GROUNDWATER RESTORATION PLAN FOR THE ANACONDA-DEER LODGE COUNTY DOMESTIC WATER SYSTEM

PREPARED FOR:

STATE OF MONTANA
NATURAL RESOURCE DAMAGE PROGRAM
1301 EAST LOCKEY
P.O. BOX 201425
HELENA, MT 59620-1425

BY

ANACONDA-DEER LODGE COUNTY
AND
DOWL HKM

OCTOBER 2012

I hereby approve of this final document, along with the associated final response to comments on the August 2012 draft version of this document:

Governor Brian Schweitzer

10-19-2012
Date

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Governor Brian Schweitzer **Date**

Anaconda-Deer Lodge County

Preliminary Engineering Report
Master Plan Update

Proposed Final Draft

October 2012

Prepared for:

Anaconda-Deer Lodge County
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I. Groundwater Restoration Plan

As established under the Natural Resource Damage Program's *2011 Long Range Guidance Plan and 2012 Upper Clark Fork River Basin Interim Restoration Process Plan*, ADLC is required to develop and submit a Groundwater Restoration Plan for approval, prior to receiving its proposed Groundwater Allocation funds (estimated at $10 million) for additional water system improvements. This chapter constitutes ADLC's Groundwater Restoration Plan, based on the Water Master Plan Update appearing in the subsequent chapters of this document. The water system capital improvements plan described in Chapter III contains $14,579,783 in overall system improvements, of which the Groundwater Restoration Plan proposes approximately $11.2 million as the highest priorities based on engineering analysis. The following discussion details the prioritized Groundwater Restoration Plan improvements in the context of the six requirements and related legal/policy criteria as contained in the *2012 UCFRB Interim Restoration Process Plan*. Given that the proposed Groundwater Restoration Plan projects are a subset of the overall Master Plan Update recommended improvements, the City-County is proposing these projects as a "single phase" of improvements. The projects are structured to span several years and construction seasons, but ADLC is not intending this Groundwater Restoration Plan as a partial "first phase" proposal.

A. Description

Figure 1 shows the general location of the proposed projects (in Sections 2, 3 and 4, T4N, R11W), along with the overall layout of Anaconda's water supply, storage, and transmission system. The project objectives are the replacement or installation of the water main segments identified as the "Phase I through Phase V" improvements in this PER Master Plan Update with new, properly installed pipe and accessories, as well as a Voluntary Metering Program and installation of backup power at the well field. The proposed projects include 41,195-lf of main line renewals and installations sized 6" to 20" as well as installing backup power at the well field and developing a funded voluntary metering program. The projects prioritized from the Water Master Plan Update for inclusion in Anaconda's Groundwater Restoration Plan are as follows. Detailed cost estimates are included in Appendix E.

- Phase I – This project phase includes those water mains described in the 2009 Modeling Study Update[1] as Phase III. They are further described as the remaining cross streets throughout town. The majority of cross streets will be replaced with 6-inch water main. This phase contains combinations of six, four, and two-inch water lines, totaling approximately 11,600-lf.

- Phase II – This project phase includes the following: 1) replacement of the 20-inch water supply line from the pump station, across Tamarack St. and to the valve house on Washoe St, 2) replacement of the 16-inch and 12-inch supply line from the valve house over to Poplar and Sycamore Streets. A total of approximately 8,300-lf of large diameter mains are included in this phase.

[1] (DOWL HKM, 2009)

- Phase III - On the north side of the railroad tracks near Cable Road and from Sycamore Street to Cedar Street the area experiences low pressures during peak demands as a result of the dead end mains. Fire flows are limited in this area. A new 8-inch main is proposed for looping between Sycamore and Cedar to alleviate the pressure and flow problems in this area. The total length of the new main would be approximately 7,400-lf while 1,650-lf would be replaced.

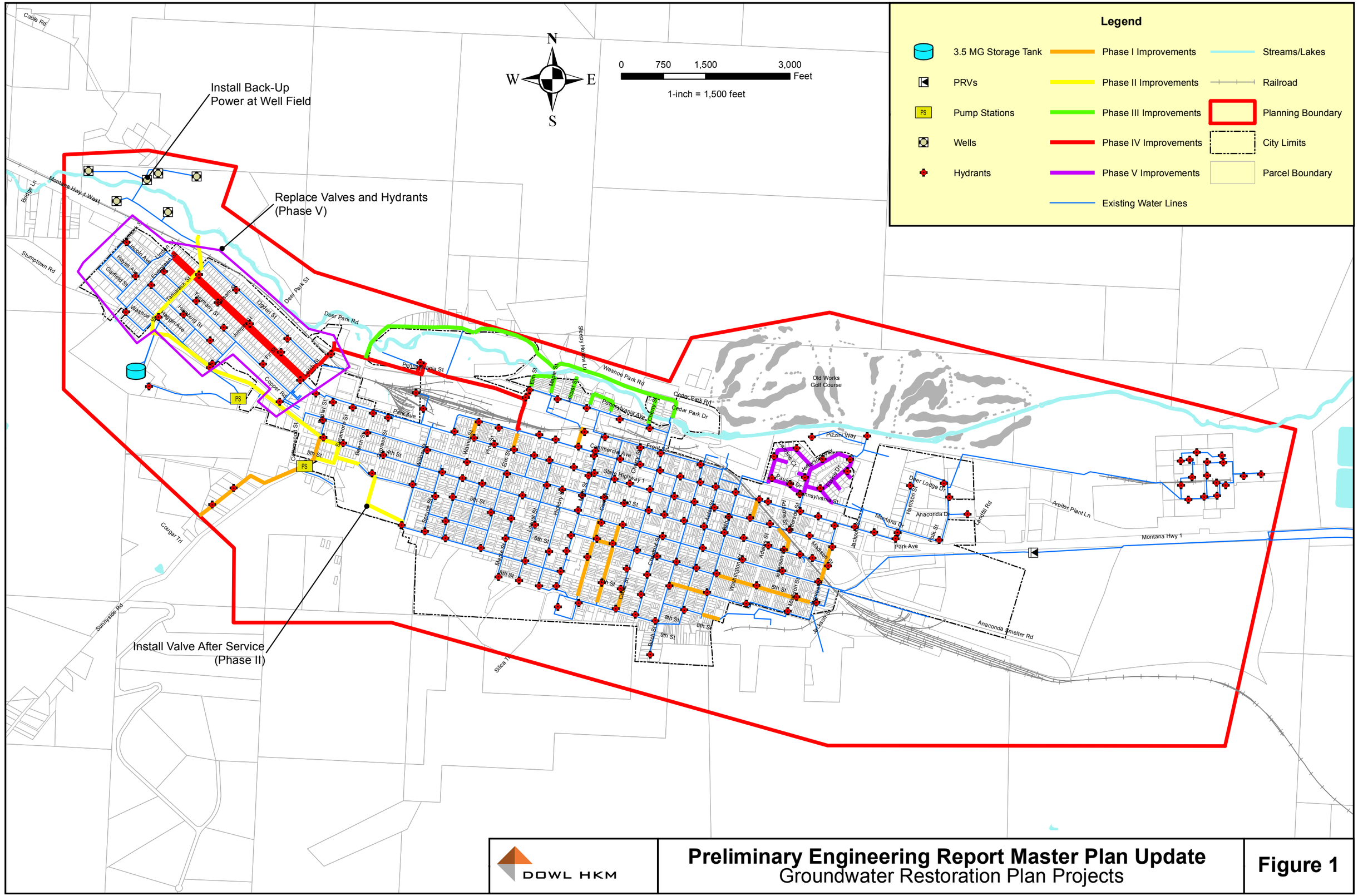
- Phase IV – Park St. west of Larch St. contains 8-inch and 6-inch trunk water mains installed in the 1950s. This section of Park St. has been identified by the MT Department of Transportation for possible future reconstruction. Prior to this road reconstruction, these water mains should be replaced. On Pennsylvania Avenue between Larch St and Elm St. a 6-inch section of the original system which services the Washoe Park Area will be replaced as well as the line on Larch St. that connects this main to the proposed replacements on Park St. A total of approximately 12,250-lf of mains are included in this phase.

- Phase V – Near the Old Works Golf Course, a subdivision was built in the 1970's including 5,865-lf of waterline on Pauline Drive, Jefferson Way, Elaine Drive, Diane Drive, Heather Drive, Caroline Court, Christine Court, and Sharon Court, and water mains there are part of the ADLC system. While not overtly leaking due to age, due to some miscommunications during construction the waterlines in the subdivision were installed at an average depth of only 4-ft. In the winter months, the homeowners on these streets must keep a small amount of water running in their houses at all times in order to prevent their service lines from freezing. This is a significant waste on the system and these lines are slated for replacement to an appropriate depth. Furthermore, in the West Side area which is west of Larch St., the valve and hydrants installed were poor quality and require continued maintenance by ADLC Water Personnel. This phase includes replacement of these valves and hydrants.

- Anaconda has already implemented a voluntary metering program. If a homeowner requests to have a meter installed, ADLC purchases the meter and installs it for free. The homeowner is responsible for additional plumbing necessary to install the meter as well as a $49.16 inspection fee. In general the homeowner ends up paying between $80 and $140 while ADLC pays $220 and donates the labor. Due to the cost of the program to the homeowner, many would-be volunteers are discouraged from participating. To increase the success of the voluntary metering program, this Master Plan Update proposes to implement a *fully funded* voluntary metering program. It is proposed that $200,000 of Groundwater Allocation funds be used per year for the next 5 years. Table 12 includes 2,642 meters at a total cost of $3,709,983. An interior installation of a water meter generally costs $600 while an exterior meter pit installation generally costs $1,500. At these costs, approximately 150 - 200 meters could be installed each year under this voluntary program.

- The wells do not currently have any provision for backup power; therefore, the water supply could be compromised during an extended power outage. Though the water storage tank has ample emergency storage, this stored water would only last for a short time depending upon the system demand. The most cost effective way to provide sufficient redundancy would be to purchase a portable generator with adequate capacity to operate at least two of the different wells, one at a time. This would require installation of a transfer switch and appropriate connection equipment to allow the generator to be connected to the well.

As has been done on past projects, service connections would be renewed between the main and the property line as part of waterline construction including those in Phase V which were also installed shallow near the main, correcting another proven source of leakage. Improvements will be designed and constructed to conform to Circular DEQ-1 and other applicable regulatory and construction standards.


Legend
3.5 MG Storage Tank
PRVs
Pump Stations
Wells
Hydrants
Phase I Improvements
Phase II Improvements
Phase III Improvements
Phase IV Improvements
Phase V Improvements
Existing Water Lines
Streams/Lakes
Railroad
Planning Boundary
City Limits
Parcel Boundary
N
W
E
S
0 750 1,500 3,000 Feet
1-inch = 1,500 feet
Install Back-Up Power at Well Field
Replace Valves and Hydrants (Phase V)
Install Valve After Service (Phase II)
Cable Rd
Bridge Ln
Montana Hwy 1 West
Stumptown Rd
Deer Park St
Deer Park Rd
Washoe Park Rd
Cedar Park Rd
Cedar Park Dr
Pennsylvania St
Park Ave
Front St
State Highway 1
Sleepy Hollow Ln
Old Works Golf Course
Pizzini Way
Deer Lodge Dr
Anaconda Dr
Montana Dr
Arbiter Plant Ln
Montana Hwy 1
Anaconda Smelter Rd
Cougar Trl
Sunnyside Rd
Silica Trl
PS
DOWL HKM
Preliminary Engineering Report Master Plan Update
Groundwater Restoration Plan Projects
Figure 1

B. Benefits

The primary driver for the project is to reduce still unacceptably high water distribution system leakage. A steady improvement in leakage rates can be directly attributed to the main replacements over the past nine construction seasons (2003 through 2011). While water transmission/distribution piping leakage losses were 2.18 mgd before the start of NRD-funded main replacements in 2002, approximately 460,000 gpd of leakage still remains as of January 2012. Remaining leakage equates to 42 percent of Anaconda's year round water production. If the same leakage loss recovery rate continues, the remaining pipe replacements could bring system-wide leakage at least down to 20 percent, thereby saving a minimum of 68,000 gpd in current leakage under the assumption of system wide metering. Even the Phase V main replacements will reduce losses in that water left running by consumers over the winter to deter shallow line freeze-ups will be curtailed.

Anaconda's system leakage is a direct result of both age and inferior pipe materials used in initial construction. Thin-walled galvanized steel (Kalimane) pipe installed circa 1900 was corrosion and perforation prone. Leakage and system deterioration was not addressed diligently over the past century, partly because of revolving utility ownership – i.e., Anaconda Company, ARCO, and Butte Water Company, a Washington Corporation subsidiary – and also due to substandard maintenance and undercapitalization by some past owners. Numerous service connections have also been found to leak during the course of past main replacements.

Saving at least an additional 20 percent of Anaconda's current water consumption by conservation resulting from system-wide metering equates to 143 million gallons per year less production. At an estimated production/delivery cost of $0.87 per thousand gallons (based on FYE11 Water Enterprise Fund revenue of $620,800; and 0.71 billion gallons water produced FY2011), this is a $23,000/yr in direct cost savings (quantified benefits).

Equally important, meter-induced conservation of an estimated 20 percent forestalls the difficulties involved with expanding Anaconda's water supply, and contributes a significant offset for water resources lost (or otherwise unavailable) due to contamination. In addition to water savings, the project will conserve other resources including pumping and chlorine costs.

Options for expanding groundwater supply are limited by aquifer contamination, and surface water supplies are hydraulically limited and would require costly treatment. Conservation of Anaconda's finite usable water resources is of paramount importance, making it critical to curtail leakage and to extend the utility of the limited available water supply for both current residents and future growth.

C. Costs

Appendix E provides an itemization of the estimated total Groundwater Restoration Plan project(s) cost of $11,237,300 for the improvements identified in Section A, above. Groundwater Restoration Plan costs are summarized in Table 1, below.

This cost is greater than the estimated $10 million of Groundwater Allocation currently proposed for Anaconda. It is anticipated that as the allocated funds are used, the remaining principal will generate some interest. This plan assumes that some of this generated interest would also be available for the costs identified in this plan. Furthermore, it is anticipated that at the time additional costs would be incurred, the 1992 revenue bonds will be re-paid making available additional rate revenues to contribute towards the funding gap. In recent years of annual NRD-funded water main replacement projects, Anaconda has been able to contribute approximately $200,000 per year toward those projects. Over the five-year span of the Groundwater Restoration Plan this trend should continue, assuring that the balance of the $11.2 million Groundwater Restoration Plan costs are met. A detailed project cost estimate appears in Appendix E. Construction and engineering costs are based on the per lineal foot costs developed by evaluating past projects. The costs provided below are budget estimates only. Actual project costs will be based on competitive public bids received for the construction work, as well as the engineering design and inspection contract task order once negotiated.

Table 1 - Groundwater Restoration Plan Costs

Description		Construction Cost	Engineering Cost	Total Cost
Distribution System	Phase I	$ 2,048,090	$ 307,214	$ 2,355,304
	Phase II	$ 1,711,765	$ 256,765	$ 1,968,530
	Phase III	$ 1,590,864	$ 238,630	$ 1,829,494
	Phase IV	$ 2,196,476	$ 329,471	$ 2,525,947
	Phase V	$ 1,285,240	$ 192,786	$ 1,478,026
Voluntary Metering		$ 1,000,000	$ -	$ 1,000,000
Backup Power		$ 80,000	$ -	$ 80,000
Totals		**$ 9,912,435**	**$ 1,324,865**	**$ 11,237,300**

As shown in Table 1, $1,324,865 of contracted services will be required for the proposed project to out-source engineering and construction, and assistance with grant administration and Superfund-related issues. Additionally the City-County has incurred NRD-reimbursable costs for preparation of this Water Master Plan Update including the Groundwater Restoration Plan. Anticipated contracted services for engineering and construction are broken out as Professional Services and Construction Services and are further described as follows:

1. Professional Services

Engineering Consultant

2012 Water Master Plan Update, including NRD Groundwater Restoration Plan.

Geotechnical investigation, field surveying, preparation of draft engineering design plans and specifications, and final construction cost estimate.

	Finalization of plans and specifications, and preparation of bid package.
	Assistance with solicitation of agency approval of bid documents, bid advertisement, opening, and construction contract award.
	Construction field inspection.
	Construction contract administration, shop drawing review, pay estimate review, as-built drawings, construction contract close-out, and MDEQ certification of completion.
Funding Administration Consultant	Assistance with development and representation of 2012 Groundwater Restoration Plan to the NRDP.
	NRDP funding administration, including project budget tracking, in-kind local match cost accounting, preparing reimbursement requests, NRDP Progress Reports, and Final Project Reports.
Superfund Technical Assistance Contractor	(standing contracted services to ADLC for Superfund-related coordination, including DPS implementation and SOP oversight, and access by construction Contractor to Waste Repository for disposal of RCRA waste materials)

DOWL HKM as the project Engineer has already been selected under a quality-based selection process meeting MCA 18-8-201 to -212. ADLC conducted the professional services procurement process for water system engineering in 2008, and selected DOWL HKM for a multi-year "indefinite quantities contract." Design and inspection services for the Groundwater Restoration Plan Projects will be contracted as new "task orders" under the base agreement from that selection.

Kuipers & Associates will address Development Permit System, Community Soils, Waste Repository, and related Superfund issues on the project through its standing contract with ADLC as Superfund Technical Assistance Contractor for the community. Beard Environmental & Technical Assistance (BETA), retained under an MDOC-recognized "long term partnership" for small purchase contracts for professional grant-writing services, will assist the City-County with funding administration.

2. Construction Services

As described in Chapter III, the projects included in Anaconda's Groundwater Restoration Plan will span multiple years and construction seasons. They will also likely be bid as annual projects, and likely involve separate construction contractors each year. Project Construction costs for the improvements, including mobilization, site work, demolition and disposal, new piping and appurtenances, earthwork, and paving, are estimated to total $9,912,435 as shown in Table 1 and detailed in Appendix E. Construction unit prices have been developed by DOWL HKM, based on similar work in Anaconda and statewide.

Construction Contractor(s)	Construction of Groundwater Restoration Plan water main replacements.

Competitive bidding for construction Contractor services will be duly advertised, and conducted according to MCA 7-5-2301. Construction is proposed to be bid separately as annual construction packages corresponding to the individual phases shown, hence different contractors may be involved year-to-year.

Construction Contingency, at approximately 10 percent of the construction cost, is estimated at $991,243. A contingency of 10 percent is being used partly due to the inflation uncertainties in the construction market, and to address any unanticipated consultant contract amendments or construction contract Change Orders. Engineering services for design and construction-phase services on the projects is estimated 15%, which includes NRD funding administration is estimated at $7,500 per year (100 hr/yr) over the span of the Groundwater Restoration Plan projects.

Contractor performance on each project will be assured by his/her Performance Bond and Labor and Materials Payment Bond, each required in the amount of 100 percent of the construction contract amount. The construction Contractor will also be required to carry insurance coverage meeting statutory and NRD Program requirements.

D. Implementation Schedule

The following implementation Schedule is proposed for the improvements:

Table 2- Implementation Time Line

	Design Completion	Bid Opening	Construction Startup	Construction Completion
Phase I	March 2013	April 2013	June 2013	October 2013
Phase II	March 2014	April 2014	June 2014	October 2014
Phase III	March 2015	April 2015	June 2015	October 2015
Phase IV	March 2016	April 2016	June 2016	October 2016
Phase V	March 2017	April 2017	June 2017	October 2017
Voluntary Metering	N/A	N/A	January 2013	December 2017
Backup Power	March 2013	April 2013	June 2013	October 2013

Project implementation requires engineering design and construction of each phase of the proposed improvements. Final engineering designs for the waterline replacement as well as waterline and meter installation projects will consist of preparing plans and specifications and producing a bid package, along with bid-phase services and construction inspection. The engineering and

construction sequence for water meter installations differs from usual utility projects in that most work will occur on private property, on the water customer's own service line or interior plumbing. Engineering design focuses on developing an exact inventory of meter types and installation requirements, and preparing standard installation drawings, detailed equipment specifications, and biddable contracts. Utility construction characteristic of underground pipeline replacement will be required as well as plumbing installation of meter equipment. Engineering and construction activities are of the type traditionally required for municipal utility projects.

The exact approach will be decided during design for each project phase, but has been assumed according to the project tasks and schedule described below. If any substantive changes in the scope of this Groundwater Restoration Plan are proposed, they will be reviewed and concurred by the NRDP per section 3.3 of its Process Plan before proceeding. Implementation of each phase of the proposed project will proceed according to this chronology, with the phases and tasks noted.

1. Engineering services through a specific "task order(s)" for these projects are anticipated to be contracted in Fall of each project year. Final design will involve field surveying, geotechnical investigations, preparation of draft plans and specifications, final cost estimating, and finalization of bid documents. Design completion will target bidding in early each spring.

2. Prior to advertisement of each project for construction bidding, final plans and specifications for the water main replacement will be furnished to ADLC and the MDEQ for review. Note that metering projects will not require MDEQ review. Any agency-required modifications to the documents will be incorporated prior to bidding. Final plans will also be furnished to the NRD Program to verify conformance of the design with the project scope as contained in this application.

3. Following a publicly advertised bid solicitation in accordance with state law, a Contractor will be selected and contracted for the construction work. For the voluntary metering project, a contractor may be pre-selected using the same solicitation procedures to complete meter installation on an as-needed basis. Construction for each water line project is anticipated to span approximately six months, and completed within one calendar year. As noted, the multiple projects prioritized for inclusion the ADLC's Groundwater Restoration Plan will span multiple years. During construction of each one, inspection and contract administration services will be provided by the Engineer. Contractor bonds will guarantee performance; insurance meeting NRD Program and statutory requirements will also be required.

4. Construction will be preceded by a Preconstruction Conference, review of submittals and shop drawings, field location of existing utilities, materials testing, and approval of the construction Contractor's proposed construction schedule.

5. Construction will be authorized by a Notice to Proceed issued by ADLC.

6. Field inspection and construction contract administration for the projects will be primarily the responsibility of the engineering consultant, with collaboration by the City-County Planning Office and personnel from ADLC's Water, Streets and Roads, Street Lighting, and Fire Departments. Kuipers and Associates, as ADLC's Superfund Technical Assistance Contractor, will provide field inspection and coordination during construction relative to the Development Permit System Street Opening Permit and Waste Repository access. Since local match is not anticipated to be required for the City-County's NRDP Groundwater Allocation funds, staff in-kind match will not be recorded as it has been on past "grant cycle" projects.

7. As they are installed, new water mains will be disinfected, tested, and commissioned.

8. Upon receipt of the Contractor's lien releases and contract close-out documentation for each project and with the concurrence of the Engineer, ADLC will accept the completed water main projects and issue final payment to the Contractor.

9. Project close-out tasks following construction will include preparation of "as-built" drawings by the Engineer, and ADLC's submission of final documentation to the NRD Program. The Engineer will issue the legally required "Certification of Completion in Accordance with Approved Plans and Specifications" to the MDEQ, following construction.

10. A one-year construction warranty will be provided by each construction Contractor with the backing of his/her performance bond, to assure repair of any defects in workmanship or materials occurring after construction of each project. A one-year warranty inspection will be conducted each year, involving the Engineer, the Contractor, and ADLC.

E. Monitoring

The waterline projects will afford the opportunity for limited post-project monitoring. Quantitative monitoring will target measuring (or estimating) water leakage reductions from the proposed main replacements, which conceivably could be up to 3.3 million gallons per month if system leakage is reduced to 20%, which should be observable. This could be done in one of two ways:

- Comparison of well field (total) flow meter readings for corresponding months before and after construction of the project may indicate some quantified reduction in leakage. Comparison of winter demand when irrigation is not occurring is the most valid. Post-project January well field flowmeter readings could be compared to data from before each project to discern any drop in water demand due to leakage correction. Alternatively another formal Leakage Re-evaluation, repeating the methodology of the PER, could be performed.

- The former informal assessment is proposed. At ADLC's discretion, a more rigorous analysis through another formal Leakage Re-evaluation could be conducted, although the cost for this level of evaluation has not been included in the budget for the Groundwater Restoration Plan projects.

- With full metering in place, the sum of all metered water sales per month should be compared to well field production. Since well field flow measurements also include leakage, estimated at 0.45 mgd in January 2012, such a comparison will give a direct measure of "unaccounted for water," specifically remaining system leakage. This information will be directly useful in quantifying the benefits of ongoing water main replacements, and should be re-calculated on a regular basis after meters are installed.

Qualitative monitoring would be limited to comparison of leak incidences along the project corridors for several years following project completion. Future leaks along the corridors would be expected to be nil, given the new pipe installation, and the potential for water line freeze-ups (Phase V mains) should be mitigated. Any leaks detected within the first year due to defects in construction would be repaired under the Contractor's warranty.

F. NRD Evaluation Criteria

Each of legal criteria identified in section 6 of the NRD Process Plan[1], will be discussed separately below.

1. Technical Feasibility

ADLC has successfully demonstrated its ability to successfully execute similar projects with measurable beneficial results in terms of water leakage abated over the course of eight past (plus one current) NRD-funded waterline replacements. Alternatives have been evaluated to formulate the most feasible and beneficial water line replacements – including system modeling in the 2009 PER Modeling Amendment and further alternatives analysis/prioritization in this Water Master Plan Update. Conventional methods for underground utility design and construction and similar project management protocols will be used for the Groundwater Restoration Plan projects. A state-licensed Professional Engineer will be in "responsible charge" of design and bid documents, as required by state law. RCRA-related project elements and conformance to Anaconda's Development Permit System will be overseen by ADLC's Superfund Technical Assistance Contractor. Construction Contractors will be selected to build the projects through publicly advertised, competitive bid processes.

Contractors will use conventional construction methods for installation of the waterlines, including trench excavation in accordance with OSHA norms, and pipeline assembly and testing per MDEQ and AWWA standards for design, materials, and construction. New mains will be six- and twenty-inch ductile iron pipe, subject to final engineering design.

[1] (State of Montana Natural Resource Damage Program, 2012)

Conventional plumber services will be used for meter installation, including both interior plumbing and "in yard" buried meter pit setting and connection. Licensed plumbers will be used, as required by state law. The services of a Professional Engineering firm will be used for design, bid-phase assistance, construction inspection, and contract administration. RCRA-related project elements and conformance to Anaconda's Development Permit System will be overseen by ADLC's Superfund Technical Advisor, already retained for such issues community-wide.

Given the replacement nature of the water main construction projects, Contractors will be required to maintain water service to ADLC customers during construction. All existing service connections between the tap at the main and the user's curb stop at the property line will be replaced. This practice has proven on past projects to remove another significant source of leakage. At the same time, any existing "combined" service lines serving more than one user can be reconstructed to provide individual connections, which enhances operations and accountability.

Equally important will be maintenance of fire protection, and coordination with the ADLC Fire Department to assure that hydrants remain serviceable, or if not, that their temporarily inoperable status is known to fire fighters. Simultaneous involvement of the ADLC Streets and Roads Department will also assure that residential, business, and emergency vehicle access is suitably maintained throughout construction.

Project uncertainties are minimal. No innovative approaches are involved, and all aspects of the work will utilize similar methods proven to be successful on multiple recent projects.

2. Relationship of Expected Costs to Expected Benefits

The estimated direct cost of the proposed improvements is $11,237,300, including a 10% construction cost contingency. No quantifiable indirect costs are attributable to the project. The proposed project will provide direct benefits to individuals living and working in Anaconda-Deer Lodge County, an area in the midst of the largest Superfund site in the United States. The direct benefits of this proposed project will conserve and enhance the City-County's limited water resources as a "replacement" for the impaired groundwater in the area. The replacements will not only conserve water lost to leakage along the old lines, but also conserve energy in that water pumped into the system will drop commensurately. Additional water supply will not have to be developed prematurely. Up-sizing over 6,000 feet of these existing mains that are currently two-inch size to six-inch will also enhance water delivery and fire protection for residents.

These benefits result primarily from the availability of up to 259,000 gpd of additional water available that was previously lost to leakage. This loss could realistically make 94 million gallons per year of previously wasted water supply available to the Anaconda community. Augmenting the 403 already metered water users in Anaconda, system-wide metering is

estimated to save at least 20 percent of Anaconda's current water supply by financially motivating consumers to conserve. This equates to 392,000 gpd in savings. Correcting this loss represents a potential annual direct benefit of up to $23,000 in water production costs alone.

3. Cost Effectiveness

Cost effectiveness of the proposed projects in the long term is being promoted in several ways:

- The proposed projects have been established as the most cost effective by a detailed alternatives analysis which is further described in section 10 below.

- Replacement of old leaking water mains continues to be proven by engineering analysis to be the most cost-effective, immediate solution to extend Anaconda's limited water supply. Repeated "post-project' leakage evaluations coupled with system modeling and other alternative analyses demonstrate that it is the most cost-effective option. Continuing incremental or voluntary metering of the community is proposed as a conjunctive option, offering obvious collateral benefits and cost efficiencies in water delivery and consumption.

- The design of the projects will emphasize value engineering in construction requirements, and be subject to the Engineer's internal quality assurance/quality control program.

- The design life for the new water mains of 100 years promotes long-term cost efficiency.

- The design life of new water meters is 20-plus years with proper maintenance, promoting long-term cost efficiency of the project. Installation plumbing and meter pits are estimated to last 50 years, even if meters themselves are replaced in the interim. Meter replacement responsibility at the end of their useful life can be assigned to either the landowner or the City-County, and will be addressed in forthcoming water ordinance revisions.

- Maintenance of the new water mains is assured through the ADLC Water Department's history of successful O&M of the Anaconda municipal public water system since 1992. The Department's regular regimen includes main flushing and valve exercising, daily chlorine residual testing, equipment preventative maintenance, and as needed, pipe repairs.

- The Department's fulltime staff includes two Class II Distribution (and Class III Treatment) Operators licensed by MDEQ for these functions for the public water system, plus one assistant and two billing clerks. (A letter verifying the City-County's commitment to water system maintenance can be furnished upon request.)

- Maintenance of the new meters is assured through the ADLC Water Department's history of successful operation and maintenance of the public water system and current O&M of 403

meters already in place. The Department's regular meter O&M regimen includes regular monitoring through self-diagnostics associated with the "radio read" system and associated water billing software, and checking meters in response to abnormalities or customer service calls.

- Spring letting targets the most competitive bidding timeframe as Contractors pursue work for the coming construction season, and bid competition minimizes costs.

4. Results of Response Actions

The Superfund process has identified large areas of contaminated soil and water that directly affect the Anaconda-Deer Lodge community. Volumes of groundwater contaminated beyond Primary and Secondary Drinking Water Standards for various metals are projected to be excessive. The prognosis is that many acre-feet of groundwater in the area cannot be remediated. While various response actions are both contemplated and being implemented for the Butte-Anaconda Superfund site, these actions will not restore the groundwater resources lost to Anaconda for municipal water supply. In the absence of an effectual restoration response for this extensive groundwater contamination, ADLC is left with "replacement" – i.e., maximizing use of its existing water resources, conserving them and extending their availability wherever possible. The proposed Groundwater Restoration Plan projects are consistent with that goal.

The Groundwater Restoration Plan projects will proceed independently of ongoing or planned CERCLA response actions relative to the Butte-Anaconda Superfund sites. The project will not interfere with or affect other remediation or response actions. As part of its institutional controls relative to Superfund, the City-County has a Development Permit System (DPS) to assure safe management of hazardous materials disturbed by construction. Accordingly the Contractor will be required to obtain a DPS Street Opening Permit that will include requirements for handling and disposition of any mining waste or hazardous materials encountered, and any soil materials excavated and not replaced in situ. The ARCO Waste Repository is available for waste materials requiring such disposal.

5. Environmental Impacts

This section itemizes the anticipated effects to the physical and human environment during and after construction of the proposed projects. References consulted to assess potential environmental impacts and suitable mitigation if required include the Montana Natural Resource Information System database (www.nris.state.mt.us), the National Historic Register (www.nr.nps.gov), Federal Emergency Management Agency (FEMA) floodplain maps, and construction experience by Anaconda-Deer Lodge County with similar water main renewals within its urban areas over the past nine years.

Impacts to the physical environment resulting from the proposed project include both short term transient impacts associated with the construction, and long term environmental benefits

resulting from completion. Work will be confined to previously excavated corridors, where existing water mains and in some cases sewer lines presently are laid. New ("voluntary") water meters will typically be installed inside existing buildings, or vaults placed on current buried service lines.

No construction in or adjacent to waterways is involved for the main replacement work or meter installation. Many of the waterline corridors are classified by FEMA as "Zone B" floodplain, meaning the areas lie between the limits of the 100-year and 500-year flood events, or could be subject to less than one foot of inundation during the 100-year event. The proposed project involves only underground construction, upon completion of which, the ground surface will be restored to pre-project elevations and conditions. Hence no permanent impacts to floodplains will result. Local floodplain permitting should not be required, given that no above ground structures are being constructed. Caution will need to be exercised during construction along the corridors to minimize exposure of the work site to flooding in the event of a significant storm event.

No identified wetlands or watercourses will be traversed or disturbed by the project. Likewise no Threatened or Endangered Species will be impacted, given that project disturbance will be confined to developed urban corridors with no wildlife or riparian habitats.

Thirty historic properties and districts currently listed in the National Register for Anaconda. With water main work confined to street right-of-ways, no impacts will jeopardize these historic areas, and enhanced fire protection is a significant positive benefit for the properties involved.

No archeological sites of significance are known to exist along the project corridors. The corridors are urban and have been disturbed previously on several occasions for road improvements and excavation of underground utilities. Should any potentially significant archeological findings be encountered during the course of project construction, work will be halted to allow assessment of such findings by qualified personnel, with full involvement of the State Historic Preservation Office.

Limited aesthetic and visual impacts typical of an underground utility work site will occur during each approximately six-month construction period. These adverse impacts will be transient in nature, limited to the duration of construction, and will not require mitigation other than maintenance of a clean orderly work site and adherence to the construction contract schedule. Following construction, the project corridors will be fully restored to the pre-project condition, including re-paving, re-installation of curbs and sidewalks, and seeding and mulching on unpaved disturbed areas.

Construction impacts to soil and surface water resources will be mitigated by use of erosion control measures (strategic soil stockpiling and silt fencing) around excavated areas to prevent sediment transport. Such construction measures will concentrate on prevention of siltation in the existing municipal storm drainage system which ultimately drains to Warm Springs Creek. The construction Contractor will likely be required to obtain a construction site storm water management permit from MDEQ, since the area of disturbance within the project corridors may exceed the one-acre exemption. Asphalt paving and curb and gutter on most portions of the corridors will also help reduce erosion potential.

Potential transient impacts to human health and safety during construction will be effectively mitigated by proper fencing and signage at the work site to prohibit access and protect the public against hazards. Blasting is not anticipated to be necessary for trench excavation. Business and residential access during construction can be maintained from adjacent streets and alleyways while work progresses along the corridors.

Transient air quality and noise impacts due to operation of construction machinery will be attenuated by haul road watering and proper operation and maintenance of equipment. State of Montana air quality standards for fugitive dust emissions govern such releases, and will be enforced. Noise impacts may cause localized disturbance, but can be minimized by limiting equipment operation to traditional work hours.

Construction work will be executed in full compliance with OSHA standards, including designation of the job sites as "hard hat areas," and trench excavation and other work place safety conforming to applicable requirements. A jobsite safety plan will be solicited from the construction Contractor to assure adequate barriers and protection for the public are provided, both during and after work hours. Contractor personnel will have OSHA 40-hour HAZWOPER training, given the potential for encountering hazardous materials. The Contractor will be assigned contractual responsibility for all job site safety and regulatory compliance.

Protection of public (sanitary) health during construction, specifically isolation and replacement of existing water mains and services, will be provided by adherence to MDEQ Circular DEQ1 and Montana Public Works Standard Specifications requirements for thorough disinfection and bacteriological testing of new water mains. Such testing will likewise apply to temporary piping provided to maintain water service to residents during construction. Adherence to these standards and requirements will be legally required in the construction contract.

6. Recovery Period and Potential for Natural Recovery

Because of cost and "technical infeasibility" limitations, EPA opted to cap large areas of mining wastes in the Anaconda area and allow groundwater contamination to remain without direct remedial action. While surface reclamation should reduce infiltration through the waste material, over 40 square miles of contamination continues to impact groundwater resources. Natural

recovery of contaminated water resources has been discounted, due partly to the magnitude of the problem[1]. This results in an irreversible loss for Anaconda, and limits availability of potable water resources to meet the existing and future needs of its residents.

Prospects for natural recovery of contaminated groundwater resources are improbable, as addressed above. The prospects and time frame for natural recovery are not affected by this project. In lieu, the project promotes efficient utilization of Anaconda's remaining usable groundwater, providing "resource replacement" as an alternative to natural recovery.

7. Applicable Policies, Rules and Laws

Anaconda-Deer Lodge County has the legal authority to enter into a binding contract with the State of Montana to authorize funding for the proposed project(s). ADLC will comply with all applicable state and federal laws and regulations in the completion of this project.

MDEQ jurisdiction over public water systems will require approval of design plans and specifications by that agency for all main replacements and central water system improvements (meter installations are exempt). A Professional Engineer licensed by the State of Montana must be in "responsible charge" of preparation of central system improvements design. Following completion of construction, the Engineer must also file with MDEQ a "Certification of Completion in Accordance with Approved Plans and Specifications."

ADLC owns all right-of-way needed for main replacement projects, specifically dedicated public street right-of-way along the project corridor. Railroad or state/federal highway crossings will be permitted as required by the appropriate agencies. City-County water ordinances allow access for water meter installation and maintenance on private property.

Water main Contractors will likely be required to obtain a construction site storm water management permits from MDEQ, since areas of disturbance within the project corridors will likely exceed the one-acre exemption. Responsibility for obtaining and complying with this permit will be assigned to the Contractor in the bid documents.

Other than concurrence by the NRD Program that the Engineer's completed design plans conform to the project scope under this Groundwater Restoration Plan, no other permitting or approvals are anticipated to be required for the project. ADLC will enter into a grant contract with the NRD Program if/as required for its Groundwater Allocation funds, and abide by the conditions therein.

The City-County will not only comply with the MDEQ approval process, but will also utilize the Montana Public Works Standard Specifications for Construction in the implementation of the

[1] (Woessner, 1995)

proposed projects. This includes compliance with approved construction practices, safety measures, and environmental requirements (including dust, runoff, and noise abatement) during construction.

No other ramifications of the proposed project to laws, rules, policies, or Consent Decree requirements are anticipated.

8. Resources of Special Interest to The Tribes And DOI

The proposed water main projects are confined to urban residential and commercial corridors previously disturbed by construction activities. No Tribal lands, nor any wildlife, wetland, or riparian habitats are present. Therefore, it is anticipated that this project will have no adverse impacts on resources related to Tribal Nations, or the Department of Interior - U.S. Fish and Wildlife Service. ADLC acknowledges that appropriate actions and consultation with Tribes and/or the Department of Interior will be required if any unanticipated Resources of Special Interest relative to these entities are encountered in the course of executing the project.

9. Normal Government Functions

Even though assessment of normal government functions has already been evaluated for Groundwater Restoration Plans developed per Section 3 of the Process Plan, it is included here for clarity. Operation and capitalization of municipal water systems is a local government responsibility, traditionally funded through user rate revenues as an "enterprise fund." ADLC currently operates its Water Department and water utility infrastructure on a $1.0 million annual budget (FYE11, excluding that year's NRD grant assistance and debt service). This budget, funded by rate revenues, provides for repayment of 1992 revenue bonds, operator salaries, materials and repairs, and was intended to afford a modest reserve account contribution. Current water user charges surpass MDOC Target Rate (water only). While ADLC is able to meet current system operating expenses within its water utility budget, further major capital improvements projects remain financially unattainable without UCFRB Restoration Fund assistance. ADLC's water infrastructure and related financial needs go beyond "normal government function" for several reasons:

- ADLC inherited a vastly substandard public water system from the Anaconda Company's successors in 1991, with capitalization needs of over $25 million.

- Overall capitalization needs at the time ADLC assumed ownership equated to over $9,000 per user connection in the system. This was due primarily to the lack of investment by past owners of the water utility, a circumstance well beyond the City-County's control. Such a contribution far outstrips normal capital commitments that are typical for water users in most other Montana communities. It is an even worse burden for a community whose federally defined "Low and Moderate Income" households have increased significantly between 1990 and 2000.

- The Superfund status of the Anaconda area makes infrastructure improvements more difficult. EPA and ARCO policies and covenants add to construction complexities and cost, including special provisions for disposal of waste materials and surface restoration.

- In the absence of widespread groundwater contamination, ADLC could have less expensive options for expanding its water supply – specifically supplemental wells if available may be developable at less cost than virtually system-wide main replacement. Anaconda faces very non-typical constraints, between lack of available water supply and severely deteriorated mains.

10. Analysis of Alternatives

To validate the selection of the recommended option of distribution main replacement and installation as well as system wide metering, other alternatives were considered. The 2004 PER[1] screened seven alternatives to address ADLC's water system deficiencies (PER Chapter 4, pp. 49-51), including the following:

- Construction of Additional Wells in Same General Location
- Construction of Additional Wells in Alternative Locations
- Development of Surface Water Source – Hearst Lake/Fifer Gulch
- Connection to Other Community Water Systems
- Recovery of Capacity through Water Main Replacements
- Initiation of Comprehensive Metering Plan
- No Action

Of these, additional wells in alternative locations, connection to other community systems, and no action were screened out as infeasible. The PER evaluated and ranked the remaining four alternatives. Ranking was based on multiple criteria, and resulted in the following "scores" (PER Table 5-2, p. 71):

- Alternative I – Rehabilitate Distribution System +3
- Alternative II – Install Water Meters +2
- Alternative III – Additional Wells at Existing Field 0
- Alternative IV – Hearst Lake/Fifer Gulch Surface Water Source -6

The PER endorsed a dual recommendation of proceeding with distribution main rehabilitation (primary), while proceeding with system-wide metering (secondary). The PER further recommended, "…completing the water main replacement program until the recoverable benefits replacements is exhausted, and instituting a responsible water metering plan and rate structure." The PER finally concluded that distribution system replacement is the recommended immediate alternative, both in terms of enhancing water supply (by reducing leakage) and cost-

[1] (HKM Engineering, Inc., 2004)

effectiveness, followed by comprehensive metering. Based on those two alternatives, the PER outlined a seven-year main replacement program, extendable to nine years with optional system-wide metering. After five years of main renewals since publication of the PER, a 2009 Modeling Study Amendment[1] re-evaluated the remaining replacement priorities (NRD grant #600214). This 2012 PER Master Plan Update re-assesses the system and identifies all the remaining water system work to be done in Anaconda.

[1] (DOWL HKM, 2009)