

## 10.0 FINDINGS AND CONCLUSIONS

Significant flooding occurred in the Huntington Subdivision along Cameron Run in Fairfax County, Virginia on June 25 and June 26, 2006 and approximately 160 houses were damaged. Based on the Corps' most recent hydraulic modeling, there are 180 houses in the Huntington and Huntington Station communities that are located in the 1 % annual chance floodplain (100-year floodplain) and are at risk of flooding again in the future. The purpose of this study was to develop and evaluate alternative solutions for mitigating future flooding and to select a final plan for implementation. The flood damage reduction measures that were evaluated include a levee, dredging, buyouts and flood proofing individual buildings.

The flood damage reduction alternatives underwent a three-phase plan formulation process and a public involvement process which led to the selection and design of a final accepted plan. Concept plans were developed for each of the alternatives and they were evaluated based on construction costs, economic benefits (reduction in future damage costs), impacts, risk, and public acceptance. None of the alternatives had an economic benefit to cost ratio greater than 1.0, which is required to meet the guidelines for federal funding. The most cost-effective solution that would solve the flooding problem and meet the established project goals and objectives is Final Concept Plan 2C, the construction of a levee. Fairfax County selected this plan for implementation and requested that the Corps conduct further design of the project.

The main components of the selected plan are a levee and a pumping station. As part of this study, the Corps developed the levee to a 65% design level. Further design of the levee will be required to take it to a 100% level so that it may proceed to construction. The Corps only designed the pumping station to a concept level design stage. This concept plan allowed the team to develop an approximate construction cost estimate. However, significant further design will be required for the pumping station and the accompanying features (such as the flow diversion pipes).

The grassed levee is 2,865 feet long and will tie into high ground upstream and downstream of Huntington. The project is designed to prevent flood damages to the Huntington houses during the 1% annual chance flood event (100-year flood) and lower events. The top of the levee will be approximately 10 to 15 feet above the existing ground. The crest elevation at the upstream end of the levee is 19.4 feet (4 feet higher than the 1% annual chance flood elevation); the crest elevation at the downstream end is 17.3 feet (3 feet higher than the 1% annual chance flood elevation). The additional height above the 1% annual chance flood elevation is to allow for risk and uncertainty and sea level rise. Based on the risk and uncertainty analysis, the probability that the levee will not be overtopped during a 1% annual chance event is 99%. The levee height meets FEMA certification standards. The levee has a 10-foot wide crest and 1 vertical on 2.5 horizontal side slopes.

The project consists of two drainage structures, one near each end, to allow stormwater to flow through the levee. There are flow diversion pipes to divert flow to the pumping station during high water events, when the drainage structures are closed. There is an 8-foot wide asphalt

recreational path along the top of the levee and ramps that lead over the levee for maintenance and handicap access.

The project also includes excavating part of the open space/park area adjacent to the levee approximately 1-2 feet deeper to elevation 6.0 feet to allow for more rainfall storage during a flood event. A pumping station with a capacity of 100,000 gpm will be constructed to pump the interior drainage across the levee to Cameron Run during a flood event. During a high water event (when the storm drains through the levee are closed) and a 100-year rainfall, the pump station will maintain a maximum pond elevation in the community of 8.0 feet. There would still be some water ponding in the roads and in yards.

Based on hydraulic modeling, the levee would increase the 1% annual chance flood elevations by up to 0.6 feet just upstream of the project. The increase in flood elevations extends upstream to Telegraph Road. This increase will affect four structures just upstream of Huntington. However, two of them have low openings above the 1% annual chance flood, so the levee will have no impact. The other two buildings (Mid-Town High Rise and Huntington Car Care) are already located in the floodplain and would be flooded during a 1% annual chance flood even without the levee. Therefore, there would be no increase in flood damages during a 1% annual chance flood caused by the levee.

The project will have an impact to wetlands and forest habitat, however these impacts have been minimized. Approximately 0.02 acres (935 square feet) of palustrine forested wetlands would be impacted by the construction of the project. As a result of levee construction there would be permanent direct adverse impacts to existing flora due to removal of mature trees, saplings, shrubs and other established vegetation along the levee alignment and the 15 foot easement on either side. Approximately 4.85 acres (231,928 square feet) would be impacted. These areas would be seeded and converted to grassy areas. The park will also be impacted by the project. Due to the excavation of the park area for interior drainage, recreational use of this area may be limited.

The total project cost, including the final design phase, construction management, lands and easements, and escalation (assuming construction will take place between FY11 and FY13), is estimated to be \$20.2 million. The benefit to cost ratio is 0.4. The project construction duration is estimated to be 2 years.

The next step for the project is the final design of the levee and pump station. In addition to further design, the county will need to obtain the necessary permits and approvals and secure funding prior to construction.