SECTION 3.0
RECOMMENDED MASTER PLAN IMPROVEMENTS

This section of the watershed management plan describes the improvements that are recommended to address the problems identified in the previous section. The first portion of this section describes the projects recommended to address the flood protection, water quality, and erosion/sedimentation problems. Several of these projects also incorporate features to enhance the quality of wildlife habitat, and to provide the potential for recreational and educational facilities. The second portion of this section provides recommendations for maintenance of the existing and proposed stormwater infrastructure throughout the watershed. The third and fourth subsections present recommendations for public awareness/involvement and exotic plant eradication programs; and the fifth section outlines the regulatory framework governing actions related to stormwater management within City of Clearwater. The sixth and final section summarizes the capital improvement cost estimates for the recommended projects.

3.1 FLOOD PROTECTION, WATER QUALITY, NATIVE HABITAT, EROSION AND SEDIMENTATION IMPROVEMENTS

In accordance with Sections 16.3.2, 17.1.2, and 23.1.2 of the City of Clearwater Comprehensive Plan, conservation of natural drainage systems, use of natural alternatives such as natural and man-made wetlands, and the protection and improvement of the quality of receiving waters are goals of the Stevenson Creek Watershed Management Plan. These goals, together with the flood protection level of service goals identified in Section 2.1.5.3, are reflected in the recommended improvement projects as illustrated on Figure 3.1-1 (located in the rear map pockets) and described in the following subsections.

Computer modeling of each project was conducted using the AdICPR model and the pollutant loading spreadsheet model developed for the existing conditions, as described in Sections 2.1 and 2.3. Various alternatives were analyzed by modifying the models to reflect an array of infrastructure improvement scenarios. In this manner, the modeling

was used as a planning tool to optimize the flood protection and water quality benefits of the projects, while working within the constraints of cost, available right-of-way, and existing facilities and infrastructure. The relative scarcity of publicly-owned and vacant land within the watershed limited the range of available alternatives and posed a unique challenge in meeting all the goals of the Watershed Management Plan in a cost effective manner. For this reason, acquisition of private property, including 33 flood-prone or flood-susceptible single-family residential homes, is recommended in order to provide the necessary land for various infrastructure improvement projects that will benefit the watershed as a whole.

In most, but not all cases, it was considered feasible and cost-effective to achieve the adopted flood protection level of service goals. If all recommended projects are implemented, 243 of the identified 334 structure FPLOS deficiencies (73%) will be remedied. Many (28) of the remaining FPLOS deficiencies are located within the coastal high hazard area of Lower Stevenson Creek and are susceptible to flooding from storm surge. Reductions in the riverine floodplain (flooding due to rainfall and runoff) will therefore not remedy these FPLOS deficiencies. The combined projects would remove FPLOS deficiencies at 33 locations on residential streets, 16 locations on collector roads, and on one arterial road. Proposed conditions AdICPR model input and output are provided in Appendix E. Proposed conditions flood elevations and levels of service for the 10-, 25-, and 100-year design storm events are provided in Appendix F, along with a node-by-node comparison of existing and proposed 100-year flood elevations. AdICPR results are provided for Spring Branch Alternative 1 (Project 1B); results are similar for Alternative 2 (Project 1C) with identical level of service for proposed conditions. Proposed conditions flood profiles are included as Figures 3.1-36 through 3.1-44 at the end of this section. A comparison of the existing and project conditions 100-year floodplain limits is provided as Figure 3.1-45 in the rear map pockets.

Water quality, habitat, erosion and sedimentation projects were developed individually and in conjunction with the recommended flood protection projects wherever feasible. Alternative projects were evaluated with respect to water quality improvement

benefits. The net loads (refer to Section 2.3.4) present at each project location were calculated and BMP removal efficiencies were applied to calculate the load removed by each project.

Wet detention, percolation, and sedimentation were considered for stormwater treatment methods. These treatment methods, or BMP's, are described more specifically in Table 3.1-1, along with the maximum removal efficiencies. These efficiencies were adjusted downward based on the percentage to which the project achieved ideal conditions. For example, if a wet detention pond providing 1-inch of treatment is assumed to remove 60% of phosphorus, then a wet detention pond providing one-half-inch of treatment is assumed to remove 30% of phosphorus.

Table 3.1-1
Maximum BMP Removal Efficiencies

BMP Type	Pb	Zn	BOD_5	TSS	TP	TN
CDS Unit	0.5	0.35	0.3	0.5	0.25	0
Channel Improvements	0.2	0.15	0.1	0.2	0.15	0.1
Percolation	0.8	0.8	0.8	0.8	0.8	0.8
Sediment Sump	0.7	0.55	0.1	0.7	0.25	0
Water Quality Inlet	0.15	0.05	0.05	0.35	0.1	0
Wet Detention (1-inch)	0.75	0.6	0.5	0.75	0.6	0.3
Wet Detention (2-inches)	0.24	0.8	0.6	0.9	0.75	0.45

The alternative projects are listed along with the type of BMP proposed, loads present at BMP site, and the estimated load removed, in Table 3.1-2.

Descriptions and conceptual schematic plans of these improvements are provided in the following subsections.

(TABLE 3.1-2)

3.1.1 Subwatershed 1: Spring Branch

Project 1A. Spring Branch Conveyance Enhancements. In order to address the 27 structure FPLOS deficiencies in the area of Byram Drive and Flora Drive between King's Highway and Highland Avenue, and along Huntington Lane, east of King's Highway, various enhancements to the conveyance capacity of the existing Spring Branch system are proposed. These enhancements include widening approximately 700 linear feet of the Spring Branch Channel downstream of King's Highway. This section of channel was constructed with high, steep, and unstable banks that are now nearly vertical in places due to soil erosion. The recommended project is to reshape the banks to a 4:1 (horizontal to vertical) side slope, providing additional cross sectional area for conveyance of flood flows, and providing a more stable bank configuration that would support vegetation. The bottom width and bottom elevations of the channel would remain essentially unchanged, with the exception that low, sloping walls (2.5'-3' high) constructed of gabion baskets or a cellular confinement system such as Geoweb (or equivalent) would be constructed to reduce bank erosion. The project would also include a maintenance travelway that would normally be dry but would be submerged for brief periods during major flood events. To accommodate the widened cross section, approximately 50' of additional easement width would be required adjacent to the existing 50' easement for Spring Branch extending from King's Highway downstream to the City Limits (refer to Figure 3.1-3).

Some planting of native vegetation will be undertaken for this project. Where possible, trees will be planted along the banks of the channel to eventually provide shade and reduce erosion. The shade will reduce maintenance requirements significantly because most nuisance exotic species require full sun for exponential growth. Trees recommended for the upper banks in this area are dahoon holly, southern magnolia, and eastern red cedar. These evergreen trees will not contribute as much litter to the channel as deciduous trees.

The understory on the banks and on the slopes above the normal water elevation may be planted with Florida coontie and Virginia chain fern. Both species will tolerate full sun but can adapt to full shade as the trees mature. Another species recommended for the upper banks is cord grass. This grass forms dense clumps that will prevent bank erosion and filter runoff from the adjacent residential areas. The area around the planted vegetation may be sodded with bahia grass for temporary stabilization.

Planting in the channel at and below the normal water elevation may occur in areas where lining the channel with gabions or other bank armaments is not required. For these areas sturdy species that will withstand occasional floodwaters are recommended. Such species include bulrush, pickerelweed, and soft rush. These plants will not only provide erosion protection, they will also improve water quality during periods of low flow. The scientific names and planting depths of the recommended plants are provided in Table 3.1-3.

In addition to the channel improvements, the project includes removal of a private driveway crossing of Spring Branch between Sunset Point Road and Betty Lane, within unincorporated Pinellas County (See Figure 3.1-2). This crossing consists of a 92" x 152" CMP arch culvert, which severely restricts the flow for major storm events. As evidenced in the Spring Branch flood profile (Figure 2.1-22), this structure causes 3.4 feet of head loss for the 100-year storm. Although the culvert under Betty Lane is the same size, Betty Lane itself is much lower than the private crossing, so floodwaters are allowed to overtop the road during major events. The purpose of this private driveway is unclear, as the property served by it has access from Macomber Avenue. This culvert would have to be removed prior to implementing the channel improvements described above. Removal of this culvert would also reduce flooding for the estimated 10-15 flood-susceptible homes along Betty Lane and Macomber Avenue within unincorporated Pinellas County.

(TABLE 3.1-3)

Figure 3.1-2. Private Crossing of Spring Branch Near Betty Lane (to be Removed)

In order to provide flood relief for the areas east of Highland Avenue, Project 1A also includes the upsizing of approximately 3,300 feet of storm sewer near Highland Avenue and Byram Drive. The Project 1A.1 and 1A.2 conveyance improvements would work together to remove the 100-year flood risk from 21 homes east of King's Highway. This total does not include the estimated 10-15 homes in unincorporated Pinellas County. Because Project 1A would increase the discharge rates to downstream areas, this project will require construction of either Project 1B (alternative 1) or Project 1C (alternative 2) in order to offset potential downstream flooding impacts. Projects 1A.1 and 1A.2 are illustrated on Figures 3.1-3 and 3.1-4, respectively.

Project 1B. Springtime Avenue and Douglas Avenue Bridges. In order to offset the potential downstream flooding impacts of Project 1A, the bridges at Springtime Avenue and Douglas Avenue over Spring Branch could be enlarged (refer to Figure 3.1-5). This alternative would allow the excess food flows to be safely conveyed to the Stevenson Creek estuary. The existing crossings consist of a 6' x 15' concrete arch at Springtime

Avenue, and twin 7' x 8' box culverts at Douglas Avenue. The recommended pipe sizes are twin 9' x 12' box culverts (or equivalent) at both locations. This alternative would rely on the planned dredging of sediment from Edgewater Drive Bridge, as part of the Stevenson Creek Estuary Restoration Project, in order to avoid increases in flood elevations within the estuary.

Project 1C. Spring Branch Flood Detention Basin. As an alternative to Project 1B, a stormwater detention basin could be constructed downstream of the proposed channel improvements. This detention basin would provide storage and attenuation of the excess floodwaters, which could then be safely conveyed by the existing downstream system. This new facility would provide over 0.1-inches of treatment for the Spring Branch subwatershed removing an estimated 9,950 pounds of suspended solids and 290 pounds of nitrogen on an annual average basis. As illustrated on Figure 3.1-6, the recommended improvements consist of a three-acre expansion of the existing Pinellas County mitigation area and construction of an eight-acre flood detention facility on vacant property owned by the Pinellas County School Board.

A discharge control weir would be constructed upstream of Betty Lane at elevation 5.5' NGVD, and a diversion weir would be constructed near the downstream end of Project 1A, at elevation 6.5', to divert a portion of the flow from Spring Branch into the facility where it would be treated and attenuated. The total area of the facility would be approximately 11 acres, and would require acquisition of a 4-acre parcel from Sunset Point Baptist Church, and acquisition of approximately 8-10 acres of property from the School Board. The project provides a significant opportunity for wetland habitat creation and water quality improvements.

The existing mitigation area on the north side of Sunset Point Road could be graded on the east side to extend the wetland into the existing church recreation area. This wetland would be connected via a culvert to another created wetland on the School Board property on the southern side of Sunset Point Road.

(FIGURE 3.1-3)

(FIGURE 3.1-4)

(FIGURE 3.1-5)

(FIGURE 3.1-6)

Figure 3.1-7. This photograph shows the area on the south side of Sunset Point Road that could be excavated to create the stormwater detention facility.

The majority of the created wetland will consist of a shallow littoral shelf that would be planted with pickerelweed, soft rush, arrowhead, water lily, and other wetland species. Table 3.1-3 provides a list of suitable wetland species and their planting depths. A shallow channel would meander through the center of the wetland, as shown in Figure 3.1-6. It is recommended that trees be planted around the perimeter of the wetlands to screen the area from adjacent land uses. Recommended trees are pond cypress, red maple, and pop ash in the wetland and laurel and live oak at the top of bank. The wetland vegetation would provide water quality treatment and wildlife habitat in a very depauperate area.

Project 1D. Woodland Terrace Storm Sewer Replacement. As illustrated on Figure 3.1-8, this project involves upsizing approximately 1,300' of 24" diameter storm sewer along Woodland Terrace, from Oakdale Way to Shore Drive, with 42" RCP storm sewer.

The project will eliminate the four structure FPLOS deficiencies near Woodlawn Terrace and Oakdale Way**,** and may incorporate water quality inlets and / or CDS units for stormwater treatment.

Project 1E. Byram Pond Dredging and Expansion. Byram Pond is located in-line with Spring Branch immediately east of King's Highway. Since the small pond is in-line with the channel, it is a natural place for sediments to settle out of the water column and accumulate. The City desires to have the ability to regularly dredge the accumulated sediments from the pond. However, concerns over access and possible impacts to surface water quality have prevented the dredging from taking place. In order to provide an equipment access and staging area, removal of three (3) flood-susceptible homes adjacent to Byram Pond is proposed. The location of the proposed expansion and/or staging and de-watering area is illustrated on Figure 3.1-9.

Project 1F. Spring Branch Stabilization, Union Street to Byram Pond. Extremely steep banks and lack of access for equipment create difficulties in maintaining the portion of the main Spring Branch channel that extends from Union Street, south to the Byram Pond. As illustrated on Figure 3.1-10, the proposed improvements consist of reshaping the banks to a stable configuration and constructing a maintenance travelway within the existing 65' drainage easement. The improvements would require the construction of 4' high retaining walls on either side of a 10' wide earth-bottom channel which would convey the majority of storm events. Flood events would be allowed to occupy the upper portions of the cross section including the maintenance travelway. As an alternative, an 11' x 7' box culvert could be constructed within the existing ditch at approximately the same cost and hydraulic efficiency. However, the box culvert alternative could be expected to result in much lower long-term maintenance costs. Although this would require wetland mitigation, Project 1C could potentially be used for that purpose.

Project 1G. Clearview Lake. As illustrated on Figure 3.1-11, this project includes construction of approximately 3,000' of 18" to 66" storm sewer with inlets in order to provide drainage for, and divert runoff from, approximately 20 acres into Clearview Lake. In addition to providing stormwater treatment for the currently untreated runoff from the 20 acres, this diversion will decrease the load on the downstream storm sewer system by utilizing excess storage capacity within Clearview Lake. In addition, an outfall control structure would be constructed on the lake in order to increase residence time for small storm events, providing additional water quality benefits for the runoff that currently enters the lake. This project will remedy a collector road flooding level of service deficiency at Highland Avenue and Sunset Point, while providing wet detention stormwater treatment for a total of 52 acres.

Project 1H. Betty Lane Forested Habitat Preservation Site. Approximately 1200 feet of Spring Branch maintains a remnant of riparian habitat and a somewhat natural profile. Adjacent to the north side of the stream is a forested area that although disturbed by draining and some clearing, has not yet been developed. This forested upland area is approximately 25 acres and is located in the northeast quadrant of the intersection of Sunset Point Road and Betty Lane (refer to Figure 3.1-12).

Despite the impacted condition of the parcel, it currently provides the only existing wildlife habitat of any substantial size within the watershed. Discussions with City staff indicate that residential development may be pending on portions of the site, despite the fact that the majority of the property lies within the 100-year floodplain of Spring Branch (refer to Figure 2.1-15). Approximately six acres of this property is under City ownership and will be used as a park site. If, however, more of the site could be preserved in a natural state through purchase of additional privately owned property, it would have the potential to become locally significant wildlife habitat, floodplain preservation, and neighborhood recreational area. The site would need to be cleaned up, and all nuisance vegetation and trash removed. If the site were to become a passive park, fencing the site would be essential.

(FIGURE 3.1-8)

(FIGURE 3.1-9)

(FIGURE 3.1-10)

(FIGURE 3.1-11)

(FIGURE 3.1-12)

3.1.2 Subwatershed 2: Lower Stevenson Creek

Project 2A. Palmetto Street Sediment Sump. As part of the Stevenson Creek Phase 1 improvements, a small sediment sump was created south of Palmetto Street, within the Clearwater Country Club Golf Course. Since its completion, the sump has rapidly filled with sediment resulting in, on at least one occasion, the migration of sediment downstream of the low control weir. Although the City routinely removes sediment from the sump, this operation requires closing of a portion of the golf course.

Creation of an expanded sedimentation basin north of Palmetto Street on Stevenson Creek would provide improved equipment access and staging areas, and a less frequent maintenance interval than the existing sump. The proposed 60' x 350' sump, as illustrated on Figure 3.1-13, is designed to have an average maintained bottom elevation of –4.5' NGVD. A low weir would be constructed at elevation 1.5' NGVD at the downstream end of the project in order to trap the sediment. Dredging would be required when the average bottom elevation reaches –3.5' NGVD, at which point an average of 2' of sediment over the bottom would be removed (allowing one foot of overdredging). The capacity of the sump with two feet of sedimentation between elevations –5.5 and –3.5 is approximately 1,550 cubic yards (bank measure). Maintenance dredging of the sump would be recommended annually, or as needed based on actual rates of accumulation. Construction of the sump would require the acquisition of an existing residential property on Palmetto Street to create an access drive from the Street. The property to be acquired is currently a structure FPLOS deficiency. Acquisition of additional drainage/access easements would be required from three properties on Betty Lane that front the Creek.

As the City of Clearwater continues to search for ways to improve water quality, wildlife habitat, and aesthetics in the community, they have been receptive to comments and suggestions from the experts at state and local environmental agencies, as well as from the Pinellas County Department of Environmental Management. It has been suggested by some of these experts that this proposed sump be planted with wetland species to the greatest extent possible. This will be a challenge due to the spatial

requirements needed for the maintenance equipment, but the proposed conceptual design would allow some plantings of wetland species in the area near the outfall. Plants proposed for this area will include species tolerant of a wide range in salinity, such as bulrush, black rush, red and black mangrove, and leather fern. Also proposed are trees such as cypress and red maple at the toe of slope in areas that will not interfere with the maintenance equipment. Table 3.1-3 lists the scientific names of the recommended plants and planting depths.

Project 2B. North Missouri Avenue and Palmetto Street Drainage Improvements. In order to remedy street FPLOS deficiencies at North Missouri Avenue and Seminole Street, upsizing of approximately 1,450 feet of existing 42" and 54" storm drain to 60" RCP is proposed (refer to Figure 3.1-14). As an alternative to constructing a portion of the 60" culvert, approximately 860 feet of 36" RCP culvert could be installed parallel to the existing 54" pipe on the opposite side of Palmetto Street.

This project will incorporate water quality improvements as part of the City's North Greenwood Demonstration Project, in which CDS units will be installed within the storm piping systems near North Missouri Avenue and Palmetto Street, and near Pennsylvania Avenue and Grant Street. CDS units are devices that can be installed underground within new or existing storm sewer systems to remove sediment and floatable debris from the stormwater runoff stream. Together, these two units are expected to remove an estimated 2,320 pounds of suspended solids on an annual average basis. As part of the North Greenwood Demonstration Project currently underway, the stormwater quality of the inflow and outflow streams will be monitored and evaluated to assess the efficiency of the CDS units. In addition, 192 feet of the proposed 60" RCP will be installed as part of the North Greenwood Project.

Project 2C. Installation of Additional CDS Units. In addition to the CDS units installed as part of the North Greenwood Demonstration Project, other CDS units could be installed at strategic outfall locations within the Lower Stevenson Creek

Subwatershed. This project would reduce the loading of sediments, floatable debris, and other pollutants from stormwater runoff prior to entering the Stevenson Creek Estuary. Potential locations for these additional units are located on Figure 3.1-1.

Project 2D. Overbrook Avenue Detention Pond. In order to remedy street FPLOS deficiencies on Rollen Road at Parkwood Street and Terrace Road, and to provide stormwater treatment and attenuation for currently untreated runoff from 78 acres, creation of a four-acre stormwater detention pond is proposed. This new facility would provide over 0.8-inches of treatment removing an estimated 3,320 pounds of suspended solids on an annual average basis. As illustrated on Figure 3.1-15, the pond would be constructed at the site of an existing auto-salvage facility southwest of Betty Lane and Overbrook Road, which has also been identified as a possible dredge material de-watering area for the Stevenson Creek Estuary Restoration Project. The detention pond would be constructed following completion of the dredging, spoil de-watering, and spoil material final disposal. In addition to the flood protection and water quality benefits, this project will remove a potential source of pollution and incompatible riparian land use adjacent to Stevenson Creek. However, prior to final determination of the feasibility of this project, testing and evaluation of the soil underneath the existing auto salvage facility is recommended.

The vacant site adjacent to the west side of the salvage yard could be incorporated into the stormwater facility created on the salvage yard, or could be converted into riparian habitat. The mangrove areas along the shoreline and in the western portion of the site should be cleaned up by removing trash and Brazilian pepper. The upland areas could be dredged and turned into additional mangrove and salt marsh habitat. This area could be developed into a passive use park with a canoe launch area and a boardwalk through the mangroves with an observation deck overlooking the creek.

Figure 3.1-16. This photograph shows the nuisance vegetation and trash on the 9-acre vacant land parcel adjacent to the west side of the auto salvage.

Plantings in the proposed stormwater treatment facility may include pickerelweed, bulrush, soft rush, arrowhead, alligator flag, cord grass, saw grass, and other freshwater species listed in Table 3.1-3. If the vacant land is developed into a salt marsh/mangrove combination habitat area, species planted should include black mangrove, red mangrove, buttonwood, black rush, and other species tolerant of brackish water. Figure 3.1-15 depicts the conceptual design for the proposed stormwater facility and estuarine habitat.

Stevenson Creek Estuary Restoration Plan**.** The sedimentation of the Stevenson Creek Estuary has been identified as a primary concern for the City of Clearwater. The deposition of sediments over the years has reduced flow, impacted water quality, and degraded wildlife habitat. In addition, the residents in the area have reported foul odors when the sediments are exposed to the air.

The Stevenson Creek Estuary is located within an area of the City that has been designated as a "Brownfield". Brownfield areas, as defined by the Environmental

Protection Agency (EPA), are abandoned, idled, or underused industrial and commercial areas where expansion or redevelopment is complicated by real or perceived environmental contamination. The EPA's Brownfield Initiative is intended to empower states, municipalities, and other stakeholders to work together to determine the optimal way to assess, safely cleanup, and develop brownfields for sustainable uses that would improve the community. The Stevenson Creek Estuary area was chosen as a pilot project for the Brownfields Assessment Program, and the City of Clearwater is working with the U.S. Army Corps of Engineers (USACE) to develop a preliminary plan and feasibility study for the restoration project. If the project is deemed feasible by the USACE, the project could qualify for federal funding of up to 65% of the total cost of project implementation. The City is also working with the FDEP, the SWFWMD, Pinellas County, and local residents to promote awareness and solicit input regarding the project.

The proposed project includes a plan to dredge the estuary between the Douglas Avenue Bridge and the North Fort Harrison Bridge. As previously stated, dredging under the North Fort Harrison Bridge is a necessary precursor to Project 1B, and will improve both tidal circulation and flood flows in the estuary. The dredging will remove approximately 80,000 cubic yards of sediment and deposit it on an undeveloped parcel adjacent to the auto salvage yard, and potentially on the salvage yard site as well. The spoil will be allowed to de-water in this location and then will either be used as cover at a local landfill, or deposited on a nearby vacant parcel. The City intends to use the dredge material disposal site as a public park eventually, with a canoe launch, boardwalk, and other amenities. During the dredging, nuisance vegetation such as Brazilian pepper and cattail will be removed. Upon completion of the dredging, the banks of the creek will be planted with native vegetation such as mangroves, black rush, giant leather leaf ferns, and other species tolerant of salt or brackish water.

Although analysis of the Estuary Restoration Plan is the beyond the scope of this report, it is being developed in conjunction with this Watershed Management Plan and is considered to be a key component of the Plan. Many of the projects recommended herein

would reduce sediment and pollutant loading to the estuary, with the intent of ensuring the future environmental and physical integrity of the estuary once it has been restored.

(FIGURE 3.1-13)

(FIGURE 3.1-14)

(FIGURE 3.1-15)

3.1.3 Subwatershed 3: Middle Stevenson Creek

Project 3A. Glen Oaks Stormwater Detention Facility. A major stormwater infrastructure project is needed in the Middle Stevenson Creek Subwatershed in order to address the severe flooding and water quality level of service deficiencies documented within the Lower and Middle Stevenson Creek Subwatersheds. As discussed in Section 2.1.5.4, a total of 49 structures consisting of 105 ground-floor dwelling units along the banks of Middle Stevenson Creek are identified to be subject to inundation from the 100-year design flood. In addition, there have been numerous documented water quality and sedimentation problems in the downstream creek and estuary, due in large part to the contribution of untreated runoff from areas upstream of Glen Oaks. The parcel of land containing Glen Oaks Golf Club was chosen as a potential capital improvement project site due to the following factors:

- The parcel is strategically located on Stevenson Creek immediately adjacent to the most severe flooding problem area in the subwatershed,
- There are no vacant properties in the area that are large enough to provide benefits on a scale commensurate with the scale of the problems, and
- The parcel is currently under City ownership.

The recommended project would entail conversion of almost the entire parcel into a multi-purpose flood detention, stormwater treatment, wildlife habitat and recreational facility. Alternatives to this plan were considered that would provide some flood protection and water quality benefits, while allowing the existing golf course to remain in service. However, these alternatives would provide only a fraction of the benefits needed to alleviate the majority of the level of service deficiencies in the area, and would likely have a negative impact the functioning of the golf course due to poor drainage and increased frequency of flooding.

As shown conceptually in Figures 3.1-17 and 3.1-18, the facility would consist of two separate ponds. The western portion of the site would be converted into a 13-acre wet pond on-line with Stevenson Creek. A weir structure with a bleed-down orifice located just south of the Court Street box culverts would control the normal water level at

elevation 14.0 ft NGVD, or four feet above the existing channel bottom. A wide concrete overflow weir would be constructed at the same location at elevation 15.25, allowing the water level to fluctuate between elevations 14.0 and 15.25 during the wet season. This pond would provide improved conveyance of flood flows through the area, while at the same time attenuating peak discharge rates in the Creek. A net increase of 78 acre-feet of available floodplain storage would be created at the proposed 100-year flood elevation. The pond could be designed with both shallow and deep zones for maximum water quality benefits. Wetland plantings would be introduced into the shallow zones, with the deep zones acting as sediment sumps.

In the northeast portion of the property, a 4-acre pond would be constructed which would capture, treat, and attenuate the currently untreated runoff from approximately 50 acres of residential and commercial land uses. The 100-year peak discharge rate from the contributing area would be reduced from over 300 cfs to approximately 20 cfs. The pond could be a designed as a dry pond with a bottom elevation of 25.0 ft NGVD, although additional investigation is needed in order to determine whether this site would support a dry pond. The alternative would be a wet pond with a control orifice at elevation 25.0.

The flood protection benefits of this project would be to remove the risk of flooding from 33 out of the 49 identified flood-susceptible structures (78 out of 104 dwelling units) from floods up to and including the 100-year design event. For 14 of the remaining flood susceptible structures in the Middle Stevenson Subwatershed, the frequency of flooding would be reduced from every 5 to 25 years to every 50 to 100 years. In addition, four out of the five residential street FPLOS deficiencies in the subwatershed would be eliminated. These streets are Pierce Street, Franklin Street, Betty Lane, and Mark Drive. Also, 100-year flood depths would be reduced by more than 1.7’ on Cleveland Street (S.R. 60), currently a hurricane evacuation route.

The water quality benefits of this plan would include 100% treatment (retention) of runoff from the 50 acres draining to the northeastern pond, and partial, yet substantial treatment of runoff from the remaining 1,193 acres which drain directly to Stevenson

Creek at the Glen Oaks parcel. Based on the pond surface area available, and assuming a maximum fluctuation depth of 15 inches, the on-line pond could provide wet detention for ½" of runoff from the directly connected impervious surfaces contained within the 1,193 acres. This is approximately equivalent to the runoff generated from a 0.6" rainfall over the entire contributing area. The project is expected to remove an estimated 16,500 pounds of suspended solids and 560 pounds of nitrogen on an annual average basis. The Glen Oaks treatment pond would be designed to function, in conjunction with the modified Lake Belleview system and the modified lakes upstream of Jeffords street ditch, as a "cascading pond" treatment system (refer to Sections 3.1.6 and 3.1.7). The upstream lake outfall structures would be designed to create substantially longer residence times than would exist in the Glen Oaks pond, to ensure that the residence time in the downstream pond would not be compromised by the contribution of treated discharge from the upstream ponds.

In addition to the flood protection and water quality benefits, the Glen Oaks facility would provide up to seven acres of new wetland habitat. The wetland would be planted with species such as pickerelweed, arrowhead, alligator flag, soft rush, cord grass, yellow canna, saw grass, string lily, prairie iris, water lily, spatterdock, cypress, red maple, dahoon holly, water hickory, buttonbush, and Virginia willow (refer to Table 3.1-3). This site could therefore serve as a mitigation bank to provide compensation for wetland impacts for this and other City of Clearwater capital improvement projects.

Due to variations in topography, approximately six acres of upland area is unusable as part of the stormwater facility. This remaining property would be suitable for use as either a passive or an active recreational facility. Active recreational facilities could include soccer fields, which are currently in short supply throughout the City. Alternatively, creation of upland habitat in this area would enhance the value of the wetland habitat and provide a buffer against the adjacent residential areas. If this area is converted to passive recreation and wildlife habitat, some landscaping will be required. Trees planted should include holly, southern magnolia, live oak, laurel oak, and cabbage palm. Understory plantings may include saw palmetto, wax myrtle, and gallberry.

(FIGURE 3.1-17)

(FIGURE 3.1-18)

3.1.4 Subwatershed 4: Upper Stevenson Creek

Upper Stevenson Creek encompasses the portion of the Creek targeted for conveyance improvements in Phase 3 of the 1988 W.K. Daugherty study. This phase was never constructed, primarily due to environmental concerns raised over the proposed improvement method of hardlining (paving) the channel with concrete. Because of this project history, hardlining this section of the creek was eliminated as an alternative without further study in the Stevenson Creek Watershed Management Plan. Instead, various alternatives are proposed to solve the flood control and erosion problems within Upper Stevenson Creek.

Project 4A. Hillcrest Avenue Overflow Bypass Culvert. In order to remove the 100-year flood risk from 47 homes adjacent to the Creek between Jeffords Street and Bellevue Boulevard, installation of 1,900' of 7' x 11' box culvert from Browning Street to the upstream end of Linn Lake at the Evergreen Avenue footbridge is recommended. The culvert would be constructed primarily under the southbound lane of Hillcrest Avenue, and within the Jeffords Street right-of-way. Initially, alternatives were considered that would have involved channel widening or installing a box culvert in the existing channel with a swale over the top of the culvert. Both of these alternatives would have required the removal of the existing Sweetgum trees on the banks of the Creek, shown on Figure 3.1-19. Several residents spoke out at the public meetings opposing any plan that would require removal of the trees or otherwise permanently impact the nature of the existing Creek. In the recommended plan, however, the box culvert would be installed under the street, allowing the existing channel and sweetgum trees along Hillcrest Avenue to remain mostly undisturbed. This alternative received favorable comments at the second public meeting. Construction of high-flow diversion weir will allow low flows to remain within the existing channel. In addition to the bypass, the crossing of Stevenson Creek at Browning Street is proposed to be replaced with a 5' x 12' concrete box culvert.

Figure 3.1-19. Stevenson Creek Channel and Trees Along Hillcrest Avenue, Between Jeffords Street and Browning Street (to remain)

This project also includes replacement of a failing retaining wall upstream of Browning Street, and removal of excess vegetation from the Creek downstream of the Lakeview Road Bridge. As can be seen in Figure 3.1-20, the majority of the vegetation to be removed is nuisance vegetation such as primrose willow (*Ludwigia peruviana*), melaleuca (*Melaleuca quinquenervia*), and Brazilian pepper (*Schinus terebinthifolius*). The City of Clearwater spends many precious man-hours and a significant part of the annual budget removing these noxious species from their waterways. The conceptual layout of Project 4A is depicted in Figure 3.1-21.

Figure 3.1-20. Failing Retaining Wall Upstream of Browning Street, to be Replaced and Exotic Vegetation to be Removed

Project 4B. Upper Stevenson Creek Stabilization. Channel bank erosion is a major problem within Upper Stevenson Creek, in particular the section between Lakeview Road and Bellevue Boulevard, and to a lesser extent between Jeffords Street and Lakeview Road. As a partial remedy, various site-specific erosion repair measures could be implemented. These would consist of "spot" repairs of severely eroded areas using various methods such as gabion walls and geotextiles. These minor projects would target only those repairs necessary to protect public safety and private property from stream bank failures. However, this alternative would not stop the erosion from occurring, it would only repair the existing eroded areas. Additional repairs would have to be made periodically as problems occur. Another, more permanent alternative would be to re-shape the channel cross section and install erosion control measures along entire lengths of channel, in particular between Lakeview Road and Bellevue Boulevard. Examples of erosion control measures would be low retaining walls along the toe of the channel banks, constructed of gabion baskets or "geoweb"-type retaining walls. These walls

would support a gradually sloping backfill that could support vegetation, as illustrated on Figure 3.1-22. The recommended cross section would also include a maintenance travelway to facilitate access to the creek by City maintenance crews. This alternative would create a temporary impact to the creek that would require removal of some of the existing trees and other vegetation. Many of the trees within the easement could be preserved, however, and those that are removed would be replanted with 12'-15' shade trees such as Live Oak.

The project could also incorporate low rock weirs that create shallow pools, providing habitat for small fish, turtles, and beneficial invertebrates. The weirs would have the additional benefit of slowing bed erosion and oxygenating the water as it riffles over the rocks. The weirs would be low enough as to not cause a restriction to flood flows.

Project 4C. St Thomas Drive / Bellevue Boulevard Creek Restoration. The most severe and frequent flooding in the subwatershed occurs along Evergreen Avenue between Bellevue Boulevard and St. Thomas Drive, where seven homes were found susceptible to the 10-year flood. The flooding problem at this location is due to a 54" CMP culvert placed within the Stevenson Creek Channel that lacks the capacity to convey even the mean annual storm event. As illustrated on Figure 3.1-23, the recommended alternative project for Stevenson Creek between St. Thomas Drive and Belleview Boulevard includes removal of 950 feet of 54" CMP, restoration of the historical, meandering stream channel, and replacement of the Rice Lake control structure.

The Rice Lake control structure is designed as a 20-foot wide fixed concrete weir crest at elevation 36.0' NGVD, with a 24" wide low-flow notch at elevation 35.0', attached to a proposed 58" x 91" elliptical RCP culvert under St. Thomas Drive. It is recommended that the proposed Rice Lake control structure include an operable sluice gate at elevation 30.0' NGVD that would allow the lake to be temporarily drained for periodic maintenance dredging with the City's Menzi-Muck excavator. The

recommended maintained bottom elevation of Rice Lake is 30.0' NGVD. The culvert under Bellevue Boulevard is proposed to be replaced with a 58" x 91" elliptical RCP as well.

The project will require purchase of ten (10) flood prone homes on Evergreen Avenue between Belleview Boulevard and St. Thomas Drive. Including the ten homes to be removed, the project will remove 19 structure FPLOS deficiencies adjacent to the Creek between Bellevue Boulevard and Belleair Road.

The creation of a meandering stream in this area will greatly enhance the aesthetics of the neighborhood and provide significant water quality benefits. The meanders will include natural rock riffles at intervals in the stream. The riffles will provide protection against erosion in strategic areas but will also perform water quality functions. These riffles will oxygenate the water and provide habitat for beneficial invertebrates on the rock surfaces and in the interstitial spaces. The stream will be planted with trees and understory species that will mimic a natural hardwood hammock. Tree species proposed include laurel oak, Virginia live oak, red maple, cabbage palm, and American elm. Understory species may include such native shrub species Virginia willow, saw palmetto, and fetterbush, while the ground cover will likely be ferns such as royal fern, cinnamon fern, and Virginia chain fern. The master list of plants and the recommended planting depths are provided in Table 3.1-3.

As an alternative to this project, the 54" CMP could be replaced with 950' of double 8' x 14' box culvert within the existing easement. The culvert would safely convey and contain the 100-year discharge, alleviating the flooding and allowing all of the existing homes to remain for approximately the same capital cost, and substantially lower maintenance costs. However, this alternative would not create the secondary benefits associated with water quality, habitat, and aesthetics provided by the recommended alternative.

(FIGURE 3.1-21)

(FIGURE 3.1-22)

(FIGURE 3.1-23)

3.1.5 Subwatershed 5: Hammond Branch

Project 5A. Flagler Drive / CSX Railroad North Swale Improvements. As illustrated on Figure 3.1-24, this project includes construction of approximately 2,120 linear feet of minor ditch improvements along north side of the CSX Railroad from Linwood Drive and Sharondale Drive, west and southwest along the railroad, to Highland Avenue. The project will remedy the three FPLOS deficiencies identified on Linwood Drive near Sharondale Drive, on the north side of the CSX railroad that runs parallel to Flagler Drive. This problem area is the result of floodwaters from the Flagler Drive ditch backing up through twin 48" RCP culverts under the CSX railroad. The 48" culverts were intended to convey runoff from the subbasin to the north into the Flagler ditch. During flood events, however, the culverts flow in the opposite direction, directing floodwaters from the south side of the railroad, across the flood susceptible properties bordering Linwood Drive. The problem is exacerbated by the fact that the floor elevations of the homes are only 2-3 feet above the invert of the Flagler Drive Ditch.

The project alignment currently contains a poorly defined drainage swale. The proposed typical cross section has a 5-foot bottom width, and 3:1 (horizontal to vertical) side slopes on the side adjacent to the residential properties and 1:1 side slopes on the railroad side. The railroad side will need to be armored with riprap, and the project will require permission to perform work in railroad-owned Right-of-Way.

Downstream of the swale improvements, several upgrades to the Hammond Branch conveyance system will be required in order to remedy existing FPLOS deficiencies on Highland Avenue and Overlea Street, to replace a failed control structure between the two ponds between King's Highway and Highland Avenue, and to safely convey the additional discharge due to the swale improvements. The improvements include replacing the twin 48" culverts under King's Highway with a double 7' x 5' box culvert, replacement of both control structures on the two ponds between King's Highway and Highland Avenue, and replacement of the 38" x 60" ERCP culvert from the CSX railroad to the Highland Avenue pond with a combination of 10' x 6' box culvert and twin 60"

RCP's. In addition, construction of a 350'-long berm adjacent to the proposed swale would be required in order to divert drainage from a partially blocked ditch to Highland Avenue and into the proposed twin 60" RCP's (refer to Figure 3.1-24).

Project 5B. Palmetto Street Drainage Improvements. As illustrated on Figure 3.1-25, construction of approximately 1,900' of 54" RCP along Palmetto Street is recommended to divert treated stormwater from the Highland Avenue drainage system directly into Stevenson Creek. This project will provide flood relief for streets and homes in the area of the Hibiscus Street Pond, where a single structure FPLOS deficiency occurs on Hibiscus Street near King's Highway, when the storage capacity of the Hibiscus Pond is exceeded due to inflows from a 54" RCP culvert from the Highland Avenue drainage system. The existing outfall of Hibiscus Pond, consisting of a gunited 30" CMP, is not adequate to handle the inflows from the Highland Avenue culvert. A diversion weir near the outfall of the Highland Avenue detention pond will divert flood flows into the proposed 54" culvert. By installation of a small orifice, low flows could be allowed to continue to flow into the Hibiscus pond in order to promote flushing. The project will remedy a second structure FPLOS deficiency at the corner of Palmetto Street and King's Highway, and a collector road FPLOS deficiency at the same location. These FPLOS deficiencies technically lie within the Lower Stevenson Creek Subwatershed.

In order to provide additional water quality benefits, two existing small ponds on the Clearwater Country Club Golf Course near King's Highway and Palmetto Street could potentially be converted into an offline treatment system.

Project 5C. Saturn Avenue Drainage Improvements. This project includes the upsizing of 1,200' of existing 24" CMP and 14" x 23 arch CMP storm sewer along Saturn Avenue from Sherwood Street to Flagler Drive, in order to remedy street FPLOS deficiencies on Saturn Avenue at Sherwood Street and Leo Lane. The proposed pipe sizes are 36" RCP and 38" x 60" ERCP, as illustrated on Figure 3.1-26. The project could incorporate water quality features such as water quality inlets and/or CDS units.

Project 5D. Smallwood Circle Drainage Improvements. In the area of Smallwood Circle and Rosemere Road (southeast of Highland and Palmetto), homes were built in a depressional area surrounding a small city park, which floods frequently during moderate to heavy rains. As illustrated on Figure 3.1-27, the depression is drained by an undersized, failing 24" CMP culvert that runs under existing homes on Elmwood Street and Smallwood Circle. The recommended project is to abandon and fill the existing 24" CMP storm drain and construct approximately 1,000 feet of 24" x 38" and 36" storm sewer in a new alignment. The new alignment will tie into the Highland Avenue drainage system at Elmwood Street. Although the majority of the pipe will be constructed in public property or right-of-way, acquisition of drainage easements will be necessary along the rear lot lines of four properties on Smallwood Circle. The project will remove 100-year flood risk from two homes, and it will reduce the risk of house foundation failures due to the failing metal pipes. In addition, the project could incorporate water quality features such as water quality inlets and/or CDS units.

Project 5E. Lake Hobart Outfall Control Structure. The decrepit metal and wood outfall structure on this lake is proposed to be replaced with a new concrete structure, located on Figure 3.1-28. The new structure will be designed to increase hydraulic residence time of runoff from small storm events, which will increase the level of stormwater treatment this lake provides. This will be accomplished by incorporating a bleed-down notch at the existing control water elevation of approximately 63.7 feet, NGVD. In order to avoid increasing the flood elevations in the lake, a 6'-wide overflow weir will be constructed at elevation 64.5, allowing unrestricted discharge of flood flows. An oil and grease skimmers will be included to prevent discharge of these contaminants to the downstream system. In addition, homeowners around the lake could be encouraged to plant the shoreline with native aquatic species that will provide biological treatment and wildlife habitat. Figure 3.1-29 provides an example of the plants that can be used and the depths at which they should be planted.

(FIGURE 3.1-24)

(FIGURE 3.1-25)

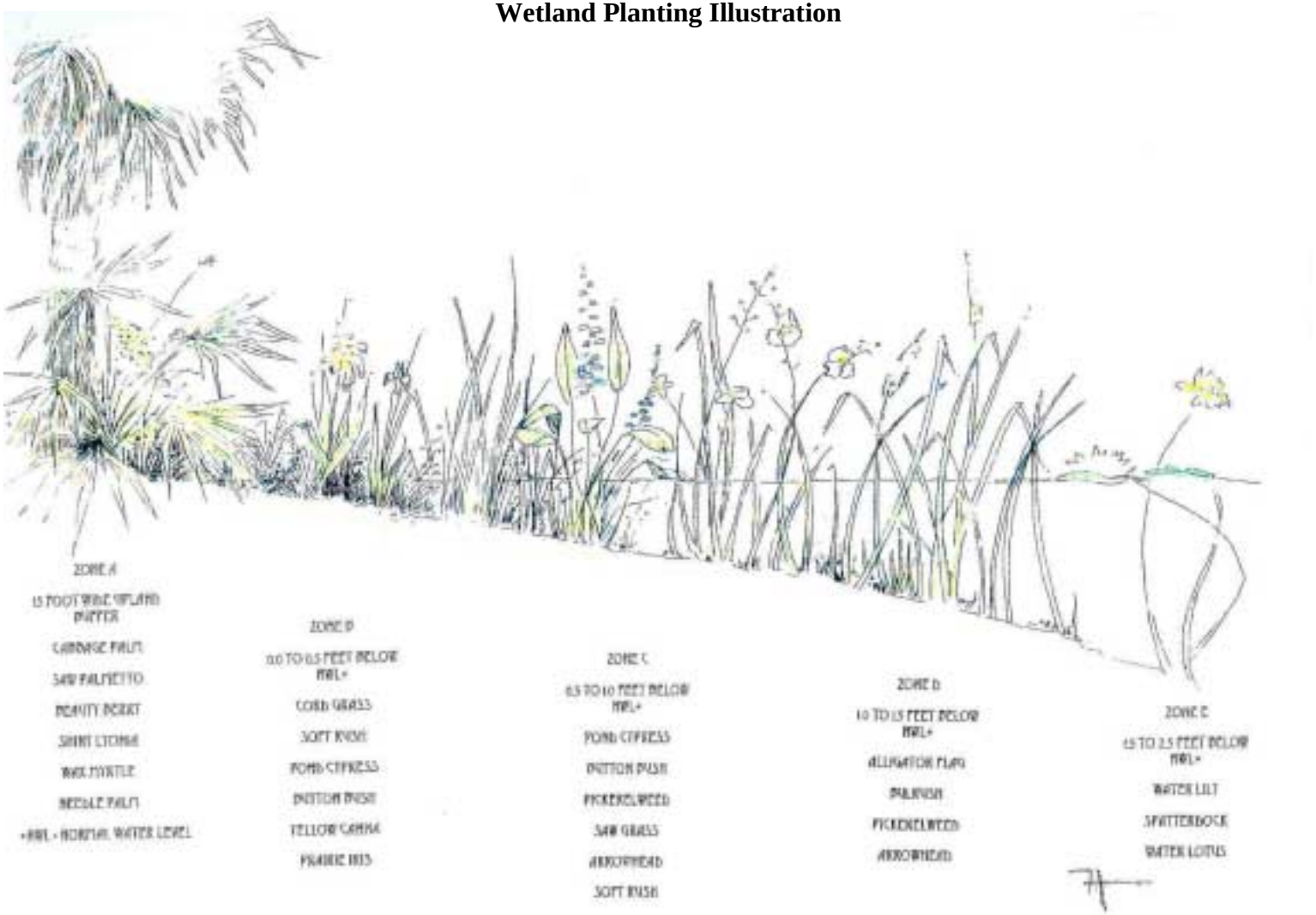
(FIGURE 3.1-26)

(FIGURE 3.1-27)

(FIGURE 3.1-28)

Figure 3.1-29

Wetland Planting Illustration



3.1.6 Subwatershed 6: Lake Bellevue Branch

Project 6A. Expansion of Lake Bellevue. In order to provide additional flood storage and littoral/wetland vegetation for water quality improvements, up to an eight-acre expansion of Lake Bellevue is proposed. The expansion would be accomplished by excavating the unutilized areas of Ed Wright Park and Ross Norton Park to provide additional lake area. The expansion is shown conceptually on Figure 3.1-30, however the actual limits of excavation must be coordinated with the City of Clearwater Parks and Recreation Department due to the plans for construction of a new recreation center in Ross Norton Park. A location for the recreation center has not been determined at the time of this writing.

This expansion would further increase the level of treatment provided by the lake and should improve overall lake water quality. Additional mass reductions of approximately 13,300 pounds of suspended solids and 550 pounds of nitrogen are expected on an annual average basis. These improvements will also enhance the ability of this lake to cope with current loadings and may reduce the frequency and severity of seasonal algal blooms that have been observed.

The project includes reconfiguration of Lake Bellevue outfall structure with addition of a bleed down notch and 30’ wide overflow weir to control the 100-year flood discharge. Control of the 100-year flood discharge would also require elevating the eastern 400’ of Dempsey Street approximately 12”, and construction of a low berm (1’-2’ high) through a portion of the park

The proposed expansion would remove an area of overgrown vegetation on the west side of the lake, as well as some areas on the east side. The vegetation on the west side of the lake includes some native trees such as laurel oak and live oak, as well as a number of exotic tree species such as ear tree (*Enterolobium contortisiliquum*) and Brazilian pepper. Several dead pine trees are also present on the site and the entire area is overgrown with wild grape. Native trees in good health could be preserved by creative grading, and some of the dense vegetation adjacent to the railroad tracks could be preserved as a buffer. The

inflow could be redirected to meander through this area for treatment prior to discharging into the lake. The excavated areas will be planted with pickerelweed, soft rush, arrowhead, yellow canna, cordgrass, and other herbaceous plant species suitable for this shallow littoral habitat. Trees will be planted to replace those removed, and the species planted will include cypress, red maple, and pop ash at the lake shoreline, and laurel oak, live oak, and dahoon holly in the upland portions of the site.

On Wildwood Way, west of the CSX railroad, several structures were built in a low area southwest of the Lake. The drainage for this area is towards Lake Bellevue, but flows are restricted by undersized culverts beneath the CSX railroad tracks. As illustrated on Figure 3.1-31, addition of three (3) 36" culverts by jack-and-bore under the railroad tracks is proposed at this location. Replacement of the culverts within the CSX railroad ditch at Woodlawn Ave. and Howard Street are proposed in order to remedy street FPLOS deficiencies at those locations. Projects 6A.1 and 6A.2 combined will remove the 100-year flood risk from eight structures corresponding to a total of 17 dwelling units, and will remedy street FPLOS deficiencies on one collector road and three residential streets.

Project 6B. Turner Street Box Culvert This project is to alleviate structure FPLOS deficiencies in five businesses on Missouri Avenue immediately south of Turner Street, and on Missouri Avenue itself, which constitutes an arterial road FPLOS deficiency at this location. This flooding problem is due to the fact that upstream of Missouri Avenue, the Lake Bellevue Branch flows into a 54" diameter culvert which lacks the capacity to convey the discharge resulting from even a mean-annual storm event. As illustrated on Figure 3.1-32, the recommended project includes construction of a 25-foot wide concrete control weir on the existing pond west of Missouri Avenue and north of Druid. The weir would have a lower notch at elevation 17.5 and an overflow weir at elevation 18.5. A portion of the 54" culvert would be replaced by approximately 180 feet of 5' x 9' concrete box culvert from the weir to Missouri Avenue, and construction of 1,530' of 6' x 11' concrete box culvert along Turner Street from Missouri Avenue to Glen Oaks

stormwater detention facility. A portion of the existing 60" and 66" culvert that runs along the south lot lines of properties on the south side of Turner Street could remain in service, running parallel to the proposed box culvert. In addition to the structure FPLOS deficiencies, the project will remedy street FPLOS deficiencies on one arterial road, one collector road, and two residential streets.

(FIGURE 3.1-30)

(FIGURE 3.1-31)

(FIGURE 3.1-32)

3.1.7 Subwatershed 7: Jeffords Street Branch

Due to the severe flooding problems identified at the confluence of the Jeffords Street Branch and Stevenson Creek, improvements to the conveyance system of the Jeffords Street Branch that would increase flood elevations downstream were not considered. The projects in this subwatershed consist primarily of creation or expansion of lakes, ponds, and wetlands in order to temporarily detain the floodwaters and control their discharge at a rate more effectively conveyed by the existing downstream system. These projects will also reduce pollutant loadings to Stevenson Creek. Collectively these three projects are estimated to remove approximately 6,960 pounds of suspended solids and 390 pounds of nitrogen on an annual average basis.

Project 7A. Crest Lake Expansion. The primary objective of this project is to reduce 100-year flood elevations in downstream areas of Jeffords Street Branch, and to provide water quality treatment of currently untreated runoff from 43 acres of residential land use. This would be accomplished by diverting runoff from subbasins 4424 and 4426 (refer to Figures 2.1-1 and 3.1-33) into Crest Lake via a proposed 1,370' long 36" RCP culvert from the intersection of Duncan Avenue and Rainbow Drive, along Rainbow Drive to Crest Lake. The existing 24" storm sewer along Duncan Avenue between Rainbow Drive and Marion Street would be abandoned. In order to provide an acceptable design tailwater elevation for the proposed diversion pipe, an expansion of Crest Lake of approximately six acres will be required. The expansion is shown conceptually on Figure 3.1-33, however the exact limits of excavation will need to be coordinated with the City Parks Department. In order to preserve the relatively good water quality in Crest Lake, the lake expansion could be designed as a shallow littoral shelf that will enhance the assimilative capacity of the lake.

Creating the 6-acre littoral shelf will require creative grading and sensitive design to preserve as many of the trees as possible. Several upland tree islands may be preserved in the created wetland for wildlife habitat. However, the expansion of the lake will

require the removal of numerous oaks, pines, and cabbage palms. These trees and other valuable plants will be replaced by installing new trees in all available upland areas. The littoral area will be planted with pickerelweed, arrowhead, soft rush, cord grass, alligator flag, bulrush, yellow canna, spatterdock, saw grass, and other beneficial aquatic species. Trees planted will include cypress, red maple, and pop ash at the lake shoreline, and laurel oak, live oak, and dahoon holly in the upland portions of the site.

The water quality improvements that will be realized by the creation of this wetland will be significant, and the wetland will be of sufficient size and quality to become breeding habitat for some wading birds, small mammals, and reptiles and amphibians.

The project is designed to work in tandem with Projects 7B and 7C to reduce FPLOS deficiencies within the Jeffords Street Branch Subwatershed.

Project 7B. Duncan Avenue/Turner Street Detention Pond. In the area bounded by Spencer Avenue, Turner Street, Duncan Avenue, and Druid Road, ten structure FPLOS deficiencies were identified, as described in Section 2.1.5.4. These structures were built in what was once a wetland, and they now flood on a very frequent basis, as seven are below the 10-year flood level and nine of the ten are below the 25-year flood level. The recommended solution to this problem is acquisition and removal of the ten flood-prone structures at this location and construction of a 2.5-acre wet pond, as shown on Figure 3.1-34. Since two of the structures have recently been purchased by the City, the project will require purchase of the remaining eight structures, two of which are on the same building lot and would likely be sold as a single property. The project includes construction of a control structure for the proposed pond that will control the normal water level at elevation 56.0 NGVD, and will tie into the existing 30” storm sewer along Duncan Avenue, south of Marion Street. The project will work in tandem with Projects 7A and 7C to reduce 100-year flood elevations in downstream areas of Jeffords Street Branch. In addition, the project will provide water quality treatment of currently untreated runoff from 27 acres of residential land use.

Project 7C. Jeffords Street/Barry Road Detention Pond. The primary component of this project is the construction of a 2.5-acre pond with wetland plantings east of Lake Avenue, incorporating 500 linear feet of the existing Jeffords/Barry ditch and requiring the purchase of nine (9) flood prone residential structures on south side of the existing ditch (refer to Figure 3.1-35). The pond will include construction of control structure with bleed down orifice near Lake Avenue, and new storm sewers to equalize the proposed pond with three existing lakes at the headwaters of the Jeffords Street Branch. The orifice at Lake Avenue will control the normal water level of the four equalized lakes at elevation 25.0 NGVD. A 30-foot wide overflow weir would be constructed at elevation 26.0 for flood control. The four lakes will be equalized by three segments of new storm sewer constructed below the proposed control water elevation, totaling approximately 930 feet in length, and ranging in size from 30" to 66". These culverts will allow the elevations within the four lakes to fluctuate together, thus behaving as a single lake for flood control and stormwater treatment purposes.

If constructed as part of projects 7A and 7B, the project will remove 100-year flood risk from 28 out of 45 structures (34 of 51 dwelling units). In addition, the four equalized lakes will provide wet detention stormwater treatment for runoff from 362 acres. The bleed down orifices will create a longer residence time in the lake system compared to the downstream Glen Oaks pond (Project 3A), so that the two projects would work together as a cascading wet detention system. The proposed 2.5-acre pond will serve as the littoral zone for the interconnected system of lakes. Plants recommended for this area include pickerelweed, arrowhead, soft rush, cord grass, alligator flag, bulrush, yellow canna, spatterdock, saw grass, and other beneficial aquatic species. Trees may be planted on the perimeter of the pond to act as a buffer from the residential areas. Trees recommended for planting in this vicinity are laurel oak, live oak, and dahoon holly. The planting depth zones for these species are found in Table 3.1-3.

In order to resolve problems of bank erosion and nuisance vegetation, and to reduce annual maintenance costs, the remaining 600 feet of the Jeffords/Barry Street ditch west of Lake Avenue is proposed to be piped in with twin 60" HDPE storm sewer. This portion of the project will nearly eliminate the $45,000 per year in maintenance costs to maintain existing ditch, based on man-hour and equipment cost estimates provided by the City's Road and Drainage Division to periodically remove the nuisance vegetation. If a project life span of 50 years is assumed with an annual interest rate of 7.0%, the present value of the savings in maintenance costs would be over $620,000 per year. Mitigation for this project would be provided in the proposed 2.5-acre pond on the east side of Lake Avenue.

(FIGURE 3.1-33)

(FIGURE 3.1-34)

(FIGURE 3.1-35)

- Figure 3.1-37 Stevenson Creek Flood Profile, Project Conditions
- Figure 3.1-38 Stevenson Creek Flood Profile, Project Conditions
- Figure 3.1-39 Stevenson Creek Flood Profile, Project Conditions
- Figure 3.1-40 Stevenson Creek Flood Profile, Project Conditions
- Figure 3.1-41 Stevenson Creek Flood Profile, Project Conditions
- Figure 3.1-42 Stevenson Creek Flood Profile, Project Conditions
- Figure 3.1-43 Spring Branch Flood Profile, Project Conditions
- Figure 3.1-44 Spring Branch Flood Profile, Project Conditions