

# *MDOJ Natural Resource Damage Program*

## *Anaconda-Deer Lodge County Groundwater Restoration Plan (2012)*

### **NRD Final Project Report**

**Oct. 22, 2019**

*project name:* Groundwater Restoration Plan for the Anaconda Domestic Water System [2012 ADLC Final Groundwater Restoration Plan]

*grantee:* Anaconda-Deer Lodge County, MT  
Courthouse – 800 South Main  
Anaconda, MT 59711  
(ph: 406/563-4000)

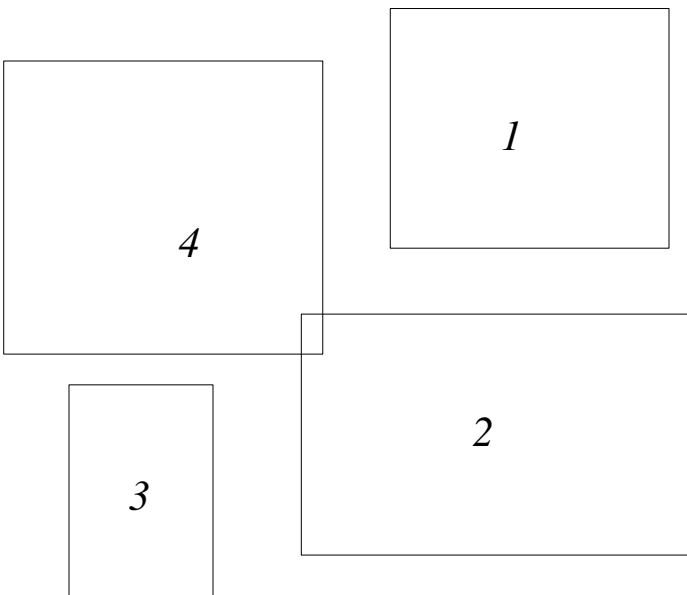
*funding:* \$10,200,000 NRD Groundwater Allocation Funds

*DOJ contract:* #800003



prepared by: *Beard Environmental & Technical Assistance, LLC*  
Elliston, MT





*Title Page Photo Legend:*

- 1. Century-old Kalimane steel water main piping showing typical pipe perforation causing leakage, along with severe pipe corrosion and structural deformation.*
- 2. Old Kalimane steel water main removed along West Park Street (GWRP Phase IV project, 2014).*
- 3. Typical residential water meter.*
- 4. Construction of first NRD grant-funded waterline replacement in Anaconda – Main St. in 2003.*

*[Photos 1 and 2 courtesy of Copper Environmental Consulting; Photo 4 courtesy of Morrison-Maierle, Inc.]*

## ATTACHMENT E

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**1. Title Page:** (preceding)

**2. Introduction:**

To conserve available domestic water supply, replacement of century-old corroded water mains along with voluntary water metering was undertaken over a seven-year program in the Anaconda municipal water service area. These *Groundwater Restoration Plan* (GWRP) projects comprised 54,000 lf of pipe replacements, and in concert with 69,000 lf installed prior to 2012, reduced system leakage from 2.2 mgd to less than 400,000 gpd today. Metering of 493 additional customers, plus 77 household pressure-reducing valves installed, augment the critical water conservation mandate of this project.

**3. Discussion and Results:**

**A. Parties Responsible**

Engineering Planning/Design/Inspection/Construction Administration:

- DOWL HKM – 2013 and 2014 projects
- Copper Environmental Consulting – 2015, 2016, 2017, 2018 and 2019 projects

Waterline Construction:

- H&H Contracting – 2013, 2014 and 2015 projects
- LHC, Inc. – 2016 project
- Mungas Company – 2017, 2018 and 2019 projects

Wellfield Gen-set Construction:

- Ray Peterson Electric

Water Meter (and PRV) Installations:

- Galle Plumbing
- Miller Mechanical
- Charles Sundberg
- Saltenberger Heating & Plumbing
- Sawyer Plumbing

NRD Funding Administration:

- Beard Environmental & Technical Assistance

Waterline Plan Review/Approval:

- Montana Dept. of Environmental Quality – Public Water Supply Section

**B. Project Goals and Objectives**

Per UCFRB Restoration Fund Agreement #80003 the project is a restoration replacement project, “with the primary goal to enhance the reliability and availability of water service community-wide, and improve flows and fire protection for water users in Anaconda.” Specific objectives included Phases I through V of waterline replacements, a system-wide voluntary metering program, and emergency generator installations for the municipal well field.

As identified and budgeted in Anaconda's 2012 *Groundwater Restoration Plan* and NRD funding agreement, the eventual seven-year program included three categories:

- Five annual phases of waterline replacements (budgeted at \$8 million construction and \$1.3 million engineering), modified with NRDP approval as follows:
  - MDT paving on W. Park Street shifted the order of the 5-year waterline renewals, accelerating Phase IV (West Park & Pennsylvania waterlines) to Year 2 (2014), followed by the Phase II (2015) and III (2016) projects.
  - Phase V (Year 5) improvements were adjusted to substitute Ogden St. waterlines for those originally proposed in Theresa Ann Terrace, where freeze-ups subsided as the subdivision built out. Leakage on the Ogden main became more acute since 2012, while the West Side valve/hydrant replacements proposed in the 2012 GWRP remained in Phase V.
  - An additional Phase 5A (2018) was added for waterline replacements on Tammany Street and the east side of the Courthouse in Year 6. The estimated budget of \$837,000 for NRD-eligible construction (\$742,500 Tammany + \$94,500 Courthouse Loop) came from Anaconda's unspent Groundwater Allocation funds due to cost underruns on prior projects.
  - Design for the Haggin, Hamburg and Cross Streets project was approved as a Phase 5B (2019) waterline addition by the NRDP in Sept. 2018. Construction was subsequently approved in March 2019, once the NRDP confirmed available remaining Groundwater Allocation funds available to Anaconda. This Year 7 project was budgeted at \$1,310,570.80 for waterline components and further metering, although remaining NRD funds will not cover the full amount leaving the balance to be covered by ADLC.
- An emergency generator for backup power at the municipal well field – original estimate of \$80,000 including engineering, increased to \$130,000 construction plus \$25,670 engineering per NRD Funding Agreement Modification #1. Both a new stationary wellhead gen-set and rehabilitation of a portable generator trailer for use at a second well were included.
- Five years of fully subsidized “voluntary” water meter installations (\$1 million, or \$200,000 for “150 to 200 meters” per year including engineering). This was extended two more years under Phases 5A and 5B, and expanded to offer voluntary Pressure Reducing Valves (PRVs) for metered customers as an additional water conservation measure. PRV installations were forecast at 30± installations per year.

Water main Phases I through V and the well field generators were implemented by engineering design, public bidding, and contractor construction. Design was typically

conducted in fall/winter, with late winter bid lettings and construction beginning in spring. This approach met objectives nicely by allowing consecutive annual projects, and benefitted from consistently under-budget bid results. Contingency funds budgeted for each project remained unspent, and the cumulative savings allowed the addition of two more years of projects to the original five-year GWRP.

Voluntary water metering followed a public solicitation to pre-qualify plumbers, giving property owners their choice of five installers. The program was expanded in 2018 to also offer Pressure Reducing Valves (PRVs) as well. Lower elevations in Anaconda can see over 120 psi water pressure, and pressure reduction promotes water conservation plus reduces pressure-related plumbing problems. Voluntary PRV installations for customers were preconditioned on having (or adding) a water meter. The ADLC Water Department allowed 1.0 hr plumbing labor for PRVs, in addition to 2.0 hr allowed for meter installs – all at a rate of \$79.00/hr.

No meter pits were required, despite a forecast in the *2010 Metering Implementation Plan PER Amendment* that one-third of installation would require pits. Meter pits were avoided since the Water Department could make individual on-site evaluations, which was a significant cost benefit since pits entail roughly threefold the cost of indoor meter installations. Metering costs ran well below budget – 49.3 percent of the maximum goal of 1,000 meters (up to 200 per year) were installed at only 25 percent of budget (including recent PRV additions).

Overall Anaconda's contractual goals and objectives were very successfully met. A total of 53,987 lf of old leaking water mains were replaced, compared to 47,065 lf originally forecast in the 2012 *Groundwater Restoration Plan*. A leakage re-evaluation at the end of 2009 showed system losses at 1.25 mgd, down from 2.2 mgd in 2002 due to 69,275 lf of NRD-funded pipe replacements prior to the 2012 GWRP. After the seven-year GWRP projects, water losses have further reduced to less than 400,000 gpd (the practical limits of measurement without a fully metered system). A total of 493 new meters and 77 PRVs were installed over the seven years, doubling Anaconda's metered customer base which is now approaching 50 percent. A summary of GWRP project costs and quantities appears in **Table 1** (next page).

While the 2019 Phase 5B project is not yet fully complete, this Final Project Report has been prepared now at the juncture of full expenditure of Anaconda's \$10.2 million Groundwater Allocation.

**Table 1 - Summary of Final GWRP Improvements Constructed**  
**-through Sept. 2019-**  
**[NRD Funding Agreement #800003]**

year built	project	pipe footage	NRD funding <sup>(a)</sup>
			(final costs shown, except 2018)
2012 Groundwater Restoration Plan (\$10.2M NRD Allocation):			
2013	Phase I – East Cross Streets Mains	11,708	\$2,004,309 <sup>(b)(c)</sup>
2014	Phase IV – W. Park, Larch & Penn. Mains	13,141	\$1,877,208 <sup>(c)</sup>
2015	Phase II – Transmission Mains	7,967	\$1,604,833 <sup>(c)</sup>
2016	Phase III – Washoe Park Rd. Water Mains	8,621	\$1,701,903 <sup>(c)</sup>
2017	Phase V – Westside Valve/Hydrant & Ogden St. Water Main Replacements	3,078	\$974,099 <sup>(c)</sup>
2018	Phase 5A – Tammany & Courthouse Loop Waterline Replacements <i>(close-out pending)</i>	3,667	\$919,818
2019	Phase 5B – Hamburg-Haggin & Cross Streets Waterline Replacements <i>(completion pending)</i>	5,805	\$726,095 <sup>(d)</sup>
Subtotal – GWRP Waterline Projects:		53,987	\$9,808,265

<sup>(a)</sup> Project costs shown include engineering, construction, and funding administration.

<sup>(b)</sup> Excludes \$27,969 in 2013 NRD-reimbursed costs for *Groundwater Restoration Plan* preparation, and \$137,040 in well field generators with engineering (itemized below).

<sup>(c)</sup> Excludes “voluntary” water meter installs and engineering (itemized below).

<sup>(d)</sup> Excludes ~\$301,680 (pending final quantities) in additional waterline costs in excess of GWA funds available, and paid by ADLC.

Non-waterline Projects (under <i>Groundwater Restoration Plan</i> ):		
2012	<i>Groundwater Restoration Plan</i> Preparation	\$27,969
2013	Well Field Emergency Generators	\$137,040
2013-19	“Voluntary” Water Meter (493) & PRV (77) Installs	\$226,726
Subtotal – GWRP Non-waterline Projects:		\$391,735
Total – GWRP Projects:		\$10,200,000

### C. Changes in Project Scope

Three formal Contract Modifications to the NRD Groundwater Allocation funding agreement occurred. Contract Modification #1 accelerated Phase IV waterlines into 2014 to dovetail with MDT paving on W. Park Street, and also amended the Phase I budget for increased cost of the wellfield generator(s) plus a schedule extension for same. **Table 2** appearing later in this report reflects the approved budget line item shifts covered in NRD funding Contract Modification #1 (Dec. 2013). A second Contract Modification (Dec. 2017) extended Anaconda’s time of performance under the funding agreement for three more years, through December 2020. The NRDP issued Contract Modification #3 on 12Mar19 increasing Anaconda’s \$10.0M Groundwater Allocation by \$200,000.00 for interest earned, less NRD program expenses.

For Year 5 (2017) of its GWRP, Anaconda secured NRDP approval to substitute the Ogden Street water main replacement in lieu of the originally proposed Theresa Ann Terrace

waterline deepening. For 2018, the NRDP approved adding the Tammany/ Courthouse waterlines and ongoing metering as a Year 6 (Phase 5A) GWRP project. ADLC also obtained NRDP approval for the Hamburg, Haggin & Cross Streets waterline project as a Year 7 (Phase 5B) project for 2019. These adjustments did not require formal amendments to the NRD Funding Agreement, since they were considered consistent with the original GWRP scope as water conservation through leakage abatement and customer metering.

Anaconda's original GWRP contribution was largely budgeted for Contingency (\$774,980), none of which has been required to be spent during construction. Consistent cost under-runs on its annual waterline projects permitted ADLC to extend its GWRP program from five to seven years.

ADLC also asks to be relieved of the commitment to provide "up to" \$1,237,300 in local funds to complete its approved GWRP program. In lieu, the City-County will contribute ~\$203,000 to complete the original Hamburg-Haggin waterline scope, plus ~\$98,680 more for additional waterlines added outside the GWRP process (estimated costs pending final construction quantities).

An additional adjustment on ADLC's part was the inclusion of storm drains and ancillary street improvements (e.g., wider re-paving and ADA ramps) in conjunction with the 2017, 2018 and 2019 project bids. These "non-NRD reimbursable" bid items were tallied separately, but created economy in the combined projects plus avoided separate future disruptions of the project corridors for new drainage improvements.

#### **D. Problems Encountered and Solutions Adopted**

Minimal problems were encountered in the seven annual increments of the GWRP project(s).

- The singular biggest problem encountered on most annual waterline projects was the failure to meet Substantial and particularly Final Completion construction deadlines. The onset of cold weather was typically the cause of some delays, and on occasion contractors struggled to complete asphalt re-paving ahead of winter. Nonetheless waterline projects generally reached Substantial Completion within the calendar year, although in some cases Liquidated Damages were assessed.
- Final Completion and construction close-out was the larger problem, with most projects lapsing until spring of the following year for Punch List completion and contractor submission of all required final documentation. As examples, the 2017 Phase V project was just fully closed out in Sept. 2019, and the 2018 Phase 5A construction close-out remains pending.

Limited solutions proved available to incentivize waterline contractors to expedite annual project completion and close-out. Liquidated damages, while specified in bid documents, apparently were insufficient incentive, likely coupled with reduced Retainage held by the

end of construction. One solution in retrospect may be to hold full 5% Retainage without any reduction until contractors meet all close-out requirements.

## **E. Comments and Recommendations**

There were two particularly beneficial aspects of the project(s) approach utilized – 1) the metering installation protocol developed by the ADLC Water Department saved substantial cost, and 2) collateral storm drain and paving upgrades on select waterline corridors avoids the likelihood of substantial disruptions to those roadways in the foreseeable future.

By prequalifying five plumbing contractors and stipulating an allowable labor charge (based on averages of prices submitted), water meter and PRV installations were expedited while giving property owners a choice of installers. ADLC Water Department purchase and dispensing of metering materials also helped contain costs. The direct involvement of the Department in assessing installation needs at each meter or PRV location also completely avoided the need for expensive buried “meter pit” installations in yards or right-of-ways. The approach also avoided the added cost of preparing plan/spec documents and annual bid lettings, as reflected by meter engineering expenditures of only \$2,945 compared to \$75,665 budgeted.

ADLC’s decision to incorporate storm drain and/or paving upgrades along multiple waterline corridors during the 2017, 2018 and 2019 projects was also a future cost savings. Future corridor disruptions for major construction were forestalled, and costs were also saved by avoiding mobilization costs for a second (later) contractor.

Both of these measures are recommended for other entities contemplating similar large scale waterline replacements, given similar needs.

## **4. Grant Administration and Project Costs**

### **A. Work Schedule**

The original GWRP project(s) schedule of five years extended to seven, but not due to delays. Rather two years of additional waterline (and metering) projects were added, resulting from substantial cost savings during the five initial annual projects.

As previously described, there were delays in completion and particularly close-out of individual annual waterline construction efforts. These resulted most conspicuously from an apparent lack of priority by waterline contractors to expediently comply with Punch List and final documentation requirements. Cold weather also contributed to delay in completion of some Punch List items involving weather-sensitive restoration tasks like revegetation or concrete repairs.

## B. Budget

As described above, iterative cost savings during the initial five years of projects allowed the GWRP waterline and metering installations to extend for two additional years. A total of 47,065 lf of new mains were proposed in the 2012 *Groundwater Restoration Plan* over a five-year period. The seven annual projects actually constructed increased that total footage to 53,987 lf.

Consistent bid and construction cost under-runs resulted more money available for post-Phase V projects, and none of the budgeted \$774,980 for Contingency had to be spent during the Phases I through V. Together these cost savings created significant financial capacity for the added Phase 5A and 5B (Year 6 and 7) efforts.

Another obvious part of cost savings was expenditure of only 25% of the Voluntary Water Metering budget – i.e., \$909,100 construction + \$75,665 engineering budgeted vs. \$223,781 construction + \$2,945 engineering spent. Nonetheless 493 new meters and 77 PRVs were installed, compared to a goal of up to 1,000 meters, the “voluntary” subscription aspect of the program notwithstanding.

NRD-eligible costs exceed remaining Groundwater Allocation funds by \$188,408.41 as of the Phase 5B waterline contractors Pay Application #6 (through Sept. 2019), at which point all new mains and re-paving had been claimed. That amount is being paid by ADLC, and may increase to an estimated \$301,680 (pending final quantities) by the end of the 2019 project.

**Table 2** on the next page shows the budgeted and actual final project costs for all seven annual projects (through Final NRD Progress Report #37 dated 21Oct19). As shown, the full \$10,200,000 NRD Groundwater Allocation was expended, plus an additional \$188,408 in ADLC funds for waterlines. No unbudgeted expenses arose over the course of the projects, and as previously noted, no budgeted Contingency funds were spent during the initial five years of construction.

NRD-reimbursable funding administration costs for the seven-year program totaled \$52,984, or 0.52% of the \$10.2 million Groundwater Allocation.

All project costs were for contracted services – including engineering and funding consultants, construction contractors, licensed plumbers, and meter equipment suppliers. There was no reimbursed local labor or force account work on the projects.

**Table 2 – Anaconda NRD Groundwater Allocation Final Project Report: Budget & Expenditure Summary  
(through Oct. 21, 2019 & Final Progress Report #37)**

expense category	5-yr GW Alloc. budget <sup>(1)</sup>		Ph. I NRD	Ph. IV NRD	Ph. II NRD	Ph. III NRD	Ph. V NRD	Phase 5A (2018) NRD funds <sup>(5)</sup>		Phase 5B (2019) NRD funds <sup>(6)</sup>		local funds expended for Phase 5B waterlines	7-yr FINAL expended	
	NRD funds <sup>(1)</sup>	local funds <sup>(2)</sup>	total expended	total expended	total expended	total expended	total expended	NRD funds budget <sup>(19)</sup>	final expended	est. project budget <sup>(10)</sup>	final expended		NRD funds	local funds <sup>(2)</sup>
<b>Contracted Services:</b>														
2012 <i>Water Master Plan Update</i> (incl. <i>GW Restoration Plan</i> ) - DOWL HKM <sup>(2)</sup>	\$23,620	\$0	\$23,620.00										\$23,620.00	
2012 <i>GW Restoration Plan</i> Grantwriter Assistance - BETA	\$4,348	\$0	\$4,348.75										\$4,348.75	
Water Main Construction (annual) <sup>(3)(4)</sup>	\$7,506,731	\$462,320	\$1,694,436.70	\$1,573,312.40	\$1,354,896.00	\$1,496,980.49	\$787,296.68	\$837,000.00	\$764,510.75	\$1,009,581.00	\$601,233.93	\$188,408.41	\$8,272,666.95	\$188,408.41
“Voluntary” Water Meter (& PRV) Installs (less Engineering)	\$909,100	\$0	\$86,130.55	\$31,841.15	\$27,485.24	\$12,598.09	\$22,959.52	\$85,000.00	\$19,658.90	\$85,000.00	\$23,107.82		\$223,781.27	
Backup Power at Wellfield (less Engineering) <sup>(3)</sup>	\$130,000	\$0	\$111,979.64										\$111,979.64	
Engineering:														
Water Main Engineering Design/Insp.(15%) <sup>(6)</sup>	\$1,284,866	\$0	\$300,246.75	\$296,237.37	\$242,748.80	\$193,431.36	\$179,308.55	\$147,312.00	\$147,812.00	\$147,312.00	\$122,829.50		\$1,482,614.33	
Meter Engineering & Bid (10% of metering)	\$75,665		\$2,945.15	\$0.00	\$0.00	\$0.00			\$0.00		\$0.00		\$2,945.15	
Backup Power Engineering & Inspection	\$25,670	\$0	\$25,060.00										\$25,060.00	
Contingency (10% of waterlines)	\$0	\$774,980	\$0.00	\$0.00				\$83,700.00	\$0.00	\$83,700.00	\$0.00		\$0.00	
NRD Funding Administration	\$40,000	\$0	\$9,625.24	\$7,658.24	\$7,187.73	\$11,491.46	\$7,493.75	\$7,500.00	\$7,495.49	\$7,500.00	\$2,032.00		\$52,983.91	
<b>Total Contracted Services:</b>	\$10,000,000	\$1,237,300	\$2,258,392.78	\$1,909,049.16	\$1,632,317.77	\$1,714,501.40	\$997,058.50	\$1,160,512.00	\$939,477.14	\$1,333,093.00	\$749,203.25	\$188,408.41	\$10,200,000.00	\$188,408.41
<b>TOTAL:</b>	\$11,237,300													
<b>2012 NRD Funds Budget:</b>			\$2,477,082.00	\$2,526,267.00	\$2,012,915.00	\$1,884,870.00	\$1,098,866.00							
<b>Percent of Funds Used:</b>			91.17%	75.57%	81.09%	90.96%	90.74%		80.95%		56.20%		100.00%	

<sup>(1)</sup> Budget line items have been revised per Dec. 2013 Contract Modification #1 to NRD funding agreement; budget line items not revised for NRD funding increase to \$10.2 million per Contract Modification #3.

<sup>(2)</sup> Maximum estimated cost per budget in UCFRB Restoration Fund Agreement No. 80003; local funds up to the maximum of \$1,237,300 would only be spent should the NRD allocation of \$10.0 million be inadequate to complete the approved scope of work.

<sup>(3)</sup> Wellfield Backup Power construction budget increased from \$69,565 to \$130,000; budget for Phase I (2013) Water Main Construction reduced by \$60,435 due to \$187,773 bid under-run compared to budget.

<sup>(4)</sup> Construction costs include Gross Receipts Tax payments to MDOR.

<sup>(5)</sup> Phase 5A (2018) project approved by NRDP at a budget of \$1,160,512 from unused NRD funds from Years 1 thru 5.

<sup>(6)</sup> Phase 5B (2019) project approved by NRDP for expenditure of remainder of ADLC’s remaining Groundwater Allocation funds (amended to \$10,200,465.38) – incl. \$161,533 for Engineering and remainder towards NRD-eligible waterline Construction; ADLC paid additional construction costs beyond NRD funds available.

## **5. Project Completion and Certification**

### **A. Project Sponsor's Certificate of Compliance**

*(see next page)*

### **B. As-Built Drawings**

*(not required – Record Drawings for each individual annual waterline project were prepared by the respective Engineers according to MDEQ plan approval conditions, and furnished to MDEQ and ADLC.)*

### **C. Engineer's Statement of Final Completion**

*(not required – Multiple engineering firms were involved in the seven years of annual waterline projects. The respective Engineers for each annual waterline project were required to submit letters "Certifying Completion in Accordance with Approved Plans & Specifications" to MDEQ as a condition of that agency's plan approval.)*

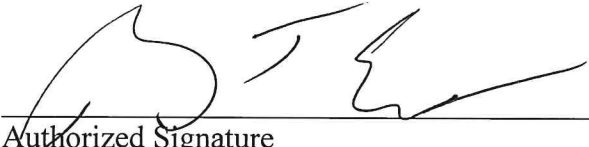
*prepared by: Alden Beard, P.E.*  
**BETA**  
22Oct2019

FINAL REPORT  
CERTIFICATE OF COMPLIANCE

Grantee:       Anaconda-Deer Lodge County, Montana

Name of Project:       Groundwater Restoration Plan for the Anaconda Domestic Water System  
                                  [2012 ADLC Final Groundwater Restoration Plan]

I, the undersigned, being duly qualified, respectfully, of Anaconda-Deer Lodge County (Name of Sponsor), in the County of Deer Lodge, State of Montana, do hereby certify that the above named project is in full compliance with all of the covenants and conditions set forth in Contract #800003 between Anaconda-Deer Lodge County (Name of Sponsor) and the state of Montana of Montana, Natural Resource Damage Program.

  
\_\_\_\_\_  
Authorized Signature

10-22-19  
\_\_\_\_\_  
Date