Water and Wastewater Plant Capacity Evaluation

The City of Ann Arbor is currently conducting a Drinking Water Distribution Plan update and a Sanitary Sewer Collection System Comprehensive Plan (SSCSCP). These projects are evaluating the performance of the water distribution system and sanitary sewer collection system and will recommend improvements to these underground piping networks. However, this memo was created in response to specific questions related to the drinking water and wastewater treatment plant capacities.

These projects rely on land use build-out projections from the City's Draft Comprehensive Land Use Plan (CLUP) to estimate future water demands and wastewater flows. Draft build-out projections through the year 2050 were shared by the City Planning Department and include low- and high-end build-out scenarios. It should be noted that these build-out projections are currently in draft format and are based on several estimates and assumptions, thus should be considered as approximations only. If the low- and high-end build-out projections were to be realized, they would equate to a 52%-79% increase in population by the year 2050 as shown in the table below.

Table 1. City of Ann Arbor projections of population increase by 2050. These projections would be in addition to the City's existing population of approximately 126,000 people in 2025.

	Average Annual Housing Unit Increase	Population Increase by 2050	Percent Increase by 2050
SEMCOG Growth Projections	~200*	~11,000	9%
Draft CLUP Low-End Build Out Scenario	~1,200	~66,000	52%
Draft CLUP High-End Build Out Scenario	~1,800	~99,000	79%

**Per Planning Department, in the last few years the City has constructed approximately 650 units/year*

Depending on the intensity of future growth, there may be strains on the current drinking water and wastewater treatment plant capacities and associated piping networks. When water demands or sewer flows reach 80% of their respective plant capacities, the Michigan Department of Environment, Great Lakes, and Energy (EGLE) begins initiating conversations with the municipality to plan for expanded plant capacity.

Drinking Water

The Ann Arbor Water Treatment Plant (WTP) has a maximum day capacity of 44.5 million gallons per day (MGD). This limit is based on three components: 1) EGLE limits City withdrawals from the Huron River to 40 MGD to maintain flow of the river, 2) there is an additional 4.5 MGD provided by groundwater wells, and 3) the plant is landlocked and has no room for expansion. If the projected build-out is realized, the trigger point to begin planning a WTP expansion, or 80% of WTP capacity (red line in Figure 1), would be reached by 2035 in the high-end projection and by 2038 in the low-end projection (see Figure 1).

The City would need to develop a new approach to delivering additional drinking water capacity to meet the projected build-out. Previously, as part of the City's 2024 Water Facility Plan, the City utilized long-term growth projections developed by the Southeast Michigan Council of Governments (SEMCOG), the regional planning body, which resulted in the determination that the existing plant capacity was sufficient for a 50-year horizon. A 50-year horizon is typically used for planning major WTP projects, which can require a decade or more to develop. The City is already in the process of planning for replacement of the oldest portion of the WTP. The pace of anticipated build-out considered under the Draft Comprehensive Land Use Plan would alter the current planning process so as to avoid constructing components that would be undersized before the plant construction is complete. If the City continues with the current planning process, another planning effort to secure additional capacity would need to be started in 10 to 13 years depending on the build-out projection utilized., otherwise the WTP capacity could be exceeded in 19 years using the high-end build-out projection.

Wastewater

The wastewater treatment plant (WWTP) capacity limitations are slightly less extreme. The WWTP has both dry and wet weather capacity limitations, but this analysis focuses on the dry weather capacity only. The wet weather capacity will be further evaluated as part of the ongoing SSCSCP. The WWTP dry weather capacity is 29.5 MGD. (Note that the WWTP uses dry weather capacity and the WTP uses maximum day capacity, so these capacities cannot be directly compared. For this reason, the capacities in this document are expressed in terms of populations and years.) The build-out projections would result in a flow increase that reaches 80% of the WWTP capacity by 2042 in the high-end build-out projection and 2050 in the low-end build-out projection (see Figure 2). The pace of anticipated build-out could trigger the need to begin planning a WWTP expansion in 17 to 25 years depending on the build-out projection utilized.

Options

Potential options in consideration of the WTP and WWTP capacities include:

- Implement a growth strategy that aligns with the current capacities of the WTP and WWTP.

- Explore options to secure additional WTP and WWTP capacities to accommodate anticipated build-out and commit to planning and funding these improvements.

Both options have advantages and disadvantages and involve risks, all of which the City will need to evaluate.

Figures

The following section presents graphs that compare the WTP (Figure 1) and WWTP (Figure 2) capacities in terms of population served to the estimated population projections from SEMCOG as well as from the City's low- and high-end build-out scenarios. It should be noted that the service area populations shown on the figures include both the projected populations within the City as well as the populations served within the portions of the adjacent Townships that also receive water and wastewater services from the City. The City was recently approached by one of the Townships with a request to increase their water demand from the City. Although their request for additional water is not significant enough to cause an increase in any City-expanded capacity planning efforts, it should be noted as it indicates anticipated growth in surrounding Townships into the future. The estimates of equivalent population served in the figures below were based on high-level assumptions related to the number of persons per household and demand/flow per person. Plant capacities, in terms of population served, were rounded to the nearest 1,000 persons.

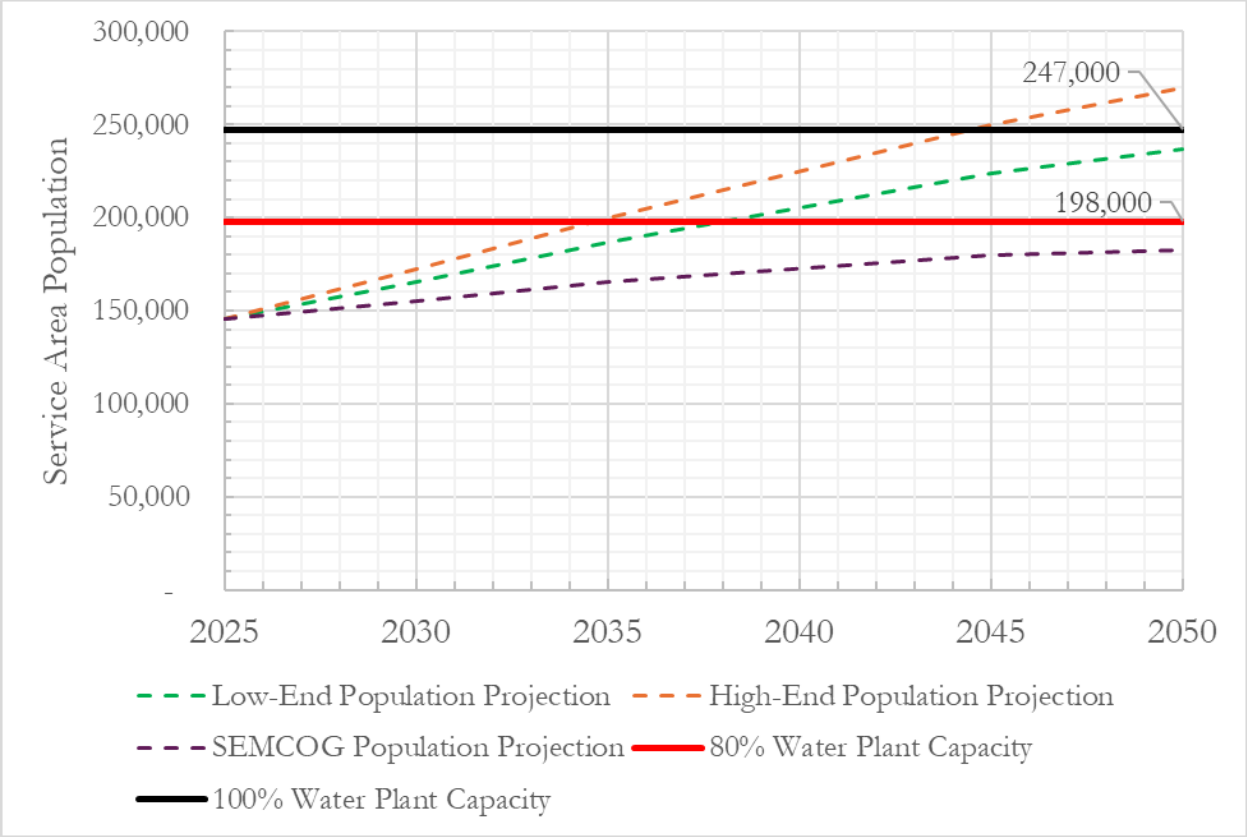

Figure 1. Projected Population Growth Compared to Drinking Water Treatment Plant Maximum Day Capacity

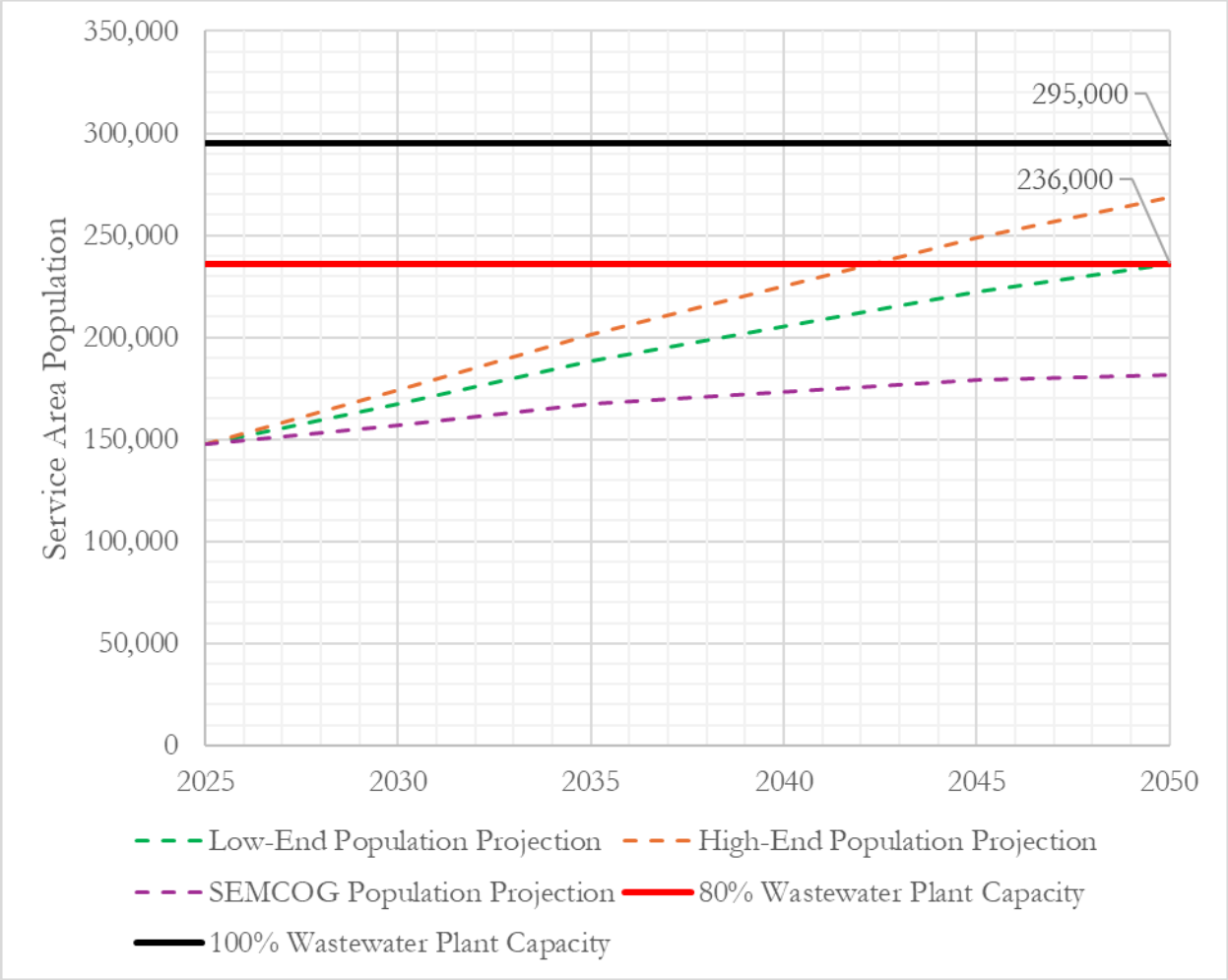

Figure 2. Projected Population Growth Compared to Wastewater Treatment Plant Dry Weather Capacity