



City of Horseshoe Bay Water Supply System Assessment

May
2022





CITY OF HORSESHOE BAY WATER SUPPLY SYSTEM ASSESSMENT

May 2022

EXECUTIVE SUMMARY

The City of Horseshoe Bay engaged HDR Engineering, Inc. (HDR) to provide professional engineering services to assist the City with a general assessment of its water supply system. The assessment was performed by reviewing existing data provided by City staff, a field review of water treatment operations, and an overall review of system capacity and water demand.

The City's water supply system is primarily served by the Central Water Treatment Plant (WTP), which draws raw water from Lake LBJ on the eastern side of the City. The Central WTP, with a rated capacity of 4.0 mgd, has and will continue to be the primary water production facility for the City. The City also has a smaller water treatment plant to supplement water supply to Horseshoe Bay West (West WTP) which has a nominal capacity of about 2.0 mgd. Both water treatment plants include Pall membrane filtration technology systems that have been dependable in producing quality drinking water.

Overall, the rated treated water production capacity for the entire system is 6.0 mgd (4.0 mgd for Central WTP and 2.0 mgd for West WTP). The average day and peak day water demands of the City system has remained relatively consistent over the last five years (Figure ES-1). The average day use has stayed just under 2.0 mgd and the highest peak day use was 4.6 mgd in the Summer 2020. Not surprisingly, peak demands are generally experienced in the summer associated with holiday weekends, but have not approached the City's production capacity of 6.0 mgd. The City has adequate water production capacity, but should continue with water conservation and peak demand management (alternating irrigation scheduling) to manage the system. The peak day water demand in the West system is consistently close to the West WTP capacity. The West System area is where the City will experience an increase in demand due to current growth trends and will likely require the Central WTP to supplement the West system in future summer months. The West system is where most of the investment in improvements is recommended.

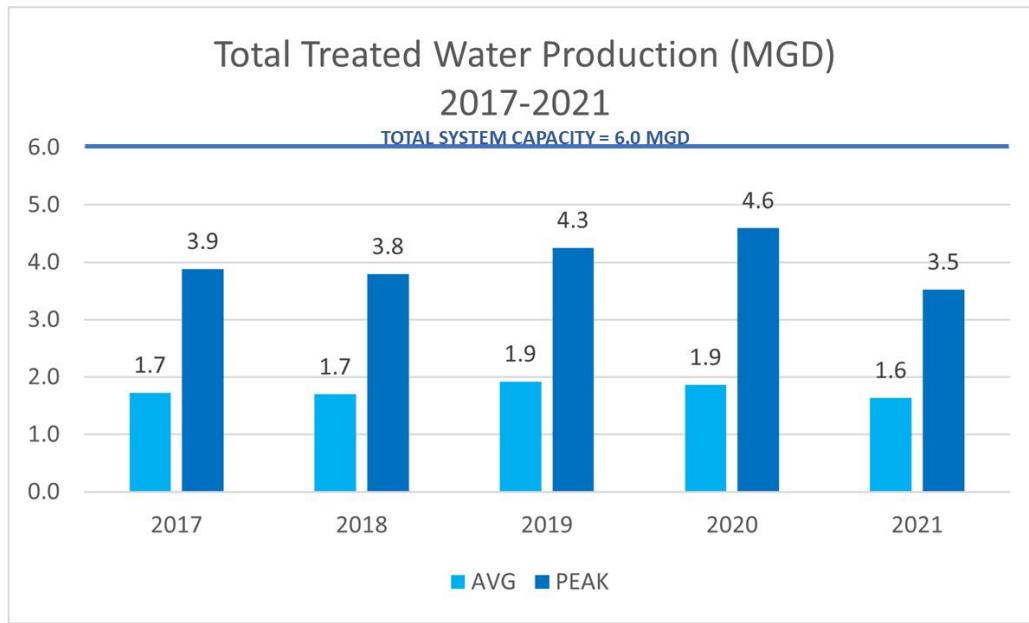


Figure ES-1

In 2019 and 2020, the average daily water demand for the entire City system was 1.9 mgd. The City currently has a contract with LCRA to purchase raw water from Lake LBJ for 2.0 mgd (2,225 acre-feet per year). Accounting for water loss between the raw water intake and water treatment plant production, the City is approaching its contracted capacity. There is available water from LCRA for the City to increase its raw water supply. As the demand for water in the LCRA system increases, contracting for the City's future water supply would provide the City assurance that it can meet the needs of its customers from Lake LBJ for the foreseeable future. The current LCRA system rate is \$155 per acre-foot per year for water used and \$77.50 per acre-foot per year for reserving firm supply for future use. It is recommended that the City consider contracting with LCRA for firm supply for future use, considering the City's long-term water demands.

If the City were to consider contracting for an additional 1.0 mgd (1,120 ac-ft/yr) to provide the City with a total firm water supply of 3.0 mgd, the annual cost for the reservation would equate to \$86,800 per year. There are approximately 4,000 connections in the City's system, so the reservation cost would equate to approximately \$22 per year per customer or about \$1.80 per month. Some of the cost for reservation can be incorporated into the City's impact fees for reimbursement from new development, so the cost for existing customers may even be less to secure a long-term water supply.

Operationally, there are some measures that the City should consider for immediate implementation and implementation within the next five years to improve performance and reliability. The recommendations are summarized below:

OPERATION IMPROVEMENTS NEAR-TERM RECOMMENDATIONS (0 TO 2 YEARS):

1. ***Disinfection Byproduct Formation Reduction:*** The Horseshoe Bay Water Utility has received violation notices from TCEQ on the level of disinfection byproducts in the drinking water. A review of the disinfection system has indicated that the plant has consistently met disinfection requirements, but the system does not provide the tools to minimize disinfection byproduct formation. Recommended action items include laboratory studies to determine disinfection byproduct formation rates, revisions to the disinfection protocol, addition of new chlorine application points, and improved mixing at the points of chemical injections. These recommendations apply to both the Central and West Water Treatment Plants. A budget of \$100,000 is recommended for these activities and improvements.
2. ***Remove Obsolete Treatment Unit from West WTP Building:*** A Roberts Water Treatment Unit was used many years ago but is now obsolete and takes up significant, valuable space inside the building. There is a need to add chemical storage, chemical feed pumps, and ancillary equipment to improve operational efficiency and redundancy for the existing WTP and allow it to reach its full rated capacity. A budget of \$50,000 is recommended for the removal of the abandoned treatment unit.
3. ***West WTP Intake Reliability Improvements:*** Install check valve on the suction line for the West WTP raw water intake pipe to increase the reliability of the raw water pump station operation at a recommended budget allowance of \$40,000. These improvements are planned to be undertaken as part of the grant funds received as a result of the October 2018 flood event.
4. ***Raw Water System Water Loss Investigation:*** Investigate the water loss between the raw water pump stations and the water treatment plants. Currently, both water treatment plants experience as much as a 20% loss between the raw water pump volume and water treatment plant production volume. While some water loss is expected during the water treatment plant process, a 20% loss is excessive. There is suspicion that the loss is an instrumentation error, but that should be confirmed and corrected with meter tests. If it is realized that it is not an instrumentation error, then additional investigations should be performed to determine where the water loss is occurring. If the City could reduce the water loss to 5%, the annual savings in raw water cost could be \$34,000. A budget of \$5,000 is recommended to investigate the root cause of the raw water loss issues.

5. **West WTP Membrane System Improvements:** At the West WTP, there are a number of improvements recommended once the space constraint is resolved. The improvements include additional chemical storage and chemical feed systems, adding an automatic strainer to meet minimum requirements, refurbish or replace the flow control valve on the membrane feed pump, and installing a standby membrane feed pump to improve reliability. A total budget of \$200,000 is recommended for West WTP Membrane System Improvements.
6. **West WTP Raw Water Pump System:** The firm capacity is 2.0 MGD, which exactly matches the rated capacity of the West WTP. Water losses in the treatment plant will prevent the plant from achieving its rated capacity. A budget of \$50,000 is recommended for increasing the capacity of the raw water pumping system.
7. **West WTP High Service Pump Station Improvements:** Improvements to the West Water Treatment Plant High Service Pump Facilities are recommended to increase the firm pumping capacity sufficiently to accommodate the rated West Plant Capacity plus in-plant water uses and losses. A budget of \$40,000 is recommended.
8. **Hypochlorite Off-Gassing Improvements:** Hypochlorite off-gassing at the Central WTP and West WTP binds the disinfection feed systems resulting in loss of disinfection capacity. The recommended budget for hypochlorite off-gassing is \$12,000 to provide for safe and automatic release of the off-gas.

TOTAL NEAR-TERM (0 TO 2 YEARS) BUDGET RECOMMENDATION - \$497,000

RECOMMENDATIONS FOR SHORT-TERM (2 TO 5 YEARS):

1. **Central WTP Membrane System Improvements:** The Central WTP generally has adequate redundancy and excess process capacity. If additional system capacity is needed in the future, the Central WTP could more easily accommodate expansion than the West WTP. A review of the membrane cleaning protocols by the membrane manufacturer is recommended. A budget of \$3000 is recommended to bring a Pall Service Representative to the site review current membrane operations and recommend modifications.
2. **System Model and Long-term Master Plan:** Growth in the service area is rapidly increasing. Based on the number of building permit applications, the growth rate is anticipated to continue. Based on recent growth patterns, additional plant treatment capacity will likely need to be online within the next ten years. A master plan that addresses short- and long-term growth, the location of anticipated growth, the availability of the source water supply to meet anticipated demands, and a distribution system computer model to determine how to best serve existing and new service areas is recommended. A budget of \$100,000 is recommended. Long-term budgets can be established through the completion of the master planning effort.

TOTAL SHORT-TERM (2 TO 5 YEARS) BUDGET RECOMMENDATION - \$103,000

Near-Term and Short-Term budget recommendations are summarized in Table ES-1 below.

Table ES-1
Near-Term and Short-Term Budget Recommendations

| Period | Item | Budget Recommendation |
|---|--|-----------------------|
| Near-Term (0 to 2 yrs) | 1. Disinfection Byproduct Formation Reduction | \$100,000 |
| | 2. Remove Obsolete Treatment Unit from West WTP Building | \$50,000 |
| | 3. West WTP Intake Reliability Improvements | \$40,000 |
| | 4. Raw Water System Loss Investigation | \$5,000 |
| | 5. West WTP Membrane System Improvements | \$200,000 |
| | 6. West WTP Raw Water Pump System | \$50,000 |
| | 7. West WTP High Service Pump Station Improvements | \$40,000 |
| | 8. Hypochlorite Off-Gassing Improvements | \$12,000 |
| Subtotal – Near-Term (0 to 2 yrs) | | \$497,000 |
| Short-Term (0 to 5 yrs) | 1. Central WTP Membrane System Improvements | \$3,000 |
| | 2. System Model and Long-Term Master Plan | \$100,000 |
| Subtotal – Short-Term (0 to 5 yrs) | | \$103,000 |
| Total | | \$600,000 |