



Design Review Committee Briefing #4

Subject: Nampa Wastewater Current Capacity and Capacity Allocations

Date: October 11, 2018

The Issue

The Nampa Wastewater Treatment Plant (WWTP) is designed to accommodate the flow and loadings from the Nampa community. In order to maintain the expected level of service, it is important to compare the current capacity of the Nampa WWTP with the allocated capacity. This briefing summarizes these two components, the current and allocated capacity.

Background and Analysis

The City is continuously monitoring both the capacity allocations and available capacity within the Nampa WWTP's treatment systems. The following sections summarize these two connected issues.

Current Nampa WWTP Capacity

The capacity assessment of the existing Nampa WWTP evaluated the performance and capacity of the existing system to determine its capabilities to perform biological phosphorus removal and nitrification to meet the future Permit limits. In addition, these unit processes were examined to determine whether adequate capacity exists to serve expected increases in both flow and loadings. The capacity assessment followed a systematic approach to evaluate unit process performance and capacity. The approach taken addresses the constraints of each unit process, with the most constraining unit process defining the performance and overall capacity of the plant. The results of this work can be used to determine which processes should be targeted as priorities to upgrade and thereby unlock additional capacity at the facility to meet current and future effluent permit requirements. The results of the capacity assessment exercise are presented in Table 1, below. For a detailed discussion of the approach, refer to *TM T-49 Nampa WWTP Capacity Assessment*.

Table 1. Nampa WWTP Capacity Constraints			
Capacity constraint	2 Aeration Basins in Service (mgd)	3 Aeration Basins in Service (mgd)	3 Aeration Basins in Service BOD Load (lb/day)
Peak day blower capacity (1 out of service)	-	-	52,000
WAS pump (total capacity)	-	-	55,100
15-day digester HRT (total)	-	-	56,000
Post aeration basin HRT	16.8	16.8	-
Final clarifier flow splitter box	17.1	17.1	-
Digester VSLR limit (all in service)	-	-	67,100
Chlorine disinfection channel effluent submerged weir	19.9	19.9	-
Excess aeration basin MLSS	-	-	76,000

It should be noted and strongly reinforced that the capacities presented in Table 1 reflect the capacity under the **current operating conditions**. The function of the existing infrastructure will require modification to meet the requirements for producing Class A Recycled Water, one of the outcomes of the Phase II/III Upgrades. Because the Nampa WWTP will be required to remove both total phosphorus and total nitrogen, the capacity of the existing secondary treatment system will be reduced from the values presented in Table 1 due in part

to a shift away from the trickling filters. These changes will be considered and presented in a future Design Review Committee meeting when secondary treatment process options are discussed.

The results of the capacity assessment (Table 1) identify capacity limiting unit processes at the Nampa WWTP. If not addressed, these unit processes will limit the performance of the Nampa WWTP as flows and loadings reach the performance limits for each process. The Phase II/III Upgrades include elements that will address these capacity limitations and provide sufficient capacity for future system demands.

Capacity Allocations

The current flow and loadings to the Nampa WWTP are comprised of three main sources: domestic, infiltration and inflow (both irrigation and non-irrigation related), and industrial contributors. In addition to these three sources, the City has made additional capacity commitments to future domestic contributors and vacant users. Each of these capacity allocations are described further below.

- **Domestic Contributions** - Domestic flows and loads are generated by the general public (residential and commercial), are independent of seasonal and climate conditions, and follow a diurnal flow pattern that reflects timing of water usage in a community (peaks in early morning and late evening). Domestic flow and loadings are closely correlated with the population within the service area.
- **Industrial Contributions** - The Nampa WWTP receives wastewater from several industrial customers in addition to the domestic flow and loadings. Major industries, categorized as Significant Industrial users (SIUs) are permitted through the City for flow and nutrient loadings. For the purposes of this analysis, it is assumed that all industrial dischargers use their full flow and capacity allotment established by the City's Industrial Waste Acceptance (IWA) permits as a conservative approach.
- **Infiltration and Inflow** - Infiltration and inflow flows are a combination of those influenced by irrigation and those influenced by storm events (i.e. non-irrigation). The irrigation-related flows have varied from 1.39 mgd in 2012 to 2.56 mgd in 2009. A maximum month flow of 2.28 mgd was used to project a typical year total irrigation-related flow. Precipitation data was used in conjunction with historical WWTP influent flow data from 2008 through 2016 to determine the effect of storm events on WWTP influent flow (i.e. non-irrigation). The maximum month non-irrigation related flow is 0.34 mgd.
- **Future Domestic Contributions** - The City has made future capacity commitments to developers through the platting and building permit processes. Until these structures are occupied, this capacity is not realized as influent to the Nampa WWTP but must be accounted for within the allocated flow and loadings. This capacity is continually reviewed and updated by the City. Currently this capacity constitutes approximately 1.3 mgd.
- **Vacancy Allowance** - The City's policy has been to assume that an additional 5 percent of the current domestic flow and loadings are allocated to vacant properties. This allocation is meant to cover previously constructed properties that are vacant and not discharging to the City's system. This capacity constitutes approximately 0.52 mgd.

For the purposes of planning and design, the maximum month allocated capacity, the sum of the five contribution sources noted above, is used to assess required capacity at the Nampa WWTP. The allocated capacity represents commitments the City has made to customers to provide capacity. This approach ensures that sufficient capacity is available to meet the City's commitments. However, there is often a difference between the allocated capacity and the actual influent flow and loadings, especially for industrial customers. This is demonstrated in Figure 1, below. This figure summarizes the current capacity allocations as a percentage of the total available design capacity after the completion of the Phase I Upgrades. For clarity, the actual maximum month influent flows and loads for the Nampa WWTP are shown for each constituent (black line).

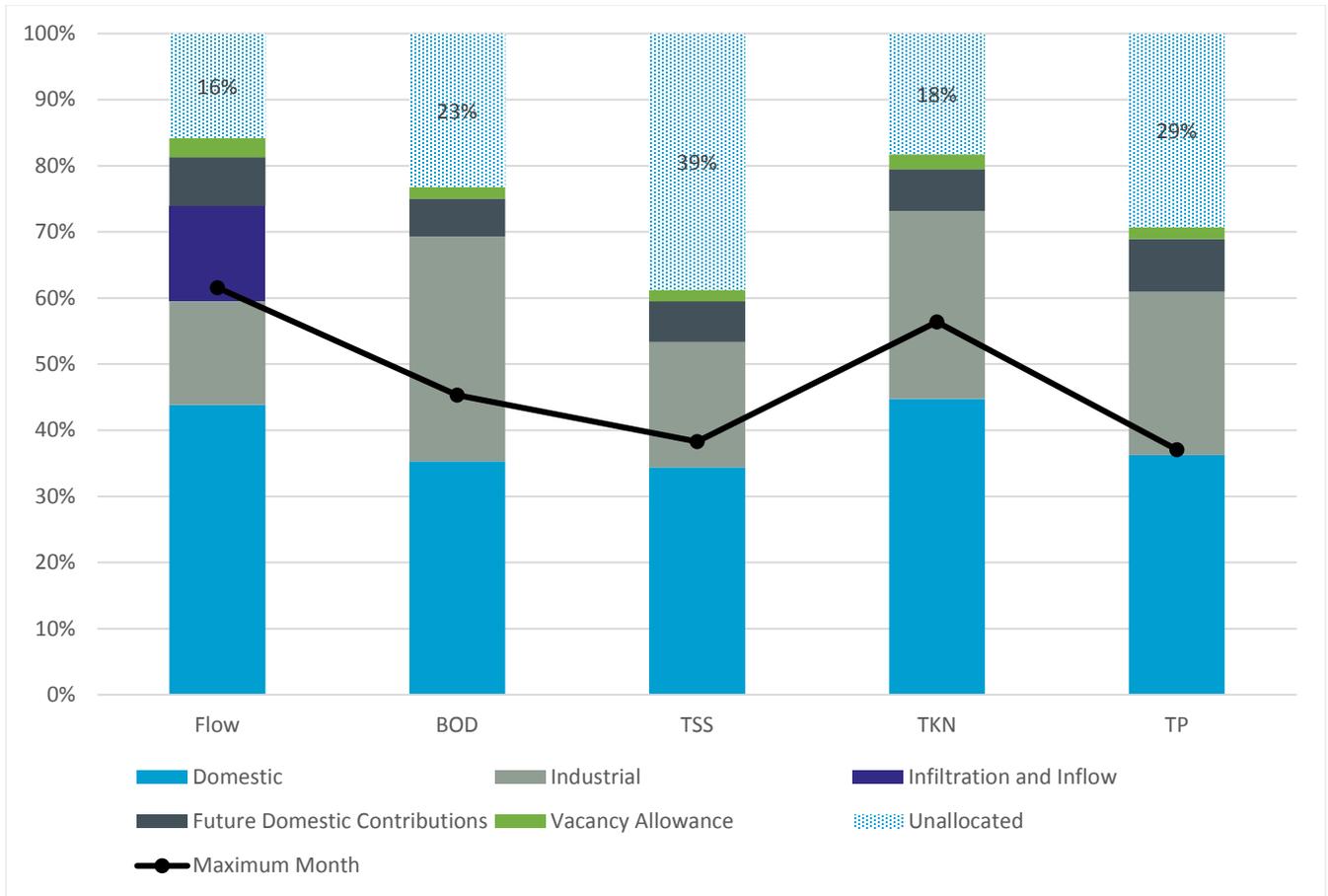


Figure 1. Flow and Loading Allocations Compared to Design Capacity

Potential Consequences

There is a difference between the actual influent flow and loadings and the allocated capacity for the Nampa WWTP. This can be seen in the difference between actual influent flow and loadings (black line) and the allocated capacity (solid bars) in Figure 1. This difference ranges from 23 to 34 percent of the actual plant capacity depending on the constituent. The discrepancy between allocated flow and loadings and the actual influent flow and loadings to the Nampa WWTP can result in additional capital investments to accommodate the allocated but unused capacity. More closely aligning the allocated and used capacity could reduce the overall capital investment required in the Phase II/III Upgrades.

The industrial capacity allocations are a primary source of the discrepancy between the actual and allocated flows and loadings. For the purposes of planning and design, it is assumed that all industrial dischargers use their full capacity allocations at all times during the year. This assumption is a result of the terms of the City’s IWA permits with their industrial customers, which allow the maximum month flow and loadings at all times during the year. The Capacity Optimization Fee, which charges industrial customers for allocated unused capacity, was developed in 2012 in an effort to better align the allocated and used capacity. This has resulted in better alignment of these values. Additional steps, such as revising industrial permits to reduce capacity or establish different reasonable limits, could be taken to further reduce the discrepancy.

Recommendation

This DRC briefing is intended to provide background information as the Nampa WWTP Phase II/III Upgrades commences.