

5. MODELING SCENARIOS & COMPUTER FILES

See Section 4.2.8 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 = St. Julian 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, “sj_E50 (2004)” is the 50-year EXTRAN model for St. Julian Creek Watershed based on 2004 conditions, and “sj_R2 (2004)” is the 2-year RUNOFF model for St. Julian Creek Watershed based on 2004 conditions. Open the file “sj_R2 (2004).out” with PCSWMM, a text editor, or word processor to view the output file for the sj_R2 (2004) 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 2004 and future conditions models respectively.

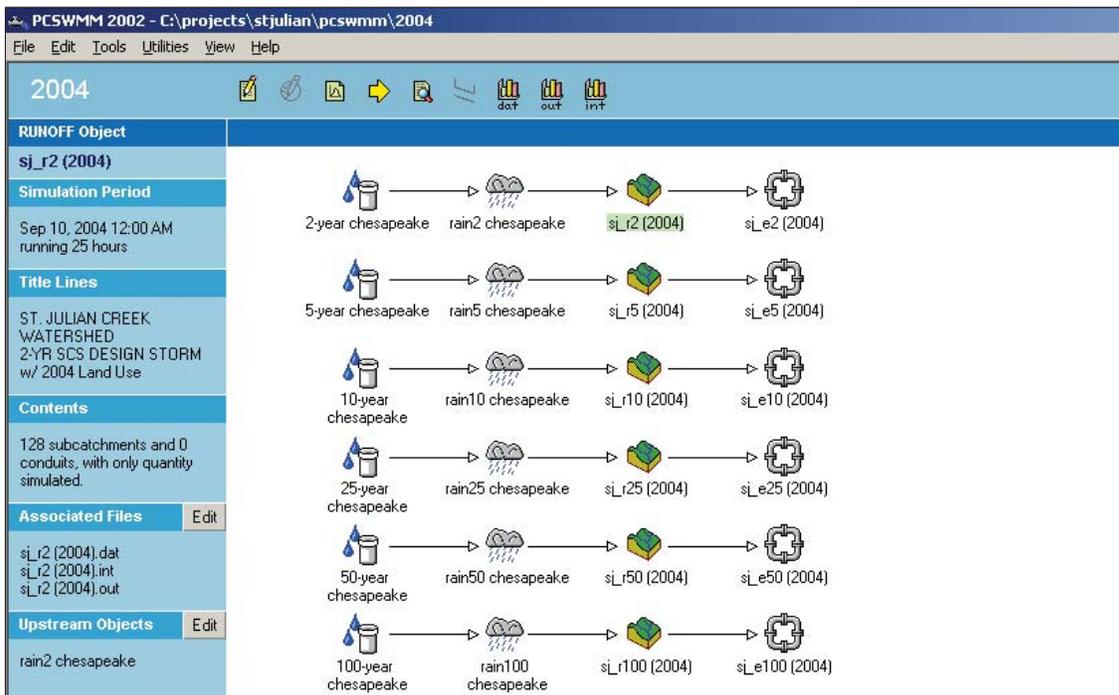


Figure 5-1. SWMM File Relationships for Existing (2004) Conditions Models

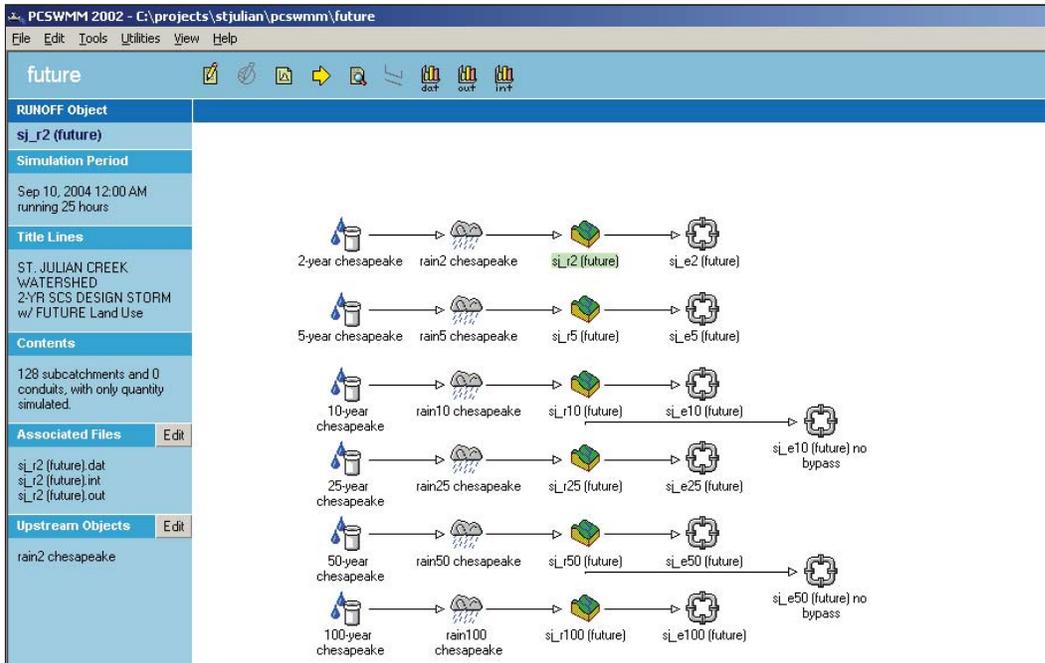


Figure 5-2. SWMM File Relationships for Future Conditions Models

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 (2004) 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 contains very little usable invert and culvert attribute data in the St. Julian Creek watershed, so City surveyors collected invert and channel and culvert information at key locations identified by URS, 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 site plans included:

- Gilmerton Road culvert addition,
- Channel improvements downstream of Gilmerton Road, and

- Norfolk Equipment.

All of these site plans were scanned and geo-referenced into the GIS, and included in the modeling as if they existed in 2004.

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 (2004) conditions models were constructed and successful results were obtained, a series of future conditions models was constructed using the 2004 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 St. Julian Creek watershed, including plans for:

- Canal Drive improvements, including a major outfall along Deaton Drive,
- Chesapeake Fire Station,
- Deep Creek Condos,
- Hambaz gas station,
- Walgreens, and
- Willow Bend (residential development).

Parcels at these sites are clearly identified in the “Future SWMM” GIS files submitted as part of this Master Drainage Plan study by the “fXXX” land use category, where “f” represents future conditions, and “XXX” represents the City’s three-letter land use code. 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 20 additional parcels 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 for both the existing and future conditions models.

After adjusting the future conditions models to account for future developments, the St. Julian Creek watershed increased from 40.0 to 43.5 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, St. Julian Creek produces 1.309 inches of runoff in 2004, which increases to 1.418 inches in the future — comprising an 8.3 percent increase.