

5. MODELING SCENARIOS & COMPUTER FILES

See Sections 4.3.14 and 4.3.15 for important information regarding boundary conditions and return periods.

The SWMM files generated for this study are available from the City of Chesapeake, Department of Public Works. All of the modeling files are contained in a single zip file. The RUNOFF and EXTRAN files contained in this zip file have the following nomenclature:

md_Brt (cond)

where:

md = Milldam Creek Watershed identifier
 B = SWMM block (R for RUNOFF, X for EXTRAN)
 rt = return period of design storm (in years)
 cond = date of conditions being modeled

For example, “md_X50 (2003)” is the 50-year EXTRAN model for Milldam Creek Watershed based on 2003 conditions, and “md_R2 (2003)” is the 2-year RUNOFF model for Milldam Creek Watershed based on 2003 conditions. Open the file “md_R2 (2003).out” with PCSWMM, a text editor, or word processor to view the output file for the md_R2 (2003) modeling scenario. Input data files have a “dat” extension.

The PCSWMM files are related as shown in Figures 5-1 and 5-2 for the 2003 and future conditions models respectively.

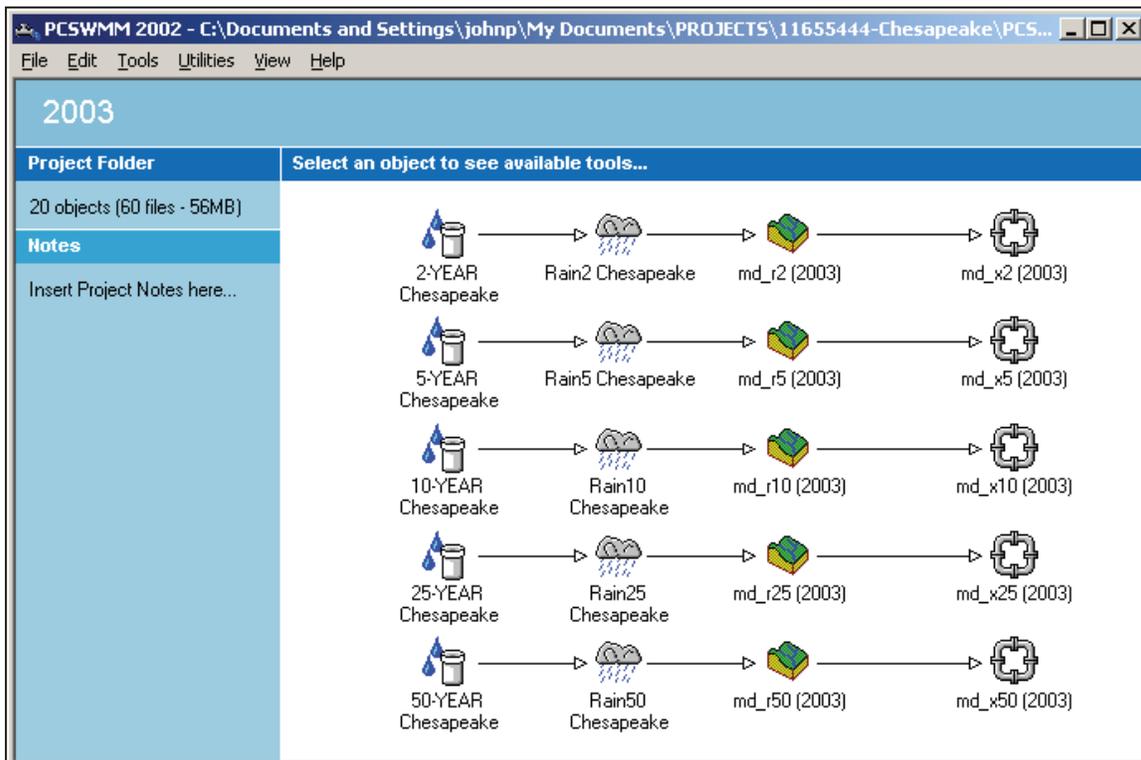


Figure 5-1. SWMM File Relationships for Existing (2003) Conditions Models

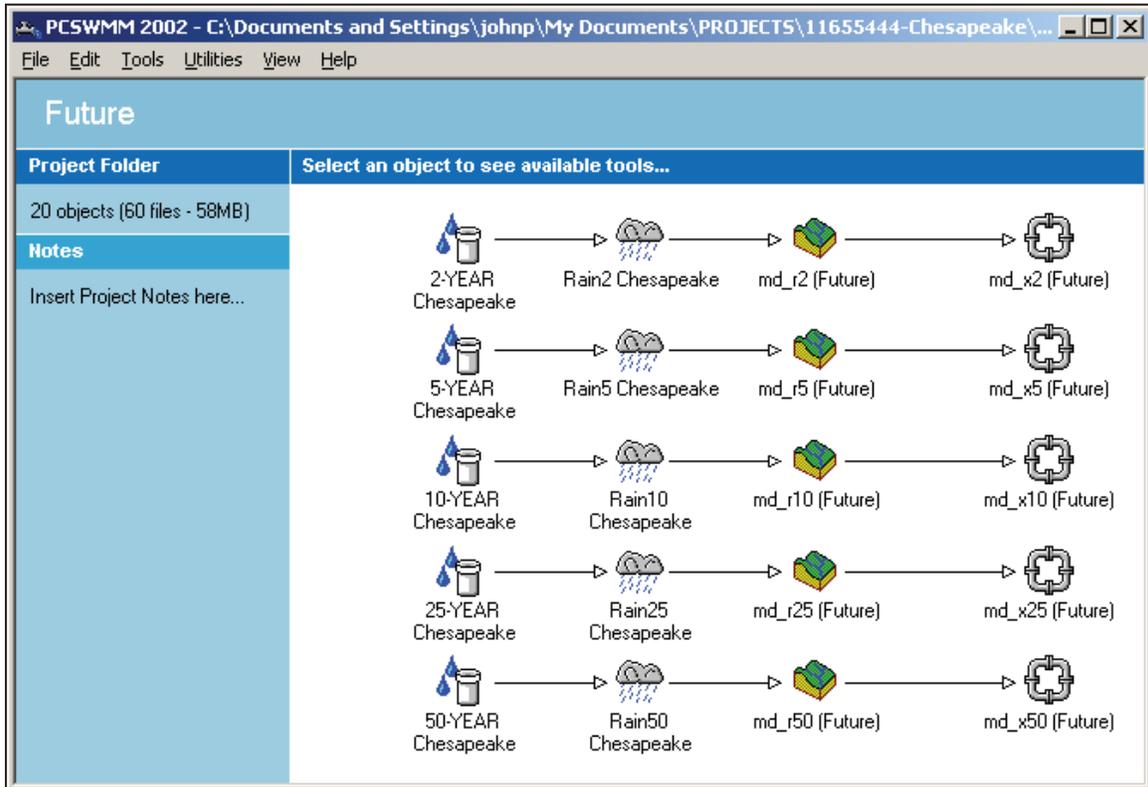


Figure 5-2. SWMM File Relationships for Future Conditions Models

To work with any of these files using the PCSWMM editor, simply click on the appropriate icon, and follow the software prompts to review the input or output files for the selected scenario. PCSWMM also contains tools for reviewing the dynamic hydraulic grade line of the EXTRAN runs, and provides an excellent editor to work with any of the input files. The SWMM model may be run directly by selecting an icon or group of icons and pressing the RUN button (that appears after selecting the icons).

5.1 Vertical Datum

For the purposes of this Master Drainage Plan study, all vertical information was either collected in or converted to the NAVD88 vertical datum. All elevations listed in the modeling data and in the GIS files are on the NAVD88 datum.

5.2 Existing (2003) Conditions Models

The existing conditions models were constructed largely from available GIS data and site plans that had been previously approved by the City. The GIS data contained only about three percent of the invert and culvert attribute data in the Milldam Creek watershed, so the City requested that URS collect as much useful surveying information as could be collected for \$4,000 (the provision allowed for in the study contract). Surveyors from Precision Measurements, Inc. collected invert and channel and culvert information using this budget, and the field information was incorporated into the existing conditions models.

Much of the available watershed and drainage information was produced at different times, with different levels of accuracy for different purposes. URS engineers made several site visits to verify the drainage

system configuration, and spent many hours trying to resolve conflicting information among various site plans, the GIS and data other data sources.

The City identified three development projects that were substantially through the site plan approval process, or nearly complete with their construction. These sites plans included:

- Chesapeake Crossing Seniors (a housing development),
- Kohls Department Store, and
- Estes Express (a trucking facility).

All of these site plans were scanned and geo-referenced into the GIS, and included in the modeling as if they existed in 2003.

As with all models of this size and complexity, there is a great deal of detailed information, much of which has been supplemented with educated guesses about inverts and pipe and channel dimensions and geometries. Where future designs and studies will be based on these models, engineers are strongly encouraged to field-verify all items that may critically impact the results.

5.3 Future Conditions Models

After the existing (2003) conditions models were constructed and successful results were obtained, a series of future conditions models was constructed using the 2003 models as a starting point. The entire watershed was evaluated for development potential, and the RUNOFF block data files were modified to reflect the increased imperviousness that would result from future development.

The City provided several site plans that are in various stages of consideration for development of future parcels in the Milldam Creek watershed, including plans for:

- Space Cadets 2,
- Savannah Suites,
- Belmont at Greenbrier,
- Battlefield Blvd Retail Center,
- Sair Enterprises, and
- Atlantic Corporate Park.

These sites are clearly identified in the “Future SWMM” GIS files submitted as part of this Master Drainage Plan study. Some of these plans did not have design details, such as storm water management basin configurations, available at the time of this study, and some lacked sufficient detail to incorporate directly. These site plans were incorporated into the future conditions models as much as was possible.

In addition to these plans, URS identified 12 additional sites that appear to be prime candidates for future development in the watershed. All of the parcels considered for future development are shaded in yellow in Figure 5-3. There are other parcel sites available, but they were not considered likely candidates primarily due to topographic and/or wetlands constraints. The subcatchment delineations are the same as for the existing conditions model with two exceptions—two subcatchments were split to allow for an anticipated change in drainage pattern east of Battlefield Boulevard and to accommodate the two storm water management basins shown on the Space Cadets 2 site plan.

In 2003, the large tract of undeveloped land east of Battlefield Boulevard has an area of poorly drained forest and fields that currently drains through the I-64 / Battlefield Boulevard interchange. When this land is developed in the future, it is much more likely that the area north of the I-64 interchange will be drained away from the interchange, through the new storm water management basin modeled at Node 1180.

After adjusting the future conditions models to account for future developments, 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.

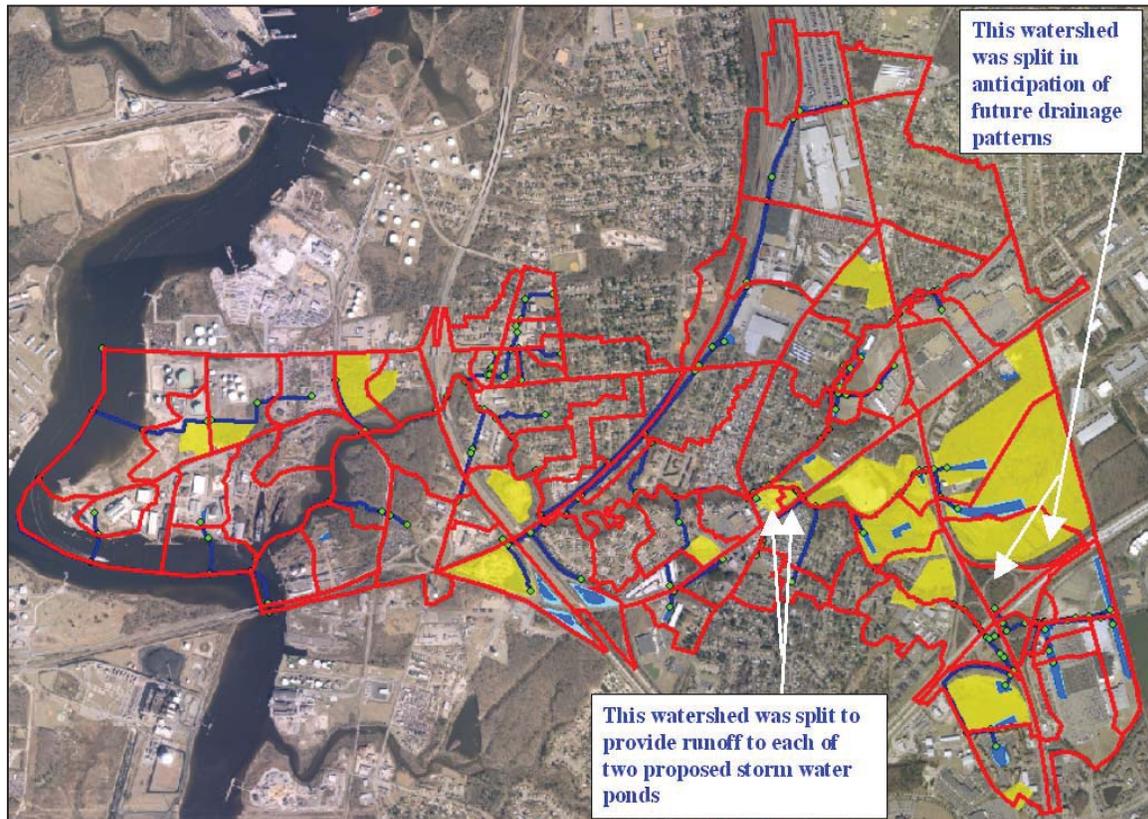


Figure 5-3. Potential Future Site Developments Considered in the Future Conditions Models