DES MOINES WATER WORKS
Board of Water Works Trustees

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MEMORANDUM

DATE: February 23, 2022

TO: Ted Corrigan, P.E., CEO and General Manager

FROM: Michael J. McCurnin, P.E., Director of Engineering Services

SUBJECT: Saylorville Water Treatment Plant Expansion – HDR Preliminary Engineering Report

Background: In 2017, an extensive long range plan was developed that targeted the source, treatment, and transmission needs of DMWW through 2040. The plan, completed by CH2M and HDR, Inc., called for the completion of treatment expansion projects on a pace to stay ahead of increasing customer demand. Scheduled expansions included a 12.5 MGD expansion at the McMullen Water Treatment Plant (MWTP), a 10 MGD expansion at the Saylorville Water Treatment Plant (SWTP), and an additional 25 MGD expansion at a to-be-determined location. Interrogations in 2021, with five additional years of customer demand data in hand, revealed that the initial prescribed expansions should not be delayed.

In 2021, HDR, Inc. and Black & Veatch teamed to begin preliminary engineering on both a 10 MGD and 25 MGD expansion at SWTP. The preliminary engineering work is nearing completion. A quick summary is as follows:

10 MGD Expansion @ SWTP: A variety of membrane alternatives were considered. Three alternatives were interrogated more thoroughly. Ultimately, the HDR Inc., Black & Veatch, and DMWW technical team selected an option that advances the UF (ultrafiltration) and RO (reverse osmosis) membrane treatment in a way that produces 20 MGD of firm capacity for water with hardness as high as 400 mg/l and a temperature as low as 40°F. By comparison, the original plant was capable of 10 MGD with 300 mg/l hardness and temperatures as low as 60°F. This significant design decision will result in greater year-round production and move SWTP from a "peaking plant" to a more robust contributor to DMWW's overall production capacity. The preliminary design includes an additional building to relocate chemicals and an addition to the existing building on the site.

Raw water for the 20 MGD firm capacity plant is conceptualized with 4 additional collector wells along the Des Moines River. One of the projected sites is south of I-35/80. All well sites are located on federal property and will require easements.

Transmission projects for this level of expansion include more than 2 miles of 36-inch or 42-inch water main that will allow SWTP outputs to reach the Tenny Standpipe area (Merle Hay Mall) which, in turn, will facilitate enhanced flows to the west.

25 MGD Expansion @ SWTP: A variety of conventional treatment, lime softening, and membrane treatment options were considered. Ultimately, the team selected a membrane plant option that allows for 25 MGD of firm production with the 400 mg/l and 40°F raw water conditions. Additional property will be required for the additional buildings and lagoons. In additional to the high-end membrane treatment, the plant is equipped with other frontend processes to deal with the most severe raw water conditions that can occur with direct surface water intakes. A very robust treatment process is clearly proposed. State regulators will likely require significant pilot testing of both the frontend processes and the membrane products to be used.

Raw water for this expansion includes both a direct surface water intake and collector wells. Initial interrogations of the Des Moines River corridor indicate alluvial capacity may be limited. Use of the alluvial water for the 10 MGD expansion and foreseeable uses at Fleur Drive Water Treatment Plant (FDWTP) are likely more prudent. For this reason, the collection system and the treatment process are presently configured to treat 100% river water.

The necessary transmission projects are more significant for this expansion. All of the 10 MGD transmission projects are required, but then an additional river-crossing water main and then a 10-mile water main is needed to extend the core network from Johnston to the LP Moon area. Additional modeling is being completed to confirm necessary feeder main sizes, but they will be significant.

10 MGD vs 25 MGD: Delivery of final cost estimates is slated to occur within the next month. These estimates, along with the preliminary engineering report materials, will allow pursuit of design loans, completion of design work, and ultimately acquisition of construction loans for one of these options. Preliminary engineering for both options was pursued to allow for more informed decision making. There is sentiment that completing the 10 MGD expansion first has merit. Overall costs will naturally be lower, but the cost per MGD of production capacity gained for this expansion will also be lower as this expansion takes advantage of existing infrastructure at the site. The piloting needed for the 25 MGD expansion will be more comprehensive and time consuming, which will likely result in a longer construction window. Siting as many as four additional collector wells for the 10 MGD expansion will also allow for an even better understanding of the potential yield limits of the alluvial along this corridor of the Des Moines River.