



April 4, 2013

John Ross
Department of Public Works
Worcester County
1000 Shore Lane
Ocean Pines, MD 21811

Re: Water Supply Capacity Management Plans (WSCMP) project
Mystic Harbour Water System (PSWID #0230011)

Dear Mr. Ross,

Whitman, Requardt, and Associates, LLP (WR&A) worked with MDE to update the Water Supply Capacity Management Plans (WSCMPs) for selected jurisdictions. WR&A was tasked with contacting local jurisdictions and owners of community water systems to obtain information on water system capacity and allocation, and used that data, along with system operating data provided by MDE to submit an updated WSCMP to MDE for each jurisdiction.

An assessment of the ability of the water system to meet existing and future water demands has been conducted and comments on that assessment should be sent to MDE. This letter serves as the Plan submittal for the system of Mystic Harbour. The final WSCMP for the Town is attached. A brief narrative of the system's water system is included below:

Mystic Harbour

The Mystic Harbour Water System is served by three wells and a standby well. The three active wells were installed for the Mystic Harbour subdivision, and the standby well was originally installed in the Sunset ^{Village} Lakes community. Water is pumped from the wells and treated at two separate treatment plant locations before entering the system with a 500,000 gallon storage tank. There are four additional wells that are currently offline in the system. The communities of South Point Village and Oyster Harbor originally were served by their own water systems with two wells each. After these areas were incorporated into the Mystic Harbour water system, the South Point Village (SPV) and Oyster Harbor (OH) wells were taken offline.

Wells MH-1 and MH-2 draw from the Pocomoke Aquifer. Wells MH-3 and SNS-1 draw from the Ocean City Aquifer. Three of the offline wells are intended to draw from the Manokin Aquifer. The system is permitted to withdraw an annual average flow of 532,500 gpd, and an average daily maximum month flow of 957,500 gpd (from online sources only). From 2007 to 2011 the water demand within Mystic Harbour has averaged 253,437 gpd.

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Largest Well Out Analysis

The capacity of the system's well field to meet current and future average annual demand is based on an estimate of groundwater production capacity when the largest well is out of service. The pumping rates for Wells MH-1, MH-2, and MH-3 are 370 gpm, 370 gpm, and 200 gpm, respectively, according to the August 1995 report by HIS HydroSystems in the MDE files. The well within Sunset ~~Lake~~^{Lakes}, SNS-1, is turned on manually for periods of high demand. Assuming Well MH-1 or MH-2 is out of service, and assuming pumping the other wells for 16 hours per day, the available pumping capacity with the largest well out of service is estimated at 604,800 gpd. Pumping information for the wells is as follows:

Water Appropriation Permit #	Tag #	Well #	Pumping Capacity	Average Flow (gpd) - 16 hours/day
WO1974G009	WO-73-0329	MH-1	370 gpm	355,200
WO1974G009	WO-73-0330	MH-2	370 gpm	355,200
WO1974G109	WO-95-0948	MH-3	200 gpm	192,000
WO1988G007	unknown	SNS-1	60 gpm	57,600
TOTAL				960,000
<i>Largest well out of service</i>				<i>604,800</i>

Drought Yield

The total drought yield can be computed assuming the wells operate for extended periods of time. During the month of maximum use it is assumed all pumps could operate at a maximum of 19 hours per day, producing a total flow rate of 1,140,000 gpd. Under peak day drought conditions, the pumps could continuously run to produce a flow rate of 1,440,000 gpd (although this exceeds demands).

System Capacity

In our professional opinion, calculations using the WSCMP worksheet indicated that the system has a potential current average day capacity excess of approximately 258,028 gpd based on the difference between average day drought demand and the total permitted annual average daily appropriations. Our calculations also indicated an excess capacity at the current average daily-maximum month condition of approximately 25,136 gpd, and a potential maximum day capacity deficit of approximately 334,000 gpd. The analysis was based on data provided to WR&A by Worcester County and MDE, but not verified by WR&A.

WR&A was advised by the County that 840 EDUs of growth is allocated for the water system, which equates to 210,000 gpd of additional average day demand. The growth consists of 571 EDUs of existing connections without service. The remaining 269 EDUs have not been allocated. Our analysis indicated

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that this lowers potential average day excess capacity to approximately 48,028 gpd, the average daily capacity during the month of maximum use will have a potential deficit of 460,601 gpd, and the maximum day capacity will have a deficit of approximately 780,880 gpd.

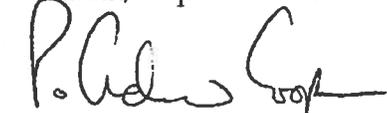
Wastewater flow from the Mystic Harbour System is served by the Mystic Harbour wastewater treatment plant (WWTP) and some flow is sent to the West Ocean City WWTP. Based on the new upgrade underway at the Mystic Harbour WWTP, the permitted capacity will be 450,000 and the WWTP currently receives an annual average flow of 200,000 gpd. Capacity appears to be available at the plant to serve projected development in the system.

The County has expressed interest in rehabilitating the existing offline wells or redistributing the allocation to reduce flow deficits.

This analysis is based on best available records provided to WR&A by MDE and from information given to WR&A during interviews with County personnel. Any changes to the information contained in the Plan will require reinterpretation of the analysis. If you have any questions or would like additional information, please contact the MDE Water Supply program directly at 410-537-3706.

Very truly yours,

Whitman, Requardt & Associates, LLP



P. Andrew Cooper, P.E., BCCE
Associate

Enclosures

cc: Neil Winner – MDE
John Grace – MDE
MDE System File
Francis Bonkowski – WR&A
Steve Mogilnicki – WR&A
WR&A File – 13997

WATER SUPPLY CAPACITY MANAGEMENT PLAN

Worksheets and Summary

Updated March, 2013

SYSTEM AND PLAN SUBMITTAL INFORMATION

Name of the water supply system:	<u>Mystic Harbour</u>
County and municipality, if applicable:	<u>Worcester County</u>
Population served:	<u>2658</u>
Number of connections:	<u>2658</u>
Name of person completing plan:	<u>Francis Bonkowski</u>
Date of plan submittal:	<u>4/4/2013</u>

IV. ELEMENTS OF A WATER SUPPLY CAPACITY MANAGEMENT PLAN

Please refer to the appropriate sections of the Guidance Document for Developing Water Supply Capacity Management Plans. Include any assumptions into this worksheet, as applicable.

NOTE: gpd = gallons per day; gpm = gallons per minute; gpcd = gallons per capita per day;
gph = gallons per hour; gal = gallons; hrs = hours; PF = peaking factor

A. DETERMINE THE EXISTING WATER DEMAND

A-1 Provide the Annual Average Daily Demand (AADD) for each of the previous 5 years.

2011	282,076	gpd
2010	307,710	gpd
2009	200,198	gpd
2008	234,560	gpd
2007	242,641	gpd

A-2 Determine the average demand for previous 5 years.

253,437	gpd
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A-3 Enter the percentage of residential use.

83.00	%
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A-4 Determine the Annual Average Daily Drought Demand.

274,472	gpd
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A-5 Provide the Average Daily Demand for the Month of Maximum Use (MMU) for each of the previous 5 years and determine the Peaking Factor for each year.

<u>Month</u>	<u>Year</u>	<u>MMU</u>		<u>Peaking Factor</u>
July	2011	511,291	gpd	1.81
July	2010	634,864	gpd	2.06
July	2009	377,238	gpd	1.88
July	2008	364,394	gpd	1.55
July	2007	395,445	gpd	1.63

A-6 Enter the greatest Average Daily Demand during the Month of Maximum Use from the previous five years.

634,864 gpd

A-7 Determine the Average Daily, Maximum Month Drought Demand.

634,864 gpd
2.31 PF

A-8 List the greatest Maximum Day Demand observed within the previous five years and the date.

994,000 gpd
Date: July 2010

*Based on MDE MOR data

A-9 Determine the Maximum Day Demand.

994,000 gpd
3.62 PF

A-10 List the Peak Hour Demand, if data is available.

gph

A-11 Determine the existing water usage per capita per day.

95 gpcd

A-12 Determine the existing Water Usage per connection.

95 gpd

A-13 List the percentage of Water Demand attributable to the following uses:

Residential;	83.00	%
Commercial; and	17.00	%
Industrial	0.00	%

A-14 If data is available, list the approximate amount of water lost due to each of the following:

System losses (leaks);		gpd
Transfers;		gpd
Meter errors; and		gpd
Other (specify below)		gpd

[Empty box for specifying other water loss categories]

A-15 Enter the percentage of customers that are metered.

100.00 %

B. ESTIMATE THE POTENTIAL ADDITIONAL WATER DEMAND

B-1 Determine the potential additional annual average daily residential water demand.

174,300 gpd

B-2 Determine the potential additional annual average daily commercial water demand.

35,700 gpd

B-3 Determine the potential additional annual average daily industrial water demand.

0 gpd

B-4 Determine the total potential additional annual average daily water demand. 210,000 gpd

B-5 Determine the total potential additional average daily water demand during the month of maximum use. 485,737 gpd
2.31 PF

B-6 Calculate the potential additional maximum day demand. 446,880 gpd
2.13 PF

B-7 Use the table below to record the system's anticipated allocation schedule for each of the next ten years.

2013		2018	6,750	gpd
2014		2019	6,750	gpd
2015	47,750	2020	6,750	gpd
2016	47,750	2021	6,750	gpd
2017	47,750	2022	6,500	gpd

*Assumes 571 EDUs in 3-5 yrs and 269 EDUs in 5-10 yrs.

C. DETERMINE THE CAPACITY OF THE WATER SUPPLY SYSTEM

C-1 List all Water Appropriation Permits, Water Purchase Agreements, permit/agreement limits, and indicate if there are Special Conditions that limit withdrawal quantities.

Permit Number or Purchase Agreement	Well Numbers or Source Names	Annual Average (gpd)	Ave. Day-Max Month or Max Day Amt. (gpd)	Special Conditions?
WO1974G009(10)	2 Wells in Pocomoke Aq.	400,000	720,000	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
WO1974G109(09)	1 Well in Ocean City Aq.	112,500	202,500	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
WO1988G007(07)	1 Well in Ocean City Aq.	20,000	35,000	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
WO1988G028(05)	2 Wells in Manokin Aq.	52,000 * offline	84,000	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
WO1986G027(05)	1 Well in Pocomoke Aq.	2,000 * offline	7,500	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
WO1996G008(03)	1 Well in Manokin Aq.	7,200 * offline	12,000	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

**C-2 Total the Water Appropriation Permit Limits for:
Ground Water :**

- a.) Sum of Annual Average Daily permit limits 532,500 gpd
- b.) Sum of Average Daily-Maximum Month Permit limits 957,500 gpd

Surface Water: **Only online well systems were included (see C-4)*

- c.) Sum of Annual Average Daily permit limits gpd
- d.) Sum of Maximum Daily Permit limits gpd

C-3 Calculate the total Annual Average Daily permit limits 532,500 gpd

C-4 Describe how permits may limit withdrawal quantities due to special conditions or proposed permit revisions.

Wells under permits: WO1988G028(05), WO1996G008(03), WO1986G027(05) are not currently in use. Future upgrades to these sites may return them to operation or the appropriation permits may be modified.

C-5 Calculate system's capacity under average climatic conditions.

Well Name	Tag #	In use, standby, or emergency?	Appropriation Permit #	Well Yield (gpm)	*Max hours/day	Daily Production Capacity (gpd)
MH-1	WO-73-0329	In use	WO1974G009	370	16	355,200
MH-2	WO-73-0330	In use	WO1974G009	370	16	355,200
MH-3	WO-95-0948	In use	WO1974G109	200	16	192,000
SNS-1 *		Standby	WO1988G007	60	16	57,600
OH-1 *		Offline	WO1988G028	25	0	0
OH-2 *		Offline	WO1988G028	25	0	0
SPV-1 *		Offline	WO1986G027	5	0	0
SPV-2 *		Offline	WO1996G008	10	0	0
						0
						0
						0
						0
* Note: Well yields are assumed based on appropriation permit limits or from the August 1995 report by HIS HydroSystems in the MDE files.						0
						0
						0
						0
						0
						0
						0
						0
Total Capacity						960,000

C-6

*Explain below if more than 16 hours is needed to meet the average daily demand with the largest well out of service. Only use a greater time period if the amount is sustainable at the given pumping rates.

C-7 Enter the daily production capacity of highest producing well. 355,200 gpd
Well Name: MH-1 or 2

C-8 Calculate the total system capacity with the largest well out of service. 604,800 gpd

Note: If removal of largest well increases the capacity of another well, adjust the capacity in C-8 accordingly. Explain below:

C-9 Determine the total reliable drought yield for the following conditions:

a.) During the Month of Maximum Use 1,140,000 gpd
b.) During Peak Day conditions 1,440,000 gpd

C-10 Enter the safe-yield of the reservoir system, if one exists. []

C-11 Enter the total treatment capacity of the water plant(s). 660,000 gpd
*Assumes 550 gpm through filters for 20 hr/day

C-12 Enter the pump capacity of the water plant. 892,000 gpd

C-13 Enter the total system storage capacity. 500,000 gal

C-14 Enter the maximum fire flow and duration. 1,000 gpm
2 hrs

C-15 Enter the storage for fire flow. 500,000 gal

C-16 Explain how the fire flow and storage values were determined. In what year were these values most recently evaluated?

The fire flow was determined to the target output from a 1999 study.

C-17 Discuss the frequency of power outages.

Power outages are rare, normally caused by weather events.

C-18 Is there a back-up power source for treatment and pumping? Yes No
If yes, please describe.

Under proposed upgrades to the WWTP a generator will be installed at the WTP. A portable generator is used to provide power to the wells in the event of a power outage.

C-19 Enter the average day capacity for the wastewater treatment system in the service area. Is additional capacity available at the plant? Explain below.

450,000 gpd

Based on the new upgrade underway, there will be approximately 200,000 gpd of excess capacity. Some wastewater for this system is directed to the Ocean City WWTP as well.

C-20 Are there anticipated future modifications to the appropriation permits? Yes No
If yes, explain below.

Following the upgrades to the WWTP, the water system may be expanded to match capacities. The existing wells out of service will be evaluated for upgrades and possible reuse. Other options are to redistribute the allocation and combine permits to increase capacity.

D. ESTIMATE THE EXCESS WATER SUPPLY CAPACITY BY DETERMINING THE MOST LIMITING FACTOR

PART I. ESTIMATE THE EXCESS WATER SUPPLY CAPACITY ABOVE EXISTING DEMAND

Average Day Capacity Limitation

- C-3 Total permitted annual average daily permit limits **532,500** gpd
- C-8 Total system capacity with largest well out of service **604,800** gpd
- C-10 Safe-yield of the reservoir system **N/A** gpd
- C-11 Treatment capacity **660,000** gpd
- C-12 Pump capacity of treatment plant **892,000** gpd
- D-1 **Average Day Capacity Limitation** **532,500** gpd

Excess Average Day Capacity

- D-1 Average Day Capacity Limitation **532,500** gpd
- A-4 Annual Average Daily Drought Demand **274,472** gpd
- D-2 **Excess Average Day Capacity** **258,028** gpd

Average Daily - Maximum Month Capacity Limitation

- C-2(b) Total permitted Average Daily-Maximum Month Appropriations **957,500** gpd
- C-9(a) Reliable drought yield during Month of Maximum Use **1,140,000** gpd
- C-11 Treatment Capacity **660,000** gpd
- C-12 Pump capacity of treatment plant **892,000** gpd
- D-3 **Average Daily-Maximum Month Capacity Limitation** **660,000** gpd

Excess Average Daily - Maximum Month Capacity

D-3	Average Daily-Maximum Month Capacity limitation	660,000	gpd
A-7	Average Daily-Maximum Month Drought Demand	634,864	gpd
D-4	Excess Average Daily-Maximum Month Capacity	25,136	gpd

Maximum Day Capacity Limitation

C-2(d)	Total permitted Maximum Day Permit Limits	N/A	gpd
C-9(b)	Peak Day Drought Capacity	1,440,000	gpd
C-11	Treatment Capacity	660,000	gpd
C-12	Pump Capacity of treatment plant	892,000	gpd
D-5	Maximum Day Capacity Limitation	660,000	gpd

Excess Maximum Day Capacity

D-5	Maximum Day Capacity Limitation	660,000	gpd
A-9	Maximum Day Demand	994,000	gpd
D-6	Excess Maximum Day Capacity	-334,000	gpd

SUMMARY OF EXCESS EXISTING CAPACITY

D-2	Excess Average Day Capacity	258,028	gpd
D-4	Excess Average Daily-Maximum Month Capacity	25,136	gpd
D-6	Excess Maximum Day Capacity	-334,000	gpd

**D. PART II. ESTIMATE THE EXCESS WATER SUPPLY CAPACITY AVAILABLE FOR
FUTURE ALLOCATION**

The three net excess values calculated below indicate the **approximate excess capacity (gpd)** available for new growth. If an excess capacity value is a negative number, there is a capacity deficit for that demand category.

NAME OF THE WATER SUPPLY SYSTEM: Mystic Harbour

COUNTY AND MUNICIPALITY, IF APPLICABLE: Worcester County

SUMMARY OF POTENTIAL ADDITIONAL DEMAND FROM APPROVED

B-4	Potential Additional Annual Avg. Daily Demand	210,000	gpd
B-5	Potential Additional Avg. Daily-Max. Month Demand	485,737	gpd
B-6	Potential Additional Maximum Day Demand	446,880	gpd

ANNUAL AVERAGE DAILY CAPACITY

D-2	Excess Average Day Capacity	258,028	gpd
B-4	Potential Annual Avg. Daily Demand	210,000	gpd
D-7	NET EXCESS	48,028	gpd

AVERAGE DAILY CAPACITY DURING THE MAX. MONTH

D-4	Excess Avg. Daily-Max. Month Capacity	25,136	gpd
B-5	Potential Avg. Daily Demand During Max. Month	485,737	gpd
D-8	NET EXCESS	-460,601	gpd

MAXIMUM DAY CAPACITY

D-6	Excess Maximum Day Capacity	-334,000	
B-6	Potential Maximum Day Demand	446,880	
D-9	NET EXCESS	-780,880	gpd

SUMMARY OF EXCESS ADDITIONAL CAPACITY

D-7	Excess annual average daily capacity	48,028	gpd
D-8	Excess average daily capacity during max. month	-460,601	gpd
D-9	Excess maximum day capacity	-780,880	gpd

E. CONTROL THE ALLOCATION OF NEW CONNECTIONS TO THE WATER SUPPLY SYSTEM

- 1.) Describe your jurisdiction's Adequate Public Facilities Ordinance (APFO) or comparable statute. Attach a copy of the APFO regulations or comparable regulations.
The County has no APFO.

- 2.) Describe your jurisdiction's allocation procedures. Attach a copy of the procedures.
Water capacity is allocated during the subdivision review process. Each proposed subdivision is required to provide evidence of adequate water and wastewater facilities.

- 3.) How frequently are periodic allocation tracking reports produced?
Allocations are only tracked when changes are made.

- 4.) To whom are these reports distributed?

- 5.) During the plat approval process, which agency (or official) ensures that the water supply system has adequate capacity to serve the proposed development?
The Environmental Programs Department reviews plats for water supply adequacy with technical review by the Department of Public Works.

- 6.) During the building permit approval process, which agency (or official) ensures that the water supply system has adequate capacity to serve the proposed development?
Building permit applications are signed by the Department of Environmental Programs.

- 7.) Which agency (or official) controls the allocation of connections to the water supply system?
The Department of Environmental Programs.

NAME OF THE WATER SUPPLY SYSTEM: Mystic Harbour

COUNTY AND MUNICIPALITY, IF APPLICABLE: Worcester County

CONTACT INFORMATION:

List the name, title, address, phone number, fax number, and email address of the elected official or water supply system owner completing this Capacity Management Plan.

Name: John Ross

Title: Deputy Director of Public Works

Address: 1000 Shore Lane

Ocean Pines, MD 21811

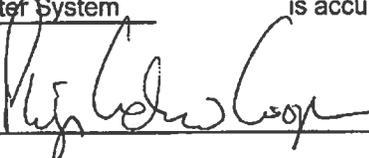
Telephone: (410) 641-5251 X-112

Fax: (410) 641-5185

Email: jross@co.worcester.md.us

CERTIFICATION:

I, Philip Andrew Cooper hereby certify that it is my professional opinion that to the best of my knowledge, information, and belief based on unverified data supplied by the Owner of the water supply system and MDE, that the attached Water Supply Capacity Management Plan for the Mystic Harbour Water System is accurate and complete.

Signature: 

Date: 5 APRIL 2013

Printed Name: PHILIP ANDREW COOPER

