Dewberry

TECHNICAL MEMORANDUM - DRAFT

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To: City of Louisville, Brue Baukol

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Subject: TM2 City of Louisville and Redtail Ridge Water Treatment and Conveyance Infrastructure – Subject to Revision - DRAFT

INTRODUCTION

Redtail Ridge, a proposed development in southeastern Louisville, is estimated to produce a max month demand (MMD) of 1.02 to 1.39 MGD and a max day demand (MDD) of 1.34 to 1.71 MGD. Total buildout MMD projections for the City of Louisville with the proposed Redtail Ridge Development range from 8.79 to 9.16 MGD. Total buildout MDD projections for the City with Redtail Ridge Development range from 10.99 to 11.36 MGD. A breakdown of the projected water demands by Phase with irrigation assumptions is provided in Table 16 of the "City of Louisville and Redtail Ridge Development Projected Water Demands" Technical Memorandum 1. It should be noted that the irrigation estimates included in TM1 assume that 30 percent of the development will require irrigation. Since the development of TM1, progress has been made on the site development and the actual irrigated area is closer to 17 percent of the total land (see attached figure). The difference between assumptions is approximately 0.50 MGD. The projections used in this analysis uses the assumption of 30 percent irrigated area, thus the projections are conservative.

Water Treatment Plant Capacities

The SCWTP was constructed in early 1980s with a rated capacity of 8.0 MGD. The HBWTP was constructed in 1993 with a rated capacity of 5.0 MGD. The City prefers to utilize one treatment facility at a time during periods of average water demands, however both facilities can be used during periods of high water demand. Water is distributed through three pressure zones and three storage tanks. In the instance of the SCWTP and HBWTP, backwashing is the limiting factor when determining plant capacity. Backwashing can result in decreased capacity depending on how often it is necessary. Increased demand from Redtail Ridge will likely require the WTPs to operate at elevated filter flow rates (up to 5 gpm/sf rather than the current 2-2.5 gpm/sf) which will likely result in shorter filter run times. During max months, backwashing may be necessary every day depending on raw water quality. Increased backwashing has the potential to result in increased maintenance due to increased usage of backwash pumps and associated equipment.

Filter firm capacity can be considered as the largest filter out of service with adequate storage. In this case, firm capacity is approximately 11 MGD assuming one filter offline at the HBWTP. This can be considered worst case as backwashing typically takes up to 1-2 hours per filter. This assumption is conservative and allows additional time for backwash as the City has a total of 6 filters. Low to High projections for max month demands are below firm capacity and can be considered the maximum long-term demand. Max day projections are at or slightly above firm capacity. Max day demands are expected

to seldomly occur, and not for extended periods of time. The lower demands from Redtail Ridge and capacity of the City's potable water systems suggest Redtail Ridge will have minimal impact to the City's water systems.

Water Storage and Distribution Infrastructure Needs

In general, water utilities provide water treatment capacity to meet Maximum Day Demands (MDD), while providing storage volume to meet emergency and fire flow needs, as well as, operational volume for daily demand variations. In practice, considerations are made to provide the optimal balance between providing a robust system, controlling capital costs, and managing water quality. The City's distribution system contains 3 storage tanks that store approximately 8.5 million gallons of water, as shown in **Table 1**.

Table 1 - Distribution System Storage Volume

Zone	Water Storage Volume (MG)
High Zone	2
Mid Zone	3.5
Low Zone	3
Total Storage	**8.5**

The addition of Redtail Ridge would contribute, at buildout, a MDD of 1.34 to 1.71 MGD, while total buildout MDD projections for the City and Redtail Ridge Development range from 10.99 to 11.36 MGD. The greatest source of uncertainty in system planning is the uncertainty of demand projections. The irrigation projections provide the principal source of uncertainty in the Redtail Ridge demand projections. The most conservative irrigation projections for Redtail Ridge were used in this analysis, however, Redtail Ridge plans to implement xeric or low water landscaping which will decrease the irrigation demand.

The Mid zone, where Redtail Ridge is located, has a 3.5 MG tank which provides storage volume to meet emergency and fire flow needs, as well as, operational volume for daily flow variations. In the event of a fire during max day demand, the City's WTPs would be capable of providing max day demand, while the Mid Zone tank would provide the fire flow demand. Fire flow requirements stipulate the minimum fire flow and duration required of 4,000 gpm for 4 hours, or 960,000 gallons, would be provide by the tank. Similarly, in the event of a water line break, the tank's emergency storage volume would provide the necessary shortage to the Mid Zone. In general, a tank is sized to provide one-third of the tank's volume to each need: emergency, fire flow and operational storage. In practice, considerations are made to provide the optimal balance between providing a robust system, controlling capital costs, and managing water quality. The modified Redtail Ridge development plan fits within the City's potable water systems ability to provide max day demands at buildout, while providing adequate storage within the Mid zone.