Attachment J-5:
Summary of Model Inputs and Results for Each Significant LSRWA Model Run

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The accompanying table provides a summary of the significant model runs performed during this watershed assessment. For each LSRWA model run, the run is described by the study question being evaluated, the models used, the watershed load in terms of the land use conditions, the Conowingo Reservoir bathymetry, the scour load method, and the sediment nutrient content. In addition, the non-attainment analytical time period and results are presented for those model runs where nonattainment was analyzed.

This is a summary of all significant model runs performed for the Lower Susquehanna River Watershed Assessment involving the Chesapeake Bay Environmental Modeling Package (CBEMP). However, there were additional alternative scenarios evaluated which did not involve the CBEMP model. These scenarios are discussed in other tables in the main report (Tables 3-2 and 5-7). ERDC/EPA-CBPO ran roughly 30 modeling runs utilizing CBEMP. Modeling runs were denoted by "LSRWA-number." Only the significant modeling runs are reported here. A number of modeling runs conducted early in the study were supplanted as the modeling team developed improved information and understanding.

Summary of Model Inputs and Results for Each Significant LSRWA Model Run

Model Run	Description or Study Question	Models Used	Land Use (i.e., watershed sediment/nutrient loads)	Reservoir Bathymetry	Reservoir Scour Load Method	Reservoir Sediment Nutrient Content	Time Period Analyzed for WQ Nonattainment	Deep-Channel DO Nonattainment in CB4MH	Deep-Channel DO Nonattainment in EASMH	Deep-Channel DO Nonattainment in CHSMH
LSRWA-3	What is the system's condition when WIPS are in full effect and reservoirs have not all reached dynamic equilibrium?	CBEMP[1,2]	TMDL – WIPs in place	1991-2000 condition	None	N/A	1993-1995	0%	0%	0%
LSRWA-4	What is the system's current (existing) condition?	CBEMP	2010 land use	1991-2000 condition	None	N/A	1993-1995	23%	14%	28%
LSRWA-5	2010 land use with Conowingo reservoir removed from WSM. All sediments and nutrients pass through – no deposition or scour.	CBEMP	2010 land use	N/A	N/A	N/A	Not analyzed	Not analyzed	Not analyzed	Not analyzed
LSRWA-6	TMDL land use with Conowingo reservoir removed from WSM. All sediments and nutrients pass through – no deposition or scour.	CBEMP	TMDL – WIPs in place	N/A	N/A	N/A	Not analyzed	Not analyzed	Not analyzed	Not analyzed
LSRWA-18	What is the system's condition when WIPS are not in effect, reservoirs have all reached dynamic equilibrium and there is a winter scour event?	HEC-RAS AdH CBEMP	2010 land use	"Conowingo Full" condition	Excess volume method from AdH results (from 2008 bathymetry)	2011 Tropical Storm Lee	Not analyzed	Not analyzed	Not analyzed	Not analyzed
LSRWA-20	2010 land use with sediment/nutrient from Conowingo scour added in.	HEC-RAS[3] AdH CBEMP	2010 land use	2008 condition	Excess volume method from AdH results (from 2011 bathymetry)	2011 Tropical Storm Lee	Not analyzed	Not analyzed	Not analyzed	Not analyzed
LSRWA-21	What is the system's condition when WIPS are in full effect, reservoirs have not all reached dynamic equilibrium and there is a winter scour event?	HEC-RAS AdH CBEMP	TMDL – WIPs in place	2011 condition	Excess volume method from AdH results (from 2011 bathymetry)	2011 Tropical Storm Lee	1996-1998	1%	1%	1%
LSRWA-22	TMDL land use, sediment/nutrients from Conowingo scour added in	HEC-RAS AdH CBEMP	TMDL – WIPs in place	2008 condition	Excess volume method from AdH results (from 2008 bathymetry)	January 1996 flood event	1996-1998	1%	1%	1%
LSRWA-23	TMDL land use, 1996 storm removed from hydrologic record and load record	CBEMP	TMDL – WIPs in place	2008 condition	N/A	N/A	Not analyzed	Not analyzed	Not analyzed	Not analyzed
LSRWA-24	What is the system's condition when WIPS are in full effect, reservoirs have not all reached dynamic equilibrium and there is a summer scour event?	HEC-RAS AdH CBEMP	TMDL – WIPS in place	2011 condition	Excess volume method from AdH results (from 2008 bathymetry)	2011 Tropical Storm Lee	1996-1998	4%	8%	3%
LSRWA-25	What is the system's condition when WIPS are in full effect, reservoirs have not all reached dynamic equilibrium and there is a fall scour event?	HEC-RAS AdH CBEMP	TMDL – WIPS in place	2011 condition	Excess volume method from AdH results (from 2008 bathymetry)	2011 Tropical Storm Lee	1996-1998	0%	0%	2%
LSRWA-26	TMDL land use, January 1996 storm moved to June 1996	HEC-RAS AdH CBEMP	TMDL – WIPs in place	2008 condition	Excess volume method from AdH results (from 2008 bathymetry)	January 1996 flood event	Not analyzed	Not analyzed	Not analyzed	Not analyzed

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Model Run	Description or Study Question	Models Used	Land Use (i.e., watershed sediment/nutrient loads)	Reservoir Bathymetry	Reservoir Scour Load Method	Reservoir Sediment Nutrient Content	Time Period Analyzed for WQ Nonattainment	Deep-Channel DO Nonattainment in CB4MH	Deep-Channel DO Nonattainment in EASMH	Deep-Channel DO Nonattainment in CHSMH
LSRWA-27	TMDL land use, January 1996 storm moved to October 1996	HEC-RAS AdH CBEMP	TMDL – WIPs in place	2008 condition	Excess volume method from AdH results (from 2008 bathymetry)	January 1996 flood event	Not analyzed	Not analyzed	Not analyzed	Not analyzed
LSRWA-28	TMDL land use, sediment/nutrients from Conowingo scour added, 3 MCY dredged from Conowingo Pond	HEC-RAS AdH CBEMP	TMDL – WIPs in place	Post dredging (3 MCY removed)	Excess volume method from AdH results (from 2008 bathymetry, dredged 3 MCY)	2011 Tropical Storm Lee	1996-1998	0.2%	0.1%	0%
LSRWA-29	TMDL land use, sediment/nutrients from Conowingo scour added, 3 MCY removed from Conowingo Pond to represent bypassing, sediments/nutrients bypassed downstream from December-February every year	HEC-RAS AdH CBEMP	TMDL – WIPs in place	Post dredging (3 MCY removed), bypassing during some months	Excess volume method from AdH results (from 2008 bathymetry, dredged 3 MCY)	2011 Tropical Storm Lee	1996-1998	5%	4%	3%
LSRWA-30	What is the system's condition when WIPS are in full effect, the reservoirs have all reached dynamic equilibrium and there is a winter scour event?	HEC-RAS AdH CBEMP	TMDL – WIPs in place	"Conowingo Full" condition	Excess volume method from AdH results (from 2011 bathymetry)	2011 Tropical Storm Lee	1996-1998	1%	1%	1%
LSRWA-31	TMDL land use, sediment/nutrients from Conowingo scour added in.	HEC-RAS AdH CBEMP	TMDL – WIPs in place	1996 condition	Excess volume method from AdH results (from 2011 bathymetry)	2011 Tropical Storm Lee	Not analyzed	Not analyzed	Not analyzed	Not analyzed

NOTES:

1. This is a summary of all significant CBEMP model runs performed for the Lower Susquehanna River Watershed Assessment. However, there were additional alternative scenarios evaluated which did not involve the CBEMP model. These scenarios are discussed in other tables in the main report (Tables 3-2 and 5-7).
2. ERDC/EPA-CBPO ran roughly 30 modeling runs utilizing CBEMP. Modeling runs were denoted by "LSRWA-number." Only the significant modeling runs are reported here. A number of modeling runs conducted early in the study were supplanted as the modeling team developed improved information and understanding.
3. CBEMP is a suite of models used to assess Chesapeake Bay water quality conditions. Sub-models within CBEMP include the watershed model (WSM), a hydrodynamic model (HM) and a water quality/eutrophication model (WQM).
4. CBEMP is always run for a hydrologic period from 1991-2000. AdH and HEC-RAS were always run using the four-year 2008-11 hydrologic period (January 1, 2008 through December 31, 2011).
5. HEC-RAS informed the AdH model but did not explicitly determine the daily sediment loads and rating curves used in the AdH model.