1. EXECUTIVE SUMMARY

This Master Drainage Plan document describes a storm water management model (SWMM) study that was completed in February 2004 for the Milldam Creek watershed in the City of Chesapeake. The purposes of the study are to update the City's watershed models to reflect the significant amount of development that has occurred in this watershed since the original models were completed, and to improve the models by taking advantage of GIS technology and improvements in the SWMM model itself.

This document summarizes the methodology, data sources and approach used in the modeling. It also provides complete documentation regarding the construction of the models and parameterization of the modeling data.

The updated models comprising the technical basis of this study have greater resolution than the original models, and constitute a new modeling baseline based on 2003 conditions. Future conditions were also analyzed using proposed site plans to build the models based on likely development scenarios considered in the aggregate.

These modeling results were obtained subject to limitations on available data—particularly surveying data. In this respect these models represent "best guess" modeling. They should however be quite sufficient for use in watershed planning applications, and can easily be enhanced with detailed surveying data, as it becomes available. A limited amount of field surveying was performed in support of this study to verify critical invert elevations and channel and culvert configurations and dimensions. Compared to other SWMM studies in the region, this study is very detailed and has undergone a great deal of digital data validation during the construction and checking of the models.

After preparing and running the future conditions models, the Milldam Creek watershed increased from 57.3 to 64.6 percent impervious cover. This increase in impervious cover produces greater volumes of storm water runoff, which have been incorporated into the future conditions models. For the 2-year design storm, Milldam Creek produces 1.872 inches of runoff in 2003, which increases to 2.105 inches in the future—comprising a 12.4 percent increase.

The previous study of the Milldam Creek Watershed Master Drainage Plan—completed in 1986—called for several million dollars worth of storm water and drainage improvements, some of which have already been constructed in conjunction with private development. The current study reviewed all of the previous recommendations, and considered a number of additional options aimed at improving drainage conditions with the watershed. One of the previous study's recommendations was totally eliminated. Three were substantially validated. This study recommends four significant improvements, estimated to cost approximately $1,230,590 in 2004 dollars. Specifically these improvements are:

- A new 32-foot bridge at Campostella Road,
- Channel improvements to provide additional flood storage and conveyance capacity between Campostella Road and Military Highway,
- A new 6x6 box culvert at Military Highway, and
- Two new storm water management basins for future development east of Battlefield Boulevard.

An evaluation of the City's Pro-Rata Share program was also performed, and summarized in Appendix B of this report. The suggested improvements identified during the modeling were evaluated using three common cost-recovery mechanisms, including the Billing Unit method, Impervious Area method, and the Rational Coefficient method (currently used by the City). A recommendation is made to switch to the Billing Unit method for calculating pro-rata fees in this watershed.

As described in Section 4.3.15, the FEMA flood insurance models are the definitive source of floodplain limits and elevations in all cases. The City's SWMM models described herein are specific design scenarios based on 2-, 5-, 10-, 25-, and 50-year rainfall events—THEY ARE NOT TO BE CONSTRUED AS

INDICATIVE OF EXPECTED WATER SURFACE ELEVATIONS FOR THE PURPOSE OF FLOODPLAIN MANAGEMENT AND/OR INSURANCE REQUIREMENTS.

All documentation and computer modeling files associated with this study are available for review from the City of Chesapeake, Department of Public Works.

Mr. Sam Sawan, PE (757.382.8267) served as the project manager for the City of Chesapeake on this project. Mr. Bryant Wilkins was the Section 22 contract manager for the Corps of Engineers, Norfolk District. Mr. Michael Barbachem, PE, DEE (757.499.4224) was the project manager for URS. The modeling and pro-rata share evaluations were produced by Wendy J. Cox Royston, PE and John Paine, PE, PH. Dr. Seshadri Iyer, PE performed the quality assurance review.