

# Water Resources Element

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## Preface

This plan document was a joint effort between Carroll County and its municipalities: Hampstead, Manchester, Mount Airy, New Windsor, Sykesville, Taneytown, Union Bridge, and Westminster. Coordination and review took place through the Water Resources Coordination Council. **The plan is based on the adopted comprehensive/land use plans, regulations, and policies in place in 2007 and 2008 (not on any proposals).** Upon adoption by each of these jurisdictions, it is intended to satisfy the requirements of House Bill 1141 (2006) to develop and adopt a Water Resources Element (WRE) of the comprehensive plan for each of these jurisdictions.

The entire plan document is intended to be applied to and adopted by each jurisdiction, with the exception of the “Overview by Municipal System.” Within this section, only the portion specific to an individual jurisdiction is intended to apply to and be adopted by that jurisdiction. If any jurisdiction chooses not to or fails to adopt this plan document, it does not invalidate the document and/or adoption for the other jurisdictions.

The plan provides information and evaluation of the county’s water resources at the MDE 8-digit watershed level and a countywide assessment of nonpoint source issues. Strategies are offered on a countywide basis. Water supply and wastewater are also discussed for each individual municipal system that serves a designated growth area. Strategies that are specific to those systems and that reflect the unique characteristics and needs of those systems and communities are included in the individual municipal system sections. Strategies are intended to identify measures that could, and should, be taken by each jurisdiction to achieve the goals and intentions of this plan document. However, they do not require any jurisdiction to implement every strategy contained in the document.

The information and recommendations provided in this plan are supported by technical assessments conducted and reported in documents separate from, but as support to, the WRE plan document. The supporting reports, prepared by Malcolm Pirnie, are referenced for more detailed information than the summaries provided in this plan document. They are:

- Technical Memorandum, “Review of 1988 Water Resources Study,” dated March 26, 2009
- Report, *Carroll County Demands and Availability*, dated July 30, 2009
- Report, *Carroll County Wastewater Limitations*, dated May 29, 2009
- Report, *Carroll County Alternatives Evaluation*, dated September 28, 2009

The information contained within and addressed by this plan is based on the requirements of the legislation as interpreted by guidance presented within the Models and Guidelines (No. 26), The Water Resources Element: Planning for Water Supply and Wastewater and Stormwater Management. Additional guidance on information to be included and issues to be addressed was provided by Maryland Departments of Environment, Planning, and Natural Resources through a “Guidance Team” and the cooperative process undertaken to include these State agencies in the planning process.

# *Water Resources Element*

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Prepared by *Carroll County Department of Planning*

*In collaboration with the:*  
Carroll County Water Resources Coordination Council

*On behalf of:*  
Carroll County  
Freedom  
Hampstead  
Manchester  
Mount Airy  
New Windsor  
Sykesville  
Union Bridge  
Westminster

*Adopted by:*  
Carroll County  
Hampstead  
Manchester  
Mount Airy  
New Windsor  
Sykesville  
Union Bridge  
Westminster

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- Report, *Carroll County Alternatives Evaluation*, dated September 28, 2009
- Guidance Document, *Models and Guidelines Managing Maryland’s Growth No. 26, “The Water Resources Element: Planning for Water Supply and Wastewater and Stormwater Management,”* Prepared by Maryland Departments of Environment, Planning, and Natural Resources, dated June 2007  
(<http://www.mdp.state.md.us/ourproducts/publications.shtml>)
- Guidance Document, *Water Supply Capacity Management Plans*, Maryland Department of the Environment, dated 2006  
([www.mde.maryland.gov/assets/document/water/WaterSupplyCapacityPlansGuidance.pdf](http://www.mde.maryland.gov/assets/document/water/WaterSupplyCapacityPlansGuidance.pdf))
- Guidance Document, *Wastewater Supply Capacity Management Plans*, Maryland Department of the Environment, dated 2006  
([www.mde.maryland.gov/assets/document/water/WastewaterCapacityMgmtGuidance.pdf](http://www.mde.maryland.gov/assets/document/water/WastewaterCapacityMgmtGuidance.pdf))
- Plan, *Maryland’s Chesapeake Bay Tributary Strategy Statewide Implementation Plan*, Maryland Departments of Natural Resources, Environment, Planning, and Agriculture, dated February 22, 2006, draft  
([www.dnr.state.md.us/Bay/tribstrat/implementation\\_plan.html](http://www.dnr.state.md.us/Bay/tribstrat/implementation_plan.html))
- Plan, *Carroll County Master Plan for Water & Sewerage*, Carroll County Planning Department, dated September 2007  
(<http://ccgovernment.carr.org/ccg/plan/w-splan/2006%20update/default.asp>)

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## Acronyms

APFO	Adequate Public Facilities Ordinance	MDP	Maryland Department of Planning
BRF	Bay Restoration Fund	mgd	million gallons per day
BMC	Baltimore Metropolitan Council	NPDES	National Pollutant Discharge Elimination System
BMP	best management practice	NPS	nonpoint source
BNR	biological nutrient removal	NPSS	Nonpoint Source Spreadsheet
BLI	Buildable Land Inventory	OSDS	onsite disposal system
CMP	capacity management plan	PFA	Priority Funding Area
CIP	Capital Improvement Program or Community Investment Plan	PDR	purchase of development rights
CBP	Chesapeake Bay Program	SBR	sequencing batch reactor
CWA	Clean Water Act	SOC	synthetic organic compounds
CWP	Center for Watershed Protection	SSA	sewer service area
DGA	Designated Growth Area	SW	surface water
DU	dwelling unit	SWA	source water assessment
DNR	(Maryland) Department of Natural Resources	SPH	Super Pump House
EAC	Environmental Advisory Council	TMDL	Total Maximum Daily Load
ENR	enhanced nutrient removal	TDR	transfer of development rights
ESD	Environmental Site Delineation	U&O	use and occupancy (permit)
GAB	Growth Area Boundary	USACE	United State Army Corps of Engineers
Gpd	gallons per day	USEPA	United States Environmental Protection Agency
GHG	greenhouse gas	USGS	United States Geological Survey
GW	groundwater	VOC	volatile organic compounds
HB	House Bill	WSA	water service area
HUC	hydrologic unit code	WLA	wasteload allocation
I&I	infiltration and inflow	WWCMP	Wastewater Capacity Management Plan
IPA	installment purchase agreement	WWTP	Wastewater Treatment Plant
LULC	Land Use/Land Cover	WSCMP	Water Supply Capacity Management Plan
LID	Low-impact design or low-impact development	WTP	Water Treatment Plant
MACS	Maryland Agricultural Cost Share Program	WIP	Watershed Improvements Plan
MCL	maximum contaminant level	WMA	Watershed Management Agreement
MD	Maryland	WSM	watershed model
MDA	Maryland Department of Agriculture	WRCC	Water Resources Coordination Council
MDE	Maryland Department of the Environment	WRE	Water Resource Element