RICHARDSON & O'LEARY
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19 January 2007

Ms. Jean Jewell
Commission Secretary
Idaho Public Utilities Commission
P O Box 83720
Boise ID 83720-0074

Hand Delivered

RE: Case No. EAG-W-05-02 / EAG-W-07-01

Dear Ms. Jewell:

Pursuant to Commission Order Nos. 29840 and 30213, Eagle Water Company, Inc. ("Eagle Water") herewith submits its Final Preliminary Engineering Report for the Commission's review.

Further pursuant to Commission Order No. 30213, Eagle Water intends to submit an application for a rate increase on or before March 1, 2007, following Commission review of the enclosed report and further discussions with Commission Staff.

Sincerely,

Molly O'Leary
Richardson & O'Leary, PLLC

Enclosure

MTC, INC.
CONSULTING ENGINEERS, SURVEYORS, AND PLANNERS
707 N. 27TH ST. BOISE, IDAHO 83702-3113 (208) 345-0780 FAX (208) 343-8967

EAG-W-05-02/EAG-W-07-01

Ms. Tiffany Floyd, Regional Drinking Water Manager
Department of Environmental Quality
Boise Regional Office
1445 N. Orchard St.
Boise, ID 83706

19 January 2007
Project 05-840

Dear Ms. Floyd,

Transmitted herewith are three copies of the final draft of the Preliminary Engineering Report on the Eagle Water Company, Inc. water system as required by 1076/16RO Consent Order.

We look forward to assisting you in any manner necessary during your review of this report. Please contact us directly if you have any questions.

Yours truly,

REGISTERED PROFESSIONAL ENGINEER 1840 JAMES M. REES

James M. Rees, P.E.
MTC, Inc.

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IDAHO PUBLIC UTILITIES COMMISSION

MTC, INC.
CONSULTING ENGINEERS, SURVEYORS, AND PLANNERS
707 N. 27TH ST. BOISE, IDAHO 83702-3113 (208) 345-0780 FAX (208) 343-8967

Mr. Robert V. DeShazio, Jr.
Eagle Water Company, Inc.
P.O. Box 455
Eagle, ID 83616

January 19, 2007
Project 05-840

Dear Mr. DeShazio,

Transmitted herewith is the final draft of the Preliminary Engineering Report performed on the Eagle Water Company, Inc. water System.

We sincerely appreciate the opportunity to be of service to you on this project and we look forward to continue to serve you..

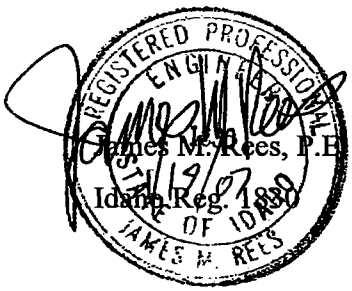
Yours truly,

REGISTERED PROFESSIONAL ENGINEER 1830 STATE OF IDAHO JAMES M. REES

James M. Rees
MTC, Inc.

ENGINEER'S CERTIFICATION AND DECLARATION

James M. Rees and Chet A. Hovey, hereby certify that they are Registered Professional Civil Engineer in the state of Idaho. They declare that this Preliminary Engineering Report was prepared under their direct supervision for Eagle Water Company, Inc., Ada County, Idaho.



James M. Rees, P.E.
Idaho Reg. 1880

Chet A. Hovey

Chet A. Hovey, P. E.
Idaho Reg. 11861
1-19-07

Acknowledgements

We wish to acknowledge the willing cooperation and assistance of the staff of Eagle Water Company and the City of Eagle. Particularly we acknowledge the efforts of Mrs. Betty Holt and Mrs. Toni Velie at Eagle Water Company in provide us with the meter records necessary to perform the consumption analysis. Your patience and forbearance were exemplary. We would also like to acknowledge the modeling efforts provided by Ward Engineering Group. Thank You.

MTC, INC.
CONSULTING ENGINEERS, SURVEYORS, AND PLANNERS
707 N. 27TH ST. BOISE, IDAHO 83702-3113 (208) 345-0780 FAX (208) 343-8967

Mr. Robert V. DeShazo, Jr.
Eagle Water Company, Inc.
P.O. Box 455
Eagle, ID 83616

19 January 2007
Project 05-840

Dear Mr. Deshazio,

In the following Executive Summary are the main findings and recommendations of this study:

1. Eagle Water Company serves 2924 residential accounts, 358 commercial accounts, and 112 landscape irrigation accounts.

2. Eagle Water Company's records for 2006 show an annual production of 815 mg/yr resulting in the following rates:
   - D.U. Max Day Demand 1.12 gpm/D.U.
   - System Max Day Demand 5.26 mg/d
   - Average Day System Demand 2.23 mg/d

3. The breakdown by use is approximately as follows: Residential 75%, Commercial 11%, and Landscape Irrigation 14%. These figures are based on annual averages and will vary by season.

4. Population growth shows few signs of slowing down. Growth in the Eagle Water Company's service area will be primarily by infill, densification, and/or service area expansion.

5. Water supply source is pumped groundwater from six wells (#1, #2, #3, #4, #6, and #7).

6. Recommended system improvement are:

Description	Cost Estimate
New Water Source – Well #7 (Constructed and Online)	$620,000
Well #7 Interconnect (Constructed and Online)	$146,000
Upgrade Pump in the Main Booster Pump Station	$29,360
Install PRSV on Floating Feather Road	$25,000
Upgrade Pump in Booster Pump Station #2	$30,500
New Water Source	$785,000
Emergency Backup Power	$160,000/site

Install SCADA/Telemetry System.....$23,000/site plus $25,000/master site

7. Recommended future system study elements are:
   - Provide ongoing system model maintenance

The recommended current system improvements based on 2006 price estimates is $2,142,000.

We sincerely appreciate the opportunity to be of service to you on this project and we look forward to continuing to serve you.

Yours truly,

James M. Rees, P.E.
MTC, Inc.

EAG-W-05-02/
EAG-W-07-01

REPORT SUMMARY

Authorization

Pursuant to the contract agreement between the Engineers, MTC, Inc. (MTC) and Eagle Water Company, Inc. (EWC or "the Company"), MTC, Inc. has performed this water distribution system study on the Company's system.

Purpose, Need, and Plan of Study

The purpose of the investigation was 1) to identify current system pressure and supply deficiencies, if any 2) to identify and analyze potential remedial actions, and 3) to generate a model for the Company to use as a tool in current and future planning, monitoring, and management. The scope of the investigation was system-wide. At the current time, the Idaho Department of Environmental Quality (IDEQ) has placed a development moratorium on the Company's certified service area until potential remedial actions are identified.

The principle need for the study was to identify facility improvements, if any, needed to eliminate low pressures.

The need for additional supply has long been recognized. In the early 1990's, a well was proposed near State Highway 55 (SH-55) and Hill Road, however, access was a major obstacle and the well was never drilled. Well #4 was completed in 1992 near the South-central area of the service area. Well #6[1] was completed in 1996 near the West end of the service area. A connection was begun from Well #6 thence West on State Street and North on Ballantyne Road to Country Side Subdivision. The plan was to continue North on Ballantine Road then East to the existing Floating Feather mainline. The request for this as service area was denied by the IPUC so the connection was never made. Another possible routing through the proposed Covenant Hill Subdivision was also thwarted when the subdivision area was removed from the Company's service area by the IPUC and included in the service area of United Water-Idaho.

In the meantime, the City of Eagle has been in a significant growth pattern. Census and population estimates, as obtained from the Idaho State Department of Commerce and Labor and other sources, are shown below:

Historical Population Data

1990	4,577
1995	6,777
2000	11,085
2004	16,176

The 2006 population estimate by the City of Eagle is 20,130.

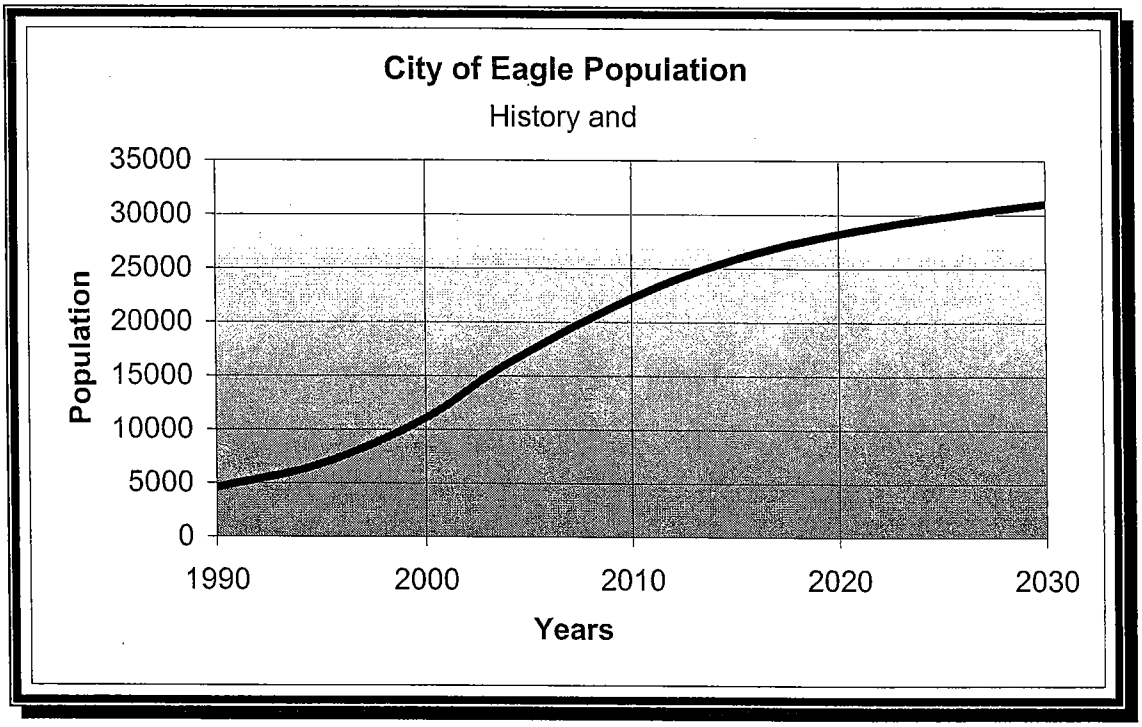
[1] There is no Well #5.

The demographics group of COMPASS of IDAHO, a regional planning agency, provided the following population figures:

Population Projects

2005	19,124
2010	22,227
2015	25,854
2020	28,216
2025	29,785
2030	31,043

The chart below shows historical data in conjunction with growth projections for the City of Eagle.



Portions of this growth were by annexation and were outside the Company's service area. However, growth has occurred within the EWC service area as well through population growth, residential infilling, and an expanding commercial base as shown by the increase in the number of residential and commercial accounts serviced. Further information about water accounts will be provide later within this summary. The need for additional supply remains to this day.

EWC needs an updated master plan to keep pace with the growth in its service area and to continue to provide cost effective, quality service to its customers. To that end, EWC is working to stay ahead of the curve and anticipate domestic water supply needs and fire flow requirements.

The plan of study was to utilize computer based modeling software, calibrate the model to available existing system data, and then test various scenarios in the model to see their impact on the overall system's modeled operation. Based on system evaluations, system improvements will be identified with a prioritization and cost estimate.

Generalized Description of the Existing Conditions and Water System

The certified service area of EWC, Inc. lies in portions of Sections 2, 3, 4, 8, 9, 10, 11, 14, 15, and 16, in T. 4N., R. 1E., B.M., City of Eagle, Ada County, Idaho. Physiographically it is on the alluvial fan of Dry Creek together with portions of the adjacent Boise Front foothills and the Boise River floodplain, all North of the North Channel of the Boise River between River Miles ~42 and ~46. Portions in the North and East lie on terraced alluvium left by the down cutting of the Boise River. Topographically the majority of the service area lies West of the Boise Front foothills between elevations 2650' and 2500 feet; the balance rises to the East to an elevation of 2800± feet. The geology, as read in the well logs, is generally coarse sand to silts and clays, with minor horizontal lenses of coarser grained materials from major storm events, as would be expected at the mouth of a major drainage. The soils in the alluvial fan areas are in the Notus-Moulton-Falk series while those on the foothills are in the Quincy-Lankbush-Brent series.[2] With the exception of Dry Creek, the surface hydrology has been significantly modified by over a century of agricultural activity and by urban/suburban development. Groundwater is encountered between -2' and –40' depending on proximity to the river; well depths vary from 230' to 466 feet; and drawdown varies from 60' to 160 feet.

There are no known cultural resources, prime agricultural lands, or wetlands in the service area. The Southern boundary of the service area is the North Channel of the Boise River that is in the City of Eagle's designated Scenic Corridor. Most of the area is developed and in general, the native fauna and flora have been supplanted by domestic pets, decorative plantings and grasses.

One well is located planimetrically in the mapped fringe area of the Boise River floodplain; however, it is elevated above the 100-year base flood elevation as required by the City ordinance.

With an estimated 2006 population of 20,130, the City of Eagle covers about 17 square miles. The Company's water distribution system lies generally within the City of Eagle and it's area of impact. In 2006, service was provided to 2924 residential accounts, 358 commercial accounts, and 112 landscaping accounts.

The supply and distribution systems, owned and operated by the Company are the subject of this study. Included are five wells (#1, #2, #3, #4, #6, and #7) and associated pumping stations, one water storage facility for well #2 booster pump station, two booster pump stations

[2] Soil Survey of Ada County, Idaho; USDA Soil Conservation Service, 1977.

(main and well #2), and approximately 54 miles of waterline, with appurtenances, of which about one mile (less than 2% of the overall system) is smaller than 6-inch. All these smaller lines serve five or fewer customers and/or short cul-de-sacs, and all are without fire hydrants and flows are acceptable. See Appendix A for system inventory.

The existing water supply is pumped groundwater from the deep aquifers under the Boise River floodplain. All wells have been permitted by the Idaho Department of Water Resources and logs are on file in their offices. See Appendix B for well logs.

Water Quality/Security

The water quality is good and meets the public drinking water standards. In addition to specific testing required by the IDEQ, EWC personnel perform wellhead tests monthly. There have been no known problems with water quality.

All well/pump house facilities are securely locked. Each facility is inspected daily and the pumping quantities and pressures are recorded.

Source Protection Plan

A Source Protection Plan is on file in the EWC office. Currently the system operator monitors the provisions of the Source Protection Plan in operation of EWC's system. General source protection practices include but are not limited to the following:

1. Well houses shall not be used for storage of any chemicals.
2. Well house access is limited to operating staff and persons they admit. No person shall be admitted into a well house unless a member of the operating staff is present.
3. Well sites are visited daily by maintenance personnel in the course of operation and any potential source of contamination is immediately noted and removed.

According to the EWC personnel (Tom Gilbert), A Source Water Assessment Final Report was prepared by DEQ that defined the potential for water contaminates.

A Brief System History

Eagle Ranch Water Company was formed in 1972 to serve Eagle Ranch Subdivision. In 1974, the Company applied to the Idaho Public Utilities Commission for a ruling to establish the Eagle Ranch Water Company. In 1976, the Public Utilities Commission ruled on case No. U-1116-1 Order No. 12621 to establish Eagle Ranch Water Company. At that time, there were 150 customers and Well No. 1 was the only well in the system. As the customer base grew, Well No. 2 was drilled and integrated into the system. Eagle Hills subdivision water system was acquired and it's well designated as Well #3. Due to problems of sand production, however, Well No. 3 is generally used for backup.

In the 1980's, the company name was changed to Eagle Water Company, Inc (EWC). Water meters were added in 1986 and the billing rate was changed from a flat rate basis to a meter rate basis. Well No. 4 was drilled and added to the system in 1992. With the expansion of the City of Eagle, Well No. 6 was drilled in 1996 in order to:

1.) Serve the West side of the service area, and

2.) Provide additional supply for the system once this well was looped to the North and connected to the existing EWC 12" mainline on Floating Feather Road. (This connection has yet to be made.)

The Floating Feather 12" mainline is a major line to the higher East end of the service area.[3]

WaterCAD® Modeling

As with any computer modeling, there are often differences between data from a model and the actual workings of the system. We have compared the actual water system performance against the model results and are satisfied with the correlation.

Current Modeling Project

This modeling effort was begun in the Fall of 2005 utilizing Haestad Methods' WaterCAD® v7.0 software. The model required the following input for analysis:

i. Horizontal and vertical geometry
ii. Water source information
iii. Pumping information
iv. Consumption data
v. Performance criteria

i.) Horizontal and vertical geometry was obtained from EWC and MTC Engineers. Pipe number and junction node numbers were then assigned to an AutoCAD® model. The model was then imported as the background layer of the WaterCAD® model and used as the guide for constructing the WaterCAD® model. Node elevations were obtained from existing record drawings and topographical mapping. System demands, water sources, and other controlling hydraulic features were incorporated within the model. This established the base model.

ii.) Water source for the EWC system is groundwater pumped from six wells. Information regarding the wells was obtained from the IDWR well logs, test pump records, EWC records, and MTC Engineers' records. This information includes well stratigraphy, depth, diameter, casing, screen placement, and pumping/drawdown data.

[3] The service area has an elevation difference of ~160 feet from its Western edge, West of Well No. 6 (elevation 2560 feet), to the East end of Big Springs Boulevard (elevation 2720 feet). This equates to a pressure difference of 70± psi.

From water consumption and production data, it was obvious that an additional water source was required and new Well #7 was drilled and constructed. The new Well #7 is located in the NE^4 of the SW^4 of Section 15, T.4N., R.1E., B.M., Ada County, Idaho. Well #7 has just recently been completed and put online during the course of completing this report. Well #7 was originally tested at 1350 gpm with 130 feet of drawdown. This was because the driller and test pumping company set the test pump at 160 feet. The production pump was installed at 200 feet. The well was later test pumped with the production pump at 1800 gpm with a total drawdown of 190 feet. For modeling purposes, the maximum pumping rate was conservatively limited to 1600 gpm with a drawdown of 160 feet. It is anticipated that with additional testing and further development of the well, the capacity of the well could be increased.

iii.) Pump information was obtained from the pump identification plates, manufacture's catalogues, well logs, test pump records, and EWC records. Pumping curves were either obtained from the manufacture's pump performance curves or hand generated. Also provided by EWC was information on the pump controller settings for the variable speed pumps (VSP) and the fixed speed pumps with on/off pressure settings.

iv.) Consumption data for commercial and residential customers were provide by EWC. This data was used to assign proportional flows to each node within the model. A copy of this data is included in Appendix C. In addition to this information, EWC provided the total annual demand and the maximum day demand for the years 2003 through 2006.

System Demand

Year	Annual Demand (gallons)	Maximum Day	Maximum Day Demand (gpd)
2003	675,334,680	7/13/03	4,647,000
2004	689,607,640	8/16/04	4,763,000
2005	624,127,005	7/17/05	5,180,000
2006	815,222,000	8/27/06	5,261,000

Annual demand data can fluctuate from one year to the other due to weather variations, system improvements, and such things as a water service rate designed to encourage water conservation in high demand seasons. Typical variations can happen as can be seen by the 2005 data.

The peak day demand is steadily increasing due the increase in water accounts served. To determine the maximum day demand per account and determine if it is changing with time, the maximum day demand was divided by the number accounts for the years 2003 through 2006. The results are listed in the table below.

System Demand

Year	Maximum Day Demand (gpd)	Account Total	Maximum Day Demand per Account (gpm)
2003	4,647,000	2,745	1.18

2004	4,763,000	2,888	1.15
2005	5,180,000	3,196	1.13
2006	5,261,000	3,261	1.12

The table shows a continual decrease with time for maximum day demand per account. In projecting future demands on the water system, it was conservatively assumed that each water account would have a maximum day demand of 1.12 gpm instead of following the downward trend.

Each water account was considered a dwelling unit (D.U.). Using the AutoCAD®/WaterCAD® model, each D.U. was assigned to a specific node and the maximum day demand was applied.

v.) Calibration of the model was verified comparing modeling results with actual fire hydrant flow test data. Fire hydrant flow testing was performed in August of 2006 at three strategic locations within the system. The following table shows the results and indicates the result from the 2006 Scenario, which does not include any of the approved developments.

Hydrant Flow Summary

Location	Corresponding Junction	Field Pressure at 1500 gpm (psi)	Model Pressure at 1500 gpm (psi)
HomeDepot	J-960	84	68
Lakeland – Whitby	J-437	81	43
Edgewood & Clubhouse	J-116	53	45

A copy of the fire hydrant testing is located in Appendix D and modeling results for the 2006 Scenario is included in Appendix E. As can be seen in the Hydrant Flow Summary table above, the results from the field hydrant testing indicate the fire flow availability in the model is less than what was available in the field. This is expected because the model is using the maximum day demand, which is likely higher than the actual demand on the system when the hydrant testing was conducted. It is also evident in the results that the difference in pressure from the model and actual field tests are not consistent. This can be explained due to the current demand on the system and how it affects the production rates due to different pressures within the system.

vi.) Performance criteria are listed in the general requirements for all public water systems found in the *Idaho Rules for Public Drinking Water Systems* (IRPDWS) and the *Recommended Standards for Water Works* (RSWW). Additional information supplementing the IRPDWS and RSWW were provided by Mr. Monty Marchus, P.E., IDEQ-Boise Office, in his Design File Notes (DFN) titled *Pressure Requirements-Public Water Systems* and *Design Flows-Public Water Systems*. Additional correspondence with IDEQ and an interpretation of rules is included in Appendix F. Specific standards utilized in this modeling were pressure related rather

than demand related. For example, fire flow during the maximum day demand requires satisfying the pressure standards of 20 psi residual and a system wide minimum of 20 psi. The system also needs to meet the system wide operational pressure standards of 100 psi maximum and an optimal minimum of 40 psi during normal operations.

WaterCAD® Modeling Results

A computer model was setup to simulate the existing 2006 water system w/ approved developments, the 2010 water system, and the 2026 water system. Each of these scenarios was run with well # 4 off and then well #6 off per the General Design Conditions (Section 501.17.a). Because the water system is considered a pumping system and is not equipped with storage, the system is required to meet fire flow conditions with the largest well out of service. Due to the nature of the water system with multiple pressure zones, the system was modeled with the largest well turned off in each pressure zone. Because Well #7 is a new well with new equipment and soon with emergency backup power, Well #4 was selected to be turned off in the lowest pressure zone. The modeling output for all scenarios is included in Appendix G. Figures of the water system are shown in Appendix H. The Fire Marshal of Eagle Fire Department has informed MTC that the minimum fire flow requirements for one and two family dwellings having area less than 3,600 square feet shall be 1,000 gpm. Correspondence with the Fire Marshall is included Appendix I. However, for insurance rate purposes only, the model was setup to determine which fire hydrants do not have a 1,500 gpm fire flow while maintaining a minimum system pressure of 20 psi.

2006 Scenario w/ Approved Developments

The 2006 Scenario w/ Approved Developments includes the existing water system, Well #7 and related infrastructure along with the IDEQ approved developments the new St. Lukes Medical Center and Gladstone Subdivision.

The maximum day demand for 2006 without these approved developments is 3,653.5 gpm. The maximum day demand flow was determined using actual 2006 data as discussed and reviewed by IDEQ. The peak day demand was increase to 3801.28 gpm to account for the additional consumptive use by the approved additions.

Two improvements were made over the existing water system condition for modeling purposes. These improvements included replacement of a butterfly valve in Floating Feather Road with a pressure reducing/sustaining valve and adding a pressure reducing/sustaining valve to the Gladstone Subdivision. The addition of the pressure reducing/sustaining valve at Gladstone Subdivision is a recommendation only. Under normal operation, the valve will be completely open and would only be used to maintain the pressure in the middle pressure zone under a major line break in the lower pressure zone.

A summary of the modeling result is shown in the table below with all the wells in operation, then with Well #4 off, and then with Well #6 off.

2006 w/ Approved Developments Modeling Results

Scenario	Minimum System Working Pressure (psi)	Minimum Fire Flow Within the Water System for Residential Junctions (gpm)	# of Residential Junctions Below Fire Flow Requirement (1,000 gpm)	# of Residential Junctions Below Suggested Insurance Minimum (1,500 gpm)	Minimum Fire Flow Within the Water System for Commercial Junctions (gpm)	# of Commercial Junctions Below Fire Flow Requirement (2,500 gpm)
All Improvements On	45	1501	0	0	2702	0
Well 4 Off	40	806	37	101	1160	11
Well 6 Off	42	907	1, J-186	52	1571	4

The results indicate the need for an additional water source or the increase in capacity within the system. The main booster pump station is not equipped with enough capacity to utilize the combined flow from Well #4 and Well #7.

2010 Scenario

Growth rates were estimated using the City of Eagle's population predictions and applied to the EWC's water accounts. Currently, EWC has three types of water accounts; Residential, Commercial, and Agricultural. The following table lists the current water accounts and the anticipated water accounts for 2010 and 2026.

Water Accounts Summary

Year	Residential Accounts	Commercial Accounts	Agricultural Accounts	Total Water System Accounts
2006 w/ Approved Developments	2,924	358	112	3,394
2010	3,333	408	112	3,853
2026	3,603	530	112	4,245

As the table above indicates, it was assumed that growth will occur in Residential and Commercial accounts only and Agricultural accounts would remain constant. This is because of the policy of the City of Eagle that all new development must be equipped with a pressurized secondary irrigation system from existing irrigation water rights.

A planning unit was assigned for both residential and commercial growth. The residential planning unit for ultimate build-out was assumed at 2.25 D.U.s/acre. A total of 301.6 acres were

identified for potential residential growth and using population projections a total of 409 residential D.U.s were evenly distributed. The resulting density was 1.36 D.U.s/acre, which indicates build-out would take place after the year 2010, closer to 2014, using the City of Eagle's population projects.

The commercial development planning unit can vary upon end use. For planning purposes, a commercial development planning unit of 2.5 D.U.s/acre was used as ultimate build-out. For the 2010 Scenario, an additional 50 commercial D.U.s was estimated above the 2006 w/ Approved Developments Scenario. Six commercial development parcels containing 162.2 acres were identified in the 20-year development window excluded the St. Lukes Medical Center.

The model used a peak day demand of 4,241.44 gpm plus fire flow. System modifications are shown on figures included in Appendix H. Modifications to the model from the previous 2006 Scenario w/ Approved Developments are listed separately below.

- Upgrade Main Booster Pump Station Capacity – The model indicated modification to the booster pumps in the Main Booster Pump Station is required. With the addition of Well #7 and the proposed Well #8 discussed below, the Main Booster Pump Station capacity must be increased to distribute the flow through the water system. As the modeling results shown in the previous scenario, the water sources generate more flow than the booster pump station can convey to the upper system.
- Additional Water Source – Additional water supply was added to the middle pressure zone and designated as Well #8. This additional source may be obtained by improvements to existing water sources like Well #4, Well #3, and/or Well #7.
- Upgrade Well #2 Booster Pump Station – The model indicated that modification to the booster pumps in the Well #2 Booster Pump Station is required.

A summary of the modeling result is shown in the table below with all the wells in operation, then with Well #4 off, and then with Well #6 off.

2010 Modeling Results

Scenario	Minimum System Working Pressure (psi)	Minimum Fire Flow Within the Water System for Residential Junctions (gpm)	# of Residential Junctions Below Fire Flow Requirement (1,000 gpm)	# of Residential Junctions Below Suggested Insurance Minimum (1,500 gpm)	Minimum Fire Flow Within the Water System for Commercial Junctions (gpm)	# of Commercial Junctions Below Fire Flow Requirement (2,500 gpm)
All Improvements On	44	1501	0	0	3521	0
Well 4 Off	40	1501	0	0	2382	7
Well 6 Off	46	1084	0	10	3122	0

In comparing the 2006 w/ Approved Developments modeling results to the 2010 modeling results, a dramatic transformation can be seen. All residential junctions are above the 1500 gpm insurance reduction requirement. The commercial fire flow availability at the junctions identified below the 2500 gpm, when well #4 is off, is acceptable due to the type of structure and being equipped with fire sprinklers.

2026 Scenario

As previously stated, growth rates for projections were estimated using the City of Eagle's population predictions and applied to the EWC's water accounts. See the Water Accounts Summary Table located in the 2010 Scenario write-up.

A planning unit was assigned for both residential and commercial growth. The residential planning unit for ultimate build-out was assumed at 2.25 D.U.s/acre. A total of 301.6 acres were identified for potential grow with an ultimate build-out of 679 residential D.U.s. Using the growth projections, it is anticipated build-out would occur prior to 2026 and is estimated to occur in 2014.

For planning purposes, a commercial development planning unit of 2.5 D.U.s/acre was used as ultimate build-out. For the 2026 Scenario, an additional 172 commercial D.U.s were estimated above the 2006 w/ Approved Development scenario. Six commercial development parcels containing 162.2 acres were identified in the 20-year development window excluding the St. Lukes Medical Center. The 2026 density is therefore 1.06 D.U.s/acre. Build-out is estimated well beyond the 20-year projection.

The model used a peak day demand of 4,754.4 gpm plus fire flow. System modifications are shown on figures included in Appendix H. Modifications to the model from the previous 2010 Scenario are listed separately below.

- West Enchantment Street, West Cobblestone Way, and West Yellowstone Street Interconnect – The capacity of Well #6 is not optimized throughout the water system due to pressure restraints and headlosses within the system. The original idea was to interconnect Well #6 with the main trunk line in Floating Feather Road. Due to the prevention of EWC service to the Covenant Hills Subdivision, the original idea is no longer feasible leaving this the next preferred option. As development occurs, this interconnect should be constructed as part of the infrastructure.

A summary of the modeling result is shown in the table below with all the wells in operation, then with Well #4 off, and then with Well #6 off.

2026 Modeling Results

Scenario	Minimum System Working Pressure (psi)	Minimum Fire Flow Within the Water System for Residential Junctions (gpm)	# of Residential Junctions Below Fire Flow Requirement (1,000 gpm)	# of Residential Junctions Below Suggested Insurance Minimum (1,500 gpm)	Minimum Fire Flow Within the Water System for Commercial Junctions (gpm)	# of Commercial Junctions Below Fire Flow Requirement (2,500 gpm)
All Improvements On	44	1501	0	0	3520	0
Well 4 Off	40	1501	0	0	2429	7
Well 6 Off	44	1473	0	1, J-186	3302	0

The improvements made for the 2010 model run had a dramatic impact on the performance of the water system. The impact from the improvements can still be seen in 2026 scenario in which all the residential were above the local fire flow requirements. The commercial fire flow availability at the junctions identified below the 2500 gpm, when well #4 is off, is acceptable due to the type of structure and being equipped with fire sprinklers.

Recommendations

The model identified areas within the system that did not meet the suggested insurance minimum of 1,500 gpm available fire flow but did meet the 1,000 gpm International Fire Code requirements. The recommendations have been divided into planning and construction related projects. A list of planning recommendations is as follows:

- All new subdivisions, if possible, should be a looped system to ensure a minimum available fire flow of 1,500 gpm.
- Minimum 8" waterlines in residential areas and 12" waterlines in commercial areas.
- No booster pumps should be connected to the system unless they are owned and operated by EWC and any currently unauthorized pumps should be removed.
- Minimum service pressure for all future connections should not drop below 50 psi.
- As development occurs around existing subdivisions, it should be required, if possible, to connect to the existing subdivision and loop back into the water system. Multiple existing subdivisions are being serviced from one feed line limiting fire flow availability and a redundant water supply.

- All proposed developments should require a fee for a water model analysis prior to approval. It is suggested that developers are required to submit electronic copies of plans to be integrated into the water model for preliminary plat review.

The following list of recommended improvement projects and the construction priority has been developed to increase the service pressure, available fire flow, and water supply within the water system.

Date	Description	Cost Estimate
(2006)	New Water Source – Well #7 (Constructed and Online)	$620,000
	Construct new water source and associated piping with emergency backup power supply.	
(2006)	Well #7 Interconnect (Constructed and Online)	$146,000
	Construct new transmission piping from Well #7 to existing piping along Eagle Bypass.	
(2007-2008)	Upgrade Pump in the Main Booster Pump Station	$29,360
	Evaluate the pump in the Main Booster Pump Station to determine if replacement is required.	
(2007)	Install PRSV on Floating Feather Road	$25,000
	Replace existing throttling valve with a pressure reducing/sustaining valve station. In the water model, the upstream pressure setting was set at 72.5 psi and downstream pressure remained around 55 psi.	
(2008-2009)	Upgrade Pump in Booster Pump Station #2	$30,500
	Upgrade the pump in Booster Pump Station #2 to add additional head and determine if replacement is required.	
(2008 Contingent on Permitting)	New Water Source	$785,000
	Drill and construct new water source or renovate existing water sources and equip water source with emergency backup power supply and SCAD/Telemetry. This item also includes associated piping ($35/ft at 1350 ft), PRSV ($50,000), and Land ($150,000).	
(2008-2009)	Emergency Backup Power	$160,000/site

Because the water system is feed with power from two separate electrical distribution feeds coming from opposite directions, it is likely that should power be lost it would only affect part of the water system. With this in mind, it is suggested that a mobile generator be considered. The Main Booster Pump Station and any future water sources should be equipped with a stationary emergency backup power system and a mobile emergency backup power system should be available for Well #4, and Well #6. Currently, Well #7 is equipped with emergency backup power.

(2009-2010) Install SCADA/Telemetry System ..... $23,000/site plus $25,000/master site
It is recommended that all wells and booster pump stations should be controlled through a SCADA/Telemetry System to increase reliability and efficiency of the water system.

(As Developed) West Enchantment Street, West Cobblestone Way, and West Yellowstone Street Interconnect ..... $30/ft @ 3,740 ft plus Bore & Jack $50,000, $162,200
Increase the capacity of fire flow near Well #6 when it is off line. It should be a requirement of the developer of residential parcel #2 to make the looped connection including the bore and jack under the canal. The cost should be split with the developer.

(Evaluated) Water Storage ..... $1,421,000 - $1,178,000
The concept of utilizing a tank for a supplemental source when one of the wells is out of service was studied from several angles. The recommended storage capacity of one million gallons was used for the study. To be effective the tank must supply water to the highest service connection with the required working pressure of 40 psi. This would require the minimum operating water level of the tank to be around elevation 2840 feet. This requires the tank to be outside the existing certificated area or to construct an elevated tank. There are few if any locations available for the construction of an elevated tank. Two locations outside the service area were evaluated for a tank location. See the attached drawing for a vicinity map. One of the areas is near the Skateboard Park and the other near the Northeast Corner of Sage Acres Subdivision both located on County property. To fill either of the tanks, a tank booster pump station would be required. The Skateboard Park location would require a pump station close enough to the source's of supply that a single pipe could be constructed for the fill pipe. Pressure reducing valves would need to be installed on other lines in