

San Jacinto River Authority
Raw Water Supply Master Plan
Raw Water Supply Master Plan Development

SCOPE

Introduction

The purpose of the Raw Water Supply Master Plan is to define SJRA options for meeting long-range water supply needs for the SJRA Lake Conroe and Groundwater Reduction Plan (GRP) Divisions in Montgomery County and the Highlands Division in East Harris County. One objective is to refine the 50-year demand projections for industrial, municipal and irrigation water use from Lake Conroe and Highlands Division raw water systems and identify various possible strategies for meeting these demands. The second objective is to prioritize the possible strategies with respect to the risks associated with each, including availability and delivery. The highest prioritized strategies shall be selected for detailed analysis, including sensitivity analyses, estimating the costs of each strategy and developing an associated implementation schedule.

This Master Plan will provide guidance for making long-term raw water supply decisions through the analysis of future demands, existing supplies, and identified future supply projects required to meet identified needs. Demand analysis will consist of a review of various demand scenarios based on projections and potential changes to groundwater regulation and future conservation measures. A range of future demand scenarios will be developed to represent the most likely increases in demand for the service area. Supply analyses will include not only a baseline estimate of existing supplies identified as currently available from accepted state water models but will also include the potential variability of such available supplies which may be predicted as a result of climate change models. Finally, the study will investigate potential water supply options for mitigating or eliminating any identified supply shortfalls through a study of alternative supply strategies, including alternative benefits, financial costs, and potential risks. This preliminary analysis of alternatives will be followed by more detailed analyses divided across this phase of effort and as well as subsequent phases.

This Work Order includes the study of four of the aforementioned alternative supply strategies. Additional projects will be considered under future Work Orders and completed on an adequate schedule to contribute to the completion of the 2021 Region H Regional Water Plan.

Fundamental assumptions related to the study are as follows:

1. The duration of the Master Plan will extend to the 2070 decade as considered in the 2017 and 2022 cycles of State Water Plan (SWP) development. Interim conditions will also be considered based on SJRA preference.
2. The population projections incorporated into the 2017 State Water Plan through modification of the Regional Groundwater Update Project (RGUP) will serve as the basis for population growth within the SJRA service areas.
3. Any costs will be developed or considered using the same basis identified for the 2017 State Water Plan (September 2013).
4. Preliminary screening of project options will follow the Region H methodology for comparison of environmental factors.

Task 1 – Demand Scenario Evaluation

1. Highlands Service Area Demand Evaluation

- a. Review SJRA contract obligations as an alternative range for projected demands.
- b. Summarize a range of estimates of Highlands Service Area demands (low, most probable, and high) for review by and discussion with SJRA staff.

2. Montgomery County Demand Evaluation

- a. Compile existing estimates of industrial demand in Montgomery County based on 2016 Region H RWP, estimates used in development of SJRA DCP update, and other data and information.
- b. Compile existing estimates of irrigation demand in Montgomery County based on 2016 Region H RWP and estimates used in development of SJRA DCP update.
- c. Use the population grid developed for the RGUP, known service area boundaries, and other data and information to determine population projections for major utility service areas in Montgomery County as appropriate for water supply planning purposes.
- d. Apply unit demand factors from the RGUP, the 2016 Region H RWP, and other data and information to develop estimates of average and peak-year demand for municipal users in Montgomery County. Develop uncertainty factors to establish a range of growth projections for low, most probable, and high growth scenarios.
- e. Review SJRA contractual obligations as an alternative range for projected demands.
- f. Consider potential for demand reduction through conservation efforts.
- g. Summarize a range of estimates of Montgomery County demands (low, most probable, and high) for review by and discussion with SJRA staff.

3. Develop Demand Scenarios for Consideration.

- a. Consider results of service area-specific analyses including projected peak and average water demands, contractual obligations, and potential conservation.
- b. Consider Montgomery County approaches to groundwater regulation and potential for future service by SJRA GRP Division through “safe harbor” inclusion of new Large Volume Groundwater Users (LVGUs). Consider continuation of current regulatory plan, consider limit of 64,000 acre-feet annually, and consider up to two alternatives developed through ongoing study by Lone Star Groundwater Conservation District (LSGCD).
- c. Meet with SJRA staff to discuss the existing estimates of demand for the Highlands Service Area and Montgomery County and consider the potential regulatory scenarios that may impact future demands from the SJRA system.
- d. Select three demand scenarios for future consideration.

4. Documentation

- a. Prepare a draft summary report of demand study findings with explanation of methodology and results and conclusions.
- b. Meet with SJRA staff to present the findings of the study.

- c. Receive comments from SJRA staff on the draft report and incorporate into a final document.

Task 2 – Supply Scenario Evaluation

1. Develop Return Flow Factors Relevant to Supply Analysis

- a. Consider future year snapshots for consideration of return flows.
- b. Calculate return flows for the drainage areas above Lake Conroe and Lake Houston and distinguish between return flows associated with GRP-delivered surface water and other sources.

2. Evaluate Climate Impacts

- a. Review existing climate model impacts for the SJRA service area and consider potential impacts to rainfall and evaporation patterns.
- b. Identify scenarios that represent a significant departure from historical climate patterns (greater than 15%) and present to SJRA as potential scenarios for consideration.
- c. Select extreme conditions scenario as a reasonable, worst-case future climate scenario.

3. Highlands Service Area Supply Evaluation

- a. Utilize the Texas Commission on Environmental Quality (TCEQ) Water Availability Model (WAM) Run 3 previously used in the Highlands Water Availability Analysis to determine the monthly availability for San Jacinto and Trinity River Basin supplies available to the Highlands Division.
- b. Develop three future conditions models based on agreed-upon future return flow conditions and maximum diversions. Use developed models to estimate future reliability. Consider contractual agreement with City of Houston (COH) to make Lake Houston diversions firm.
- c. Apply selected climate scenario to future condition models to estimate potential impacts of climate change on supplies.

4. Montgomery County Supply Evaluation

- a. Utilize the TCEQ WAM Run 3 to determine the monthly availability for San Jacinto River Basin supplies available to the Lake Conroe Division.
- b. Develop three future conditions models based on agreed-upon future return flow conditions and maximum diversions. Use developed models to estimate future reliability. Consider contractual agreement with City of Houston to make Lake Conroe supplies available to SJRA.
- c. Apply selected climate scenario to future condition models to estimate potential impacts of climate change on supplies.
- d. Consider contractual agreement with the COH regarding future Lake Conroe water supply.

5. Needs Identification

- a. Meet with SJRA to discuss the combinations of supply and demand scenarios for identification of future needs.

- b. Develop a model in STELLA Modeling and Simulation Software to represent operation of the Highlands and Lake Conroe Divisions and the potential availability from each supply source. Consider infrastructure capacity limitations in model development.
- c. Compare the supply estimates and demand projections developed above to produce estimates of future need in each SJRA service area.
- d. Statistically consider the impacts of the SJRA drought contingency plan (DCP) on the need for additional raw water supplies.
- e. Identify limitations in the system that may cause infrastructure-based needs.
- f. Develop projections of future need for each selected supply and demand scenario.

6. Documentation

- a. Prepare a draft summary report of supply study findings with explanation of methodology and results and conclusions.
- b. Prepare brief summaries of each water right including yield, limitations, and potential impacts to availability.
- c. Meet with SJRA staff to present the findings of the study.
- d. Receive comments from SJRA staff on the draft report and incorporate into a final document.

Task 3 – Preliminary Strategy Identification and Evaluation

1. Strategy Identification

- a. Meet with SJRA to discuss potential strategies for meeting identified long-term needs, including infrastructure (non-supply development) projects and supply-development projects. Strategies for the Lake Conroe service area will include water swap with the City of Houston, transfer of water from Lake Livingston to Lake Conroe, Lake Creek scalping, regional return flows above Lake Conroe and within the West Fork of the San Jacinto River for scalping and transmission to Lake Conroe, Catahoula Aquifer supplies, development of a southern Montgomery County treatment facility, and advanced municipal conservation. Strategies for the Highlands service area will include purchase of water from Chambers Liberty Counties Navigation District or the Trinity River Authority, transfer of additional water through the Coastal Water Authority Main Canal, Trinity River Basin return flows, regional return flows above Lake Houston, and purchase of groundwater for import. Additional strategies may be considered in addition to the options described.
- b. Compare identified needs to project opportunities.

2. Preliminary Evaluation

- a. Complete preliminary analysis for projects using existing information and compile into a matrix format for review and comparison.
- b. Identify information gaps for future analyses.
- c. Meet with SJRA to present initial findings and prioritize potential projects for further study.

- d. Prepare scopes of work and budgets to be reviewed by SJRA prior to commencement detailed strategy studies.
3. Documentation
 - a. Summarize preliminary strategy analysis including tabular matrix of existing information, identified data gaps, and recommendations for future study including a scope of work for additional services.
 - b. Meet with SJRA staff to present the findings of the draft report.
 - c. Receive comments from SJRA staff on the draft report and incorporate into a final document.

Task 4 – Strategy Evaluation and Selection

This task includes initial strategy review for a limited number of potential strategies. Evaluated strategies will include additional alternatives to be completed under subsequent phases of funding.

1. Strategy Evaluation.

- a. Projects to supply water to the Lake Conroe service area.
 - i. Transfer of water from Lake Livingston to Lake Conroe.
 - Review costs in 2016 Region H RWP for Lake Livingston to Lake Conroe Transfer.
 - Revise project concept based on input from SJRA.
 - Add contract cost of water to infrastructure costs to develop comprehensive costs for Lake Livingston Transfer.
 - Develop summary memorandum.
 - Receive comments from SJRA staff and develop final memorandum.
 - ii. Catahoula Aquifer supplies.
 - Review studies performed in the area of northwest Montgomery County to estimate a reasonable volume of water production from the Catahoula Aquifer.
 - Update project costs for brackish water production for use in blending with raw water supplies through either bed and banks or direct transfer to SJRA treatment facilities at Lake Conroe.
 - Develop summary memorandum.
 - Receive comments from SJRA staff and develop final memorandum.
 - iii. Regional return flows above Lake Conroe and within West Fork San Jacinto River for scalping and transmission to Lake Conroe.
 - Identify the location of surface water return flows associated with SJRA GRP using data developed in demand projection portion of the study.

- Project the magnitude of future surface water return flows that may be permitted from GRP participants using data developed in demand projection portion of the study.
- Identify the potential to permit groundwater based return flows in coordination with other water providers within Montgomery County.
- Estimate availability, reliability, and potential cost of permitting identified return flows.
- Prepare planning level estimates of cost for delivery of permitted return flows to Lake Conroe.
- Develop summary memorandum.
- Receive comments from SJRA staff and develop final memorandum.

b. Projects to supply water to the Highlands service area.

i. Regional return flows above Lake Houston

- Identify the location of surface water return flows associated with SJRA GRP.
- Project the magnitude of future surface water return flows that may be permitted from GRP participants.
- Identify the potential to permit groundwater based return flows in coordination with other water providers within Montgomery County.
- Develop summary memorandum.
- Receive comments from SJRA staff and develop final memorandum.