



## **Sarasota County Stormwater Division**

### **Whitaker Bayou**

### **Alternative Analysis Report**

April 22, 2020



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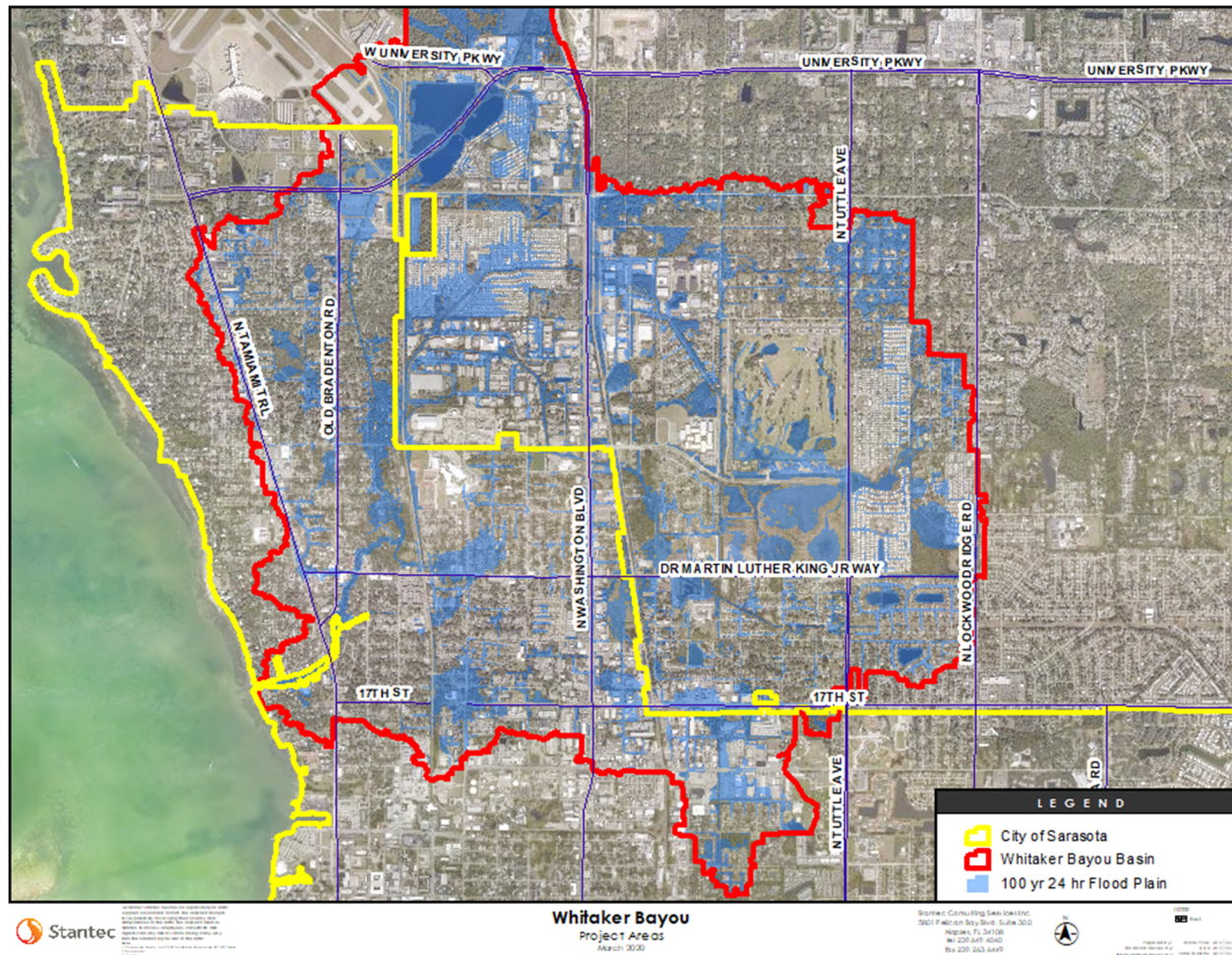


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# 1. INTRODUCTION

The Whitaker Bayou Basin is in the northwest portion of Sarasota County with approximately 40% of the basin located within the city limits of the City of Sarasota. The Whitaker Bayou basin experiences repeated residential and commercial damage due to flooding. No assessment for flood protection capital improvement projects has been implemented in the Whitaker Bayou Basin.



In 2016 and 2017, 100-year design storm rainfall events impacted the residents of Whitaker Bayou including structure flooding and street flooding in excess of the County's adopted Level of Service. While the County has provided the required maintenance of the stormwater management system in the Whitaker Bayou Basin, flood prone areas as identified in previous basin studies remain vulnerable to flooding.

Stantec was requested to perform an analysis of the Whitaker Bayou Basin to determine if there are any cost-effective flood control projects. This report outlines the analysis including the update to the cost-effective analysis, potential flood protection improvements, conclusions and recommendations.

## 2. BACKGROUND

In the late 1990's and early 2000's, Sarasota County worked with the US Army Corp of Engineers (USACE) to develop and evaluate projects to address Floodplain Level of Service Deficiencies in the Whitaker Bayou Basin. Several proposed projects were developed, but the projects did not meet the Federal requirements for participation because the cost to implement the projects exceeded the annualized benefits. The Whitaker Bayou Final Feasibility Study was issued by the USACE in June 2003.

Sarasota County staff developed the Whitaker Bayou Basin Master Plan and mapped the Whitaker Bayou 100-year 24-hour floodplain. The County's Whitaker Bayou Basin Master Plan was adopted by the Board of County Commissioners in December 2003.

In 2003, Sarasota County contracted with Boyle Engineering Corporation to develop and evaluate alternative projects that may be implemented without Federal Funding from the USACE. Since the cost of the projects would be carried by the residents in the Whitaker Bayou by a special capital project assessment, the County held public meetings to present the projects and the annual assessment costs. The residents of the Whitaker Bayou were not receptive to the cost of the projects. The Whitaker Bayou Flood Attenuation Alternatives Analysis final report published by Boyle in November of 2004 identified projects and found that the project costs exceeded the benefit from the projects.

In January 2012, the Sarasota Bay Estuary Program received the final report for the Whitaker Bayou Greenway Park and Stormwater LID Retrofit Pilot report from Stantec. The report identified the potential greenway park area in Whitaker Bayou and several options to implement low impact designs in the Whitaker Bayou to provide both water quality benefits and an additional stormwater storage to mitigate runoff volumes.

In December 2013, the Whitaker Bayou stormwater model and GIS database were updated with the 2007 LiDar and is considered the most recent Whitaker Bayou Model data. The ICPR v3 Model and all the elevation data used in this analysis is in the NGVD29 datum.

### 3. COST EFFECTIVE ANALYSIS UPDATE

A Cost Benefit Analysis was adopted by the Board of County Commissioners on December 5, 2000. The Sarasota County Stormwater Division applies a cost benefit analysis to proposed capital projects to determine if the project will provide stormwater management improvements for a cost-effective investment.

In certain instances, even if a project's costs exceed the tangible benefits of flood control, the County may determine the project provides public value supported by numerous intangible benefits such as health, safety, and community support. These intangibles should be given consideration on a case by case basis when deciding whether to go forward with a project.

Stantec updated the Cost Benefit Analysis and the update is included Section 6.1.

## 4. WHITAKER BAYOU ALTERNATIVES

### 4.1 REVIEW WHITAKER BAYOU MASTER PLAN

Stantec reviewed alternatives proposed in the Whitaker Bayou Master Plans:

1. Whitaker Bayou Final Feasibility Study – USACE June 2003

The proposed alternatives provided some flooding relief, but only one was considered cost effective for federal implementation. Alternative 4 was considered further but the benefit did not outweigh the costs of the project, which is required for federal implementation. Therefore, none of the proposed alternatives were advanced to design phase.

2. Whitaker Bayou Flood Attenuation Alternatives Analysis – Boyle November 2004

The benefit to cost ratio for the proposed alternatives ranges from 0.036-0.211. A project with a cost benefit ratio greater than one (1.0) is an effective project. The two alternatives that have the highest benefit to cost ratio, E and G, proved to be the most economically feasible.

A Public Information Meeting was held on September 23, 2004 to share the proposed projects with the residents of the area. Survey and comment sheets were provided and the public expressed concerns which include the following: high cost of projects, homeowners wouldn't be able to afford; County should consider buying out the structures that repeatedly flood; evaluate further options that are beneficial and cost effective; education of public on keeping ditches clean; suspended solids concentration in the basin is too high; and many residents did not think the projects would be beneficial to their neighborhood. Based on the feedback collected at the public meeting, none of the proposed alternatives were advanced to the design phase.

3. Whitaker Bayou Greenway Park and Stormwater LID Retrofit Pilot – WilsonMiller Stantec January 2012

Stantec evaluated the Whitaker Bayou Basin to identify the opportunities for a Whitaker Bayou greenway and to identify opportunities for water quality improvement projects in the basin. The Whitaker Bayou greenway project consists of investigating the addition of a public amenities along the main Whitaker Bayou area as well as incorporation of eight other project sites for improved water quality and public education. The Whitaker Bayou Greenway project was determined to be economically infeasible due to the private land ownership along the canal. The connection of the Bus Rapid Transit (BRT) to the



Whitaker Bayou would require trips through neighborhoods and would reduce the natural greenway experience that would have been created.

Stantec proposed the conceptual plans for the Whitaker Bayou LID Improvements to the North Trail Redevelopment Committee, New College Coastal Ecology Class, the Science and Environment Council of Sarasota County, personnel at the Ringling College of Art and Design and the Sarasota Bay Estuary Program's Management District, and the Florida Department of Environment Protection. Stantec also discussed the improvements with SWFWMD regarding permitting for the improvements.

The three (3) studies provided alternative solutions to help address the flood control issues in the basin and looked at opportunities to retrofit areas to provide water quality improvements and recreational amenities to the residents of the Whitaker Bayou area, however the proposed projects were not cost effective.

## **4.2 MODEL CALIBRATION**

Adjustments within the December 2013 Whitaker Bayou model were made to calibrate to the survey data collected from August 27-30, 2017 storm. These adjustments included changing Manning's "n" based on known county maintenance activities, as well as adjusted for known blockages. Specific nodes were outside of an acceptable margin of error, which was attributed to isolated blockages and/or local differences in rainfall. It was agreed that the calibration exercise illustrated that the on-ground conditions for the northern portion of the Whitaker Bayou were captured in the model calibration and adjustments to the Manning's "n" values for the cross sections downstream of Myrtle could be refined.

It was decided that for the purposes of evaluating the proposed projects, the standard 100-year 24-hour design storm would be used along with modifications to the Manning's "n" values to reflect standard county maintenance practices.

## **4.3 ALTERNATIVE DEVELOPMENT**

Addressing structures susceptible to flooding in the 2-, 5- and 10-year storms will return the best value for the money, however these will also be the most difficult to address when designing for the 100-year storm. Purchasing properties at risk in the 2-, 5- and 10-year storms was discussed with Stormwater Division staff. Purchasing at risk properties will eliminate the flood risk for all storm events for the purchased properties. A significant amount of these properties are mobile homes located in Tri Par Estates. Purchasing properties also creates opportunities for future flood control and passive recreation projects.

The concept of Aquifer Recharge wells was also discussed. Whitaker Bayou is in the most impacted area of the Southwest Use Conservation Area (SWUCA), which is looking for opportunities to recharge the aquifer. This also has the potential to create a salinity barrier using surface water runoff. The challenge for Aquifer Recharge in this basin is the limited public land.

A Stormwater Harvesting option was considered. The analysis was based on peak discharges from five proposed pump stations. The volume of stormwater runoff generated in a 100-year 24-hour event was calculated to be approximately 425 ac-ft or 138,880,395 gallons. Option 1 was evaluated based on a free flow discharge to Sarasota Bay. Option 2 evaluated connecting the five proposed pump stations to existing reclaim lines in proximity to each of the proposed pump stations. Option 3 evaluated pump stations with a dedicated conveyance to an Eastern Sarasota County Site. The options developed for stormwater harvesting systems to accommodate the runoff volume of stormwater runoff generated in a 100-year 24-hour event were cost prohibitive.

#### **4.3.1 CAPITAL IMPROVEMENTS AND COST-EFFECTIVE ANALYSIS**

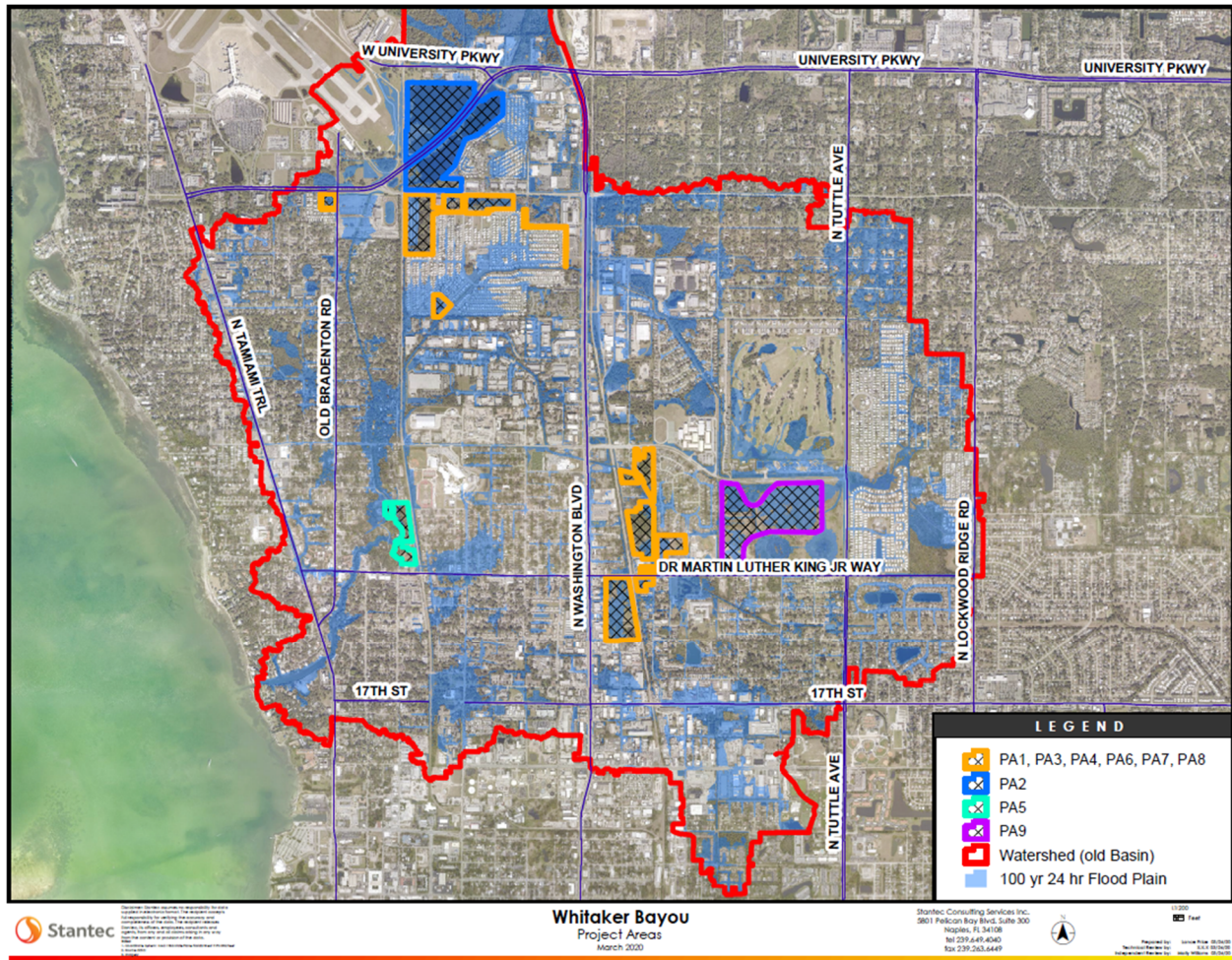
##### **Existing Conditions**

Sarasota County has conducted several studies to identify potential flood control projects to reduce flood risk in the Whitaker Bayou Basin. Finished Floor Elevation data for flood prone areas of the Whitaker Bayou was provided by the County and reviewed. With re-development and removal of some structures, there are 21 commercial properties, 10 multi-family properties, 54 residential structures, and 41 residential mobile home structures for a total of 126 structures in flood prone areas.

Cost effective projects are difficult to identify due to the limited available land for stormwater runoff storages in highly urbanized area. The Whitaker Bayou Basin generally has very dense housing with minimal open space with localized low areas of elevation and areas upstream of conveyance restrictions. Housing in the Whitaker Bayou includes structures constructed prior to the adopting of the Flood Insurance Rate Study (FIS) and the Flood Insurance Rate Maps (FIRM) in 1974. The commercial corridor with the greatest flood risk is in a localized low area of elevation and options for conveyance improvements are limited and have minimal benefit.

##### **Project Areas 1, 3, 4, 6, 7, and 8**

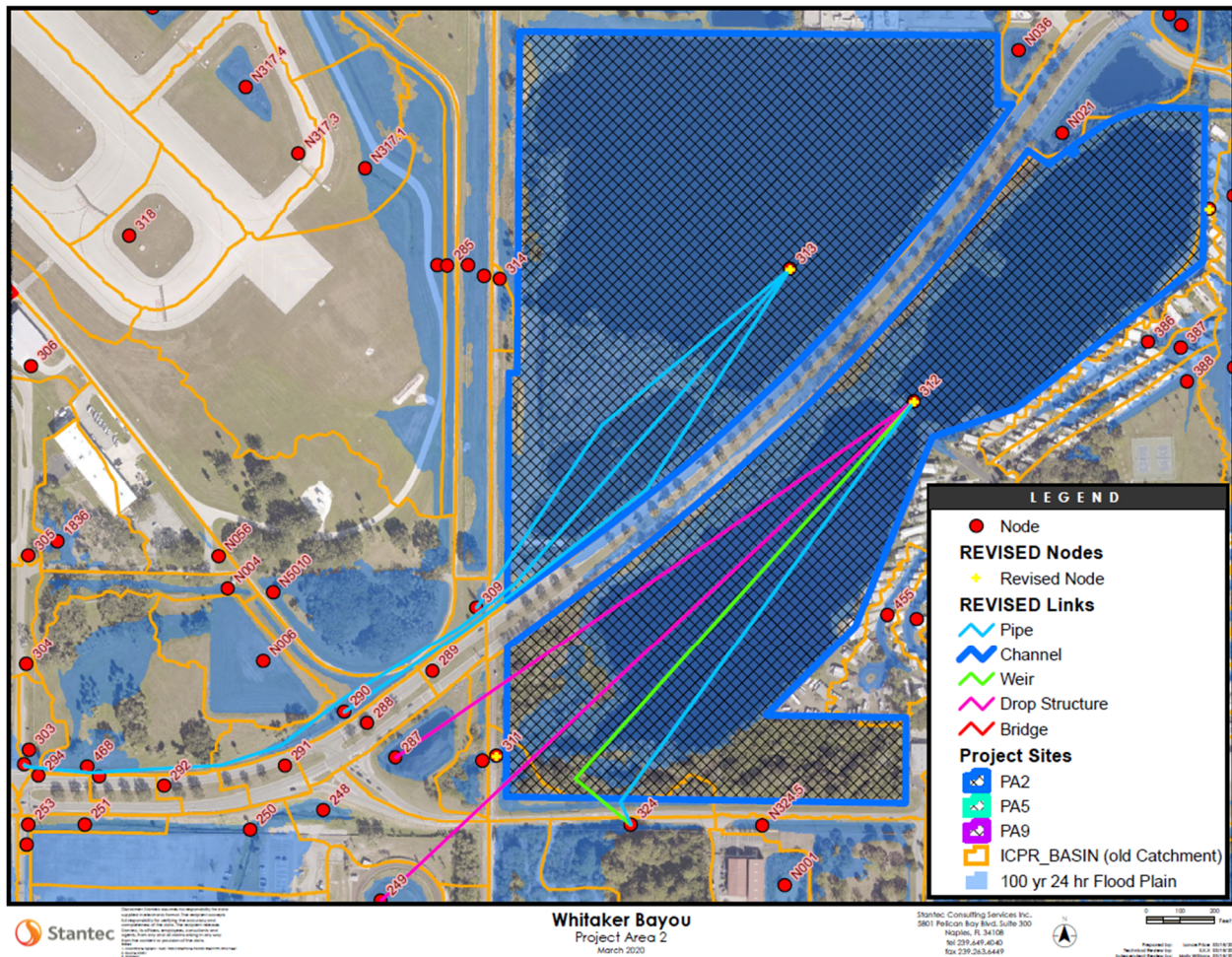
Project Areas 1, 3, 6 and 7 were determined to be cost prohibitive. These projects required the purchase of private property in addition to the construction costs and the projects provided minimal benefit. Project Area 4 is located on public lands, but the reduction in flood risk would be negligible. Project Area 8 is about half of the land area as Project Area 9 and is further removed from the flood prone areas. Project Area 8 costs would be 60% to 70% of costs for Project Area 9 and may have decreased benefits.





## Project Area 2 (PA2)

Project Area 2 is located in the Main Whitaker Bayou Sub Watershed and includes the two stormwater ponds owned by Sarasota County along University Parkway just east of the Sarasota Bradenton International Airport and west of US 301. The intent of the project is to hold back flow from the downstream system during the peak time and release the flow after the peak – similar to the active management of the Celery Field Stormwater Management Facility.



The improvements include:

- Maximizing the storage area with additional excavation of areas adjacent to the existing pond sites;
- Modification of the outfall and control elevation;
- Active management of the surface water level including dropping the water level pre storm events to increase storage capacity in the stormwater ponds to reduce the conveyance from the area during a storm event; and

- Redirect flow from areas adjacent to the stormwater ponds that currently discharge to the main Whitaker Bayou system to the stormwater ponds to attenuate the stormwater runoff.

Project Area 2 conceptual stormwater modeling resulted in \$336,000 in avoided damages with a conceptual level cost estimate of \$1,866,320 for a cost benefit ratio of 0.18.

### **PA2 with Property Purchase**

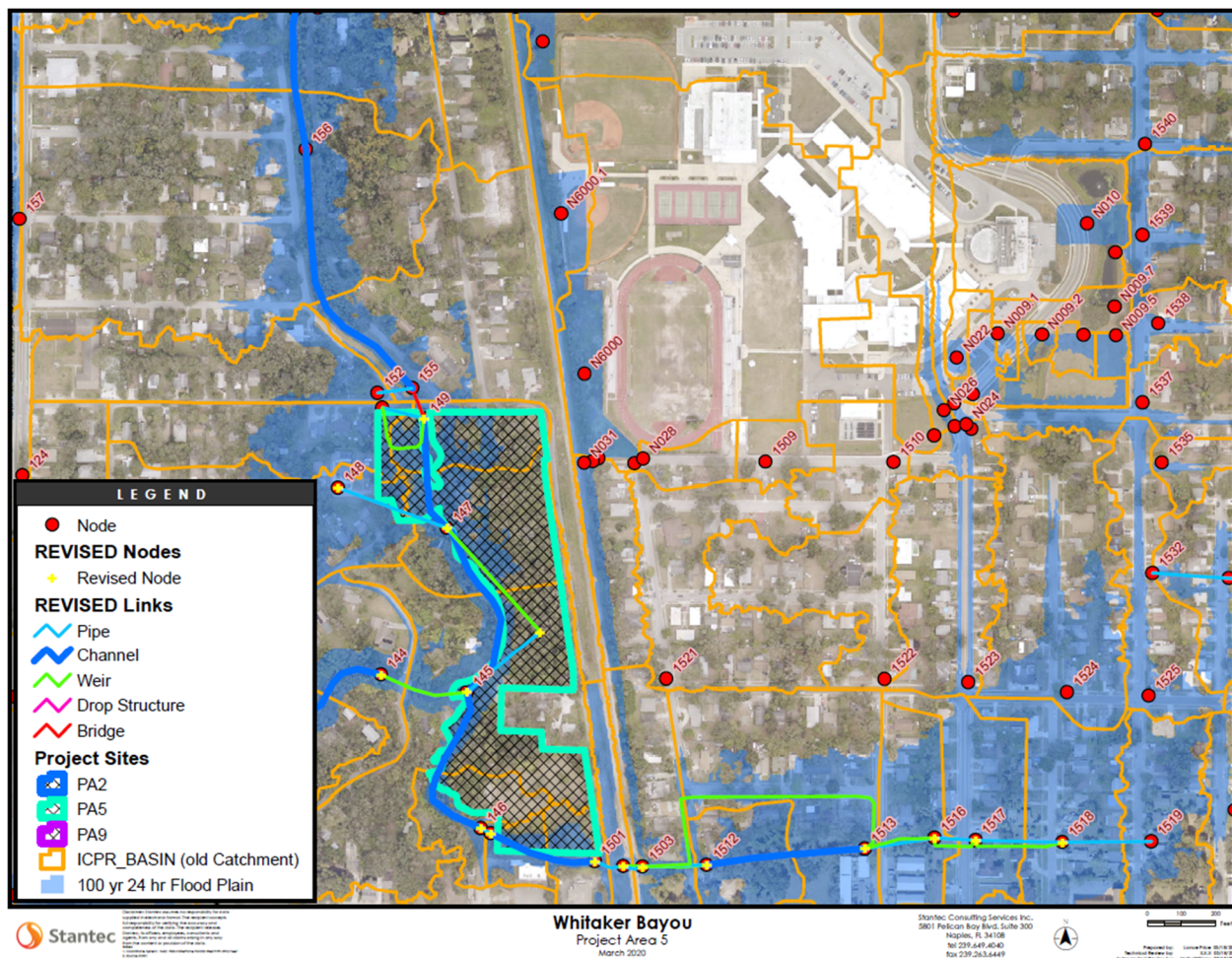
Purchase of properties in conjunction with conceptual project improvements was evaluated. The criteria for property purchase was targeted properties at flooding risk from the 2-year, 5-year and 10-year 24-hour storm events accounting for the conceptual project improvements.

Project Area 2 conceptual project improvements reduced the flood risk for four (4) properties. The Project Area 2 including property purchase option resulted in \$7,460,000 in avoided damages and recommended the purchase of 47 properties with an estimated purchase cost (2 x the 2019 Assessed Value) of \$7,463,034. The estimated purchase cost added to the project construction cost of \$1,866,320 yielded a total cost of \$9,329,354 and a cost benefit ratio of 0.80 with a total of 51 properties benefiting from the project.



## Project Area 5 (PA5)

Project Area 5 is located in the Main Whitaker Bayou Sub Watershed between Myrtle Street and Dr. Martin Luther King Blvd between Coconut Ave and the Railroad corridor. The project area also includes conveyance improvements to the Whitaker Bayou Tributary C between Riverside Drive and Goodrich Avenue. The intent of the project is to create a storage area for stormwater with enough capacity to allow increased flows due to conveyance improvements along Tributary C to flow and discharge to the downstream conveyance before the stored stormwater volume is released using the same downstream conveyance at a later time in the storm.



The improvements include:

- Conveyance Improvements between Myrtle St and 32nd St;
- Improve open conveyance along the main Whitaker Bayou and between 32nd St and confluence with Tributary C;
- Create a stormwater storage facility between 32nd Street and the Tributary C confluence;
- Improve closed conveyance in Railroad right-of-way; and

- Conveyance Improvements along Tributary C between North Orange Avenue and the confluence with the Main Whitaker Bayou.

Project Area 5 conceptual stormwater modeling resulted in \$2,410,000 in avoided damages with a conceptual level cost estimate of \$4,520,281 for a cost benefit ratio of 0.53.

#### **PA5 with Property Purchase**

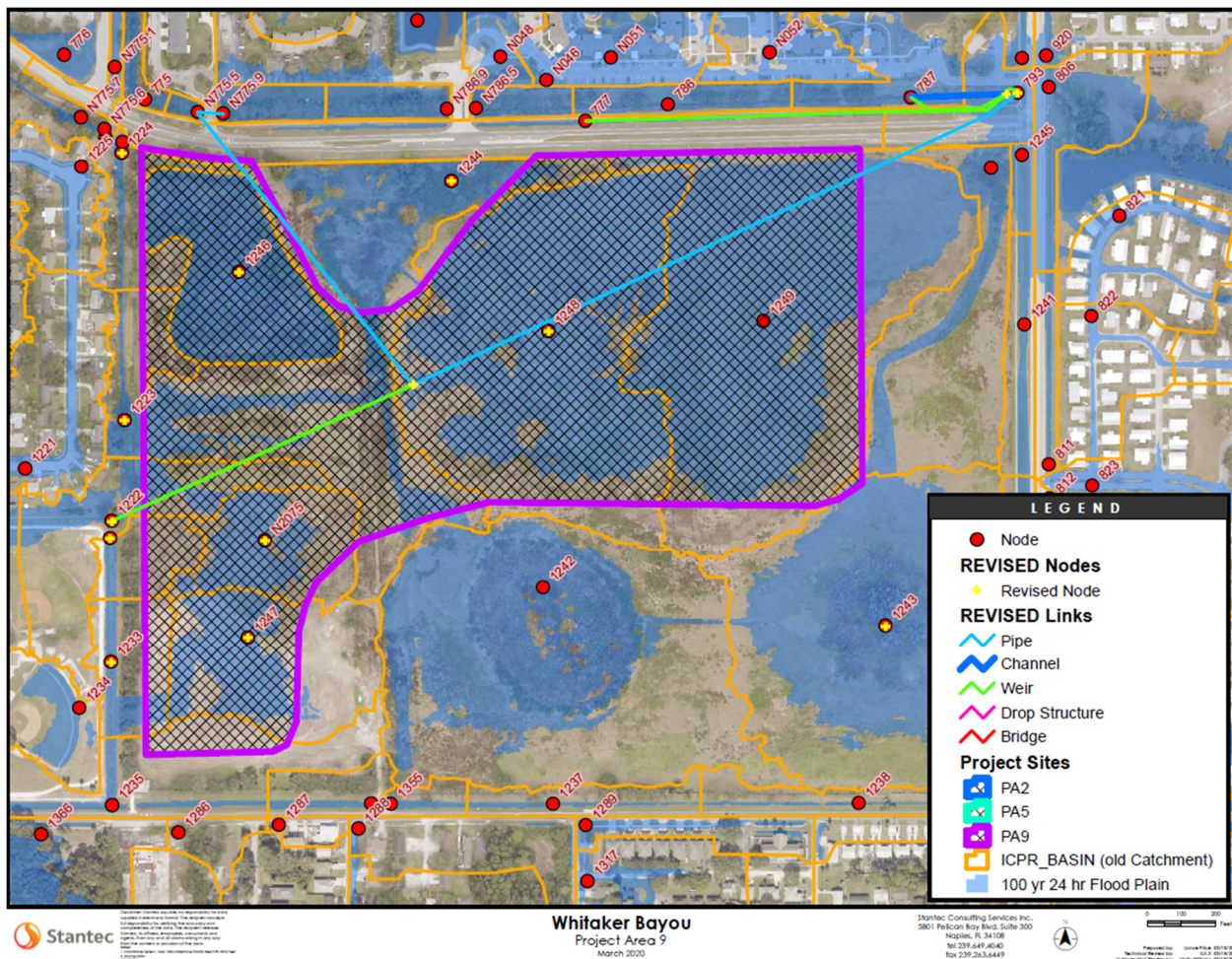
Purchase of properties in conjunction with conceptual project improvements was evaluated. The criteria for property purchase was targeted properties at flooding risk from the 2-year, 5-year and 10-year 24-hour storm events accounting for the conceptual project improvements.

Project Area 5 conceptual project improvements reduced the flood risk for 37 properties. The Project Area 5 including property purchase option resulted in \$5,894,000 in avoided damages and recommended the purchase of 27 properties with an estimated purchase cost (2 x the 2019 Assessed Value) of \$3,768,472. The estimated purchase cost added to the project construction cost of \$4,520,281 yielded a total cost of \$8,288,753 and a cost benefit ratio of 0.71 with a total of 64 properties benefiting from the project.



## Project Area 9 (PA9)

Project Area 9 is located in the Tributary B Sub Watershed. PA9 would create a Stormwater Management Facility located on the Sarasota County Public Utilities owned parcel bounded by Dr Martin Luther King Blvd to the south, Tuttle Avenue to the East and Myrtle Street to the north. The intent of the project is to hold back flow from the downstream system during the peak time and release the flow after the peak – similar to the active management of the Celery Field Stormwater Management Facility. The project would move the Stormwater Management Facility from the Tributary B Sub Watershed into and benefit the Tributary A Sub Watershed, specifically providing benefit in the Tri-Par Estates area.



- Construction of a discharge pipe from the stormwater facility to a location downstream of Grantham Drive.

Project Area 9 conceptual stormwater modeling resulted in \$1,175,000 in avoided damages with a conceptual level cost estimate of \$8,161,200 for a cost benefit ratio of 0.14. The project cost may be reduced by optimizing the storage facility size, outfall, and function.

### **PA9 with Property Purchase**

Purchase of properties in conjunction with conceptual project improvements was evaluated. The criteria for property purchase was targeted properties at flooding risk from the 2-year, 5-year and 10-year 24-hour storm events accounting for the conceptual project improvements.

Project Area 9 conceptual project improvements reduced the flood risk for 27 properties. The Project Area 9 including property purchase option resulted in \$5,973,000 in avoided damages and recommended the purchase of 38 properties with an estimated purchase cost (2 x the 2019 Assessed Value) of \$6,259,880. The estimated purchase cost added to the project construction cost of \$8,161,200 yielded a total cost of \$14,421,080 and a cost benefit ratio of 0.41 with a total of 65 properties benefiting from the project.

### **ALT MASTER**

The ALT MASTER model includes Project Area 2, Project Area 5, and Project Area 9 improvements as a wholistic approach to reduce the flood risk in the Whitaker Bayou.

The ALT MASTER conceptual stormwater modeling resulted in \$3,998,000 in avoided damages with a conceptual level cost estimate of \$14,547,801 for a cost benefit ratio of 0.27.

### **ALT MASTER with Property Purchase**

Purchase of properties in conjunction with conceptual project improvements was evaluated. The criteria for property purchase was targeted properties at flooding risk from the 2-year, 5-year and 10-year 24-hour storm events accounting for the conceptual project improvements.

The ALT MASTER model includes the Project Area 2, Project Area 5, and Project Area 9 improvements as a holistic approach to reduce the flood risk in the Whitaker Bayou and reduce the flood risk for 68 properties. The ALT MASTER project including property purchase option resulted in \$6,454,000 in avoided damages and recommended the purchase of 15 properties with an estimated purchase cost (2 x the 2019 Assessed Value) of \$2,225,980. The estimated purchase cost added to the project construction cost of \$14,547,801 yielded a total cost of \$16,773,781 with a cost benefit ratio of 0.38 and a total of 83 properties benefiting from the project.

## **Additional Capital Improvement Opportunities**

As roadway improvements are designed to increase roadway capacity and function, additional design considerations to reduce flood risk and improve floodplain level of service should be considered in conjunction with the roadway design to capture cost efficiencies. The additional costs warrant a cost share between roadway and stormwater improvements.

As capital improvement projects are implemented in the community, the use of green infrastructure and low impact design can provide an incremental benefit to water quality and quantity and over time the community can benefit from the compounded improvements.

### **4.3.2 LOW IMPACT DESIGN IMPLEMENTATION**

Sarasota County published a Low Impact Development (LID) Guidance Document in May 2015 to supplement the Southwest Florida Water Management District (SWFWMD) stormwater and surface water management guidance documents. The LID stormwater management practices are not mandatory but are encouraged. Applying LID design concepts especially in urbanized areas can improve the water quality of runoff discharging to the bays. Implementing an incentive program could encourage the use of LID practices.

### **4.3.3 FLOODPLAIN RECLAMATION PROJECTS**

Floodplain reclamation projects are viable option for areas where voluntary property purchases are implemented. In addition to reducing the flood risk, the facilities can be designed to provide amenities and passive recreation facilities for residents in addition to providing flood protection and increasing community resilience.

### **4.3.4 VOLUNTARY PROPERTY PURCHASE**

Purchase of properties at risk for flood damage and / or in areas where the contiguous floodplain is such that a cost-effective capital improvement project is not feasible, will reduce the community flood risk. Federal program allows for purchase of properties up to \$276,000 without cost benefit analysis. See Section 6.3 for FEMA's *Cost Effectiveness Determinations for Acquisitions and Elevations in Special Flood Hazard Areas* memo dated August 15, 2013.

### **4.3.5 FEDERAL MITIGATION GRANT PROGRAMS**

FEMA requires state, tribal, and local governments to develop and adopt hazard mitigation plans as a condition for receiving certain types of non-emergency disaster assistance, including funding for mitigation projects. Jurisdictions must update their hazard mitigation plans and re-submit them for FEMA approval every five years to



maintain eligibility. Sarasota County has a well-developed Joint Unified Local Mitigation Strategy (LMS) that is a tool to establish funding priorities for hazard mitigation activities for disaster assistance available following a major disaster. The Stormwater Division can consider placing the flood protection recommendations for the Whitaker Bayou on the LMS project list to ensure eligibility for funding. The LMS was updated and adopted in 2018; however, additional projects can be added to the list as needed. Therefore, careful planning on the part of the City can result in significant funding opportunities for mitigation projects.

FEMA's Hazard Mitigation Assistance (HMA) grant programs provide funding for eligible mitigation activities that reduce disaster losses and protect life and property from future disaster damages including the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM), Flood Mitigation Assistance (FMA). FMA funding is available through the National Flood Insurance Fund (NFIF) for flood hazard mitigation projects as well as plan development and is appropriated by Congress.

Existing Federal mitigation programs are available for repetitive loss properties and properties at risk. Property owners are required to pay for the mitigation improvements and the Federal program reimburses the property owner. Several structures in Sarasota County have taken advantage of the program, however participation is limited as the property owner is required to pay for the improvements upfront.

### **Hazard Mitigation Grant Program**

The Hazard Mitigation Grant Program (HMGP) assists communities with funding projects that will help reduce or eliminate the losses and threats associated with future disasters. The funding targets infrastructure upgrades that mitigate potential threats to public safety and public property resulting from storms and natural disasters. Once a disaster declaration is made by the Federal Government, the LMS Committee prioritizes and ranks projects for submission to FEMA for consideration for funding as it is appropriated by Congress. There is a Federal / Local Cost Share of 75% / 25%.

For at-risk structures, the HMGP can include:

- Acquisition and Structure Demolition/Relocation – FEMA funding is provided to the homeowner. The home is demolished or relocated.
- Structure Elevation – The home is raised so potential floodwaters may flow underneath the home.
- Mitigation Reconstruction – The existing home is demolished, and a new, elevated home is constructed.
- Dry Floodproofing of Historic Residential Structures – The home is protected with barriers to prevent flood water from entering.
- Structural Retrofitting of Existing Buildings – Enhancements are made to a home to make it more resistant to flood, wind, earthquakes, and/or fire.

### **Pre-Disaster Mitigation Program**

The Pre-Disaster Mitigation (PDM) program is issued jointly by:

- US Department of Homeland Security
- Federal Emergency Management Agency
- Federal Insurance and Mitigation Administration
- Hazard Mitigation Assistance Division

The PDM program aims to strengthen national disaster preparedness and provides federal funding to State and local governments to implement “cost effective measures designed to reduce risk to individuals and property from natural hazards, while reducing reliance on Federal funding from future disasters.”

Moving forward, the County could consider the PDM program. Funding can be applied to the improvements as well as to the preparation of mitigation plans. There is a Federal / Local Cost Share of 75% / 25% and the maximum award is \$4 million for projects and \$150,000 for planning.

## 5. CONCLUSION

The Whitaker Bayou Basin is an urbanized stormwater system with limited public right-of-way combined with residential structures constructed before Sarasota County's FIS published in 1974 with the initial FIRM products. These structures are problematic as they were built before Base Flood Elevations (BFE) were determined for the area. In addition, many of the at-risk structures in the Whitaker Bayou Basin have existing property values that do not provide for adequate avoided damages in the Cost Benefit Analysis due to the density and build-out of the basin.

While the identified potential projects in this study did not meet the required Benefit Cost Ratio of one or greater, projects combined with the purchase of at-risk structures provide a greater benefit for the community than previously identified in previous studies. Alternative funding sources or updates to the funding structure of Sarasota County's Stormwater Environmental Utility may lead to the development of options for addressing the at-risk structures in the Whitaker Bayou Basin.

## **6. SUPPLEMENTAL INFORMATION**

### **6.1 COST BENEFIT ANALYSIS UPDATE**



# **A Proposed Cost-Benefit Analysis for Stormwater Projects**

**MANUAL FOR COSTS AND BENEFITS FOR  
FLOOD AND WATER QUALITY PROJECTS**

November 9, 2018

Prepared for:

Sarasota County Stormwater Division

Prepared by:

Stantec Consulting Services Inc.



## Sign-off Sheet

This document entitled A Proposed Cost Benefit Analysis for Stormwater Projects was prepared by Stantec Consulting Services Inc. ("Stantec") for the account of Sarasota County Stormwater Division (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

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(signature)

**Molly Williams, PE**

Reviewed by Scott McKenna  
(signature)

**Scott McKenna, PE**

Approved by Kelly Smith  
(signature)

**Kelly Smith, PE**

## A PROPOSED COST BENEFIT ANALYSIS FOR STORMWATER PROJECTS

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Appendix F - Data USA information from <https://datausa.io/profile/geo/sarasota-county-fl/>

Appendix G – American Fact Finder information from

<https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF>

Appendix H - Internal Revenue Service Notice 18-03 – 2018 Standard Mileage Rates

Appendix I - Email Communication with SWFWMD

Appendix J - Sarasota County Board Meeting Minutes dated December 5, 2000 - highlighted

### EXECUTIVE SUMMARY

Based on the Cost Benefit Analysis adopted by the Board of County Commissioners on December 5, 2000, the Sarasota County Stormwater Division applies a cost benefit analysis to proposed capital projects to determine if the project will provide stormwater management improvements for a cost-effective investment. The County contracted with Stantec to update the white paper titled *Projecting Damages Associated with Flooding: A Proposed Cost-Effective Analysis for Stormwater Projects* as presented to the Board of County Commissioners in an Interoffice Memorandum dated December 5, 2000.

In certain instances, even if a project's costs exceed the tangible benefits of flood control, the County may determine the project provides public value supported by numerous intangible benefits such as health, safety, and community support. These intangibles should be given consideration on a case by case basis when deciding whether to go forward with a project.

To update the Sarasota County specific multipliers for building and content damage, Stantec analyzed nearly 800 FEMA claims (historic flood damage costs) for Sarasota County that were made during rain events. The available claim data ranges from 1978 to 2016 and provide a statistically valid sample to analyze. The analysis showed that the average Sarasota County building damage claim was 12% of the building value and the median claim was 6% of the building value. Analysis of the content damage claims showed that the average claim was between 82% and 87% of the building damage claims.

Revisions included using the most current available data (2015) to update the average automobile cost, number of cars per household, landscape / hardscape cost, per diem cost for displacement from structures, the average household income, and the published 2018 IRS per mile cost for the detours. These values are fixed costs that will need to be updated as more current data becomes available.

The Lost Business Income and Lost Wages due to Closed Business were separated from the Lost Wages for increased accuracy in calculating lost business revenue caused by flooding. Data from the United States Census Bureau - American Fact Finder website was used to derive the average daily commercial revenue for Sarasota County; the average number of employees per business in Sarasota County; and the average wages in Sarasota County.

Each project under evaluation will require the following project specific data:

1. AV - assessed property values
2. FS - number of flooded residential structures
3. HFP - number of residential structures within the horizontal floodplain
4. CFS - number of flooded commercial structures
5. CHFP - number of commercial structures within the horizontal floodplain
6. RD - road detour costs
7. PW - public works costs
8. FI - flood insurance costs

In addition to the updates, the cost-benefit analysis has been expended to include water quality benefits. The methodology follows the Southwest Florida Water Management District criteria used to evaluate cooperative grant funding projects.

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The water quality benefit calculations will require the following project specific data:

1. Total area treated (acres)
2. Total nitrogen (N) removed / year (lbs)
3. Total phosphorus (P) removed / year (lbs)
4. Total suspended solids (TSS) removed / year (lbs)

Intangible benefits including public perception and political climate along with benefits such as health, safety, and community support continue to be considered for proposed projects.

## 1.0 PROJECTING DAMAGES ASSOCIATED WITH FLOODING

### 1.1 INTRODUCTION

Stantec was contracted to update the white paper titled Projecting Damages Associated with Flooding: A Proposed Cost-Effective Analysis for Stormwater Projects as presented in an Interoffice Memorandum dated December 5, 2000 submitted to the Sarasota County Board of County Commissioners for their information. The document is included as Appendix A.

Based on information in the original memo developed in 2000, the Cost Benefit analysis was updated for current costs and conditions. Projecting avoided damages by reducing structure and street flooding will allow the Stormwater Division to determine if proposed Capital Improvement Program (CIP) projects are cost-effective by comparing the cost of the proposed project to the amount of damages avoided by flood level reductions attributed to the project. The County has contracted with Stantec to update the Cost Benefit Analysis using available FEMA repetitive loss data, for current economic conditions, and expand the analysis to include Water Quality Benefits.

The County continues to strive towards providing the Level of Service (LOS) for flood protection adopted by the Board of County Commissioners. The Stormwater CIP is predicated on LOS criteria established in the Comprehensive Plan. Primarily, the criteria prohibits the flooding of any habitable structure, residential or commercial. Recognizing that roadways remaining passable during the design rain event is a reasonable and realistic expectation of the citizens, the LOS also sets allowable roadway flooding depths for various classifications of roadways. This LOS provides a higher level of security and comfort to the general population and especially those in need of emergency services.

### 1.2 COMPONENTS OF AVOIDED DAMAGE CALCULATIONS

Review of the original cost-effective analysis, several factors must be considered when projecting costs that are associated with flood events. **Table 1-1** shows the components that have been incorporated. Methodologies to determine the tangible damage for each of these components will be discussed in the following sections.

## A PROPOSED COST BENEFIT ANALYSIS FOR STORMWATER PROJECTS

**Table 1-1: Factors considered on projecting cost calculations.**

Abbreviation	Component	Description
BD	Building Damage	Structural Damage associates with flooded structures.
CD	Content Damage	Damage associated with contents of flooded structures.
AD	Automobile Damage	Damage to flooded vehicles.
PD	Exterior Property Damage	Damage to landscape / hardscape and flooded lots.
DISF	Displacement Costs for Flooded Structures	Per diem cost associated with uninhabitable structures.
DIS	Displacement Costs for Structures in the Horizontal Floodplain	Per Diem cost associated with non-accessible structures, but structure not flooded.
LW	Lost Wages due to Residential Flooding	Costs associated with time off from work due to residential flooding.
LBI	Lost Business Income	Costs associated with loss of commercial business income due to flooding.
LWB	Lost Wages due to Closed Business	Costs associated with employee time off from work due to business flooding.
RD	Road Detour Costs	Costs associated with detouring traffic due impassable to street flooding.
PW	Public Works Costs	Cost incurred by public entity to maintain traffic detours and public safety because of flooding events.
FI	Flood Insurance Costs	Avoided flood insurance premiums if a structure is removed from the Special Flood Hazard Area (SFHA).



### 1.3 EVALUATION OF FLOOD INSURANCE CLAIMS IN SARASOTA COUNTY

FEMA's statistics are based on nation-wide data from flood insurance claims. Nationwide data does not accurately represent flood damages for southwest Florida. Evaluation of flood claims in Sarasota County account for one-story homes with no basement or second story and residential properties with ground level storage sheds. Content damage or structure damage incurred by single-story structures would be higher than those with multiple levels.

To evaluate historic flood damage costs in Sarasota County, Stantec analyzed nearly 800 FEMA claims for Sarasota County that were made during rain events. The available claim data ranges from 1978 to 2016 and is a statistically valid sample to analyze. Flood claims evaluated for the following:

1. Structural Damage Claim amount as a percentage of the Building Value of the Home.
2. Content Damage Claim amount as a percentage of the Structural Damage Claim.

The analysis showed that the average Structural Damage Claim was 12% of the building value of the home and the median claim was 6%.

Analysis of the Content Damage Claims showed that the average claim was between 82% and 87% of the Structural Damage Claim. Summary of the FEMA flood claim data for Sarasota County is included in Appendix B and the summary for the City of Sarasota flood claim data is included in Appendix C.

#### 1.3.1 Damage Calculations by Component

A component summary sheet is included as Appendix D. Additional information is included below:

##### 1.3.1.1 Building Damages (BD)

$$BD = 0.12 * AV * 1.25$$

0.12 = Sarasota County specific multiplier for building damage

AV = Assessed value of property (building only)

1.25 = Multiplier for assessed value

##### 1.3.1.2 Content Damages (CD)

$$CD = 0.86 * BD$$

0.86 = Sarasota County specific multiplier for content damage

BD = Building Damages

##### 1.3.1.3 Automobile Damages (AD)

$$AD = \$25,000 * 2 * 0.075 * \#FS$$

\$25,000 = Replacement value of a car

## A PROPOSED COST BENEFIT ANALYSIS FOR STORMWATER PROJECTS

2 = Number of cars per residence



0.075 = Average damage expected as a percent of the value of a car.

#FS = Number of flooded structures.

In calculating potential automobile damage, consideration should be given to garage/carport elevation (rather than habitable finished floor elevation).

Average cost of a car in Sarasota County was derived from information on the following website:

<https://www.numbeo.com/cost-of-living/in/Sarasota>

Transportation		Range
Volkswagen Golf 1.4 90 KW Trendline (Or Equivalent New Car)	18,525.00 \$	15,000.00  22,050.00
Toyota Corolla 1.6l 97kW Comfort (Or Equivalent New Car)	24,050.33 \$	18,151.00  35,000.00

The information from the Numbeo website is included as Appendix E.

### 1.3.1.4 Exterior Property Damages (PD)

$$PD = \$2,000 * \# \text{ HFPL}$$

\$2,000 = Expected damage to landscaping / hardscaping or exterior of property

# HFPL = Number of lots in the horizontal floodplain

All properties within the horizontal limits of the event floodplain are subject to Exterior Property Damages. Exterior Property Damages includes cost of restoration of landscaping and hardscape include costs such as debris removal, yard work, possible loss of mature trees, restoration of paver and other impervious surfaces, and improvements to onsite drainage. Costs specifically associated with Exterior Property Damages were not readily available but were estimated at \$2,000 per flooded property.

### 1.3.1.5 Displacement Costs for Flooded Structures (DISF)

$$DISF = \$250/\text{day} * \# \text{ Fdays} * \# \text{ FS}$$

\$250 = Per diem costs to be displaced from residence

# Fdays = 14 days for flooded structures to restore residence to habitable state

# FS = Number of flooded structures

The residents of flooded structures are displaced for the duration of standing floodwaters and for a period after the waters recede for cleanup of their homes. A conservative estimate of 14 days at a cost of \$250 per day was used. It should be noted that displacement costs are for a time period where the structure may not be accessible due to flood waters and time

## A PROPOSED COST BENEFIT ANALYSIS FOR STORMWATER PROJECTS

required for initial clean up. The displacement cost does not reflect the time for full restoration of the structure as the structure may be habitable while reconstruction is in progress.

### 1.3.1.6 Displacement Costs for Structures in the Floodplain (DIS)

$$\text{DIS} = \$250/\text{day} * \# \text{Ddays} * \# \text{HFP}$$

\$250 = Per diem costs to be displaced from residence (inaccessible)

# Ddays = 2 days for displaced residents

# HFP = Number of structures in horizontal floodplain

The residents of structures in the horizontal limits of the floodplain are displaced for the duration of standing floodwaters. An estimate of 2 days at a cost of \$250 per day was used.

### 1.3.1.7 Lost Wages due to Residential Flooding (LW)

$$\text{LW} = \$56,286 * 8 / 2080 * [(\# \text{HFP} * \# \text{Ddays}) + (\# \text{FS} * \# \text{Fdays})]$$

\$56,286 = Average household income

8 = Work hours per day

2080 = Work hours per year

# HFP = Number of structures in the horizontal floodplain

# Ddays = 2 days for displaced residents

# FS = Number of flooded structures

# Fdays = 14 days for flooded structures to restore residence to habitable state

The Lost Wages calculation is based on the most current Median Household Income (2015) for Sarasota County as reported by DATA USA at the following website:

<https://datausa.io/profile/geo/sarasota-county-fl/>

Basic data from the DATA USA website is included as Appendix F. It is understood that there are areas of Sarasota County where salaries may be higher or lower than average, but actual salaries are not known without requesting information from individuals in the project area.

Lost wages represent the economic impact on residents when they miss work due to flooding.

### 1.3.1.8 Lost Business Income (LBI)

$$\text{LBI} = \$5,104 * [(\# \text{CHFP} * \# \text{Ddays}) + (\# \text{CFS} * \# \text{Fdays})]$$

\$5,104 = Average daily commercial revenue for Sarasota County firms with paid employees

#CHFP = Number of commercial displaced structures in the horizontal floodplain

#Ddays = 2 days lost due to commercial displaced structures

#CFS = Number of commercial flooded structures

#Fdays = 14 days lost due to commercial flooded structures

## A PROPOSED COST BENEFIT ANALYSIS FOR STORMWATER PROJECTS

The Lost Business Income calculation is based on the most current Average Annual Revenue (2012) published in 2015 for Sarasota County derived from the data reported by American Fact Finder at the following website:

<https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF>

									<b>Data Used for Average Daily Commercial Revenue</b>	
Geographic area name	2012 NAICS code	Meaning of 2012 NAICS code	Meaning of Gender code	Meaning of Ethnicity code	Meaning of Race code	Year	Number of firms with or without paid employees	Sales, receipts, or value of shipments of firms with or without paid employees (\$1,000)	Number of firms with paid employees	Sales, receipts, or value of shipments of firms with paid employees (\$1,000)
Sarasota County, Florida	00	Total for all sectors	All firms	All firms	All firms	2012	43,592	21,968,228	10,918	20,339,108

Lost Business Income represents lost opportunity for commercial business or industrial sites that are flooded. Basic data from the American Fact Finder website is included as Appendix G.

### 1.3.1.9 Lost Wages due to Closed Business (LWB)

$$LWB = 10 * 8 * \$19.35 * [(\#CHFP * \#Ddays) + (\#CFS * \#Fdays)]$$

10 = Average employees per business

8 = Work hours per day

\$19.35 = Average Sarasota County payroll (hourly rate)

#CHFP = Number of commercial displaced structures in the horizontal floodplain

#Ddays = 2 Days lost due to commercial displaced structures

#CFS = Number of commercial flooded structures

#Fdays = 14 Days lost due to commercial flooded structures

The Lost Wages due to Closed Business calculation is based on the most current statistics published for Sarasota County. The Average Sarasota County Payroll Hourly Rate was derived from the data reported by American Fact Finder at the following website:

<https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF>

				<b>Data Used for Average Hourly Wages and Average Employees per Business</b>			
Geographic area name	2012 NAICS code	Meaning of 2012 NAICS code	Year	Number of establishments	Paid employees for pay period including March 12 (number)	First-quarter payroll (\$1,000)	Annual payroll (\$1,000)
Sarasota County, Florida	00	Total for all sectors	2015	13,405	137,827	1,335,703	5,547,522

It should be noted that not all residents who work in Sarasota County live in Sarasota County and that income values used for Lost Wages due to Residential Flooding are based on Sarasota County Average Household Income. Lost Wages due to Closed Business represents lost opportunity for

## A PROPOSED COST BENEFIT ANALYSIS FOR STORMWATER PROJECTS

employees of commercial business or industrial sites that are flooded. Basic data from the American Fact Finder website is included as Appendix G.

### 1.3.1.10 Road Detour Costs (RD)

$$RD = RDI + RDV$$

RDI, Income lost due to road detour

$$RDI = (\text{Detour Length} / \text{Avg. Speed}) * \text{Avg. Hourly Salary} * \text{AADT} * \# \text{ Days}$$

RDV, Vehicle/Mileage costs due to road detours

$$RDV = \text{Detour Length} * \text{AADT} * \# \text{ of Days} * \$/\text{mile}$$

**Table 1-2: Elements of Road Detour Cost (RD).**

Value	Description	Source
Detour Length	Length of Detour in miles	GIS Detour Route
Avg. Speed	20 miles per hour	Assumed Value
Avg. Hourly Salary (Household)	\$27.06/hour	Data USA: <a href="https://datausa.io/profile/geo/sarasota-county-fl/">https://datausa.io/profile/geo/sarasota-county-fl/</a>
AADT	Annual Average Daily Traffic	Traffic Operations
# Ddays	Number of Days Detour is in Effect	Maximo Data
\$/Mile	\$0.545 per mile	IRS Notice 18-03

Each flooded roadway segment is to be evaluated to determine the most feasible detour route to minimize the traffic affected by the detour. The \$0.545 per mile rate is the IRS standard for 2018. This rate would be adjusted annually as the IRS adjusts the published rate. The IRS Notice 18-03 2018 Standard Mileage Rates is included as Appendix H.

### 1.3.1.11 Public Works Costs (PW)

Public Works Costs include setting the detours, maintenance of the detours, emergency maintenance during the storm event, reconstruction of roadways damaged due to standing flood waters, manpower to answer phones and inspect complaints resulting from the storm event. For a specific project, the cost ranges from \$2,000 to \$100,000 depending on the duration of the flooding, the length and number of roadway segments, and structures affected by the flooding.

### 1.3.1.12 Flood Insurance Costs (FI)

Mortgage companies require homeowners in FEMA's Special Flood Hazard Area to carry flood insurance during the life of the mortgage. Rates are dependent on the age of the structure and how far the finished floor elevation is below the 100-year flood elevation. If a structure is removed



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from the vertical floodplain they receive the benefit of avoiding the mandatory flood insurance costs. The homeowner may decide to keep flood insurance, but the rate will be lower. The average rate of flood insurance for a structure within the floodplain is 1% of the value of the home annually.

$$FI = \text{Avg SV} * 0.01 * \# FS$$

Avg SV = Average value of structures in horizontal floodplain

0.01 = 1% of the value of structures

#FS = Number of flooded structures

### 1.3.2 Annualized Damages

To determine a present worth cost of avoided damages if a project were built today, the estimated damages for each interval rainfall event were calculated and multiplied by the probability that the event will happen in any given year. For example, a 100-year rainfall event has a 1% (0.01) probability of occurring in a given year; 2% for the 50-year rainfall event; 4% for the 25-year event; and 10% for the 10-year rainfall event. The Stormwater Division's standard scope for Basin Master Plans does not include modeling of the 50-year rain event. Therefore, recognizing that 50-year event would have tangible damages, the cost was estimated by subtracting the 25-year damages from the 100-year damages, dividing by 3 and adding to the 25-year damages. An analysis of projects where the 50-year flood event information was available and found this to be an accurate representation of the 50-year damages.

Avoided Flood Insurance costs are included as an annualized cost, since the expenses are not related to the probability of a rainfall event. Residential structures that would be removed from the 100-year floodplain will be required to pay these annual premiums if they have a mortgage on their home. The sum of the annualized avoided damages is then calculated to determine a present worth value.

### 1.3.3 Present Worth Analysis

The Present Worth of the Total Expected Annual Damages is calculated:

$$P = A [(1 + i)^n - 1] / [i * (1 + i)^n] \text{ where}$$

P = Present worth

A = Total expected annual damages

i = Interest rate = 5%, the average rate of return on municipal bonds

n = 30-year Project Life per County Stormwater Ordinance

### 1.3.4 Summary of Avoided Damage Analysis

The present worth value should be considered a guide when evaluating the cost-effectiveness of a project. It should be noted this method is sensitive to assessed value of homes as well as the volume of traffic on flooded roadways. While this value represents an educated guess of the

## A PROPOSED COST BENEFIT ANALYSIS FOR STORMWATER PROJECTS

economic impact resulting from project, there are invariably other intangible benefits associated with a project that may need to be considered, such as quality of life benefits.

### 1.3.5 Acquisitions and Elevations

FEMA has issued a memorandum regarding the Cost Effectiveness Determinations for Acquisitions and Elevations in Special Flood Hazard Areas and has determined that “the acquisition or elevation of a structure located in the 100-year floodplain (as delineated on the Flood Insurance Rate Map or based on best available data) that costs less than or equal to the amount of benefits...is considered cost effective.” The determined benefit for an acquisition is \$276,000 and the determined benefit for an elevation project is \$175,000. In the past, Sarasota County has not considered acquisition as a mitigation strategy for reducing flood risk. With the implementation of the Basin Master Plans and the construction of Flood Control projects throughout the County that have reduced the flood risk due to riverine rainfall events, the County should consider acquisition as an option to reduce future flood risk.

### 1.3.6 Intangible Factors

Currently, a weighting system for intangible benefits has not been developed and has not performed a sensitivity analysis of projects to determine how weights would affect a cost-effective analysis. Due to the high degree of judgement that would be needed, it is reasonable to acknowledge the intangible factors without assigning a dollar figure to be included in any type of economic analysis. Some examples of these intangible factors include, but are not limited to:

- Health Factors, such as ability to use septic systems
- Safety Factors, such as access by Emergency Vehicles
- Community Support for a Project
- Public Perception of a Stormwater Problem
- Board Policy for Addressing Stormwater Needs

In certain instances, even if a project's costs exceed the tangible benefits of flood control, it may still be a worthwhile project if it has numerous intangible benefits such as health, safety, and community support. These intangibles should be given consideration on a case by case basis when deciding whether to go forward with a project.

## 2.0 QUANTIFYING WATER QUALITY BENEFITS

### 2.1 INTRODUCTION TO WATER QUALITY IMPROVEMENT COST EFFECTIVENESS

Funding agencies, such as the Southwest Florida Water Management District (SWFWMD), have begun to evaluate water quality improvement projects based on the cost of the project and the expected cost per pound of pollutant removed and/or the cost per acre of implementing the project. The water quality cost-benefit matrix developed by SWFWMD for project evaluation is currently the most relevant such analysis for evaluating projects proposed in Sarasota County.

Cost Effectiveness (CE) is calculated as follows:

$$CE = (\text{Total cost of project}^*/20 \text{ years}) / (\text{pound of pollutant reduced/year}) = \$/\text{lb reduction}$$

\*Total project cost includes design costs. SWFWMD water quality benefits are based on a 20-year project life for the purpose of cooperative funding.

#### 2.1.1 The SWFWMD Cost Effectiveness Matrix

The SWFWMD cost effectiveness matrix currently in use to rank water quality improvement projects was developed by District staff in approximately 2013-2014. A new study to formalize and update cost benefit criteria was contracted by the District with The Balmoral Group, but the results of that study, completed in October 2017, have not yet been adopted by the District and it has not yet been decided if the study will be adopted for use in SWFWMD's Cooperative Funding Initiative (CFI) program. It is also unknown whether the data used by District staff were normalized for a particular years' dollars based on the Consumer Price Index (CPI), or if the current SWFWMD-developed matrix values will be updated using the CPI or updated with new project numbers as the years progress. If the Balmoral study is adopted, it is unknown if or how often the dollar values from the study will be updated. A copy of the email communication with SWFWMD is provided as Appendix I. **Tables 2.1 and 2.2** below detail cost effectiveness ranking criteria currently in use for projects proposed for SWFWMD cooperative funding.

**Table 2.1 – Current (March 2018) SWFWMD High, Medium and Low-ranking criteria for Urban/Suburban project types.**

Urban/Suburban Projects	High Rank	Medium Rank	Low Rank
<b>Water Quality BMP Implementation (TN target pollutant)</b>	Cost/lb TN \$224 or less and Cost/acre \$8,050 or less	High rank for Cost/lb and Low rank for Cost/acre or Low rank for Cost/lb and High rank for Cost/acre	Cost/lb TN more than \$224 and Cost/acre more than \$8,050

## A PROPOSED COST BENEFIT ANALYSIS FOR STORMWATER PROJECTS

Urban/Suburban Projects	High Rank	Medium Rank	Low Rank
<b>Water Quality BMP Implementation (TP target pollutant)</b>	Cost/lb TP \$896 or less and Cost/acre \$8,050 or less	High rank for Cost/lb and Low rank for Cost/acre or Low rank for Cost/lb and High rank for Cost/acre	Cost/lb TP more than \$896 and Cost/acre more than \$8,050
<b>Water Quality BMP Implementation (TSS target pollutant)</b>	Cost/lb TSS \$12 or less and Cost/acre \$8,050 or less	High rank for Cost/lb and Low rank for Cost/acre or Low rank for Cost/lb and High rank for Cost/acre	Cost/lb TSS more than \$12 and Cost/acre more than \$8,050

Table 2-2 – Current (March 2018) SWFWMD High, Medium and Low-ranking criteria for Coastal/LID project types.

Coastal/LID Projects	High Rank	Medium Rank	Low Rank
<b>Water Quality BMP Implementation (TN target pollutant)</b>	Cost/lb TN \$646 or less and Cost/acre \$46,947 or less	High rank for Cost/lb and Low rank for Cost/acre or Low rank for Cost/lb and High rank for Cost/acre	Cost/lb TN more than \$646 and Cost/acre more than \$46,947
<b>Water Quality BMP Implementation (TP target pollutant)</b>	Cost/lb TP \$4,715 or less and Cost/acre \$46,947 or less	High rank for Cost/lb and Low rank for Cost/acre or Low rank for Cost/lb and High rank for Cost/acre	Cost/lb TP more than \$4,715 and Cost/acre more than \$46,947
<b>Water Quality BMP Implementation (TSS target pollutant)</b>	Cost/lb TSS \$20 or less and Cost/acre \$46,947 or less	High rank for Cost/lb and Low rank for Cost/acre or Low rank for Cost/lb and High rank for Cost/acre	Cost/lb TSS more than \$20 and Cost/acre more than \$46,947

### 2.1.2 SWFWMD Cost Effectiveness Study – The Balmoral Group

The SWFWMD funded study conducted by The Balmoral Group in 2017 and the factors considered in the development of the water quality cost-benefit matrix developed by the study, which may or may not be adopted by SWFWMD, to rank proposed projects for possible funding will be

## A PROPOSED COST BENEFIT ANALYSIS FOR STORMWATER PROJECTS

discussed. While not yet adopted by SWFWMD, the information is presented here because the Balmoral report findings might be adopted at any time and, if adopted, would be used for future projects.

The cost-effectiveness chart developed by The Balmoral Group used the total, actual project cost (including design costs) divided by 20 years and compared the estimated load reductions expected for TN, TP or TSS in the same calculation shown above. Costs for past projects were adjusted to 2017 dollars, which should be kept in mind as the years progress. It is unknown whether if or how often SWFWMD will update the costs used in this ranking matrix, if it is adopted for use.

The matrix divides cost effectiveness into Urban/Suburban groupings and the distance from the coast used to distinguish which group a project falls under was determined to be 1,500 meters (4,921 feet), based on how far inland proximity to the coast significantly increases property values. However, the report does recommend that site specific information be considered before automatically applying the 1,500-meter distance criteria.

The process that The Balmoral Group used in determining the thresholds for high or low-cost effectiveness was developed by collecting data from projects conducted by SWFWMD as well as projects conducted by other agencies. To be included in the evaluation, each project needed to have information regarding a load reduction estimate for TN, TP or TSS, a total actual project cost, known project location and a description of Best Management Practices (BMPs) implemented for the project. A total of 67 SWFWMD projects (internal) and 71 (external) projects from other agencies were used for the final economic analysis. Ultimately, only SWFWMD (internal) projects were used to develop the high, medium and low-ranking cost benefit ranges in the Balmoral report because the external data showed significantly smaller values for cost effectiveness than the SWFWMD data.

The ranges developed by The Balmoral Group for ranking projects are presented here in **Tables 2-3 and 2-4** in case they are adopted by SWFWMD for future use; however, these numbers have not been entered into the cost calculator and **SHOULD NOT BE USED AT THIS TIME** because they have not been officially adopted by SWFWMD. Cost effectiveness on a per acre basis was not included in the Balmoral report.



## A PROPOSED COST BENEFIT ANALYSIS FOR STORMWATER PROJECTS

**Table 2-3: The Balmoral Group PROPOSED (NOT ADOPTED) High, Medium and Low-ranking criteria for water quality improvement projects for General (non-coastal) project types. Based on cost of past projects for cost/lb of pollutant removed for 20 years.**

General (non-coastal) Projects	High Rank	Medium Rank	Low Rank
Water Quality BMP Implementation (TN target pollutant)	Cost/lb TN is < \$113	Cost/lb TN $\geq$ \$113 and $\leq$ \$240	Cost/lb TN > \$240
Water Quality BMP Implementation (TP target pollutant)	Cost/lb TP < \$791	Cost/lb TP $\geq$ \$791 and $\leq$ \$2,055	Cost/lb TP > \$2,055
Water Quality BMP Implementation (TSS target pollutant)	Cost/lb TSS < \$3	Cost/lb TSS $\geq$ \$3 and $\leq$ \$6	Cost/lb TSS > \$6

**Table 2-4: The Balmoral Group PROPOSED (NOT ADOPTED) High, Medium and Low-ranking criteria for water quality improvement projects for Coastal project types. Based on cost of past projects for cost/lb of pollutant removed for 20 years.**

Coastal Projects	High Rank	Medium Rank	Low Rank
Water Quality BMP Implementation (TN target pollutant)	Cost/lb TN < \$547	Cost/lb TN $\geq$ \$547 and $\leq$ \$1,543	Cost/lb TN > \$1,543
Water Quality BMP Implementation (TP target pollutant)	Cost/lb TP < \$2,188	Cost/lb TP $\geq$ \$2,188 and $\leq$ \$4,152	Cost/lb TP > \$4,152
Water Quality BMP Implementation (TSS target pollutant)	Cost/lb TSS < \$4	Cost/lb TSS $\geq$ \$4 and $\leq$ \$13	Cost/lb TSS > \$13

### 2.1.2.1 Developing the Cost per Pound Removed or Cost per Acre Treated

There are many examples of projects available, both in design and implemented, for which cost per pound of pollutant removed/per acre treated has been estimated for various project types. However, the actual estimate and actual realization of benefits will be very site specific and must be developed on a case-by-case basis for each new project, and it is recommended that estimates be very conservative, partially due to SWFWMD CFI contract language, wherein repayment may be required if projected benefits are not achieved.

It is advisable to compare Sarasota County project removal estimates developed for a specific project to similar BMP projects in similar land use areas, soil types and climatological regions in Florida. Comparison to projects outside Florida or in regions with different BMPs, land use, soil, climatological and other characteristics may result in estimates that are vastly different than what may be realized in Sarasota County due to these and other factors.

Many of the example projects from Brevard County related to the Indian River Lagoon were considered in the Balmoral report, and the external (non-SWFWMD) project data was determined to be significantly different than cost effectiveness data within the SWFWMD largely due to the Brevard County projects. Again, load removal estimates should be developed separately for each project based on site specific data and should be comparable to other projects conducted within the SWFWMD in order to be considered competitive for SWFWMD funding.

### 2.1.3 Tangible Benefits Associated with Water Quality Improvements

There are a number of tangible benefits associated with water quality improvements, including:

- Reducing regulatory costs by reducing pollutant loading in impaired water bodies with assigned Total Maximum Daily Loads (TMDLs)
- Prevention of TMDL establishment through preventative measures, also reducing regulatory costs
- Improving water clarity and therefore supporting water-based tourism
- Maintaining healthy fisheries to increase recreational spending in the county
- Averting or reducing health issues associated with water-based recreation, as high nutrient levels can lead to algal blooms and promotion of other organisms that may be harmful to human health
- Reducing maintenance cost of nuisance and exotic plant species, many of which increase in the presence of high nutrients (e.g. cattails)
- Reducing wastewater overflows that occur during flood events

#### 2.1.4 Intangible Benefits Associated with Water Quality Improvements

- Improving wildlife habitat
- Improving the visual aesthetics of water resources as water clarity typically improves when TN, TP, and TSS are reduced
- Improving odors associated with water resources, as high levels of nutrients can cause algal blooms, which can lead to significant odor problems (especially with blue-green algae)
- Improved safety for recreational users when water clarity is improved

**APPENDIX A – INTEROFFICE MEMORANDUM DATED  
DECEMBER 5, 2000**

**SARASOTA COUNTY GOVERNMENT**  
**PUBLIC WORKS**  
**STORMWATER DIVISION**

**INTEROFFICE MEMORANDUM**

**TO:** Board of County Commissioners  
James L. Ley, County Administrator

**THROUGH:** Stephen D. Cork, Executive Director, Public Works

**FROM:** Francisco B. Domingo, P.E., Acting General Manager,  
Public Works Planning

**SUBJECT:** Cost Effective Analysis for Stormwater Projects

**DATE:** ~~November 8, 2000~~  
December 5

**BACKGROUND:**

During the January 26, 2000 Board Workshop concerning Stormwater Management, staff proposed to utilize a Cost Effective Analysis as a tool in the evaluation of proposed improvement project. On July 31, 2000, a Board report including a white paper on the subject was forwarded to the Board for additional information. Staff indicated that a presentation and discussion of the methodology would be presented at a future Board meeting.

**REPORT:**

The most recent version of the white paper is attached for your review. No substantive changes were made to the paper since it was given to the Board in late July. Staff will present the formula and explain the elements of it as a discussion item. Staff will also provide specific applications as examples in the presentation.

When utilized in a basin approach, the numbers give staff an indication of anticipated damages associated with flood events. With that, staff can formulate capital programs with cost value in mind. The key is to put projects in place that produce the most "bang for the buck."

In addition to more easily measured quantifiable factors, project analyses will continue to consider more intangible benefits such as:

- Water Quality Enhancement
- Health Factors (impact on wells, septic systems, etc.)
- Safety Factors (access for emergency services)
- Community Acceptance



This formula combined with the above intangible benefits, was developed to refine existing project analyses and to help formulate decisions concerning future projects.

**RECOMMENDATION:**

Staff recommends the adoption of this benefit analysis as the decision making tool for future projects.

cc: David R. Bullock, Deputy County Administrator

# **PROJECTING DAMAGES ASSOCIATED WITH FLOODING**

## **A Proposed Cost-Effective Analysis for Stormwater Projects**

### **SARASOTA COUNTY**

### **STORMWATER ENVIRONMENTAL UTILITY**

#### **Introduction**

The Sarasota County Stormwater Division has developed a method of projecting damages associated with flood events consistent with methodologies used by other agencies such as the Army Corps of Engineers (ACOE) and the Federal Emergency Management Agency (FEMA). Projecting avoided damages by reducing structure and street flooding will allow Stormwater staff to determine if proposed CIP projects are cost-effective by comparing the cost of the proposed project to the amount of damages avoided by flood level reductions. This methodology has been utilized by staff and presented to the ACOE for the Whitaker Bayou Basin. The ACOE has reviewed and preliminarily approved this methodology.

The County continues to strive towards providing the Level of Service (LOS) for flood protection adopted by the Board of County Commissioners. The Stormwater Capital Improvement Program is predicated on LOS criteria established in the Comprehensive Plan. Primarily, the criteria prohibits the flooding of any habitable structure, residential or commercial. Recognizing that roadways remaining passable during the design rain event is a reasonable and realistic expectation of the citizens, the LOS also sets allowable roadway flooding depths for various classifications of roadways. This LOS provides a higher level of security and comfort to the general population and especially those in need of emergency services.

#### **Components of Avoided Damage Calculations**

Several factors must be considered when projecting costs that are associated with flood events. Based on formulas from ACOE and FEMA, the following components have been incorporated:

<b>Connotation</b>	<b>Component</b>	<b>Description</b>
BD	Building Damage	Structural damage associated with flooded residences.
CD	Content Damage	Damage associated with contents of flooded residences.
AD	Automobile Damage	Damage to flooded automobiles.
PD	Exterior Property Damage	Damage to landscaping of flooded lots.
DISF	Displacement Costs for Flooded Structures	Per diem cost associated with uninhabitable residences.
DIS	Displacement Costs for Structures in the Horizontal Floodplain	Per diem costs associated with non-accessible homes, but structure does not flood.
LBI	Lost Wages or Business Income	Costs associated with time off from work and/or lost of commercial business due to flooding.
RD	Road Detour Costs	Costs associated with detouring due to street flooding.
PW	Public Works Cost	Costs incurred by Public Works Department as a result of flooding events.
FI	Flood Insurance Costs	Flood insurance premiums that would be avoided if a structure is removed from the floodplain.

Methodologies to determine the tangible damage for each of these components will be discussed in the following sections.

### **Evaluation of Flood Insurance Claims in Sarasota County**

Both FEMA and ACOE use actuarial tables to determine building damage and content damage based on depth of flooding in the structure. The FEMA method uses a stair-step scale to calculate building damages based on depth of flooding. Their scale starts at 7% of the appraised value of a home for one foot of flooding. ACOE uses a complex computer program that includes formulas for integration of the area under a logarithmic curve based on data developed by ACOE to calculate damages. The statistics used to develop FEMA's and ACOE's formulas are most likely based on nation-wide statistics from flood insurance claims. Staff wanted to be sure that nationwide data accurately represented flood damages for southwest Florida for several reasons including the fact that most homes are one-story homes with no basement or second story. Intuitively it seems that content damage or structure damage incurred by single-story structures would be higher than those with multiple levels.

To verify flood damages in Sarasota County, staff analyzed over 300 FEMA claims for Sarasota County that were made during the extreme rain events of 1992, 1995 and 1997. At some point, all FEMA claims made in Sarasota County can be included in the analysis. But this data provides a starting point, and also a statistically valid sample to analyze. Although there were several more claims made to FEMA during the three referenced rainfall events, 333 claims contained the data needed for inclusion in the analysis. Staff evaluated flood claims for the following:

1. Structural Damage Claim amount as a percentage of the Appraised Value of the Home.
2. Content Damage Claim amount as a percentage of the Structural Damage Claim.

The analysis showed that the average Structural Damage Claim was 16% of the appraised value of the home and the median claim was 9%. The population distribution of the claims showed that the majority of the claims made were between 0 and 10%.

Analysis of the Content Damage Claims showed that the average claim was 86% of the Structural Damage Claim, but the standard deviation of the data set was high. The population distribution showed that there was a normal distribution of the data around the average. Therefore, Stormwater staff computed a 95% Confidence Interval to check the validity of the data and found based on statistics, 95% of the time, the average content claim will range between 71 and 100 percent of the structural damage claim. This is a relatively small confidence interval and staff feels confident that the 86% figure is a reliable indicator of Content Damage as compared to Structural Damage.

### **Damage Calculations by Component**

#### **Building Damages (BD)**

$$BD = df * AV * 1.25$$

## Cost-Effective Analysis of Stormwater Projects

Detour Length = Length of Detour in miles  
Avg Speed = 20 miles per hour (assumed)  
Avg Hourly Salary = \$20/hour (assumed)  
AADT = Annual Average Daily Traffic  
# of Days = Number of Days Detour is in Effect – assume 2 days  
\$/Mile = \$0.30 per mile

Staff evaluates each segment of flooded roadway to determine the most feasible detour route and what traffic will be affected by the detour. Because of the low traffic counts on local roadways, this formula will not favor projects to address local roadway level of service.

### Public Works Costs (PW)

Public Works Costs include setting the detours, maintenance of the detours, emergency maintenance during the storm event, manpower to answer phones and inspect complaints resulting from the storm event. Typically this cost ranges from \$2,000 to \$100,000 depending on the number of roadway segments and structures affected by the flooding. More research into this value is warranted.

### Flood Insurance Costs (FI)

Mortgage companies require homeowners in the vertical floodplain (the finished floor elevation is lower than the 100-year flood elevation) to carry flood insurance during the life of the mortgage. If a structure is removed from the vertical floodplain they receive the benefit of avoiding the mandatory flood insurance costs. The homeowner may decide to keep flood insurance but the rate will be lower. Initial research shows the rate of flood insurance for a structure within the floodplain is 1% of the value of the home annually. Further research into this number is warranted for verification of accuracy.

FI = Avg Value of Structure in Floodplain \* 0.01 \* # of Flooded Structures

### Annualized Damages

To determine a present worth cost of avoided damages if a project were built today, the estimated damages for each interval rainfall event were calculated and multiplied by the probability that the event will happen in any given year. For example, a 100-year rainfall event has a 1% (0.01) probability of occurring in a given year; 2% for the 50-year rainfall event; 4% for the 25 year event; and 10% for the 10-year rainfall event. The Stormwater Division's standard scope for Basin Master Plans does not include modeling of the 50-year rain event. Therefore, recognizing that 50-year event would have tangible damages, the cost was estimated by subtracting the 25-year damages from the 100-year damages, dividing by 3 and adding to the 25-year damages. Staff did an analysis of projects where the 50-year flood event information was available and found this to be an accurate representation of the 50-year damages.

Avoided Flood Insurance costs are included as an annualized cost, since the expenses are not related to the probability of a rainfall event. Residential structures that would be removed from the 100-year floodplain will be required to pay these annual premiums if they have a mortgage on their home. The sum of the annualized avoided damages is then calculated to determine a present worth value.

## Cost-Effective Analysis of Stormwater Projects

### Present Worth Analysis

The Present Worth of the Total Expected Annual Damages is calculated:

$$P = A \{ [(1 + I)^N - 1] / [I \times (1 + I)^N] \} \text{ where}$$

P, Present Worth

A, Total Expected Annual Damages

I, Interest Rate = 5%, the average rate of return on municipal bonds

N, Project Life in years = 50 years, same as ACOE

### Summary of Avoided Damage Analysis

Stormwater staff cautions that this present worth value should be considered a guide when evaluating the cost-effectiveness of a project. It should be noted this method is sensitive to assessed value of homes as well as the volume of traffic on flooded roadways. While this value represents an educated guess of the economic impact resulting from a project, there are invariably other intangible benefits associated with a project that may need to be considered, such as water quality and quality of life benefits. Staff proposes to present results of the Cost Effective Analysis by presenting the Estimated Avoided Damages from a Project in comparison to the Estimated Cost.

### Intangible Factors

Currently staff does not have a weighting system for intangible benefits and has not performed a sensitivity analysis of projects to determine how weights would affect a cost-effective analysis. Due to the high degree of judgement that would be needed, it is reasonable to acknowledge the intangible factors without assigning a dollar figure to be included in any type of economic analysis. Some examples of these intangible factors include, but are not limited to:

- Water Quality Benefits
- Health Factors, such as ability to use septic systems
- Safety Factors, such as access by Emergency Vehicles
- Community Support for a Project
- Public Perception of a Stormwater Problem
- Board Policy for Addressing Stormwater Needs

Staff feels that in certain instances even if a project's costs exceed the tangible benefits of flood control, it may still be a worthwhile project if it has numerous intangible benefits such as improving water quality, health and safety, and community support. These intangibles should be given consideration on a case by case basis when deciding whether to go forward with a project.



## Cost-Effective Analysis of Stormwater Projects

- $df$  = Depth Factor:  
9% for up to 1 foot of flooding (used for the 10, 25, 50 year Events)  
16% for 1 to 2 feet of flooding (used for the 100-year Event)  
see FEMA tables for above two feet of flooding.
- AV = Assessed Value of Property (including building and lot)
- 1.25 = Multiplier for Appraised Value

Staff completed a detailed analysis of damages due to structure flooding in the Whitaker Bayou for the 25, 50 and 100-year return storm event based on depth of flooding in the structure. Then staff completed a general analysis multiplying the value of all structures by 0.16 for the 100-year event when significant flooding is expected and 0.09 for the 25 and 50-year events when flood levels would be lower. The two analyses were within 10% of each other. Stormwater staff considers the general analysis to be indicative of expected damages. Engineers evaluating damages can use their judgement if a detailed analysis or general analysis should be completed.

### Content Damages (CD)

$$CD = 0.86 * BD$$

- 0.86 = Sarasota County specific multiplier  
BD = Building Damages

### Automobile Damages (AD)

$$AD = \$10,000 * 1.5 * 0.075 * \#FS$$

- 10,000 = Assumed Replacement Value of a Car  
1.5 = Number of Cars per Residence  
0.075 = Average damage expected as a percent of the value of a car.  
#FS = Number of Flooded Structures.

This formula is consistent with the ACOE method. In calculating potential automobile damage, consideration should be given to garage/carport elevation (rather than habitable finished floor elevation).

### Exterior Property Damages (PD)

$$PD = \$1,000 * \#HFP$$

- 1,000 = Expected Damage to Landscaping or Exterior of Property  
#HFP = Number of Lots in the Horizontal Floodplain

All properties within the horizontal limits of the event floodplain are subject to Exterior Property Damages. The Exterior Property Damages were estimated at \$1000 per flooded property consistent with the FEMA methodology.

## Cost-Effective Analysis of Stormwater Projects

### Displacement Costs for Flooded Structures (DISF)

$$\text{DISF} = \$100/\text{day} * 14 \text{ days} * \text{\#FS}$$

\$100 = Per Diem costs to be displaced from residence  
14 days = Number of days to restore residence to habitable state.  
#FS = Number of Flooded structures.

The residents of flooded structures are displaced for the duration of standing floodwaters and for a period after the waters recede for clean up of their homes. A conservative estimate of 14 days at a cost of \$100 per day was used and reflects FEMA methodology.

### Displacement Costs for Structures in the Floodplain (DIS)

$$\text{DIS} = \$100/\text{day} * 2 \text{ days} * \text{\#HFP}$$

\$100 = Per Diem costs to be displaced from residence (inaccessible)  
2 = Number of days residence is inaccessible  
#HFP = Number of structures in Horizontal Floodplain.

The residents of structures in the horizontal limits of the floodplain are displaced for the duration of standing floodwaters. An estimate of 2 days at a cost of \$100 per day was used.

### Lost Wages or Business Income (LBI)

Lost wages represent the economic impact on residents when they miss work due to flooding.

$$\text{LW} = \$40,000 * 1.5 * 8 / 2080 * (\text{\#HSF} * \text{\#Days} + \text{\#FS} * \text{\#Days})$$

\$40,000 = Average Annual Income  
1.5 = Number of Employed Residents per Home  
#Days = Number of Work Days Lost due to Flooding;  
= 7 for flooded structures  
= 2 for displaced residents  
8 = Work Hours per Day  
2,080 = Work Hours per Year  
#HSF = Number of Structures in the Horizontal Floodplain  
#FS = Number of Flooded Structures

Lost Business Income represents lost opportunity for commercial business or industrial sites that are flooded. Staff is currently working through this scenario in the Catfish Creek Basin by contacting the businesses to determine how flooding impacts them.

### Road Detour Costs (RD)

RDI = Income lost due to Road Detour  
RDI = Detour Length \* Avg Speed \* Avg Hourly Salary \* AADT \* # of Days  
  
RDV = Vehicle/Milage Costs due to Road Detours  
RDV = Detour Length \* \$/mile \* AADT \* # of Days

## Cost-Effective Analysis of Stormwater Projects

Detour Length = Length of Detour in miles  
Avg Speed = 20 miles per hour (assumed)  
Avg Hourly Salary = \$20/hour (assumed)  
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Staff evaluates each segment of flooded roadway to determine the most feasible detour route and what traffic will be affected by the detour. Because of the low traffic counts on local roadways, this formula will not favor projects to address local roadway level of service.

### Public Works Costs (PW)

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### Flood Insurance Costs (FI)

Mortgage companies require homeowners in the vertical floodplain (the finished floor elevation is lower than the 100-year flood elevation) to carry flood insurance during the life of the mortgage. If a structure is removed from the vertical floodplain they receive the benefit of avoiding the mandatory flood insurance costs. The homeowner may decide to keep flood insurance but the rate will be lower. Initial research shows the rate of flood insurance for a structure within the floodplain is 1% of the value of the home annually. Further research into this number is warranted for verification of accuracy.

FI = Avg Value of Structure in Floodplain \* 0.01 \* # of Flooded Structures

### Annualized Damages

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Avoided Flood Insurance costs are included as an annualized cost, since the expenses are not related to the probability of a rainfall event. Residential structures that would be removed from the 100-year floodplain will be required to pay these annual premiums if they have a mortgage on their home. The sum of the annualized avoided damages is then calculated to determine a present worth value.

## **Cost-Effective Analysis of Stormwater Projects**

### **Present Worth Analysis**

The Present Worth of the Total Expected Annual Damages is calculated:

$$P = A \{ [(1 + I)^N - 1] / [I \times (1 + I)^N] \} \text{ where}$$

P, Present Worth

A, Total Expected Annual Damages

I, Interest Rate = 5%, the average rate of return on municipal bonds

N, Project Life in years = 50 years, same as ACOE

### **Summary of Avoided Damage Analysis**

Stormwater staff cautions that this present worth value should be considered a guide when evaluating the cost-effectiveness of a project. It should be noted this method is sensitive to assessed value of homes as well as the volume of traffic on flooded roadways. While this value represents an educated guess of the economic impact resulting from a project, there are invariably other intangible benefits associated with a project that may need to be considered, such as water quality and quality of life benefits. Staff proposes to present results of the Cost Effective Analysis by presenting the Estimated Avoided Damages from a Project in comparison to the Estimated Cost.

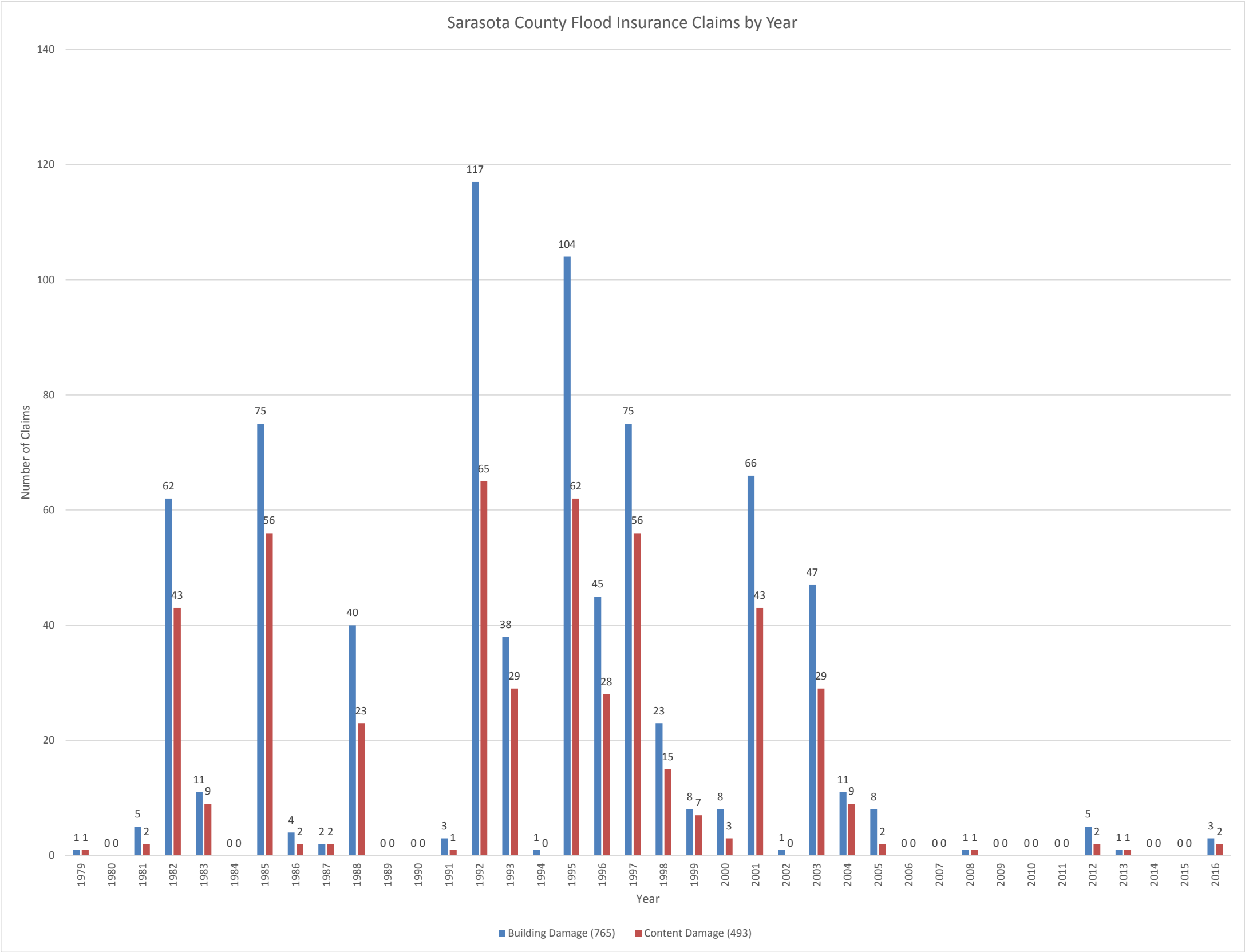
### **Intangible Factors**

Currently staff does not have a weighting system for intangible benefits and has not performed a sensitivity analysis of projects to determine how weights would affect a cost-effective analysis. Due to the high degree of judgement that would be needed, it is reasonable to acknowledge the intangible factors without assigning a dollar figure to be included in any type of economic analysis. Some examples of these intangible factors include, but are not limited to:

- Water Quality Benefits
- Health Factors, such as ability to use septic systems
- Safety Factors, such as access by Emergency Vehicles
- Community Support for a Project
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- Board Policy for Addressing Stormwater Needs

Staff feels that in certain instances even if a project's costs exceed the tangible benefits of flood control, it may still be a worthwhile project if it has numerous intangible benefits such as improving water quality, health and safety, and community support. These intangibles should be given consideration on a case by case basis when deciding whether to go forward with a project.

## APPENDIX B – SARASOTA COUNTY FLOOD CLAIMS

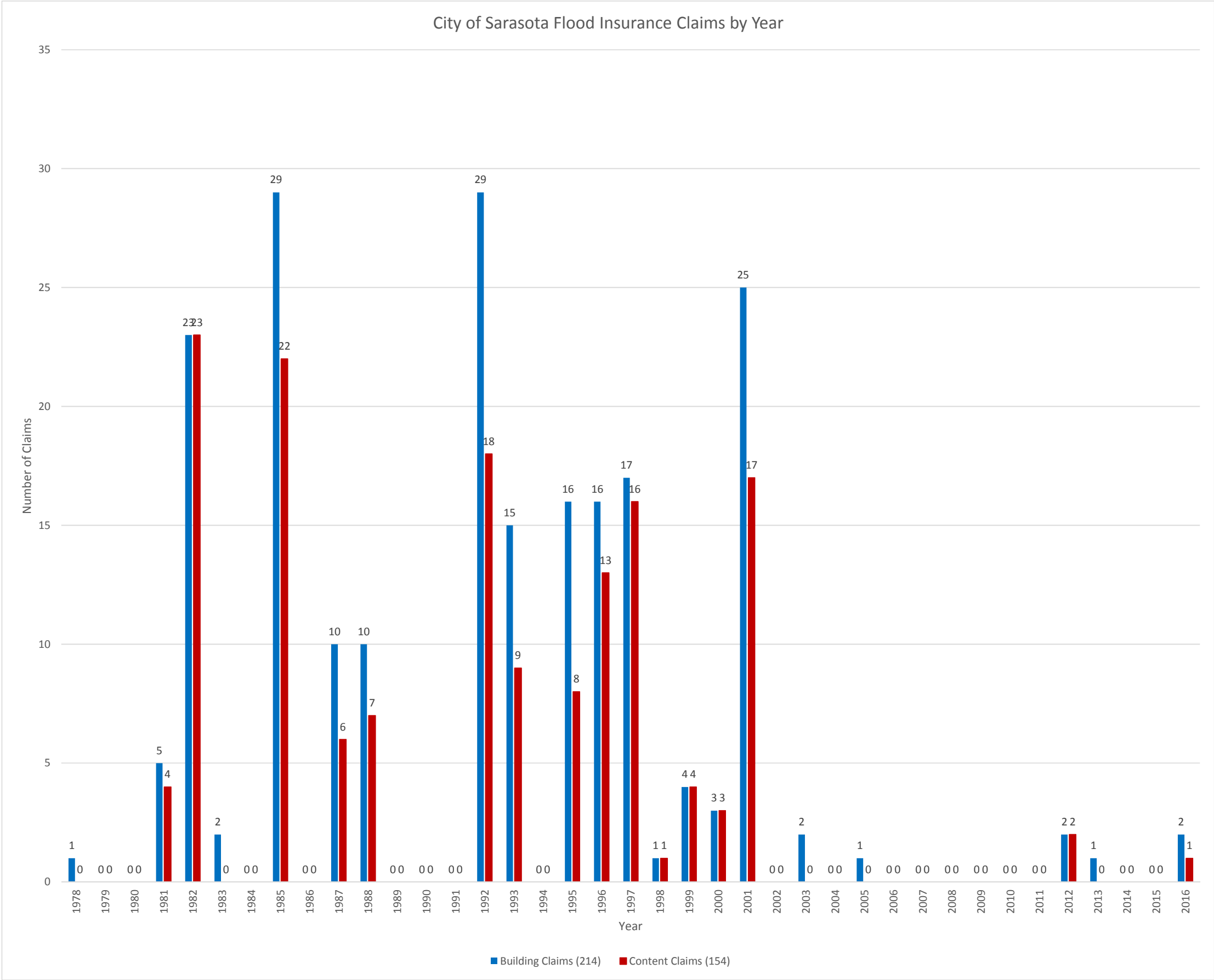


Year	Building Claims	Content Claims	Primary Month
1979	1	1	Apr
1980	0	0	
1981	5	2	Aug
1982	62	43	June
1983	11	9	Mar
1984	0	0	
1985	75	56	Aug
1986	4	2	Dec
1987	2	2	July
1988	40	23	Sep / Nov
1989	0	0	
1990	0	0	
1991	3	1	Mar
1992	117	65	June
1993	38	29	Mar
1994	1	0	July
1995	104	62	July
1996	45	28	Oct
1997	75	56	Nov
1998	23	15	Mar
1999	8	7	Jan
2000	8	3	Sep
2001	66	43	Sep
2002	1	0	Jan
2003	47	29	June
2004	11	9	Sep
2005	8	2	July
2006	0	0	
2007	0	0	
2008	1	1	Aug
2009	0	0	
2010	0	0	
2011	0	0	
2012	5	2	June
2013	1	1	Sep
2014	0	0	
2015	0	0	
2016	3	2	Aug

765	493
12.1%	Average Building Damage
6.2%	Median Building Damage
82.3%	Average Content Damage / Building Damage
42.7%	Median Content Damage / Building Damage



## APPENDIX C – CITY OF SARASOTA FLOOD CLAIMS



Year	Building Claims	Content Claims	Primary Month
1978	1	0	
1979	0	0	
1980	0	0	
1981	5	4	Aug
1982	23	23	June
1983	2	0	Mar
1984	0	0	
1985	29	22	Aug
1986	0	0	
1987	10	6	July
1988	10	7	Sep / Nov
1989	0	0	
1990	0	0	
1991	0	0	
1992	29	18	June
1993	15	9	Mar
1994	0	0	
1995	16	8	July
1996	16	13	Oct
1997	17	16	Nov
1998	1	1	Mar
1999	4	4	Jan
2000	3	3	Sep
2001	25	17	Sep
2002	0	0	
2003	2	0	June
2004	0	0	
2005	1	0	July
2006	0	0	
2007	0	0	
2008	0	0	
2009	0	0	
2010	0	0	
2011	0	0	
2012	2	2	June
2013	1	0	Sep
2014	0	0	
2015	0	0	
2016	2	1	Aug

214	154
11.2%	Average Building Damage
6.0%	Median Building Damage

87.0%	Average Content Damage / Building Damage
15.9%	Median Content Damage / Building Damage

## APPENDIX D – COMPONENT SUMMARY SHEET

Abbreviation	Component	Description
BD	Building Damage	Structural Damage associates with flooded structures.
Equation: $BD = 0.12 * AV * 1.25$ 0.12 = Sarasota County specific multiplier for building damage AV = Assessed Value of Property (building only) 1.25 = Multiplier for Appraised Value		
CD	Content Damage	Damage associated with contents of flooded structures.
Equation: $CD = 0.86 * BD$ 0.86 = Sarasota County specific multiplier for content damage BD = Building Damages		
AD	Automobile Damage	Damage to flooded vehicles.
Equation: $AD = \$25,000 * 2 * 0.075 * \#FS$ \$25,000 = Replacement value of a car 2 = Number of cars per residence 0.075 = Average damage expected as a percent of the value of a car. #FS = Number of flooded structures		
PD	Exterior Property Damage	Damage to landscape / hardscape and flooded lots.
Equation: $PD = \$2,000 * \# HFPL$ \$2,000 = Expected damage to landscaping / hardscaping or exterior of property # HFPL = Number of Lots in the Horizontal Floodplain		
DISF	Displacement Costs for Flooded Structures	Per diem cost associated with uninhabitable structures.
Equation: $DISF = \$250/day * \# Fdays * \# FS$ \$250 = Per diem costs to be displaced from residence # Fdays = 14 days for flooded structures to restore residence to habitable state # FS = Number of flooded structures		
DIS	Displacement Costs for Structures in the Horizontal Floodplain	Per Diem cost associated with non-accessible structures, but structure not flooded.
Equation: $DIS = \$250/day * \#Ddays * \# HFP$ \$250 = Per diem costs to be displaced from residence (inaccessible) # Ddays = 2 days for displaced residents # HFP = Number of structures in horizontal floodplain		
LW	Lost Wages due to Residential Flooding	Costs associated with time off from work due to residential flooding.
Equation: $LW = \$56,286 * 8 / 2080 * [(\# HFP * \# Ddays) + (\# FS * \#Fdays)]$ \$56,286 = Average Household Income (2015) 8 = Work hours per day 2080 = Work hours per year # HFP = Number of structures in the horizontal floodplain # Ddays = 2 days for displaced residents # FS = Number of flooded structures # Fdays = 14 days for flooded structures to restore residence to habitable state		

Abbreviation	Component	Description
LBI	Lost Business Income	Costs associated with loss of commercial business income due to flooding.
Equation: $LBI = \$5,104 * [( \#CHFP * \#Ddays ) + ( \#CFS * \#Fdays )]$ \$5,104 = Average daily commercial revenue for Sarasota County firms with paid employees #CHFP = Number of commercial displaced structures in the horizontal floodplain #Ddays = 2 days Lost due to commercial displaced structures #CFS = Number of commercial flooded structures #Fdays = 14 Days Lost due to commercial flooded structures		
LWB	Lost Wages due to Closed Business	Costs associated with employee time off from work due to business flooding.
Equation: $LWB = 10 * 8 * \$19.35 * [( \#CHFP * \#Ddays ) + ( \#CFS * \#Fdays )]$ 10 = Average employees per business 8 = Work hours per day \$19.35 = Average Sarasota County payroll (hourly rate) #CHFP = Number of commercial displaced structures in the horizontal floodplain #Ddays = 2 days Lost due to commercial displaced structures #CFS = Number of commercial flooded structures #Fdays = 14 Days Lost due to commercial flooded structures		
RD	Road Detour Costs	Costs associated with detouring traffic due impassable to street flooding.
Equation: $RD = RDI + RDV$ $RDI = \text{Income lost due to road detour}$ $= \text{Detour Length} * \text{Avg. Speed} * \text{Avg. Hourly Salary} * \text{AADT} * \# \text{ Ddays}$ $RDV = \text{Vehicle / Mileage costs due to road detours}$ $= \text{Detour Length} * \text{AADT} * \# \text{ of Ddays} * \$/\text{mile}$		
PW	Public Works Costs	Cost incurred by public entity to maintain traffic detours and public safety because of flooding events.
Cost ranges from \$2,000 to \$50,000 depending on the duration of the flooding, the number of roadway segments, and structures affected by the flooding.		
FI	Flood Insurance Costs	Avoided flood insurance premiums if a structure is removed from the Special Flood Hazard Area (SFHA).
Equation: $FI = \text{Avg SV} * 0.01 * \# \text{ FS}$ Avg SV = Average value of structures in horizontal floodplain 0.01 = 1% of the value of structures # FS = Number of flooded structures		

## APPENDIX E – NUMBEO INFORMATION


 
[Cost Of Living](#) [Property Prices](#) [Crime](#) [Health Care](#) [Pollution](#) [Traffic](#) [Quality Of Life](#) [Travel](#)
[Cost of Living](#) > [United States](#) > [Sarasota, FL](#)

## Cost of Living in Sarasota

 Compare Sarasota, FL with: 

 Do you live in [Sarasota](#)? [Add data for Sarasota, FL!](#)

 Currency:  [Sticky Currency](#) [Switch to metric measurement units](#)

<b>Restaurants</b>	<a href="#">[ Edit ]</a>	Range
Meal, Inexpensive Restaurant	12.00 \$	9.00 - 15.00
Meal for 2 People, Mid-range Restaurant, Three-course	40.00 \$	30.00 - 45.00
McMeal at McDonalds (or Equivalent Combo Meal)	6.50 \$	4.00 - 8.00
Domestic Beer (1 pint draught)	4.50 \$	4.00 - 5.00
Imported Beer (11.2 oz small bottle)	6.00 \$	5.00 - 6.00
Cappuccino (regular)	3.79 \$	2.50 - 5.00
Coke/Pepsi (11.2 oz small bottle)	1.43 \$	1.00 - 2.50
Water (11.2 oz small bottle)	1.15 \$	1.00 - 1.50
<b>Markets</b>	<a href="#">[ Edit ]</a>	
Milk (regular), (1 gallon)	3.79 \$	3.59 - 4.00
Loaf of Fresh White Bread (1 lb)	2.63 \$	2.00 - 3.00
Rice (white), (1 lb)	3.50 \$	2.00 - 4.00
Eggs (regular) (12)	1.81 \$	1.50 - 2.50
Local Cheese (1 lb)	10.50 \$	5.00 - 14.00
Chicken Breasts (Boneless, Skinless), (1 lb)	5.37 \$	3.50 - 6.00
Beef Round (1 lb) (or Equivalent Back Leg Red Meat)	6.98 \$	5.00 - 8.00
Apples (1 lb)	3.00 \$	2.00 - 4.00
Banana (1 lb)	1.40 \$	0.55 - 2.00
Oranges (1 lb)	3.00 \$	2.00 - 3.00
Tomato (1 lb)	2.00 \$	1.50 - 3.00
Potato (1 lb)	1.50 \$	1.00 - 2.00
Onion (1 lb)	2.00 \$	1.50 - 2.00
Lettuce (1 head)	2.50 \$	1.50 - 3.00
Water (1.5 liter bottle)	1.33 \$	0.50 - 2.00
Bottle of Wine (Mid-Range)	19.50 \$	15.00 - 24.00
Domestic Beer (0.5 liter bottle)	3.00 \$	2.00 - 4.00
Imported Beer (11.2 oz small bottle)	4.50 \$	3.00 - 6.00
Pack of Cigarettes (Marlboro)	6.89 \$	6.79 - 7.00
<b>Transportation</b>	<a href="#">[ Edit ]</a>	
One-way Ticket (Local Transport)	1.25 \$	1.25 - 1.25
Monthly Pass (Regular Price)	40.00 \$	30.00 - 50.00
Taxi Start (Normal Tariff)	3.00 \$	
Taxi 1 mile (Normal Tariff)	2.50 \$	2.00 - 3.00
Taxi 1hour Waiting (Normal Tariff)	?	
Gasoline (1 gallon)	2.35 \$	2.16 - 2.59
Volkswagen Golf 1.4 90 KW Trendline (Or Equivalent New Car)	18,525.00 \$	15,000.00 - 22,050.00
Toyota Corolla 1.6l 97kW Comfort (Or Equivalent New Car)	24,050.33 \$	18,151.00 - 35,000.00
<b>Utilities (Monthly)</b>	<a href="#">[ Edit ]</a>	
Basic (Electricity, Heating, Cooling, Water, Garbage) for 915 sq ft Apartment	152.85 \$	101.66 - 228.73
1 min. of Prepaid Mobile Tariff Local (No Discounts or Plans)	0.10 \$	0.10 - 0.10
Internet (60 Mbps or More, Unlimited Data, Cable/ADSL)	63.33 \$	40.00 - 85.00
<b>Sports And Leisure</b>	<a href="#">[ Edit ]</a>	
Fitness Club, Monthly Fee for 1 Adult	28.43 \$	10.00 - 60.00
Tennis Court Rent (1 Hour on Weekend)	21.50 \$	15.00 - 30.00



Cinema, International Release, 1 Seat	9.00 \$	8.00	-	14.00
<b>Childcare</b>	<a href="#">[ Edit ]</a>			
Preschool (or Kindergarten), Full Day, Private, Monthly for 1 Child	1,300.00 \$	1,200.00	-	1,500.00
International Primary School, Yearly for 1 Child	18,000.00 \$	15,000.00	-	24,000.00
<b>Clothing And Shoes</b>	<a href="#">[ Edit ]</a>			
1 Pair of Jeans (Levis 501 Or Similar)	34.83 \$	28.99	-	45.00
1 Summer Dress in a Chain Store (Zara, H&M, ...)	35.00 \$	30.00	-	49.00
1 Pair of Nike Running Shoes (Mid-Range)	71.43 \$	50.00	-	120.00
1 Pair of Men Leather Business Shoes	88.33 \$	65.00	-	120.00
<b>Rent Per Month</b>	<a href="#">[ Edit ]</a>			
Apartment (1 bedroom) in City Centre	1,166.67 \$	900.00	-	1,800.00
Apartment (1 bedroom) Outside of Centre	991.67 \$	800.00	-	1,200.00
Apartment (3 bedrooms) in City Centre	2,058.33 \$	1,250.00	-	3,000.00
Apartment (3 bedrooms) Outside of Centre	1,700.00 \$	1,200.00	-	2,100.00
<b>Buy Apartment Price</b>	<a href="#">[ Edit ]</a>			
Price per Square Feet to Buy Apartment in City Centre	320.04 \$	311.66	-	424.25
Price per Square Feet to Buy Apartment Outside of Centre	132.96 \$	111.00	-	171.00
<b>Salaries And Financing</b>	<a href="#">[ Edit ]</a>			
Average Monthly Net Salary (After Tax)	2,605.56 \$			
Mortgage Interest Rate in Percentages (%), Yearly, for 20 Years Fixed-Rate	3.90	3.56	-	4.54

### Prices in Sarasota, Florida

These data are based on 343 entries in the past 18 months from 45 different contributors.  
Last update: April 2018

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#### Sources and References: [i](#)

No sources and references provided yet.

#### Add new source here:

URL:

Description:

Sign up for our newsletter:

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#### Nearby cities:

Cost of Living in <a href="#">Bradenton, Florida</a>	13.20 miles
Cost of Living in <a href="#">Venice, Florida</a>	18.96 miles
Cost of Living in <a href="#">Saint Petersburg, Florida</a>	37.69 miles
Cost of Living in <a href="#">Clearwater, Florida</a>	55.60 miles
Cost of Living in <a href="#">Tampa, Florida</a>	61.08 miles
Cost of Living in <a href="#">New Port Richey, Florida</a>	73.66 miles
Cost of Living in <a href="#">Fort Myers, Florida</a>	75.95 miles
Cost of Living in <a href="#">Zephyrhills, Florida</a>	79.31 miles
Cost of Living in <a href="#">Spring Hill, Florida</a>	93.86 miles
Cost of Living in <a href="#">Naples, Florida</a>	116.61 miles

#### Leave a comment:

Your name:  [Sign In](#)

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Your comment (no HTML):

Post comment

0 Comments so far

More about Sarasota, FL:

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## APPENDIX F – DATA USA INFORMATION

<https://datausa.io/profile/geo/sarasota-county-fl/>



[https://datausa.io/profile/geo/sarasota-county-fl/#category\\_wages](https://datausa.io/profile/geo/sarasota-county-fl/#category_wages)

## Household Income

Please note that the buckets used in this visualization were not evenly distributed by ACS when publishing the data.

**\$56,286**

MEDIAN HOUSEHOLD INCOME  
± \$2,523

**177,807**

NUMBER OF HOUSEHOLDS  
± 3,612

In 2015, the median household income of the 177,807 households in Sarasota County, FL grew to \$56,286 from the previous year's value of \$52,109.

The following chart displays the households in Sarasota County, FL distributed between a series of income buckets compared to the national averages for each bucket. The largest share of households have an income in the \$75-\$100k range.

Dataset: ACS 1-year Estimate  
Source: Census Bureau

## Car Ownership

**2 cars**

AVERAGE NUMBER

The following chart displays the households in Sarasota County, FL distributed between a series of car ownership buckets compared to the national averages for each bucket. The largest share of households in Sarasota County, FL have 2 cars, followed by 1 car.

Dataset: ACS 1-year Estimate  
Source: Census Bureau

## APPENDIX G – AMERICAN FACT FINDER INFORMATION

<https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF>

United States Census Bureau

AMERICAN FactFinder

MAIN COMMUNITY FACTS GUIDED SEARCH ADVANCED SEARCH DOWNLOAD CENTER

**Community Facts** - Find popular facts and frequently requested data about your community

1 Community Facts 2 Table Viewer

SB1200CSA01 Statistics for All U.S. Firms by Industry, Gender, Ethnicity, and Race for the U.S., States, Metro Areas, Counties, and Places: 2012 2012 Survey of Business Owners

Table View

Actions: Modify Table Bookmark/Save Print Download Create a Map

This table is displayed with default industry codes. Not all rows may be displayed below. Click Back to Search to select other industry codes using the search options on the left.

The table contains a total of 4,020,463 data rows.

Release Date : 12/15/2015

[NOTE: Includes firms with paid employees and firms with no paid employees. Data are based on the 2012 Economic Census, and the estimates of business ownership by gender, ethnicity, race, and veteran status are for one race and therefore is included in each race selected. Firms with more than one domestic establishment are counted in each geographic area and industry in which they operate, but only once in the U.S. and state totals.]

Versions of this table are available for the following years: 2012 2007

Geographic area name	2012 NAICS code	Meaning of 2012 NAICS code	Meaning of Gender code	Meaning of Ethnicity code	Meaning of Race code	Year	Number of firms with or without paid employees	Sales, receipts, or value of shipments of firms with or without paid employees (\$1,000)	Number of firms with paid employees	Sales, receipts, or value of shipments of firms with paid employees (\$1,000)
Sarasota County, Florida	00	Total for all sectors	All firms	All firms	All firms	2012	43,592	21,908,228	10,918	20,339,106

United States Census Bureau

AMERICAN FactFinder

Feedback FAQs Glossary Help

MAIN COMMUNITY FACTS GUIDED SEARCH ADVANCED SEARCH DOWNLOAD CENTER

**Community Facts** - Find popular facts and frequently requested data about your community

1 Community Facts 2 Table Viewer

CB1500A11 Geography Area Series: County Business Patterns 2015 Business Patterns

Table View BACK TO COMMUNITY FACTS

Actions: Modify Table Bookmark/Save Print Download Create a Map

This table is displayed with default industry codes. Not all rows may be displayed below. Click Back to Search to select other industry codes using the search options on the left.

The table contains a total of 3,169,793 data rows.

Release Date : 04/20/2017

[NOTE: Data based on the 2015 County Business Patterns. CBP html tables and download files can be found at the County Business Patterns Website. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see Survey Methodology. Data in this table represent those available when this report was created; data may not be available for all NAICS industries or geographies. Excludes most government employees, railroad employees, and self-employed persons.]

Versions of this table are available for the following years: 2015

Geographic area name	2012 NAICS code	Meaning of 2012 NAICS code	Year	Number of establishments	Paid employees for pay period including March 12 (number)	First-quarter payroll (\$1,000)	Annual payroll (\$1,000)
Sarasota County, Florida	00	Total for all sectors	2015	13,405	137,827	1,335,703	5,547,522

## **APPENDIX H – INTERNAL REVENUE SERVICE NOTICE 2018 STANDARD MILEAGE RATES**



## 2018 Standard Mileage Rates

Notice 2018-03

### SECTION 1. PURPOSE

This notice provides the optional 2018 standard mileage rates for taxpayers to use in computing the deductible costs of operating an automobile for business, charitable, medical, or moving expense purposes. This notice also provides the amount taxpayers must use in calculating reductions to basis for depreciation taken under the business standard mileage rate, and the maximum standard automobile cost that may be used in computing the allowance under a fixed and variable rate (FAVR) plan.

### SECTION 2. BACKGROUND

Rev. Proc. 2010-51, 2010-51 I.R.B. 883, provides rules for computing the deductible costs of operating an automobile for business, charitable, medical, or moving expense purposes, and for substantiating, under § 274(d) of the Internal Revenue Code and § 1.274-5 of the Income Tax Regulations, the amount of ordinary and necessary business expenses of local transportation or travel away from home. Taxpayers using the standard mileage rates must comply with Rev. Proc. 2010-51. However, a taxpayer is not required to use the substantiation methods described in Rev. Proc. 2010-51, but

instead may substantiate using actual allowable expense amounts if the taxpayer maintains adequate records or other sufficient evidence.

An independent contractor conducts an annual study for the Internal Revenue Service of the fixed and variable costs of operating an automobile to determine the standard mileage rates for business, medical, and moving use reflected in this notice. The standard mileage rate for charitable use is set by § 170(i).

### SECTION 3. STANDARD MILEAGE RATES

The standard mileage rate for transportation or travel expenses is 54.5 cents per mile for all miles of business use (business standard mileage rate). See section 4 of Rev. Proc. 2010-51.

The standard mileage rate is 14 cents per mile for use of an automobile in rendering gratuitous services to a charitable organization under § 170. See section 5 of Rev. Proc. 2010-51.

The standard mileage rate is 18 cents per mile for use of an automobile (1) for medical care described in § 213, or (2) as part of a move for which the expenses are deductible under § 217. See section 5 of Rev. Proc. 2010-51.

### SECTION 4. BASIS REDUCTION AMOUNT

For automobiles a taxpayer uses for business purposes, the portion of the business standard mileage rate treated as depreciation is 22 cents per mile for 2014, 24 cents per mile for 2015, 24 cents per mile for 2016, 25 cents per mile for 2017, and 25 cents per mile for 2018. See section 4.04 of Rev. Proc. 2010-51.

### SECTION 5. MAXIMUM STANDARD AUTOMOBILE COST

For purposes of computing the allowance under a FAVR plan, the standard automobile cost may not exceed \$27,300 for automobiles (excluding trucks and vans) or \$31,000 for trucks and vans. See section 6.02(6) of Rev. Proc. 2010-51.

#### SECTION 6. EFFECTIVE DATE

This notice is effective for (1) deductible transportation expenses paid or incurred on or after January 1, 2018, and (2) mileage allowances or reimbursements paid to an employee or to a charitable volunteer (a) on or after January 1, 2018, and (b) for transportation expenses the employee or charitable volunteer pays or incurs on or after January 1, 2018.

#### SECTION 7. EFFECT ON OTHER DOCUMENTS

Notice 2016-79 is superseded.

#### DRAFTING INFORMATION

The principal author of this notice is Bernard P. Harvey of the Office of Associate Chief Counsel (Income Tax and Accounting). For further information on this notice contact Bernard P. Harvey on (202) 317-7005 (not a toll-free call).

## APPENDIX I – EMAIL COMMUNICATION WITH SWFWMD

From: Nicole R. Mytyk <[nicole.mytyk@swfwmd.state.fl.us](mailto:nicole.mytyk@swfwmd.state.fl.us)>  
Sent: Thursday, February 22, 2018 2:49 PM  
Subject: RE: Cost Effective Analysis - sample reports  
To: Brunty, Jennifer <[jennifer.brunty@stantec.com](mailto:jennifer.brunty@stantec.com)>

Pounds per year but the cost effectiveness is calculated for 20 years (considered the life of the project).

**Nicole Mytyk – SWIM Program, SWFWMD**

**From:** Brunty, Jennifer [<mailto:Jennifer.Brunty@stantec.com>]  
**Sent:** Thursday, February 22, 2018 2:36 PM  
**To:** Nicole R. Mytyk <[Nicole.Mytyk@swfwmd.state.fl.us](mailto:Nicole.Mytyk@swfwmd.state.fl.us)>  
**Subject:** RE: Cost Effective Analysis - sample reports

Me again with one more question – is the pollutant removal rate pounds per year or pounds per life of the project?

**Jennifer L. Brunty, PhD, PMP**

Senior Environmental Scientist

Direct: (941) 907-6900

Mobile: (941) 779-5925

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6900 Professional Parkway East  
Sarasota FL 34240-8414 US



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**From:** Nicole R. Mytyk [<mailto:Nicole.Mytyk@swfwmd.state.fl.us>]  
**Sent:** Thursday, February 22, 2018 9:37 AM  
**To:** Brunty, Jennifer <[Jennifer.Brunty@stantec.com](mailto:Jennifer.Brunty@stantec.com)>  
**Subject:** RE: Cost Effective Analysis - sample reports

Decisions on both questions are unknown at this time.

The metrics were based on past District projects and the Balmoral study was to look at all available info (explained in various reports) to verify the numbers and provide suggestions. At this time none have been adopted. That may or may not change in the future, so for now our metrics have stayed the same. The report was finished around October of last year.

**Nicole Mytyk – SWIM Program, SWFWMD**

**From:** Brunty, Jennifer [<mailto:Jennifer.Brunty@stantec.com>]  
**Sent:** Thursday, February 22, 2018 9:34 AM  
**To:** Nicole R. Mytyk <[Nicole.Mytyk@swfwmd.state.fl.us](mailto:Nicole.Mytyk@swfwmd.state.fl.us)>  
**Subject:** RE: Cost Effective Analysis - sample reports

Thanks – I was using the chart you had pasted into the Janaury 25<sup>th</sup> email and thought it came out of the Balmoral report but I see it's a little different. I'm trying to write a paragraph for the county so they can understand where the numbers SWFWMD is using came from.

Where did the numbers in the chart used in the past come from? Was it based on District staff doing calculations on past District projects? That's what I vaguely remember but I was never involved in that. What year was the chart created (seems like 2013-14 if I remember right)? I ask because the Balmoral report looks like it was normalized for 2017 dollars and I don't know what dollars or any normalization was done for the chart currently in use. Overall, I'm trying to determine if the dollars will be updated as the years progress, or if that is unknown I'll just say it's unknown right now and leave it at that. The years the dollars came from would be something for the county to keep in mind as they do budgets.

Are there plans to use the Balmoral report in the future?

Thanks again for your help!

**Jennifer L. Brunty, PhD, PMP**  
Senior Environmental Scientist

Direct: (941) 907-6900  
Mobile: (941) 779-5925

Stantec Consulting Services Inc.  
6900 Professional Parkway East  
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**From:** Nicole R. Mytyk [<mailto:Nicole.Mytyk@swfwmd.state.fl.us>]  
**Sent:** Thursday, February 22, 2018 9:23 AM  
**To:** Brunty, Jennifer <[Jennifer.Brunty@stantec.com](mailto:Jennifer.Brunty@stantec.com)>  
**Subject:** RE: Cost Effective Analysis - sample reports

Hi Jennifer! We are not adopting any of the Balmoral study at this time. I provided it to show our current metrics listed in Table 6. This may change in the future, but as of 2018 that was how we evaluated projects for FY2019.

See the note in my first email: "The WQ Metrics is an evaluation we completed on our metrics this past year. Table 6 (furthest right column) has our current metrics."

**Nicole Mytyk – SWIM Program, SWFWMD**

**From:** Brunty, Jennifer [<mailto:Jennifer.Brunty@stantec.com>]  
**Sent:** Thursday, February 22, 2018 8:55 AM  
**To:** Nicole R. Mytyk <[Nicole.Mytyk@swfwmd.state.fl.us](mailto:Nicole.Mytyk@swfwmd.state.fl.us)>  
**Subject:** RE: Cost Effective Analysis - sample reports

Good morning – A question about the Balmoral study. The costs were adjusted to 2017 dollars. Do you know if there are plans to update the costs periodically using the consumer price index? I just want to make a note about that in the report for Sarasota County.

Thanks!



**APPENDIX J –SARASOTA COUNTY BOARD MEETING MINUTES  
DATED DECEMBER 5, 2000-HIGHLIGHTED**

December 5, 2000

**MINUTES  
BOARD OF COUNTY COMMISSIONERS**

Book 68  
Page 519

**SARASOTA COUNTY ADMINISTRATION CENTER  
1650 RINGLING BOULEVARD  
COUNTY COMMISSION CHAMBERS  
SARASOTA, FLORIDA**

9:00 a.m.

Nora Patterson, Chair, District 4  
David R. Mills, Vice Chairman, District 2  
Paul Mercier, District 1  
Shannon Staub, District 3  
Jon Thaxton, District 5

Also present were:

James Ley, County Administrator  
David Bullock, Deputy County Administrator  
Jorge L. Fernandez, County Attorney  
Stephen DeMarsh, Assistant County Attorney  
Peter Ramsden, Clerk of the Circuit Court Finance Director  
Tricia Granger, Deputy Clerk

**INVOCATION**

Johnnie Mae Reid

**PLEDGE OF ALLEGIANCE**

Commissioner Staub

**PROCLAMATIONS**

Circus Sarasota Season - December 26, 2000 - January 27, 2001  
Civil Air Patrol Week - December 1-7, 2000

**PERFORMANCE RECOGNIZED AS OUTSTANDING (PRO) AWARDS**

Gary Krauss, Community Services - Individual Accomplishment  
Diane M. Thibodeau and Dianne M. Shipley, Health & Human Services - Team Merit

**RECOGNITION OF RETIREMENTS**

John H. Albritton, Emergency Services - 31 years  
Les McKinney, Public Works - 37 years

**PRESENTATION**

Commr. Mills presented Sarasota Herald Tribune Staff Writer Chad Binette an editorial cartoon commemorating the current Presidential election campaign ballot recounts.

**PRESENTATION OF CERTIFICATES**

Citizens Academy Class Graduation  
(1-0961)

**26. COMMISSION REPORTS**

**A. ADVISORY COUNCILS/ORGANIZATIONS**

Commr. Staub introduced STAR (Students Taking Active Role in Government) members observing the meeting.  
(1-1060)

December 5, 2000

**MINUTES  
BOARD OF COUNTY COMMISSIONERS**

Book 68  
Page 520

**ELECTION OF BOARD OF COUNTY COMMISSION 2001 OFFICERS AND BOARD  
COMMITTEE APPOINTMENTS**

Commr. Staub moved to elect Commr. Mills as Chairman for calendar year 2001. The motion, seconded by Commr. Thaxton, carried without objection.

Chairman. Mills moved to elect Commr. Patterson as Vice Chairman for calendar year 2001. The motion, seconded by Commr. Staub, carried without objection.

Chairman Mills moved to elect Commr. Staub as Chairman Pro-Tem for calendar year 2001. The motion, seconded by Commr. Thaxton, carried without objection.

**RECESS: 9:40 a.m. - 9:45 a.m.**  
**(1-1147)**

Interim Chair Patterson passed the gavel and Chairman Mills noted consideration of the Board Committee Appointments, and subsequent to comments and discussion, the annual appointments of individual Commissioners as representatives for 2001 were confirmed, as follows:

**Organizations/Agencies/Boards:**

**Southwest Florida Regional Planning Council (SWFRPC)**

Two members:

Commr. Staub  
Commr. Thaxton  
Commr. Mercier

One alternate:

**Tourist Development Council (TDC)**

One member:

Commr. Mills  
Commr. Patterson

One alternate:

**Peace River/Manasota Regional Water Supply Authority**

One member:

Commr. Staub  
Commr. Thaxton

One alternate:

**Value Adjustment Board**

Three members:

Commr. Staub  
Commr. Mercier  
Commr. Thaxton

**Economic Development Board**

One member:

Commr. Mills  
Commr. Mercier

One alternate:

**National Estuary Program Policy Committee**

One member:

Commr. Thaxton  
Commr. Patterson

One alternate:

**West Coast Inland Navigation District (WCIND)**

One member:

Commr. Patterson  
Commr. Staub

One alternate:

ELECTION OF BOARD OF COUNTY COMMISSION 2001 OFFICERS AND BOARD  
COMMITTEE APPOINTMENTS - ContinuedOrganizations/Agencies/Boards:

## Metropolitan Planning Organization

Three members:

Commr. Staub  
Commr. Mills  
Commr. Patterson  
Commr. Mercier  
Commr. Thaxton

Two alternates:

## Transportation Disadvantaged Board

One member:

Commr. Mercier

One alternate:

Commr. Mills

## Juvenile Justice

One member:

Commr. Mercier

One alternate:

Commr. Patterson

## Public Safety Council

One member:

Commr. Mercier

One alternate:

Commr. Thaxton

## Utilities Acquisition

One member:

Commr. Patterson

## Charlotte Harbor National Estuary Program

One member:

Commr. Thaxton

One alternate:

Commr. Mercier

## Trail Corridor Committee

One member:

Commr. Mills

## Community Action Agency Board

One member:

Commr. Mercier

One alternate:

Commr. Mills

## Council of Governments

One member:

Commr. Mills

One alternate:

Commr. Patterson

## School Readiness Coalition

One member:

Commr. Staub

One alternate:

Commr. Mercier

## Sarasota County Community Alliance (SCCA)

## Department of Children and Families (DCF)

One member:

Commr. Mercier

One alternate:

Commr. Mills

## G. Pierce Woods Closure Committee

One member:

Commr. Staub

One alternate:

Commr. Mills

**CONSENT MOTION**

A motion was made by Commr. Staub, seconded by Commr. Thaxton, and carried by a 5-0 vote to approve Items 1-11 as follows, with the exception of Items 2 and 3, considered later this meeting.

**1. RESOLUTIONS/GRANTS**

- A. Adopted Resolution No. 2000-278 authorizing the approval for grant application submissions to the Florida Department of Community Affairs (FDCA) for the Emergency Management Preparedness and Assistance Competitive Grant Program;
- B. Authorized execution and submissions of the grant applications by the County Administrator or his designee.

**2. ENVIRONMENTAL SERVICES**

See consideration of the Certification of Financial Responsibility for the Venice Gardens Water Treatment Plant deep injection well, later this meeting.

**3. ENVIRONMENTAL SERVICES**

See consideration of the recommended priority list for County projects to be submitted for Southwest Florida Water Management District Manasota Basin Board Cooperative Funding, later this meeting.

**4. CONTRACTS**

Approved Contract No. 2001-061, Change Order No. 2 to Contract No. 2000-214, with Stately Contractors, Inc., for the construction of the Newtown Water Distribution and Wastewater Collection System, Phase 3, in an amount not to exceed \$188,686.01; and to reduce the Contract retainage to 2.5 percent (%).

**5. PUBLIC WORKS**

- A. Approved a Non-Exclusive Permanent Utility Easement to Florida Power and Light Company for the purpose of relocating existing facilities to accommodate the Cattlemen Road Project - Phase I;
- B. Approved a Non-Exclusive Access Easement to Florida Power and Light Company for the purpose of relocating existing facilities to accommodate the Cattlemen Road Project - Phase I.

**6. CONTRACTS**

Approved Contract No. 2001-062, Supplemental Agreement No. 4 to Contract No. 97-358, with Hole, Montes & Associates, Inc., to provide additional engineering services for the Clark Road Stormwater Improvement Project, in the amount of \$21,470.00.

**7. ORDINANCES**

Authorized advertising of a public hearing to consider a proposed Ordinance to establish the Boleyn Road Non-Maintained Secondary Road Improvement District.

**8. RESOLUTIONS**

- A. Adopted Resolution No. 2000-279 authorizing the execution and submittal of Contract No. 2000-331, a Joint Participation Agreement (JPA), with the Florida Department of Transportation (FDOT), for a Federal Transportation Administration (FTA) Section 5310 Capital Equipment Grant, in the amount of \$136,800.00, and \$17,100.00 of FDOT matching funds; authorizing the execution and filing of the Application for Federal Assistance for the Grant Program; and rescinding Resolution No. 2000-186, approved by the Board on September 12, 2000.

- 8. RESOLUTIONS - Continued**
- B.** Adopted Resolution No. 2000-280, authorizing the execution and submittal of Contract No. 2000-330, a Joint Participation Agreement (JPA), with the Florida Department of Transportation (FDOT), for a Federal Transportation Administration (FTA) Section 5311 Non-Urbanized Grant, in the amount of \$54,100.00; authorizing execution and filing of the Application for Federal Assistance for the Grant Program; authorizing the execution and filing of the FY2000 Federal Transit Administration's certifications and Assurances, and rescinding Resolution No. 2000-185, approved by the Board on September 12, 2000.
- 9. RESOLUTIONS**
- Adopted Resolution No. 2000-281 authorizing the execution and submittal of Contract No. 99-358, a Joint Participation Agreement with the Florida Department of Transportation (FDOT) permitting FDOT to provide up to \$715,277.00 in transit operating assistance to the SCAT (Sarasota County Area Transit) bus system, and rescinding Resolution No. 2000-220, approved by the Board on September 26, 2000.
- 10. WARRANTS**
- Approved the warrants dated November 27 through December 1, 2000, in the amount of \$5,801,910.76, as detailed in the voucher packages filed in the Finance Department.
- 11. MINUTES**
- Approved the Minutes of meetings dated September 28 and October 11, 2000.  
(1-1913)
- 2. ENVIRONMENTAL SERVICES - Continued**
- Following clarification of Staff's report by County Administrator James Ley pertaining to funding requirements, Chairman Mills moved to authorize execution of the Certification of Financial Responsibility for the Venice Gardens Water Treatment Plant deep injection well, for submission to the Florida Department of Environmental Protection (FDEP). The motion, seconded by Commr. Staub, carried without objection.
- 3. ENVIRONMENTAL SERVICES - Continued**
- Following inquiry, Environmental Services Utilities Planning Section Supervisor John Knowles reviewed the process for the development of the priority listing for County projects to be submitted for Southwest Florida Water Management District (SWFWMD) Manasota Basin Board Cooperative Funding.
- Subsequent to discussion on the development process, the Catfish Creek Stormwater Improvement Project, and anticipated funding, Chairman Mills moved to approve the priority listing for County projects to be submitted. The motion, seconded by Commr. Patterson, carried without objection.  
(1-2254)
- 26. COMMISSION REPORTS - Continued**
- B. ORGANIZATIONS**
- Chairman Mills noted the attendance of Ms. Cathy Layton and congratulated her on her recent appointment to the Charter Review Board by Governor Jeb Bush.

**12. CONTRACTS/RESOLUTIONS**

Following comments from Chairman Mills on consideration of the requests for tax exemption status for historical property, Community Services Historical Resources Specialist Lorrie Muldowney provided background information on Ordinance requirements and an overview of criteria for consideration and approval of the requests.

Ms. Muldowney presented the proposed Resolution to grant tax exemption status for property known as the Crisp Building located at 1970 Main Street, Sarasota, and Contract, a Historic Preservation Property Tax Exemption Covenant, with the Kauffman Family Partnership I (Owner) for the purpose of qualifying the Owner for an ad valorem tax exemption for qualified improvements made to the property for a ten-year period commencing January 1, 2001 through December 31, 2011.

Commr. Staub moved to adopt Resolution No. 2000-282, approving the tax exemption status for the Crisp Building. The motion, seconded by Commr. Mercier, carried by a 5-0 vote.

Commr. Staub moved to approve Contract No. 2001-063, a Historic Preservation Property Tax Exemption Covenant, with the Kauffman Family Partnership I, for the Crisp Building. The motion, seconded by Commr. Mercier, carried by a 5-0 vote.

(1-2585)

Ms. Muldowney presented an overview of the proposed Resolution to grant tax exemption status for property known as the Leonard Reid House located at 1435 7<sup>th</sup> Street, Sarasota, and Contract, a Historic Preservation Property Tax Exemption Covenant, with Donald Wallace (Owner) for the purpose of qualifying the Owner for an ad valorem tax exemption for qualified improvements made to the property for a ten-year period commencing January 1, 2001 through December 31, 2011.

Commr. Thaxton declared a conflict and filed the appropriate documentation.

Commr. Patterson moved to adopt Resolution No. 2000-283, approving the tax exemption status for the Leonard Reid House. The motion, seconded by Commr. Mercier, carried by a 4-0 vote, with Commr. Thaxton abstaining.

Commr. Patterson moved to approve Contract No. 2001-064, a Historic Preservation Property Tax Exemption Covenant, with David Wallace for the Leonard Reid House. The motion, seconded by Commr. Mercier, carried by a 4-0 vote, with Commr. Thaxton abstaining.

(1-2718)

Ms. Muldowney presented an overview of the proposed Resolution to grant tax exemption status for property known as the Hood Building located at 1373-1385 5<sup>th</sup> Street, Sarasota, and Contract, a Historic Preservation Property Tax Exemption Covenant, with Daniel P. and Judith C. Ball (Owners) for the purpose of qualifying the Owner for an ad valorem tax exemption for qualified improvements made to the property for a ten-year period commencing January 1, 2001 through December 31, 2011.

Commr. Thaxton moved to adopt Resolution No. 2000-284, approving the tax exemption status for the Hood Building. The motion, seconded by Commr. Staub, carried by a 5-0 vote.

**12. CONTRACTS/RESOLUTIONS - Continued**

Commr. Thaxton moved to approve Contract No. 2001-065, a Historic Preservation Property Tax Exemption Covenant, with Daniel P. and Judith C. Ball for the Hood Building. The motion, seconded by Commr. Staub, carried by a 5-0 vote.  
(1-2795)

Ms. Muldowney presented an overview of the proposed Resolution to grant tax exemption status for property known as the Kicklighter House located at 1205 Coconut Avenue, Sarasota, and Contract, a Historic Preservation Property Tax Exemption Covenant, with Katherine Kelly (Owner) for the purpose of qualifying the Owner for an ad valorem tax exemption for qualified improvements made to the property for a ten-year period commencing January 1, 2001 through December 31, 2011.

Commr. Mercier moved to adopt Resolution No. 2000-285, approving the tax exemption status for the Kicklighter House. The motion, seconded by Commr. Staub, carried by a 5-0 vote.

Commr. Mercier moved to approve Contract No. 2001-066, a Historic Preservation Property Tax Exemption Covenant, with Katherine Kelly for the Kicklighter House. The motion, seconded by Commr. Staub, carried by a 5-0 vote.  
(1-2872)

Ms. Muldowney presented an overview of the proposed Resolution to grant tax exemption status for property known as the Alice Watters Beebe House located at 1265 Tree Bay Lane, Sarasota, and a Contract, a Historic Preservation Property Tax Exemption Covenant, with Harold and Mary Michaels (Owners) for the purpose of qualifying the Owner for an ad valorem tax exemption for qualified improvements made to the property for a ten-year period commencing January 1, 2001 through December 31, 2011.

Commr. Staub moved to adopt Resolution No. 2000-286, approving the tax exemption status for the Alice Watters Beebe House. The motion, seconded by Commr. Patterson, carried by a 5-0 vote.

Commr. Staub moved to approve Contract No. 2001-067, a Historic Preservation Property Tax Exemption Covenant, with Harold and Mary Michaels for the Alice Watters Beebe House. The motion, seconded by Commr. Patterson, carried by a 5-0 vote.  
(1-2980)

**13. RESOLUTIONS**

Following comments, Ms. Mikki Hartig, Agent for Geraldine and Walter Schwab, Owner/Petitioner, presented an overview of Historic Designation Petition No. 00-CoD-04, for the Alvah Jordan Home and Guest House located at 218 E. Pocono Trail, Nokomis, discussed the improvements to the property, and reviewed the criteria for consideration of the petition.

Community Services Historical Resources Specialist Lorrie Muldowney presented an overview of the Petition and noted the recommendation for approval by the Historic Preservation Board, pursuant to Ordinance No. 97-133.

Subsequent to comments, Commr. Staub moved to adopt Resolution No. 2000-287, approving Historic Designation Petition No. 00-CoD-04. The motion, seconded by Commr. Mercier, carried by a 5-0 vote.  
(2-0006)



**14. RESOLUTIONS**

Ms. Ginger Daniel, Agent for Lisa S. Jones, Owner/Petitioner, presented an overview of Historic Designation Petition No. 00-CoD-03, a petition, for the George A. and Ethel Freeman House located at 4010 Roberts Point Road, Sarasota, reviewed the improvements to the property, and supported approval.

Community Services Historical Resources Specialist Lorrie Muldowney presented an overview of the Petition and reviewed the historic designation process. Discussion ensued on the criteria for application for tax exemptions.

Chairman Mills requested and County Administrator James Ley confirmed that the historic designation process will be clarified in future reports.

Subsequent to comments, Commr. Patterson moved to adopt Resolution No. 2000-288, approving Historic Designation Petition No. 00-CoD-04. The motion, seconded by Commr. Staub, carried by a 5-0 vote.

**RECESS: 10:52 a.m. - 11:00 a.m.**  
**(2-0355)**

**15. PUBLIC WORKS**

Following comments from Chairman Mills on a request to speak, Public Works Project Development and Environment (PD&E) Section Supervisor Robert Fakhri, presented an overview of the design concepts and alignment recommendations for McIntosh Road from Sawyer Loop Road to Hicks Street, and advised of Staff's recommendation for proposed Alignment No. 5. Discussions were held with Mr. Fakhri and Public Works Construction Services General Manager Tom Wilcox on the following:

- modifications to traffic signal locations
- Wilkinson Road intersection
- proposed stormwater pond locations
- anticipated speed limit on the roadway
- ingress/egress to Old McIntosh Road.

Following comments, Commr. Staub moved to approve the design concepts and Alignment Recommendation No. 5 outlined in Staff's report. The motion, seconded by Commr. Thaxton, carried by a 5-0 vote.

**(2-1323)**

**16. ADVISORY COUNCILS**

The Board considered the appointment of seven (7) individuals to serve two-year terms on the Water and Sewer Advisory Committee, effective through December 2003.

Commr. Thaxton moved to reappoint Patrick Arbolino, Robert Fedel, John Finnimore, Michael Pender, and Leonard Smally. The motion, seconded by Commr. Staub, carried by a 5-0 vote.

Commr. Staub nominated Judith Johnson. Commr. Thaxton seconded the nomination. Commr. Staub nominated William Taft. Commr. Patterson nominated Harold Simon. Commr. Mercier seconded the nomination.

**16. ADVISORY COUNCILS - Continued**

Following discussion on the nominations, Chairman Mills noted the unanimous appointments of Judith Johnson and William Taft to serve two-year terms on the Water and Sewer Advisory Committee effective through December 2003.

(2-1480)

**17. ADVISORY COUNCILS**

The Board considered the appointments of four (4) individuals to the Keep Sarasota Beautiful Advisory Board as follows:

One (1) individual to fill an unexpired three-year term effective through March 2001;

One (1) individual to fill an unexpired three-year term effective through November 2001;

Two (2) individuals to fill three-year term effective through November 2003.

Commr. Staub moved to reappoint Donald Fleming and Tommy Meyer to three-year terms effective through November 2003. The motion, seconded by Commr. Thaxton, carried by a 5-0 vote.

Commr. Staub nominated John Johnston to fill an unexpired three-year term effective through March 2001 and Mark Royall to fill an unexpired three-year term effective through November 2001.

Chairman Mills closed the nominations without objection, and noted the unanimous appointments of John Johnston to fill an unexpired three-year year term effective through March 2001, and Mark Royall to fill an unexpired three-year term effective through November 2001, on the Keep Sarasota Beautiful Advisory Board.

(2-1560)

**18. BUDGETS**

Administrative Services Fiscal Planning and Budget Coordinator Juanita Still presented an overview and slide presentation on the Capital Improvement Program (CIP) FY2000, Fourth Quarter Status Report and noted the distribution of revised copies for Section E.

Discussions were held with County Administrator James Ley and Emergency Services Fire Chief Brian Gorski on the Waterworks/10<sup>th</sup> Street project included on Page E-2 of Staff's report.

Ms. Still responded to inquiries on the following projects:

- Englewood Sports Complex - Page E-6
- Van Wezel Remodeling - Page A-1
- Jacaranda Library - Page D-2.

Chairman Mills inquired and Ms. Still commented on allocations for the acquisition of properties for the North Library and noted that the information is the final report for FY1999-2000.

(2-2065)

**19. HOUSING/RESOLUTIONS**

Following comments on the remaining agenda items to be considered, Growth Management Office of Housing and Community Development Director Donald Hadsell presented an overview of the revised Housing Credit Guidelines and a proposed Resolution to authorize conceptual site plan review for specified affordable housing projects.

**19. HOUSING/RESOLUTIONS - Continued**

Subsequent to comments, Commr. Staub moved to approve the revised Housing Credit Guidelines and to adopt Resolution No. 2000-289, authorizing conceptual site plan review for specified affordable housing projects. The motion, seconded by Commr. Thaxton, carried by a 5-0 vote.

**RECESS: 11:55 a.m. - 1:30 p.m.  
(2-2281)**

**26. COMMISSION REPORTS - Continued**

**C. BCC**

Chairman Mills reviewed revisions to the Open to the Public portion of Board meetings and noted the afternoon schedule.

**29. OPEN TO THE PUBLIC**

**A. ENVIRONMENTAL SERVICES**

Mr. Edward Harding commented on the disposal of solid waste through composting methods and options for wastewater/septic systems maintenance.

**B. ELECTIONS/POLICIES AND PROCEDURES**

Mr. John Flaherty commented on campaign contributions, speaker time limits, and compliance with County ordinances and State Statutes.

**C. COMMUNITY SERVICES/ORGANIZATIONS**

Mr. Robert Friedman commented on the Little League Baseball program and existing lease with the County.

**D. COMMUNITY SERVICES/ORGANIZATIONS**

Mr. Kurt Rohde commented on the history of Little League program and the existing lease with the County.

Following discussion, County Attorney Jorge Fernandez commented on Staff's review of the lease. Upon inquiry, Deputy County Administrator David Bullock commented on Staff options for resolution of the issue.

Discussion ensued with Mr. Rohde on the efforts of the Little League organization to resolve the issues.

**E. COMMUNITY SERVICES/ORGANIZATIONS**

Ms. Toneen Slimick commented on the Little League Baseball program and existing lease with the County.

Following comments, County Attorney Jorge Fernandez commented on the legal rights of the parties, advised that the courts have the final authority to determine individual rights, and discussed the terms of the lease. Individual comments followed.

**(3-0433)**

**20. ENVIRONMENTAL SERVICES**

Environmental Services General Manager Warren Wagner presented a status report on potable water and public supply water management. Discussions were held on the following:

- supply versus demand
- daily production and costs
- planning activities.

Environmental Services Administration and Finance Manager David Cook presented a status report on current and future conservation efforts. Discussions were held on the following:

- irrigation customers and large users
- code enforcement reporting hotline

Mr. Cook reviewed Staff's recommendation to amend Ordinance No. 2000-015 and requested authorization to advertise proposed amendments to the Ordinance. Mr. Cook noted the time frame for planning activities with County business centers and commented on variances granted by the Southwest Florida Water Management District (SWFWMD).

Environmental Services Public Communications and Outreach Coordinator Amie Haer commented on watering days/restrictions included in the Ordinance No. 2000-015 versus current SWFWMD restrictions.

Following comments from County Administrator James Ley on the enforcement process, Commr. Staub moved to authorize advertising of a public hearing to consider proposed Ordinance No. 2000-082, amending Ordinance No. 2000-015. The motion was seconded by Commr. Patterson. Subsequent to individual comments, the motion carried by a 5-0 vote.

(3-1981)

**26. COMMISSION REPORTS - Continued****D. BCC**

Following comments, Commr. Mercier moved to proceed with the public hearing on Coastal Setback Variance Petition No. 79-03-00-290, at this time. The motion, seconded by Commr. Staub, carried by a 5-0 vote.

(3-2030)

**30. RESOLUTIONS**

Public hearing continued from November 8, 2000, to consider a proposed Resolution, Coastal Setback Variance Petition No. 79-03-00-290, a petition by Edward C. and Elizabeth J. Bavaria, represented by Ms. Kristina V. Tignor, P.E., for the construction of a 75-foot long, shore-parallel vinyl bulkhead adjacent to and landward of a proposed 6-foot wide and 75-foot long rock revetment structure with two 40-foot long, shore-perpendicular, vinyl bulkhead returns at each end of the proposed revetment/bulkhead structure, and for the placement of beach compatible sand fill behind the bulkhead. All proposed construction is to be located a maximum of 55 feet waterward of the Barrier Island Pass Twenty-Year Hazard Line at property fronting the waters of Big Sarasota Pass at 4083 Shell Road, Siesta Key.

**30. RESOLUTIONS - Continued**

Following comments from Chairman Mills on the public hearing on November 8, 2000, Commr. Patterson inquired, and County Attorney Jorge Fernandez opined that no conflict exists for Commr. Patterson to consider the petition.

Having been duly sworn, Development Services Resource Protection Services Senior Engineer Rob LaDue commented on previous Board review of the petition, noted that the Petitioner has submitted a draft plan for review, and discussed the proposed public access. Mr. LaDue submitted a copy of an interoffice memorandum for the Office of the County Attorney dated December 4, 2000, and discussion ensued with Mr. LaDue and County Attorney Fernandez on the requirements of the County Code pertaining to public access.

Mr. LaDue's presentation continued with review of existing shore protection structures on neighboring properties, the proposed conceptual plan, and existing revetments. Mr. LaDue submitted a document entitled "Comparison Report of Prior and Pending Coastal Setback Variance Petitions" and a letter of support from Attorney William Merrill.

(4-0088)

Attorney Brenda Patten, representing Edward and Elizabeth Bavaria and duly sworn, commented on property owned by the petitioners, reviewed previous and existing property conditions, and discussed previous Board direction noting support of neighboring property owners.

Upon inquiry, County Attorney Fernandez noted that the Board is limited to act on only the current petition and action taken will not "bind" the Board to future approvals for surrounding properties.

Agent Kristina Tignor, duly sworn, commented on the time frame for the petition, the intent of the surrounding property owners, the proposed conceptual plan, and a code enforcement case on neighboring property, and reviewed the comparison report submitted by Staff.

Attorney Patten commented on the requested variance and pedestrian easements/public access.

(4-1050)

Upon inquiry, County Attorney Fernandez noted that the County will not incur any liability exposure for the proposed public access.

The following individuals, duly sworn, commented on the proposed variance petition:

Mr. Steven King  
Attorney William Merrill

During speaker presentations, Mr. LaDue responded to inquiries pertaining to additional variance requests pending for neighboring properties and the time frame for Board consideration.

**RECESS: 4:12 p.m. - 4:20 p.m.**  
(4-1523)

**30. RESOLUTIONS - Continued**

Upon inquiry, Mr. LaDue discussed erosion issues pertaining to a "straight line versus bowed line" revetment, the time frame for construction of the structure, and previous variances constructed in the area.

Commr. Staub moved to close the public hearing. The motion, seconded by Commr. Patterson, carried without objection.

(4-1720)

Following discussion on the proposed revetment line, Commr. Thaxton moved to adopt Resolution No. 2000-290, approving Coastal Setback Variance Petition No. 79-03-00-290. The motion was seconded by Commr. Staub. Subsequent to discussion on future variance requests, Commr. Staub moved to reopen the public hearing. The motion, seconded by Commr. Patterson, carried without objection.

Upon inquiry, Ms. Tignor noted agreement with Board discussion pertaining to variance petitions for neighboring property. Commr. Staub moved to close the public hearing. The motion, seconded by Commr. Thaxton, carried without objection.

Following individual comments, the motion to adopt Resolution No. 2000-290 carried by a 5-0 vote.

Discussion ensued on the time frame for consideration of variance petitions for neighboring properties. (See item later this meeting.)

(4-2302)

**31. PUBLIC WORKS**

Chairman Mills noted that consideration of the Metropolitan Planning Organization (MPO) discussion of the coordination and project priorities will be continued to the meeting scheduled for December 6, 2000.

**30. RESOLUTIONS - Continued**

Upon inquiry by Attorney William Merrill, Assistant County Attorney Stephen DeMarsh commented on Board options for documenting action taken this date and consideration of future petitions.

(4-2375)

**21. PUBLIC WORKS**

Public Works Stormwater Planning Section Supervisor Theresa Connor presented the Cost Effective Analysis for Stormwater Projects report and noted Staff's recommendation for adoption of the Benefit Analysis as outlined in the report. Ms. Connor discussed expenses incurred by private utilities for damages during a storm event, stormwater fees, and level of service, and reviewed the proposed use of the analysis report.

Commr. Thaxton moved to adopt the Benefit Analysis as outlined in Staff's report. The motion, seconded by Commr. Patterson, carried by a 5-0 vote.

Commr. Patterson inquired, and Ms. Connor noted the status of the Hatchett Creek Stormwater project.

(4-3375)



**22. CLERK'S REPORT****A. CLERK OF CIRCUIT COURT**

The Filed for Record List was noted.

**23. COUNTY ADMINISTRATOR'S REPORT****A. BCC**

County Administrator James Ley noted distribution of literature for the Board Retreat scheduled for December 7, 2000, and for the Convocation of Governments meeting scheduled for December 14, 2000. Discussion ensued on the format for the December 7<sup>th</sup> meeting.

**24. COUNTY ATTORNEY'S REPORT****A. PLATS**

County Attorney Jorge Fernandez presented, and Commr. Staub moved to approve the Final Plat of Venice Palms, Phase II. The motion, seconded by Commr. Thaxton, carried by a 5-0 vote.

(5-0069)

**25. COMMITTEE REPORTS****A. ORGANIZATIONS**

- Commr. Mercier noted that he will be serving on the canvassing board for Holiday Park and thanked Staff for their assistance to date.
- Commr. Staub discussed issues reviewed at the West Coast Inland Navigation District (WCIND) meeting pertaining to project funding.

Commr. Patterson moved to authorize correspondence to Congressman Miller requesting support for Federal funds for the Midnight Pass Study and Lemon Bay project. The motion, seconded by Commr. Staub, carried by a 5-0 vote.

- Chairman Mills noted attendance at the anniversary celebration of the Pinellas Trail Program, and noted an upcoming meeting of the Metropolitan Planning Organization.

(5-0386)

**26. COMMISSION REPORTS - Continued****D. BCC**

Commr. Thaxton commended Staff for their efforts in providing information to the new commissioners and their service to the County.

**E. GROWTH MANAGEMENT**

Commr. Patterson commented on the Dearborn Community Redevelopment Area and funding alternatives. Following comments, Commr. Patterson moved to direct Staff to review options for lighting and financing options for the area. The motion, seconded by Commr. Staub, carried without objection.

(5-0566)

**26. COMMISSION REPORTS - Continued****F. ADMINISTRATION**

Commr. Patterson commented on available non-emergency numbers, and following comments, County Administrator James Ley noted that Staff will review the issue to provide public information for non-emergencies.

(5-066)

**G. BCC**

Commr. Staub commented on the installation of Constitutional Officers on January 2, 2000, and County Administrator James Ley noted that he will review options for holding the ceremonies at the Administration building.

**H. ORDINANCES/POLICIES AND PROCEDURES**

Commr. Staub noted receipt of a request for Mr. William King for additional speaking time at the public hearing scheduled for December 6, 2000, pertaining to connection to available central wastewater utility. Individual comments followed.

**I. STATE AGENCIES**

Subsequent to comments, Commr. Staub requested that Staff contact the Florida Department of Transportation (FDOT) and request the removal of a directional sign on State Road 70 directing traffic to Fruitville Road.

**J. ORGANIZATIONS**

Commr. Staub commented on the presentation to Mr. Chad Binette earlier this meeting and commended Englewood Sun Herald Warren Richardson on his service.

(5-0839)

**K. ORGANIZATIONS**

Chairman Mills noted receipt of the "Best Small City Award" and invited Board members to attend the presentation on December 12, 2000 to be held at the Van Wezel Auditorium.

**L. PUBLIC WORKS**

Following inquiry from Chairman Mills, Commr. Staub provided a status report on the Jacaranda lighting project.

**M. LEGISLATION**

Following comments from Chairman Mills, Administration Intergovernmental Relations Policy Coordinator William Broughton noted the distribution of an interoffice memorandum outlining legislative priorities to be presented at the Legislative Delegation on December 8, 2000.

**27. BCC**

The Board reviewed the County Commission "Board Assignments Report" dated November 30, 2000.

**28. BCC**

The Board reviewed the County Commissioners Meeting Schedule and 2001 Board calendar. Chairman Mills requested Board review of the 2001 calendar.



December 5, 2000

**MINUTES  
BOARD OF COUNTY COMMISSIONERS**

Book 68  
Page 534

29. OPEN TO THE PUBLIC - No one appeared at this time.

MEETING ADJOURNED: 5:35 p.m.  
(5-0978)

MINUTES APPROVED: 12/19/2000

BY:

A circular seal of the Board of County Commissioners is visible in the background. It features the text "BOARD OF COUNTY COMMISSIONERS" around the top and "STATE OF FLORIDA" around the bottom. In the center, there is a smaller seal with the year "1822".  
*David R. Mills*  
Chairman

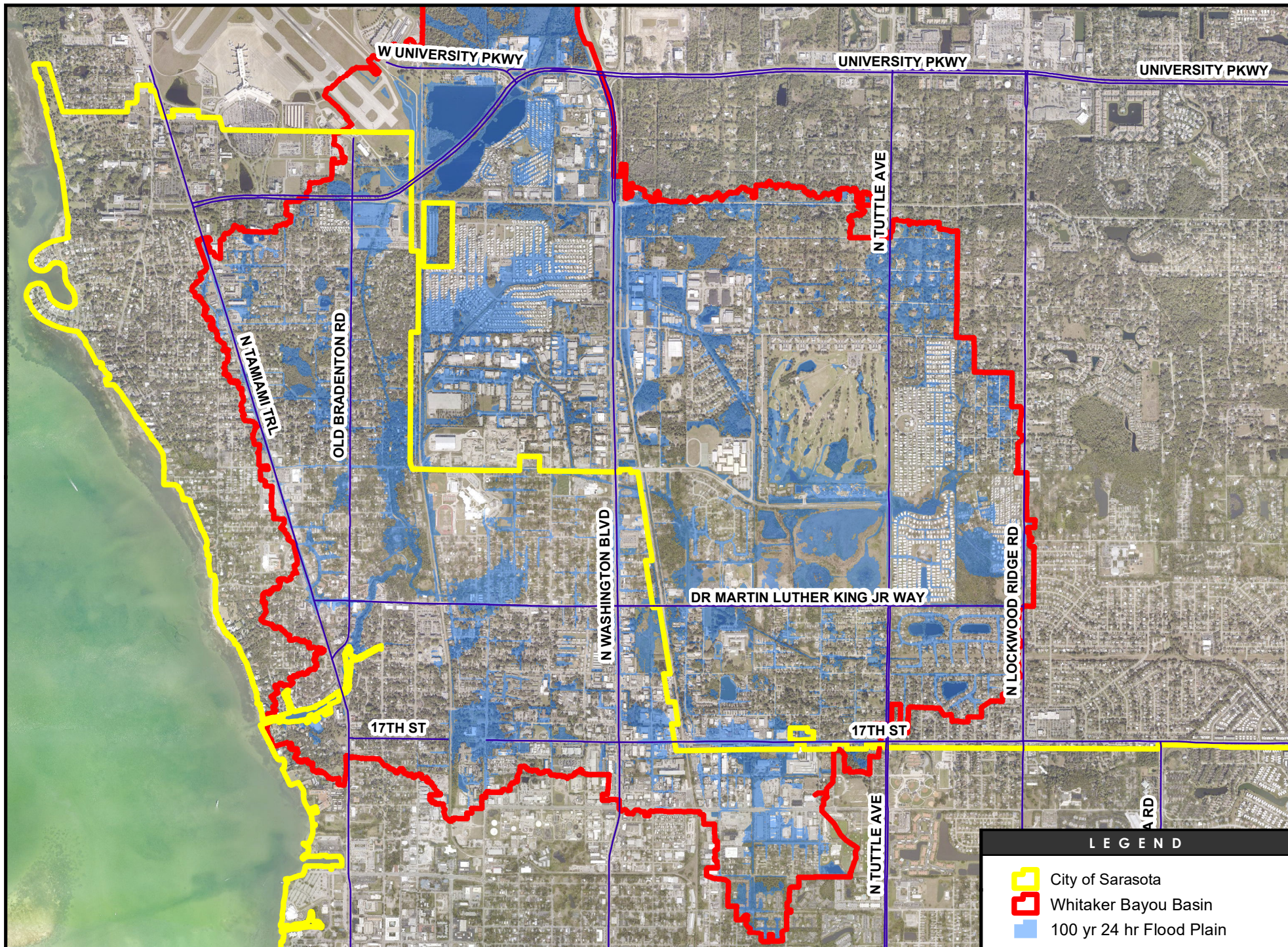
ATTEST:

*Paula J. Clinton*

Deputy Clerk

## **6.2 PROJECT LOCATION MAPS**





**LEGEND**

- City of Sarasota
- Whitaker Bayou Basin
- 100 yr 24 hr Flood Plain



**Whitaker Bayou**  
Project Areas  
March 2020

Stantec Consulting Services Inc.  
5801 Pelican Bay Blvd, Suite 300  
Naples, FL 34108  
tel 239.649.4040  
fax 239.263.6449

**LEGEND**

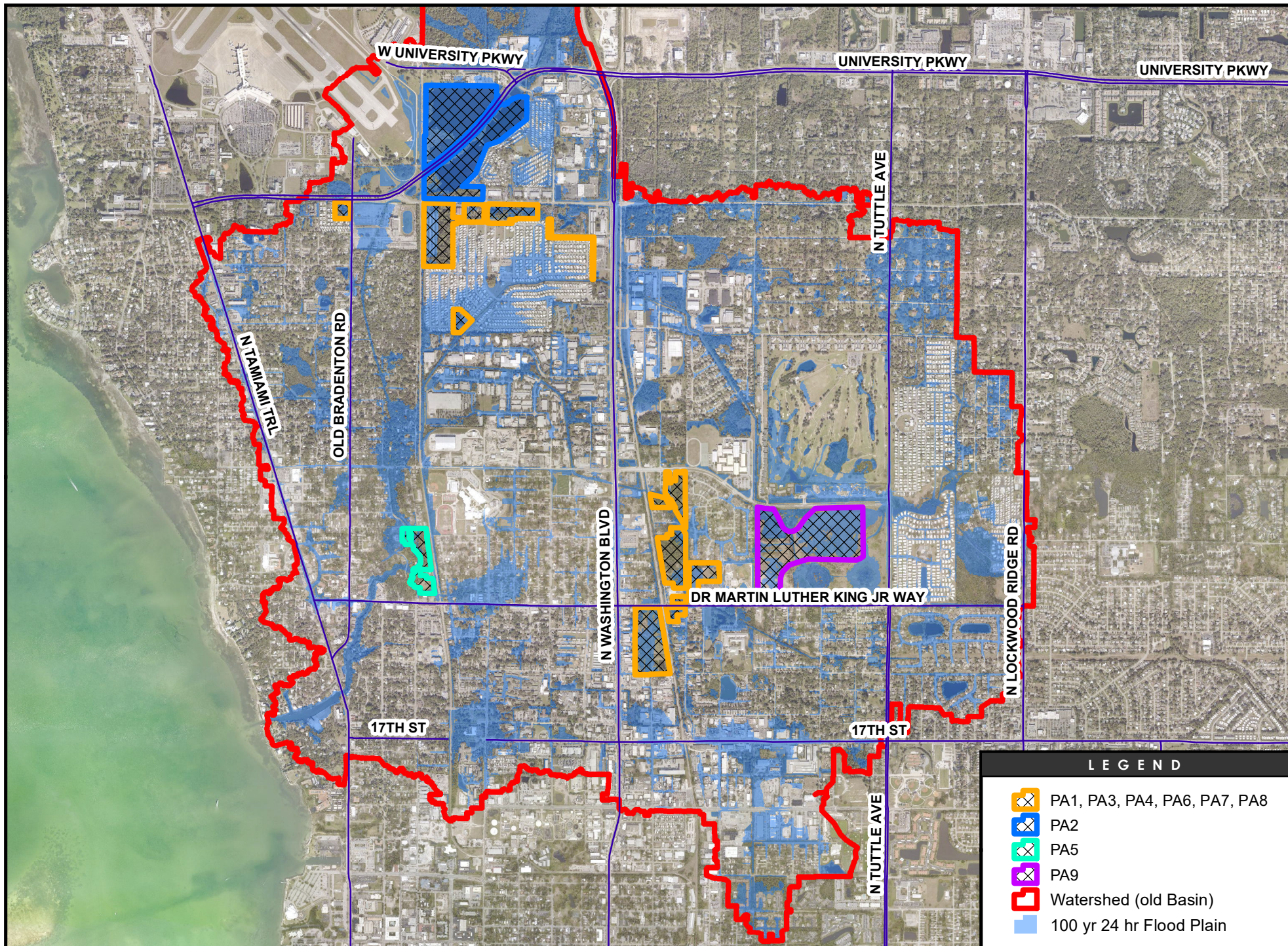
11/200 Feet

Prepared by: Lance Price 03/27/20  
Technical Review by: X.X.X 03/27/20  
Independent Review by: Molly Williams 03/27/20







Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.

1. Coordinate System: NAD 1983 StatePlane Florida West FIPS 3202 Feet  
2. Source: ESRI  
3. Imagery: ESRI

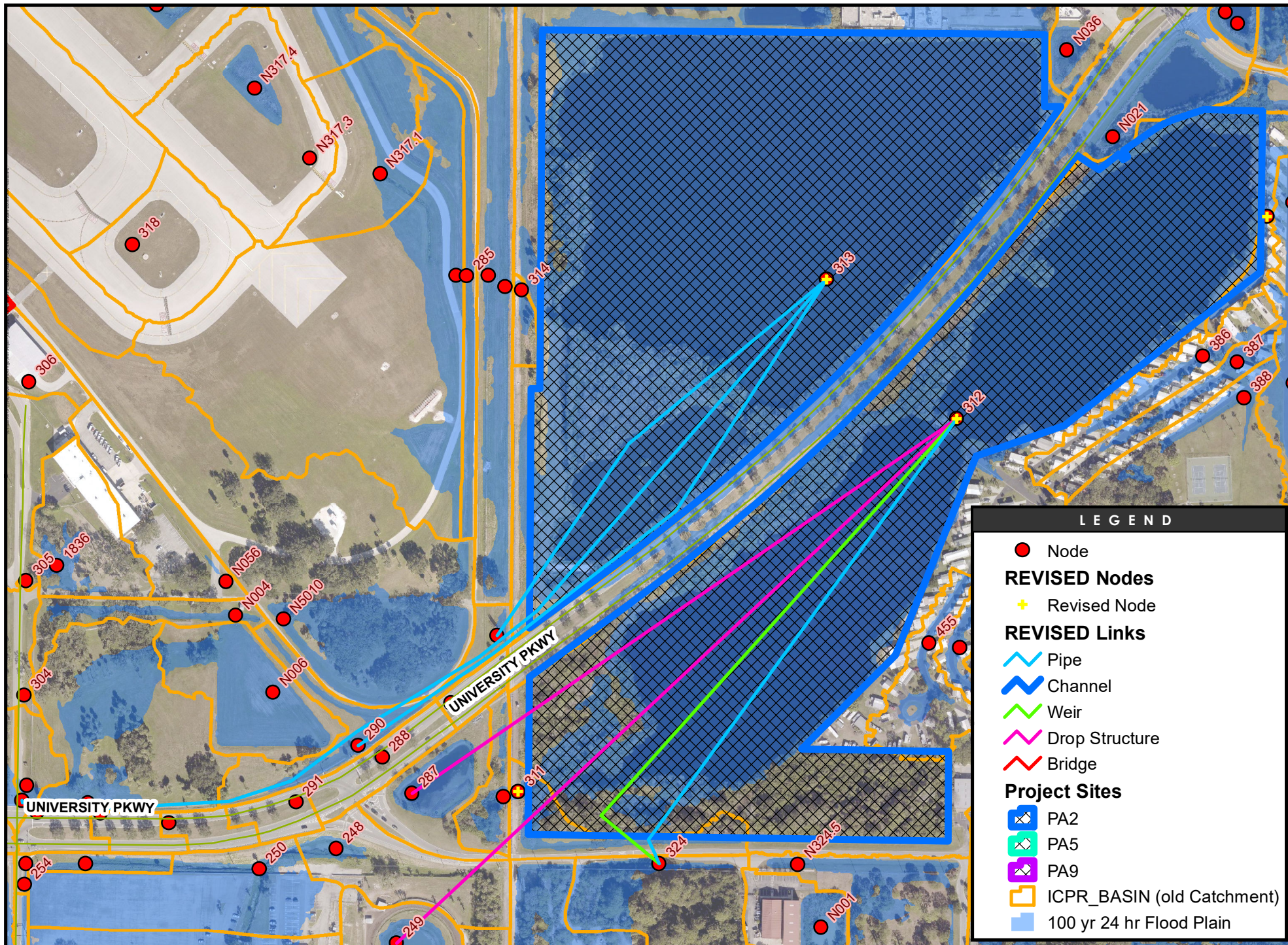




# LEGEND

-  PA1, PA3, PA4, PA6, PA7, PA8
-  PA2
-  PA5
-  PA9
-  Watershed (old Basin)
-  100 yr 24 hr Flood Plain





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1. Coordinate System: NAD 1983 State Plane Florida West FIPS 5002 Feet  
2. Source: AEC  
3. Date: 03/26/20

# **Whitaker Bayou** Project Area 2 March 2020

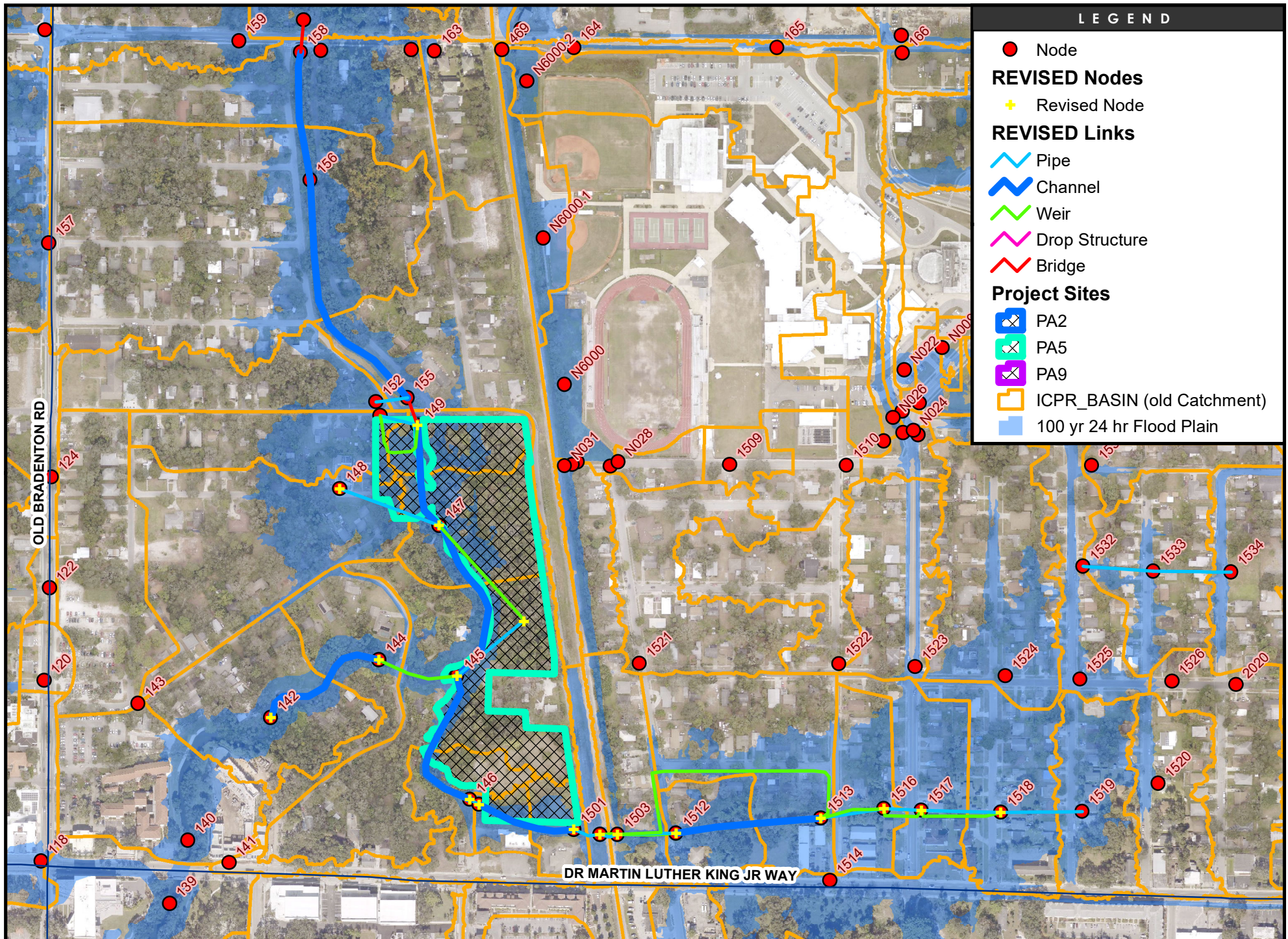
Stantec Consulting Services Inc.  
5801 Pelican Bay Blvd, Suite 300  
Naples, FL 34108  
tel 239.649.4040  
fax 239.263.6449



Prepared by: Lance Price 03/26/20  
Technical Review by: X.X.X 03/26/20  
Independent Review by: Molly Williams 03/26/20







# LEGEND

● Node

## REVISED Nodes

+ Revised Node

## REVISED Links

— Pipe

— Channel

— Weir

— Drop Structure

— Bridge

## Project Sites

PA2

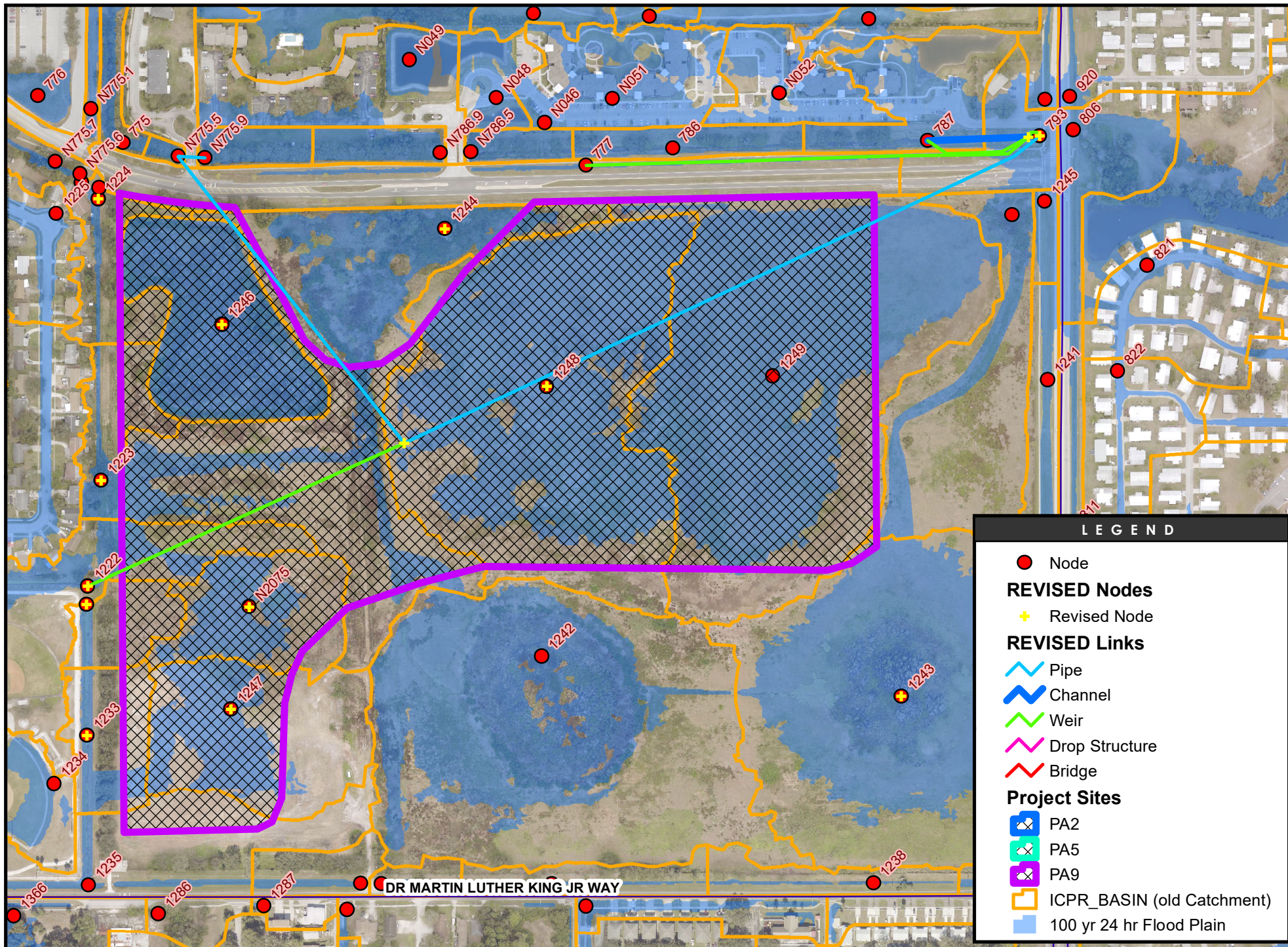
PA5

PA9

ICPR BASIN (old Catchment)

100 yr 24 hr Flood Plain





**LEGEND**

- Node
- REVISED Nodes**
- + Revised Node
- REVISED Links**
- Pipe
- Channel
- Weir
- Drop Structure
- Bridge
- Project Sites**
- PA2
- PA5
- PA9
- ICPR\_BASIN (old Catchment)
- 100 yr 24 hr Flood Plain



### **6.3 COST EFFECTIVENESS DETERMINATIONS – MEMO DATED AUGUST 15, 2013**



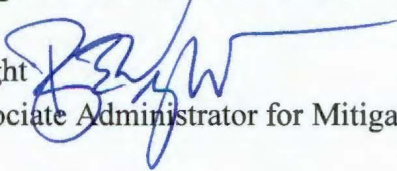


**FEMA**

**AUG 15 2013**

MEMORANDUM FOR: Regional Administrators  
Regions I-X

ATTENTION: Regional Mitigation Division Directors  
Hazard Mitigation Assistance Branch Chiefs

FROM: Roy E. Wright   
Deputy Associate Administrator for Mitigation

SUBJECT: Cost Effectiveness Determinations for Acquisitions and Elevations  
in Special Flood Hazard Areas

Projects that are eligible for funding under the Hazard Mitigation Assistance (HMA) programs must be cost effective, i.e., have a Benefit Cost Ratio (BCR) equal to or greater than 1.0. The Risk Reduction Division has completed an analysis of 11,000 acquisition and elevation projects and determined that the average benefits for each type of project were \$276,000 and \$175,000 respectively. Therefore, FEMA has determined that the acquisition or elevation of a structure located in the 100-year floodplain (as delineated on the Flood Insurance Rate Map or based on best available data) that costs less than or equal to the amount of benefits listed above is considered cost effective. For projects that contain multiple structures, the average cost of all structures in the project must meet the stated criterion. There is no need for applicants to conduct a separate benefit cost analysis for a structure that meets this criterion.

Additionally, the specific geographic location of structures can greatly increase acquisition and elevation costs. The amount of benefits identified above may be adjusted by the applicant or subapplicant using locality multipliers that are included in industry accepted cost and pricing guides for construction. If a multiplier is used, a copy of the source document must be included as part of the grant application for review and the methodology demonstrated for the increase of benefits. Also, the applicant or subapplicant should use the most up-to-date locality multiplier at the time of application.

To qualify for these pre-calculated benefits, applicants must provide maps with the structure footprint clearly identified and the 100-year Special Flood Hazard Area (SFHA) delineated (Flood Insurance Rate Map or best available data) as part of the grant application. If the structure or any part of the structure lies in the 100-year SFHA, the structure can utilize the pre-

**AUG 15 2013**

calculated benefits. Alternatively, first floor elevations (FFE) can be included for each structure as well as the base flood elevation (BFE) for that location. If the FFE is less than BFE, structures can use the pre-calculated benefits. No other detailed analysis will be required. These pre-calculated benefits can be used for structures in 100-year floodplains in riverine and coastal areas that meet the stated criterion.

This methodology satisfies the cost-effective requirements for the Flood Mitigation Assistance program, any disasters with an open grant application period as of the date of this memorandum, and future disasters. We will discuss the methodology used in the analysis in a future call with the HMA Branch Chiefs.

This determination advances FEMA's commitment to streamline the HMA programs by eliminating the need to perform a complete benefit cost analysis for each structure; reducing time involved in data collection, application development and review; and assisting communities in recovering from disaster more quickly. This memorandum does not replace or supersede the substantial damage benefit cost analysis waiver memorandum.

If you have any questions, please contact me directly at (202) 646-3461, or Kayed Lakhia, Deputy Director, Risk Reduction Division at (202) 646-3458.

## **6.4 LEVEL OF SERVICE SUMMARY BY PROJECT**

Whitaker Bayou Alternative Analysis  
Level of Service Summary by Project

ECM (Existing Conditions)					
ECM (Existing Conditions)	2 YR	5 YR	10 YR	25 YR	100 YR
At Risk Residential and Commercial	1	12	37	53	85
At Risk Manufactured Homes (non-TriPar)	0	0	1	2	4
At Risk Manufactured Homes (TriPar)	0	10	19	28	37
<b>TOTAL At Risk Stuctures</b>	<b>1</b>	<b>22</b>	<b>57</b>	<b>83</b>	<b>126</b>
PA2					
PA2	2 YR	5 YR	10 YR	25 YR	100 YR
At Risk Residential and Commercial	1	12	36	50	85
At Risk Manufactured Homes (non-TriPar)	0	0	1	2	4
At Risk Manufactured Homes (TriPar)	0	10	19	28	37
TOTAL At Risk Stuctures Remaining	1	22	56	80	126
<b>Stuctures REMOVED from Risk</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>3</b>	<b>0</b>
PA5 (100200NoPump)					
PA5	2 YR	5 YR	10 YR	25 YR	100 YR
At Risk Residential and Commercial	1	7	18	40	73
At Risk Manufactured Homes (non-TriPar)	0	0	1	2	4
At Risk Manufactured Homes (TriPar)	0	10	19	28	37
TOTAL At Risk Stuctures Remaining	1	17	38	70	114
<b>Stuctures REMOVED from Risk</b>	<b>0</b>	<b>5</b>	<b>19</b>	<b>13</b>	<b>12</b>
PA9					
PA9	2 YR	5 YR	10 YR	25 YR	100 YR
At Risk Residential and Commercial	1	11	36	52	82
At Risk Manufactured Homes (non-TriPar)	0	0	1	2	2
At Risk Manufactured Homes (TriPar)	0	10	12	19	35
TOTAL At Risk Stuctures Remaining	1	21	49	73	119
<b>Stuctures REMOVED from Risk</b>	<b>0</b>	<b>1</b>	<b>8</b>	<b>10</b>	<b>7</b>
ALT_MASTER					
ALT_MASTER	2 YR	5 YR	10 YR	25 YR	100 YR
At Risk Residential and Commercial	1	7	17	38	68
At Risk Manufactured Homes (non-TriPar)	0	0	1	2	2
At Risk Manufactured Homes (TriPar)	0	7	12	19	35
TOTAL At Risk Stuctures Remaining	1	14	30	59	105
<b>Stuctures REMOVED from Risk</b>	<b>0</b>	<b>8</b>	<b>27</b>	<b>24</b>	<b>21</b>

## **6.5 COST BENEFIT ANALYSIS FOR PROJECTS**

Whitaker Bayou Alternative Analysis  
Cost Benefit Summary

Project	Option	Benefit (Avoided Damages)	Number of Properties for Purchase	2019 Assessed Value x 2 (Estimated Purchase Cost)	Preliminary Constuction Cost Estimate	Constuction + Purchase Cost	Cost Benefit Ratio	Projected Assessment Cost per ESU (20 Year Period)
PA2	1	\$ 336,000			\$ 1,866,320		0.18	\$12.00
PA2 + Purchase	2	\$ 7,460,000	47	\$ 7,463,034	\$ 1,866,320	\$ 9,329,354	0.80	\$58.00
PA5	3	\$ 2,410,000			\$ 4,520,281		0.53	\$28.00
PA5 + Purchase	4	\$ 5,894,000	27	\$ 3,768,472	\$ 4,520,281	\$ 8,288,753	0.71	\$51.00
PA9	5	\$ 1,175,000			\$ 8,161,200		0.14	\$51.00
PA9 + Purchase	6	\$ 5,973,000	38	\$ 6,259,880	\$ 8,161,200	\$ 14,421,080	0.41	\$89.00
ALT_MASTER	7	\$ 3,998,000			\$ 14,547,801		0.27	\$90.00
ALT_MASTER + Purchase	8	\$ 6,454,000	15	\$ 2,225,980	\$ 14,547,801	\$ 16,773,781	0.38	\$103.00

**Whitaker Bayou Alternatives Analysis - Project Area 2**

Expected Damages for 30 - year Project Life = \$ 336,000

Anticipated Water Quality Constuction and Design Costs = \$ -

Anticipated Flood Control Constuction and Design Costs = \$ 1,866,320

Anticipated Construction and Design Cost for Project = \$ 1,866,320

Cost Benefit Ratio = 0.18

**Expected Damages by Component**

Component		2 - Year Event	5 - Year Event	10 - Year Event	25 - Year Event	100 - Year Event
Building Damages	BD	\$ -	\$ -	\$ 4,954	\$ 29,516	\$ -
Content Damages	CD	\$ -	\$ -	\$ 4,261	\$ 25,384	\$ -
Automobile Damages	AD	\$ -	\$ -	\$ 3,750	\$ 11,250	\$ -
Exterior Property Damages	PD	\$ -	\$ -	\$ 2,000	\$ 6,000	\$ -
Displacement Costs for Flooded Structures	DISF	\$ -	\$ -	\$ 3,500	\$ 10,500	\$ -
Displacement Costs for Structures in the Horizontal Floodplain	DIS	\$ -	\$ -	\$ 500	\$ 1,500	\$ -
Lost Wages due to Residential Flooding	LW	\$ -	\$ -	\$ 488	\$ 1,465	\$ -
Lost Business Income	LBI	\$ -	\$ -	\$ -	\$ -	\$ -
Lost Wages due to Closed Business	LWB	\$ -	\$ -	\$ -	\$ -	\$ -
Road Detour Costs	RD	\$ 3,278	\$ 22,172	\$ 33,740	\$ 67,480	\$ -
Public Works Costs	PW	\$ 3,010	\$ 2,510	\$ 620	\$ 840	\$ -
Flood Insurance Costs	FI	\$ -	\$ -	\$ 413	\$ 2,460	\$ -
<b>Total Avoided Damages</b>		<b>\$ 6,288</b>	<b>\$ 24,682</b>	<b>\$ 54,226</b>	<b>\$ 156,396</b>	<b>\$ -</b>

**Annualized Damages**

Storm Event		Expected Damages for Storm Event	Probability of Occurance During Any Year	Expected Annual Damages For Storm Event
2 - Year Event		\$ 6,288	50.0%	\$ 3,144
5 - Year Event		\$ 24,682	20.0%	\$ 4,936
10 - Year Event		\$ 54,226	10.0%	\$ 5,423
25 - Year Event		\$ 156,396	4.0%	\$ 6,256
50 - Year Event*		\$ 104,000	2.0%	\$ 2,080
100 - Year Event		\$ -	1.0%	\$ -
<b>Total Expected Annual Cost (A)</b>				<b>\$ 21,839</b>

\*50 Year Damages are Estimated

Present Worth Analysis	
Total Expected Annual Cost (A)	\$ 21,839
Interest (I)	5.00%
Project Life (n)	30
$P = A \{ [(1 + I)^n - 1] / [I \times (1 + I)^n] \}$	
<b>Expected Damages for 30 - year Project Life (P)</b>	<b>\$ 336,000</b>



### Whitaker Bayou Alternatives Analysis - Project Area 2 and Purchase

Expected Damages for 30 - year Project Life =	\$ 7,460,000
Anticipated Water Quality Constuction and Design Costs =	\$ -
Anticipated Flood Control Constuction and Design Costs =	\$ 9,329,354
Anticipated Construction and Design Cost for Project =	\$ 9,329,354
Cost Benefit Ratio =	0.80

#### Expected Damages by Component

Component		2 - Year Event	5 - Year Event	10 - Year Event	25 - Year Event	100 - Year Event
Building Damages	BD	\$ 60,266	\$ 279,114	\$ 452,736	\$ 471,602	\$ 447,782
Content Damages	CD	\$ 51,829	\$ 240,038	\$ 389,353	\$ 405,577	\$ 385,093
Automobile Damages	AD	\$ 15,000	\$ 82,500	\$ 183,750	\$ 191,250	\$ 180,000
Exterior Property Damages	PD	\$ 8,000	\$ 44,000	\$ 98,000	\$ 102,000	\$ 96,000
Displacement Costs for Flooded Structures	DISF	\$ 14,000	\$ 77,000	\$ 171,500	\$ 178,500	\$ 168,000
Displacement Costs for Structures in the Horizontal Floodplain	DIS	\$ 2,000	\$ 11,000	\$ 24,500	\$ 25,500	\$ 24,000
Lost Wages due to Residential Flooding	LW	\$ 1,954	\$ 10,747	\$ 23,936	\$ 24,913	\$ 23,447
Lost Business Income	LBI	\$ -	\$ -	\$ -	\$ -	\$ -
Lost Wages due to Closed Business	LWB	\$ -	\$ -	\$ -	\$ -	\$ -
Road Detour Costs	RD	\$ 3,278	\$ 22,172	\$ 33,740	\$ 67,480	\$ -
Public Works Costs	PW	\$ 3,010	\$ 2,510	\$ 620	\$ 840	\$ -
Flood Insurance Costs	FI	\$ 5,022	\$ 23,259	\$ 37,728	\$ 39,300	\$ 37,315
<b>Total Avoided Damages</b>		<b>\$ 164,358</b>	<b>\$ 792,340</b>	<b>\$ 1,415,863</b>	<b>\$ 1,506,962</b>	<b>\$ 1,361,637</b>

#### Annualized Damages

Storm Event		Expected Damages for Storm Event	Probability of Occurance During Any Year	Expected Annual Damages For Storm Event
2 - Year Event		\$ 164,358	50.0%	\$ 82,179
5 - Year Event		\$ 792,340	20.0%	\$ 158,468
10 - Year Event		\$ 1,415,863	10.0%	\$ 141,586
25 - Year Event		\$ 1,506,962	4.0%	\$ 60,278
50 - Year Event*		\$ 1,459,000	2.0%	\$ 29,180
100 - Year Event		\$ 1,361,637	1.0%	\$ 13,616
<b>Total Expected Annual Cost (A)</b>				<b>\$ 485,308</b>

\*50 Year Damages are Estimated

Present Worth Analysis	
Total Expected Annual Cost (A)	\$ 485,308
Interest (I)	5.00%
Project Life (n)	30
$P = A \{ [(1 + I)^n - 1] / [I \times (1 + I)^n] \}$	
<b>Expected Damages for 30 - year Project Life (P)</b>	<b>\$ 7,460,000</b>



**Whitaker Bayou Alternatives Analysis - Project Area 5**

Expected Damages for 30 - year Project Life = \$ 2,410,000

Anticipated Water Quality Constuction and Design Costs = \$ -

Anticipated Flood Control Constuction and Design Costs = \$ 4,520,281

Anticipated Construction and Design Cost for Project = \$ 4,520,281

Cost Benefit Ratio = 0.53

**Expected Damages by Component**

Component		2 - Year Event	5 - Year Event	10 - Year Event	25 - Year Event	100 - Year Event
Building Damages	BD	\$ -	\$ 108,164	\$ 208,449	\$ 86,559	\$ 78,121
Content Damages	CD	\$ -	\$ 93,021	\$ 179,266	\$ 74,441	\$ 67,184
Automobile Damages	AD	\$ -	\$ 18,750	\$ 71,250	\$ 48,750	\$ 45,000
Exterior Property Damages	PD	\$ -	\$ 10,000	\$ 38,000	\$ 26,000	\$ 24,000
Displacement Costs for Flooded Structures	DISF	\$ -	\$ 17,500	\$ 66,500	\$ 45,500	\$ 42,000
Displacement Costs for Structures in the Horizontal Floodplain	DIS	\$ -	\$ 2,500	\$ 9,500	\$ 6,500	\$ 6,000
Lost Wages due to Residential Flooding	LW	\$ -	\$ 2,442	\$ 9,281	\$ 6,350	\$ 5,862
Lost Business Income	LBI	\$ -	\$ -	\$ -	\$ -	\$ -
Lost Wages due to Closed Business	LWB	\$ -	\$ -	\$ -	\$ -	\$ -
Road Detour Costs	RD	\$ 3,278	\$ 21,690	\$ 66,516	\$ 111,824	\$ 167,736
Public Works Costs	PW	\$ 3,010	\$ 3,010	\$ 1,820	\$ 3,240	\$ 4,060
Flood Insurance Costs	FI	\$ -	\$ 9,014	\$ 17,371	\$ 7,213	\$ 6,510
<b>Total Avoided Damages</b>		<b>\$ 6,288</b>	<b>\$ 286,090</b>	<b>\$ 667,953</b>	<b>\$ 416,378</b>	<b>\$ 446,473</b>

**Annualized Damages**

Storm Event		Expected Damages for Storm Event	Probability of Occurance During Any Year	Expected Annual Damages For Storm Event
2 - Year Event		\$ 6,288	50.0%	\$ 3,144
5 - Year Event		\$ 286,090	20.0%	\$ 57,218
10 - Year Event		\$ 667,953	10.0%	\$ 66,795
25 - Year Event		\$ 416,378	4.0%	\$ 16,655
50 - Year Event*		\$ 426,000	2.0%	\$ 8,520
100 - Year Event		\$ 446,473	1.0%	\$ 4,465
<b>Total Expected Annual Cost (A)</b>				<b>\$ 156,797</b>

\*50 Year Damages are Estimated

Present Worth Analysis	
Total Expected Annual Cost (A)	\$ 156,797
Interest (I)	5.00%
Project Life (n)	30
$P = A \{ [(1 + I)^n - 1] / [I \times (1 + I)^n] \}$	
<b>Expected Damages for 30 - year Project Life (P)</b>	<b>\$ 2,410,000</b>

**Whitaker Bayou Alternatives Analysis - Project Area 5 and Purchase**

Expected Damages for 30 - year Project Life = \$ 5,894,000

Anticipated Water Quality Constuction and Design Costs = \$ -

Anticipated Flood Control Constuction and Design Costs = \$ 8,288,753

Anticipated Construction and Design Cost for Project = \$ 8,288,753

Cost Benefit Ratio = 0.71

**Expected Damages by Component**

Component		2 - Year Event	5 - Year Event	10 - Year Event	25 - Year Event	100 - Year Event
Building Damages	BD	\$ 32,997	\$ 227,629	\$ 424,623	\$ 302,733	\$ 294,295
Content Damages	CD	\$ 28,377	\$ 195,761	\$ 365,176	\$ 260,351	\$ 253,094
Automobile Damages	AD	\$ 3,750	\$ 63,750	\$ 172,500	\$ 150,000	\$ 146,250
Exterior Property Damages	PD	\$ 2,000	\$ 34,000	\$ 92,000	\$ 80,000	\$ 78,000
Displacement Costs for Flooded Structures	DISF	\$ 3,500	\$ 59,500	\$ 161,000	\$ 140,000	\$ 136,500
Displacement Costs for Structures in the Horizontal Floodplain	DIS	\$ 500	\$ 8,500	\$ 23,000	\$ 20,000	\$ 19,500
Lost Wages due to Residential Flooding	LW	\$ 488	\$ 8,304	\$ 22,470	\$ 19,539	\$ 19,051
Lost Business Income	LBI	\$ -	\$ -	\$ -	\$ -	\$ -
Lost Wages due to Closed Business	LWB	\$ -	\$ -	\$ -	\$ -	\$ -
Road Detour Costs	RD	\$ 3,278	\$ 21,690	\$ 66,516	\$ 111,824	\$ 167,736
Public Works Costs	PW	\$ 3,010	\$ 3,010	\$ 1,820	\$ 3,240	\$ 4,060
Flood Insurance Costs	FI	\$ 2,750	\$ 18,969	\$ 35,385	\$ 25,228	\$ 24,525
<b>Total Avoided Damages</b>		<b>\$ 80,650</b>	<b>\$ 641,113</b>	<b>\$ 1,364,490</b>	<b>\$ 1,112,915</b>	<b>\$ 1,143,010</b>

**Annualized Damages**

Storm Event		Expected Damages for Storm Event	Probability of Occurance During Any Year	Expected Annual Damages For Storm Event
2 - Year Event		\$ 80,650	50.0%	\$ 40,325
5 - Year Event		\$ 641,113	20.0%	\$ 128,223
10 - Year Event		\$ 1,364,490	10.0%	\$ 136,449
25 - Year Event		\$ 1,112,915	4.0%	\$ 44,517
50 - Year Event*		\$ 1,123,000	2.0%	\$ 22,460
100 - Year Event		\$ 1,143,010	1.0%	\$ 11,430
<b>Total Expected Annual Cost (A)</b>				<b>\$ 383,403</b>

\*50 Year Damages are Estimated

Present Worth Analysis	
Total Expected Annual Cost (A)	\$ 383,403
Interest (I)	5.00%
Project Life (n)	30
$P = A \{ [(1 + I)^n - 1] / [I \times (1 + I)^n] \}$	
<b>Expected Damages for 30 - year Project Life (P)</b>	<b>\$ 5,894,000</b>

**Whitaker Bayou Alternatives Analysis - Project Area 9**

Expected Damages for 30 - year Project Life = \$ 1,175,000

Anticipated Water Quality Constuction and Design Costs = \$ -

Anticipated Flood Control Constuction and Design Costs = \$ 8,161,200

Anticipated Construction and Design Cost for Project = \$ 8,161,200

Cost Benefit Ratio = 0.14

**Expected Damages by Component**

Component		2 - Year Event	5 - Year Event	10 - Year Event	25 - Year Event	100 - Year Event
Building Damages	BD	\$ -	\$ 93,912	\$ 49,875	\$ 64,881	\$ 74,525
Content Damages	CD	\$ -	\$ 80,764	\$ 42,892	\$ 55,798	\$ 64,091
Automobile Damages	AD	\$ -	\$ 3,750	\$ 30,000	\$ 37,500	\$ 26,250
Exterior Property Damages	PD	\$ -	\$ 2,000	\$ 16,000	\$ 20,000	\$ 14,000
Displacement Costs for Flooded Structures	DISF	\$ -	\$ 3,500	\$ 28,000	\$ 35,000	\$ 24,500
Displacement Costs for Structures in the Horizontal Floodplain	DIS	\$ -	\$ 500	\$ 4,000	\$ 5,000	\$ 3,500
Lost Wages due to Residential Flooding	LW	\$ -	\$ 488	\$ 3,908	\$ 4,885	\$ 3,419
Lost Business Income	LBI	\$ -	\$ -	\$ -	\$ -	\$ -
Lost Wages due to Closed Business	LWB	\$ -	\$ -	\$ -	\$ -	\$ -
Road Detour Costs	RD	\$ -	\$ 3,470	\$ 6,941	\$ 13,882	\$ 109,896
Public Works Costs	PW	\$ -	\$ 510	\$ 620	\$ 840	\$ 2,060
Flood Insurance Costs	FI	\$ -	\$ 7,826	\$ 4,156	\$ 5,407	\$ 6,210
<b>Total Avoided Damages</b>		<b>\$ -</b>	<b>\$ 196,721</b>	<b>\$ 186,391</b>	<b>\$ 243,192</b>	<b>\$ 328,452</b>

**Annualized Damages**

Storm Event		Expected Damages for Storm Event	Probability of Occurance During Any Year	Expected Annual Damages For Storm Event
2 - Year Event		\$ -	50.0%	\$ -
5 - Year Event		\$ 196,721	20.0%	\$ 39,344
10 - Year Event		\$ 186,391	10.0%	\$ 18,639
25 - Year Event		\$ 243,192	4.0%	\$ 9,728
50 - Year Event*		\$ 272,000	2.0%	\$ 5,440
100 - Year Event		\$ 328,452	1.0%	\$ 3,285
<b>Total Expected Annual Cost (A)</b>				<b>\$ 76,436</b>

\*50 Year Damages are Estimated

Present Worth Analysis	
Total Expected Annual Cost (A)	\$ 76,436
Interest (I)	5.00%
Project Life (n)	30
$P = A \{ [(1 + I)^n - 1] / [I \times (1 + I)^n] \}$	
<b>Expected Damages for 30 - year Project Life (P)</b>	<b>\$ 1,175,000</b>

**Whitaker Bayou Alternatives Analysis - Project Area 9 and Purchase**

Expected Damages for 30 - year Project Life = \$ 5,973,000

Anticipated Water Quality Constuction and Design Costs = \$ -

Anticipated Flood Control Constuction and Design Costs = \$ 14,421,080

Anticipated Construction and Design Cost for Project = \$ 14,421,080

Cost Benefit Ratio = 0.41

**Expected Damages by Component**

Component		2 - Year Event	5 - Year Event	10 - Year Event	25 - Year Event	100 - Year Event
Building Damages	BD	\$ 32,997	\$ 227,629	\$ 425,467	\$ 440,474	\$ 450,118
Content Damages	CD	\$ 28,377	\$ 195,761	\$ 365,902	\$ 378,807	\$ 387,101
Automobile Damages	AD	\$ 3,750	\$ 63,750	\$ 172,500	\$ 180,000	\$ 168,750
Exterior Property Damages	PD	\$ 2,000	\$ 34,000	\$ 92,000	\$ 96,000	\$ 90,000
Displacement Costs for Flooded Structures	DISF	\$ 3,500	\$ 59,500	\$ 161,000	\$ 168,000	\$ 157,500
Displacement Costs for Structures in the Horizontal Floodplain	DIS	\$ 500	\$ 8,500	\$ 23,000	\$ 24,000	\$ 22,500
Lost Wages due to Residential Flooding	LW	\$ 488	\$ 8,304	\$ 22,470	\$ 23,447	\$ 21,982
Lost Business Income	LBI	\$ -	\$ -	\$ -	\$ -	\$ -
Lost Wages due to Closed Business	LWB	\$ -	\$ -	\$ -	\$ -	\$ -
Road Detour Costs	RD	\$ -	\$ 3,470	\$ 6,941	\$ 13,882	\$ 109,896
Public Works Costs	PW	\$ -	\$ 510	\$ 620	\$ 840	\$ 2,060
Flood Insurance Costs	FI	\$ 2,750	\$ 18,969	\$ 35,456	\$ 36,706	\$ 37,510
<b>Total Avoided Damages</b>		<b>\$ 74,362</b>	<b>\$ 620,393</b>	<b>\$ 1,305,356</b>	<b>\$ 1,362,156</b>	<b>\$ 1,447,417</b>

**Annualized Damages**

Storm Event		Expected Damages for Storm Event	Probability of Occurance During Any Year	Expected Annual Damages For Storm Event
2 - Year Event		\$ 74,362	50.0%	\$ 37,181
5 - Year Event		\$ 620,393	20.0%	\$ 124,079
10 - Year Event		\$ 1,305,356	10.0%	\$ 130,536
25 - Year Event		\$ 1,362,156	4.0%	\$ 54,486
50 - Year Event*		\$ 1,391,000	2.0%	\$ 27,820
100 - Year Event		\$ 1,447,417	1.0%	\$ 14,474
<b>Total Expected Annual Cost (A)</b>				<b>\$ 388,576</b>

\*50 Year Damages are Estimated

Present Worth Analysis	
Total Expected Annual Cost (A)	\$ 388,576
Interest (I)	5.00%
Project Life (n)	30
$P = A \{ [(1 + I)^n - 1] / [I \times (1 + I)^n] \}$	
<b>Expected Damages for 30 - year Project Life (P)</b>	<b>\$ 5,973,000</b>

**Whitaker Bayou Alternatives Analysis - Alt Master Project**

Expected Damages for 30 - year Project Life = \$ 3,998,000

Anticipated Water Quality Constuction and Design Costs = \$ -

Anticipated Flood Control Constuction and Design Costs = \$ 14,547,801

Anticipated Construction and Design Cost for Project = \$ 14,547,801

Cost Benefit Ratio = 0.27

**Expected Damages by Component**

Component		2 - Year Event	5 - Year Event	10 - Year Event	25 - Year Event	100 - Year Event
Building Damages	BD	\$ -	\$ 140,351	\$ 259,671	\$ 161,899	\$ 1,126,429
Content Damages	CD	\$ -	\$ 120,702	\$ 223,317	\$ 139,233	\$ 968,729
Automobile Damages	AD	\$ -	\$ 30,000	\$ 101,250	\$ 90,000	\$ 75,000
Exterior Property Damages	PD	\$ -	\$ 16,000	\$ 54,000	\$ 48,000	\$ 40,000
Displacement Costs for Flooded Structures	DISF	\$ -	\$ 28,000	\$ 94,500	\$ 84,000	\$ 70,000
Displacement Costs for Structures in the Horizontal Floodplain	DIS	\$ -	\$ 4,000	\$ 13,500	\$ 12,000	\$ 10,000
Lost Wages due to Residential Flooding	LW	\$ -	\$ 3,908	\$ 13,189	\$ 11,724	\$ 9,770
Lost Business Income	LBI	\$ -	\$ -	\$ -	\$ -	\$ 81,664
Lost Wages due to Closed Business	LWB	\$ -	\$ -	\$ -	\$ -	\$ 26,189
Road Detour Costs	RD	\$ 3,278	\$ 47,236	\$ 106,040	\$ 188,944	\$ 283,416
Public Works Costs	PW	\$ 3,010	\$ 3,510	\$ 3,620	\$ 5,640	\$ 7,060
Flood Insurance Costs	FI	\$ -	\$ 11,696	\$ 21,639	\$ 13,492	\$ 93,869
<b>Total Avoided Damages</b>		<b>\$ 6,288</b>	<b>\$ 405,403</b>	<b>\$ 890,727</b>	<b>\$ 754,932</b>	<b>\$ 2,792,126</b>

**Annualized Damages**

Storm Event		Expected Damages for Storm Event	Probability of Occurance During Any Year	Expected Annual Damages For Storm Event
2 - Year Event		\$ 6,288	50.0%	\$ 3,144
5 - Year Event		\$ 405,403	20.0%	\$ 81,081
10 - Year Event		\$ 890,727	10.0%	\$ 89,073
25 - Year Event		\$ 754,932	4.0%	\$ 30,197
50 - Year Event*		\$ 1,434,000	2.0%	\$ 28,680
100 - Year Event		\$ 2,792,126	1.0%	\$ 27,921
<b>Total Expected Annual Cost (A)</b>				<b>\$ 260,096</b>

\*50 Year Damages are Estimated

Present Worth Analysis	
Total Expected Annual Cost (A)	\$ 260,096
Interest (I)	5.00%
Project Life (n)	30
$P = A \{ [(1 + I)^n - 1] / [I \times (1 + I)^n] \}$	
<b>Expected Damages for 30 - year Project Life (P)</b>	<b>\$ 3,998,000</b>

### Whitaker Bayou Alternatives Analysis - Alt Master Project and Purchase

Expected Damages for 30 - year Project Life = \$ 6,454,000

Anticipated Water Quality Constuction and Design Costs = \$ -

Anticipated Flood Control Constuction and Design Costs = \$ 16,773,781

Anticipated Construction and Design Cost for Project = \$ 16,773,781

Cost Benefit Ratio = 0.38

#### Expected Damages by Component

Component		2 - Year Event	5 - Year Event	10 - Year Event	25 - Year Event	100 - Year Event
Building Damages	BD	\$ 32,997	\$ 227,629	\$ 393,230	\$ 295,458	\$ 1,259,988
Content Damages	CD	\$ 28,377	\$ 195,761	\$ 338,178	\$ 254,094	\$ 1,083,590
Automobile Damages	AD	\$ 3,750	\$ 63,750	\$ 157,500	\$ 146,250	\$ 131,250
Exterior Property Damages	PD	\$ 2,000	\$ 34,000	\$ 84,000	\$ 78,000	\$ 70,000
Displacement Costs for Flooded Structures	DISF	\$ 3,500	\$ 59,500	\$ 147,000	\$ 136,500	\$ 122,500
Displacement Costs for Structures in the Horizontal Floodplain	DIS	\$ 500	\$ 8,500	\$ 21,000	\$ 19,500	\$ 17,500
Lost Wages due to Residential Flooding	LW	\$ 488	\$ 8,304	\$ 20,516	\$ 19,051	\$ 17,097
Lost Business Income	LBI	\$ -	\$ -	\$ -	\$ -	\$ 81,664
Lost Wages due to Closed Business	LWB	\$ -	\$ -	\$ -	\$ -	\$ 26,189
Road Detour Costs	RD	\$ 3,278	\$ 47,236	\$ 106,040	\$ 188,944	\$ 283,416
Public Works Costs	PW	\$ 3,010	\$ 3,510	\$ 3,620	\$ 5,640	\$ 7,060
Flood Insurance Costs	FI	\$ 2,750	\$ 18,969	\$ 32,769	\$ 24,622	\$ 104,999
<b>Total Avoided Damages</b>		<b>\$ 80,650</b>	<b>\$ 667,159</b>	<b>\$ 1,303,854</b>	<b>\$ 1,168,058</b>	<b>\$ 3,205,253</b>

#### Annualized Damages

Storm Event		Expected Damages for Storm Event	Probability of Occurance During Any Year	Expected Annual Damages For Storm Event
2 - Year Event		\$ 80,650	50.0%	\$ 40,325
5 - Year Event		\$ 667,159	20.0%	\$ 133,432
10 - Year Event		\$ 1,303,854	10.0%	\$ 130,385
25 - Year Event		\$ 1,168,058	4.0%	\$ 46,722
50 - Year Event*		\$ 1,847,000	2.0%	\$ 36,940
100 - Year Event		\$ 3,205,253	1.0%	\$ 32,053
<b>Total Expected Annual Cost (A)</b>				<b>\$ 419,857</b>

\*50 Year Damages are Estimated

Present Worth Analysis	
Total Expected Annual Cost (A)	\$ 419,857
Interest (I)	5.00%
Project Life (n)	30
$P = A \{ [(1 + I)^n - 1] / [I \times (1 + I)^n] \}$	
<b>Expected Damages for 30 - year Project Life (P)</b>	<b>\$ 6,454,000</b>