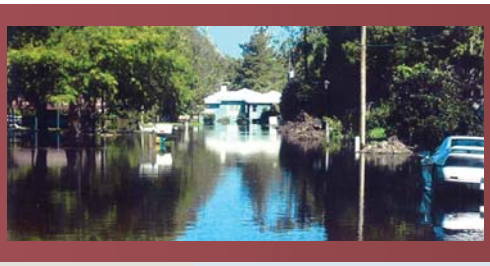
The Astor Flood Study
Lake County, Florida



Astor is generally located in northern Lake County along the west bank of the St. Johns River just upstream of Lake George and is adjacent to the Ocala National Forest (Figure 1). Astor is within unincorporated Lake County and is approximately 3.0 square miles in size and has a population of approximately 1,725. Currently, Astor has limited stormwater infrastructure and has a history of road and residential flooding issues. As a result, the County initiated Phase I of the Astor Flood Study to identify system problems and improvements to help address both flooding and water quality issues issues.

Figure 1

The conveyance system in Astor is comprised mainly of natural channels, overland flow, swales and driveway culverts which all eventually discharge to the St. Johns River. Astor itself generally consists of medium density residential land uses. The soils for the area are primarily poorly drained soils. Elevations range from 33 ft-NGVD on the west side of the study area to 0 ft-NGVD at the St. Johns River.

Drainage System Overview

There are 21.2 miles of County- maintained roads and 5.7 miles of unpaved roads within the Astor community. All unpaved roads with the exception of 3rd Street are privately maintained. Stormwater management in Astor is characterized by an open conveyance system which consists mainly of culverts, swales and open channels. There are 22.6 miles of swales and channels in Astor; two thirds (15.2 miles) of these are maintained by the County; the remaining one third are privately maintained. There are 983 culverts in Astor; 707 of them are County-maintained and 276 are privately maintained. Ninety percent of the culverts in Astor are equal to or less than 18 inches in diameter.

Flooding

Flooding that occurs in Astor can be categorized into two major categories: 1) flooding due to low lying areas within the natural floodplain of the St. Johns River; and 2) localized flooding problems due to lack of infrastructure and/or structural deficiencies. The County undertook an alternatives analysis to identify conceptual solutions to address flooding within the Astor community. In general, solutions to address localized flooding problems included the following activities:

- Clean, repair, reconstruct or upsize culverts; and
- Clean, repair or widen channels and swales; and
- Improve and/or provide drainage system; and
- Construct storage facilities (i.e., ponds); and
- Routine maintenance of the stormwater management system.

Problem Area ID	Description	Estimated Cost
	Non-County Maintained	
1	Bass and Indigo Roads	$1,106,000
2	Ward Street	$4,010,000
3	James Street, Lisa Street and Trespass Trail	$649,000
N/A	Finger Canals	$544,000
1	Tyty Road	$0
9	Veterans Drive	$0
12	Aqua Utilities Pond	$0
	Total	***$6,309,000***
	County Maintained	
4	3rd Street	$1,179,000
6	Maple Road	$48,000
8	Carrol Street	$7,000
11	Fern, Bobcat, Palmetto and Deer Roads	$37,000
13	Riverview Drive	$475,000
N/A	Damaged Infrastructure	$406,000
2	West Loyd Street and Alco Road	$0
5	Butler Street	$0
5	Ann Street	$0
7	Fox Road	$0
10	Alco Road	$0
N/A	Flood Early Warning System	$0
	Total	***$2,152,000***

Table 1

CDM

The Astor Flood Study - Lake County, Florida

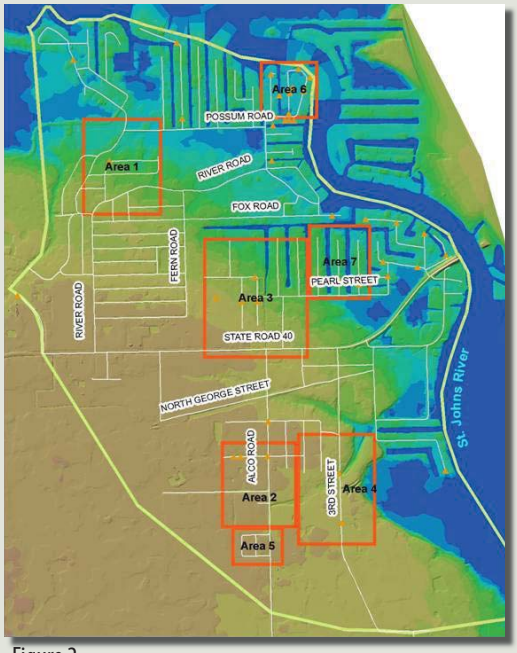


Figure 2

The general locations of where conceptual improvements were recommended are shown in Figure 2. A summary of these alternatives and associated estimated capital costs are shown in Table 1. Due to the nature of flooding associated with rising stages of the St. Johns River, structural improvements will only provide limited benefit. Although recommendations were made for several problem areas located within the floodplain, once the St. Johns River rises to a certain elevation, little can be done to prevent the river from overtopping its banks into the floodplain.

In order to address situations when the stage of the St. Johns River exceeds the top of bank elevation and public safety is threatened, the implementation of a Flood Early Warning System was recommended. Almost half of Astor lies in the 100-year floodplain which ranges from 0.0 to 7.0 ft-NGVD in elevation (as shown in Figure 3). When the St. Johns River rises above a certain elevation, lower areas of Astor are inundated. Approximately 60 percent of the reported flooding problems in Astor occur when stages in the St. Johns River are elevated. Improvements to local drainage systems will not mitigate this type of flooding. A flood early warning system (FEWS) may be the most effective means to help reduce the threat to public safety and damages in a flood of this type. A FEWS is crucial for public safety; it will provide as much advance notice as possible of an impending flood, thus enabling residents and businesses to secure property and evacuate to safe places.

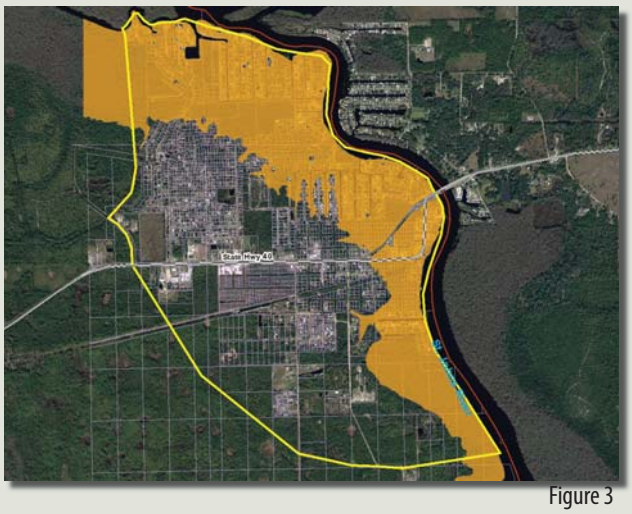


Figure 3

In order to seek an efficient and economical way in developing and implementing a FEWS for Astor, several governmental agencies were contacted such as U.S. Geological Survey (USGS), the Southeast River Forecast Center (SERFC) and the local Weather Service Office (WSO) in Melbourne, FL. Both the SERFC and WSO are under the administration of National Weather Service (NWS) of the National Oceanic and Atmospheric Administration (NOAA). Based on communications with SERFC, they have agreed to add Astor as one of the river stage forecast points (as shown in Figure 4). Communication with NOAA indicated that they have completed the preliminary background surveys and are in the process of establishing flood forecasts for Astor, which are tentatively set to start in June 2008. The real-time St. Johns River stage at Astor will be available on the SERFC's webpage to the County and the general public. The webpage address is: http://www.srh.noaa.gov/alr/ahps/ahps_RVFCF.htm
The WSO in Melbourne will issue flood watch and flood warning messages via public media, and notify the County's Emergency Operations Center and other departments. The County then will be able to notify the residents via dedicated communication means such as reverse 911 telephone system.

Figure 2