

# Storm Water Management Model

## Cooper's Ditch Watershed MDPU

Chesapeake, VA

URS Nos. 11656706, 11656729

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### Executive Summary

Engineers from the U.S. Army Corps of Engineers, City of Chesapeake and URS Corporation have completed a drainage study of the Cooper's Ditch Watershed using the Storm Water Management Model (SWMM) computer program.

The analytical procedure is based on computing localized flood volumes resulting from design rainfall events such as the 2-, 5-, 10-, 25-, 50- and 100-year storms. The watershed is analyzed using modeling configurations to quantify flooding associated with both existing and future watershed conditions. Drainage improvement alternatives are carefully evaluated with respect to their potential impact to the entire watershed. The improvement alternatives are then given further consideration based on construction feasibility and financing constraints, with the focus on the entire watershed rather than on a few individual components. The advantage of this approach is that the entire drainage system can be evaluated on a consistent, system-wide basis.

The process of identifying candidate drainage improvement projects is based on trial-and-error modeling techniques. The watershed is analyzed using anticipated future land use and imperviousness, and locations and volumes of computed flooding are identified in the modeling.

After analyzing existing and potential flooding problems in this watershed, URS has identified five specific projects that can alleviate future flooding in the Cooper's Ditch watershed. Four of the five projects are not considered Master Drainage Facilities (MDFs) because their contributing drainage area is less than 320 acres. Preliminary cost opinion computations, provided in a separate Cost Appendix, indicate that the one Master Drainage Facility is financially feasible. This project can be carried forward as Capital Improvements Project with some assurance that the impacts on the watershed as a whole have already been adequately considered.

There are many combinations of drainage improvements that can be evaluated in any watershed. While a substantial effort has been applied to develop this study, it is by no means exhaustive. The intent of this undertaking was not only to develop sound alternatives for watershed improvements, but also to leave the underlying data files and computer models so that they can be used in a straightforward manner in the future.

The peak computed water surface elevations at each modeled node are presented in Appendix C for existing conditions and future conditions.

Portions of this watershed associated with roadway or development projects have been evaluated by the City over the past several years. Some studies have been completed to address specific problems as described elsewhere in this report. The modeling conducted as part of this Master Drainage Plan Update incorporates the previously prescribed improvements where possible, either directly or with modifications. In several cases, previously recommended improvements have been validated, as detailed later in this report.

FEMA flood insurance studies and rate maps are the definitive source of floodplain limits and elevations. The SWMM models developed for this drainage study are specific design scenarios based on 2-, 5-, 10-, 25-, 50-, and 100-year rainfall events—**THEY ARE NOT TO BE CONSTRUED AS INDICATIVE OF EXPECTED WATER SURFACE ELEVATIONS FOR THE PURPOSES OF FLOODPLAIN MANAGEMENT AND/OR INSURANCE REQUIREMENTS.** The SWMM models developed for this study could be adapted for use in the National Flood Insurance Program and submitted to FEMA for approval, but until they are subjected to that process the published flood insurance studies and rate maps remain fully in effect.