EXECUTIVE SUMMARY

Lee County experienced two major rainfall events during the summer of 2017, the events being spaced at an approximated two weeks apart. A major event occurred between August 25 through 27, first known as Invest 92L by the National Hurricane Center (NHC) with many areas in south Lee County getting 10 to 12 inches or more of rainfall in a three-day period, with smaller pockets having higher amounts.   Hurricane Irma followed on September 10, which delivered another 6 to 10 inches in most county areas in one day with higher amounts in the eastern portion of Lee County, according to NEXRAD and local rainfall data. The back-to-back events within two weeks did not allow sufficient time for most areas to recover from the late August storm, nor to allow sufficient time for clean-up operations to be completed. Subsequently, the Irma event produced higher flood-water levels in many areas than did the late August event due to the already saturated conditions.

After Hurricane Irma, Lee County responded with a three-phased effort to address the flooding impacts. Phase 1 focused on the immediate removal of known obstructions in waterways that had been identified in initial assessments. Work moved forward countywide including but not limited to Lehigh (downstream creeks), Island Park, Estero River, and San Carlos Park areas. Phase 2, which is the subject of this assessment effort, was to identify impediments to flow that could be removed in the near-term or short-term in advance of the upcoming rainy season. The County entered into an agreement with four local consultant engineering firms to canvas five heavily impacted watersheds and establish an inventory of remedial measures. Through the County's online flood questionnaire and direct public contacts, community input was substantial and provided valuable information. In addition, observations of the permitting process and ideas for long-term remedial measures were provided and will be utilized in Phase 3 (Long-Term Planning).

Phase 2 objectives were to observe conditions in the field where flooding had occurred and map locations where impediments to flow existed that could be remedied fairly quickly, or where catch basins, culverts and other crossings appeared to be undersized or damaged. Flooding issues found ranged from simple trees blocking ditches to sediment in structures and overgrown outfall ditches. Other issues included berm reconstruction and sediment in major drainage canals. Some of these issues – while noted and mapped with this report – will require advance planning, design and permitting efforts. They would not meet the criteria of "quick fixes," but they are important enough to document for future consideration of longer term projects. Many areas of Lee County are simply in low lying areas prone to recurring flooding at various levels and having older patchwork drainage systems not capable of handling higher levels of stormwater runoff. These areas will be more difficult to provide upgraded levels of service.

Field work showed many locations needing localized maintenance efforts such as ditch and Structure cleaning. Additionally, systemic issues exist in the study areas that are much more difficult to address, requiring high funding levels, engineering and environmental design as well as permitting.

The stormwater impacts experienced by many residents in late August and again in September from Hurricane Irma were the result of a combination of circumstances that compounded each other. The rainfall in two intense events in a short time period produced large runoff volumes without sufficient recovery time or time for sufficient maintenance. Flow impediments limited how fast the runoff could get through downstream conveyances. Equally important, late summer is typically the peak of the rainy season and the ground is fully saturated. Any rain that falls will either runoff, stack up or evaporate, as there is little percolation into the soil. For example, the average rainfall of 25 inches over the 68 square mile Ten Mile Canal watershed during the 20-day period between the August and Hurricane Irma events would generate over 29 billion gallons of water. This same 25 inches is roughly one-half the annual rainfall amount Lee County receives any given year.

Observations also revealed considerable information about permitting criteria. Construction of new communities is generally designed to have critical facilities above the 25-year storm event with residential roadways at or above the five-year, one-day event. House pads are typically raised to above the 100-year

storm event. Largely, homes built to these standards were not flooded but may have received wind-driven rain. Development patterns also play a factor. Early in the development of our community (1950s through 1970s), many homes were built next to and on top of historic floodplains to take advantage of waterfront access. Unfortunately, the meteorological science and engineering analysis were not what we have available today and homes were systematically built along creeks, streams and other watercourses into harm's way and also reducing its natural flood carrying capacity.

Additionally, the consultant team looked at potential long-term type projects that could help reduce the flooding on a much larger scale. These are engineered solutions that will take considerable effort in analysis, design, permitting and funding. These ideas will be brought forward in Phase 3 – Long-Term Planning. The County has advertised for the updating of the stormwater master plans. Consideration will also be given to bringing in other agencies such as the South Florida Water Management District and U.S. Army Corps of Engineers.

Implementation is underway. Phase 1 work is nearing completion. Phase 2 work will be prioritized and sorted by responsible entity – many jurisdictions were impacted by these storms. The County, the cities, FDOT, SFWMD, LA-MSID, Community Development Districts, homeowners' associations and partnering agencies all have a role to play. The County will continue its dialogue and cooperative efforts with these groups.