Orange Water and Sewer Authority
Our community's trusted partner for clean water and environmental protection.

November 9, 2023

Ms. Judy Johnson, Assistant Planning Director
Town of Chapel Hill
405 Martin Luther King Jr Blvd.
Chapel Hill, NC 27514

**SUBJECT: Impact of proposed water and sewer boundary expansion in Southern Orange County on OWASA Water Distribution and Wastewater Collection Systems**

Dear Ms. Johnson,

In response to your inquiry, we are providing a summary of a preliminary analysis we conducted to determine the impacts to the water distribution system and sewer collection system as a result of potential expansion to the service area. The area of expansion used for analysis is shown below:

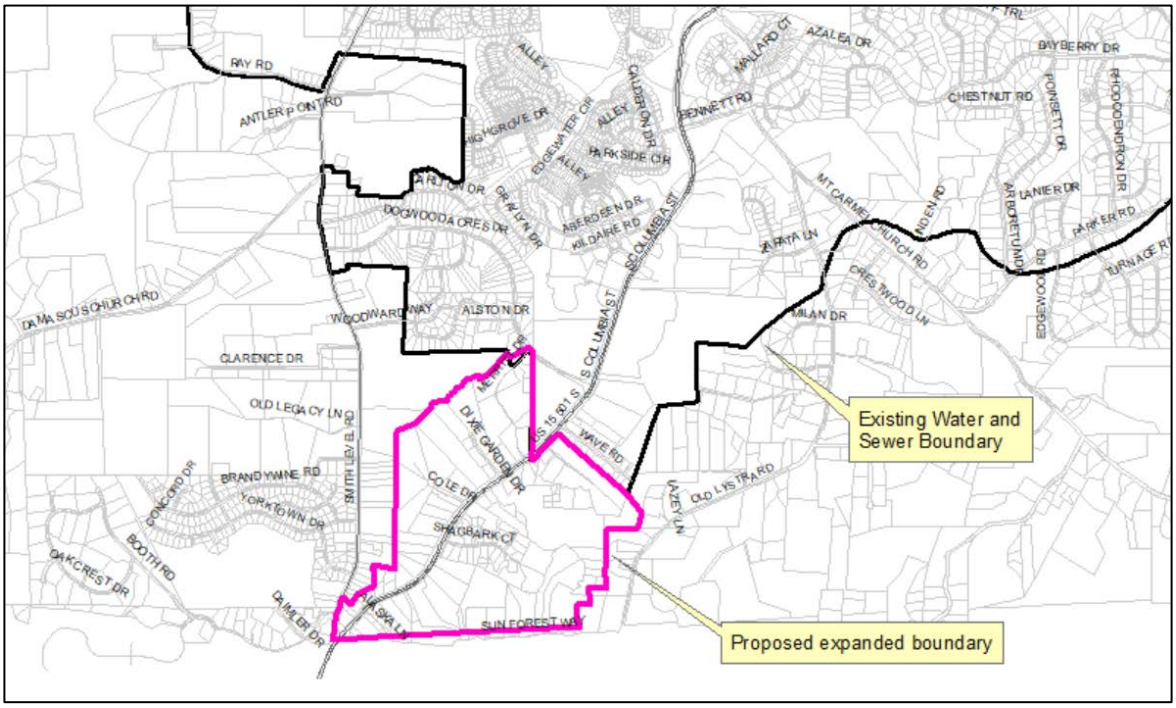


**Figure 1 – Proposed Boundary Expansion for the analysis**

**Demand Projections**

Based on conversations with Town of Chapel Hill planning staff, we conducted the analysis assuming buildout development densities would align with the "missing middle" housing and would result in three to six dwelling units per acre; we assumed no non-residential development would occur. We further

broke this assumption down based on whether a parcel was developed or not, and the acreage if it was developed. Our assumptions are further described in Table 1 below.

| Lot type | # Dwelling Units Low density scenario | # Dwelling Units High density scenario |
|---|---|---|
| Undeveloped | 3 per acre | 6 per acre |
| Developed, less than or equal to 2 acres | 2 total (1 new) | 2 total (1 new) |
| Developed, greater than 2 acres | 3 per acre | 6 per acre |
| Total number of dwelling units | 1170 | 2202 |

**Table 1: Development Assumptions for Water Demand Projections**

We did not evaluate the validity of these assumptions on a parcel-by-parcel basis but we did eliminate OWASA property from the analysis as well as another parcel designated as a utility right-of-way in the County's parcel data. This resulted in a total of 1170 new dwelling units under the low density scenario and 2202 new dwelling units under the high density scenario. We assumed that each unit would use an average of 110 gallons of water per day (gpd) which aligns with average multi-family residential water use and median residential water use throughout the OWASA service area. Wastewater flow for a dwelling unit under an average dry weather condition was estimated at 88 gpd (aligning with multi-family residential use) plus 10 percent of the future flow increase to account for groundwater infiltration. The resulting water demands for the low density and high density scenarios were analyzed using our hydraulic models to determine their impact on the existing water distribution system and wastewater collection system capacity. The results are described in the following sections.

Water Distribution System

Freese and Nichols conducted the water distribution system analysis, which incorporated the additional demands under average day, maximum day and peak hour conditions and determined the resulting impacts on existing system capacity, pressure, fire flow and resilience.

Without the additional development, buildout projections of average day demands for the entire service area are 12.99 million gallons per day (MGD). Based on the assumptions listed in the prior section, additional demand from the expanded service area would equate to between 0.13 and 0.24 MGD for the low and high density scenarios, respectively. A desktop analysis of water storage requirements showed that adding the projected service area expansion had minimal impact on overall system storage requirements, with the high density scenario requiring an additional 0.20 MGD of storage within the 640 pressure zone that feeds this area, based on peak hour – average day demands. Available fire flow capacity in the area decreased on average by 7% with the high density demands.

The existing water distribution system extends south along Smith Level Road to the intersection of Highway 15-501 and Smith Level Road. The neighborhood of Heritage Hills is served by OWASA's existing system in this area; however, the distribution system is not 'looped' back along Highway 15-501 (connected with two-directions of water supply). Freese and Nichols considered the implications of additional new development in this area both with and without additional system looping along Highway 15-501 to analyze the differential impacts on system resilience.

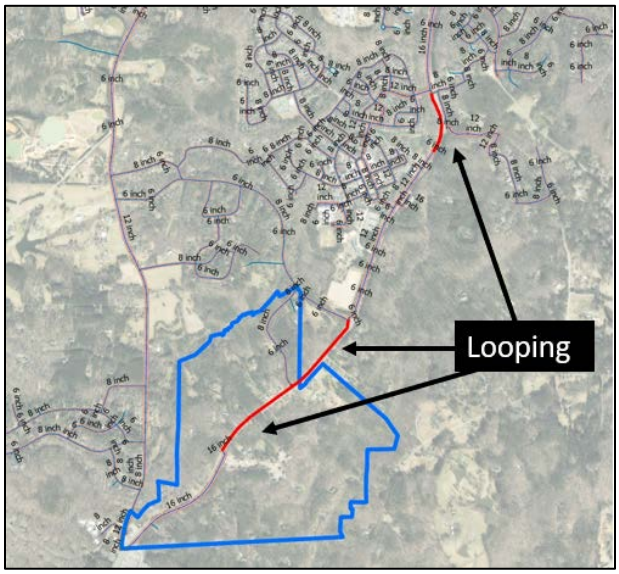


**Figure 2 – Distribution System Additional Looping**

Due to the decrease in available fire flow capacity noted above, additional looping was modeled to improve system resilience in this area assuming the high density scenario. Additional looping would consist of approximately 4800 lineal feet of additional 8-inch water main along Highway 15-501 to improve resilience to the area and restore fire flow availability under buildout conditions. Under the assumptions of the high density scenario, this looping is the only capital expenditure found to be necessary for the distribution system as a result of the additional demand at a buildout condition.

Sewer Collection System

CDM Smith conducted the gravity sewer analysis, adding the additional demands to the baseline buildout scenario, and determining impacts to collection system capacity under both dry weather and wet weather scenarios.

Based on the assumptions listed in the Demand Projections section above, the expanded service area would generate an additional 113,000 to 213,200 gpd of flow (low and high density scenarios, respectively). To convey this additional flow, two new 8" diameter sewer outfalls would be required to be extending along the east and west side of Highway 15-501 from OWASA's existing system for approximately 7,700 lineal feet (combined total). Additional footage within the development area is not included in this total.

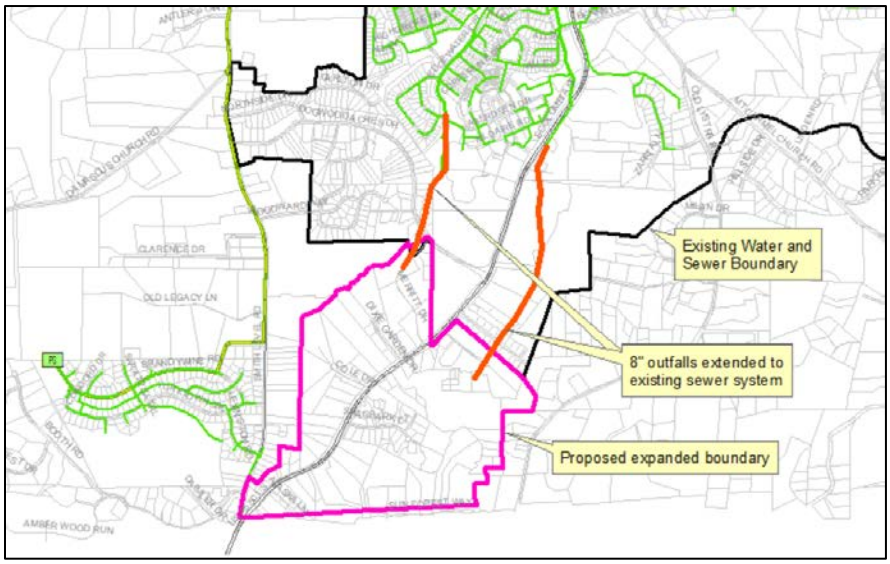


**Figure 3 – Gravity Outfall Extensions**

In addition to the new sewer extensions, there are some impacts to the receiving sewer interceptors north of the proposed expansion. Between 1,600 and 2,300 lineal feet (low density vs high density scenarios, respectively) of the Morgan Creek Interceptor would require upsizing from 24-inch to 30-inch. This interceptor is considered backbone sewer as described in the section below.

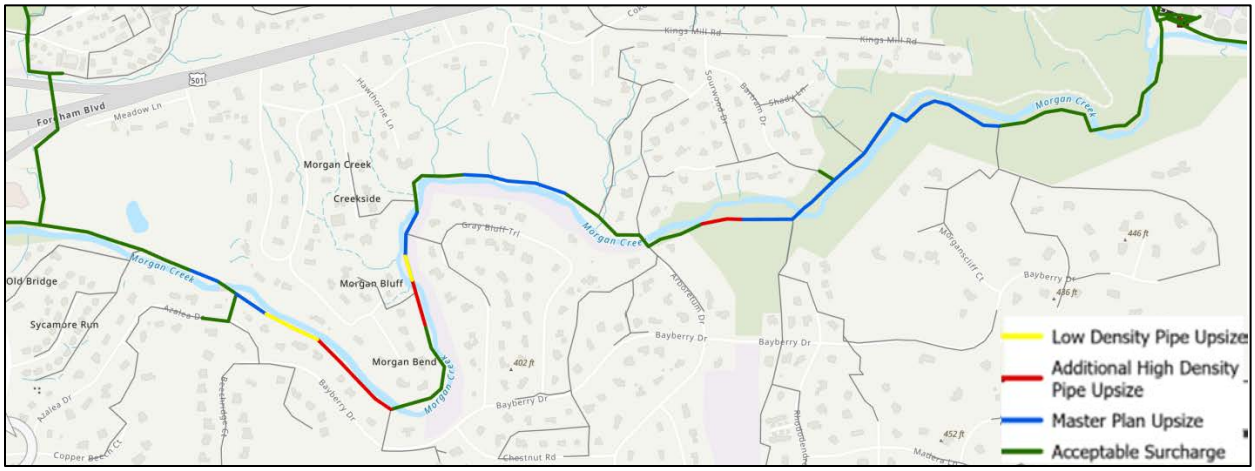


**Figure 4 – Downstream Interceptor Upsizing**

**OWASA Cost Policies for Growth**

OWASA was created with the requirement that it would ensure, to the extent possible, that the ultimate cost of any extension of water or sewer main would be borne by those primarily benefitting from such extension. OWASA uses two primary methods to ensure that "growth pays for growth" in its service area. One method is through adoption and enforcement of service extension policies. The second method is through *System Development Fees* that are charged to the owner of any property who

connects their property to OWASA utilities. The purpose of these fees is to recover a portion of OWASA's Primary Capital Facilities necessary for providing water, sewer, and/or reclaimed water and, in effect, to "buy in" to the utility system.

The benefitting party pays for main extensions as needed to bring water, sewer, or reclaimed water to and throughout their property. The extension of service may consist of constructing water, sewer, and/or reclaimed water mains, service lines, pump stations, and other appurtenances necessary to serve a property. In addition, to support future orderly development, they are required to provide easement within their property for main extension to unserved properties. For developed but unserved areas, residents may request an assessment project, where OWASA manages and builds the desired infrastructure and recovers all costs needed to serve the benefitting properties through assessment.

When the mains need to be sized larger than required for the property in order to support the needs of future development, there may be a cost differential, or excess capacity cost, between the size of pipe required by OWASA and the base size of the pipe required to serve the property. For sewer mains, this cost is borne by the developer but may be partially or fully recovered through an Excess Capacity Credit Agreement. With this agreement, OWASA recovers additional 4% of the System Development Fees from each new customer benefitting from the upsized main and returns them to the developer annually for ten years. There is therefore no direct cost of the main extension to current customers. For upsizing of water mains, OWASA pays the excess capacity cost through a betterment agreement with the developer. Because of the looped and interconnected nature of water mains, there are not distinct future beneficiaries of the upsized main to whom the cost is attributable: as the entire distribution system is strengthened, the excess capacity cost is paid by OWASA ratepayers.

System Development Fees ensure that new development pays its share of OWASA's Primary Capital Facilities, for which OWASA is financially responsible. Those facilities benefit all or large portions of OWASA's service area and customer base, and include OWASA's lands, buildings, reservoirs, and treatment facilities; raw water storage and transmission; treated water pumping; ground and elevated storage tanks; interconnections with Durham, Hillsborough, and Chatham County; "backbone" water, sewer, and reclaimed water mains (generally those that are 12 inches or larger in diameter); and sewer pumping stations and force mains collecting flows from multiple interceptors or those deemed necessary and permanent by past formal action of the OWASA Board. By paying these fees, the property becomes an equal partner in the existing OWASA infrastructure and holdings, and shares equally in any excess capacity costs borne by customers.

**Summary**

The recommended adjustments to the water distribution and wastewater collection systems to serve the modeled demands under a high density buildout condition are summarized below.

| Type | Cost | Purpose |
|---|---|---|
| Water Main Reinforcing Loop (4800 feet) | 1.5 to 3 million | Restore available fire flow capacity |
| Sewer Main Extension (7700 feet) | 2 to 3 million | Extend from existing system |
| Sewer Interceptor (2300 feet) | 3 to 5 million | Provide necessary downstream capacity |

As described in the Cost Policies for Growth section above, the extension of sewer main to the existing system would be completed by the benefitting party (developer). The other projects would be included within OWASA's Capital Improvements Program and would need to be completed sometime before ultimate buildout occurs. Should the proposed expansion of the water and sewer boundary become a reality, we expect that the timing, cost, and scope of projects would be further clarified through our periodic master planning efforts for the distribution and collection systems.

Sincerely,

Vishnu Gangadharan, P.E.
Director of Engineering and Planning

Copy: Todd Taylor
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