



Function and Capacity of WTP and WWTP

Town Council Work Session
December 13, 2022

Function of WTP and WWTP

*Plan Warrenton 2040-
Community Facilities
Goals: CF4 and CF5*

- Plan Warrenton 2040 adopted by Council
- Community Facilities Goals
- CF-4: Ensure healthy, safe adequate water and wastewater services
- CF-5: To provide fiscally responsible infrastructure that maintains a high quality of life for residents, supports current businesses, and attracts new employers with a stable tax structure

Function of WTP and WWTP

*Plan Warrenton 2040-
Community Facilities
Goals: CF-4 and CF-5*

CF-4: Ensure healthy, safe, adequate water and wastewater services.

- **CF-4.1:** Maintain a reliable and sufficient quantity of wastewater treatment capacity and a sufficient quantity and quality of public water supply to meet the needs of expected long term residential and commercial growth.
- **CF-4.2:** Meet the future infrastructure needs through careful planning and acquisition of required permits.
- **CF-4.3:** Reduce Infiltration and Inflow (I&I) and promote sustainability within the wastewater infrastructure system.
- **CF-4.5:** Evaluate and update the Town of Warrenton – Fauquier County Master Water and Sewer Plan’s Tri-Party Agreement as needed, creating a regional strategy for future needs, and reevaluating the Town boundaries in relationship to its service areas.
- **CF-4.8:** Explore resources to help property owners and promote connection to public water and sewer within the Town boundaries.

Function of WTP and WWTP

*Plan Warrenton 2040-
Community Facilities
Goals: CF-4 and CF-5*

CF-5: To provide a fiscally responsible infrastructure that maintains a high quality of life for residents, supports current businesses, and attracts new employers with a stable tax structure.

- **CF-5.1:** Implement robust maintenance schedules on community facilities to extend the life of investments.
- **CF-5.2:** Support the Town's current and future population through the provision of timely and comprehensive community facilities.

Objective

- Provide an overview to operations at both the Water and Wastewater Treatment Plant
- Provide a holistic overview of current status for better planning
- Outline Challenges moving forward
- Provide an overview as we move forward

Background

- Growth and Capacity studies completed in 2002, 2006, and 2009 with WRA.
- Capacity study in 2014 reports and presentation was provided to Town Council in 2015 identifying several areas of concern
- Town staff has been working with WRA and contractors to move the plan forward
- Budget concerns and restraints have deferred some projects and timelines
- Staff review of 2015 study led to current study: 2022, Completed

2015 Report Highlights from 2015 Presentation to Council

- Water:
 - Buildout between 2028 and 2033
 - At buildout 92% safe yield
- Sewer:
 - Buildout 2029
 - WWTP capacity (95%) in 2022-2024

Actions Taken from 2015 Report

- Engaged in I&I efforts
- Developed a plan of plant improvements with consultants
- Used the developed plan to define CIP and CARP to move forward
- MBBR completed
- Chemical building completed
- Presented plan for current budget
- Working with Community Development to address future growth needs

2015 Report Review– 2022

- Projections were very accurate
- Did not take into consideration current condition of plant equipment
- Based on study review, we are approaching projected capacity levels causing concern
- Updated Capacity Study completed in November 2022

2022 Capacity Report

- Current Study Considered all Future Expansions
- Reviewed current capacities with improvements since 2015 report
- Provided chart analysis based on potential future expansions to include BLA adjustments

2022 Capacity Report

- Projected Build Out in 2040
- WTP 2.42 MGD reached with Build Out
- WWTP 2.92 MGD reached with Build Out
- WWTP 2.5 MGD reached by 2030
- Updated Capacity Study reenforces staying on track with Improvements moving through the next 5-8 years

Current Capacity

- WTP- at 40% of Capacity
- WWTP- at 70% Capacity

Current Operations- Water Plant



Current Operations- Water Plant

- **Hydraulic Flow (Denoted by Blue on the Map)**
- **Solids & Wastewater Flow (Denoted by Green on the Map)**
- #1 Intake Structure:
- #2 Raw Water Pump Station:
- #3 Chemical Building:
- #4 Flocculation Basins:
- #5 Sedimentation Basins:
- #6 Filter Gallery:
- #7 Clearwell:
- The Distribution System has two Storage Tanks. The “Mountain Tank”, a 1.5-million-gallon ground storage tank located on Bear Wallow drive and the “City Tank”, a 500-thousand-gallon elevated storage tank located on fourth street.

Current Operations- Water Plant

- **Solids and Wastewater**
- #1 (Green) Waste Tanks
- #1 (Blue & Black) Backwash Tank

Current Operations- Water Plant

- **Questions?**

Completed Projects- Water Plant

➤ Chemical Building

- Auto flow based chemical injection : Streamlines and more accurate dosing of all treatment chemicals.
- Brought SCADA online- Allows operators automated control of systems
- Phased out outdated and broken equipment

Upcoming Projects- Water Plant

- Clear Well- with High Service Pump Station
- Filter Control Valves
- Remote Automated Filling Station
- Aeration of reservoir
- Dam

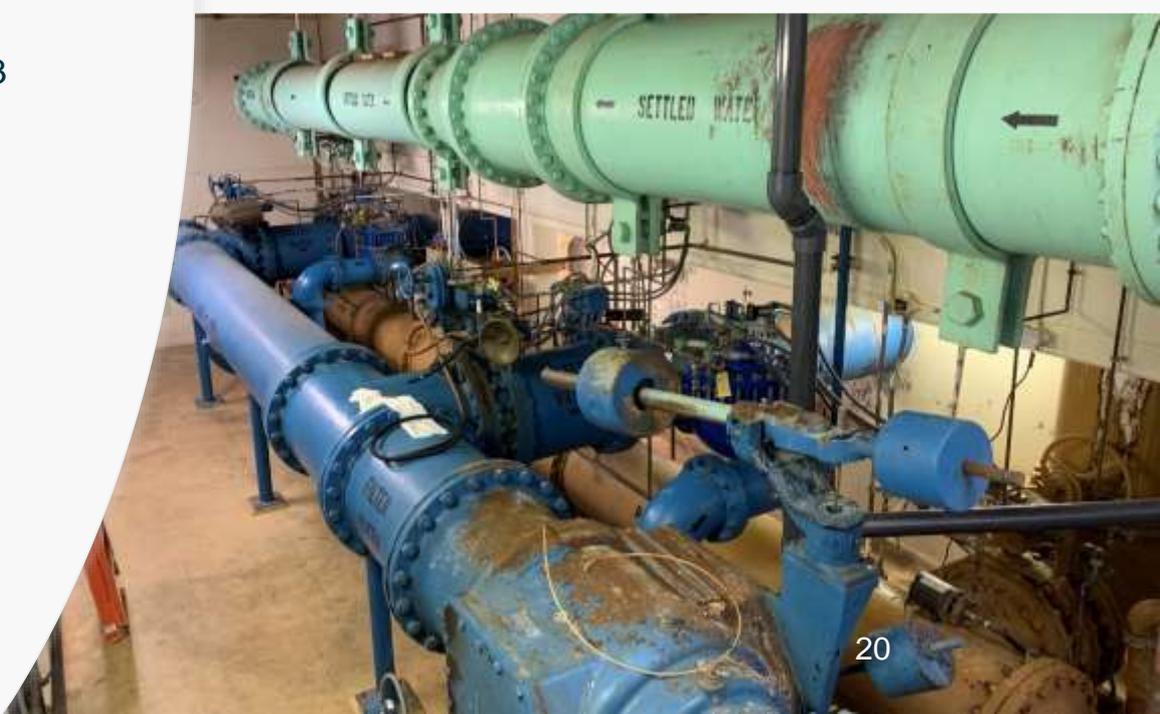
Next Steps- Water Plant

- Implement the CIP, CARP and outlined ARPA projects to upgrade both plants
- Work with DCR as required post Dam permit review and report
- Explore funding options for future dam costs
- Ensure Plan Warrenton 2040 Goals are met

Next Steps- Water Plant

Filter Control Valves (CARP, formally U-26-007)

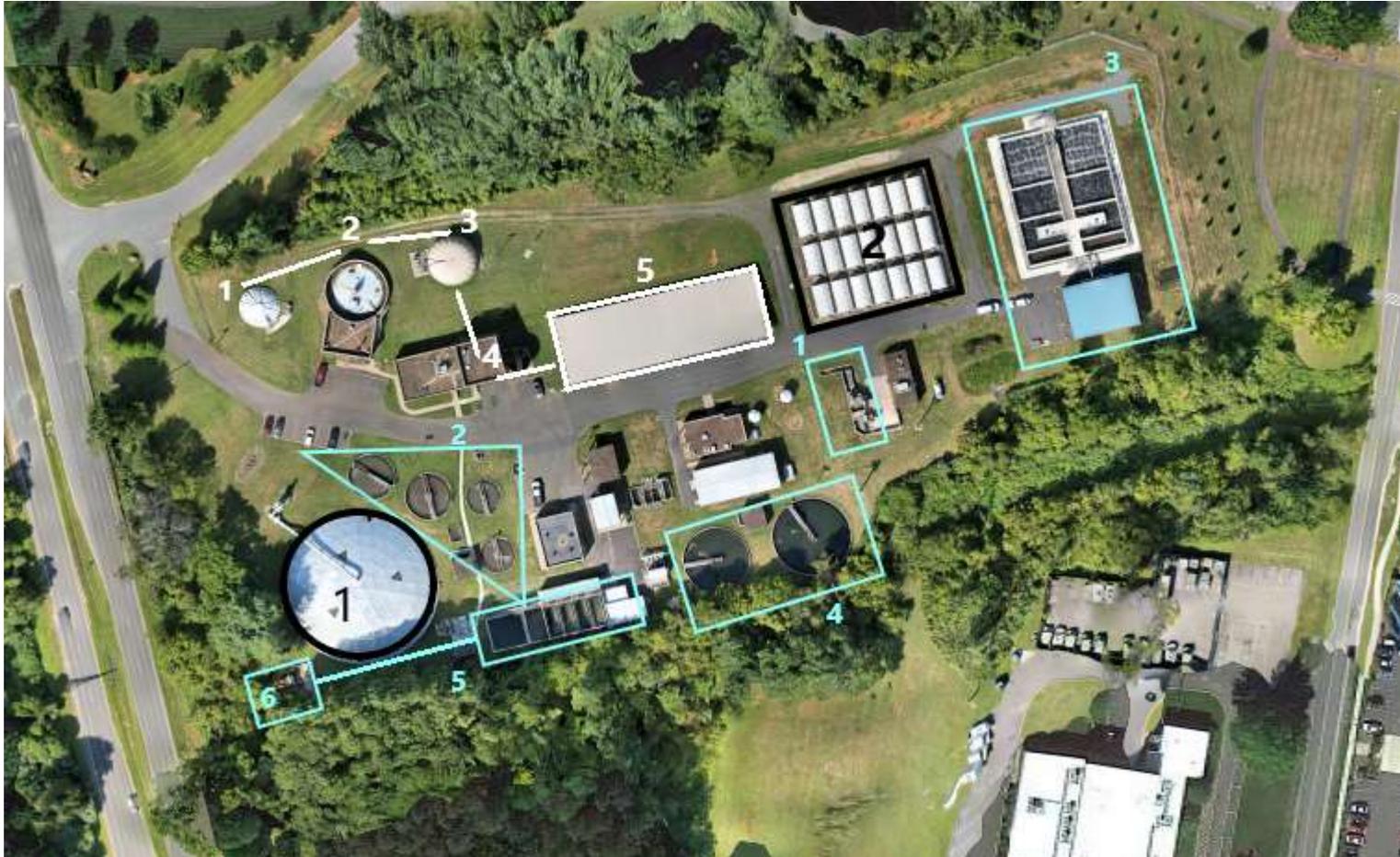
- Preliminary feasibility and engineering October 1, 2022
- Final Design Completed July 2023
- Out for Bid: Aug 2023
- Bid deadline and review: October 2023
- Project begins: November 2023
- End Date: May 2024



Questions

➤ Questions?

Current Operations- Waste Water Treatment Plant



Current Operations- Waste Water Treatment Plant

- WWTP equipment is aging- despite the plan for upgrades and replacement staff must work around unplanned maintenance issues and failures
- Cost of required upgrades and replacements is high which has resulted in several “push backs” of timelines

Current Operations- Waste Water Treatment Plant

- **Hydraulic Flow, denoted by Blue on the map**
- **Solids Flow, denoted by White on the map**

Current Operations- Waste Water Treatment Plant

- **Hydraulic:**
 - #1 Headworks
 - #2 Primary Clarifiers
 - #3 Moving Bed Biofilm Reactor (MBBR)
 - #4 Secondary Clarifies
 - #5: Denitrification Filters
 - #6: Effluent Flume

Current Operations- Waste Water Treatment Plant

- **Solids:**
- #1 Gravity Sludge Thickener (GST)
- #2 Primary Digester
- #3 Secondary Digester:
- #4 Dewatering:
- #5 Drying Beds

Current Operations- Waste Water Treatment Plant

- **Note:** The numbers 1 and 2 denoted in Black on the map are process components that have been taken out of service when they were replaced by the MBBR system.
- #1 Tricking Filter: This is now being utilized as a surge control tank in the event of high flow events. Usually caused by heavy rain events.
- #2 Rotating Biological Contactors (RBC's): These units currently serve no additional role, and they will be removed to make room for future plant expansion and upgrades mainly where the new Secondary Clarifiers will be placed.

Current Operations- Waste Water Treatment Plant

- **Questions?**

Completed Projects-Waste Water Treatment Plant

- MBBR- Moving Bed Biofilm Reactor
 - Removes Ammonia
 - Controls dissolved Oxygen
 - Helps with organic treatment
- UV Disinfection System
- Corrective fixes and upgrades on pumps, mixers, and motors

Next Steps- Waste Water Treatment Plant

- Implement the CIP, CARP and outlined ARPA projects to upgrade both plants
- Work with DEQ over the next five years (permit cycle) to upgrade permit to 3.0 MGD
- Ensure Plan Warrenton 2040 Goals are met

Current Projects-Waste Water Treatment Plant

- Headworks- Grit Collector
- Primary Clarifier
- Secondary Clarifier
- Denitrification Blower
- GST
- Primary Digester
- Mixing and Heating System
- Belt Press- Dewatering

Next Steps- Waste Water Treatment Plant

1. Primary Clarifier (WS-014, formally U-28-003) combined with Primary Sludge Pump (CARP, formally U-24-004)

Preliminary Engineering estimates started October 11, 2022

- a. Review of estimates and proposals November 1, 2022
- b. Align proposals, begin design phase- Dec 15, 2022
- c. Jan 15, 2023, design phase completed, review of proposals
- d. June 1, 2023, final design phase begins
- e. Sept 15, 2023, Final design phase completed, review for construction
- f. IFB for construction posted Sept 1, 2023
- g. Award construction Nov 1, 2023
- h. Final construction Nov 2024

Next Steps- Waste Water Treatment Plant

2. Secondary Clarifier (WS-015, formally U-28-004)- Preliminary Upgrade to Carry until Complete replacement in 2026

Start: July 2022, mechanical failure

a.Repairs to begin: November 2022

b.Complete: December 2022

c.Reevaluation and next steps to begin Post Primary Clarifier completion

Next Steps- Waste Water Treatment Plant

3. Headworks Building (WS-019, Formally U-28-008)
 - Channel Gates
 - a. Quotes Deadline: November 1, 2022
 - b. Awarded: December 2022
 - c. Work started: February 1, 2023, (16-week fabrication timeframe)
 - d. Work complete: March 1, 2023
 - Grit Collector
 - a. Quotes Deadline: November 1, 2022
 - b. Awarded: November 15, 2022
 - c. Work started: December 1, 2023, pending material availability
 - d. Worked completed: April 1, 2023

Next Steps- Waste Water Treatment Plant

4. Sludge Dewatering (WS-017, formally U-28-006)

- a. Start: October 1, 2022
- b. Repairs begin: October 15, 2022
- c. Work completed: December 20, 2022, pending material availability

Next Steps- Waste Water Treatment Plant

5. GST Upgrades (CARP, formally U-23-018)
 - a. Nov 9- Bids close
 - b. Awarded Dec 2022
 - c. Construction begins: Jan 2023, pending material availability
 - d. Completed: September 2023, pending material availability

Questions

➤ Questions?