

EXECUTIVE SUMMARY

Watershed Description

The Stevenson Creek Watershed, the largest and most urbanized watershed within the City of Clearwater, drains 6,286 acres in west central Pinellas County. Of this area, 4,057 acres (65 percent) are within the Clearwater city limits. The remaining 35 percent of the basin is within the City of Dunedin (1,287 acres or 20%), unincorporated Pinellas County (859 acres or 14%) and the City of Largo (83 acres or about 1%).

Stevenson Creek discharges to Clearwater Harbor. The majority of the creek has been channelized or otherwise altered, and little of the historic floodplain remains intact. Land uses within the basin are predominantly medium- and high-density residential, commercial, and open space. Approximately 90 percent of the watershed has been developed, and the vast majority of the development occurred prior to the implementation of regulatory requirements for floodplain preservation, environmental protection, stormwater treatment and attenuation. Several developments have been constructed within the creek's floodplain and have experienced severe flooding. In addition, the creek and its tributaries experience moderate to severe erosion problems due to steep embankments, improper maintenance, highly erodible soils, and inadequate right-of-way.

The majority of the land use changes within the watershed have been detrimental to water quality, flood protection, and wildlife habitat. Urban development has resulted in greater stormwater runoff volumes and peak flow rates, as well as the transport of sediments and pollutants into the creek.

Purpose and Objectives

The Stevenson Creek Watershed Management Plan has been initiated as the result of a cooperative agreement between the City of Clearwater and the Southwest Florida Water Management District (SWFWMD). Stormwater quality and quantity are identified within the City of Clearwater Comprehensive Plan as areas of service deficiencies which must be addressed.



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The basic purpose of the management plan is to identify the causes and sources of problems such as flooding, water quality degradation, excessive channel erosion, and loss of riparian habitat. Once these problems were identified, recommendations were made to solve or alleviate the problems. Recommendations include capital improvement projects (i.e. stormwater infrastructure improvements), creation and restoration of habitat, maintenance strategies, pollution reduction programs, and public involvement and awareness. This management plan will be used as a tool in the planning, regulation, and management of natural resources and future development, and as a basis for determining and prioritizing capital improvements by the City of Clearwater and SWFWMD.

Data Collection

The information-gathering process included such activities as a literature search and review of existing data, field reconnaissance and ground-truthing of aerial photography, ground surveying, streamflow monitoring, surface water sampling and testing, habitat assessment, interviews with City operations personnel, and input from residents of the watershed.

Flood Protection Level of Service

In order to assess the current flood protection level of service and to determine the most effective means of alleviating the identified flooding problems, a hydrologic and hydraulic model of the watershed was prepared.

The Advanced Interconnected Channel and Pond Routing Model, Version 2.2 (AdICPR) was chosen for the hydrologic and hydraulic modeling analysis. To provide the necessary level of detail, the basin was divided into a total of 307 discrete subbasins averaging 20.5 acres in size. The delineation of subbasins was dictated to a large extent by the complexity of the drainage network itself and the need to define the contributing drainage area to modeled elements of the conveyance system.

The AdICPR model was calibrated to measured rainfall and streamflow data collected for this project. The large storm of July 15, 2000 was used as the calibration event. Once calibrated, the model was used to simulate the 5, 10, 25, 50, 100, and 500-year design flood events. Floodplain mapping and flood profiles were prepared in order



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to identify flooding problem areas. This information will be used to support a request for revision of the applicable FEMA flood insurance rate maps.

Design 100 year flood elevations were compared with surveyed finished floor elevations of homes and businesses within the 100-year floodplain. Of the 470 structures entered into the database, 263 structures were found to have finished floor elevations below the 100-year flood level. This is, by definition, a structure flooding level of service deficiency. The majority of these structures are located within the primary floodplains of the Stevenson Creek and Spring Branch main channels. However, many of the identified FPLOS deficiencies result from inadequate secondary drainage systems that feed into the main channels.

Natural Systems

The entire watershed was investigated for undeveloped land, wetlands, natural areas, and potential restoration or preservation areas. The boundaries of the natural areas were identified and mapped on aerial photography. These areas were characterized using the Florida Land Use Cover and Forms Classification System (FLUCCS) (FDOT, 1985).

The Stevenson Creek Watershed is a highly urbanized, densely populated area with little to offer in the way of natural systems. With one exception, the only undeveloped areas are golf courses and city parks. Wetlands are predominantly small isolated stormwater retention ponds or natural lakes that have been altered to such a degree that their origin can only be determined from historic aerial photography. The waterways are predominantly channelized with little riparian habitat. The intense development has also altered the estuarine system so that little habitat is provided at the mouth of Stevenson Creek.

Water Quality Assessment

Low dissolved oxygen levels, fecal contamination, and excessive nutrient concentrations are the primary water quality issues that have been identified in the watershed, and as such, water quality in Stevenson Creek is rated as “poor” by the state. The state’s rating is based on sampling conducted by the Pinellas County Department of



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Environmental Management (PDEM). The city's ambient monitoring program as well as monitoring conducted for this study affirms these water quality issues.

Stevenson Creek is included on Florida's impaired waters list {303(d) List} due to concerns over dissolved oxygen, fecal coliform bacteria, and nutrients. The FDEP has given Stevenson Creek a priority rating of "High". Stevenson Creek is located in the "Crystal River to St. Petersburg Beach Basin" which is in Group 5 of the basin rotation cycle. TMDL development activity is expected to begin in 2004.

Water quality assessments conducted for this study included the following elements:

- Review of Existing Data,
- Base flow and storm event monitoring program,
- Water quality data interpretation,
- Nonpoint source loading assessment, and
- Fecal contamination source tracking study.

Capital Improvement Projects

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. A total of 26 individual capital projects are recommended, consisting of a combination new stormwater management facilities and retrofits to existing facilities and infrastructure. 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



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FPLOS deficiencies at 33 locations on residential streets, 16 locations on collector roads, and on one arterial road.

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.

Other Improvements/Recommendations

In addition to the capital improvement projects, the WMP includes recommendations for watershed maintenance activities, exotic plant eradication, public education and involvement, and legal and regulatory framework. A more detailed and comprehensive study to pinpoint the source(s) of the fecal coliform bacteria is also recommended. The study would serve as the basis for developing an effective strategy to address the fecal contamination problem.

Capital Costs

For purposes of budgetary planning, cost estimates were made of each recommended capital improvement project. The cost estimates are based on the conceptual design and are subject to change pending completion of a more detailed design process. The total estimated cost of the recommended projects is approximately \$27 million, in 2001 dollars, including property acquisition design, and permitting. The magnitude and scope of the recommended improvements, coupled with budgetary constraints, will require phased implementation of the plan over a number of years.

Project Prioritization

Capital projects that can be expected to provide the greatest overall benefit in the most cost effective manner were identified using a project ranking procedure. This management tool is a convenient and effective method of recommending priorities for the allocation of available funding. To help identify the priority projects in the Stevenson Creek Watershed Management Plan, a set of comparative evaluation criteria were identified, and a project ranking matrix was developed. Within each category, individual projects were graded on a scale from 0 to 10, with the lowest score indicating no real



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benefit and the highest indicating a high beneficial value. The categories considered in the ranking analysis included the following:

- flood control benefits,
- water quality benefits,
- ecological benefits,
- channel erosion and sedimentation control benefits,
- Recreational and Educational Benefits,
- Implementability, and
- Relative Benefits to Cost.

Those projects which serve multiple purposes rank the highest when compared to those with singular objectives. Also apparent is the observation that the projects that rank the highest generally have the highest scores in the relative benefits to cost category.

Through the public meetings, workshops, and meetings among members of the project team, five projects were identified as potentially controversial. These include the highest-ranked project, the Glen Oaks stormwater detention facility. Winning public support for these projects through the City's public information initiatives will be crucial to successful implementation of these projects. The final design and implementation of these projects must be sensitive to resident's potential concerns regarding alternative recreational opportunities, the environment, safety, aesthetics, and property values.

