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## Memorandum

DATE: October 17, 2019

TO: Ron Taylor, P.E., CWNOAP Program Director

FROM: Heather Housel, P.E., CDM Smith  
Paul Stonecipher, P.E., CWNOAP Design Manager

RE: Mill Creek Trunk Improvements and Equalization Facility  
MWS 11-SC-0151, OAP.C.38.01  
Omohundro Water Treatment Plant Backwash Discharge

cc: Greg Ballard, P.E. CWNOAP Deputy Director  
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Attachments: None

As part of the ongoing planning activities associated with the Clean Water Nashville Overflow Abatement Program's (CWNOAP) Mill Creek Trunk and Equalization Facility project, the impact of the wastewater flows from the Omohundro Water Treatment Plant (Omohundro WTP) have been evaluated and determined to have a significant impact on the operational efficiency of both the existing sanitary sewer system and the planned improvements.

As part of the Mill Creek Trunk Improvements and Equalization Facility project, the Designer is tasked with attenuating the wastewater flows from the Omohundro WTP. Additional information on the existing flows and system limitations are provided in the following sections.

### 1.0 Background

The Omohundro WTP is located in the Central Wastewater Treatment Plant's (Central WWTP) service area near the Cumberland River, east of downtown Nashville, along Pumping Station Road / Omohundro Drive. The Omohundro WTP is also adjacent to the proposed site of the Mill Creek / Opryland Equalization (EQ) Facility. See **Figure 1** for location information.

Constructed in 1929, the Omohundro WTP is one of two treatment facilities that provide drinking water to Nashville. Wastewater flows from the Omohundro WTP are discharged to a 36-inch diameter sewer that ties into the 48-inch diameter Opryland trunk sewer at manhole 094-07-001 upstream of the existing Mill Creek / Opryland EQ Facility. Under wet-weather or high flow conditions, the existing

EQ Facility is utilized to temporarily store wastewater from the 48-inch diameter Opryland trunk sewer until system flows have receded. Flows from the 78-inch diameter trunk sewer are isolated from the 48-inch diameter Opryland trunk sewer and continue to the 84-inch diameter sewer downstream of the EQ Facility during dry- and wet-weather conditions.

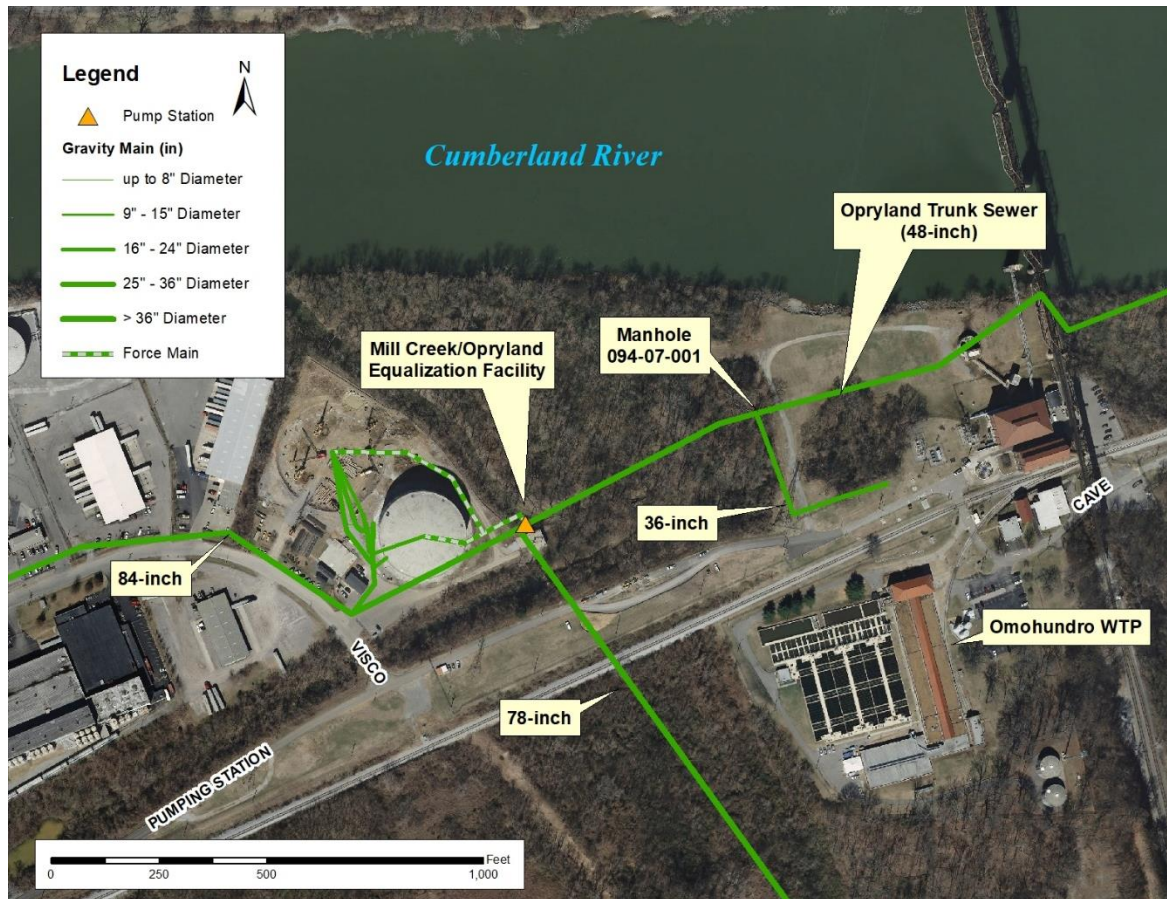
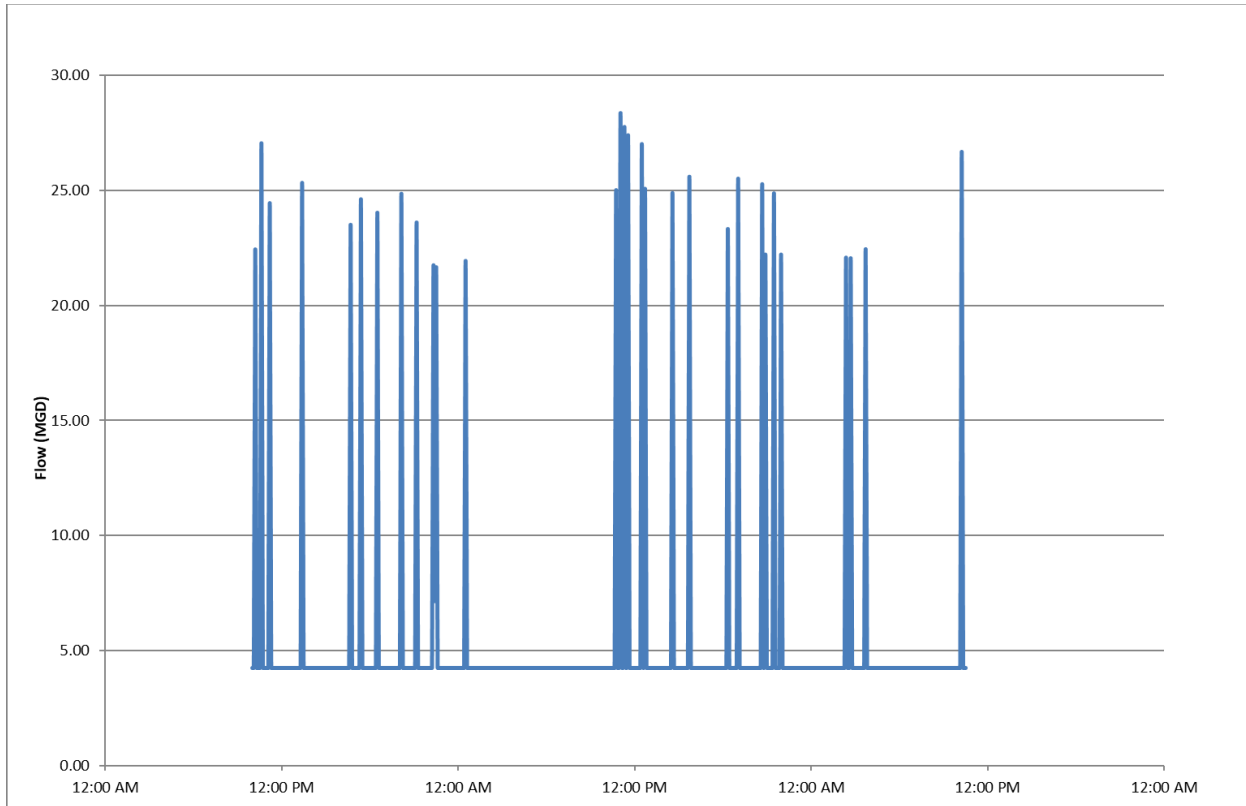


Figure 1 Location of Omohundro WTP Discharge

## 2.0 Omohundro WTP Analysis

As part of the ongoing planning activities for the Mill Creek Trunk and Equalization Facility project, the existing wastewater flows from the Omohundro WTP were evaluated to determine their potential impact on the planned equalization improvements. As presented in **Figure 2**, an example of the plant's existing wastewater flow hydrograph was provided by Metro Water Services (MWS) in March 2017. Based on this 48-hour hydrograph and follow-up discussions with MWS staff, the Omohundro WTP discharges a relatively constant 4.25 million gallons per day (MGD) from the sedimentation basins and other operations. However during filter backwashing, an additional discharge of 20 MGD or more is observed which typically lasts 10 to 15 minutes per backwash. Average backwash frequency is approximately every 120 minutes with a gap range up to 10 hours. This results in a typical daily discharge of approximately 5.6 MGD based on the March 2017 data provided.

Discharge rates from the Omohundro WTP may vary seasonally and through operational changes, and the Designer should account for this variability as well as the incorporation of future improvements to the Omohundro WTP in their analysis and design.



**Figure 2 Omohundro WTP Waste Flow Hydrograph, March 2017**

To reduce the impact to the sanitary sewer system, backwash cycles are typically held off during wet-weather events, if possible. However, during normal dry weather flow (DWF), the peak backwash discharge exceeds the design capacity of the existing 48-inch diameter Opryland trunk sewer, and MWS believes this contributes to observed sediment in the trunk sewer. Additionally, issues with capacity and sediment build-up are worsened during wet-weather events, even when backwashing is held off during rain events due to the extended wet-weather response in the sanitary sewer system and draining of the EQ tanks at the existing EQ facility.

Changing the discharge location of the Omohundro flows to the 78-inch diameter or 84-inch diameter sewers was evaluated, but the available capacity within each of these larger diameter sewers is limited during and following wet-weather events. Additionally, upsizing a portion of the 48-inch diameter sewer from the discharge location to the existing EQ facility has a similar adverse impact on the sewer system's performance and is not viewed favorably by MWS.

Although the storage and pumping capacity of the wet-weather pump station for the Mill Creek / Opryland EQ Facility are to be increased as part of the Mill Creek Trunk Improvements and Equalization Facility project, the current peak backwash flows from the Omohundro WTP reduce the efficiency of the planned improvements and would require expanding the capacity of the planned

wet-weather pump station, which is not preferred by MWS. As such, the Designer is tasked with evaluation, selection, and design of improvements that would attenuate the peak flow discharged from Omohundro WTP. For planning purposes, a maximum flowrate of 7.5 MGD from Omohundro WTP has been assumed. Attenuation may be accomplished by constructing a small EQ tank at the Omohundro WTP, by increasing the planned EQ storage for the Mill Creek Trunk and Equalization Facility project and routing the discharge to that location, or by other means as evaluated by the Designer.