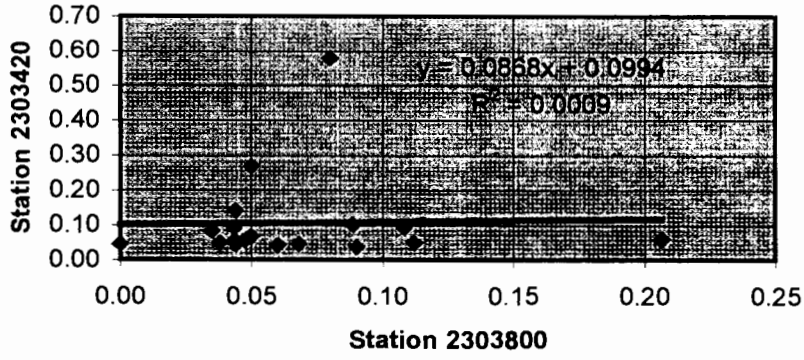
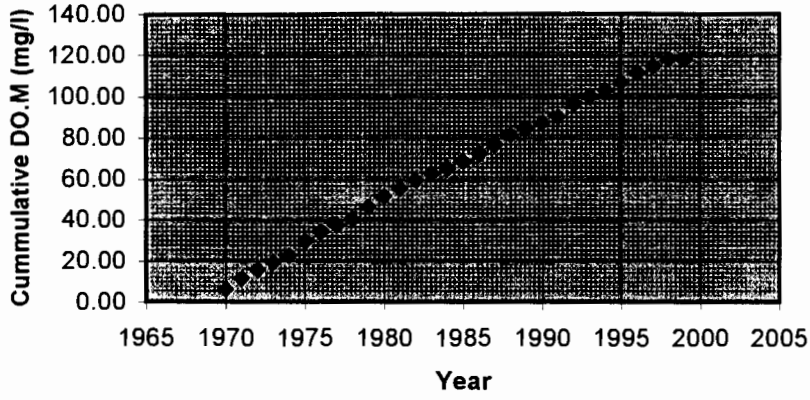
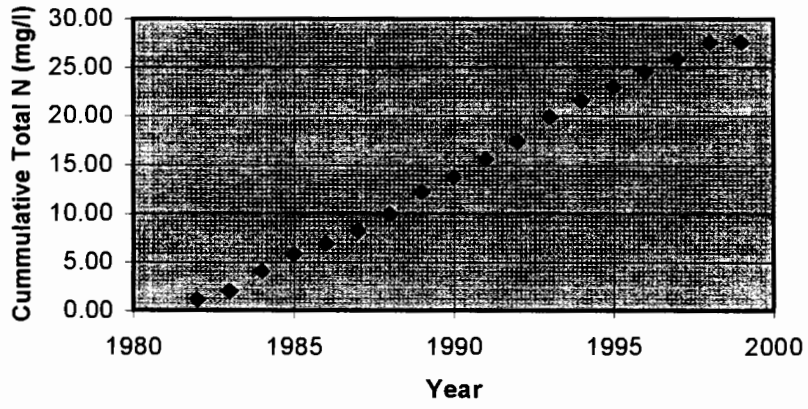


Fig. 7.14 Single Mass Curve of Station 2303420



Single Mass Curve of Station 2303420



Single Mass Curve of Station 2303420

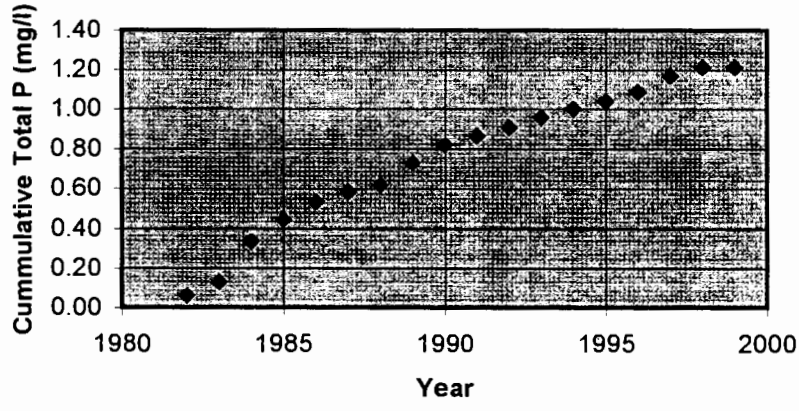
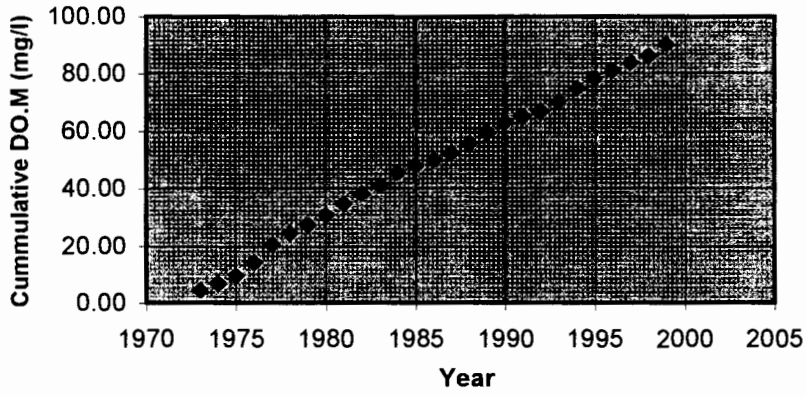
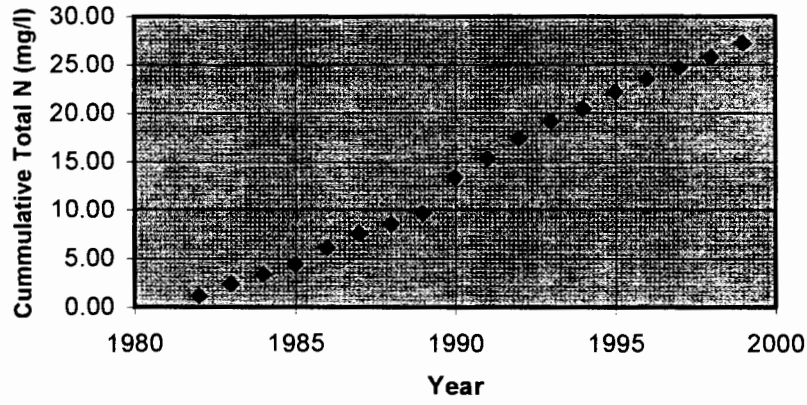


Fig. 7.14 Single Mass Curve of Station 2303800



Single Mass Curve of Station 2303800



Single Mass Curve of Station 2303420

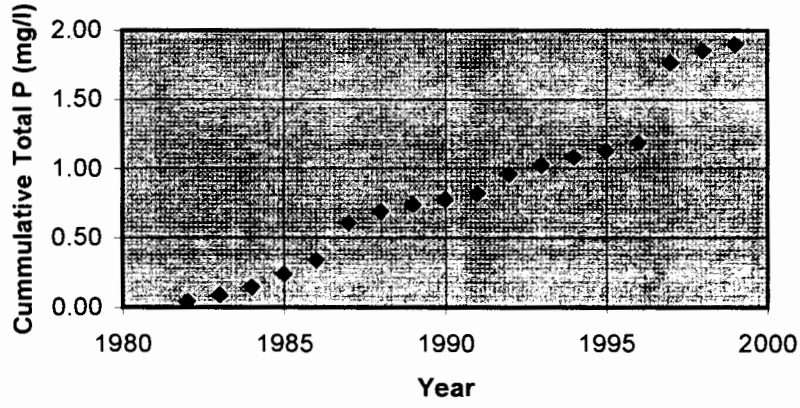
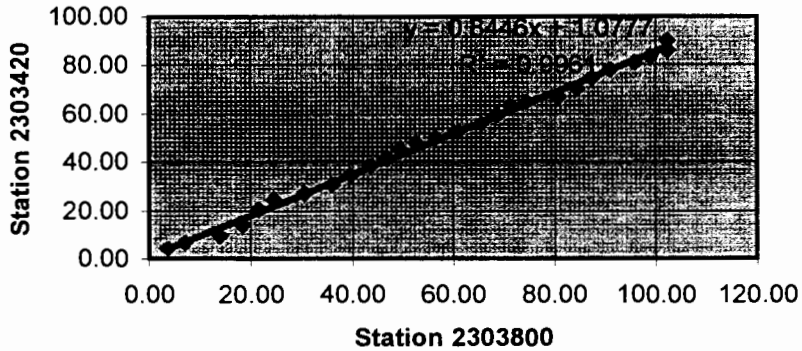
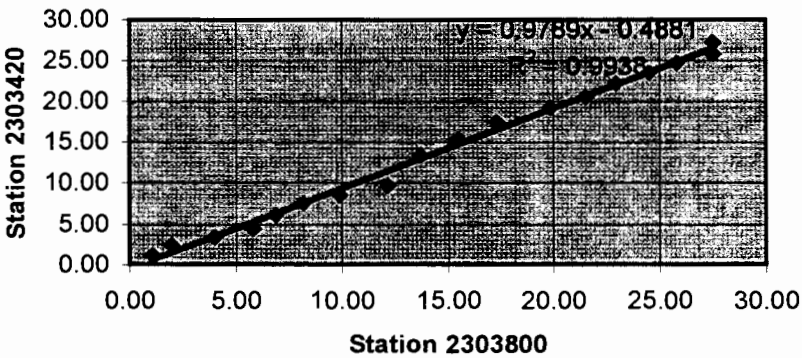


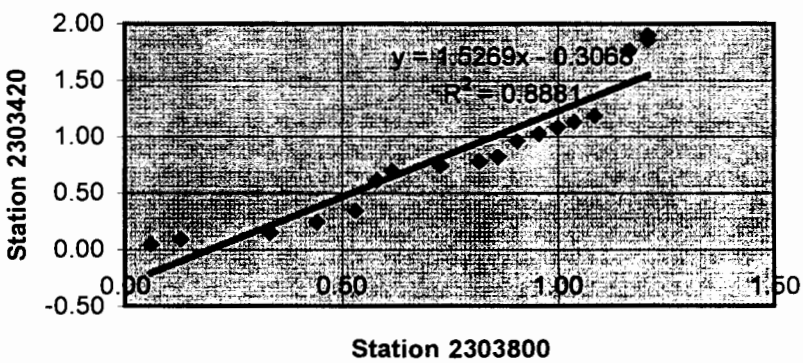
Fig. 7.15 **Linear Regression Analysis of Upstream and Downstream Cummulative DO.M (mg/l)**



Linear Regression Analysis of Upstream and Downstream Cummulative TN (mg/l)



Linear Regression Analysis of Upstream and Downstream Cummulative TP (mg/l)



APPENDIX F
Chapter Ten - Public Meeting I Information & Comments

PUBLIC MEETING 1

CYPRESS CREEK WATERSHED MANAGEMENT PLAN
February 9, 2000

Project Overview

Hillsborough County has embarked on nine major watershed management plans to determine ways to provide flood control, improve water quality and enhance natural habitats in certain designated watersheds within its jurisdiction. This involves a thorough study and understanding of each designated watershed. It also includes the development and assessment of alternatives and potential long-term management approaches to flooding and water quality maintenance. This watershed management plan will serve as an integrated management tool for solving persistent flooding problems, improving water quality and natural habitats, and providing water supply and recreational benefits throughout Hillsborough County.

One of the nine watershed management plans currently being developed by Hillsborough County with the assistance of the engineering firm, URS Greiner Woodward Clyde is for the Cypress Creek Watershed. The Cypress Creek Watershed drains an area of approximately 33 square miles or 21,000 acres in northern Hillsborough County. The total Cypress Creek Watershed including areas within Pasco and Hillsborough Counties is approximately 150 square miles. The watershed is primarily suburban, and drains into the Hillsborough River. The basin is roughly bounded on its north side by Pasco County, to its east side by I-75, along its south side by Bruce B. Downs Boulevard and on its west side by U.S. 41. Additionally, several major roads, including Livingston Avenue, Sunset Lane, Hanna Road, Debuel Road, Whitaker Road, and Sinclair Hills Road bisect the watershed. The basin is composed of 105 smaller units of sub-basins ranging in size from approximately 10 to 400 acres. The watershed includes ten conveyance outfalls that discharge east into the Cypress Creek main channel which then flows south into the Hillsborough River. Flooding in several areas of the watershed was reported during the El Niño rainfall events during late 1997 and early 1998.

To keep residents living in or around the watershed informed of the project's development, and for the County and its consultant to gain information about the area, Hillsborough County will hold public meetings for each of the project's three phases. These meetings will give stakeholders a chance to voice their concerns and offer first-hand accounts of persistent flooding or water quality problems within their area.

Public Meeting 1

Tonight's meeting, being held at the Lutz Community Center, is the public meeting for Phase 1 of the Cypress Creek Watershed Management Plan. The first phase of the watershed management plan involves extensive field work and data collection performed to gain a better understanding of the water quality and hydrology of the area. This includes an assessment of the existing water quality, natural systems and hydrology of the area. Computer models using water quality data will be developed to predict gross pollutant runoff from different areas within the watershed. Flooding within the area will also be evaluated using computer models to simulate the affects of a variety of rainfall conditions over the watershed. Public involvement in this phase of the project is particularly

important. Reliance on the residents of the area that know of flooding and water quality problems, or could more accurately describe runoff flow direction from personal experience, will ultimately result in a better overall product for the County.

Public Meeting 2

The second phase of the watershed management plan involves the development and analysis of alternative water management practices. Alternatives, both structural and non-structural, are to be developed to deal with flooding and water quality problems and water supply concerns within the area. At the beginning of this phase, possible alternatives will be presented at a second public meeting to assist the County in the selection and identification of preferred alternatives. Stakeholder input into the prioritization of these alternatives is vital.

Public Meeting 3

Based on economic analysis, technical review, political considerations, and public input, recommendations for achieving cost-effective flood control and water quality objectives are to be developed for the final stage of the watershed management plan. These recommendations will be presented in a third and final public meeting where stakeholders will have another opportunity to voice their concerns and critique the work product. Based on the results of this public meeting, a final list of recommended projects will be incorporated into the watershed plan.

Project Website

To keep track of progress and developments with the management plan, a web site has been established. This site can be viewed by logging onto http://www.cypress-creek.org. For additional information, contact the Hillsborough County Project Manager Horatio Droc, P.E., at (813) 272-5912, or Robert Johnson, of URS Greiner Woodward Clyde at (813) 286-1711 ext. 5276. Hillsborough County Commission District 2, Mr. Jim Norman County Commissioner.

Project Schedule

Task Name	Completion Date
Project Kick-off	June 1999
1st Milestone Report	December 1999
Public Meeting 1	February 2000
2nd Milestone Report	March 2000
Public Meeting 2	May 2000
3rd Milestone Report	June 2000
Public Meeting 3	July 2000
4th Milestone Report	August 2000
Final Report	September 2000

CYPRESS CREEK WATERSHED MANAGEMENT PLAN
PUBLIC COMMENT SHEET

Date: Wednesday, February 9, 2000

Do you want to receive information on the remaining meetings? ☐ **Yes** ☐ **No**

Name: _____

Address: _____

Telephone: _____ Fax: _____ Email: _____

Comments: _____

_____

_____

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Do your comments continue on the back of this sheet? ☐ **Yes** ☐ **No**

Your comments are important to this Hillsborough County project. All written comments will be summarized and included in the Watershed Management Plan document.

Please complete the comment sheet and place it in the box provided at the meeting, or

Mail your comments to: Robert Johnson, P.E.
URS Greiner Woodward Clyde
7650 W. Courtney Campbell Causeway
Tampa, FL 33607

Fax your comments to: Robert Johnson at (813) 286-6587

Email your comments, in a format similar to this form to: robert_johnson@urscorp.com or Submit comments on-line at http://www.cypress-creek.org under "Public Comment."

CYPRESS CREEK WATERSHED MANAGEMENT PLAN
PUBLIC MEETING 1
FEBRUARY 9, 2000

	NAME	ADDRESS	CITY/STATE/ZIP
1	JAY & BARBARA MUFFLY	102 5TH AVE S.E.	LUTZ, FL 33549
2	MICHAEL DUNN	TAMPA TRIBUNE	
3	JEFFREY L. NY	PASCO ES	
4	Rod Kramer	421 E County Rd	Lutz FL 33549
5	Dan Pistrom	Hills. County STORMWATER	
6	Bill Coats (St. Pete Times)	16808 Windsor Park Drive	Lutz, FL 33549
7	SRI RAO	EAS 18525 Hanwood	Tampa, FL 33647
8	Bob NELSON	19113 CROOKED LN	LUTZ 33549
9			
10			
11			
12			
13			
14			
15			

CYPRESS CREEK WATERSHED MANAGEMENT PLAN
PUBLIC MEETING-1
FEBRUARY 9, 2000

	NAME	ADDRESS	CITY/STATE/ZIP
1	Yoav RAPPAPORT	10016 Bridgeton Dr.	Tampa, FL 33626
2	BRAD NAFFZIGER	423 E. County Line Road	LUTZ, FL 33549
3	Roger Burnette	403 E. county Line Rd	Lutz, Fl. 33549
4	ALAN DE GUZMAN	11801 N. 50th ST. #A-21	TAMPA, FL 33617
5	John & Jan Means	1721 Neuberger Rd	Lutz, FL 33549
6	[illegible]	19905 Long Leaf Dr.	Lutz FL 33549
7	[illegible]	14937 Lake Forest Ave	LUTZ, FL 33549
8	[illegible]	17823 Hickory Moss Pl.	TAMPA 33647
9	[illegible]	5501 W. Waters Ave.	Tampa – Carrollwood News
10	CARLOS A. FERNANDES	4255 W HUMPHREY ST.	TAMPA - 33614
11	Sherri ACKERMAN	5401 W. Waters	TAMPA Tribune.
12	CINDY NAGY	NEIGHBORHOOD NEWS, 14611 BOB AL JR TAMPA 33647	TAMPA, FL 33647
13			
14			
15			

February 6, 2000

County Line Coalition, Inc.
PO Box 1732
Lutz, FL 33548 - 1732
Phone/Fax 949 - 6398 ~ e - mail ~ Aldan@gte.net

Gaye M. Townsend
19905 Long Leaf Drive
Lutz, FL 33549

Cypress Creek Watershed Management Plan

Comments:

Design culverts under county and state roads to facilitate movements of both water and wildlife, retrofitting exciting culverts that do neither.

Survey all culverts to address the above.

Public work projects should be coordinated with this management plan to avoid ditching, diking, damming and flooding. Planning and Growth Management and the Planning Commission should use this plan when reviewing zoning and land use changes. Purpose to review the effects of development to the corridor and future land use. Encourage development in a holistic manner to coordinate the link between water and growth.

Preserve, restore and maintain all water courses IE. riverines to assure sustainable water ~~quality~~ quanity and quality to lakes and wetland. This will benefit the Cypress Creek and the Hillsborough River as well. Riverine and flow thru systems are the life link to the lakes, they cleanses, nourish and are the beginning of life for many species.. They should also implement education as there is a lack of understanding to the importance of these systems.

Inclusion of the public and other county agencies in emergency storm water management procedures. That has been a huge problem in this area.

Encourage aquifer storage and recovery to re hydrate isolated lakes and wetlands.

We are very concerned about M.~~F~~Ls do to the rule change culverts or alterations to the lakes can have an adverse impact to the level that is set.

Give incentives to property owners and developers to maintain setbacks, use native plants, xeroscape, and discourage pesticides and fertilizers.

Spread of invasive plant exotic plants, particularly skunk vine, cogongrass, Brazilian pepper, and Melaleuca. Eradication of existing infestation. Replace with native plants assuring a native habitat.
Catail 5
Survey existing wildlife and corridors. Native habitat restoration of altered area adjacent to or in the Cypress Creek Corridor and the entire watershed.

Acquisition and protection of critical property for preservation.

Watershed Management is paramount to offset the depletion of the aquifer do to over pumping of the well fields and the pressure of development.

Identify all riverine and flow thru systems.

Hog Island Lake is a top priority. The basin is locked! This is not healthy for the lake or the residents. We want this lake to function as naturally as possible. NO DITCHING OR DIKING!!!!

Use the 1930 aerials to establish historic flow and when possible restore.

Look for more comments from us.

Thank you,

Gaye M. Townsend

Gaye M. Townsend, President

CYPRESS CREEK WATERSHED MANAGEMENT PLAN
PUBLIC COMMENT SHEET

Date: Wednesday, February 9, 2000

Do you want to receive information on the remaining meetings? ☑ Yes ☐ No

Name: JAY MUFFLY

Address: 102 5th Ave SE Lutz, FL 33549

Telephone: 813-949-2224 Fax: _____ Email: _____

Comments: Last 4yrs quality of water at our home has deteriorated, at times water runs black for hrs, the EPC, have promised testing have yet to show up after numerous calls to have checked. Along with my mother-in-laws next dr with same problem at 108 5th Ave S.E. Water quality deteriorated after pumping marsh land of US 41.

Hwy Needs to learn how water flows

Do your comments continue on the back of this sheet? ☐ Yes ☐ No

Your comments are important to this Hillsborough County project. All written comments will be summarized and included in the Watershed Management Plan document.

Please complete the comment sheet and place it in the box provided at the meeting, or

Mail your comments to: Robert Johnson, P.E.
URS Greiner Woodward Clyde
7650 W. Courtney Campbell Causeway
Tampa, FL 33607

Fax your comments to: Robert Johnson at (813) 286-6587

Email your comments, in a format similar to this form to: robert_johnson@urscorp.com or Submit comments on-line at http://www.cypress-creek.org under "Public Comment."

CYPRESS CREEK WATERSHED MANAGEMENT PLAN
PUBLIC COMMENT SHEET

Date: Wednesday, February 9, 2000

Do you want to receive information on the remaining meetings? ☑ Yes ☐ No

Name: JEFF & JAN MEANS

Address: 1721 NEWBERGER Rd

Telephone: 813-949-0185 Fax: 948-2305 Email: _____

Comments:

Thank you for taking time to listen to our concerns.

We feel that uncontrolled and "irresponsible" growth poses a threat to Water quality & quantity, destroys wildlife habitat and creates the possibility of flooding. Places that were under water during EL Nino should not be developed as the displaced water will Flood somewhere else as the rains come. As new development occurs, The new property is built up & Runoff goes towards existing homes - Serious problem.

Do your comments continue on the back of this sheet? ☒ Yes ☐ No

Your comments are important to this Hillsborough County project. All written comments will be summarized and included in the Watershed Management Plan document.

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Email your comments, in a format similar to this form to: robert_johnson@urscorp.com or Submit comments on-line at http://www.cypress-creek.org under "Public Comment."

(2)

· The East-West Road as proposed will channel water & reduce the purifying effect of a wetland habitat. The Logic? - Build a road that people want to use & the development multiplies exponentially. Both commercial & residential will be promoted by this road so do not have it in a environmentally sensitive area!!! Keep working on cleaning the culverts & drainage ditches as this is a valuable lesson Learned From EL Niño.

Thanks JEFF & Jan Means

"Mike Olsen" <molsen@tampabay.rr.com> on 02/23/2000 10:12:19 AM

To: Robert Johnson/Tampa@URSGreiner
cc:

Subject: Sinclair Hills/Curry Cove flooding

My wife and I have a little three acre farm on the east side of the Curry Cove neighborhood, (west of Livingston). Between Livingston and our farm on Darnell Road is what I think is an old borrow pit area from when they built I275. I think that this is now an ELAP area, (per Commissioner Platt). A year ago when Tampa had the big rains which flooded parts of the neighborhood along Sinclair Hills, (to our south), the county brought tank trucks of water from Sinclair Hills and pumped water into a little lake which borders Curry Road. As the lake filled, it spilled over into the, (sometimes), wetlands behind our property and finally over into our pond and up into our pasture. I think that the reason the trucks had to pump the water and deliver it was because the natural flow through the Violet Curry Nature Preserve did not work correctly. Has anyone considered a plan to expand the old borrow pit in the ELAP area. An expansion of wetlands in this ELAP area could capture and hold the excess water. Flood waters could be directed away from the Sinclair Hills area through the Violet Curry Nature Preserve, through the culvert under Curry Road and into the lake and wet lands. Judging by the size of the oak trees killed by the flooding, the area behind our property has not seen flooding in many ,many years. Now, as we look east from our property into the ELAP area, it looks like 100's of dead oak trees which were forced to remain under water for a period of months. An expansion of the wetlands could help the flooding problem, divert the water back into the ground, and possibly reduce a fire hazard with the removal of all of the dead oak trees that were killed by last year's flooding. I'm the volunteer President of Keep Hillsborough County Beautiful, so we could even get some people together to replant wetland shrubs.

The Carrollwood News printed your E-mail, so you are probably getting dozens of comments. I'll cut mine short, but if you want more info, or want to see the property, e-mail me or give me a call.

Mike Olsen (home) 632-0300
(work) 931-1010
(cel) 417-7077

Thanks - Mike

Horatiu Droc <DrocH@hillsboroughcounty.org> on 01/21/2000 10:18:51 AM

To: Ming Lee/Tampa@URSGreiner, Robert Johnson/Tampa@URSGreiner
cc:

Subject: Hog Island Lake -Forwarded

Received: from hillsboroughcounty.org ([207.156.7.30]) by Groupwise (GroupWise SMTP/MIME daemon 4.1 v3) ; Thu, 20 Jan 00 16:38:20 EST
Received: from smtppop3.gte.net by hillsboroughcounty.org (SMI-8.6/SMI-SVR4) id QAA02054; Thu, 20 Jan 2000 16:39:48 -0500
Received: from eoltown (1Cust37.tnt1.tampa.fl.da.uu.net [63.23.184.37]) by smtppop3.gte.net with SMTP for <Droch@hillsboroughcounty.org>; id PAA31066166 Thu, 20 Jan 2000 15:37:25 -0600 (CST)
Message-ID: <000201bf63a9$8ecd3820$25b8173f@eoltown>
X-Priority: 3
X-MSMail-Priority: Normal
X-Mailer: Microsoft Outlook Express 4.72.3110.1
X-MimeOLE: Produced By Microsoft MimeOLE V4.72.3110.3
Date: Thu, 20 Jan 2000 19:48:36 -0500
From: "Gaye M. Townsend" <eoltown@gte.net>
To: DrocH@HillsboroughCounty.ORG
Subject: Hog Island Lake
Mime-Version: 1.0
Content-Type: multipart/mixed; boundary="=_530AEEF3.D9B8D0E9"

County Line Coalition, Inc
PO Box 1732
Lutz, FL 33548 - 1732

Gaye M. Townsend
19905 Long Leaf Drive
Lutz, FL 33549

Pnone/Fax (813) 949 -6398 e - mail eoltown@gte.net

Dear Mr. Droc,

Per our conversation this A.M. The CLC has been involved with the cotinuous problems with Hog Island Lake as follows: flooding, the basin is locked the lake does not have the ability to discharge thru the natural outfall do to the fact the basin is locked. The issues are documented with Hillsborough, Pasco County's, Environmental Protection Commission and Southwest Florida Water Management District all whom we have been involved with.

We look forward to cooperatively working with you and Greiner Engineering, on the Cypress Creek Watershed Study.

I will inform the residents who and what your purpose is, and they will be pleased to assist in your efforts.

We look forward to your presentation at The Lutz Community Center ~ February 8, 2000 ~ 6:30 PM

Please e - mail HTML for the study.

Thank you,

Gaye M. Townsend, President

C10000382.00
Public Meeting File

From: laura.delise@dep.state.fl.us <laura.delise@dep.state.fl.us>
To: ursg@mindspring.com <ursg@mindspring.com>
Date: Wednesday, February 02, 2000 10:38 AM
Subject: Cypress Creek Comments

Lastname: DeLise
Name: Laura
Phone: 813-744-6100 ext 479
Street: 3804 Coconut palm Drive
City: Tampa
state: FL
zip: 33619
comments: Please include me on your mailing and meial list for upcoming meetings. I worl with the Hillsborough River Greenways Task Force and know that our participants are very interested. Thank you.

From: wthing@gte.net <wthing@gte.net>
To: ursg@mindspring.com <ursg@mindspring.com>
Date: Monday, January 31, 2000 1:37 PM
Subject: Cypress Creek Comments

Lastname: Williams
Name: Judy A.
Phone: (813) 949-0321
Street: 1710 Daiquiri Lane
City: Lutz
state: FL
zip: 33549
comments: I am so glad that Hillsborough County is doing this study. I only wish that Pasco County could be even a fraction as aware as you are of the importance of watershed management and the fact that it crosses county lines. I am a Pasco resident, a water activist and very aware of the fact pollution and water flow problems which begin in Pasco in up being problems for Hillsborough County, and, eventually, the city of Tampa's drinking water supply. I believe a regional perspective is needed to solve all of our water problems and your project is an excellent beginning. Please let me know how I can assist you. I live within this watershed and am aware of several types of problems on the Pasco side which no one seems to be able to help solve.

Robert Johnson
01/20/2000 03:48 PM

To: rvmclean@prodigy.net
cc: horatiu droc

Subject: Response to Cypress Creek 1-18-00 E-mail

Thank you for your recent E-mail. The Cypress Creek public meeting will be on February 9, 200 at the Lutz Community Center from 6:30 to 8:30 PM.

We have coordinated with Pasco County concerning our study. However, our study is being funded by Hillsborough County and the study focus is the portion of the Cypress Creek watershed within Hillsborough County. We will continue to coordinate with Pasco County and SWFWMD as the project progresses but cannot comment on funding for improvements on their behalf.

In general, the watershed which drains into Hillsborough County extends north of SR 54 between US 41 and Collier Parkway. The Cypress Creek main channel also extends into Pasco County in the general vicinity of I-75 north of the Hillsborough/Pasco County Line. We will have more detailed maps at the public meeting which you can review. Please let me know if you have any other questions.

APPENDIX G
Chapter Eleven Tables & Figures

APPENDIX G

CHAPTER 11 - TABLES AND FIGURES

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TABLE 11-2 RUNOFF COEFFICIENTS BY LAND USE CATEGORY AND SOIL TYPE
TABLE 11-3 EMC VALUES BY PARAMETER FOR LAND USE CATEGORIES UNDER EXISTING CONDITIONS
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TABLE 11-1RAINFALL DATA

Month	Northwest Hillsborough Basin (inches)	Hillsborough River Basin (inches)	Average (inches)
January	2.34	2.53	
February	2.93	3.06	
March	3.48	3.76	
April	2.32	2.58	
May	3.20	3.82	
June	6.58	7.52	
July	8.24	8.22	
August	8.57	8.20	
September	6.61	6.91	
October	2.83	2.96	
November	1.75	1.92	
December	2.28	2.37	
Total (inches)	51.13	53.85	52.49
Wet Season (May - Sept)	33.2	34.67	33.94
Dry Season (Oct - April)	17.93	19.18	18.56

Source: SWFWMD Monthly Hydologic Conditions Report, 2000

Table 11-2

Runoff Coefficients by Land Use Category and Soil Type

Stormwater Pollutant Loading and Removal Model

Hillsborough County Public Works / Stormwater Management

1100	Low/Medium Density Residential	A	0.267
1100	Low/Medium Density Residential	B/D	0.322
1100	Low/Medium Density Residential	C	0.379
1100	Low/Medium Density Residential	D	0.430
1200	Low/Medium Density Residential	A	0.267
1200	Low/Medium Density Residential	B/D	0.322
1200	Low/Medium Density Residential	C	0.379
1200	Low/Medium Density Residential	D	0.430
1300	High Density Residential	A	0.500
1300	High Density Residential	B/D	0.566
1300	High Density Residential	C	0.634
1300	High Density Residential	D	0.700
1460	Light Industrial	A	0.500
1460	Light Industrial	B/D	0.599
1460	Light Industrial	C	0.701
1460	Light Industrial	D	0.800
1500	Light Industrial	A	0.500
1500	Light Industrial	B/D	0.599
1500	Light Industrial	C	0.701
1500	Light Industrial	D	0.800
2000	Agricultural	A	0.150
2000	Agricultural	B/D	0.233
2000	Agricultural	C	0.318
2000	Agricultural	D	0.400
1430	Commercial	A	0.450
1430	Commercial	B/D	0.549
1430	Commercial	C	0.651
1430	Commercial	D	0.750
1440	Commercial	A	0.450
1440	Commercial	B/D	0.549
1440	Commercial	C	0.651
1440	Commercial	D	0.750
1450	Commercial	A	0.450
1450	Commercial	B/D	0.549
1450	Commercial	C	0.651
1450	Commercial	D	0.750
1410	Commercial	A	0.450
1410	Commercial	B/D	0.549
1410	Commercial	C	0.651
1410	Commercial	D	0.750
1420	Commercial	A	0.450
1420	Commercial	B/D	0.549
1420	Commercial	C	0.651
1420	Commercial	D	0.750
8000	Highway/Utility	A	0.500
8000	Highway/Utility	B/D	0.599
8000	Highway/Utility	C	0.701
8000	Highway/Utility	D	0.800

Table 11-2

Runoff Coefficients by Land Use Category and Soil Type

Stormwater Pollutant Loading and Removal Model

Hillsborough County Public Works / Stormwater Management

1800	Recreational	A	0.100
1800	Recreational	B/D	0.166
1800	Recreational	C	0.234
1800	Recreational	D	0.300
1900	Open Land	A	0.100
1900	Open Land	B/D	0.166
1900	Open Land	C	0.234
1900	Open Land	D	0.300
1600	Extractive (Mining)/Disturbed	A	0.050
1600	Extractive (Mining)/Disturbed	B/D	0.050
1600	Extractive (Mining)/Disturbed	C	0.050
1600	Extractive (Mining)/Disturbed	D	0.050
7400	Extractive (Mining)/Disturbed	A	0.050
7400	Extractive (Mining)/Disturbed	B/D	0.050
7400	Extractive (Mining)/Disturbed	C	0.050
7400	Extractive (Mining)/Disturbed	D	0.050
4000	Upland Forest	A	0.050
4000	Upland Forest	B/D	0.050
4000	Upland Forest	C	0.050
4000	Upland Forest	D	0.050
5000	Water	A	1.000
5000	Water	B/D	1.000
5000	Water	C	1.000
5000	Water	D	1.000
6000	Wetland Non-Forested	A	0.200
6000	Wetland Non-Forested	B/D	0.200
6000	Wetland Non-Forested	C	0.200
6000	Wetland Non-Forested	D	0.200
1400	Commercial	A	0.450
1400	Commercial	B/D	0.549
1400	Commercial	C	0.651
1400	Commercial	D	0.750
1700	Institutional	A	0.450
1700	Institutional	B/D	0.549
1700	Institutional	C	0.651
1700	Institutional	D	0.750
2100	Agricultural	A	0.150
2100	Agricultural	B/D	0.233
2100	Agricultural	C	0.318
2100	Agricultural	D	0.400
2140	Agricultural	A	0.150
2140	Agricultural	B/D	0.233
2140	Agricultural	C	0.318
2140	Agricultural	D	0.400
2200	Agricultural	A	0.150
2200	Agricultural	B/D	0.233
2200	Agricultural	C	0.318
2200	Agricultural	D	0.400

Table 11-2

Runoff Coefficients by Land Use Category and Soil Type

Stormwater Pollutant Loading and Removal Model

Hillsborough County Public Works / Stormwater Management

2300	Agricultural	A	0.150
2300	Agricultural	B/D	0.233
2300	Agricultural	C	0.318
2300	Agricultural	D	0.400
2400	Agricultural	A	0.150
2400	Agricultural	B/D	0.233
2400	Agricultural	C	0.318
2400	Agricultural	D	0.400
2500	Agricultural	A	0.150
2500	Agricultural	B/D	0.233
2500	Agricultural	C	0.318
2500	Agricultural	D	0.400
2550	Agricultural	A	0.150
2550	Agricultural	B/D	0.233
2550	Agricultural	C	0.318
2550	Agricultural	D	0.400
2600	Agricultural	A	0.150
2600	Agricultural	B/D	0.233
2600	Agricultural	C	0.318
2600	Agricultural	D	0.400
3100	Open Land	A	0.100
3100	Open Land	B/D	0.166
3100	Open Land	C	0.234
3100	Open Land	D	0.300
3200	Open Land	A	0.100
3200	Open Land	B/D	0.166
3200	Open Land	C	0.234
3200	Open Land	D	0.300
3300	Open Land	A	0.100
3300	Open Land	B/D	0.166
3300	Open Land	C	0.234
3300	Open Land	D	0.300
4100	Upland Forest	A	0.050
4100	Upland Forest	B/D	0.050
4100	Upland Forest	C	0.050
4100	Upland Forest	D	0.050
4110	Upland Forest	A	0.050
4110	Upland Forest	B/D	0.050
4110	Upland Forest	C	0.050
4110	Upland Forest	D	0.050
4120	Upland Forest	A	0.050
4120	Upland Forest	B/D	0.050
4120	Upland Forest	C	0.050
4120	Upland Forest	D	0.050
4200	Upland Forest	A	0.050
4200	Upland Forest	B/D	0.050
4200	Upland Forest	C	0.050
4200	Upland Forest	D	0.050

Table 11-2

Runoff Coefficients by Land Use Category and Soil Type

Stormwater Pollutant Loading and Removal Model

Hillsborough County Public Works / Stormwater Management

4340	Upland Forest	A	0.050
4340	Upland Forest	B/D	0.050
4340	Upland Forest	C	0.050
4340	Upland Forest	D	0.050
4400	Upland Forest	A	0.050
4400	Upland Forest	B/D	0.050
4400	Upland Forest	C	0.050
4400	Upland Forest	D	0.050
5100	Water	A	1.000
5100	Water	B/D	1.000
5100	Water	C	1.000
5100	Water	D	1.000
5200	Water	A	1.000
5200	Water	B/D	1.000
5200	Water	C	1.000
5200	Water	D	1.000
5300	Water	A	1.000
5300	Water	B/D	1.000
5300	Water	C	1.000
5300	Water	D	1.000
5400	Water	A	1.000
5400	Water	B/D	1.000
5400	Water	C	1.000
5400	Water	D	1.000
6100	Wetland Forest	A	0.100
6100	Wetland Forest	B/D	0.100
6100	Wetland Forest	C	0.100
6100	Wetland Forest	D	0.100
6110	Wetland Forest	A	0.100
6110	Wetland Forest	B/D	0.100
6110	Wetland Forest	C	0.100
6110	Wetland Forest	D	0.100
6120	Wetland Forest	A	0.100
6120	Wetland Forest	B/D	0.100
6120	Wetland Forest	C	0.100
6120	Wetland Forest	D	0.100
6150	Wetland Forest	A	0.100
6150	Wetland Forest	B/D	0.100
6150	Wetland Forest	C	0.100
6150	Wetland Forest	D	0.100
6200	Wetland Forest	A	0.100
6200	Wetland Forest	B/D	0.100
6200	Wetland Forest	C	0.100
6200	Wetland Forest	D	0.100
6210	Wetland Forest	A	0.100
6210	Wetland Forest	B/D	0.100
6210	Wetland Forest	C	0.100
6210	Wetland Forest	D	0.100

Table 11-2

Runoff Coefficients by Land Use Category and Soil Type

Stormwater Pollutant Loading and Removal Model

Hillsborough County Public Works / Stormwater Management

6300	Wetland Forest	A	0.100
6300	Wetland Forest	B/D	0.100
6300	Wetland Forest	C	0.100
6300	Wetland Forest	D	0.100
6400	Wetland Non-Forested	A	0.100
6400	Wetland Non-Forested	B/D	0.100
6400	Wetland Non-Forested	C	0.100
6400	Wetland Non-Forested	D	0.100
6410	Wetland Non-Forested	A	0.100
6410	Wetland Non-Forested	B/D	0.100
6410	Wetland Non-Forested	C	0.100
6410	Wetland Non-Forested	D	0.100
6420	Wetland Non-Forested	A	0.100
6420	Wetland Non-Forested	B/D	0.100
6420	Wetland Non-Forested	C	0.100
6420	Wetland Non-Forested	D	0.100
6430	Wetland Non-Forested	A	0.100
6430	Wetland Non-Forested	B/D	0.100
6430	Wetland Non-Forested	C	0.100
6430	Wetland Non-Forested	D	0.100
6440	Wetland Non-Forested	A	0.100
6440	Wetland Non-Forested	B/D	0.100
6440	Wetland Non-Forested	C	0.100
6440	Wetland Non-Forested	D	0.100
6500	Wetland Non-Forested	A	0.100
6500	Wetland Non-Forested	B/D	0.100
6500	Wetland Non-Forested	C	0.100
6500	Wetland Non-Forested	D	0.100
6510	Wetland Non-Forested	A	0.100
6510	Wetland Non-Forested	B/D	0.100
6510	Wetland Non-Forested	C	0.100
6510	Wetland Non-Forested	D	0.100
6520	Wetland Non-Forested	A	0.100
6520	Wetland Non-Forested	B/D	0.100
6520	Wetland Non-Forested	C	0.100
6520	Wetland Non-Forested	D	0.100
6530	Wetland Non-Forested	A	0.100
6530	Wetland Non-Forested	B/D	0.100
6530	Wetland Non-Forested	C	0.100
6530	Wetland Non-Forested	D	0.100
7100	Wetland Non-Forested	A	0.100
7100	Wetland Non-Forested	B/D	0.100
7100	Wetland Non-Forested	C	0.100
7100	Wetland Non-Forested	D	0.100
7400	Extractive (Mining)/Disturbed	A	0.050
7400	Extractive (Mining)/Disturbed	B/D	0.050
7400	Extractive (Mining)/Disturbed	C	0.050
7400	Extractive (Mining)/Disturbed	D	0.050

Table 11-2

Runoff Coefficients by Land Use Category and Soil Type

Stormwater Pollutant Loading and Removal Model

Hillsborough County Public Works / Stormwater Management

8100	Highway/Utility	A	0.500
8100	Highway/Utility	B/D	0.599
8100	Highway/Utility	C	0.701
8100	Highway/Utility	D	0.800
8200	Highway/Utility	A	0.500
8200	Highway/Utility	B/D	0.599
8200	Highway/Utility	C	0.701
8200	Highway/Utility	D	0.800
8300	Highway/Utility	A	0.500
8300	Highway/Utility	B/D	0.599
8300	Highway/Utility	C	0.701
8300	Highway/Utility	D	0.800

Note: B/D used for all NC soils

Table 11-3

EMC Values by Parameter for Land Use Categories under Existing Conditions

Stormwater Pollutant Loading and Removal Model

Hillsborough County Public Works / Stormwater Management

	NPDES Conventional WQ (mg/l)								NPDES Metals (mg/l)			
Land Use	BOD_5	TSS	TKN	NO_3 $+NO_2$	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
Low/Medium Density Residential	1.00	19.00	1.082	0.281	1.363	0.401	0.282	1.080	0.001	0.013	0.008	0.022
High Density Residential	2.60	29.00	1.368	0.679	2.047	1.337	0.552	1.073	0.001	0.047	0.006	0.058
Light Industrial	2.87	18.20	2.088	0.187	2.275	0.332	0.187	3.663	0.001	0.024	0.006	0.096
Agricultural	18.30	12.70	2.167	0.803	2.970	2.349	1.223	0.500	0.013	0.041	0.003	0.017
Commercial	2.67	22.92	1.645	0.387	2.032	0.279	0.157	0.650	0.001	0.018	0.004	0.026
Institutional	2.67	22.92	1.645	0.387	2.032	0.279	0.157	0.650	0.001	0.018	0.004	0.026
Highway/Utility	24.00	261.00	2.990	1.140	4.130	0.120	0.300	0.400	0.040	0.103	0.960	0.410
Recreational	3.80	11.10	2.090	0.508	2.598	0.050	0.130	0.900	0.007	0.041	0.006	0.004
Open Land	3.80	11.10	2.090	0.508	2.598	0.050	0.130	0.900	0.001	0.001	0.001	0.006
Extractive (Mining)/Disturbed	28.94	13.20	3.500	0.030	3.530	0.194	0.134	0.900	0.001	0.001	0.001	0.006
Upland Forest	0	0	0	0	0	0	0	0	0	0	0	0
Wetland Forest	0	0	0	0	0	0	0	0	0	0	0	0
Wetland Non-Forested	0	0	0	0	0	0	0	0	0	0	0	0
Water	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 11-4

SUMMARY OF SWFWMD PERMITS WITHIN CYPRESS CREEK WATERSHED

Permit ID	Project Name	BMP Type	
1838 001,002	Livingston Ave & Sunset Lane Improvements	N/A	
11826 000	Livingston Ave & Sunset Lane Intersection	N/A	
1842 000,001	Chapman Manors		
13468 0 [illegible]	Tampa Palms		permit reviewed-not in area
4820 [illegible]	Re[illegible] Tampa Palms		permit reviewed-not in area
9569 00	Oaks at Windmere	Retention	
2206 00	Tampa Tech Park		permit reviewed-not in area
1399 200	Palm Center		permit reviewed-not in area
14394 00,01,03	Sherry Brook Lane	Wet Detention	
38530 00	Curry Cove	Underdrain	
18230 00	Hounds Hollow	Percolation	
2230 00	Willow Pond Subdivision	Underdrain	
9548 03	Newberger Road Subdivision	Wet Detention	
37800 10, 02	Oakledge Subdivision	Wet Detention	
4643 000,001,002	Tiffany Lake Manor	Underdrain	
2130 000, 6234 000	Surrey Chase	Percolation	
6132 001	Ridgelake Subdivision	Percolation	
1941 000	Keene Lake Manor	Underdrain & Perc	
2063 000	Sunset Manor Subdivision	Percolation	
13007 000, 001	Lakes of Wellington/Cool Kell Manors		Mitigation plans only
5168 000, 001	Cool Kell Manors	Wet Retention	
4863 000	Stewart Manor	Percolation	
5494 000	Hounds Hollow(Pinellas Co)		permit reviewed-not in area
2955 00,01,02,03,04	Lakeshore Villas		permit reviewed-not in area

Table 11-5

Percent Removal by Pollutant for BMP Types

Stormwater Pollutant Loading and Removal Model

Hillsborough County Public Works / Stormwater Management

BMP ID	Description	BOD_5	TSS	TKN	NO_3 $+NO_2$	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
1	Wet-detention	60% [1]	85% [1]	30% [1]	80% [1]	30% [1]	65% [1]	80% [3]	35% [2]	75% [2]	65% [1]	75% [1]	85% [1]
2	Percolation	80% [1]	80% [1]	80% [1]	80% [1]	80% [1]	80% [1]	80% [3]	80% [3]	80% [3]	80% [1]	80% [1]	80% [1]
3	Infiltration Trench		75% [3]				60% [3]					65% [3]	65% [3]
4	Grass Swale		60% [3]	10% [3]	15% [3]	10%	20% [3]					70% [3]	60% [3]

Note:

1. Harper, 1995. "Pollutant Removal Efficiencies for Typical Stormwater Management Systems in Florida." Stormwater Reseach Conference, 1995.
2. Kadlec, R.H. and R.L. Knight, 1996. "Treatment Wetlands." CTC Press, Inc. Boca Raton, Florida.
3. Parson ES, 1999.

TABLE 11-6

	Low/Medium Density		High Density Residen		Light Industrial		Agricultural		Commercial		Institutional		Highway/Utility		Recreational		Open Land		Extractive (Mining)/Di		Upland Forest		Wetland Forest		Wetland Non-Foreste		Water	
	Coverage	BMP	Coverage	BMP	Coverage	BMP	Coverage	BMP	Coverage	BMP	Coverage	BMP	Coverage	BMP	Coverage	BMP	Coverage	BMP	Coverage	BMP	Coverage	BMP	Coverage	BMP	Coverage	BMP	Coverage	BMP
500100	1	1	0.9	1									1	4														
500200			1	1					1	1			1	4														
500300	0.9	1	1	1									1	4														
500400									1	1			1	4														
500500													1	4														
500600													1	4														
500700													1	4														
500900													1	4														
501000													1	4														
510100													1	4														
510150																												
510200													1	1														
510260													1	1														
510300													1	1														
510400																												
510450																												
510451																												
510500													1	1														
510600																												
510700													1	1														
510800																												
510900																												
511100													1	4														
511200													1	4														
511300													1	4														
511400																												
511500																												
511600																												
520100	0.8	3											1	4														
520200																												
520300																												
520400													1	1														
520600													1	1														
520700																												
520750													1	1														
520800													1	1														
520900																												
521000																												
521100																												
521200	0.8	2																										
521300																												
521400																	1	3										
521600	0.5	1	0.1	1																								
521800			1	3																								
521700																												
521800													1	4														
521800													1	4														
522000	0.4	2											1	4														
522100																												
522200													1	1														
522300																												
530100																												
530190																												
530200																												
530300																												
530500																												
540100	1	1																										
540200																												
540300																												
540400	1	1																										
540460																												
540500																												
540600	0.1	2																										
540700													1	4														
540800	0.2	2																										
540900													1	4														
541000																												
541100													1	4														
541150													1	4														
541200	0.2	2																										
541300	1	2																										
542010							1	2																				
542020																												
542030																												
542040																												
542050	0.05	1																										

1/27/00
cypress creek exist bmp.xls

TABLE 11-6

542060					
542070					
542080	0.05	2			
542090					
542100				1	1
542110					
542120					
542130					
542140					
542150	0.5	2		0.9	2
542160					
542170					
542180					
542190					
542200					
542210					
542220					
542230					
542240					
542250					
542260					
542270	0.2	2		1	1

TABLE 11-7

CYPRESS CREEK WATERSHED GROSS POLLUTANT LOAD BY SUBBASIN USING AVERAGE ANNUAL RAINFALL

Subbasin ID	Area (acres)	Volume (acre-ft)	RC	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
500100	390.8	546.2	0.36	10632.3	116176.0	2251.2	867.2	3118.3	820.2	457.8	982.8	15.3	65.8	352.3	185.2
500200	1038.0	727.1	0.18	4381.0	52556.2	1505.8	491.0	1996.8	549.2	344.7	1053.4	6.0	31.8	127.1	78.4
500300	1682.9	1003.1	0.15	15037.8	143349.7	3095.1	958.3	4053.4	305.4	355.2	1098.7	21.0	58.3	478.2	215.8
500400	1761.3	1271.4	0.18	26192.5	173467.6	4275.5	1437.1	5712.6	1542.6	1010.7	1308.6	31.5	90.1	569.6	262.8
500500	577.2	386.8	0.17	10699.3	30359.3	1393.9	502.2	1896.1	1095.6	599.3	344.4	9.6	28.4	87.5	45.5
500600	1910.8	1225.0	0.16	24234.4	134611.8	4449.9	1407.3	5857.1	1346.7	904.3	1284.1	25.8	69.0	434.5	199.2
500700	1664.7	1046.8	0.16	18863.1	127633.8	3798.6	1183.5	4982.1	844.6	638.6	1235.2	21.9	59.0	413.5	189.0
500900	1117.6	776.4	0.18	15855.2	87257.8	2547.1	854.7	3401.8	1042.9	653.6	712.4	17.5	48.4	284.4	131.4
501000	1194.9	836.6	0.18	20655.9	128940.0	3458.5	1143.4	4601.9	1092.1	735.2	928.7	24.0	64.5	431.2	194.7
510100	160.6	297.0	0.47	1280.1	17256.3	567.0	161.3	728.2	177.6	130.7	470.2	1.8	9.3	37.1	23.9
510150	99.0	89.6	0.23	245.4	3434.0	220.2	56.1	276.3	67.0	47.8	189.3	0.2	2.3	1.3	3.9
510200	43.3	59.5	0.35	581.0	6254.2	220.6	96.3	316.9	158.3	68.7	139.9	0.5	6.7	9.8	11.0
510250	16.1	16.6	0.26	582.4	6389.7	90.9	31.8	122.8	9.0	11.1	25.2	0.9	2.6	22.3	9.9
510260	23.1	57.7	0.64	1022.5	10970.3	270.0	111.3	381.3	143.4	67.7	137.1	1.3	8.1	28.1	18.1
510300	144.9	238.1	0.42	2389.8	24122.9	881.9	329.1	1211.0	438.3	202.9	468.8	2.2	21.1	44.4	39.2
510400	60.3	128.6	0.54	768.7	7500.1	411.6	180.4	592.0	317.4	135.1	288.7	0.3	11.3	1.5	14.1
510450	53.1	76.9	0.37	408.7	4542.1	215.1	106.5	321.6	209.2	86.4	168.3	0.2	7.4	0.9	9.1
510451	14.5	36.6	0.64	246.6	2750.5	129.7	64.4	194.1	126.8	52.4	101.8	0.1	4.5	0.6	5.5
510500	162.0	311.7	0.49	2997.5	32442.8	1131.7	376.3	1508.0	441.8	235.1	650.2	3.2	23.4	65.7	49.3
510600	42.7	109.5	0.65	707.7	7806.8	375.4	180.9	556.3	350.1	145.1	286.3	0.3	12.4	1.6	15.4
510700	43.2	86.7	0.51	1295.3	13976.8	379.3	110.7	490.1	73.7	52.8	170.5	1.7	7.1	37.6	20.4
510800	108.2	144.0	0.34	384.8	7283.2	415.1	107.8	522.8	153.5	107.9	413.4	0.4	5.0	3.1	8.4
510900	81.3	118.2	0.37	444.7	6430.6	352.9	113.9	466.8	183.3	100.4	311.3	0.3	6.4	2.2	9.2
511100	97.3	133.0	0.35	1951.6	18561.4	610.3	196.9	807.1	163.8	92.1	257.3	2.2	11.4	46.4	28.2
511200	142.3	230.1	0.41	2301.3	22982.9	936.3	250.9	1187.2	188.2	131.7	534.1	2.7	14.8	48.7	32.7
511300	96.8	183.3	0.48	690.9	8096.2	476.3	122.9	599.1	165.3	96.3	429.4	0.5	7.0	5.4	13.2
511400	37.6	66.3	0.45	124.1	2358.8	134.3	34.9	169.2	49.8	35.0	134.1	0.1	1.6	1.0	2.7
511500	81.0	98.8	0.31	514.2	6171.0	301.4	135.4	436.8	258.2	113.0	249.2	0.2	9.0	1.5	11.5
511600	24.3	39.7	0.42	189.3	2558.7	131.3	50.6	181.9	90.9	44.2	116.2	0.1	3.1	0.8	4.2
520100	195.8	178.0	0.23	2089.1	7987.3	549.8	166.2	716.0	343.9	202.7	386.1	1.7	8.2	5.9	9.8
520200	120.5	90.8	0.19	674.9	1073.7	106.1	40.7	146.8	104.8	53.1	44.6	0.5	2.3	0.3	1.7
520300	76.0	110.8	0.37	139.5	2644.9	150.7	39.1	189.9	55.8	39.3	150.4	0.1	1.8	1.1	3.1
520400	174.8	244.9	0.36	5457.8	34500.1	908.4	308.5	1217.0	438.4	272.2	376.1	6.4	19.9	105.7	51.8
520600	22.5	19.0	0.21	573.9	6418.9	92.5	32.4	124.9	11.6	13.1	32.9	0.9	2.7	22.3	9.9
520700	73.1	84.4	0.29	938.1	10652.4	281.4	84.5	365.9	84.5	63.3	200.0	1.4	5.3	28.3	15.4
520750	29.9	30.0	0.26	1208.8	13337.5	174.8	63.3	238.1	16.2	22.0	47.1	2.0	5.4	47.5	20.8
520800	58.7	82.3	0.36	1919.2	21733.9	372.7	123.7	496.4	68.2	63.1	180.9	3.1	9.4	71.2	33.0
520900	136.6	184.4	0.34	759.0	9012.1	536.5	143.2	679.7	223.8	150.5	508.7	0.7	6.7	3.7	10.5
521000	67.1	90.0	0.34	1303.6	4250.0	324.3	99.0	423.3	213.9	124.4	221.0	1.0	4.8	2.0	5.1
521100	118.5	132.8	0.29	1854.6	5750.5	454.6	139.2	593.7	304.5	176.4	307.3	1.4	6.8	2.2	6.9
521200	23.6	36.9	0.40	568.2	6824.3	146.8	45.5	192.4	34.3	28.5	93.9	0.9	3.1	20.2	10.1
521300	41.6	75.3	0.46	2647.4	22637.2	404.3	157.9	562.2	168.8	100.8	131.2	3.6	12.1	75.0	35.9
521400	62.9	86.9	0.35	367.1	2384.8	206.3	53.5	259.8	54.9	40.1	145.7	0.2	1.5	0.8	2.5
521500	154.6	156.2	0.26	2413.1	5565.6	490.6	156.3	646.8	367.7	207.0	289.7	1.8	7.7	2.0	6.7
521600	125.3	215.9	0.44	1699.1	11945.7	724.4	261.7	986.1	460.3	221.5	480.5	1.0	15.3	3.0	19.0
521700	36.4	67.8	0.47	328.5	3786.6	200.0	76.1	276.1	137.4	66.8	169.4	0.2	4.7	1.1	6.2
521800	428.8	699.3	0.42	6993.4	22326.4	1098.1	372.8	1470.9	787.9	438.4	415.7	6.2	20.8	53.1	32.1
521900	36.0	66.7	0.47	1101.1	3302.0	141.5	51.4	192.9	114.1	62.2	35.6	1.0	3.0	9.5	5.0
522000	65.3	67.4	0.26	1087.4	8957.6	254.9	76.9	331.8	76.6	50.3	109.9	1.3	4.9	24.7	13.0

TABLE 11-7

CYPRESS CREEK WATERSHED GROSS POLLUTANT LOAD BY SUBBASIN USING AVERAGE ANNUAL RAINFALL

(Continued)

Subbasin ID	Area (acres)	Volume (acre-ft)	RC	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
522300	16.6	15.9	0.26	636.8	519.8	79.5	28.9	108.4	82.9	43.5	21.9	0.5	1.5	0.1	0.7
530100	141.5	167.3	0.26	2448.7	6989.7	570.6	178.1	748.7	389.0	219.1	348.0	1.8	8.8	2.4	8.6
530150	74.0	165.7	0.24	1538.3	10495.4	552.7	261.6	814.3	540.3	233.4	394.0	0.8	17.5	2.2	20.5
530200	89.8	115.0	0.30	2619.3	4754.9	464.8	153.0	617.8	380.0	209.6	240.5	1.9	7.6	1.6	5.8
530300	33.1	46.5	0.57	122.4	2324.7	132.4	34.4	166.8	49.1	34.5	132.1	0.1	1.6	1.0	2.7
530500	103.3	168.8	0.33	1073.4	10882.5	572.0	229.2	801.2	431.7	204.9	478.0	0.6	14.4	3.1	18.5
540100	59.2	75.7	0.36	1523.5	3329.4	298.1	97.4	395.5	232.4	128.8	169.4	1.1	4.9	1.2	4.2
540200	55.4	121.1	0.42	847.0	9337.2	443.1	217.9	661.0	428.6	178.0	348.2	0.3	15.0	2.0	18.6
540300	112.0	142.3	0.33	2975.5	13587.1	544.9	179.6	724.4	338.6	198.3	278.0	2.9	10.4	33.1	19.5
540400	45.8	70.2	0.56	420.4	2494.1	165.7	47.0	212.7	86.8	54.0	138.1	0.3	2.2	1.0	2.9
540450	75.2	89.7	0.32	1763.8	4065.3	344.5	122.2	466.7	291.2	153.5	190.5	1.3	6.6	1.2	5.8
540500	154.4	245.9	0.39	1656.0	4546.3	374.9	116.7	491.6	263.2	150.6	240.6	1.2	5.7	1.7	5.4
540600	198.7	421.9	0.30	4362.5	12043.1	991.1	308.2	1299.4	694.2	397.5	637.6	3.2	15.1	4.5	14.4
540700	336.9	239.9	0.41	4796.1	11340.3	787.8	258.8	1046.6	572.5	308.4	261.1	3.7	13.7	18.7	15.4
540800	107.9	144.4	0.54	863.2	3904.7	304.4	84.5	388.9	136.8	83.0	195.8	0.7	4.3	1.4	4.4
540900	30.4	64.9	0.18	1117.3	11816.1	303.7	87.2	390.9	45.8	35.6	115.8	1.5	5.7	33.3	17.2
541000	46.5	92.3	0.34	273.7	3392.3	213.9	53.3	267.2	60.8	40.2	154.5	0.2	2.4	1.1	3.9
541100	196.0	345.5	0.54	7746.3	32804.6	1050.7	377.9	1428.6	722.6	409.7	314.4	7.9	23.7	100.6	49.7
541150	1422.5	2204.1	0.50	20636.7	136351.4	5353.1	1907.8	7260.9	2800.4	1449.0	2629.7	19.4	113.0	290.1	213.0
541200	93.4	153.1	0.45	2140.5	2672.1	358.6	117.6	476.1	272.3	149.0	137.8	1.5	5.0	0.7	3.1
541300	12.6	16.6	0.39	42.6	809.6	46.1	12.0	58.1	17.1	12.0	46.0	0.0	0.6	0.3	0.9
542010	71.5	78.9	0.42	3225.3	2906.2	417.1	150.2	567.3	423.9	223.4	126.5	2.3	7.6	0.7	3.8
542020	81.6	111.9	0.33	1826.2	4533.2	390.0	122.4	512.4	279.9	158.2	232.3	1.3	6.0	1.6	5.4
542030	37.3	48.2	0.28	634.6	2303.4	174.4	52.0	226.4	107.1	62.8	121.0	0.5	2.5	0.9	2.7
542040	42.7	34.3	0.35	350.3	1436.5	105.1	28.6	133.8	56.2	34.2	79.2	0.2	1.4	0.6	1.7
542050	60.9	88.8	0.33	250.8	4583.6	261.8	68.1	329.9	97.9	68.6	260.4	0.2	3.2	1.9	5.3
542060	103.5	130.5	0.20	1500.7	4865.9	379.0	115.4	494.4	249.6	145.2	260.9	1.1	5.6	1.8	5.8
542070	30.2	21.2	0.37	587.4	613.7	80.4	28.4	108.8	78.5	41.7	27.9	0.4	1.4	0.2	0.8
542080	56.7	66.1	0.32	1537.3	1863.1	224.0	77.8	301.7	209.2	112.1	87.8	1.1	3.9	0.6	2.3
542090	43.2	55.0	0.18	1561.1	1372.5	200.1	72.2	272.3	204.7	107.7	59.3	1.1	3.7	0.3	1.8
542100	258.2	283.8	0.30	5276.7	7773.1	1027.4	320.9	1348.3	650.7	366.1	428.8	3.5	12.3	2.0	8.5
542110	23.3	20.1	0.32	129.7	934.1	59.8	16.6	76.4	29.2	18.6	52.1	0.1	0.8	0.4	1.1
542120	141.0	165.0	0.28	1331.0	7290.9	504.9	142.8	647.7	257.2	159.2	398.7	1.0	6.6	2.8	8.5
542130	50.5	53.7	0.22	1638.3	1635.6	220.2	78.3	298.6	217.7	115.3	73.4	1.2	4.0	0.4	2.1
542140	93.1	101.1	0.30	2751.1	2744.2	370.4	130.5	501.0	362.3	192.0	123.7	1.9	6.6	0.7	3.5
542150	59.4	78.8	0.27	220.4	2233.7	167.6	42.8	210.4	44.2	33.2	134.0	0.1	1.4	0.8	2.4
542160	114.0	74.6	0.28	377.0	2461.8	231.6	58.8	290.4	47.6	37.8	155.2	0.2	1.4	0.8	2.4
542170	42.4	32.1	0.34	1523.8	1070.8	183.0	67.4	250.4	194.9	101.6	42.9	1.1	3.4	0.2	1.4
542180	163.5	194.6	0.17	4309.9	6694.4	709.8	238.0	947.8	606.3	330.7	331.9	3.1	11.8	2.2	8.2
542190	76.8	59.6	0.19	442.0	1992.0	184.8	49.7	234.6	61.2	41.2	120.3	0.3	1.5	0.7	2.1
542200	107.6	92.9	0.30	3719.4	2888.6	456.6	167.2	623.8	482.0	252.2	119.3	2.6	8.5	0.6	3.8
542210	105.7	81.5	0.20	2341.9	3042.1	336.0	130.2	466.2	347.3	175.7	121.4	1.6	7.2	0.7	4.8
542220	91.6	111.5	0.22	1996.6	5778.0	433.4	164.1	597.5	376.9	190.5	255.3	1.4	9.4	1.6	9.1
542230	139.3	136.9	0.20	4075.9	3872.2	538.0	192.5	730.5	538.5	284.6	171.5	2.9	9.7	1.0	5.0
542240	46.2	42.8	0.31	940.7	1467.7	170.6	55.0	225.6	125.2	69.4	76.8	0.7	2.4	0.4	1.7
542250	101.9	106.9	0.25	1773.5	1403.1	230.6	82.3	312.9	224.8	118.4	61.3	1.2	4.0	0.3	1.8
542260	229.4	316.9	0.24	3929.9	4396.3	561.7	195.7	757.4	525.3	280.7	205.6	2.8	9.7	1.2	5.5
542270	96.0	138.6	0.27	3375.8	3756.8	478.3	167.2	645.5	452.4	241.5	174.6	2.4	8.4	1.1	4.7

TABLE 11-8

CYPRESS CREEK WATERSHED GROSS POLLUTANT LOAD BY SUBBASIN USING WET SEASON AVERAGE RAINFALL

Subbasin ID	Area (acres)	Volume (acre-ft)	RC	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
500100	390.8	546.2	0.36	6887.5	75258.2	1458.3	561.8	2020.0	531.3	296.5	636.7	9.9	42.6	228.2	120.0
500200	1038.0	727.1	0.18	2838.0	34045.6	975.4	318.1	1293.5	355.7	223.3	682.4	3.9	20.6	82.3	50.8
500300	1682.9	1003.1	0.15	9741.4	92861.2	2005.0	620.8	2625.8	197.9	230.1	711.7	13.6	37.7	309.8	139.8
500400	1761.3	1271.4	0.18	16967.3	112371.4	2769.6	930.9	3700.6	999.3	654.7	847.7	20.4	58.4	369.0	170.2
500500	577.2	386.8	0.17	6930.9	19666.6	903.0	325.3	1228.3	709.7	388.2	223.1	6.2	18.4	56.7	29.5
500600	1910.8	1225.0	0.16	15698.9	87200.8	2882.6	911.6	3794.2	872.4	585.8	831.8	16.7	44.7	281.4	129.1
500700	1664.7	1046.8	0.16	12219.4	82680.5	2460.7	766.6	3227.3	547.1	413.7	800.1	14.2	38.2	267.9	122.4
500900	1117.6	776.4	0.18	10270.9	56525.1	1650.0	553.7	2203.7	675.6	423.4	461.5	11.3	31.4	184.2	85.1
501000	1194.9	836.6	0.18	13380.8	83526.7	2240.4	740.7	2981.1	707.5	476.3	601.6	15.5	41.8	279.4	126.1
510100	160.6	297.0	0.47	829.2	11178.5	367.3	104.5	471.8	115.0	84.7	304.6	1.2	6.0	24.0	15.5
510150	99.0	89.6	0.23	158.9	2224.5	142.6	36.4	179.0	43.4	31.0	122.7	0.1	1.5	0.9	2.5
510200	43.3	59.5	0.35	376.3	4051.4	142.9	62.4	205.3	102.5	44.5	90.6	0.3	4.3	6.3	7.1
510250	16.1	16.6	0.26	377.3	4139.2	58.9	20.6	79.5	5.8	7.2	16.3	0.6	1.7	14.5	6.4
510260	23.1	57.7	0.64	662.4	7106.5	174.9	72.1	247.0	92.9	43.8	88.8	0.8	5.2	18.2	11.8
510300	144.9	238.1	0.42	1548.1	15626.7	571.3	213.2	784.5	283.9	131.4	303.7	1.5	13.6	28.8	25.4
510400	60.3	128.6	0.54	497.9	4858.5	266.7	116.8	383.5	205.6	87.5	187.0	0.2	7.3	1.0	9.2
510450	53.1	76.9	0.37	264.8	2942.4	139.3	69.0	208.3	135.5	56.0	109.0	0.1	4.8	0.6	5.9
510451	14.5	36.6	0.64	159.7	1781.8	84.0	41.7	125.8	82.1	33.9	65.9	0.1	2.9	0.4	3.6
510500	162.0	311.7	0.49	1941.8	21016.3	733.1	243.8	976.8	286.2	152.3	421.2	2.1	15.2	42.5	31.9
510600	42.7	109.5	0.65	458.4	5057.2	243.2	117.2	360.4	226.8	94.0	185.5	0.2	8.0	1.0	9.9
510700	43.2	86.7	0.51	839.1	9054.1	245.7	71.7	317.5	47.8	34.2	110.4	1.1	4.6	24.4	13.2
510800	108.2	144.0	0.34	249.2	4718.0	268.9	69.8	338.7	99.4	69.9	267.8	0.2	3.2	2.0	5.5
510900	81.3	118.2	0.37	288.0	4165.7	228.6	73.8	302.4	118.7	65.0	201.6	0.2	4.1	1.4	5.9
511100	97.3	133.0	0.35	1264.2	12024.0	395.3	127.5	522.9	106.1	59.6	166.7	1.4	7.4	30.0	18.2
511200	142.3	230.1	0.41	1490.8	14888.2	606.5	162.6	769.1	121.9	85.3	346.0	1.8	9.6	31.5	21.2
511300	96.8	183.3	0.48	447.6	5244.7	308.5	79.6	388.1	107.1	62.4	278.2	0.3	4.6	3.5	8.6
511400	37.6	66.3	0.45	80.4	1528.0	87.0	22.6	109.6	32.2	22.7	86.9	0.1	1.0	0.6	1.8
511500	81.0	98.8	0.31	333.1	3997.6	195.2	87.7	283.0	167.2	73.2	161.5	0.2	5.8	1.0	7.4
511600	24.3	39.7	0.42	122.6	1657.5	85.1	32.8	117.8	58.9	28.6	75.3	0.1	2.0	0.5	2.7
520100	195.8	178.0	0.23	1353.3	5174.2	356.1	107.7	463.8	222.7	131.3	250.1	1.1	5.3	3.8	6.4
520200	120.5	90.8	0.19	437.2	695.5	68.7	26.4	95.1	67.9	34.4	28.9	0.3	1.5	0.2	1.1
520300	76.0	110.8	0.37	90.3	1713.3	97.6	25.4	123.0	36.2	25.4	97.4	0.1	1.2	0.7	2.0
520400	174.8	244.9	0.36	3535.6	22349.0	588.5	199.9	788.3	284.0	176.3	243.6	4.1	12.9	68.5	33.6
520600	22.5	19.0	0.21	371.7	4158.1	59.9	21.0	80.9	7.5	8.5	21.3	0.6	1.7	14.4	6.4
520700	73.1	84.4	0.29	607.7	6900.6	182.3	54.7	237.0	54.7	41.0	129.6	0.9	3.5	18.3	10.0
520750	29.9	30.0	0.26	783.1	8640.0	113.2	41.0	154.3	10.5	14.3	30.5	1.3	3.5	30.8	13.4
520800	58.7	82.3	0.36	1243.3	14079.1	241.4	80.1	321.6	44.2	40.9	117.2	2.0	6.1	46.1	21.4
520900	136.6	184.4	0.34	491.7	5838.0	347.6	92.8	440.3	145.0	97.5	329.5	0.4	4.3	2.4	6.8
521000	67.1	90.0	0.34	844.5	2753.1	210.1	64.2	274.2	138.6	80.6	143.2	0.6	3.1	1.3	3.3
521100	118.5	132.8	0.29	1201.4	3725.1	294.5	90.2	384.6	197.3	114.3	199.1	0.9	4.4	1.4	4.4
521200	23.6	36.9	0.40	368.1	4420.7	95.1	29.5	124.6	22.2	18.5	60.8	0.6	2.0	13.1	6.5
521300	41.6	75.3	0.46	1715.0	14664.3	261.9	102.3	364.2	109.3	65.3	85.0	2.3	7.9	48.6	23.2
521400	62.9	86.9	0.35	237.8	1544.8	133.6	34.7	168.3	35.6	26.0	94.4	0.1	1.0	0.5	1.6
521500	154.6	156.2	0.26	1563.2	3605.3	317.8	101.2	419.0	238.2	134.1	187.7	1.2	5.0	1.3	4.4
521600	125.3	215.9	0.44	1100.7	7738.3	469.3	169.5	638.8	298.1	143.5	311.2	0.6	9.9	1.9	12.3
521700	36.4	67.8	0.47	212.8	2453.0	129.5	49.3	178.8	89.0	43.3	109.7	0.1	3.0	0.7	4.0
521800	428.8	699.3	0.42	4530.3	14462.9	711.3	241.5	952.8	510.4	284.0	269.3	4.0	13.5	34.4	20.8
521900	36.0	66.7	0.47	713.3	2139.0	91.7	33.3	125.0	73.9	40.3	23.1	0.7	2.0	6.1	3.2
522000	65.3	67.4	0.26	704.4	5802.7	165.1	49.8	214.9	49.6	32.6	71.2	0.9	3.1	16.0	8.5

TABLE 11-8

CYPRESS CREEK WATERSHED GROSS POLLUTANT LOAD BY SUBBASIN USING WET SEASON AVERAGE RAINFALL *(Continued)*

Subbasin ID	Area (acres)	Volume (acre-ft)	RC	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
522300	16.6	15.9	0.24	412.5	336.7	51.5	18.8	70.3	53.7	28.2	14.2	0.3	1.0	0.1	0.4
530100	141.5	167.3	0.30	1586.2	4527.9	369.6	115.4	485.0	252.0	141.9	225.4	1.2	5.7	1.6	5.6
530150	74.0	165.7	0.57	996.5	6798.8	358.1	169.4	527.5	350.0	151.2	255.3	0.5	11.3	1.4	13.3
530200	89.8	115.0	0.33	1696.8	3080.2	301.1	99.1	400.2	246.1	135.8	155.8	1.2	4.9	1.0	3.8
530300	33.1	46.5	0.36	79.3	1505.9	85.8	22.3	108.0	31.8	22.4	85.6	0.1	1.0	0.6	1.7
530500	103.3	168.8	0.42	695.3	7049.6	370.5	148.5	519.0	279.6	132.7	309.7	0.4	9.3	2.0	12.0
540100	59.2	75.7	0.33	986.9	2156.7	193.1	63.1	256.2	150.6	83.4	109.7	0.7	3.2	0.7	2.7
540200	55.4	121.1	0.56	548.7	6048.6	287.1	141.2	428.2	277.7	115.3	225.5	0.2	9.7	1.3	12.0
540300	112.0	142.3	0.32	1927.5	8801.6	353.0	116.3	469.3	219.4	128.5	180.1	1.9	6.7	21.4	12.6
540400	45.8	70.2	0.39	272.4	1615.7	107.3	30.4	137.8	56.2	35.0	89.5	0.2	1.4	0.7	1.9
540450	75.2	89.7	0.30	1142.6	2633.5	223.2	79.1	302.3	188.6	99.4	123.4	0.8	4.3	0.8	3.8
540500	154.4	245.9	0.41	1072.8	2945.0	242.9	75.6	318.4	170.5	97.6	155.9	0.8	3.7	1.1	3.5
540600	198.7	421.9	0.54	2826.0	7801.5	642.1	199.7	841.7	449.7	257.5	413.1	2.1	9.8	2.9	9.3
540700	336.9	239.9	0.18	3106.9	7346.2	510.3	167.6	678.0	370.9	199.8	169.2	2.4	8.9	12.1	10.0
540800	107.9	144.4	0.34	559.2	2529.5	197.2	54.7	251.9	88.6	53.8	126.9	0.4	2.8	0.9	2.9
540900	30.4	64.9	0.54	723.8	7654.4	196.7	56.5	253.2	29.7	23.1	75.0	1.0	3.7	21.6	11.2
541000	46.5	92.3	0.50	177.3	2197.5	138.5	34.5	173.1	39.4	26.0	100.1	0.1	1.6	0.7	2.5
541100	196.0	345.5	0.45	5018.0	21250.6	680.6	244.8	925.5	468.1	265.4	203.6	5.1	15.4	65.2	32.2
541150	1422.5	2204.1	0.39	13368.4	88327.7	3467.7	1235.9	4703.6	1814.1	938.6	1703.5	12.6	73.2	187.9	138.0
541200	93.4	153.1	0.42	1386.6	1731.0	232.3	76.2	308.4	176.4	96.5	89.2	1.0	3.3	0.4	2.0
541300	12.6	16.6	0.33	27.6	524.4	29.9	7.8	37.6	11.1	7.8	29.8	0.0	0.4	0.2	0.6
542010	71.5	78.9	0.28	2089.3	1882.6	270.2	97.3	367.5	274.6	144.7	82.0	1.5	4.9	0.5	2.4
542020	81.6	111.9	0.35	1183.0	2936.6	252.7	79.3	331.9	181.3	102.5	150.5	0.9	3.9	1.0	3.5
542030	37.3	48.2	0.33	411.1	1492.1	113.0	33.7	146.6	69.4	40.7	78.4	0.3	1.6	0.6	1.8
542040	42.7	34.3	0.20	226.9	930.6	68.1	18.6	86.7	36.4	22.1	51.3	0.1	0.9	0.4	1.1
542050	60.9	88.8	0.37	162.5	2969.2	169.6	44.1	213.7	63.4	44.4	168.7	0.2	2.0	1.2	3.4
542060	103.5	130.5	0.32	972.2	3152.1	245.5	74.7	320.3	161.7	94.1	169.0	0.7	3.6	1.2	3.8
542070	30.2	21.2	0.18	380.5	397.6	52.1	18.4	70.5	50.8	27.0	18.1	0.3	0.9	0.1	0.5
542080	56.7	66.1	0.30	995.9	1206.9	145.1	50.4	195.5	135.5	72.6	56.9	0.7	2.5	0.4	1.5
542090	43.2	55.0	0.32	1011.3	889.1	129.6	46.8	176.4	132.6	69.8	38.4	0.7	2.4	0.2	1.2
542100	258.2	283.8	0.28	3418.2	5035.4	665.6	207.9	873.4	421.5	237.2	277.8	2.3	8.0	1.3	5.5
542110	23.3	20.1	0.22	84.0	605.1	38.7	10.8	49.5	18.9	12.0	33.7	0.1	0.5	0.2	0.7
542120	141.0	165.0	0.30	862.2	4723.0	327.1	92.5	419.6	166.6	103.1	258.3	0.7	4.3	1.8	5.5
542130	50.5	53.7	0.27	1061.3	1059.5	142.7	50.8	193.4	141.0	74.7	47.6	0.8	2.6	0.3	1.4
542140	93.1	101.1	0.28	1782.1	1777.7	240.0	84.6	324.5	234.7	124.4	80.2	1.3	4.3	0.5	2.3
542150	59.4	78.8	0.34	142.8	1447.0	108.5	27.7	136.3	28.6	21.5	86.8	0.1	0.9	0.5	1.6
542160	114.0	74.6	0.17	244.2	1594.7	150.0	38.1	188.1	30.8	24.5	100.6	0.1	0.9	0.5	1.6
542170	42.4	32.1	0.19	987.1	693.6	118.6	43.7	162.2	126.3	65.8	27.8	0.7	2.2	0.1	0.9
542180	163.5	194.6	0.30	2791.9	4336.6	459.8	154.1	614.0	392.7	214.2	215.0	2.0	7.6	1.4	5.3
542190	76.8	59.6	0.20	286.3	1290.4	119.7	32.2	151.9	39.6	26.7	77.9	0.2	1.0	0.4	1.3
542200	107.6	92.9	0.22	2409.4	1871.2	295.8	108.3	404.1	312.2	163.4	77.3	1.7	5.5	0.4	2.5
542210	105.7	81.5	0.20	1517.1	1970.7	217.7	84.3	302.0	225.0	113.8	78.7	1.1	4.6	0.4	3.1
542220	91.6	111.5	0.31	1293.4	3743.0	280.7	106.3	387.1	244.1	123.4	165.4	0.9	6.1	1.0	5.9
542230	139.3	136.9	0.25	2640.4	2508.4	348.5	124.7	473.2	348.9	184.3	111.1	1.9	6.3	0.7	3.2
542240	46.2	42.8	0.24	609.4	950.8	110.5	35.6	146.1	81.1	45.0	49.7	0.4	1.6	0.3	1.1
542250	101.9	106.9	0.27	1148.9	908.9	149.4	53.3	202.7	145.6	76.7	39.7	0.8	2.6	0.2	1.2
542260	229.4	316.9	0.35	2545.8	2847.9	363.9	126.8	490.7	340.3	181.8	133.2	1.8	6.3	0.8	3.6
542270	96.0	138.6	0.37	2186.8	2433.6	309.8	108.3	418.2	293.1	156.4	113.1	1.6	5.4	0.7	3.1

TABLE 11-9

CYPRESS CREEK WATERSHED GROSS POLLUTANT LOAD BY SUBBASIN USING DRY SEASON AVERAGE RAINFALL

Subbasin ID	Area (acres)	Volume (acre-ft)	RC	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
500100	390.8	546.2	0.36	3765.0	41139.5	797.2	307.1	1104.2	290.5	162.1	348.0	5.4	23.3	124.7	65.6
500200	1038.0	727.1	0.18	1551.4	18610.9	533.2	173.9	707.1	194.5	122.0	373.0	2.1	11.2	45.0	27.8
500300	1682.9	1003.1	0.15	5325.1	50762.1	1096.0	339.3	1435.4	108.2	125.8	389.1	7.4	20.6	169.4	76.4
500400	1761.3	1271.4	0.18	9275.1	61427.2	1514.0	508.9	2022.9	546.3	357.9	463.4	11.2	31.9	201.7	93.1
500500	577.2	386.8	0.17	3788.8	10750.6	493.6	177.8	671.4	388.0	212.2	122.0	3.4	10.0	31.0	16.1
500600	1910.8	1225.0	0.16	8581.7	47667.9	1575.8	498.3	2074.1	476.9	320.2	454.7	9.1	24.5	153.9	70.5
500700	1664.7	1046.8	0.16	6679.7	45196.9	1345.1	419.1	1764.2	299.1	226.1	437.4	7.7	20.9	146.4	66.9
500900	1117.6	776.4	0.18	5614.5	30899.2	902.0	302.7	1204.6	369.3	231.4	252.3	6.2	17.2	100.7	46.5
501000	1194.9	836.6	0.18	7314.5	45659.4	1224.7	404.9	1629.6	386.7	260.4	328.9	8.5	22.8	152.7	68.9
510100	160.6	297.0	0.47	453.3	6110.7	200.8	57.1	257.9	62.9	46.3	166.5	0.6	3.3	13.1	8.5
510150	99.0	89.6	0.23	86.9	1216.0	78.0	19.9	97.8	23.7	16.9	67.0	0.1	0.8	0.5	1.4
510200	43.3	59.5	0.35	205.7	2214.7	78.1	34.1	112.2	56.0	24.3	49.5	0.2	2.4	3.5	3.9
510250	16.1	16.6	0.26	206.2	2262.7	32.2	11.3	43.5	3.2	3.9	8.9	0.3	0.9	7.9	3.5
510260	23.1	57.7	0.64	362.1	3884.7	95.6	39.4	135.0	50.8	24.0	48.5	0.4	2.9	9.9	6.4
510300	144.9	238.1	0.42	846.3	8542.2	312.3	116.5	428.8	155.2	71.8	166.0	0.8	7.5	15.7	13.9
510400	60.3	128.6	0.54	272.2	2655.9	145.8	63.9	209.6	112.4	47.9	102.2	0.1	4.0	0.5	5.0
510450	53.1	76.9	0.37	144.7	1608.4	76.2	37.7	113.9	74.1	30.6	59.6	0.1	2.6	0.3	3.2
510451	14.5	36.6	0.64	87.3	974.0	45.9	22.8	68.8	44.9	18.5	36.0	0.0	1.6	0.2	1.9
510500	162.0	311.7	0.49	1061.5	11488.4	400.7	133.3	534.0	156.5	83.2	230.2	1.1	8.3	23.3	17.5
510600	42.7	109.5	0.65	250.6	2764.5	132.9	64.1	197.0	124.0	51.4	101.4	0.1	4.4	0.6	5.4
510700	43.2	86.7	0.51	458.7	4949.4	134.3	39.2	173.5	26.1	18.7	60.4	0.6	2.5	13.3	7.2
510800	108.2	144.0	0.34	136.2	2579.1	147.0	38.2	185.1	54.4	38.2	146.4	0.1	1.8	1.1	3.0
510900	81.3	118.2	0.37	157.5	2277.1	125.0	40.3	165.3	64.9	35.6	110.2	0.1	2.3	0.8	3.2
511100	97.3	133.0	0.35	691.1	6572.8	216.1	69.7	285.8	58.0	32.6	91.1	0.8	4.0	16.4	10.0
511200	142.3	230.1	0.41	814.9	8138.5	331.5	88.9	420.4	66.7	46.6	189.1	1.0	5.2	17.2	11.6
511300	96.8	183.3	0.48	244.7	2867.0	168.7	43.5	212.2	58.5	34.1	152.1	0.2	2.5	1.9	4.7
511400	37.6	66.3	0.45	44.0	835.3	47.6	12.4	59.9	17.6	12.4	47.5	0.0	0.6	0.4	1.0
511500	81.0	98.8	0.31	182.1	2185.2	106.7	47.9	154.7	91.4	40.0	88.3	0.1	3.2	0.5	4.1
511600	24.3	39.7	0.42	67.0	906.1	46.5	17.9	64.4	32.2	15.6	41.1	0.0	1.1	0.3	1.5
520100	195.8	178.0	0.23	739.8	2828.4	194.7	58.9	253.5	121.8	71.8	136.7	0.6	2.9	2.1	3.5
520200	120.5	90.8	0.19	239.0	380.2	37.6	14.4	52.0	37.1	18.8	15.8	0.2	0.8	0.1	0.6
520300	76.0	110.8	0.37	49.4	936.6	53.4	13.9	67.2	19.8	13.9	53.2	0.0	0.6	0.4	1.1
520400	174.8	244.9	0.36	1932.7	12217.0	321.7	109.3	430.9	155.2	96.4	133.2	2.3	7.1	37.4	18.3
520600	22.5	19.0	0.21	203.2	2273.0	32.7	11.5	44.2	4.1	4.6	11.6	0.3	0.9	7.9	3.5
520700	73.1	84.4	0.29	332.2	3772.2	99.7	29.9	129.6	29.9	22.4	70.8	0.5	1.9	10.0	5.4
520750	29.9	30.0	0.26	428.1	4723.0	61.9	22.4	84.3	5.7	7.8	16.7	0.7	1.9	16.8	7.3
520800	58.7	82.3	0.36	679.6	7696.3	132.0	43.8	175.8	24.2	22.3	64.0	1.1	3.3	25.2	11.7
520900	136.6	184.4	0.34	268.8	3191.3	190.0	50.7	240.7	79.3	53.3	180.1	0.2	2.4	1.3	3.7
521000	67.1	90.0	0.34	461.6	1505 0	114.8	35.1	149.9	75.8	44.1	78.3	0.3	1.7	0.7	1.8
521100	118.5	132.8	0.29	656.7	2036.3	161.0	49.3	210.3	107.8	62.5	108.8	0.5	2.4	0.8	2.4
521200	23.6	36.9	0.40	201.2	2416.6	52.0	16.1	68.1	12.1	10.1	33.3	0.3	1.1	7.1	3.6
521300	41.6	75.3	0.46	937.5	8016.2	143.2	55.9	199.1	59.8	35.7	46.5	1.3	4.3	26.6	12.7
521400	62.9	86.9	0.35	130.0	844.5	73.0	19.0	92.0	19.4	14.2	51.6	0.1	0.5	0.3	0.9
521500	154.6	156.2	0.26	854.5	1970.8	173.7	55.3	229.1	130.2	73.3	102.6	0.6	2.7	0.7	2.4
521600	125.3	215.9	0.44	601.7	4230.1	256.5	92.7	349.2	163.0	78.4	170.1	0.3	5.4	1.0	6.7
521700	36.4	67.8	0.47	116.3	1340.9	70.8	27.0	97.8	48.6	23.7	60.0	0.1	1.7	0.4	2.2
521800	428.8	699.3	0.42	2476.4	7906.1	388.8	132.0	520.9	279.0	155.3	147.2	2.2	7.4	18.8	11.4
521900	36.0	66.7	0.47	389.9	1169.3	50.1	18.2	68.3	40.4	22.0	12.6	0.4	1.1	3.4	1.8
522000	65.3	67.4	0.26	385.0	3172.0	90.2	27.2	117.5	27.1	17.8	38.9	0.5	1.7	8.7	4.6

TABLE 11-9

CYPRESS CREEK WATERSHED GROSS POLLUTANT LOAD BY SUBBASIN USING DRY SEASON AVERAGE RAINFALL *(Continued)*

Subbasin ID	Area (acres)	Volume (acre-ft)	RC	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
522300	16.6	15.9	0.24	225.5	184.1	28.2	10.3	38.4	29.4	15.4	7.7	0.2	0.5	0.0	0.2
530100	141.5	167.3	0.30	867.1	2475.1	202.0	63.1	265.1	137.8	77.6	123.2	0.6	3.1	0.8	3.0
530150	74.0	165.7	0.57	544.7	3716.6	195.7	92.6	288.4	191.3	82.7	139.5	0.3	6.2	0.8	7.3
530200	89.8	115.0	0.33	927.5	1683.8	164.6	54.2	218.8	134.6	74.2	85.2	0.7	2.7	0.6	2.1
530300	33.1	46.5	0.36	43.3	823.2	46.9	12.2	59.1	17.4	12.2	46.8	0.0	0.6	0.3	1.0
530500	103.3	168.8	0.42	380.1	3853.6	202.5	81.2	283.7	152.9	72.6	169.3	0.2	5.1	1.1	6.5
540100	59.2	75.7	0.33	539.5	1179.0	105.6	34.5	140.0	82.3	45.6	60.0	0.4	1.7	0.4	1.5
540200	55.4	121.1	0.56	299.9	3306.4	156.9	77.2	234.1	151.8	63.0	123.3	0.1	5.3	0.7	6.6
540300	112.0	142.3	0.32	1053.7	4811.4	192.9	63.6	256.5	119.9	70.2	98.4	1.0	3.7	11.7	6.9
540400	45.8	70.2	0.39	148.9	883.2	58.7	16.6	75.3	30.7	19.1	48.9	0.1	0.8	0.4	1.0
540450	75.2	89.7	0.30	624.6	1439.6	122.0	43.3	165.3	103.1	54.3	67.5	0.4	2.3	0.4	2.1
540500	154.4	245.9	0.41	586.4	1609.9	132.8	41.3	174.1	93.2	53.3	85.2	0.4	2.0	0.6	1.9
540600	198.7	421.9	0.54	1544.8	4264.6	351.0	109.1	460.1	245.8	140.8	225.8	1.1	5.3	1.6	5.1
540700	336.9	239.9	0.18	1698.4	4015.7	279.0	91.6	370.6	202.7	109.2	92.5	1.3	4.8	6.6	5.5
540800	107.9	144.4	0.34	305.7	1382.7	107.8	29.9	137.7	48.4	29.4	69.3	0.2	1.5	0.5	1.6
540900	30.4	64.9	0.54	395.7	4184.2	107.5	30.9	138.4	16.2	12.6	41.0	0.5	2.0	11.8	6.1
541000	46.5	92.3	0.50	96.9	1201.3	75.7	18.9	94.6	21.5	14.2	54.7	0.1	0.9	0.4	1.4
541100	196.0	345.5	0.45	2743.1	11616.6	372.1	133.8	505.9	255.9	145.1	111.3	2.8	8.4	35.6	17.6
541150	1422.5	2204.1	0.39	7307.7	48283.9	1895.6	675.6	2571.2	991.7	513.1	931.2	6.9	40.0	102.7	75.4
541200	93.4	153.1	0.42	758.0	946.2	127.0	41.6	168.6	96.4	52.8	48.8	0.5	1.8	0.2	1.1
541300	12.6	16.6	0.33	15.1	286.7	16.3	4.2	20.6	6.1	4.3	16.3	0.0	0.2	0.1	0.3
542010	71.5	78.9	0.28	1142.1	1029.1	147.7	53.2	200.9	150.1	79.1	44.8	0.8	2.7	0.3	1.3
542020	81.6	111.9	0.35	646.7	1605.3	138.1	43.3	181.5	99.1	56.0	82.3	0.5	2.1	0.6	1.9
542030	37.3	48.2	0.33	224.7	815.7	61.8	18.4	80.2	37.9	22.3	42.9	0.2	0.9	0.3	1.0
542040	42.7	34.3	0.20	124.0	508.7	37.2	10.1	47.4	19.9	12.1	28.0	0.1	0.5	0.2	0.6
542050	60.9	88.8	0.37	88.8	1623.1	92.7	24.1	116.8	34.7	24.3	92.2	0.1	1.1	0.7	1.9
542060	103.5	130.5	0.32	531.4	1723.1	134.2	40.9	175.1	88.4	51.4	92.4	0.4	2.0	0.7	2.1
542070	30.2	21.2	0.18	208.0	217.3	28.5	10.1	38.5	27.8	14.8	9.9	0.1	0.5	0.1	0.3
542080	56.7	66.1	0.30	544.4	659.8	79.3	27.5	106.8	74.1	39.7	31.1	0.4	1.4	0.2	0.8
542090	43.2	55.0	0.32	552.8	486.0	70.9	25.6	96.4	72.5	38.1	21.0	0.4	1.3	0.1	0.6
542100	258.2	283.8	0.28	1868.5	2752.6	363.8	113.6	477.5	230.4	129.7	151.9	1.2	4.4	0.7	3.0
542110	23.3	20.1	0.22	45.9	330.8	21.2	5.9	27.1	10.3	6.6	18.4	0.0	0.3	0.1	0.4
542120	141.0	165.0	0.30	471.3	2581.8	178.8	50.6	229.4	91.1	56.4	141.2	0.4	2.3	1.0	3.0
542130	50.5	53.7	0.27	580.1	579.2	78.0	27.7	105.7	77.1	40.8	26.0	0.4	1.4	0.2	0.7
542140	93.1	101.1	0.28	974.2	971.8	131.2	46.2	177.4	128.3	68.0	43.8	0.7	2.3	0.3	1.2
542150	59.4	78.8	0.34	78.0	791.0	59.3	15.2	74.5	15.7	11.8	47.4	0.0	0.5	0.3	0.9
542160	114.0	74.6	0.17	133.5	871.7	82.0	20.8	102.8	16.9	13.4	55.0	0.1	0.5	0.3	0.9
542170	42.4	32.1	0.19	539.6	379.2	64.8	23.9	88.7	69.0	36.0	15.2	0.4	1.2	0.1	0.5
542180	163.5	194.6	0.30	1526.2	2370.6	251.3	84.3	335.6	214.7	117.1	117.5	1.1	4.2	0.8	2.9
542190	76.8	59.6	0.20	156.5	705.4	65.5	17.6	83.1	21.7	14.6	42.6	0.1	0.5	0.2	0.7
542200	107.6	92.9	0.22	1317.1	1022.9	161.7	59.2	220.9	170.7	89.3	42.2	0.9	3.0	0.2	1.3
542210	105.7	81.5	0.20	829.3	1077.3	119.0	46.1	165.1	123.0	62.2	43.0	0.6	2.5	0.2	1.7
542220	91.6	111.5	0.31	707.0	2046.1	153.5	58.1	211.6	133.5	67.4	90.4	0.5	3.3	0.6	3.2
542230	139.3	136.9	0.25	1443.3	1371.2	190.5	68.2	258.7	190.7	100.8	60.7	1.0	3.4	0.4	1.8
542240	46.2	42.8	0.24	333.1	519.7	60.4	19.5	79.9	44.3	24.6	27.2	0.2	0.9	0.2	0.6
542250	101.9	106.9	0.27	628.0	496.8	81.7	29.1	110.8	79.6	41.9	21.7	0.4	1.4	0.1	0.6
542260	229.4	316.9	0.35	1391.6	1556.8	198.9	69.3	268.2	186.0	99.4	72.8	1.0	3.4	0.4	2.0
542270	96.0	138.6	0.37	1195.4	1330.3	169.4	59.2	228.6	160.2	85.5	61.8	0.9	3.0	0.4	1.7

TABLE 11-10

CYPRESS CREEK WATERSHED NET POLLUTANT LOAD BY SUBBASIN USING AVERAGE ANNUAL RAINFALL

Subbasin ID	Area (acres)	Volume (acre-ft)	RC	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
500100	390.8	546.2	0.36	9838.9	45834.8	1905.0	526.3	2626.3	382.5	223.4	750.7	14.9	50.8	106.2	71.3
500200	1038.0	727.1	0.18	4025.8	27645.7	1371.4	358.2	1806.3	383.6	260.4	975.8	5.9	25.8	42.1	37.9
500300	1682.9	1003.1	0.15	14839.2	60603.8	2839.9	799.4	3713.9	207.3	280.5	973.5	20.8	55.5	144.1	88.0
500400	1761.3	1271.4	0.18	26088.5	80123.3	4067.6	1316.4	5430.1	1516.8	1002.5	1293.8	31.5	89.4	174.3	116.7
500500	577.2	386.8	0.17	10699.3	16325.9	1367.1	486.8	1859.1	1093.5	599.3	344.4	9.6	28.4	27.3	23.5
500600	1910.8	1225.0	0.16	24234.4	64110.8	4315.3	1330.3	5671.2	1335.9	904.3	1284.1	25.8	69.0	131.9	88.5
500700	1664.7	1046.8	0.16	18863.1	60652.9	3670.7	1110.3	4805.4	834.3	638.6	1235.2	21.9	59.0	126.1	83.8
500900	1117.6	776.4	0.18	15855.2	41194.2	2459.1	804.4	3280.3	1035.9	653.6	712.4	17.5	48.4	86.8	59.0
501000	1194.9	836.6	0.18	20655.9	58901.3	3324.8	1066.9	4417.2	1081.4	735.2	928.7	24.0	64.5	130.7	84.6
510100	160.6	297.0	0.47	1280.1	11759.2	556.5	155.3	713.7	176.7	130.7	470.2	1.8	9.3	13.5	15.2
510150	99.0	89.6	0.23	245.4	3434.0	220.2	56.1	276.3	67.0	47.8	189.3	0.2	2.3	1.3	3.9
510200	43.3	59.5	0.35	445.5	4167.9	212.2	87.7	305.2	157.5	66.4	138.5	0.2	6.0	3.0	7.7
510250	16.1	16.6	0.26	582.4	6389.7	90.9	31.8	122.8	9.0	11.1	25.2	0.9	2.6	22.3	9.9
510260	23.1	57.7	0.64	611.8	4642.0	244.4	85.3	345.9	141.1	60.8	133.1	0.4	6.2	7.6	8.2
510300	144.9	238.1	0.42	1760.4	14426.7	842.7	289.2	1156.9	434.8	192.4	462.7	0.9	18.1	12.9	24.0
510400	60.3	128.6	0.54	768.7	7500.1	411.6	180.4	592.0	317.4	135.1	288.7	0.3	11.3	1.5	14.1
510450	53.1	76.9	0.37	408.7	4542.1	215.1	106.5	321.6	209.2	86.4	168.3	0.2	7.4	0.9	9.1
510451	14.5	36.6	0.64	246.6	2750.5	129.7	64.4	194.1	126.8	52.4	101.8	0.1	4.5	0.6	5.5
510500	162.0	311.7	0.49	2070.9	18168.1	1073.9	317.6	1428.2	436.8	219.6	641.2	1.3	19.1	19.3	26.9
510600	42.7	109.5	0.65	707.7	7806.8	375.4	180.9	556.3	350.1	145.1	286.3	0.3	12.4	1.6	15.4
510700	43.2	86.7	0.51	746.8	5527.6	345.2	76.0	442.9	70.8	43.6	165.2	0.6	4.5	10.2	7.1
510800	108.2	144.0	0.34	384.8	7283.2	415.1	107.8	522.8	153.5	107.9	413.4	0.4	5.0	3.1	8.4
510900	81.3	118.2	0.37	444.7	6430.6	352.9	113.9	466.8	183.3	100.4	311.3	0.3	6.4	2.2	9.2
511100	97.3	133.0	0.35	1951.6	11180.1	596.2	188.8	787.7	162.7	92.1	257.3	2.2	11.4	14.7	16.6
511200	142.3	230.1	0.41	2301.3	15545.6	922.1	242.8	1167.6	187.1	131.7	534.1	2.7	14.8	16.7	21.0
511300	96.8	183.3	0.48	690.9	7585.5	475.3	122.3	597.8	165.2	96.3	429.4	0.5	7.0	3.2	12.4
511400	37.6	66.3	0.45	124.1	2358.8	134.3	34.9	169.2	49.8	35.0	134.1	0.1	1.6	1.0	2.7
511500	81.0	98.8	0.31	514.2	6171.0	301.4	135.4	436.8	258.2	113.0	249.2	0.2	9.0	1.5	11.5
511600	24.3	39.7	0.42	189.3	2558.7	131.3	50.6	181.9	90.9	44.2	116.2	0.1	3.1	0.8	4.2
520100	195.8	178.0	0.23	2089.1	4794.5	548.8	165.7	714.7	298.6	202.7	386.1	1.7	8.2	2.7	6.3
520200	120.5	90.8	0.19	674.9	1073.7	106.1	40.7	146.8	104.8	53.1	44.6	0.5	2.3	0.3	1.7
520300	76.0	110.8	0.37	139.5	2644.9	150.7	39.1	189.9	55.8	39.3	150.4	0.1	1.8	1.1	3.1
520400	174.8	244.9	0.36	3905.3	10581.4	811.7	210.2	1083.4	430.0	246.3	361.0	3.2	12.7	28.1	14.2
520600	22.5	19.0	0.21	242.7	1316.9	71.9	11.4	96.4	9.8	7.6	29.7	0.3	1.1	5.7	1.9
520700	73.1	84.4	0.29	938.1	10652.4	281.4	84.5	365.9	84.5	63.3	200.0	1.4	5.3	28.3	15.4
520750	29.9	30.0	0.26	499.5	2410.0	130.6	18.4	177.1	12.4	10.2	40.2	0.5	2.1	12.0	3.6
520800	58.7	82.3	0.36	867.6	5532.6	307.2	57.1	405.9	62.5	45.6	170.6	0.9	4.5	18.6	7.6
520900	136.6	184.4	0.34	759.0	9012.1	536.5	143.2	679.7	223.8	150.5	508.7	0.7	6.7	3.7	10.5
521000	67.1	90.0	0.34	1303.6	4250.0	324.3	99.0	423.3	213.9	124.4	221.0	1.0	4.8	2.0	5.1
521100	118.5	132.8	0.29	1854.6	5750.5	454.6	139.2	593.7	304.5	176.4	307.3	1.4	6.8	2.2	6.9
521200	23.6	36.9	0.40	517.3	5858.4	91.8	31.3	123.1	13.9	14.2	39.0	0.8	2.5	19.8	9.0
521300	41.6	75.3	0.46	2647.4	22637.2	404.3	157.9	562.2	168.8	100.8	131.2	3.6	12.1	75.0	35.9
521400	62.9	86.9	0.35	367.1	2031.5	206.3	53.5	259.8	53.6	40.1	145.7	0.2	1.5	0.8	2.3
521500	154.6	156.2	0.26	2349.3	3849.2	456.1	132.4	603.4	340.0	183.0	249.5	1.7	6.8	1.4	4.7
521600	125.3	215.9	0.44	1699.1	7288.1	724.4	261.7	986.1	288.5	221.5	480.5	1.0	15.3	2.1	10.9
521700	36.4	67.8	0.47	328.5	3786.6	200.0	76.1	276.1	137.4	66.8	169.4	0.2	4.7	1.1	6.2
521800	428.8	699.3	0.42	6993.4	14069.1	1082.3	363.8	1449.1	786.6	438.4	415.7	6.2	20.8	17.7	19.1
521900	36.0	66.7	0.47	1101.1	1785.8	138.6	49.7	188.9	113.9	62.2	35.6	1.0	3.0	3.0	2.6
522000	65.3	67.4	0.26	1070.5	4725.8	229.2	67.9	298.5	69.2	45.5	91.7	1.3	4.6	7.7	6.5

TABLE 11-10

CYPRESS CREEK WATERSHED NET POLLUTANT LOAD BY SUBBASIN USING AVERAGE ANNUAL RAINFALL
(Continued)

Subbasin ID	Area (acres)	Volume (acre-ft)	RC	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
522300	16.6	15.9	0.24	636.8	519.8	79.5	28.9	108.4	82.9	43.5	21.9	0.5	1.5	0.1	0.7
530100	141.5	167.3	0.30	2448.7	6989.7	570.6	178.1	748.7	389.0	219.1	348.0	1.8	8.8	2.4	8.6
530150	74.0	165.7	0.57	1538.3	10495.4	552.7	261.6	814.3	540.3	233.4	394.0	0.8	17.5	2.2	20.5
530200	89.8	115.0	0.33	2619.3	4754.9	464.8	153.0	617.8	380.0	209.6	240.5	1.9	7.6	1.6	5.8
530300	33.1	46.5	0.36	122.4	2324.7	132.4	34.4	166.8	49.1	34.5	132.1	0.1	1.6	1.0	2.7
530500	103.3	168.8	0.42	1073.4	10882.5	572.0	229.2	801.2	431.7	204.9	478.0	0.6	14.4	3.1	18.5
540100	59.2	75.7	0.33	1453.5	1447.0	260.3	71.2	347.8	202.1	102.5	125.4	1.0	3.9	0.5	2.0
540200	55.4	121.1	0.56	847.0	9337.2	443.1	217.9	661.0	428.6	178.0	348.2	0.3	15.0	2.0	18.6
540300	112.0	142.3	0.32	2975.5	13587.1	544.9	179.6	724.4	338.6	198.3	278.0	2.9	10.4	33.1	19.5
540400	45.8	70.2	0.39	348.2	551.2	126.7	19.9	163.5	55.4	26.8	92.7	0.2	1.2	0.3	0.7
540450	75.2	89.7	0.30	1763.8	4065.3	344.5	122.2	466.7	291.2	153.5	190.5	1.3	6.6	1.2	5.8
540500	154.4	245.9	0.41	1656.0	4546.3	374.9	116.7	491.6	263.2	150.6	240.6	1.2	5.7	1.7	5.4
540600	198.7	421.9	0.53	3958.4	11041.5	905.3	281.1	1186.5	631.6	362.0	585.1	2.9	13.7	4.1	13.2
540700	336.9	239.9	0.18	4796.1	8535.6	782.4	255.7	1039.2	572.1	308.4	261.1	3.7	13.7	6.7	11.0
540800	107.9	144.4	0.34	842.3	3506.7	281.7	78.6	360.3	128.4	77.1	173.2	0.7	4.0	1.2	3.9
540900	30.4	64.9	0.54	1117.3	6496.7	293.6	81.4	376.9	45.0	35.6	115.8	1.5	5.7	10.5	8.9
541000	46.5	92.3	0.50	273.7	3392.3	213.9	53.3	267.2	60.8	40.2	154.5	0.2	2.4	1.1	3.9
541100	196.0	345.5	0.45	7746.3	16664.2	1019.9	360.3	1386.1	720.1	409.7	314.4	7.9	23.7	31.4	24.4
541150	1422.5	2204.1	0.39	20636.7	91244.7	5267.0	1858.6	7142.0	2793.5	1449.0	2629.7	19.4	113.0	96.6	142.1
541200	93.4	153.1	0.42	2132.8	2525.2	350.2	115.4	465.6	269.2	146.8	129.4	1.5	4.9	0.6	2.9
541300	12.6	16.6	0.33	8.5	161.9	9.2	2.4	11.6	3.4	2.4	9.2	0.0	0.1	0.1	0.2
542010	71.5	78.9	0.28	674.2	1135.8	115.0	38.2	153.2	96.5	52.9	56.8	0.5	1.9	0.4	1.4
542020	81.6	111.9	0.35	1826.2	4533.2	390.0	122.4	512.4	279.9	158.2	232.3	1.3	6.0	1.6	5.4
542030	37.3	48.2	0.33	634.6	2303.4	174.4	52.0	226.4	107.1	62.8	121.0	0.5	2.5	0.9	2.7
542040	42.7	34.3	0.20	350.3	1436.5	105.1	28.6	133.8	56.2	34.2	79.2	0.2	1.4	0.6	1.7
542050	60.9	88.8	0.37	243.6	4389.1	257.9	65.4	325.0	94.7	65.9	255.9	0.2	3.1	1.9	5.1
542060	103.5	130.5	0.32	1500.7	4865.9	379.0	115.4	494.4	249.6	145.2	260.9	1.1	5.6	1.8	5.8
542070	30.2	21.2	0.18	587.4	613.7	80.4	28.4	108.8	78.5	41.7	27.9	0.4	1.4	0.2	0.8
542080	56.7	66.1	0.30	1535.6	1830.1	222.1	77.3	299.4	208.5	111.6	85.9	1.1	3.9	0.5	2.3
542090	43.2	55.0	0.32	1561.1	1372.5	200.1	72.2	272.3	204.7	107.7	59.3	1.1	3.7	0.3	1.8
542100	258.2	283.8	0.28	2557.5	5099.7	866.4	161.8	1127.7	272.6	123.8	385.5	1.1	5.7	1.5	4.9
542110	23.3	20.1	0.22	129.7	934.1	59.8	16.6	76.4	29.2	18.6	52.1	0.1	0.8	0.4	1.1
542120	141.0	165.0	0.30	1331.0	7290.9	504.9	142.8	647.7	257.2	159.2	398.7	1.0	6.6	2.8	8.5
542130	50.5	53.7	0.27	1638.3	1635.6	220.2	78.3	298.6	217.7	115.3	73.4	1.2	4.0	0.4	2.1
542140	93.1	101.1	0.28	2751.1	2744.2	370.4	130.5	501.0	362.3	192.0	123.7	1.9	6.6	0.7	3.5
542150	59.4	78.8	0.34	167.3	1455.1	122.2	30.9	153.1	26.3	20.9	89.8	0.1	0.8	0.5	1.5
542160	114.0	74.6	0.17	377.0	2461.8	231.6	58.8	290.4	47.6	37.8	155.2	0.2	1.4	0.8	2.4
542170	42.4	32.1	0.19	1523.8	1070.8	183.0	67.4	250.4	194.9	101.6	42.9	1.1	3.4	0.2	1.4
542180	163.5	194.6	0.30	4309.9	6694.4	709.8	238.0	947.8	606.3	330.7	331.9	3.1	11.8	2.2	8.2
542190	76.8	59.6	0.20	442.0	1992.0	184.8	49.7	234.6	61.2	41.2	120.3	0.3	1.5	0.7	2.1
542200	107.6	92.9	0.22	3719.4	2888.6	456.6	167.2	623.8	482.0	252.2	119.3	2.6	8.5	0.6	3.8
542210	105.7	81.5	0.20	2341.9	3042.1	336.0	130.2	466.2	347.3	175.7	121.4	1.6	7.2	0.7	4.8
542220	91.6	111.5	0.31	1996.6	5778.0	433.4	164.1	597.5	376.9	190.5	255.3	1.4	9.4	1.6	9.1
542230	139.3	136.9	0.25	4075.9	3872.2	538.0	192.5	730.5	538.5	284.6	171.5	2.9	9.7	1.0	5.0
542240	46.2	42.8	0.24	940.7	1467.7	170.6	55.0	225.6	125.2	69.4	76.8	0.7	2.4	0.4	1.7
542250	101.9	106.9	0.27	1773.5	1403.1	230.6	82.3	312.9	224.8	118.4	61.3	1.2	4.0	0.3	1.8
542260	229.4	316.9	0.35	3929.9	4396.3	561.7	195.7	757.4	525.3	280.7	205.6	2.8	9.7	1.2	5.5
542270	96.0	138.6	0.37	1391.4	1587.8	348.4	48.4	469.0	173.3	62.3	130.1	0.7	3.4	0.6	1.9

TABLE 11-11

CYPRESS CREEK WATERSHED NET POLLUTANT LOAD BY SUBBASIN USING WET SEASON AVERAGE RAINFALL

Subbasin ID	Area (acres)	Volume (acre-ft)	RC	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
500100	390.8	546.2	0.36	3484.1	16230.7	674.6	186.4	930.0	135.5	79.1	265.8	5.3	18.0	37.6	25.2
500200	1038.0	727.1	0.18	1425.6	9789.7	485.6	126.9	639.6	135.8	92.2	345.5	2.1	9.1	14.9	13.4
500300	1682.9	1003.1	0.15	5254.8	21460.6	1005.6	283.1	1315.1	73.4	99.3	344.7	7.3	19.6	51.0	31.2
500400	1761.3	1271.4	0.18	9238.3	28372.8	1440.4	466.2	1922.9	537.1	355.0	458.2	11.1	31.6	61.7	41.3
500500	577.2	386.8	0.17	3788.8	5781.2	484.1	172.4	658.3	387.2	212.2	122.0	3.4	10.0	9.7	8.3
500600	1910.8	1225.0	0.16	8581.7	22702.5	1528.1	471.1	2008.3	473.1	320.2	454.7	9.1	24.5	46.7	31.3
500700	1664.7	1046.8	0.16	6679.7	21478.0	1299.8	393.2	1701.7	295.4	226.1	437.4	7.7	20.9	44.7	29.7
500900	1117.6	776.4	0.18	5614.5	14587.4	870.8	284.9	1161.6	366.8	231.4	252.3	6.2	17.2	30.7	20.9
501000	1194.9	836.6	0.18	7314.5	20857.8	1177.4	377.8	1564.2	382.9	260.4	328.9	8.5	22.8	46.3	30.0
510100	160.6	297.0	0.47	453.3	4164.1	197.0	55.0	252.7	62.6	46.3	166.5	0.6	3.3	4.8	5.4
510150	99.0	89.6	0.23	86.9	1216.0	78.0	19.9	97.8	23.7	16.9	67.0	0.1	0.8	0.5	1.4
510200	43.3	59.5	0.35	157.8	1475.9	75.1	31.1	108.1	55.8	23.5	49.1	0.1	2.1	1.1	2.7
510250	16.1	16.6	0.26	206.2	2262.7	32.2	11.3	43.5	3.2	3.9	8.9	0.3	0.9	7.9	3.5
510260	23.1	57.7	0.64	216.6	1643.8	86.6	30.2	122.5	50.0	21.5	47.1	0.1	2.2	2.7	2.9
510300	144.9	238.1	0.42	623.4	5108.7	298.4	102.4	409.7	154.0	68.1	163.8	0.3	6.4	4.6	8.5
510400	60.3	128.6	0.54	272.2	2655.9	145.8	63.9	209.6	112.4	47.9	102.2	0.1	4.0	0.5	5.0
510450	53.1	76.9	0.37	144.7	1608.4	76.2	37.7	113.9	74.1	30.6	59.6	0.1	2.6	0.3	3.2
510451	14.5	36.6	0.64	87.3	974.0	45.9	22.8	68.8	44.9	18.5	36.0	0.0	1.6	0.2	1.9
510500	162.0	311.7	0.49	733.3	6433.6	380.3	112.5	505.8	154.7	77.8	227.1	0.5	6.8	6.9	9.5
510600	42.7	109.5	0.65	250.6	2764.5	132.9	64.1	197.0	124.0	51.4	101.4	0.1	4.4	0.6	5.4
510700	43.2	86.7	0.51	264.5	1957.4	122.2	26.9	156.8	25.1	15.4	58.5	0.2	1.6	3.6	2.5
510800	108.2	144.0	0.34	136.2	2579.1	147.0	38.2	185.1	54.4	38.2	146.4	0.1	1.8	1.1	3.0
510900	81.3	118.2	0.37	157.5	2277.1	125.0	40.3	165.3	64.9	35.6	110.2	0.1	2.3	0.8	3.2
511100	97.3	133.0	0.35	691.1	3959.0	211.1	66.9	278.9	57.6	32.6	91.1	0.8	4.0	5.2	5.9
511200	142.3	230.1	0.41	814.9	5504.9	326.5	86.0	413.5	66.3	46.6	189.1	1.0	5.2	5.9	7.4
511300	96.8	183.3	0.48	244.7	2686.1	168.3	43.3	211.7	58.5	34.1	152.1	0.2	2.5	1.1	4.4
511400	37.6	66.3	0.45	44.0	835.3	47.6	12.4	59.9	17.6	12.4	47.5	0.0	0.6	0.4	1.0
511500	81.0	98.8	0.31	182.1	2185.2	106.7	47.9	154.7	91.4	40.0	88.3	0.1	3.2	0.5	4.1
511600	24.3	39.7	0.42	67.0	906.1	46.5	17.9	64.4	32.2	15.6	41.1	0.0	1.1	0.3	1.5
520100	195.8	178.0	0.23	739.8	1697.8	194.3	58.7	253.1	105.7	71.8	136.7	0.6	2.9	1.0	2.2
520200	120.5	90.8	0.19	239.0	380.2	37.6	14.4	52.0	37.1	18.8	15.8	0.2	0.8	0.1	0.6
520300	76.0	110.8	0.37	49.4	936.6	53.4	13.9	67.2	19.8	13.9	53.2	0.0	0.6	0.4	1.1
520400	174.8	244.9	0.36	1382.9	3747.0	287.4	74.4	383.6	152.3	87.2	127.8	1.1	4.5	9.9	5.0
520600	22.5	19.0	0.21	85.9	466.3	25.4	4.0	34.1	3.5	2.7	10.5	0.1	0.4	2.0	0.7
520700	73.1	84.4	0.29	332.2	3772.2	99.7	29.9	129.6	29.9	22.4	70.8	0.5	1.9	10.0	5.4
520750	29.9	30.0	0.26	176.9	853.4	46.3	6.5	62.7	4.4	3.6	14.2	0.2	0.7	4.3	1.3
520800	58.7	82.3	0.36	307.2	1959.2	108.8	20.2	143.7	22.1	16.1	60.4	0.3	1.6	6.6	2.7
520900	136.6	184.4	0.34	268.8	3191.3	190.0	50.7	240.7	79.3	53.3	180.1	0.2	2.4	1.3	3.7
521000	67.1	90.0	0.34	461.6	1505.0	114.8	35.1	149.9	75.8	44.1	78.3	0.3	1.7	0.7	1.8
521100	118.5	132.8	0.29	656.7	2036.3	161.0	49.3	210.3	107.8	62.5	108.8	0.5	2.4	0.8	2.4
521200	23.6	36.9	0.40	183.2	2074.5	32.5	11.1	43.6	4.9	5.0	13.8	0.3	0.9	7.0	3.2
521300	41.6	75.3	0.46	937.5	8016.2	143.2	55.9	199.1	59.8	35.7	46.5	1.3	4.3	26.6	12.7
521400	62.9	86.9	0.35	130.0	719.4	73.0	19.0	92.0	19.0	14.2	51.6	0.1	0.5	0.3	0.8
521500	154.6	156.2	0.26	831.9	1363.1	161.5	46.9	213.7	120.4	64.8	88.4	0.6	2.4	0.5	1.7
521600	125.3	215.9	0.44	601.7	2580.8	256.5	92.7	349.2	102.2	78.4	170.1	0.3	5.4	0.7	3.9
521700	36.4	67.8	0.47	116.3	1340.9	70.8	27.0	97.8	48.6	23.7	60.0	0.1	1.7	0.4	2.2
521800	428.8	699.3	0.42	2476.4	4982.0	383.3	128.8	513.2	278.5	155.3	147.2	2.2	7.4	6.3	6.8
521900	36.0	66.7	0.47	389.9	632.4	49.1	17.6	66.9	40.3	22.0	12.6	0.4	1.1	1.0	0.9
522000	65.3	67.4	0.26	379.1	1673.5	81.1	24.0	105.7	24.5	16.1	32.5	0.5	1.6	2.7	2.3

TABLE 11-11

CYPRESS CREEK WATERSHED NET POLLUTANT LOAD BY SUBBASIN USING WET SEASON AVERAGE RAINFALL

(Continued)

Subbasin ID	Area (acres)	Volume (acre-ft)	RC	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
522300	16.6	15.9	0.24	225.5	184.1	28.2	10.3	38.4	29.4	15.4	7.7	0.2	0.5	0.0	0.2
530100	141.5	167.3	0.30	867.1	2475.1	202.0	63.1	265.1	137.8	77.6	123.2	0.6	3.1	0.8	3.0
530150	74.0	165.7	0.57	544.7	3716.6	195.7	92.6	288.4	191.3	82.7	139.5	0.3	6.2	0.8	7.3
530200	89.8	115.0	0.33	927.5	1683.8	164.6	54.2	218.8	134.6	74.2	85.2	0.7	2.7	0.6	2.1
530300	33.1	46.5	0.36	43.3	823.2	46.9	12.2	59.1	17.4	12.2	46.8	0.0	0.6	0.3	1.0
530500	103.3	168.8	0.42	380.1	3853.6	202.5	81.2	283.7	152.9	72.6	169.3	0.2	5.1	1.1	6.5
540100	59.2	75.7	0.33	514.7	512.4	92.2	25.2	123.2	71.6	36.3	44.4	0.4	1.4	0.2	0.7
540200	55.4	121.1	0.56	299.9	3306.4	156.9	77.2	234.1	151.8	63.0	123.3	0.1	5.3	0.7	6.6
540300	112.0	142.3	0.32	1053.7	4811.4	192.9	63.6	256.5	119.9	70.2	98.4	1.0	3.7	11.7	6.9
540400	45.8	70.2	0.39	123.3	195.2	44.9	7.1	57.9	19.6	9.5	32.8	0.1	0.4	0.1	0.2
540450	75.2	89.7	0.30	624.6	1439.6	122.0	43.3	165.3	103.1	54.3	67.5	0.4	2.3	0.4	2.1
540500	154.4	245.9	0.41	586.4	1609.9	132.8	41.3	174.1	93.2	53.3	85.2	0.4	2.0	0.6	1.9
540600	198.7	421.9	0.53	1401.7	3909.9	320.6	99.6	420.1	223.7	128.2	207.2	1.0	4.9	1.5	4.7
540700	336.9	239.9	0.18	1698.4	3022.6	277.1	90.5	368.0	202.6	109.2	92.5	1.3	4.8	2.4	3.9
540800	107.9	144.4	0.34	298.3	1241.8	99.8	27.8	127.6	45.5	27.3	61.3	0.2	1.4	0.4	1.4
540900	30.4	64.9	0.54	395.7	2300.6	104.0	28.8	133.5	15.9	12.6	41.0	0.5	2.0	3.7	3.1
541000	46.5	92.3	0.50	96.9	1201.3	75.7	18.9	94.6	21.5	14.2	54.7	0.1	0.9	0.4	1.4
541100	196.0	345.5	0.45	2743.1	5901.0	361.2	127.6	490.8	255.0	145.1	111.3	2.8	8.4	11.1	8.6
541150	1422.5	2204.1	0.39	7307.7	32311.0	1865.1	658.1	2529.1	989.2	513.1	931.2	6.9	40.0	34.2	50.3
541200	93.4	153.1	0.42	755.3	894.2	124.0	40.9	164.9	95.3	52.0	45.8	0.5	1.8	0.2	1.0
541300	12.6	16.6	0.33	3.0	57.3	3.3	0.8	4.1	1.2	0.9	3.3	0.0	0.0	0.0	0.1
542010	71.5	78.9	0.28	238.8	402.2	40.7	13.5	54.3	34.2	18.7	20.1	0.2	0.7	0.1	0.5
542020	81.6	111.9	0.35	646.7	1605.3	138.1	43.3	181.5	99.1	56.0	82.3	0.5	2.1	0.6	1.9
542030	37.3	48.2	0.33	224.7	815.7	61.8	18.4	80.2	37.9	22.3	42.9	0.2	0.9	0.3	1.0
542040	42.7	34.3	0.20	124.0	508.7	37.2	10.1	47.4	19.9	12.1	28.0	0.1	0.5	0.2	0.6
542050	60.9	88.8	0.37	86.2	1554.2	91.3	23.2	115.1	33.5	23.3	90.6	0.1	1.1	0.7	1.8
542060	103.5	130.5	0.32	531.4	1723.1	134.2	40.9	175.1	88.4	51.4	92.4	0.4	2.0	0.7	2.1
542070	30.2	21.2	0.18	208.0	217.3	28.5	10.1	38.5	27.8	14.8	9.9	0.1	0.5	0.1	0.3
542080	56.7	66.1	0.30	543.8	648.1	78.6	27.4	106.0	73.8	39.5	30.4	0.4	1.4	0.2	0.8
542090	43.2	55.0	0.32	552.8	486.0	70.9	25.6	96.4	72.5	38.1	21.0	0.4	1.3	0.1	0.6
542100	258.2	283.8	0.28	905.7	1805.9	306.8	57.3	399.3	96.5	43.9	136.5	0.4	2.0	0.5	1.7
542110	23.3	20.1	0.22	45.9	330.8	21.2	5.9	27.1	10.3	6.6	18.4	0.0	0.3	0.1	0.4
542120	141.0	165.0	0.30	471.3	2581.8	178.8	50.6	229.4	91.1	56.4	141.2	0.4	2.3	1.0	3.0
542130	50.5	53.7	0.27	580.1	579.2	78.0	27.7	105.7	77.1	40.8	26.0	0.4	1.4	0.2	0.7
542140	93.1	101.1	0.28	974.2	971.8	131.2	46.2	177.4	128.3	68.0	43.8	0.7	2.3	0.3	1.2
542150	59.4	78.8	0.34	59.2	515.3	43.3	10.9	54.2	9.3	7.4	31.8	0.0	0.3	0.2	0.5
542160	114.0	74.6	0.17	133.5	871.7	82.0	20.8	102.8	16.9	13.4	55.0	0.1	0.5	0.3	0.9
542170	42.4	32.1	0.19	539.6	379.2	64.8	23.9	88.7	69.0	36.0	15.2	0.4	1.2	0.1	0.5
542180	163.5	194.6	0.30	1526.2	2370.6	251.3	84.3	335.6	214.7	117.1	117.5	1.1	4.2	0.8	2.9
542190	76.8	59.6	0.20	156.5	705.4	65.5	17.6	83.1	21.7	14.6	42.6	0.1	0.5	0.2	0.7
542200	107.6	92.9	0.22	1317.1	1022.9	161.7	59.2	220.9	170.7	89.3	42.2	0.9	3.0	0.2	1.3
542210	105.7	81.5	0.20	829.3	1077.3	119.0	46.1	165.1	123.0	62.2	43.0	0.6	2.5	0.2	1.7
542220	91.6	111.5	0.31	707.0	2046.1	153.5	58.1	211.6	133.5	67.4	90.4	0.5	3.3	0.6	3.2
542230	139.3	136.9	0.25	1443.3	1371.2	190.5	68.2	258.7	190.7	100.8	60.7	1.0	3.4	0.4	1.8
542240	46.2	42.8	0.24	333.1	519.7	60.4	19.5	79.9	44.3	24.6	27.2	0.2	0.9	0.2	0.6
542250	101.9	106.9	0.27	628.0	496.8	81.7	29.1	110.8	79.6	41.9	21.7	0.4	1.4	0.1	0.6
542260	229.4	316.9	0.35	1391.6	1556.8	198.9	69.3	268.2	186.0	99.4	72.8	1.0	3.4	0.4	2.0
542270	96.0	138.6	0.37	492.7	562.3	123.4	17.2	166.1	61.4	22.1	46.1	0.2	1.2	0.2	0.7

TABLE 11-12

CYPRESS CREEK WATERSHED NET POLLUTANT LOAD BY SUBBASIN USING DRY SEASON AVERAGE RAINFALL

Subbasin ID	Area (acres)	Volume (acre-ft)	RC	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
500100	390.8	546.2	0.36	3484.1	16230.7	674.6	186.4	930.0	135.5	79.1	265.8	5.3	18.0	37.6	25.2
500200	1038.0	727.1	0.18	1425.6	9789.7	485.6	126.9	639.6	135.8	92.2	345.5	2.1	9.1	14.9	13.4
500300	1682.9	1003.1	0.15	5254.8	21460.6	1005.6	283.1	1315.1	73.4	99.3	344.7	7.3	19.6	51.0	31.2
500400	1761.3	1271.4	0.18	9238.3	28372.8	1440.4	466.2	1922.9	537.1	355.0	458.2	11.1	31.6	61.7	41.3
500500	577.2	386.8	0.17	3788.8	5781.2	484.1	172.4	658.3	387.2	212.2	122.0	3.4	10.0	9.7	8.3
500600	1910.8	1225.0	0.16	8581.7	22702.5	1528.1	471.1	2008.3	473.1	320.2	454.7	9.1	24.5	46.7	31.3
500700	1664.7	1046.8	0.16	6679.7	21478.0	1299.8	393.2	1701.7	295.4	226.1	437.4	7.7	20.9	44.7	29.7
500900	1117.6	776.4	0.18	5614.5	14587.4	870.8	284.9	1161.6	366.8	231.4	252.3	6.2	17.2	30.7	20.9
501000	1194.9	836.6	0.18	7314.5	20857.8	1177.4	377.8	1564.2	382.9	260.4	328.9	8.5	22.8	46.3	30.0
510100	160.6	297.0	0.47	453.3	4164.1	197.0	55.0	252.7	62.6	46.3	166.5	0.6	3.3	4.8	5.4
510150	99.0	89.6	0.23	86.9	1216.0	78.0	19.9	97.8	23.7	16.9	67.0	0.1	0.8	0.5	1.4
510200	43.3	59.5	0.35	157.8	1475.9	75.1	31.1	108.1	55.8	23.5	49.1	0.1	2.1	1.1	2.7
510250	16.1	16.6	0.26	206.2	2262.7	32.2	11.3	43.5	3.2	3.9	8.9	0.3	0.9	7.9	3.5
510260	23.1	57.7	0.64	216.6	1643.8	86.6	30.2	122.5	50.0	21.5	47.1	0.1	2.2	2.7	2.9
510300	144.9	238.1	0.42	623.4	5108.7	298.4	102.4	409.7	154.0	68.1	163.8	0.3	6.4	4.6	8.5
510400	60.3	128.6	0.54	272.2	2655.9	145.8	63.9	209.6	112.4	47.9	102.2	0.1	4.0	0.5	5.0
510450	53.1	76.9	0.37	144.7	1608.4	76.2	37.7	113.9	74.1	30.6	59.6	0.1	2.6	0.3	3.2
510451	14.5	36.6	0.64	87.3	974.0	45.9	22.8	68.8	44.9	18.5	36.0	0.0	1.6	0.2	1.9
510500	162.0	311.7	0.49	733.3	6433.6	380.3	112.5	505.8	154.7	77.8	227.1	0.5	6.8	6.9	9.5
510600	42.7	109.5	0.65	250.6	2764.5	132.9	64.1	197.0	124.0	51.4	101.4	0.1	4.4	0.6	5.4
510700	43.2	86.7	0.51	264.5	1957.4	122.2	26.9	156.8	25.1	15.4	58.5	0.2	1.6	3.6	2.5
510800	108.2	144.0	0.34	136.2	2579.1	147.0	38.2	185.1	54.4	38.2	146.4	0.1	1.8	1.1	3.0
510900	81.3	118.2	0.37	157.5	2277.1	125.0	40.3	165.3	64.9	35.6	110.2	0.1	2.3	0.8	3.2
511100	97.3	133.0	0.35	691.1	3959.0	211.1	66.9	278.9	57.6	32.6	91.1	0.8	4.0	5.2	5.9
511200	142.3	230.1	0.41	814.9	5504.9	326.5	86.0	413.5	66.3	46.6	189.1	1.0	5.2	5.9	7.4
511300	96.8	183.3	0.48	244.7	2686.1	168.3	43.3	211.7	58.5	34.1	152.1	0.2	2.5	1.1	4.4
511400	37.6	66.3	0.45	44.0	835.3	47.6	12.4	59.9	17.6	12.4	47.5	0.0	0.6	0.4	1.0
511500	81.0	98.8	0.31	182.1	2185.2	106.7	47.9	154.7	91.4	40.0	88.3	0.1	3.2	0.5	4.1
511600	24.3	39.7	0.42	67.0	906.1	46.5	17.9	64.4	32.2	15.6	41.1	0.0	1.1	0.3	1.5
520100	195.8	178.0	0.23	739.8	1697.8	194.3	58.7	253.1	105.7	71.8	136.7	0.6	2.9	1.0	2.2
520200	120.5	90.8	0.19	239.0	380.2	37.6	14.4	52.0	37.1	18.8	15.8	0.2	0.8	0.1	0.6
520300	76.0	110.8	0.37	49.4	936.6	53.4	13.9	67.2	19.8	13.9	53.2	0.0	0.6	0.4	1.1
520400	174.8	244.9	0.36	1382.9	3747.0	287.4	74.4	383.6	152.3	87.2	127.8	1.1	4.5	9.9	5.0
520600	22.5	19.0	0.21	85.9	466.3	25.4	4.0	34.1	3.5	2.7	10.5	0.1	0.4	2.0	0.7
520700	73.1	84.4	0.29	332.2	3772.2	99.7	29.9	129.6	29.9	22.4	70.8	0.5	1.9	10.0	5.4
520750	29.9	30.0	0.26	176.9	853.4	46.3	6.5	62.7	4.4	3.6	14.2	0.2	0.7	4.3	1.3
520800	58.7	82.3	0.36	307.2	1959.2	108.8	20.2	143.7	22.1	16.1	60.4	0.3	1.6	6.6	2.7
520900	136.6	184.4	0.34	268.8	3191.3	190.0	50.7	240.7	79.3	53.3	180.1	0.2	2.4	1.3	3.7
521000	67.1	90.0	0.34	461.6	1505.0	114.8	35.1	149.9	75.8	44.1	78.3	0.3	1.7	0.7	1.8
521100	118.5	132.8	0.29	656.7	2036.3	161.0	49.3	210.3	107.8	62.5	108.8	0.5	2.4	0.8	2.4
521200	23.6	36.9	0.40	183.2	2074.5	32.5	11.1	43.6	4.9	5.0	13.8	0.3	0.9	7.0	3.2
521300	41.6	75.3	0.46	937.5	8016.2	143.2	55.9	199.1	59.8	35.7	46.5	1.3	4.3	26.6	12.7
521400	62.9	86.9	0.35	130.0	719.4	73.0	19.0	92.0	19.0	14.2	51.6	0.1	0.5	0.3	0.8
521500	154.6	156.2	0.26	831.9	1363.1	161.5	46.9	213.7	120.4	64.8	88.4	0.6	2.4	0.5	1.7
521600	125.3	215.9	0.44	601.7	2580.8	256.5	92.7	349.2	102.2	78.4	170.1	0.3	5.4	0.7	3.9
521700	36.4	67.8	0.47	116.3	1340.9	70.8	27.0	97.8	48.6	23.7	60.0	0.1	1.7	0.4	2.2
521800	428.8	699.3	0.42	2476.4	4982.0	383.3	128.8	513.2	278.5	155.3	147.2	2.2	7.4	6.3	6.8
521900	36.0	66.7	0.47	389.9	632.4	49.1	17.6	66.9	40.3	22.0	12.6	0.4	1.1	1.0	0.9
522000	65.3	67.4	0.26	379.1	1673.5	81.1	24.0	105.7	24.5	16.1	32.5	0.5	1.6	2.7	2.3

TABLE 11-12

CYPRESS CREEK WATERSHED NET POLLUTANT LOAD BY SUBBASIN USING DRY SEASON AVERAGE RAINFALL

(Continued)

Subbasin ID	Area (acres)	Volume (acre-ft)	RC	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
522300	16.6	15.9	0.24	225.5	184.1	28.2	10.3	38.4	29.4	15.4	7.7	0.2	0.5	0.0	0.2
530100	141.5	167.3	0.30	867.1	2475.1	202.0	63.1	265.1	137.8	77.6	123.2	0.6	3.1	0.8	3.0
530150	74.0	165.7	0.57	544.7	3716.6	195.7	92.6	288.4	191.3	82.7	139.5	0.3	6.2	0.8	7.3
530200	89.8	115.0	0.33	927.5	1683 8	164.6	54.2	218.8	134.6	74.2	85.2	0.7	2.7	0.6	2.1
530300	33.1	46.5	0.36	43.3	823.2	46.9	12.2	59.1	17.4	12.2	46.8	0.0	0.6	0.3	1.0
530500	103.3	168.8	0.42	380.1	3853.6	202.5	81.2	283.7	152.9	72.6	169.3	0.2	5.1	1.1	6.5
540100	59.2	75.7	0.33	514.7	512.4	92.2	25.2	123.2	71.6	36.3	44.4	0.4	1.4	0.2	0.7
540200	55.4	121.1	0.56	299.9	3306.4	156.9	77.2	234.1	151.8	63.0	123.3	0.1	5.3	0.7	6.6
540300	112.0	142.3	0.32	1053.7	4811.4	192.9	63.6	256.5	119.9	70.2	98.4	1.0	3.7	11.7	6.9
540400	45.8	70.2	0.39	123.3	195.2	44.9	7.1	57.9	19.6	9.5	32.8	0.1	0.4	0.1	0.2
540450	75.2	89.7	0.30	624.6	1439.6	122.0	43.3	165.3	103.1	54.3	67.5	0.4	2.3	0.4	2.1
540500	154.4	245.9	0.41	586.4	1609.9	132.8	41.3	174.1	93.2	53.3	85.2	0.4	2.0	0.6	1.9
540600	198.7	421.9	0.53	1401.7	3909.9	320.6	99.6	420.1	223.7	128.2	207.2	1.0	4.9	1.5	4.7
540700	336.9	239.9	0.18	1698.4	3022.6	277.1	90.5	368.0	202.6	109.2	92.5	1.3	4.8	2.4	3.9
540800	107.9	144.4	0.34	298.3	1241.8	99.8	27.8	127.6	45.5	27.3	61.3	0.2	1.4	0.4	1.4
540900	30.4	64.9	0.54	395.7	2300.6	104.0	28.8	133.5	15.9	12.6	41.0	0.5	2.0	3.7	3.1
541000	46.5	92.3	0.50	96.9	1201.3	75.7	18.9	94.6	21.5	14.2	54.7	0.1	0.9	0.4	1.4
541100	196.0	345.5	0.45	2743.1	5901.0	361.2	127.6	490.8	255.0	145.1	111.3	2.8	8.4	11.1	8.6
541150	1422.5	2204.1	0.39	7307.7	32311.0	1865.1	658.1	2529.1	989.2	513.1	931.2	6.9	40.0	34.2	50.3
541200	93.4	153.1	0.42	755.3	894.2	124.0	40.9	164.9	95.3	52.0	45.8	0.5	1.8	0.2	1.0
541300	12.6	16.6	0.33	3.0	57.3	3.3	0.8	4.1	1.2	0.9	3.3	0.0	0.0	0.0	0.1
542010	71.5	78.9	0.28	238.8	402.2	40.7	13.5	54.3	34.2	18.7	20.1	0.2	0.7	0.1	0.5
542020	81.6	111.9	0.35	646.7	1605.3	138.1	43.3	181.5	99.1	56.0	82.3	0.5	2.1	0.6	1.9
542030	37.3	48.2	0.33	224.7	815.7	61.8	18.4	80.2	37.9	22.3	42.9	0.2	0.9	0.3	1.0
542040	42.7	34.3	0.20	124.0	508.7	37.2	10.1	47.4	19.9	12.1	28.0	0.1	0.5	0.2	0.6
542050	60.9	88.8	0.37	86.2	1554.2	91.3	23.2	115.1	33.5	23.3	90.6	0.1	1.1	0.7	1.8
542060	103.5	130.5	0.32	531.4	1723.1	134.2	40.9	175.1	88.4	51.4	92.4	0.4	2.0	0.7	2.1
542070	30.2	21.2	0.18	208.0	217.3	28.5	10.1	38.5	27.8	14.8	9.9	0.1	0.5	0.1	0.3
542080	56.7	66.1	0.30	543.8	648.1	78.6	27.4	106.0	73.8	39.5	30.4	0.4	1.4	0.2	0.8
542090	43.2	55.0	0.32	552.8	486.0	70.9	25.6	96.4	72.5	38.1	21.0	0.4	1.3	0.1	0.6
542100	258.2	283.8	0.28	905.7	1805.9	306.8	57.3	399.3	96.5	43.9	136.5	0.4	2.0	0.5	1.7
542110	23.3	20.1	0.22	45.9	330.8	21.2	5.9	27.1	10.3	6.6	18.4	0.0	0.3	0.1	0.4
542120	141.0	165.0	0.30	471.3	2581.8	178.8	50.6	229.4	91.1	56.4	141.2	0.4	2.3	1.0	3.0
542130	50.5	53.7	0.27	580.1	579.2	78.0	27.7	105.7	77.1	40.8	26.0	0.4	1.4	0.2	0.7
542140	93.1	101.1	0.28	974.2	971.8	131.2	46.2	177.4	128.3	68.0	43.8	0.7	2.3	0.3	1.2
542150	59.4	78.8	0.34	59.2	515.3	43.3	10.9	54.2	9.3	7.4	31.8	0.0	0.3	0.2	0.5
542160	114.0	74.6	0.17	133.5	871.7	82.0	20.8	102.8	16.9	13.4	55.0	0.1	0.5	0.3	0.9
542170	42.4	32.1	0.19	539.6	379.2	64.8	23.9	88.7	69.0	36.0	15.2	0.4	1.2	0.1	0.5
542180	163.5	194.6	0.30	1526.2	2370.6	251.3	84.3	335.6	214.7	117.1	117.5	1.1	4.2	0.8	2.9
542190	76.8	59.6	0.20	156.5	705.4	65.5	17.6	83.1	21.7	14.6	42.6	0.1	0.5	0.2	0.7
542200	107.6	92.9	0.22	1317.1	1022.9	161.7	59.2	220.9	170.7	89.3	42.2	0.9	3.0	0.2	1.3
542210	105.7	81.5	0.20	829.3	1077.3	119.0	46.1	165.1	123.0	62.2	43.0	0.6	2.5	0.2	1.7
542220	91.6	111.5	0.31	707.0	2046.1	153.5	58.1	211.6	133.5	67.4	90.4	0.5	3.3	0.6	3.2
542230	139.3	136.9	0.25	1443.3	1371.2	190.5	68.2	258.7	190.7	100.8	60.7	1.0	3.4	0.4	1.8
542240	46.2	42.8	0.24	333.1	519.7	60.4	19.5	79.9	44.3	24.6	27.2	0.2	0.9	0.2	0.6
542250	101.9	106.9	0.27	628.0	496.8	81.7	29.1	110.8	79.6	41.9	21.7	0.4	1.4	0.1	0.6
542260	229.4	316.9	0.35	1391.6	1556.8	198.9	69.3	268.2	186.0	99.4	72.8	1.0	3.4	0.4	2.0
542270	96.0	138.6	0.37	492.7	562.3	123.4	17.2	166.1	61.4	22.1	46.1	0.2	1.2	0.2	0.7

TABLE 11-13

CYPRESS CREEK WATERSHED UNIT AREA POLLUTANT LOAD BY SUBBASIN (LBS/ACRE) USING AVERAGE ANNUAL RAINFALL

Subbasin ID	Area (acres)	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
500100	390.8	25.2	117.3	4.9	1.3	6.7	1.0	0.6	1.9	0.038	0.130	0.272	0.182
500200	1038.0	3.9	26.6	1.3	0.3	1.7	0.4	0.3	0.9	0.006	0.025	0.041	0.036
500300	1682.9	8.8	36.0	1.7	0.5	2.2	0.1	0.2	0.6	0.012	0.033	0.086	0.052
500400	1761.3	14.8	45.5	2.3	0.7	3.1	0.9	0.6	0.7	0.018	0.051	0.099	0.066
500500	577.2	18.5	28.3	2.4	0.8	3.2	1.9	1.0	0.6	0.017	0.049	0.047	0.041
500600	1910.8	12.7	33.6	2.3	0.7	3.0	0.7	0.5	0.7	0.014	0.036	0.069	0.046
500700	1664.7	11.3	36.4	2.2	0.7	2.9	0.5	0.4	0.7	0.013	0.035	0.076	0.050
500900	1117.6	14.2	36.9	2.2	0.7	2.9	0.9	0.6	0.6	0.016	0.043	0.078	0.053
501000	1194.9	17.3	49.3	2.8	0.9	3.7	0.9	0.6	0.8	0.020	0.054	0.109	0.071
510100	160.6	8.0	73.2	3.5	1.0	4.4	1.1	0.8	2.9	0.011	0.058	0.084	0.095
510150	99.0	2.5	34.7	2.2	0.6	2.8	0.7	0.5	1.9	0.002	0.023	0.013	0.039
510200	43.3	10.3	96.3	4.9	2.0	7.1	3.6	1.5	3.2	0.005	0.140	0.070	0.178
510250	16.1	36.1	396.6	5.6	2.0	7.6	0.6	0.7	1.6	0.059	0.164	1.386	0.614
510260	23.1	26.5	201.1	10.6	3.7	15.0	6.1	2.6	5.8	0.018	0.267	0.327	0.356
510300	144.9	12.1	99.5	5.8	2.0	8.0	3.0	1.3	3.2	0.006	0.125	0.089	0.165
510400	60.3	12.7	124.3	6.8	3.0	9.8	5.3	2.2	4.8	0.005	0.187	0.025	0.234
510450	53.1	7.7	85.5	4.0	2.0	6.1	3.9	1.6	3.2	0.003	0.138	0.018	0.171
510451	14.5	17.0	189.4	8.9	4.4	13.4	8.7	3.6	7.0	0.007	0.307	0.039	0.379
510500	162.0	12.8	112.2	6.6	2.0	8.8	2.7	1.4	4.0	0.008	0.118	0.119	0.166
510600	42.7	16.6	182.9	8.8	4.2	13.0	8.2	3.4	6.7	0.006	0.291	0.038	0.360
510700	43.2	17.3	127.8	8.0	1.8	10.2	1.6	1.0	3.8	0.013	0.105	0.235	0.164
510800	108.2	3.6	67.3	3.8	1.0	4.8	1.4	1.0	3.8	0.004	0.046	0.028	0.078
510900	81.3	5.5	79.1	4.3	1.4	5.7	2.3	1.2	3.8	0.004	0.078	0.026	0.113
511100	97.3	20.0	114.8	6.1	1.9	8.1	1.7	0.9	2.6	0.022	0.117	0.151	0.170
511200	142.3	16.2	109.3	6.5	1.7	8.2	1.3	0.9	3.8	0.019	0.104	0.118	0.148
511300	96.8	7.1	78.4	4.9	1.3	6.2	1.7	1.0	4.4	0.005	0.073	0.033	0.128
511400	37.6	3.3	62.7	3.6	0.9	4.5	1.3	0.9	3.6	0.003	0.043	0.026	0.073
511500	81.0	6.4	76.2	3.7	1.7	5.4	3.2	1.4	3.1	0.003	0.111	0.019	0.141
511600	24.3	7.8	105.4	5.4	2.1	7.5	3.7	1.8	4.8	0.004	0.129	0.031	0.173
520100	195.8	10.7	24.5	2.8	0.8	3.7	1.5	1.0	2.0	0.008	0.042	0.014	0.032
520200	120.5	5.6	8.9	0.9	0.3	1.2	0.9	0.4	0.4	0.004	0.019	0.002	0.014
520300	76.0	1.8	34.8	2.0	0.5	2.5	0.7	0.5	2.0	0.002	0.024	0.015	0.040
520400	174.8	22.3	60.5	4.6	1.2	6.2	2.5	1.4	2.1	0.018	0.073	0.161	0.081
520600	22.5	10.8	58.6	3.2	0.5	4.3	0.4	0.3	1.3	0.011	0.050	0.253	0.084
520700	73.1	12.8	145.7	3.8	1.2	5.0	1.2	0.9	2.7	0.019	0.073	0.387	0.210
520750	29.9	16.7	80.5	4.4	0.6	5.9	0.4	0.3	1.3	0.017	0.070	0.402	0.120
520800	58.7	14.8	94.3	5.2	1.0	6.9	1.1	0.8	2.9	0.015	0.077	0.318	0.129
520900	136.6	5.6	66.0	3.9	1.0	5.0	1.6	1.1	3.7	0.005	0.049	0.027	0.077
521000	67.1	19.4	63.3	4.8	1.5	6.3	3.2	1.9	3.3	0.015	0.072	0.030	0.076
521100	118.5	15.7	48.5	3.8	1.2	5.0	2.6	1.5	2.6	0.012	0.057	0.018	0.058
521200	23.6	22.0	248.7	3.9	1.3	5.2	0.6	0.6	1.7	0.036	0.105	0.840	0.381
521300	41.6	63.6	544.2	9.7	3.8	13.5	4.1	2.4	3.2	0.087	0.292	1.803	0.863
521400	62.9	5.8	32.3	3.3	0.9	4.1	0.9	0.6	2.3	0.003	0.025	0.013	0.037
521500	154.6	15.2	24.9	3.0	0.9	3.9	2.2	1.2	1.6	0.011	0.044	0.009	0.031
521600	125.3	13.6	58.2	5.8	2.1	7.9	2.3	1.8	3.8	0.008	0.122	0.017	0.087
521700	36.4	9.0	104.0	5.5	2.1	7.6	3.8	1.8	4.7	0.005	0.128	0.030	0.170
521800	428.8	16.3	32.8	2.5	0.8	3.4	1.8	1.0	1.0	0.014	0.049	0.041	0.045
521900	36.0	30.5	49.5	3.8	1.4	5.2	3.2	1.7	1.0	0.028	0.084	0.082	0.072
522000	65.3	16.4	72.4	3.5	1.0	4.6	1.1	0.7	1.4	0.020	0.071	0.119	0.100

TABLE 11-13

CYPRESS CREEK WATERSHED UNIT AREA POLLUTANT LOAD BY SUBBASIN (LBS/ACRE) USING AVERAGE ANNUAL RAINFALL *(Continued)*

Subbasin ID	Area (acres)	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
522300	16.6	38.3	31.3	4.8	1.7	6.5	5.0	2.6	1.3	0.027	0.089	0.007	0.041
530100	141.5	17.3	49.4	4.0	1.3	5.3	2.8	1.5	2.5	0.013	0.062	0.017	0.061
530150	74.0	20.8	141.8	7.5	3.5	11.0	7.3	3.2	5.3	0.011	0.237	0.030	0.277
530200	89.8	29.2	53.0	5.2	1.7	6.9	4.2	2.3	2.7	0.021	0.085	0.018	0.065
530300	33.1	3.7	70.3	4.0	1.0	5.0	1.5	1.0	4.0	0.004	0.048	0.030	0.081
530500	103.3	10.4	105.3	5.5	2.2	7.8	4.2	2.0	4.6	0.006	0.139	0.030	0.179
540100	59.2	24.6	24.4	4.4	1.2	5.9	3.4	1.7	2.1	0.017	0.066	0.008	0.033
540200	55.4	15.3	168.7	8.0	3.9	11.9	7.7	3.2	6.3	0.006	0.271	0.035	0.335
540300	112.0	26.6	121.3	4.9	1.6	6.5	3.0	1.8	2.5	0.026	0.093	0.295	0.174
540400	45.8	7.6	12.0	2.8	0.4	3.6	1.2	0.6	2.0	0.005	0.027	0.006	0.015
540450	75.2	23.4	54.0	4.6	1.6	6.2	3.9	2.0	2.5	0.017	0.087	0.016	0.077
540500	154.4	10.7	29.4	2.4	0.8	3.2	1.7	1.0	1.6	0.008	0.037	0.011	0.035
540600	198.7	19.9	55.6	4.6	1.4	6.0	3.2	1.8	2.9	0.015	0.069	0.021	0.067
540700	336.9	14.2	25.3	2.3	0.8	3.1	1.7	0.9	0.8	0.011	0.041	0.020	0.033
540800	107.9	7.8	32.5	2.6	0.7	3.3	1.2	0.7	1.6	0.006	0.037	0.011	0.037
540900	30.4	36.8	213.7	9.7	2.7	12.4	1.5	1.2	3.8	0.049	0.188	0.344	0.292
541000	46.5	5.9	72.9	4.6	1.1	5.7	1.3	0.9	3.3	0.004	0.053	0.024	0.083
541100	196.0	39.5	85.0	5.2	1.8	7.1	3.7	2.1	1.6	0.040	0.121	0.160	0.124
541150	1422.5	14.5	64.1	3.7	1.3	5.0	2.0	1.0	1.8	0.014	0.079	0.068	0.100
541200	93.4	22.8	27.0	3.8	1.2	5.0	2.9	1.6	1.4	0.016	0.053	0.007	0.031
541300	12.6	0.7	12.8	0.7	0.2	0.9	0.3	0.2	0.7	0.001	0.009	0.005	0.015
542010	71.5	9.4	15.9	1.6	0.5	2.1	1.3	0.7	0.8	0.007	0.027	0.005	0.020
542020	81.6	22.4	55.6	4.8	1.5	6.3	3.4	1.9	2.8	0.016	0.074	0.020	0.067
542030	37.3	17.0	61.7	4.7	1.4	6.1	2.9	1.7	3.2	0.013	0.067	0.023	0.073
542040	42.7	8.2	33.7	2.5	0.7	3.1	1.3	0.8	1.9	0.005	0.032	0.013	0.039
542050	60.9	4.0	72.1	4.2	1.1	5.3	1.6	1.1	4.2	0.004	0.050	0.031	0.084
542060	103.5	14.5	47.0	3.7	1.1	4.8	2.4	1.4	2.5	0.011	0.054	0.018	0.056
542070	30.2	19.5	20.3	2.7	0.9	3.6	2.6	1.4	0.9	0.014	0.048	0.006	0.026
542080	56.7	27.1	32.3	3.9	1.4	5.3	3.7	2.0	1.5	0.019	0.069	0.009	0.041
542090	43.2	36.1	31.8	4.6	1.7	6.3	4.7	2.5	1.4	0.026	0.085	0.008	0.041
542100	258.2	9.9	19.7	3.4	0.6	4.4	1.1	0.5	1.5	0.004	0.022	0.006	0.019
542110	23.3	5.6	40.1	2.6	0.7	3.3	1.3	0.8	2.2	0.005	0.034	0.016	0.047
542120	141.0	9.4	51.7	3.6	1.0	4.6	1.8	1.1	2.8	0.007	0.047	0.020	0.060
542130	50.5	32.5	32.4	4.4	1.6	5.9	4.3	2.3	1.5	0.023	0.079	0.009	0.042
542140	93.1	29.6	29.5	4.0	1.4	5.4	3.9	2.1	1.3	0.021	0.071	0.008	0.038
542150	59.4	2.8	24.5	2.1	0.5	2.6	0.4	0.4	1.5	0.002	0.014	0.009	0.025
542160	114.0	3.3	21.6	2.0	0.5	2.5	0.4	0.3	1.4	0.002	0.012	0.007	0.021
542170	42.4	35.9	25.2	4.3	1.6	5.9	4.6	2.4	1.0	0.025	0.080	0.005	0.033
542180	163.5	26.4	41.0	4.3	1.5	5.8	3.7	2.0	2.0	0.019	0.072	0.013	0.050
542190	76.8	5.8	25.9	2.4	0.6	3.1	0.8	0.5	1.6	0.004	0.020	0.009	0.027
542200	107.6	34.6	26.8	4.2	1.6	5.8	4.5	2.3	1.1	0.025	0.079	0.006	0.035
542210	105.7	22.2	28.8	3.2	1.2	4.4	3.3	1.7	1.1	0.015	0.068	0.006	0.046
542220	91.6	21.8	63.1	4.7	1.8	6.5	4.1	2.1	2.8	0.015	0.102	0.017	0.100
542230	139.3	29.3	27.8	3.9	1.4	5.2	3.9	2.0	1.2	0.021	0.070	0.007	0.036
542240	46.2	20.4	31.8	3.7	1.2	4.9	2.7	1.5	1.7	0.014	0.052	0.009	0.037
542250	101.9	17.4	13.8	2.3	0.8	3.1	2.2	1.2	0.6	0.012	0.039	0.003	0.017
542260	229.4	17.1	19.2	2.4	0.9	3.3	2.3	1.2	0.9	0.012	0.042	0.005	0.024
542270	96.0	14.5	16.5	3.6	0.5	4.9	1.8	0.6	1.4	0.007	0.035	0.006	0.020

TABLE 11-14

CYPRESS CREEK WATERSHED UNIT AREA POLLUTANT LOAD BY SUBBASIN (LBS/ACRE) USING WET SEASON AVERAGE RAINFALL

Subbasin ID	Area (acres)	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
500100	390.8	16.3	76.0	3.2	0.9	4.4	0.6	0.4	1.2	0.025	0.084	0.176	0.118
500200	1038.0	2.5	17.3	0.9	0.2	1.1	0.2	0.2	0.6	0.004	0.016	0.026	0.024
500300	1682.9	5.7	23.3	1.1	0.3	1.4	0.1	0.1	0.4	0.008	0.021	0.055	0.034
500400	1761.3	9.6	29.5	1.5	0.5	2.0	0.6	0.4	0.5	0.012	0.033	0.064	0.043
500500	577.2	12.0	18.3	1.5	0.5	2.1	1.2	0.7	0.4	0.011	0.032	0.031	0.026
500600	1910.8	8.2	21.7	1.5	0.5	1.9	0.5	0.3	0.4	0.009	0.023	0.045	0.030
500700	1664.7	7.3	23.6	1.4	0.4	1.9	0.3	0.2	0.5	0.009	0.023	0.049	0.033
500900	1117.6	9.2	23.9	1.4	0.5	1.9	0.6	0.4	0.4	0.010	0.028	0.050	0.034
501000	1194.9	11.2	31.9	1.8	0.6	2.4	0.6	0.4	0.5	0.013	0.035	0.071	0.046
510100	160.6	5.2	47.4	2.2	0.6	2.9	0.7	0.5	1.9	0.007	0.037	0.054	0.061
510150	99.0	1.6	22.5	1.4	0.4	1.8	0.4	0.3	1.2	0.001	0.015	0.009	0.025
510200	43.3	6.7	62.4	3.2	1.3	4.6	2.4	1.0	2.1	0.003	0.090	0.045	0.115
510250	16.1	23.4	256.9	3.7	1.3	4.9	0.4	0.4	1.0	0.038	0.106	0.898	0.398
510260	23.1	17.2	130.3	6.9	2.4	9.7	4.0	1.7	3.7	0.012	0.173	0.212	0.230
510300	144.9	7.9	64.5	3.8	1.3	5.2	1.9	0.9	2.1	0.004	0.081	0.058	0.107
510400	60.3	8.3	80.6	4.4	1.9	6.4	3.4	1.5	3.1	0.003	0.121	0.016	0.152
510450	53.1	5.0	55.4	2.6	1.3	3.9	2.6	1.1	2.1	0.002	0.090	0.011	0.111
510451	14.5	11.0	122.7	5.8	2.9	8.7	5.7	2.3	4.5	0.004	0.199	0.025	0.245
510500	162.0	8.3	72.7	4.3	1.3	5.7	1.7	0.9	2.6	0.005	0.076	0.077	0.108
510600	42.7	10.7	118.5	5.7	2.7	8.4	5.3	2.2	4.3	0.004	0.188	0.024	0.233
510700	43.2	11.2	82.8	5.2	1.1	6.6	1.1	0.7	2.5	0.009	0.068	0.153	0.106
510800	108.2	2.3	43.6	2.5	0.6	3.1	0.9	0.6	2.5	0.002	0.030	0.018	0.051
510900	81.3	3.5	51.2	2.8	0.9	3.7	1.5	0.8	2.5	0.002	0.051	0.017	0.073
511100	97.3	13.0	74.4	4.0	1.3	5.2	1.1	0.6	1.7	0.014	0.076	0.098	0.110
511200	142.3	10.5	70.8	4.2	1.1	5.3	0.9	0.6	2.4	0.012	0.067	0.076	0.096
511300	96.8	4.6	50.8	3.2	0.8	4.0	1.1	0.6	2.9	0.003	0.047	0.022	0.083
511400	37.6	2.1	40.6	2.3	0.6	2.9	0.9	0.6	2.3	0.002	0.028	0.017	0.047
511500	81.0	4.1	49.4	2.4	1.1	3.5	2.1	0.9	2.0	0.002	0.072	0.012	0.092
511600	24.3	5.1	68.3	3.5	1.3	4.9	2.4	1.2	3.1	0.003	0.084	0.020	0.112
520100	195.8	6.9	15.9	1.8	0.5	2.4	1.0	0.7	1.3	0.005	0.027	0.009	0.021
520200	120.5	3.6	5.8	0.6	0.2	0.8	0.6	0.3	0.2	0.003	0.012	0.001	0.009
520300	76.0	1.2	22.5	1.3	0.3	1.6	0.5	0.3	1.3	0.001	0.015	0.009	0.026
520400	174.8	14.5	39.2	3.0	0.8	4.0	1.6	0.9	1.3	0.012	0.047	0.104	0.053
520600	22.5	7.0	37.9	2.1	0.3	2.8	0.3	0.2	0.9	0.007	0.032	0.164	0.055
520700	73.1	8.3	94.4	2.5	0.7	3.2	0.7	0.6	1.8	0.012	0.047	0.251	0.136
520750	29.9	10.8	52.2	2.8	0.4	3.8	0.3	0.2	0.9	0.011	0.046	0.260	0.078
520800	58.7	9.6	61.1	3.4	0.6	4.5	0.7	0.5	1.9	0.010	0.050	0.206	0.084
520900	136.6	3.6	42.7	2.5	0.7	3.2	1.1	0.7	2.4	0.003	0.032	0.018	0.050
521000	67.1	12.6	41.0	3.1	1.0	4.1	2.1	1.2	2.1	0.010	0.047	0.020	0.049
521100	118.5	10.1	31.4	2.5	0.8	3.2	1.7	1.0	1.7	0.008	0.037	0.012	0.038
521200	23.6	14.2	161.1	2.5	0.9	3.4	0.4	0.4	1.1	0.023	0.068	0.544	0.247
521300	41.6	41.2	352.5	6.3	2.5	8.8	2.6	1.6	2.0	0.056	0.189	1.168	0.559
521400	62.9	3.8	20.9	2.1	0.6	2.7	0.6	0.4	1.5	0.002	0.016	0.008	0.024
521500	154.6	9.8	16.1	1.9	0.6	2.5	1.4	0.8	1.0	0.007	0.028	0.006	0.020
521600	125.3	8.8	37.7	3.7	1.4	5.1	1.5	1.1	2.5	0.005	0.079	0.011	0.056
521700	36.4	5.8	67.4	3.6	1.4	4.9	2.4	1.2	3.0	0.003	0.083	0.020	0.110
521800	428.8	10.6	21.3	1.6	0.5	2.2	1.2	0.7	0.6	0.009	0.031	0.027	0.029
521900	36.0	19.8	32.1	2.5	0.9	3.4	2.0	1.1	0.6	0.018	0.055	0.053	0.047
522000	65.3	10.6	46.9	2.3	0.7	3.0	0.7	0.5	0.9	0.013	0.046	0.077	0.065

TABLE 11-14

CYPRESS CREEK WATERSHED UNIT AREA POLLUTANT LOAD BY SUBBASIN (LBS/ACRE) USING WET SEASON AVERAGE RAINFALL

(Continued)

Subbasin ID	Area (acres)	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
522300	16.6	16.3	76.0	3.2	0.9	4.4	0.6	0.4	1.2	0.025	0.084	0.176	0.118
530100	141.5	2.5	17.3	0.9	0.2	1.1	0.2	0.2	0.6	0.004	0.016	0.026	0.024
530150	74.0	5.7	23.3	1.1	0.3	1.4	0.1	0.1	0.4	0.008	0.021	0.055	0.034
530200	89.8	9.6	29.5	1.5	0.5	2.0	0.6	0.4	0.5	0.012	0.033	0.064	0.043
530300	33.1	12.0	18.3	1.5	0.5	2.1	1.2	0.7	0.4	0.011	0.032	0.031	0.026
530500	103.3	8.2	21.7	1.5	0.5	1.9	0.5	0.3	0.4	0.009	0.023	0.045	0.030
540100	59.2	7.3	23.6	1.4	0.4	1.9	0.3	0.2	0.5	0.009	0.023	0.049	0.033
540200	55.4	9.2	23.9	1.4	0.5	1.9	0.6	0.4	0.4	0.010	0.028	0.050	0.034
540300	112.0	11.2	31.9	1.8	0.6	2.4	0.6	0.4	0.5	0.013	0.035	0.071	0.046
540400	45.8	5.2	47.4	2.2	0.6	2.9	0.7	0.5	1.9	0.007	0.037	0.054	0.061
540450	75.2	1.6	22.5	1.4	0.4	1.8	0.4	0.3	1.2	0.001	0.015	0.009	0.025
540500	154.4	6.7	62.4	3.2	1.3	4.6	2.4	1.0	2.1	0.003	0.090	0.045	0.115
540600	198.7	23.4	256.9	3.7	1.3	4.9	0.4	0.4	1.0	0.038	0.106	0.898	0.398
540700	336.9	17.2	130.3	6.9	2.4	9.7	4.0	1.7	3.7	0.012	0.173	0.212	0.230
540800	107.9	7.9	64.5	3.8	1.3	5.2	1.9	0.9	2.1	0.004	0.081	0.058	0.107
540900	30.4	8.3	80.6	4.4	1.9	6.4	3.4	1.5	3.1	0.003	0.121	0.016	0.152
541000	46.5	5.0	55.4	2.6	1.3	3.9	2.6	1.1	2.1	0.002	0.090	0.011	0.111
541100	196.0	11.0	122.7	5.8	2.9	8.7	5.7	2.3	4.5	0.004	0.199	0.025	0.245
541150	1422.5	8.3	72.7	4.3	1.3	5.7	1.7	0.9	2.6	0.005	0.076	0.077	0.108
541200	93.4	10.7	118.5	5.7	2.7	8.4	5.3	2.2	4.3	0.004	0.188	0.024	0.233
541300	12.6	11.2	82.8	5.2	1.1	6.6	1.1	0.7	2.5	0.009	0.068	0.153	0.106
542010	71.5	2.3	43.6	2.5	0.6	3.1	0.9	0.6	2.5	0.002	0.030	0.018	0.051
542020	81.6	3.5	51.2	2.8	0.9	3.7	1.5	0.8	2.5	0.002	0.051	0.017	0.073
542030	37.3	13.0	74.4	4.0	1.3	5.2	1.1	0.6	1.7	0.014	0.076	0.098	0.110
542040	42.7	10.5	70.8	4.2	1.1	5.3	0.9	0.6	2.4	0.012	0.067	0.076	0.096
542050	60.9	4.6	50.8	3.2	0.8	4.0	1.1	0.6	2.9	0.003	0.047	0.022	0.083
542060	103.5	2.1	40.6	2.3	0.6	2.9	0.9	0.6	2.3	0.002	0.028	0.017	0.047
542070	30.2	4.1	49.4	2.4	1.1	3.5	2.1	0.9	2.0	0.002	0.072	0.012	0.092
542080	56.7	5.1	68.3	3.5	1.3	4.9	2.4	1.2	3.1	0.003	0.084	0.020	0.112
542090	43.2	6.9	15.9	1.8	0.5	2.4	1.0	0.7	1.3	0.005	0.027	0.009	0.021
542100	258.2	3.6	5.8	0.6	0.2	0.8	0.6	0.3	0.2	0.003	0.012	0.001	0.009
542110	23.3	1.2	22.5	1.3	0.3	1.6	0.5	0.3	1.3	0.001	0.015	0.009	0.026
542120	141.0	14.5	39.2	3.0	0.8	4.0	1.6	0.9	1.3	0.012	0.047	0.104	0.053
542130	50.5	7.0	37.9	2.1	0.3	2.8	0.3	0.2	0.9	0.007	0.032	0.164	0.055
542140	93.1	8.3	94.4	2.5	0.7	3.2	0.7	0.6	1.8	0.012	0.047	0.251	0.136
542150	59.4	10.8	52.2	2.8	0.4	3.8	0.3	0.2	0.9	0.011	0.046	0.260	0.078
542160	114.0	9.6	61.1	3.4	0.6	4.5	0.7	0.5	1.9	0.010	0.050	0.206	0.084
542170	42.4	3.6	42.7	2.5	0.7	3.2	1.1	0.7	2.4	0.003	0.032	0.018	0.050
542180	163.5	12.6	41.0	3.1	1.0	4.1	2.1	1.2	2.1	0.010	0.047	0.020	0.049
542190	76.8	10.1	31.4	2.5	0.8	3.2	1.7	1.0	1.7	0.008	0.037	0.012	0.038
542200	107.6	14.2	161.1	2.5	0.9	3.4	0.4	0.4	1.1	0.023	0.068	0.544	0.247
542210	105.7	41.2	352.5	6.3	2.5	8.8	2.6	1.6	2.0	0.056	0.189	1.168	0.559
542220	91.6	3.8	20.9	2.1	0.6	2.7	0.6	0.4	1.5	0.002	0.016	0.008	0.024
542230	139.3	9.8	16.1	1.9	0.6	2.5	1.4	0.8	1.0	0.007	0.028	0.006	0.020
542240	46.2	8.8	37.7	3.7	1.4	5.1	1.5	1.1	2.5	0.005	0.079	0.011	0.056
542250	101.9	5.8	67.4	3.6	1.4	4.9	2.4	1.2	3.0	0.003	0.083	0.020	0.110
542260	229.4	10.6	21.3	1.6	0.5	2.2	1.2	0.7	0.6	0.009	0.031	0.027	0.029
542270	96.0	19.8	32.1	2.5	0.9	3.4	2.0	1.1	0.6	0.018	0.055	0.053	0.047

TABLE 11-15

CYPRESS CREEK WATERSHED UNIT AREA POLLUTANT LOAD BY SUBBASIN (LBS/ACRE) USING DRY SEASON AVERAGE RAINFALL

Subbasin ID	Area (acres)	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
500100	390.8	8.9	41.5	1.7	0.5	2.4	0.3	0.2	0.7	0.013	0.046	0.096	0.065
500200	1038.0	1.4	9.4	0.5	0.1	0.6	0.1	0.1	0.3	0.002	0.009	0.014	0.013
500300	1682.9	3.1	12.8	0.6	0.2	0.8	0.0	0.1	0.2	0.004	0.012	0.030	0.019
500400	1761.3	5.2	16.1	0.8	0.3	1.1	0.3	0.2	0.3	0.006	0.018	0.035	0.023
500500	577.2	6.6	10.0	0.8	0.3	1.1	0.7	0.4	0.2	0.006	0.017	0.017	0.014
500600	1910.8	4.5	11.9	0.8	0.2	1.1	0.2	0.2	0.2	0.005	0.013	0.024	0.016
500700	1664.7	4.0	12.9	0.8	0.2	1.0	0.2	0.1	0.3	0.005	0.013	0.027	0.018
500900	1117.6	5.0	13.1	0.8	0.3	1.0	0.3	0.2	0.2	0.006	0.015	0.027	0.019
501000	1194.9	6.1	17.5	1.0	0.3	1.3	0.3	0.2	0.3	0.007	0.019	0.039	0.025
510100	160.6	2.8	25.9	1.2	0.3	1.6	0.4	0.3	1.0	0.004	0.020	0.030	0.034
510150	99.0	0.9	12.3	0.8	0.2	1.0	0.2	0.2	0.7	0.001	0.008	0.005	0.014
510200	43.3	3.6	34.1	1.7	0.7	2.5	1.3	0.5	1.1	0.002	0.049	0.025	0.063
510250	16.1	12.8	140.4	2.0	0.7	2.7	0.2	0.2	0.6	0.021	0.058	0.491	0.217
510260	23.1	9.4	71.2	3.8	1.3	5.3	2.2	0.9	2.0	0.006	0.095	0.116	0.126
510300	144.9	4.3	35.2	2.1	0.7	2.8	1.1	0.5	1.1	0.002	0.044	0.032	0.059
510400	60.3	4.5	44.0	2.4	1.1	3.5	1.9	0.8	1.7	0.002	0.066	0.009	0.083
510450	53.1	2.7	30.3	1.4	0.7	2.1	1.4	0.6	1.1	0.001	0.049	0.006	0.061
510451	14.5	6.0	67.1	3.2	1.6	4.7	3.1	1.3	2.5	0.002	0.109	0.014	0.134
510500	162.0	4.5	39.7	2.3	0.7	3.1	1.0	0.5	1.4	0.003	0.042	0.042	0.059
510600	42.7	5.9	64.8	3.1	1.5	4.6	2.9	1.2	2.4	0.002	0.103	0.013	0.127
510700	43.2	6.1	45.3	2.8	0.6	3.6	0.6	0.4	1.4	0.005	0.037	0.083	0.058
510800	108.2	1.3	23.8	1.4	0.4	1.7	0.5	0.4	1.4	0.001	0.016	0.010	0.028
510900	81.3	1.9	28.0	1.5	0.5	2.0	0.8	0.4	1.4	0.001	0.028	0.009	0.040
511100	97.3	7.1	40.7	2.2	0.7	2.9	0.6	0.3	0.9	0.008	0.041	0.053	0.060
511200	142.3	5.7	38.7	2.3	0.6	2.9	0.5	0.3	1.3	0.007	0.037	0.042	0.052
511300	96.8	2.5	27.8	1.7	0.4	2.2	0.6	0.4	1.6	0.002	0.026	0.012	0.045
511400	37.6	1.2	22.2	1.3	0.3	1.6	0.5	0.3	1.3	0.001	0.015	0.009	0.026
511500	81.0	2.2	27.0	1.3	0.6	1.9	1.1	0.5	1.1	0.001	0.039	0.007	0.050
511600	24.3	2.8	37.3	1.9	0.7	2.7	1.3	0.6	1.7	0.002	0.046	0.011	0.061
520100	195.8	3.8	8.7	1.0	0.3	1.3	0.5	0.4	0.7	0.003	0.015	0.005	0.011
520200	120.5	2.0	3.2	0.3	0.1	0.4	0.3	0.2	0.1	0.001	0.007	0.001	0.005
520300	76.0	0.6	12.3	0.7	0.2	0.9	0.3	0.2	0.7	0.001	0.008	0.005	0.014
520400	174.8	7.9	21.4	1.6	0.4	2.2	0.9	0.5	0.7	0.006	0.026	0.057	0.029
520600	22.5	3.8	20.7	1.1	0.2	1.5	0.2	0.1	0.5	0.004	0.018	0.090	0.030
520700	73.1	4.5	51.6	1.4	0.4	1.8	0.4	0.3	1.0	0.007	0.026	0.137	0.074
520750	29.9	5.9	28.5	1.5	0.2	2.1	0.1	0.1	0.5	0.006	0.025	0.142	0.042
520800	58.7	5.2	33.4	1.9	0.3	2.5	0.4	0.3	1.0	0.005	0.027	0.113	0.046
520900	136.6	2.0	23.4	1.4	0.4	1.8	0.6	0.4	1.3	0.002	0.017	0.010	0.027
521000	67.1	6.9	22.4	1.7	0.5	2.2	1.1	0.7	1.2	0.005	0.026	0.011	0.027
521100	118.5	5.5	17.2	1.4	0.4	1.8	0.9	0.5	0.9	0.004	0.020	0.006	0.021
521200	23.6	7.8	88.1	1.4	0.5	1.8	0.2	0.2	0.6	0.013	0.037	0.297	0.135
521300	41.6	22.5	192.7	3.4	1.3	4.8	1.4	0.9	1.1	0.031	0.103	0.638	0.306
521400	62.9	2.1	11.4	1.2	0.3	1.5	0.3	0.2	0.8	0.001	0.009	0.005	0.013
521500	154.6	5.4	8.8	1.0	0.3	1.4	0.8	0.4	0.6	0.004	0.016	0.003	0.011
521600	125.3	4.8	20.6	2.0	0.7	2.8	0.8	0.6	1.4	0.003	0.043	0.006	0.031
521700	36.4	3.2	36.8	1.9	0.7	2.7	1.3	0.7	1.6	0.002	0.045	0.011	0.060
521800	428.8	5.8	11.6	0.9	0.3	1.2	0.6	0.4	0.3	0.005	0.017	0.015	0.016
521900	36.0	10.8	17.5	1.4	0.5	1.9	1.1	0.6	0.3	0.010	0.030	0.029	0.025
522000	65.3	5.8	25.6	1.2	0.4	1.6	0.4	0.2	0.5	0.007	0.025	0.042	0.035

TABLE 11-15

CYPRESS CREEK WATERSHED UNIT AREA POLLUTANT LOAD BY SUBBASIN (LBS/ACRE) USING DRY SEASON AVERAGE RAINFALL

(Continued)

Subbasin ID	Area (acres)	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
522300	16.6	1.5	14.1	0.9	0.2	1.1	0.4	0.2	0.8	0.001	0.011	0.006	0.016
530100	141.5	8.5	21.0	1.6	0.4	2.2	0.7	0.4	0.5	0.007	0.026	0.085	0.030
530150	74.0	13.6	11.1	1.7	0.6	2.3	1.8	0.9	0.5	0.010	0.031	0.003	0.015
530200	89.8	6.1	17.5	1.4	0.4	1.9	1.0	0.5	0.9	0.004	0.022	0.006	0.021
530300	33.1	7.4	50.2	2.6	1.3	3.9	2.6	1.1	1.9	0.004	0.084	0.011	0.098
530500	103.3	10.3	18.8	1.8	0.6	2.4	1.5	0.8	0.9	0.008	0.030	0.006	0.023
540100	59.2	1.3	24.9	1.4	0.4	1.8	0.5	0.4	1.4	0.001	0.017	0.010	0.029
540200	55.4	3.7	37.3	2.0	0.8	2.7	1.5	0.7	1.6	0.002	0.049	0.010	0.063
540300	112.0	8.7	8.7	1.6	0.4	2.1	1.2	0.6	0.7	0.006	0.023	0.003	0.012
540400	45.8	5.4	59.7	2.8	1.4	4.2	2.7	1.1	2.2	0.002	0.096	0.013	0.119
540450	75.2	9.4	42.9	1.7	0.6	2.3	1.1	0.6	0.9	0.009	0.033	0.105	0.062
540500	154.4	2.7	4.3	1.0	0.2	1.3	0.4	0.2	0.7	0.002	0.009	0.002	0.005
540600	198.7	8.3	19.1	1.6	0.6	2.2	1.4	0.7	0.9	0.006	0.031	0.006	0.027
540700	336.9	3.8	10.4	0.9	0.3	1.1	0.6	0.3	0.6	0.003	0.013	0.004	0.012
540800	107.9	7.1	19.7	1.6	0.5	2.1	1.1	0.6	1.0	0.005	0.024	0.007	0.024
540900	30.4	5.0	9.0	0.8	0.3	1.1	0.6	0.3	0.3	0.004	0.014	0.007	0.012
541000	46.5	2.8	11.5	0.9	0.3	1.2	0.4	0.3	0.6	0.002	0.013	0.004	0.013
541100	196.0	13.0	75.7	3.4	0.9	4.4	0.5	0.4	1.3	0.017	0.066	0.122	0.103
541150	1422.5	2.1	25.8	1.6	0.4	2.0	0.5	0.3	1.2	0.001	0.019	0.008	0.029
541200	93.4	14.0	30.1	1.8	0.7	2.5	1.3	0.7	0.6	0.014	0.043	0.057	0.044
541300	12.6	5.1	22.7	1.3	0.5	1.8	0.7	0.4	0.7	0.005	0.028	0.024	0.035
542010	71.5	8.1	9.6	1.3	0.4	1.8	1.0	0.6	0.5	0.006	0.019	0.002	0.011
542020	81.6	0.2	4.5	0.3	0.1	0.3	0.1	0.1	0.3	0.000	0.003	0.002	0.005
542030	37.3	3.3	5.6	0.6	0.2	0.8	0.5	0.3	0.3	0.002	0.009	0.002	0.007
542040	42.7	7.9	19.7	1.7	0.5	2.2	1.2	0.7	1.0	0.006	0.026	0.007	0.024
542050	60.9	6.0	21.8	1.7	0.5	2.1	1.0	0.6	1.1	0.004	0.024	0.008	0.026
542060	103.5	2.9	11.9	0.9	0.2	1.1	0.5	0.3	0.7	0.002	0.011	0.005	0.014
542070	30.2	1.4	25.5	1.5	0.4	1.9	0.6	0.4	1.5	0.001	0.018	0.011	0.030
542080	56.7	5.1	16.7	1.3	0.4	1.7	0.9	0.5	0.9	0.004	0.019	0.006	0.020
542090	43.2	6.9	7.2	0.9	0.3	1.3	0.9	0.5	0.3	0.005	0.017	0.002	0.009
542100	258.2	9.6	11.4	1.4	0.5	1.9	1.3	0.7	0.5	0.007	0.024	0.003	0.014
542110	23.3	12.8	11.2	1.6	0.6	2.2	1.7	0.9	0.5	0.009	0.030	0.003	0.015
542120	141.0	3.5	7.0	1.2	0.2	1.5	0.4	0.2	0.5	0.002	0.008	0.002	0.007
542130	50.5	2.0	14.2	0.9	0.3	1.2	0.4	0.3	0.8	0.002	0.012	0.006	0.017
542140	93.1	3.3	18.3	1.3	0.4	1.6	0.6	0.4	1.0	0.003	0.017	0.007	0.021
542150	59.4	11.5	11.5	1.5	0.5	2.1	1.5	0.8	0.5	0.008	0.028	0.003	0.015
542160	114.0	10.5	10.4	1.4	0.5	1.9	1.4	0.7	0.5	0.007	0.025	0.003	0.013
542170	42.4	1.0	8.7	0.7	0.2	0.9	0.2	0.1	0.5	0.001	0.005	0.003	0.009
542180	163.5	1.2	7.6	0.7	0.2	0.9	0.1	0.1	0.5	0.001	0.004	0.003	0.008
542190	76.8	12.7	8.9	1.5	0.6	2.1	1.6	0.8	0.4	0.009	0.028	0.002	0.012
542200	107.6	9.3	14.5	1.5	0.5	2.1	1.3	0.7	0.7	0.007	0.026	0.005	0.018
542210	105.7	2.0	9.2	0.9	0.2	1.1	0.3	0.2	0.6	0.001	0.007	0.003	0.010
542220	91.6	12.2	9.5	1.5	0.6	2.1	1.6	0.8	0.4	0.009	0.028	0.002	0.013
542230	139.3	7.8	10.2	1.1	0.4	1.6	1.2	0.6	0.4	0.005	0.024	0.002	0.016
542240	46.2	7.7	22.3	1.7	0.6	2.3	1.5	0.7	1.0	0.005	0.036	0.006	0.035
542250	101.9	10.4	9.8	1.4	0.5	1.9	1.4	0.7	0.4	0.007	0.025	0.003	0.013
542260	229.4	7.2	11.3	1.3	0.4	1.7	1.0	0.5	0.6	0.005	0.019	0.003	0.013
542270	96.0	6.2	4.9	0.8	0.3	1.1	0.8	0.4	0.2	0.004	0.014	0.001	0.006

TABLE 11-16

CYPRESS CREEK WATERSHED UNIT AREA POLLUTANT LOAD RANKING BY SUBBASIN USING AVERAGE ANNUAL RAINFALL

Subbasin ID	BOD5	TSS	TN	TP	Oil and Grease	Cd	Cu	Pb	Zn	AVG LOAD
500100	82	86	77	20	47	95	87	90	88	86
500200	9	18	3	3	15	28	10	67	22	7
500300	27	38	5	1	2	51	15	77	42	22
500400	50	44	15	16	8	73	38	79	49	35
500500	66	22	20	49	3	69	35	69	31	28
500600	39	34	12	12	6	56	19	71	38	25
500700	37	39	10	8	9	55	17	73	40	26
500900	44	40	11	19	5	66	27	74	43	30
501000	63	47	28	18	11	81	42	80	52	41
510100	25	70	34	25	69	47	45	76	67	61
510150	3	36	9	11	46	5	7	31	27	14
510200	32	78	80	75	75	26	90	72	86	77
510250	95	98	84	9	37	98	91	98	98	98
510260	84	95	99	95	96	74	95	93	94	95
510300	38	79	87	66	74	33	84	78	79	78
510400	40	88	91	94	93	21	92	51	90	87
510450	22	76	65	84	73	7	88	40	83	75
510451	59	94	97	99	99	34	99	66	96	94
510500	41	84	90	61	87	40	81	83	80	84
510600	57	93	96	98	98	32	97	65	95	93
510700	62	89	92	40	83	54	78	87	78	89
510800	7	65	39	35	84	11	29	55	59	51
510900	12	73	56	54	85	13	64	53	71	71
511100	70	85	88	42	62	86	80	84	82	85
511200	54	83	89	31	81	78	76	81	77	83
511300	20	72	68	45	90	23	58	63	74	72
511400	5	60	35	33	79	8	26	52	54	45
511500	19	71	55	70	71	6	79	44	76	67
511600	23	82	82	79	94	19	86	62	84	80
520100	34	13	27	38	48	41	24	32	15	13
520200	15	1	2	17	1	16	4	1	1	2
520300	2	37	6	13	49	4	8	33	29	12
520400	76	58	69	58	52	75	59	86	61	66
520600	36	56	31	6	23	46	36	89	64	46
520700	42	91	44	26	64	76	60	95	89	90
520750	58	74	63	4	26	72	53	96	72	74
520800	49	77	79	24	68	64	63	92	75	76
520900	13	64	42	41	80	22	34	54	57	52
521000	67	62	73	71	77	61	57	59	56	68
521100	53	46	45	59	61	48	44	43	45	44
521200	74	97	48	10	42	94	77	97	97	97
521300	99	99	98	85	72	99	98	99	99	99
521400	17	30	30	15	56	10	9	28	24	17
521500	51	14	29	52	41	44	28	23	13	21
521600	43	55	86	56	86	38	83	37	66	55
521700	28	80	83	80	92	24	85	60	81	79
521800	55	33	24	48	16	60	33	68	35	29
521900	90	49	49	68	17	93	69	75	53	60
522000	56	68	36	23	31	80	55	82	70	70

TABLE 11-16

CYPRESS CREEK WATERSHED UNIT AREA POLLUTANT LOAD RANKING BY SUBBASIN USING AVERAGE ANNUAL RAINFALL

(Continued)

Subbasin ID	BOD5	TSS	TN	TP	Oil and Grease	Cd	Cu	Pb	Zn	AVG LOAD
522300	11	41	18	21	54	9	13	34	37	24
530100	80	57	67	51	24	82	61	88	65	65
530150	97	26	76	93	22	92	73	16	32	53
530200	64	48	52	63	57	52	46	38	47	48
530300	72	90	93	96	95	43	94	58	91	91
530500	87	51	78	88	63	85	70	42	48	69
540100	8	66	47	37	88	14	32	56	60	54
540200	33	81	85	87	91	29	89	57	87	81
540300	81	11	60	73	53	71	47	17	17	33
540400	52	92	94	97	97	30	96	64	93	92
540450	85	87	74	67	58	91	74	91	85	88
540500	21	2	25	28	50	25	12	10	2	3
540600	79	52	70	82	60	70	72	36	58	62
540700	35	24	19	44	36	39	20	26	19	19
540800	69	53	64	69	70	62	51	48	50	58
540900	45	16	16	43	10	45	23	46	16	16
541000	24	32	23	27	40	31	21	27	23	18
541100	96	96	95	36	82	97	93	94	92	96
541150	18	69	57	30	78	15	40	50	62	59
541200	98	75	81	76	39	96	82	85	73	82
541300	48	63	46	50	44	57	67	70	69	57
542010	78	20	43	65	30	67	41	13	14	31
542020	1	3	1	2	7	1	1	6	3	1
542030	29	5	4	34	12	36	11	4	6	5
542040	77	54	71	74	67	68	62	45	51	63
542050	60	59	66	64	76	53	48	49	55	64
542060	26	35	17	32	45	27	14	29	28	23
542070	10	67	53	39	89	17	37	61	63	56
542080	47	45	38	57	59	42	43	41	44	40
542090	68	9	26	60	14	58	31	7	11	20
542100	86	29	51	77	35	79	50	25	30	38
542110	94	27	72	92	29	90	71	18	33	50
542120	31	8	32	22	33	18	6	8	5	8
542130	14	42	21	29	55	20	16	35	39	27
542140	30	50	37	47	66	37	30	47	46	39
542150	91	31	62	89	32	87	65	21	34	47
542160	89	25	54	83	25	84	54	19	26	37
542170	4	12	8	7	34	2	3	20	10	6
542180	6	10	7	5	28	3	2	14	8	4
542190	93	15	61	91	18	89	68	3	18	42
542200	83	43	59	78	51	77	56	30	41	49
542210	16	17	13	14	38	12	5	22	12	10
542220	92	19	58	90	19	88	66	9	20	43
542230	75	23	33	72	20	65	49	11	36	32
542240	73	61	75	86	65	63	75	39	68	73
542250	88	21	50	81	21	83	52	15	21	36
542260	71	28	40	62	43	59	39	24	25	34
542270	65	4	14	53	4	49	22	2	4	9

TABLE 11-17

CYPRESS CREEK WATERSHED UNIT AREA POLLUTANT LOAD RANKING BY SUBBASIN USING WET SEASON AVERAGE RAINFALL

Subbasin ID	BOD5	TSS	TN	TP	Oil and Grease	Cd	Cu	Pb	Zn	AVG LOAD
500100	82	86	77	20	47	95	87	90	88	86
500200	9	18	3	3	15	28	10	67	22	7
500300	27	38	5	1	2	51	15	77	42	22
500400	50	44	15	16	8	73	38	79	49	35
500500	66	22	20	49	3	69	35	69	31	28
500600	39	34	12	12	6	56	19	71	38	25
500700	37	39	10	8	9	55	17	73	40	26
500900	44	40	11	19	5	66	27	74	43	30
501000	63	47	28	18	11	81	42	80	52	41
510100	25	70	34	25	69	47	45	76	67	61
510150	3	36	9	11	46	5	7	31	27	14
510200	32	78	80	75	75	26	90	72	86	77
510250	95	98	84	9	37	98	91	98	98	98
510260	84	95	99	95	96	74	95	93	94	95
510300	38	79	87	66	74	33	84	78	79	78
510400	40	88	91	94	93	21	92	51	90	87
510450	22	76	65	84	73	7	88	40	83	75
510451	59	94	97	99	99	34	99	66	96	94
510500	41	84	90	61	87	40	81	83	80	84
510600	57	93	96	98	98	32	97	65	95	93
510700	62	89	92	40	83	54	78	87	78	89
510800	7	65	39	35	84	11	29	55	59	51
510900	12	73	56	54	85	13	64	53	71	71
511100	70	85	88	42	62	86	80	84	82	85
511200	54	83	89	31	81	78	76	81	77	83
511300	20	72	68	45	90	23	58	63	74	72
511400	5	60	35	33	79	8	26	52	54	45
511500	19	71	55	70	71	6	79	44	76	67
511600	23	82	82	79	94	19	86	62	84	80
520100	34	13	27	38	48	41	24	32	15	13
520200	15	1	2	17	1	16	4	1	1	2
520300	2	37	6	13	49	4	8	33	29	12
520400	76	58	69	58	52	75	59	86	61	66
520600	36	56	31	6	23	46	36	89	64	46
520700	42	91	44	26	64	76	60	95	89	90
520750	58	74	63	4	26	72	53	96	72	74
520800	49	77	79	24	68	64	63	92	75	76
520900	13	64	42	41	80	22	34	54	57	52
521000	67	62	73	71	77	61	57	59	56	68
521100	53	46	45	59	61	48	44	43	45	44
521200	74	97	48	10	42	94	77	97	97	97
521300	99	99	98	85	72	99	98	99	99	99
521400	17	30	30	15	56	10	9	28	24	17
521500	51	14	29	52	41	44	28	23	13	21
521600	43	55	86	56	86	38	83	37	66	55
521700	28	80	83	80	92	24	85	60	81	79
521800	55	33	24	48	16	60	33	68	35	29
521900	90	49	49	68	17	93	69	75	53	60
522000	56	68	36	23	31	80	55	82	70	70

TABLE 11-17

CYPRESS CREEK WATERSHED UNIT AREA POLLUTANT LOAD RANKING BY SUBBASIN USING WET SEASON AVERAGE RAINFALL

(Continued)

Subbasin ID	BOD5	TSS	TN	TP	Oil and Grease	Cd	Cu	Pb	Zn	AVG LOAD
522300	11	41	18	21	54	9	13	34	37	24
530100	80	57	67	51	24	82	61	88	65	65
530150	97	26	76	93	22	92	73	16	32	53
530200	64	48	52	63	57	52	46	38	47	48
530300	72	90	93	96	95	43	94	58	91	91
530500	87	51	78	88	63	85	70	42	48	69
540100	8	66	47	37	88	14	32	56	60	54
540200	33	81	85	87	91	29	89	57	87	81
540300	81	11	60	73	53	71	47	17	17	33
540400	52	92	94	97	97	30	96	64	93	92
540450	85	87	74	67	58	91	74	91	85	88
540500	21	2	25	28	50	25	12	10	2	3
540600	79	52	70	82	60	70	72	36	58	62
540700	35	24	19	44	36	39	20	26	19	19
540800	69	53	64	69	70	62	51	48	50	58
540900	45	16	16	43	10	45	23	46	16	16
541000	24	32	23	27	40	31	21	27	23	18
541100	96	96	95	36	82	97	93	94	92	96
541150	18	69	57	30	78	15	40	50	62	59
541200	98	75	81	76	39	96	82	85	73	82
541300	48	63	46	50	44	57	67	70	69	57
542010	78	20	43	65	30	67	41	13	14	31
542020	1	3	1	2	7	1	1	6	3	1
542030	29	5	4	34	12	36	11	4	6	5
542040	77	54	71	74	67	68	62	45	51	63
542050	60	59	66	64	76	53	48	49	55	64
542060	26	35	17	32	45	27	14	29	28	23
542070	10	67	53	39	89	17	37	61	63	56
542080	47	45	38	57	59	42	43	41	44	40
542090	68	9	26	60	14	58	31	7	11	20
542100	86	29	51	77	35	79	50	25	30	38
542110	94	27	72	92	29	90	71	18	33	50
542120	31	8	32	22	33	18	6	8	5	8
542130	14	42	21	29	55	20	16	35	39	27
542140	30	50	37	47	66	37	30	47	46	39
542150	91	31	62	89	32	87	65	21	34	47
542160	89	25	54	83	25	84	54	19	26	37
542170	4	12	8	7	34	2	3	20	10	6
542180	6	10	7	5	28	3	2	14	8	4
542190	93	15	61	91	18	89	68	3	18	42
542200	83	43	59	78	51	77	56	30	41	49
542210	16	17	13	14	38	12	5	22	12	10
542220	92	19	58	90	19	88	66	9	20	43
542230	75	23	33	72	20	65	49	11	36	32
542240	73	61	75	86	65	63	75	39	68	73
542250	88	21	50	81	21	83	52	15	21	36
542260	71	28	40	62	43	59	39	24	25	34
542270	65	4	14	53	4	49	22	2	4	9

TABLE 11-18

CYPRESS CREEK WATERSHED UNIT AREA POLLUTANT LOAD RANKING BY SUBBASIN USING DRY SEASON AVERAGE RAINFALL

Subbasin ID	BOD5	TSS	TN	TP	Oil and Grease	Cd	Cu	Pb	Zn	AVG LOAD
500100	82	86	77	20	47	95	87	90	88	66
500200	9	18	3	3	15	28	10	67	22	8
500300	27	38	5	1	2	51	15	77	42	7
500400	50	44	15	16	8	73	38	79	49	21
500500	66	22	20	49	3	69	35	69	31	30
500600	39	34	12	12	6	56	19	71	38	15
500700	37	39	10	8	9	55	17	73	40	14
500900	44	40	11	19	5	66	27	74	43	16
501000	63	47	28	18	11	81	42	80	52	28
510100	25	70	34	25	69	47	45	76	67	48
510150	3	36	9	11	46	5	7	31	27	10
510200	32	78	80	75	75	26	90	72	86	85
510250	95	98	84	9	37	98	91	98	98	64
510260	84	95	99	95	96	74	95	93	94	99
510300	38	79	87	66	74	33	84	78	79	87
510400	40	88	91	94	93	21	92	51	90	93
510450	22	76	65	84	73	7	88	40	83	72
510451	59	94	97	99	99	34	99	66	96	97
510500	41	84	90	61	87	40	81	83	80	92
510600	57	93	96	98	98	32	97	65	95	96
510700	62	89	92	40	83	54	78	87	78	86
510800	7	65	39	35	84	11	29	55	59	51
510900	12	73	56	54	85	13	64	53	71	68
511100	70	85	88	42	62	86	80	84	82	80
511200	54	83	89	31	81	78	76	81	77	82
511300	20	72	68	45	90	23	58	63	74	75
511400	5	60	35	33	79	8	26	52	54	44
511500	19	71	55	70	71	6	79	44	76	65
511600	23	82	82	79	94	19	86	62	84	89
520100	34	13	27	38	48	41	24	32	15	31
520200	15	1	2	17	1	16	4	1	1	2
520300	2	37	6	13	49	4	8	33	29	13
520400	76	58	69	58	52	75	59	86	61	77
520600	36	56	31	6	23	46	36	89	64	33
520700	42	91	44	26	64	76	60	95	89	62
520750	58	74	63	4	26	72	53	96	72	42
520800	49	77	79	24	68	64	63	92	75	74
520900	13	64	42	41	80	22	34	54	57	56
521000	67	62	73	71	77	61	57	59	56	81
521100	53	46	45	59	61	48	44	43	45	50
521200	74	97	48	10	42	94	77	97	97	47
521300	99	99	98	85	72	99	98	99	99	98
521400	17	30	30	15	56	10	9	28	24	25
521500	51	14	29	52	41	44	28	23	13	32
521600	43	55	86	56	86	38	83	37	66	76
521700	28	80	83	80	92	24	85	60	81	88
521800	55	33	24	48	16	60	33	68	35	35
521900	90	49	49	68	17	93	69	75	53	57
522000	56	68	36	23	31	80	55	82	70	38

TABLE 11-18

CYPRESS CREEK WATERSHED UNIT AREA POLLUTANT LOAD RANKING BY SUBBASIN USING DRY SEASON AVERAGE RAINFALL
(Continued)

Subbasin ID	BOD5	TSS	TN	TP	Oil and Grease	Cd	Cu	Pb	Zn	AVG LOAD
522300	97	26	76	93	22	92	73	16	32	58
530100	64	48	52	63	57	52	46	38	47	54
530150	72	90	93	96	95	43	94	58	91	94
530200	87	51	78	88	63	85	70	42	48	79
530300	8	66	47	37	88	14	32	56	60	61
530500	33	81	85	87	91	29	89	57	87	91
540100	81	11	60	73	53	71	47	17	17	49
540200	52	92	94	97	97	30	96	64	93	95
540300	85	87	74	67	58	91	74	91	85	84
540400	21	2	25	28	50	25	12	10	2	18
540450	79	52	70	82	60	70	72	36	58	69
540500	35	24	19	44	36	39	20	26	19	24
540600	69	53	64	69	70	62	51	48	50	70
540700	45	16	16	43	10	45	23	46	16	20
540800	24	32	23	27	40	31	21	27	23	19
540900	96	96	95	36	82	97	93	94	92	90
541000	18	69	57	30	78	15	40	50	62	55
541100	98	75	81	76	39	96	82	85	73	83
541150	48	63	46	50	44	57	67	70	69	52
541200	78	20	43	65	30	67	41	13	14	34
541300	1	3	1	2	7	1	1	6	3	1
542010	29	5	4	34	12	36	11	4	6	4
542020	77	54	71	74	67	68	62	45	51	73
542030	60	59	66	64	76	53	48	49	55	71
542040	26	35	17	32	45	27	14	29	28	22
542050	10	67	53	39	89	17	37	61	63	67
542060	47	45	38	57	59	42	43	41	44	45
542070	68	9	26	60	14	58	31	7	11	17
542080	86	29	51	77	35	79	50	25	30	43
542090	94	27	72	92	29	90	71	18	33	59
542100	31	8	32	22	33	18	6	8	5	11
542110	14	42	21	29	55	20	16	35	39	27
542120	30	50	37	47	66	37	30	47	46	46
542130	91	31	62	89	32	87	65	21	34	53
542140	89	25	54	83	25	84	54	19	26	41
542150	4	12	8	7	34	2	3	20	10	5
542160	6	10	7	5	28	3	2	14	8	3
542170	93	15	61	91	18	89	68	3	18	39
542180	83	43	59	78	51	77	56	30	41	60
542190	16	17	13	14	38	12	5	22	12	9
542200	92	19	58	90	19	88	66	9	20	40
542210	75	23	33	72	20	65	49	11	36	29
542220	73	61	75	86	65	63	75	39	68	78
542230	88	21	50	81	21	83	52	15	21	37
542240	71	28	40	62	43	59	39	24	25	36
542250	65	4	14	53	4	49	22	2	4	6
542260	61	7	22	55	13	50	25	5	9	12
542270	46	6	41	46	27	35	18	12	7	26

TABLE 11-19

CYPRESS CREEK WATERSHED 10 HIGHEST SUBBASIN RANKING BY POLLUTANTS USING AVERAGE ANNUAL RAINFALL

BOD5	TSS	TN	TP	Oil and Grease	Cd	Cu	Pb	Zn	AVG LOAD
521300	521300	510260	510451	510451	521300	510451	521300	521300	521300
541100	510250	521300	510600	510600	510250	521300	510250	510250	510250
522300	521200	510451	540200	540200	540900	510600	521200	521200	521200
540900	540900	510600	530150	510260	541100	540200	520750	510451	540900
510250	510260	540900	510260	530150	500100	510260	520700	510600	510260
542090	510451	540200	510400	511600	521200	530150	540900	510260	510451
542170	510600	530150	522300	510400	521900	540900	510260	540200	510600
542200	540200	510700	542090	521700	522300	510400	520800	540900	540200
542130	520700	510400	542170	530500	540300	510250	540300	530150	530150
521900	530150	510500	542200	511300	542090	510200	500100	510400	520700

TABLE 11-20

CYPRESS CREEK WATERSHED HIGHEST SUBBASIN RANKING BY POLLUTANTS USING WET SEASON AVERAGE RAINFALL

BOD5	TSS	TN	TP	Oil and Grease	Cd	Cu	Pb	Zn	AVG LOAD
521300	521300	510260	510451	510451	521300	510451	521300	521300	521300
541100	510250	521300	510600	510600	510250	521300	510250	510250	510250
522300	521200	510451	540200	540200	540900	510600	521200	521200	521200
540900	540900	510600	530150	510260	541100	540200	520750	510451	540900
510250	510260	540900	510260	530150	500100	510260	520700	510600	510260
542090	510451	540200	510400	511600	521200	530150	540900	510260	510451
542170	510600	530150	522300	510400	521900	540900	510260	540200	510600
542200	540200	510700	542090	521700	522300	510400	520800	540900	540200
542130	520700	510400	542170	530500	540300	510250	540300	530150	530150
521900	530150	510500	542200	511300	542090	510200	500100	510400	520700

TABLE 11-21

CYPRESS CREEK WATERSHED HIGHEST SUBBASIN RANKING BY POLLUTANTS USING DRY SEASON AVERAGE RAINFALL

BOD5	TSS	TN	TP	Oil and Grease	Cd	Cu	Pb	Zn	AVG LOAD
521300	521300	510260	510451	510451	521300	510451	521300	521300	510260
541100	510250	521300	510600	510600	510250	521300	510250	510250	521300
522300	521200	510451	540200	540200	540900	510600	521200	521200	510451
540900	540900	510600	530150	510260	541100	540200	520750	510451	510600
510250	510260	540900	510260	530150	500100	510260	520700	510600	540200
542090	510451	540200	510400	511600	521200	530150	540900	510260	530150
542170	510600	530150	522300	510400	521900	540900	510260	540200	510400
542200	540200	510700	542090	521700	522300	510400	520800	540900	510500
542130	520700	510400	542170	530500	540300	510250	540300	530150	530500
521900	530150	510500	542200	511300	542090	510200	500100	510400	540900

TABLE 11-9

CYPRESS CREEK WATERSHED GROSS POLLUTANT LOAD BY SUBBASIN USING DRY SEASON AVERAGE RAINFALL

Subbasin ID	Area (acres)	Volume (acre-ft)	RC	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
500100	390.8	546.2	0.36	3765.0	41139.5	797.2	307.1	1104.2	290.5	162.1	348.0	5.4	23.3	124.7	65.6
500200	1038.0	727.1	0.18	1551.4	18610.9	533.2	173.9	707.1	194.5	122.0	373.0	2.1	11.2	45.0	27.8
500300	1682.9	1003.1	0.15	5325.1	50762.1	1096.0	339.3	1435.4	108.2	125.8	389.1	7.4	20.6	169.4	76.4
500400	1761.3	1271.4	0.18	9275.1	61427.2	1514.0	508.9	2022.9	546.3	357.9	463.4	11.2	31.9	201.7	93.1
500500	577.2	386.8	0.17	3788.8	10750.6	493.6	177.8	671.4	388.0	212.2	122.0	3.4	10.0	31.0	16.1
500600	1910.8	1225.0	0.16	8581.7	47667.9	1575.8	498.3	2074.1	476.9	320.2	454.7	9.1	24.5	153.9	70.5
500700	1664.7	1046.8	0.16	6679.7	45196.9	1345.1	419.1	1764.2	299.1	226.1	437.4	7.7	20.9	146.4	66.9
500900	1117.6	776.4	0.18	5614.5	30899.2	902.0	302.7	1204.6	369.3	231.4	252.3	6.2	17.2	100.7	46.5
501000	1194.9	836.6	0.18	7314.5	45659.4	1224.7	404.9	1629.6	386.7	260.4	328.9	8.5	22.8	152.7	68.9
510100	160.6	297.0	0.47	453.3	6110.7	200.8	57.1	257.9	62.9	46.3	166.5	0.6	3.3	13.1	8.5
510150	99.0	89.6	0.23	86.9	1216.0	78.0	19.9	97.8	23.7	16.9	67.0	0.1	0.8	0.5	1.4
510200	43.3	59.5	0.35	205.7	2214.7	78.1	34.1	112.2	56.0	24.3	49.5	0.2	2.4	3.5	3.9
510250	16.1	16.6	0.26	206.2	2262.7	32.2	11.3	43.5	3.2	3.9	8.9	0.3	0.9	7.9	3.5
510260	23.1	57.7	0.64	362.1	3884.7	95.6	39.4	135.0	50.8	24.0	48.5	0.4	2.9	9.9	6.4
510300	144.9	238.1	0.42	846.3	8542.2	312.3	116.5	428.8	155.2	71.8	166.0	0.8	7.5	15.7	13.9
510400	60.3	128.6	0.54	272.2	2655.9	145.8	63.9	209.6	112.4	47.9	102.2	0.1	4.0	0.5	5.0
510450	53.1	76.9	0.37	144.7	1608.4	76.2	37.7	113.9	74.1	30.6	59.6	0.1	2.6	0.3	3.2
510451	14.5	36.6	0.64	87.3	974.0	45.9	22.8	68.8	44.9	18.5	36.0	0.0	1.6	0.2	1.9
510500	162.0	311.7	0.49	1061.5	11488.4	400.7	133.3	534.0	156.5	83.2	230.2	1.1	8.3	23.3	17.5
510600	42.7	109.5	0.65	250.6	2764.5	132.9	64.1	197.0	124.0	51.4	101.4	0.1	4.4	0.6	5.4
510700	43.2	86.7	0.51	458.7	4949.4	134.3	39.2	173.5	26.1	18.7	60.4	0.6	2.5	13.3	7.2
510800	108.2	144.0	0.34	136.2	2579.1	147.0	38.2	185.1	54.4	38.2	146.4	0.1	1.8	1.1	3.0
510900	81.3	118.2	0.37	157.5	2277.1	125.0	40.3	165.3	64.9	35.6	110.2	0.1	2.3	0.8	3.2
511100	97.3	133.0	0.35	691.1	6572.8	216.1	69.7	285.8	58.0	32.6	91.1	0.8	4.0	16.4	10.0
511200	142.3	230.1	0.41	814.9	8138.5	331.5	88.9	420.4	66.7	46.6	189.1	1.0	5.2	17.2	11.6
511300	96.8	183.3	0.48	244.7	2867.0	168.7	43.5	212.2	58.5	34.1	152.1	0.2	2.5	1.9	4.7
511400	37.6	66.3	0.45	44.0	835.3	47.6	12.4	59.9	17.6	12.4	47.5	0.0	0.6	0.4	1.0
511500	81.0	98.8	0.31	182.1	2185.2	106.7	47.9	154.7	91.4	40.0	88.3	0.1	3.2	0.5	4.1
511600	24.3	39.7	0.42	67.0	906.1	46.5	17.9	64.4	32.2	15.6	41.1	0.0	1.1	0.3	1.5
520100	195.8	178.0	0.23	739.8	2828.4	194.7	58.9	253.5	121.8	71.8	136.7	0.6	2.9	2.1	3.5
520200	120.5	90.8	0.19	239.0	380.2	37.6	14.4	52.0	37.1	18.8	15.8	0.2	0.8	0.1	0.6
520300	76.0	110.8	0.37	49.4	936.6	53.4	13.9	67.2	19.8	13.9	53.2	0.0	0.6	0.4	1.1
520400	174.8	244.9	0.36	1932.7	12217.0	321.7	109.3	430.9	155.2	96.4	133.2	2.3	7.1	37.4	18.3
520600	22.5	19.0	0.21	203.2	2273.0	32.7	11.5	44.2	4.1	4.6	11.6	0.3	0.9	7.9	3.5
520700	73.1	84.4	0.29	332.2	3772.2	99.7	29.9	129.6	29.9	22.4	70.8	0.5	1.9	10.0	5.4
520750	29.9	30.0	0.26	428.1	4723.0	61.9	22.4	84.3	5.7	7.8	16.7	0.7	1.9	16.8	7.3
520800	58.7	82.3	0.36	679.6	7696.3	132.0	43.8	175.8	24.2	22.3	64.0	1.1	3.3	25.2	11.7
520900	136.6	184.4	0.34	268.8	3191.3	190.0	50.7	240.7	79.3	53.3	180.1	0.2	2.4	1.3	3.7
521000	67.1	90.0	0.34	461.6	1505.0	114.8	35.1	149.9	75.8	44.1	78.3	0.3	1.7	0.7	1.8
521100	118.5	132.8	0.29	656.7	2036.3	161.0	49.3	210.3	107.8	62.5	108.8	0.5	2.4	0.8	2.4
521200	23.6	36.9	0.40	201.2	2416.6	52.0	16.1	68.1	12.1	10.1	33.3	0.3	1.1	7.1	3.6
521300	41.6	75.3	0.46	937.5	8016.2	143.2	55.9	199.1	59.8	35.7	46.5	1.3	4.3	26.6	12.7
521400	62.9	86.9	0.35	130.0	844.5	73.0	19.0	92.0	19.4	14.2	51.6	0.1	0.5	0.3	0.9
521500	154.6	156.2	0.26	854.5	1970.8	173.7	55.3	229.1	130.2	73.3	102.6	0.6	2.7	0.7	2.4
521600	125.3	215.9	0.44	601.7	4230.1	256.5	92.7	349.2	163.0	78.4	170.1	0.3	5.4	1.0	6.7
521700	36.4	67.8	0.47	116.3	1340.9	70.8	27.0	97.8	48.6	23.7	60.0	0.1	1.7	0.4	2.2
521800	428.8	699.3	0.42	2476.4	7906.1	388.8	132.0	520.9	279.0	155.3	147.2	2.2	7.4	18.8	11.4
521900	36.0	66.7	0.47	389.9	1169.3	50.1	18.2	68.3	40.4	22.0	12.6	0.4	1.1	3.4	1.8
522000	65.3	67.4	0.26	385.0	3172.0	90.2	27.2	117.5	27.1	17.8	38.9	0.5	1.7	8.7	4.6

TABLE 11-9

CYPRESS CREEK WATERSHED GROSS POLLUTANT LOAD BY SUBBASIN USING DRY SEASON AVERAGE RAINFALL

(Continued)

Subbasin ID	Area (acres)	Volume (acre-ft)	RC	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
522300	16.6	15.9	0.24	225.5	184.1	28.2	10.3	38.4	29.4	15.4	7.7	0.2	0.5	0.0	0.2
530100	141.5	167.3	0.30	867.1	2475.1	202.0	63.1	265.1	137.8	77.6	123.2	0.6	3.1	0.8	3.0
530150	74.0	165.7	0.57	544.7	3716.6	195.7	92.6	288.4	191.3	82.7	139.5	0.3	6.2	0.8	7.3
530200	89.8	115.0	0.33	927.5	1683.8	164.6	54.2	218.8	134.6	74.2	85.2	0.7	2.7	0.6	2.1
530300	33.1	46.5	0.36	43.3	823.2	46.9	12.2	59.1	17.4	12.2	46.8	0.0	0.6	0.3	1.0
530500	103.3	168.8	0.42	380.1	3853.6	202.5	81.2	283.7	152.9	72.6	169.3	0.2	5.1	1.1	6.5
540100	59.2	75.7	0.33	539.5	1179.0	105.6	34.5	140.0	82.3	45.6	60.0	0.4	1.7	0.4	1.5
540200	55.4	121.1	0.56	299.9	3306.4	156.9	77.2	234.1	151.8	63.0	123.3	0.1	5.3	0.7	6.6
540300	112.0	142.3	0.32	1053.7	4811.4	192.9	63.6	256.5	119.9	70.2	98.4	1.0	3.7	11.7	6.9
540400	45.8	70.2	0.39	148.9	883.2	58.7	16.6	75.3	30.7	19.1	48.9	0.1	0.8	0.4	1.0
540450	75.2	89.7	0.30	624.6	1439.6	122.0	43.3	165.3	103.1	54.3	67.5	0.4	2.3	0.4	2.1
540500	154.4	245.9	0.41	586.4	1609.9	132.8	41.3	174.1	93.2	53.3	85.2	0.4	2.0	0.6	1.9
540600	198.7	421.9	0.54	1544.8	4264.6	351.0	109.1	460.1	245.8	140.8	225.8	1.1	5.3	1.6	5.1
540700	336.9	239.9	0.18	1698.4	4015.7	279.0	91.6	370.6	202.7	109.2	92.5	1.3	4.8	6.6	5.5
540800	107.9	144.4	0.34	305.7	1382.7	107.8	29.9	137.7	48.4	29.4	69.3	0.2	1.5	0.5	1.6
540900	30.4	64.9	0.54	395.7	4184.2	107.5	30.9	138.4	16.2	12.6	41.0	0.5	2.0	11.8	6.1
541000	46.5	92.3	0.50	96.9	1201.3	75.7	18.9	94.6	21.5	14.2	54.7	0.1	0.9	0.4	1.4
541100	196.0	345.5	0.45	2743.1	11616.6	372.1	133.8	505.9	255.9	145.1	111.3	2.8	8.4	35.6	17.6
541150	1422.5	2204.1	0.39	7307.7	48283.9	1895.6	675.6	2571.2	991.7	513.1	931.2	6.9	40.0	102.7	75.4
541200	93.4	153.1	0.42	758.0	946.2	127.0	41.6	168.6	96.4	52.8	48.8	0.5	1.8	0.2	1.1
541300	12.6	16.6	0.33	15.1	286.7	16.3	4.2	20.6	6.1	4.3	16.3	0.0	0.2	0.1	0.3
542010	71.5	78.9	0.28	1142.1	1029.1	147.7	53.2	200.9	150.1	79.1	44.8	0.8	2.7	0.3	1.3
542020	81.6	111.9	0.35	646.7	1605.3	138.1	43.3	181.5	99.1	56.0	82.3	0.5	2.1	0.6	1.9
542030	37.3	48.2	0.33	224.7	815.7	61.8	18.4	80.2	37.9	22.3	42.9	0.2	0.9	0.3	1.0
542040	42.7	34.3	0.20	124.0	508.7	37.2	10.1	47.4	19.9	12.1	28.0	0.1	0.5	0.2	0.6
542050	60.9	88.8	0.37	88.8	1623.1	92.7	24.1	116.8	34.7	24.3	92.2	0.1	1.1	0.7	1.9
542060	103.5	130.5	0.32	531.4	1723.1	134.2	40.9	175.1	88.4	51.4	92.4	0.4	2.0	0.7	2.1
542070	30.2	21.2	0.18	208.0	217.3	28.5	10.1	38.5	27.8	14.8	9.9	0.1	0.5	0.1	0.3
542080	56.7	66.1	0.30	544.4	659.8	79.3	27.5	106.8	74.1	39.7	31.1	0.4	1.4	0.2	0.8
542090	43.2	55.0	0.32	552.8	486.0	70.9	25.6	96.4	72.5	38.1	21.0	0.4	1.3	0.1	0.6
542100	258.2	283.8	0.28	1868.5	2752.6	363.8	113.6	477.5	230.4	129.7	151.9	1.2	4.4	0.7	3.0
542110	23.3	20.1	0.22	45.9	330.8	21.2	5.9	27.1	10.3	6.6	18.4	0.0	0.3	0.1	0.4
542120	141.0	165.0	0.30	471.3	2581.8	178.8	50.6	229.4	91.1	56.4	141.2	0.4	2.3	1.0	3.0
542130	50.5	53.7	0.27	580.1	579.2	78.0	27.7	105.7	77.1	40.8	26.0	0.4	1.4	0.2	0.7
542140	93.1	101.1	0.28	974.2	971.8	131.2	46.2	177.4	128.3	68.0	43.8	0.7	2.3	0.3	1.2
542150	59.4	78.8	0.34	78.0	791.0	59.3	15.2	74.5	15.7	11.8	47.4	0.0	0.5	0.3	0.9
542160	114.0	74.6	0.17	133.5	871.7	82.0	20.8	102.8	16.9	13.4	55.0	0.1	0.5	0.3	0.9
542170	42.4	32.1	0.19	539.6	379.2	64.8	23.9	88.7	69.0	36.0	15.2	0.4	1.2	0.1	0.5
542180	163.5	194.6	0.30	1526.2	2370.6	251.3	84.3	335.6	214.7	117.1	117.5	1.1	4.2	0.8	2.9
542190	76.8	59.6	0.20	156.5	705.4	65.5	17.6	83.1	21.7	14.6	42.6	0.1	0.5	0.2	0.7
542200	107.6	92.9	0.22	1317.1	1022.9	161.7	59.2	220.9	170.7	89.3	42.2	0.9	3.0	0.2	1.3
542210	105.7	81.5	0.20	829.3	1077.3	119.0	46.1	165.1	123.0	62.2	43.0	0.6	2.5	0.2	1.7
542220	91.6	111.5	0.31	707.0	2046.1	153.5	58.1	211.6	133.5	67.4	90.4	0.5	3.3	0.6	3.2
542230	139.3	136.9	0.25	1443.3	1371.2	190.5	68.2	258.7	190.7	100.8	60.7	1.0	3.4	0.4	1.8
542240	46.2	42.8	0.24	333.1	519.7	60.4	19.5	79.9	44.3	24.6	27.2	0.2	0.9	0.2	0.6
542250	101.9	106.9	0.27	628.0	496.8	81.7	29.1	110.8	79.6	41.9	21.7	0.4	1.4	0.1	0.6
542260	229.4	316.9	0.35	1391.6	1556.8	198.9	69.3	268.2	186.0	99.4	72.8	1.0	3.4	0.4	2.0
542270	96.0	138.6	0.37	1195.4	1330.3	169.4	59.2	228.6	160.2	85.5	61.8	0.9	3.0	0.4	1.7

TABLE 11-10

CYPRESS CREEK WATERSHED NET POLLUTANT LOAD BY SUBBASIN USING AVERAGE ANNUAL RAINFALL

Subbasin ID	Area (acres)	Volume (acre-ft)	RC	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
500100	390.8	546.2	0.36	9838.9	45834.8	1905.0	526.3	2626.3	382.5	223.4	750.7	14.9	50.8	106.2	71.3
500200	1038.0	727.1	0.18	4025.8	27645.7	1371.4	358.2	1806.3	383.6	260.4	975.8	5.9	25.8	42.1	37.9
500300	1682.9	1003.1	0.15	14839.2	60603.8	2839.9	799.4	3713.9	207.3	280.5	973.5	20.8	55.5	144.1	88.0
500400	1761.3	1271.4	0.18	26088.5	80123.3	4067.6	1316.4	5430.1	1516.8	1002.5	1293.8	31.5	89.4	174.3	116.7
500500	577.2	386.8	0.17	10699.3	16325.9	1367.1	486.8	1859.1	1093.5	599.3	344.4	9.6	28.4	27.3	23.5
500600	1910.8	1225.0	0.16	24234.4	64110.8	4315.3	1330.3	5671.2	1335.9	904.3	1284.1	25.8	69.0	131.9	88.5
500700	1664.7	1046.8	0.16	18863.1	60652.9	3670.7	1110.3	4805.4	834.3	638.6	1235.2	21.9	59.0	126.1	83.8
500900	1117.6	776.4	0.18	15855.2	41194.2	2459.1	804.4	3280.3	1035.9	653.6	712.4	17.5	48.4	86.8	59.0
501000	1194.9	836.6	0.18	20655.9	58901.3	3324.8	1066.9	4417.2	1081.4	735.2	928.7	24.0	64.5	130.7	84.6
510100	160.6	297.0	0.47	1280.1	11759.2	556.5	155.3	713.7	176.7	130.7	470.2	1.8	9.3	13.5	15.2
510150	99.0	89.6	0.23	245.4	3434.0	220.2	56.1	276.3	67.0	47.8	189.3	0.2	2.3	1.3	3.9
510200	43.3	59.5	0.35	445.5	4167.9	212.2	87.7	305.2	157.5	66.4	138.5	0.2	6.0	3.0	7.7
510250	16.1	16.6	0.26	582.4	6389.7	90.9	31.8	122.8	9.0	11.1	25.2	0.9	2.6	22.3	9.9
510260	23.1	57.7	0.64	611.8	4642.0	244.4	85.3	345.9	141.1	60.8	133.1	0.4	6.2	7.6	8.2
510300	144.9	238.1	0.42	1760.4	14426.7	842.7	289.2	1156.9	434.8	192.4	462.7	0.9	18.1	12.9	24.0
510400	60.3	128.6	0.54	768.7	7500.1	411.6	180.4	592.0	317.4	135.1	288.7	0.3	11.3	1.5	14.1
510450	53.1	76.9	0.37	408.7	4542.1	215.1	106.5	321.6	209.2	86.4	168.3	0.2	7.4	0.9	9.1
510451	14.5	36.6	0.64	246.6	2750.5	129.7	64.4	194.1	126.8	52.4	101.8	0.1	4.5	0.6	5.5
510500	162.0	311.7	0.49	2070.9	18168.1	1073.9	317.6	1428.2	436.8	219.6	641.2	1.3	19.1	19.3	26.9
510600	42.7	109.5	0.65	707.7	7806.8	375.4	180.9	556.3	350.1	145.1	286.3	0.3	12.4	1.6	15.4
510700	43.2	86.7	0.51	746.8	5527.6	345.2	76.0	442.9	70.8	43.6	165.2	0.6	4.5	10.2	7.1
510800	108.2	144.0	0.34	384.8	7283.2	415.1	107.8	522.8	153.5	107.9	413.4	0.4	5.0	3.1	8.4
510900	81.3	118.2	0.37	444.7	6430.6	352.9	113.9	466.8	183.3	100.4	311.3	0.3	6.4	2.2	9.2
511100	97.3	133.0	0.35	1951.6	11180.1	596.2	188.8	787.7	162.7	92.1	257.3	2.2	11.4	14.7	16.6
511200	142.3	230.1	0.41	2301.3	15545.6	922.1	242.8	1167.6	187.1	131.7	534.1	2.7	14.8	16.7	21.0
511300	96.8	183.3	0.48	690.9	7585.5	475.3	122.3	597.8	165.2	96.3	429.4	0.5	7.0	3.2	12.4
511400	37.6	66.3	0.45	124.1	2358.8	134.3	34.9	169.2	49.8	35.0	134.1	0.1	1.6	1.0	2.7
511500	81.0	98.8	0.31	514.2	6171.0	301.4	135.4	436.8	258.2	113.0	249.2	0.2	9.0	1.5	11.5
511600	24.3	39.7	0.42	189.3	2558.7	131.3	50.6	181.9	90.9	44.2	116.2	0.1	3.1	0.8	4.2
520100	195.8	178.0	0.23	2089.1	4794.5	548.8	165.7	714.7	298.6	202.7	386.1	1.7	8.2	2.7	6.3
520200	120.5	90.8	0.19	674.9	1073.7	106.1	40.7	146.8	104.8	53.1	44.6	0.5	2.3	0.3	1.7
520300	76.0	110.8	0.37	139.5	2644.9	150.7	39.1	189.9	55.8	39.3	150.4	0.1	1.8	1.1	3.1
520400	174.8	244.9	0.36	3905.3	10581.4	811.7	210.2	1083.4	430.0	246.3	361.0	3.2	12.7	28.1	14.2
520600	22.5	19.0	0.21	242.7	1316.9	71.9	11.4	96.4	9.8	7.6	29.7	0.3	1.1	5.7	1.9
520700	73.1	84.4	0.29	938.1	10652.4	281.4	84.5	365.9	84.5	63.3	200.0	1.4	5.3	28.3	15.4
520750	29.9	30.0	0.26	499.5	2410.0	130.6	18.4	177.1	12.4	10.2	40.2	0.5	2.1	12.0	3.6
520800	58.7	82.3	0.36	867.6	5532.6	307.2	57.1	405.9	62.5	45.6	170.6	0.9	4.5	18.6	7.6
520900	136.6	184.4	0.34	759.0	9012.1	536.5	143.2	679.7	223.8	150.5	508.7	0.7	6.7	3.7	10.5
521000	67.1	90.0	0.34	1303.6	4250.0	324.3	99.0	423.3	213.9	124.4	221.0	1.0	4.8	2.0	5.1
521100	118.5	132.8	0.29	1854.6	5750.5	454.6	139.2	593.7	304.5	176.4	307.3	1.4	6.8	2.2	6.9
521200	23.6	36.9	0.40	517.3	5858.4	91.8	31.3	123.1	13.9	14.2	39.0	0.8	2.5	19.8	9.0
521300	41.6	75.3	0.46	2647.4	22637.2	404.3	157.9	562.2	168.8	100.8	131.2	3.6	12.1	75.0	35.9
521400	62.9	86.9	0.35	367.1	2031.5	206.3	53.5	259.8	53.6	40.1	145.7	0.2	1.5	0.8	2.3
521500	154.6	156.2	0.26	2349.3	3849.2	456.1	132.4	603.4	340.0	183.0	249.5	1.7	6.8	1.4	4.7
521600	125.3	215.9	0.44	1699.1	7288.1	724.4	261.7	986.1	288.5	221.5	480.5	1.0	15.3	2.1	10.9
521700	36.4	67.8	0.47	328.5	3786.6	200.0	76.1	276.1	137.4	66.8	169.4	0.2	4.7	1.1	6.2
521800	428.8	699.3	0.42	6993.4	14069.1	1082.3	363.8	1449.1	786.6	438.4	415.7	6.2	20.8	17.7	19.1
521900	36.0	66.7	0.47	1101.1	1785.8	138.6	49.7	188.9	113.9	62.2	35.6	1.0	3.0	3.0	2.6
522000	65.3	67.4	0.26	1070.5	4725.8	229.2	67.9	298.5	69.2	45.5	91.7	1.3	4.6	7.7	6.5

TABLE 11-10

CYPRESS CREEK WATERSHED NET POLLUTANT LOAD BY SUBBASIN USING AVERAGE ANNUAL RAINFALL

(Continued)

Subbasin ID	Area (acres)	Volume (acre-ft)	RC	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
522300	16.6	15.9	0.24	636.8	519.8	79.5	28.9	108.4	82.9	43.5	21.9	0.5	1.5	0.1	0.7
530100	141.5	167.3	0.30	2448.7	6989.7	570.6	178.1	748.7	389.0	219.1	348.0	1.8	8.8	2.4	8.6
530150	74.0	165.7	0.57	1538.3	10495.4	552.7	261.6	814.3	540.3	233.4	394.0	0.8	17.5	2.2	20.5
530200	89.8	115.0	0.33	2619.3	4754.9	464.8	153.0	617.8	380.0	209.6	240.5	1.9	7.6	1.6	5.8
530300	33.1	46.5	0.36	122.4	2324.7	132.4	34.4	166.8	49.1	34.5	132.1	0.1	1.6	1.0	2.7
530500	103.3	168.8	0.42	1073.4	10882.5	572.0	229.2	801.2	431.7	204.9	478.0	0.6	14.4	3.1	18.5
540100	59.2	75.7	0.33	1453.5	1447.0	260.3	71.2	347.8	202.1	102.5	125.4	1.0	3.9	0.5	2.0
540200	55.4	121.1	0.56	847.0	9337.2	443.1	217.9	661.0	428.6	178.0	348.2	0.3	15.0	2.0	18.6
540300	112.0	142.3	0.32	2975.5	13587.1	544.9	179.6	724.4	338.6	198.3	278.0	2.9	10.4	33.1	19.5
540400	45.8	70.2	0.39	348.2	551.2	126.7	19.9	163.5	55.4	26.8	92.7	0.2	1.2	0.3	0.7
540450	75.2	89.7	0.30	1763.8	4065.3	344.5	122.2	466.7	291.2	153.5	190.5	1.3	6.6	1.2	5.8
540500	154.4	245.9	0.41	1656.0	4546.3	374.9	116.7	491.6	263.2	150.6	240.6	1.2	5.7	1.7	5.4
540600	198.7	421.9	0.53	3958.4	11041.5	905.3	281.1	1186.5	631.6	362.0	585.1	2.9	13.7	4.1	13.2
540700	336.9	239.9	0.18	4796.1	8535.6	782.4	255.7	1039.2	572.1	308.4	261.1	3.7	13.7	6.7	11.0
540800	107.9	144.4	0.34	842.3	3506.7	281.7	78.6	360.3	128.4	77.1	173.2	0.7	4.0	1.2	3.9
540900	30.4	64.9	0.54	1117.3	6496.7	293.6	81.4	376.9	45.0	35.6	115.8	1.5	5.7	10.5	8.9
541000	46.5	92.3	0.50	273.7	3392.3	213.9	53.3	267.2	60.8	40.2	154.5	0.2	2.4	1.1	3.9
541100	196.0	345.5	0.45	7746.3	16664.2	1019.9	360.3	1386.1	720.1	409.7	314.4	7.9	23.7	31.4	24.4
541150	1422.5	2204.1	0.39	20636.7	91244.7	5267.0	1858.6	7142.0	2793.5	1449.0	2629.7	19.4	113.0	96.6	142.1
541200	93.4	153.1	0.42	2132.8	2525.2	350.2	115.4	465.6	269.2	146.8	129.4	1.5	4.9	0.6	2.9
541300	12.6	16.6	0.33	8.5	161.9	9.2	2.4	11.6	3.4	2.4	9.2	0.0	0.1	0.1	0.2
542010	71.5	78.9	0.28	674.2	1135.8	115.0	38.2	153.2	96.5	52.9	56.8	0.5	1.9	0.4	1.4
542020	81.6	111.9	0.35	1826.2	4533.2	390.0	122.4	512.4	279.9	158.2	232.3	1.3	6.0	1.6	5.4
542030	37.3	48.2	0.33	634.6	2303.4	174.4	52.0	226.4	107.1	62.8	121.0	0.5	2.5	0.9	2.7
542040	42.7	34.3	0.20	350.3	1436.5	105.1	28.6	133.8	56.2	34.2	79.2	0.2	1.4	0.6	1.7
542050	60.9	88.8	0.37	243.6	4389.1	257.9	65.4	325.0	94.7	65.9	255.9	0.2	3.1	1.9	5.1
542060	103.5	130.5	0.32	1500.7	4865.9	379.0	115.4	494.4	249.6	145.2	260.9	1.1	5.6	1.8	5.8
542070	30.2	21.2	0.18	587.4	613.7	80.4	28.4	108.8	78.5	41.7	27.9	0.4	1.4	0.2	0.8
542080	56.7	66.1	0.30	1535.6	1830.1	222.1	77.3	299.4	208.5	111.6	85.9	1.1	3.9	0.5	2.3
542090	43.2	55.0	0.32	1561.1	1372.5	200.1	72.2	272.3	204.7	107.7	59.3	1.1	3.7	0.3	1.8
542100	258.2	283.8	0.28	2557.5	5099.7	866.4	161.8	1127.7	272.6	123.8	385.5	1.1	5.7	1.5	4.9
542110	23.3	20.1	0.22	129.7	934.1	59.8	16.6	76.4	29.2	18.6	52.1	0.1	0.8	0.4	1.1
542120	141.0	165.0	0.30	1331.0	7290.9	504.9	142.8	647.7	257.2	159.2	398.7	1.0	6.6	2.8	8.5
542130	50.5	53.7	0.27	1638.3	1635.6	220.2	78.3	298.6	217.7	115.3	73.4	1.2	4.0	0.4	2.1
542140	93.1	101.1	0.28	2751.1	2744.2	370.4	130.5	501.0	362.3	192.0	123.7	1.9	6.6	0.7	3.5
542150	59.4	78.8	0.34	167.3	1455.1	122.2	30.9	153.1	26.3	20.9	89.8	0.1	0.8	0.5	1.5
542160	114.0	74.6	0.17	377.0	2461.8	231.6	58.8	290.4	47.6	37.8	155.2	0.2	1.4	0.8	2.4
542170	42.4	32.1	0.19	1523.8	1070.8	183.0	67.4	250.4	194.9	101.6	42.9	1.1	3.4	0.2	1.4
542180	163.5	194.6	0.30	4309.9	6694.4	709.8	238.0	947.8	606.3	330.7	331.9	3.1	11.8	2.2	8.2
542190	76.8	59.6	0.20	442.0	1992.0	184.8	49.7	234.6	61.2	41.2	120.3	0.3	1.5	0.7	2.1
542200	107.6	92.9	0.22	3719.4	2888.6	456.6	167.2	623.8	482.0	252.2	119.3	2.6	8.5	0.6	3.8
542210	105.7	81.5	0.20	2341.9	3042.1	336.0	130.2	466.2	347.3	175.7	121.4	1.6	7.2	0.7	4.8
542220	91.6	111.5	0.31	1996.6	5778.0	433.4	164.1	597.5	376.9	190.5	255.3	1.4	9.4	1.6	9.1
542230	139.3	136.9	0.25	4075.9	3872.2	538.0	192.5	730.5	538.5	284.6	171.5	2.9	9.7	1.0	5.0
542240	46.2	42.8	0.24	940.7	1467.7	170.6	55.0	225.6	125.2	69.4	76.8	0.7	2.4	0.4	1.7
542250	101.9	106.9	0.27	1773.5	1403.1	230.6	82.3	312.9	224.8	118.4	61.3	1.2	4.0	0.3	1.8
542260	229.4	316.9	0.35	3929.9	4396.3	561.7	195.7	757.4	525.3	280.7	205.6	2.8	9.7	1.2	5.5
542270	96.0	138.6	0.37	1391.4	1587.8	348.4	48.4	469.0	173.3	62.3	130.1	0.7	3.4	0.6	1.9

TABLE 11-11

CYPRESS CREEK WATERSHED NET POLLUTANT LOAD BY SUBBASIN USING WET SEASON AVERAGE RAINFALL

Subbasin ID	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
500100	6373.6	29691.5	1234.0	340.9	1701.3	247.8	144.7	486.3	9.6	32.9	68.8	46.2
500200	2607.9	17908.7	888.4	232.1	1170.1	248.5	168.7	632.1	3.8	16.7	27.3	24.5
500300	9612.8	39258.8	1839.6	517.8	2405.8	134.3	181.7	630.6	13.4	35.9	93.4	57.0
500400	16900.0	51903.5	2635.0	852.8	3517.6	982.5	649.4	838.1	20.4	57.9	112.9	75.6
500500	6930.9	10575.8	885.6	315.4	1204.3	708.3	388.2	223.1	6.2	18.4	17.7	15.2
500600	15698.9	41530.7	2795.4	861.7	3673.8	865.4	585.8	831.8	16.7	44.7	85.5	57.3
500700	12219.4	39290.6	2377.9	719.3	3112.9	540.5	413.7	800.1	14.2	38.2	81.7	54.3
500900	10270.9	26685.4	1593.0	521.1	2125.0	671.0	423.4	461.5	11.3	31.4	56.2	38.3
501000	13380.8	38156.0	2153.8	691.1	2861.4	700.5	476.3	601.6	15.5	41.8	84.7	54.8
510100	829.2	7617.6	360.5	100.6	462.4	114.5	84.7	304.6	1.2	6.0	8.7	9.9
510150	158.9	2224.5	142.6	36.4	179.0	43.4	31.0	122.7	0.1	1.5	0.9	2.5
510200	288.6	2699.9	137.5	56.8	197.7	102.1	43.0	89.7	0.1	3.9	2.0	5.0
510250	377.3	4139.2	58.9	20.6	79.5	5.8	7.2	16.3	0.6	1.7	14.5	6.4
510260	396.3	3007.0	158.3	55.2	224.1	91.4	39.4	86.2	0.3	4.0	4.9	5.3
510300	1140.4	9345.5	545.9	187.4	749.4	281.7	124.6	299.7	0.6	11.8	8.4	15.5
510400	497.9	4858.5	266.7	116.8	383.5	205.6	87.5	187.0	0.2	7.3	1.0	9.2
510450	264.8	2942.4	139.3	69.0	208.3	135.5	56.0	109.0	0.1	4.8	0.6	5.9
510451	159.7	1781.8	84.0	41.7	125.8	82.1	33.9	65.9	0.1	2.9	0.4	3.6
510500	1341.5	11769.2	695.7	205.7	925.2	283.0	142.3	415.4	0.9	12.4	12.5	17.4
510600	458.4	5057.2	243.2	117.2	360.4	226.8	94.0	185.5	0.2	8.0	1.0	9.9
510700	483.8	3580.7	223.6	49.2	286.9	45.8	28.3	107.0	0.4	2.9	6.6	4.6
510800	249.2	4718.0	268.9	69.8	338.7	99.4	69.9	267.8	0.2	3.2	2.0	5.5
510900	288.0	4165.7	228.6	73.8	302.4	118.7	65.0	201.6	0.2	4.1	1.4	5.9
511100	1264.2	7242.4	386.2	122.3	510.3	105.4	59.6	166.7	1.4	7.4	9.5	10.7
511200	1490.8	10070.4	597.3	157.3	756.4	121.2	85.3	346.0	1.8	9.6	10.8	13.6
511300	447.6	4913.8	307.9	79.2	387.2	107.0	62.4	278.2	0.3	4.6	2.1	8.1
511400	80.4	1528.0	87.0	22.6	109.6	32.2	22.7	86.9	0.1	1.0	0.6	1.8
511500	333.1	3997.6	195.2	87.7	283.0	167.2	73.2	161.5	0.2	5.8	1.0	7.4
511600	122.6	1657.5	85.1	32.8	117.8	58.9	28.6	75.3	0.1	2.0	0.5	2.7
520100	1353.3	3105.8	355.5	107.3	463.0	193.4	131.3	250.1	1.1	5.3	1.8	4.1
520200	437.2	695.5	68.7	26.4	95.1	67.9	34.4	28.9	0.3	1.5	0.2	1.1
520300	90.3	1713.3	97.6	25.4	123.0	36.2	25.4	97.4	0.1	1.2	0.7	2.0
520400	2529.8	6854.6	525.8	136.2	701.8	278.6	159.6	233.8	2.0	8.2	18.2	9.2
520600	157.2	853.1	46.5	7.4	62.4	6.3	4.9	19.2	0.2	0.7	3.7	1.2
520700	607.7	6900.6	182.3	54.7	237.0	54.7	41.0	129.6	0.9	3.5	18.3	10.0
520750	323.6	1561.2	84.6	11.9	114.7	8.0	6.6	26.0	0.3	1.4	7.8	2.3
520800	562.0	3584.0	199.0	37.0	263.0	40.5	29.5	110.5	0.6	2.9	12.1	4.9
520900	491.7	5838.0	347.6	92.8	440.3	145.0	97.5	329.5	0.4	4.3	2.4	6.8
521000	844.5	2753.1	210.1	64.2	274.2	138.6	80.6	143.2	0.6	3.1	1.3	3.3
521100	1201.4	3725.1	294.5	90.2	384.6	197.3	114.3	199.1	0.9	4.4	1.4	4.4
521200	335.1	3795.0	59.5	20.2	79.7	9.0	9.2	25.3	0.5	1.6	12.8	5.8
521300	1715.0	14664.3	261.9	102.3	364.2	109.3	65.3	85.0	2.3	7.9	48.6	23.2
521400	237.8	1316.0	133.6	34.7	168.3	34.8	26.0	94.4	0.1	1.0	0.5	1.5
521500	1521.9	2493.5	295.4	85.8	390.9	220.2	118.6	161.6	1.1	4.4	0.9	3.1
521600	1100.7	4721.2	469.3	169.5	638.8	186.9	143.5	311.2	0.6	9.9	1.4	7.1
521700	212.8	2453.0	129.5	49.3	178.8	89.0	43.3	109.7	0.1	3.0	0.7	4.0
521800	4530.3	9113.9	701.1	235.7	938.7	509.6	284.0	269.3	4.0	13.5	11.4	12.4
521900	713.3	1156.9	89.8	32.2	122.4	73.8	40.3	23.1	0.7	2.0	1.9	1.7
522000	693.5	3061.3	148.4	44.0	193.4	44.8	29.5	59.4	0.8	3.0	5.0	4.2
522100	175.7	1666.5	104.9	28.0	133.0	42.8	28.2	90.7	0.1	1.3	0.7	1.9
522200	1029.6	2534.4	192.6	44.4	260.8	86.4	48.8	56.4	0.9	3.1	10.3	3.6

TABLE 11-11 (CONTINUED)

CYPRESS CREEK WATERSHED NET POLLUTANT LOAD BY SUBBASIN USING WET SEASON AVERAGE RAINFALL

Subbasin ID	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
522300	412.5	336.7	51.5	18.8	70.3	53.7	28.2	14.2	0.3	1.0	0.1	0.4
530100	1586.2	4527.9	369.6	115.4	485.0	252.0	141.9	225.4	1.2	5.7	1.6	5.6
530150	996.5	6798.8	358.1	169.4	527.5	350.0	151.2	255.3	0.5	11.3	1.4	13.3
530200	1696.8	3080.2	301.1	99.1	400.2	246.1	135.8	155.8	1.2	4.9	1.0	3.8
530300	79.3	1505.9	85.8	22.3	108.0	31.8	22.4	85.6	0.1	1.0	0.6	1.7
530500	695.3	7049.6	370.5	148.5	519.0	279.6	132.7	309.7	0.4	9.3	2.0	12.0
540100	941.6	937.4	168.6	46.1	225.3	130.9	66.4	81.2	0.7	2.5	0.3	1.3
540200	548.7	6048.6	287.1	141.2	428.2	277.7	115.3	225.5	0.2	9.7	1.3	12.0
540300	1927.5	8801.6	353.0	116.3	469.3	219.4	128.5	180.1	1.9	6.7	21.4	12.6
540400	225.6	357.0	82.0	12.9	105.9	35.9	17.4	60.0	0.2	0.8	0.2	0.4
540450	1142.6	2633.5	223.2	79.1	302.3	188.6	99.4	123.4	0.8	4.3	0.8	3.8
540500	1072.8	2945.0	242.9	75.6	318.4	170.5	97.6	155.9	0.8	3.7	1.1	3.5
540600	2564.3	7152.6	586.5	182.1	768.6	409.2	234.5	379.0	1.9	8.9	2.7	8.6
540700	3106.9	5529.3	506.9	165.6	673.2	370.6	199.8	169.2	2.4	8.9	4.3	7.1
540800	545.6	2271.6	182.5	50.9	233.4	83.2	49.9	112.2	0.4	2.6	0.8	2.6
540900	723.8	4208.5	190.2	52.7	244.1	29.1	23.1	75.0	1.0	3.7	6.8	5.8
541000	177.3	2197.5	138.5	34.5	173.1	39.4	26.0	100.1	0.1	1.6	0.7	2.5
541100	5018.0	10795.0	660.7	233.4	897.9	466.5	265.4	203.6	5.1	15.4	20.3	15.8
541150	13368.4	59107.8	3411.9	1204.0	4626.5	1809.6	938.6	1703.5	12.6	73.2	62.6	92.1
541200	1381.6	1635.8	226.9	74.7	301.6	174.4	95.1	83.8	0.9	3.2	0.4	1.9
541300	5.5	104.9	6.0	1.6	7.5	2.2	1.6	6.0	0.0	0.1	0.0	0.1
542010	436.8	735.7	74.5	24.8	99.3	62.5	34.3	36.8	0.3	1.2	0.2	0.9
542020	1183.0	2936.6	252.7	79.3	331.9	181.3	102.5	150.5	0.9	3.9	1.0	3.5
542030	411.1	1492.1	113.0	33.7	146.6	69.4	40.7	78.4	0.3	1.6	0.6	1.8
542040	226.9	930.6	68.1	18.6	86.7	36.4	22.1	51.3	0.1	0.9	0.4	1.1
542050	157.8	2843.2	167.1	42.4	210.5	61.4	42.7	165.7	0.2	2.0	1.2	3.3
542060	972.2	3152.1	245.5	74.7	320.3	161.7	94.1	169.0	0.7	3.6	1.2	3.8
542070	380.5	397.6	52.1	18.4	70.5	50.8	27.0	18.1	0.3	0.9	0.1	0.5
542080	994.7	1185.5	143.9	50.1	193.9	135.1	72.3	55.7	0.7	2.5	0.3	1.5
542090	1011.3	889.1	129.6	46.8	176.4	132.6	69.8	38.4	0.7	2.4	0.2	1.2
542100	1656.8	3303.6	561.3	104.8	730.5	176.6	80.2	249.7	0.7	3.7	1.0	3.2
542110	84.0	605.1	38.7	10.8	49.5	18.9	12.0	33.7	0.1	0.5	0.2	0.7
542120	862.2	4723.0	327.1	92.5	419.6	166.6	103.1	258.3	0.7	4.3	1.8	5.5
542130	1061.3	1059.5	142.7	50.8	193.4	141.0	74.7	47.6	0.8	2.6	0.3	1.4
542140	1782.1	1777.7	240.0	84.6	324.5	234.7	124.4	80.2	1.3	4.3	0.5	2.3
542150	108.4	942.6	79.2	20.0	99.2	17.1	13.6	58.2	0.1	0.5	0.3	1.0
542160	244.2	1594.7	150.0	38.1	188.1	30.8	24.5	100.6	0.1	0.9	0.5	1.6
542170	987.1	693.6	118.6	43.7	162.2	126.3	65.8	27.8	0.7	2.2	0.1	0.9
542180	2791.9	4336.6	459.8	154.1	614.0	392.7	214.2	215.0	2.0	7.6	1.4	5.3
542190	286.3	1290.4	119.7	32.2	151.9	39.6	26.7	77.9	0.2	1.0	0.4	1.3
542200	2409.4	1871.2	295.8	108.3	404.1	312.2	163.4	77.3	1.7	5.5	0.4	2.5
542210	1517.1	1970.7	217.7	84.3	302.0	225.0	113.8	78.7	1.1	4.6	0.4	3.1
542220	1293.4	3743.0	280.7	106.3	387.1	244.1	123.4	165.4	0.9	6.1	1.0	5.9
542230	2640.4	2508.4	348.5	124.7	473.2	348.9	184.3	111.1	1.9	6.3	0.7	3.2
542240	609.4	950.8	110.5	35.6	146.1	81.1	45.0	49.7	0.4	1.6	0.3	1.1
542250	1148.9	908.9	149.4	53.3	202.7	145.6	76.7	39.7	0.8	2.6	0.2	1.2
542260	2545.8	2847.9	363.9	126.8	490.7	340.3	181.8	133.2	1.8	6.3	0.8	3.6
542270	901.4	1028.6	225.7	31.4	303.8	112.3	40.4	84.3	0.4	2.2	0.4	1.2

TABLE 11-11

CYPRESS CREEK WATERSHED NET POLLUTANT LOAD BY SUBBASIN USING WET SEASON AVERAGE RAINFALL

Subbasin ID	Area (acres)	Volume (acre-ft)	RC	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
500100	390.8	546.2	0.36	3484.1	16230.7	674.6	186.4	930.0	135.5	79.1	265.8	5.3	18.0	37.6	25.2
500200	1038.0	727.1	0.18	1425.6	9789.7	485.6	126.9	639.6	135.8	92.2	345.5	2.1	9.1	14.9	13.4
500300	1682.9	1003.1	0.15	5254.8	21460.6	1005.6	283.1	1315.1	73.4	99.3	344.7	7.3	19.6	51.0	31.2
500400	1761.3	1271.4	0.18	9238.3	28372.8	1440.4	466.2	1922.9	537.1	355.0	458.2	11.1	31.6	61.7	41.3
500500	577.2	386.8	0.17	3788.8	5781.2	484.1	172.4	658.3	387.2	212.2	122.0	3.4	10.0	9.7	8.3
500600	1910.8	1225.0	0.16	8581.7	22702.5	1528.1	471.1	2008.3	473.1	320.2	454.7	9.1	24.5	46.7	31.3
500700	1664.7	1046.8	0.16	6679.7	21478.0	1299.8	393.2	1701.7	295.4	226.1	437.4	7.7	20.9	44.7	29.7
500900	1117.6	776.4	0.18	5614.5	14587.4	870.8	284.9	1161.6	366.8	231.4	252.3	6.2	17.2	30.7	20.9
501000	1194.9	836.6	0.18	7314.5	20857.8	1177.4	377.8	1564.2	382.9	260.4	328.9	8.5	22.8	46.3	30.0
510100	160.6	297.0	0.47	453.3	4164.1	197.0	55.0	252.7	62.6	46.3	166.5	0.6	3.3	4.8	5.4
510150	99.0	89.6	0.23	86.9	1216.0	78.0	19.9	97.8	23.7	16.9	67.0	0.1	0.8	0.5	1.4
510200	43.3	59.5	0.35	157.8	1475.9	75.1	31.1	108.1	55.8	23.5	49.1	0.1	2.1	1.1	2.7
510250	16.1	16.6	0.26	206.2	2262.7	32.2	11.3	43.5	3.2	3.9	8.9	0.3	0.9	7.9	3.5
510260	23.1	57.7	0.64	216.6	1643.8	86.6	30.2	122.5	50.0	21.5	47.1	0.1	2.2	2.7	2.9
510300	144.9	238.1	0.42	623.4	5108.7	298.4	102.4	409.7	154.0	68.1	163.8	0.3	6.4	4.6	8.5
510400	60.3	128.6	0.54	272.2	2655.9	145.8	63.9	209.6	112.4	47.9	102.2	0.1	4.0	0.5	5.0
510450	53.1	76.9	0.37	144.7	1608.4	76.2	37.7	113.9	74.1	30.6	59.6	0.1	2.6	0.3	3.2
510451	14.5	36.6	0.64	87.3	974.0	45.9	22.8	68.8	44.9	18.5	36.0	0.0	1.6	0.2	1.9
510500	162.0	311.7	0.49	733.3	6433.6	380.3	112.5	505.8	154.7	77.8	227.1	0.5	6.8	6.9	9.5
510600	42.7	109.5	0.65	250.6	2764.5	132.9	64.1	197.0	124.0	51.4	101.4	0.1	4.4	0.6	5.4
510700	43.2	86.7	0.51	264.5	1957.4	122.2	26.9	156.8	25.1	15.4	58.5	0.2	1.6	3.6	2.5
510800	108.2	144.0	0.34	136.2	2579.1	147.0	38.2	185.1	54.4	38.2	146.4	0.1	1.8	1.1	3.0
510900	81.3	118.2	0.37	157.5	2277.1	125.0	40.3	165.3	64.9	35.6	110.2	0.1	2.3	0.8	3.2
511100	97.3	133.0	0.35	691.1	3959.0	211.1	66.9	278.9	57.6	32.6	91.1	0.8	4.0	5.2	5.9
511200	142.3	230.1	0.41	814.9	5504.9	326.5	86.0	413.5	66.3	46.6	189.1	1.0	5.2	5.9	7.4
511300	96.8	183.3	0.48	244.7	2686.1	168.3	43.3	211.7	58.5	34.1	152.1	0.2	2.5	1.1	4.4
511400	37.6	66.3	0.45	44.0	835.3	47.6	12.4	59.9	17.6	12.4	47.5	0.0	0.6	0.4	1.0
511500	81.0	98.8	0.31	182.1	2185.2	106.7	47.9	154.7	91.4	40.0	88.3	0.1	3.2	0.5	4.1
511600	24.3	39.7	0.42	67.0	906.1	46.5	17.9	64.4	32.2	15.6	41.1	0.0	1.1	0.3	1.5
520100	195.8	178.0	0.23	739.8	1697.8	194.3	58.7	253.1	105.7	71.8	136.7	0.6	2.9	1.0	2.2
520200	120.5	90.8	0.19	239.0	380.2	37.6	14.4	52.0	37.1	18.8	15.8	0.2	0.8	0.1	0.6
520300	76.0	110.8	0.37	49.4	936.6	53.4	13.9	67.2	19.8	13.9	53.2	0.0	0.6	0.4	1.1
520400	174.8	244.9	0.36	1382.9	3747.0	287.4	74.4	383.6	152.3	87.2	127.8	1.1	4.5	9.9	5.0
520600	22.5	19.0	0.21	85.9	466.3	25.4	4.0	34.1	3.5	2.7	10.5	0.1	0.4	2.0	0.7
520700	73.1	84.4	0.29	332.2	3772.2	99.7	29.9	129.6	29.9	22.4	70.8	0.5	1.9	10.0	5.4
520750	29.9	30.0	0.26	176.9	853.4	46.3	6.5	62.7	4.4	3.6	14.2	0.2	0.7	4.3	1.3
520800	58.7	82.3	0.36	307.2	1959.2	108.8	20.2	143.7	22.1	16.1	60.4	0.3	1.6	6.6	2.7
520900	136.6	184.4	0.34	268.8	3191.3	190.0	50.7	240.7	79.3	53.3	180.1	0.2	2.4	1.3	3.7
521000	67.1	90.0	0.34	461.6	1505.0	114.8	35.1	149.9	75.8	44.1	78.3	0.3	1.7	0.7	1.8
521100	118.5	132.8	0.29	656.7	2036.3	161.0	49.3	210.3	107.8	62.5	108.8	0.5	2.4	0.8	2.4
521200	23.6	36.9	0.40	183.2	2074.5	32.5	11.1	43.6	4.9	5.0	13.8	0.3	0.9	7.0	3.2
521300	41.6	75.3	0.46	937.5	8016.2	143.2	55.9	199.1	59.8	35.7	46.5	1.3	4.3	26.6	12.7
521400	62.9	86.9	0.35	130.0	719.4	73.0	19.0	92.0	19.0	14.2	51.6	0.1	0.5	0.3	0.8
521500	154.6	156.2	0.26	831.9	1363.1	161.5	46.9	213.7	120.4	64.8	88.4	0.6	2.4	0.5	1.7
521600	125.3	215.9	0.44	601.7	2580.8	256.5	92.7	349.2	102.2	78.4	170.1	0.3	5.4	0.7	3.9
521700	36.4	67.8	0.47	116.3	1340.9	70.8	27.0	97.8	48.6	23.7	60.0	0.1	1.7	0.4	2.2
521800	428.8	699.3	0.42	2476.4	4982.0	383.3	128.8	513.2	278.5	155.3	147.2	2.2	7.4	6.3	6.8
521900	36.0	66.7	0.47	389.9	632.4	49.1	17.6	66.9	40.3	22.0	12.6	0.4	1.1	1.0	0.9
522000	65.3	67.4	0.26	379.1	1673.5	81.1	24.0	105.7	24.5	16.1	32.5	0.5	1.6	2.7	2.3

TABLE 11-11

CYPRESS CREEK WATERSHED NET POLLUTANT LOAD BY SUBBASIN USING WET SEASON AVERAGE RAINFALL

(Continued)

Subbasin ID	Area (acres)	Volume (acre-ft)	RC	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
522300	16.6	15.9	0.24	225.5	184.1	28.2	10.3	38.4	29.4	15.4	7.7	0.2	0.5	0.0	0.2
530100	141.5	167.3	0.30	867.1	2475.1	202.0	63.1	265.1	137.8	77.6	123.2	0.6	3.1	0.8	3.0
530150	74.0	165.7	0.57	544.7	3716.6	195.7	92.6	288.4	191.3	82.7	139.5	0.3	6.2	0.8	7.3
530200	89.8	115.0	0.33	927.5	1683.8	164.6	54.2	218.8	134.6	74.2	85.2	0.7	2.7	0.6	2.1
530300	33.1	46.5	0.36	43.3	823.2	46.9	12.2	59.1	17.4	12.2	46.8	0.0	0.6	0.3	1.0
530500	103.3	168.8	0.42	380.1	3853.6	202.5	81.2	283.7	152.9	72.6	169.3	0.2	5.1	1.1	6.5
540100	59.2	75.7	0.33	514.7	512.4	92.2	25.2	123.2	71.6	36.3	44.4	0.4	1.4	0.2	0.7
540200	55.4	121.1	0.56	299.9	3306.4	156.9	77.2	234.1	151.8	63.0	123.3	0.1	5.3	0.7	6.6
540300	112.0	142.3	0.32	1053.7	4811.4	192.9	63.6	256.5	119.9	70.2	98.4	1.0	3.7	11.7	6.9
540400	45.8	70.2	0.39	123.3	195.2	44.9	7.1	57.9	19.6	9.5	32.8	0.1	0.4	0.1	0.2
540450	75.2	89.7	0.30	624.6	1439.6	122.0	43.3	165.3	103.1	54.3	67.5	0.4	2.3	0.4	2.1
540500	154.4	245.9	0.41	586.4	1609.9	132.8	41.3	174.1	93.2	53.3	85.2	0.4	2.0	0.6	1.9
540600	198.7	421.9	0.53	1401.7	3909.9	320.6	99.6	420.1	223.7	128.2	207.2	1.0	4.9	1.5	4.7
540700	336.9	239.9	0.18	1698.4	3022.6	277.1	90.5	368.0	202.6	109.2	92.5	1.3	4.8	2.4	3.9
540800	107.9	144.4	0.34	298.3	1241.8	99.8	27.8	127.6	45.5	27.3	61.3	0.2	1.4	0.4	1.4
540900	30.4	64.9	0.54	395.7	2300.6	104.0	28.8	133.5	15.9	12.6	41.0	0.5	2.0	3.7	3.1
541000	46.5	92.3	0.50	96.9	1201.3	75.7	18.9	94.6	21.5	14.2	54.7	0.1	0.9	0.4	1.4
541100	196.0	345.5	0.45	2743.1	5901.0	361.2	127.6	490.8	255.0	145.1	111.3	2.8	8.4	11.1	8.6
541150	1422.5	2204.1	0.39	7307.7	32311.0	1865.1	658.1	2529.1	989.2	513.1	931.2	6.9	40.0	34.2	50.3
541200	93.4	153.1	0.42	755.3	894.2	124.0	40.9	164.9	95.3	52.0	45.8	0.5	1.8	0.2	1.0
541300	12.6	16.6	0.33	3.0	57.3	3.3	0.8	4.1	1.2	0.9	3.3	0.0	0.0	0.0	0.1
542010	71.5	78.9	0.28	238.8	402.2	40.7	13.5	54.3	34.2	18.7	20.1	0.2	0.7	0.1	0.5
542020	81.6	111.9	0.35	646.7	1605.3	138.1	43.3	181.5	99.1	56.0	82.3	0.5	2.1	0.6	1.9
542030	37.3	48.2	0.33	224.7	815.7	61.8	18.4	80.2	37.9	22.3	42.9	0.2	0.9	0.3	1.0
542040	42.7	34.3	0.20	124.0	508.7	37.2	10.1	47.4	19.9	12.1	28.0	0.1	0.5	0.2	0.6
542050	60.9	88.8	0.37	86.2	1554.2	91.3	23.2	115.1	33.5	23.3	90.6	0.1	1.1	0.7	1.8
542060	103.5	130.5	0.32	531.4	1723.1	134.2	40.9	175.1	88.4	51.4	92.4	0.4	2.0	0.7	2.1
542070	30.2	21.2	0.18	208.0	217.3	28.5	10.1	38.5	27.8	14.8	9.9	0.1	0.5	0.1	0.3
542080	56.7	66.1	0.30	543.8	648.1	78.6	27.4	106.0	73.8	39.5	30.4	0.4	1.4	0.2	0.8
542090	43.2	55.0	0.32	552.8	486.0	70.9	25.6	96.4	72.5	38.1	21.0	0.4	1.3	0.1	0.6
542100	258.2	283.8	0.28	905.7	1805.9	306.8	57.3	399.3	96.5	43.9	136.5	0.4	2.0	0.5	1.7
542110	23.3	20.1	0.22	45.9	330.8	21.2	5.9	27.1	10.3	6.6	18.4	0.0	0.3	0.1	0.4
542120	141.0	165.0	0.30	471.3	2581.8	178.8	50.6	229.4	91.1	56.4	141.2	0.4	2.3	1.0	3.0
542130	50.5	53.7	0.27	580.1	579.2	78.0	27.7	105.7	77.1	40.8	26.0	0.4	1.4	0.2	0.7
542140	93.1	101.1	0.28	974.2	971.8	131.2	46.2	177.4	128.3	68.0	43.8	0.7	2.3	0.3	1.2
542150	59.4	78.8	0.34	59.2	515.3	43.3	10.9	54.2	9.3	7.4	31.8	0.0	0.3	0.2	0.5
542160	114.0	74.6	0.17	133.5	871.7	82.0	20.8	102.8	16.9	13.4	55.0	0.1	0.5	0.3	0.9
542170	42.4	32.1	0.19	539.6	379.2	64.8	23.9	88.7	69.0	36.0	15.2	0.4	1.2	0.1	0.5
542180	163.5	194.6	0.30	1526.2	2370.6	251.3	84.3	335.6	214.7	117.1	117.5	1.1	4.2	0.8	2.9
542190	76.8	59.6	0.20	156.5	705.4	65.5	17.6	83.1	21.7	14.6	42.6	0.1	0.5	0.2	0.7
542200	107.6	92.9	0.22	1317.1	1022.9	161.7	59.2	220.9	170.7	89.3	42.2	0.9	3.0	0.2	1.3
542210	105.7	81.5	0.20	829.3	1077.3	119.0	46.1	165.1	123.0	62.2	43.0	0.6	2.5	0.2	1.7
542220	91.6	111.5	0.31	707.0	2046.1	153.5	58.1	211.6	133.5	67.4	90.4	0.5	3.3	0.6	3.2
542230	139.3	136.9	0.25	1443.3	1371.2	190.5	68.2	258.7	190.7	100.8	60.7	1.0	3.4	0.4	1.8
542240	46.2	42.8	0.24	333.1	519.7	60.4	19.5	79.9	44.3	24.6	27.2	0.2	0.9	0.2	0.6
542250	101.9	106.9	0.27	628.0	496.8	81.7	29.1	110.8	79.6	41.9	21.7	0.4	1.4	0.1	0.6
542260	229.4	316.9	0.35	1391.6	1556.8	198.9	69.3	268.2	186.0	99.4	72.8	1.0	3.4	0.4	2.0
542270	96.0	138.6	0.37	492.7	562.3	123.4	17.2	166.1	61.4	22.1	46.1	0.2	1.2	0.2	0.7

TABLE 11-12

CYPRESS CREEK WATERSHED NET POLLUTANT LOAD BY SUBBASIN USING DRY SEASON AVERAGE RAINFALL

Subbasin ID	Area (acres)	Volume (acre-ft)	RC	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
500100	390.8	546.2	0.36	3484.1	16230.7	674.6	186.4	930.0	135.5	79.1	265.8	5.3	18.0	37.6	25.2
500200	1038.0	727.1	0.18	1425.6	9789.7	485.6	126.9	639.6	135.8	92.2	345.5	2.1	9.1	14.9	13.4
500300	1682.9	1003.1	0.15	5254.8	21460.6	1005.6	283.1	1315.1	73.4	99.3	344.7	7.3	19.6	51.0	31.2
500400	1761.3	1271.4	0.18	9238.3	28372.8	1440.4	466.2	1922.9	537.1	355.0	458.2	11.1	31.6	61.7	41.3
500500	577.2	386.8	0.17	3788.8	5781.2	484.1	172.4	658.3	387.2	212.2	122.0	3.4	10.0	9.7	8.3
500600	1910.8	1225.0	0.16	8581.7	22702.5	1528.1	471.1	2008.3	473.1	320.2	454.7	9.1	24.5	46.7	31.3
500700	1664.7	1046.8	0.16	6679.7	21478.0	1299.8	393.2	1701.7	295.4	226.1	437.4	7.7	20.9	44.7	29.7
500900	1117.6	776.4	0.18	5614.5	14587.4	870.8	284.9	1161.6	366.8	231.4	252.3	6.2	17.2	30.7	20.9
501000	1194.9	836.6	0.18	7314.5	20857.8	1177.4	377.8	1564.2	382.9	260.4	328.9	8.5	22.8	46.3	30.0
510100	160.6	297.0	0.47	453.3	4164.1	197.0	55.0	252.7	62.6	46.3	166.5	0.6	3.3	4.8	5.4
510150	99.0	89.6	0.23	86.9	1216.0	78.0	19.9	97.8	23.7	16.9	67.0	0.1	0.8	0.5	1.4
510200	43.3	59.5	0.35	157.8	1475.9	75.1	31.1	108.1	55.8	23.5	49.1	0.1	2.1	1.1	2.7
510250	16.1	16.6	0.26	206.2	2262.7	32.2	11.3	43.5	3.2	3.9	8.9	0.3	0.9	7.9	3.5
510260	23.1	57.7	0.64	216.6	1643.8	86.6	30.2	122.5	50.0	21.5	47.1	0.1	2.2	2.7	2.9
510300	144.9	238.1	0.42	623.4	5108.7	298.4	102.4	409.7	154.0	68.1	163.8	0.3	6.4	4.6	8.5
510400	60.3	128.6	0.54	272.2	2655.9	145.8	63.9	209.6	112.4	47.9	102.2	0.1	4.0	0.5	5.0
510450	53.1	76.9	0.37	144.7	1608.4	76.2	37.7	113.9	74.1	30.6	59.6	0.1	2.6	0.3	3.2
510451	14.5	36.6	0.64	87.3	974.0	45.9	22.8	68.8	44.9	18.5	36.0	0.0	1.6	0.2	1.9
510500	162.0	311.7	0.49	733.3	6433.6	380.3	112.5	505.8	154.7	77.8	227.1	0.5	6.8	6.9	9.5
510600	42.7	109.5	0.65	250.6	2764.5	132.9	64.1	197.0	124.0	51.4	101.4	0.1	4.4	0.6	5.4
510700	43.2	86.7	0.51	264.5	1957.4	122.2	26.9	156.8	25.1	15.4	58.5	0.2	1.6	3.6	2.5
510800	108.2	144.0	0.34	136.2	2579.1	147.0	38.2	185.1	54.4	38.2	146.4	0.1	1.8	1.1	3.0
510900	81.3	118.2	0.37	157.5	2277.1	125.0	40.3	165.3	64.9	35.6	110.2	0.1	2.3	0.8	3.2
511100	97.3	133.0	0.35	691.1	3959.0	211.1	66.9	278.9	57.6	32.6	91.1	0.8	4.0	5.2	5.9
511200	142.3	230.1	0.41	814.9	5504.9	326.5	86.0	413.5	66.3	46.6	189.1	1.0	5.2	5.9	7.4
511300	96.8	183.3	0.48	244.7	2686.1	168.3	43.3	211.7	58.5	34.1	152.1	0.2	2.5	1.1	4.4
511400	37.6	66.3	0.45	44.0	835.3	47.6	12.4	59.9	17.6	12.4	47.5	0.0	0.6	0.4	1.0
511500	81.0	98.8	0.31	182.1	2185.2	106.7	47.9	154.7	91.4	40.0	88.3	0.1	3.2	0.5	4.1
511600	24.3	39.7	0.42	67.0	906.1	46.5	17.9	64.4	32.2	15.6	41.1	0.0	1.1	0.3	1.5
520100	195.8	178.0	0.23	739.8	1697.8	194.3	58.7	253.1	105.7	71.8	136.7	0.6	2.9	1.0	2.2
520200	120.5	90.8	0.19	239.0	380.2	37.6	14.4	52.0	37.1	18.8	15.8	0.2	0.8	0.1	0.6
520300	76.0	110.8	0.37	49.4	936.6	53.4	13.9	67.2	19.8	13.9	53.2	0.0	0.6	0.4	1.1
520400	174.8	244.9	0.36	1382.9	3747.0	287.4	74.4	383.6	152.3	87.2	127.8	1.1	4.5	9.9	5.0
520600	22.5	19.0	0.21	85.9	466.3	25.4	4.0	34.1	3.5	2.7	10.5	0.1	0.4	2.0	0.7
520700	73.1	84.4	0.29	332.2	3772.2	99.7	29.9	129.6	29.9	22.4	70.8	0.5	1.9	10.0	5.4
520750	29.9	30.0	0.26	176.9	853.4	46.3	6.5	62.7	4.4	3.6	14.2	0.2	0.7	4.3	1.3
520800	58.7	82.3	0.36	307.2	1959.2	108.8	20.2	143.7	22.1	16.1	60.4	0.3	1.6	6.6	2.7
520900	136.6	184.4	0.34	268.8	3191.3	190.0	50.7	240.7	79.3	53.3	180.1	0.2	2.4	1.3	3.7
521000	67.1	90.0	0.34	461.6	1505.0	114.8	35.1	149.9	75.8	44.1	78.3	0.3	1.7	0.7	1.8
521100	118.5	132.8	0.29	656.7	2036.3	161.0	49.3	210.3	107.8	62.5	108.8	0.5	2.4	0.8	2.4
521200	23.6	36.9	0.40	183.2	2074.5	32.5	11.1	43.6	4.9	5.0	13.8	0.3	0.9	7.0	3.2
521300	41.6	75.3	0.46	937.5	8016.2	143.2	55.9	199.1	59.8	35.7	46.5	1.3	4.3	26.6	12.7
521400	62.9	86.9	0.35	130.0	719.4	73.0	19.0	92.0	19.0	14.2	51.6	0.1	0.5	0.3	0.8
521500	154.6	156.2	0.26	831.9	1363.1	161.5	46.9	213.7	120.4	64.8	88.4	0.6	2.4	0.5	1.7
521600	125.3	215.9	0.44	601.7	2580.8	256.5	92.7	349.2	102.2	78.4	170.1	0.3	5.4	0.7	3.9
521700	36.4	67.8	0.47	116.3	1340.9	70.8	27.0	97.8	48.6	23.7	60.0	0.1	1.7	0.4	2.2
521800	428.8	699.3	0.42	2476.4	4982.0	383.3	128.8	513.2	278.5	155.3	147.2	2.2	7.4	6.3	6.8
521900	36.0	66.7	0.47	389.9	632.4	49.1	17.6	66.9	40.3	22.0	12.6	0.4	1.1	1.0	0.9
522000	65.3	67.4	0.26	379.1	1673.5	81.1	24.0	105.7	24.5	16.1	32.5	0.5	1.6	2.7	2.3

TABLE 11-12

CYPRESS CREEK WATERSHED NET POLLUTANT LOAD BY SUBBASIN USING DRY SEASON AVERAGE RAINFALL

(Continued)

Subbasin ID	Area (acres)	Volume (acre-ft)	RC	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
522300	16.6	15.9	0.24	225.5	184.1	28.2	10.3	38.4	29.4	15.4	7.7	0.2	0.5	0.0	0.2
530100	141.5	167.3	0.30	867.1	2475.1	202.0	63.1	265.1	137.8	77.6	123.2	0.6	3.1	0.8	3.0
530150	74.0	165.7	0.57	544.7	3716.6	195.7	92.6	288.4	191.3	82.7	139.5	0.3	6.2	0.8	7.3
530200	89.8	115.0	0.33	927.5	1683.8	164.6	54.2	218.8	134.6	74.2	85.2	0.7	2.7	0.6	2.1
530300	33.1	46.5	0.36	43.3	823.2	46.9	12.2	59.1	17.4	12.2	46.8	0.0	0.6	0.3	1.0
530500	103.3	168.8	0.42	380.1	3853.6	202.5	81.2	283.7	152.9	72.6	169.3	0.2	5.1	1.1	6.5
540100	59.2	75.7	0.33	514.7	512.4	92.2	25.2	123.2	71.6	36.3	44.4	0.4	1.4	0.2	0.7
540200	55.4	121.1	0.56	299.9	3306.4	156.9	77.2	234.1	151.8	63.0	123.3	0.1	5.3	0.7	6.6
540300	112.0	142.3	0.32	1053.7	4811.4	192.9	63.6	256.5	119.9	70.2	98.4	1.0	3.7	11.7	6.9
540400	45.8	70.2	0.39	123.3	195.2	44.9	7.1	57.9	19.6	9.5	32.8	0.1	0.4	0.1	0.2
540450	75.2	89.7	0.30	624.6	1439.6	122.0	43.3	165.3	103.1	54.3	67.5	0.4	2.3	0.4	2.1
540500	154.4	245.9	0.41	586.4	1609.9	132.8	41.3	174.1	93.2	53.3	85.2	0.4	2.0	0.6	1.9
540600	198.7	421.9	0.53	1401.7	3909.9	320.6	99.6	420.1	223.7	128.2	207.2	1.0	4.9	1.5	4.7
540700	336.9	239.9	0.18	1698.4	3022.6	277.1	90.5	368.0	202.6	109.2	92.5	1.3	4.8	2.4	3.9
540800	107.9	144.4	0.34	298.3	1241.8	99.8	27.8	127.6	45.5	27.3	61.3	0.2	1.4	0.4	1.4
540900	30.4	64.9	0.54	395.7	2300.6	104.0	28.8	133.5	15.9	12.6	41.0	0.5	2.0	3.7	3.1
541000	46.5	92.3	0.50	96.9	1201.3	75.7	18.9	94.6	21.5	14.2	54.7	0.1	0.9	0.4	1.4
541100	196.0	345.5	0.45	2743.1	5901.0	361.2	127.6	490.8	255.0	145.1	111.3	2.8	8.4	11.1	8.6
541150	1422.5	2204.1	0.39	7307.7	32311.0	1865.1	658.1	2529.1	989.2	513.1	931.2	6.9	40.0	34.2	50.3
541200	93.4	153.1	0.42	755.3	894.2	124.0	40.9	164.9	95.3	52.0	45.8	0.5	1.8	0.2	1.0
541300	12.6	16.6	0.33	3.0	57.3	3.3	0.8	4.1	1.2	0.9	3.3	0.0	0.0	0.0	0.1
542010	71.5	78.9	0.28	238.8	402.2	40.7	13.5	54.3	34.2	18.7	20.1	0.2	0.7	0.1	0.5
542020	81.6	111.9	0.35	646.7	1605.3	138.1	43.3	181.5	99.1	56.0	82.3	0.5	2.1	0.6	1.9
542030	37.3	48.2	0.33	224.7	815.7	61.8	18.4	80.2	37.9	22.3	42.9	0.2	0.9	0.3	1.0
542040	42.7	34.3	0.20	124.0	508.7	37.2	10.1	47.4	19.9	12.1	28.0	0.1	0.5	0.2	0.6
542050	60.9	88.8	0.37	86.2	1554.2	91.3	23.2	115.1	33.5	23.3	90.6	0.1	1.1	0.7	1.8
542060	103.5	130.5	0.32	531.4	1723.1	134.2	40.9	175.1	88.4	51.4	92.4	0.4	2.0	0.7	2.1
542070	30.2	21.2	0.18	208.0	217.3	28.5	10.1	38.5	27.8	14.8	9.9	0.1	0.5	0.1	0.3
542080	56.7	66.1	0.30	543.8	648.1	78.6	27.4	106.0	73.8	39.5	30.4	0.4	1.4	0.2	0.8
542090	43.2	55.0	0.32	552.8	486.0	70.9	25.6	96.4	72.5	38.1	21.0	0.4	1.3	0.1	0.6
542100	258.2	283.8	0.28	905.7	1805.9	306.8	57.3	399.3	96.5	43.9	136.5	0.4	2.0	0.5	1.7
542110	23.3	20.1	0.22	45.9	330.8	21.2	5.9	27.1	10.3	6.6	18.4	0.0	0.3	0.1	0.4
542120	141.0	165.0	0.30	471.3	2581.8	178.8	50.6	229.4	91.1	56.4	141.2	0.4	2.3	1.0	3.0
542130	50.5	53.7	0.27	580.1	579.2	78.0	27.7	105.7	77.1	40.8	26.0	0.4	1.4	0.2	0.7
542140	93.1	101.1	0.28	974.2	971.8	131.2	46.2	177.4	128.3	68.0	43.8	0.7	2.3	0.3	1.2
542150	59.4	78.8	0.34	59.2	515.3	43.3	10.9	54.2	9.3	7.4	31.8	0.0	0.3	0.2	0.5
542160	114.0	74.6	0.17	133.5	871.7	82.0	20.8	102.8	16.9	13.4	55.0	0.1	0.5	0.3	0.9
542170	42.4	32.1	0.19	539.6	379.2	64.8	23.9	88.7	69.0	36.0	15.2	0.4	1.2	0.1	0.5
542180	163.5	194.6	0.30	1526.2	2370.6	251.3	84.3	335.6	214.7	117.1	117.5	1.1	4.2	0.8	2.9
542190	76.8	59.6	0.20	156.5	705.4	65.5	17.6	83.1	21.7	14.6	42.6	0.1	0.5	0.2	0.7
542200	107.6	92.9	0.22	1317.1	1022.9	161.7	59.2	220.9	170.7	89.3	42.2	0.9	3.0	0.2	1.3
542210	105.7	81.5	0.20	829.3	1077.3	119.0	46.1	165.1	123.0	62.2	43.0	0.6	2.5	0.2	1.7
542220	91.6	111.5	0.31	707.0	2046.1	153.5	58.1	211.6	133.5	67.4	90.4	0.5	3.3	0.6	3.2
542230	139.3	136.9	0.25	1443.3	1371.2	190.5	68.2	258.7	190.7	100.8	60.7	1.0	3.4	0.4	1.8
542240	46.2	42.8	0.24	333.1	519.7	60.4	19.5	79.9	44.3	24.6	27.2	0.2	0.9	0.2	0.6
542250	101.9	106.9	0.27	628.0	496.8	81.7	29.1	110.8	79.6	41.9	21.7	0.4	1.4	0.1	0.6
542260	229.4	316.9	0.35	1391.6	1556.8	198.9	69.3	268.2	186.0	99.4	72.8	1.0	3.4	0.4	2.0
542270	96.0	138.6	0.37	492.7	562.3	123.4	17.2	166.1	61.4	22.1	46.1	0.2	1.2	0.2	0.7

TABLE 11-13

CYPRESS CREEK WATERSHED UNIT AREA POLLUTANT LOAD BY SUBBASIN (LBS/ACRE) USING AVERAGE ANNUAL RAINFALL

Subbasin ID	Area (acres)	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
500100	390.8	25.2	117.3	4.9	1.3	6.7	1.0	0.6	1.9	0.038	0.130	0.272	0.182
500200	1038.0	3.9	26.6	1.3	0.3	1.7	0.4	0.3	0.9	0.006	0.025	0.041	0.036
500300	1682.9	8.8	36.0	1.7	0.5	2.2	0.1	0.2	0.6	0.012	0.033	0.086	0.052
500400	1761.3	14.8	45.5	2.3	0.7	3.1	0.9	0.6	0.7	0.018	0.051	0.099	0.066
500500	577.2	18.5	28.3	2.4	0.8	3.2	1.9	1.0	0.6	0.017	0.049	0.047	0.041
500600	1910.8	12.7	33.6	2.3	0.7	3.0	0.7	0.5	0.7	0.014	0.036	0.069	0.046
500700	1664.7	11.3	36.4	2.2	0.7	2.9	0.5	0.4	0.7	0.013	0.035	0.076	0.050
500900	1117.6	14.2	36.9	2.2	0.7	2.9	0.9	0.6	0.6	0.016	0.043	0.078	0.053
501000	1194.9	17.3	49.3	2.8	0.9	3.7	0.9	0.6	0.8	0.020	0.054	0.109	0.071
510100	160.6	8.0	73.2	3.5	1.0	4.4	1.1	0.8	2.9	0.011	0.058	0.084	0.095
510150	99.0	2.5	34.7	2.2	0.6	2.8	0.7	0.5	1.9	0.002	0.023	0.013	0.039
510200	43.3	10.3	96.3	4.9	2.0	7.1	3.6	1.5	3.2	0.005	0.140	0.070	0.178
510250	16.1	36.1	396.6	5.6	2.0	7.6	0.6	0.7	1.6	0.059	0.164	1.386	0.614
510260	23.1	26.5	201.1	10.6	3.7	15.0	6.1	2.6	5.8	0.018	0.267	0.327	0.356
510300	144.9	12.1	99.5	5.8	2.0	8.0	3.0	1.3	3.2	0.006	0.125	0.089	0.165
510400	60.3	12.7	124.3	6.8	3.0	9.8	5.3	2.2	4.8	0.005	0.187	0.025	0.234
510450	53.1	7.7	85.5	4.0	2.0	6.1	3.9	1.6	3.2	0.003	0.138	0.018	0.171
510451	14.5	17.0	189.4	8.9	4.4	13.4	8.7	3.6	7.0	0.007	0.307	0.039	0.379
510500	162.0	12.8	112.2	6.6	2.0	8.8	2.7	1.4	4.0	0.008	0.118	0.119	0.166
510600	42.7	16.6	182.9	8.8	4.2	13.0	8.2	3.4	6.7	0.006	0.291	0.038	0.360
510700	43.2	17.3	127.8	8.0	1.8	10.2	1.6	1.0	3.8	0.013	0.105	0.235	0.164
510800	108.2	3.6	67.3	3.8	1.0	4.8	1.4	1.0	3.8	0.004	0.046	0.028	0.078
510900	81.3	5.5	79.1	4.3	1.4	5.7	2.3	1.2	3.8	0.004	0.078	0.026	0.113
511100	97.3	20.0	114.8	6.1	1.9	8.1	1.7	0.9	2.6	0.022	0.117	0.151	0.170
511200	142.3	16.2	109.3	6.5	1.7	8.2	1.3	0.9	3.8	0.019	0.104	0.118	0.148
511300	96.8	7.1	78.4	4.9	1.3	6.2	1.7	1.0	4.4	0.005	0.073	0.033	0.128
511400	37.6	3.3	62.7	3.6	0.9	4.5	1.3	0.9	3.6	0.003	0.043	0.026	0.073
511500	81.0	6.4	76.2	3.7	1.7	5.4	3.2	1.4	3.1	0.003	0.111	0.019	0.141
511600	24.3	7.8	105.4	5.4	2.1	7.5	3.7	1.8	4.8	0.004	0.129	0.031	0.173
520100	195.8	10.7	24.5	2.8	0.8	3.7	1.5	1.0	2.0	0.008	0.042	0.014	0.032
520200	120.5	5.6	8.9	0.9	0.3	1.2	0.9	0.4	0.4	0.004	0.019	0.002	0.014
520300	76.0	1.8	34.8	2.0	0.5	2.5	0.7	0.5	2.0	0.002	0.024	0.015	0.040
520400	174.8	22.3	60.5	4.6	1.2	6.2	2.5	1.4	2.1	0.018	0.073	0.161	0.081
520600	22.5	10.8	58.6	3.2	0.5	4.3	0.4	0.3	1.3	0.011	0.050	0.253	0.084
520700	73.1	12.8	145.7	3.8	1.2	5.0	1.2	0.9	2.7	0.019	0.073	0.387	0.210
520750	29.9	16.7	80.5	4.4	0.6	5.9	0.4	0.3	1.3	0.017	0.070	0.402	0.120
520800	58.7	14.8	94.3	5.2	1.0	6.9	1.1	0.8	2.9	0.015	0.077	0.318	0.129
520900	136.6	5.6	66.0	3.9	1.0	5.0	1.6	1.1	3.7	0.005	0.049	0.027	0.077
521000	67.1	19.4	63.3	4.8	1.5	6.3	3.2	1.9	3.3	0.015	0.072	0.030	0.076
521100	118.5	15.7	48.5	3.8	1.2	5.0	2.6	1.5	2.6	0.012	0.057	0.018	0.058
521200	23.6	22.0	248.7	3.9	1.3	5.2	0.6	0.6	1.7	0.036	0.105	0.840	0.381
521300	41.6	63.6	544.2	9.7	3.8	13.5	4.1	2.4	3.2	0.087	0.292	1.803	0.863
521400	62.9	5.8	32.3	3.3	0.9	4.1	0.9	0.6	2.3	0.003	0.025	0.013	0.037
521500	154.6	15.2	24.9	3.0	0.9	3.9	2.2	1.2	1.6	0.011	0.044	0.009	0.031
521600	125.3	13.6	58.2	5.8	2.1	7.9	2.3	1.8	3.8	0.008	0.122	0.017	0.087
521700	36.4	9.0	104.0	5.5	2.1	7.6	3.8	1.8	4.7	0.005	0.128	0.030	0.170
521800	428.8	16.3	32.8	2.5	0.8	3.4	1.8	1.0	1.0	0.014	0.049	0.041	0.045
521900	36.0	30.5	49.5	3.8	1.4	5.2	3.2	1.7	1.0	0.028	0.084	0.082	0.072
522000	65.3	16.4	72.4	3.5	1.0	4.6	1.1	0.7	1.4	0.020	0.071	0.119	0.100

TABLE 11-13

CYPRESS CREEK WATERSHED UNIT AREA POLLUTANT LOAD BY SUBBASIN (LBS/ACRE) USING AVERAGE ANNUAL RAINFALL

(Continued)

Subbasin ID	Area (acres)	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
522300	16.6	38.3	31.3	4.8	1.7	6.5	5.0	2.6	1.3	0.027	0.089	0.007	0.041
530100	141.5	17.3	49.4	4.0	1.3	5.3	2.8	1.5	2.5	0.013	0.062	0.017	0.061
530150	74.0	20.8	141.8	7.5	3.5	11.0	7.3	3.2	5.3	0.011	0.237	0.030	0.277
530200	89.8	29.2	53.0	5.2	1.7	6.9	4.2	2.3	2.7	0.021	0.085	0.018	0.065
530300	33.1	3.7	70.3	4.0	1.0	5.0	1.5	1.0	4.0	0.004	0.048	0.030	0.081
530500	103.3	10.4	105.3	5.5	2.2	7.8	4.2	2.0	4.6	0.006	0.139	0.030	0.179
540100	59.2	24.6	24.4	4.4	1.2	5.9	3.4	1.7	2.1	0.017	0.066	0.008	0.033
540200	55.4	15.3	168.7	8.0	3.9	11.9	7.7	3.2	6.3	0.006	0.271	0.035	0.335
540300	112.0	26.6	121.3	4.9	1.6	6.5	3.0	1.8	2.5	0.026	0.093	0.295	0.174
540400	45.8	7.6	12.0	2.8	0.4	3.6	1.2	0.6	2.0	0.005	0.027	0.006	0.015
540450	75.2	23.4	54.0	4.6	1.6	6.2	3.9	2.0	2.5	0.017	0.087	0.016	0.077
540500	154.4	10.7	29.4	2.4	0.8	3.2	1.7	1.0	1.6	0.008	0.037	0.011	0.035
540600	198.7	19.9	55.6	4.6	1.4	6.0	3.2	1.8	2.9	0.015	0.069	0.021	0.067
540700	336.9	14.2	25.3	2.3	0.8	3.1	1.7	0.9	0.8	0.011	0.041	0.020	0.033
540800	107.9	7.8	32.5	2.6	0.7	3.3	1.2	0.7	1.6	0.006	0.037	0.011	0.037
540900	30.4	36.8	213.7	9.7	2.7	12.4	1.5	1.2	3.8	0.049	0.188	0.344	0.292
541000	46.5	5.9	72.9	4.6	1.1	5.7	1.3	0.9	3.3	0.004	0.053	0.024	0.083
541100	196.0	39.5	85.0	5.2	1.8	7.1	3.7	2.1	1.6	0.040	0.121	0.160	0.124
541150	1422.5	14.5	64.1	3.7	1.3	5.0	2.0	1.0	1.8	0.014	0.079	0.068	0.100
541200	93.4	22.8	27.0	3.8	1.2	5.0	2.9	1.6	1.4	0.016	0.053	0.007	0.031
541300	12.6	0.7	12.8	0.7	0.2	0.9	0.3	0.2	0.7	0.001	0.009	0.005	0.015
542010	71.5	9.4	15.9	1.6	0.5	2.1	1.3	0.7	0.8	0.007	0.027	0.005	0.020
542020	81.6	22.4	55.6	4.8	1.5	6.3	3.4	1.9	2.8	0.016	0.074	0.020	0.067
542030	37.3	17.0	61.7	4.7	1.4	6.1	2.9	1.7	3.2	0.013	0.067	0.023	0.073
542040	42.7	8.2	33.7	2.5	0.7	3.1	1.3	0.8	1.9	0.005	0.032	0.013	0.039
542050	60.9	4.0	72.1	4.2	1.1	5.3	1.6	1.1	4.2	0.004	0.050	0.031	0.084
542060	103.5	14.5	47.0	3.7	1.1	4.8	2.4	1.4	2.5	0.011	0.054	0.018	0.056
542070	30.2	19.5	20.3	2.7	0.9	3.6	2.6	1.4	0.9	0.014	0.048	0.006	0.026
542080	56.7	27.1	32.3	3.9	1.4	5.3	3.7	2.0	1.5	0.019	0.069	0.009	0.041
542090	43.2	36.1	31.8	4.6	1.7	6.3	4.7	2.5	1.4	0.026	0.085	0.008	0.041
542100	258.2	9.9	19.7	3.4	0.6	4.4	1.1	0.5	1.5	0.004	0.022	0.006	0.019
542110	23.3	5.6	40.1	2.6	0.7	3.3	1.3	0.8	2.2	0.005	0.034	0.016	0.047
542120	141.0	9.4	51.7	3.6	1.0	4.6	1.8	1.1	2.8	0.007	0.047	0.020	0.060
542130	50.5	32.5	32.4	4.4	1.6	5.9	4.3	2.3	1.5	0.023	0.079	0.009	0.042
542140	93.1	29.6	29.5	4.0	1.4	5.4	3.9	2.1	1.3	0.021	0.071	0.008	0.038
542150	59.4	2.8	24.5	2.1	0.5	2.6	0.4	0.4	1.5	0.002	0.014	0.009	0.025
542160	114.0	3.3	21.6	2.0	0.5	2.5	0.4	0.3	1.4	0.002	0.012	0.007	0.021
542170	42.4	35.9	25.2	4.3	1.6	5.9	4.6	2.4	1.0	0.025	0.080	0.005	0.033
542180	163.5	26.4	41.0	4.3	1.5	5.8	3.7	2.0	2.0	0.019	0.072	0.013	0.050
542190	76.8	5.8	25.9	2.4	0.6	3.1	0.8	0.5	1.6	0.004	0.020	0.009	0.027
542200	107.6	34.6	26.8	4.2	1.6	5.8	4.5	2.3	1.1	0.025	0.079	0.006	0.035
542210	105.7	22.2	28.8	3.2	1.2	4.4	3.3	1.7	1.1	0.015	0.068	0.006	0.046
542220	91.6	21.8	63.1	4.7	1.8	6.5	4.1	2.1	2.8	0.015	0.102	0.017	0.100
542230	139.3	29.3	27.8	3.9	1.4	5.2	3.9	2.0	1.2	0.021	0.070	0.007	0.036
542240	46.2	20.4	31.8	3.7	1.2	4.9	2.7	1.5	1.7	0.014	0.052	0.009	0.037
542250	101.9	17.4	13.8	2.3	0.8	3.1	2.2	1.2	0.6	0.012	0.039	0.003	0.017
542260	229.4	17.1	19.2	2.4	0.9	3.3	2.3	1.2	0.9	0.012	0.042	0.005	0.024
542270	96.0	14.5	16.5	3.6	0.5	4.9	1.8	0.6	1.4	0.007	0.035	0.006	0.020

TABLE 11-14

CYPRESS CREEK WATERSHED UNIT AREA POLLUTANT LOAD BY SUBBASIN (LBS/ACRE) USING WET SEASON AVERAGE RAINFALL

Subbasin ID	Area (acres)	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
500100	390.8	16.3	76.0	3.2	0.9	4.4	0.6	0.4	1.2	0.025	0.084	0.176	0.118
500200	1038.0	2.5	17.3	0.9	0.2	1.1	0.2	0.2	0.6	0.004	0.016	0.026	0.024
500300	1682.9	5.7	23.3	1.1	0.3	1.4	0.1	0.1	0.4	0.008	0.021	0.055	0.034
500400	1761.3	9.6	29.5	1.5	0.5	2.0	0.6	0.4	0.5	0.012	0.033	0.064	0.043
500500	577.2	12.0	18.3	1.5	0.5	2.1	1.2	0.7	0.4	0.011	0.032	0.031	0.026
500600	1910.8	8.2	21.7	1.5	0.5	1.9	0.5	0.3	0.4	0.009	0.023	0.045	0.030
500700	1664.7	7.3	23.6	1.4	0.4	1.9	0.3	0.2	0.5	0.009	0.023	0.049	0.033
500900	1117.6	9.2	23.9	1.4	0.5	1.9	0.6	0.4	0.4	0.010	0.028	0.050	0.034
501000	1194.9	11.2	31.9	1.8	0.6	2.4	0.6	0.4	0.5	0.013	0.035	0.071	0.046
510100	160.6	5.2	47.4	2.2	0.6	2.9	0.7	0.5	1.9	0.007	0.037	0.054	0.061
510150	99.0	1.6	22.5	1.4	0.4	1.8	0.4	0.3	1.2	0.001	0.015	0.009	0.025
510200	43.3	6.7	62.4	3.2	1.3	4.6	2.4	1.0	2.1	0.003	0.090	0.045	0.115
510250	16.1	23.4	256.9	3.7	1.3	4.9	0.4	0.4	1.0	0.038	0.106	0.898	0.398
510260	23.1	17.2	130.3	6.9	2.4	9.7	4.0	1.7	3.7	0.012	0.173	0.212	0.230
510300	144.9	7.9	64.5	3.8	1.3	5.2	1.9	0.9	2.1	0.004	0.081	0.058	0.107
510400	60.3	8.3	80.6	4.4	1.9	6.4	3.4	1.5	3.1	0.003	0.121	0.016	0.152
510450	53.1	5.0	55.4	2.6	1.3	3.9	2.6	1.1	2.1	0.002	0.090	0.011	0.111
510451	14.5	11.0	122.7	5.8	2.9	8.7	5.7	2.3	4.5	0.004	0.199	0.025	0.245
510500	162.0	8.3	72.7	4.3	1.3	5.7	1.7	0.9	2.6	0.005	0.076	0.077	0.108
510600	42.7	10.7	118.5	5.7	2.7	8.4	5.3	2.2	4.3	0.004	0.188	0.024	0.233
510700	43.2	11.2	82.8	5.2	1.1	6.6	1.1	0.7	2.5	0.009	0.068	0.153	0.106
510800	108.2	2.3	43.6	2.5	0.6	3.1	0.9	0.6	2.5	0.002	0.030	0.018	0.051
510900	81.3	3.5	51.2	2.8	0.9	3.7	1.5	0.8	2.5	0.002	0.051	0.017	0.073
511100	97.3	13.0	74.4	4.0	1.3	5.2	1.1	0.6	1.7	0.014	0.076	0.098	0.110
511200	142.3	10.5	70.8	4.2	1.1	5.3	0.9	0.6	2.4	0.012	0.067	0.076	0.096
511300	96.8	4.6	50.8	3.2	0.8	4.0	1.1	0.6	2.9	0.003	0.047	0.022	0.083
511400	37.6	2.1	40.6	2.3	0.6	2.9	0.9	0.6	2.3	0.002	0.028	0.017	0.047
511500	81.0	4.1	49.4	2.4	1.1	3.5	2.1	0.9	2.0	0.002	0.072	0.012	0.092
511600	24.3	5.1	68.3	3.5	1.3	4.9	2.4	1.2	3.1	0.003	0.084	0.020	0.112
520100	195.8	6.9	15.9	1.8	0.5	2.4	1.0	0.7	1.3	0.005	0.027	0.009	0.021
520200	120.5	3.6	5.8	0.6	0.2	0.8	0.6	0.3	0.2	0.003	0.012	0.001	0.009
520300	76.0	1.2	22.5	1.3	0.3	1.6	0.5	0.3	1.3	0.001	0.015	0.009	0.026
520400	174.8	14.5	39.2	3.0	0.8	4.0	1.6	0.9	1.3	0.012	0.047	0.104	0.053
520600	22.5	7.0	37.9	2.1	0.3	2.8	0.3	0.2	0.9	0.007	0.032	0.164	0.055
520700	73.1	8.3	94.4	2.5	0.7	3.2	0.7	0.6	1.8	0.012	0.047	0.251	0.136
520750	29.9	10.8	52.2	2.8	0.4	3.8	0.3	0.2	0.9	0.011	0.046	0.260	0.078
520800	58.7	9.6	61.1	3.4	0.6	4.5	0.7	0.5	1.9	0.010	0.050	0.206	0.084
520900	136.6	3.6	42.7	2.5	0.7	3.2	1.1	0.7	2.4	0.003	0.032	0.018	0.050
521000	67.1	12.6	41.0	3.1	1.0	4.1	2.1	1.2	2.1	0.010	0.047	0.020	0.049
521100	118.5	10.1	31.4	2.5	0.8	3.2	1.7	1.0	1.7	0.008	0.037	0.012	0.038
521200	23.6	14.2	161.1	2.5	0.9	3.4	0.4	0.4	1.1	0.023	0.068	0.544	0.247
521300	41.6	41.2	352.5	6.3	2.5	8.8	2.6	1.6	2.0	0.056	0.189	1.168	0.559
521400	62.9	3.8	20.9	2.1	0.6	2.7	0.6	0.4	1.5	0.002	0.016	0.008	0.024
521500	154.6	9.8	16.1	1.9	0.6	2.5	1.4	0.8	1.0	0.007	0.028	0.006	0.020
521600	125.3	8.8	37.7	3.7	1.4	5.1	1.5	1.1	2.5	0.005	0.079	0.011	0.056
521700	36.4	5.8	67.4	3.6	1.4	4.9	2.4	1.2	3.0	0.003	0.083	0.020	0.110
521800	428.8	10.6	21.3	1.6	0.5	2.2	1.2	0.7	0.6	0.009	0.031	0.027	0.029
521900	36.0	19.8	32.1	2.5	0.9	3.4	2.0	1.1	0.6	0.018	0.055	0.053	0.047
522000	65.3	10.6	46.9	2.3	0.7	3.0	0.7	0.5	0.9	0.013	0.046	0.077	0.065

TABLE 11-14

CYPRESS CREEK WATERSHED UNIT AREA POLLUTANT LOAD BY SUBBASIN (LBS/ACRE) USING WET SEASON AVERAGE RAINFALL

(Continued)

Subbasin ID	Area (acres)	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
522300	16.6	16.3	76.0	3.2	0.9	4.4	0.6	0.4	1.2	0.025	0.084	0.176	0.118
530100	141.5	2.5	17.3	0.9	0.2	1.1	0.2	0.2	0.6	0.004	0.016	0.026	0.024
530150	74.0	5.7	23.3	1.1	0.3	1.4	0.1	0.1	0.4	0.008	0.021	0.055	0.034
530200	89.8	9.6	29.5	1.5	0.5	2.0	0.6	0.4	0.5	0.012	0.033	0.064	0.043
530300	33.1	12.0	18.3	1.5	0.5	2.1	1.2	0.7	0.4	0.011	0.032	0.031	0.026
530500	103.3	8.2	21.7	1.5	0.5	1.9	0.5	0.3	0.4	0.009	0.023	0.045	0.030
540100	59.2	7.3	23.6	1.4	0.4	1.9	0.3	0.2	0.5	0.009	0.023	0.049	0.033
540200	55.4	9.2	23.9	1.4	0.5	1.9	0.6	0.4	0.4	0.010	0.028	0.050	0.034
540300	112.0	11.2	31.9	1.8	0.6	2.4	0.6	0.4	0.5	0.013	0.035	0.071	0.046
540400	45.8	5.2	47.4	2.2	0.6	2.9	0.7	0.5	1.9	0.007	0.037	0.054	0.061
540450	75.2	1.6	22.5	1.4	0.4	1.8	0.4	0.3	1.2	0.001	0.015	0.009	0.025
540500	154.4	6.7	62.4	3.2	1.3	4.6	2.4	1.0	2.1	0.003	0.090	0.045	0.115
540600	198.7	23.4	256.9	3.7	1.3	4.9	0.4	0.4	1.0	0.038	0.106	0.898	0.398
540700	336.9	17.2	130.3	6.9	2.4	9.7	4.0	1.7	3.7	0.012	0.173	0.212	0.230
540800	107.9	7.9	64.5	3.8	1.3	5.2	1.9	0.9	2.1	0.004	0.081	0.058	0.107
540900	30.4	8.3	80.6	4.4	1.9	6.4	3.4	1.5	3.1	0.003	0.121	0.016	0.152
541000	46.5	5.0	55.4	2.6	1.3	3.9	2.6	1.1	2.1	0.002	0.090	0.011	0.111
541100	196.0	11.0	122.7	5.8	2.9	8.7	5.7	2.3	4.5	0.004	0.199	0.025	0.245
541150	1422.5	8.3	72.7	4.3	1.3	5.7	1.7	0.9	2.6	0.005	0.076	0.077	0.108
541200	93.4	10.7	118.5	5.7	2.7	8.4	5.3	2.2	4.3	0.004	0.188	0.024	0.233
541300	12.6	11.2	82.8	5.2	1.1	6.6	1.1	0.7	2.5	0.009	0.068	0.153	0.106
542010	71.5	2.3	43.6	2.5	0.6	3.1	0.9	0.6	2.5	0.002	0.030	0.018	0.051
542020	81.6	3.5	51.2	2.8	0.9	3.7	1.5	0.8	2.5	0.002	0.051	0.017	0.073
542030	37.3	13.0	74.4	4.0	1.3	5.2	1.1	0.6	1.7	0.014	0.076	0.098	0.110
542040	42.7	10.5	70.8	4.2	1.1	5.3	0.9	0.6	2.4	0.012	0.067	0.076	0.096
542050	60.9	4.6	50.8	3.2	0.8	4.0	1.1	0.6	2.9	0.003	0.047	0.022	0.083
542060	103.5	2.1	40.6	2.3	0.6	2.9	0.9	0.6	2.3	0.002	0.028	0.017	0.047
542070	30.2	4.1	49.4	2.4	1.1	3.5	2.1	0.9	2.0	0.002	0.072	0.012	0.092
542080	56.7	5.1	68.3	3.5	1.3	4.9	2.4	1.2	3.1	0.003	0.084	0.020	0.112
542090	43.2	6.9	15.9	1.8	0.5	2.4	1.0	0.7	1.3	0.005	0.027	0.009	0.021
542100	258.2	3.6	5.8	0.6	0.2	0.8	0.6	0.3	0.2	0.003	0.012	0.001	0.009
542110	23.3	1.2	22.5	1.3	0.3	1.6	0.5	0.3	1.3	0.001	0.015	0.009	0.026
542120	141.0	14.5	39.2	3.0	0.8	4.0	1.6	0.9	1.3	0.012	0.047	0.104	0.053
542130	50.5	7.0	37.9	2.1	0.3	2.8	0.3	0.2	0.9	0.007	0.032	0.164	0.055
542140	93.1	8.3	94.4	2.5	0.7	3.2	0.7	0.6	1.8	0.012	0.047	0.251	0.136
542150	59.4	10.8	52.2	2.8	0.4	3.8	0.3	0.2	0.9	0.011	0.046	0.260	0.078
542160	114.0	9.6	61.1	3.4	0.6	4.5	0.7	0.5	1.9	0.010	0.050	0.206	0.084
542170	42.4	3.6	42.7	2.5	0.7	3.2	1.1	0.7	2.4	0.003	0.032	0.018	0.050
542180	163.5	12.6	41.0	3.1	1.0	4.1	2.1	1.2	2.1	0.010	0.047	0.020	0.049
542190	76.8	10.1	31.4	2.5	0.8	3.2	1.7	1.0	1.7	0.008	0.037	0.012	0.038
542200	107.6	14.2	161.1	2.5	0.9	3.4	0.4	0.4	1.1	0.023	0.068	0.544	0.247
542210	105.7	41.2	352.5	6.3	2.5	8.8	2.6	1.6	2.0	0.056	0.189	1.168	0.559
542220	91.6	3.8	20.9	2.1	0.6	2.7	0.6	0.4	1.5	0.002	0.016	0.008	0.024
542230	139.3	9.8	16.1	1.9	0.6	2.5	1.4	0.8	1.0	0.007	0.028	0.006	0.020
542240	46.2	8.8	37.7	3.7	1.4	5.1	1.5	1.1	2.5	0.005	0.079	0.011	0.056
542250	101.9	5.8	67.4	3.6	1.4	4.9	2.4	1.2	3.0	0.003	0.083	0.020	0.110
542260	229.4	10.6	21.3	1.6	0.5	2.2	1.2	0.7	0.6	0.009	0.031	0.027	0.029
542270	96.0	19.8	32.1	2.5	0.9	3.4	2.0	1.1	0.6	0.018	0.055	0.053	0.047

TABLE 11-15

CYPRESS CREEK WATERSHED UNIT AREA POLLUTANT LOAD BY SUBBASIN (LBS/ACRE) USING DRY SEASON AVERAGE RAINFALL

Subbasin ID	Area (acres)	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
500100	390.8	8.9	41.5	1.7	0.5	2.4	0.3	0.2	0.7	0.013	0.046	0.096	0.065
500200	1038.0	1.4	9.4	0.5	0.1	0.6	0.1	0.1	0.3	0.002	0.009	0.014	0.013
500300	1682.9	3.1	12.8	0.6	0.2	0.8	0.0	0.1	0.2	0.004	0.012	0.030	0.019
500400	1761.3	5.2	16.1	0.8	0.3	1.1	0.3	0.2	0.3	0.006	0.018	0.035	0.023
500500	577.2	6.6	10.0	0.8	0.3	1.1	0.7	0.4	0.2	0.006	0.017	0.017	0.014
500600	1910.8	4.5	11.9	0.8	0.2	1.1	0.2	0.2	0.2	0.005	0.013	0.024	0.016
500700	1664.7	4.0	12.9	0.8	0.2	1.0	0.2	0.1	0.3	0.005	0.013	0.027	0.018
500900	1117.6	5.0	13.1	0.8	0.3	1.0	0.3	0.2	0.2	0.006	0.015	0.027	0.019
501000	1194.9	6.1	17.5	1.0	0.3	1.3	0.3	0.2	0.3	0.007	0.019	0.039	0.025
510100	160.6	2.8	25.9	1.2	0.3	1.6	0.4	0.3	1.0	0.004	0.020	0.030	0.034
510150	99.0	0.9	12.3	0.8	0.2	1.0	0.2	0.2	0.7	0.001	0.008	0.005	0.014
510200	43.3	3.6	34.1	1.7	0.7	2.5	1.3	0.5	1.1	0.002	0.049	0.025	0.063
510250	16.1	12.8	140.4	2.0	0.7	2.7	0.2	0.2	0.6	0.021	0.058	0.491	0.217
510260	23.1	9.4	71.2	3.8	1.3	5.3	2.2	0.9	2.0	0.006	0.095	0.116	0.126
510300	144.9	4.3	35.2	2.1	0.7	2.8	1.1	0.5	1.1	0.002	0.044	0.032	0.059
510400	60.3	4.5	44.0	2.4	1.1	3.5	1.9	0.8	1.7	0.002	0.066	0.009	0.083
510450	53.1	2.7	30.3	1.4	0.7	2.1	1.4	0.6	1.1	0.001	0.049	0.006	0.061
510451	14.5	6.0	67.1	3.2	1.6	4.7	3.1	1.3	2.5	0.002	0.109	0.014	0.134
510500	162.0	4.5	39.7	2.3	0.7	3.1	1.0	0.5	1.4	0.003	0.042	0.042	0.059
510600	42.7	5.9	64.8	3.1	1.5	4.6	2.9	1.2	2.4	0.002	0.103	0.013	0.127
510700	43.2	6.1	45.3	2.8	0.6	3.6	0.6	0.4	1.4	0.005	0.037	0.083	0.058
510800	108.2	1.3	23.8	1.4	0.4	1.7	0.5	0.4	1.4	0.001	0.016	0.010	0.028
510900	81.3	1.9	28.0	1.5	0.5	2.0	0.8	0.4	1.4	0.001	0.028	0.009	0.040
511100	97.3	7.1	40.7	2.2	0.7	2.9	0.6	0.3	0.9	0.008	0.041	0.053	0.060
511200	142.3	5.7	38.7	2.3	0.6	2.9	0.5	0.3	1.3	0.007	0.037	0.042	0.052
511300	96.8	2.5	27.8	1.7	0.4	2.2	0.6	0.4	1.6	0.002	0.026	0.012	0.045
511400	37.6	1.2	22.2	1.3	0.3	1.6	0.5	0.3	1.3	0.001	0.015	0.009	0.026
511500	81.0	2.2	27.0	1.3	0.6	1.9	1.1	0.5	1.1	0.001	0.039	0.007	0.050
511600	24.3	2.8	37.3	1.9	0.7	2.7	1.3	0.6	1.7	0.002	0.046	0.011	0.061
520100	195.8	3.8	8.7	1.0	0.3	1.3	0.5	0.4	0.7	0.003	0.015	0.005	0.011
520200	120.5	2.0	3.2	0.3	0.1	0.4	0.3	0.2	0.1	0.001	0.007	0.001	0.005
520300	76.0	0.6	12.3	0.7	0.2	0.9	0.3	0.2	0.7	0.001	0.008	0.005	0.014
520400	174.8	7.9	21.4	1.6	0.4	2.2	0.9	0.5	0.7	0.006	0.026	0.057	0.029
520600	22.5	3.8	20.7	1.1	0.2	1.5	0.2	0.1	0.5	0.004	0.018	0.090	0.030
520700	73.1	4.5	51.6	1.4	0.4	1.8	0.4	0.3	1.0	0.007	0.026	0.137	0.074
520750	29.9	5.9	28.5	1.5	0.2	2.1	0.1	0.1	0.5	0.006	0.025	0.142	0.042
520800	58.7	5.2	33.4	1.9	0.3	2.5	0.4	0.3	1.0	0.005	0.027	0.113	0.046
520900	136.6	2.0	23.4	1.4	0.4	1.8	0.6	0.4	1.3	0.002	0.017	0.010	0.027
521000	67.1	6.9	22.4	1.7	0.5	2.2	1.1	0.7	1.2	0.005	0.026	0.011	0.027
521100	118.5	5.5	17.2	1.4	0.4	1.8	0.9	0.5	0.9	0.004	0.020	0.006	0.021
521200	23.6	7.8	88.1	1.4	0.5	1.8	0.2	0.2	0.6	0.013	0.037	0.297	0.135
521300	41.6	22.5	192.7	3.4	1.3	4.8	1.4	0.9	1.1	0.031	0.103	0.638	0.306
521400	62.9	2.1	11.4	1.2	0.3	1.5	0.3	0.2	0.8	0.001	0.009	0.005	0.013
521500	154.6	5.4	8.8	1.0	0.3	1.4	0.8	0.4	0.6	0.004	0.016	0.003	0.011
521600	125.3	4.8	20.6	2.0	0.7	2.8	0.8	0.6	1.4	0.003	0.043	0.006	0.031
521700	36.4	3.2	36.8	1.9	0.7	2.7	1.3	0.7	1.6	0.002	0.045	0.011	0.060
521800	428.8	5.8	11.6	0.9	0.3	1.2	0.6	0.4	0.3	0.005	0.017	0.015	0.016
521900	36.0	10.8	17.5	1.4	0.5	1.9	1.1	0.6	0.3	0.010	0.030	0.029	0.025
522000	65.3	5.8	25.6	1.2	0.4	1.6	0.4	0.2	0.5	0.007	0.025	0.042	0.035

TABLE 11-15

CYPRESS CREEK WATERSHED UNIT AREA POLLUTANT LOAD BY SUBBASIN (LBS/ACRE) USING DRY SEASON AVERAGE RAINFALL

(Continued)

Subbasin ID	Area (acres)	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
522300	16.6	1.5	14.1	0.9	0.2	1.1	0.4	0.2	0.8	0.001	0.011	0.006	0.016
530100	141.5	8.5	21.0	1.6	0.4	2.2	0.7	0.4	0.5	0.007	0.026	0.085	0.030
530150	74.0	13.6	11.1	1.7	0.6	2.3	1.8	0.9	0.5	0.010	0.031	0.003	0.015
530200	89.8	6.1	17.5	1.4	0.4	1.9	1.0	0.5	0.9	0.004	0.022	0.006	0.021
530300	33.1	7.4	50.2	2.6	1.3	3.9	2.6	1.1	1.9	0.004	0.084	0.011	0.098
530500	103.3	10.3	18.8	1.8	0.6	2.4	1.5	0.8	0.9	0.008	0.030	0.006	0.023
540100	59.2	1.3	24.9	1.4	0.4	1.8	0.5	0.4	1.4	0.001	0.017	0.010	0.029
540200	55.4	3.7	37.3	2.0	0.8	2.7	1.5	0.7	1.6	0.002	0.049	0.010	0.063
540300	112.0	8.7	8.7	1.6	0.4	2.1	1.2	0.6	0.7	0.006	0.023	0.003	0.012
540400	45.8	5.4	59.7	2.8	1.4	4.2	2.7	1.1	2.2	0.002	0.096	0.013	0.119
540450	75.2	9.4	42.9	1.7	0.6	2.3	1.1	0.6	0.9	0.009	0.033	0.105	0.062
540500	154.4	2.7	4.3	1.0	0.2	1.3	0.4	0.2	0.7	0.002	0.009	0.002	0.005
540600	198.7	8.3	19.1	1.6	0.6	2.2	1.4	0.7	0.9	0.006	0.031	0.006	0.027
540700	336.9	3.8	10.4	0.9	0.3	1.1	0.6	0.3	0.6	0.003	0.013	0.004	0.012
540800	107.9	7.1	19.7	1.6	0.5	2.1	1.1	0.6	1.0	0.005	0.024	0.007	0.024
540900	30.4	5.0	9.0	0.8	0.3	1.1	0.6	0.3	0.3	0.004	0.014	0.007	0.012
541000	46.5	2.8	11.5	0.9	0.3	1.2	0.4	0.3	0.6	0.002	0.013	0.004	0.013
541100	196.0	13.0	75.7	3.4	0.9	4.4	0.5	0.4	1.3	0.017	0.066	0.122	0.103
541150	1422.5	2.1	25.8	1.6	0.4	2.0	0.5	0.3	1.2	0.001	0.019	0.008	0.029
541200	93.4	14.0	30.1	1.8	0.7	2.5	1.3	0.7	0.6	0.014	0.043	0.057	0.044
541300	12.6	5.1	22.7	1.3	0.5	1.8	0.7	0.4	0.7	0.005	0.028	0.024	0.035
542010	71.5	8.1	9.6	1.3	0.4	1.8	1.0	0.6	0.5	0.006	0.019	0.002	0.011
542020	81.6	0.2	4.5	0.3	0.1	0.3	0.1	0.1	0.3	0.000	0.003	0.002	0.005
542030	37.3	3.3	5.6	0.6	0.2	0.8	0.5	0.3	0.3	0.002	0.009	0.002	0.007
542040	42.7	7.9	19.7	1.7	0.5	2.2	1.2	0.7	1.0	0.006	0.026	0.007	0.024
542050	60.9	6.0	21.8	1.7	0.5	2.1	1.0	0.6	1.1	0.004	0.024	0.008	0.026
542060	103.5	2.9	11.9	0.9	0.2	1.1	0.5	0.3	0.7	0.002	0.011	0.005	0.014
542070	30.2	1.4	25.5	1.5	0.4	1.9	0.6	0.4	1.5	0.001	0.018	0.011	0.030
542080	56.7	5.1	16.7	1.3	0.4	1.7	0.9	0.5	0.9	0.004	0.019	0.006	0.020
542090	43.2	6.9	7.2	0.9	0.3	1.3	0.9	0.5	0.3	0.005	0.017	0.002	0.009
542100	258.2	9.6	11.4	1.4	0.5	1.9	1.3	0.7	0.5	0.007	0.024	0.003	0.014
542110	23.3	12.8	11.2	1.6	0.6	2.2	1.7	0.9	0.5	0.009	0.030	0.003	0.015
542120	141.0	3.5	7.0	1.2	0.2	1.5	0.4	0.2	0.5	0.002	0.008	0.002	0.007
542130	50.5	2.0	14.2	0.9	0.3	1.2	0.4	0.3	0.8	0.002	0.012	0.006	0.017
542140	93.1	3.3	18.3	1.3	0.4	1.6	0.6	0.4	1.0	0.003	0.017	0.007	0.021
542150	59.4	11.5	11.5	1.5	0.5	2.1	1.5	0.8	0.5	0.008	0.028	0.003	0.015
542160	114.0	10.5	10.4	1.4	0.5	1.9	1.4	0.7	0.5	0.007	0.025	0.003	0.013
542170	42.4	1.0	8.7	0.7	0.2	0.9	0.2	0.1	0.5	0.001	0.005	0.003	0.009
542180	163.5	1.2	7.6	0.7	0.2	0.9	0.1	0.1	0.5	0.001	0.004	0.003	0.008
542190	76.8	12.7	8.9	1.5	0.6	2.1	1.6	0.8	0.4	0.009	0.028	0.002	0.012
542200	107.6	9.3	14.5	1.5	0.5	2.1	1.3	0.7	0.7	0.007	0.026	0.005	0.018
542210	105.7	2.0	9.2	0.9	0.2	1.1	0.3	0.2	0.6	0.001	0.007	0.003	0.010
542220	91.6	12.2	9.5	1.5	0.6	2.1	1.6	0.8	0.4	0.009	0.028	0.002	0.013
542230	139.3	7.8	10.2	1.1	0.4	1.6	1.2	0.6	0.4	0.005	0.024	0.002	0.016
542240	46.2	7.7	22.3	1.7	0.6	2.3	1.5	0.7	1.0	0.005	0.036	0.006	0.035
542250	101.9	10.4	9.8	1.4	0.5	1.9	1.4	0.7	0.4	0.007	0.025	0.003	0.013
542260	229.4	7.2	11.3	1.3	0.4	1.7	1.0	0.5	0.6	0.005	0.019	0.003	0.013
542270	96.0	6.2	4.9	0.8	0.3	1.1	0.8	0.4	0.2	0.004	0.014	0.001	0.006

TABLE 11-16

CYPRESS CREEK WATERSHED UNIT AREA POLLUTANT LOAD RANKING BY SUBBASIN USING AVERAGE ANNUAL RAINFALL

Subbasin ID	BOD5	TSS	TN	TP	Oil and Grease	Cd	Cu	Pb	Zn	AVG LOAD
500100	82	86	77	20	47	95	87	90	88	86
500200	9	18	3	3	15	28	10	67	22	7
500300	27	38	5	1	2	51	15	77	42	22
500400	50	44	15	16	8	73	38	79	49	35
500500	66	22	20	49	3	69	35	69	31	28
500600	39	34	12	12	6	56	19	71	38	25
500700	37	39	10	8	9	55	17	73	40	26
500900	44	40	11	19	5	66	27	74	43	30
501000	63	47	28	18	11	81	42	80	52	41
510100	25	70	34	25	69	47	45	76	67	61
510150	3	36	9	11	46	5	7	31	27	14
510200	32	78	80	75	75	26	90	72	86	77
510250	95	98	84	9	37	98	91	98	98	98
510260	84	95	99	95	96	74	95	93	94	95
510300	38	79	87	66	74	33	84	78	79	78
510400	40	88	91	94	93	21	92	51	90	87
510450	22	76	65	84	73	7	88	40	83	75
510451	59	94	97	99	99	34	99	66	96	94
510500	41	84	90	61	87	40	81	83	80	84
510600	57	93	96	98	98	32	97	65	95	93
510700	62	89	92	40	83	54	78	87	78	89
510800	7	65	39	35	84	11	29	55	59	51
510900	12	73	56	54	85	13	64	53	71	71
511100	70	85	88	42	62	86	80	84	82	85
511200	54	83	89	31	81	78	76	81	77	83
511300	20	72	68	45	90	23	58	63	74	72
511400	5	60	35	33	79	8	26	52	54	45
511500	19	71	55	70	71	6	79	44	76	67
511600	23	82	82	79	94	19	86	62	84	80
520100	34	13	27	38	48	41	24	32	15	13
520200	15	1	2	17	1	16	4	1	1	2
520300	2	37	6	13	49	4	8	33	29	12
520400	76	58	69	58	52	75	59	86	61	66
520600	36	56	31	6	23	46	36	89	64	46
520700	42	91	44	26	64	76	60	95	89	90
520750	58	74	63	4	26	72	53	96	72	74
520800	49	77	79	24	68	64	63	92	75	76
520900	13	64	42	41	80	22	34	54	57	52
521000	67	62	73	71	77	61	57	59	56	68
521100	53	46	45	59	61	48	44	43	45	44
521200	74	97	48	10	42	94	77	97	97	97
521300	99	99	98	85	72	99	98	99	99	99
521400	17	30	30	15	56	10	9	28	24	17
521500	51	14	29	52	41	44	28	23	13	21
521600	43	55	86	56	86	38	83	37	66	55
521700	28	80	83	80	92	24	85	60	81	79
521800	55	33	24	48	16	60	33	68	35	29
521900	90	49	49	68	17	93	69	75	53	60
522000	56	68	36	23	31	80	55	82	70	70

TABLE 11-16

CYPRESS CREEK WATERSHED UNIT AREA POLLUTANT LOAD RANKING BY SUBBASIN USING AVERAGE ANNUAL RAINFALL

(Continued)

Subbasin ID	BOD5	TSS	TN	TP	Oil and Grease	Cd	Cu	Pb	Zn	AVG LOAD
522300	11	41	18	21	54	9	13	34	37	24
530100	80	57	67	51	24	82	61	88	65	65
530150	97	26	76	93	22	92	73	16	32	53
530200	64	48	52	63	57	52	46	38	47	48
530300	72	90	93	96	95	43	94	58	91	91
530500	87	51	78	88	63	85	70	42	48	69
540100	8	66	47	37	88	14	32	56	60	54
540200	33	81	85	87	91	29	89	57	87	81
540300	81	11	60	73	53	71	47	17	17	33
540400	52	92	94	97	97	30	96	64	93	92
540450	85	87	74	67	58	91	74	91	85	88
540500	21	2	25	28	50	25	12	10	2	3
540600	79	52	70	82	60	70	72	36	58	62
540700	35	24	19	44	36	39	20	26	19	19
540800	69	53	64	69	70	62	51	48	50	58
540900	45	16	16	43	10	45	23	46	16	16
541000	24	32	23	27	40	31	21	27	23	18
541100	96	96	95	36	82	97	93	94	92	96
541150	18	69	57	30	78	15	40	50	62	59
541200	98	75	81	76	39	96	82	85	73	82
541300	48	63	46	50	44	57	67	70	69	57
542010	78	20	43	65	30	67	41	13	14	31
542020	1	3	1	2	7	1	1	6	3	1
542030	29	5	4	34	12	36	11	4	6	5
542040	77	54	71	74	67	68	62	45	51	63
542050	60	59	66	64	76	53	48	49	55	64
542060	26	35	17	32	45	27	14	29	28	23
542070	10	67	53	39	89	17	37	61	63	56
542080	47	45	38	57	59	42	43	41	44	40
542090	68	9	26	60	14	58	31	7	11	20
542100	86	29	51	77	35	79	50	25	30	38
542110	94	27	72	92	29	90	71	18	33	50
542120	31	8	32	22	33	18	6	8	5	8
542130	14	42	21	29	55	20	16	35	39	27
542140	30	50	37	47	66	37	30	47	46	39
542150	91	31	62	89	32	87	65	21	34	47
542160	89	25	54	83	25	84	54	19	26	37
542170	4	12	8	7	34	2	3	20	10	6
542180	6	10	7	5	28	3	2	14	8	4
542190	93	15	61	91	18	89	68	3	18	42
542200	83	43	59	78	51	77	56	30	41	49
542210	16	17	13	14	38	12	5	22	12	10
542220	92	19	58	90	19	88	66	9	20	43
542230	75	23	33	72	20	65	49	11	36	32
542240	73	61	75	86	65	63	75	39	68	73
542250	88	21	50	81	21	83	52	15	21	36
542260	71	28	40	62	43	59	39	24	25	34
542270	65	4	14	53	4	49	22	2	4	9

TABLE 11-17

CYPRESS CREEK WATERSHED UNIT AREA POLLUTANT LOAD RANKING BY SUBBASIN USING WET SEASON AVERAGE RAINFALL

Subbasin ID	BOD5	TSS	TN	TP	Oil and Grease	Cd	Cu	Pb	Zn	AVG LOAD
500100	82	86	77	20	47	95	87	90	88	86
500200	9	18	3	3	15	28	10	67	22	7
500300	27	38	5	1	2	51	15	77	42	22
500400	50	44	15	16	8	73	38	79	49	35
500500	66	22	20	49	3	69	35	69	31	28
500600	39	34	12	12	6	56	19	71	38	25
500700	37	39	10	8	9	55	17	73	40	26
500900	44	40	11	19	5	66	27	74	43	30
501000	63	47	28	18	11	81	42	80	52	41
510100	25	70	34	25	69	47	45	76	67	61
510150	3	36	9	11	46	5	7	31	27	14
510200	32	78	80	75	75	26	90	72	86	77
510250	95	98	84	9	37	98	91	98	98	98
510260	84	95	99	95	96	74	95	93	94	95
510300	38	79	87	66	74	33	84	78	79	78
510400	40	88	91	94	93	21	92	51	90	87
510450	22	76	65	84	73	7	88	40	83	75
510451	59	94	97	99	99	34	99	66	96	94
510500	41	84	90	61	87	40	81	83	80	84
510600	57	93	96	98	98	32	97	65	95	93
510700	62	89	92	40	83	54	78	87	78	89
510800	7	65	39	35	84	11	29	55	59	51
510900	12	73	56	54	85	13	64	53	71	71
511100	70	85	88	42	62	86	80	84	82	85
511200	54	83	89	31	81	78	76	81	77	83
511300	20	72	68	45	90	23	58	63	74	72
511400	5	60	35	33	79	8	26	52	54	45
511500	19	71	55	70	71	6	79	44	76	67
511600	23	82	82	79	94	19	86	62	84	80
520100	34	13	27	38	48	41	24	32	15	13
520200	15	1	2	17	1	16	4	1	1	2
520300	2	37	6	13	49	4	8	33	29	12
520400	76	58	69	58	52	75	59	86	61	66
520600	36	56	31	6	23	46	36	89	64	46
520700	42	91	44	26	64	76	60	95	89	90
520750	58	74	63	4	26	72	53	96	72	74
520800	49	77	79	24	68	64	63	92	75	76
520900	13	64	42	41	80	22	34	54	57	52
521000	67	62	73	71	77	61	57	59	56	68
521100	53	46	45	59	61	48	44	43	45	44
521200	74	97	48	10	42	94	77	97	97	97
521300	99	99	98	85	72	99	98	99	99	99
521400	17	30	30	15	56	10	9	28	24	17
521500	51	14	29	52	41	44	28	23	13	21
521600	43	55	86	56	86	38	83	37	66	55
521700	28	80	83	80	92	24	85	60	81	79
521800	55	33	24	48	16	60	33	68	35	29
521900	90	49	49	68	17	93	69	75	53	60
522000	56	68	36	23	31	80	55	82	70	70

TABLE 11-17

CYPRESS CREEK WATERSHED UNIT AREA POLLUTANT LOAD RANKING BY SUBBASIN USING WET SEASON AVERAGE RAINFALL

(Continued)

Subbasin ID	BOD5	TSS	TN	TP	Oil and Grease	Cd	Cu	Pb	Zn	AVG LOAD
522300	11	41	18	21	54	9	13	34	37	24
530100	80	57	67	51	24	82	61	88	65	65
530150	97	26	76	93	22	92	73	16	32	53
530200	64	48	52	63	57	52	46	38	47	48
530300	72	90	93	96	95	43	94	58	91	91
530500	87	51	78	88	63	85	70	42	48	69
540100	8	66	47	37	88	14	32	56	60	54
540200	33	81	85	87	91	29	89	57	87	81
540300	81	11	60	73	53	71	47	17	17	33
540400	52	92	94	97	97	30	96	64	93	92
540450	85	87	74	67	58	91	74	91	85	88
540500	21	2	25	28	50	25	12	10	2	3
540600	79	52	70	82	60	70	72	36	58	62
540700	35	24	19	44	36	39	20	26	19	19
540800	69	53	64	69	70	62	51	48	50	58
540900	45	16	16	43	10	45	23	46	16	16
541000	24	32	23	27	40	31	21	27	23	18
541100	96	96	95	36	82	97	93	94	92	96
541150	18	69	57	30	78	15	40	50	62	59
541200	98	75	81	76	39	96	82	85	73	82
541300	48	63	46	50	44	57	67	70	69	57
542010	78	20	43	65	30	67	41	13	14	31
542020	1	3	1	2	7	1	1	6	3	1
542030	29	5	4	34	12	36	11	4	6	5
542040	77	54	71	74	67	68	62	45	51	63
542050	60	59	66	64	76	53	48	49	55	64
542060	26	35	17	32	45	27	14	29	28	23
542070	10	67	53	39	89	17	37	61	63	56
542080	47	45	38	57	59	42	43	41	44	40
542090	68	9	26	60	14	58	31	7	11	20
542100	86	29	51	77	35	79	50	25	30	38
542110	94	27	72	92	29	90	71	18	33	50
542120	31	8	32	22	33	18	6	8	5	8
542130	14	42	21	29	55	20	16	35	39	27
542140	30	50	37	47	66	37	30	47	46	39
542150	91	31	62	89	32	87	65	21	34	47
542160	89	25	54	83	25	84	54	19	26	37
542170	4	12	8	7	34	2	3	20	10	6
542180	6	10	7	5	28	3	2	14	8	4
542190	93	15	61	91	18	89	68	3	18	42
542200	83	43	59	78	51	77	56	30	41	49
542210	16	17	13	14	38	12	5	22	12	10
542220	92	19	58	90	19	88	66	9	20	43
542230	75	23	33	72	20	65	49	11	36	32
542240	73	61	75	86	65	63	75	39	68	73
542250	88	21	50	81	21	83	52	15	21	36
542260	71	28	40	62	43	59	39	24	25	34
542270	65	4	14	53	4	49	22	2	4	9

TABLE 11-18

CYPRESS CREEK WATERSHED UNIT AREA POLLUTANT LOAD RANKING BY SUBBASIN USING DRY SEASON AVERAGE RAINFALL

Subbasin ID	BOD5	TSS	TN	TP	Oil and Grease	Cd	Cu	Pb	Zn	AVG LOAD
500100	82	86	77	20	47	95	87	90	88	66
500200	9	18	3	3	15	28	10	67	22	8
500300	27	38	5	1	2	51	15	77	42	7
500400	50	44	15	16	8	73	38	79	49	21
500500	66	22	20	49	3	69	35	69	31	30
500600	39	34	12	12	6	56	19	71	38	15
500700	37	39	10	8	9	55	17	73	40	14
500900	44	40	11	19	5	66	27	74	43	16
501000	63	47	28	18	11	81	42	80	52	28
510100	25	70	34	25	69	47	45	76	67	48
510150	3	36	9	11	46	5	7	31	27	10
510200	32	78	80	75	75	26	90	72	86	85
510250	95	98	84	9	37	98	91	98	98	64
510260	84	95	99	95	96	74	95	93	94	99
510300	38	79	87	66	74	33	84	78	79	87
510400	40	88	91	94	93	21	92	51	90	93
510450	22	76	65	84	73	7	88	40	83	72
510451	59	94	97	99	99	34	99	66	96	97
510500	41	84	90	61	87	40	81	83	80	92
510600	57	93	96	98	98	32	97	65	95	96
510700	62	89	92	40	83	54	78	87	78	86
510800	7	65	39	35	84	11	29	55	59	51
510900	12	73	56	54	85	13	64	53	71	68
511100	70	85	88	42	62	86	80	84	82	80
511200	54	83	89	31	81	78	76	81	77	82
511300	20	72	68	45	90	23	58	63	74	75
511400	5	60	35	33	79	8	26	52	54	44
511500	19	71	55	70	71	6	79	44	76	65
511600	23	82	82	79	94	19	86	62	84	89
520100	34	13	27	38	48	41	24	32	15	31
520200	15	1	2	17	1	16	4	1	1	2
520300	2	37	6	13	49	4	8	33	29	13
520400	76	58	69	58	52	75	59	86	61	77
520600	36	56	31	6	23	46	36	89	64	33
520700	42	91	44	26	64	76	60	95	89	62
520750	58	74	63	4	26	72	53	96	72	42
520800	49	77	79	24	68	64	63	92	75	74
520900	13	64	42	41	80	22	34	54	57	56
521000	67	62	73	71	77	61	57	59	56	81
521100	53	46	45	59	61	48	44	43	45	50
521200	74	97	48	10	42	94	77	97	97	47
521300	99	99	98	85	72	99	98	99	99	98
521400	17	30	30	15	56	10	9	28	24	25
521500	51	14	29	52	41	44	28	23	13	32
521600	43	55	86	56	86	38	83	37	66	76
521700	28	80	83	80	92	24	85	60	81	88
521800	55	33	24	48	16	60	33	68	35	35
521900	90	49	49	68	17	93	69	75	53	57
522000	56	68	36	23	31	80	55	82	70	38

TABLE 11-18

CYPRESS CREEK WATERSHED UNIT AREA POLLUTANT LOAD RANKING BY SUBBASIN USING DRY SEASON AVERAGE RAINFALL

(Continued)

Subbasin ID	BOD5	TSS	TN	TP	Oil and Grease	Cd	Cu	Pb	Zn	AVG LOAD
522300	97	26	76	93	22	92	73	16	32	58
530100	64	48	52	63	57	52	46	38	47	54
530150	72	90	93	96	95	43	94	58	91	94
530200	87	51	78	88	63	85	70	42	48	79
530300	8	66	47	37	88	14	32	56	60	61
530500	33	81	85	87	91	29	89	57	87	91
540100	81	11	60	73	53	71	47	17	17	49
540200	52	92	94	97	97	30	96	64	93	95
540300	85	87	74	67	58	91	74	91	85	84
540400	21	2	25	28	50	25	12	10	2	18
540450	79	52	70	82	60	70	72	36	58	69
540500	35	24	19	44	36	39	20	26	19	24
540600	69	53	64	69	70	62	51	48	50	70
540700	45	16	16	43	10	45	23	46	16	20
540800	24	32	23	27	40	31	21	27	23	19
540900	96	96	95	36	82	97	93	94	92	90
541000	18	69	57	30	78	15	40	50	62	55
541100	98	75	81	76	39	96	82	85	73	83
541150	48	63	46	50	44	57	67	70	69	52
541200	78	20	43	65	30	67	41	13	14	34
541300	1	3	1	2	7	1	1	6	3	1
542010	29	5	4	34	12	36	11	4	6	4
542020	77	54	71	74	67	68	62	45	51	73
542030	60	59	66	64	76	53	48	49	55	71
542040	26	35	17	32	45	27	14	29	28	22
542050	10	67	53	39	89	17	37	61	63	67
542060	47	45	38	57	59	42	43	41	44	45
542070	68	9	26	60	14	58	31	7	11	17
542080	86	29	51	77	35	79	50	25	30	43
542090	94	27	72	92	29	90	71	18	33	59
542100	31	8	32	22	33	18	6	8	5	11
542110	14	42	21	29	55	20	16	35	39	27
542120	30	50	37	47	66	37	30	47	46	46
542130	91	31	62	89	32	87	65	21	34	53
542140	89	25	54	83	25	84	54	19	26	41
542150	4	12	8	7	34	2	3	20	10	5
542160	6	10	7	5	28	3	2	14	8	3
542170	93	15	61	91	18	89	68	3	18	39
542180	83	43	59	78	51	77	56	30	41	60
542190	16	17	13	14	38	12	5	22	12	9
542200	92	19	58	90	19	88	66	9	20	40
542210	75	23	33	72	20	65	49	11	36	29
542220	73	61	75	86	65	63	75	39	68	78
542230	88	21	50	81	21	83	52	15	21	37
542240	71	28	40	62	43	59	39	24	25	36
542250	65	4	14	53	4	49	22	2	4	6
542260	61	7	22	55	13	50	25	5	9	12
542270	46	6	41	46	27	35	18	12	7	26

TABLE 11-19

CYPRESS CREEK WATERSHED 10 HIGHEST SUBBASIN RANKING BY POLLUTANTS USING AVERAGE ANNUAL RAINFALL

BOD5	TSS	TN	TP	Oil and Grease	Cd	Cu	Pb	Zn	AVG LOAD
521300	521300	510260	510451	510451	521300	510451	521300	521300	521300
541100	510250	521300	510600	510600	510250	521300	510250	510250	510250
522300	521200	510451	540200	540200	540900	510600	521200	521200	521200
540900	540900	510600	530150	510260	541100	540200	520750	510451	540900
510250	510260	540900	510260	530150	500100	510260	520700	510600	510260
542090	510451	540200	510400	511600	521200	530150	540900	510260	510451
542170	510600	530150	522300	510400	521900	540900	510260	540200	510600
542200	540200	510700	542090	521700	522300	510400	520800	540900	540200
542130	520700	510400	542170	530500	540300	510250	540300	530150	530150
521900	530150	510500	542200	511300	542090	510200	500100	510400	520700

TABLE 11-20

CYPRESS CREEK WATERSHED HIGHEST SUBBASIN RANKING BY POLLUTANTS USING WET SEASON AVERAGE RAINFALL

BOD5	TSS	TN	TP	Oil and Grease	Cd	Cu	Pb	Zn	AVG LOAD
521300	521300	510260	510451	510451	521300	510451	521300	521300	521300
541100	510250	521300	510600	510600	510250	521300	510250	510250	510250
522300	521200	510451	540200	540200	540900	510600	521200	521200	521200
540900	540900	510600	530150	510260	541100	540200	520750	510451	540900
510250	510260	540900	510260	530150	500100	510260	520700	510600	510260
542090	510451	540200	510400	511600	521200	530150	540900	510260	510451
542170	510600	530150	522300	510400	521900	540900	510260	540200	510600
542200	540200	510700	542090	521700	522300	510400	520800	540900	540200
542130	520700	510400	542170	530500	540300	510250	540300	530150	530150
521900	530150	510500	542200	511300	542090	510200	500100	510400	520700

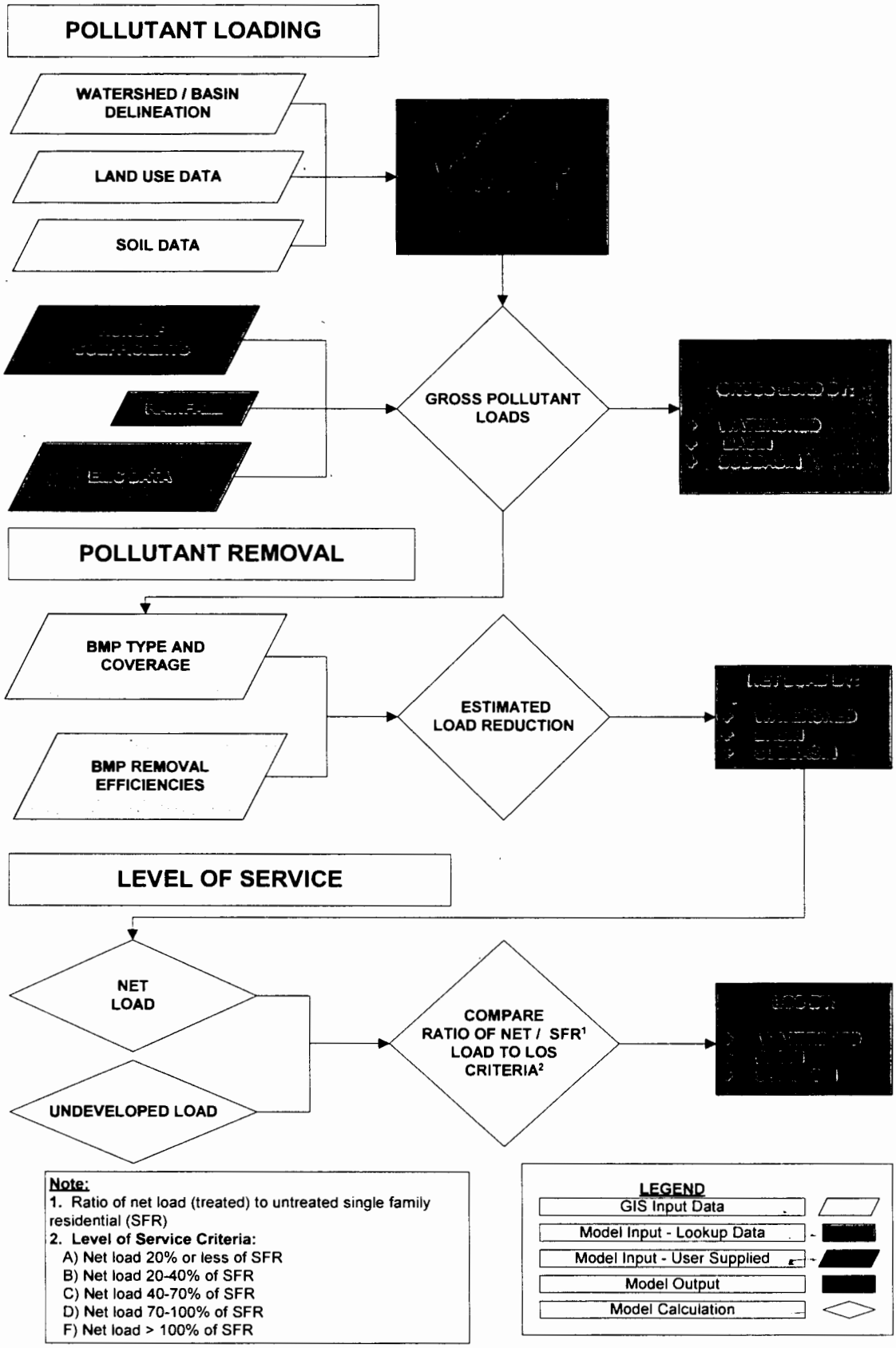
TABLE 11-21

CYPRESS CREEK WATERSHED HIGHEST SUBBASIN RANKING BY POLLUTANTS USING DRY SEASON AVERAGE RAINFALL

BOD5	TSS	TN	TP	Oil and Grease	Cd	Cu	Pb	Zn	AVG LOAD
521300	521300	510260	510451	510451	521300	510451	521300	521300	510260
541100	510250	521300	510600	510600	510250	521300	510250	510250	521300
522300	521200	510451	540200	540200	540900	510600	521200	521200	510451
540900	540900	510600	530150	510260	541100	540200	520750	510451	510600
510250	510260	540900	510260	530150	500100	510260	520700	510600	540200
542090	510451	540200	510400	511600	521200	530150	540900	510260	530150
542170	510600	530150	522300	510400	521900	540900	510260	540200	510400
542200	540200	510700	542090	521700	522300	510400	520800	540900	510500
542130	520700	510400	542170	530500	540300	510250	540300	530150	530500
521900	530150	510500	542200	511300	542090	510200	500100	510400	540900

Figure 11-1

HILLSBOROUGH COUNTY STORMWATER MANAGEMENT WATER QUALITY MODEL SCHEMATIC



APPENDIX H
Chapter Twelve Tables & Figures

APPENDIX H

CHAPTER 12 - TABLES AND FIGURES

TABLE 12-1 RUNOFF COEFFICIENTS FOR LOW DENSITY (SINGLE FAMILY) RESIDENTIAL BENCHMARK

TABLE 12-2 EMC VALUES FOR LOW DENSITY (SINGLE FAMILY) RESIDENTIAL BENCHMARK

TABLE 12-3 CYPRESS CREEK WATERSHED GROSS POLLUTANT LOAD BY SUBBASIN USING AVERAGE ANNUAL RAINFALL FOR SINGLE-FAMILY RESIDENTIAL BENCHMARK

TABLE 12-4 CYPRESS CREEK WATERSHED GROSS POLLUTANT LOAD BY SUBBASIN USING WET SEASON AVERAGE RAINFALL FOR SINGLE-FAMILY RESIDENTIAL BENCHMARK

TABLE 12-5 CYPRESS CREEK WATERSHED GROSS POLLUTANT LOAD BY SUBBASIN USING DRY SEASON AVERAGE RAINFALL FOR SINGLE-FAMILY RESIDENTIAL BENCHMARK

TABLE 12-6 CYPRESS CREEK WATERSHED GROSS LEVEL OF SERVICE BY SUBBASIN USING AVERAGE ANNUAL RAINFALL

TABLE 12-7 CYPRESS CREEK WATERSHED GROSS LEVEL OF SERVICE BY SUBBASIN USING WET SEASON AVERAGE RAINFALL

TABLE 12-8 CYPRESS CREEK WATERSHED GROSS LEVEL OF SERVICE BY SUBBASIN USING DRY SEASON AVERAGE RAINFALL

TABLE 12-9 CYPRESS CREEK WATERSHED SUBBASINS OF LEVEL OF SERVICE D AND F

Table 12-1

Runoff Coefficients for Low Density (Single Family) Residential Benchmark

Stormwater Pollutant Loading and Removal Model

Hillsborough County Public Works / Stormwater Management

FLUCCS Code	Land Use	Hydro Class	Runoff Coeff.
1100	Low/Medium Density Residential	A	0.267
1100	Low/Medium Density Residential	B/D	0.322
1100	Low/Medium Density Residential	C	0.379
1100	Low/Medium Density Residential	D	0.430
1200	Low/Medium Density Residential	A	0.267
1200	Low/Medium Density Residential	B/D	0.322
1200	Low/Medium Density Residential	C	0.379
1200	Low/Medium Density Residential	D	0.430
1300	High Density Residential	A	0.267
1300	High Density Residential	B/D	0.322
1300	High Density Residential	C	0.379
1300	High Density Residential	D	0.430
1460	Light Industrial	A	0.267
1460	Light Industrial	B/D	0.322
1460	Light Industrial	C	0.379
1460	Light Industrial	D	0.430
1500	Light Industrial	A	0.267
1500	Light Industrial	B/D	0.322
1500	Light Industrial	C	0.379
1500	Light Industrial	D	0.430
2000	Agricultural	A	0.267
2000	Agricultural	B/D	0.322
2000	Agricultural	C	0.379
2000	Agricultural	D	0.430
1430	Commercial	A	0.267
1430	Commercial	B/D	0.322
1430	Commercial	C	0.379
1430	Commercial	D	0.430
1440	Commercial	A	0.267
1440	Commercial	B/D	0.322
1440	Commercial	C	0.379
1440	Commercial	D	0.430
1450	Commercial	A	0.267
1450	Commercial	B/D	0.322
1450	Commercial	C	0.379
1450	Commercial	D	0.430
1410	Commercial	A	0.267
1410	Commercial	B/D	0.322
1410	Commercial	C	0.379
1410	Commercial	D	0.430
1420	Commercial	A	0.267
1420	Commercial	B/D	0.322
1420	Commercial	C	0.379
1420	Commercial	D	0.430
8000	Highway/Utility	A	0.267
8000	Highway/Utility	B/D	0.322
8000	Highway/Utility	C	0.379
8000	Highway/Utility	D	0.430

Table 12-1

Runoff Coefficients for Low Density (Single Family) Residential Benchmark

Stormwater Pollutant Loading and Removal Model

Hillsborough County Public Works / Stormwater Management

FLUCCS Code	Land Use	Hydro Class	Runoff Coeff.
1800	Recreational	A	0.267
1800	Recreational	B/D	0.322
1800	Recreational	C	0.379
1800	Recreational	D	0.430
1900	Open Land	A	0.267
1900	Open Land	B/D	0.322
1900	Open Land	C	0.379
1900	Open Land	D	0.430
1600	Extractive (Mining)/Disturbed	A	0.267
1600	Extractive (Mining)/Disturbed	B/D	0.322
1600	Extractive (Mining)/Disturbed	C	0.379
1600	Extractive (Mining)/Disturbed	D	0.430
7400	Extractive (Mining)/Disturbed	A	0.267
7400	Extractive (Mining)/Disturbed	B/D	0.322
7400	Extractive (Mining)/Disturbed	C	0.379
7400	Extractive (Mining)/Disturbed	D	0.430
4000	Upland Forest	A	0.267
4000	Upland Forest	B/D	0.322
4000	Upland Forest	C	0.379
4000	Upland Forest	D	0.430
5000	Water	A	0.267
5000	Water	B/D	0.322
5000	Water	C	0.379
5000	Water	D	0.430
6000	Wetland Non-Forested	A	0.267
6000	Wetland Non-Forested	B/D	0.322
6000	Wetland Non-Forested	C	0.379
6000	Wetland Non-Forested	D	0.430
1400	Commercial	A	0.267
1400	Commercial	B/D	0.322
1400	Commercial	C	0.379
1400	Commercial	D	0.430
1700	Institutional	A	0.267
1700	Institutional	B/D	0.322
1700	Institutional	C	0.379
1700	Institutional	D	0.430
2100	Agricultural	A	0.267
2100	Agricultural	B/D	0.322
2100	Agricultural	C	0.379
2100	Agricultural	D	0.430
2140	Agricultural	A	0.267
2140	Agricultural	B/D	0.322
2140	Agricultural	C	0.379
2140	Agricultural	D	0.430
2200	Agricultural	A	0.267
2200	Agricultural	B/D	0.322
2200	Agricultural	C	0.379
2200	Agricultural	D	0.430

Table 3.2-1

Runoff Coefficients for Low Density (Single Family) Residential Benchmark

Stormwater Pollutant Loading and Removal Model

Hillsborough County Public Works / Stormwater Management

FLUCCS Code	Land Use	Hydro Class	Runoff Coeff.
2300	Agricultural	A	0.267
2300	Agricultural	B/D	0.322
2300	Agricultural	C	0.379
2300	Agricultural	D	0.430
2400	Agricultural	A	0.267
2400	Agricultural	B/D	0.322
2400	Agricultural	C	0.379
2400	Agricultural	D	0.430
2500	Agricultural	A	0.267
2500	Agricultural	B/D	0.322
2500	Agricultural	C	0.379
2500	Agricultural	D	0.430
2550	Agricultural	A	0.267
2550	Agricultural	B/D	0.322
2550	Agricultural	C	0.379
2550	Agricultural	D	0.430
2600	Agricultural	A	0.267
2600	Agricultural	B/D	0.322
2600	Agricultural	C	0.379
2600	Agricultural	D	0.430
3100	Open Land	A	0.267
3100	Open Land	B/D	0.322
3100	Open Land	C	0.379
3100	Open Land	D	0.430
3200	Open Land	A	0.267
3200	Open Land	B/D	0.322
3200	Open Land	C	0.379
3200	Open Land	D	0.430
3300	Open Land	A	0.267
3300	Open Land	B/D	0.322
3300	Open Land	C	0.379
3300	Open Land	D	0.430
4100	Upland Forest	A	0.267
4100	Upland Forest	B/D	0.322
4100	Upland Forest	C	0.379
4100	Upland Forest	D	0.430
4110	Upland Forest	A	0.267
4110	Upland Forest	B/D	0.322
4110	Upland Forest	C	0.379
4110	Upland Forest	D	0.430
4120	Upland Forest	A	0.267
4120	Upland Forest	B/D	0.322
4120	Upland Forest	C	0.379
4120	Upland Forest	D	0.430
4200	Upland Forest	A	0.267
4200	Upland Forest	B/D	0.322
4200	Upland Forest	C	0.379
4200	Upland Forest	D	0.430

Table 12-1

Runoff Coefficients for Low Density (Single Family) Residential Benchmark

Stormwater Pollutant Loading and Removal Model

Hillsborough County Public Works / Stormwater Management

FLUCCS Code	Land Use	Hydro Class	Runoff Coeff.
4340	Upland Forest	A	0.267
4340	Upland Forest	B/D	0.322
4340	Upland Forest	C	0.379
4340	Upland Forest	D	0.430
4400	Upland Forest	A	0.267
4400	Upland Forest	B/D	0.322
4400	Upland Forest	C	0.379
4400	Upland Forest	D	0.430
5100	Water	A	0.267
5100	Water	B/D	0.322
5100	Water	C	0.379
5100	Water	D	0.430
5200	Water	A	0.267
5200	Water	B/D	0.322
5200	Water	C	0.379
5200	Water	D	0.430
5300	Water	A	0.267
5300	Water	B/D	0.322
5300	Water	C	0.379
5300	Water	D	0.430
5400	Water	A	0.267
5400	Water	B/D	0.322
5400	Water	C	0.379
5400	Water	D	0.430
6100	Wetland Forest	A	0.267
6100	Wetland Forest	B/D	0.322
6100	Wetland Forest	C	0.379
6100	Wetland Forest	D	0.430
6110	Wetland Forest	A	0.267
6110	Wetland Forest	B/D	0.322
6110	Wetland Forest	C	0.379
6110	Wetland Forest	D	0.430
6120	Wetland Forest	A	0.267
6120	Wetland Forest	B/D	0.322
6120	Wetland Forest	C	0.379
6120	Wetland Forest	D	0.430
6150	Wetland Forest	A	0.267
6150	Wetland Forest	B/D	0.322
6150	Wetland Forest	C	0.379
6150	Wetland Forest	D	0.430
6200	Wetland Forest	A	0.267
6200	Wetland Forest	B/D	0.322
6200	Wetland Forest	C	0.379
6200	Wetland Forest	D	0.430
6210	Wetland Forest	A	0.267
6210	Wetland Forest	B/D	0.322
6210	Wetland Forest	C	0.379
6210	Wetland Forest	D	0.430

Table 12-1

Runoff Coefficients for Low Density (Single Family) Residential Benchmark

Stormwater Pollutant Loading and Removal Model

Hillsborough County Public Works / Stormwater Management

FLUCCS Code	Land Use	Hydro Class	Runoff Coeff.
6300	Wetland Forest	A	0.267
6300	Wetland Forest	B/D	0.322
6300	Wetland Forest	C	0.379
6300	Wetland Forest	D	0.430
6400	Wetland Non-Forested	A	0.267
6400	Wetland Non-Forested	B/D	0.322
6400	Wetland Non-Forested	C	0.379
6400	Wetland Non-Forested	D	0.430
6410	Wetland Non-Forested	A	0.267
6410	Wetland Non-Forested	B/D	0.322
6410	Wetland Non-Forested	C	0.379
6410	Wetland Non-Forested	D	0.430
6420	Wetland Non-Forested	A	0.267
6420	Wetland Non-Forested	B/D	0.322
6420	Wetland Non-Forested	C	0.379
6420	Wetland Non-Forested	D	0.430
6430	Wetland Non-Forested	A	0.267
6430	Wetland Non-Forested	B/D	0.322
6430	Wetland Non-Forested	C	0.379
6430	Wetland Non-Forested	D	0.430
6440	Wetland Non-Forested	A	0.267
6440	Wetland Non-Forested	B/D	0.322
6440	Wetland Non-Forested	C	0.379
6440	Wetland Non-Forested	D	0.430
6500	Wetland Non-Forested	A	0.267
6500	Wetland Non-Forested	B/D	0.322
6500	Wetland Non-Forested	C	0.379
6500	Wetland Non-Forested	D	0.430
6510	Wetland Non-Forested	A	0.267
6510	Wetland Non-Forested	B/D	0.322
6510	Wetland Non-Forested	C	0.379
6510	Wetland Non-Forested	D	0.430
6520	Wetland Non-Forested	A	0.267
6520	Wetland Non-Forested	B/D	0.322
6520	Wetland Non-Forested	C	0.379
6520	Wetland Non-Forested	D	0.430
6530	Wetland Non-Forested	A	0.267
6530	Wetland Non-Forested	B/D	0.322
6530	Wetland Non-Forested	C	0.379
6530	Wetland Non-Forested	D	0.430
7100	Wetland Non-Forested	A	0.267
7100	Wetland Non-Forested	B/D	0.322
7100	Wetland Non-Forested	C	0.379
7100	Wetland Non-Forested	D	0.430
7400	Extractive (Mining)/Disturbed	A	0.267
7400	Extractive (Mining)/Disturbed	B/D	0.322
7400	Extractive (Mining)/Disturbed	C	0.379
7400	Extractive (Mining)/Disturbed	D	0.430

Table 12-1

Runoff Coefficients for Low Density (Single Family) Residential Benchmark

Stormwater Pollutant Loading and Removal Model

Hillsborough County Public Works / Stormwater Management

FLUCCS Code	Land Use	Hydro Class	Runoff Coeff.
8100	Highway/Utility	A	0.267
8100	Highway/Utility	B/D	0.322
8100	Highway/Utility	C	0.379
8100	Highway/Utility	D	0.430
8200	Highway/Utility	A	0.267
8200	Highway/Utility	B/D	0.322
8200	Highway/Utility	C	0.379
8200	Highway/Utility	D	0.430
8300	Highway/Utility	A	0.267
8300	Highway/Utility	B/D	0.322
8300	Highway/Utility	C	0.379
8300	Highway/Utility	D	0.430

Note: B/D used for all NC soils

Table 12-2

EMC Values for Low Density (Single Family) Residential Benchmark

Stormwater Pollutant Loading and Removal Model

Hillsborough County Public Works / Stormwater Management

	NPDES Conventional WQ (mg/l)								NPDES Metals (mg/l)			
Land Use	BOD_5	TSS	TKN	NO_3 $+NO_2$	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
Low/Medium Density Residential	1.00	19.00	1.08	0.28	1.36	0.40	0.28	1.08	0.00	0.01	0.01	0.02
High Density Residential	1.00	19.00	1.08	0.28	1.36	0.40	0.28	1.08	0.00	0.01	0.01	0.02
Light Industrial	1.00	19.00	1.08	0.28	1.36	0.40	0.28	1.08	0.00	0.01	0.01	0.02
Agricultural	1.00	19.00	1.08	0.28	1.36	0.40	0.28	1.08	0.00	0.01	0.01	0.02
Commercial	1.00	19.00	1.08	0.28	1.36	0.40	0.28	1.08	0.00	0.01	0.01	0.02
Institutional	1.00	19.00	1.08	0.28	1.36	0.40	0.28	1.08	0.00	0.01	0.01	0.02
Highway/Utility	1.00	19.00	1.08	0.28	1.36	0.40	0.28	1.08	0.00	0.01	0.01	0.02
Recreational	1.00	19.00	1.08	0.28	1.36	0.40	0.28	1.08	0.00	0.01	0.01	0.02
Open Land	1.00	19.00	1.08	0.28	1.36	0.40	0.28	1.08	0.00	0.01	0.01	0.02
Extractive (Mining)/Disturbed	1.00	19.00	1.08	0.28	1.36	0.40	0.28	1.08	0.00	0.01	0.01	0.02
Upland Forest	1.00	19.00	1.08	0.28	1.36	0.40	0.28	1.08	0.00	0.01	0.01	0.02
Wetland Forest	1.00	19.00	1.08	0.28	1.36	0.40	0.28	1.08	0.00	0.01	0.01	0.02
Wetland Non-Forested	1.00	19.00	1.08	0.28	1.36	0.40	0.28	1.08	0.00	0.01	0.01	0.02
Water	1.00	19.00	1.08	0.28	1.36	0.40	0.28	1.08	0.00	0.01	0.01	0.02

TABLE 12-3

CYPRESS CREEK WATERSHED GROSS POLLUTANT LOAD BY SUBBASIN USING AVERAGE ANNUAL RAINFALL FOR SINGLE-FAMILY RESIDENTIAL BENCHMARK

Subbasin ID	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
500100	1500.4	28508.0	1623.5	421.6	2045.1	601.7	423.1	1620.5	1.5	19.5	12.0	33.0
500200	4236.0	80484.1	4583.4	1190.3	5773.7	1698.6	1194.6	4574.9	4.2	55.1	33.9	93.2
500300	6803.8	129272.1	7361.7	1911.9	9273.6	2728.3	1918.7	7348.1	6.8	88.4	54.4	149.7
500400	6975.3	132530.2	7547.2	1960.1	9507.3	2797.1	1967.0	7533.3	7.0	90.7	55.8	153.5
500500	2400.1	45602.1	2596.9	674.4	3271.4	962.4	676.8	2592.1	2.4	31.2	19.2	52.8
500600	7413.5	140857.3	8021.5	2083.2	10104.7	2972.8	2090.6	8006.6	7.4	96.4	59.3	163.1
500700	6713.5	127556.8	7264.0	1886.5	9150.5	2692.1	1893.2	7250.6	6.7	87.3	53.7	147.7
500900	4548.6	86423.4	4921.6	1278.2	6199.7	1824.0	1282.7	4912.5	4.5	59.1	36.4	100.1
501000	4458.4	84708.8	4823.9	1252.8	6076.7	1787.8	1257.3	4815.0	4.5	58.0	35.7	98.1
510100	586.0	11133.7	634.0	164.7	798.7	235.0	165.2	632.9	0.6	7.6	4.7	12.9
510150	349.7	6643.5	378.3	98.3	476.6	140.2	98.6	377.6	0.3	4.5	2.8	7.7
510200	174.3	3312.1	188.6	49.0	237.6	69.9	49.2	188.3	0.2	2.3	1.4	3.8
510250	63.8	1212.1	69.0	17.9	87.0	25.6	18.0	68.9	0.1	0.8	0.5	1.4
510260	93.5	1775.8	101.1	26.3	127.4	37.5	26.4	100.9	0.1	1.2	0.7	2.1
510300	494.0	9386.4	534.5	138.8	673.4	198.1	139.3	533.5	0.5	6.4	4.0	10.9
510400	234.6	4457.8	253.9	65.9	319.8	94.1	66.2	253.4	0.2	3.1	1.9	5.2
510450	212.3	4033.8	229.7	59.7	289.4	85.1	59.9	229.3	0.2	2.8	1.7	4.7
510451	58.8	1117.5	63.6	16.5	80.2	23.6	16.6	63.5	0.1	0.8	0.5	1.3
510500	640.1	12162.6	692.6	179.9	872.5	256.7	180.5	691.3	0.6	8.3	5.1	14.1
510600	171.8	3263.7	185.9	48.3	234.1	68.9	48.4	185.5	0.2	2.2	1.4	3.8
510700	173.2	3291.1	187.4	48.7	236.1	69.5	48.8	187.1	0.2	2.3	1.4	3.8
510800	394.4	7492.9	426.7	110.8	537.5	158.1	111.2	425.9	0.4	5.1	3.2	8.7
510900	302.6	5749.7	327.4	85.0	412.5	121.3	85.3	326.8	0.3	3.9	2.4	6.7
511100	383.7	7289.7	415.1	107.8	522.9	153.9	108.2	414.4	0.4	5.0	3.1	8.4
511200	546.0	10374.7	590.8	153.4	744.2	219.0	154.0	589.7	0.5	7.1	4.4	12.0
511300	388.8	7387.4	420.7	109.3	529.9	155.9	109.6	419.9	0.4	5.1	3.1	8.6
511400	143.2	2720.9	155.0	40.2	195.2	57.4	40.4	154.7	0.1	1.9	1.1	3.2
511500	329.5	6260.3	356.5	92.6	449.1	132.1	92.9	355.8	0.3	4.3	2.6	7.2
511600	86.0	1633.2	93.0	24.2	117.2	34.5	24.2	92.8	0.1	1.1	0.7	1.9
520100	653.2	12411.7	706.8	183.6	890.4	262.0	184.2	705.5	0.7	8.5	5.2	14.4
520200	450.1	8551.3	487.0	126.5	613.4	180.5	126.9	486.1	0.5	5.9	3.6	9.9
520300	284.5	5405.3	307.8	79.9	387.8	114.1	80.2	307.3	0.3	3.7	2.3	6.3
520400	651.4	12377.1	704.8	183.1	887.9	261.2	183.7	703.5	0.7	8.5	5.2	14.3
520600	71.1	1351.5	77.0	20.0	97.0	28.5	20.1	76.8	0.1	0.9	0.6	1.6
520700	259.5	4930.0	280.7	72.9	353.7	104.0	73.2	280.2	0.3	3.4	2.1	5.7
520750	94.8	1802.0	102.6	26.7	129.3	38.0	26.7	102.4	0.1	1.2	0.8	2.1
520800	185.0	3515.5	200.2	52.0	252.2	74.2	52.2	199.8	0.2	2.4	1.5	4.1
520900	496.6	9435.2	537.3	139.5	676.9	199.1	140.0	536.3	0.5	6.5	4.0	10.9
521000	257.1	4885.7	278.2	72.3	350.5	103.1	72.5	277.7	0.3	3.3	2.1	5.7
521100	454.7	8639.4	492.0	127.8	619.8	182.3	128.2	491.1	0.5	5.9	3.6	10.0
521200	92.7	1761.3	100.3	26.0	126.4	37.2	26.1	100.1	0.1	1.2	0.7	2.0
521300	171.6	3260.2	185.7	48.2	233.9	68.8	48.4	185.3	0.2	2.2	1.4	3.8
521400	220.8	4195.1	238.9	62.0	300.9	88.5	62.3	238.5	0.2	2.9	1.8	4.9
521500	595.3	11310.5	644.1	167.3	811.4	238.7	167.9	642.9	0.6	7.7	4.8	13.1
521600	479.5	9110.3	518.8	134.7	653.5	192.3	135.2	517.8	0.5	6.2	3.8	10.5
521700	145.2	2759.1	157.1	40.8	197.9	58.2	41.0	156.8	0.1	1.9	1.2	3.2
521800	1685.1	32017.2	1823.3	473.5	2296.8	675.7	475.2	1819.9	1.7	21.9	13.5	37.1
521900	134.2	2548.9	145.2	37.7	182.8	53.8	37.8	144.9	0.1	1.7	1.1	3.0
522000	262.0	4978.5	283.5	73.6	357.1	105.1	73.9	283.0	0.3	3.4	2.1	5.8

TABLE 12-3

CYPRESS CREEK WATERSHED GROSS POLLUTANT LOAD BY SUBBASIN USING AVERAGE ANNUAL RAINFALL FOR SINGLE-FAMILY RESIDENTIAL BENCHMARK

(Continued)

Subbasin ID	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
522300	92.7	1761.3	100.3	26.0	126.4	37.2	26.1	100.1	0.1	1.2	0.7	2.0
530100	171.6	3260.2	185.7	48.2	233.9	68.8	48.4	185.3	0.2	2.2	1.4	3.8
530150	220.8	4195.1	238.9	62.0	300.9	88.5	62.3	238.5	0.2	2.9	1.8	4.9
530200	595.3	11310.5	644.1	167.3	811.4	238.7	167.9	642.9	0.6	7.7	4.8	13.1
530300	479.5	9110.3	518.8	134.7	653.5	192.3	135.2	517.8	0.5	6.2	3.8	10.5
530500	145.2	2759.1	157.1	40.8	197.9	58.2	41.0	156.8	0.1	1.9	1.2	3.2
540100	1685.1	32017.2	1823.3	473.5	2296.8	675.7	475.2	1819.9	1.7	21.9	13.5	37.1
540200	134.2	2548.9	145.2	37.7	182.8	53.8	37.8	144.9	0.1	1.7	1.1	3.0
540300	262.0	4978.5	283.5	73.6	357.1	105.1	73.9	283.0	0.3	3.4	2.1	5.8
540400	223.9	4253.2	242.2	62.9	305.1	89.8	63.1	241.8	0.2	2.9	1.8	4.9
540450	243.9	4633.4	263.9	68.5	332.4	97.8	68.8	263.4	0.2	3.2	2.0	5.4
540500	56.9	1080.2	61.5	16.0	77.5	22.8	16.0	61.4	0.1	0.7	0.5	1.3
540600	535.7	10177.4	579.6	150.5	730.1	214.8	151.1	578.5	0.5	7.0	4.3	11.8
540700	271.9	5166.0	294.2	76.4	370.6	109.0	76.7	293.6	0.3	3.5	2.2	6.0
540800	338.5	6432.3	366.3	95.1	461.4	135.8	95.5	365.6	0.3	4.4	2.7	7.4
540900	132.0	2507.6	142.8	37.1	179.9	52.9	37.2	142.5	0.1	1.7	1.1	2.9
541000	395.3	7509.9	427.7	111.1	538.7	158.5	111.5	426.9	0.4	5.1	3.2	8.7
541100	222.1	4219.0	240.3	62.4	302.7	89.0	62.6	239.8	0.2	2.9	1.8	4.9
541150	210.6	4000.6	227.8	59.2	287.0	84.4	59.4	227.4	0.2	2.7	1.7	4.6
541200	406.3	7719.6	439.6	114.2	553.8	162.9	114.6	438.8	0.4	5.3	3.3	8.9
541300	171.8	3265.0	185.9	48.3	234.2	68.9	48.5	185.6	0.2	2.2	1.4	3.8
542010	307.5	5842.7	332.7	86.4	419.1	123.3	86.7	332.1	0.3	4.0	2.5	6.8
542020	592.9	11264.4	641.5	166.6	808.1	237.7	167.2	640.3	0.6	7.7	4.7	13.0
542030	968.9	18409.1	1048.4	272.3	1320.6	388.5	273.2	1046.4	1.0	12.6	7.8	21.3
542040	1439.8	27355.6	1557.8	404.6	1962.4	577.3	406.0	1555.0	1.4	18.7	11.5	31.7
542050	412.3	7833.1	446.1	115.8	561.9	165.3	116.3	445.2	0.4	5.4	3.3	9.1
542060	116.8	2219.2	126.4	32.8	159.2	46.8	32.9	126.1	0.1	1.5	0.9	2.6
542070	177.9	3379.2	192.4	50.0	242.4	71.3	50.2	192.1	0.2	2.3	1.4	3.9
542080	756.3	14370.2	818.3	212.5	1030.9	303.3	213.3	816.8	0.8	9.8	6.1	16.6
542090	5040.2	95763.4	5453.5	1416.3	6869.8	2021.1	1421.3	5443.4	5.0	65.5	40.3	110.9
542100	352.2	6692.0	381.1	99.0	480.1	141.2	99.3	380.4	0.4	4.6	2.8	7.7
542110	50.9	967.8	55.1	14.3	69.4	20.4	14.4	55.0	0.1	0.7	0.4	1.1
542120	269.0	5110.1	291.0	75.6	366.6	107.8	75.8	290.5	0.3	3.5	2.2	5.9
542130	304.2	5779.9	329.2	85.5	414.6	122.0	85.8	328.5	0.3	4.0	2.4	6.7
542140	137.0	2602.3	148.2	38.5	186.7	54.9	38.6	147.9	0.1	1.8	1.1	3.0
542150	143.8	2732.1	155.6	40.4	196.0	57.7	40.5	155.3	0.1	1.9	1.2	3.2
542160	241.9	4595.4	261.7	68.0	329.7	97.0	68.2	261.2	0.2	3.1	1.9	5.3
542170	388.6	7383.6	420.5	109.2	529.7	155.8	109.6	419.7	0.4	5.1	3.1	8.5
542180	114.7	2179.5	124.1	32.2	156.4	46.0	32.3	123.9	0.1	1.5	0.9	2.5
542190	200.8	3815.4	217.3	56.4	273.7	80.5	56.6	216.9	0.2	2.6	1.6	4.4
542200	169.6	3222.6	183.5	47.7	231.2	68.0	47.8	183.2	0.2	2.2	1.4	3.7
542210	968.9	18408.2	1048.3	272.2	1320.5	388.5	273.2	1046.4	1.0	12.6	7.8	21.3
542220	74.6	1416.5	80.7	20.9	101.6	29.9	21.0	80.5	0.1	1.0	0.6	1.6
542230	487.4	9260.4	527.4	137.0	664.3	195.4	137.4	526.4	0.5	6.3	3.9	10.7
542240	183.7	3491.1	198.8	51.6	250.4	73.7	51.8	198.4	0.2	2.4	1.5	4.0
542250	357.8	6799.0	387.2	100.6	487.7	143.5	100.9	386.5	0.4	4.7	2.9	7.9
542260	197.1	3745.2	213.3	55.4	268.7	79.0	55.6	212.9	0.2	2.6	1.6	4.3
542270	408.9	7768.4	442.4	114.9	557.3	164.0	115.3	441.6	0.4	5.3	3.3	9.0

TABLE 12-4

CYPRESS CREEK WATERSHED GROSS POLLUTANT LOAD BY SUBBASIN USING WET SEASON AVERAGE RAINFALL FOR SINGLE-FAMILY RESIDENTIAL BENCHMARK

Subbasin ID	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
500100	972.0	18467.3	1051.7	273.1	1324.8	389.8	274.1	1049.7	1.0	12.6	7.8	21.4
500200	2744.1	52137.2	2969.1	771.1	3740.2	1100.4	773.8	2963.6	2.7	35.7	22.0	60.4
500300	4407.5	83741.8	4768.9	1238.5	6007.4	1767.4	1242.9	4760.1	4.4	57.3	35.3	97.0
500400	4518.5	85852.4	4889.1	1269.7	6158.8	1811.9	1274.2	4880.0	4.5	58.7	36.1	99.4
500500	1554.8	29540.8	1682.3	436.9	2119.2	623.5	438.4	1679.2	1.6	20.2	12.4	34.2
500600	4802.5	91246.6	5196.3	1349.5	6545.7	1925.8	1354.3	5186.6	4.8	62.4	38.4	105.7
500700	4349.0	82630.6	4705.6	1222.1	5927.7	1743.9	1226.4	4696.9	4.3	56.5	34.8	95.7
500900	2946.6	55984.6	3188.2	828.0	4016.2	1181.6	830.9	3182.3	2.9	38.3	23.6	64.8
501000	2888.1	54873.9	3124.9	811.6	3936.5	1158.1	814.4	3119.1	2.9	37.5	23.1	63.5
510100	379.6	7212.4	410.7	106.7	517.4	152.2	107.0	410.0	0.4	4.9	3.0	8.4
510150	226.5	4303.6	245.1	63.6	308.7	90.8	63.9	244.6	0.2	2.9	1.8	5.0
510200	112.9	2145.6	122.2	31.7	153.9	45.3	31.8	122.0	0.1	1.5	0.9	2.5
510250	41.3	785.2	44.7	11.6	56.3	16.6	11.7	44.6	0.0	0.5	0.3	0.9
510260	60.5	1150.3	65.5	17.0	82.5	24.3	17.1	65.4	0.1	0.8	0.5	1.3
510300	320.0	6080.5	346.3	89.9	436.2	128.3	90.2	345.6	0.3	4.2	2.6	7.0
510400	152.0	2887.7	164.4	42.7	207.2	60.9	42.9	164.1	0.2	2.0	1.2	3.3
510450	137.5	2613.1	148.8	38.6	187.5	55.1	38.8	148.5	0.1	1.8	1.1	3.0
510451	38.1	723.9	41.2	10.7	51.9	15.3	10.7	41.1	0.0	0.5	0.3	0.8
510500	414.7	7878.9	448.7	116.5	565.2	166.3	116.9	447.9	0.4	5.4	3.3	9.1
510600	111.3	2114.2	120.4	31.3	151.7	44.6	31.4	120.2	0.1	1.4	0.9	2.4
510700	112.2	2132.0	121.4	31.5	152.9	45.0	31.6	121.2	0.1	1.5	0.9	2.5
510800	255.5	4853.8	276.4	71.8	348.2	102.4	72.0	275.9	0.3	3.3	2.0	5.6
510900	196.0	3724.6	212.1	55.1	267.2	78.6	55.3	211.7	0.2	2.5	1.6	4.3
511100	248.5	4722.2	268.9	69.8	338.8	99.7	70.1	268.4	0.2	3.2	2.0	5.5
511200	353.7	6720.7	382.7	99.4	482.1	141.8	99.7	382.0	0.4	4.6	2.8	7.8
511300	251.9	4785.5	272.5	70.8	343.3	101.0	71.0	272.0	0.3	3.3	2.0	5.5
511400	92.8	1762.6	100.4	26.1	126.4	37.2	26.2	100.2	0.1	1.2	0.7	2.0
511500	213.4	4055.4	230.9	60.0	290.9	85.6	60.2	230.5	0.2	2.8	1.7	4.7
511600	55.7	1058.0	60.2	15.6	75.9	22.3	15.7	60.1	0.1	0.7	0.4	1.2
520100	423.2	8040.3	457.9	118.9	576.8	169.7	119.3	457.0	0.4	5.5	3.4	9.3
520200	291.6	5539.5	315.5	81.9	397.4	116.9	82.2	314.9	0.3	3.8	2.3	6.4
520300	184.3	3501.5	199.4	51.8	251.2	73.9	52.0	199.0	0.2	2.4	1.5	4.1
520400	422.0	8017.8	456.6	118.6	575.2	169.2	119.0	455.7	0.4	5.5	3.4	9.3
520600	46.1	875.5	49.9	12.9	62.8	18.5	13.0	49.8	0.0	0.6	0.4	1.0
520700	168.1	3193.6	181.9	47.2	229.1	67.4	47.4	181.5	0.2	2.2	1.3	3.7
520750	61.4	1167.3	66.5	17.3	83.7	24.6	17.3	66.4	0.1	0.8	0.5	1.4
520800	119.9	2277.4	129.7	33.7	163.4	48.1	33.8	129.4	0.1	1.6	1.0	2.6
520900	321.7	6112.1	348.1	90.4	438.5	129.0	90.7	347.4	0.3	4.2	2.6	7.1
521000	166.6	3165.0	180.2	46.8	227.0	66.8	47.0	179.9	0.2	2.2	1.3	3.7
521100	294.6	5596.6	318.7	82.8	401.5	118.1	83.1	318.1	0.3	3.8	2.4	6.5
521200	60.1	1141.0	65.0	16.9	81.9	24.1	16.9	64.9	0.1	0.8	0.5	1.3
521300	111.2	2112.0	120.3	31.2	151.5	44.6	31.3	120.0	0.1	1.4	0.9	2.4
521400	143.0	2717.5	154.8	40.2	194.9	57.4	40.3	154.5	0.1	1.9	1.1	3.1
521500	385.6	7326.9	417.2	108.4	525.6	154.6	108.7	416.5	0.4	5.0	3.1	8.5
521600	310.6	5901.6	336.1	87.3	423.4	124.6	87.6	335.5	0.3	4.0	2.5	6.8
521700	94.1	1787.3	101.8	26.4	128.2	37.7	26.5	101.6	0.1	1.2	0.8	2.1
521800	1091.6	20740.6	1181.1	306.7	1487.9	437.7	307.8	1178.9	1.1	14.2	8.7	24.0
521900	86.9	1651.1	94.0	24.4	118.4	34.8	24.5	93.9	0.1	1.1	0.7	1.9
522000	169.7	3225.1	183.7	47.7	231.4	68.1	47.9	183.3	0.2	2.2	1.4	3.7

TABLE 12-4

CYPRESS CREEK WATERSHED GROSS POLLUTANT LOAD BY SUBBASIN USING WET SEASON AVERAGE RAINFALL FOR SINGLE-FAMILY RESIDENTIAL BENCHMARK

(Continued)

Subbasin ID	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
522300	145.0	2755.2	156.9	40.7	197.6	58.1	40.9	156.6	0.1	1.9	1.2	3.2
530100	158.0	3001.5	170.9	44.4	215.3	63.3	44.5	170.6	0.2	2.1	1.3	3.5
530150	36.8	699.7	39.8	10.3	50.2	14.8	10.4	39.8	0.0	0.5	0.3	0.8
530200	347.0	6592.9	375.4	97.5	473.0	139.1	97.9	374.8	0.3	4.5	2.8	7.6
530300	176.1	3346.5	190.6	49.5	240.1	70.6	49.7	190.2	0.2	2.3	1.4	3.9
530500	219.3	4166.8	237.3	61.6	298.9	87.9	61.8	236.9	0.2	2.9	1.8	4.8
540100	85.5	1624.4	92.5	24.0	116.5	34.3	24.1	92.3	0.1	1.1	0.7	1.9
540200	256.0	4864.8	277.0	71.9	349.0	102.7	72.2	276.5	0.3	3.3	2.0	5.6
540300	143.8	2733.0	155.6	40.4	196.1	57.7	40.6	155.4	0.1	1.9	1.2	3.2
540400	136.4	2591.6	147.6	38.3	185.9	54.7	38.5	147.3	0.1	1.8	1.1	3.0
540450	263.2	5000.7	284.8	74.0	358.7	105.5	74.2	284.3	0.3	3.4	2.1	5.8
540500	111.3	2115.0	120.4	31.3	151.7	44.6	31.4	120.2	0.1	1.4	0.9	2.4
540600	199.2	3784.9	215.5	56.0	271.5	79.9	56.2	215.1	0.2	2.6	1.6	4.4
540700	384.1	7297.0	415.5	107.9	523.5	154.0	108.3	414.8	0.4	5.0	3.1	8.4
540800	627.6	11925.3	679.1	176.4	855.5	251.7	177.0	677.9	0.6	8.2	5.0	13.8
540900	932.7	17720.8	1009.2	262.1	1271.2	374.0	263.0	1007.3	0.9	12.1	7.5	20.5
541000	267.1	5074.2	289.0	75.0	364.0	107.1	75.3	288.4	0.3	3.5	2.1	5.9
541100	75.7	1437.6	81.9	21.3	103.1	30.3	21.3	81.7	0.1	1.0	0.6	1.7
541150	115.2	2189.1	124.7	32.4	157.0	46.2	32.5	124.4	0.1	1.5	0.9	2.5
541200	489.9	9309.0	530.1	137.7	667.8	196.5	138.2	529.1	0.5	6.4	3.9	10.8
541300	3265.0	62035.0	3532.7	917.5	4450.2	1309.3	920.7	3526.2	3.3	42.4	26.1	71.8
542010	228.2	4335.1	246.9	64.1	311.0	91.5	64.3	246.4	0.2	3.0	1.8	5.0
542020	33.0	627.0	35.7	9.3	45.0	13.2	9.3	35.6	0.0	0.4	0.3	0.7
542030	174.2	3310.3	188.5	49.0	237.5	69.9	49.1	188.2	0.2	2.3	1.4	3.8
542040	197.1	3744.2	213.2	55.4	268.6	79.0	55.6	212.8	0.2	2.6	1.6	4.3
542050	88.7	1685.7	96.0	24.9	120.9	35.6	25.0	95.8	0.1	1.2	0.7	2.0
542060	93.1	1769.8	100.8	26.2	127.0	37.4	26.3	100.6	0.1	1.2	0.7	2.0
542070	156.7	2976.9	169.5	44.0	213.6	62.8	44.2	169.2	0.2	2.0	1.3	3.4
542080	251.7	4783.1	272.4	70.7	343.1	100.9	71.0	271.9	0.3	3.3	2.0	5.5
542090	74.3	1411.9	80.4	20.9	101.3	29.8	21.0	80.3	0.1	1.0	0.6	1.6
542100	130.1	2471.6	140.8	36.6	177.3	52.2	36.7	140.5	0.1	1.7	1.0	2.9
542110	109.9	2087.6	118.9	30.9	149.8	44.1	31.0	118.7	0.1	1.4	0.9	2.4
542120	627.6	11924.7	679.1	176.4	855.4	251.7	177.0	677.8	0.6	8.2	5.0	13.8
542130	48.3	917.6	52.3	13.6	65.8	19.4	13.6	52.2	0.0	0.6	0.4	1.1
542140	315.7	5998.8	341.6	88.7	430.3	126.6	89.0	341.0	0.3	4.1	2.5	6.9
542150	119.0	2261.5	128.8	33.4	162.2	47.7	33.6	128.6	0.1	1.5	1.0	2.6
542160	231.8	4404.3	250.8	65.1	316.0	93.0	65.4	250.4	0.2	3.0	1.9	5.1
542170	127.7	2426.1	138.2	35.9	174.0	51.2	36.0	137.9	0.1	1.7	1.0	2.8
542180	264.9	5032.3	286.6	74.4	361.0	106.2	74.7	286.0	0.3	3.4	2.1	5.8
542190	90.0	1709.9	97.4	25.3	122.7	36.1	25.4	97.2	0.1	1.2	0.7	2.0
542200	377.8	7177.3	408.7	106.1	514.9	151.5	106.5	408.0	0.4	4.9	3.0	8.3
542210	175.6	3335.6	190.0	49.3	239.3	70.4	49.5	189.6	0.2	2.3	1.4	3.9
542220	230.5	4379.7	249.4	64.8	314.2	92.4	65.0	249.0	0.2	3.0	1.8	5.1
542230	228.1	4333.6	246.8	64.1	310.9	91.5	64.3	246.3	0.2	3.0	1.8	5.0
542240	212.4	4036.4	229.9	59.7	289.6	85.2	59.9	229.4	0.2	2.8	1.7	4.7
542250	318.7	6054.5	344.8	89.5	434.3	127.8	89.9	344.1	0.3	4.1	2.5	7.0
542260	100.5	1908.6	108.7	28.2	136.9	40.3	28.3	108.5	0.1	1.3	0.8	2.2
542270	243.9	4634.4	263.9	68.5	332.5	97.8	68.8	263.4	0.2	3.2	2.0	5.4

TABLE 12-5

CYPRESS CREEK WATERSHED GROSS POLLUTANT LOAD BY SUBBASIN USING DRY SEASON AVERAGE RAINFALL FOR SINGLE-FAMILY RESIDENTIAL BENCHMARK

Subbasin ID	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
500100	531.3	10095.1	574.9	149.3	724.2	213.1	149.8	573.8	0.5	6.9	4.3	11.7
500200	1500.0	28500.5	1623.0	421.5	2044.5	601.5	423.0	1620.0	1.5	19.5	12.0	33.0
500300	2409.3	45777.0	2606.9	677.0	3283.9	966.1	679.4	2602.1	2.4	31.3	19.3	53.0
500400	2470.0	46930.8	2672.6	694.1	3366.7	990.5	696.6	2667.6	2.5	32.1	19.8	54.3
500500	849.9	16148.3	919.6	238.8	1158.4	340.8	239.7	917.9	0.8	11.0	6.8	18.7
500600	2625.2	49879.5	2840.5	737.7	3578.2	1052.7	740.3	2835.3	2.6	34.1	21.0	57.8
500700	2377.3	45169.6	2572.3	668.0	3240.3	953.3	670.4	2567.5	2.4	30.9	19.0	52.3
500900	1610.7	30603.7	1742.8	452.6	2195.4	645.9	454.2	1739.6	1.6	20.9	12.9	35.4
501000	1578.8	29996.5	1708.2	443.6	2151.9	633.1	445.2	1705.1	1.6	20.5	12.6	34.7
510100	207.5	3942.6	224.5	58.3	282.8	83.2	58.5	224.1	0.2	2.7	1.7	4.6
510150	123.8	2352.5	134.0	34.8	168.8	49.7	34.9	133.7	0.1	1.6	1.0	2.7
510200	61.7	1172.9	66.8	17.3	84.1	24.8	17.4	66.7	0.1	0.8	0.5	1.4
510250	22.6	429.2	24.4	6.3	30.8	9.1	6.4	24.4	0.0	0.3	0.2	0.5
510260	33.1	628.8	35.8	9.3	45.1	13.3	9.3	35.7	0.0	0.4	0.3	0.7
510300	174.9	3323.9	189.3	49.2	238.4	70.2	49.3	188.9	0.2	2.3	1.4	3.8
510400	83.1	1578.6	89.9	23.3	113.2	33.3	23.4	89.7	0.1	1.1	0.7	1.8
510450	75.2	1428.4	81.3	21.1	102.5	30.1	21.2	81.2	0.1	1.0	0.6	1.7
510451	20.8	395.7	22.5	5.9	28.4	8.4	5.9	22.5	0.0	0.3	0.2	0.5
510500	226.7	4307.0	245.3	63.7	309.0	90.9	63.9	244.8	0.2	2.9	1.8	5.0
510600	60.8	1155.7	65.8	17.1	82.9	24.4	17.2	65.7	0.1	0.8	0.5	1.3
510700	61.3	1165.4	66.4	17.2	83.6	24.6	17.3	66.2	0.1	0.8	0.5	1.3
510800	139.6	2653.3	151.1	39.2	190.3	56.0	39.4	150.8	0.1	1.8	1.1	3.1
510900	107.2	2036.0	115.9	30.1	146.1	43.0	30.2	115.7	0.1	1.4	0.9	2.4
511100	135.9	2581.4	147.0	38.2	185.2	54.5	38.3	146.7	0.1	1.8	1.1	3.0
511200	193.4	3673.8	209.2	54.3	263.5	77.5	54.5	208.8	0.2	2.5	1.5	4.3
511300	137.7	2616.0	149.0	38.7	187.7	55.2	38.8	148.7	0.1	1.8	1.1	3.0
511400	50.7	963.5	54.9	14.2	69.1	20.3	14.3	54.8	0.1	0.7	0.4	1.1
511500	116.7	2216.9	126.2	32.8	159.0	46.8	32.9	126.0	0.1	1.5	0.9	2.6
511600	30.4	578.3	32.9	8.6	41.5	12.2	8.6	32.9	0.0	0.4	0.2	0.7
520100	231.3	4395.2	250.3	65.0	315.3	92.8	65.2	249.8	0.2	3.0	1.9	5.1
520200	159.4	3028.1	172.4	44.8	217.2	63.9	44.9	172.1	0.2	2.1	1.3	3.5
520300	100.7	1914.1	109.0	28.3	137.3	40.4	28.4	108.8	0.1	1.3	0.8	2.2
520400	230.7	4382.9	249.6	64.8	314.4	92.5	65.1	249.1	0.2	3.0	1.8	5.1
520600	25.2	478.6	27.3	7.1	34.3	10.1	7.1	27.2	0.0	0.3	0.2	0.6
520700	91.9	1745.8	99.4	25.8	125.2	36.8	25.9	99.2	0.1	1.2	0.7	2.0
520750	33.6	638.1	36.3	9.4	45.8	13.5	9.5	36.3	0.0	0.4	0.3	0.7
520800	65.5	1244.9	70.9	18.4	89.3	26.3	18.5	70.8	0.1	0.9	0.5	1.4
520900	175.8	3341.1	190.3	49.4	239.7	70.5	49.6	189.9	0.2	2.3	1.4	3.9
521000	91.1	1730.1	98.5	25.6	124.1	36.5	25.7	98.3	0.1	1.2	0.7	2.0
521100	161.0	3059.3	174.2	45.2	219.5	64.6	45.4	173.9	0.2	2.1	1.3	3.5
521200	32.8	623.7	35.5	9.2	44.7	13.2	9.3	35.5	0.0	0.4	0.3	0.7
521300	60.8	1154.5	65.7	17.1	82.8	24.4	17.1	65.6	0.1	0.8	0.5	1.3
521400	78.2	1485.5	84.6	22.0	106.6	31.4	22.0	84.4	0.1	1.0	0.6	1.7
521500	210.8	4005.2	228.1	59.2	287.3	84.5	59.4	227.7	0.2	2.7	1.7	4.6
521600	169.8	3226.1	183.7	47.7	231.4	68.1	47.9	183.4	0.2	2.2	1.4	3.7
521700	51.4	977.0	55.6	14.4	70.1	20.6	14.5	55.5	0.1	0.7	0.4	1.1
521800	596.7	11337.7	645.7	167.7	813.3	239.3	168.3	644.5	0.6	7.8	4.8	13.1
521900	47.5	902.6	51.4	13.3	64.7	19.0	13.4	51.3	0.0	0.6	0.4	1.0
522000	92.8	1763.0	100.4	26.1	126.5	37.2	26.2	100.2	0.1	1.2	0.7	2.0

TABLE 12-5

CYPRESS CREEK WATERSHED GROSS POLLUTANT LOAD BY SUBBASIN USING DRY SEASON AVERAGE RAINFALL FOR SINGLE-FAMILY RESIDENTIAL BENCHMARK

(Continued)

Subbasin ID	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
522300	79.3	1506.1	85.8	22.3	108.0	31.8	22.4	85.6	0.1	1.0	0.6	1.7
530100	86.4	1640.8	93.4	24.3	117.7	34.6	24.4	93.3	0.1	1.1	0.7	1.9
530150	20.1	382.5	21.8	5.7	27.4	8.1	5.7	21.7	0.0	0.3	0.2	0.4
530200	189.7	3604.0	205.2	53.3	258.5	76.1	53.5	204.9	0.2	2.5	1.5	4.2
530300	96.3	1829.4	104.2	27.1	131.2	38.6	27.2	104.0	0.1	1.3	0.8	2.1
530500	119.9	2277.8	129.7	33.7	163.4	48.1	33.8	129.5	0.1	1.6	1.0	2.6
540100	46.7	888.0	50.6	13.1	63.7	18.7	13.2	50.5	0.0	0.6	0.4	1.0
540200	140.0	2659.3	151.4	39.3	190.8	56.1	39.5	151.2	0.1	1.8	1.1	3.1
540300	78.6	1494.0	85.1	22.1	107.2	31.5	22.2	84.9	0.1	1.0	0.6	1.7
540400	74.6	1416.7	80.7	21.0	101.6	29.9	21.0	80.5	0.1	1.0	0.6	1.6
540450	143.9	2733.6	155.7	40.4	196.1	57.7	40.6	155.4	0.1	1.9	1.2	3.2
540500	60.9	1156.2	65.8	17.1	82.9	24.4	17.2	65.7	0.1	0.8	0.5	1.3
540600	108.9	2069.0	117.8	30.6	148.4	43.7	30.7	117.6	0.1	1.4	0.9	2.4
540700	209.9	3988.9	227.2	59.0	286.1	84.2	59.2	226.7	0.2	2.7	1.7	4.6
540800	343.1	6518.9	371.2	96.4	467.6	137.6	96.8	370.5	0.3	4.5	2.7	7.5
540900	509.8	9687.0	551.6	143.3	694.9	204.4	143.8	550.6	0.5	6.6	4.1	11.2
541000	146.0	2773.8	158.0	41.0	199.0	58.5	41.2	157.7	0.1	1.9	1.2	3.2
541100	41.4	785.8	44.8	11.6	56.4	16.6	11.7	44.7	0.0	0.5	0.3	0.9
541150	63.0	1196.6	68.1	17.7	85.8	25.3	17.8	68.0	0.1	0.8	0.5	1.4
541200	267.8	5088.7	289.8	75.3	365.0	107.4	75.5	289.3	0.3	3.5	2.1	5.9
541300	1784.8	33911.1	1931.1	501.5	2432.7	715.7	503.3	1927.6	1.8	23.2	14.3	39.3
542010	124.7	2369.7	135.0	35.0	170.0	50.0	35.2	134.7	0.1	1.6	1.0	2.7
542020	18.0	342.7	19.5	5.1	24.6	7.2	5.1	19.5	0.0	0.2	0.1	0.4
542030	95.2	1809.5	103.0	26.8	129.8	38.2	26.9	102.9	0.1	1.2	0.8	2.1
542040	107.7	2046.7	116.6	30.3	146.8	43.2	30.4	116.3	0.1	1.4	0.9	2.4
542050	48.5	921.5	52.5	13.6	66.1	19.4	13.7	52.4	0.0	0.6	0.4	1.1
542060	50.9	967.5	55.1	14.3	69.4	20.4	14.4	55.0	0.1	0.7	0.4	1.1
542070	85.6	1627.3	92.7	24.1	116.7	34.3	24.2	92.5	0.1	1.1	0.7	1.9
542080	137.6	2614.6	148.9	38.7	187.6	55.2	38.8	148.6	0.1	1.8	1.1	3.0
542090	40.6	771.8	44.0	11.4	55.4	16.3	11.5	43.9	0.0	0.5	0.3	0.9
542100	71.1	1351.1	76.9	20.0	96.9	28.5	20.1	76.8	0.1	0.9	0.6	1.6
542110	60.1	1141.2	65.0	16.9	81.9	24.1	16.9	64.9	0.1	0.8	0.5	1.3
542120	343.1	6518.6	371.2	96.4	467.6	137.6	96.7	370.5	0.3	4.5	2.7	7.5
542130	26.4	501.6	28.6	7.4	36.0	10.6	7.4	28.5	0.0	0.3	0.2	0.6
542140	172.6	3279.2	186.7	48.5	235.2	69.2	48.7	186.4	0.2	2.2	1.4	3.8
542150	65.1	1236.3	70.4	18.3	88.7	26.1	18.3	70.3	0.1	0.8	0.5	1.4
542160	126.7	2407.6	137.1	35.6	172.7	50.8	35.7	136.9	0.1	1.6	1.0	2.8
542170	69.8	1326.2	75.5	19.6	95.1	28.0	19.7	75.4	0.1	0.9	0.6	1.5
542180	144.8	2750.9	156.7	40.7	197.3	58.1	40.8	156.4	0.1	1.9	1.2	3.2
542190	49.2	934.7	53.2	13.8	67.1	19.7	13.9	53.1	0.0	0.6	0.4	1.1
542200	206.5	3923.4	223.4	58.0	281.5	82.8	58.2	223.0	0.2	2.7	1.7	4.5
542210	96.0	1823.4	103.8	27.0	130.8	38.5	27.1	103.6	0.1	1.2	0.8	2.1
542220	126.0	2394.2	136.3	35.4	171.7	50.5	35.5	136.1	0.1	1.6	1.0	2.8
542230	124.7	2368.9	134.9	35.0	169.9	50.0	35.2	134.7	0.1	1.6	1.0	2.7
542240	116.1	2206.5	125.7	32.6	158.3	46.6	32.7	125.4	0.1	1.5	0.9	2.6
542250	174.2	3309.6	188.5	48.9	237.4	69.9	49.1	188.1	0.2	2.3	1.4	3.8
542260	54.9	1043.3	59.4	15.4	74.8	22.0	15.5	59.3	0.1	0.7	0.4	1.2
542270	133.3	2533.4	144.3	37.5	181.7	53.5	37.6	144.0	0.1	1.7	1.1	2.9

TABLE 12-6

CYPRESS CREEK WATERSHED GROSS LEVEL OF SERVICE BY SUBBASIN USING AVERAGE ANNUAL RAINFALL

Subbasin ID	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
500100	F	F	F	F	F	C	C	C	F	F	F	F
500200	D	B	B	B	B	B	B	B	F	C	F	C
500300	F	C	B	C	C	A	A	A	F	C	F	C
500400	F	C	C	C	C	C	C	A	F	D	F	D
500500	F	B	C	D	C	F	D	A	F	D	F	C
500600	F	C	C	C	C	C	C	A	F	D	F	C
500700	F	C	C	C	C	B	B	A	F	C	F	C
500900	F	C	C	C	C	C	C	A	F	D	F	C
501000	F	C	C	D	D	C	C	A	F	F	F	D
510100	F	F	D	D	D	D	D	D	F	F	F	F
510150	D	C	C	C	C	C	C	C	C	C	C	C
510200	F	F	F	F	F	F	F	D	F	F	F	F
510250	F	F	F	F	F	B	C	B	F	F	F	F
510260	F	F	F	F	F	F	F	F	F	F	F	F
510300	F	F	F	F	F	F	F	D	F	F	F	F
510400	F	F	F	F	F	F	F	F	F	F	D	F
510450	F	F	D	F	F	F	F	D	D	F	C	F
510451	F	F	F	F	F	F	F	F	F	F	F	F
510500	F	F	F	F	F	F	F	D	F	F	F	F
510600	F	F	F	F	F	F	F	F	F	F	F	F
510700	F	F	F	F	F	F	D	D	F	F	F	F
510800	D	D	D	D	D	D	D	D	D	D	D	D
510900	F	F	F	F	F	F	F	D	D	F	D	F
511100	F	F	F	F	F	F	D	C	F	F	F	F
511200	F	F	F	F	F	D	D	D	F	F	F	F
511300	F	F	F	F	F	F	D	F	F	F	F	F
511400	D	D	D	D	D	D	D	D	D	D	D	D
511500	F	D	D	F	D	F	F	D	D	F	C	F
511600	F	F	F	F	F	F	F	F	F	F	F	F
520100	F	B	D	D	D	F	F	C	F	D	C	C
520200	F	A	B	B	B	C	C	A	F	B	A	A
520300	C	C	C	C	C	C	C	C	C	C	C	C
520400	F	D	F	F	F	F	F	C	F	F	F	D
520600	F	D	D	C	D	B	B	B	F	F	F	F
520700	F	F	F	F	F	D	D	D	F	F	F	F
520750	F	F	F	C	F	B	B	B	F	F	F	F
520800	F	F	F	F	F	D	D	D	F	F	F	F
520900	F	D	D	F	F	F	F	D	F	F	D	D
521000	F	D	F	F	F	F	F	D	F	F	D	D
521100	F	C	D	F	D	F	F	C	F	F	C	C
521200	F	F	D	F	D	B	C	B	F	F	F	F
521300	F	F	F	F	F	F	F	D	F	F	F	F
521400	F	C	D	D	D	C	C	C	D	C	C	C
521500	F	B	D	D	D	F	F	B	F	D	B	B
521600	F	D	F	F	F	F	F	D	F	F	C	F
521700	F	F	F	F	F	F	F	F	F	F	D	F
521800	F	C	C	D	C	F	D	B	F	D	F	C
521900	F	D	D	F	F	F	F	B	F	F	F	D
522000	F	D	D	D	D	C	C	B	F	F	F	F

TABLE 12-6

CYPRESS CREEK WATERSHED GROSS LEVEL OF SERVICE BY SUBBASIN USING AVERAGE ANNUAL RAINFALL

(Continued)

Subbasin ID	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
522300F		C	C	C	C	D	C	C	D	C	C	C
530100F		D	F	D	F	F	F	B	F	F	F	F
530150F		C	F	F	F	F	F	B	F	F	B	C
530200F		C	D	F	F	F	F	C	F	F	C	D
530300F		F	F	F	F	F	F	F	F	F	F	F
530500F		D	F	F	F	F	F	C	F	F	C	D
540100D		D	D	D	D	D	D	D	D	D	D	D
540200F		F	F	F	F	F	F	F	F	F	D	F
540300F		B	F	F	F	F	F	C	F	F	B	C
540400F		F	F	F	F	F	F	F	F	F	F	F
540450F		F	F	F	F	F	F	C	F	F	F	F
540500F		A	C	C	C	D	C	C	F	C	B	A
540600F		C	F	F	F	F	F	C	F	F	C	D
540700F		C	C	D	C	F	D	B	F	D	B	C
540800F		C	D	F	D	F	F	C	F	F	C	C
540900F		B	C	C	C	D	D	A	F	D	C	B
541000F		C	C	C	C	D	C	B	F	D	B	C
541100F		F	F	F	F	D	F	D	F	F	F	F
541150F		F	F	F	F	D	D	D	D	F	D	D
541200F		F	F	F	F	F	F	B	F	F	F	F
541300F		D	D	F	F	F	F	C	F	F	F	F
542010F		B	D	F	D	F	F	B	F	F	B	B
542020A		A	A	A	A	A	A	A	A	A	A	A
542030F		B	B	C	C	D	C	A	F	C	A	B
542040F		D	F	F	F	F	F	D	F	F	C	D
542050F		D	F	F	F	F	F	D	F	F	D	D
542060F		C	C	D	C	D	D	C	F	D	C	C
542070F		D	D	D	D	D	D	D	D	D	D	D
542080F		C	D	F	D	F	F	C	F	F	C	C
542090F		B	C	D	C	F	F	B	F	D	A	B
542100F		C	F	F	F	F	F	B	F	F	B	C
542110F		C	F	F	F	F	F	B	F	F	B	C
542120F		B	D	C	D	D	C	B	F	C	A	B
542130F		C	D	D	D	D	D	C	F	D	C	C
542140F		D	D	F	D	F	F	D	F	F	D	D
542150F		C	F	F	F	F	F	B	F	F	B	C
542160F		C	D	F	F	F	F	B	F	F	B	C
542170D		B	C	C	C	B	B	C	C	B	B	B
542180D		B	C	C	C	B	B	B	C	B	B	B
542190F		C	F	F	F	F	F	B	F	F	A	C
542200F		C	F	F	F	F	F	C	F	F	C	C
542210F		B	C	C	C	C	C	C	F	C	B	B
542220F		C	F	F	F	F	F	B	F	F	B	C
542230F		C	D	F	D	F	F	B	F	F	B	C
542240F		D	F	F	F	F	F	D	F	F	C	F
542250F		C	F	F	F	F	F	B	F	F	B	C
542260F		C	F	F	F	F	F	C	F	F	B	C
542270F		A	C	D	C	F	F	A	F	D	A	B

TABLE 12-7

CYPRESS CREEK WATERSHED GROSS LEVEL OF SERVICE BY SUBBASIN USING WET SEASON AVERAGE RAINFALL

Subbasin ID	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
500100	F	F	F	F	C	C	C	F	F	F	F	
500200	D	B	B	B	B	B	B	F	C	F	C	
500300	F	C	B	C	C	A	A	A	F	C	F	C
500400	F	C	C	C	C	C	C	A	F	D	F	D
500500	F	B	C	D	C	F	D	A	F	D	F	C
500600	F	C	C	C	C	C	C	A	F	D	F	C
500700	F	C	C	C	C	B	B	A	F	C	F	C
500900	F	C	C	C	C	C	C	A	F	D	F	C
501000	F	C	C	D	D	C	C	A	F	F	F	D
510100	F	F	D	D	D	D	D	D	F	F	F	F
510150	D	C	C	C	C	C	C	C	C	C	C	C
510200	F	F	F	F	F	F	F	D	F	F	F	F
510250	F	F	F	F	F	B	C	B	F	F	F	F
510260	F	F	F	F	F	F	F	F	F	F	F	F
510300	F	F	F	F	F	F	F	D	F	F	F	F
510400	F	F	F	F	F	F	F	F	F	F	D	F
510450	F	F	D	F	F	F	F	D	D	F	C	F
510451	F	F	F	F	F	F	F	F	F	F	F	F
510500	F	F	F	F	F	F	F	D	F	F	F	F
510600	F	F	F	F	F	F	F	F	F	F	F	F
510700	F	F	F	F	F	F	D	D	F	F	F	F
510800	D	D	D	D	D	D	D	D	D	D	D	D
510900	F	F	F	F	F	F	F	D	D	F	D	F
511100	F	F	F	F	F	F	D	C	F	F	F	F
511200	F	F	F	F	F	D	D	D	F	F	F	F
511300	F	F	F	F	F	F	D	F	F	F	F	F
511400	D	D	D	D	D	D	D	D	D	D	D	D
511500	F	D	D	F	D	F	F	D	D	F	C	F
511600	F	F	F	F	F	F	F	F	F	F	F	F
520100	F	B	D	D	D	F	F	C	F	D	C	C
520200	F	A	B	B	B	C	C	A	F	B	A	A
520300	C	C	C	C	C	C	C	C	C	C	C	C
520400	F	D	F	F	F	F	F	C	F	F	F	D
520600	F	D	D	C	D	B	B	B	F	F	F	F
520700	F	F	F	F	F	D	D	D	F	F	F	F
520750	F	F	F	C	F	B	B	B	F	F	F	F
520800	F	F	F	F	F	D	D	D	F	F	F	F
520900	F	D	D	F	F	F	F	D	F	F	D	D
521000	F	D	F	F	F	F	F	D	F	F	D	D
521100	F	C	D	F	D	F	F	C	F	F	C	C
521200	F	F	D	F	D	B	C	B	F	F	F	F
521300	F	F	F	F	F	F	F	D	F	F	F	F
521400	F	C	D	D	D	C	C	C	D	C	C	C
521500	F	B	D	D	D	F	F	B	F	D	B	B
521600	F	D	F	F	F	F	F	D	F	F	C	F
521700	F	F	F	F	F	F	F	F	F	F	D	F
521800	F	C	C	D	C	F	D	B	F	D	F	C
521900	F	D	D	F	F	F	F	B	F	F	F	D
522000	F	D	D	D	D	C	C	B	F	F	F	F

TABLE 12-7

CYPRESS CREEK WATERSHED GROSS LEVEL OF SERVICE BY SUBBASIN USING WET SEASON AVERAGE RAINFALL

(Continued)

Subbasin ID	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
522300F		C	C	C	C	D	C	C	D	C	C	C
530100F		D	F	D	F	F	F	B	F	F	F	F
530150F		C	F	F	F	F	F	B	F	F	B	C
530200F		C	D	F	F	F	F	C	F	F	C	D
530300F		F	F	F	F	F	F	F	F	F	F	F
530500F		D	F	F	F	F	F	C	F	F	C	D
540100D		D	D	D	D	D	D	D	D	D	D	D
540200F		F	F	F	F	F	F	F	F	F	D	F
540300F		B	F	F	F	F	F	C	F	F	B	C
540400F		F	F	F	F	F	F	F	F	F	F	F
540450F		F	F	F	F	F	F	C	F	F	F	F
540500F		A	C	C	C	D	C	C	F	C	B	A
540600F		C	F	F	F	F	F	C	F	F	C	D
540700F		C	C	D	C	F	D	B	F	D	B	C
540800F		C	D	F	D	F	F	C	F	F	C	C
540900F		B	C	C	C	D	D	A	F	D	C	B
541000F		C	C	C	C	D	C	B	F	D	B	C
541100F		F	F	F	F	D	F	D	F	F	F	F
541150F		F	F	F	F	D	D	D	D	F	D	D
541200F		F	F	F	F	F	F	B	F	F	F	F
541300F		D	D	F	F	F	F	C	F	F	F	F
542010F		B	D	F	D	F	F	B	F	F	B	B
542020A		A	A	A	A	A	A	A	A	A	A	A
542030F		B	B	C	C	D	C	A	F	C	A	B
542040F		D	F	F	F	F	F	D	F	F	C	D
542050F		D	F	F	F	F	F	D	F	F	D	D
542060F		C	C	D	C	D	D	C	F	D	C	C
542070F		D	D	D	D	D	D	D	D	D	D	D
542080F		C	D	F	D	F	F	C	F	F	C	C
542090F		B	C	D	C	F	F	B	F	D	A	B
542100F		C	F	F	F	F	F	B	F	F	B	C
542110F		C	F	F	F	F	F	B	F	F	B	C
542120F		B	D	C	D	D	C	B	F	C	A	B
542130F		C	D	D	D	D	D	C	F	D	C	C
542140F		D	D	F	D	F	F	D	F	F	D	D
542150F		C	F	F	F	F	F	B	F	F	B	C
542160F		C	D	F	F	F	F	B	F	F	B	C
542170D		B	C	C	C	B	B	C	C	B	B	B
542180D		B	C	C	C	B	B	B	C	B	B	B
542190F		C	F	F	F	F	F	B	F	F	A	C
542200F		C	F	F	F	F	F	C	F	F	C	C
542210F		B	C	C	C	C	C	C	F	C	B	B
542220F		C	F	F	F	F	F	B	F	F	B	C
542230F		C	D	F	D	F	F	B	F	F	B	C
542240F		D	F	F	F	F	F	D	F	F	C	F
542250F		C	F	F	F	F	F	B	F	F	B	C
542260F		C	F	F	F	F	F	C	F	F	B	C
542270F		A	C	D	C	F	F	A	F	D	A	B

TABLE 12-8

CYPRESS CREEK WATERSHED GROSS LEVEL OF SERVICE BY SUBBASIN USING DRY SEASON AVERAGE RAINFALL

Subbasin ID	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
500100	F	F	F	F	F	C	C	C	F	F	F	F
500200	D	B	B	B	B	B	B	B	F	C	F	C
500300	F	C	B	C	C	A	A	A	F	C	F	C
500400	F	C	C	C	C	C	C	A	F	D	F	D
500500	F	B	C	D	C	F	D	A	F	D	F	C
500600	F	C	C	C	C	C	C	A	F	D	F	C
500700	F	C	C	C	C	B	B	A	F	C	F	C
500900	F	C	C	C	C	C	C	A	F	D	F	C
501000	F	C	C	D	D	C	C	A	F	F	F	D
510100	F	F	D	D	D	D	D	D	F	F	F	F
510150	D	C	C	C	C	C	C	C	C	C	C	C
510200	F	F	F	F	F	F	F	D	F	F	F	F
510250	F	F	F	F	F	B	C	B	F	F	F	F
510260	F	F	F	F	F	F	F	F	F	F	F	F
510300	F	F	F	F	F	F	F	D	F	F	F	F
510400	F	F	F	F	F	F	F	F	F	F	D	F
510450	F	F	D	F	F	F	F	D	D	F	C	F
510451	F	F	F	F	F	F	F	F	F	F	F	F
510500	F	F	F	F	F	F	F	D	F	F	F	F
510600	F	F	F	F	F	F	F	F	F	F	F	F
510700	F	F	F	F	F	F	D	D	F	F	F	F
510800	D	D	D	D	D	D	D	D	D	D	D	D
510900	F	F	F	F	F	F	F	D	D	F	D	F
511100	F	F	F	F	F	F	D	C	F	F	F	F
511200	F	F	F	F	F	D	D	D	F	F	F	F
511300	F	F	F	F	F	F	D	F	F	F	F	F
511400	D	D	D	D	D	D	D	D	D	D	D	D
511500	F	D	D	F	D	F	F	D	D	F	C	F
511600	F	F	F	F	F	F	F	F	F	F	F	F
520100	F	B	D	D	D	F	F	C	F	D	C	C
520200	F	A	B	B	B	C	C	A	F	B	A	A
520300	C	C	C	C	C	C	C	C	C	C	C	C
520400	F	D	F	F	F	F	F	C	F	F	F	D
520600	F	D	D	C	D	B	B	B	F	F	F	F
520700	F	F	F	F	F	D	D	D	F	F	F	F
520750	F	F	F	C	F	B	B	B	F	F	F	F
520800	F	F	F	F	F	D	D	D	F	F	F	F
520900	F	D	D	F	F	F	F	D	F	F	D	D
521000	F	D	F	F	F	F	F	D	F	F	D	D
521100	F	C	D	F	D	F	F	C	F	F	C	C
521200	F	F	D	F	D	B	C	B	F	F	F	F
521300	F	F	F	F	F	F	F	D	F	F	F	F
521400	F	C	D	D	D	C	C	C	D	C	C	C
521500	F	B	D	D	D	F	F	B	F	D	B	B
521600	F	D	F	F	F	F	F	D	F	F	C	F
521700	F	F	F	F	F	F	F	F	F	F	D	F
521800	F	C	C	D	C	F	D	B	F	D	F	C
521900	F	D	D	F	F	F	F	B	F	F	F	D
522000	F	D	D	D	D	C	C	B	F	F	F	F

TABLE 12-8

CYPRESS CREEK WATERSHED GROSS LEVEL OF SERVICE BY SUBBASIN USING DRY SEASON AVERAGE RAINFALL

(Continued)

Subbasin ID	BOD5	TSS	TKN	NO3 +NO2	TN	TP	TDP	Oil and Grease	Cd	Cu	Pb	Zn
522300F		C	F	F	F	F	F	B	F	F	B	C
530100F		C	D	F	F	F	F	C	F	F	C	D
530150F		F	F	F	F	F	F	F	F	F	F	F
530200F		D	F	F	F	F	F	C	F	F	C	D
530300D		D	D	D	D	D	D	D	D	D	D	D
530500F		F	F	F	F	F	F	F	F	F	D	F
540100F		B	F	F	F	F	F	C	F	F	B	C
540200F		F	F	F	F	F	F	F	F	F	F	F
540300F		F	F	F	F	F	F	C	F	F	F	F
540400F		A	C	C	C	D	C	C	F	C	B	A
540450F		C	F	F	F	F	F	C	F	F	C	D
540500F		C	C	D	C	F	D	B	F	D	B	C
540600F		C	D	F	D	F	F	C	F	F	C	C
540700F		B	C	C	C	D	D	A	F	D	C	B
540800F		C	C	C	C	D	C	B	F	D	B	C
540900F		F	F	F	F	D	F	D	F	F	F	F
541000F		F	F	F	F	D	D	D	D	F	D	D
541100F		F	F	F	F	F	F	B	F	F	F	F
541150F		D	D	F	F	F	F	C	F	F	F	F
541200F		B	D	F	D	F	F	B	F	F	B	B
541300A		A	A	A	A	A	A	A	A	A	A	A
542010F		B	B	C	C	D	C	A	F	C	A	B
542020F		D	F	F	F	F	F	D	F	F	C	D
542030F		D	F	F	F	F	F	D	F	F	D	D
542040F		C	C	D	C	D	D	C	F	D	C	C
542050F		D	D	D	D	D	D	D	D	D	D	D
542060F		C	D	F	D	F	F	C	F	F	C	C
542070F		B	C	D	C	F	F	B	F	D	A	B
542080F		C	F	F	F	F	F	B	F	F	B	C
542090F		C	F	F	F	F	F	B	F	F	B	C
542100F		B	D	C	D	D	C	B	F	C	A	B
542110F		C	D	D	D	D	D	C	F	D	C	C
542120F		D	D	F	D	F	F	D	F	F	D	D
542130F		C	F	F	F	F	F	B	F	F	B	C
542140F		C	D	F	F	F	F	B	F	F	B	C
542150D		B	C	C	C	B	B	C	C	B	B	B
542160D		B	C	C	C	B	B	B	C	B	B	B
542170F		C	F	F	F	F	F	B	F	F	A	C
542180F		C	F	F	F	F	F	C	F	F	C	C
542190F		B	C	C	C	C	C	C	F	C	B	B
542200F		C	F	F	F	F	F	B	F	F	B	C
542210F		C	D	F	D	F	F	B	F	F	B	C
542220F		D	F	F	F	F	F	D	F	F	C	F
542230F		C	F	F	F	F	F	B	F	F	B	C
542240F		C	F	F	F	F	F	C	F	F	B	C
542250F		A	C	D	C	F	F	A	F	D	A	B
542260F		B	C	D	C	F	F	B	F	D	A	B
542270F		B	D	C	D	F	C	B	F	C	B	B

TABLE 12-9

CYPRESS CREEK WATERSHED SUBBASINS OF LEVEL OF SERVICE D AND F

All F	All D	All D and F
510260	510800	510100
510451	511400	510200
510600	530300	510300
511600		510400
530150		510500
540200		510700
		510900
		511200
		511300
		520700
		520800
		520900
		521000
		521300

Note: 510460 is the new basin name for 510451
510540 is the new basin name for 510500
510930 is the new basin name for 510900

510050 & 510100 are new basins for 510100

APPENDIX I
Public Meeting 2 - Information and Comments

PUBLIC MEETING 2

CYPRESS CREEK WATERSHED MANAGEMENT PLAN
June 1, 2000

Project Overview

Hillsborough County has embarked on nine major watershed management plans to determine ways to provide flood control, improve water quality and enhance natural habitats in certain designated watersheds within its jurisdiction. This involves a thorough study and understanding of each designated watershed. It also includes the development and assessment of alternatives and potential long-term management approaches to flooding and water quality maintenance. This watershed management plan will serve as an integrated management tool for solving persistent flooding problems, improving water quality and natural habitats, and providing water supply and recreational benefits throughout Hillsborough County.

One of the nine watershed management plans currently being developed by Hillsborough County with the assistance of the engineering firm, URS Greiner Woodward Clyde is for the Cypress Creek Watershed. The Cypress Creek Watershed drains an area of approximately 33 square miles or 21,000 acres in northern Hillsborough County. The total Cypress Creek Watershed including areas within Pasco and Hillsborough Counties is approximately 150 square miles. The watershed is primarily suburban, and drains into the Hillsborough River. The basin is roughly bounded on its north side by Pasco County, to its east side by I-75, along its south side by Bruce B. Downs Boulevard and on its west side by U.S. 41. Additionally, several major roads, including Livingston Avenue, Sunset Lane, Hanna Road, Debuel Road, Whitaker Road, and Sinclair Hills Road bisect the watershed. The basin is composed of 105 smaller units of sub-basins ranging in size from approximately 10 to 400 acres. The watershed includes ten conveyance outfalls that discharge east into the Cypress Creek main channel which then flows south into the Hillsborough River. Flooding in several areas of the watershed was reported during the El Niño rainfall events during late 1997 and early 1998.

To keep residents living in or around the watershed informed of the project's development, and for the County and its consultant to gain information about the area, Hillsborough County will hold public meetings for each of the project's three phases. These meetings will give stakeholders a chance to voice their concerns and offer first-hand accounts of persistent flooding or water quality problems within their area.

Public Meeting 1

Public Meeting 1 was held on February 9, 2000 at the Lutz Community Center was the public meeting for Phase 1 of the Cypress Creek Watershed Management Plan. The first phase of the watershed management plan involved extensive field work and data collection performed to gain a better understanding of the water quality and hydrology of the area. This included an assessment of the existing water quality, natural systems and hydrology of the area. Computer models using water quality data were developed to predict gross pollutant runoff from different areas within the watershed. Flooding within the area was also evaluated using computer models to simulate the affects of a variety of rainfall conditions over the watershed.

Public Meeting 2

Tonight's meeting, being held at the Lutz Community Center, is the public meeting for Phase 2 of the Cypress Creek Watershed Management Plan. The second phase of the watershed management plan involves the development and analysis of alternative water management practices. Alternatives, both structural and non-structural, are to be developed to deal with flooding and water quality problems and water supply concerns within the area. Possible alternatives will be presented at this second public meeting (see attached sheets) to assist the County in the selection and identification of preferred alternatives. Stakeholder input into the prioritization of these alternatives is vital.

Public Meeting 3

Based on economic analysis, technical review, political considerations, and public input, recommendations for achieving cost-effective flood control and water quality objectives are to be developed for the final stage of the watershed management plan. These recommendations will be presented in a third and final public meeting where stakeholders will have another opportunity to voice their concerns and critique the work product. Based on the results of this public meeting, a final list of recommended projects will be incorporated into the watershed plan.

Project Website

To keep track of progress and developments with the management plan, a web site has been established. This site can be viewed by logging onto http://www.cypress-creek.org. For additional information, contact the Hillsborough County Project Manager Horatio Droc, P.E., at (813) 272-5912, or Robert Johnson, of URS Greiner Woodward Clyde at (813) 286-1711 ext. 5276. Hillsborough County Commission District 2, Mr. Jim Norman County Commissioner.

Project Schedule

Task Name	Completion Date
Project Kick-off	June 1999
1st Milestone Report	December 1999
Public Meeting 1	February 2000
2nd Milestone Report	March 2000
Public Meeting 2	June 2000
3rd Milestone Report	July 2000
Public Meeting 3	July 2000
4th Milestone Report	August 2000
Final Report	September 2000

CYPRESS CREEK WATERSHED MANAGEMENT PLAN
PUBLIC COMMENT SHEET

Public Meeting 2
Date: Thursday, June 1, 2000

Name: _____

Address: _____

Telephone: _____ Fax: _____ Email: _____

Comments: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Do your comments continue on the back of this sheet? ☐ **Yes** ☐ **No**

Your comments are important to this Hillsborough County project. All written comments will be summarized and included in the Watershed Management Plan document.

Please complete the comment sheet and place it in the box provided at the meeting, or

Mail your comments to: Robert Johnson, P.E.
URS Greiner Woodward Clyde
7650 W. Courtney Campbell Causeway
Tampa, FL 33607

Fax your comments to: Robert Johnson at (813) 286-6587

Email your comments, in a format similar to this form to: robert_johnson@urscorp.com or Submit comments on-line at http://www.cypress-creek.org under "Public Comment."

25 registered

PLACE: LUTZ COMMUNITY CENTER
CYPRESS CREEK WATERSHED MANAGEMENT

MEETING ATTENDANCE

PLEASE PRINT

	NAME	ADDRESS	TELEPHONE NUMBER
1	Jim Hazelett	16234 Livingston Ave	813 971 1181
2	Don Kipp	19805 Deer Lake Rd	727-789-9500
3	~~Joyce~~ Sutherland	2107 Curry Rd; Lutz	813-971-1750
4	Mariela & Randy Hurst	15821 Livingston Ave	813 971-1563
5	Jan & Jeff Means	1721 Newberry Rd	813 949 0185
6	Jack + Bev Henry	18706 Lakeshore Dr	949-7539
7	Roy Keene	421 E County Line Rd	949-6711
8	Mary Beth Hughes	18705 Walker Rd. Lutz	948-0817
9	Susan Eichler	"	" "
10	Brad Maffziger	423 E. County Line Rd. Lutz	949-6296
11	Donna Rogers	Lutz Community News	949-0505
12	Jim Griffin	14937 Lake Forest Dr. Lutz	977-5691
13	Kathy Steele	Tampa Tribune	885-5437
14	Antero & Dora Fernandez	417 E County Line Rd	949-1570
15	Julie + Craig Kemack	2310 Sinclair Hills Rd.	971-6484
16	Rue Coats	16808 Windsor Park Drive	226-3469
17	Roger + Janice Burnette	403 E County Line Rd	9496715
18	Ernie Metcalf	18702 Hamilton St.	949-6986

	NAME	ADDRESS	TELEPHONE NUMBER
	~~Wolfgang + Regula Swarzynski~~		
19			
20	Pat Swails	19909 French Ln Lutz	33549
21	COREEN, CROWLEY	- 16409 BONNEVILLE DR TPA	
22	R.P. Scott	16705 Livingston Ave. ~~Lutz~~	33624 813 ~~949-3056~~
23	J. Jordan	16206 Cypress Cove Ln	33549 949 3194
24	Ralph J. Viggiani	18304 Cypress Cove Rd. Lutz Fla	33549 9494554
25	Gayle Townsend	19905 Long Leaf Dr. Lutz FL	33549
26	RON STAY	907 TOMLINSON DR. LUTZ FL.	33549
27			
28			
29			
30			
31			
32			
33			
34			
35			
36			
37			
38			

CYPRESS CREEK WATERSHED MANAGEMENT
COMMENT SHEET

DATE: June 1, 2000

NAME: John Means

ADDRESS: 1721 Nanberger Rd

TELEPHONE: Lutz 33549

COMMENTS: The Process is an excellent way of getting input from the Community The start is excellent - Now to get the County Commission to Listen - good Luck The area at Hanna + Sunset Floods always

COMMUNITY RELATIONS
601 EAST KENNEDY BLVD., 22ND FLOOR
P.O. BOX 1110

Your comments are valuable to us. If you have any unanswered questions, please include them on this form. Please leave this form with the public information representative or mail it to:

HILLSBOROUGH COUNTY COMMUNICATIONS DEPARTMENT
TAMPA, FL 33601
ATTENTION: STEVE VALDEZ, COMMUNITY RELATIONS MANAGER
(813) 272-5275 (fax: 276-2915)

CYPRESS CREEK WATERSHED MANAGEMENT
COMMENT SHEET

DATE: June 1, 2000

NAME: Roger & Janice Burnette

ADDRESS: 403 E County Line Rd Lutz

TELEPHONE: 9496715

COMMENTS: Flood Complaints Hog Island — on Map — 0 complaints listed.
To relieve flood pump to Lake Kesl ⇒ Lake has listed flood complaints ??
Option II Improve Hog Island Lake outflow through Willow Bend Subdivision culverts.
Easement drainage from Bird Lake + swamp culvert across County Line to Hog Island. — Easement drainage (ditch) needs to be maintained. — Shallow basin excess water floods the property (3 property owners). Needs to be maintained + have corrected standards (depth + size + 'pitch' etc).

COMMUNITY RELATIONS
601 EAST KENNEDY BLVD., 22ND FLOOR
P.O. BOX 1110

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TAMPA, FL 33601
ATTENTION: STEVE VALDEZ, COMMUNITY RELATIONS MANAGER
(813) 272-5275 (fax: 276-2915)

CYPRESS CREEK WATERSHED MANAGEMENT
COMMENT SHEET

DATE: June 1, 2000

NAME: Joyce Sutherland (Conservation Dept for Tampa Lake Woodie Club)

ADDRESS: 2107 Curry Road, Lutz

TELEPHONE: 971-1750

COMMENTS: I have been living in my home for 15 years I have a well and septic tank. I am close to Violet Curry Preserve. I trust you will take care to protect our wildlife and water table to protect our beautiful area. I appreciate construction but please stay in focus to keep the long range plans as a goal rather than short term profits. Apartments are usually owned by out of state companies - and don't have our wellbeing in mind - only profits. Thanks

COMMUNITY RELATIONS
601 EAST KENNEDY BLVD., 22ND FLOOR
P.O. BOX 1110

Your comments are valuable to us. If you have any unanswered questions, please include them on this form. Please leave this form with the public information representative or mail it to:

HILLSBOROUGH COUNTY COMMUNICATIONS DEPARTMENT
TAMPA, FL 33601
ATTENTION: STEVE VALDEZ, COMMUNITY RELATIONS MANAGER
(813) 272-5275 (fax: 276-2915)

CYPRESS CREEK WATERSHED MANAGEMENT
COMMENT SHEET

DATE: June 1, 2000

NAME: P. Swails

ADDRESS: 19909 French Lane Lutz 33549

TELEPHONE:

COMMENTS:

Re: Improvement Alternative 10

Option one was utilized during last flood and damaged French Lane, our easement.

Option two is most viable option. I endorse it.

COMMUNITY RELATIONS
601 EAST KENNEDY BLVD., 22ND FLOOR
P.O. BOX 1110

Your comments are valuable to us. If you have any unanswered questions, please include them on this form. Please leave this form with the public information representative or mail it to:

HILLSBOROUGH COUNTY COMMUNICATIONS DEPARTMENT
TAMPA, FL 33601
ATTENTION: STEVE VALDEZ, COMMUNITY RELATIONS MANAGER
(813) 272-5275 (fax: 276-2915)

CYPRESS CREEK WATERSHED MANAGEMENT
COMMENT SHEET

DATE: June 1, 2000

NAME: Brad Naffziger

ADDRESS: 423 East County Line Road

TELEPHONE: 949-6296

COMMENTS: I live on Hog Island lake and the improvements would both work, but I would recommend Option 2.

COMMUNITY RELATIONS
601 EAST KENNEDY BLVD., 22ND FLOOR
P.O. BOX 1110

Your comments are valuable to us. If you have any unanswered questions, please include them on this form. Please leave this form with the public information representative or mail it to:

HILLSBOROUGH COUNTY COMMUNICATIONS DEPARTMENT
TAMPA, FL 33601
ATTENTION: STEVE VALDEZ, COMMUNITY RELATIONS MANAGER
(813) 272-5275 (fax: 276-2915)

Lastname: Boger
Name: Jan
Phone: (813) 949-5220
Street: 2419 Regal Dr.
City: Lutz
state: Fl
zip: 33549
comments: My main concern is with flooding issues. You are aware of the flooding problems we had two years ago. Although this was the first time that flooding became so severe since we have lived in Lutz (since 1980), I want to avoid the problems that developed for us. Specifically, we found that people living on a larger tract of land behind us (south), were pumping water off of their back property onto their front property. The front property abutted our property and was the lowest area. Therefore, the natural flow of water would not have been as bad if the "neighbor" had not pumped water off of his property and then it flowed into our backyard. Then we were forced to have the county come in and pump from our yard. This may not have been necessary if the neighbor would have allowed the natural flow of the rain waters. How do we make sure this does not happen again? I believe that this pumping also lead to the "blue house" on Livingston becoming an island. Water from the back property was pumped downhill and right onto the "blue house" property.

We got no relief and the "blue house" got no relief from the county until it was almost too late. When the Media arrived.
Please make sure this pumping without county supervision does not occur again.
Jan Boger

PUBLIC WORKS DEPT/ENG. DIVISION
Stormwater Management Section
601 E. Kennedy Blvd., 23rd Fl
Tampa, FL 33602

(813) 272-5912, ext. 3643
Fax (813) 272-5320

DATE: 06-02-00

TO: BILL COATS

FROM: HORATIU DROC

Total # of Pages (including cover): 7 (Seven)

Comments: Please find the information requested with this fax transmittal
If you have any question please do not hesitate to contact me at (813) 272-5912 ext 3643

APPENDIX J
Flood Control Alternatives Preliminary Cost Estimates &Alternatives Schematics

Cypress Creek Alternatives
Alternative 1: 149th Street Outfall and Lake Forest Subdivision
Preliminary Cost Estimate and Summary of Quantities

Item Number	Item Descriptioin	Unit	Amount	Unit Cost**	Total Cost
101-1	Mobilization	LS	1	$3,000.00	$3,000.00
102-1	Maintenance of Traffic	LS	1	$3,000.00	$3,000.00
104-11	Turbidity Barrier, Floating	LF	180	$6.75	$1,215.00
104-13-11	Silt Fence, Staked (Type III)	LF	1700	$0.85	$1,445.00
110-1-1	Clearing and Grubbing	AC	4	$6,100.00	$24,400.00
575-1	Sodding	SY	175	$1.25	$218.75
570-2	Seed & Mulch	SY	10000	$0.10	$1,000.00
Sub Total					**$34,278.75**
	Contingency (30%)				**$10,283.63**
Total					**$44,562.38**

** **Unit Costs are derived from the FDOT 1999 Historical Cost Index**

Cypress Creek Alternatives
Alternative 3: USF Area upgrades along 143rd St. and Culverts under B.B.Downs Blvd.
Preliminary Cost Estimate and Summary of Quantities

Item Number	Item Descriptioin	Unit	Amount	Unit Cost**	Total Cost
101-1	Mobilization	LS	1	$140,000.00	$140,000.00
102-1	Maintenance of Traffic	LS	1	$20,000.00	$20,000.00
104-13-11	Silt Fence, Staked (Type III)	LF	8800	$0.60	$5,280.00
110-1-1	Clearing and Grubbing	LS	1	$15,000.00	$15,000.00
430-11-341	48" RCP (Class III SS)	LF	1150	$65.00	$74,750.00
425-1521	Type C - Inlet (DBI)	EA	8	$1,300.00	$10,400.00
430-11-342	54" RCP (Class III SS)	LF	650	$80.00	$52,000.00
425-1-551	Type E - Inlet (DBI)	EA	8	$1,750.00	$14,000.00
430-11-343	60" RCP (Class III SS)	LF	1350	$114.00	$153,900.00
425-2-71	Type P-7 Manhole (<10')	EA	5	$1,600.00	$8,000.00
400-2-2	Concrete Class II (Endwalls) (60" RCP)	EA	5	$8,600.00	$43,000.00
410-70-105	Precast Conc Box Culvert (10' Span)(5' Rise)	LF	600	$600.00	$360,000.00
410-70-125	Precast Conc Box Culvert (12' Span)(5' Rise)	LF	250	$700.00	$175,000.00
104-11	Turbidity Barrier, Floating	LF	200	$6.75	$1,350.00
110-4	Pavement Removal of Existing Concrete	SY	900	$6.50	$5,850.00
350-1-1	Concrete Replacement	SF	98100	$5.00	$490,500.00
570-2	Seed & Mulch	SY	15000	$0.10	$1,500.00
120-1	Excavation Regular	CY	5500	$3.00	$16,500.00
120-1	Utlity Relocation	LS	1	$1,500.00	$1,500.00
Sub Total					**$1,588,530.00**
	Contingency (30%)				**$476,559.00**
Total					**$2,065,089.00**

** **Unit Costs are derived from the FDOT 1999 Historical Cost Index**

Cypress Creek Alternatives
Alternative 5: Improve Drainage from Flynn Lake to Livingston Avenue
Preliminary Cost Estimate and Summary of Quantities

Item Number	Item Descriptioin	Unit	Amount	Unit Cost**	Total Cost
101-1	Mobilization	LS	1	$6,000.00	$6,000.00
102-1	Maintenance of Traffic	LS	1	$6,000.00	$6,000.00
104-13-11	Silt Fence, Staked (Type III)	LF	4500	$0.85	$3,825.00
110-1-1	Clearing and Grubbing	AC	2.3	$6,100.00	$14,030.00
110-4	Pavement Removal of Existing Concrete	SY	266	$6.50	$1,729.00
120-1	Excavation Regular	CY	6500	$2.50	$16,250.00
120-1	Utlity Relocation	LS	1	$1,500.00	$1,500.00
160-4	Stabilization, Type "B"	SY	266	$1.40	$372.40
331-72-50	Asphalt Concrete Type S 5" (Full Depth)	SY	266	$8.70	$111.72
400-2-2	Concrete Class II (Endwalls) (42" RCP)	EA	2	$1,000.00	$2,000.00
430-11-340	42" RCP (Class III SS)	LF	100	$53.00	$5,300.00
575-1	Sodding	SY	11000	$1.20	$13,200.00
Sub Total					**$70,318.12**
	Contingency (30%)				**$21,095.44**
Total					**$91,413.56**

** **Unit Costs are derived from the FDOT 1999 Historical Cost Index**

Cypress Creek Alternatives
Alternative 6: Storm Sewer along Blind Pond Ave. to Livingston Ave.
Preliminary Cost Estimate and Summary of Quantities

Item Number	Item Descriptioin	Unit	Amount	Unit Cost**	Total Cost
101-1	Mobilization	LS	1	$29,000.00	$29,000.00
102-1	Maintenance of Traffic	LS	1	$29,000.00	$29,000.00
104-13-11	Silt Fence, Staked (Type III)	LF	1700	$0.60	$1,020.00
110-1-1	Clearing and Grubbing	LS	1	$5,000.00	$5,000.00
110-4	Pavement Removal of Existing Concrete	SY	3600	$6.50	$23,400.00
120-1	Excavation Regular	CY	2078	$3.00	$6,234.00
120-1	Utlity Relocation	LS	1	$1,500.00	$1,500.00
160-4	Stabilization, Type "B"	SY	3599	$1.40	$5,038.60
331-72-50	Asphalt Concrete Type S 5" (Full Depth)	SY	3600	$8.70	$1,511.58
350-1-1	Concrete Replacement	SF	960	$5.00	$4,800.00
400-2-2	Concrete Class II (Endwalls) (36" RCP)	EA	1	$1,000.00	$1,000.00
400-2-2	Concrete Class II (Endwalls) (29"x45" RCP)	EA	1	$1,200.00	$1,200.00
425-1521	Type C - Inlet (DBI)	EA	2	$1,300.00	$2,600.00
425-2-71	Type P-7 Manhole (<10')	EA	6	$1,600.00	$9,600.00
430-11338	36" RCP (Class III SS)	LF	2500	$58.00	$145,000.00
430-141105	29" x 45" ERCP (Class HE III)	LF	100	$45.50	$4,550.00
520-1-1	Curb & Gutter	LF	2500	$14.20	$35,500.00
570-2	Seed & Mulch	SY	3778	$0.10	$377.80
575-1	Sodding	SY	3778	$1.20	$4,533.60
Sub Total					**$310,865.58**
	Contingency (30%)				**$93,259.67**
Total					**$404,125.25**

** **Unit Costs are derived from the FDOT 1999 Historical Cost Index**

Cypress Creek Alternatives
Alternative 6A: South of Clement Road to Livingston Ave.
Preliminary Cost Estimate and Summary of Quantities

Item Number	Item Descriptioin	Unit	Amount	Unit Cost**	Total Cost
101-1	Mobilization	LS	1	$3,600.00	$3,600.00
102-1	Maintenance of Traffic	LS	1	$3,600.00	$3,600.00
104-13-11	Silt Fence, Staked (Type III)	LF	3200	$0.85	$2,720.00
120-1	Excavation Regular	CY	4622	$2.50	$11,555.00
120-1	Utlity Relocation	LS	1	$1,500.00	$1,500.00
110-1-1	Clearing and Grubbing	AC	1.7	$6,100.00	$10,370.00
575-1	Sodding	SY	7822	$1.25	$9,777.50
Sub Total					**$43,122.50**
	Contingency (30%)				**$12,936.75**
Total					**$56,059.25**

** **Unit Costs are derived from the FDOT 1999 Historical Cost Index**

Cypress Creek Alternatives
Alternative 7: Weir Ranch Lane and Livingston Ave.
Preliminary Cost Estimate and Summary of Quantities

Item Number	Item Descriptioin	Unit	Amount	Unit Cost**	Total Cost
101-1	Mobilization	LS	1	$4,300.00	$4,300.00
102-1	Maintenance of Traffic	LS	1	$4,300.00	$4,300.00
104-11	Turbidity Barrier, Floating	LF	100	$6.75	$675.00
104-13-11	Silt Fence, Staked (Type III)	LF	2500	$0.60	$1,500.00
110-1-1	Clearing and Grubbing	LS	1	$5,000.00	$5,000.00
110-4	Pavement Removal of Existing Concrete	SY	266	$6.50	$1,729.00
120-1	Excavation Regular	CY	3055	$3.00	$9,165.00
120-1	Utlity Relocation	LS	1	$1,500.00	$1,500.00
160-4	Stabilization, Type "B"	SY	266	$1.40	$450.00
331-72-50	Asphalt Concrete Type S 5" (Full Depth)	SY	266	$8.70	$2,314.20
350-1-1	Concrete Replacement	SF	960	$5.00	$4,800.00
400-2-2	Concrete Class II (Endwalls) (29"x45" RCP)	EA	1	$1,200.00	$1,200.00
425-1521	Type C - Inlet (DBI)	EA	2	$1,300.00	$2,600.00
430-141105	29" x 45" ERCP (Class HE III)	LF	100	$45.50	$4,550.00
575-1	Sodding	SY	5555	$1.20	$6,666.00
Sub Total					**$50,749.20**
	Contingency (30%)				**$15,224.76**
Total					**$65,973.96**

** **Unit Costs are derived from the FDOT 1999 Historical Cost Index**

Cypress Creek Alternatives
Alternative 8: Newberger Road & Livingston Ave.
Preliminary Cost Estimate and Summary of Quantities

Item Number	Item Descriptioin	Unit	Amount	Unit Cost**	Total Cost
101-1	Mobilization	LS	1	$2,700.00	$2,700.00
102-1	Maintenance of Traffic	LS	1	$2,700.00	$2,700.00
104-11	Turbidity Barrier, Floating	LF	100	$6.75	$675.00
104-13-11	Silt Fence, Staked (Type III)	LF	1300	$0.60	$780.00
110-1-1	Clearing and Grubbing	LS	1	$5,000.00	$5,000.00
110-4	Pavement Removal of Existing Concrete	SY	266	$6.50	$1,729.00
120-1	Excavation Regular	CY	1467	$3.00	$4,401.00
120-1	Utlity Relocation	LS	1	$1,500.00	$1,500.00
160-4	Stabilization, Type "B"	SY	266	$1.40	$450.00
331-72-50	Asphalt Concrete Type S 5" (Full Depth)	SY	266	$8.70	$2,314.20
400-2-2	Concrete Class II (Endwalls) (36" RCP)	EA	2	$1,000.00	$2,000.00
425-1521	Type C - Inlet (DBI)	EA	1	$1,300.00	$1,300.00
430-11338	36" RCP (Class III SS)	LF	50	$58.00	$2,900.00
575-1	Sodding	SY	2667	$1.20	$3,200.40
Sub Total					**$31,649.60**
	Contingency (30%)				**$9,494.88**
Total					**$41,144.48**

** **Unit Costs are derived from the FDOT 1999 Historical Cost Index**

Cypress Creek Alternatives
Alternative 9: Newberger Road near Rhodes Woods Acres
Preliminary Cost Estimate and Summary of Quantities

Item Number	Item Descriptioin	Unit	Amount	Unit Cost**	Total Cost
101-1	Mobilization	LS	1	$4,300.00	$4,300.00
102-1	Maintenance of Traffic	LS	1	$4,300.00	$4,300.00
110-1-1	Clearing and Grubbing	LS	1	$5,000.00	$5,000.00
110-4	Pavement Removal of Existing Concrete	SY	266	$6.50	$1,729.00
120-1	Utlity Relocation	LS	1	$1,500.00	$1,500.00
160-4	Stabilization, Type "B"	SY	266	$1.40	$372.40
331-72-50	Asphalt Concrete Type S 5" (Full Depth)	SY	266	$8.70	$2,314.20
425-1521	Type C - Inlet (DBI)	EA	1	$1,300.00	$1,300.00
430-11-338	36" RCP (Class III SS)	LF	500	$58.00	$390.00
575-1	Sodding	SY	1111	$1.20	$1,333.20
Sub Total					**$22,538.80**
	Contingency (30%)				**$6,761.64**
Total					**$29,300.44**

** **Unit Costs are derived from the FDOT 1999 Historical Cost Index**

Cypress Creek Alternatives
Alternative 10: Hog Island Force Main and County Line Pipe Replacement
Preliminary Cost Estimate and Summary of Quantities

Item Number	Item Descriptioin	Unit	Amount	Unit Cost**	Total Cost
101-1	Mobilization	LS	1	$2,000.00	$2,000.00
102-1	Maintenance of Traffic	LS	1	$1,000.00	$1,000.00
575-1	Sodding	SY	1080	$1.20	$1,296.00
120-1	Excavation Regular	CY	1467	$3.00	$4,401.00
110-1-1	Clearing and Grubbing	LS	1	$1,000.00	$1,000.00
1513-120-118	Pipe Ductile Iron (F&I) (PUSH-ON JOINT)(8")	LF	400	$25.00	$10,000.00
353- 70-	Concrete Pad	CY	2	$200.00	$400.00
430-141-003	19" x 30" ERCP (Class HE III)	LF	30	$45.50	$1,365.00
400-2-2	Concrete Class II (Endwalls) (19"x30" RCP)	EA	2	$1,000.00	$2,000.00
575-1	Sodding	SY	1080	$1.20	$1,296.00
Sub Total					**$24,758.00**
	Contingency (30%)				**$7,427.40**
Total					**$32,185.40**

** **Unit Costs are derived from the FDOT 1999 Historical Cost Index**

Cypress Creek Alternatives
Alternative 20: Erosion Control for channels east of Livingston Avenue and south of Max Smith Road and Clement Road
Preliminary Cost Estimate and Summary of Quantities

Item Number	Item Descriptioin	Unit	Amount	Unit Cost**	Total Cost
101-1	Mobilization	LS	1	$8,000.00	$8,000.00
102-1	Maintenance of Traffic	LS	1	$3,600.00	$3,600.00
104-13-11	Silt Fence, Staked (Type III)	LF	2800	$0.85	$2,380.00
120-1	Excavation Regular	CY	9000	$2.50	$22,500.00
120-1	Utlity Relocation	LS	1	$1,500.00	$1,500.00
110-1-1	Clearing and Grubbing	AC	2	$6,100.00	$12,200.00
530-3-3	Riprap (Rubble - Bank & Shore)	TN	150	$45.00	$6,750.00
550-2-6	Fencing	LF	4800	$5.00	$24,000.00
575-1	Sodding	SY	13350	$1.25	$16,687.50
Sub Total					**$97,617.50**
	Contingency (30%)				**$29,285.25**
Total					**$126,902.75**

** **Unit Costs are derived from the FDOT 1999 Historical Cost Index**

	Cypress Creek Watershed Management Plan Improvement Alternatives		
Improvement Alternative	**Problem Area Location/ Basin #**	**Problem Description**	**Improvement Alternatives**
1	**Lake Forest Outlet Structure** Basin 510100, 510050	Heavy vegetation in 149th Street ditch and Lake Forest ditch. 149th Street Pond weir has deteriorated.	**Option 1.** Cleanup 149th Street ditch between Livingston Ave. and 149th Street outfall detention basin. Cleanup Lake Forest ditch from B. B. Downs Blvd to Lake Forest Dr. Increase weir width at 149th Street detention pond from 79 feet to 150 feet. Construct new weir structure north of Lake Forest Avenue pond. **Option 2.** Increase size of 149th Street outfall detention pond and add littoral zone for water quality treatment. **Option 3**. Increase size of culvert connection between the 149th Street pond and the Lake Forest pond.
2	**149th Street Outfall** Basin 510150, 510800, 510900, 511200, 511100	Inadequate secondary drainage system and lateral ditches along 19th, 20th, 23rd, and 24th Streets.	See CIP 47005, CIP 47251 and CIP 47014.
3	**B. B. Downs System** Basin 510200, 510250, 510260, 510400, 510460, 510600	Inadequate drainage and conveyance capacity.	Construct new storm sewer system from 18th Street/143rd Avenue to existing storm sewer along 143rd Avenue. Upgrade existing storm sewer system on 143rd Avenue from 20th street to existing ditch east of 22nd Street. Upgrade ditch from east of 22nd Street to B. B. Downs Blvd. Upgrade existing pipes which cross from west to east and then from south to north under B. B. Downs Blvd.
4	**Sinclair Hills & Flynn Lake** Basin 511400, 511500	Flooding along Sinclair Hills Road. Inadequate drainage to 149th Street outfall system.	See CIP 47137 and CIP 47251.
5	**Flynn Lake Outlet** Basin 520100	Flooding in Flynn Lake area. Inadequate drainage outfall.	**Option 1-** Improve Flynn Lake outfall to two existing cross drains (STR-3 and STR-6) at Livingston Avenue. Construct ditch from Flynn Lake to these two cross drains. Upgrade cross drains sizes at STR-3 and STR-6 at Livingston Avenue. Improve outfall from the cross drains to Cypress Creek. **Option 2-** Construct ditches or pipes from Flynn Lake southward to Sinclair Hills Road, then connect to 24th Street project (CIP 47005). **Option 3-** Construct ditches or pipes southward then connect to 20th Street project (CIP 47251).
6	**Blind Pond Avenue** Basin 530100, 530200	Flooding in Blind Pond Avenue. Inadequate drainage to Livingston Avenue cross drain.	**Option 1-** Improve ditch to connect from Blind Pond sub-division to Clement Road roadside ditch. Construct ditch to connect to existing cross drain at Livingston Avenue (STR 15). **Option 2-** Construct a pipe along Blind Pond Avenue to Livingston Avenue. Construct a new cross drain under Livingston Avenue to Cypress Creek.
7	**Wein Range Lane** Basin 540100, 530500	Flooding occurred at Wein Range Lane. Inadequate conveyance and cross drain at Livingston Avenue.	Regrade existing ditch at northside of the basin. Construct roadside ditch along Wein Range Lane. Connect the roadside ditch of Wein Range Lane to north swale through existing low area. Replace crushed pipe at Livingston Avenue (STR-19).
8	**Newburger Road and Livingston Road** Basin 542240, 542190	No outlet at the intersection of Newburger Road and Livingston Avenue.	Construct roadside ditch from the intersection of Newburger Road and Livingston Avenue to connect to the existing cross drain (STR-38). Increase culvert size of STR-38. Coordinate these improvements with Mobilaire and Livingston project (CIP 47163).
9	**Rhodes Wood Acres** Basin 542250	Road flooding at Newburger Road.	Construct a positive outfall from Newburger Road to the pond/wetland in Rhodes Wood Acres subdivision. Install a 30-inch cross drain, two ditch bottom inlets, and pipes at Newburger Road. Convey stormwater to wetland south of Newburger Road.
10	**Hog Island Lake** Basin 542260 541140	High water levels at Hog Island Lake and Road flooding at County Line Road northwest of Hog Island Lake.	**Option 1-** Construct 400 feet of force main from Hog Island Lake west to Lake Kell. Use portable pump unit to release extra water to Lake Kell. Upgrade the existing culvert at County Line Road at Basin 541140. **Option 2-** Improve Hog Island Lake outflow through Willow Bend Subdivision culverts.

	Cypress Creek Watershed Management Plan		
11	**Lakes in Cypress Creek Basin**	Cypress Creek Basin lakes are eutrophic and have invasive species establishment.	Slow eutrophication process in basin lakes by reducing nitrogen and phosphorous loading through point source location and public education. Remove invasive species located in and around edges of lakes (e.g. primrose willow, cattail, melaleucha, torpedo grass).
12	**Upland Restoration Areas in Cypress Creek Basin**	Upland pasture / shrub and brushland have been disturbed. These areas provide minimal habitat for wildlife.	Restore upland pasture / shrub and brushland areas located west of I-275, if being acquired. Provide invasive species removal and native species plantings. Refer to map for potential upland restoration area locations.
13	**Borrow Pits in Cypress Creek Basin**	Borrow pits are disturbed areas that provide minimal wildlife habitat.	Create/enhance littoral shelf areas in borrow pit areas located near I-275 and I-75 to provide water quality treatment and wildlife habitat. Refer to map for borrow pit locations.
14	**Invasive Species Control in Cypress Creek Basin**	Invasive species have established along roads, in ditches, yards, and natural areas. Invasives outcompete native species.	Remove invasive species located throughout Cypress Creek Basin in ditches and along right-of-ways (e.g. cogongrass along right-of-ways, skunkvine and air potato in ditches). Continue public education on the importance of controlling invasive species in yards.
15	**Wildlife Corridor Enhancement in Cypress Creek Basin**	Cypress Creek Watershed is a part of the Cypress Creek greenway which is an important wildlife corridor. Major roads have fragmented this section of the corridor.	Cypress Creek greenway corridor has the potential to be enhanced through retrofitting culverts or creating wildlife crossing that will accommodate small mammals, reptiles and amphibians. See map for wildlife crossing improvement locations.
16	**New CIP Projects in Basin**	Water Quality Treatment for Proposed CIP projects in the Cypress Creek Basin	Utilize grassed swales or detention areas where feasible, for water quality treatment for proposed CIP projects.
17	**Wet Detention Pond in Thirteen Mile Run**	Water Quality Treatment for areas in the Thirteen Mile Run Basin	Create wet detention area to provide water quality treatment of areas within the Thirteen Mile Run basins upstream of Vandervort Road.
18	**Wet Detention Pond in Blind Pond Avenue Basin**	Water Quality Treatment for areas in the Blind Pond Avenue Basin	Create wet detention area to provide water quality treatment of areas within the Blind Pond Basin east of Livingston Avenue.
19	**Coordinate With Pasco County for upper watershed water quality improvements**	Improve water quality from areas coming into Hillsborough County from Pasco County and the City of Tampa.	Coordinate with Pasco County to improve water quality from areas coming into Hillsborough County from Pasco County and the City of Tampa.

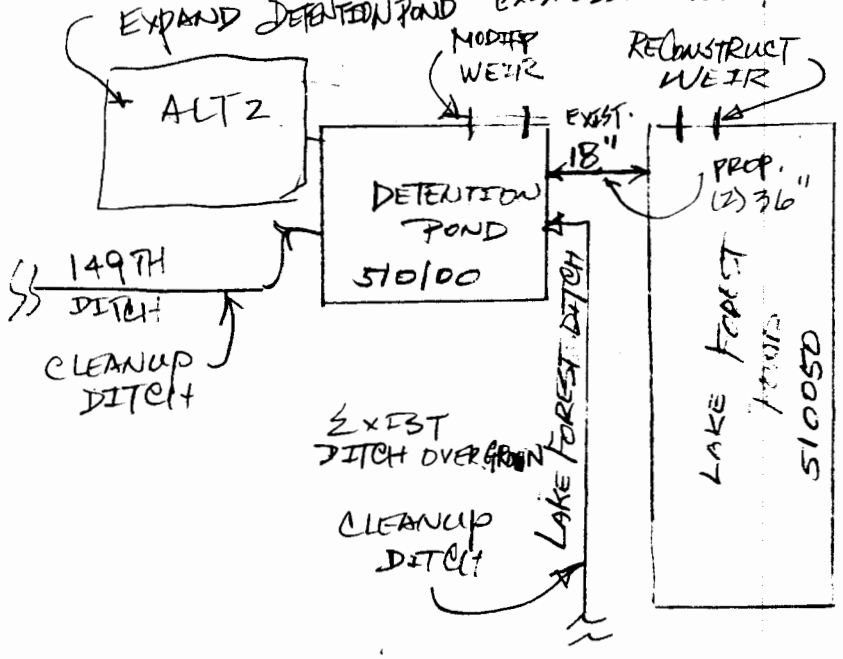
Hillsborough County Upcoming Capital Improvement Projects in the Cypress Creek Watershed

CIP#	LOCATION	PROJECT DESCRIPTION	STATUS
CIP 47014	148th and 20th Street Outfall	Reconstruct the existing drainage conveyance system between 19th Street and Livingston Avenue and between Sinclair Hills Road and 148th Avenue. Construct a retention/detention pond to reduce the frequency of street and structure flooding.	To be designed in 2001
CIP 49226	Debuel Road Stormsewer (CIT)	Replace culvert and construct drainage structure.	In House project, to be designed 2001
CIP 47224	Regal Oaks Lane/Underdrain construction	Due to high ground water elevation, the pavement at the eastern end of Regal Oaks Lane and High Oaks Lane is cracking and pumping occurs during heavy rainfall events. An underdrain system is required along both sides of Regal Oaks Lane and High Oaks Lane. All underdrain can be tied into existing DBI in the stormwater drainage system.	In House project, design 2002
CIP 47163	Livingston Ave. & Mobilaire (General vicinity)	Local street flooding.	60% design plan
CIP47137	Lake Burrell Drive West Drainage Improvements	Construct a series of ditch bottom inlets on West Lake Burrel Drive	90% design plan.
CIP 47122	Irene Street & Livingston Avenue Outfall	Construct a positive outfall to allow stormwater to drain into the existing stormwater system on Livingston Ave. Project will require the construction of a series of ditch bottom inlets, cross drain and junction box to connect into existing 48" outfall system on Livingston Ave.	Design completed. Construction to start July 2000.
CIP 47005	24th Street North/Sinclair Hills Drainage	Construct drainage improvements with pipes of adequate size, length and grade at intersecting roads and driveways. Project begins on 24th Street at Sinclair Hills Road southward to 149th Street.	Design completed. Construction to start July 2000.
CIP 47150	Lake St. Clair Outfall Construction	Construct enclosed pipe drainage system to provide positive outfall for Lake St. Clair and improved roadway drainage for East Lake Burrel Drive. The new drainage system will be piped through a series of structures to a cross drains under Sinclair Hills Road and into the 149th St. outfall system. All disturbed area shall be restored.	30% to 60% design.
CIP 47251	Sinclair Hills Road Outfall System Drainage	Conservation area overtops road due to absence of positive outfall. Design an outfall system from the conservation area south to Lake Sinclair then to the existing ditch on the south side of 151st Street. Clean existing ditch system southward to 149th Street.	Design in 2001
CIP 47015	148th Avenue and Ranch Lake Circle Drainage	Reconstruct the existing drainage conveyance system to meet Hillsborough County minimum standards.	To be designed in 2001.
CIP 47164	Livingston Ave. at Bulrush Avenue Drainage Outfall	Construct a cross drain under Livingston Avenue with required mitered end section and ditch bottom inlets. Excavate a swale or install an 18" RCP outfall for approximately 500 feet south along the right of way on Livingston Ave. Construct an outfall system to the east of discharging into a large bayhead	To be designed in 2001.
CIP 47137	Lake Burrel Drive West Drainage Improvements	Construct a series of ditch bottom inlets on West Lake Burrel Drive: install pipes of adequate size, length and grade and replace and upgrade the cross under Sinclair Hills Road. The driveway pipes under the driveways on the 12th Street need to be replaced with structures of adequate size and length. Install a series of monitoring underdrains along West Burrel Drive.	To be designed in 2001.
CIP 47281	Tiffany Lake Drainage Improvements	Construct inlet and pipes at the basin boundary of Lake Tiffany and east of this basin.	60% design plan (in house project)

PROBLEM AREA 1 LAKE FOREST OUTFALL STRUCTURES

1. PROBLEM DESCRIPTION

AT LAKE FOREST OUTFALL STRUCTURE, HIGH VEGETATION IN 149TH DITCH AND LAKE FOREST DITCH, OVERFLOW WEIR NEEDS TO INCREASE WIDTH. EXIST WIDTH = 78.6', CHANGE TO 150'.



REPLACE CMP THAT HAS ERODED BANK AND COLLAPSED PIPES.

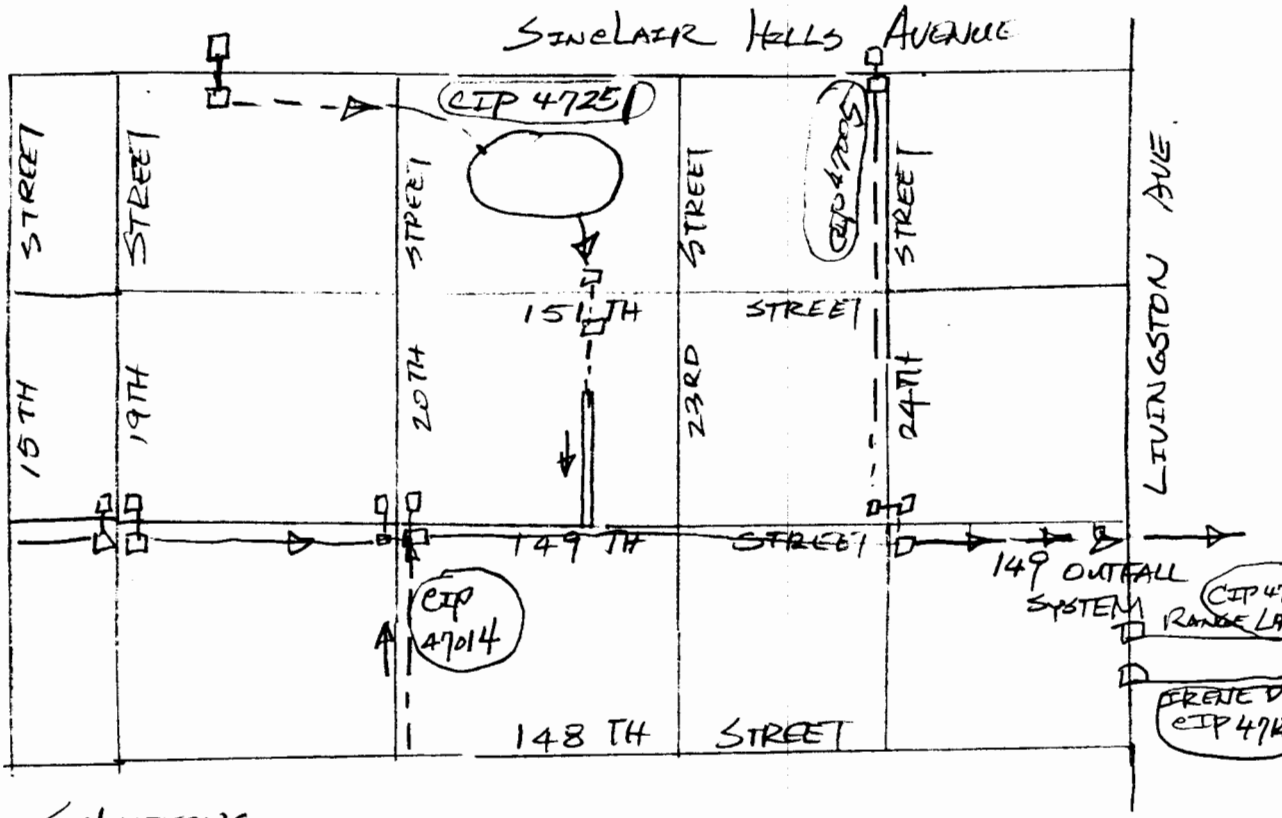
SOLUTION

1. CLEANUP 149TH DITCH AND LAKE FOREST DITCH (n VALUE FROM 0.100 TO 0.05)
2. INCREASE WEIR WIDTH AT 510100 FROM 78.1F TO 100 LF.
   CONSTRUCT NEW WEIR AT 510050.
3. EXPAND DETENTION POND.

PROBLEM AREA 2 — 149TH OUTFALL SYSTEM

PROBLEM DESCRIPTION

INADEQUATE LATERAL DITCHES ALONG 19TH, 20TH, 23RD AND 24TH STREET. FLOODINGS IN THIS AREA ARE DUE TO INADEQUET LATERAL STORM SEWER SYSTEM.



SOLUTIONS

1. CONSTRUCT DITCHS OR PIPES CROSSING SINCLAIR HILLS AVENUE, THEN CONVEYING STORMWATER ALONG 24TH STREET SOUTHWARD TO 149TH STREET OUTFALL (CIP 47005).

PROBLEM AREA 2 (CONT'D)

2. CONSTRUCT AN OUTFALL SYSTEM FROM CONSERVATION AREA NORTH OF SINCLAIR HILLS AVENUE TO A POND BETWEEN 20TH AND 23RD STREET, THEN TO AN EXISTING DITCH ON SOUTH OF 151ST STREET AND CLEAN EXISTING DITCH SYSTEM SOUTHWARD TO 149TH STREET OUTFALL (CIP 47251)

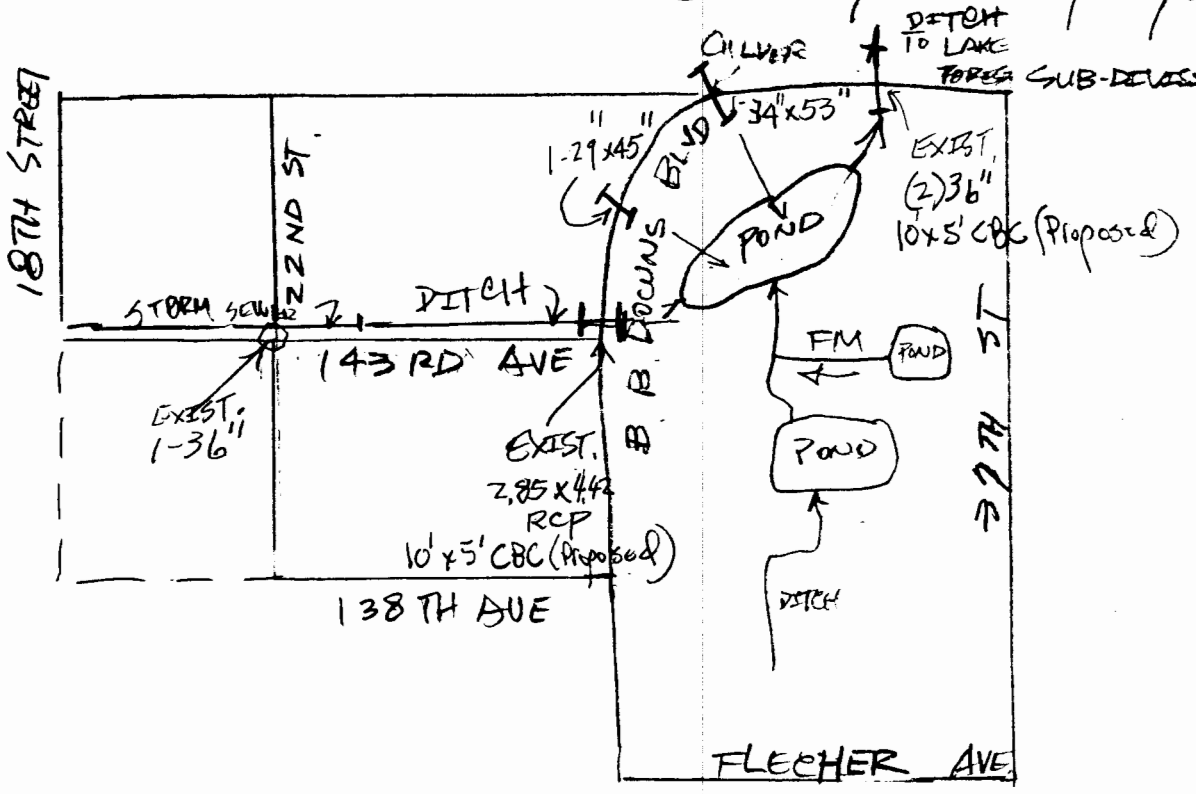
3. CONSTRUCT LATERAL CONVEYANCE SYSTEM BETWEEN 19TH STREET AND LIVINGSTON AND BETWEEN SINCLAIR HILLS ROAD AND 148TH AVENUE. (CIP 47014)

4. CONSTRUCT DETENTION PONDS AT 148TH AND 20TH OR 151ST AND 23RD ST.

PROBLEM AREA 3 B. B DOWNS SYSTEM

1. PROBLEM DESCRIPTION

INADEQUATE DRAINAGE AND CONVEYANCE CAPACITY.



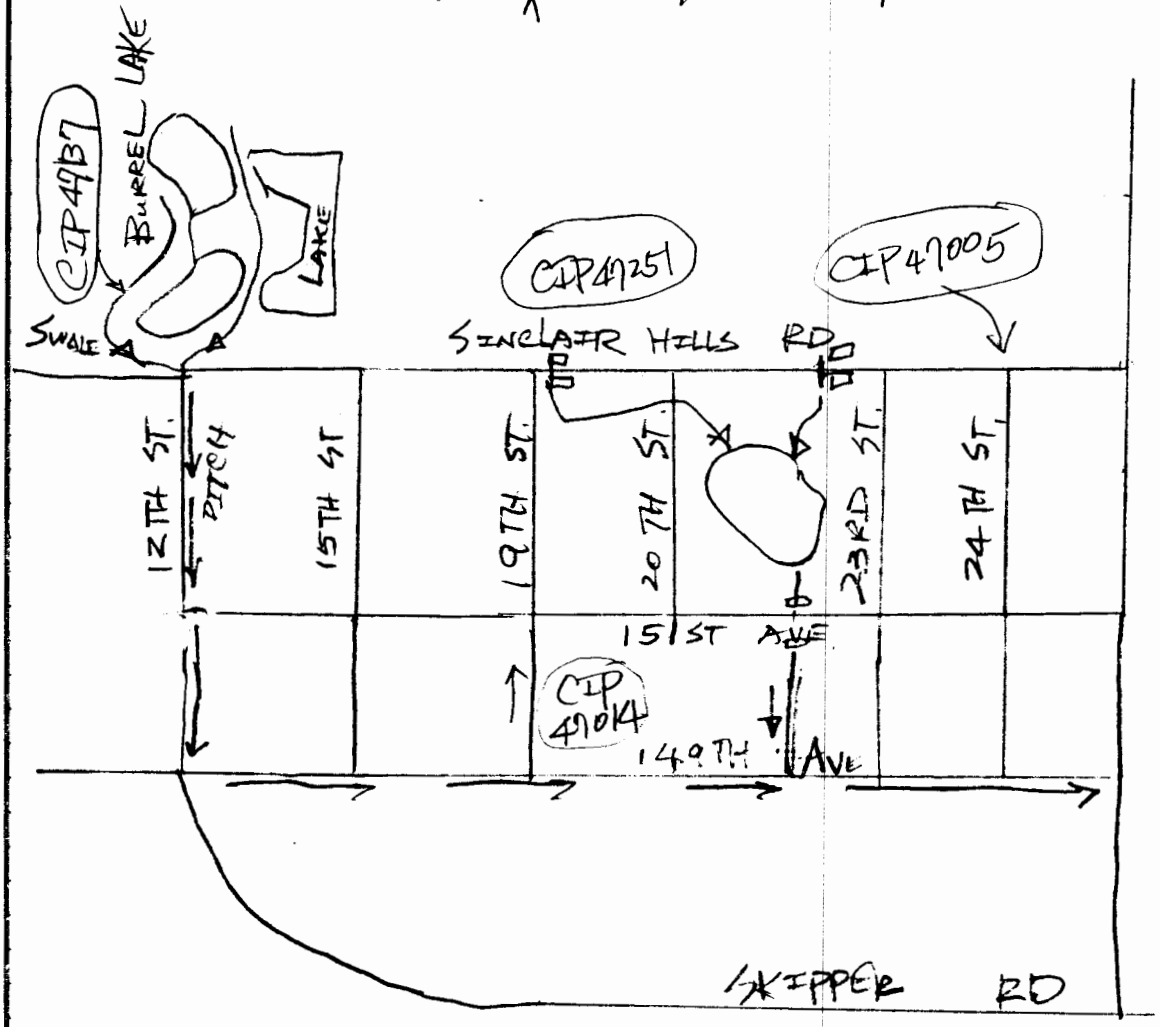
2 SOLUTIONS

- CONSTRUCT STORM SEWER AND DITCH ALONG 143RD AVENUE
- RECONSTRUCT CULVERTS UNDER B.B. DOWNS BLVD TO CONNECT LAKE FOREST DITCH NORTHWARD.

PROBLEM AREA 4 SINCLAIR HILLS AND FLYNN LAKE

1. PROBLEM DESCRIPTION

FLOODING ALONG THE SINCLAIR HILLS RD. INADEQUATE DRAINAGE TO 149TH ST. CONVEYANCE SYSTEM.



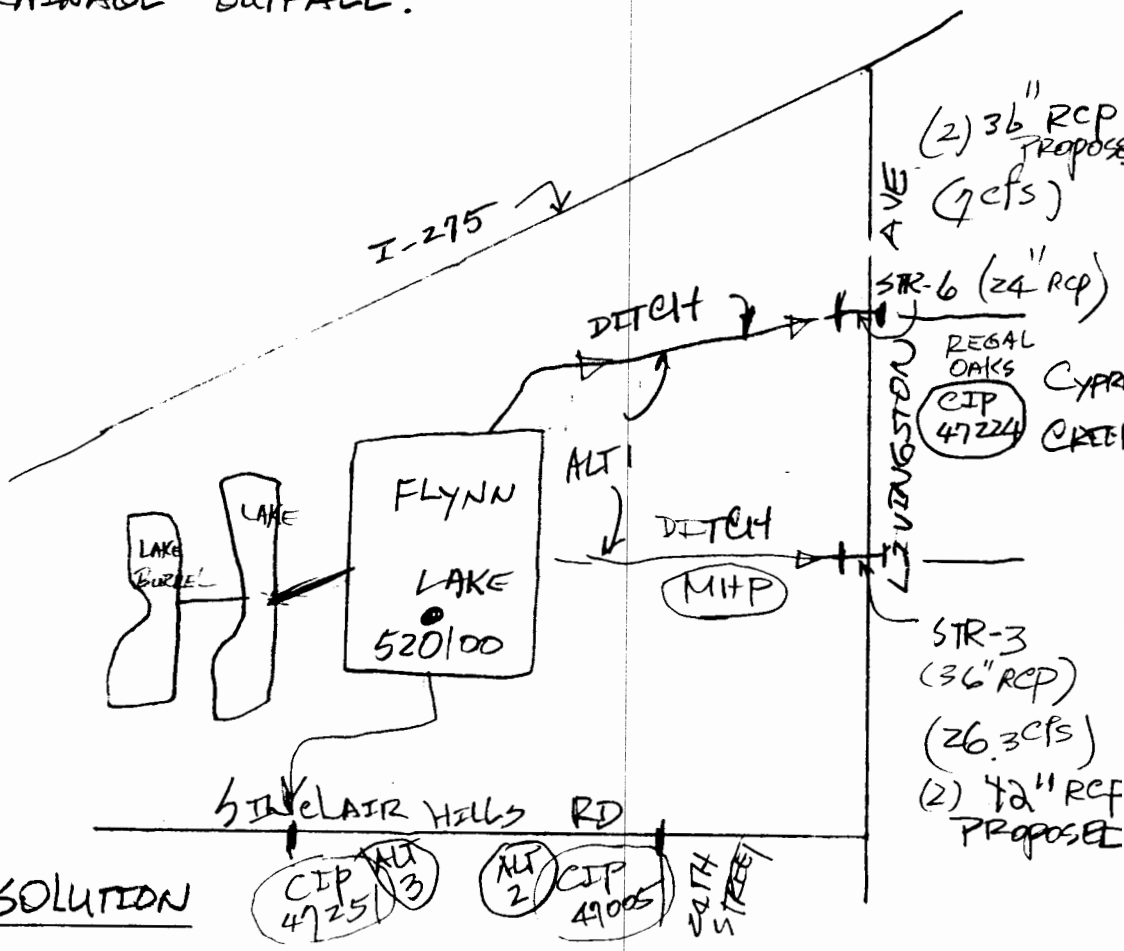
PROBLEM AREA 4 (CONT'D)

1. CONSTRUCT A SERIES OF DITCH BOTTOM INLETS ON WEST LAKE BURREL DRIVE (CIP 47137)
2. CONSTRUCT CROSS DRAINS AT 19TH ST. AND 23RD STREET CONNECTING TO 149TH OUTFALL SYSTEM. (SEE PROBLEM AREA 2).

PROBLEM AREA 5 FLYNN LAKE OUTFALL

1. PROBLEM DESCRIPTION

FLOODING COMPLAINTS IN THE AREA. INADEQUATE DRAINAGE OUTFALL.



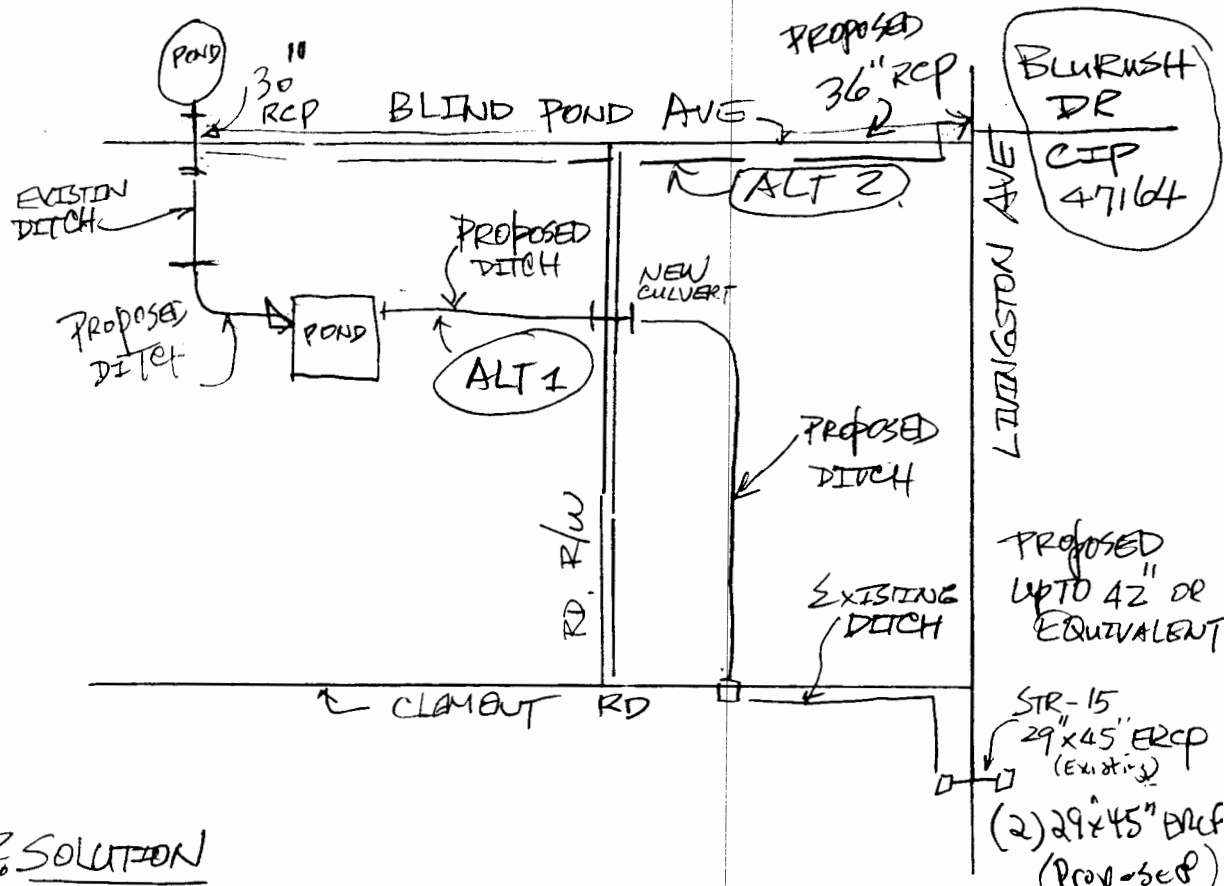
2 SOLUTION

IMPROVE THE FLYNN LAKE OUTFALL TO 2 CROSS DRAINS (STR-3, 36" RCP AND STR-6, 24" RCP). CONSTRUCT DITCH FROM FLYNN LAKE TO THESE TWO CROSS DRAINS.

PROBLEM AREA 6 BLIND POND AVENUE

1. PROBLEM DESCRIPTION

FLOODING IN BLIND POND AVENUE. INADEQUATE DRAINAGE TO LIVINGSTON CROSS DRAIN.



2. SOLUTION

IMPROVE DITCH TO CONNECT FROM BLIND POND SUB-DIVISION TO CLEMENT RD ROADSIDE DITCH, THEN TO STR-15 AT LIVINGSTON AVE CROSS DRAIN (29"x45" ERCP).

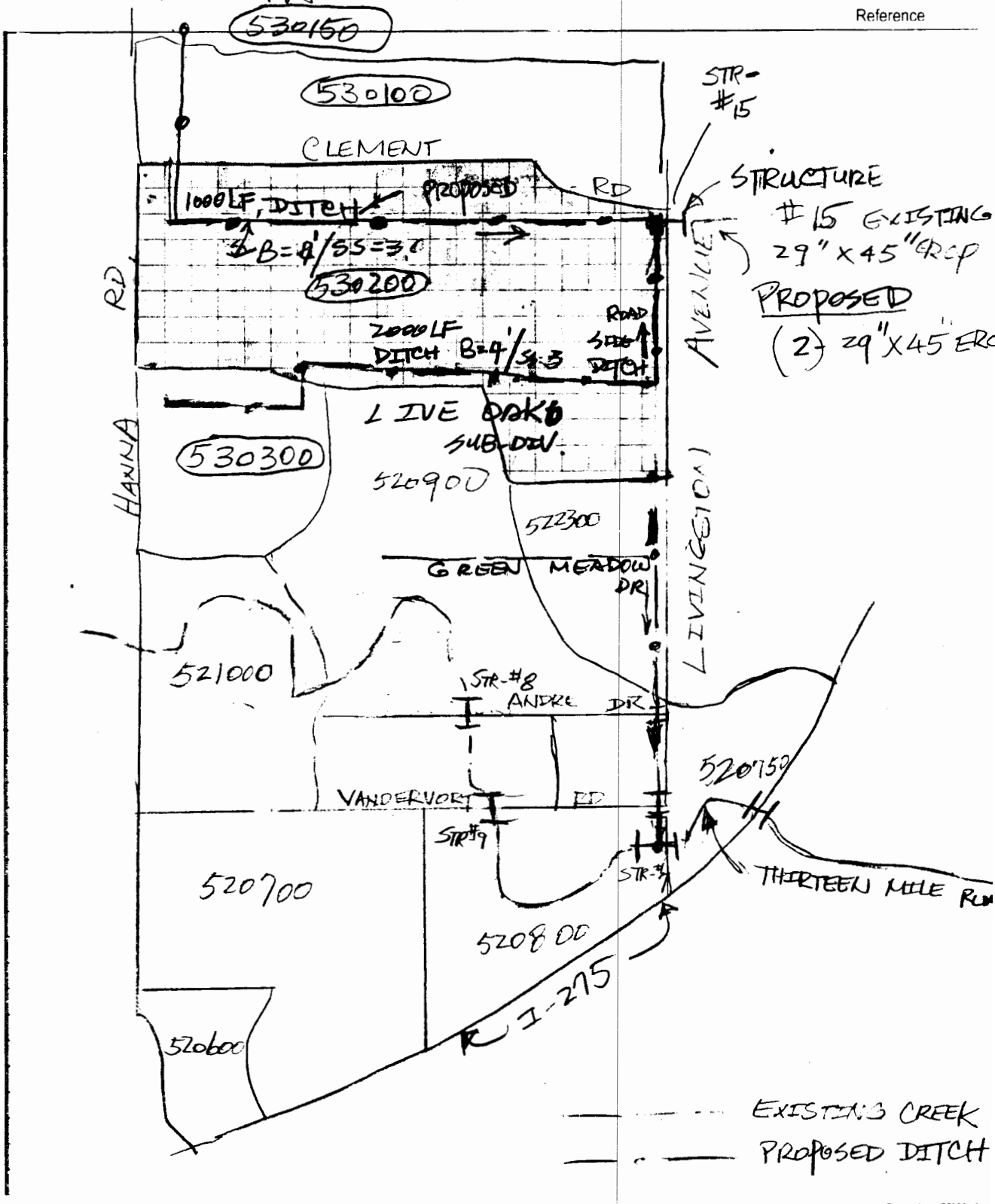
URS Greiner Woodward Clyde

Job CYPRESS CREEK
Description PROBLEM AREA 10A

Project No. C10000382800
Computed by MTL
Checked by

Page ____ of ____
Sheet ____ of ____
Date 06/22/00
Date ____

Reference

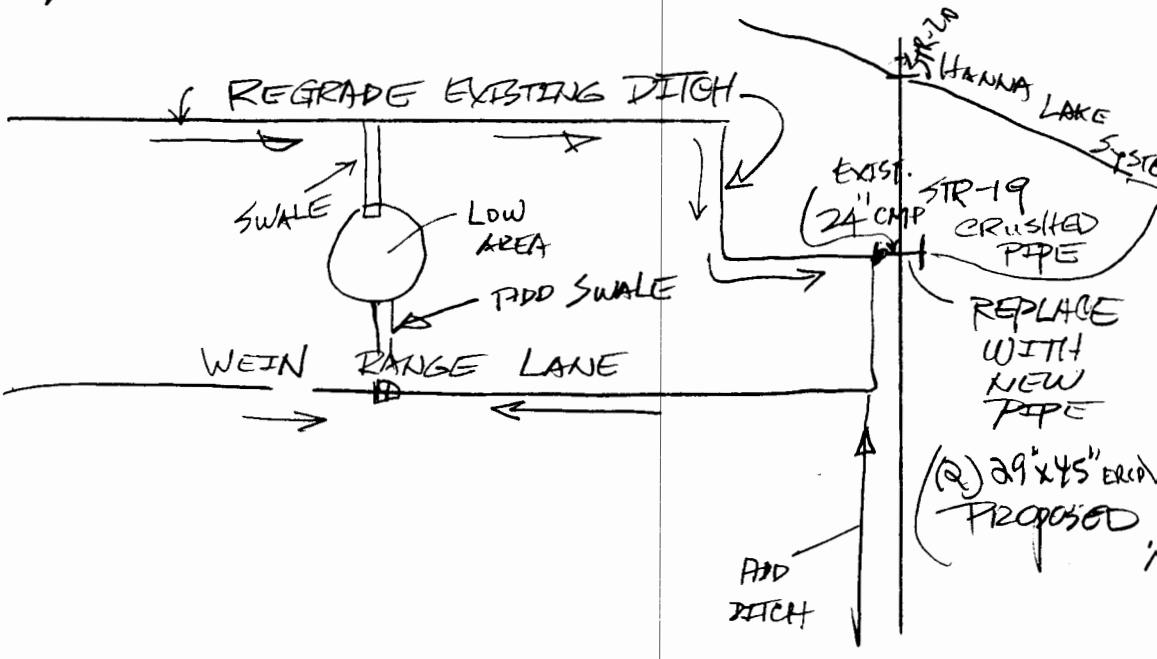


Form No. GTB82-6

PROBLEM AREA 7 WEIN RANGE LANE

1. PROBLEM DESCRIPTION

FLOODING OCCURRED IN THIS AREA. INADEQUATE CONVEYANCE AND CROSS DRAIN AT LIVINGSTON AVE.



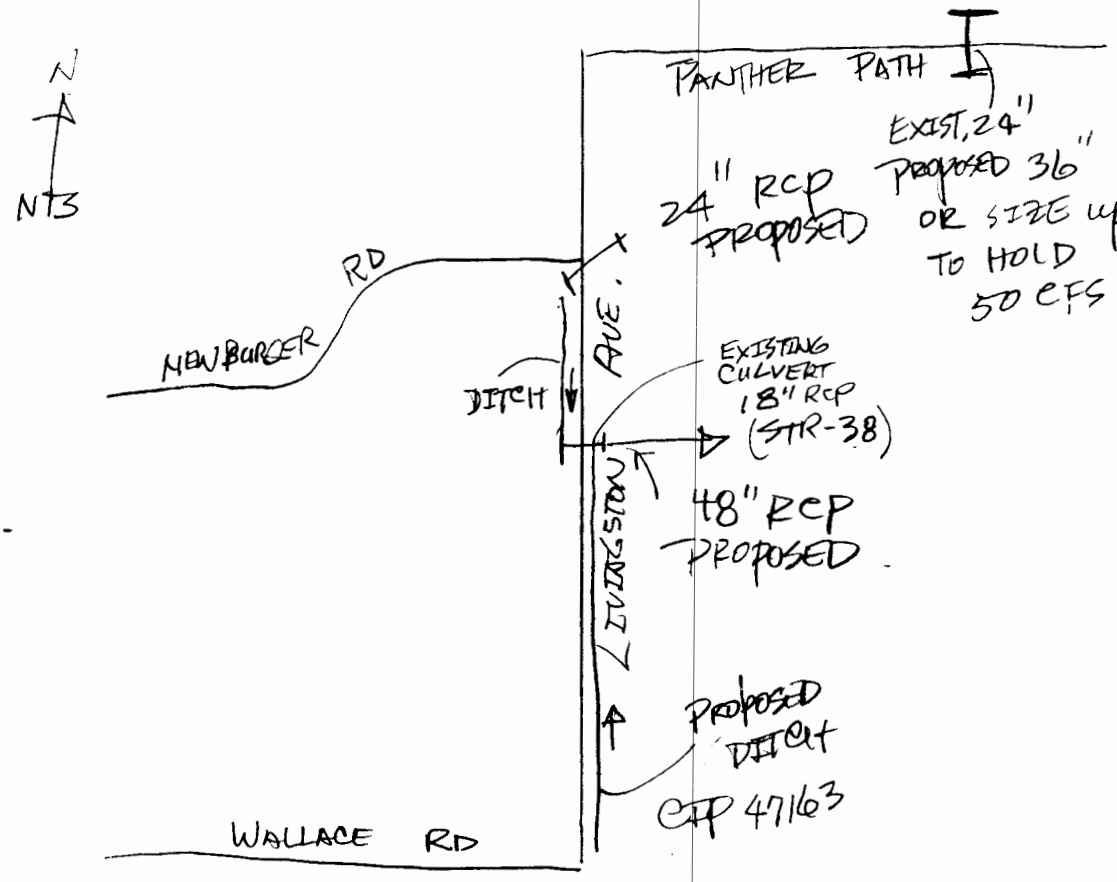
SOLUTION

REGRADE EXISTING DITCH AT NORTH. CONSTRUCT ROADSIDE DITCH ALONG WEIN RANGE LANE. CONNECT THE WEIN RANGE LANE TO IMPROVED DITCH THROUGH A LOW AREA. REPLACE CRUSH PIPE AT LIVINGSTON (STR-19).

PROBLEM AREA 8 NEWBURGER ROAD AND LIVINGSTON AVE.

1. PROBLEM DESCRIPTION

NO OUTLET AT THE INTERSECTION OF NEWBURGER ROAD AND LIVINGSTON.



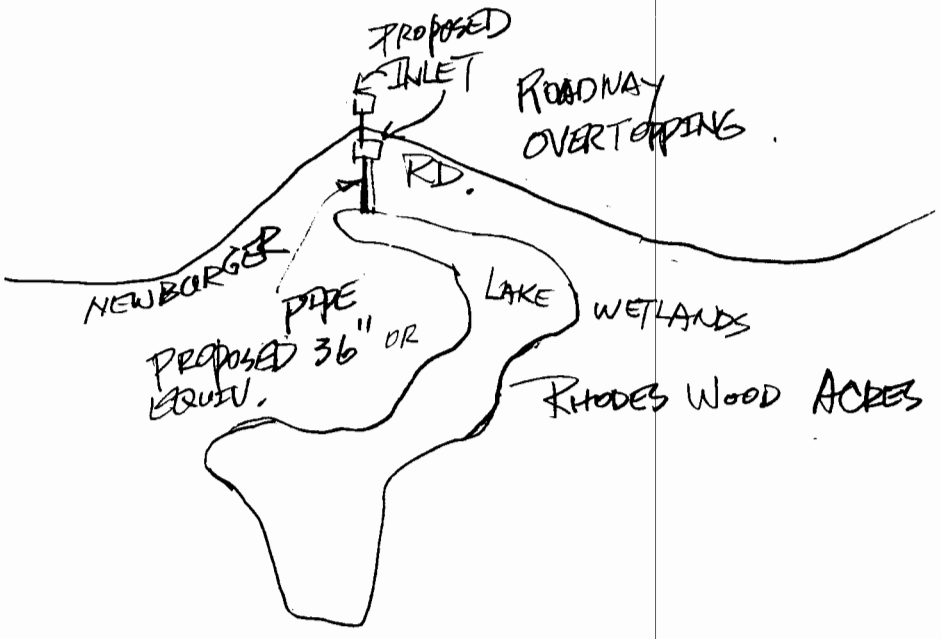
2. SOLUTION

CONSTRUCT ROADSIDE DITCH FROM INTERSECTION OF NEWBURGER RD AND LIVINGSTON TO A CROSS DRAIN (STR-3. REPLACE STR-38 WITH LARGER CULVERT. COORDINATE WITH MOBILAIRE / LIVINGSTON CIP PROJECT (CIP 47163

PROBLEM AREA 9 RHODES WOOD ACRES

1. PROBLEM DESCRIPTION

NO POSITIVE OUTLET FOR HOG ISLAND LAKE AND HART LAKE TO THE SOUTH DIRECTION. ROAD FLOODING IN THIS AREA



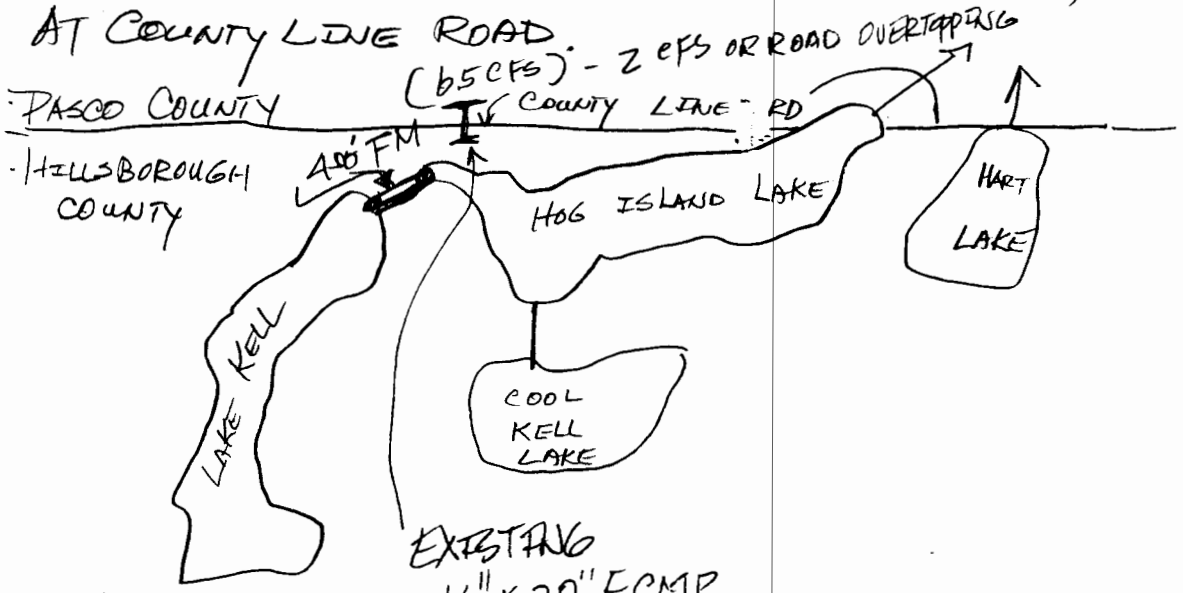
2. SOLUTION

CONSTRUCT TWO INLETS, A CROSS DRAIN AT NEWBURG ROAD, THEN CONVEY STORM WATER TO THE SOUTH OF NEWBURGER RD/ WETLAND.

PROBLEM AREA 10 HOG ISLAND LAKE

1. PROBLEM DESCRIPTION

HIGH LAKE WATER LEVEL AND ROAD FLOODING AT COUNTY LINE ROAD.



EXISTING 14" x 20" ECMP UPGRADE TO 30" OR EQUIV. AND REGRADE DITCH FROM COUNTY LINE ROAD TO HOG ISLAND LAKE

2. SOLUTION

ALT 1. INSTALL 400' FM BETWEEN HOG ISLAND LAKE AND LAKE KELL. TEMPORARY PUMP UNIT WILL BE USED TO RELEASE HIGH LAKE WATER WHEN NEEDED.

ALT 2. IMPROVE HOG ISLAND LAKE OUTFALL THROUGH PASCO COUNTY (WILLOW BEND SUB-DIVISION).

Appendix K
Public Meeting Comments

PUBLIC MEETING 3

CYPRESS CREEK WATERSHED MANAGEMENT PLAN
August 22, 2000

Project Overview

Hillsborough County has embarked on nine major watershed management plans to determine ways to provide flood control, improve water quality and enhance natural habitats in certain designated watersheds within its jurisdiction. This involves a thorough study and understanding of each designated watershed. It also includes the development and assessment of alternatives and potential long-term management approaches to flooding and water quality maintenance. This watershed management plan will serve as an integrated management tool for solving persistent flooding problems, improving water quality and natural habitats, and providing water supply and recreational benefits throughout Hillsborough County.

One of the nine watershed management plans currently being developed by Hillsborough County with the assistance of the engineering firm, URS Greiner Woodward Clyde is for the Cypress Creek Watershed. The Cypress Creek Watershed drains an area of approximately 33 square miles or 21,000 acres in northern Hillsborough County. The total Cypress Creek Watershed including areas within Pasco and Hillsborough Counties is approximately 150 square miles. The watershed is primarily suburban, and drains into the Hillsborough River. The basin is roughly bounded on its north side by Pasco County, to its east side by I-75, along its south side by Bruce B. Downs Boulevard and on its west side by U.S. 41. Additionally, several major roads, including Livingston Avenue, Sunset Lane, Hanna Road, Debuel Road, Whitaker Road, and Sinclair Hills Road bisect the watershed. The basin is composed of 105 smaller units of sub-basins ranging in size from approximately 10 to 400 acres. The watershed includes ten conveyance outfalls that discharge east into the Cypress Creek main channel which then flows south into the Hillsborough River. Flooding in several areas of the watershed was reported during the El Niño rainfall events during late 1997 and early 1998.

To keep residents living in or around the watershed informed of the project's development, and for the County and its consultant to gain information about the area, Hillsborough County will hold public meetings for each of the project's three phases. These meetings will give stakeholders a chance to voice their concerns and offer first-hand accounts of persistent flooding or water quality problems within their area.

Public Meeting 1

Public Meeting 1 was held on February 9, 2000 at the Lutz Community Center was the public meeting for Phase 1 of the Cypress Creek Watershed Management Plan. The first phase of the watershed management plan involved extensive field work and data collection performed to gain a better understanding of the water quality and hydrology of the area. This included an assessment of the existing water quality, natural systems and hydrology of the area. Computer models using water quality data were developed to predict gross pollutant runoff from different areas within the watershed. Flooding within the area was also evaluated using computer models to simulate the affects of a variety of rainfall conditions over the watershed.

Public Meeting 2

Public Meeting 2 was held on June 1, 2000 at the Lutz Community Center, and was the public meeting for Phase 2 of the Cypress Creek Watershed Management Plan. The second phase of the watershed management plan involved the development and analysis of alternative water management practices. Alternatives, both structural and non-structural, were developed to deal with flooding and water quality problems and water supply concerns within the area. The possible alternatives were presented at this second public meeting to assist the County in the selection and identification of preferred alternatives.

Public Meeting 3

Tonight's meeting, being held at the Lutz Community Center, is the public meeting for Phase 3 of the Cypress Creek Watershed Management Plan. Based on technical review, political considerations, and public input, recommendations for achieving cost-effective flood control and water quality objectives are to be developed for the final stage of the watershed management plan. These recommendations will be presented in this third and final public meeting where stakeholders will have another opportunity to voice their concerns and critique the work product. Based on the results of this public meeting, a final list of recommended projects will be incorporated into the watershed plan.

Project Website

To keep track of progress and developments with the management plan, a web site has been established. This site can be viewed by logging onto http://www.cypress-creek.org. For additional information, contact the Hillsborough County Project Manager Horatio Dróc, P.E., at (813) 272-5912, or Robert Johnson, of URS Greiner Woodward Clyde at (813) 286-1711 ext. 5276 or Mr. Jim Norman County Commissioner, Hillsborough County Commission District 2.

Project Schedule

Task Name	Completion Date
Project Kick-off	June 1999
1st Milestone Report	December 1999
Public Meeting 1	February 2000
2nd Milestone Report	March 2000
Public Meeting 2	June 2000
3rd Milestone Report	July 2000
Public Meeting 3	August 2000
Final Report	September 2000

CYPRESS CREEK WATERSHED MANAGEMENT PLAN
PUBLIC COMMENT SHEET

Public Meeting 3
Date: Tuesday, August 22, 2000

Name: _____

Address: _____

Telephone: _____ Fax: _____ Email: _____

Comments: _____

_____

_____

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Do your comments continue on the back of this sheet? ☐ **Yes** ☐ **No**

Your comments are important to this Hillsborough County project. All written comments will be summarized and included in the Watershed Management Plan document.

Please complete the comment sheet and place it in the box provided at the meeting, or

Mail your comments to: Robert Johnson, P.E.
URS Greiner Woodward Clyde
7650 W. Courtney Campbell Causeway
Tampa, FL 33607

Fax your comments to: Robert Johnson at (813) 286-6587

Email your comments, in a format similar to this form to: robert_johnson@urscorp.com or Submit comments on-line at http://www.cypress-creek.org under "Public Comment."

	Table 13-1 Cypress Creek Watershed Management Plan Improvement Alternatives		
Improvement Alternative	Problem Area Location/ Basin #	Problem Description	Improvement Alternatives
1	149th Street Outfall Lake Forest Outlet Structure Basin 510100, 510050	Heavy vegetation in 149th Street ditch and Lake Forest ditch. 149th Street Pond weir has deteriorated.	Option 1-1. Cleanup 149th Street ditch between Livingston Ave. and 149th Street outfall detention basin. Cleanup Lake Forest ditch from B. B. Downs Blvd to Lake Forest Dr. Increase weir width at 149th Strect detention pond from 79 feet to 150 feet. Construct new weir structure north of Lake Forest Avenue pond. Option 1-2. Increase size of culvert connection between the 149th Street pond and the Lake Forest pond.
2	149th Street Outfall Basin 510150, 510800, 510900, 511200, 511100	Inadequate secondary drainage system and lateral ditches along 19th, 20th, 23rd, and 24th Streets.	See CIP 47005, CIP 47251 and CIP 47014.
3	B. B. Downs System Basin 510200, 510250, 510260, 510400, 510460, 510600	Inadequate drainage and conveyance capacity.	Construct new storm sewer system from 18th Street/143rd Avenue to existing storm sewer along 143rd Avenue. Upgrade existing storm sewer system on 143rd Avenue from 20th street to existing ditch east of 22nd Street. Upgrade ditch from east of 22nd Street to B. B. Downs Blvd. Upgrade existing pipes which cross from west to east and then from south to north under B. B. Downs Blvd.
4	Silver Lake Basin 511400, 511500	Flooding along Sinclair Hills Road. Inadequate drainage to 149th Street outfall system.	See CIP 47137 and CIP 47251.
5	Flynn Lake Basin 520100	Flooding in Flynn Lake area. Inadequate drainage outfall.	Option 5-1- Improve Flynn Lake outfall to two existing cross drains (STR-3 and STR-6) at Livingston Avenue. Construct ditch from Flynn Lake to these two cross drains. Upgrade cross drains sizes at STR-3 and STR-6 at Livingston Avenue. Improve outfall from the cross drains to Cypress Crcek. Option 5-2- Construct ditches or pipes from Flynn Lake southward to Sinclair Hills Road, then connect to 24th Street project (CIP 47005).
6	Blind Pond Avenue Basin 530100, 530200	Flooding in Blind Pond Avenue. Inadequate drainage to Livingston Avenue cross drain.	Option 6-1- Improve ditch to connect from Blind Pond sub-division to Clement Road roadside ditch. Construct ditch to connect to existing cross drain at Livingston Avenue (STR-15). Option 6-2- Construct a pipe along Blind Pond Avenue to Livingston Avenue. Construct a new cross drain under Livingston Avenue to Cypress Creek.
7	Hanna Lake Basin 540100, 530500	Flooding occurred at Wein Range Lane. Inadequatc conveyance and cross drain at Livingston Avenue.	Regrade existing ditch at northsidc of the basin. Construct roadside ditch along Wein Range Lane. Connect the roadside ditch of Wein Range Lane to north swale through existing low area. Replace crushed pipe at Livingston Avenue (STR-19).
8	County Line Road Basin 542240, 542190	No outlet at the intersection of Newburger Road and Livingston Avenue.	Construct roadside ditch from the intersection of Newburger Road and Livingston Avenue to connect to the existing cross drain (STR-38). Increase culvert size of STR-38. Coordinate these improvements with Mobilaire and Livingston project (CIP 47163).
9	County Line Road Basin 542250	Road flooding at Newburger Road and Rhodes Woods.	Construct a positive outfall from Newburger Road to the pond/wetland in Rhodes Wood Acres subdivision. Install a 30-inch cross drain, two ditch bottom inlets, and pipes at Newburger Road. Convey stormwater to wetland south of Newburger Road.
10	County Line Road Basin 542260 541140	High water levels at Hog Island Lake and Road flooding at County Line Road northwest of Hog Island Lake.	Option 10-1- Construct 400 feet of force main from Hog Island Lake west to Lake Kell. Use portable pump unit to release extra water to Lake Kell. Upgrade the existing culvert at County Line Road at Basin 541140. Option 10-2- Improve Hog Island Lake outflow through Willow Bend Subdivision culverts.

11	Lakes in Cypress Creek Basin	Cypress Creek Basin lakes are eutrophic and have invasive species establishment.	Slow eutrophication process in basin lakes by reducing nitrogen and phosphorous loading through point source location and public education. Remove invasive species located in and around edges of lakes (e.g. primrose willow, cattail, melaleucha, torpedo grass).
12	Upland Restoration Areas in Cypress Creek Basin	Upland pasture / shrub and brushland have been disturbed. These areas provide minimal habitat for wildlife.	Restore upland pasture / shrub and brushland areas located west of I-275, if being acquired. Provide invasive species removal and native species plantings. Refer to Figure 13-1 for potential upland restoration area locations.
13	Borrow Pits in Cypress Creek Basin	Borrow pits are disturbed areas that provide minimal wildlife habitat.	Create/enhance littoral shelf areas in borrow pit areas located near I-275 and I-75 to provide water quality treatment and wildlife habitat. Refer to Figure 13-1 for borrow pit locations.
14	Invasive Species Control in Cypress Creek Basin	Invasive species have established along roads, in ditches, yards, and natural areas. Invasives outcompete native species.	Remove invasive species located throughout Cypress Creek Basin in ditches and along right-of-ways (e.g. cogongrass along right-of-ways, skunkvine and air potato in ditches). Continue public education on the importance of controlling invasive species in yards.
15	Wildlife Corridor Enhancement in Cypress Creek Basin	Cypress Creek Watershed is a part of the Cypress Creek greenway which is an important wildlife corridor. Major roads have fragmented this section of the corridor.	Cypress Creek greenway corridor has the potential to be enhanced through retrofitting culverts or creating wildlife crossing that will accommodate small mammals, reptiles and amphibians. See Figure 13-1 for wildlife crossing improvement locations.
16	New CIP Projects in Basin	Water Quality Treatment for Proposed CIP projects in the Cypress Creek Basin	Utilize grassed swales or detention areas where feasible, for water quality treatment for proposed CIP projects.
17	Wet Detention Pond in Thirteen Mile Run	Water Quality Treatment for areas in the Thirteen Mile Run Basin	Create wet detention area to provide water quality treatment of areas within the Thirteen Mile Run basins upstream of Vandervort Road.
18	Wet Detention Pond in Blind Pond Avenue Basin	Water Quality Treatment for areas in the Blind Pond Avenue Basin	Create wet detention area to provide water quality treatment of areas within the Blind Pond Basin east of Livingston Avenue.
19	Coordinate With Pasco County for upper watershed water quality improvements	Improve water quality from areas coming into Hillsborough County from Pasco County and the City of Tampa.	Coordinate with Pasco County to improve water quality from areas coming into Hillsborough County from Pasco County and the City of Tampa.
20	Erosion Control for channels east of Livingston Avenue and south of Max Smith Road and Clement Road	Existing channels have severely eroding banks which could impact the Cypress Creek main channel	Regrade, stabilize and vegetate the channel banks and keep cattle out of channel by fencing. Construct energy dissipators or riprap to reduce velocities from Livingston Avenue culverts.

Hillsborough County Upcoming Capital Improvement Projects in the Cypress Creek Watershed

CIP#	LOCATION	PROJECT DESCRIPTION	STATUS
CIP 47014	148th and 20th Street Outfall	Reconstruct the existing drainage conveyance system between 19th Street and Livingston Avenue and between Sinclair Hills Road and 148th Avenue. Construct a retention/detention pond to reduce the frequency of street and structure flooding.	To be designed in 2001
CIP 49226	Debuel Road Stormsewer (CIT)	Replace culvert and construct drainage structure.	In House project, to be designed 2001
CIP 47224	Regal Oaks Lane/Underdrain construction	Due to high ground water elevation, the pavement at the eastern end of Regal Oaks Lane and High Oaks Lane is cracking and pumping occurs during heavy rainfall events. An underdrain system is required along both sides of Regal Oaks Lane and High Oaks Lane. All underdrain can be tied into existing DBI in the stormwater drainage system.	In House project, design 2002
CIP 47163	Livingston Ave. & Mobilaire (General vicinity)	Local street flooding.	60% design plan
CIP47137	Lake Burrell Drive West Drainage Improvements	Construct a series of ditch bottom inlets on West Lake Burrel Drive	90% design plan
CIP 47122	Irene Street & Livingston Avenue Outfall	Construct a positive outfall to allow stormwater to drain into the existing stormwater system on Livingston Ave. Project will require the construction of a series of ditch bottom inlets, cross drain and junction box to connect into existing 48" outfall system on Livingston Ave.	Design completed. Construction to start July 2000.
CIP 47005	24th Street North/Sinclair Hills Drainage Improvement	Construct drainage improvements with pipes of adequate size, length and grade at interseeting roads and driveways. Project begins on 24th Street at Sinclair Hills Road southward to 149th Street.	Design completed. Construction to start July 2000.
CIP 47150	Lake St. Clair Outfall Construction	Construct enclosed pipe drainage system to provide positive outfall for Lake St. Clair and improved roadway drainage for East Lake Burrel Drive. The new drainage system will be piped through a series of structures to a cross drains under Sinclair Hills Road and into the 149th St. outfall system. All disturbed area shall be restored.	30% to 60% design.
CIP 47251	Sinclair Hills Road Outfall System Drainage improvements	Conservation area overtops road due to absence of positive outfall. Design an outfall system from the conservation area south to Lake Sinclair then to the existing ditch on the south side of 151st Street. Clean existing ditch system southward to 149th Street.	Design in 2001
CIP 47015	148th Avenue and Ranch Lake Circle Drainage improvements.	Reconstruct the existing drainage conveyance system to meet Hillsborough County minimum standards.	To be designed in 2001.
CIP 47164	Livingston Ave. at Bulrush Avenue Drainage Outfall	Construct a cross drain under Livingston Avenue with required mitered end section and ditch bottom inlets. Excavate a swale or install an 18" RCP outfall for approximately 500 feet south along the right of way on Livingston Ave. Construct an outfall system to the east of discharging into a large bayhead connected to Hanna outfall system.	To be designed in 2001.
CIP 47137	Lake Burrel Drive West Drainage Improvements	Construct a series of ditch bottom inlets on West Lake Burrel Drive: install pipes of adequate size, length and grade and replace and upgrade the cross under Sinclair Hills Road. The driveway pipes under the driveways on the 12th Street need to be replaced with structures of adequate size and length. Install a series of monitoring underdrains along West Burrel Drive.	To be designed in 2001.
CIP 47281	Tiffany Lake Drainage Improvements	Construct inlet and pipes at the basin boundary of Lake Tiffany and east of this basin.	60% design plan (in house project)

Table 16-1
Cypress Creek Watershed Management Plan
Alternatives Analysis Decision Matrix

Alternative No.	Project Description	Flood Protection Improvement	Level of Service (LOS) Benefit	Water Quality Benefits	Operation/Maint Requirements	Easement/ROW Requirements	Recreational Benefits	Regulatory Constraints	Water Supply Benefits	Natural System Enhancement	Overall Score
1-1	Cleanup 149th Street ditch between Livingston Ave. and 149th Street outfall detention basin. Cleanup Lake Forest ditch from B.B. Downs Blvd. to Lake Forest Dr. Increase weir width at 149th Street detention pond from 79 feet to 150 feet. Construct new weir structure north of Lake Forest Ave. pond.	3	1	2	1	0	1	2	0	-1	9
1-2	Increase size of culvert connection between the 149th St. pond and Lake Forest pond.	2	1	2	0	0	0	3	0	0	8
2	See CIP 47005, CIP 47251 and CIP 47014	1	1	1	0	0	0	2	0	0	5
3	Construct new storm sewer system from 18th Street/143rd Ave. to existing storm sewer along 143rd Ave. Upgrade existing storm sewer system on 143rd Ave. from 20th Street to existing ditch east of 22nd Street. Upgrade ditch from east of 22nd Street to B.B. Downs Blvd. Upgrade existing pipes which cross from west to east and then from south to north under B.B. Downs Blvd.	3	1	0	0	0	0	1	0	-1	4
4	See CIP 47137 and CIP 47251	2	1	1	0	0	0	2	0	0	6
5-1	Improve Flynn Lake outfall to two existing cross drains (STR-3 and STR-6) at Livingston Ave. Construct ditch from Flynn Lake to these two cross drains. Upgrade cross drains sizes at STR-3 and STR-6 at Livingston Ave. Improve outfall from the cross drains to Cypress Creek.	3	1	-1	-1	-1	1	1	0	-1	2
5-2	Construct ditches or pipes from Flynn Lake southward to Sinclair Hills Road, then connect to 24th Street project (CIP 47005).	3	1	-1	-1	-1	1	1	0	-1	2
6-1	Improve ditch to connect from Blind Pond sub-division to Clement Road roadside ditch. Construct ditch to connect to existing cross drain at Livingston Ave. (STR-15).	3	2	0	0	-1	0	2	0	0	6
6-2	Construct a pipe along Blind Pond Ave. to Livingston Ave. Construct a new cross drain under Livngston Ave. to Cypress Creek.	3	2	-1	0	-1	0	2	0	0	5
7	Regrade existing ditch at northside of the basin. Construct roadside ditch along Wein Range Lane. Connect the roadside ditch of Wein Range Lane to north swale through existing low area. Replace crushed pipe at Livingston Ave. (STR-19)	3	1	0	1	0	0	2	0	-1	6

8	Construct roadside ditch from the intersection of Newburger Road and Livingston Ave. to connect to the existing cross drain (STR-38). Increase culvert size of STR	3	1	0	0	0	0	2	0	0	6	P
9	Construct a positive outfall from Newburger Road to the pond/wetland in Rhodes Wood Acre subdivision. Install a 30-inch cross drain, two ditch bottom inlets, and pipes at Newburger Road. Convey stormwater to wetland south of Newburger Road.	3	1	-1	0	-1	0	1	0	-1	2	P
10-1	Construct 400 feet of force main from Hog Island Lake west to Lake Kell. Use portable pump unit to release extra water to Lake Kell. Upgrade the existing culvert at County Line Road at Basin 541140.	2	1	0	-1	0	0	2	0	0	4	P
10-2	Improve Hog Island Lake outflow through Willow Bend Subdivision culverts.	2	1	0	-1	-1	0	2	0	0	3	
11	Slow eutrophication process in basin lakes by reducing nitrogen and phosphorus loading through point source location and public education. Remove invasive species located in and around edges of lakes (e.g. primrose willow, cattail, melaleucha, torpedo grass).	0	0	2	-2	-1	1	0	0	2	2	P
12	Restore upland pasture/shrub and brushland areas located west of I-275, if being acquired. Provide invasive species removal and native species plantings.	0	0	0	-2	-1	0	0	1	3	1	
13	Create/enhance littoral shelf areas in borrow pit areas located near I-275 and I-75 to provide water quality treatment and wildlife habitat.	0	0	2	-2	-1	0	0	0	3	2	P
14	Remove invasive species located throughout Cypress Creek Basin in ditches and along right-of-ways (e.g. cogongrass along right-of-ways, skunkvine and air potato in ditches). Continue public education on the importance of controlling invasive species in yards.	0	0	0	-2	-1	0	0	0	3	0	
15	Cypress Creek greenway has the potential to be enhanced through retrofitting culverts or creating wildlife crossing that will accommodate small mammals, reptiles and amphibians.	0	0	0	-1	-1	0	0	0	2	0	P
16	Utilize grassed swales or detention areas where feasible, for water quality treatment for proposed CIP projects.	0	0	2	-1	0	0	0	1	0	2	P
17	Create wet detention area to provide water quality treatment of areas within the Thirteen Mile Run basins upstream of Vandervort Road.	0	0	2	-2	-3	0	0	1	1	-1	P
18	Create wet detention area to provide water quality treatment of areas within the Blind Pond Basin east of Livingston Avenue.	0	0	2	-2	-3	0	0	1	1	-1	P
19	Coordinate with Pasco County to improve water quality from areas coming into Hillsborough County from Pasco County and the City of Tampa.	0	0	2	0	0	0	0	1	0	3	P

20	Regrade, stabilize and vegetate the channel banks and keep cattle out of the channel by fencing. Construct energy dissipators or riprap to reduce velocities from Livingston Avenue culverts.	0	0	2	-1	-3	0	1	0	3	2
Note: -3 - Highest Negative Impact											
0 - No Impact											
3 - Highest Positive Impact											

(P)

COMMISSION
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JAN PLATT
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WETLANDS MANAGEMENT DIVISION
TELEPHONE (813) 272-7104

August 22, 2000

Mr. Horatio Droc, P.E., Project Manager
Hillsborough County Stormwater
P.O. Box 1110
Tampa, FL 33601

Subject: Review of Cypress Creek Stormwater Management Master Plan- Chapters 13 - 16 / Received July 21, 2000

Dear Mr. Droc:

Review of the subject report alternatives provided by the Hillsborough County Stormwater Management Section has generated the following comments: (Please note, a review of the Hog Island Lake outfall portion of the plan [Alternative 10] was provided in a letter to Robert Johnson [URS Greiner] dated May 17, 2000.

The alternative proposals indicated in this stormwater management master plan may have impacts on wetland and/or lake systems. These impacts may be direct dredge and fill impacts, or hydrologic alterations to existing surface water or surface flow routing. Impacts to wetlands require authorization from the Executive Director of the EPC, as outlined in Ch. 1-11, the wetland rule.

Alternative 1, Lake Forest Outlet: Analysis of lengthening the 149th St. weir from 79' to 150' will need to be evaluated in terms of any lake level changes, and alterations to any adjacent wetland hydroperiod elevations (Normal Pool [NP] and Seasonal High [SH]) with lesser storm events such as the mean annual event. The same comments apply to construction of a replacement weir on Lake Forest and any other alternatives in the SMMP proposals.

Alternative 2, 149th St. Outfall: It is unclear in this alternative if the proposed water routing is existing conditions, or if the proposal is to move water from historic drainage boundaries. In #2, where it is proposed to construct an outfall from a conservation area north of Sinclair Hills (CIP 47251), wetland hydroperiods (SH and NP) and existing quantities of water that flow to and from the wetland need to be provided as well as an analysis that indicates how these elevations and flows in the wetland will not be altered by the proposal. Any other proposed "lateral conveyance systems" if they are ditches or other constructs which will move sustaining flows of water from existing wetlands and/or drainage basins that serve wetlands will not be viewed favorably by this agency.

Alternative 3, B.B. Downs System: Any proposals that increase culvert capacity, modify existing culvert inverts, regrade or upgrade existing ditches and/or construct alternate stormwater routing, will need to be evaluated in terms of upstream and downstream wetland systems. This analysis needs to be performed to ensure that hydroperiod elevations (NP and SH), flows and quantities of surface water that sustain the wetlands will not be altered by this proposal.

Alternative 5, Flynn Lake Outfall: It is unclear from the submittal, which ditches are existing and which are proposed. This agency will not view the construction of ditches favorably. This proposal appears to route Flynn Lake in a direction it did not historically go. Please indicate if any of the constructs in this proposal will alter the existing routing of water from or toward any lake or wetland system or alter NP and SH elevations in Flynn Lake or any adjacent wetlands.

Alternative 6, Blind Pond Avenue: How does the proposed ditch and/or culvert routing differ from existing flow quantities and directions? Will the proposal affect any existing lake or wetland NP, SH or existing surface water inflow?

Problem Area 6-A (South of Clement Rd): The proposal indicates ditch construction in various portions of the 13- Mile Run Basin. What is the historic routing of the surface flow that is proposed to be re-routed by these constructs? Please indicate if any adjacent wetland systems received this flow and/or if this proposal would alter the SH and NP of these wetlands. Ditch construction will not be viewed favorably by this agency. Please indicate any alternatives to ditch construction.

Problem Area 7, (Hanna Lake, Wein Range Lane): The same comments apply as outlined in Alternative 6.

Alternative 8, Newburger Road and Livingston Avenue: The proposal calls for a culvert size increase from 18" to 48". This is a significant increase. Will the culvert have a structure placed upstream? Will it dewater or alter the SH or NP of any adjacent wetland systems? Is the proposed 24" RCP routing water in a direction it did not historically flow? Please indicate the existing flow routing and quantities in this proposal.

Alternative 9, County Line Road/Rhodes Woods: Please indicate if the proposed routing south of Newburger Road is the existing direction of flow. Will the proposal affect the NP and/or SH of any adjacent wetlands and lakes, including Hart and Hog Island?

As you can surmise from this review, more field evaluations coordinating our staff and yours, as well as wetland survey information and modeling will need to be performed before a final review of these proposals can be provided. These comments are thus preliminary and may change as this information becomes available. If you have any questions or need further coordination on this issue please contact me at (813)-272-7104.

Sincerely,

Peter S. Owens

Peter S. Owens, M.E., P.E.
Professional Engineer
Wetlands Management Division
Environmental Protection Commission
of Hillsborough County

cc: Darrell Howton, Director, EPC Wetlands Division
Robert Johnson, P.E., URS Greiner

CYPRESS CREEK WATERSHED MANAGEMENT PLAN
PUBLIC COMMENT SHEET

Public Meeting 3
Date: Tuesday, August 22, 2000

Name: Resource Management Team
Hillsborough County Parks and Recreation Department
Address: 10940 McMullen Rd. Riverview, FL 33569-6226
Telephone: (813) 672-7876 Fax: (813) 672-7880 Email: HCPRDELAPP@aol.com

Comments:

Alt. #5 - Improvements are located within the Violet Curry Nature Preserve. The flooding will not be relieved by what is proposed. We would like to meet with staff to further explain our concerns

Alt. # 12 - We would like to add a site to figure 13-1.

Alt. # 13 - One of the enhancement areas is a dry borrow pit with large upland trees. We would prefer other areas and can meet with staff and suggest locations

Alt. #4 Skunkvine, Cogongrass, and air potato should be removed wherever they occur

Alt #19 - Coordinate with SWFWMD as well - they manage/own quite a bit of land in the watershed.

Do your comments continue on the back of this sheet? **Yes** **☒ No**

Your comments are important to this Hillsborough County project. All written comments will be summarized and included in the Watershed Management Plan document.

Please complete the comment sheet and place it in the box provided at the meeting, or

Mail your comments to: Robert Johnson, P.E.
URS Greiner Woodward Clyde
7650 W. Courtney Campbell Causeway
Tampa, FL 33607

Fax your comments to: Robert Johnson at (813) 286-6587 / Jack Merriam 272-5320 Fax

Email your comments, in a format similar to this form to: robert_johnson@urscorp.com or Submit comments on-line at http://www.cypress-creek.org under "Public Comment."

CYPRESS CREEK WATERSHED MANAGEMENT PLAN
PUBLIC COMMENT SHEET

Public Meeting 3
Date: Tuesday, August 22, 2000

Name: Ted Blommel

Address: 1123 Livingston Rd Lutz Fl 33549

Telephone: 949-1352 Fax: _____ Email: Tedbirgit@AOL.com

Comments: your August public meeting was very informative and I wish I had known of the study when it began. Please consider my suggestions and look over the enclosed material. Having lived here since the 70's I have experienced the traditional drainage and the now "no drainage". Due to the realigning of Livingston Ave just south of Posco line and Colin parkway construction my South drainage was completely cut off or blocked. Construction in the Willow Bend subdivision on Cypress Trails drive blocked my North drainage with the placement of 2 bridges, one with no culvert and the 2nd with culverts too high (1/3 cap. during el Nino)

Do your comments continue on the back of this sheet? ☑ **Yes** ☐ **No**

Your comments are important to this Hillsborough County project. All written comments will be summarized and included in the Watershed Management Plan document.

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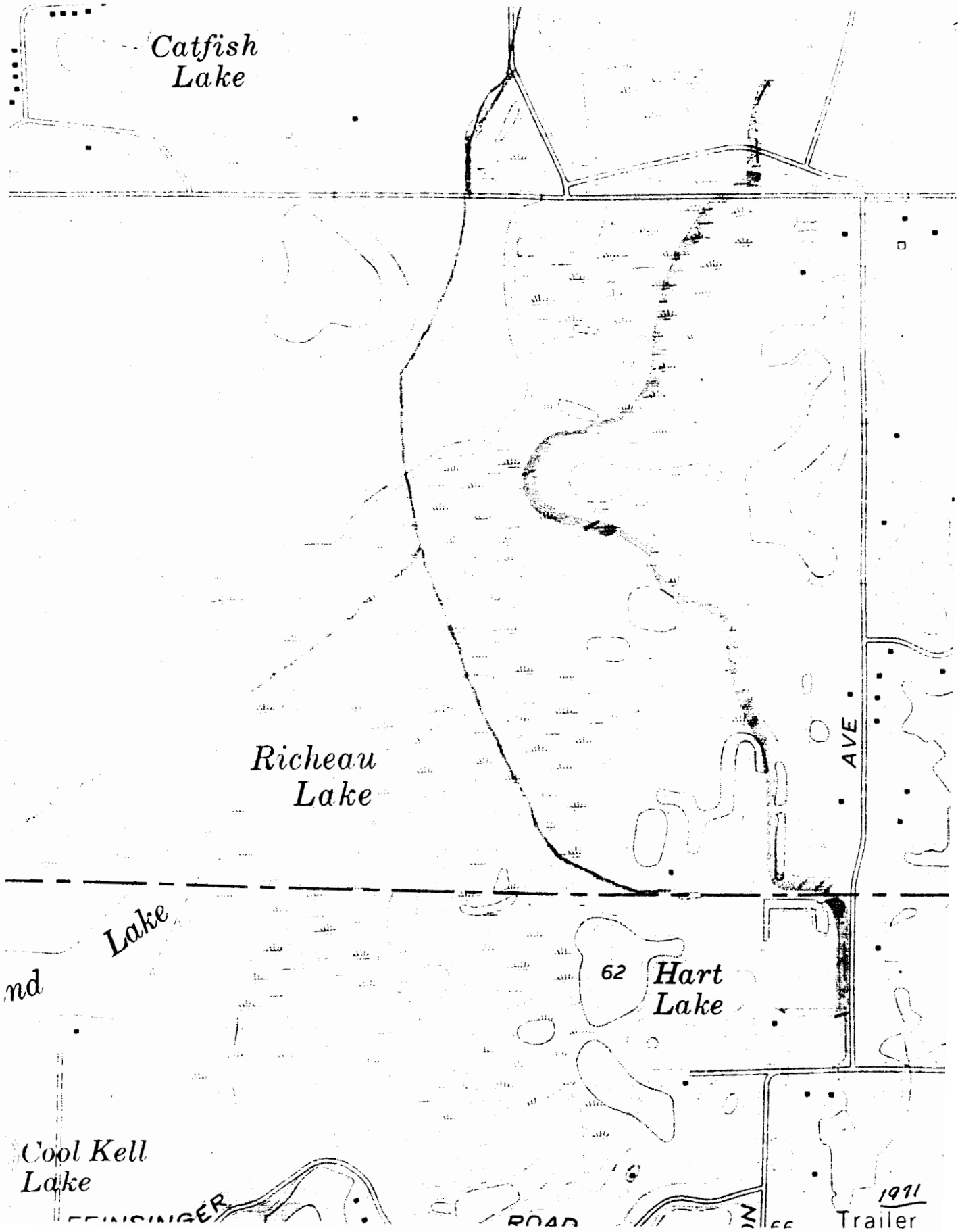
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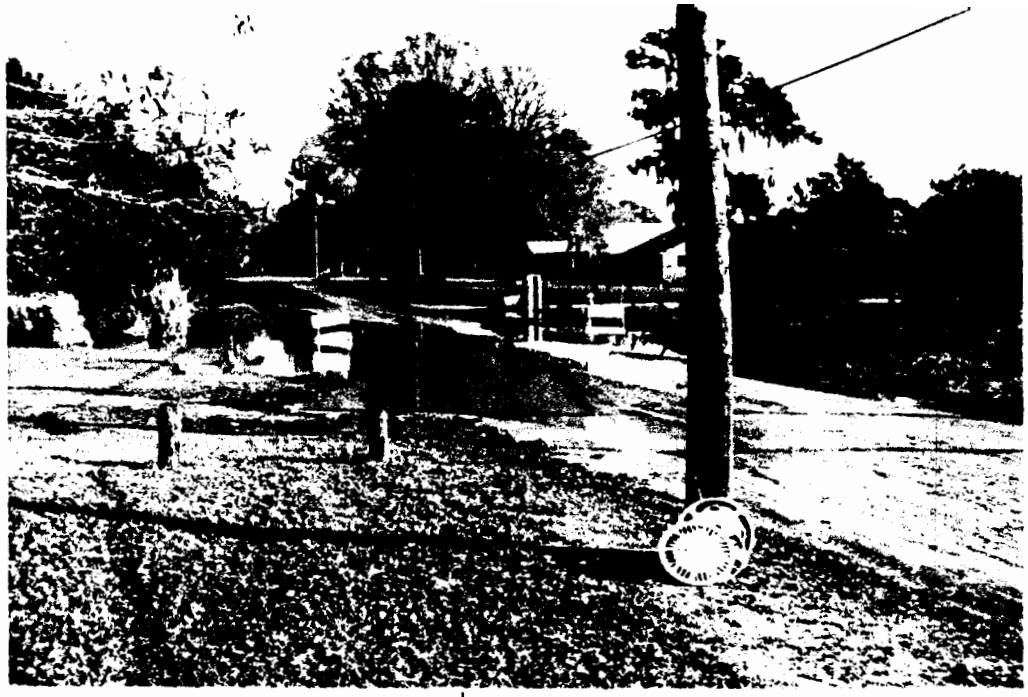

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1-800-492-7862 or (941) 534-1448
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Brenda Menendez
Tampa

E. D. "Sonny" Vergara
Executive Director
Gene A. Heath
Assistant Executive Director
Edward B. Helvenston
General Counsel

March 10, 1999

Mr. T. W. Blommel
1123 Livingston Road
Lutz, FL 33549

Subject: Flooding of Property (Log #14089-99)

Dear Mr. Blommel

This letter addresses the issues you cited in your February 27, 1999 letter to Mr. Vergara, our Executive Director. As Mr. Mroz's documents (enclosed) illustrate, the process of implementing the needed improvements "is slow to come." The overall project involves both Hillsborough and Pasco Counties. Ms. JoEllyn Miller of Pasco County and Mr. Bob Gordon of Hillsborough County, we understand, are working together to bring this flooding problem to closure.

We appreciate your concern and we will do what we can to resolve the issues. If we can be of further assistance, do call us at your convenience.

Sincerely

A. Paul Desmarais, P.E.
Brooksville Regulation Director

APD:cfb99-034
Enclosures
cc: E. D. "Sonny" Vergara, Executive Director
G. A. Heath, Assistant Executive Director
J. W. Heuer, Jr., Deputy Executive Director
W. M. Mroz, P.E., Surface Water Regulation Manager

Excellence Through Quality Service

March 5, 1999

MEMORANDUM

TO: A. Paul Desmarais, P.E., Director, Brooksville Regulation

FROM: WMM

SUBJECT: Flooding - Ted Blommel's Property

Ted Blommel's property is located at the NW corner of Livingston and Collier Parkway. The realignment of the Livingston Avenue in Hillsborough County inadvertently severed the drainage connection towards the south that left Mr. Blommel in a ~~land locked basin~~. The solution to this situation involves the following:

Recontouring of the road side ditch on the west side of Livingston Avenue in Hillsborough County, and
Cross drain under Collier parkway that would reconnect Mr. Blommel's basin to the ditch.

This problem is known to us for approximately one year, however the process of implementation of improvements is slow to come. JoEllyn Miller of Pasco County is constantly pursuing the issue with Bob Gordon of Hillsborough County. So far, the ditch work has been done, however the cross drain is yet to materialize. For reference, I am including the copies of the correspondence between Pasco and Hillsborough Counties.

WMM:ml:99-029

PASCO COUNTY, FLORIDA

DADE CITY (352) 521-4274
WEST PASCO (727) 847-8140
TELEFAX (727) 847-8084

ENGINEERING SERVICES/STORMWATER MGMT
WEST PASCO GOVERNMENT CENTER, S-320
7530 LITTLE ROAD
NEW PORT RICHEY, FL 34654

February 9, 1999

Mr. Robert R. Gordon, P.E. Director
Engineering Division, Hillsborough County
Public Works Department
Post Office Box 1110
Tampa, FL 33601

RE: Hog Island Outfall Maintenance
Collier Parkway

Dear Mr. Gordon:

This letter is in response to your January 25, 1999 letter to me regarding the restoration of the drainage connection on Collier Parkway for Hog Island Lake.

because of the realignment of Livingston Road, which was constructed by Hillsborough County in 1987, the roadside swales of Livingston Road no longer flow southerly to the cross drain under Livingston Road, which is located approximately 900 feet south of County Line Road.

Pasco County is aware that Hog Island Lake flows northeasterly, however, Hog Island Lake also flowed southeasterly to said culvert under Livingston Road. The previous drainage pattern needs to be re-established via a culvert under Collier Parkway at its intersection with Livingston Road. This portion of Collier Parkway is not within Pasco County, rather it lies within the boundaries of Hillsborough County. This connection for Hog Island Lake is shown on the 1977 SWFWMD topographic maps of Section 32, Township 26 South, Range 19 East and Section 5, Township 27 South, Range 19 East.

According to the State Road Department (FDOT) drainage map dated September 1961, Hart Lake drains westerly and southerly to ~~Newburger~~ Road through a series of culverts located under Newberger Road

Southwest Florida Water

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Patricia Bean

Assistant County Administrators
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Jimmie Keel

January 07, 1999

Mr. Bippin Parikh, P.E.
County Engineer, Pasco County
West Pasco Government Center
7530 Little Road, Suite 320
New Port Richey, Florida 34654

RE: HOG ISLAND LAKE OUTFALL MAINTENANCE IN PASCO COUNTY

Dear Mr. Parikh:

As a follow up to our recent discussion and the letter of November 15, 1998, received from JoEllyn Miller, I would like to know the status of the scheduled culvert maintenance in the Willow Bend Subdivision. You will recall that Mr. Gary Everett informed a member of my staff that these culverts would be scheduled for maintenance.

All of the work committed by Hillsborough County to be performed on Collier Parkway and Livingston Avenue was completed as of Thursday, December 31, 1998. A driveway culvert just west of the intersection of Livingston Avenue and Collier Parkway was replaced approximately a month ago and the ditch construction eastward along Collier Parkway, southward to a roundabout under Livingston Avenue was subsequently completed.

I would appreciate any information you can provide me regarding your scheduled maintenance.

Sincerely yours,

Robert R. Gordon

Robert R. Gordon, P.E.
County Engineer
Public Works Department

cc: Patricia Bean, Deputy County Administrator
Bernardo Garcia, Director, Public Works Department

Southwest Florida Water Management District
MAR 3 1999
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DADE CITY (352) 521-4274
WEST PASCO (813) 847-8140
TELEFAX (813) 847-8084

ENGINEERING SERVICES/STORMWATER MGMT
WEST PASCO GOVERNMENT CENTER, S-320
7530 LITTLE ROAD
NEW PORT RICHEY, FL 34654

June 11, 1999

Dr. Nagar T. Nashti
1001 Livingston Road
Lutz, FL 33549-6971

RE: Flooding of Property
Section 22, Township 26S., Range 18E

Dear Mr. Nashti,

Please note that a meeting was held on Monday, June 8, 1998, at the Hillsborough County Public Works Department to discuss the flooding near your property at Livingston Road and Collier Parkway. After reviewing the 1986 realignment plans for Livingston Road and the 1977 topographic maps [illegible] was jointly agreed that the hydraulic connection may have been altered. Mr. Hillsborough County Public Works Department plans to conduct a site visit to determine the extent of work required to restore the drainage pattern. Construction work will be undertaken by Hillsborough County to restore access fill within the roadside ditches of Livingston Road south of Collier Parkway.

Should you have any questions concerning this matter, do not hesitate to contact me.

Sincerely,
PASCO COUNTY

Jo Ellyn M. Miller

Jo Ellyn M. Miller, P.E.
Engineer III/Stormwater Management

JMM/at SM199-071

cc: [illegible] Dan Putman, P.E., Hillsborough County Stormwater Management Section, 601 E. Kennedy Boulevard, 23rd Floor, P.O. Box 1110, Tampa FL 33601
Honorable Pat M. Mulieri, Ed. D., County Commissioner, District 2
Bipin Parikh, P.E., ACA/Acting County Engineer

Southwest Florida Water Management District
MAR 3 1999
REG-BRO

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Hillsborough County
Florida

Office of the County Administrator
Daniel A. Klemm

January 25, 1999

JoEllyn M. Miller, P.E.
Engineer III/Stormwater Management
Pasco County Engineering Services
West Pasco Goverment Center, S-320
7530 Little Road
New Port Richey, FL 34654

SUBJECT: Hog Island Lake Outfall Investigation
Livingston Road/Collier Parkway

Dear Ms. Miller:

This letter is in response to your December 15, 1998 letter to me regarding the restoration of a drainage connection at Livingston Road south of Collier Parkway and the Hog Island Lake Outfall.

As of December 31, 1998, the project to reestablish a connection from Collier Parkway to the outfall under Livingston Road was constructed by the Countywide Construction Section of our Roadway Maintenance Division. The project consisted of leveling a driveway culvert on Collier Parkway and the excavation of a shallow ditch easterly from the culvert to the west right of way of Livingston Road. A ditch and swale were then excavated along the west side of Livingston southerly for approximately 900 feet to the existing crossdrain which discharges east under the roadway. Sedding and restoration of the excavated areas is scheduled for completion within the next few weeks.

~~As mentioned in your letter, prior~~ to the realignment of Livingston Road in 1987, ~~roadside swales~~ existed along the original right of ~~way which~~ conveyed runoff from Pasco County to the crossdrain under ~~that~~ road. The new system will now allow the pond on the south side of Collier Parkway to discharge under Livingston Road. The reconnection also may serve as a secondary outfall for the Hog Island Lake watershed when it reaches peak stage. The primary outfall for the Hog Island Lake and Hart Lake system is northeasterly through the interconnected wetlands in Pasco County which eventually drain to the Cypress Creek swamp. It was previously disclosed that a series of culverts within the Willow Bend development were heavily silted and in need of maintenance cleaning. Please advise if the cleaning of these structures has been completed or scheduled to reestablish this primary outfall.

25 Aug 00 at this time the drainage pipe under Collier Parkway does not exist, project got completed
Ted Blum

Appendix L
Memorandum of Understanding

WATERSHED MANAGEMENT PLAN
MEMORANDUM OF UNDERSTANDING
BETWEEN
HILLSBOROUGH COUNTY AND THE
SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

Fifth Draft August 22, 2000

Preamble

Watershed management plans (WMP), developed by Hillsborough County (County), are intended to establish existing conditions and provide a sound basis for achieving flood protection, preventing water quality degradation, and providing environmental protection for aquatic, wetland and terrestrial habitats. Effective watershed management is based on the following components:

- A comprehensive watershed management plan that assesses existing flooding, water quality and environmental features, and provides guidance for eliminating problems and improving Level of Service (LOS) attainment
- An integrated system of capital investment, continuing facilities maintenance, and effective regulation and management of land development/redevelopment, industrial and agricultural activities.
- Involvement of Federal, State, Regional and local governments and private stake holders in the development of long-term regulatory and management approaches and permitting solutions

The purpose of this Memorandum of Understanding is to assist in the coordination and implementation of WMPs being developed by the county and the Comprehensive Watershed Management Initiative (CWM) being implemented by the Southwest Florida Water Management District (District). Benefits of this coordination effort include more effective regional investment in stormwater management projects, more efficient regulatory actions, enhanced public education efforts, reduced incidence of flooding, improved regional water quality, and potential enhancement of critical habitats. It is also anticipated that District concurrence will be required for some WMP recommendations.

Whereas

The County is currently developing or has plans to develop WMPs for the seventeen watersheds within its geographical boundaries. These watersheds are identified as the following:

1) Alafia River
2) Brooker Creek Area
3) Bullfrog Creek/Wolf Branch
4) Curiosity Creek
5) Cypress Creek Area
6) Delaney Creek Area
7) Double Branch Creek
10) Hillsborough River
11) Little Manatee River
12) Lower Sweetwater Creek
13) Pemberton/Baker Area
14) Rocky/Brushy Creek
15) Silver / Twin Lakes Area
16) Sweetwater Creek

8) Duck Pond Area
9) East Lake Area
17) Tampa By-pass Area

The goals of the WMP are to improve the water resources and environment of the County, enhancing the quality of living standards within the County;

These goals include improvement of water quality, flood control, environmental systems, water supply and recreation that are consistent and compatible between the County's WMP Program and the District's CWM initiative. The primary focus of the CWM include: Water Quality, Water Supply, Flood Control and Natural Systems; and

It is in the best interest of the County and the District to implement these goals in their respective projects.

Therefore

The purpose of this Memorandum of Understanding is the timely and cost-effective implementation of the recommendations in the WMPs. It is agreed between the County and the District that the following initiatives be implemented to achieve this goal:

1. The District will agree to assist in the implementation of recommendations in the County's WMPs;

2. The District will coordinate water quality and quantity monitoring with the County and others (FDEP, USGS, etc.) to develop common databases and share in the economy of scales of obtaining this information. The District will also assist the County in monitoring the water quality and quantity results from the projects implemented from the WMPs;

3. The District will agree, to the extent feasible, to expedite the permitting process for the projects that are outlined in the WMPs. This will be done through pre-application meetings and other project meetings that will assist both the County and the District in compiling and filing complete applications;

4. Assist in developing and participating in a team permitting process similar to the FDEP's Ecosystem Team Permitting Process. This would include the US Army Corps of Engineers, the Hillsborough County Environmental Protection Commission, the Hillsborough County Planning & Growth Management Department, and the District among others. This would allow WMP project permit review to be done in a collaborative manner and result in a more environmentally oriented permit, consistent permit conditions and the permits issued in a more timely manner;

5. Based on the data and detailed modeling generated from the WMPs, the District will update its ERP permitting criteria to reflect that this information is the best available information for permit applicants to use when designing projects;

6. The District will support the County's efforts in updating the Flood Mapping for Hillsborough County generated by the Federal Emergency Management Agency (FEMA) based on information from the WMPs; and,

7. The District will assist the County in finding alternative funding sources for projects identified in the WMPs. This will include but not be limited to Federal, State, Regional (District) and local funding sources.

Attest

[To be developed by Legal Staff upon successful negotiation of MOU content.]

APPENDIX M
Maintenance Plan

CYPRESS CREEK WATERSHED
MAINTENANCE PLAN

Introduction

The proposed maintenance plan will identify stormwater maintenance problem areas, provide maintenance recommendations and maintenance schedules. Currently, maintenance within the Cypress Creek Watershed is performed by the Hillsborough County West Maintenance Unit for areas within Hillsborough County right-of-way or easement. Due to the number of ditches and structures to be maintained and the limited maintenance budget, maintenance is done primarily on an as needed basis.

In addition to Hillsborough County, SWFWMD provides maintenance of their lake level water control structures on selected lakes within the project area (Lake Kell, Lake Keene, Lake Hanna, Lake Stemper, etc.). FDOT also provides maintenance of ditches and culverts in their right-of-way in the project area (I-275, I-75, and Bruce B. Downs Boulevard). This discussion will focus on maintenance within the Hillsborough County jurisdiction.

Maintenance Activities

The drainage maintenance program is driven by established maintenance schedules, incident inspections, routine maintenance and from complaints by residents within the watershed. Maintenance activities that are currently performed include:

- Mowing of canal banks and retention ponds on County owned-owned property and drainage easements
- Repair or install cross-drain and side-drain pipe culverts in County easement or right-of-way
- Cleaning and removal of debris and silt from drainage structures in County easement or right-of-way
- Dragline cleaning and reshaping of canals and drainage ditches in County easement or right-of-way
- Roadside ditch cleaning in County easement or right-of-way

Approximately 80% of the West Maintenance Unit resources are utilized for responding to citizen's complaints. This leaves only about 20% of the West Maintenance Unit resources to perform scheduled routine maintenance activities in the watershed.

Identified Maintenance Problem Areas

Several maintenance problem areas were identified during field reviews for the project and during conversations with representatives of the west maintenance unit. These areas include:

- Sediment accumulation in box culvert at Thirteen Mile Run and Livingston Avenue (STR-7)

- Sediment accumulation at culvert at Thirteen Mile Run and Andre Drive (STR-8)
- Sediment accumulation at culvert at Thirteen Mile Run and Vandervort Road (STR-9)
- Sediment accumulation at culvert at on dirt road in Blind Pond system
- Crushed and silted pipe crossing at Livingston Avenue and Wein Ranch Lane (STR-19)
- Damaged storm sewer system in Brandywine Drive north of Blind Pond Avenue
- Overgrown ditches at 149th Avenue inflow ditches to the 149th Avenue pond
- Overgrown berm at 149th Avenue pond outfall weir
- Overgrown ditches south of Spring Glen Drive east of Livingston Avenue

National Flood Insurance Program Community Rating System (CRS)

The Community Rating System (CRS) provides credit for maintaining the local drainage system in order to prevent flooding that is caused by blockages or reduction in storage resulting from the accumulations of debris. To obtain credit from the CRS, a community must demonstrate a drainage system maintenance program that includes maintenance of channels and storage basins and provides regulations that prohibit dumping in drainageways.

Inspection Procedures

Inspection and maintenance requirements vary widely across the country. In areas with high rainfall, some communities may need to remove vegetation several times each year in order to ensure that its channels function properly. This may vary highly within a community from year to year if there are no major storms one-year and several the next. However, a periodic inspection of channels and basins in developed areas is needed in every community to prevent the accumulation of debris deposited by dumpers and careless people.

For the CRS credit, inspections must be conducted:

- At least once each year,
- After each storm that could adversely impact the drainage system, and
- In response to citizen's complaints.

These should be considered minimums. Local conditions may well warrant more frequent regular inspections.

The CRS will not provide credit for a program that only makes inspections when a complaint is filed. While the program must respond to complaints, regular inspections are vital. Often complaints are filed after the problem causes a flood. The objective of drainage system maintenance is to prevent such problems. It should be noted that CRS encourages communities to advise their residents on how to submit complaints, especially if they see illegal dumping.

CYPRESS CREEK WATERSHED
MAINTENANCE PLAN

Problem Sites. While annual inspection may be sufficient for may parts of the drainage system, some spots may need more frequent checks. Additional credit is provided if the community "identifies specific problem sites that are inspected and maintained differently or more frequently than other parts of the drainage system."

For example, some areas may be more prone to vandalism or dumping or some culverts may catch debris more than others. Drainage maintenance procedures that recognize different needs for different parts of the drainage system receive more CRS credit.

Maintenance Procedures. Typical problems found in open channels include trash, shopping carts, tires, plastic containers, branches, and logjams. Typical storage basin problems that must be fixed include clogged inlets and outlets, basin sedimentation, and broken pumps. A regular maintenance program with inspections can prevent these items from becoming big problems. When found early, they can often be removed or corrected with minimal equipment and expense.

The maintenance work for the basic CRS credit is normally carried out by a public works crew or contractor, usually without heavy equipment. The objective is to remove debris that has accumulated, such as shopping carts and log jams. For this CRS credit, the community's program must clearly describe what can and cannot be removed.

Stream Classification. The community's drainage system maintenance program must identify what is considered a problem and what happens when a problem is found. This may require classifying streams and basins as natural and human-made and treating them differently. Debris like trash would be removed from both but the community would only mow and remove small trees from the human-made ditches.

Natural channels. The natural channel has a wider area in which to flow. Trees and small log or debris jams can be accommodated by minor diversions of flow without causing any problems. In fact, vegetation and minor obstructions that cause riffles and pools are desired in many natural streams because they improve habitat and water quality.

Human-made ditches. A human-made drainage ditch or canal is designed to use less area to carry more water. These channels need more attention because there is no room to carry overflows caused by blockages. They are not intended to have trees and other vegetation growing in them. In human-made ditches, too much vegetation is considered "debris." Therefore, if an inspection finds trees and brush growing in the channel, they have to be removed. Regular mowing and grubbing ensures that these channels do their job.

Maintenance of Natural Channels. The community's program should not treat natural and human-made ditches similarly. In natural streams, natural organic debris like branches should be left in the channel as long as it does not cause a flood problem. Such debris is part of the natural system that provides a habitat for water-dependent life. Although debris that accumulates at a

bridge can cause a major obstruction and should be removed, branches that fall in other locations that would not impact flooding could be left to help maintain the natural habitat.

Another problem in natural streams is that new vegetation grows close to the ground. It forms more resistance to flood flows than taller, more mature bushes and trees. If the vegetation is cut every year, the community may be preserving flood obstructions. On the other hand, allowing the vegetation to reach maturity may improve the channel's flood carrying capacity and provide for a better habitat.

In short, drainage system maintenance programs need to take into account the habitat and recreational as well as the flood control facets of the stream. The community with a multiobjective approach to its river corridors will best be able to handle the competing interests and get the best results from its stream maintenance efforts.

Bank Erosion. Another kind of problem is bank erosion. This is more important where there are steeper banks, such as in a human-made ditch, and where houses or bridges are threatened by the erosion. Because bank erosion usually does not cause an obstruction to flood flows, CRS credits do not reflect local programs that deal with it. Similarly, bridge and culvert maintenance are only considered if their condition obstructs the flow of water.

Storage Basins. Retention and detention basins are usually human-made. Normally, the owners of basins on private property have agreed to specific maintenance requirements. Typical problems are obstructions to inlets and outlets, sedimentation, and pump failure. As with bank stabilization, CRS credits are not adjusted if there are problems with appearance and aesthetics.

State Permits. If the community has the right to enter all affected properties to perform maintenance, there should be no legal problems. In some cases, a state or water management permit may be required. Usually a permit is needed only for major projects, such as channel widening or bank stabilization. If a permit is needed for routine maintenance and debris removal, a general permit can often be obtained for a period of years and that specifies what work can be done. The community's program needs to identify the instances in which a state permit is needed.

Capital Improvements. For the basic CRS credit, one-time-only projects like channel alterations are not needed. However, additional credit is provided if the community has an ongoing program, such as a capital improvements plan, to eliminate or correct problem sites to construct "low maintenance" channels or other facilities. These could include:

- Reconstructing or enlarging bridge openings,
- Modifying a channel,
- Dredging or removing sedimentation,
- Placing rip-rap on banks,

- Reconstructing inlets and outlets,
- Installing grates to catch debris,
- Constructing new storage basins to reduce flows into channels,
- Replacing of pumps, or
- Planting willow shoots or installing other "soft" bank protection measures.

These items are not routine maintenance but they can reduce surface flooding and other damage caused by smaller, more frequent storms. They can also reduce a community's overall maintenance effort by correcting known problem sites.

There is no credit for capital improvements if:

- The community does not have a written capital improvements or drainage system improvements plan, or
- The community does not budget money on an annual basis for drainage system improvement projects.

Infrequent capital expenditures are not credited. However, if the community has a master plan that shows that few or no capital improvements are needed, then a program that funds a project only every few years can be recognized.

Records. A maintenance program needs records. Records should be kept to verify field checking both the channels and basins and that demonstrate periodic inspections and corrective actions taken. Other records that may be needed are citizen complaint forms and state permits.

Stream Dumping Regulations (SDR)

The second element in CRS recognition of drainage system maintenance credits regulations prohibiting the dumping of trash and debris in streams and storage basins. This element is known by its acronym, "SDR."

Regulatory Language. The community's regulations must include the following items:

1. A prohibition against dumping any material in a channel or basin that could cause an obstruction to flows. The ordinance or law must specifically prohibit dumping in streams and ditches.

2. Identification of an officer or office responsible for monitoring compliance and conducting enforcement actions. It must be clear that if a violation is found, the community or other enforcement agency will pursue it. It is not sufficient to rely on an ordinance that depends on a citizen to initiate a civil suit against a neighbor or other violator.

Usually the enforcing agency is the police department, environmental control officer, or the building or housing code department. In some states, a state law has qualified for SDR credit. However, those states have field enforcement officers who patrol the streams and have the authority to issue citations.

Provisions for penalties and abatement of violations. It must be clear that there is a penalty for violating the dumping regulations and that someone has the authority to order the obstruction removed.

Maintenance Recommendations

The following table includes a list of commonly recommended maintenance intervals taken from EPA/FDEP guidelines. These recommendations should be reviewed by the West Maintenance Unit and modified as necessary based on local conditions.

RECOMMENDED INSPECTION & MAINTENANCE GUIDELINES

Facility	Inspection Frequency	Maintenance Frequency	Maintenance Items
Cross Drains	6 mo.	1 yr	Litter and debris removal
		5 yr	Sediment removal
Culverts	6 mo.	1 yr	Litter and debris removal
		5 yr	Sediment removal
Inlets/Catch Basins	6 mo.	1 yr	Litter and debris removal
		5 yr	Sediment removal
Ditches	6 mo.	3 mo.	Mowing
		6 mo.	Litter and debris removal
		5 yrs	Sediment removal
Canals	1 yr.	3 mo.	Mowing
		6 mo.	Litter and debris removal
		3 yr.	Invasive plant species removal
		5 yr.	Sediment removal
Ponds	6 mo.	3 mo.	Mowing
		6 mo.	Litter and debris removal
		3 yr.	Invasive plant species removal
		5 yr.	Sediment removal
		5 yr.	Bottom restoration

- Accurate written records and maps should be kept by the West Maintenance Unit to identify chronic problem areas requiring maintenance resources. These areas should be reviewed with stormwater section staff to identify potential improvements that could be implemented to reduce maintenance requirements.

- At a minimum, the information identified above for CRS should be developed and accurate written records kept to ensure compliance with CRS guidelines.

Appendix N
Monitoring Plan

CYPRESS CREEK WATERSHED
MONITORING PLAN

There is currently minimal monitoring for water quantity and water quality in the Cypress Creek Watershed. The following monitoring stations are located within the Cypress Creek Watershed within the project study area:

- USGS gage at Bruce B. Downs Boulevard
- Hillsborough County EPC water quality monitoring station at Bruce B. Downs Boulevard
- USGS gage at Worthington Gardens in Pasco County
- Florida Lakewatch water quality monitoring on selected lakes in the Cypress Creek project study area
- SWFWMD stage monitoring of selected lakes within the project study area

ADDITIONAL MONITORING STATIONS

Water Quantity Monitoring Stations

Additional water quantity monitoring stations are recommended at the major tributary inflows from west of Livingston Avenue to the Cypress Creek main channel. These include:

- Sherry's Brook Outfall
- Hanna Lake Outfall
- Blind Pond Avenue Outfall
- Thirteen Mile Run
- 149th Avenue Outfall
- Bruce B. Downs Outfall

Depending on funding availability, these stations should have continuous stage/ flow recorders or at a minimum monthly stage/ flow readings taken. This flow information will allow the County to monitor flows entering Cypress Creek from these tributaries and identify areas for future drainage improvements.

Lake Level Monitoring

Additional lake level monitoring stations should be implemented on major lakes not currently being monitored by SWFWMD. These include:

- Hog Island Lake
- Lake Forest
- 149th Avenue Pond

In addition, Hillsborough County should continue to support the Lakewatch efforts to collect water quality and other environmental data at the lakes currently being monitored in the Cypress Creek Watershed.

CYPRESS CREEK WATERSHED
MONITORING PLAN

Water Quality Monitoring

Additional water quality monitoring stations are recommended at the Cypress Creek main channel and major tributary inflows from west of Livingston Avenue to the Cypress Creek main channel. These include:

- Cypress Creek Main Channel at the Hillsborough / Pasco County Line
- Sherry's Brook Outfall
- Hanna Lake Outfall
- Blind Pond Avenue Outfall
- Thirteen Mile Run
- 149th Avenue Outfall

Water quality data could be collected monthly or quarterly depending on funding availability. Constituents and parameters to be monitored should be coordinated with the HCEPC and included in their monitoring program.