

APPENDIX J

CITY OF TAMPA JURISDICTION REPORT

City of Tampa Floodplain Management Plan

INTRODUCTION

The National Flood Insurance Program (NFIP) provides federally supported flood insurance for communities that regulate development in floodplains and take active steps to mitigate the hazards of flooding. The Community Rating System (CRS), a voluntary program under the NFIP, grades community Floodplain Management Programs and reduces flooding insurance premiums for citizens whose communities meet certain requirements. In order to reduce the potential for personal/property losses and ensure the lowest possible flood insurance rates for our citizens, the City of Tampa has pursued a program to maximize compliance with the standards of the Community Rating System. One facet of this compliance is the development of this Floodplain Management Plan which will detail the City's flood hazards and our efforts to reduce losses during both tidal and severe rainfall events.

BACKGROUND

The City of Tampa was historically a coastal community with a long shoreline on three bays and modest relief. The majority of the City was bisected by the Hillsborough River which is controlled by the Hillsborough River Dam. In recent decades, the City has expanded to the north through a small corridor in surrounding Hillsborough County. The terrain in New Tampa, as this area is called, is considerably different, a large riverine floodplain with numerous wetlands discharging to large creeks and the headwaters of the Hillsborough River. All of the City features large areas of gentle relief which have been dealt with by the construction of over 365 miles of stormsewer system, 180 miles of ditches, and 104 City-owned retention ponds.

Due to its relatively low relief and proximity to Tampa Bay, the Interbay Peninsula is most at risk from coastal flooding from storm surge associated with tropical storms. The Hillsborough River corridor is subject to flooding associated with storm surges as well but the higher relief south of the dam makes this less widespread. Flooding in the early 1960s prompted the construction of the Tampa Bypass Canal to direct Hillsborough River water away from Temple Terrace and Tampa and directly to the Bay. This has been very successful and since the canal came online there has been no real riverine flooding within the City of Tampa north of the Dam. The remainder of the City is a karst plain which was drained to sinkholes or small creeks. These have been supplemented or supplanted by the construction of stormwater management systems to direct runoff to the receiving waters. There are still a number of smaller basins which depend on sinkholes for their primary discharge but most have had retention facilities

and automatic pumping stations constructed to both reduce environmental degradation and control flooding.

Base flood elevations have been calculated in the Flood Insurance Study for Hillsborough County and flood zones are published in the Flood Insurance Rate Map (FIRM) dated 1982. These data have been incorporated into the City of Tampa Flood Zone Building Map 1982 which also includes local flood areas not found on the FIRM. Approximately 20,470 acres or 29% of the total city acreage is located in the 100-year floodplain.

ASSESSING THE HAZARDS

The City of Tampa is subject to both Coastal Flooding and floods caused by excessive rainfall during Severe Rain Events. Data obtained from the National Climate Data Center indicates 39 major flood events occurred in Tampa-Hillsborough County area between 1950 and 1998.

Severe Rain Events

Severe Rain Events, either by themselves or in conjunction with Coastal Flooding events, can cause significant flooding. Inland flooding affects lands located within the 100-year floodplain or along recognizable drainage channels. When soils become saturated because of prolonged or frequent rainfall, water can accumulate and lower the ability of the systems to transport or store additional rainfall. Flooding can also be a result of storms overwhelming clogged or inadequate drainage facilities.

Probability of Occurrence

Rainfall in Tampa follows a seasonal pattern. There are two distinct dry seasons, in the spring and late fall, and over the winter there are rain events which coincide with the passage of cold fronts. During the summer and early fall we are subject to convective thunderstorms and tropical storms. Summer rainfall, in the four months from June to September, account for over 60% of the total rainfall and the majority of flooding. For the Period of Record (112 years) Tampa has averaged 48.03 inches of rain per year.

As a general rule almost every event or day with rainfall in excess of 3.5 inches will result in some form of flooding. Even two-day totals of 3.5" have resulted in flooding, especially if preceded by a wet period. As shown in Table 1, there were seventeen occasions during the period 1979-2002 when the amount of rainfall exceeded 3.5 inches and which resulted in flooding. Based on historical patterns, the City of Tampa can expect to receive 1-2 such Severe Rainfall Events each year.

<p>Table 1 Summary of Rainfall Events Expected to Produce Flooding in Tampa</p>

Year	Raindays	Days> 3.5"	Extreme Events
2002	119	1	1
2001	96	1	1
2000	114	1	1
1999	106	0	0
1998	121	0	0
1997	98	1	1
1996	118	1	1
1989	ND	2	2
1988	ND	2	2
1987	91	1	1
1986	99	1	1
1985	71	1	1
1984	96	0*	1
1983	85	0	0
1982	77	0**	3
1979	ND	2	2
Mean	92	0.92	1.25
Totals	Insufficient Data	N/A	17
* One two-day total of over 5" locally ** Three two day totals of over 4" Note: Raindays are days with over 0.01" of rain Source: City of Tampa Stormwater Department, 2004			

Risk Assessment

The greatest risk during a Severe Rain Event is flooding causing property damage and loss of life. In assessing risk from Severe Rain Events a decision must be made as to the level of protection which can reasonably be provided. Unlike some hazards, rain events inhabit a continuum with probabilities associated with different levels of rainfall and different costs associated with dealing with these probabilities. The City has used the 5-year storm as its standard level of protection for all new stormwater management systems. The probability of a storm of greater magnitude than this occurring in any given year is 20%. Older systems were designed to lesser standards or, in some cases, to no standard. All of these systems provide some level of protection. We believe a 5 year system provides a reasonable level of protection without incurring significant increases in improvement costs. It is not possible to construct stormwater management systems

which can handle all possible events. The resources which would be required would be extreme and would, in most cases, not be justified for the level of protection provided.

Obviously, the most vulnerable area during severe storm events is the 100-year floodplain, which typically receives inland flooding. We have also identified approximately 100 locations within the City which are subject to flooding during events of less than the 100-year intensity. The total cost estimate for addressing these problems is currently about \$100,000,000. We have also developed a prioritization process using information received from flooding complaints. These complaints present a picture of the stormwater situation in Tampa but must be viewed with some discretion. In most cases engineering investigations have not been performed and it is impossible to ascertain the severity of the storm which caused the flooding. Our current inventory of flooding complaints include 222 structural flooding complaints, 255 complaints of yard flooding and about 200 complaints of street flooding. This does not, necessarily, include the repetitive loss properties, which are primarily Coastal Flooding. Due to the mechanism used to capture this information many of these are the same locations and more detailed analysis needs to be performed. This will be covered in greater detail in the Action Plan Section.

Coastal Flooding

Coastal or Tidal Flooding is primarily experienced along the western side of the Interbay Peninsula, the Davis Islands, McKay Bay, and the lower Hillsborough River. The eastern side of the Interbay Peninsula is relatively higher, though historically the majority of the peninsula has been inundated at one time or another. A hurricane in the 1840s was reported to have had a storm surge which reached 14' above sea level. This would have been enough to flood all but the very center of the peninsula. One interior area of the peninsula is hydraulically connected to the bay and is flooded even when the land on the seaward side is not.

In 1985 the City contracted for a study to assess the impacts of coastal flooding on the Interbay Peninsula in response to the flooding caused by Tropical Storm Elena. The analysis was capable of estimating the number of structures which would be inundated as a result of tidal stages ranging from 4.0 to 6.0 feet. This was done by comparing aerial photo contour maps and records of flooding maintained by the City. An analysis was performed on structures constructed between the 4.0, 5.0, and 6.0' MSL contours. For the purpose of the evaluation, the following definitions were utilized to describe the extent or severity of the flooding:

- Encroached – Properties which experience at least partial flooding of property areas
- Inundated – Properties which experience complete flooding of property areas. Structural flooding is not directly indicated; it is a function of the individual floor elevations of the affected structures.
- Impacted – Structures which experience either encroachment or inundation as defined above

The degree of damage associated with each condition is variable and associated with the actual floor elevations of the structures, the duration of exposure associated with the tidal period, and the accuracy of the topographic mapping. The following table summarizes the findings of the inventory of impacted structures.

Table 2. Structures Impacted by Coastal Tide Stage			
Level	Tidal	Stage	In Feet (MSL)
	4.0	5.0	6.0
Encroached	58	198	489
Inundated	51	461	1,379
Impacted	109	659	1,868

Source: Coastal Zone Flooding Assessment, City of Tampa, Florida; Post, Buckley, Schuh, and Jernigan, Inc. 1986

Probability of Occurrence

The frequency of extreme tides are relatively low, on the order of 5- to 25-years. Tidal stage and recurrence interval data from federal sources was analyzed and the following recurrence intervals were determined.

Table 3. Tide Stage Recurrence Intervals	
Approximate Recurrence Interval (Years)	Tidal Stage In Feet (MSL)
1	2.8
2	3.3
5	4.0
10	4.8
15	5.3
20	5.9
25	6.0
50	7.1

Damage Assessment

The National Climate Data Center Severe Weather Events Database reports a total of \$12.92 million damage to property as a result of flooding events in Tampa-Hillsborough

County between 1950-1998. According to FEMA's 1997 report on Multi-Hazard Identification and Risk Assessment, 75% of federal disaster declarations are due to flooding and water related damages occurring along rivers and coastal areas.

Table 4 Flooding Events in Tampa-Hillsborough County 1950-1998				
Type	#	Deaths	Injuries	Property Damage
Flood	4	1	1	\$7,150,000
Riverine	21	0	0	\$5,220,000
Urban/Small Stream Flood	14	0	0	\$555,000
Total	39	1	1	\$12,925,000
Average Loss Per Year				\$340,132
Average Loss Per Occurrence				\$331,410
Source: National Climate Data Center Severe Weather Events Database				

Although not usually considered life threatening, freshwater flooding may inundate potential evacuation routes preventing the flow of people and emergency supplies and equipment back into the area. Flooded roads and inundated storm drains can have significant consequences. The flooding that accompanied Elena in September 1985 caused the closure of Interstate 4 for several days and flooded numerous residences. The El Nino Storms of 1997-98 caused similar flooding and widespread damage in low-lying areas of the City and County.

Repetitive Loss Properties. One hundred and thirty-six buildings have shown two or more repetitive losses within 10-year period. A repetitive loss is defined as a property in which two or more claims have been filed to the NFIP for \$1,000 each in any 10-year rolling period since 1978. There is a pattern of repetitive losses in the 100-year floodplain south of Kennedy Boulevard, west of Westshore Boulevard, Davis Island and scattered claims along the coastal area of the Bay and Hillsborough River. Outside the 100-year flood plain, the repetitive losses are sparsely distributed.

National Flood Insurance Program. The National Flood Insurance Program (NFIP) plays an important role in recouping the losses incurred from flood disasters. The NFIP was established by the National Flood Insurance Act of 1968, which makes federally backed flood insurance available in those States and communities that agree to adopt and enforce floodplain management measures that meet or exceed minimum federal criteria. The NFIP was broadened and modified by the Flood Disaster Protection Act of 1973, which requires the mandatory purchase of flood insurance as a condition of receiving any form of federal or federally related financial assistance, such as mortgage loans from federally-insured lending institutions. The National Flood Insurance Program (Reform) Act of 1994 created penalties for lender non-compliance, created an increased cost of compliance benefit (ICC) as well as created the Flood Mitigation

Assistance Program. The City of Tampa adoption of floodplain ordinances, structural controls, and floodplain management strategies far exceed the NFIP requirements and have resulted in discounts on flood insurance for the citizens of Tampa.

Table 3 City of Tampa NFIP Flood Claims (1979-98)				
Claim Amount	Number of Claims			
	Structural Claims	%	Building Contents	%
< \$5,000	995	59	1,279	76
\$5,000 - \$25,000	540	32	366	22
\$25,000 - \$50,000	137	8	40	2
\$50,000 - \$150,000	20	1	7	0.4
Total Number of Claims	1,692			

The NFIP Claim Data shows that Tampa residents filed 1,692 claims for flood damage between 1979-98, of which 20 claims were \$50,000 or more for building damages and 7 claims filed were \$50,000 or more for personal properties. Between 1979-98, FEMA paid a total of \$1,919,537 in flood insurance claims to businesses and homeowners with \$50,000 or more flood loss. The average claim for building damage was \$8,307.62 and \$4,003.90 for building contents. However, for homeowners and businesses, some will either not have insurance or be under insured. The cost of repair is almost impossible to establish. For those that are insured, claims may not fully reflect actual losses.

Vulnerability Assessment

Areas that are subject to flooding (i.e., the 100-year floodplain) have been delineated on Flood Insurance Rate Maps (FIRMs) and the City of Tampa Flood Zone Map. These maps provide a basis for planning; however, it should be noted that in any storm, it is always possible to exceed the flood level in vulnerable areas (for example, FEMA reports that almost 30% of all flood damage assistance is provided to victims outside the 100-year floodplain).

Approximately 29% or 28,470 acres of the City's land area are located in the 100-year floodplain and are vulnerable to flooding, depending on the strength and frequency of storm events. Although the greatest land use impacts in the 100-year floodplain is shown to be related to government uses, consisting of 7,725 acres, or 37 percent of the affected land, more that 5,500 acres is occupied by MacDill Air Force Base. Residential lands account for 4,813 acres of the land area in the 100-year floodplain. The 1995 population estimates for this area stood at 62,902, accounting for 23 percent of the

overall population of the city. By year 2020, the population projections for 100-year floodplain area indicates an increase to 80,923 (22% increase).

The affected area had an employment figure of 77,837 in 1998. By year 2020, the employment figure is estimated to increase to 127,233. The residential property value for this area is \$1.1 billion (47% of the total improved property value) with commercial and industrial property valued at \$860.3 million. The residential property value for the 100-Year floodplain area accounts for 27 percent of the overall residential property value in the city

REPETITIVE LOSSES

All new structures are required to be elevated above the 100-year flood plain level in the City of Tampa. However, as with the Coastal Zone, many structures were built prior to such standards coming into adoption, so much of the emphasis will be on retrofitting structures to protect against inland flooding.

The most widely advocated mitigation measures to prevent flooding are elevating the structure above the anticipated storm surge level; elevating electrical or essential components above the surge level; using water resistant materials at the lowest levels; retrofitting structures and sites to allow water to flow around a structure. Elevating a structure or components above the anticipated flood level provides for the greatest protection against the possibility of flooding.

Targeting mitigation efforts to the existing population centers along Old Tampa Bay, the Hillsborough River and Davis Island could help to reduce risks in the most vulnerable areas. Education and flood mitigation assistance programs targeted to private residential property owners could help spur this segment of the community in taking steps to protect their homes from floods. However, without incentives to justify the added costs, many homeowners may not complete retrofits in advance of a disaster. This is further exacerbated by the increased taxes levied against properties which have undergone improvements, including mitigating for flood damage.

FLOODPLAIN MANAGEMENT PLAN GOALS AND OBJECTIVES

The City of Tampa Floodplain Management Plan Goals are to:

1. Ensure the existing stormwater system is maintained to maximize capacity
2. Address stormwater flooding which occurs during the 5 year and less storms
3. Ensure new and redevelopment is done in a manner consistent with protecting both that property and others in the basins from flooding
4. Reduce flooding of Repetitive Loss properties
5. Ensure the public is educated as to its role in flood protection

The Objectives for each goal are:

1. Ensure the existing stormwater system is maintained to maximize capacity
 - a. Implement Zone-based maintenance to increase the ratio of proactive to reactive maintenance
 - b. Increase training of the maintenance workforce to ensure maximum productivity
 - c. Inspect vulnerable portions of the system prior to flood events
2. Address stormwater flooding which occurs during the 5-year recurrence interval storms
 - a. Research existing flood complaints to determine the type, degree, and frequency of flooding, and the best method of addressing the problem
 - b. Develop and Fund Capital Improvement Projects to address problems which can effectively be relieved
 - c. Purchase those structures where cost-effective relief cannot be obtained through capital projects
3. Ensure new and redevelopment is done in a manner consistent with protecting both that property and others in the basin from flooding
 - a. Follow NFIP guidelines for permitting new development
 - b. Ensure all new construction is permitted
 - c. Ensure new development does not impact existing systems
- d. Reduce Coastal Flooding Losses
 - a. Pursue grants to fund study of repetitive loss properties and means to correct or remove the properties from that roll
 - b. Assist in obtaining grants for homeowners to fund floodproofing and elevation projects
 - c. Explore reducing tax burdens generated by acceptance of mitigation assistance grants
 - d. Explore capital improvements which can reduce the severity of coastal flooding events.
- e. Ensure the public is educated as to its role in flood protection
 - a. Continue to educate the public through our utility newsletter and other publications
 - b. Direct mailings to Repetitive Loss properties informing them of grant opportunities

ACTION PLAN

Severe Rain Events

Over the past 20 years the City has undertaken the systematic investigation of stormwater floodin problems in several large drainage basins. Early in the program

these Master Basin Plans determined what would be necessary to bring the basins up to the design specifications of the City: stormwater contained in the system one-foot below the throats of all stormwater inlets, no street, yard, or structural flooding. After performing three of these large studies and reviewing the results it was obvious some other method would have to be found to address stormwater flooding. The costs estimates from these studies were extremely large and oftentimes addressed problems of negligible severity. As a result, the plans were not implemented and a more realistic approach was sought. After consideration, it was determined to develop different levels of service to apply to these basins, hopefully addressing the worst problems but not causing excessive expenditures to follow a one-size-fits-all solution. Three studies were performed using this methodology and improvements made to the basins, considerably reducing the worst flooding. This approach was not followed for basins which did not have any functional stormwater system. Those basins had systems developed to meet the standard criteria.

In order to address the remaining problem areas we plan to:

- Review Master Basin Plans which were not implemented to determine feasibility of completing proposed projects
- Systematically review the known problem areas in the inventory to determine the most effective manner and costs of addressing the problem
- Assign recurrence intervals to all known stormwater problems
- Develop the best solutions for each problem
- Develop master basin plans for those basins where the number of problems warrant it and which cannot be relieved without systemic changes
- Prioritize the problems
- Systematically address the problems with either capital improvements, purchasing of affected properties, or education

Control of Coastal Flooding:

Coastal Flooding resulting from elevated tides is a combination of two distinct tidal flood mechanisms. The first mechanism is the tidal encroachment of the tidewater prism on coastal areas, which can be remedied only by the imposition of physical barrier (see the Section 2 of coastal flood).

The City of Tampa has participated in two studies to determine the most effective means of protecting flood zone properties from Coastal Flooding. The first, cited earlier established a number of basins which might benefit from the addition of one-way flap gates or valves to reduce incoming tidal flooding. The second, done by the Corps of Engineers, explored the possibility of raising certain areas to protect inland areas from tidal flooding.

In order to address the remaining problem areas we plan to:

- Review the studies to determine if all applicable solutions have been sufficiently evaluated in light of current conditions
- Perform benefit/cost determinations on projects not yet implemented
- Implement those projects which may have positive benefit/cost ratios and do not have sufficient negative impacts associated with them

PROPERTY PROTECTION

The City will continue to explore mechanisms which will assist homeowners in lowering the impacts of flood events on their property. The City performed an in-house study to explore the efficacy of sandbags and other means to reduce the inflow of floodwaters into structures. We determined that, contrary to expectations, sandbagging was not an effective mechanism but that other, simpler methods had better effect. Duct tape and expansive foam both had much better effectiveness and were more appropriate for use by those with limited mobility or strength.

In addition to publicizing these findings the City will assist homeowners in retrofitting their flooded structures by providing advice and assistance in applying for federal and state funding grants for retrofit projects. Typical retrofits we anticipate include: elevating buildings above the flood hazard level, providing watertight closures for doors and windows, and using floodwalls around ground level openings or, alternatively, eliminating such openings. Also included is the use of water-resistant materials, structural reinforcements to withstand water pressures, and placement of mechanical elements in the upper parts of the building.

The City will continue to review NFIP repetitive loss properties and identify possible elevation projects in order to assist homeowners with grant applications through FEMA Flood Mitigation Programs. Property owners will be sent information to advise them of the flood threat and opportunities for assistance.

PREVENTION

The aforementioned capital improvements will prevent future losses due to flooding events. In order to prevent flooding caused by failures in the existing systems, the City has undertaken an optimization program aimed to increase the ratio of preventative or proactive maintenance to reactive maintenance. By dividing the City into quadrants and assigning specific, better-trained crews to work only on the systems within those areas, an improvement is expected in the maintenance of these systems. The Operations Section has also diverted resources formerly directed at construction of small capital improvements to maintenance.

The City will continue to enforce the Flood Ordinance which regulates new construction and substantial improvements of buildings located in the 100 year floodplain for compliance with NFIP regulations. The City will also ensure staff charged

with the review of new development in the 100-year floodplain are properly trained in floodplain regulations.

EMERGENCY SERVICES

Emergency Response Team

The Stormwater Operations & Maintenance emergency response team is responsible for rain event response and any after hour complaints that are Stormwater related. These individuals are authorized to take appropriate action to prevent or minimize flooding. As assigned, any emergency response member is capable of working in any capacity - Dispatch, Ditch Assessment, Pumping Assessment, Ybor City Assessment, Complaint Investigation, or Incident Investigation.

Prior to an expected storm event the following locations are to be inspected to ensure there are no apparent blockages:

Emergency Inspection - Ditch and Grate Locations:

South Tampa		
Atlas	Location	Activity/Inspection
J-08	2350 Hesperides @ San Carlos Street	Concrete Ditch/Grate
J-11	1700 Swann Avenue @ Packwood	Ditch System
K-09	3300 S. Manhattan Avenue @ Leona	Ditch Grate
K-09	3900 Palmira Avenue	Ditch System
L-09	3800 Hubert @ Bay Villa Avenue	Inlets
L-09	4300 S. Clark Avenue @ Knights Avenue	Drainage Canal
L-09	4300 Lois Avenue	Ditch System
L-09	4300 Lois Avenue @ Knights Avenue	Drainage Canal
L-09	4300 Coolidge Avenue	Ditch Grate
L-09	4607 Lois Avenue @ Oakellar Street	Major Ditch
L-09	4900 S. Lois Avenue	Ditch Outfall
M-08	4545 Gandy Boulevard{Rear}	Concrete Flume
N-09	4319 Tyson Avenue	Ditch System
N-08	6342 Renellie Court	Ditch System
N-09	3800 Elmwood Terrace	Concrete Ditch
N-09	6401 Manhattan Avenue	Ditch System
J-10	Himes Avenue @ Morrison Avenue	Street Grate
J-10	Himes Avenue @ Mullen Avenue	Street Grate
J-11	201 Bayshore Boulevard @ Platt Street	Street Grate

J-12	101 Davis Boulevard @ Chippewa	Street Grate
Six Mile Creek/East Tampa		
Atlas	Location	Activity/Inspection
H-15	3607 37th Street @ 4th Avenue	Open Ditch
H-17	1601 43rd Street @ Broadway {Fla. Steel}	Open Ditch
H-17	6022 East 14th Avenue @ 64th Street	Open Ditch/System
H-17	6502 East 14th Avenue @65th Street	Open Ditch/System
H-17	2024 62nd Street @ 14th Avenue	Open Ditch
Drew Park/West Tampa		
Atlas	Location	Activity/Inspection
F-10	3300 Caracas Street @ Wilder Street	Open Ditch
F-11	100 Alexander Drive @ Mendenhall	Open Ditch
F-12	507 Chelsea Street @ Clearfield	Alley Ditch
F-08	4400 Lois Avenue @ MLK Boulevard	Open Ditch
F-08	4401 Cooper Place @ Alva Street	Alley Ditch
I-09	1101 Grady Avenue @ State Street	Lemon Street Ditch
I-09	4600 Cypress Street @ Trask Street	Lemon St. Ditch Grate
H-08	4901 Cypress Street @ Ward Street	Open Ditch
I-10	3400 Lemon Street @ Himes Avenue	Retention Pond/Ditch
North Tampa		
Atlas	Location	Activity/Inspection
B-16	5001 Chilkoot Street @ 50th Street	Open Ditch
B-16	10315 Myrtle Street @ Holland Street	Open Ditch
B-16	5000 Holland Street @ Sassafras Street	Open Ditch
B-16	10601 Myrtle Street @ Serena Drive	Open Ditch
C-13	9224 Brooks Street @ Wilma Street	Open Ditch
C-15	9801 Takomah Trail Rd @ 99th Avenue	Open Ditch
F-12	4499 Lynn Avenue @ Emma Street	Alley Ditch
D-11	904 Kirby Street @ Rome Avenue	Kirby Creek Cannel
D-11	2101 Hamilton Avenue @ Albany Avenue	Open Ditch
D-13	1401Park Circle @ Hilton Place	Storm Drains

Additionally, prior to an expected event, and periodically at other times, the following pump stations are inspected to ensure capacity is available in the sumps and that the pumping stations are operable:

Pump Stations & Emergency Pump Location:

1. 115th Avenue @ Florida Avenue - "The Blue Sink" Fixed M&W Hydraulic Site
2. Penalty Lake Golf Course - Fixed Electric Pump.
3. Florida Avenue @ Seneca Street - Pump Station.
4. 215 West 109th Avenue - "Curiosity Creek" Pump Station - Additional capacity available nearby
5. 109th Avenue @ North Boulevard - Pump Station - drains two retention ponds
6. Lake Eckles - Pump Station Electric with diesel generator back-up on large lake
7. Newport Avenue / El Portal Drive - Retention Pond/Portable 6" Pump
8. Yukon Street @ Willow Avenue - Sinkhole Storage/Portable 6" Pump (as needed)
9. Okara Street @ 24th Street - Retention Pond/Portable 6" Pump
10. Lantana Avenue @ Poinsettia Avenue - Retention Pond/Portable 6" Pump
11. Bougainvillea Avenue @ Marjory Avenue ROW - Ditch System/Portable M&W Pump Site
12. Poinsettia Avenue @ 29th Street - Pump Station
13. Janette Avenue @ Avon Avenue - "Robles Park" Pump Station

After major storm events the Stormwater Operations Group participates in clean-up activities to reduce the potential for system clogging and reduced capacity.

PUBLIC INFORMATION

In order to share the information the City possesses with those most impacted we will continue to pursue educational projects. In the past we have mailed out Flooding Information Brochures. Currently we are distributing this information via Utility Newsletters which are sent out quarterly with the City Utility bills. We will also be doing a newspaper insert to provide public education on stormwater environmental as well as flooding. Keeping trash and debris from the stormwater system has both flood and environmental benefits.