



Appomattox River Water Authority

Storage Management Plan Stakeholder Engagement Meeting as required by Virginia Water Protection Permit (#01-1719)

ARWA Executive Directors Welcome

History of Chesdin Reservoir

Meeting Purpose





Storage Management Plan Purpose

 ARWA Virginia Water Protection permit requires a storage management plan for Chesdin Reservoir



DEPARTMENT OF ENVIRONMENTAL QUALITY

VWP Individual Permit Number 01-1719 Effective Date: November 1, 2013 Expiration Date: October 31, 2028

VIRGINIA WATER PROTECTION PERMIT ISSUED PURSUANT TO THE STATE WATER CONTROL LAW AND SECTION 401 OF THE CLEAN WATER ACT

Based upon an examination of the information submitted by the owner, and in compliance with § 401 of the Clean Water Act as amended (33 USC 1341 et seq.) and the State Water Control Law and regulations adopted pursuant thereto, the State Water Control Board (board) has determined that there is a reasonable assurance that the activity authorized by this permit, if conducted in accordance with the conditions set forth herein, will protect instream beneficial uses and will not violate applicable water quality standards. The board finds that the effect of the impact, together with other existing or proposed impacts to surface waters, will not cause or contribute to a significant impairment to state waters or fish and wildlife resources.

Permittee:	Appomattox River Water Authority		
Address:	21300 Chesdin Road, Petersburg, Virginia 23803		
Activity Location:	The two raw water intakes are located on the Chesdin Reservoir, one adjacent to the Brasfield Dam and one within in the embankment of the dam, Chesterfield County, Virginia.		

Activity Description: This permit authorizes the operation of a surface water withdrawal from two existing intakes located on the Chesdin Reservoir and the operation of the dam to provide instream flow downstream of the Brasfield Dam.

The permitted activity shall be in accordance with this Permit Cover Page, Part I - Special Conditions, and Part II - General Conditions.

11-1-12

Overview

- a) Stakeholder Participation
- b) Sedimentation Analysis
- c) Water Supply Alternatives
- d) Bathymetric Survey
- e) DEQ Reporting

Public Comment



DEPARTMENT OF ENVIRONMENTAL QUALITY

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- 4. The permittee shall develop a Storage Management Plan for the Chesdin Reservoir for maintaining the storage volume during the permit term (the "Plan"). The Plan shall be submitted to DEQ for review and approval within four (4) years of permit issuance. Development of the plan shall be coordinated with DEQ. The Plan shall include, at a minimum, the following:
 - a. Stakeholder participation in the development of the Plan. The Plan shall include documentation of stakeholder involvement.
 - b. A description and analysis of the storage management alternatives considered in developing the Plan, including, at a minimum, raising the height of the Brasfield Dam, dredging, and offstream storage. The Plan shall acknowledge that any proposed dredging activity will require environmental permits from both state and federal agencies.
 - c. An analysis of the main sources of sedimentation to the reservoir from sources in Chesterfield and Dinwiddie Counties. This analysis should include sedimentation from instream as well as offstream sources and those actions proposed to manage these sources of sediment. This analysis shall be updated when a bathymetric survey is conducted.
 - d. Schedule for conducting a bathymetric survey of the reservoir to provide an updated analysis of sedimentation in the reservoir, including identification of areas of accumulated sediment and areas having a high potential for accumulation during the permit term. The survey shall be conducted at least once during the permit term but no later than year 10.
 - e. The permittee shall submit a report to DEQ documenting progress towards procurement of a preferred alternative for a future alternative source of supply every two (2) years, with the first report due two (2) years after permit issuance. The reports shall document actions taken to secure additional raw water supply by the end of the permit term, including a proposed timeline with implementation milestones. The reports shall include any applicable documentation of stakeholder involvement.

Introduction to Chesdin Reservoir Watershed

Chesdin Reservoir Background

- Impounded (1968) by George F. Brasfield Dam
- Primary purpose: water supply
 - Current average: 34.5 mgd
- Also provides:
 - Recreation
 - Hydropower
 - Downstream water quality & flood control
- Surface Area: 2,590 acres
- Storage Volume: 9.3 BG (2011 est.)
- ARWA easement to the 160 ft contour



Chesdin Reservoir Watershed



Drainage area of 1,330 sq. mi.

- 63% forested
- 18% agriculture
- 15% open water, wetlands, and other
- 4% developed



What is sedimentation?

c. An analysis of the main sources of sedimentation to the reservoir from sources in Chesterfield and Dinwiddie Counties. This analysis should include sedimentation from instream as well as offstream sources and those actions proposed to manage these sources of sediment. This analysis shall be updated when a bathymetric survey is conducted.

Watershed Erosion

- Movement of soil particles is a normal, natural process.
- Some sources of erosion include:
 - Agriculture
 - Livestock grazing
 - Construction sites
 - Unprotected stream crossings
 - Increased flows
 - Steep, unprotected banks





Implications of Sedimentation on the Reservoir

- Reduced storage volume
- Reduced water quality
- Deposition at water supply and hydropower intakes
- Reduced accessibility in shallower areas

Quantifying Erosion and Reservoir Sedimentation at Chesdin Reservoir

c. An analysis of the main sources of sedimentation to the reservoir from sources in Chesterfield and Dinwiddie Counties. This analysis should include sedimentation from instream as well as offstream sources and those actions proposed to manage these sources of sediment. This analysis shall be updated when a bathymetric survey is conducted.

Estimated Sediment Yield from Chesdin Reservoir Watershed



Hazen

*Includes areas within Chesdin Reservoir watershed only.

Sedimentation Model vs Actual Measured Storage Volume

Comparison of storage volume in 2000 and 2011





Comparison of Sediment Yield Estimates and References



Conclusions

- Chesdin Reservoir sediment movement is natural and influenced by land use
- Chesdin Reservoir watershed is predominantly undeveloped
- Chesdin Reservoir sedimentation estimate is within the expected ranges
- Model can be used to identify areas of watershed that are more susceptible to increased rates of erosion
- Possible actions to reduce erosion:
 - Riparian buffers
 - Enforcement of the required 100' Chesapeake Bay Preservation Buffer
 - Agricultural best management practices (BMPs)
 - Enforcement of construction erosion and sediment (E&S) control

Storage Management Alternatives

Storage Management Alternatives



Permit Requires:

b. A description and analysis of the storage management alternatives considered in developing the Plan, including, at a minimum, raising the height of the Brasfield Dam, dredging, and offstream storage. The Plan shall acknowledge that any proposed dredging activity will require environmental permits from both state and federal agencies.

Raise Brasfield Dam



Raise Brasfield Dam

- Increase dam height
- Provides additional storage volume
- Pool level increases
- 2012 engineering work analyzed 3 alternatives
 - 18" = +1.9 BG
 - 24" = +2.55 BG
 - 36" = +3.86 BG



Raise Brasfield Dam Considerations

- Public & private infrastructure
 - Route 623 (Sutherland Road) and two bridges
 - Docks and bulkheads
 - Marinas
 - Wells/septic systems
- Permits
 - Environmental (USCOE, VDEQ, VMRC, JPA, local)
 - Historical / archeological sites
 - FEMA
 - Federal Energy Regulatory Commission (FERC)
- ARWA facility operation
- Aquatic

Dredging



Dredging

- Physically removes deposited sediment
- Recovers lost storage volume
- Pool level remains
- 2012 engineering work estimated 3-4 MCY resulting in 0.6 BG



Dredging Considerations

- Disposal
 - Upper reaches
 - Dewatering area(s) adjacent to reservoir
 - Off-site
 - Traffic
- Permits
 - Environmental (USCOE, VMRC, VPDES, JPA, local)
 - Historic
- ARWA facility operation
- Aquatic

Offstream Storage



Offstream Storage

- Create a water impoundment external to Chesdin Reservoir
- High river flow conditions transfer water in
- Release/pump water from during drought conditions
- 2012 engineering work identified 7.08 BG



Offstream Storage Considerations

- Public & private infrastructure
 - Site
 - Piping/Pumping
 - · Potential intake or bi-directional flow
- Permits
 - Environmental (USCOE, VDEQ VMRC, JPA, local)
 - Historical / archeological sites
- ARWA facility operation



Planning Level Estimates of Water Supply Volumes and Costs

Description	Raise Brasfield Dam 18"	Dredge Chesdin Reservoir	Offstream Storage
Storage Increase (BG)	1.9 ¹	0.6 ¹	5.0 - 7.0 ³
Safe Yield / Reliable Service Level Increase (mgd)	11 ¹ - 15 ⁴	3.5 ¹	20 - 33 ³
Estimated Construction Cost	\$24.4M - \$33M ²	\$23.5M ¹ - \$73M ⁵	\$91.6M - \$96.6M ³

- 1. Values taken from Raw Water Supply Alternatives Analysis by Black and Veatch, dated September 2012
- 2. ARWA Board Meeting minutes, February 23, 2017
- 3. Evaluation of ARWA Capacity Expansion Options, September 25, 2014
- 4. Potential Brasfield Dam Eighteen Inch Project Summary, September 25, 2014
- 5. ARWA Source Water Study by Gannett Fleming, February 2001

Planning Level Estimates of Water Supply Volumes and Costs



Federal & State Regulatory Agencies are required to approve the project with the "least environmentally damaging practicable alternative" Section 404 of the Clean Water Act Memorandum of Agreement https://www.epa.gov/cwa-404/memorandum-agreement



Bathymetric Survey



d. Schedule for conducting a bathymetric survey of the reservoir to provide an updated analysis of sedimentation in the reservoir, including identification of areas of accumulated sediment and areas having a high potential for accumulation during the permit term. The survey shall be conducted at least once during the permit term but no later than year 10.

DEQ Reporting

Next Steps



APPOMATTOX RIVER WATER AUTHORITY

ARWA Announces Public Meeting on Chesdin Reservoir Click here

Lake Chesdin Water Conservation Measures Begin 5.29.17 Click Here

http://arwava.org/



Comments on Storage Management Plan

Thank you