Kennedy/Jenks Consultants

421 SW 6th Avenue, Suite 1000
Portland, Oregon 97204
503-423-4000
FAX: 503-295-4901

Water Supply Development Moratorium Corrective Action Plan

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Prepared for

City of Banks
13680 NW Main Street
Banks, OR 97106

K/J Project No. 0791015*00

Table of Contents

List of Tables ..... *i*

List of Figures ..... *i*

Section 1: Introduction and Purpose 1

1.1 Purpose 1
1.2 Water Supply and Demand, Current and Projected 1
1.2.1 Water Supply Capacity 1
1.2.2 Historical Supply and Demand 2
1.2.3 Projected Demand Versus Supply 2

Section 2: Corrective Action Measures 4

2.1.1 Leak Repair Program 4
2.1.2 Capital Improvement Projects 5
2.1.3 Water Conservation Ordinance 6
2.1.4 Aquifer Storage and Recovery 6
2.2 Evaluation of Corrective Actions 6

References *8*

List of Tables

1 Historic Production and Demand Summary

List of Figures

1 Projected Summer ADD and MDD Compared to Current Supply and Supply Increased by Transmission Line Replacement
2 System Water Losses by Month During the Leak Detection and Repair Program

Section 1: Introduction and Purpose

1.1 Purpose

During a city council meeting held on December 11, 2018, the Banks city council voted to adopt Resolution No. 2018-19 to declare a moratorium on new development throughout the City because the municipal water demand is projected to exceed supply under the current development trend (City of Banks, 2018). Pursuant to ORS 197.530, the City shall adopt a corrective action program to address the water system deficiencies causing the moratorium and present this plan to the Department of Land Conservation and Development at a public hearing. The purpose of this Corrective Action Plan is to summarize the current and projected water system deficiencies and to document short- and long-term corrective measures.

1.2 Water Supply and Demand, Current and Projected

Kennedy Jenks prepared a Water Inventory Analysis (Kennedy/Jenks 2018) to gain an understanding of current and projected seasonal demand and supply based on buildout of the Urban Growth Boundary. CwM-H2O produced an Aquifer Storage and Recovery (ASR) Feasibility Study (CwM-H2O, 2018) for the City of Banks to use ASR to offset projected average annual municipal water demand using current or potential water sources. Summarized below are the findings of those reports related to current and projected water supply and demand.

1.2.1 Water Supply Capacity

The City currently has water rights or groundwater permits totaling 1,019 gpm of permitted water. The surface water rights authorize 188 gpm from the West Springs and 81 gpm from the East Springs, collectively known as the Green Mountain Springs (269 gpm total). Groundwater permits authorize withdrawals of 301 gpm and 449 gpm from Behrman Wells No. 1 and No. 2 respectively. The actual capacities of these sources are less than their permitted capacities.

A water supply inventory was prepared to determine the maximum theoretical surface water supply from the Green Mountain Springs (Springs) as detailed in the ASR Study. Maximum annual production possible from the Springs was determined to be 114 million gallons per year (MGY), though current infrastructure limitations mean that effective production is closer to 93 MGY. The seasonal nature of the Springs water supply limits its utility, as the maximum period of productivity occurs during the period of minimum demand, and the minimum period of productivity occurs during the period of maximum demand.

Maximum annual groundwater production from the Behrman wells is believed to be 71 MGY, based usage data from 2012, when demand was at a maximum relative to supply. The total theoretical system capacity is estimated to be 140 MGY, considering a safety factor of 15%. The wells typically make up the demand deficit during the high demand period, however, extended pumping of wells during peak demand periods results in diminished capacity and unsustainable use of the aquifer resource.

1.2.2 Historical Supply and Demand

As detailed in the ASR Study, Historical production from 2013-2017 is 113 MGY, or 81% of the estimated current annual supply capacity of 140 MGY. Average Daily Demand (ADD) over the five-year period from 2013-2017 was 142 gallons per capita per day (gpcpd) based on a total service population of 2,080 persons served. These values take system water losses into account.

Historical seasonal production, demand, and losses from the years 2015-2018 are presented in the Water Inventory Analysis. This analysis is summarized below in Table 1.

Table 1: Historic Production and Demand Summary

Parameter	Jun-Aug 2015-2018	Sep-May 2015-2018
Total Water Production[(a)], Surface and Groundwater, gpd	620,435	219,478
Estimated Water Loss, gpd	97,360	91,161
Average Day Demand, gpcpd[(b)]	108	66
Max Day Demand[(c)], gpcpd	248	152
Effective ADD, gpcpd	155	107
Effective MDD, gpcpd	356	245

Note:
(a) consists of Green Mountain Springs and Behrman wells 1 and 2
(b) assuming 3 persons per connection
(c) Effective values are inclusive of water consumption and unaccounted water
ADD = average daily demand
MDD = maximum daily demand
gpcpd = gallons per capita per day

Table 1 shows ADD was 108 gpcpd (based on an average of 3 persons per connection) during the high-demand season of June through August, and 66 gpcpd during the low demand period from September through May. However, system losses during these two periods were approximately 30% and 42%, respectively, creating effective ADDs of 155 and 107 gpcpd during the same periods. Maximum daily demand (MDD) exceeded supply three times during several periods of extended hot weather in 2014, 2015, and 2018 and Stage 1 curtailments were issued by the city to reduce demand to meet supply.

1.2.3 Projected Demand Versus Supply

The City is currently undertaking a number of projects to minimize system water losses. Assuming that these losses are lowered to 10% of production, the ASR study projects an annual per-capita water demand of 126 gpcpd. Based on a constant population growth model, the ASR

study estimates an annual average ADD of 119 MGY in 2018 growing to 157 MGY in 2050. The total annual deficit between supply and demand in 2050, assuming the loss of the East Springs (24 MGY) supply in the event of an emergency or ecological water supply scenario, is 42 MGY. This analysis is detailed further in the ASR study.

A seasonal water demand analysis is presented in the Water Inventory Analysis and compares the MDD and ADD against current and future water supply. This analysis is presented below as Figure 1:

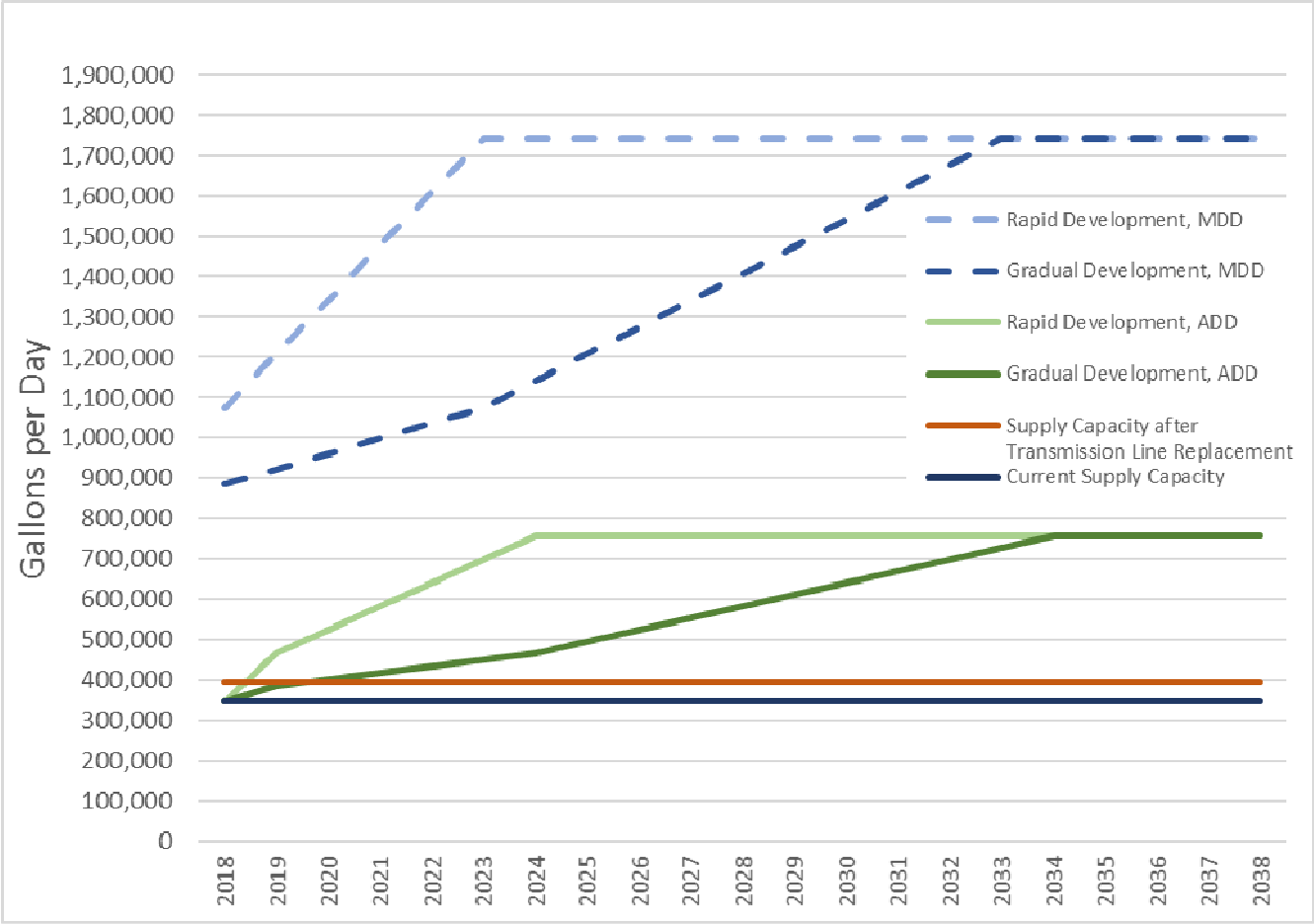

Figure 1: Projected Summer ADD and MDD Compared to Current Supply and Supply Increased by Transmission Line Replacement

Figure 1 presents a future demand condition based on two development scenarios. In both scenarios, a total number of connections will be added within the Urban Growth Boundary (1,513 connections in total), either gradually or rapidly. Both the current supply and additional supply available assuming the repair of the Sellers road transmission pipeline are shown as horizontal lines in Figure 1. Limiting ADDs and MDDs are presented here, that is, assuming a maximum per capita demand reflecting the current ADD during the high demand period from June-August. Under both scenarios, the system can only meet the current ADD, while all future ADD and MDD projections exceed capacity.

Section 2: Corrective Action Measures

To address the historic water loss and projected gap between supply and demand, the City implemented a leak detection and repair program beginning in 2014. The program assisted in identifying key repairs and capital improvements to improve distribution system efficiency. In 2018, the City adopted a water conservation ordinance; and a study on aquifer storage and recovery (ASR) was completed to determine the feasibility of long-term storage of water from the springs and additional sources. Finally, the City will evaluate the result of each improvement to determine the effectiveness of corrective actions. This section summarizes the measures and efforts to be completed.

2.1.1 Leak Repair Program

From 2014 through January of 2016, the City conducted a series of water audits through the production, transmission, and distribution system. Audits were conducted using metered water use, estimated unmetered usage (such as hydrant testing, line flushing, fire department uses, and unauthorized connections) were estimated. Where possible, individual customer meters older than 20 years were replaced. Other city meters were periodically calibrated to improve audit accuracy. Based on these audits, known leaks were prioritized for repair.

System water losses were reduced by approximately 1.5 MG per month, or 18 MGY from November 2014 to December 2015, as shown in Figure 2 (Kennedy/Jenks, 2016).

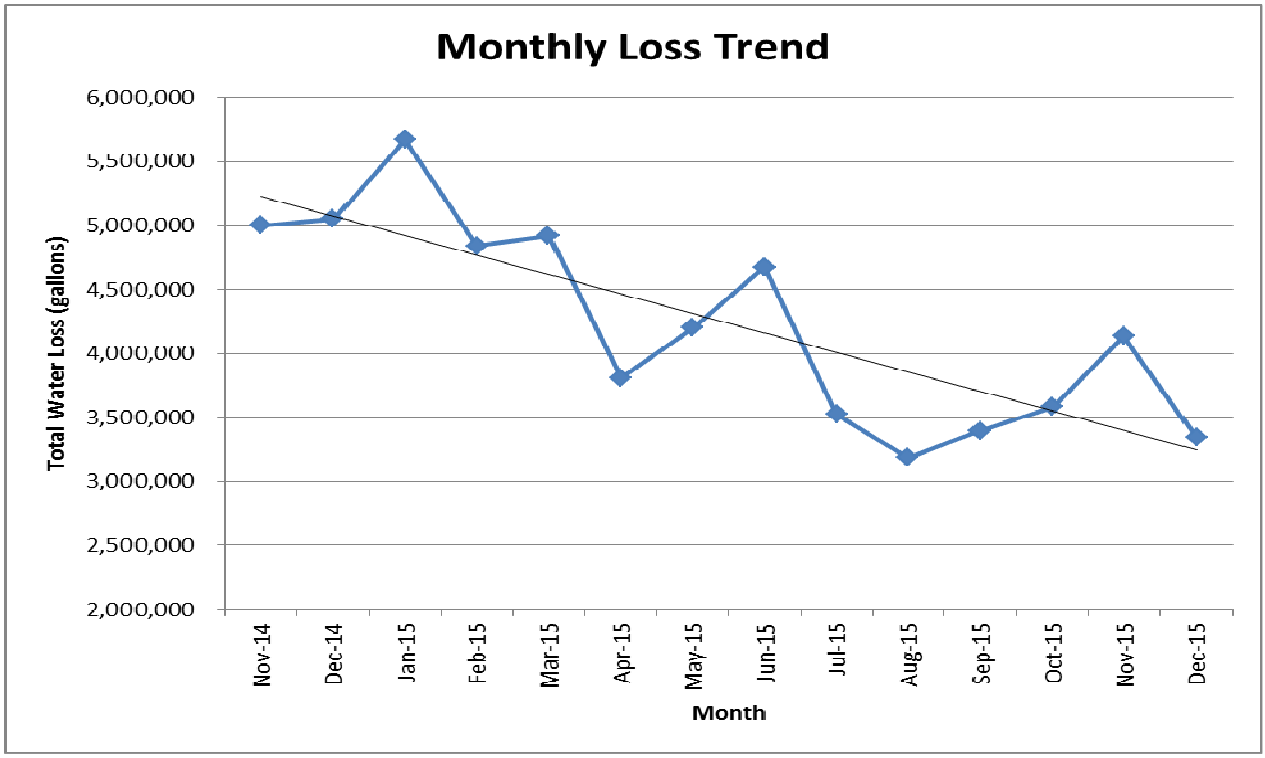

Figure 2: System Water Losses by Month During the Leak Detection and Repair Program

Monitoring continues, but in decreased scope while other measures are implemented. Future capital improvement projects will be conducted and are expected to further decrease system water losses. A more detailed review of specific improvements provided in Section 2.1.2.

2.1.2 Capital Improvement Projects

The Water System Capital Improvement Plan (CIP) was last updated in September 2014 (Kennedy/Jenks, 2014). In January 2019, a new draft CIP was submitted to the City Council for consideration (Kennedy/Jenks, 2019). We anticipate the updated CIP will be adopted by City Council in the first quarter of 2019. The updated CIP includes the following projects designed to improve water loss detection, decrease water losses, or increase supply:

- Sellers Road Transmission Pipeline replacement (2020)

  This transmission line is the site of significant water losses and will be replaced along its entire 3.2-mile length beginning in 2019. This replacement is estimated to provide additional supply for 92 connections, or approximately 46,100 gallons per day during peak demand months of June through August.

- Automatic Meter Reading

  Replacing current analog meters with automatic meters which remotely read and transmit usage data. Better metering is critical to understanding where water losses are occurring.

- Distribution System Looping and Upgrades (2024)

  Dead-end lines will be looped, and undersized lines will be upgraded through the distribution system, occurring in 9 different areas. Two specific projects are planned:

  - Commerce Street Waterline Improvements are under contract to be constructed and will be completed in 2019

  - Park/Woodman Street Waterline Improvements have been submitted for funding and are projected to be constructed in 2024

- Banks Road and Cedar Canyon Road line replacements

  Both of these are large distribution mains lines with significant water loss and are currently in design. If funding is available, these projects are projected to be complete in 2020.

- Additional Source Development/Water Providers

  A number of potential sources have been identified to increase supply, including acquiring the groundwater rights and well currently serving the Quail Valley Golf course, obtaining supplementary water from the City of Forest Grove and/or the Tualatin Valley Water District, and securing a surface water right and supply from the West Fork of Dairy

Creek. A new water supply would require a water treatment plant (WTP) to be constructed. In addition, an ASR system can provide storage of water from the wet season when supply is available to be withdrawn during the high demand season. This project is projected to be complete between 2024 and 2028.

2.1.3 Water Conservation Ordinance

During the city council meeting held on 11 December 2018, the council also adopted an ordinance (No. 2018-10-01) to promote and enforce water conservation. Specific provisions include:

- New connections are prohibited unless they demonstrate that the City has sufficient capacity to serve these connections
- New groundwater wells are prohibited within the UGB
- Withdrawing water in excess of beneficial use is prohibited
- Water efficient landscaping and fixtures must be adopted in new developments
- Irrigation regulations, including seasonal and daily regulations, have been adopted

For more detail, see the text of ordinance No. 2018-10-01 (City of Banks 2018).

2.1.4 Aquifer Storage and Recovery

CwM-H2O conducted a study on the feasibility of an ASR System (CwM-H2O, 2018). Results of this study show that ASR is feasible for the City in terms of aquifer storage capacity, recovery of stored water, existing infrastructure capacity, and permitting. The feasibility of ASR is limited by the City's existing source water supplies. The Green Mountain Springs surface water supply does not have the winter flow volume necessary to meet the City's winter demands and support an ASR system. Thus, additional supply is necessary.

The recommended ASR alternative is presented in three phases. Phase 1 consists of acquiring a new water supply. Currently, the Quail Valley Golf Course well is being evaluated for water right and mechanical suitability. This well would be added to the Well 2 water right, and be used for a pilot ASR program. Following a successful pilot test, Well 2 will be redeveloped for ASR as well. Phase 2 consists of developing water rights for diversion on the West Fork of Dairy Creek during periods of high flow during the winter. A new WTP would also be constructed for this diversion prior to injection into the ASR system. Phase 3 consists of exploration and development of a deep basalt well southwest of the city to expand the capability of the ASR system to meet summer time demands.

2.2 Evaluation of Corrective Actions

The results of the corrective actions will be evaluated on a quarterly basis by reviewing monthly water demand data and calculating per capita demand. Activities in 2019 will include the following tasks:

- Identify new leaks and repair them promptly

- Monitor per capita demand based on monthly demand data with the goal of reducing demand to 125 gpcpd

- Prepare a semi-annual evaluation of water demand, water loss reduction

Six months after adoption of the development moratorium, the monthly results will be compiled and submitted to City Council for evaluation. At that time, the City Council will determine if the moratorium will be continued.

References

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