



- **Board of Directors**
One Water and Stewardship Committee

3/14/2023 Board Meeting

9-2

Subject

Information on the High Desert Water Bank Program status, updated costs, and water quality

Executive Summary

This letter provides an update on the status, costs, and water quality of the High Desert Water Bank (HDWB) Program with Antelope Valley – East Kern Water Agency (AVEK). The estimated costs of the HDWB have increased since the 2019 Board authorization of \$131 million to a current estimate of \$210 million. Over the past four years, inflation has significantly increased, the off-site power distribution design was finalized, modeling based on four-pilot recovery wells revealed the need for additional wells to achieve the recovery target, and water quality testing of the pilot recovery wells revealed naturally occurring arsenic levels above the California Maximum Contaminant Level (MCL), potentially requiring treatment before pumping into the California Aqueduct. Based on the current construction schedule, the HDWB Program can begin recharging in Summer 2023 with full recharge and recovery operation in 2025. The current HDWB agreement provides:

- (1) Metropolitan and AVEK will agree in writing to the final design, construction schedule, and estimated budget;
- (2) if the capital costs will exceed the budget, Metropolitan may either scale down the project to stay within the original budget of \$131 million or pay the additional costs;
- (3) Metropolitan will pay the actual energy costs; and
- (4) if Metropolitan determines that water quality treatment is required before water is returned to Metropolitan, and if AVEK or a third party is not responsible for impairing water quality, Metropolitan can decide on the type of treatment to implement and would be required to pay actual treatment costs. Staff will return to the Board to request authorization for additional project costs, design changes, any necessary amendments to the HDWB agreement, and to provide regular updates.

Details

Background

In April 2019, the Board authorized the General Manager to enter into the HDWB Agreement with AVEK (HDWB Agreement) and provide up to \$131 million for the construction of monitoring and production wells, turnouts from the California Aqueduct, underground and aboveground pipelines, recharge basins, and water storage and booster pump facilities. Metropolitan and AVEK executed the HDWB Agreement in December 2019. Once operational, Metropolitan is required to pay for the actual operation and maintenance (O&M) and power costs for the facilities when used for Metropolitan's benefit and, potentially, any required treatment costs. Under the program, Metropolitan may store up to 280,000 AF of its State Water Project (SWP) supplies in the Antelope Valley Groundwater Basin. In addition, Metropolitan has first priority to 70,000 AF per year of put and take capacity. AVEK has a secondary priority right to access the groundwater bank. At this point in time, there are no other participants in the groundwater bank. However, AVEK plans to develop additional capacity to bring new participants into future phases of the bank over time. Under the HDWB Agreement, Metropolitan can recover a portion of its costs should future participants utilize unused capacity that was developed by Metropolitan's investment in the program.

When completed, the HDWB will provide the region with valuable supply benefits. The HDWB, like Metropolitan's other SWP groundwater storage programs, will help manage surplus supplies and improve dry-year regional reliability. The HDWB will provide an increased emergency benefit with a direct pump back of stored water into the California Aqueduct when needed. The HDWB is downstream of the Edmonston Pumping

Plant and provides an additional factor of reliability. If the Edmonston Pumping Plant or facilities upstream are damaged by an earthquake or shut down due to another type of failure, stored water would be returned from the HDWB to help maintain deliveries. In addition to earthquake-related failures, the aging California Aqueduct is experiencing increased occurrences of failures, particularly in portions of the San Joaquin Valley upstream of the AVEK connection. Staff is also evaluating opportunities to deliver supplies to the West Branch and increase supply reliability of SWP-dependent areas.

High Desert Water Bank (HDB) Program

Construction of the HDWB is on schedule and anticipated to be fully operational by the end of 2025. As of March 2023, AVEK has completed the construction of ten recovery wells. Current construction activities include work on turnout to the California Aqueduct and staged work of recharge basins allowing Metropolitan the ability to begin recharging in Summer 2023. To date, Metropolitan has paid approximately \$50 million primarily for land acquisition, design, and construction of the HDWB facilities. Metropolitan's anticipated expenditure for the remainder of this fiscal year is approximately \$12 million.

As construction of the HDWB progresses, staff regularly meets with AVEK to get updates on project status, milestone achievements, and challenges. Staff is in discussions with AVEK regarding unforeseen issues impacting the project and estimated project costs, including project design, the power distribution system, hydraulic variability, water quality, and inflation.

Power Distribution System

In 2018 when the original cost estimate was prepared, it did not include electrical distribution system costs to bring power to the project site. At that time, AVEK had not received the Method of Service (MOS) study and associated cost estimate from Southern California Edison (SCE). SCE recently completed a MOS study including the conceptual design and estimated distribution system costs. Based on the conceptual design, SCE will be taking power from the nearest substation at Neenach via a new 66 kV transmission line to a new substation adjacent to the project. AVEK will install three-12 kV power lines within the project site to power the project facilities. SCE will own all the off-site facilities, and AVEK will own facilities within the project site. The estimated cost for the power facilities is about \$75 million; however, the majority of the capital will be covered by SCE. Metropolitan's capital cost responsibility for power for the project is approximately \$11 million. Metropolitan is also responsible for the facilities' O&M costs (which are estimated to be 3 percent of capital costs) once operational.

Hydraulic Variability

In 2017, in accordance with the original project design, AVEK completed its initial field investigation and drilled five monitoring wells to a depth of approximately 500 feet below ground surface. Shortly after completion, the monitoring wells were tested and sampled. In 2020, AVEK completed an initial groundwater model based on the information collected from the monitoring wells. The model was refined and calibrated to calculate the estimated recharge and recovery capacity. Based on the modeling results, the recovery capacity objective of 70,000 AF-per year could not be met with the original proposed well design of 23 shallow wells. In 2021, AVEK installed and tested four deep pilot recovery wells drilled to approximately 1000 feet. These pilot wells were drilled with the intention of being permanent recovery wells but are referred to as "pilot" since they were the first wells and were used for extensive testing and modeling of the basin. Testing included step and constant rate pumping tests and zonal testing. AVEK also installed a deep piezometer and monitoring well. Based on the depth-specific data collected, AVEK was able to estimate, among other things, the recovery capacity of the wells. Modeling revealed that the annual recovery objectives could be met by drilling deeper wells and increasing the total number of wells by four. The new recovery facilities would include a total of 27 deep aquifer wells. The impacts of increasing the depth and number of recovery wells, including drilling, pumps, motors, instrumentation and SCADA, piping, and well site electrical, results in an increase in costs of about \$29 million. It should be noted that this is a conservative approach in design to ensure production of at least 70,000 acre-feet of direct pump-back capacity in a given year. It is possible that this infrastructure may allow for a higher amount of annual pumping or for the full 70,000 acre-feet to be produced in a shorter time window within the year.

Groundwater Quality and Treatment

The initial field investigation in 2017 included Title 22 water quality sampling for the five monitoring wells. In 2018, the monitoring wells were resampled per Metropolitan's request. All water quality samples collected from the monitoring wells met California's Title 22 Drinking Water Standards. The monitoring wells were shallow, based on the initial well design. However, after completing the groundwater modeling described above, water quality testing of the first four deeper recovery wells (pilot recovery wells) revealed that arsenic levels in all four wells were above the MCL of 10 micrograms per liter ($\mu\text{g/L}$),¹ ranging from 11 to 19 $\mu\text{g/L}$. Metropolitan's Board adopted policy governing the introduction of new water sources into treated and untreated conveyance facilities requires new water pump-in programs to meet all MCLs in effect at the time and to be modified, if necessary, to meet subsequent, more stringent MCLs. AVEK conducted additional testing and monitoring, including zonal testing and depth-specific sampling, to refine the groundwater model and further study the basin. The groundwater basin is comprised of a shallow and a deep aquifer. Arsenic is naturally occurring and widespread throughout the basin but is more concentrated in the deeper aquifer. AVEK has completed and tested ten of the 27 planned wells. Arsenic levels in nine wells range from 8 to 20 $\mu\text{g/L}$. Based on the current water quality data, recovered water from the HDWB may require arsenic treatment prior to delivery to the California Aqueduct. Based on performance requirements, project constraints, and cost-effectiveness for large flow rates, AVEK's recommended treatment process is coagulation and sedimentation. The estimated capital cost for the construction of a treatment facility designed to treat the full program's capacity of 70,000 acre-feet per year is \$29 million and \$4.2 million per year for O&M costs. Metropolitan staff are reviewing this recommendation. A hybrid operation of treating some wells while blending with other untreated wells could be considered.

Additionally, nitrate was detected in both the monitoring wells and recovery wells, although concentrations were below the MCL of 10 milligrams per liter as Nitrogen (mg/L-N). The nitrate concentrations ranged from 6.3 to 7.8 mg/L-N in the shallower monitoring wells and 2.7 to 5.9 mg/L-N in nine deeper recovery wells. Before AVEK introduces its water into the California Aqueduct, the DWR's Facilitation Group (of which Metropolitan is a member) will review AVEK's proposal to evaluate the program's impact on water quality and provide the program's approval recommendations to DWR. Nitrate cannot be removed through the conventional water treatment process at most treatment plants. However, nitrate treatment is not anticipated at this time. As such, the treatment costs for nitrate are not included in the estimated treatment costs discussed above. Staff will continue to monitor if and how nitrate levels change over time in order to determine whether additional treatment for nitrate is warranted in the future.

Inflation

In 2018, AVEK's consultant prepared the original cost estimate for the project. Since then, the unprecedented pandemic resulted in unforeseen challenges to project development, including supply chain issues affecting the ability to acquire materials/equipment coupled with increased material and construction costs. The original estimate assumed an inflation rate of three percent per year. The Construction Cost Index (CCI) between 2018 and 2022 shows a cost increase of about 30 percent over this period. Recent construction bids received are higher than the estimates, consistent with the CCI. The estimated cost increase due to higher-than-anticipated inflation is about \$37 million.

Changes to Design and Costs

Metropolitan continues to work with AVEK to search for cost-saving opportunities without compromising project performance. As an example, AVEK's consultant redesigned the recharge facilities based on additional modeling completed in 2021 to maximize the gravity-fed recharge areas and remove pumped recharge facilities. Absent this design change, the recharge facilities' costs would have been about \$27 million higher. Furthermore, staff is working with AVEK to potentially extend the term of the agreement by 20 years beyond the end of the original SWP contract (*i.e.*, to 2077) to distribute the costs over a more extended period, thus reducing the project's unit

¹ The California State Water Resources Control Board, Division of Drinking Water (DDW) is currently investigating the technological and economic feasibility of lowering the arsenic MCL below the current California and federal MCL and closer to the Public Health Goal of 0.004 $\mu\text{g/L}$.

cost. Staff revised the estimated O&M costs of the program to reflect common industry practice of three percent of capital costs and added the estimated annual O&M costs of \$4.2 million for the arsenic treatment facility. All O&M costs are assumed to be escalated annually based on the Consumer Price Index. Based on the discussed increases in cost, modification to estimated O&M costs, and assuming AVEK and Metropolitan agree to extend the term of the HDWB Agreement, the estimated unit cost of the program is \$565/AF. The table below provides a summary of the capital cost impacts to the program.

Program Component	Cost Increase
Power	\$11 million
Hydraulic Variability	\$29 million
Recharge Basins	(\$27 million)
Groundwater Quality	\$29 million
Inflation	\$37 million
Total	\$79 million

With the changes shown above, the total capital cost of the program has increased to \$210 million. The HDWB Agreement includes an option for Metropolitan to downsize the program facilities to meet the authorized amount of \$131 million should the capital costs increase. However, if Metropolitan chose to exercise this option and if AVEK constructed additional facilities that Metropolitan did not pay for, the parties may need to negotiate for Metropolitan to access a proportionate share of all program facilities, including recharge, recovery, and storage.

Considerations

Although the changes described above have resulted in increases in the overall costs for the project, there may be opportunities to recover some costs in the future. For example, the turnout to the California Aqueduct and the off-site power distribution system have additional capacity available that can be used in a future expanded phase of the program. These facilities could be used for Metropolitan's benefit or instead, Metropolitan can negotiate reimbursement for those costs, if other participants benefit from the facilities. In addition, the redesign of the recharge basins reduced the amount of land required for the first phase. Because Metropolitan paid for the initial land purchase, Metropolitan can benefit from that land if the program is expanded, or Metropolitan can negotiate with AVEK to be credited for use of facilities and purchased land if Metropolitan chooses not to participate in a future phase. Additionally, the planned facilities are designed to allow at least 70,000 acre-feet of capture and pump-back capacity. It is possible that program performance may exceed these amounts. Metropolitan and AVEK may consider revising the agreement to reflect the potential for higher program performance.

Timeline and Next Steps

Staff will incorporate committee feedback and return to the Board to request authorization for the additional project costs, approval of the final project design including treatment options, and necessary contract amendments, as may be required. In addition, staff will continue to monitor the construction and schedule of the project and provide regular updates to the committee.

Policy

By Minute Item 44357, dated February 13, 2001, the Board authorized adopting a water quality policy governing the introduction of new water sources into treated and untreated conveyance facilities, and authorized the General Manager to implement the policy, as set forth in the letter signed by the General Manager on January 29, 2001.

By Minute Item 50302, dated November 10, 2015, the Board authorized entering into an agreement for Storage and Exchange Programs with AVEK.

By Minute Item 51564, dated April 9, 2019, the Board authorized to enter into an agreement for the High Desert Water Bank Program with AVEK.

Metropolitan Water District Administrative Code Section 4203: Water Transfer Policy

Fiscal Impact

Based on the delineated increases in costs attributed to power, hydraulic variability, groundwater quality, and inflation, the capital costs for the construction of the HDWB Program are estimated to increase by \$79 million. Total capital costs are projected to be \$210 million with an estimated unit cost of about \$565/AF. In the Adopted Biennium Budget for Fiscal Years 2022/23 and 2023/24 (the "Adopted Budget"), the Board approved bond financing for the HDWB Program, which reduces O&M expenditures for this supply program by converting short-term construction cash expenditures to debt service payments over the term of bonds. Staff will propose the issuance of additional bonds to fund the \$79 million in increased capital costs. The net fiscal impact of the delayed financing and increased capital costs is negligible (approximately \$30,000) during the term of the Adopted Budget. The additional debt financing costs, however, are estimated to increase supply program costs by \$112.2 million over the fifteen-year term of the bonds, averaging about \$6.5 million per year over prior annual projections.



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3/4/2023

Date



Adel Hagekhalil
General Manager

3/4/2023

Date