Water Supply

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About Me

- Over 20 Years of Professional Experience
  - Erosion and Sediment Control (E&S) – Local Government
  - Wetland Delineation and Permitting – VDOT
  - Stormwater, Chesapeake Bay and E&S Review – Local Government
  - Stormwater and E&S Plan Preparation – Engineering Firm
  - Utility Management – Local Government
    - Water Resources
    - Water and Wastewater Treatment
    - Distribution and Collection
Presentation Road Map

- Water Supply Planning
  - Sources of water
  - Why is there a need to plan?
  - Who regulates in Virginia?
  - Local Needs
  - How Water Supply Planning Effects Permitting
- Riparian Buffers
- In Reservoir Treatment
- Water Treatment Plant Overview
Sources of Water

- **Groundwater**
  - Groundwater wells are numerous
  - Over 3,000 Non-Residential wells
    - No estimate for residential wells
  - Only Provides $\frac{1}{4}$ of water to Virginians
- **Surface Water**
  - 800 Surface Water Sources
  - Provides $\frac{3}{4}$ of water
  - Larger water provides

Groundwater Management Area- Saltwater Intrusion
Why is there a need to plan?

- Water is everywhere, what is problem?
  - Droughts can happen in any year.
  - Droughts do not need to be an entire year
    - Dry months can have a negative effect
- Water supply to all Virginians
- Response to 1999 – 2001 Drought
  - Continuous Planning Process
  - Informs Permitting Process

Swift Creek Reservoir - 2019
Who regulates water supply planning?

- Department of Environmental Quality (DEQ)
- Water Supply Planning Program
  - Goal – Develop a Statewide Planning Process
    - Make sure all people have drinking water
    - Ensure other uses have adequate water supplies
      - Support Aquatic Life
      - Recreation
    - Promote Alternative Water Uses
      - Reuse
      - Conservation
Local Needs

- DEQ required all local government to submit a Water Supply Plan
- Typical Process – Not Exclusive to DEQ
  - Existing Water Source and Use
  - Projected Demand – Million Gallons per Day (MGD)
  - Determine Additional Water Needed
  - Determine Alternatives for new supplies
    - Potential Reservoirs
    - Quarries
    - Other localities
  - Conservation Strategy
    - Existing Programs
State Water Resources Plan

- State Water Resources Plan (SWRP) - information from all water supply plans
  - DEQ can analyze the expected impacts of future water demands on water resources
- DEQ also regulates permits
  - Surface and Ground Water Withdrawals
  - Construction of new water sources
  - DEQ can also use the SWRP for permitting
  - Ensure that all new permits meet the needs of localities and minimize impacts to water resources
Permit in Action

- Lake Mooney – Stafford VA
  - 15 Years to permit and construct
  - 8 Billion Gallons, 15 MGD – Serves 135,000 customers
  - Filled by a pump station on the Rappahannock River
    - Can only fill during high river flow
Riparian Buffers

- Minimum 100’ – 150’ from normal pool
- Vegetative Buffer
  - Used to Enhance Water Quality
  - Prevent Nutrients and Sediment in the Water
- Serves to keep unwanted items out of reservoir
  - Septic Systems not allowed
  - No storage of chemicals
  - No Feedlots or Animals
- VDH Source Water
  - Assessment
  - Ensure practices in place
In Reservoir Treatment

- **Aeration**
  - Atmospheric Air or Pure Oxygen
  - Keeps reservoir destratified
    - Oxygen throughout water profile
    - Minimize taste and odors
    - Keeps Iron and Manganese in the soil

- **Algaecide**
  - Copper or Peroxide based
  - Kills Algae that causes taste and odors
Water Treatment Plant

WATER TREATMENT PLANT
SURFACE WATER SUPPLY

1. Intake Pipe
2. Protective Bar Screen
3. Travelling Water Screen
4. Low Lift Pump Well
5. Pre-Chlorination
6. Coagulation
7. Flocculation
8. Sedimentation Basin
9. Sand Filtration
10. Clear Well
11. Post-Chlorination
12. Fluoridation
13. High Lift Pump Well
14a. Elevated Water Storage Tower
14b. Ground Level Reservoir

To Distribution System