2019

Montana Coal Impact Grant Application

Submitted by:
City of Hardin, MT

Submitted to:
Montana Coal Board
301 S Park Ave, Helena, MT 59601

Prepared by:
Stahly Engineering

ENGINEERING EST. STAHLY 1970 & ASSOCIATES, INC.

THE COAL IMPACT GRANT APPLICATION FORM SUBMITTED BY The City of Hardin

CERTIFICATION

To the best of my knowledge and belief, the information provided in this application and in the attached documents is true and correct.

In accordance with Section 90-6-205, MCA, the applicant is eligible for Coal Board grants and has the statutory authority to make expenditures to provide for the particular service or facility.

Name: Joseph Purcell
Title: Mayor

Joseph Purcell 10/21/19

Signature: Date:

TABLE OF CONTENTS

Uniform Application

Attachment 1: Current funding commitment

Coal Impact Grant Application

Summary Information....1-4
Budget and Budget Narrative....5-7
Implementation Schedule....8-9
Need....9-14
Severity of Coal Impacts....14-18
Availability of Funds....18-19
Degree of Local Effort....20-25
Planning and Management....25-27

EXHIBITS

Exhibit A: Maps

Exhibit B: EPA Compliance Evaluation Inspection

Exhibit C: City of Hardin Financial Information

Exhibit D: Excerpts from City of Hardin Planning Documents

- City of Hardin Growth Management Plan
- Beartooth RC&D Comprehensive Economic Development Strategy (CEDS)

Exhibit E: Preliminary Engineering Report (under separate cover – submitted one copy with application)

UNIFORM APPLICATION FORM
FOR MONTANA PUBLIC FACILITY PROJECTS

(Please type or print legibly)

SECTION A - CERTIFICATION

To the best of my knowledge and belief, the information provided in this application and in the attached documents is true and correct.

Name (printed): Joseph Purcell

Title (printed): Mayor
Chief Elected Official or Authorized Representative

Signature: Joseph Purcell

Date: 10/21/19

SECTION B - SUMMARY INFORMATION

1. **NAME OF APPLICANT(S):** City of Hardin
2. **TYPE OF ENTITY:** City Government
3. **FEDERAL TAX ID NUMBER:** [redacted]
4. **TYPE OF PROJECT:** Wastewater Treatment System Upgrades
5. **SENATE AND HOUSE DISTRICTS:** Senate District 21, House District 42

5.a **NAMES OF SENATOR(S) AND REPRESENTATIVE(S):** Sen. Jason Small, Rep. Sharon Stewart-Peregoy

6. **POPULATION SERVED BY PROJECT** 3,837

6.a **NUMBER OF HOUSEHOLDS SERVED BY PROJECT:** 1,286 Active Sewer Connections

7. **DUNS Number:** 785091612

8. CHIEF ELECTED OFFICIAL OR AUTHORIZED REPRESENTATIVE:

JOSEPH PURCELL
(Name)
MAYOR
(Title)
406 NORTH CHEYENNE AVENUE
(Street/PO Box)
HARDIN, MONTANA, 59034
(City/State/Zip)
406-665-9292
(Telephone) (FAX No)
CITYCLERK@HARDINMT.COM
(E Mail address)

9. PRIMARY ENTITY CONTACT PERSON:

JOSEPH PURCELL
(Name)
MAYOR
(Title)
406 NORTH CHEYENNE AVENUE
(Street/PO Box)
HARDIN, MONTANA, 59034
(City/State/Zip)
406-665-9292
(Telephone) (FAX No)
CITYCLERK@HARDINMT.COM
(E Mail address)

10. PROJECT ENGINEER/ARCHITECT:

GREG STECKLER, P.E.
(Name of Engineer)
STAHLY ENGINEERING AND ASSOCIATES
(Name of Firm)
851 BRIDGER DRIVE, SUITE 1
(Street/PO Box)
BOZEMAN, MONTANA, 59715
(City/State/Zip)
406-522-8594
(Telephone) (FAX No)
RRITTAL@SEAENG.COM
(E Mail address)

11. GRANT/LOAN ADMINISTRATOR:

ROBIE CULVER
(Name)
GRANT ADMINISTRATOR
(Title)
3530 CENTENNIAL DRIVE
(Street/PO Box)
HELENA, MONTANA, 59601
(City/State/Zip)
406-442-8594
(Telephone) (FAX No)
RCULVER@SEAENG.COM
(E Mail address)

12. LEGAL COUNSEL:

JORDAN KNUDSEN
(Name)
CITY ATTORNEY
(Title)
406 NORTH CHEYENNE AVENUE
(Street/PO Box)
HARDIN, MONTANA, 59034
(City/State/Zip)
406-665-9292
(Telephone) (FAX No)
(E Mail address)

13. BOND COUNSEL:

COURTNEY ELLIS - DORSEY & WHITNEY
(Name)
BOND COUNSEL
(Title)
125 BANK STREET, STE. 200
(Street/PO Box)
MISSOULA, MT 59802
(City/State/Zip)
406-721-6025
(Telephone) (FAX No)
(E Mail address)

14. CLERK/CHIEF FINANCIAL OFFICER:

MICHELLE DYCKMAN
(Name)
FINANCIAL OFFICER
(Title)
406 NORTH CHEYENNE AVENUE
(Street/PO Box)
HARDIN, MONTANA, 59034
(City/State/Zip)
406-665-9292
(Telephone) (FAX No)
CITYFINANCE@HARDINMT.COM
(E Mail address)

15. ACCOUNTANT:

(Name of Accountant)
Tripp & Associates
(Name of Firm)
1645 Avenue D
(Street/PO Box)
Billings, MT 59102
(City/State/Zip)
406-248-5150
(Telephone) (FAX No)
(E Mail address)

16. BRIEF PROJECT SUMMARY: (Refer to instructions and examples)

Historical Information -
The City of Hardin wastewater system consists of a gravity sewer system with a lift station and an oxidation ditch mechanical treatment system that was built in 1978. Treated effluent is discharged to the Bighorn River.

Problem - See next page for full content of this section
Due to the age of the existing collection system and wastewater treatment plant, several components of the of upgrade to meet EPA and MDEQ Standards. Recent EPA inspection results list issues with the system that include lack of backup power, surge flow issues, and lack of grease/grit removal and secondary clarific

Proposed Solution - See next page for full content of this section
Deteriorated mains and manholes will be replaced to significantly reduce infiltration into the wastewater sys Aeration System continuous flow SBR, converting the existing oxidation ditch to surge flow equalization, an Other upgrades will include a new plant potable water well, septage receiving station, installation of a backu

SECTION C - FINANCIAL INFORMATION

1. ESTIMATED TOTAL PROJECT COST: $ 11,265,000

2. PROPOSED FUNDING SOURCES (List loans and grants from same funding source separately) (Refer to the instructions and examples)**:**

Source	Type of Funds	Amount	Status of Commitment	Loan Rates and Terms
TSEP	Grant	$625,000	Award per HB652	
RRGL	Grant	$125,000	Award per HB652	
SRF	Loan	$2,715,000	On priority list	2.5%/30 years
CDBG	Grant	$450,000	Application planned for Sum	
DLA	Grant	$750,000	Applied for September 2019	
USDA RD	Loan/Grant	$6,000,000	Applied for October 2019	
Montana Coal Board	Grant	$500,000	Applied for October 2019	
CIty of Hardin	Cash Reserve	$100,000	Committed June 2018	

BRIEF PROJECT SUMMARY

Problem

Due to the age of the existing collection system and wastewater treatment plant, several components of the system are in need of upgrade to meet EPA and MDEQ Standards. Recent EPA inspection results list issues with the system that include lack of backup power, surge flow issues, and lack of grease/grit removal and secondary clarification.

Proposed Solution

Deteriorated mains and manholes will be replaced to significantly reduce infiltration into the wastewater system. The mechanical plant will be upgraded by replacing the headworks structure and adding a new Intermittent Cycle Extended Aeration System continuous flow SBR, converting the existing oxidation ditch to surge flow equalization, and correcting individual issues within the system. Other upgrades will include a new plant potable water well, septage receiving station, installation of a backup power generator, a new redundant UV disinfection system, and an administration building for lab space and the UV system.

3. FUNDING STRATEGY NARRATIVE

- Funding Strategy Narrative **(Complete and attach)**
  (Refer to the instructions. Answer each question individually.)

  a. What are the conditions on the use of each source of funds?

  b. When will each source of funds listed be available (month and year)?

  c. Is there any additional information on the level of commitment for each source of funds listed?

  d. How will funding sources be coordinated with each other?

  e. Will interim-loan funds be required as part of the project? If yes, how will they be used and coordinated with other funding sources?

  f. What other sources of funds from public and private sources have been considered for this project? Explain why they are not being pursued or used for this project.

  g. If a particular source of funding is not obtained, how will the applicant proceed? Explain how the funding strategy will change if a particular source of funding is not received.

  h. What is the level of local financial participation in the project and is that level the maximum that the applicant can reasonably provide?

4. PROJECT BUDGET FORM

- Project Budget Form **(Complete form on next page)**
  (Refer to the instructions and example)

- Project Budget Narrative **(Complete and attach)**
  (Refer to the instructions and example)

Project Funding Strategy Narrative – City of Hardin Wastewater System Upgrade

a. What are the conditions on the use of each source of funds?
GRANT FUNDING PLANNED *(strategy subject to change based on amount received)*

Treasure State Endowment Program (TSEP) - $625,000
Grant application deadline:
Application was submitted to TSEP by June 15, 2018.

The City of Hardin applied to TSEP June 2018. The 2019 legislature passed HB652 which resulted in a TSEP award conditioned on the availability of funding that was made available in this bonding bill. TSEP staff have informed awardees that there may not be enough money in the TSEP portion of the bill to fund all listed projects and that it is critical for funded projects to meet all startup conditions for the project as soon as possible. The award letter is included in Attachment 1.

Limitation on total amount of funding:
TSEP sets potential grant award amounts based on the resulting target rate of the project. Funding levels range from $500,000 to $750,000. Funding is limited to $20,000 per benefitted household.

The current estimate to complete the City of Hardin Wastewater Treatment System Project and the resulting target rate that will be charged to rate payers is above 125% of the City's target rate of $66.92 utilizing ACS 2011-2015 data for MHI. The combined rate for water and wastewater forecasted at the end of the project is $89.38. With 1,286 benefitted households, the City applied for $625,000.

Matching funds:
TSEP funding must be matched in the amount of 50% of the overall grant amount. The City of Hardin funding strategy includes other sources of grant funding and loan funds to provide working capital for the project and meet the match requirements of TSEP. Bond counsel will be utilized to determine the best method for repayment of loan funds.

Activity reimbursement:
No costs incurred prior to the effective date of the TSEP contract will be eligible for reimbursement other than reasonable expenses associated with attending TSEP project administration training.

Renewable Resource Grant and Loan (RRGL) Program - $125,000
Grant application deadline:
Application was submitted by May 15, 2018.

The City of Hardin applied to RRGL by the due date. The 2019 legislature passed HB652 which resulted in an RRGL award. The funding source requires start up conditions that include commitment of all funds for the project. RRGL staff has

assured the City that their program is fully funded, and the funds will be available when the City needs them.

Limitation on total amount of funding:
The City of Hardin applied for an RRGL grant in the amount of $125,000 which is the maximum amount of the grant. Projects funded with RRGL program funds must result in resource and citizen benefits, be financially feasible, have no significant environmental impacts, have an adequate project management plan, and be technically feasible. The award letter is included in Attachment 1.

Matching funds:
None required.

Activity reimbursement:
The City will execute a Grant Agreement and Bond Purchase Agreement once startup conditions are met. DNRC reimburses only project-specific costs.

Delivering Local Assistance (DLA) - $750,000
Grant application deadline:
Applications were accepted from June 1, 2019 – September 30, 2019.

The City of Hardin applied for DLA funds from the Montana Department of Commerce on September 30, 2019.

Limitation on total amount of funding:
The maximum amount of funding can not exceed $750,000 per project. Funding can be used to complete infrastructure projects.

The City of Hardin applied for the maximum amount of $750,000.

Matching funds:
None required.

Activity reimbursement:
All grant recipients must meet start-up conditions no later than September 30, 2020.

Montana Coal Impact Grant - $500,000
Grant application deadline:
Applications are due 45 days prior to the next Coal Board meeting. The next due date is October 28, 2019. Applicants must appear before the Coal Board when their application is on the agenda for consideration.

The City of Hardin will apply by the date applications are due and will appear before the Coal Board on the date requested.

Limitation on total amount of funding:
Communities that qualify can receive up to $500,000 in grant funding. The community must show the degree of severity of impact from an increase or decrease in coal development.

The City of Hardin will apply for the maximum amount of $500,000.

Match required:
None required.

Activity reimbursement:
Eligible and reasonable expenses will be reimbursed after the contract has been fully executed between MDOC and the grant recipient and the grant recipient has demonstrated a firm commitment of funds from other funding entities.

Community Development Block Grant (CDBG) Public and Community Facilities - $450,000

Grant application deadline:
CDBG funding is subject to federal congressional approval tied to the federal budgeting process. Currently there is no application deadline for CDBG but, in conversations with CDBG staff, it is anticipated in summer or fall of 2020.

Limitation on total amount of funding:
Communities that qualify for CDBG Public and Community Facilities grants can receive up to $450,000 for their project, limited to $20,000 per benefitted household. The City of Hardin, with 1,286 benefitted households, will apply for $450,000.

CDBG funds construct or rehabilitate infrastructure and facilities that primarily benefit low- to moderate-income (LMI) Montanans, i.e. individuals earning less than 80% of the area median income. At least 51% of the project's beneficiaries must be determined to be LMI. The City of Hardin qualifies based on its current LMI percentage of 51.85%.

New CDBG grants may be limited by additional open grants that are being utilized by the community. The City of Hardin does not currently have an outstanding CDBG grant.

Expenses that are ineligible for funding from CDBG include:

- Operation and maintenance costs;
- Temporary furnishings, fixtures, or equipment; and
- Any unauthorized costs incurred prior to the date identified in the Notice of Award letter (with some exceptions as discussed with CDBG staff).

Matching funds:
CDBG funding must be matched in the amount of 25% of the overall grant amount unless a waiver request is approved. The City of Hardin funding strategy includes other sources of grant funding and loan funds intends to provide working capital for the project and meet the match requirements of TSEP. Bond counsel will be utilized to determine the best method for repayment of loan funds. The amount of additional funding needed for the wastewater system upgrade will exceed the 25% match requirement.

Activity reimbursement:
No costs incurred prior the date identified in the Notice of Award letter will be eligible for reimbursement unless planned for with CDBG staff. Beyond that, project activities eligible for reimbursement with CDBG funding include, but are not limited to:

- Expenses that directly relate to construction activities that implement the scope of work identified in the CDBG grant contract, including materials, labor, land acquisition, and permanent furnishings, equipment, and fixtures;
- Professional services that directly relate to design activities that implement the scope of work identified in the CDBG grant contract;
- Repayment of interim financing directly related to project activities that implement the scope of work identified in the CDBG grant contract;
- Special assessments, connection charges, and hook-up fees for LMI residents;
- Legal costs and fees, including bond counsel;
- Direct grant administration expenses, up to a maximum 10% of the total CDBG budget for the project.

LOAN FUNDING PLANNED/CONSIDERED *(strategy subject to change based on amount of grant funding received, pending interest rates, and potential for loan forgiveness or grant funding from the lender)*

SRF Loan/Local Funds - $2,715,000

The City of Hardin will contribute local funds to this project in the form of an SRF loan that will be secured once final construction bids have been received, currently estimated at $2,715,000. Bond counsel retained by the City will assist in determining how the City will fund their loan based on the amount needed and the capacity of the City to bond at the time of the loan. Current strategy assumes a revenue bond secured by the revenues of the City's Wastewater fund from rate payers.

Limitation on total amount of funding:

SRF loan terms currently have a 2.5% interest rate with payment schedules not to exceed 30 years. Applications must be approved by the Montana Department of Environmental Quality. The process to qualify begins with the entity requesting that their project be added to the Priority List and Intended Use Plan. The City of Hardin Wastewater Project is currently on the Priority List and Intended Use Plan (Appendix K of the PER contains the SRF Priority List Survey and Attachment 1 of this document includes the SRF Priority List).

Matching funds:

None required. However, a revenue bond requires debt service reserve and coverage of 110%. The loan will be secured by the revenues of the City's Wastewater fund from all current and future rate payers. Rates are required to be set by the City to achieve the 110% coverage requirement. Current reserves to assist with securing loan funds to provide the required additional match as necessary are shown in budget documents in Attachment B of the Montana Coal Impact Grant Application and Appendix G of the PER.

Activity reimbursement:

Once the loan has been closed, regular reporting on project activities and semi-annual payments are made by the entity.

USDA Rural Development Water & Waste Disposal Loan & Grant Program
The City of Hardin applied for Loan and Grant funds October 2019. Total RD request is for $6,000,000 with $4,500,000 being loan funds and $1,500,000 in grant funds.

USDA Rural Development provides funding for clean and reliable drinking water systems, sanitary sewage disposal, sanitary solid waste disposal, and storm water drainage to households and businesses in eligible rural areas (under 10,000 in population).

The USDA Rural Development office responsible for the Hardin area (Billings office) has been contacted regarding the City's eligibility and potential interest rate and grant funding amount for the project. The City of Hardin is eligible for loan funding and, if available, up to 45% of the amount planned for RD loan funding may be awarded as grant funds. If available, this grant funding may determine the final source of loan funds for the project. The current funding strategy conservatively estimates grant funding at 25% grant funds.

Bond counsel retained by the City will assist in determining how the City will fund their loan based on the amount needed and the capacity of the City to bond at the time of the loan.

Limitation on total amount of funding:
RD loans have up to a 40 year pay back period. Currently, the interest rate quoted for the City of Hardin is 3.125%. Funds may be used to finance the acquisition, construction or improvement of sewer collection, transmission, treatment and disposal.

In some cases, funding may also be available for related activities such as:

- Legal and engineering fees
- Land acquisition, water and land rights, permits and equipment
- Start-up operations and maintenance
- Interest incurred during construction
- Purchase of facilities to improve service or prevent loss of service
- Other costs determined to be necessary for completion of the project

Matching funds:
None.

Activity reimbursement:
Once the loan has been closed, regular reporting on project activities and regular payments are made by the entity.

b. When will each source of funds listed be available (month and year)?
Treasure State Endowment Fund
TSEP funding for this project was determined by the Montana State Legislature during their session in 2019. The 2019 legislature passed HB652 which resulted in a TSEP award to the City of Hardin. Unfortunately, the bill did not include enough money to fund all listed projects. It is important for the City of Hardin to meet all startup conditions for the project as soon as possible. A final contract with TSEP will

only become available once all other funds are committed. It is anticipated that contracting may be possible as soon as Spring 2020.

Renewable Resource Grant and Loan (RRGL) Program
RRGL funding for this project was determined by the Montana State Legislature during their session in 2019. The 2019 legislature passed HB652 which resulted in an RRGL award to the City of Hardin. The funding source requires start up conditions that include commitment of all funds for the project. RRGL staff has assured the City that their program is fully funded, and the funds will be available when the City needs them.

Delivering Local Assistance (DLA)
The grant application review will take place the fall of 2019. Award notification will occur early 2020. DLA has the same requirements as TSEP which must be met prior to use of grant funds.

Montana Coal Impact Grant
After Grant Application review by the Coal Board, applicants are asked to present their proposal to the board. If the City of Hardin is successful, grant funds will become available after start up conditions are met.

Community Development Block Grant (CDBG) Program
CDBG has not set a due date for applications to their program and all future dates of grant awards are contingent on available funding from the federal government. CDBG staff anticipate a grant due date of Summer 2020 and award potential in Winter 2020/Spring 2021. Hardin's strategy and implementation schedule anticipates a Spring 2021 award.

SRF Loan/RD Loan/Local Funds
Local funds will be available once the loan source and amount is determined after construction bids have been awarded and the loan is secured. The City will reflect the obligation in their 2020/2021 annual budget and Capital Improvements Plan once the funding sources are known. The City can approve the loan and budget the project expenses at any time the funding sources are established.

c. Is there any additional information on the level of commitment for each source of funds listed?
As described above, all sources of funds and the amount of loan funds required is subject to grant fund availability. All grant funding sources are highly competitive so no commitment can be made ahead of ranking applications received. Both loan funding sources have been contacted. The project is on the SRF priority. The application for RD funds has been submitted.

d. How will funding sources be coordinated with each other?
The City of Hardin has determined that both the SRF and RD loan funding will be required to complete the project with loan closing likely the spring of 2020 following award of a construction contract. The planned funding scenario allows the City to conduct their final engineering design of the project primarily using City of Hardin reserves and grant funding. Once the design is complete, the construction bidding process can be conducted. The final construction bid amount will allow the City to determine the amount of loan funding needed and

they will then close that loan so the project can commence. A project budget is included in the Uniform Application.

e. Will interim-loan funds be required as part of the project? If yes, how will they be used and coordinated with other funding sources?

Interim loan financing may be required depending on the amount of grant funding available for completing final design of improvements. SRF has the ability to provide bond anticipation loans for costs that may be incurred prior to construction bid award.

f. What other sources of funds from public and private sources have been considered for this project? Explain why they are not being pursued or used for this project.

Other funding sources considered but deemed either unlikely include:

1. Section 595 of the Water Resources Development Act (WRDA) of 1999 – federal funding for wastewater treatment and related facilities, water supply and related facilities, environmental restoration and surface water resource protection and development. WRDA generally funds projects that are constructible within 12 months of award. This is not a consistent source of funding but one that, if available the City may pursue.
2. Since the City plans to budget for the project and finance it with grants and an SRF or RD loan, it is not necessary for them to secure an INTERCAP Loan.

Further, it is not reasonable to seek funding from private lending institutions. The City has made a serious effort to fund this project with all available funding and assistance sources.

g. If a particular source of funding is not obtained, how will the applicant proceed? Explain how the funding strategy will change if a particular source of funding is not received.

Receiving TSEP, RRGL, DLA, Coal Board, and CDBG funding for Hardin's Wastewater System Upgrade Project is critical to maintaining the cost of the project for the City of Hardin and its ratepayers at a reasonable level. The resulting cost of this project without grant assistance would be considerably higher and, if the project is delayed or cancelled, would increase the risk to public health and safety resulting from a potential failure of the existing system. It would especially be a burden for many in the project area who live on fixed incomes or whose incomes are below the MHI for the area. It is likely that the project would be put on hold and re-application to all funding sources would be sought until an appropriate level of financial assistance was reached.

The project area may be subject to violations from the Montana Department of Environmental Quality and the EPA if the project was delayed. It would affect the quality of water in the Big Horn River and may cause businesses in the area to relocate or close causing disruption to the economic development of the City.

The City of Hardin has a long list of infrastructure needs as shown in the Capital Improvements Program (CIP) adopted with the annual budget - Exhibit B of the Coal Impact Grant Application. Without grant funding to assist with this project, future projects may be delayed or prioritized over this one. Delaying or

reprioritizing this project would be detrimental to the entire health and well-being of the residents of Hardin and those who visit the area for recreational purposes.

h. What is the level of local financial participation in the project and is that level the maximum that the applicant can reasonably provide?

The City of Hardin has reserved $100,000 from the general fund for this project. The City has a long list of infrastructure needs over the next five to ten years. With this project, the City has committed to increase wastewater rates for local residents to a level more than twice that of the target rate. For a community whose LMI percentage is above 50% this increase in rates to help pay for loans is the maximum the applicant can reasonably provide. Furthermore, given the ongoing needs of the City and its financial status (see financial information in Appendix G of the PER, Exhibit B of the Coal Impact Grant Application) this is the maximum level of participation for the project that is feasible within the current status of the City's budget.

PROJECT BUDGET

Completed by: Stahly Engineering & Associates For: City of Hardin Date: 10/15/2019

ADMINISTRATION	Source: DLA	Source: CDBG	Source: Coal Board	Source: TSEP	Source: RRGL	Source: USDA RD Grant	Source: USDA RD Loan	Source: SRF Loan	Source: City of Hardin	TOTAL
Professional Services								$42,000		$42,000
Legal Costs									$17,000	$17,000
Travel & Training								$3,000		$3,000
Bond Costs								$25,000		$25,000
Loan Fees/Reserves								$350,000		$350,000
										$0
TOTAL ADMINISTRATION	$0	$0	$0	$0	$0	$0	$0	$420,000	$17,000	$437,000
CONSTRUCTION RELATED ACTIVITIES										
Preliminary Design					$50,000				$53,000	$103,000
Final Design	$100,000	$100,000	$100,000	$135,000				$265,000		$700,000
Construction Inspection Eng.				$18,000		$500,000	$285,000	$167,000	$30,000	$1,000,000
Construction	$600,000	$315,000	$350,000	$427,000	$75,000	$900,000	$3,562,900	$1,770,100		$8,000,000
Contingency	$50,000	$35,000	$50,000	$45,000		$100,000	$652,100	$92,900		$1,025,000
										$0
										$0
TOTAL ACTIVITY	$750,000	$450,000	$500,000	$625,000	$125,000	$1,500,000	$4,500,000	$2,295,000	$83,000	$10,828,000
TOTAL PROJECT BUDGET	**$750,000**	**$450,000**	**$500,000**	**$625,000**	**$125,000**	**$1,500,000**	**$4,500,000**	**$2,715,000**	**$100,000**	**$11,265,000**

Project Budget Narrative – City of Hardin Wastewater System Upgrades

Administrative / Financial Costs

Professional Services Costs
$42,000 has been budgeted for this category to ensure that the project is implemented in accordance with grant funding agency guidelines, including grant administration by Stahly Engineering. These services will supplement the services provided by the City of Hardin personnel. This also includes the fee for the annual audit in accordance with the State Single-Audit Act.
Source of Funds: SRF Loan Funds

Legal Costs
$17,000 has been budgeted for legal fees related to the review of contracts, bid specifications and any other legal services associated with the project.
Source of Funds: City of Hardin Reserve Funds

Travel & Training
$3,000 has been budgeted for attendance at grant funding project administration training workshops and meetings related to the project.
Source of Funds: SRF Loan Funds

Bond Costs
$25,000 has been budgeted to hire a professional bond counsel firm to assist with the bonding requirements due to loans that will be obtained to use as matching funds for grant funds and to make up the difference in grant funding and the total amount of the project.
Source of Funds: SRF Loan Funds

Loan Reserve and Fees
$350,000 has been budgeted to provide loan reserves and fees for the anticipated SRF loan. This final amount will be determined once construction bids have been received and a loan amount has been determined. It is generally equal to one half of the highest annual payment anticipated for the loan.
Source of Funds: SRF Loan Funds

Total Administrative Costs: SRF Loan/City of Hardin Reserve Funds = $437,000

TOTAL $437,000

Activity Costs

Engineering Preliminary Design
$103,000 has been budgeted for costs associated preliminary design and modification, if necessary, of the project.
Source of Funds: RRGL Funds ($50,000)
City of Hardin Reserve Funds ($53,000)

Engineering Basic Services
$700,000 has been budgeted for costs associated with final engineering design. The final design process includes survey, engineering, project management, preparation of the bid document and managing the bid and selection process to award the construction contract.
Source of Funds: DLA Funds ($100,000)
CDBG Funds ($100,000)
Coal Board Funds ($100,000)
TSEP Funds ($135,000)
SRF Loan Funds ($265,000)

Engineering Resident Project Representative Services
$1,000,000 has been budgeted for the inspection and field engineering associated with the construction process of this project.
Source of Funds: TSEP Funds ($18,000)
USDA RD Grant Funds ($500,000)
USDA RD Loan Funds ($285,000)
SRF Loan Funds ($167,00)
City of Hardin Reserve Funds ($30,000)

Construction
$8,000,000 has been budgeted for costs associated with the construction of the wastewater system improvements. The project will be awarded to the lowest bidding qualified contractor that submits a bid for the project.
Source of Funds: DLA Funds ($600,000)
CDBG Funds ($315,000)
Coal Board Funds ($350,000)
TSEP Funds ($427,000)
RRGL Funds ($75,000)
USDA RD Grant Funds ($900,000)
USDA RD Loan Funds ($3,562,900)
SRF Loan Funds ($1,770,100)

Contingency
$1,025,000 has been budgeted for costs incurred by unforeseen and/or inflationary factors concerning the economy.
Source of Funds: DLA Funds ($50,000)
CDBG Funds ($35,000)
Coal Board Funds ($50,000)
TSEP Funds ($45,000)
USDA RD Grant Funds ($100,000)
USDA RD Loan Funds ($652,100)
SRF Loan Funds ($92,000)

Total Activity Costs:	**DLA Funds**	**= $ 750,000**
	CDBG Funds	**= $ 450,000**
	Coal Board	**= $ 500,000**
	TSEP Funds	**= $ 625,000**
	RRGL Funds	**= $ 125,000**
	USDA RD Grant Funds	**= $ 1,500,000**
	USDA RD Loan Funds	**= $ 4,500,000**
	SRF Loan Funds	**= $ 2,295,000**
	City of Hardin Reserve Funds	**= $ 83,000**
	TOTAL	**$10,828,000**
Total Project Costs:	**DLA Funds**	**= $ 750,000**
	CDBG Funds	**= $ 450,000**
	Coal Board	**= $ 500,000**
	TSEP Funds	**= $ 625,000**
	RRGL Funds	**= $ 125,000**
	USDA RD Grant Funds	**= $ 1,500,000**
	USDA RD Loan Funds	**= $ 4,500,000**
	SRF Loan Funds	**= $ 2,715,000**
	City of Hardin Reserve Funds	**= $ 100,000**
	TOTAL	**$11,265,000**

5. CURRENT DEBT (Refer to the instructions and example on pages 23-24)

Year Issued	Purpose	Type of Bond/ Security	Amount	Maturity Date (mo/yr)	Debt Holder	Coverage Requirement	Avg. Annual Payment Amount	Outstanding Balance
2003	Wastewat	Revenue	2,050,000	7/1/23	DNRC	125%	133,800	509,000
2010	Wastewat	Revenue	359,330	1/1/30	DNRC	125%	19,500	194,000
2010	Wastewat	Revenue	625,000	1/1/30	DNRC	125%	42,200	378,000
2006	TIFD	Tax Rever	20,920,000	9/1/31	US Bank,		895,000	20,920,000
2006	TIFD	Revenue	accrued interes	09/01/31	US Bank,		1,307,500	2,834,400
2009	Landfill Co	Revenue	1,664,000	7/1/24	DNRC	125%	94,520	444,000

6. CURRENT ASSETS (Indicate if assets are obligated.) (Refer to the instructions on pages 23-24.)

Cash $ 279,851
(Details) Cash, cash equivalents, petty cash - wastewater only

Investments $ 781,076
(Details) All investments are restricted - total shown at fair value

Certificates of Deposit $ 0
(Details) included with cash

Accounts Receivable $ 70,571
(Details) Net of allowance for uncollectibles

Any other current assets not specifically indicated above $ 18,755
(Details) Inventories

7. BALANCE SHEET (Submit if applying to RD; contact the other programs to determine if or when this information is needed.)

☐ Balance Sheet (Check if attached)

8. INCOME AND EXPENSE STATEMENT (Submit if applying to RD; contact the other programs to determine if or when this information is needed.)

☐ Income and Expense Statement (Check if attached)

SECTION D - CENSUS INFORMATION

Do not fill in this section. The following information will be completed by the receiving agency using data supplied by the U.S. Bureau of the Census and the U.S. Department of Housing and Urban Development based on Census data.

1. MEDIAN HOUSEHOLD INCOME $_____

2. LOW TO MODERATE INCOME PERSONS: The percent of the population at or below the level designated as low to moderate income. %_____

3. POVERTY: The percent of the population characterized as at or below the level designated as poverty. %_____

SECTION E - SYSTEM INFORMATION (Refer to instructions)

Number of unimproved properties in jurisdiction:_____

☛ **Complete and attach the "System Information Worksheet."** The figures required for the items listed below that are denoted with an " ☛ " are computed using the "System Information Worksheet." The letter in parenthesis following the " ☛ " denotes the location in the worksheet to find the figure to be inserted.

		Current	Projected
1.	Total System Annual Revenue (per FY2019 unaudited financials)	$718,704	$1,077,617
2.	Total System Annual Operation and Maintenance Costs	$629,183	$621,170
3.	Total System Equivalent Dwelling Units* ☛(e) for current and (k) for projected	1286	1286
4.	Total **Residential** Equivalent Dwelling Units* ☛(f) for current and (m) for projected	1039	1039
5.	Annual Revenue from Residential Hookups	$525,526	866,900
6.	Percent of Total Annual Revenue from Residential Hookups	81%	
7.	Average Monthly Residential Rate	$42.15 ☐ Check box if this is a flat rate.	$69.53 Projected Average Monthly Residential Rate ☛ (w) or (x)
8.	*Other System* Average Monthly Residential Rate	$19.85	$19.85

* *If this application is for a solid waste project, see instructions.*

SYSTEM INFORMATION WORKSHEET
(Refer to instructions)

SUBSECTION 1 – EQUIVALENT DWELLING UNIT COMPUTATION

Applicants with either a water and wastewater project must complete Section I, regardless of whether the applicant is served by a central water system or is planning to charge residential users a flat user fee. If the applicant is not served by a central water system, or it has water connections that provide service to multiple mixed uses, such as commercial and residential, refer to the instructions on page 26 for information on computing the number of EDU's. *Applicants with solid waste projects are not required to complete Section I*. Service connection diameters will be converted to EDU's according to the following table, with the exception of those situations noted on page 26:

Service connection inside diameter (inches)	EDU's
¾" or smaller	1.00
1"	1.79
1-1/2"	4.00
2"	7.14
2-1/2"	11.16
3"	16.00
4"	28.57
5"	44.64
6"	64.29
7"	87.11
8"	113.78
9"	144.00
10"	177.78

PART A. CURRENT WATER HOOKUP SUMMARY

Current Total Hookups*				Current Residential Hookups			
Diameter (inches)	(a) Total Number of Hookups	(b) EDU's per Hookup (from table)	Total EDU's [(a) x (b)]	Diameter (inches)	(c) Number of Residential Hookups	(d) EDU's Per Hookup (from table)	Total Residential EDU's [(c) x (d)]
	1286	1	1286		1039	1	1039
Totals	1286		1286 (e)		1039		1039 (f)

* Includes both residential and non-residential hookups

PART B. PROJECTED WATER HOOKUP SUMMARY

Diameter (inches)	Projected Total Hookups* (g) Total Number of Hookups	(h) EDU's per Hookup (from table)	Total EDU's [(g) x (h)]	Diameter (inches)	Projected Residential Hookups (i) Number of Residential Hookups	(j) EDU's Per Hookup (from table)	Total Residential EDU's [(i) x (j)]
	1286	1	1286		1039	1	1039
Totals	1286		1286 (k)		1039 (l)		1039 (m)

* Includes both residential and non-residential hookups

Projected average EDU's per residential hookup: 1 (n) [(m)/(l)]

Provide the following information if applying to the USDA RUS/RD program

Total water system flows (sales) last twelve months _____ [gallons or cubic feet (circle one) for all connections listed in (a) above]

Total residential water flows (sales) last twelve months _____ [gallons or cubic feet (circle one) for all connections listed in (c) above]

NOTE: In some cases it is necessary to provide a detailed monthly split of the residential and non-residential sales. A sample spreadsheet is available on the Montana USDA Rural Development website at http://www.rd.usda.gov/programs-services/water-waste-disposal-loan-grant-program/mt.

SUBSECTION 2 – PROJECTED AVERAGE MONTHLY RESIDENTIAL RATE COMPUTATION

Will debt be used to finance the project? Yes ☑ No ☐ If no, skip to PART E.
If yes, how will debt for the project be secured:

A. Revenue Bond $7,215,0(complete Part A)
B. General Obligation Bond _____(complete Part B)
C. Rural or Special Improvement District Bond _____(complete Part C)
D. Other (explain) _____(complete Part D)

Debt (Loan) Amount: $ 7,215,000 Interest Rate: see b% Terms: see below

SRF loan terms assume: 30 yrs @ 2.5% RD loan terms assume: 40 years @3.13%

COMPLETE THE APPLICABLE SECTIONS BELOW

PART A. REVENUE BOND SECURING DEBT OBLIGATION:

1. Debt election held? Yes ____ No ✔ If no, when will election be held (date) July 2020
2. Annual debt service for new loan, including coverage: $390,439 (i)
3. Monthly debt service for new loan, including coverage: (line i / 12) $32536.58 (ii)
4. Total number of projected EDU's after completion of project: 1286 (iii)
5. Average (per total projected EDU's) monthly debt service for new loan: (line ii / line iii) $25.30 (iv)

PART B. GENERAL OBLIGATION BOND SECURING DEBT OBLIGATION:

1. Debt election held? Yes ____ No ____ If no, when will election be held? (date): _____
2. Amount of outstanding General Obligation Bonds $ _____
3. Debt limitations of entity _____
4. Estimated average (per property) monthly assessment needed to repay debt (divide the annual assessment by 12 to obtain a monthly figure): $ _____

PART C. RURAL OR SPECIAL IMPROVEMENT DISTRICT BOND SECURING DEBT OBLIGATION:

1. Type of special assessment:
   a. SID ____
   b. RID ____
   c. Other (specify) _____
2. Proposed method of assessment:
   a. Assessable Area_____
   b. Area_____
   c. Ad Valorem Tax_____
   d. Lineal Front Footage_____
   e. Combination of a. through d. above (explain)_____

   _____
3. Number of parcels in the district_____
4. What percentage of the property (based on the methods of assessment) within the district fits these descriptions?

TYPE OF PROPERTY	PERCENT DEVELOPED	PERCENT UNDEVELOPED
Commercial		
Industrial		
Single-Family Residential		
Multi-Family Residential		
Agricultural		

5. Number of property owners in district _____

6. Estimated average (per property) monthly assessment needed to repay debt (divide the annual assessment by 12 to obtain a monthly figure): $_____

PART D. OTHER TYPE OF DEBT INSTRUMENT SECURING DEBT OBLIGATION THAT IS NOT INDICATED ABOVE

1. Explain how debt will be secured: _____

_____

2. Estimated average (per property) monthly cost to repay debt: $_____

PART E. CALCULATION OF THE PROJECTED AVERAGE MONTHLY RESIDENTIAL USER RATE:

1. Estimated increase in average monthly debt service (per projected EDU, monthly assessment per property for General Obligation Bond or SID, or per customer for solid waste projects) as the result of this project. Enter $0 if no increase is projected: $25.30 (o) [From Part A, B, C, or D]

2. Estimated increase or decrease in total monthly operation and maintenance (O&M) costs (including depreciation and replacement reserves) as the result of this project: $32,070 (p)

3. List and explain estimated increases or decreases in O&M costs, including depreciation and replacement reserves (Provide a reasonably detailed explanation regarding the reason for the increase or decrease):

Annual O&M costs will increase slightly due to additional power requirements, outside services, and reserves for short lived asset replacement and other general reserve requirements.

4. Estimated increase or decrease in monthly O&M costs (including depreciation and replacement reserves) (per projected EDU, monthly assessment per property for General Obligation Bond or SID, or per customer for solid waste projects) as the result of this project: $2.08 (q) [(p) / (k)]

5. Estimated increase or decrease in total monthly costs (per projected EDU, monthly assessment per property for General Obligation Bond or SID, or per customer for solid waste projects) as the result of this project: $27.38 (r) [(o) + (q)]

6. Projected average EDU's per residential hookup: $1 (s)
[(n)]

7. Estimated increase or decrease in total monthly costs per average residential hookup/customer as the result of this project: $27.38 (t)
[(r) x (s)]

8. Existing average monthly residential debt service, including coverage and bond reserve (subtract any existing debt service if the loan will expire before the completion of the project): $0 (u)

9. Existing average monthly residential O&M costs and replacement and depreciation reserves: $42.15 (v)

Note: (u) plus (v) should equal the current average monthly residential rate as stated in Section E, Line 7. If these amounts do not equal, provide an explanation of why the numbers differ.

10. Projected average monthly residential user rate after completion of this project: $69.53 (w)
[(t) + (u) + (v)]

11. Projected flat user rate: $_____ (x)

ATTACHMENT 1

DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

RECEIVED
JUN 03 2019
BY:

STEVE BULLOCK, GOVERNOR

1539 ELEVENTH AVENUE

STATE OF MONTANA

DIRECTOR'S OFFICE: (406) 444-2074
FAX: (406) 444-2684

PO BOX 201601
HELENA, MONTANA 59620-1601

May 30, 2019

Joseph Purcell
Hardin Wastewater Treatment Plant improvements
406 N Cheyenne Ave
Hardin MT 59034

RE: DNRC Renewable Resource Grants Application Status and Contact Information

Dear Grantee:

Congratulations on receiving your RRGL project grant! I will be your DNRC RRGL project specialist. Project grants are awarded in ranked order (ranked list included).

Prior to contracting, I will need a project timeline which includes the date you anticipate being under contract or will be most beneficial to your organization. Additionally, include when you expect to request your first reimbursement on the grant. Please send this information to me by June 14th (electronic or written correspondence).

To initiate the grant contracting process, I will need an updated budget, scope of work, and implementation plan (schedule). Please provide any matching funds commitment letters. Please notify me right away if you do not plan to move forward with your grant.

You must enter into a grant agreement with the Department of Natural Resources and Conservation prior to incurring any costs that will be reimbursed from the grant.

Please contact me if you have any questions 444-6839 or at brad.catron@mt.gov. I am looking forward to working with you on your project.

Sincerely,

Brad Catron
RRGL Program Specialist, DNRC/CARDD

Cc: file, Michelle Dyckman, Stahly Engineering

Water Pollution Control State Revolving Fund Intended Use Plan and Project Priority List

State Fiscal Year 2020

Updated: 7/8/19

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY
Water Quality Division
Water Pollution Control State Revolving Fund
1520 East Sixth Avenue
PO Box 200901
Helena MT 59620-0901
Phone: (406) 444-6697
Fax: (406) 444-6836
Website: www.deq.mt.gov

Printed on Recycled Paper

Rank	Name	EPAID	Category	Ranking Points	Amount Assist Type	Commit Date
40	Columbus Collection 2015	C302244	IIIb, II	235	$1,503,000 Loan	5/1/2016
41	Plains WWTP	C301291	I	230	$4,000,000 Loan	7/1/2021
42	Simms lagoon improvements	C301284	1	230	$360,000 Loan	7/1/2020
43	Cut Bank Southwest Lift Station	C302258	IIIB	225	$500,000 Loan	9/1/2019
44	Polson Collection System Improvements	C304244	IIIB	225	$850,000 Loan	4/1/2020
45	Shelby WWTF Upgrades & Disinfection	C301280	IIIA	225	$1,950,000 Loan	8/1/2018
46	Chester WWTF Improvements - CIPP Repairs	C304242	IIIA	220	$622,000 Loan	5/1/2019
47	Glendive Meade Ave Collection	C304216	IIIB	215	$463,000 Loan	3/1/2019
48	Belgrade WRRF Upgrade 2020	C303707	II, IIIB, IVB	215	$10,000,000 Loan	5/1/2020
49	Winifred WWTP	C303193	I	205	$1,000,000 Loan	6/1/2021
50	Hardin WWTF Upgrade	C301304	I, IIIA, IVA	205	$6,000,000 Loan	7/1/2021
51	Drummond Lagoon Improvements	C304154	I	200	$1,500,000 Loan	6/1/2022
52	Kalispell West Region Storm Water Project	C305182	VI	200	$7,000,000 Loan	4/1/2020
53	Havre I&I Improvements	C304222	IIIA	185	$1,700,000 Loan	10/1/2020
54	Terry Wastewater Treatment Upgrades	C301285	I, IIIA	185	$1,200,000 Loan	4/1/2020
55	Great Falls Stormwater Improvements 2018	C305180	VI	175	$3,512,000 Loan	3/1/2018
56	Bozeman Davis Lift Station & Norton E Ranch Sewer	C302252	IVB	160	$11,000,000 Loan	10/1/2020
57	Gardiner W&S Disrict Lagoon Rehab	C301299	I	155	$2,500,000 Loan	6/1/2021
58	South Wind - Trailer Terrace	C304224	I,IVA	155	$1,000,000 Loan	7/1/2020
59	Plentywood Collection System - Phase 2	C302254	IIIB	150	$5,000,000 Loan	6/1/2020
60	Harlowton UV and Solids Removal	C301306	IIIA	150	$1,400,000 Loan	4/1/2020

OFFICE OF THE GOVERNOR

STATE OF MONTANA

Steve Bullock
GOVERNOR

Mike Cooney
LT. GOVERNOR

RECEIVED
MAY 20 2019
BY:

May 15, 2019

Mayor Joseph Purcell
City of Hardin
406 North Cheyenne Avenue
Hardin, MT 59034

Re: Notice of Treasure State Endowment Program Infrastructure Bonding

Dear Mayor Purcell:

On behalf of the State of Montana, it is my pleasure to notify you that the City of Hardin is eligible to access infrastructure bond funds. Bonding is available for a limited number of Treasure State Endowment Program (TSEP) projects through House Bill 652 and will be made available in the order that projects meet start-up conditions.

Projects such as yours help local communities and water and wastewater districts provide essential services such as clean drinking water, proper treatment of wastewater, and other public infrastructure projects in a cost-effective manner.

All communities identified to have access to TSEP infrastructure bonding will be contacted directly with more information in the upcoming weeks by program staff. If you have any questions, please contact the Community Development Division at the Montana Department of Commerce, at 406-841-2770 or email DOCCDD@mt.gov.

Again, congratulations and good luck on the successful completion of your project.

Sincerely,

STEVE BULLOCK
Governor

Montana Coal Impact Grant Application

Submitted to the Montana Coal Board By

City of Hardin

For

Wastewater

Date submitted: October 25, 2019

SUMMARY INFORMATION

1. **NAME OF APPLICANT**
   City of Hardin, Montana

2. **TYPE OF ENTITY**
   City Government

3. **FEDERAL TAX ID NUMBER**
   81-6001271

4. **SENATE AND HOUSE DISTRICTS**
   Senate District 21, House District 42

5. **AMOUNT OF COAL IMPACT GRANT REQUESTED**
   $500,000

6. **NAME OF PROJECT**
   City of Hardin Wastewater System Upgrades

7. **TYPE OF PROJECT**
   Wastewater treatment system upgrades

8. **POPULATION SERVED BY PROJECT**
   3,837 (2010 U.S. Census Bureau American Factfinder)

9. **NUMBER OF HOUSEHOLDS SERVED BY PROJECT**
   1,286 active sewer connections

10. **CHIEF ELECTED OFFICIAL OR AUTHORIZED REPRESENTATIVE**
    Joseph Purcell, Mayor
    406 North Cheyenne Avenue, Hardin, MT 59034
    Telephone: (406) 665-9290 Email: mayor@hardinmt.com Fax: 406-665-2719

11. **PRIMARY ENTITY CONTACT PERSON**
    Michelle Dyckman
    406 North Cheyenne Avenue, Hardin, MT 59034
    Telephone: (406) 665-9292 Email: cityclerk@hardinmt.com Fax: 406-665-2719

12. **OTHER CONTACT PERSONS**
    Greg Steckler, P.E., Stahly Engineering
    851 Bridger Drive, Suite 1
    Bozeman, MT 59715
    Telephone: (406) 522-8594 Email: gsteckler@seaeng.com

Robie Culver, Grant Administrator
3530 Centennial Drive
Helena, MT 59601
Telephone: (406) 442-8594 Email: rculver@seaeng.com

13. MILLAGE RATES

The following table shows the City of Hardin millage rates for the latest finalized budget year and the previous three years.

City of Hardin Millage Rates and Values				
	FY2019-2020	**FY2018-2019**	**FY2017-2018**	**FY2016-2017**
Total Mills	157.12	151.12	147.88	158.77
Mill Values	$3,450.45	$3,506.11	$3,505.15	$3,222.51

14. AMOUNT OF COAL GROSS PROCEEDS TAX

Per MCA 15-23-703, Coal Gross Proceeds Tax is allocated to Montana County governments, and not to local municipal entities, such as the City of Hardin. The City of Hardin is located within Big Horn County, which does receive Coal Gross Proceeds Tax from the State of Montana. Hardin is specifically impacted by the coal industry due to the coal fired electrical generation plant that was built in the City in 2006. Additional impact includes the effect on the City of Hardin by employees who work in coal mines in the County and live in Hardin.

The City has received contributions from the Coal Severance Tax Fund, which were identified as revenue applied to the City's Public Employee Retirement System. Based on the 2018 PERS Defined Benefit Retirement Plan, a total of $24,158 was received for FY2016 and $24,966 was received for FY2017. This was not provided as cash to the City of Hardin.

15. IMPACTS FROM COAL INDUSTRY

The coal bearing strata found in a large portion of Big Horn County is a mineral reserve that is estimated at over 11 billion tons and contains the largest active coal mine in the state. Big Horn County was Montana's #1 coal producer with 22 million tons mined in 2012. According to the 2017 Coal County Coalition Report, within the 15-county coal region, the majority of jobs within the Bituminous Coal and Lignite Surface Mining Industry are concentrated in only two counties, Big Horn and Rosebud. Bituminous Coal and Lignite Surface Mining accounts for nearly 800 jobs within the region with average earnings per job of $107,346. The mining industry directly employs 116 people who reside in the City of Hardin[1].

To compliment the high levels of coal mined in the area, a 116-megawatt coal fired electrical generation plant was built in Hardin in 2006. A downturn in the demand for coal

[1] Headwaters Economics' Economic Profile System, October 21, 2019

energy left the plant owner, Rocky Mountain Power, owing millions in back taxes. Rocky Mountain Power has made every attempt to operate the plant as economic conditions allow and to maintain employment of the individuals whose livelihoods depend on it.

Further, in 2006, the City of Hardin issued $12,600,953 of revenue bonds, with an interest accretion phase of $8,319,047 for total bond principal of $20,920,000, to finance all or a portion of the costs of construction and installation of certain industrial infrastructure projects in relation to Rocky Mountain Power's coal-fired electric generation station and related facilities. Payments on those bonds have been in default, as they relied on incremental tax revenue from the plant. The company owes back taxes and penalties and those payments would have benefited infrastructure and the City of Hardin's tax increment financing district where the plant is located.

Under 15-24-3001 MCA, Rocky Mountain Power (the largest entity within Hardin's industrial park Tax Increment Finance District) was exempt from property taxes until January 1, 2014. In 2013, the parent company of Rocky Mountain Power, Inc. and its affiliates filed for bankruptcy. As a result of the bankruptcy, the market value and resulting taxable value of the power plant dropped significantly. The taxable values of property within the Tax Increment Finance District are insufficient to allow the Schools, County and City to assess enough taxes to meet the debt obligations of the TIF Revenue bonds.

The Big Horn County coal gross proceeds tax revenue decreased significantly during a recent three-year time span. The revenue went from a high of $10,559,906 in 2013 to a low of $6,398,426 in 2016, which is approximately a 40% reduction in revenue. As recent as 2017, revenues were over $9 million with a drop of over 30% in just one year. Additionally, revenues from oil and natural gas taxes have decreased significantly. In 2009, tax revenues from oil and gas were over $5 million, dropping to just $229,471 in 2018 (data from Montana Department of Revenue).

The Coal Impacted Local Governmental Units Designation Report for the 2021 Biennium lists the City of Hardin as a coal impacted local governmental unit due to the activities of the Spring Creek, Signal Peak and Rosebud Mines. According to the report, Spring Creek and Signal Peak Mines are expected to increase coal production by at least 1 million tons per year within the next two years. Rosebud Mine is expected to decrease by at least 1 million tons per year during the same time period[2].

[2] Montana Coal Board, Coal Impacted Local Governmental Units Designation Report, June 2019

The City of Hardin was allocated annual funding from the State of Montana that came from the tax on oil and gas revenues. This funding was unrestricted, and the City was able to use it for infrastructure upgrades. This funding stream ceased after 2017.

Hardin, MT

Oil & Gas Revenues

Fiscal Year	Revenue
2006	23,518
2007	39,392
2008	69,176
2009	92,142
2010	36,368
2011	47,160
2012	27,247
2013	16,408
2014	9,482
2015	5,137
2016	2,343
2017	1,180
2018	-

16. MAPS

See City and Project maps, Exhibit A.

17. BRIEF PROJECT SUMMARY FOR CITY OF HARDIN WASTEWATER TREATMENT

Historical Information

The City of Hardin wastewater system consists of a gravity sewer system with a lift station and an oxidation ditch mechanical treatment system that was built in 1978. Due to the age of the existing wastewater treatment plant, several components of the system need to be upgraded to meet Environmental Protection Agency (EPA) and the Montana Department of Environmental Quality (MDEQ) Standards.

Problem

Recent EPA inspection results list issues with the system that include lack of backup power, surge flow issues, and lack of grease/grit removal and secondary clarification resulting in undertreated effluent being discharged to the Bighorn River. Additionally, as a component of seeking United State Department of Agriculture (USDA) Rural Development funding and the final design process for the project, a comprehensive Inflow and Infiltration (I&I) Study was conducted in spring and early summer of 2019. Results of the study identified approximately 2,675 feet of Reinforced Concrete Pipe (RCP) sewer trunk mains and 17 manholes as significant contributors of infiltration into the wastewater system.

Proposed Solution

The mechanical plant will be upgraded by replacing the headworks structure and adding a new Intermittent Cycle Extended Aeration System continuous flow sequencing batch reactor (SBR), converting the existing oxidation ditch to surge flow equalization, and correcting individual issues within the system. Other upgrades will include a new plant potable water well, septage receiving station, installation of a backup power generator, a new redundant UV disinfection system, and an administration building for lab space and the UV system. Deteriorated mains and manholes will also be replaced to significantly reduce infiltration into the wastewater system.

18. PROJECT BUDGET AND IMPLEMENTATION SCHEDULE

A. Project Budget Form

ADMINISTRATION	Source: DLA	Source: CDBG	Source: Coal Board	Source: TSEP	Source: RRGL	Source: USDA RD Grant	Source: USDA RD Loan	Source: SRF Loan	Source: City of Hardin	TOTAL
Professional Services								$42,000		$42,000
Legal Costs									$17,000	$17,000
Travel & Training								$3,000		$3,000
Bond Costs								$25,000		$25,000
Loan Fees/Reserves								$350,000		$350,000
										$0
TOTAL ADMINISTRATION	$0	$0	$0	$0	$0	$0	$0	$420,000	$17,000	$437,000
CONSTRUCTION RELATED ACTIVITIES										
Preliminary Design					$50,000				$53,000	$103,000
Final Design	$100,000	$100,000	$100,000	$135,000				$265,000		$700,000
Construction Inspection Eng.				$18,000		$500,000	$285,000	$167,000	$30,000	$1,000,000
Construction	$600,000	$315,000	$350,000	$427,000	$75,000	$900,000	$3,562,900	$1,770,100		$8,000,000
Contingency	$50,000	$35,000	$50,000	$45,000		$100,000	$652,100	$92,900		$1,025,000
										$0
TOTAL ACTIVITY	$750,000	$450,000	$500,000	$625,000	$125,000	$1,500,000	$4,500,000	$2,295,000	$83,000	$10,828,000
TOTAL PROJECT BUDGET	**$750,000**	**$450,000**	**$500,000**	**$625,000**	**$125,000**	**$1,500,000**	**$4,500,000**	**$2,715,000**	**$100,000**	**$11,265,000**

Project Budget Narrative

Administrative/Financial Costs

Professional Services: $42,000
Professional services costs necessary to ensure that the project is implemented in accordance with Coal Board requirements, including grant administration by Stahly Engineering. This also includes the fee for the annual audit.

Legal Costs: $17,000
Legal fees related to the review of contracts, bid specifications, and any other legal services associated with the project.

Travel & Training: $3,000
Costs associated with City personnel to attend any training or meetings related to the project.

Bond Costs: $25,000
A professional bond counsel firm will be engaged in order to assist with the bonding requirements due to loans that will be obtained to use as matching funds for grants funds, as well as make up the difference in grant funding and the total amount of the project.

Fees/Reserves $350,000
Loan reserves and fees for the anticipated SRF loan. The final amount will be determined once construction bids have been received and a loan amount determined.

TOTAL ADMINISTRATIVE/FINANCIAL COSTS **$437,000**

Activity Costs

Preliminary Design: $103,000
Costs associated with the preliminary design and modification, if necessary, of the project.

Final Design: $700,000
Costs associated with final engineering design, including agency permitting, project management, preparation of bid documents and managing the bid and selection process to award the construction contract.

Construction Inspection Engineering: Inspection and field engineering associated with the construction process of this project.	$1,000,000
Construction: Costs associated with construction of the project, which will be Awarded to the lowest qualified contractor that submits a bid.	$8,000,000
Contingency: Costs incurred by unforeseen and/or inflationary factors concerning the economy.	$1,025,000
TOTAL ACTIVITY COSTS	**$10,828,000**
TOTAL PROJECT COSTS	**$11,265,000**

B. Implementation Schedule

Project Implementation Schedule		
ACTION	**DATE**	**NOTES**
Hired Engineer/Administrator	Fall 2017	
Submitted DNRC Grant Application	May 2018	
Submitted TSEP Grant Application	June 2018	
Results of TSEP, DNRC RRGL, grants known	June, 2019	TSEP Granted $625,000 RRGL Granted $125,000
Submit USDA RD Funding Application	Oct. 2019	
Submit DLA Grant Application	Oct. 2019	
Submit SRF Funding Application	Dec. 2019	
Results of USDA RD Funding Application Known	Jan. 2020	
Results of SRF Funding Application Known	Jan. 2020	
Select Bond Council, Hold Bond Election	Jan. -Mar. 2020	
Start-Up and FONSI Clearance	Mar. 2020	All environmental research already complete.
Begin Design of Phases 1 and 2	April 2020	Alternatives CS-1 and HGD-1
Submit Plans for Phases 1 and 2 to MDEQ	June 2020	
MDEQ Approval of Phases 1 and 2	Aug. 2020	Allows 2 full months for review.
Advertise and Bid Phases 1 and 2	Sep. 2020	Bid Schedules CS-1 and HGD-1
Construction of Phases 1 and 2	Oct. 2020 – June 2021	Weather permitting
Evaluate Results of Phases 1 and 2	July 2021 – June 2022	
11-Month Walk-Through for Phases 1 and 2	July 2022	
Begin Design of Phase 3	Aug. 2022	Alternative T-3

Submit Plans for Phase 3 to MDEQ	Late Dec. 2022	
MDEQ Approval of Phase 3	March 2023	Allows 3 full months for review.
Advertise and Bid Phase 3	Mar. – Apr. 2023	Bid Schedule T-3
Construction of Phase 3	May – Sep. 2023	
11-Month Walk-Through	Late Oct. 2024	
Construction Close-out	Nov. 2024	Conditional for pending grant agency audits.
Final Grants Close-out	Dec. 2024	

19. DESCRIPTION OF RELATIONSHIP TO COAL BOARD STATUTORY GRANT CRITERIA

A. Need

1. **Does a serious deficiency exist in a basic or necessary community public facility or service? Examples include emergency services such as police, fire or ambulance services. How has this been caused by a direct result of coal development or decline?**

   The EPA Compliance Evaluation Inspection Report of 2017 documents the finding of "Significant Noncompliance" status for the wastewater treatment facility (Exhibit B). Most of the sub-systems within the existing treatment facility do not meet MDEQ design standards or EPA regulations. The Inspection Report is included in the PER, Appendix F.

   The deficiencies of the overall system are:

   a. The collection system has issues with excessive I&I and illicit connections which can restrict the design capacity of the system.
   b. The facility does not have grit or grease removal systems. The headworks screen is aging. Grease is present throughout the treatment process.
   c. The wastewater treatment plant has issues with insufficient influent treatment capacity. The plant is immediately overwhelmed by surge flows exceeding 1.0 MGD which occur often during rain and snowmelt events. The oxidation ditch and secondary clarifiers run at maximum capacity during average flows of approximately 0.6 MGD. The influent to the treatment plant is often bypassed to an old lagoon basin (part of the previous treatment facility) during surge flow events. There is no way to reintroduce the bypassed effluent into the treatment process.
   d. Secondary Clarifier No. 1 has uneven flows over the weir due to an uneven weir bar. Thus, the clarifier does not operate according to design.

e. The plant operators reported freezing issues in the clarifier inlet channels.
f. Wastewater flow rate monitoring is unreliable.
g. The wastewater treatment plant does not have backup power generation.
h. The wastewater treatment plant does not have a redundant blower for the aerobic digester.
i. The plant operators have reported excessive foaming in the oxidation ditch.
j. The return activated sludge (RAS) pumping station is aging and requires repairs frequently.
k. The waste activated sludge (WAS) pumping station is aging.
l. The wastewater treatment plant does not have redundant disinfection on the effluent bypass channel.
m. The existing UV disinfection system is located outdoors, making maintenance difficult during inclement weather.
n. There is currently no way to introduce septage from pumper trucks into the treatment process. Septage is currently dumped in the old lagoon cell that is also utilized as a sludge drying bed.
o. The plant does not have an adequate water supply.

Each of these deficiencies are described in detail in the PER, Sections 2 and 3, which has been submitted with this application. Upgrades to the City of Hardin wastewater treatment plant, as described in the Preliminary Engineering Report (PER), submitted with this Coal Board grant application, will correct all the deficiencies currently documented with the existing treatment system.

The City of Hardin has experienced increased population and economic activity related to development of the coal resource in Big Horn County. Businesses and agencies that provide support, sales, and services to coal industries that operate within the City are dependent on safe, affordable infrastructure. This includes an auto parts store, lumberyard, fuel and tire shops, hardware stores, grocery store, clinics, water supplier, body shops, construction, electrical, plumbing businesses, and restaurants.

The aging wastewater system is directly affected by these increases and therefore the City has expended resources to expand the system over time but with the volatility of the coal market has lost tax revenue to further improve or upgrade the system.

2. Have serious public health or safety problems that are clearly attributable to a deficiency occurred, or are they likely to occur, such as illness, disease outbreak, substantial property loss, environmental pollution, safety problems, hazards or health risks?

As stated above, the EPA Compliance Evaluation Inspection Report of 2017 documents the finding of “Significant Noncompliance” status for the wastewater

treatment facility. Most of the sub-systems within the existing treatment facility do not meet MDEQ design standards or EPA regulations.

The Hardin wastewater treatment system discharges to the Bighorn River through Outfall 001 under a major discharge permit (NPDES# MT-0030759). The Bighorn River is located within the Bighorn River-Hardin watershed (HUC 100800150704). Both the wastewater treatment plant and the discharge outfall to the Bighorn River are located on the Crow Indian Reservation. Although the Crow Tribe has not established water quality standards for the section of the Bighorn River that is located on the Crow Indian Reservation, approximately 9 miles downstream of the wastewater treatment plant outfall at the boundary of the Crow Indian Reservation, the Bighorn River is identified by the EPA database as Montana stream segment MT43R001_010. The Bighorn River at this location is classified as B-2 according to Administrative Rules of Montana (ARM) 17.30.611. Waters classified B-2 are to be maintained suitable for drinking, culinary, and food processing purposes, after conventional treatment; bathing, swimming, and recreation; growth and marginal propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply. Pursuant to Montana's Non-Degradation Policy, degradation of high-quality water is not allowed unless authorized by MDEQ. This segment of the Bighorn River is listed as "impaired" for public water supply due to the presence of lead and mercury. No total maximum daily loads (TMDL) data is on file for this segment of the river.

The potential for public exposure to undertreated wastewater as it is discharged into the Bighorn River from a system that is not functioning properly or does not have redundant processes for treating effluent is a serious public health and safety problem. Furthermore, wastewater treatment plant operator safety is also a major consideration in evaluating the public health and safety problems that have the potential to arise if the existing system is not upgraded from its current status. Each of these risks, and the existing operational deficiencies of the existing system are thoroughly explained in Section 3 of the PER and documented in the EPA Compliance Evaluation Inspection Report also included in Appendix F of the PER.

The design of any improvements to the wastewater treatment system will need to fully comply with the latest edition of DEQ Circular 2. Plans and specifications will need to be reviewed and approved by the MDEQ before construction can begin. The proposed project will enable the City of Hardin to bring the wastewater treatment

facility and collection system into compliance with current regulations and will meet state/federal health and safety standards.

3. **Is the entire community, or a substantial percentage of the residents of the community, seriously affected by the deficiency or at risk, as opposed to a small percentage of the residents?**

   The City of Hardin currently provides wastewater service to 1,286 active sewer connections, which includes nearly all households within the City. All users of the Hardin wastewater system could be affected by the deficiencies of the existing system. The upgraded wastewater system will be accessible to all users of the system and will allow for future development to occur as planned for in the Growth Policy.

4. **Is there clear documentation that the current condition of the public facility or service violates, or may potentially violate, a state or federal health or safety standard? If the proposed project is necessary to comply with a court order or a state or federal agency directive, describe the directive and attach a copy of it.**

   The EPA conducted a compliance evaluation inspection in September of 2017 (Appendix F of the PER), which resulted in a "Significant Noncompliance" status for the wastewater treatment facility. The wastewater system deficiencies reported by the EPA and the City of Hardin public works staff are summarized previously in Section 19.A.1 of this document. Without upgrades to the wastewater system, residents will face a series of permit violations, possible enforcement actions, and, in the event a connection moratorium is issued, lost economic opportunities. This would present a significant problem for local officials, businesses and community members.

5. **Does the standard that is being violated, or potentially may be violated, represent a significant threat or potential threat to public health or safety?**

   Health, sanitation and security deficiencies are based upon reporting from a recent EPA compliance evaluation inspection as well as reporting from the City's wastewater operators and public works personnel. Several issues were mentioned in both the EPA evaluation and the lists obtained from the City's personnel. Among the items that present a potential threat to public health or safety include:

   - The wastewater treatment plant does not have adequate grit and grease removal in the existing headworks facility. There is currently no means to recycle wastewater that has not been adequately treated to the beginning of the process; therefore, grit and grease contaminated effluent is intermittently discharged to the Bighorn River.

- The wastewater treatment facility does not have backup power generation. Therefore, in the event of a power outage, all capability to treat wastewater is lost. Currently, in the event of a power outage, wastewater is manually diverted to an old lagoon cell until power is restored, with no means of reintroducing the diverted wastewater into the treatment process.
- The current water supply well for the treatment facility is inadequate. Although the City has installed a cistern to allow for storage of potable water that has been hauled from the municipal fill station, the cistern does not store adequate volume for wash-down procedures.
- Return Activated Sludge (RAS) pumping system is unreliable and requires maintenance and/or repair on a regular basis. The augers have been repaired several times by public works staff; however, this is a dangerous procedure that takes place in a confined space. During the repair procedures, treatment is impaired due to the inability to return an adequate amount of sludge to the oxidation ditch.
- The wastewater treatment facility currently only has one UV disinfection unit located in the primary treated effluent discharge channel; therefore, when effluent is bypassed in order to clean/maintain/repair the UV unit, the ability to disinfect the treated effluent is temporarily interrupted. Without a second UV disinfection system located in a bypass channel, the effluent from Hardin's wastewater treatment system is a potential public health risk for recreational river users and downstream potable water systems.

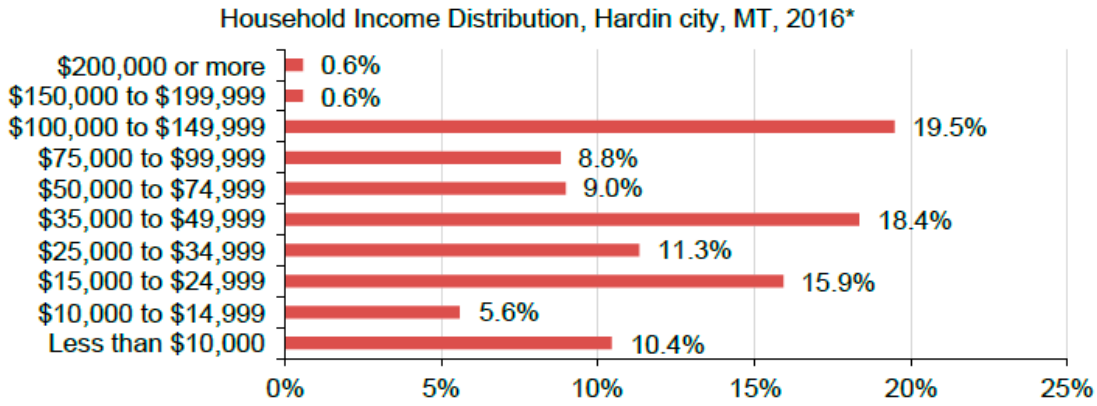
In addition, Section 3 of the PER describes health, sanitation and security deficiencies based upon reporting from the recent EPA compliance evaluation inspection and reporting from the City's wastewater operators and public works personnel.

6. Additional information supporting the NEED for this project.

Of the 3,754 residents of Hardin, 51.85% are low and moderate income while 22.6% are at poverty level. The current wastewater rates are already over the target rate and the proposed project will mean another rate increase. Additionally, lack of tax revenue from the power plant means the City has less revenue to put towards the infrastructure improvements. Grants and loans will be required to keep the costs to residents in check. The City wants to encourage and not discourage infill and new development, which will increase local tax revenue.

According to Headwaters Economics' research, poverty in Hardin is slightly less than that shown in the 2015 American Communities Survey data at 20.8% for individuals and 20.5% for families. That percentage of individuals and families living below poverty in Hardin is considerably more than that same statistic overall in the United States (15.1% individual poverty rate and 11% family rate).

Income distribution in Hardin should also be considered in the need for financial assistance since it is related to important aspects of economic well-being. According to Headwaters' research "In the 2012-2016 period, the bottom 40% of households in Hardin accumulated approximately 12.4% of total income, and the top 20% of households accumulated approximately 52.4% of total income." The burden of increased rates for utilities is particularly difficult for the bottom 40% of households.



Hardin also has a high percentage of individuals who rely on fixed incomes from Social Security or retirement income (48.2%) and Public Assistance Income (35.6%) which is also a factor in considering the burden of increased utility rates.

Mayor Purcell, in his cover letter of the 2019-2020 Budget states "We will have some difficult challenges ahead of us over the next year. The proposed upgrades to our Wastewater Treatment Plant will be a major funding challenge."

B. Degree of Severity of Impact from an Increase or Decrease in Coal Development or in the Consumption of Coal by a Coal Using Energy Complex.

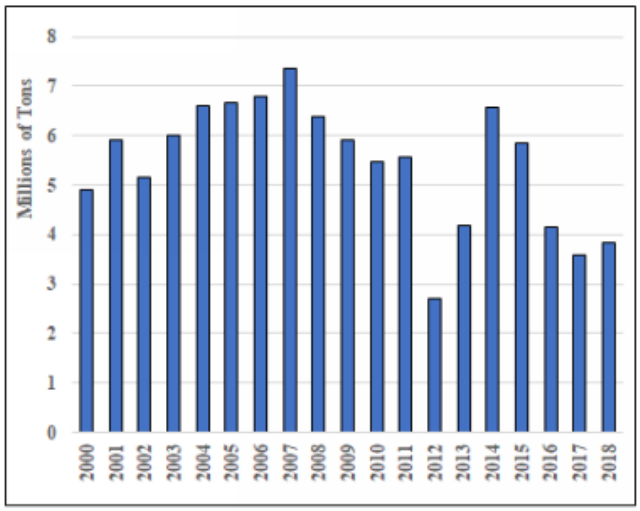
1. Describe why the need for the expansion or improvement to the public facility or public service is attributable to coal-related impacts. Additionally, please provide the percentage of the project that is a result of coal impacts.

The Absaloka Mine, located approximately 30 miles east of Hardin, was developed in the early 1970's and is a single-pit surface mine complex located near the City of Hardin and the Crow Indian Reservation. The annual production of coal from the mine has fluctuated greatly during the past 18 years as shown in the production analysis below:

Absaloka Mine - Big Horn County

Annual Coal Production (*tons*)

Year	Annual Production	Annual Change	Annual Change (%)
2000	4,910,907	--	--
2001	5,904,724	993,817	20.2%
2002	5,160,921	(743,803)	-12.6%
2003	6,016,678	855,757	16.6%
2004	6,588,633	571,955	9.5%
2005	6,663,499	74,866	1.1%
2006	6,782,935	119,436	1.8%
2007	7,347,794	564,859	8.3%
2008	6,391,000	(956,794)	-13.0%
2009	5,911,688	(479,312)	-7.5%
2010	5,467,954	(443,734)	-7.5%
2011	5,557,604	89,650	1.6%
2012	2,714,063	(2,843,541)	-51.2%
2013	4,168,749	1,454,686	53.6%
2014	6,557,844	2,389,095	57.3%
2015	5,844,619	(713,225)	-10.9%
2016	4,157,548	(1,687,071)	-28.9%
2017	3,573,756	(583,792)	-14.0%
2018	3,827,634	253,878	7.1%



Source: Montana Departmemt of Labor & Industry. Analysis by Montana Department of Commerce, Research & Information Services Bureau

Located in Hardin is the 116-MW Hardin Generating Station, which has historically purchased up to 550,000 tons of coal annually from the Absaloka Mine. A downturn in the demand for coal energy left the owner of the coal powered electrical plant, Rocky Mountain Power, owing millions in back taxes. Rocky Mountain Power has made every attempt to operate the plant as economic conditions allow and to maintain employment of the individuals whose livelihoods depend on it. The company owes back taxes and penalties and those payments would have benefited infrastructure and the City of Hardin's tax increment financing district where the plant is located.

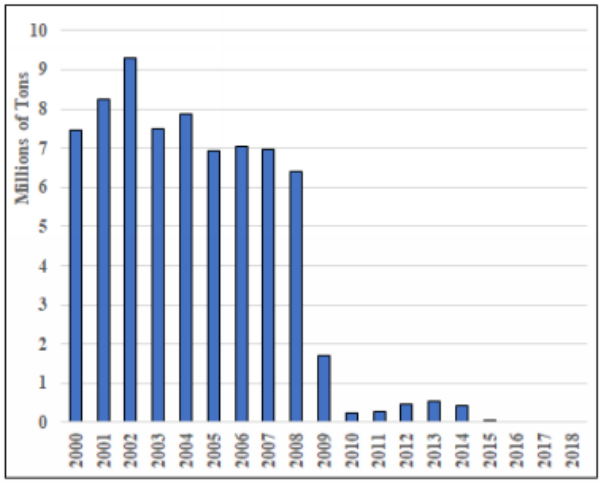
The Spring Creek Mine which is in Big Horn County is expected to increase production by at least 1 million tons per year within the next two years according to the most recent Coal Impacted Local Governmental Units Designation Report. This report lists the City of Hardin as an impacted local government due to this and the expected increases in production of the Signal Peak Mine. Additionally, the report says that the City of Hardin is an impacted City because of the expected decreases in production of the Rosebud Mine.

The West Decker Mine, located in Big Horn County, has ceased mining production:

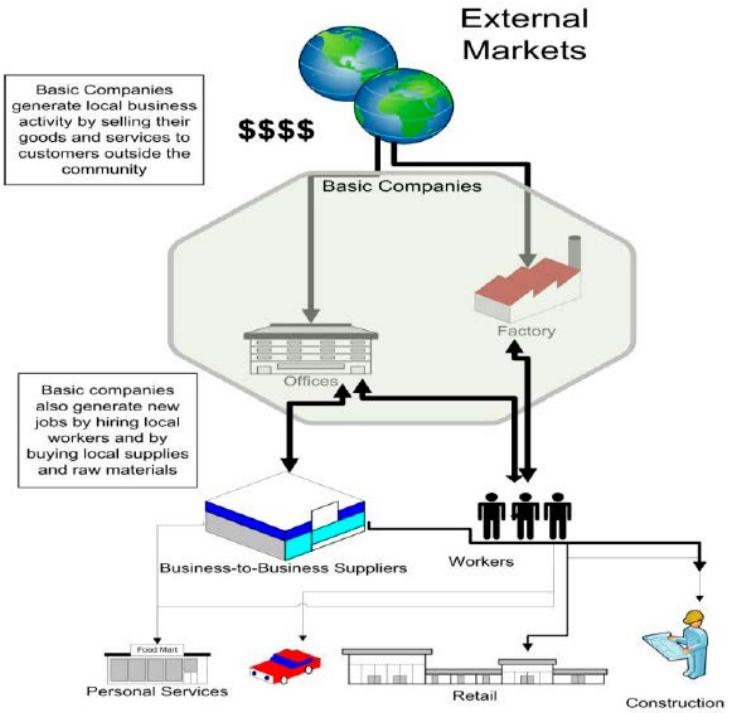
West Decker Mine - Big Horn County

Annual Coal Production (*tons*)

Year	Annual Production	Annual Change	Annual Change (%)
2000	7,466,814	--	--
2001	8,254,718	787,904	10.6%
2002	9,281,431	1,026,713	12.4%
2003	7,480,364	(1,801,067)	-19.4%
2004	7,886,137	405,773	5.4%
2005	6,915,690	(970,447)	-12.3%
2006	7,044,226	128,536	1.9%
2007	6,972,909	(71,317)	-1.0%
2008	6,411,896	(561,013)	-8.0%
2009	1,720,374	(4,691,522)	-73.2%
2010	228,006	(1,492,368)	-86.7%
2011	295,575	67,569	29.6%
2012	484,570	188,995	63.9%
2013	545,037	60,467	12.5%
2014	419,092	(125,945)	-23.1%
2015	21,496	(397,596)	-94.9%
2016	0	(21,496)	-100.0%
2017	0	0	--
2018	0	0	--



Source: Montana Departmemt of Labor & Industry. Analysis by Montana Department of Commerce, Research & Information Services Bureau



Assuming approximately 25% of employment in Big Horn County is directly related to mining, that is 592 people out of a total of 2,365 people privately employed who rely on the industry for their livelihood. However, local businesses in the City also supply goods and services to the mine and its employees, expanding the indirect impact of the industry on residents and businesses. The Taimerica Management study, *The Changing Coal Industry*, which was funded in part by an award from the Montana Department of Commerce, Big Sky Economic Development Trust Fund Program, and by an award from the United States Economic Development Administration, provides some insight into economic

impacts of the coal industry. The model used estimates of 4,400 direct coal industry jobs in the 15-county study region which also created almost 5,200 jobs in the state economy from the coal cluster. Therefore, we can assume that within Big Horn County where there are nearly 600 jobs directly related to the coal industry, and an additional 700+ jobs are created indirectly by the industry.

It is difficult to determine the percentage of the project that is a result of coal impacts except that the entire wastewater system is needed to continue to provide required services. Adequate infrastructure is needed to ensure coal supply businesses and the those indirectly created remain within the City of Hardin.
The current wastewater treatment mechanical plant was constructed in 1978 and needs major improvements to meet current health and safety standards. Although no direct development of coal is conducted within the City of Hardin, businesses and agencies that provide support, sales, and services to coal industries that operate within the City are dependent on safe, affordable infrastructure. These businesses include: an auto parts store, lumberyard, fuel and tire shops, hardware stores, grocery store, clinics, water supplier, body shops, construction, electrical, and plumbing businesses, and restaurants.

2. **Name the nearest coal development area or coal-using energy complex to your community and the road miles from your community.**

   The Absaloka Mine is a 10,427-acre permitted single-pit surface mine complex located approximately 30 miles from the City of Hardin. In addition, the 116-MW Hardin Generating Station, is located within the City limits of Hardin.

3. **Additional information supporting the Degree of Severity of Impact from an Increase or Decrease in Coal Development or in the Consumption of Coal by a Coal Using Energy Complex**

Rocky Mountain Power, which is the largest entity within Hardin's Industrial Park Tax Increment Finance District, was exempt from property taxes until January 1, 2014. The plant has historically purchased up to 550,000 tons of coal annually from the Absaloka Mine. A downturn in the demand for coal energy left the plant owners unable to meet their obligations for taxes and, therefore, the taxable values of property within the Tax Increment Finance District are

insufficient to allow the Schools, County and City to assess sufficient taxes to meet the debt obligations of the TIF Revenue bonds.

While employees of the coal fired electrical generation plant are directly impacted by the reduction in coal production, Rocky Mountain Power has made every attempt to open the plant as economic conditions allow and maintain the employment of the individuals whose livelihoods depend on it.

In 2006, the City of Hardin issued $12,600,953 of revenue bonds, with an interest accretion phase of $8,319,047 for total bond principal of $20,920,000, to finance all or a portion of the costs of construction and installation of certain industrial infrastructure projects in relation to Rocky Mountain Power's coal-fired electric generation station and related facilities. Payments on those bonds have been in default, as they relied on revenue from the plant.

C. Availability of Funds

1. **Amount requested from the Coal Board:** $500,000

2. **Amount of Coal Board funds available at the time of application:** To be completed by Coal Board Staff

3. **Explain why a coal impact grant is necessary to make the project feasible and affordable.**

   Without funds from the Coal Impact Grant, the City will be forced to rely more heavily on loan funding through RD and SRF to ensure the project continues to move forward to completion. A smaller amount of grant funding equates to a larger rate increase for system users. Because the current wastewater rates are already over the target rate, and the proposed project means another rate increase, grants are necessary to keep the costs to residents in check. For a community that is comprised of a population that is almost 52% Low to Moderate Income individuals and has a nearly 23% poverty rate, that increase will be even more burdensome without grant assistance.

4. **What are the other proposed funding sources for the project?**

Funding Sources Summary City of Hardin Wastewater System Upgrades			
Source	**Type of Fund**	**Amount**	**Status of Commitment**
Delivering Local Assistance	Grant	$750,000	Applied

Treasure State Endowment Program (TSEP)	Grant	$625,000	Awarded per HB652
DNRC RRGL	Grant	$125,000	Awarded per HB652
CDBG	Grant	$450,000	Application forthcoming
USDA RD	Grant	$1,500,000	Applied
USDA RD	Loan	$4,500,000	Applied (40 years @ 3.125%)
SRF	Loan	$2,815,000	On priority list (30 years @ 2.5%)
City of Hardin	Cash Reserve	$100,000	Approved June, 2019

The City recognizes the financial and time commitment to planning, funding, and constructing a project of this magnitude. This grant application is one of several grant and loan funding applications that have been or will be prepared to assist in financing the project. At this time, Stahly Engineering's grant writer is expected to assist the City with an additional funding application to the Community Development Block Grant (CDBG) Program in 2020. Loans, that will require the assistance of the City's Bond Counsel, will also be necessary. Those loans are currently planned for the State Revolving Fund loan program and USDA Rural Development funds. The City's wastewater project is on the SRF Priority List for and the RD application was submitted in October 2019.

5. **If a particular proposed source of funding is not obtained, how will the applicant proceed:**

Each funding source listed in the table above is a critical factor in keeping the project moving forward. Section 7 of the attached PER includes an analysis of wastewater rates utilizing loan funds only and how additional grant funds will help keep the project more affordable for ratepayers. The resulting monthly wastewater rate estimated by the increase in debt, given the success of all funding as shown in the table above, and additional operation and maintenance costs is $69.53. If only loan funds were used, the resulting monthly rate would be $76.00. Wastewater rates were raised in October by the City bringing the estimated monthly wastewater rate with all grant funding in place to $69.53. All attempts by the City to keep cost increases to a minimum with grant funding will make the needed project more acceptable to the ratepayers. Without the approval of RD funding or loans from SRF, the project is unlikely to move forward.

D. Degree of Local Effort in Meeting Needs

1. **If current millage rates given are lower than the average rates levied during the previous three years, briefly explain why they are lower.**

   The history of the overall City of Hardin millage rates is shown in the following table:

City of Hardin Millage Rates					
Fiscal Year	Taxable Valuation	% Change from Previous Year	Total Current Year Authorized Mill Levy	Current Year Actual Mill Levy	Carry Forward Mills Available
FY 16-17	3,222,508	3.01%	158.77	158.77	0
FY 17-18	3,505,154	8.77%	147.88	147.88	0
FY 18-19	3,506,113	0.03%	151.12	151.12	0
FY 19-20	3,450,447	-1.59%	157.12	157.12	0

   Taxable valuation decreased for FY 19-20, so the authorized mill levy increased. This decrease is attributable to a decrease in the value of Rocky Mountain Power's electrical generating plant. The current amount levied is the maximum authorized.

2. **Describe any local efforts to meet the public facility or public service needs by providing financial contributions to the project to the extent possible, such as local funding, donations of land, absorbing some or all administrative costs. For non-profit organizations, describe fund-raising efforts or other in-kind assistance to the proposed project as well as usual program fund-raising efforts.**

   The City of Hardin has pledged cash reserve to the project in the amount of $100,000. In addition, the City will provide cash match in the form of revenue bond proceeds that will be the result of loans acquired from USDA Rural Development (RD) and a State Revolving Fund (SRF) loan. A RD application was submitted in October 2019 and the City anticipates a portion of that $6 million application in grant funds. Results of the application will likely be determined by the end of 2019. The City's project is also listed on the State Priority List for SRF loan funding, which is being pursued along with the RD loan. The City is in contact with DNRC's Anna Miller regarding the need for additional loan funds, but a letter a commitment to provide that funding will not be forthcoming until other sources of funding are more certain, and an estimated amount of additional loan funds is known.

   Additionally, the City has contributed funding for the Preliminary Engineering Reports and I&I Study conducted to date to plan for the eventual construction project. Grant writing costs have also been incurred by the City for an approximate

total of slightly more than $162,000 The City received planning grant assistance for these activities in the amount of $60,000.

The City is also currently funding past improvements to the wastewater system with three active revenue bonds. Payments toward those bonds were $195,758 in FY2018 and $196,071 in FY2019. Furthermore, the City's personnel (Finance Officer/City Clerk, Deputy City Clerk, and Public Works Director) have contributed numerous in-kind hours to study the system and provide support and administration for grant applications.

3. **Describe past operation and maintenance budgets and practices over the long term, including any reserves for repair and replacement.**

   Maintaining adequate operation and maintenance budgets for Hardin's wastewater system has consistently been a challenge for the City of Hardin given the age of the system. The City has proactively raised rates to maintain adequate reserves for repair and replacement. The City raised rates as recently as October 2019. Per the FY2018 Audit, the operating reserves for wastewater were $693,056 with expenses of $828,152 leaving an operating income of negative $135,097. Restricted reserves for FY 2019 were $773,590. The City has consistently maintained a similar reserve amount over the reporting period for the budget (2013 – 2018) as shown the attached budget document (Exhibit C).

4. **If there are indications that the problem is not of recent origin or has developed because of inadequate operation and maintenance practices in the past, explain the circumstances and describe the actions that management will take in the future to assure that the problem will not reoccur.**

   The original wastewater collection system was constructed in 1916. Extensions to the system were conducted intermittently over the course of the next several decades. By the early 1990's the collection system had grown to include approximately 80,800 linear feet of 8-inch to 18-inch sewers including vitrified clay pipe (VCP), polyvinyl chloride (PVC) pipe, and reinforced concrete pipe (RCP) as well as approximately 235 sanitary manholes (SMH). At this point in time a lift station on the east end of 6th Street pumped wastewater from the collection system to the wastewater treatment plant through 4,700 linear feet of 12-inch asbestos cement force main. By the mid-2000's, many of these lines and appurtenances were in need of replacement. The 6th Street lift station and the force main to the treatment plant were replaced in 2008. In 2009, the City completed a project involving rehabilitation or replacement of 24,044 lineal feet of sewer mains and 82 manholes. In 2011, the plant added UV treatment and extended services 1961 lineal feet.

   The original wastewater treatment system was a facultative lagoon facility. The old facultative lagoon cells still exist directly south of the existing wastewater treatment

plant. The facultative lagoons were replaced by the current oxidation ditch mechanical plant in 1978. Portions of the old lagoon cells are still utilized as part of the current mechanical treatment system for surge flow bypass, sludge drying beds, and septage receiving. See additional information about the history of maintenance and upgrade practices in Section 2 of the PER.

A Water and Sewer Master Plan was completed in 1986 to guide the ongoing operation and maintenance of the system and plan for future upgrades. In 2004 a Wastewater Facility Plan was completed. In addition to those plans, the City also conducted a Storm Drainage, Erosion Control & Flood Mitigation Master Plan for the City of Hardin and Surrounding Growth Areas in 1986. The PER that accompanies this application is a continuation of planning efforts to identify the best solution to solve the wastewater system problems and ensure that the existing plant meets future regulatory standards. The Public Works Department has consistently developed Capital Improvements Plans over the last several years to address the issues of the aging wastewater treatment plant and plan for major maintenance and replacement projects as described in responses above

Improvements to the system have been paid for with grants, loans, and increases in utility rates paid for by local rate payers.

The EPA Compliance Evaluation Inspection for the City of Hardin Wastewater Treatment Plant confirms Hardin's employment of staff dedicated to maintenance of the plant and issues with maintenance that are associated with an aging and inadequate facility. The report, in Appendix F of the PER, documents that the Department of Public Works has five staff for operating and maintaining both the sanitary sewer and water system who perform monitoring and maintenance of the sanitary sewer collection system and assist with maintenance of the treatment plant.

Findings include some need for improved maintenance practices, but also identify other issues related to the overall condition of the plant as outlined in the issues shown above.

Currently, the City of Hardin has contracted for certified operator services and two employees are in the process of qualifying for operator-in-training certificates. Their duties include operating and maintaining all treatment plant assets, monitoring wastewater discharges, and conducting laboratory analyses for reporting purposes.

5. **If the project involves water, wastewater or solid waste, provide the current and projected monthly household user charges, including operation and maintenance.**

City of Hardin User Charges		
Average Monthly Residential Rate as of 10/15/19	**Current**	**Projected**
Wastewater	$42.15	$69.53
Water	$19.85 up to 3,000 gallons	$19.85
Total	$62.00	$89.38

6. **What are your current debt obligations?**

City of Hardin Current Debt Summary						
Year Issued	**Purpose**	**Amount**	**Maturity Date (mo/yr)**	**Debt Holder & coverage**	**Ave. Annual Payment**	**2019 Outstanding Balance**
2003	Wastewater Imp	2,050,000	7/1/23	DNRC 125%	133,800	509,000
2010	Wastewater Imp	359,330	1/1/30	DNRC 125%	19,500	194,000
2010	Wastewater Imp	625,000	1/1/30	DNRC 125%	42,200	378,000
2006	TIFD	20,920,000	9/1/31	US Bank Trustee	895,000	20,920,000
2006	TIFD	Delinquent interest	9/1/31	US Bank Trust	1,307,500	2,834,400
2009	Landfill Coal Ash Cell	1,664,000	7/1/24	DNRC 125%	94,520	444,000

7. **What are your current assets?**

Assets of City of Hardin as of June 30, 2018
(See Exhibit C).

City of Hardin Current Assets June 2018	
Total Current Assets	$7,877,859
Total Fixed Assets	$26,685,710
Total Other Assets*	$4,311,967
Total Assets	**$38,875,536**

*Total other assets ($4,311,967) are listed on the FY2018 Audit as restricted cash and investments. Per notes to the FY2018 Audit, a portion of the restricted cash is required by the bond indenture agreement covenants established with the issuance and sale of revenue bonds representing a liability to the enterprise funds, repayment of revenue bond debt requirement, customer deposits and meeting the closure and post-closure requirements of the City's landfill. Other restricted assets represent cash and cash equivalents restricted to repay current debt, establish a reserve for future debt and establish a replacement and depreciation reserve for the purpose of replacing the system in the future.

8. What financial accounting system do you use?

The City of Hardin utilizes the BARS system of accounting.

9. Is the applicant in compliance with the auditing and annual financial reporting requirements provided for in the Montana Single Audit Act, 2-7-501 to 522, MCA? What is the date of the last completed audit or financial report?

Yes X Date of last completed audit or financial report: July 1, 2019

The City of Hardin is in compliance with all auditing and reporting requirements. The 2018 audit report is available for review on the City's website: http://www.hardinmt.com/City_of_Hardin_Audit_FY2018.pdf

10. If there have been audit findings within the last five years, have they been substantially addressed?

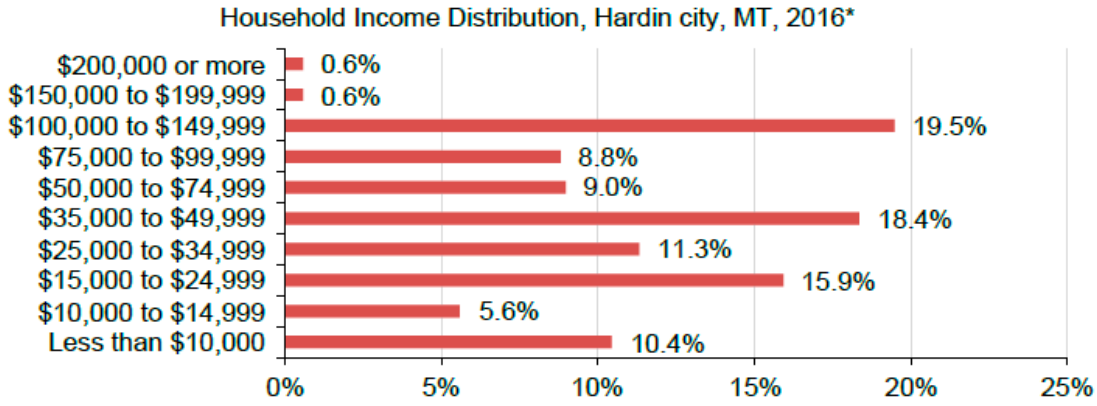
The City of Hardin has an audit finding in the most recent audit (repeat finding from 2016 and 2017) related to the Revenue Bonds Requirements of the Tax Increment Financing District (TIF) bond principal and interest payments not being met. The cause is due to the primary TIF business (Rocky Mountain Power) filed for bankruptcy, which reduced the taxable value of the entire TIF district and has not made its scheduled tax payments on time.

11. Additional information supporting the degree of local effort in meeting needs.

This project will result in a combined water/sewer rate for Hardin residents of $89.38 depending on the success of the funding strategy the City is planning. This is more than a 25% increase over the City's target rate based on 2015 American Communities Survey data and more than a 40% increase over the current wastewater rate. For a community that is comprised of a population that is almost 52% Low to Moderate Income individuals and has a nearly 23% poverty rate, that increase will be even more burdensome without grant assistance.

The City of Hardin has reserved $100,000 in general funds to offset costs of wastewater improvements. Additionally, the City has raised wastewater rates as recently as October of 2019 to increase revenues for maintenance and upgrades to the wastewater system. Concurrently, the City is applying for every grant and low interest loan available, so the user rates do not become exorbitant.

Income distribution in Hardin should also be considered in the need for financial assistance since it is related to important aspects of economic well-being. According to Headwaters' research "In the 2012-2016 period, the bottom 40% of households in Hardin accumulated approximately 12.4% of total income, and the top 20% of households accumulated approximately 52.4% of total income." The burden of increased rates for utilities is particularly difficult for the bottom 40% of households.



Hardin also has a high percentage of individuals who rely on fixed incomes from Social Security or retirement income (48.2%) and Public Assistance Income (35.6%) which is also a factor in considering the burden of increased utility rates.

E. Planning and Management

1. Describe how your grant request reasonably fits into an overall plan for the orderly management of the existing or contemplated growth or decline problems related to coal impacts.

The Changing Coal Industry publication discusses the future of Montana coal by saying that "Energy economists and leaders in the coal industry generally agree that the demand for domestic coal will continue to decline as the electric power industry switches generation from coal to natural gas." This prediction supports the reality of a declining local tax base, and the difficulty local governments will have to provide necessary improvements to local infrastructure.

The current and future population of the City of Hardin is impacted by the reduction in coal, oil and gas production as those industries provide employment, related

business economic stability, and a tax base that sustains City infrastructure. For example, the unpredictable future of the coal fired electrical general plant will directly impact employment and revenues to the City of Hardin. With reduced tax income, maintaining existing infrastructure is difficult and makes improvements to infrastructure nearly impossible. According to the 2009 City of Hardin Growth Policy, the jobs at the electrical generation plant are primary jobs, meaning that the dollars made from those jobs are original dollars coming from outside the established local economy. Those dollars turn over up to two times more in the local areas as expenditures for groceries, housing, food and similar items purchased.

2. Describe how the proposed project is consistent with current plans.

Providing system upgrades to the City of Hardin Wastewater Treatment System is consistent with past local planning efforts as outlined below. The City of Hardin Growth Management Plan (2009) can be found in Appendix D of the PER. The City's Capital Improvements Plan, updated annually, also prioritizes improvements to the wastewater system. Excepts from the Growth Management Plan and the Comprehensive Economic Develop Strategy are included in Exhibit E.

City of Hardin Growth Management Plan

The City of Hardin conducted a community-wide needs assessment process during development of its Growth Management Plan. The plan identifies wastewater infrastructure as one of the top ten priorities. Maintaining the existing wastewater treatment plant to serve future growth in the City is a focus of the discussion of the system in the Growth Management Plan.

Recommendations within the Land Use section of the Plan include discouraging unsewered development which would make "future extension of public utilities more costly and complex." The Growth Plan section addressing the public water supply and sanitary sewer system reinforces the recommendation by examining a key issue: "Because of the physical conditions of high ground water and poor groundwater quality, it is desirable to minimize the use of private septic systems and private wells for domestic water use. Most of the Hardin area is rated as having "severe limitations" for private septic systems in the Big Horn County Soil Survey." With numerous requests for utility service extension it is critical that the existing system remains compliant with state and federal regulations and is updated to ensure adequate capacity for growth.

Water and Sewer Master Plan

A Water and Sewer Master Plan prepared in 1986 is the City's long-range planning document for the municipal sanitary sewer and public water supply systems, in conjunction with a 2004 Wastewater Facility Plan.

City of Hardin Capital Improvements Plan

The City of Hardin maintains a Capital Improvements Plan in conjunction with its annual budget. Exhibit C includes a copy of the City of Hardin Capital Improvements Plan (CIP) for 2018 and updates to the CIP recommended in 2019. Included in the packet with the CIP is rate analysis information and specific project information. Development of a formal 5-year CIP is currently being planned by the City.

Beartooth RC&D Comprehensive Economic Development Strategy (CEDS)

The City of Hardin is located within the Beartooth Resource Conservation & Development region, which has recent published an updated CEDS plan for 2019. The CEDS identifies regional issues with aging infrastructure and includes the following information:

Infrastructure Development Goals:

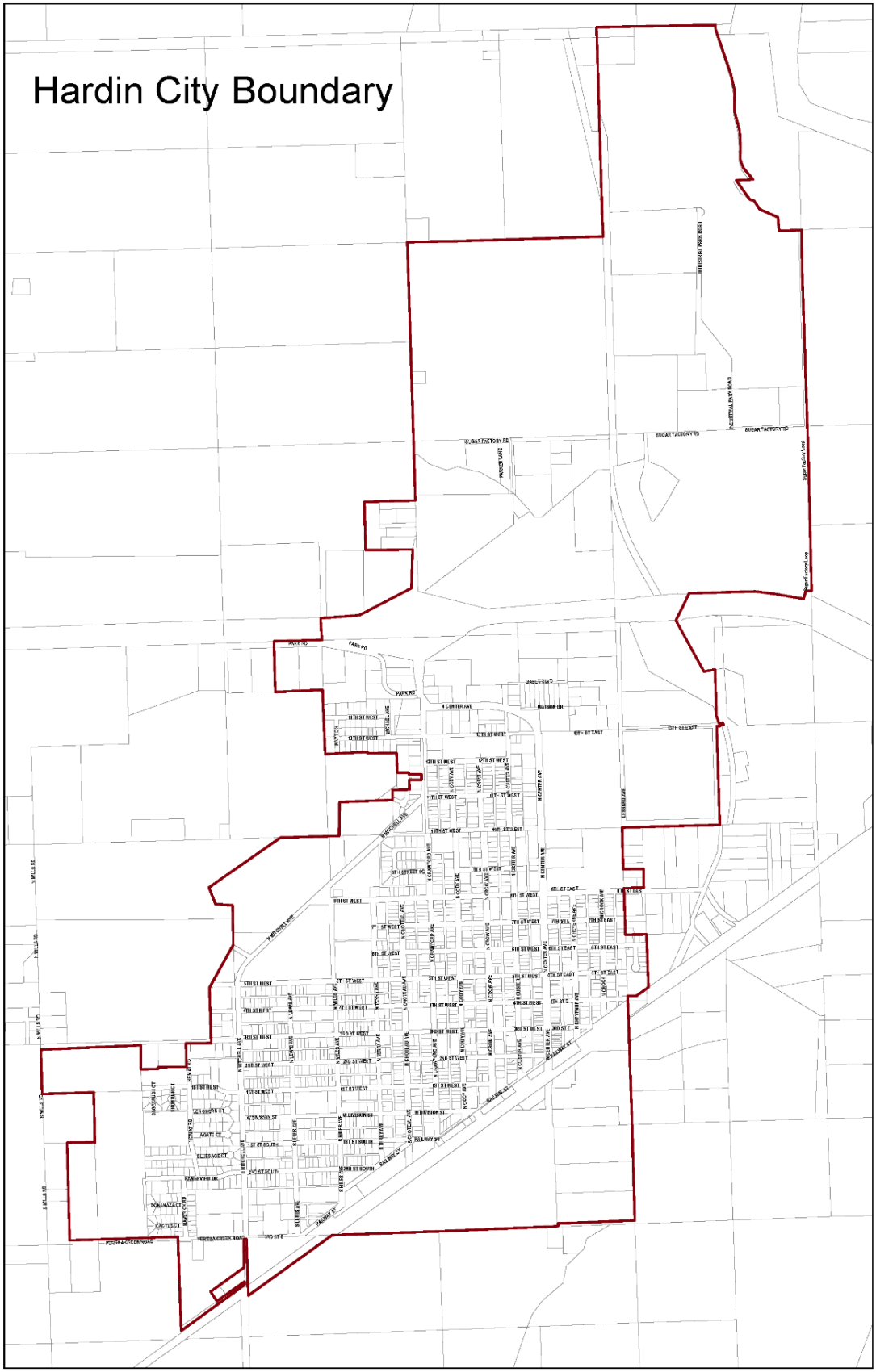
Goal 1: Support public and private sector entities in the completion of infrastructure projects.

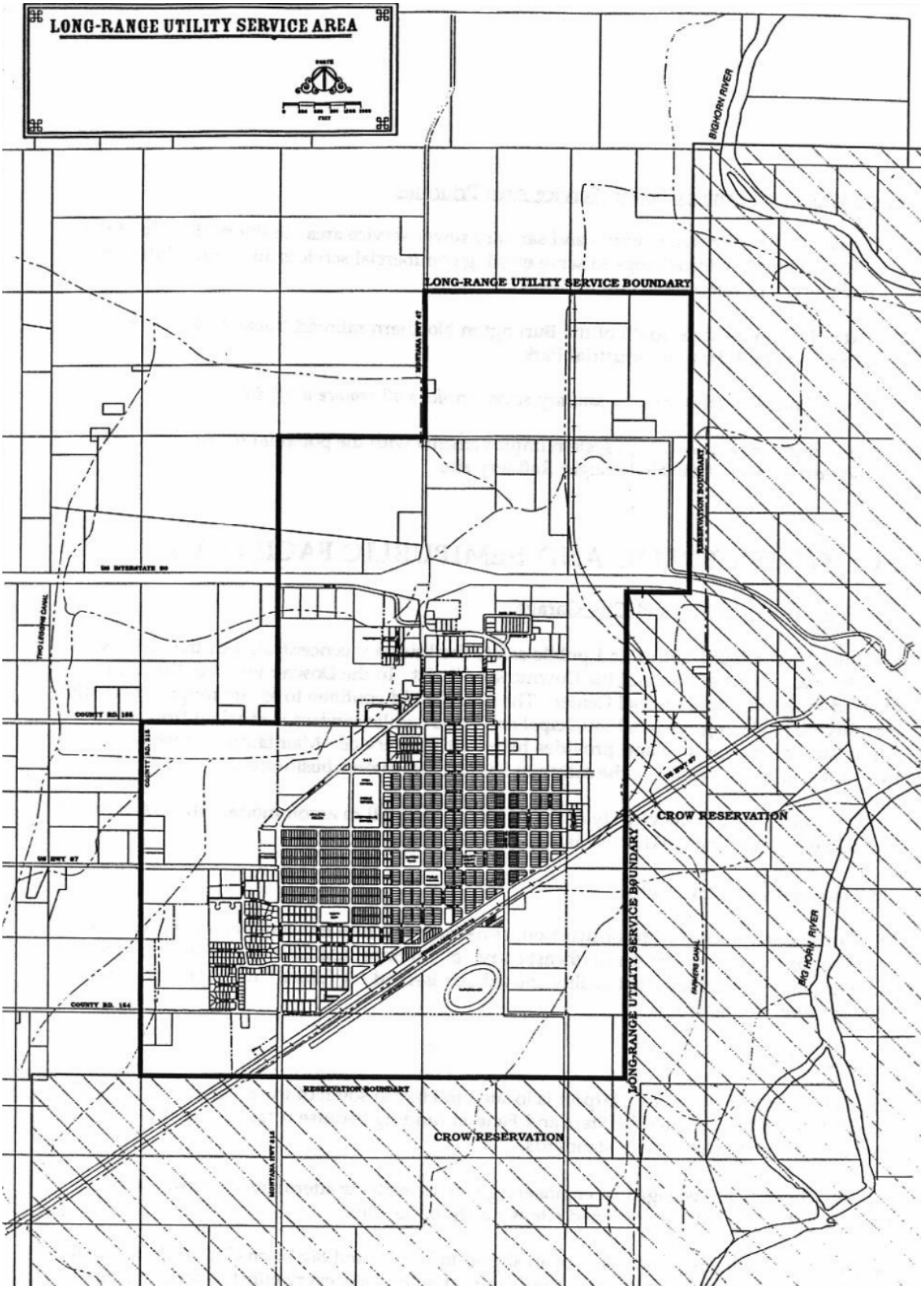
Strategy: Provide assistance with public education, communication and public meeting facilitation for the purpose of the completion of infrastructure projects.

Strategy: Provide assistance to public and private sector entities in order to help them secure funding for the completion of infrastructure projects.

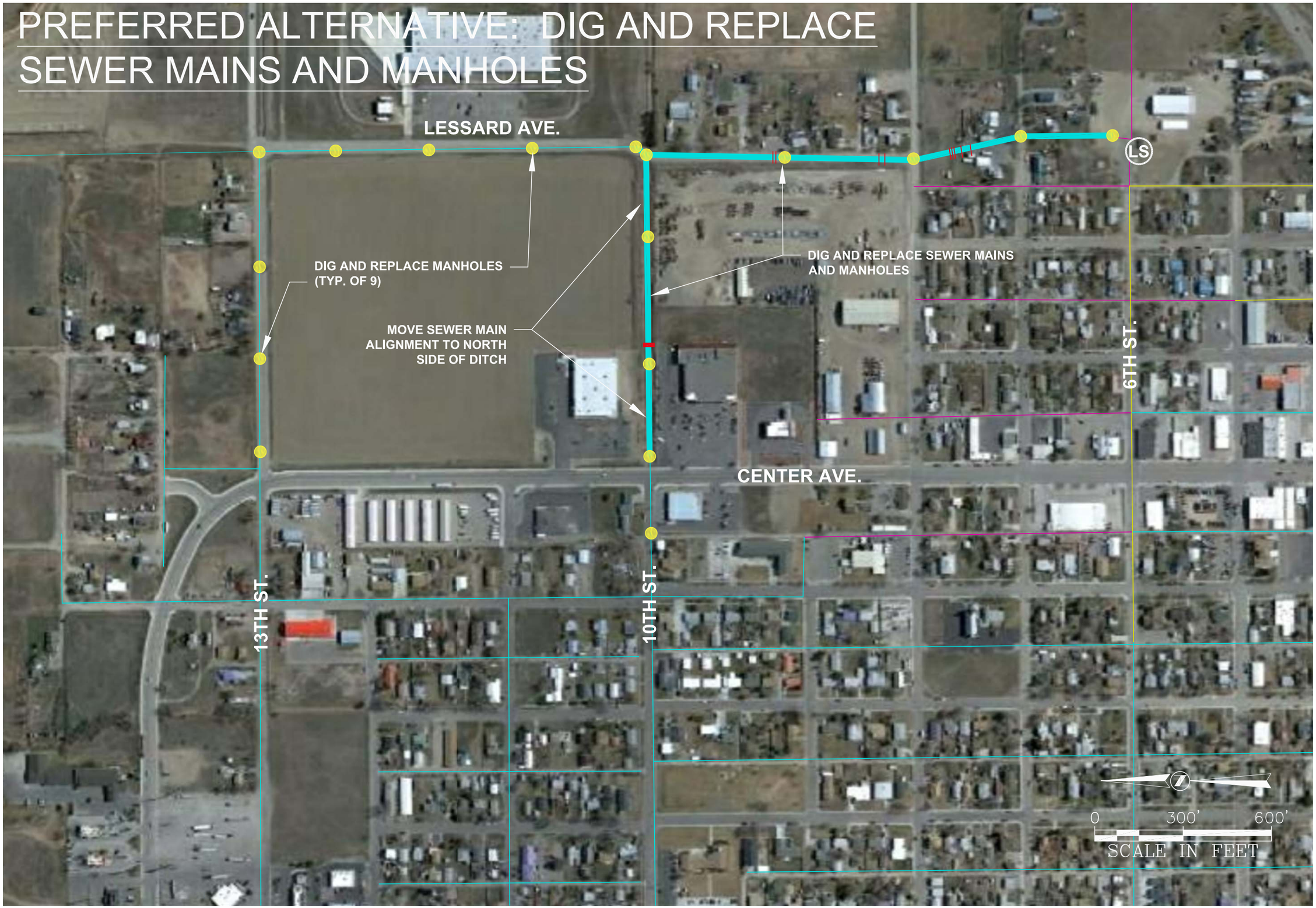
EXHIBIT A
Maps

Hardin City Boundary




LONG-RANGE UTILITY SERVICE AREA
BIGHORN RIVER
LONG-RANGE UTILITY SERVICE BOUNDARY
MONTANA HWY 47
RESERVATION BOUNDARY
US INTERSTATE 90
TWO LEGGING CANAL
COUNTY RD. 186
COUNTY RD. 215
US HWY 87
CROW RESERVATION
LONG-RANGE UTILITY SERVICE BOUNDARY
HUNGRY CANAL
BIG HORN RIVER
COUNTY RD. 184
RESERVATION BOUNDARY
CROW RESERVATION
MONTANA HWY 313

PREFERRED ALTERNATIVE: DIG AND REPLACE SEWER MAINS AND MANHOLES



STAHLY ENGINEERING & ASSOCIATES
PROFESSIONAL ENGINEERS & SURVEYORS
www.seaeng.com

2223 MONTANA AVE.
STE. 201
BILLINGS, MT 59101
Phone: (406)601-4055
Fax: (406)601-4062

3530 CENTENNIAL DR.
HELENA, MT 59601
Phone: (406)442-8594
Fax: (406)442-8557

851 BRIDGER DR. STE. 1
BOZEMAN, MT 59715
Phone: (406)522-9526
Fax: (406)522-9528

ISSUE/REVISION

No.	DATE	BY
1	####	####
DESCRIPTION		
####		

No.	DATE	BY
2		
DESCRIPTION		

No.	DATE	BY
3		
DESCRIPTION		

No.	DATE	BY
4		
DESCRIPTION		

No.	DATE	BY
5		
DESCRIPTION		

PRELIMINARY
NOT FOR CONSTRUCTION

PREFERRED ALTERNATIVE CS-1

WASTEWATER UPGRADES PER UPDATE

CITY OF HARDIN, MONTANA

DESIGNED: SJS, GMS
DRAWN: SJS, GMS
CHECKED:
DATE: 07-15-2019

FIGURE
6.1

Stahly Engineering & Associates, Inc. COPYRIGHT 2015
L:\2223-City of Hardin\-2019 WW PER Update for RD\DWG\Plan Sets\PER Exhibits\Figures 4.1-4.3 - Collection Alts Layouts.dwg, Figure 6.1, Plotted: Aug 30, 2019 - 10:04am, gsteckler

PREFERRED ALTERNATIVE: SINGLE MECHANICAL HEADWORKS AND ICEAS SBR

SITE INFORMATION

1. ABANDON EXISTING HEADWORKS
2. NEW HEADWORKS STRUCTURE AND EQUIPMENT (SCREEN, GRIT REMOVAL, GREASE REMOVAL)
3. NEW FLOW SPLITTER BOX
4. CONVERT EXISTING OXIDATION DITCH TO SURGE FLOW EQUALIZATION TANK (INSTALL TANK COVER AND EQUALIZATION PUMPS)
5. NEW INTERMITTENT CYCLE EXTENDED AERATION SYSTEM (ICEAS) SEQUENCING BATCH REACTOR (SBR)
6. NEW AEROBIC SLUDGE DIGESTER
7. CONVERT EXISTING CLARIFIER TO SECOND AEROBIC DIGESTER
8. CONVERT EXISTING CLARIFIER TO POST-EQUALIZATION TANK WITH INSULATED DOME COVER
9. BLOWER BUILDING EXPANSION W/ NEW BACKUP DIGESTER BLOWER AND NEW ICEAS AERATION BLOWERS
10. BUILDING EXPANSION TO ADD LABORATORY SPACE AND HOUSE UV DISINFECTION (NEW BACKUP UV DISINFECTION)
11. NEW EMERGENCY GENERATOR
12. NEW SEPTAGE RECEIVING STATION
13. NEW WATER SUPPLY WELL
14. EXISTING TREATED EFFLUENT DISCHARGE OUTFALL (TO REMAIN)
15. EXISTING SLUDGE DRYING BED (TO REMAIN)
16. ABANDON EXISTING RETURN ACTIVATED SLUDGE PUMPS (NOT NEEDED FOR ICEAS SBR)
17. REPLACE EXISTING AEROBIC DIGESTER MECHANICAL EQUIPMENT
18. NEW PROCESS CONTROLS AND SCADA
19. ABANDON EXISTING WASTE ACTIVATED SLUDGE PUMPS (INCLUDED IN ICEAS PACKAGE)

STAHLY ENGINEERING & ASSOCIATES
PROFESSIONAL ENGINEERS & SURVEYORS
www.seaeng.com

2223 MONTANA AVE.
STE. 201
BILLINGS, MT 59101
Phone: (406)601-4055
Fax: (406)601-4062

3530 CENTENNIAL DR.
HELENA, MT 59601
Phone: (406)442-8594
Fax: (406)442-8557

851 BRIDGER DR. STE. 1
BOZEMAN, MT 59715
Phone: (406)522-9526
Fax: (406)522-9528

ISSUE/REVISION

No.	DATE	BY
1	####	####
DESCRIPTION		
####		

No.	DATE	BY
2		
DESCRIPTION		

No.	DATE	BY
3		
DESCRIPTION		

No.	DATE	BY
4		
DESCRIPTION		

No.	DATE	BY
5		
DESCRIPTION		

PRELIMINARY
NOT FOR CONSTRUCTION

PREFERRED ALTERNATIVES HGD-1 AND T-3

WASTEWATER UPGRADES PER UPDATE

CITY OF HARDIN, MONTANA

DESIGNED: GMS
DRAWN: GMS
CHECKED:
DATE: 07-15-2019

FIGURE
6.2

Stahly Engineering & Associates, Inc. COPYRIGHT 2015
L:\2223-City of Hardin\-2019 WW PER Update for RD\DWG\Plan Sets\PER Exhibits\Figure 6.1 - Preferred Alternative Layout.dwg, Figure 6.2, Plotted: Aug 30, 2019 - 9:39am, gsteckler

EXHIBIT B
EPA Compliance Evaluation Inspection
City of Hardin Wastewater Treatment Plant
NPDES Permit: MT0030759

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 Wynkoop Street
Denver, CO 80202-1129
Phone 800-227-8917
www.epa.gov/region8

DEC 19 2017

Ref: 8ENF-W-NP

CERTIFIED MAIL NO.
RETURN RECEIPT REQUESTED

Rock Massine
Assistant Public Works Superintendent
406 N Cheyenne Ave.
Hardin, Montana 59034

Re: Compliance Evaluation Inspection for the City of Hardin Wastewater Treatment Plant
NPDES Permit: MT0030759

Dear Mr. Massine:

Enclosed is a copy of the inspection report for the Environmental Protection Agency's (EPA's) compliance evaluation inspection performed on September 12 and 13, 2017 at the City of Hardin Wastewater Treatment Plant. Deficiencies were noted during the inspection and are summarized in the enclosed report. Within **thirty (30) days** of receipt of the report, please provide the EPA with a summary of corrective actions taken to address each of the findings identified in the report and any information that may change the findings. This summary should be sent to:

Emilio Llamozas (8ENF-W-NP)	Connie Howe
U.S. EPA Region 8	Environmental Director
NPDES Enforcement Unit	Crow Environmental Protection Program
1595 Wynkoop Street	P.O. Box 159
Denver, Colorado 80202-1129	Crow Agency, Montana 59022-0400

Please contact me at 303-312-6407, or llamozas.emilio@epa.gov if you have any questions regarding this letter or the enclosed documents.

Sincerely,

Emilio Llamozas

Emilio Llamozas
NPDES Enforcement Unit
Office of Enforcement, Compliance
and Environmental Justice

Enclosures

cc: The Honorable Alvin Not Afraid, Jr., Chairman, Crow Tribe
Connie Howe, Environmental Director, Crow Environmental Protection Program

Municipal Wastewater and SSO Report

NATIONAL DATABASE INFORMATION	
Inspection Date: 9/12/17 & 9/13/17	Inspection Type: CEI & SSO
Entry/Exit Time: 9/12/17 8:40 -18:00; 9/13/17 9:00 – 13:45	NPDES ID Number: MT0030759
Type of WWTP: Municipal Wastewater	Inspection ID Number: 201709_MT0030759
Lead Inspector and affiliation: Kort Kirkeby – PG Environmental	
Inspector and affiliation: Emilio Llamozas – EPA Region 8	

WWTP Location Information	
Site/WWTP Location: City of Hardin WWTP 377 Woodley Ln. Hardin, Montana 59034	Mail Report to: Rock Massine Assistant Public Works Superintendent 406 N Cheyenne Ave. Hardin, Montana 59034

Contact Information		
WWTP Contacts: *(indicate primary lead and present during inspection)*	Name(s)/Title	Telephone
	Rock Massine – Asst. Public Works Superintendent (primary collection system lead)	406-598-0802
	John Stanich – Lead Wastewater Operator (primary WWTP lead)	406-665-1080
	Jack Lane – Mayor (present)	406-665-9290
	Dean Baker – Operator in training (present)	406-665-1080

Areas Evaluated During Inspection		
Permit	**Self-Monitoring Program**	
Records		
Facility Site Review	**Laboratory**	
Effluent/Receiving Waters	**Operations and Maintenance**	
Flow Measurement	**Sludge Handling/Disposal**	**Sanitary Sewer Overflow**

Report Review and Signature		
Reviewer Signature/Name	Address/Phone Number	Date
Emilio Llamozas	**U.S. EPA Region 8** **1595 Wynkoop Street** **8ENF-W-NP** **Denver, Colorado 80202**	12/19/17
Emilio Llamozas	**303-312-6407**	
Reviewer Signature/Name	Address/Phone Number	Date
	U.S. EPA Region 8 **1595 Wynkoop Street** **8ENF-W-NP** **Denver, Colorado 80202**	12/19/17
Monia Ben-Khaled	**303-312-6209**	

Inspection Narrative and Site Description

On September 12 and 13, 2017, the United States Environmental Protection Agency (EPA), with assistance from an EPA contractor, PG Environmental (hereinafter, Inspection Team), inspected the City of Hardin's (City's or Permittee's) sanitary sewer collection system and wastewater treatment plant (WWTP). The Inspection Team met with the Facility contacts listed above and proceeded to have an opening conference to explain the purpose of the inspection, present their inspector credentials, and discuss questions pertaining to the operation of the Facility. The Inspection Team also explained that an inspection report would be generated and provided to the City with any findings identified during the inspection.

The Inspection Team evaluated the City's compliance as it relates to the operation and maintenance of the City's wastewater collection, conveyance, and treatment system, as well as the City's record keeping and reporting procedures. The inspection consisted of the following major activities:

- Discussions with representatives from the City regarding the operation and maintenance (O&M) of the wastewater collection and conveyance system, reporting procedures, and capital improvement program;
- A physical inspection of the City's collection system assets, including the City's main sewer lift station;
- A physical inspection of the WWTP; and
- Records review of standard operating procedures for the City's wastewater collection system, conveyance system, and WWTP, as well as maintenance, reporting, and laboratory documentation.

The Permittee is authorized to discharge from the WWTP under NPDES Permit No. MT0030759 (Permit). The WWTP is located within the boundaries of the Crow Tribe Indian Reservation, but is owned and operated by the City of Hardin and only serves the City (population of approximately 4,000).

The City's Department of Public Works is responsible for the operation of the City's collection system and WWTP, as well as for compliance with the Permit. Public Works staff conducts NPDES-required monitoring activities and are responsible for submitting periodic compliance reports to the EPA. The WWTP is staffed from 8:00 a.m. to 5:00 p.m., Monday through Friday. The WWTP and main lift station are equipped with critical alarm dialers to notify operators of emergencies during unmanned hours.

Currently, the Department of Public Works has five staff for operating and maintaining both the sanitary sewer and water systems within the City. Their primary roles are to perform monitoring and maintenance of the water system and sanitary sewer collection system, including the four wastewater lift stations. The Public Works staff will also assist with WWTP maintenance, as needed.

The WWTP has two dedicated operators; one is a Montana Department of Environmental Quality (DEQ) Class 1c-certified wastewater operator, the other is in the process of qualifying for an operator-in-training (OIT) certificate. Operator duties include operating and maintaining all WWTP assets, monitoring wastewater discharges, and conducting laboratory analyses for reporting purposes.

The WWTP provides wastewater treatment for the City of Hardin, Montana. The WWTP's dry-weather design flow is 1.0 million gallons per day (mgd). The Lead Operator stated that the average

dry-weather flow from the WWTP is approximately 0.6 mgd and the flow decreases in the winter months. The treatment process consists of the following:

- Influent screening (one grinder/auger; in operation at the time of the inspection).
- Oxidation ditch (in operation at the time of the inspection).
- Two secondary clarifiers (both in operation at the time of the inspection).
- An aerobic digester (in operation at the time of the inspection).
- Ultraviolet (UV) light disinfection (in operation at the time of the inspection).

Final effluent from the WWTP is discharged to the Bighorn River through Outfall 001 (photo 1566).

Operators are able to divert influent flow from the WWTP to a lagoon basin (which is part of the old lagoon system) if the plant is overwhelmed. The five lagoon basins are located south of the current WWTP, and were part of the City's old wastewater treatment facility. The Lead Operator stated that the lagoon system is lined with bentonite. In addition to influent bypass scenarios, there is a lagoon basin that is used for sewage sludge drying and storage. Septage is also stored in that same lagoon basin. Three lagoon basins are used for the City's water treatment plant waste discharge (backwash ponds). Discharges to the first lagoon basin/emergency bypass pond are treated as bypasses, and the raw wastewater influent is left in the lagoon basin to evaporate. The Inspection Team viewed the lagoon basin/emergency bypass pond as a component of the inspection, and noted that it had a large capacity and was dry at the time of the inspection (photos 1554 and 1555). Bypass events appear to have been reported to the EPA as well as noted in the Permittee's monthly Discharge Monitoring Reports (DMRs). Section 3.7.1 of the Permit states, "The Permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Parts 3.7.2 and 3.7.3."

Solids from the WWTP are sent to an aerobic digester and then to a lagoon basin for further drying (photo 1558). The Lead Operator stated the sewage sludge is removed from the lagoon basin approximately every 2 to 4 years by the City and hauled to a nearby landfill. According to the Lead Operator, septic trucks also offload raw sewage into this lagoon basin (photo 1557). He added that there are no identified significant industrial users contributing wastewater to the WWTP.

Power to the WWTP is provided by Rural Electric Association. The WWTP does not have a backup generator, which is further discussed in the *WWTP Operation and Maintenance Evaluation* section of this report.

Permit Verification

The current NPDES Permit No. MT0030759 was to expire September 30, 2011, but has been administratively extended. The permit was available onsite at the time of the inspection.

Recordkeeping Evaluation

As part of the inspection, records, plans, reports, and documentation specifically required by the Permit or NPDES Region 8 Statement of Basis was viewed on site or shortly following the inspection. The onsite review was not a thorough review of each record, plan, or report, and its inclusion in the following list as being reviewed does not indicate complete adequacy and acceptance by the permitting agency. The records review is conducted to identify issues with record keeping, verify proper monitoring and reporting practices, identify required reports that have not been completed as specified in the Permit, identify recent effluent limitation exceedances, and identify other compliance issues that may become apparent through onsite reviews. The findings from the records review are further discussed in the *Sampling and Reporting Evaluation* section of this report. Records, plans, reports, and documentation requested on the date of the inspection included the following:

- Copy of the Permit and Statement of Basis;
- Operator daily log book;
- Three recent months (June – August 2017) of Discharge Monitoring Reports (DMRs) with chain of custodies and laboratory analytical data;
- DMR Quality Assurance (QA) for Energy Lab Inc. (dated July 28, 2017);
- DMR QA 37 – MT DEQ Water Protection Bureau for City of Hardin, MT (closed July 7, 2017); and
- Flow meter installation records.

Sampling and Reporting Evaluation

The two WWTP operators collect all influent and effluent samples for analysis. Influent samples are collected immediately prior to the headworks influent screening. Effluent samples are collected from a recently-installed spigot located immediately after the UV light disinfection system (photo 1595). It should be noted that the Permittee's Statement of Basis states that effluent samples are to be collected at a weir located after the chlorine contact chamber. The Lead Operator stated that he installed the spigot sample location to limit the sample's exposure to outside air; the City had not alerted EPA of the new effluent sampling location.

The WWTP operators also conduct laboratory analyses for pH, total suspended solids (TSS), and temperature at the City's onsite laboratory. Total residual chlorine is not analyzed, as the WWTP no longer utilizes chlorine for disinfection. It should be noted that the onsite laboratory is not certified, and the operators conducting the laboratory analyses do not have laboratory certifications. An outside contract laboratory, Energy Lab, Inc. out of Billings, Montana, conducts analyses for biochemical oxygen demand (BOD), E. coli, and the annual parameters required in section 1.3.2 of the Permit.

Influent flow (not a specific Permit-required parameter) to the WWTP is measured by a magmeter. The influent flow meter was recently installed and was not operating correctly at the time of the inspection. The Lead Operator stated that the WWTP was working with the installer to provide totalizer data; no timeline was provided on when the influent flow meter would be fully operational. Effluent flow is measured by a Parshall flume and ultrasonic transducer located immediately prior to Outfall 001.

Finding 1. The accuracy of the WWTP effluent flow measurement could not be verified because the effluent flow meter was not routinely calibrated.

The Lead Operator stated that the effluent flow meter had not been calibrated since its installation in 2011; therefore, the accuracy of the measurement could not be verified. He was unaware of the need to calibrate the flow meter, and stated that he would look into calibrating the meter. He added that he occasionally checks the staff gage in the effluent flume to ensure that the electronic flow measurements appear to be reasonable.

Permit requirement:

Section 1.3.2 of the Permit, *Self-Monitoring Requirements – Outfall 001*, requires total effluent flow to be measured continuously, and footnote b of section 1.3.2 states, "Flow measurements of effluent volume shall be made in such a manner that the Permittee can affirmatively demonstrate that representative values are being obtained."

Corrective action:

Calibrate the effluent flow meter to demonstrate that representative values are being obtained. Provide the EPA and the Crow Tribe with the date and the results of the effluent flow meter calibration.

Finding 2. The Permittee had not implemented adequate laboratory controls or appropriate quality control procedures for the onsite laboratory.

The City's onsite laboratory did not have written standard operating procedures (SOPs) or a quality control guidance document to describe proper analysis procedures for the permit-required analyses conducted in-house. The Lead Operator stated that he had started writing an SOP for the lab, but had not completed or implemented it. The Inspection Team made multiple observations of inconsistent or inappropriate laboratory procedures, including using white-out on a laboratory bench sheet to correct data in April 2017. Additionally, bench sheet information was observed to be crossed out without documentation of the individual that made the correction (e.g., initialing). The City did not keep a record of laboratory refrigerator temperature, and there was no calibrated thermometer in the refrigerator to verify temperature. Further, there was no documentation or set protocol for benchtop meter probe maintenance or replacement.

The Permittee was not calibrating the pH meter used for effluent pH readings per manufacturer specifications. Specifically, the Lead Operator stated that effluent samples for Outfall 001 are analyzed for pH with an in-house YSI Pro Plus multimeter. The Inspection Team reviewed the YSI operator manual for the pH meter, which stated, "the pH calibration should be verified every day the instrument is used. However, a new pH sensor may be capable of holding its calibration for several days." The Inspection Team reviewed the laboratory calibration book for the pH meter for entries in 2017, and noted meter calibrations recorded on the following dates: January 20, May 24, and September 8. The Lead Operator stated that the pH meter is compared to a standard blank approximately one time every week or so, but calibrations are not conducted on a regular basis and are not always documented.

Permit requirement:

Section 3.5 of the Permit, *Proper Operation and Maintenance*, states, "Proper operation and maintenance also includes adequate laboratory controls and appropriate quality control procedures."

Corrective action:
Finalize the onsite laboratory standard operating procedures and ensure that the procedures are followed when analyzing samples. Ensure that the pH meter calibrations are performed per the manufactures recommendations and that the calibrations be recorded and retained as required by the Permit.

Finding 3. The Permittee did not record daily visual observations of oil and grease as required by the Permit.
The Lead Operator stated that visual observations are conducted by the operators at the effluent sample location, but the observations are not documented or recorded. Further, as noted in the *WWTP Operation and Maintenance Evaluation* section of this report, gray and white balls, identified by the Lead Operator as grease balls, were observed in the final effluent and were observed flowing through Outfall 001 and into the Bighorn River. He added that the WWTP has not conducted oil and grease sampling or analysis because they have not identified a sheen and therefore, were unsure when to sample and analyze for oil and grease.

Permit requirement:
Footnote c. of section 1.3.2 of the Permit, *Self-Monitoring Requirements – Outfall 001*, states that for oil and grease, "A daily visual observation is required. If a visible sheen is detected, a grab sample shall be taken and analyzed immediately."

Corrective action:
Perform and document daily visual oil and grease observations. If a visible sheen is detected, collect an oil and grease sample and analyze it immediately.

Discharge Monitoring Reports Evaluation

As part of the inspection, the Inspection Team reviewed the last three months (June – August 2017) of laboratory bench sheets and contract laboratory results, and compared them to reported values in EPA's NetDMR monthly reporting website.

Transcription errors were noted between the WWTP's laboratory bench sheets and data submitted in DMRs in June and July 2017. The following transcription errors were noted:

Date	Parameter	Bench Sheet Result	DMR Reported Value
06/09/17	pH	7.42 standard units (s.u.)	7.41 s.u.
06/19/17	pH	7.40 s.u.	7.42 s.u.
07/05/17	pH	7.52 s.u.	7.53 s.u.

The Lead Operator stated that he transfers the laboratory bench sheet information to an electronic spreadsheet, and also enters the information into the EPA NetDMR website for submittal. He stated that he conducts all of the quality assurance checks of the data, and was unsure why the transcription errors occurred. It should be noted that the transcription errors did not result in effluent exceedances. Due to time constraints, the Inspection Team was unable to review additional DMRs for transcription errors.

Finding 4. The total suspended solids (TSS) DMR loading calculation appeared to not be calculated correctly for July 2017.

The average flow for July 2017 was 0.559 MGD and the average TSS concentration for the month was 6 mg/l. The total TSS loading reported for the month was 27 lbs/day. The Inspection Team performed the July 2017 TSS loading calculation and obtained a value of 27.97 lbs/day.

TSS loading = Flow (MGD) x TSS concentration (mg/l) x 8.34

TSS loading = 0.559 MGD x 6 mg/l x 8.34 = 27.97 lbs/day

Permit requirement:

Part 2.4 of the Permit states, "Effluent monitoring results obtained during the previous month shall be summarized and reported on one Discharge Monitoring Report Form (EPA No. 3320), postmarked no later than the 28th day of the month following the completed reporting period."

Corrective action:

Ensure that accurate information is reported in the DMRs. Submit DMR corrections to the EPA via the e-DMR system for the July 2017 TSS DMR loading calculations.

Collection System Evaluation

The City's wastewater collection system services primarily residential areas within the City of Hardin as well as a few small industrial and commercial users such as a power plant, an asphalt plant, a truck stop, small restaurants, and two car washes. The Assistant Superintendent explained that much of the wastewater within the City flows via gravity to the 6th Street Lift Station. The City also has three smaller lift stations located on the north side of the City. These smaller stations lift wastewater to the 6th Street Lift Station. The 6th Street Lift Station pumps all wastewater through a 14-inch force main to the WWTP.

At the time of the inspection, the Permittee had not reported any sanitary sewer overflows (SSOs) within the collection system. The City representatives stated that they have not had issues with SSOs in the past. The City has reported bypasses to EPA in phone calls and in NetDMR reports, but all events have been related to bypasses from the main trunk line to the influent bypass lagoon at the WWTP to prevent an upset to the plant. As noted previously, section 3.7.1 of the Permit states, "The Permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Parts 3.7.2 and 3.7.3."

Finding 5. The Inspection Team made several observations related to collection system O&M.

a. *Proactive O&M and maintenance tracking*

The Permittee did not have a proactive maintenance approach or maintenance tracking mechanism for the collection system O&M. Specifically, the Permittee did not have a complete inventory of collection system assets or a system in place to document and track scheduled and unscheduled maintenance activities. As a result, many of the process control and maintenance activities conducted on the collection system were performed based on institutional knowledge and were not formally tracked or scheduled. During the inspection, City representatives stated that, while certain known problem areas are addressed via an increased maintenance frequency, there are no established or written SOPs for ensuring all assets in the collection system receive the necessary

level of maintenance to ensure proper operation. The Assistant Superintendent added that the City does not have formal written documentation of schedules for lift station cleaning and repairs. Further, the City does not maintain operator logs for lift station inspections; rather, operators decide each morning which lift stations need to be checked based on weekly rounds, pump run times, and alarms. The Assistant Superintendent was aware of the need to better document and track maintenance of the City's collection system assets, and stated that the City would look into improving its asset management approach and record keeping.

b. Inflow and Infiltration (I&I) and Illicit Connections

The City's collection system has issues with excessive I&I and illicit connections, which can restrict the designed capacity of the system. Specifically, City representatives stated that I&I has been a known issue within the collection system for a number of years, but the City has not conducted a comprehensive assessment of the system since the 1980s. Further, the City has not quantified the volume of I&I that occurs in the collection system. The Assistant Superintendent stated that I&I occurs in the system during dry periods from groundwater influences, but increases dramatically after rainfall. He added that some of the City's sanitary sewer lines are composed of old brick tiles from the 1950s; he was unsure of the last time any particular section of sewer lines had undergone a condition assessment or been repaired or replaced. City representatives were unsure if any repairs or replacements had been done as a result of the 1980s study.

As a component of the inspection, on September 12, 2017 the Inspection Team viewed a manhole located off of Lessard Avenue on the north side of the City (45.740771, -107.601713). A significant amount of water was observed to be actively flowing from a crack in the side of the manhole and into the sanitary sewer waste stream (photos 1552 and 1553). The Assistant Superintendent stated that the water entering the manhole was likely groundwater, and I&I has been observed at this particular manhole in the past, even during dry periods such as those conditions experienced during the inspection. The Assistant Superintendent added that the manhole had been leaking like this for at least eight years; as long as he could remember. The Assistant Superintendent stated that the City has looked into some re-lining options in the past, but no plans or timelines have been established for sewer scoping evaluations or re-lining efforts.

In addition to I&I, the Permittee also has an issue with illicit connections to the collection system. The Assistant Superintendent explained that some homes and businesses have sump pumps or rain gutters that discharge directly to the wastewater collection system. Specifically, there is a bulk water fill station located within the City (owned and operated by the City) whose outdoor drains discharge directly to the City's sanitary sewer system instead of discharging to the stormwater collection system (photos 1549 and 1550). The City representatives stated that the City has an ordinance against illicit connections to the collection system; however, the ordinance is typically not enforced unless there is a need for a maintenance project or a building remodel permit application is submitted for a particular home or business.

Proper operation and maintenance of the collection system includes maintaining its design capacity in order to minimize WWTP upsets, bypasses, and SSOs. Excess I&I and illicit connections restrict the design capacity of the collection system, and in the City's case, could contribute to unnecessary bypasses and upsets at the WWTP (e.g., untreated influent sent to the lagoon basin/emergency bypass pond).

Permit requirements:

Section 122.41(e) of the Clean Water Act (CWA) and section 3.5 of the Permit, *Proper Operation and Maintenance*, states, "The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit. However, the permittee shall operate, at a minimum, one complete set of each main line unit treatment process whether or not this process is needed to achieve permit effluent compliance."

Section 3.7.1 of the Permit states, "The Permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Parts 3.7.2 and 3.7.3."

Corrective actions:

Properly operate and maintain the wastewater collection system. Perform and I&I study of the wastewater collection system to detected areas of I&I. In order to complete the I&I study, the City should review EPA's Guide for Evaluating Capacity, Management, Operation, and Maintenance (CMOM) Programs at Sanitary Sewer Collection System
https://www3.epa.gov/npdes/pubs/cmom_guide_for_collection_systems.pdf

WWTP Operation and Maintenance Evaluation

As a component of the inspection, the Inspection Team along with the WWTP representatives conducted a tour of the WWTP, reviewed Permit-related documents, and toured the Permittee's onsite laboratory.

Finding 6. The Permittee was not properly operating and maintaining the WWTP.

The Inspection Team made the following observations during the inspection related to O&M of the WWTP:

a. Secondary Clarifier No. 1 had uneven flows over the weir due to an uneven weir bar. The Lead Operator stated that he was aware that the clarifier weir was not level, and noted that the clarifiers are old. The uneven weir in Secondary Clarifier No. 1 did not allow for the secondary clarifier to operate according to design. The Lead Operator did not have a timeframe for when the weir would be repaired.

b. The WWTP has had issues with insufficient influent treatment capacity. Specifically, the Lead Operator stated the average flow into the WWTP is approximately 0.6 mgd, and the plant gets immediately overwhelmed at flows exceeding 1.0 mgd, which often occur during rain or snowmelt events. He added that the oxidation ditch and both secondary clarifiers constantly run at maximum capacity (even during dry weather), and the WWTP does not have extra treatment capacity for large surges of influent flow. As a result, the Permittee often needs to use the lagoon basin for bypass.

c. Algae, large and small floating solids, and a white and gray floc identified by one of the WWTP operators present during the inspection as grease balls, were observed obstructing flow over the secondary clarifier weir and causing uneven flow over the weir (photo 1562).

The Inspection Team also observed algae, floating solids, and floc passing over the secondary clarifier weirs. Further, the Lead Operator stated that the WWTP's influent grinder/auger is not effective at removing all floating solids and grit prior to sending flow to the oxidation ditch. Additionally, the Lead Operator stated that operators spray the secondary clarifier weirs with high pressure water every week to remove floc and algae build-up. He also stated that the channel downstream of the UV light disinfection system, located after the WWTP's effluent sample location and immediately prior to Outfall 001, is occasionally washed out with high pressure water to remove grease balls and any other solids or algae that accumulate within the chamber. These solids are not collected or returned to the headworks, and are ultimately left to be discharged through Outfall 001 to the Bighorn River.

The WWTP's operator daily log book had a note of completed work on August 22, 2017, stating, "wash UV weir with pressure washer. No testing." The Lead Operator noted that the WWTP does not collect samples during washing activities. He added that the WWTP does not have the ability to collect, filter, or recycle the wash water from the waste stream and prevent it from discharging. The City does not monitor the effluent through Outfall 001 during these washing events.

Floating solids and the white and gray floc were observed actively discharging through Outfall 001 and into the Bighorn River at the time of the inspection (photos 1564 and 1566). The Lead Operator stated that the algae and white and gray grease balls are often observed in the secondary clarifier and he had observed solids and grease balls discharging through Outfall 001 in the past. He stated that this occurs mostly when the WWTP becomes overwhelmed and cannot properly treat the influent flows, prior to manually opening the bypass valve. The Lead Operator stated that the City is evaluating options for better grit and floating solids removal. A timeline was not provided for remedying the issues observed at the time of the inspection.

d. The WWTP did not have a backup power source to continue operations in case of power failure. Bypass to the lagoon basin is controlled via a manual valve near the head of the WWTP (photo 1556). If a power failure were to occur, the oxidation ditch or UV light disinfection system would be inoperable, causing the potential for partially-treated wastewater to discharge through Outfall 001. The Lead Operator stated that he receives an alarm if there is a power failure at the WWTP during off hours, and either he or his assistant will drive out and open the bypass channel to the lagoon basin if the power failure continues. It should be noted that the City's main lift station is equipped with a backup generator and continues to operate during an outage, sending flow to the WWTP.

Permit requirement:

Section 3.5 of the Permit, *Proper Operation and Maintenance*, states, "The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality control procedures. This provision requires the operation of a back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit. However, the Permittee shall operate, at a minimum, one complete set of each main line unit treatment process whether or not this process is needed to achieve permit effluent compliance."

Corrective action:
Properly operate and maintain the wastewater treatment plant by addressing the issues identified above. Provide a response to the EPA on how the City plans to address each of the issues.

Finding 7. The City used partially-treated wastewater from its secondary clarifier to irrigate the WWTP lawn.

During the inspection, the Inspection Team noted a pump located in one of the WWTP's secondary clarifiers (photo 1561). The Lead Operator stated that the pump was used to pull water from the clarifier and use it to irrigate the WWTP lawn. He was unaware of an issue with using partially-treated wastewater to irrigate, and stated that they were using the water as a cost savings over using well water or City water. The Inspection Team observe partially-treated wastewater being used for irrigation at the time of the inspection. The Lead Operator stated that they would stop using the partially-treated wastewater for irrigation unless they obtained a permit to do so.

Permit requirement:
Section 1.2 of the Permit, *Description of Discharge Point(s)*, authorizes discharge from the City of Hardin's wastewater treatment plant to the Bighorn River through Outfall 001 only, and states, "Discharges at any location not authorized under an NPDES permit is a violation of the Clean Water Act and could subject the person(s) responsible for such discharge to penalties under Section 309 of the Act."

Corrective action:
Do not use partially treated wastewater to irrigate the WWTP lawn. Provide a response to the EPA and the Crow Tribe on how the City plans to address this issue.

Finding 8. The Permittee did not have an up-to-date O&M manual for the WWTP.

The Permittee did not have a current O&M manual that describes proper operational procedures and maintenance requirements of activities at the WWTP. The Lead Operator was aware of the Permit requirement, and stated that the WWTP has an O&M manual from the 1980s that is not regularly used or updated, and does not reflect all current operations at the plant. He added that the City was in the process of updating and developing a manual to describe current O&M procedures. No timeline was provided on the estimated completion of the updated manual.

Permit requirement:
Section 3.5.1.1 of the Permit requires the Permittee to "Have a current O&M Manual(s) that describes the proper operational procedures and maintenance requirements of the wastewater treatment facility."

Corrective action:
Update the O&M manual for the WWTP with the current O&M procedures used at the WWTP. Provide the EPA and the Crow Tribe with a copy of the updated O&M manual for the WWTP.

Finding 9. The Permittee did not have a schedule for routine O&M activities at the WWTP.

The Permittee did not have documentation or schedules developed for routine operation and maintenance of the WWTP and associated assets. Further, the Permittee did not have a complete inventory of its WWTP assets or a mechanism to document, track, or schedule repairs.

The Lead Operator stated that maintenance of the WWTP assets is conducted on an as-needed basis (i.e., reactive). He stated that pumps and other equipment such as the UV light disinfection system undergo maintenance when issues arise. The Lead Operator added that certain components are inspected on a daily or weekly basis during routine rounds, but very little preventative maintenance is conducted at the WWTP. He stated that the City has attempted to use an asset management software in the past, but was unable to implement it due to its inability to track maintenance at the individual component level. The Permittee did not provide a timeline for implementation or state whether a schedule for routine O&M activities would be developed.

Permit requirement:
Section 3.5.1.3 of the Permit requires the Permittee to "Have a schedule(s) for routine operation and maintenance activities at the wastewater treatment facility." Further, section 3.5.1.4 of the Permit requires the City to, "perform the routine operation and maintenance requirements in accordance with the schedule(s)."

Corrective action:
Implement an operation and maintenance schedule for the WWTP.

Finding 10. The Permittee was storing sewage sludge in one of the lagoon basins for over 2 years.
Solids from the WWTP are sent to an aerobic digester and then to a lagoon basin for further drying (photo 1558). The Lead Operator stated the sewage sludge is removed from the lagoon basin approximately every 2 to 4 years by the City and hauled to a nearby landfill. According to the Lead Operator, septic trucks also offload raw sewage into this lagoon basin (photo 1557).

If sewage sludge remains on land for longer than 2 years, this land is considered an active sewage sludge unit and the surface disposal requirements in Part 503 have to be met. An active sewage sludge unit is the area, trench, waste pile, or lagoon where sewage sludge are currently being placed. Please note, however, that sewage sludge can remain on the land for longer than 2 years, but the person who prepares the sewage sludge must demonstrate that the site is not an active sewage sludge unit. The demonstration must include the following information:

- the name and address of the person who prepares the sewage sludge;
- the name and address of the person who either owns the land or leases the land;
- the location, by either street address or latitude and longitude, of the land;
- an explanation of why sewage sludge needs to remain on the land for longer than 2 years prior to final use or disposal, or why a site is used for longer than 2 years to store batches of sewage sludge for less than 2 years (e.g., storage of individual batches of sewage sludge for several months during a given 2-year period before final use or disposal); and
- the approximate time when sewage sludge will be transferred from storage to their final use or disposal destination.

This demonstration information must be retained by the person who prepares the sewage sludge for the period that the sewage sludge remains on the land.

Permit requirement:
40 C.F.R. 503.9(y) *Store or storage of sewage sludge* is the placement of sewage sludge on land on which the sewage sludge remains for two years or less. This does not include the placement of sewage sludge on land for treatment.
40 C.F.R. 503.20 Applicability. (a) This subpart applies to any person who prepares sewage sludge that is placed on a surface disposal site, to the owner/operator of a surface disposal site, to sewage sludge placed on a surface disposal site, and to a surface disposal site.
(b) This subpart does not apply to sewage sludge stored on the land or to the land on which sewage sludge is stored. It also does not apply to sewage sludge that remains on the land for longer than two years when the person who prepares the sewage sludge demonstrates that the land on which the sewage sludge remains is not an active sewage sludge unit. The demonstration shall include the following information, which shall be retained by the person who prepares the sewage sludge for the period that the sewage sludge remains on the land:
(1) The name and address of the person who prepares the sewage sludge.
(2) The name and address of the person who either owns the land or leases the land.
(3) The location, by either street address or latitude and longitude, of the land.
(4) An explanation of why sewage sludge needs to remain on the land for longer than two years prior to final use or disposal.
(5) The approximate time period when the sewage sludge will be used or disposed.

Corrective action:
Properly dispose or land apply the sewage sludge stored for greater than 2 years as require by 40 C.F.R. 503 or provide the justification to store sewage sludge for greater than 2 years as required by 40 C.F.R. 503.20(b).

EXHIBIT C
City of Hardin Financial Information

The City of

HARDIN

Montana

FINAL BUDGET DOCUMENT

Fiscal Year Beginning July 1, 2018

MONTANA CITY/TOWN/COUNTY FINAL BUDGET DOCUMENT
TABLE OF CONTENTS

Budget Certification 1
Approved Budget Resolution 2
Department of Revenue Taxable Valuation Form 4

General Statistical Information 5

Elected Officials 6

Schedule of Personnel Levels:
City/Town 7

Local Government Budget Calendar 8

Organizational Charts:
City/Town 9

Taxable Valuation/Mill Levy History and Analysis 10
Determination of Mill Levy Determination Form for Current Fiscal Year 11

Budget Message 12

General Funds (1000) 13
Summary of Revenues by Source 14-15
Summary of Expenditures by Function/Activity 16-21

Special Revenue Funds (2000) 22
Summary of Appropriations by Fund and Object 23
Other Levied Funds – Revenues by Source 24-27
Special Assessment Funds – Revenues by Source 28-40
Other Levied Funds – Expenditures by Function 41-51
Special Assessment Funds – Expenditures by Function 52-64

Debt Service Funds (3000) 65
Debt Service Budget Summary 66-68

Capital Projects Funds (4000) 71
Capital Projects Budget Summary 72-77

Enterprise Funds (5000) 78
Summary of Appropriations by Fund and Object 79
Water Operating – Budget Summary 80-85
Sewer Operating – Budget Summary 86-91
Solid Waste and Landfill – Budget Summary 92-98
Capital Expenditures Supplement-Detail (Water and Sewer) 99-100
Capital Expenditures Supplement-Detail (Other than Water and Sewer) 101

Internal Service Funds (6000) ..... N/A

Agency Fund (7000) 102
Agency Fund - Fund Budget Summary 103

Permanent Funds (8000) ..... N/A

County/City/Town Tax Levy Requirements Schedule-Non Voted Levies 104

County/City/Town Tax Levy Requirements Schedule – Voted Levies ..... N/A

County/City/Town Non-Levied Funds-Summary Schedule 105

County/City/Town Taxable Valuation Schedule 106

BUDGET CERTIFICATION

THIS IS TO CERTIFY that the Annual Budget for Fiscal Year 2019, was prepared according to law and adopted by the City Council, on September 4, 2019; and that all financial date and other information set forth herein are complete and correct to the best of my knowledge and belief.

Signed _____ Date 9/19/18
Mayor

Signed Mionell Dyckman Date 9/19/18
Finance Officer/City Clerk

City of Hardin

RESOLUTION NO. 2174

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF HARDIN, BIG HORN COUNTY, MONTANA, APPROVING AND ADOPTING THE BUDGET FOR THE CITY OF HARDIN, MONTANA FOR THE FISCAL YEAR 2018-2019

WHEREAS, the City Finance Officer of the City of Hardin has regularly and lawfully submitted to the City Council (hereinafter "Council") of the City of Hardin, Montana (hereinafter "City"), the budget for Fiscal Year 2018-2019; and

WHEREAS, the proper notice was published stating that said Council has completed the PRELIMINARY MUNICIPAL BUDGET for said Fiscal Year, and that said budget has been placed on file and is open to inspection in the office of the City Finance Officer; and that said Council would meet for the purpose of annually determining, approving and adopting the budget, and any taxpayer might appear and be heard;

WHEREAS, appropriation adjustments are sometimes integral to other business actions, and in certain situations, separate budget amendment procedures are not necessary, nor required by state law, as outlined in Mont. Code Ann. § 7-6-4006(3) (2017) and § 7-6-4012.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL FOR THE CITY OF HARDIN, MONTANA, as follows:

1. That the Budget for Fiscal Year 2018-2019, as detailed in the Budget Report, and as amended by the City Council and further detailed on Exhibit A, be, and the same hereby finally determined, approved, and adopted.

2. That the City Finance Officer is authorized to adjust appropriations for the expenditure of additional funds from the following: Debt Service Funds, Federal or State Grants, Special Assessments, and donations accepted and approved by the Council, or any other reason listed in Mont. Code Ann. § 7-6-4006(3) (2017).

3. That the City Finance Officer is authorized to adjust appropriations funded by fees throughout the budget period, as outlined in Mont. Code Ann. § 7-6-4012 (2017) including all proprietary funds appropriations, per 7-6-4012(a) and Lighting District No. 1, Lighting District No. 54, Street Maintenance #1, and Curb and Gutter as identified as fee based appropriations, pursuant to § 7-6-4012(b).

PASSED AND ADOPTED by the City Council of the City of Hardin, Montana, and APPROVED this 4th day of September, 2018.

YEA VOTES 5 NAY VOTES Ø

CITY OF HARDIN

BY: _____
Mayor

ATTEST: _____
City Clerk

CITY OF HARDIN OFFICIAL SEAL BIG HORN COUNTY, MONTANA

REVENUE

RECEIVED
AUG - 2 2018
BY: email - md

MONTANA
Form AB-72T
Rev. 3-12

2018 Certified Taxable Valuation Information

(15-10-202, MCA)

Big Horn County

CITY OF HARDIN (7HC- 7HT)

Certified values are now available online at property.mt.gov/cov

1. 2018 Total Market Value[1]	$	219,787,528
2. 2018 Total Taxable Value[2]	$	4,847,557
3. 2018 Taxable Value of Newly Taxable Property	$	47,915
4. 2018 Taxable Value less Incremental Taxable Value[3]	$	3,506,113
5. 2018 Taxable Value of Net and Gross Proceeds[4] (Class 1 and Class 2)	$	-

6. TIF Districts

Tax Increment District Name	Current Taxable Value[2]	Base Taxable Value	Incremental Value
HARDIN INDUSTRIAL INF	1,806,588	465,144	1,341,444

Total Incremental Value $ 1,341,444

Preparer Tammy Bowling

Date 8/2/2018

[1]Market value does not include class 1 and class 2 value

[2]Taxable value is calculated after abatements have been applied

[3]This value is the taxable value less total incremental value of all tax increment financing districts

[4]The taxable value of class 1 and class 2 is included in the taxable value totals

For Information Purposes Only

2018 taxable value of centrally assessed property having a market value of $1 million or more, which has transferred to a different ownership in compliance with 15-10-202(2), MCA.

I. Value Included in "newly taxable" property	$	-
II. Total value exclusive of "newly taxable" property	$	-

GENERAL STATISTICAL INFORMATION
CITY of HARDIN, MONTANA

CLASS OF CITY/TOWN	Third
COUNTY LOCATED IN	Big Horn
YEAR ORGANIZED	1911
REGISTERED VOTERS	1843
AREA (SQ. MILES)	3.27
POPULATION OF CITY/TOWN	3754
FORM OF GOVERNMENT	Mayor/Council
NUMBER OF EMPLOYEES (ELECTED)	7
NUMBER OF EMPLOYEES (NON-ELECTED)	25
MILES OF STREETS AND ALLEYS	approx. 31.4
MUNICIPAL WATER	
NUMBER OF CONSUMERS	1319
WATER RATE PER 1,000 GALLONS	$19.85/first 3000 gallons - residential
SEWER RATES	$36.25

CITY of HARDIN

OFFICIALS SHEET

OFFICE	NAME OF CITY OFFICIALS/OFFICERS	DATE TERM EXPIRES
Mayor	Joe Purcell	January, 2022
Council/Commission	Tony Maxwell	January, 2020
	Karen Molina	January, 2022
	Darren Zent	January, 2020
	Clayton Greer	January, 2022
	Jeremy Krebs	January, 2020
	Harry Kautzman	January, 2022
Attorney	Jordan Knudsen	April 23, 2020
Utility Billing Clerk	Kristi Wedel	
Deputy City Clerk	Angela Zimmer	
Finance Officer/City Clerk	Michelle Dyckman	
City Judge	James E. Seykora	June 30, 2019
City Judge	Richard Bowler	October 18, 2021
Public Works Director - Interim	Rock Massine	

CITY of HARDIN

SCHEDULE OF PERSONNEL LEVELS
OPERATING FUNDS
ELECTIVE AND NON-ELECTIVE EMPLOYEES

FUND	2015-2016 FY PERMANENT FULL-TIME EMPLOYEES	2016-2017 FY PERMANENT FULL-TIME EMPLOYEES	2017-2018 FY PERMANENT FULL-TIME EMPLOYEES	CURRENT FY PERMANENT FULL-TIME EMPLOYEES
General	8.50	10.00	10.50	11.00
Airport				
Library				
Ambulance				
Cemetery				
Planning				
Water	5.50	5.50	5.50	5.50
Sewer	4.00	4.00	4.00	4.25
Solid Waste	7.00	7.50	7.50	6.00
Gas/Electric				
Total City Employees	25.00	27.00	27.50	26.75

Local Government Budget Calendar

Local Budget Act: Title 7, Chapter 6, Part 40 MCA

1) Department Requests - Finance Officer/Clerk/Clerk & Recorder requests estimates of expenditures and revenues from Department Heads (By June 1st for Counties)

2) Requests Received - Estimates received by Finance Officer/Clerk/Clerk & Recorder (By June 10th for Counties)

3) Tabulation of estimates - Finance Officer/Clerk/Clerk & Recorder tabulates estimates, prepares preliminary budget to be submitted to the governing body (7-6-4020)

4) Preliminary budget submitted - Finance Officer/Clerk/Clerk & Recorder submits preliminary budget to governing body for its consideration

5) Governing body consider budget Governing body makes revisions and detemrines levy for each fund requiring a levy (7-6-4020)

6) Notice of Public Hearing - Governing body publishes notice that preliminary budget is available for public inspection - dates to be set by governing body (7-6-4021)

7) Hearings on Preliiminary Budget - Governing body holds public hearings for taxpayers - Hearings may be continued from day to day prior to the final adoption of the budget (7-6-4024)

8) Final Budget adopted by Resolution - Governing body concludes hearings and passes the budget resolution adopting the final budget (the later of the first Thursday after the first Tuesday in September or 30 days from the receipt of the certified taxable values) (7-6-4036)

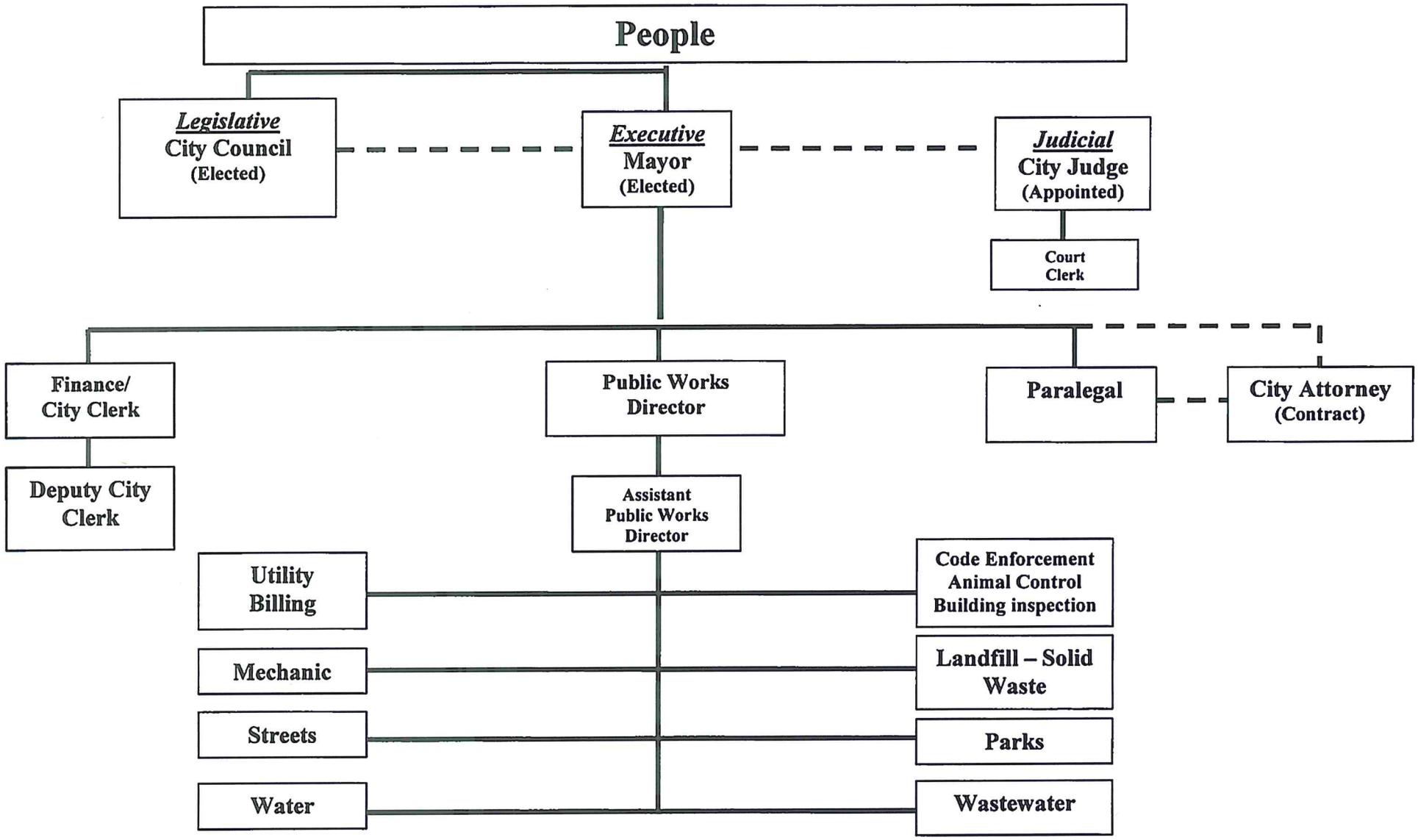
9) Levies set - Governing body set levies in accordance with law (7-6-4036)

10) Clerk & Recorder to report the number of mills needed for each taxing jurisdiction in the County to the Department of Revenue by the second Monday in September or 30 calendar days after receiving certified taxable value (15-10-305)

11) Budget submitted to Dept of Administration - LGSB Copy of the final budget and levies to be sent to the Department of Administration - Local Government Services by October 1 or within 60 days of receipt of certified taxable values (7-6-4003)

8/2018

2018 CITY OF HARDIN ORGANIZATIONAL CHART



CITY of HARDIN

Taxable Valuation/Mill Levy
Ten-Year History and Analysis

NOTE: The analysis below includes only entity-wide levies subject to the limitations of Section 15-10-420, MCA

FISCAL YEAR	ENTITY-WIDE TAXABLE VAULATION	%INCREASE (DECREASE) FROM PREVIOUS YEAR	TOTAL CURRENT YEAR AUTHORIZED MILL LEVY (Includes Prior Year Carry Forward Mills)	CURRENT YEAR ACTUAL MILL LEVY	CARRY FORWARD MILLS AVAILABLE (May be levied in a subsequent year)
			FY's 2009-2010 through 2016-2017 enter number of mills from prior year budget-page 9. FY's 2017-2018 and forward enter number of mills from line (14) of the applicable Mill Levy Determination Form.	FY's 2009-2010 through 2016-2017 enter number of mills from prior year budget - page 9. FY's 2017-2018 & forward enter number of mills from line (16) of the applicable Mill Levy Determination Form.	The Carry Forward in this column is not cumulative - the current fiscal year carry forward mills available are the full amount that may be levied in a subsequent year. These mills will be included in the next year's total authorized mill levy.
2009-2010	2,461,973		166.23	164.67	
2010 - 2011	2,496,542	1.40%	169.91	168.69	
2011 - 2012	2,503,674	0.29%	172.02	172.02	
2012 - 2013	2,538,153	1.38%	176.06	172.02	
2013 - 2014	2,605,375	2.65%	179.73	172.02	
2014 - 2015	2,810,730	7.88%	168.52	166.00	
2015 - 2016	3,128,451	11.30%	156.07	149.15	
2016 - 2017	3,222,508	3.01%	158.77	158.77	
2017 - 2018	3,505,154	8.77%	147.88	147.88	0.00
2018 - 2019	3,506,113	0.03%	151.12	151.12	0.00

Voted/Permissive mills levied in the current fiscal year:

Description	Number of Mills levied
Permissive Medical	15.50

*** Certified Taxable Value for 2014-2015 is 4,090,884 less 1,280,154 for incremental value of Tax Increment District*

*** Certified Taxable Value for 2015-2016 is 4,296,674 less 1,168,223 for incremental value of Tax Increment District*

*** Certified Taxable Value for 2016-2017 is 4,704,132 less 1,481,624 for incremental value of Tax Increment District*

*** Certified Taxable Value for 2017-2018 is 4,816,300 less 1,311,146 for incremental value of Tax Increment District*

*** Certified Taxable Value for 2018-2019 is 4,816,300 less 1,311,146 for incremental value of Tax Increment District*

The City of

HARDIN

Montana

2018

CAPITAL IMPROVEMENTS PROGRAM

TABLE OF CONTENTS

I. BACKGROUND 3

A. Introduction 3

B. The City of Hardin's and Stahly Engineering's Duties 3

C. Capital Improvements Program (CIP) 3

D. Key Elements of a CIP 5

E. Policy Development 6

F. Public Outreach 7

Establish Need 8

City Meetings 8

Service Organization Support 8

Public Education 8

G. Funding 9

H. Criteria for Setting Priorities 10

Financial Impacts 10

II. FIRE PROTECTION 12

A. Fire Protection Condition 12

B. Recommended Fire Protection Improvements and Estimated Costs 12

III. STORM DRAINAGE SYSTEM 12

IV. PARKS 12

A. Parks Condition 12

B. Recommended Parks Improvements and Estimated Costs 13

V. MUNICIPAL BUILDINGS 13

A. Municipal Buildings Condition 13

B. Recommended Municipal Buildings Improvements and Estimated Costs 13

VI. COMPUTER EQUIPMENT & OFFICE FURNITURE 14

A. Computer Equipment and Office Furniture Condition 14

B. Recommended Computer Equipment and Office Furniture and Estimated Costs 14

VII. STREET SYSTEM 14
A. Street Infrastructure Condition 14
B. Recommended Street Improvements and Estimated Costs 15
VIII. SIDEWALKS, CURBS & RAMPS 16
A. Sidewalks, Curbs & Gutter Condition 16
B. Recommended Sidewalks and Curb & Gutter Improvements and Estimated Costs .. 17
IX. WATER SYSTEM 17
A. Water System Condition 17
B. Recommended Improvements and Estimated Costs 18
X. WASTEWATER SYSTEM 19
A. Wastewater and Collection System Condition 19
B. Recommended Sewer and Drainage Improvements and Estimated Costs 20
XI. SOLID WASTE COLLECTION and LANDFILL 21
A. Solid Waste Collection and Landfill Condition 21
B. Recommended Solid Waste Collection and Landfill Improvements and Expected Costs 21
XII. SUMMARY 22
A. Summary of Recommendations 22
B. Priorities 22
C. Maintenance Program 24
Fire Protection 24
Parks 24
Municipal Buildings 25
Computer, Equipment and Office Furniture 25
Streets and Drainage 25
Sidewalks, Curbs & Ramps 25
Water System 25
Wastewater System 25
Solid Waste Collection and Landfill 25

I. BACKGROUND

A. Introduction

A Capital Improvements Plan (CIP) is a budgeting and financial tool used by a local governing body to establish public works rehabilitation and maintenance priorities and to establish funding for repairs and improvements. The CIP includes planning, setting of priorities, effective public works management, financial management, and community decision-making. A community's CIP normally covers all public works: streets, water, sewer, solid waste collection, landfill, storm drains, parks, public buildings, etc. This report sets forth a method to revise the "CIP" of the City's streets, wastewater and water facilities and all other areas of the City's facilities. As you will see set forth in this CIP, the streets, wastewater and water facilities are normally the most expensive facilities. Also, these facilities are subject to intense regulation and are time consuming to administer, operate and maintain. CIP's are generally the most appropriate planning document for small communities such as Hardin. The City of Hardin Infrastructure Needs Survey conducted during the summer of 2018 also ranked several of these facilities as priorities for improvement. Appendix A presents a summary of the results of the Needs Assessment Survey and the minutes from the September 2018 "Public Hearing for Community Needs" re-enforcing the City's priorities for improvements.

The purpose of this report is to outline the key elements of a CIP to fund repairs, replacements, upgrades and expansion to the City's facilities. The report qualifies the level of recommended repair measures as well as the associated budgetary costs. This report is intended to be a guide to the City of Hardin community leaders to effectively pursue much needed funding for their municipal infrastructure system.

B. The City of Hardin's and Stahly Engineering's Duties

The City of Hardin Council and employees reviewed the streets, wastewater and water system and did an inventory of other areas of the City's facilities. In 2018 Stahly Engineering conducted a Preliminary Engineering Report (PER) for the Wastewater Treatment Plant.

In 2008 the City contracted with Great West Engineering to update the Capital Improvements Plan. Since then the Water Treatment Plant has been automated, and the Wastewater Collection System Rehabilitation has been completed.

C. Capital Improvements Program (CIP)

The proposed CIP is a budgeting and financial tool that can be used by local governing bodies to establish public works rehabilitation and maintenance priorities and to establish improvement funding. The CIP process involves planning/prioritization, effective public works management, financial management, and community decision-making.

A CIP consists of five basic elements:

1. Inventory and evaluation of existing conditions for each facility;

2. Prioritization of needs for each segment of the improvements;

3. Identification of monetary options that can be used to meet the needs;

4. Establishment of a time schedule that matches available funds to the improvements required to meet the system needs;

5. A brief written document (this CIP), which is formally adopted by the governing body.

A CIP is a common sense, systematic approach for many municipalities to evaluate their needs and secure the necessary support of city officials and the general public. Some notable advantages of developing a CIP for the City of Hardin facility systems maintenance process include:

- Cost effectiveness and improved effectiveness of government expenditures,

- To understand and respond to citizens needs,

- To obtain community support,

- To obtain a consensus of critical projects,

- To avoid crisis situations resulting from lack of maintenance,

- To set a stable financial plan and demonstrate sound planning to bond underwriters and funding programs,

- To dedicate a CIP Fund for the sole purpose of paying for capital improvements,

- To help provide systematic direction to City staff and consultants.

A CIP is a cost saving tool that identifies where improvements will be needed rather than waiting for each crisis to occur before taking action. It is usually more expensive to make emergency repairs than it is to maintain a system in working order by foreseeing problems and making corrections before there is a total breakdown in the system. The CIP also reduces risk and avoids the inconvenience and public safety threat associated with emergency type facilities.

Since there is never enough money to meet all needs, the CIP assists the governing body in establishing priorities for funding projects from different types of facilities. A CIP provides the council with information on which project is most technically critical and which is most economical. Thus, money is allocated in the most effective way with an eye towards avoiding last minute crises.

An added benefit to implementing a CIP is to memorialize council planning and decisions. As councilpersons and key staff members come and go the CIP document, particularly if it is routinely updated, will remain a constant.

D. Key Elements of a CIP

The development of a CIP requires that certain information for each community's facility systems be collected and assembled in a format that can be entered into the CIP process. The key elements fundamental to developing a CIP are:

Inventory/Analysis

In order to develop a CIP, the City needs to inspect their entire facility systems. To do this, a thorough field analysis must be performed and the described systems carefully analyzed. Sound recommendations should be entered into a manageable database and summary tables developed as applicable. This data may then be used as the basis for the CIP approach

In 2008, Great West Engineering conducted a field investigation and document review of the water, wastewater and street systems. In 2018, a PER was completed by Stahly Engineering & Associates Inc. for the wastewater system needs. The City also conducted a detailed Infrastructure Needs Survey of all of the residents of Hardin. A summary of the Needs Assessment Survey is enclosed in Appendix A. Based on previous data, reports, DEQ files, input from the public and the City Council, Stahly Engineering will conduct an analysis of the streets, water and wastewater systems utilizing standard engineering practice and in consideration of satisfying current and future regulations and design standards.

To further the inventory/analysis the City of Hardin held a "Public Hearing for Community Needs" in September 2018. The community enforced the needs of the City. The Council and employees will continue doing an inventory and evaluation of all facility systems' needs.

Cost Estimates

Preliminary cost estimates for improvements identified by the inventory and analysis phase are made using estimated budgetary unit prices. All administrative, engineering, inspection and contingency costs are incorporated with historic construction costs to develop the budgetary unit prices. Due to the general nature of the analysis, these cost estimates are not accurate enough to be used as a definitive basis for estimating the cost of a specific improvement project, but are acceptable for budget level estimates.

Funding Analysis

The research and identification of funding sources to finance improvements to the system is one of the most important and difficult tasks in the CIP process. Due to the fluctuation of available federal and state funding, it is only possible to forecast funding availability from these sources for short time periods when budgets are known, and difficult to forecast for the periods of time over which the CIP extends. For this reason, the current level of funding from state gas tax, federal aid urban funds, other state and federal funding programs, grants, loans and user fees, is assumed to be the same for the duration of the CIP. Funding options for this CIP are discussed in more detail in Section G of this report.

Public Involvement/Outreach

Public outreach and support of the CIP is one of the most essential elements of the entire planning process. It is essential that input from the council, staff and community are solicited and considered during preparation, adoption and updating of the plan.

This topic is discussed in greater detail in Part F of this section.

Adoption of CIP

The governing body should formally adopt the CIP by resolution. The final CIP document should be utilized during the annual budgeting process.

Secure Funding

Funding sources may require passing revenue or general obligation bonds, obtaining loans, creating SID's, creating maintenance districts, raising user fees or carrying out other local government fund raising methods.

Project Construction

When the money is received, scheduling and management of the construction projects may proceed.

Annual CIP Update

Cost accounting and reprioritization occurs at the annual update stage. This annual process should also focus on periodic re-inspection of the City of Hardin facility systems as a whole and updating the maintenance database.

E. Policy Development

The City of Hardin should consider further establishing policies that guide the CIP process. Policy guidelines are a reflection of overall community goals and objectives related to future growth and development and fiscal capacity. Policies are very useful because they provide long-term guidance on how day-to-day decisions should be made so that the daily decisions conform to long-term and

overall community needs. What this means is that decision makers need to take time to ask themselves questions about where their community is going, how they are going to get there, and how funds will be allocated to do this.
The CIP will be incorporated into an annual planning process. The City - County Planning Board will be part of this process, in that they make the recommendations regarding land use and comprehensive planning that should be compatible and coordinated with CIP policies. The City of Hardin will utilize the CIP in preparation of any comprehensive plans and zoning regulations. Likewise, we will use any comprehensive plan and zoning information when preparing and updating the CIP (Example: account for population and build out density). The CIP will also be used annually when creating the fiscal year budget.

Public works policies can span the range from fiscal policies concerning indebtedness to management policies relating to proper maintenance and operation of a facility. Some categories of policies include fiscal policies, policies on allocation costs, policies on how to finance capital projects, and policies on planning construction and management.

Some suggested policies the City may consider are:

1. Regular facility inspections and systematic maintenance will be a primary goal of the City Council.

2. DEQ inspections should be incorporated into the CIP updating process.

F. Public Outreach

Public support for the CIP is the most essential element of the entire planning process. Ultimately, the consumer will pay for the improvements and must be convinced that such improvements are necessary. The best, most logical program may be rejected by the rate paying community due to lack of public awareness of infrastructure problems.

Many citizens are often unaware of the most fundamental public works issues including: scope of the problems, consequences of not making repairs, short term costs versus long term savings, what are fair rates for services, how repairs can be made affordable, etc. Thus, local leaders will have to work extra hard to inform and educate citizens on these issues. This section outlines the recommended process for involving the public.

The Mayor is the spokesman for the City to convey the needs of the local infrastructure to the general public based on Council recommendations. Techniques by this person that are vital to gaining public support are:

- Begin as early as possible in the process to inform and educate the public. It is a grave mistake to “surprise” the public with final plans just before a governing body hearing on the issues. People generally support projects in which they have been involved, especially those who have witnessed step-by-step decision making by the governing body.

- Have inspection, analysis and background data compiled at the start of the public information phase of the CIP.

- Be able to justify the need for the program as well as explain the benefits. Outline the consequences of not improving the infrastructure.

Following are suggested outreach methods to gain support for the City's CIP. These suggestions are listed in accordance with their anticipated effectiveness. Note that the order of the outreach methods is very important and is discussed further in this section:

Establish Need

First and foremost, the governing body and local community leaders must be convinced of the need for a CIP. Thorough presentation and review by the Public Works Director and/or Consultants is vital to gaining a commitment from the body.

City Meetings

Conduct a City meeting to present the CIP to the public and solicit constructive interaction. This meeting is an important gauge of the political climate and helps determine if alternatives should be considered.

Service Organization Support

The Governing Body should solicit support from local service organizations.

Public Education

Information summary fliers are successful in public education. Though the content must be short and concise, these information fliers can provide the basic components of a CIP as well as alert residents of future City workshops and meetings. Public service announcements (PSA) via press releases or paid ads are an effective outreach method. This procedure could be used in addition to utility bill stuffers or mailed fliers. Other options could also include "Open Houses" at the City Council Chamber, tours of the facilities or utilizing local TV and radio stations.

As mentioned herein, the order and timing of the public outreach campaign is vitally important. It is suggested that the outreach campaign be conducted in the following order:

1. Governing body commitments
2. Presentations and education of CIP Advisory Committee
3. Solicit service organizations support
4. Distribute information fliers/PSA's
5. Conduct City meetings

G. Funding

The role of the CIP process is to identify the amount of money required and establish the best method(s) to obtain financing. Water and sewer infrastructure improvements can often be funded with grants and low interest loans from state and/or federal programs. Unlike water and sewer infrastructure improvements, state or federal grants and loans are practically nonexistent for street improvements and maintenance. Municipalities generally use gas tax monies or general funds to finance street upgrades and maintenance.

The process of financing improvements should begin with a Financial Forecast. It is important to develop a financial forecast of the public funds likely to be used in financing improvements over the coming five years. Note that 3-5 year programs are widely used across the nation. This tool is critical to estimate how many projects can be scheduled in accordance with a five-year plan. This forecast is necessary to identify lack of available funds in existing City accounts and establish need for outside fund sources.

A Financial Forecast is broken down into two main components: A Revenue Forecast, and an Expenditure Forecast. With these forecasts in hand, the City is able to accurately assess the amount of supplemental funding needed.

Research of available supplemental funding sources reveals several options:

- Fund and/or defray costs of improvements
  - Department of Natural Resources and Conservation (DNRC)-Grants & Loans
  - Community Development Block Grant (CDBG)-Grants
  - Treasure State Endowment Program (TSEP)-Grants
  - Rural Utility Service/Rural Development (RUS/RD)-Grant and Loan
  - State Revolving Fund (SRF), (Water and Wastewater)-Loans
  - Economic Development Administration (EDA)-Grant
  - Transportation Alternative Program (TA)-Grant
  - Montana Fish, Wildlife & Parks (MT F,W&P)-Grant
  - Other Private Grants and Donations

- Fund improvement construction and remediation maintenance
  - General Obligation (GO) and/or Revenue Bonds

- Fund facilities improvements
  - Special Improvement Districts (SID's)
  - Gas Tax funding programs

- Fund annual maintenance
  - Improvement District or Maintenance District
  - Budgeting Annually in all Funds

H. Criteria for Setting Priorities

The following lists are suggested criteria for which each proposed infrastructure project could be judged. Each potential project should be accompanied by the types of information noted below. This is not to say that all such information is to be included in the CIP. Rather, this information is to be used only to help rank each project in order of priority.

Financial Impacts

Capital Costs

The governing body should be provided with information concerning both the portion of the project costs for which the local government is responsible and the portion that will be paid by others (outside funding agencies, private monies, etc.). If expenditures will be incurred over a period of more than one year, all long-term costs should be shown.

Reducing Operating and Maintenance (O&M) Costs

One of the major reasons for capital projects is often to reduce O&M costs. It is important not to underestimate the degree to which O&M costs affect your operating budget. Any capital improvements that can reduce operating costs should be seriously considered. Likewise, added long-term O&M costs arising from an expansion of facilities should be considered as they will result in future increases to the annual operating budget.

Changes in Local Government Revenue

Some proposed infrastructure projects will positively or negatively affect tax revenues or service charges. For example, a sanitary sewer extension project will generate additional hook-on fees and monthly user charges. Revenue changes should all be calculated.

Health and Safety Effects

Many public works projects will have an important impact on the crucial area of public safety. While it is difficult to assign a dollar value, they represent perhaps the most valuable public service that any government can provide. The value of the project in lives saved or injuries prevented should be stated. Projects, which protect public health and safety, should have a very high priority.

Effects on Local Economic Development

Economic development means business expansion and creation of new jobs. Since economic development is the objective of many capital projects, it is important to set forth the close correlation between capital improvements and economic development. The economic benefits of a project should be documented in the following areas:

- Local Property Tax Base
- Property Values
- Increased Employment
- Investment in Local Economy

Civic Pride and Community Livability
Falling under this category are all capital improvement impacts, which would affect the environmental, aesthetic or social condition of your community. Examples include the reduction of traffic congestion, air pollution, and noise in a downtown shopping area.

Public Support
It is usually desirable to place a higher priority on projects that have generated a good deal of public support. It should be remembered that without a sufficient degree of public support, some public projects (such as those backed by general obligation bonds or special assessments) simply couldn't go forward due to statutory requirements for public approval.

Compliance with State or Federal Regulations
A high priority should be assigned to projects that are required by state or federal regulations. Failure to comply with regulations could result in threats to public health or safety, damage to the environment, and fines levied against the local government.

Availability of Funds
If funding is available "right now" for one project, you probably will want to assign this project a higher priority ranking. Projects for which funding is not available or difficult projects to finance are normally assigned lower priorities.

Setting priorities between types of facilities is another task for the governing body and staff. The typical situation is that there is not enough money to do everything. There are no easy answers, although the 7 criteria previously mentioned can help clarify the priorities. Because the CIP looks forward 5 years, projects that cannot be financed this year could be scheduled for financing in years 2-5.

The following points are offered as an outline for a successful priority setting process.

- Consistently maintain financial viability through financial planning.
- Assure availability of qualified technical expertise.
- Promote technological innovation, "fresh ideas"; avoid quick "cookbook" approaches.
- Determine public needs for service as well as wishes in changing economic environment.
- Communicate these needs to the user, and the costs of facilities to meet those needs.
- Encourage public participation.
- Involve the regulatory or granting agency in the decision making process to assure full understanding of the project by all parties.
- Employ the planning process continuously (annually) for updates.

- Do not be afraid to plan for things you cannot currently afford; be realistic in your needs and work to obtain required funds.

II. FIRE PROTECTION

-

A. Fire Protection Condition

The City of Hardin's volunteer firefighters apply for grants to purchase turn out gear, radios, trucks and various other equipment needed. They also host events to help pay for expenses and promote education.

The City of Hardin budgets every year for the utility bills and for the upkeep of the fire department building where all of the equipment is housed.

They hold two meetings minimum per month. One is a business meeting and one is a training meeting. The firefighters are trained to fight fires and help in emergency responses as needed by the City and surrounding area.

B. Recommended Fire Protection Improvements and Estimated Costs

The recommendation is that the City of Hardin's volunteer firefighters continue their training, to write grants and have their fund raisers. It is also recommended that the City of Hardin and the volunteer firefighters continue to budget for fire protection every year.

The City plans on replacing a 1983 Ford firetruck at an estimated cost of $325,000. A Coal Board grant has been applied for to help with the purchase.

III. STORM DRAINAGE SYSTEM

Curb and gutter is used to direct storm water to a series of storm drain inlets. The storm drain inlets collect water and the water is transported to the east of the City where it discharges to the Big Horn River.

The City maintains its storm drainage system with tax revenues. In 2015, the system was extensively cleaned and televised. In 2017 two blocks of storm drainage was replaced on 4th Street West. Currently the budget for maintenance is $80,000 per year.

IV. PARKS

A. Parks Condition

Parks: Hardin has the following parks: Wilson, Heimat, South and Custer Park. The Plaza on North Center Avenue is maintained like a park for community activities.

The parks are adequate in location and size. The Public Works Department, who does the cleaning, mowing, installation and fixing of equipment and planting of trees, maintains the parks. The parks are kept in excellent condition.

The City recently installed restrooms, two pavilions, and new playground equipment in Heimat Park with assistance from a Montana Fish, Wildlife and Parks grant. South Park had a pavilion installed; and both Custer Park and South Park received new sidewalks with the assistance of a CTEP grant. Playground equipment will need to be replaced on a regular schedule.

B. Recommended Parks Improvements and Estimated Costs

For 2018 a slide will be in replaced along with some smaller playground equipment for about $15,000.

	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	Estimated Cost
Playground equipment - South Park	15,000					15,000

There is a budget set annually for the supplies, maintenance and repairs for the upkeep of the parks and recreation areas of the City.

V. MUNICIPAL BUILDINGS

A. Municipal Buildings Condition

The Hardin owns the City Hall, the Ping Building (court room, legal, and animal control/code enforcement), maintenance shop, equipment building, a fire station, water plant, water storage tanks, wastewater treatment, several lift station housings, and a landfill with a shop, scale, and scale house. Every year the City budgets for repair and maintenance to do upkeep to these buildings.

*The Ping Building was purchased and extensively remodeled in 2010. The parking lot was replaced in 2018.
* A rubberized roof will be installed over the office portion of City Hall. In 2009 the windows were upgraded. The parking lot is scheduled to be replaced in 2019. Since the building was built in 1981, no other major remodels or upgrades have been done.
*The shop portion of City Hall had its roof replaced in 2016. The shop doors were enlarged and insulated in in 2009.
*A new Firehall was built in 2010 with ARRA funding, a Coal Board grant, and city resources. The old Firehall is now used for equipment storage.

B. Recommended Municipal Buildings Improvements and Estimated Costs

The recommendation is that the City continues to budget for maintenance and repair of the buildings. Continued maintenance will preserve the buildings longer.

	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2018 Estimated Cost
City Hall Parking Lot		80,000				80,000
City Hall Roof	19,000					19,000
Ping Building Parking Lot	36,000					36,000
Shop Parking Lot	14,500					14,500
Totals by Year	69,500	80,000	-	-	-	
CAPITAL IMPROVEMENT PLAN TOTAL						149,500

VI. COMPUTER EQUIPMENT & OFFICE FURNITURE

A. Computer Equipment and Office Furniture Condition

The City of Hardin maintains its computer system by regularly updating its equipment so that the cost is spread out over a 5 year cycle. In 2017, a map printer/scanner was purchased for a GIS Software System. Printers and scanners are budgeted about every five years or as needed. The current large copier was purchased in 2011 and will need to be replaced in the next 2-3 years. The computer software updates and maintenance are budgeted for annually and updated as needed. Office furniture is purchased as needed.

B. Recommended Computer Equipment and Office Furniture and Estimated Costs

The recommendation is that the City continues to budget for and purchase computer equipment and software updates.

	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	Estimated Cost
Computer System (4 computers)	5,688					5,688
Computer System (2 computers)		2,844				2,844
Computer System (1 laptop)		1,972				1,972
Computer System (3 computers)				4,266		4,266
Computer System (server, 4PCs, 1 laptop, 2 monitors)					21,732	21,732
14 Monitors (estimate $200 each)			2,800			2,800
4 Ipads (estimate 400 each)		1,600				1,600
Sharp Copier			15,727			15,727
T795 Printer/Scanner - maps						
Various copiers, scanners/faxes (estimate 1500 per year)	1,500	1,500	1,500	1,500	1,500	7,500
	7,188	7,916	20,027	5,766	23,232	
Total						64,129

VII. STREET SYSTEM

A. Street Infrastructure Condition

The road surfacing within Hardin consists of gravel, chip seal and asphalt pavement. However, the

majority of streets in Hardin have asphalt paved surfaces. In addition some of the streets have curb, gutter and sidewalks.

The general condition of the streets in Hardin is good. The City uses gas tax funds to help replace and maintain the streets. The City has prioritized some streets for rebuilding and others for chip seal.

Terry Avenue from 6th Street West to 8th Street West in front of the High School was rebuilt in 2018 using Gas Tax revenues, a Coal Board Grant, and City resources. It will need to be chip sealed in 2019 to extend its life. In 2012 a portion of Blue Sage Court and Rangeview Drive had street paving, storm drains, curb and gutter, and sidewalks installed. In 2015 the Wagner Subdivision also had these infrastructure improvements installed.

The City also performs regular maintenance of the streets and alleys including pothole repair, street sweeping, cleaning storm drains, etc.

B. Recommended Street Improvements and Estimated Costs

It is recommended that the City practice overlaying streets once utilities have been replaced. This approach makes good sense and will make the City's practices more efficient. The full asphalt overlays and chip sealing have a long life and have performed well in Hardin where the drainage is well developed. The City will need to address replacing failing curb and gutters on some streets. The City will help owners finance some of these replacements.

In general, the City should examine the drainage as part of any street improvement project. In many cases a simple overlay will work effectively without negatively impacting drainage. However, some projects may require asphalt milling or other improvements to maintain good drainage.

Street system improvements are as listed:

	LF/sq ft	Condition	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2018 Estimated Cost
1st Street West Lewis to Miles	1000.18' / 35000	4 or 3		117,263				117,263
& Lewis - Division to 1st	360'?	4 or 3		42,215				42,215
7th St N Crook to E Terminus		3			35,179			35,179
Chouteau, 1st St S to 3rd St W		3		82,084				82,084
Crook Ave 5th to 6th St		3					158,271	158,271
Crow Ave, 6th to 7th St		4				29,316		29,316
Crow Ave, 7th to 8th St		4				29,316		29,316
Terry Ave, 170' N of 6th to 8th Coal Board		1	418,307					418,307
13th St, Cody to Custer		3		29,316				29,316
2nd, Crawford to Terry		3			70,358			70,358
Totals by year			**418,307**	**270,878**	**105,537**	**58,632**	**158,271**	**1,011,624**

Failed	1
Very Poor	2
Poor	3
Fair	4

Grants or other funding	243,903
Total to fund	**767,721**
Years	5
Total needed per year	**153,544**

Street Maintenance equipment and chip seal costs are listed below:

ITEM	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2018 Estimated Cost
1992 Chevy 1 ton - red truck #52	35,000					35,000
#12 1999 Ford F450 w/ utility box		62,991				62,991
Snowblower/Auger	?					?
Road: chip seal, resurface	80,000	80,000	80,000	80,000	80,000	400,000
Totals by year	**115,000**	**142,991**	**80,000**	**80,000**	**80,000**	**497,991**

VIII. SIDEWALKS, CURBS & RAMPS

A. Sidewalks, Curbs & Gutter Condition

Sidewalks located within the City of Hardin are in poor to excellent condition. There is not a consistent sidewalk system through the City. Some areas of the City have very old sidewalks, with an adjacent boulevard with trees; other areas have limited portions of newer sidewalks; still other areas

have no sidewalks or curbs. The City allows “Hollywood” or boulevard style sidewalks. Some sidewalks do not have handicap accessible curb ramps, and other areas that do have curb ramps do not meet the current requirements of the Americans with Disabilities Act. There is no consistency with curb and gutter throughout the City.

The City has been limited financially to replace or expand the current sidewalk system. The City will continue to write grants and enforce the sidewalk ordinance to further repair and replace old sidewalks with ADA compliant sidewalks.

B. Recommended Sidewalks and Curb & Gutter Improvements and Estimated Costs

The recommendation is that the City enforce the sidewalk ordinance. Repairing or replacement of existing sidewalks are priorities over new sidewalks.

The City should also apply for grants to replace and expand the sidewalk system throughout City. The City should map the existing sidewalks and prioritize the sections that need replaced, based on their current status, the location of public facilities and routinely used routes throughout the City. The City needs to ensure that all sidewalks throughout Hardin are ADA compliant. The City may also consider creation of Special Improvement Districts (SID’s) to provide funds for sidewalks although this would create more expenses for the private homeowners.

IX. WATER SYSTEM

A. Water System Condition

The City of Hardin’s domestic water system consists of several components. The source of water for the system currently comes from the Big Horn River. The water is piped to the treatment plant which in turn delivers water to the system and to the storage tanks on a hill approximately one mile west of the City. The storage reservoirs consist of one 500,000 gallon concrete tank and one 500,000 gallon steel tank. A pressure transducer located in a piping vault near the tanks senses the tank level and enables control of the pumping cycles and associated reservoir level. The distribution system consists of mains from 6 inches to 16 inches with associated fittings, gate valves and fire hydrants.

Several water system improvement projects have been completed in the last ten years. The most recent water projects include:
In 2007 the steel tank was recoated, extending its life. In 2014, the treatment plant was automated. Water services were extended to the Industrial Park, Yerger subdivision and the Watson Drive – Custer Avenue area.

Water lines will need to be assessed to determine the need for rehabilitation or replacement.

B. Recommended Improvements and Estimated Costs

A detailed water system analysis will need to be prepared for the City's water treatment, storage and distribution system. An updated Water PER will be written and grant applications are expected to be submitted to DNRC and TSEP to help with funding the PER.

Current needs include replacing the Variable Frequency Devices (VFDs), turbidimeter, and alum feeders for water treatment.

	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2018 Estimated Cost
Resurfacing/lining Concrete reservoir			300,000			300,000
VFD (Variable Frequency Drive)	200,000					200,000
Backhoe #71980 JD 310A	85,000					85,000
Utility trailer		31,495				31,495
Turbidimeter (original cost 15,035)	31,267					31,267
Freightliner dump truck			208,447			208,447
Excavator #49 Cat 315L		260,559				260,559
Alum Feeders	321,118					321,118
PER	59,500					59,500
Totals by year	**696,885**	**292,054**	**508,447**	**-**	**-**	**1,497,387**
GRAND TOTAL						**1,497,387**

X. WASTEWATER SYSTEM

A. Wastewater and Collection System Condition

The original wastewater collection system was constructed in 1916. By the early 1990's the collection system had grown to include approximately 80,800 linear feet as well as approximately 235 sanitary manholes (SMH). The 2003 project replaced/rehabbed 14,874 feet of sanitary sewer mains and 32 manholes. The 6th Street lift station and the force main to the treatment plant were replaced in 2008. In 2009, the City completed a project involving rehabilitation or replacement of 24,044 lineal feet of sewer mains and 82 manholes. Thus, the City has replaced or rehabbed almost 50 percent of sanitary sewer mains and manholes over the course of the last 15 years.

The original facultative lagoons were replaced by the current oxidation ditch mechanical plant in 1978. Portions of the old lagoon cells are still utilized as part of the current mechanical treatment system for surge flow bypass, sludge drying beds, and septage receiving. The existing wastewater treatment system consists of a combination grinder/auger screen headworks followed by activated sludge biological treatment via an oxidation ditch. Wastewater then flows from the oxidation ditch to one of two secondary clarifiers. Activated sludge is pumped from the clarifiers back to the oxidation ditch. Clarified effluent is then disinfected via open-channel UV units. The treated effluent is then discharged to the Bighorn River.

The wastewater collection and treatment systems were inspected by the EPA in September of 2017. The resulting inspection report identified several deficiencies and items requiring corrective action. Areas of concern for the wastewater collection and treatment systems, paraphrased from the EPA inspection report and reports from the Hardin Public Works Department are listed below.

a) The collection system has issues with excessive I&I and illicit connections which can restrict the design capacity of the system.
b) The facility does not have grit or grease removal systems. The headworks screen is aging. Grease is present throughout the treatment process.
c) The wastewater treatment plant has issues with insufficient influent treatment capacity. The plant is immediately overwhelmed by surge flows exceeding 1.0 MGD which occur often during rain and snowmelt events. The oxidation ditch and secondary clarifiers run at maximum capacity during average flows of approximately 0.6 MGD. The influent to the treatment plant is often bypassed to an old lagoon basin (part of the previous treatment facility) during surge flow events. There is no way to reintroduce the bypassed effluent into the treatment process.
d) Secondary Clarifier No. 1 has uneven flows over the weir due to an uneven weir bar. Thus, the clarifier does not operate according to design.
e) The plant operators reported freezing issues in the clarifier inlet channels.
f) Wastewater flow rate monitoring is unreliable.
g) The wastewater treatment plant does not have backup power generation.
h) The wastewater treatment plant does not have a redundant blower for the aerobic digester.
i) The plant operators have reported excessive foaming in the oxidation ditch.
j) The return activated sludge (RAS) pumping station is aging and requires repairs frequently.

k) The waste activated sludge (WAS) pumping station is aging.
l) The wastewater treatment plant does not have redundant disinfection on the effluent bypass channel.
m) The existing UV disinfection system is located outdoors, making maintenance difficult during inclement weather.
n) There is currently no way to introduce septage from pumper trucks into the treatment process. Septage is currently dumped in the old lagoon cell that is also utilized as a sludge drying bed.
o) The plant does not have an adequate water supply.

The City's collection system has issues with excessive Inflow and Infiltration (I&I) and illicit connections, which can restrict the designed capacity of the system. I&I has been a known issue within the collection system for a number of years, but the City has not conducted a comprehensive assessment of the system since the 1980s. Further, the City has not quantified the volume of I&I that occurs in the collection system. In addition to I&I, the City also has an issue with illicit connections to the collection system. Some homes and businesses have sump pumps or rain gutters that discharge directly to the wastewater collection system.

Proper operation and maintenance of the collection system includes maintaining its design capacity in order to minimize WWTP upsets, bypasses, and SSOs. Excess I&I and illicit connections restrict the design capacity of the collection system, and in the City's case, could contribute to unnecessary bypasses and upsets at the WWTP (e.g., untreated influent sent to the lagoon basin/emergency bypass pond).

Other than continued regular maintenance, the following improvements have been identified.

B. Recommended Sewer and Drainage Improvements and Estimated Costs

Wastewater system improvements costs are listed below:

	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2018 Estimated Cost
Sewer truck - VAC CON					350,000	350,000
Improvements identified by the PER		2,035,020				2,035,020
Improvements identified by the PER			9,265,216			9,265,216
Totals by year	**-**	**2,035,020**	**9,265,216**	**-**	**350,000**	**11,650,236**
GRAND TOTAL						**11,650,236**

XI. SOLID WASTE COLLECTION and LANDFILL

A. Solid Waste Collection and Landfill Condition

The Solid Waste Department operates as part of the larger Public Works Department and provides garbage collection and disposal for the community. Garbage collection is provided to every residence and business in the community at least twice a week. Containers are also provided by the City. The Solid Waste (Garbage collection) is operated as an enterprise fund and user fees are based on whether a user has an individual canister or a shared one and the number of collections per week.

The City currently has four garbage trucks and collects solid waste 6 days a week for disposal at its landfill. Collection currently runs two trucks, one full-time and one part-time. The City hosts clean-up events in the spring and fall. The spring event is called "Operation Sparkle" and is coordinated with the school so students can pick up litter around the City. The trucks are regularly maintained and are on a 5-7 year replacement schedule. However the oldest trucks are a 1996 box truck and a 1999 truck with a grabber that automatically empties canisters.

The City also maintains a Class II landfill for garbage disposal. The landfill is a separate enterprise fund from collection. Users are charged per load taken to the landfill based upon the size and type of load per a fee schedule established by the City Council. The current landfill site was purchased in 1969 and was operated by Big Horn County under an Interlocal agreement. In 1991 the City assumed operation of the landfill when new EPA regulations were introduced. A coal ash cell was added to the landfill in 2010. The 2018 estimated life for the Class II cell is 25 years and the Coal Ash cell is 27 years. The landfill serves all of Big Horn County which includes both the Crow and Northern Cheyenne reservations.

The City is required by state and federal laws and regulations to make annual contributions to a trust to finance closure and post-closure care. Annual contributions to the trusts for closure and post-closure are determined by time to closure and post-closure of each landfill cell and the cost for each as determined by an engineer.

A new Cat compactor was purchased in 2018 for $678,550 with the assistance of a Coal Board grant. Equipment is replaced every 5-10 years as needed. Regular maintenance is done and repairs of equipment are done as needed to help extend the life of the equipment.

B. Recommended Solid Waste Collection and Landfill Improvements and Expected Costs

It is recommended that the City continue to maintain and replace equipment on a regular schedule. A survey and upgraded life expectancy for the landfill will determine the life of each cell, where to place a road for future cell expansions, and placement of those cell expansions.

The Solid Waste Collection system equipment costs are as listed:

	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2018 Estimated Cost
1996 Garbage truck #11 - box truck						-
1999 Garbage truck #29 - Freightliner		332,801				332,801
2009 #55 Mack garbage truck	332,801					332,801
2016 #74 Peterbilt garbage truck				332,801		332,801
Land purchase		300,000				300,000
Totals by year	**332,801**	**632,801**	**-**	**332,801**	**-**	**1,298,403**

The Landfill system equipment costs are listed below:

	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2018 Estimated Cost
Cat motor grader			157,477			157,477
John Deere scraper		677,454				677,454
Case loader	209,969					209,969
Landfill road						impaired
Land purchase (see $300,000 in Solid Waste)		X				
Equipment shed		49,923				49,923
Road for new cell		30,000	30,000			60,000
Totals by year	**209,969**	**757,377**	**187,477**	**-**	**-**	
CAPITAL IMPROVEMENT PLAN PROJECTS IDENTIFIED TOTAL						**1,154,823**

XII. SUMMARY

A. Summary of Recommendations

Although this CIP is a valuable tool for the City of Hardin, it must be continually updated in order to represent current and changing conditions. For instance, the community's growth must be reviewed and considered.

B. Priorities

The previous section of this report outlined needed capital improvements or equipment replacements for the City's entire system and prioritized improvements for each system. The following priorities for Capital improvements and equipment replacement are recommended for implementation:

Priority	Project or Equipment to be Replaced	Project Cost	Funding Sources
1	Terry Ave, 170' N of 6th to 8th (with Coal Board)	418,307	General Fund, Gas Tax, & Coal Board
2	Ping Building Parking Lot	36,000	General Fund, Capital Improvement Fund
3	Fire truck	325,000	General Fund, Capital Imp. Fund, Coal Board
4	Playground equipment - South Park	15,000	General Fund
5	Shop Parking Lot	14,500	General Fund
6	City Hall Roof	19,000	General Fund
7	Alum Feeders	321,118	Water Fund
8	VFD (Variable Frequency Drive)	200,000	Water Fund
9	#55 Mack garbage truck	332,801	Solid Waste Collection
10	Backhoe #71980 JD 310A	85,000	Water Fund
11	1992 Chevy 1 ton - red truck #52	35,000	Street Maintenance
12	Turbidimeter (original cost 15,035)	31,267	Water Fund
13	Computer System (4 computers)	5,688	All Funds
14	Various copiers, scanners/faxes (estimate 1500 per year)	7,500	All Funds
15	Road: chip seal, resurface	400,000	Street Maintenance
16	Case loader	209,969	Landfill
17	Snowblower/Auger	?	Street Maintenance
18	WWTP: Alt. H-1 Single Headworks (includes grit & grease removal)	2,035,020	Wastewater, TSEP, DNRC, CDBG, Coal Board, & RD
19	WWTP: Alt. T-3 New ICEAS SBR (includes water well)	9,265,216	Wastewater, TSEP, DNRC, CDBG, Coal Board, & RD
20	Terry Avenue - High School - Chip seal	30,000	General Fund, Gas Tax
21	City Hall Parking Lot	80,000	General Fund
22	Computer System (2 computers)	2,844	All Funds
23	Water System PER	59,500	Water Fund
24	Computer System (1 laptop)	1,972	All Funds
25	4 Ipads (estimate 400 each)	1,600	All Funds
26	1st Street West Lewis to Miles	117,263	General Fund, Gas Tax
27	Lewis - Division to 1st	42,215	General Fund, Gas Tax
28	Road for new Landfill cell	60,000	Landfill
29	Garbage truck #29 - Freightliner	332,801	Solid Waste Collection
30	Excavator #49 Cat 315L	260,559	Water Fund
31	Utility trailer	31,495	Water Fund
32	13th St, Cody to Custer	29,316	General Fund, Gas Tax, possibly homeowners
33	Equipment shed	49,923	Landfill
34	#12 1999 Ford F450 w/ utility box	62,991	Street Maintenance
35	Chouteau, 1st St S to 3rd St W	82,084	General Fund, Gas Tax, possibly homeowners

Priority	Project or Equipment to be Replaced	Project Cost	Funding Sources
36	John Deere scraper	677,454	Landfill
37	Land purchase - Landfill	300,000	Solid Waste Collection & Landfill
38	Resurfacing/lining Concrete reservoir	300,000	Water Fund
39	Sharp Copier	15,727	All Funds
40	14 Monitors (estimate $200 each)	2,800	All Funds
41	2nd, Crawford to Terry	70,358	General Fund, Gas Tax, possibly homeowners
42	7th St N Crook to E Terminus	35,179	General Fund, Gas Tax, possibly homeowners
43	Freightliner dump truck	208,447	Water Fund
44	Cat motor grader	157,477	Landfill
45	Computer System (3 computers)	4,266	All Funds
46	Crow Ave, 6th to 7th St	29,316	General Fund, Gas Tax, possibly homeowners
47	Crow Ave, 7th to 8th St	29,316	General Fund, Gas Tax, possibly homeowners
48	#74 Peterbilt garbage truck	332,801	Solid Waste Fund
49	Sewer truck - VAC CON	350,000	Wastewater
50	Crook Ave 5th to 6th St	158,271	General Fund, Gas Tax, possibly homeowners
51	Computer System (server, 4PCs, 1 laptop, 2 monitors)	21,732	All Funds

C. Maintenance Program

Fire Protection

Proper care and maintenance of the fire protection equipment will increase the life of the equipment and will keep it in excellent condition at the time needed for fighting fires and emergency calls. Infrequent or inadequate maintenance can decrease the life of the equipment. Proper care and maintenance can increase the change of life and lower life-cycle costs for maintenance and replacement.

Parks

Park maintenance is an important element in maintaining a clean and healthy environment for the community. Infrequent or inadequate maintenance can lead to overgrown areas of noxious weeds and garbage, or fallen and dead trees. Proper maintenance can increase the beauty of the parks and lower life-cycle costs for maintenance.

Municipal Buildings

Continued repair and maintenance to the buildings is a key element in maintaining the life of the buildings. Infrequent or inadequate maintenance can decrease the life of the building and increase the overall life-cycle costs of the buildings. Proper maintenance can increase the life of the buildings and decrease the life cycle costs for maintenance.

Computer, Equipment and Office Furniture

Continual maintenance and upkeep, keeps your office and equipment running smoothly. Inadequate repair can decrease the life of your computers and furniture. Proper maintenance can increase the life of the equipment and furniture with lower life-cycle costs for maintenance.

Streets and Drainage

Street maintenance is a key element in maintaining a road surface for the design life of the street. Infrequent or inadequate maintenance can decrease the life of a street and increase the overall life-cycle cost of the street. Conversely, proper maintenance can increase the design life of the streets with lower associated life-cycle costs for maintenance.

Sidewalks, Curbs & Ramps

Repair maintenance is a high priority to keep sidewalks level or removing of broken and damaged sidewalks and curbs. Infrequent or inadequate maintenance could lead to bodily injury to the public. Repair and maintenance will decrease the chances of bodily injury and continue to have walking paths for the public. Grant writing and ordinance enforcement to replace and repair is key.

Water System

An operation and maintenance manual is used by the City's water system and continually updated. The operation and maintenance plan details all required and recommended maintenance data for the system as well as parts lists and water system product information.

Wastewater System

An operation and maintenance manual is used for the City's wastewater system and continually updated. The operation and maintenance plan details all required and recommended maintenance data for the system as well as parts lists and wastewater system product information.

Solid Waste Collection and Landfill

An operation and maintenance manual was prepared for the City's Landfill system and updated in 2015. The operation and maintenance plan details all required and recommended maintenance data for the system.

The City should continue with its existing maintenance plans.

SUMMARY

CITY of HARDIN COMMUNITY NEEDS SURVEY

Citizens of the City of Hardin were asked for their input for the various services the City provides. Hardin's population is approximately 3,754 people, and there are 1319 consumer accounts for water services. People were asked a variety of questions including where they would like to see improvements and what they want to see prioritized. The survey was mailed out in June, 2018. We received 180 responses by August 1, 2018. This is a summary of some of the questions and responses. The full report and results are available from:

Hardin City Hall
406 North Cheyenne Avenue
Hardin MT 59034

How do you rate Hardin as a place to live?

Above Average	19
Good	61
Average	79
Poor	17
No Response	5

There were 4 responses that indicated below average

What do you like best about living in this area?

The responses were able to be categorized by the following:

People - family or friendly people or know everyone	52
Small Town, rural or country atmosphere	43
Services: library, schools, events, code enforcement, downtown or food, mosquito control, parks, church, city services(water, sewer, streets, garbage), post office, clinics, pharmacies, fairgrounds, museum, Shakespeare in the Parks, bowling alley, golf	23
Close to Billings, but still a small town or location	22
Activities: Hunting, boating, mountains, etc.	16
Economic: Cost of living, affordable housing, affordability, job, agriculture	12
History &/or scenery, location, climate	11
Easy to get around, not a lot of traffic, commute	11
Nothing or other negative comment	6
Quiet area, low crime/safe, community values	5

Our home	5
Good Community in the past	3
Do not live here	1
Trees	1
The sun comes up and the sun goes down. This makes me very happy.	1
No Response	31

How many years have you lived in this area?

Less than 5 yrs.	8
5-10 yrs.	15
More than 10 yrs.	149
Business only	1
No Response	7

PUBLIC FACILITIES AND SERVICES

Please indicate how you rate the need to improve the following services.

Water System

1 - Very Important	76
2 - Important	60
3 - Not Important	32
4	1
No Response	11

Sewage Collection & Disposal

1 - Very Important	76
2 - Important	60
3 - Not Important	30
No Response	14

City Sponsored Beautification and Cleanup Campaign

1 - Very Important	61
2 - Important	70
3 - Not Important	36
4	1
-3	1
No Response	11

Drainage, Curbs & Gutters

1 - Very Important	73
2 - Important	77
3 - Not Important	14
No Response	16

Sidewalks, Trails & Walkways

1 - Very Important	54
2 - Important	71
3 - Not Important	35
4	1
5	1
No Response	18

Swimming Pool

1 - Very Important	42
2 - Important	67
3 - Not Important	53
0	1
6	1
No Response	16

Fire Protection

1 - Very Important	69
2 - Important	56
3 - Not Important	40
No Response	15

City Office Administration

1 - Very Important	22
2 - Important	62
3 - Not Important	74
6	1
-3	1
No Response	20

Street/Road Maintenance

1 - Very Important	98
2 - Important	61
3 - Not Important	15
No Response	6

Street Lighting

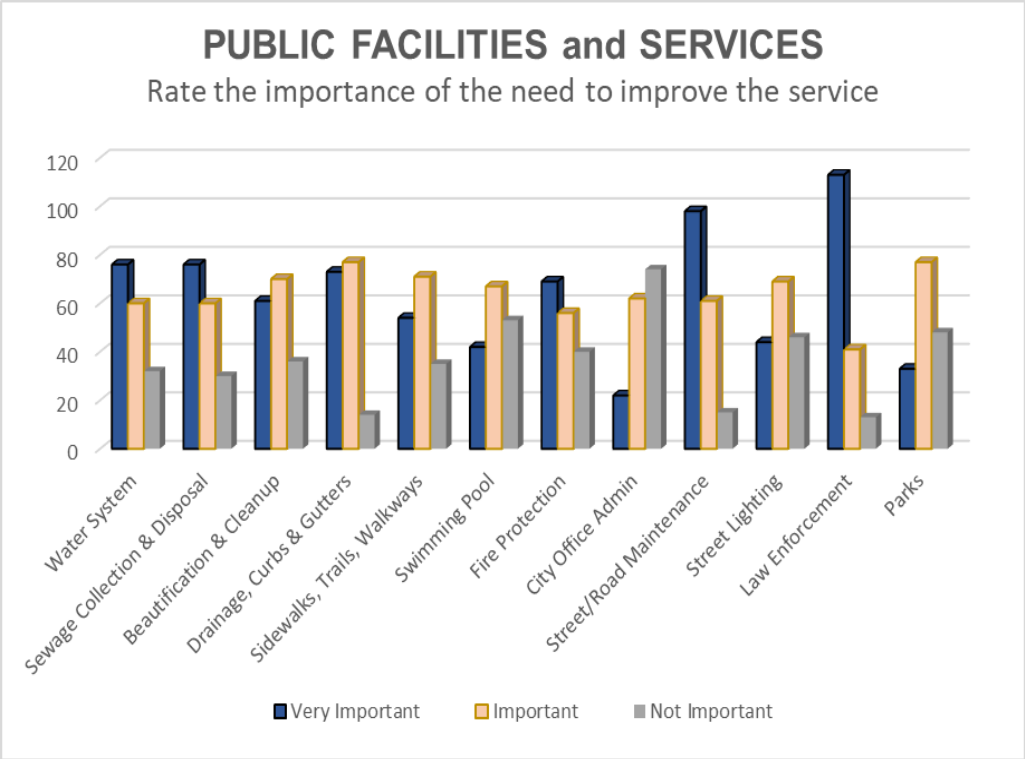
1 - Very Important	44
2 - Important	69
3 - Not Important	46
0	1
5	1
No Response	19

Law Enforcement

1 - Very Important	113
2 - Important	41
3 - Not Important	13
0	1
-3	1
No Response	11

Parks

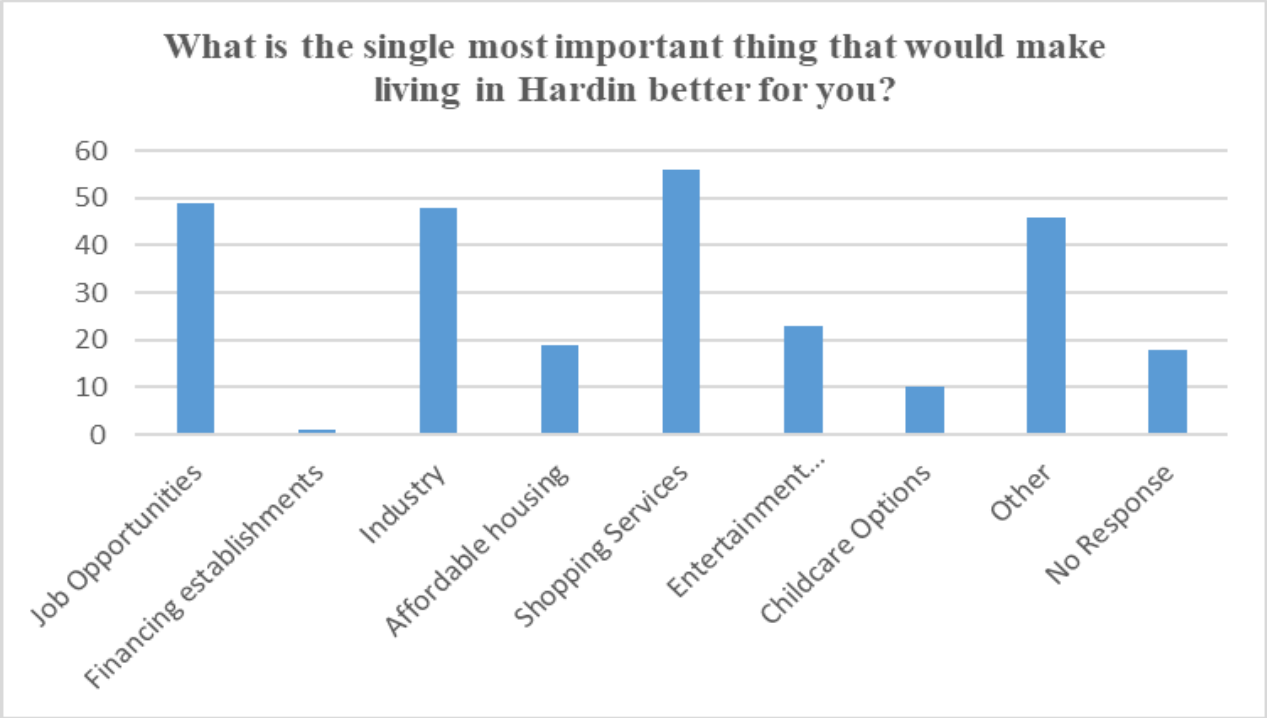
1 - Very Important	33
2 - Important	77
3 - Not Important	48
4	1
A+	1
0	1
No Response	19



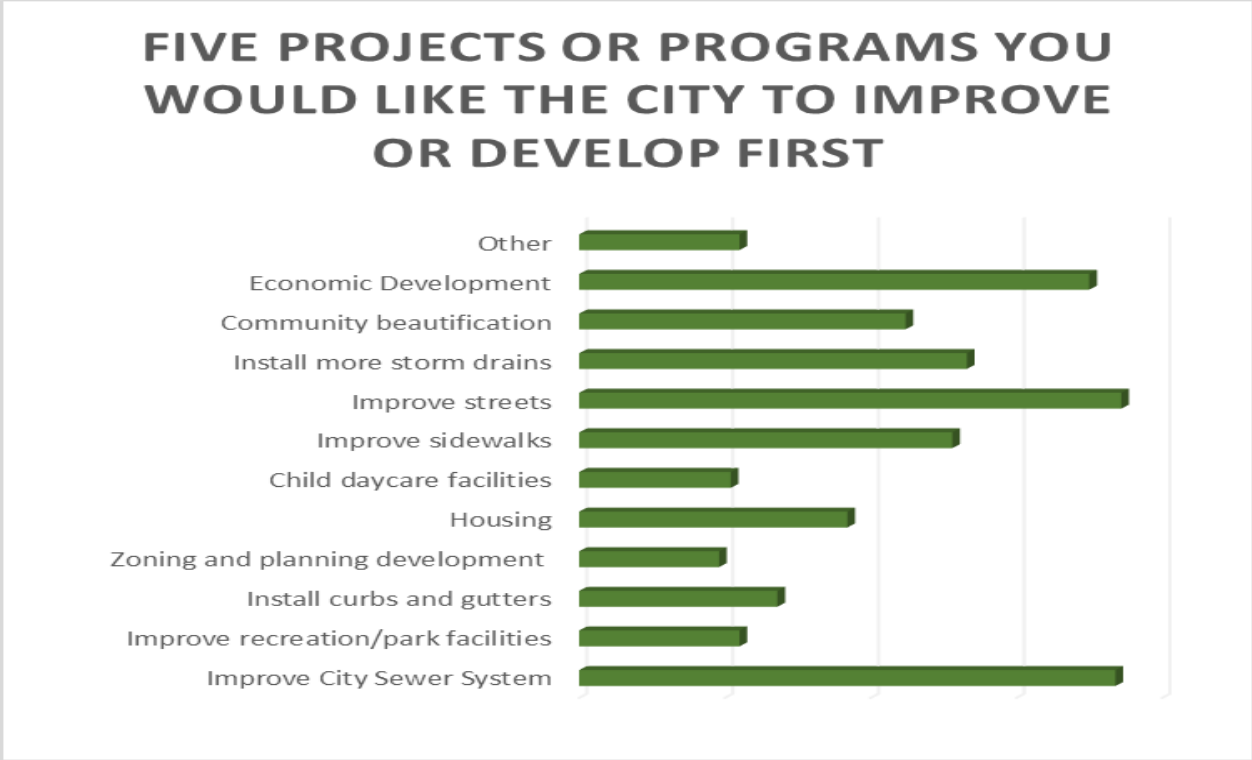
ECONOMIC DEVELOPMENT

1. What is the single most important thing that would make living in Hardin better for you?

49	More job opportunities	56	More shopping services
1	More financing establishments	23	Entertainment establishments
48	Industry	10	More childcare options
19	More affordable housing	18	No Response
46	Other		



SUMMARY QUESTIONS



1. Mark up to *five (5)* future projects or programs you would like the City to improve or develop first (1 being first and 5 being last) (listing of responses)

Improve city sewer system

#1 Priority	41
#2 Priority	6
#3 Priority	9
#4 Priority	9
#5 Priority	8
X	17
Not ranked	90

Improve recreation/park facilities

#1 Priority	5
#2 Priority	3
#3 Priority	4
#4 Priority	7
#5 Priority	12
X	7
Not ranked	142

Install curbs and gutters

#1 Priority	2
#2 Priority	7
#3 Priority	3
#4 Priority	11
#5 Priority	10
X	14
Not ranked	133

Zoning and planning development

#1 Priority	2
#2 Priority	3
#3 Priority	6
#4 Priority	9
#5 Priority	5
X	7
Not ranked	148

Housing

#1 Priority	8
#2 Priority	9
#3 Priority	8
#4 Priority	5
#5 Priority	7
X	16
Not ranked	127

Child daycare facilities

#1 Priority	4
#2 Priority	5
#3 Priority	4
#4 Priority	6
#5 Priority	5
X	8
Not ranked	148

Improve sidewalks

#1 Priority	6
#2 Priority	13
#3 Priority	14
#4 Priority	13
#5 Priority	6
X	25
Not ranked	103

Improve streets

#1 Priority	16
#2 Priority	21
#3 Priority	20
#4 Priority	8
#5 Priority	7
X	28
Not ranked	72

Install more storm drains

#1 Priority	15
#2 Priority	11
#3 Priority	13
#4 Priority	8
#5 Priority	5
X	20
Not ranked	108

Community beautification

#1 Priority	6
#2 Priority	10
#3 Priority	11
#4 Priority	8
#5 Priority	11
X	24
Not ranked	110

Economic Development

#1 Priority	21
#2 Priority	15
#3 Priority	10
#4 Priority	8
#5 Priority	9
X	32
Not ranked	85

City of Hardin

Public Hearing

September 6, 2018

The Public Hearing for the Community Needs Assessment began at 6:30 p.m. at the Hardin Depot. In addition to several members of the public, there was Mayor Joe Purcell, Council member Harry Kautzman, Finance Officer/City Clerk Michelle Dyckman, Public Works Director Rock Massine, and City Attorney Jordan Knudsen. Big Horn Hospital Association representatives included Foundation Director Bill Hodges; and Hospital Administrator Kristi Gatrell.

Mayor Purcell reviewed the results of the Community Needs Assessment. Shopping services, job opportunities, and industry were the most important developments citizens want to see in Hardin. Improving the City's Sewer System, Streets, and Economic Development were projects or programs that people indicated they would like to see prioritized. Purcell noted he has been in contact with industries who are interested in establishing businesses in the area. He opened the hearing up for discussion.

Gladys Herman said she didn't like the litter, especially from garage sales. Bart Hollis said there used to be a canister on the curb that pedestrians used to dispose their garbage. Now they just drop it in the street. Deb Winburn said there are three taxing jurisdictions: City, County and School. Taxes that are used to pay these employees are to stimulate our economy. Instead there are about 75 employees who live in Yellowstone County. At $40,000 per job, that is about $3,000,000 that is not here to stimulate Hardin's economy. She added that TRA is not working on economic development, and the City should spend money on an economic development person.

Vinetta Hollis talked about grocery shoppers approached by panhandlers, yet there are poor people that can only afford cat food. Mike Martinsen noted that it is pretty sad when you drive down the alleys. It could be better. He also asked about the dentist office going in behind Little Horn State Bank, Bighorn Valley Health Center building out by Shopko, and Reese and Ray's selling. Theresa Hert noted the distressing things going on in the community like public intoxication and fornication in the alley. She would like to see more patrolling done. Aaron Baker said he had been arrested for public intoxication when he was walking home from the bar. He asked why it was not being used. Hert said the public intoxication is now off the books, but that disorderly conduct could be used. She watched a panhandler at McDonald's giving hand signals to his friends showing how much he had received. He then walked across the street to buy liquor.

Winburn asked if they could prohibit the sale of single cans of alcohol. Knudsen replied he would need to look into that. Baker would not want to see that. Mrs. Hollis added that the deputies do not wave or say "Hi" when they drive by. The Mayor said the City is in the middle of negotiations on Law Enforcement. Hert asked what other cities do.

Jean Koebbe thought the worst trailer court in the United States was here. She sees little children eating and playing on the ground. She is tired of it. Nothing is cleaned up, and she got robbed. She moved to Hardin 64 years ago. There were nice lawns and care. She doesn't want to move to Billings; she doesn't want to leave the town she loves. She sees trailers that a dog shouldn't live in, she wants to tell what the south side of Hardin is like. Martinsen held that nothing will change unless people are accountable - - bring it back to the County Commissioners and the City Council.

Mrs. Hollis reiterated how she wanted to start a campground, but had difficulty complying with the public health standards. She wondered where the County Inspector was. She would like to see the City get rid of Section 8. Mr. Hollis asked if the City can approve or disapprove Section 8. Knudsen noted that is Federal.

Mr. Hollis said they have to live here. Mayor Purcell asked about going back to our own police department. Mr. Hollis replied that most people on a fixed income can't afford more. Mrs. Hollis said the alley way by the bowling alley needs to be cleaned up – it is like a highway.

Mike Opie asked if anyone has looked at MCA to see about eminent domain regarding urban blight, then take control of the property, fix it up, and sell it. Mr. Hollis responded "if I can't mow anymore, are you going to move me out?" Dyckman noted the City had done that with Hardin Trailer Court and is still trying to sell the lots.

Theresa Hert noted she had started a Crime Prevention Council and worked there for 7 years. Hardin needs a Community Watch program. That could be a good fix. Purcell noted on social media there is a good community watch. That could be part of the change.

Koebbe asked where the sanitarian was, you never see him. Baker noted he was the youngest in the room and would like to help with the community. He would like to see programs like the one where people helped build their own homes over by Town Pump. Sunset has trailers boarded up. His brother is moving back and doesn't want to deal with Sunset, Laurie, or Seder. There needs to be housing development.

Mayor Purcell asked about having Operation Sparkle two or three times a year and getting the youth involved. If the kids are involved, they will keep off the streets – pool, skateboard park, etc. Mrs. Hollis said that you can't go to the parks: people from Crow use them and you can't get in. Purcell responded as long as they're not abused, that is what the parks are for. The City crews do an excellent job of keeping them up. He asked about shopping services. Mrs. Hollis responded a clothing store. Mr. Hollis added that if something pops up here, they are open for six months, then go bankrupt. Look at the houses for sale.

Martinsen remembered when there were grocery stores here. A store wanted to come in, but they couldn't beat down City Council to come in. Now they take our wealth and move on. Then there are the teachers that live in Billings.

Mayor Purcell observed that we need to promote ourselves. Martinsen added that the community needs to pick up its image somehow. Purcell said there is a Main Street program that will help with establishing businesses. Chris Schneider asked how big is the prison. You could put a grocery store in there. That would bring in another business and so on. Pretty soon it is up and running. Randen Schoppe quipped that would be a "gated" community. Mrs. Hollis would like a clothing store with western clothes, etc. Now they are just jacking up the price of a business. Help the people who want to start a business; give them a break.

Purcell added there are opportunities out there. There is a community Foundation. What kind of industry should we have? Love's just came in. Mr. Hollis asked how many employees are at the power plant. The response was around 12. Purcell noted there are things in the works. Shirley Margheim said she had a hard time hearing in the back; too many people talking.

Purcell went back to the responses in the Community Needs Assessment when people were asked the five projects they wanted to see. Some of the top responses were sewer system improvements and economic development. Stahly Engineering is looking at grants to help us prepare to go forward with sewer improvements. The budget was approved with an increase in sewer rates increased gradually to help us prepare. Terry Avenue in front of the high school has been completed, and there are compliments on that. But there is plenty more to do like work on the potholes. We will work on the list, but it is a slow process. We will be using Coal Board money for the Terry Avenue project and are going for a grant for a firetruck.

CDBG (Community Development Block Grant) requires a public hearing as part of its process. Council voted to sponsor the hospital for CDBG. This is a community project. They intend to get it done within a year so we (City) can apply for a sewer grant next.

At 7:25 p.m. Bill Hodges and Kristi Gatrell presented the Hospital's plan to upgrade their facilities. The $10.2 million dollar project would expand the emergency department and add six additional rooms for patients. It would also address HIPAA concerns about patient confidentiality and add patient-controlled access for better security. They will look at borrowing about $7 million and hope to raise the other $3.2 million through grants and donations. The hospital will be up and functional the whole time. They hope to get $500,000 from the Coal Board and $450,000 from CDBG. There will be no increase in taxes because the hospital is not in a hospital district.

Mrs. Hollis asked if the rates would go up. Hodges responded that they will be within cost of living adjustments (COLA) despite receiving $47 reimbursement from Medicare/Medicaid for $100 worth of services. Chris Schneider asked about parking. Gatrell responded that the old clinic will be taken down so that a parking lot can be put in there. Schneider replied that should help with people parking in front of residents homes. When asked about new doctors, Gatrell answered that both St. V's and Bighorn Valley are recruiting.

Cliff Arbogast asked about dialysis. Gatrell replied that is was too expensive/cost prohibitive. Arbogast countered there is such a need. Gatrell noted that a transit bus could be possible, but Lame Deer and Crow Agency tried the dialysis. They are part of a big organization and could not make it work.

Hodges and Gatrell invited everyone to the groundbreaking on October 3 from 5:30-7:30. There will be food and entertainment.

At 7:40 Greg Steckler of Stahly Engineering reviewed the Wastewater Treatment Plant project. The existing plant was built in 1978 and has outlived its 20-30 years life expectancy. It will also address issues like installing a backup disinfection, removing particulates, and upgrading the headworks. To upgrade completely it is expected to cost $11.3 million. The City is being proactive and applying for as many grants as possible such as TSEP (Treasure State Endowment Program), RRGL (Renewable Resource Grant and Loan), and CDBG. They will also apply for Rural Development funding. That could be up to 75% grant funding. However, there are different percentages depending on funding. The timeline is to design next year and in 2020 go into construction.

Mrs. Hollis asked if the system would go down. Steckler responded that the existing system will keep operating. They will also reuse as much as they can such as tanks and mechanical equipment.

Purcell noted there will be more public hearings for both the hospital and the wastewater treatment plant. He added that the City Council works for you, and they are open to public comment. To get on the agenda, it needs to be scheduled the Thursday before a meeting. He is at the office every day and an appointment can be scheduled to meet with him.

The hearing concluded at 7:54 p.m.

_____
Joe Purcell, Mayor

ATTEST:

_____
Michelle Dyckman, Finance Officer/City Clerk

EXHIBIT D
Excerpts from City of Hardin Planning Documents

GROWTH MANAGEMENT PLAN

HARDIN, MONTANA

2009

HARDIN BIG-HORN CITY-COUNTY PLANNING BOARD

Tom Zelka, Chair

Cyndy Maxwell

Carla Colstad

Debbey Warren

Verna Santistevan

Jim Eshleman

Michael Martinsen

Linda Greenwalt

Bill Hodges

Gloria Menke, Administrative Assistant
Cal Cumin, AICP, Planner

HARDIN ~~TOWN~~ COUNCIL

Mayor Ronald E. Adams

Carla Colstad

William Hert

Kenton Kepp

Harry Kautzman

William Stobaugh

Harry Steinmetz, Jr.

BIG HORN COUNTY COMMISSIONERS

John Doyle, Chair

John Pretty On Top

Chad Fenner

GROWTH MANAGEMENT PLAN
HARDIN, MONTANA

TABLE OF CONTENTS

	Title	Page
1.	INTRODUCTION AND GOALS AND OBJECTIVES	1
2.	PLANNING AREA BACKGROUND AND SETTING	3
3.	POPULATION	12
4.	ECONOMY	16
	HOUSING	29
5.	LAND USE	34
6.	TRAFFIC CIRCULATION	56
7.	UTILITY INFRASTRUCTURE AND PUBLIC FACILITIES RECOMMENDATIONS	65
8.	PARK AND RECREATION	78
9.	IMPLEMENTATION AND RECOMMENDATIONS	83
10.	EVALUATION AND REVISION PROVISIONS	95
11.	LOCAL INTERGOVERNMENTAL COOPERATION	96

1. INTRODUCTION AND COMMUNITY PRIORITIES

STATISTICS

Latitude: 45.717623
Longitude: -107.618685
Elevation: 2902 feet
Persons per household: 3.34
Population: 3406
Households: 1411
Income per household: 73% of national average
Average house value: 63% of national average
Urban vs. Rural population: 74.3%
Married couples with children: 54.4%
Married: 59.3%
Speak only English: 82.3%
From out of state: 62.7%
Foreign born: 1.5%
Moved in the last 5 years: 50.1%
Work at home: 2.6%
Average travel time to work: 20 minutes
People enrolled in school (to gr 12): 30%
People with a Bachelor's degree or higher: 11.9%
People in the military + veterans: 20.6%
Unemployment: 9.2%
People below poverty line: 26.9%
Number of vacant housing units: 9.8%
Urban vs. rural housing: 74.7%
Homes owned by occupant: 63.2%
Rooms per home: 5.2
Detached homes: 67.6%
Median year structures were built: 1968
Median rent: 101% of national average
Rent as % of income: 25.1%
Median home owner cost: 80% of national average
Home owner cost of income: 20.7%

---Source: US Govt. Census 2000 (www.pikpuk.com)

In May 2008 the City of Hardin prepared a consultant-administered Needs Assessment and Income Survey and ultimately received 349 responses. The survey consisted of 45 questions taken from formats suggested by funding agencies as well as questions of particular concern to Hardin and covering a broad spectrum of issues; the opportunity to make other comments was also included in the survey-questionnaire format.[1]

At the end of the survey, the results were summarized with the question, "Please indicate what you feel should be the top five priorities for the County or City to improve on in the Hardin area?" The results are as follows in order of priority:

1. Police protection
2. Attracting new business
3. Drug control
4. Streets-road repair
5. School-quality of education
6. Recreation-teen activities
7. School-structural repairs
8. Animal control
9. Wastewater
10. Sidewalks, curbs and gutters

The 2003 Growth Management Plan for the City also included a survey of the civic interests of the populace. Of the findings of that survey, the importance of addressing wastewater and emergency services survive in the top priorities of the respondents.

[1] Great West Engineering

7. UTILITY INFRASTRUCTURE AND PUBLIC FACILITIES

The City's 1986 Comprehensive Master Plan (Volumes I through V) remains the basic long-range facility planning document. The following section identifies priority projects that have either not been fully implemented or are projects that address new problems that have arisen since the completion of the 1986 plan. The City Public Works Department has the ability to produce the maps herein at larger scale.

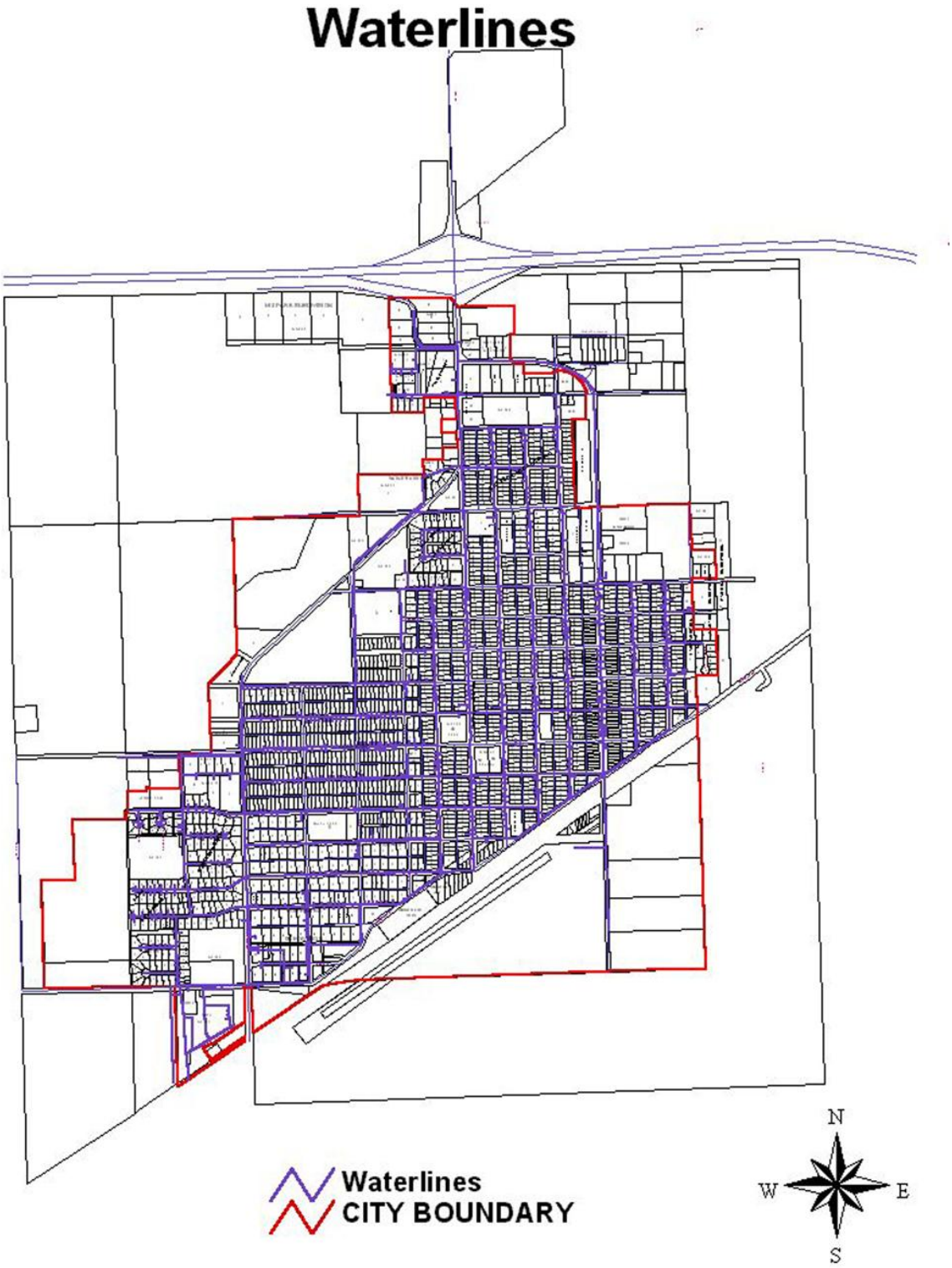
No attempt is made in this Plan to reproduce the utility improvements the City has completed in the Two Rivers Industrial Site, because the area has a separate Master Plan already adopted by the City. At some time in the future when more planning dollars are available, a comprehensive community-wide planning document can be prepared.

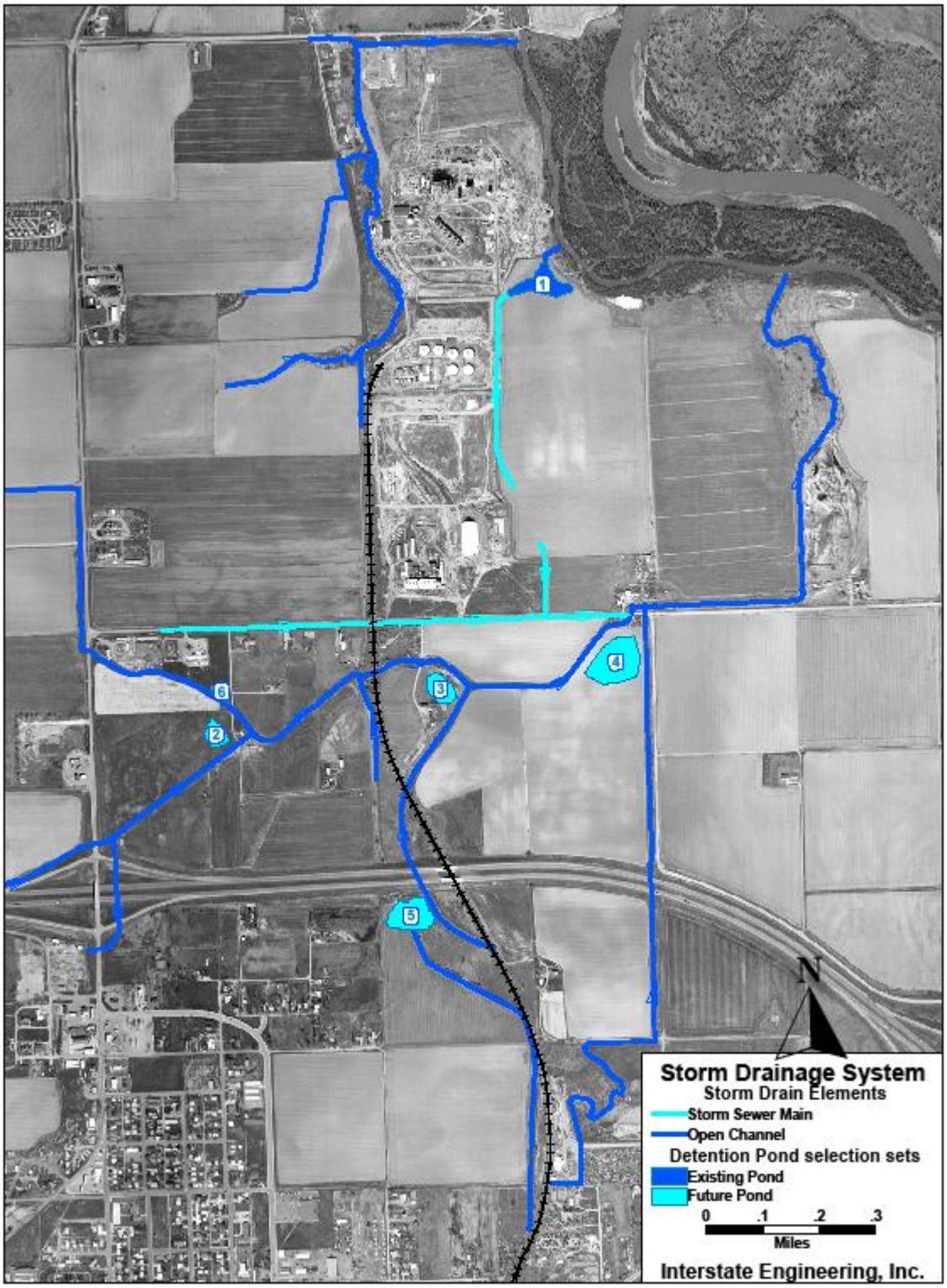
A. STORMWATER AND DRAINAGE MANAGEMENT

The Storm Drainage. Erosion Control & Flood Mitigation Master Plan prepared in 1986 by Big Horn Engineering & Surveying is the basic stormwater and drainage facility planning report of the City of Hardin. The recommendations and prioritization of projects listed below supplement the findings of the 1986 report and are based on recent development trends and facility needs that have not been fully addressed since the completion of the 1986 plan.

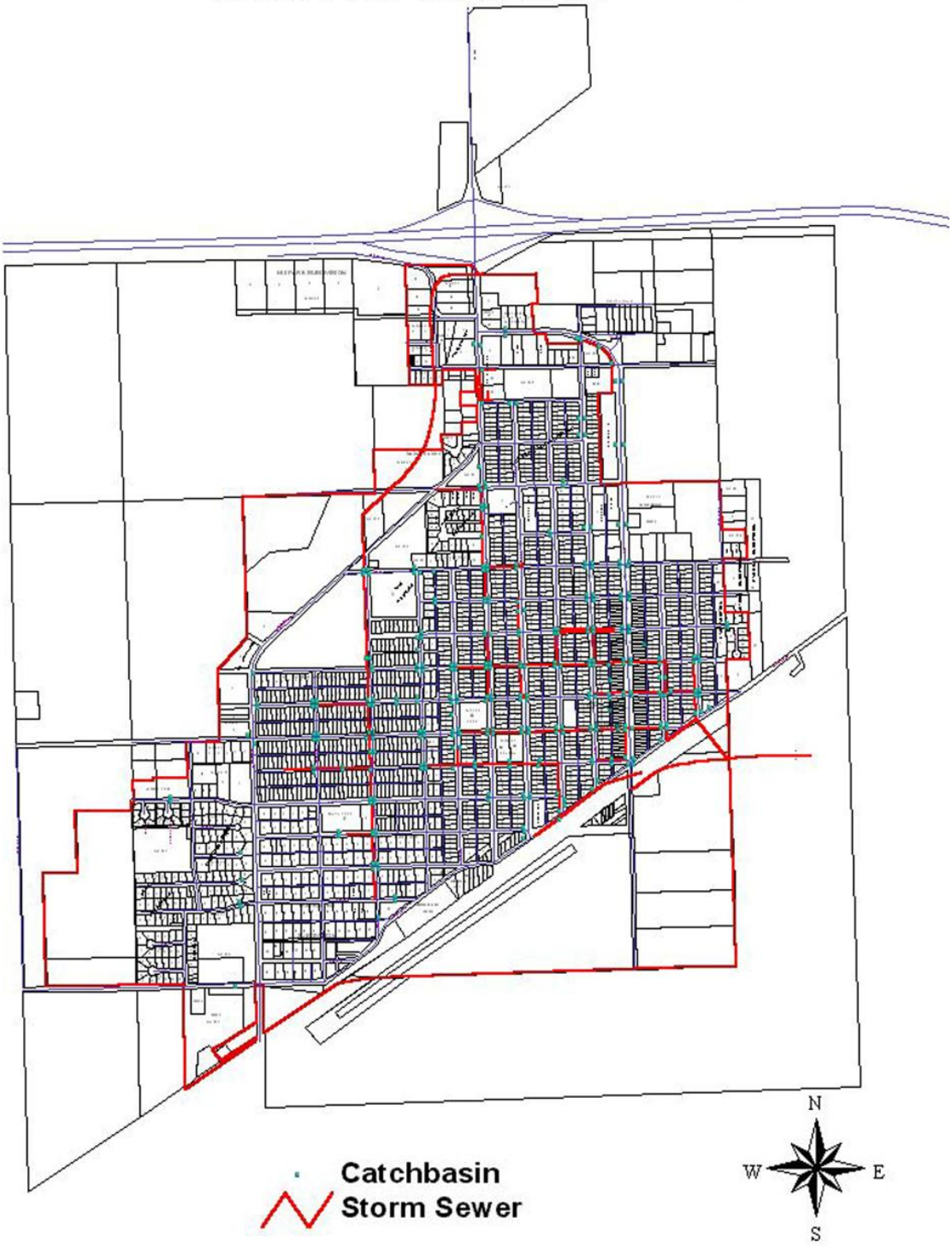
A key problem identified in the Storm Drainage. Erosion Control & Flood Mitigation Master Plan is the lack of a unified agency responsible for stormwater and drainage management in the Hardin area. Many of the severe drainage problems in Hardin result from drainage and irrigation practices outside the City and require coordination between rural and urban interests.

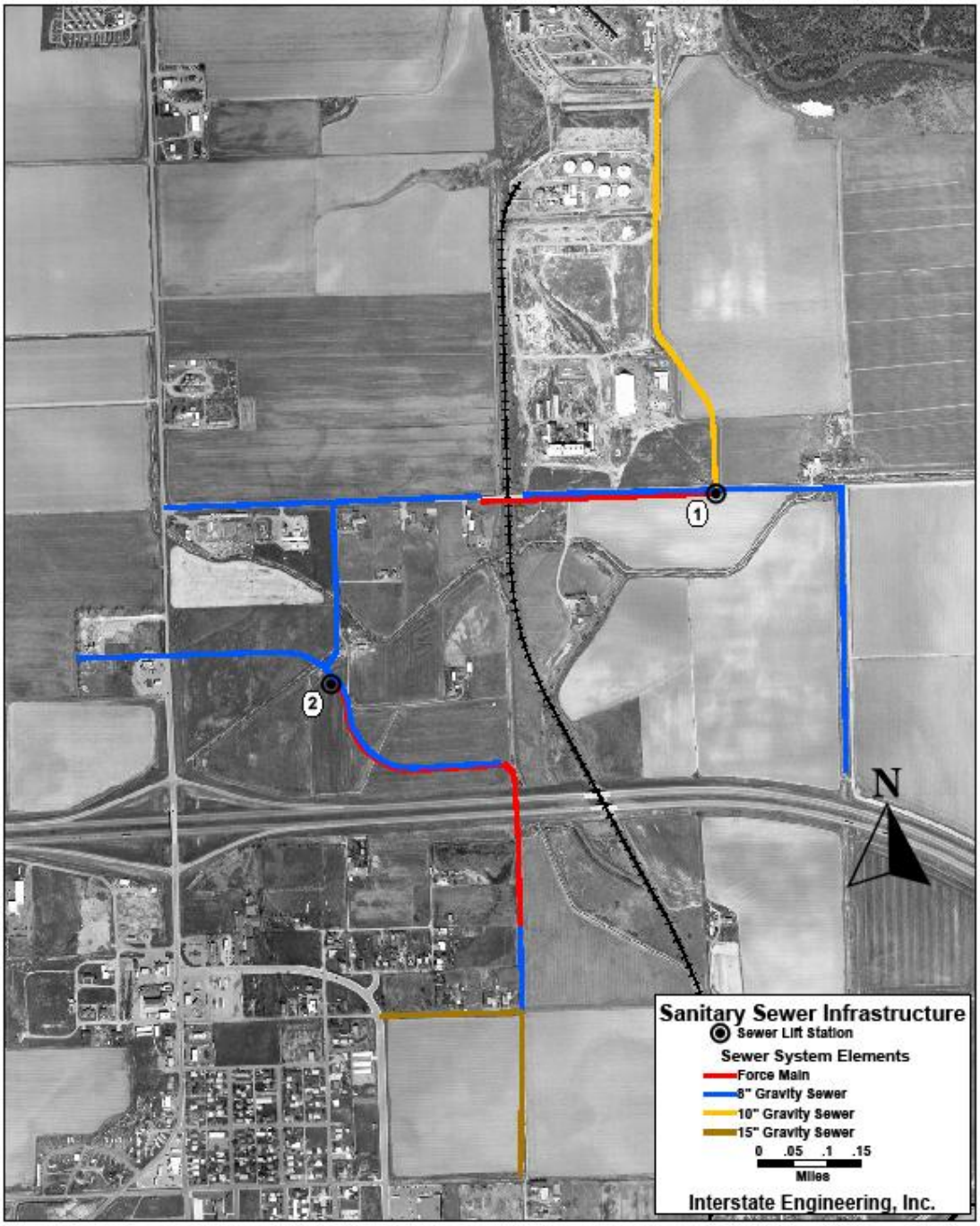
N
Water Distribution System
Water System Elements
8" Water Main
10" Water Main
12" Water Main
0
.1
.2
.3
Miles
Interstate Engineering, Inc.


Waterlines
Waterlines
CITY BOUNDARY
N
W
E
S

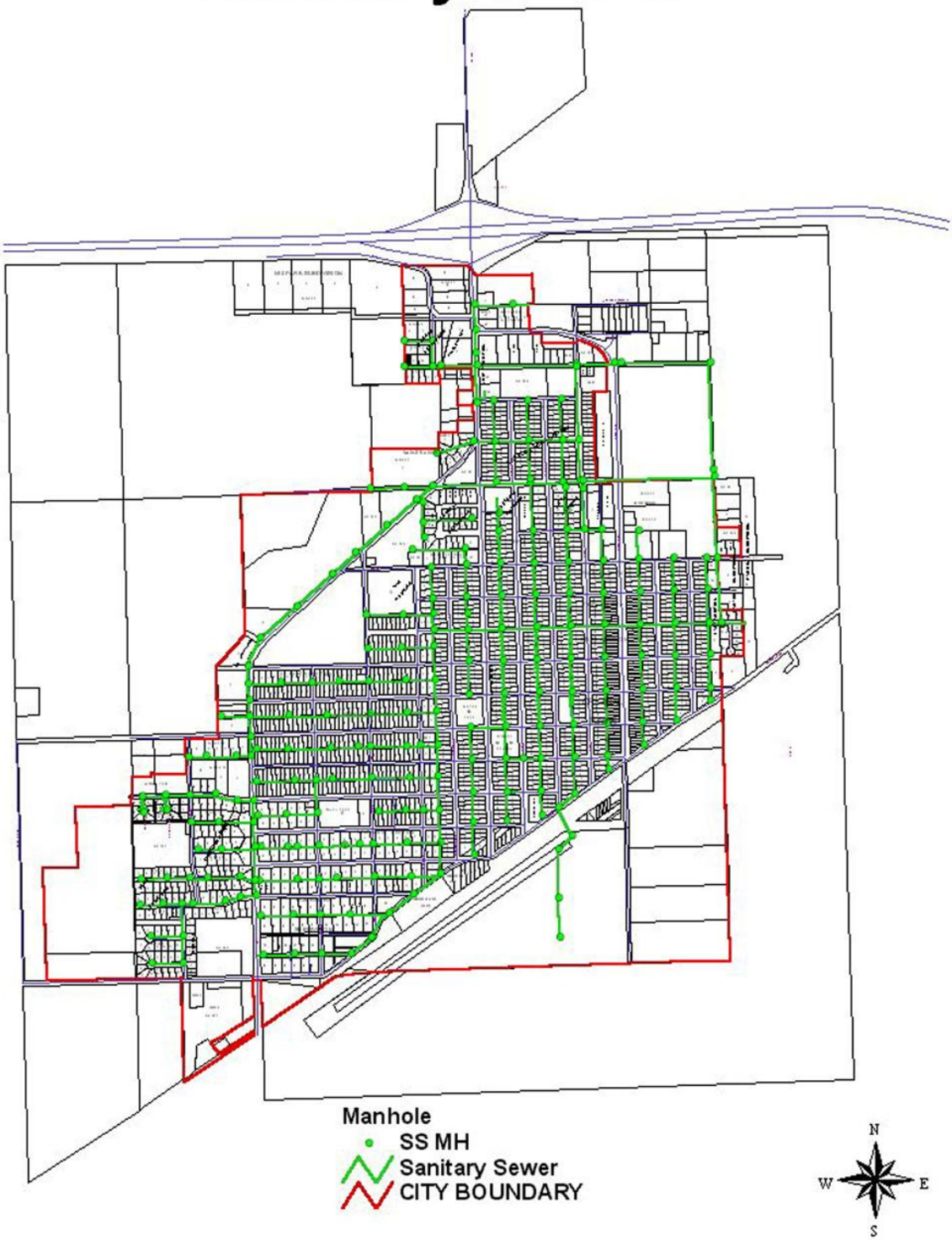

1
2
3
4
5
6
N
Storm Drainage System
Storm Drain Elements
Storm Sewer Main
Open Channel
Detention Pond selection sets
Existing Pond
Future Pond
0 .1 .2 .3
Miles
Interstate Engineering, Inc.

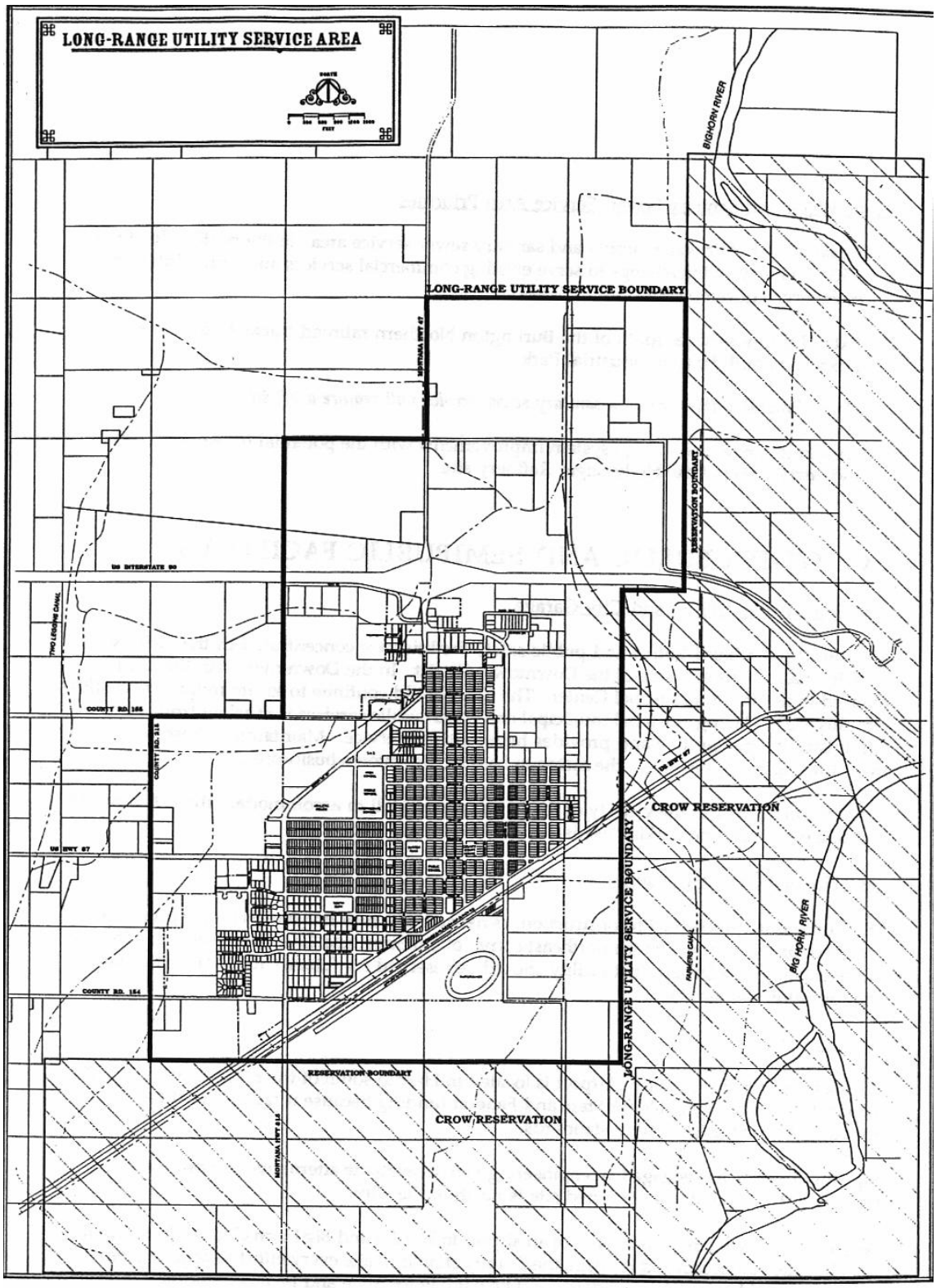
Storm Sewer




1
2
N
Sanitary Sewer Infrastructure
Sewer Lift Station
Sewer System Elements
Force Main
8" Gravity Sewer
10" Gravity Sewer
15" Gravity Sewer
0 .05 .1 .15
Miles
Interstate Engineering, Inc.

Sanitary Sewer





HARDIN · MONTANA

In the absence of effective regional drainage controls, the City needs to place greater emphasis on preserving and maintaining stormwater detention or retention basins in or near the City and reserving sufficient channels for efficient movement of stormwater through the City. The best opportunities for reservation of stormwater storage areas are at the time land is platted or surveyed into lots. The City needs to adopt local stormwater regulations so that these reservations are a required part of the platting process.

Where problems already exist or where there is a need for a basin-wide stormwater facility, the City should consider creating Special Improvement Districts (SID's) to finance stormwater management and drainage facility improvements.

Stormwater Management Priority Projects

1. Coordinate the control and maintenance of major culverts and drainage ditches and flood channels through drainage districts.

2. Adopt a City Stormwater Management Ordinance.

3. Construct stormwater detention basins as recommended in the Storm Drainage. Erosion Control & Flood Mitigation Master Plan.

4. Reserve the natural wetland and floodplain west of Mitchell Avenue, across from the Community Activity Center and High School Athletic Fields, as a permanent stormwater storage basin. The site should also function as a wetland/conservancy educational project for the school system. This will become more important as this area develops residentially with new City growth.

B. PUBLIC WATER SUPPLY AND SANITARY SEWER SYSTEM

The Water and Sanitary Sewer Master Plan prepared by Big Horn Engineering & Surveying in 1986 remains the City's long-range planning document for the municipal sanitary sewer and public water supply systems, particularly with respect to facility upgrades and design issues. The recommendations in this section refer primarily to financing policies and service areas.

Hardin's water collection and treatment facilities are closely monitored by the City and by agencies such as State Department of Environmental Quality (DEQ). Such facilities constantly need upgrading because of new standards or technology or because of factors caused by increased demand or age. A Comprehensive Performance Evaluation was made of the water treatment plant in October 2007 by Montana Rural Water Systems (MRWS) and DEQ. Engineering consultant, Interstate Engineering, Inc. also prepared an

update of the Treatment Plant in June 2008. The consulting engineer estimated the costs of addressing his findings at $680,000 to $1,200,000.[1]

In reviewing the current condition of the Water Treatment Plant, the Facility Operator notes the biggest needs are for more settling time for water from the intake--to reduce turbidity and sedimentation without overloading the present capacity of equipment; the need for additional, better filters, and the need for larger filters. The centrifugal pumps at the Water Plant need to be replaced with submersible ones. (The existing pumps are getting so old that replacement parts are impossible to get.) The Facility Operator also indicated that there are many more issues with the water treatment system than just the major ones listed here. He feels that not addressing these needs now will greatly impact the City's ability to deal with future growth. [2]

A key issue with respect to public water and sanitary sewer service is clarifying the policy with respect to expanding the service areas. Because of the physical conditions of high ground water and poor groundwater quality, it is desirable to minimize the use of private septic systems and private wells for domestic water use. Most of the Hardin area is rated as having "severe limitations" for private septic systems in the Big Horn County Soil Survey.

The City has received numerous requests for utility service extension. As a public policy, the City has not extended service unless the serviced properties annex or enter into a waiver agreement with respect to opposition to future annexations. With the exception of connections allowed at the time easements were granted for the Westside water storage facility, all utility extensions have been financed by the private property owners or developers.

The reason for the policy requiring annexation is to preserve and enhance the tax base of the City. Without annexation, the City's tax base will deteriorate, and the City will be unable to continue to support needed services and facility expansions. This principal applies to nearly every city. Where immediate annexation is not feasible due to lack of contiguity to the City and intervening unincorporated areas, waivers of objection to annexation should continue to be required.

The financing policy requiring private financing of water and sewer line extensions is also the only equitable means to finance utility service line extensions. It would be neither fair nor practical for the City to expect existing taxpayers living within the City to shoulder the burden for extensions. The costs of these improvements should be borne by the benefiting property owners and/or developers, unless State or Federal funding is made available to address specific problem areas or unless a tax incremental financing district is created to provide services to prospective industries.

With both of these policies in mind, the City should nevertheless anticipate future service area expansion to accommodate new development, particularly in the planned industrial areas and the

[1] William G. Enright, PE, Interstate Engineering, Inc., Technical Memorandum No. 2, Update of Items Completed, Hardin Water Treatment Plant, June 4, 2008
[2] Tony Maxwell, Water Treatment Plant Supervisor, interview

1-90/Highway 47 interchange area. The City should actively encourage landowners in these areas to annex into the City.

Public Water and Sanitary Sewer Service Area Priorities

1. Continue to support the Two Rivers Industrial site by further extention of City services.

2. Provide for long-range development by extending utility services south of the BNSF Railroad tracks to serve the proposed South Hardin Industrial Park. *Note: Providing this area with sanitary sewer service will require a lift station.*

3. Work with residential developers as the area along Cemetery Road/VanZandt Road grows in response to the development of the new County Airport.

7.C. OTHER PUBLIC AND SEMIPUBLIC FACILITIES

City Hall, Water Utility, and City Garage

The municipal administrative and public safety facilities are concentrated in the vicinity of the City Hall on the east side of the Downtown district. In the Downtown Plan this area is referred to as Hardin Municipal Center. The City should continue to locate municipal facilities into this area. Having clustered municipal and other public services is efficient from an administrative perspective and provides better citizen service. Maintaining these facilities Downtown also helps maintain the customer base for Downtown businesses.

There is ample area in the vicinity of the existing City Hall to accommodate the City's future building expansion and parking needs.

New Fire Station Construction

The City should proceed with construction, as needed, of a new fire station on the property acquired for this purpose on the northeast corner of 5th Street and Cheyenne Avenue. The site of the existing Fire Department facility should be reserved for future City Hall expansion and/or municipal parking.

Airport

The current Hardin Airport is owned by Big Horn County and located Fairgrounds south of the BNSF Railroad tracks east of Center Avenue on 64 acres of ground. Hangers,

Fairground structures, above ground fuel storage tanks, and grain elevators have all encroached on the airspace of the Airport.

The pavement at the Airport was chip sealed in 1986. Runway 04/22 is approximately 60 feet wide and 3,542 feet long with a gross weight rating of 15,000 pounds for single wheel and 23,000 pounds for dual wheel configurations. Displaced thresholds consist of 224 feet on Runway 04—without lighting--and 168 feet on Runway 22. (The information concerning both the existing and planned airports is taken from Morrison-Maierle's *Hardin Airport Relocation, Environmental Assessment Report, December 2006.)*

The Airport is classified by the Federal Aviation Commission (FAA) as Airport Reference Code (ARC) A-1 but does not meet those standards. Issues that affect the rating—and the non-compliance with FAA Standards include, but are not limited to, inadequate setbacks from the centerline of the runway for everything from buildings to power poles, lack of adequate taxiways and the locations of the existing taxiways, and grass growing on the runways. Recently a new cell tower was constructed which enters the Airport's Horizontal Surface Zone, an FAA-required, protected airspace. Furthermore, any future expansion of this site is restricted by existing facilities and roadways.

The Airport is an uncontrolled facility for Visual Flight Rules (VFR) use only and is mainly used by area agriculture, small business, and some pleasure flying. Existing amenities at the Airport include a lighted wind indicator, airport beacon (currently out of service indefinitely), Unicom (122.80), and a non-standard runway-edge lighting system. Among the ten sites reviewed by the airport engineering consultants, the existing Airport location is the worst. The closest airline carrier is at Billings' Logan International Airport.

The *Environmental Assessment* for the new airport states:

> "The need for development of a new airport is largely based on safety issues and not the need for additional capacity. Ultimate development of the airport will allow for a larger variety of aircraft resulting in potential increase in the number of operations. However, such an increase in operations without an increase in local economic drivers would likely be small so as to be negligible.
>
> Big Horn County desires to provide safe and adequate aviation services and facilities to serve the existing and future needs of the flying public as well as being able to accommodate the area's economic development and growth. The current airport location, with its numerous airspace obstructions, cannot meet that criteria."

The new airport (the I-90/Fairview Cemetery Site) is planned approximately 2.5 miles west of where Highway 47 crosses I-90 and will be at an elevation of 3050 feet above sea level. The primary runway (75-feet wide by 4,950-feet long) will be a little less than a

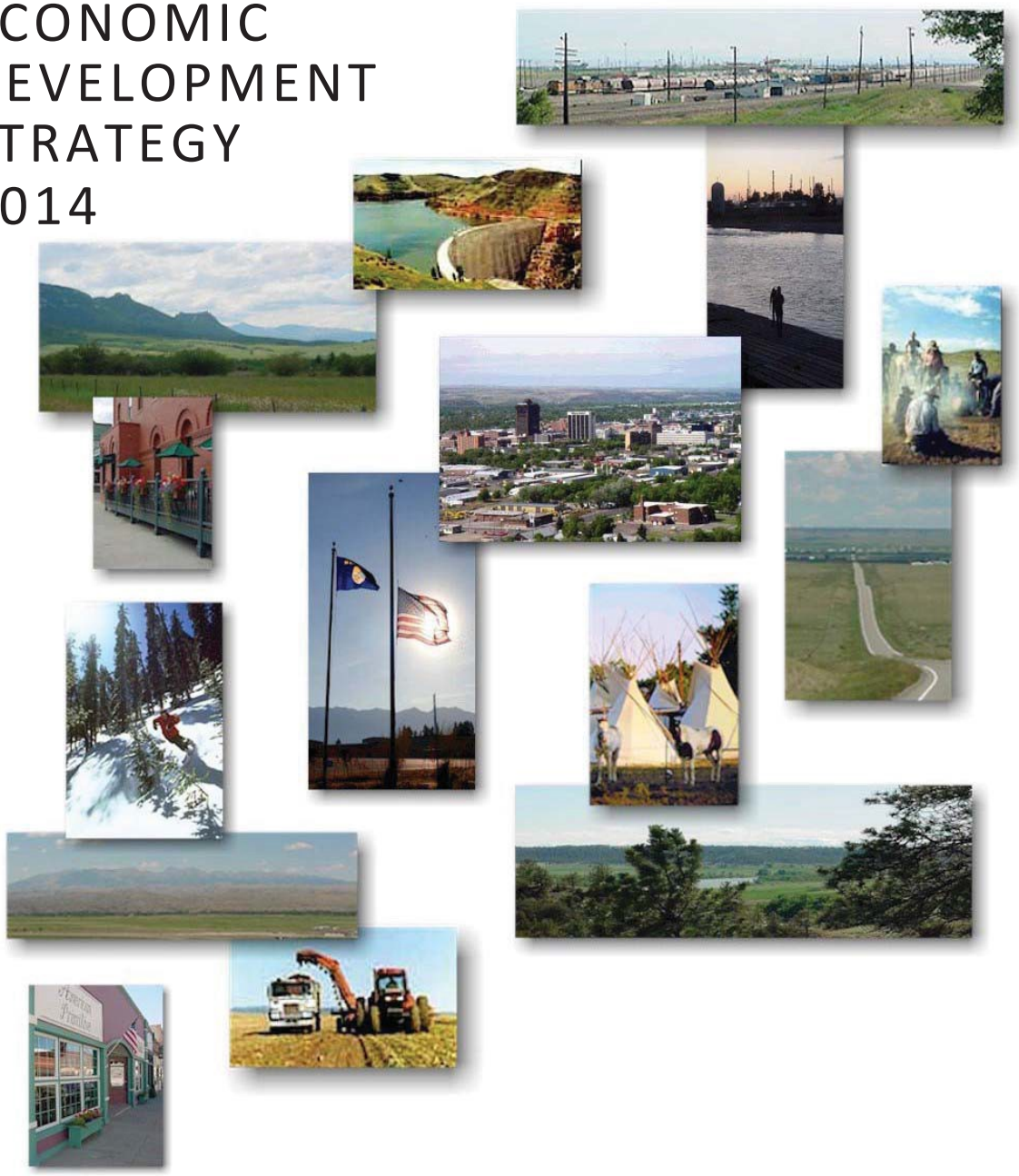
quarter mile south of and parallel to I-90. It will provide an aircraft turn-around area at each runway end (or partial parallel taxiway), aircraft parking apron, runway and taxiway edge lights, airport beacon, Precision Approach Path Indicator, wildlife perimeter fence, hangar access taxi lane, and entrance road—all in compliance with FAA Standards. The new airport will be designed to handle small airplanes with less than ten passenger seats. No crosswind runway is planned; the planned runway will catch 93.45 percent of the wind.

St. Vincent Health Care/Hardin Clinic

The Hardin Clinic, located on the southwest side of Hardin, needed additional land area for clinic expansion and parking. A proposed expansion area consisting of the eastern 140 feet of South Park was approved by voter referendum.

At the time the clinic facility is built, a sufficient landscape buffer should be constructed on the west side of the parking area to buffer the remaining portion of South Park from the clinic and parking areas. A chain link fence separates the Clinic property from the ice skating areas.

COMPREHENSIVE ECONOMIC DEVELOPMENT STRATEGY 2014



Beartooth

RESOURCE CONSERVATION & DEVELOPMENT
ECONOMIC DEVELOPMENT DISTRICT

PO Box 180, 128 South Main Street, Joliet, MT 59041 Voice: 406-962-3914

TABLE OF CONTENTS **PAGE #**

1	INTRODUCTION Executive Summary Vision and Mission CEDS Adoption Process	1
2	ORGANIZING AND STAFFING FOR ECONOMIC DEVELOPMENT Organization Overview Management Structure	3
3	REGIONAL BACKGROUND Regional Background Geography Population Transportation Access Workforce Development Environment Economy Resources Other Pertinent Information	9
4	CEDS GOALS AND OBJECTIVES – DEFINING REGIONAL EXPECTATIONS	59
5	COMMUNITY AND PRIVATE SECTOR INVOLVEMENT	68
6	ANALYSIS OF ECONOMIC DEVELOPMENT PROBLEMS AND OPPORTUNITIES	69
7	CEDS PLAN OF ACTION AND STRATEGIC PROJECTS, PROGRAMS, AND ACTIVITIES	78
8	PERFORMANCE MEASURES	110
9	DISASTER AND ECONOMIC RECOVERY AND RESILIENCY	112
10	APPENDICES	
	• Appendix A: Department of Labor and Industry County Profiles	125
	• Appendix B: Resolutions of Support	165

Yellowstone River. BNSF has implemented a product recovery system which pumps ground water and recovers materials with an oil separator.

Waste Water Treatment

There are 29 permitted wastewater treatment facilities in the area. There are 4 municipal systems in Yellowstone County. Both Crow Agency and Lodge Grass are experiencing serious problems with their systems which are quite old. Not only are the sewage lagoons full and starting to fail, but there appears to be failure in the distribution system. In Crow Agency this is causing contamination of the drinking water. From 2007 to 2014, the Apsaalooke Water and Wastewater authority has made significant strides in making improvements to the Crow Tribe systems.

Outside the cities, the concern of course is leakage or failure of the septic type systems. Failure can result in contamination of nearby wells, and can even move through groundwater into surface water creating problems with excessive fertilization, the spread of disease, or ingestion of toxic materials. Because of the increase in subdivision activity in recent years, project proponents are required to develop plans to insure appropriate wastewater treatment.

Water Quality

Water quality in the region is generally good. Rivers and streams typically support recreational fishing. The following are considered blue ribbon trout streams: the Big Horn River, portions of the Clark's Fork of the Yellowstone, and Yellowstone Rivers, the Boulder River, and Stillwater River. Also in that category are several creeks flowing from the Absaroka and Beartooth Mountains.

However, there are several water quality issues facing the region. The first involves the potential effects of hazardous waste sites on ground and surface waters. This was discussed under the Hazardous Waste Sites section.

Secondly, recreational usage of the area's streams and rivers is increasing. Water quality for the fisheries, boating and other recreational uses is important to maintain. This needs to be balanced with the agricultural, manufacturing, and human needs for water. Water quality problems include sedimentation from irrigation return flows and increased temperature.

A third issue has emerged on the Yellowstone River itself. Following major flooding in the late 1990's, a task force was appointed by the Governor to study the cumulative impact of human activity on the river. By 1999, a group of Conservation District leaders had assembled a coalition in the mid and lower Yellowstone to conduct an assessment of this reach of the river. At this point, 14 Districts have become active in addressing the future of the Yellowstone.

Finally, water quality needs to be maintained and improved for many municipal water systems. Some of these communities may not be able to afford upgrades to meet the newest EPA standards**.** Please see the infrastructure section for more details.

SECTION 4

CEDS GOALS AND OBJECTIVES – DEFINING REGIONAL EXPECTATIONS

Vision:

Beartooth Resource Conservation and Development Area, Inc. envisions a strong healthy economy for the area, one that offers opportunities for growth while protecting the unique resources of the region.

Mission:

Beartooth RC&D is sponsored and directed by local people as a regional vehicle to improve the economic and social conditions through the conservation, utilization, and development of the natural and human resources of the area.

Beartooth RC&D provides a means to focus the resources of people with various backgrounds, expertise, and points of view. People working together can develop and implement a plan which will address problems or issues that affect their quality of life. Beartooth RC&D is essentially "Citizens Building Stronger Communities".

Goals and Objectives:

Infrastructure

Goal 1: Assist in the development of infrastructure to enhance the quality of life of people in the area and support future development.

Narrative: The general condition of water, sewer, and other public facilities is good in many communities. Noted exceptions include very poor water and sewer facilities on the Crow Reservation at Crow Agency, Lodge Grass, and Wyola as well as off reservation communities in Joliet and Absarokee. Many communities are facing new development and growth which will require additions or expansion to existing infrastructure. A regional solid waste system may be needed in the near future. Development without consideration of offsite effects is a particular concern with new subdivisions which burden roads, schools, and other infrastructure. Many roads need new surfaces and bridges, however, most roads are uncongested. Most communities have low indebtedness and do have the ability to provide local funds to match outside funding sources.

Water/Waste Water

Objective 1: To assist at least 3-5 communities in the next five years in meeting needs for water and wastewater treatment facilities.

Strategies: a) Provide information on inventory, the needs assessment process, and funding opportunities to all towns identified in the CEDS.

b) Assist communities to conduct needs assessments, income surveys and write planning grant applications.

c) Assist private and public entities in the development of wastewater/water systems as they deem necessary.

d) Conduct a regional assessment to determine the feasibility of consolidated wastewater/water districts, with an emphasis on the Crow Reservation.

e) Take advantage of Montana's congressional delegation to position projects for federal funding.

f) Provide technical assistance for the Treasure State Endowment Program for grant applications related to infrastructure improvements.

g) Supply letters of support as requested for water and sewer project funding.

Housing

Objective 2: To provide first time homebuyer training and counseling to at least 1,000 households in the next five years.

Strategies a) Market our monthly training more aggressively in the rural communities.

b) Close 125 down payment assistance loans to qualified individuals by 2019.

c) Provide communities with information/education to complete planning process including: inventory, needs assessment, plan of action, and where to get help to do their projects – workshops or series of workshops in each county (FMHS, MTDOC, HUD, housing authorities, Crow Tribe (low cost, getting as many people from each town involved).

d) Explore the potential of developing regional and local housing authorities.

e) Exploring mixed-use commercial and residence options in business districts within the region.

f) Achieve HUD certification as a Housing Counseling Agency.

Solid Waste

Objective 3: To work with the Billings landfill and other service providers to develop and implement a solid waste reduction plan that will at least double the landfill's lifespan.

Strategies a) Assist communities or private businesses in assessing the feasibility of recycling, solid waste reduction, and reuse.

b) Assist in development of ventures to create and use recycled materials (tires, glass, aluminum, compost).

Transportation

BEARTOOTH RC&D ECONOMIC DEVELOPMENT DISTRICT ACTION PLAN

Big Horn County
Goal I: Infrastructure

PRIORITY	OBJECTIVE	PROJECT	# OF JOBS	SHORT TERM 1-2 YR	LONG TERM 3-5 YR	LOCAL LEADERS	OTHER ASSISTANCE	WHAT ASSISTANCE NEEDED FROM ECONOMIC DEVELOPMENT DIST.
H	2	Affordable housing, Hardin.		x	x	City of Hardin	RD	Help with technical assistance
H	2	Quality housing needed reservation-wide		x	x	Crow Tribal Housing Authority	RD, ICDBG	Help with technical assistance.
H	1	Solid waste transfer sites needed in Pryor, Fort Smith, Crow Agency	10	x		County Commission		
L	4	Pryor to Edgar Highway.			x			
M	4	Airport relocation, enhancements.		x		County Commission	FAA	
L	1	Waste water treatment system in Hardin; maintenance.			x	City/Water Dept.		Funding Sources
L	2	Housing rehab, county- wide.	50	x	x	City, Tribe	ICDBG	Funding Sources
L	4	Streets improvements in Pryor.			x	Tribe		
H	1	Deteriorated collection mains, new aerated lagoon needed in Lodge Grass.		x		Town	CDBG	Letter of support
H	1	Water system; well, hydrants, treatment in Pryor.			x	Tribe, BIA	TSEP,ICDBG, EPA,ONAP, HUD	Technical assistance and grant writing.
H	1	Sewer improvements in Pryor.			x	Tribe, BIA	TSEP,ICDBG, EPA,ONAP, HUD	Technical assistance and grant writing.
L	1	Lagoon repairs, enlargement in Pryor.			x	Tribe, BIA	TSEP,ICDBG, EPA,ONAP, HUD	Technical assistance and grant writing.
H	1	Crow Agency water/sewer improvement, collection mains and relocation of a critical lift station.		x		Tribe, BIA	TSEP,ICDBG, EPA, RRGL	Technical assistance and grant writing.

H	1	Wyola water system improvements.		x	x	Tribe, BIA	TSEP,ICDBG, EPA,ONAP, HUD	Technical assistance and grant writing.
L	3	Recycling program.			x	County		
L	4	Sarpy Basin Road improvements, maintenance.			x	County, Mine	MDOT	Assist with technical support
M	4	Rail Development & Improvement/Ind. Park		x	x	City, TRA, BNSF	MDOT	Planning and financial
H	1	Photovoltaic system at the wastewater lagoon in Crow Agency.	5	x		Tribe	RRGL	Letter of support.
H	4	Makawasha Avenue sidewalk in Crow Agency.		x		Tribe	MDOT	Letter of support.
M	1	County Jail.	250	x	x	TRA		

BEARTOOTH RC&D ECONOMIC DEVELOPMENT DISTRICT ACTION PLAN

Big Horn County

Goal II: Economy ***Action Plan, Beartooth RC&D/EDD***

PRIORITY	OBJECTIVE	PROJECT	# OF JOBS	SHORT TERM 1-2 YR	LONG TERM 3-5 YR	LOCAL LEADERS	OTHER ASSISTANCE	WHAT ASSISTANCE NEEDED FROM ECONOMIC DEVELOPMENT DIST.
M	8	Big Horn County Fairgrounds, new complex.		x	x	C.D.		Technical Assistance
L	8	Development facilities at fishing access sites and discuss preventing spread of trout disease, better maintenance.		x		Chamber	FWP	
L	3	Arts & crafts manufacturing in Pryor as well as other tribal areas.		x	x	Tribe	BSTF	Technical Assistance
L	1	Support tax reform for businesses in Hardin.		x	x	Econ. Dev. Dir./Chamber		Information
H	1	Attract small businesses to the Hardin area.		x	x	City/Chamber	BSEDA	Information
H	8	Expand tourism to attract Battlefield tourists to Hardin		x		Chamber	Southeast Montana Tourism	
H	8	Virtual Museum at Jail House Gallery in Hardin; art industry promotion.		x		Jail House	Southeast Montana Tourism	Funding
L	7	Renovate old carpet mill building at Crow Agency.		x	x	Tribe	EDA	EDA Grant
M	1	Recruit new business opportunities to airport.		x	x	County/TRA/City Airport Board		

BEARTOOTH RC&D ECONOMIC DEVELOPMENT DISTRICT ACTION PLAN

Big Horn County
Goal III: Communication ***Action Plan, Beartooth RC&D/EDD***

PRIORITY	OBJECTIVE	PROJECT	# OF JOBS	SHORT TERM 1-2 YR	LONG TERM 3-5 YR	LOCAL LEADERS	OTHER ASSISTANCE	WHAT ASSISTANCE NEEDED FROM ECONOMIC DEVELOPMENT DIST.
M	4	Establish priorities for legislative recommendations from Hardin.		x		Economic Development Director, Chamber		Information
H	5	Enhanced radio towers, emergency communications.		x	x	County		
M	6	Enhanced cell phone/broadband access.		x	x			

BEARTOOTH RC&D ECONOMIC DEVELOPMENT DISTRICT ACTION PLAN

Big Horn County
Goal IV: Services ***Action Plan, Beartooth RC&D/EDD***

PRIORITY	OBJECTIVE	PROJECT	# OF JOBS	SHORT TERM 1-2 YR	LONG TERM 3-5 YR	LOCAL LEADERS	OTHER ASSISTANCE	WHAT ASSISTANCE NEEDED FROM ECONOMIC DEVELOPMENT DIST.
M	2	Youth Center and programs needed in Lodge Grass.						
M	1	Prevention programs & law enforcement needed in Pryor; fire coverage structure.				Tribe		
M	1	Drug & alcohol treatment needed in Hardin; 72 hour care.		x		City/County Law Enforcement / Ministerial Board		
M	1	Fire hydrant operability in Pryor, Lodge Grass, and Wyola.		x		DES		
L	4	Crow public transit improvements.	15		x	Tribe	US Federal Transit Administration	

BEARTOOTH RC&D ECONOMIC DEVELOPMENT DISTRICT ACTION PLAN

Big Horn County
Goal V: Natural Resources ***Action Plan, Beartooth RC&D/EDD***

PRIORITY	OBJECTIVE	PROJECT	# OF JOBS	SHORT TERM 1-2 YR	LONG TERM 3-5 YR	LOCAL LEADERS	OTHER ASSISTANCE	WHAT ASSISTANCE NEEDED FROM ECONOMIC DEVELOPMENT DIST.
L	3	Soap Creek reclamation on the Crow Reservation.			x	CD and NRCS		Planning/Funding
H	3	BIA Ditch Co. at St. Xavier.			x	CD and NRCS		
L	3	West Bench irrigation project water reserve on the Crow Reservation.			x	CD, NRCS, Crow Tribe		Information, Education, Planning
L	3	Koyama Pond			x	FWP/County, CD		Funding/Technical Assistance
H	1	Alternative energy development including wind farm and hydro.	75		x	Tribe		Funding/Technical Assistance, grant writing

BEARTOOTH RC&D ECONOMIC DEVELOPMENT DISTRICT ACTION PLAN

Big Horn County
Goal VI: Human Capital ***Action Plan, Beartooth RC&D/EDD***

PRIORITY	OBJECTIVE	PROJECT	# OF JOBS	SHORT TERM 1-2 YR	LONG TERM 3-5 YR	LOCAL LEADERS	OTHER ASSISTANCE	WHAT ASSISTANCE NEEDED FROM ECONOMIC DEVELOPMENT DIST.
H	2	Establish additional housing for Hardin.		x		City	RD	Development/Information

Coal Board Grant Applicant – City of Hardin #0889
Staff Report / December 2019 Meeting

Applicant: City of Hardin
Project: Upgrade components of the wastewater collection system and treatment plant
Coal Board Funds Requested: $ 500,000
Total Project Cost: $11,265,000

Project Information: The applicant is requesting $500,000, of a total project cost of $11,265,000, in Coal Board funds to upgrade components of the wastewater collection systems and treatment plant or order to meet EPA and DEQ standards. The request to the Board is 4% of the project costs. Treated effluent is discharged to the Bighorn River. Several components of the treatment plant need upgrades to meet discharge standards. **The applicant is a designated unit.**

Categories

Need:

- **Applicant**
    - The applicant states that the overall system has deficiencies including excessive inflow and infiltration (I&I), no grit or grease removal system, insufficient influent treatment capacity, freezing issues and flow issues in clarifiers, lack of backup power, outdoor UV disinfection system, foaming in oxidation ditch.
    - The applicant states that there is an increased demand on wastewater services and the facility due to growing population and economic activity provided.
    - The applicant has been deemed significantly non-compliant by the EPA in a 2017 inspection.
    - The applicant states the population of Hardin is 51.85% low to moderate income and 22% of residents live in poverty, thus grant funds are critical to support the cost of infrastructure improvements, which are partly passed on to residents.
    - The applicant provided documentation of an environmental assessment, public notice, and agenda and meeting minutes for the public meeting where the environmental determination was made in the preliminary engineering report (PER) included in the application.
- **Staff Review:**
    - Staff has determined that the environmental process is complete.
    - The proposed solution will make upgrades to the mechanical treatment plant, replace deteriorated mains and manholes along with other improvements.
    - The existing system is aged and has several failing components that do not allow for proper treatment, discharge, nor to meet standards and discharge permit limits.

Degree of Severity of Impact:

- **Applicant:**
    - The applicant states that the coal production at the Absaloka mine, located approximately 30 miles east of Hardin has fluctuated greatly over the past 18 years. The applicant discusses the impacts of Spring Creek Mine, West Decker Mine and Rosebud Min on the city.
- **Staff Review:**

- Documentation provided in the application included: data from the 2021 Biennium Coal Impacted Local Governmental Units Designation Report and narrative in the application.

Availability of Funds:

- **Applicant:**
  - The applicant states that without Coal Board funds, the city will have to rely more heavily on loan funding through RD and SRF to ensure project completion.
  - The applicant states that increased debt will impact the wastewater rates for residents.
- **Staff Review:**
  - **The applicant is a designated unit.**
  - Revenues related to the Coal Natural Resource account are not sufficient to fund the costs associated with this project request.

Degree of Local Effort in Meeting Needs:

- **Applicant:**
  - The applicant states that other funding sources may include TSEP, RRGL, SRF, CDBG, DLA, USDA RD and city funds and status of the funding sources are included in the application.
  - The applicant included millage rates over the past four fiscal years.
  - The applicant has pledged a cash reserve to the project for $100,000 and will provide a cash match in the form of revenue bond proceeds that will result in loans from USDA RD and SRF.
  - The city contributed funding to the PER and the I&I study.
- **Staff Review:**
  - Millage rates provided by MDOR data demonstrates the average millage rates for the previous three years are lower than the current year millage rates. MDOR data years: 2016-2017, 2017-2018, 2018-2019.
  - The applicant is contributing 1% of the project cost.

Planning & Management:

- **Applicant:**
  - The applicant makes the case that the Hardin community will be adversely impacted economically as the demand for domestic coal continues to decline.
  - Regarding community planning, the 2009 Growth Management Plan was described in the application, which identified improvements to the wastewater infrastructure as one of the city's top ten priorities.
  - Other key planning documents mentioned were a 1986 long-range plan for Hardin's sanitary sewer and public water supply, a 2018 Capital Improvements Plan (CIP), and the Beartooth RC & D Comprehensive Economic Development Strategy (CEDS). A copy of the 2018 CIP was included, as well as excerpts from the Growth Management Plan and 2014 CEDS document.

- **Staff Review:**
  - Overall, it appears that the community has been proactive in planning for its community development needs. The 2018 CIP also included minutes from a September 6, 2018 Community Needs Assessment Public Hearing which reviewed results from a Community Needs Survey mailed out in June 2018.
  - The need to improve Hardin's sewer system was mentioned as a community priority.

Grant History:

Since 2009, the applicant has been awarded 9 projects totaling $1,703,028.

For more information on Coal Board projects for this or any other applicant, please visit the Commerce Grants Database at https://commerce.mt.gov/About/FundedProjects.

Supplemental Documents (not included in this staff report): maps, PER, I&I study, financial information, EPA compliance information, CIP, community needs survey, excerpts from the Growth Management Plan, comprehensive economic development strategy, and environmental review documents included in the PER.

Staff Summary:

See engineer memo.

A preliminary engineering report (PER) including documentation of the environmental review process was included in the application totaling over 500 pages. The table of contents and executive summary of the PER is included in the Coal Board binder for board review. The entire PER is available from staff if requested by the Board.

The applicant provided documentation of an environmental assessment, public notice, and agenda and meeting minutes for the public meeting where the environmental determination was made in the preliminary engineering report (PER) included in the application.

The environmental review record in this application is complete.

Staff does not recommend funding due to statutory criteria, Availability of Funds.

Engineers and Land Surveyors

3530 Centennial Drive, Helena, MT 59601 | phone: 406-442-8594
851 Bridger Drive, Suite 1, Bozeman, MT 59715 | phone: 406-522-8594
2223 Montana Avenue, Suite 201, Billings, MT 59101 | phone: 406- 601-4055
www.seaeng.com

January 25, 2020

Montana Coal Board
P O Box 200523
Helena, MT 59620-0523

Subject: Additional Information for Montana Coal Impact Grant Application – City of Hardin Wastewater Treatment Upgrade

Dear Members of the Montana Coal Board:

Following submission of a Montana Coal Impact Grant Application in October of 2019 and the subsequent meeting of the Montana Coal Board on December 12, 2019 where the application for the City of Hardin was tabled by the Board, Stahly Engineering & Associates was asked to provide additional specific information regarding use of Coal Board funds for the project. We appreciate the opportunity to clarify our phased plan for improvements and how the Coal Board can assist the City of Hardin in the initial phase (Phase 1) of this large project.

The feasibility and, ultimately, the final design and construction cost of the larger project will be affected by successfully constructing Phase 1 improvements that include replacement of sections of wastewater collection mains and upgrading manholes within the collection system. The improvements planned for Coal Board funding address Infiltration and Inflow (I&I) issues that have been identified in a recent study conducted by the City under guidance from Stahly Engineering and funded, in part, by USDA Rural Development (RD) and the Renewable Resource Grant and Loan (RRGL) Program. The I&I investigation report is included in **Attachment 2**.

I&I within the collection system contributes to the lack of functionality of the mechanical treatment system currently used by the City and also affects the final design parameters of upgrades that will be constructed in subsequent phases of the overall project.

A full scope of the improvements the City of Hardin is requesting Coal Board funding for (Phase 1) and an implementation schedule for completing Phase 1 of the three-phase project is in **Attachment 1**. A map (Exhibit A) depicting areas of replacement where Coal Board funding would be utilized is also included in **Attachment 1**.

Project Phasing and Coordination of Other Funding

The wastewater project is currently planned as a three-phase project:

Phase 1 – Replace collection mains and manholes determined to be contributing Infiltration and Inflow (I&I) to the wastewater system.

Phase 2 – Design and construction of improvements to wastewater treatment facility: new headworks structure, new mechanical headworks (including screening, grit removal, and grease removal), installation of a backup power generator, a new redundant UV disinfection system, and an administration/UV building addition.

Phase 3 – Design and construction of wastewater treatment components: add a new Intermittent Cycle Extended Aeration System continuous flow sequencing batch reactor (SBR) and convert the existing oxidation ditch to surge flow equalization.

Funding currently applied for or authorized for all phases of the project include:

1. Coal Tax Loan (up to $4 million) – approval letter received from the Department of Natural Resources and Conservation on December 20, 2019. This loan may be combined or revert to a State Revolving Fund Loan once contract documents are approved and the environmental process is complete.

2. RRGL Grant ($125,000) - awarded in May, 2019. Contract in process.
3. RD Loan/Grant (approximately $6 million) – application submitted and under review to determine loan/grant amount.
4. Treasure State Endowment Program (TSEP) grant ($625,000) – conditionally approved through HB625 by the Montana Legislature – subject to cancellation if funding is unavailable at the time of meeting contract start up conditions. Conditions unmet at this time only include commitment of all funding sources.
5. City of Hardin ($100,000) – committed reserves.
6. Delivering Local Assistance (DLA) grant ($750,000) – applied. Funding currently unavailable.

A grant award from the Coal Board and RRGL funding along with additional grant/loan funds available from Coal Tax Loan/RD would be utilized as early as Spring 2020 to begin design of Phase 1. Construction of Phase 1 would likely take place in late summer or early fall of 2020. Phase 2 may be bid and constructed in Winter-Spring 2021. The results of Phases 1 and 2 will determine the final design parameters of Phase 3. Remaining grant funding from TSEP and/or DLA along with Coal Board/SRF and RD loan funds will be used to design and construct Phase 3 which is anticipated for construction in Spring 2023.

The City of Hardin appreciates the opportunity to provide this information to the Montana Coal Board and is hopeful that Coal Board funds will kick off the needed improvements to the City's wastewater collection and treatment system. Grant funding from the Coal Board will produce positive results for the wastewater collection system and will help the City continue to preserve valuable water resources in the County by eliminating I&I in the system. Grant funds keep projects like this affordable to the ratepayers. Our goal over the long term is to build a system that will become a valuable asset for the City to continue to provide affordable services that will support future growth and economic development.

Sincerely,

Greg Steckler, P.E., Project Engineer
Stahly Engineering & Associates, Inc.

Attachment 1

Scope of Work to be Funded by Potential Coal Board Grant

A comprehensive I&I study conducted by Stahly Engineering for the City in spring and early summer of 2019 identified approximately 2,675 feet of reinforced concrete pipe (RCP) sewer trunk mains and 17 manholes as significant contributors of infiltration into the City's wastewater system. The Phase 1 project will replace the deteriorated mains and manholes in order to significantly reduce infiltration into the wastewater system prior to the planned Phase 2 and 3 treatment upgrades.

Table 1 below presents the overall opinion of probable cost for the entire Phase 1 project. Items that the potential $500,000 Coal Board grant would cover are highlighted in yellow.

Table 1 - Opinion Of Probable Cost
City of Hardin
Phase 1: Dig and Replace Sewer Mains and Manholes

#	BID ITEM	QTY	UNITS	UNIT PRICE	TOTAL
1	Bypass Pumping	1	LS	$60,000.00	$60,000.00
2	Trench Dewatering	1	LS	$90,000.00	$90,000.00
3	18" PS46 ASTM F679 PVC Sewer Main	1,650	LF	$90.00	$148,500.00
4	15" PS46 ASTM F679 PVC Sewer Main	1,025	LF	$85.00	$87,125.00
5	Basic 48" Sanitary Sewer Manhole	17	EA	$3,750.00	$63,750.00
6	Additional Sanitary Sewer Manhole Depth	195	VF	$250.00	$48,750.00
7	Asphalt Restoration	315	SY	$50.00	$15,750.00
8	Concrete Curb and Gutter Restoration	120	LF	$30.00	$3,600.00
9	Gravel Restoration	3,720	SY	$25.00	$93,000.00
Subtotal					**$610,475.00**
Mobilization				10%	$61,048.00
Contingency				10%	$61,048.00
Construction Subtotal					**$732,571.00**
Inflation to 2020				1%	$7,325.00
Erosion Control		1	LS	$5,000.00	$5,000.00
Review Fees and Permits		1	LS	$2,000.00	$2,000.00
Geotechnical Investigation		1	LS	$3,000.00	$3,000.00
Engineering (Design, Bidding Services, and Construction Administration)				20%	$146,514.00
Legal & Administrative				5%	$36,630.00
Project Total					**$933,040.00**

Table 2 below presents the implementation schedule for the Phase 1 project.

Table 2 Project Implementation Schedule for Phase 1		
ACTION	**DATE**	**NOTES**
Hired Engineer/Administrator	Fall 2017	
Submitted DNRC Grant Application	May 2018	
Submitted TSEP Grant Application	June 2018	
Results of TSEP, DNRC RRGL, grants known	June, 2019	TSEP Granted $625,000 RRGL Granted $125,000
Submitted USDA RD Funding Application	Aug. 2019	
Submit SRF Funding Application	Sept. 2019	
Results of USDA RD Funding Application Known	March 2020	
SRF Funding Commitment	March 2020	
Select Bond Council, Hold Bond Election	March 2020	
Start-Up and FONSI Clearance	March 2020	All environmental research already complete.
Begin Design of Phase 1	March/April 2020	
Submit Plans for Phase 1 to MDEQ	April 2020	
MDEQ Approval of Phase 1	June 2020	Allow 2 full months for review.
Advertise and Bid Phase 1	June 2020	
Construction of Phase 1	July – Sept. 2020	
Evaluate Results of Phase 1	Sept. 2020 – July 2021	
11-Month Walk-Through for Phase 1	Aug. 2021	

A map showing the proposed scope of work for the Phase 1 project is presented in Exhibit A below.

CITY OF HARDIN WASTEWATER UPGRADES PHASE 1
DIG AND REPLACE SEWER MAINS AND MANHOLES

STAHLY ENGINEERING & ASSOCIATES
PROFESSIONAL ENGINEERS & SURVEYORS
www.seaeng.com

2223 MONTANA AVE.
STE. 201
BILLINGS, MT 59101
Phone: (406)601-4055
Fax: (406)601-4062

3530 CENTENNIAL DR.
HELENA, MT 59601
Phone: (406)442-8594
Fax: (406)442-8557

851 BRIDGER DR. STE. 1
BOZEMAN, MT 59715
Phone: (406)522-9526
Fax: (406)522-9528

ISSUE/REVISION

No.	DATE	BY
1		
DESCRIPTION		
No.	DATE	BY
2		
DESCRIPTION		
No.	DATE	BY
3		
DESCRIPTION		
No.	DATE	BY
4		
DESCRIPTION		
No.	DATE	BY
5		
DESCRIPTION		

PRELIMINARY
NOT FOR CONSTRUCTION

DIG AND REPLACE SEWER MAINS AND MANHOLES

WASTEWATER UPGRADES PHASE 1

CITY OF HARDIN, MONTANA

DESIGNED: SJS, GMS
DRAWN: SJS, GMS
CHECKED:
DATE: 07-15-2019

EXHIBIT
A

Stahly Engineering & Associates, Inc. COPYRIGHT 2015
L:\2223-City of Hardin\-08H19-DLA and Coal Board Grants_WW Treatment\DWG\Phase 1 Collection System Upgrades.dwg, Figure 6.1, Plotted: Jan 27, 2020 - 9:24am, gsteckler

Attachment 2

I&I Reduction Investigation Report

Infiltration & Inflow Reduction Investigation Report

December, 2019

Prepared for:

City of Hardin
406 N. Cheyenne
Hardin, Montana 59034

Prepared by:

Stahly Engineering and Associates
851 Bridger Drive, Suite 1
Bozeman, MT 59715
(406) 522-9526

MONTANA
GREGORY M. STECKLER
No. 41873PE
LICENSED PROFESSIONAL ENGINEER

12-20-2019

Engineer of Record: _____
Greg Steckler, P.E.

Staff Engineer: _____
Scott Short, P.E.

Quality Control Reviewer: _____
Ryan Rittal, P.E.

TABLE OF CONTENTS

TABLE OF CONTENTS 1
LIST OF APPENDICES 1
LIST OF FIGURES 1
1.0 INTRODUCTION AND BACKGROUND 2
1.1 SCOPE OF INVESTIGATION 2
1.2 PROBLEM DEFINITION 2
2.0 DESCRIPTION OF INVESTIGATION AND RESULTS ANALYSIS 3
2.1 VISUAL INSPECTION 3
2.1.1 MANHOLE INSPECTION 3
2.2 FLOW MONITORING 4
2.2.1 NORTH BASINS 4
2.2.2 10th ST. DITCH AND SOUTHWEST BASIN 5
2.2.3 DOWNTOWN ROOF DRAINS 5
2.3 SEWER MAIN VIDEO INSPECTION 5
2.3.1 10TH STREET & DITCH NORTH OF IGA 5
2.3.2 LESSARD AVENUE 6
3.0 SUMMARY AND RECOMMENDATIONS 6

LIST OF APPENDICES

APPENDIX A: FLOW METERING DATA

APPENDIX B: PRECIPITATION DATA

APPENDIX C: SEWER MAIN VIDEO SUMMARIES

APPENDIX D: 2019 WASTEWATER PER UPDATE EXECUTIVE SUMMARY

LIST OF FIGURES

FIGURE 1.1: WASTEWATER COLLECTION SYSTEM

FIGURE 2.1: FLOW METER LOCATIONS

1.0 INTRODUCTION AND BACKGROUND

A Preliminary Engineering Report initially prepared in 2018 by Stahly Engineering and Associates, Inc. (SEA) and updated by SEA in 2019 for the City of Hardin's Wastewater System ***(Executive Summary in Appendix D)*** stated that the average daily per capita flow was 154 gallons/capita-day (gpcd) based on a population of 3,837 persons and the measured average daily flow of 589,000 gallons/day (gpd) for the year 2018 at the treatment plant. This value is considerably higher than the MDEQ design value of 100 gpcd, which accounts for reasonable inflow and infiltration (I&I), and is somewhat higher than the EPA standard for non-excessive dry weather infiltration of 120 gpcd.

The large non-wastewater flows are negatively affecting treatment in the City's wastewater system while potentially influencing sizing of upcoming upgrades planned for the treatment facility. Treatment issues at the plant have resulted in a finding of "Significant Noncompliance" by the EPA. Excessive I&I flows have contributed to the issues with treatment and maintenance resulting in undertreated effluent discharged to the Bighorn River.

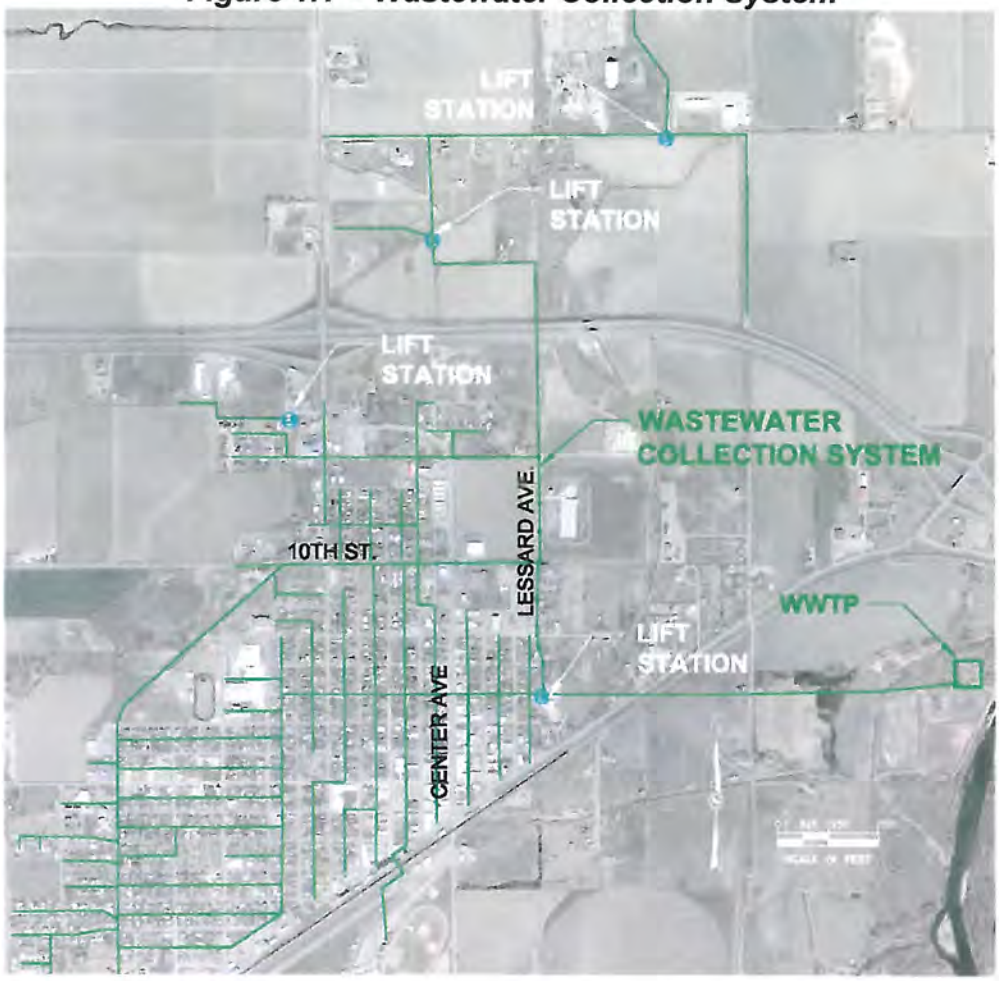
1.1 SCOPE OF INVESTIGATION

The results of this study came from investigations performed by SEA, sewer main video conducted by Tru Pipe, and information received from the City of Hardin's Public Works Department. The I&I investigation of the wastewater collection system focused on sewer collection mains and manholes that have not been recently replaced or rehabilitated. The investigation was intended to determine sources (and corresponding locations) of large non-wastewater flows into the City's wastewater collection system. The goal of the I&I investigation is to identify portions of the existing collection system that should be replaced or rehabilitated prior to construction of treatment upgrades.

1.2 PROBLEM DEFINITION

The existing wastewater collection system (***Figure 1.1)*** was last assessed for I&I in 1990. The system was found to have high levels of I&I. Since that time the City has rehabbed or replaced 38,000 lineal feet out of a total of 79,000 lineal feet within the existing collection system.

Figure 1.1 – Wastewater Collection System



The lowest wastewater flows (daily minimum) usually occur around 3:00am and are a good indicator of I&I into the system. Infiltration of groundwater into the system is an addressable factor while inflow from sump pumps is often a more difficult problem because the pumps are on private property and difficult to identify.

2.0 DESCRIPTION OF INVESTIGATION AND RESULTS ANALYSIS

2.1 VISUAL INSPECTION

2.1.1 MANHOLE INSPECTION

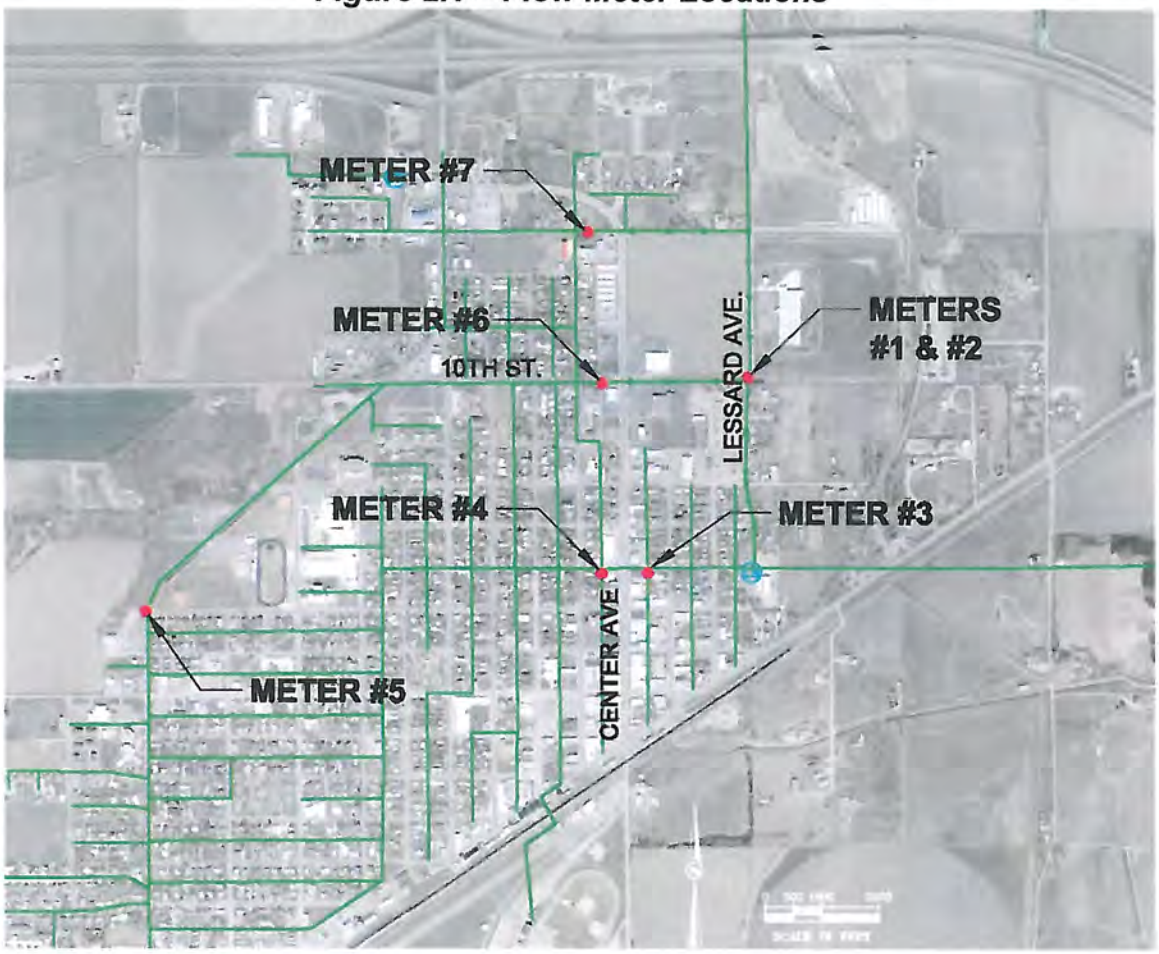
Manholes throughout the City's wastewater collection system were visually inspected. Eight manholes within Lessard Avenue and 13th Street had considerably degraded concrete, likely due to H_2S gas build up when the manhole lids were sealed. The manholes are

unserviceable, and infiltration of groundwater was observed in many of them.

2.2 FLOW MONITORING

Flow monitoring was conducted from March 26th, 2019 through June 27th, 2019. Teledyne 2150 Area Velocity Flow meters where used at 7 locations (***Figure 2.1)*** to measure wastewater flows. Graphs of all meter data are included in ***Appendix A***.

Figure 2.1 – Flow Meter Locations



2.2.1 NORTH BASINS

Flow meters #2 and #7 monitored the north basins. Meter #2 was in place for the entire monitoring period and meter #7 was in place from June 5th to June 27th. Average daily minimum flows indicate approximately 20 gpm of I&I from the North Basins. It is thought that the infiltration into the manholes along Lessard Ave. and 13th St. contribute a substantial portion of the total I&I in the basin.

An eight-day rain event – from May 16th to May 24th – coincided with an approximately 8 gpm increase in flow at meter #2 ***Appendix A***. This indicates some influence from stormwater.

2.2.2 10th ST. DITCH AND SOUTHWEST BASIN

Flow meters #1, #5, and #6 monitored the flow from the southwest and central portions of town. Meter #5 (in place from 3/27 to 5/22) had an average daily minimum of 7 gpm which suggests that there is little I&I from the southwestern portion of the City. Meter #1 showed a average daily minimum flow of 68 gpm which indicates a substantial amount of I&I in the area between Meter #5 and Meter #1.

The eight-day rain event – from May 16th to May 24th – coincided with an approximately 40 gpm increase in flow at meter #1. This indicates significant stormwater inflow into the system. It is believed that the ditch north of the IGA is where much of the inflow occurs. This increase appears to have been sustained by the filling of an irrigation ditch located at the west end of 10th Street. It is likely that when the ditch is full groundwater rises and private sump pumps introduce more inflow into the system.

2.2.3 DOWNTOWN ROOF DRAINS

Flow meters #3 and #4 were placed in manholes along 6th Street in order to capture the flow through the alleys. Although the sewer mains and manholes in this area are relatively new and in good condition, it was believed that roof drains from large downtown buildings may contribute significantly to I&I.

The flow data was compared against precipitation data for the monitoring period and no correlation between precipitation and increased wastewater flow was found.

2.3 SEWER MAIN VIDEO INSPECTION

Sewer main video inspections were conducted on June 27th 2019. Tru Pipe used a video pipeline inspection vehicle to examine 8 sewer main sections. The inspection identified numerous points of infiltration in both the sewer mains and manhole. Summaries of the video inspections are included in ***Appendix C***.

2.3.1 10TH STREET & DITCH NORTH OF IGA

Infiltration runners were identified in manholes and sewer mains and sections of the concrete pipes were degraded with one segment impassable from either direction. The inspection also found varying water levels which indicates inconsistent grades, or bellies, in the pipe.

2.3.2 LESSARD AVENUE

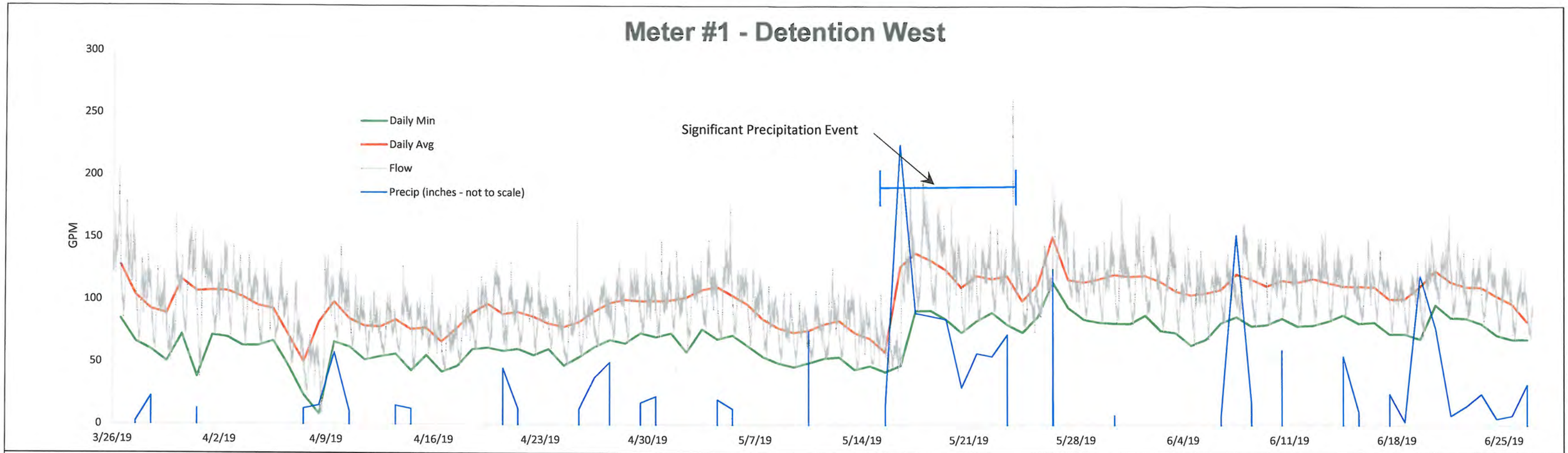
Numerous infiltration runners were identified in 3 of the 4 Lessard Ave. sewer main sections. The video equipment is only capable of seeing above water infiltration sites and it is probable that there are additional submerged points of infiltration. The concrete pipes were degraded with one impassable segment.

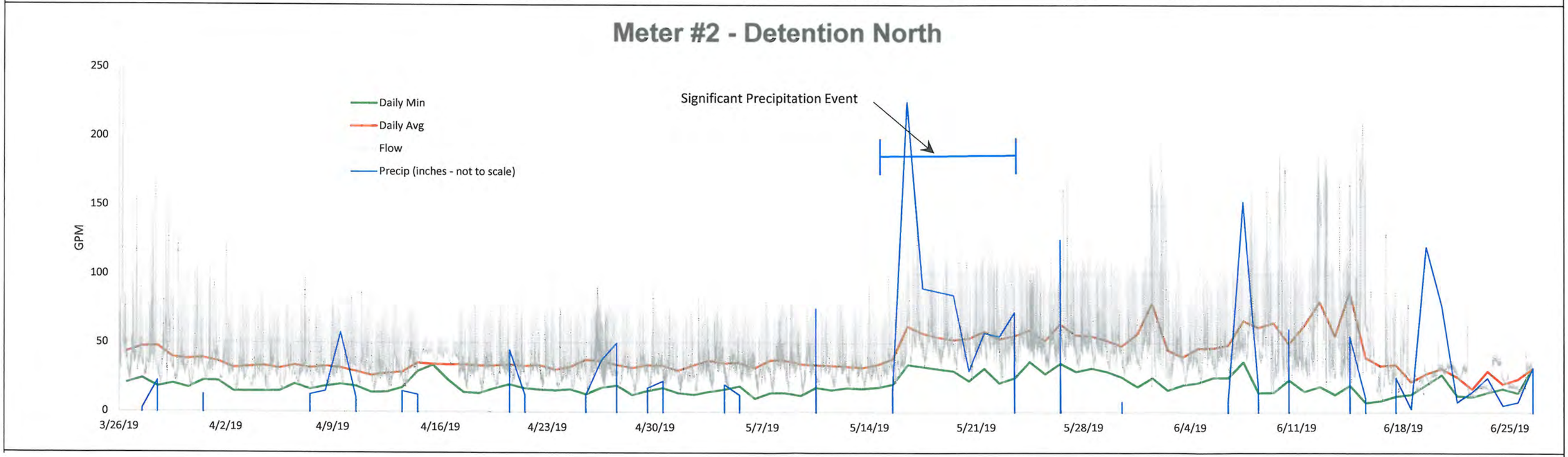
3.0 SUMMARY AND RECOMMENDATIONS

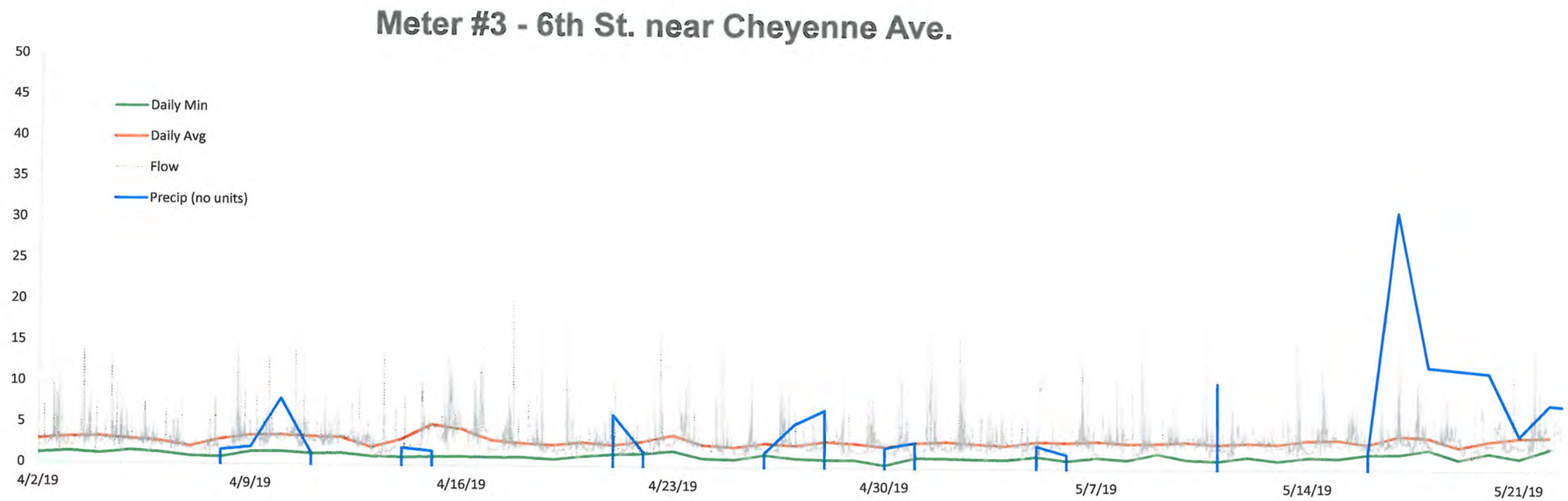
As mentioned earlier in this report, the City of Hardin's wastewater collection system is experiencing high amounts of I&I. This I&I study was conducted in the spring and early summer of 2019 to identify sections of the existing collection system that need to be repaired/replaced in order to reduce I&I to an acceptable level prior to conducting treatment system upgrades. Flow monitoring showed significant infiltration (estimated at 130 gpm) within severely deteriorated concrete trunk mains and manholes. I&I jumped in quantity during large precipitation events and when the local irrigation canals were activated near the end of May. The deteriorated condition of the concrete trunk main piping was visually confirmed by sewer main video inspection. Significant infiltration of ground water was observed in the video inspection of the concrete trunk main piping and manholes.

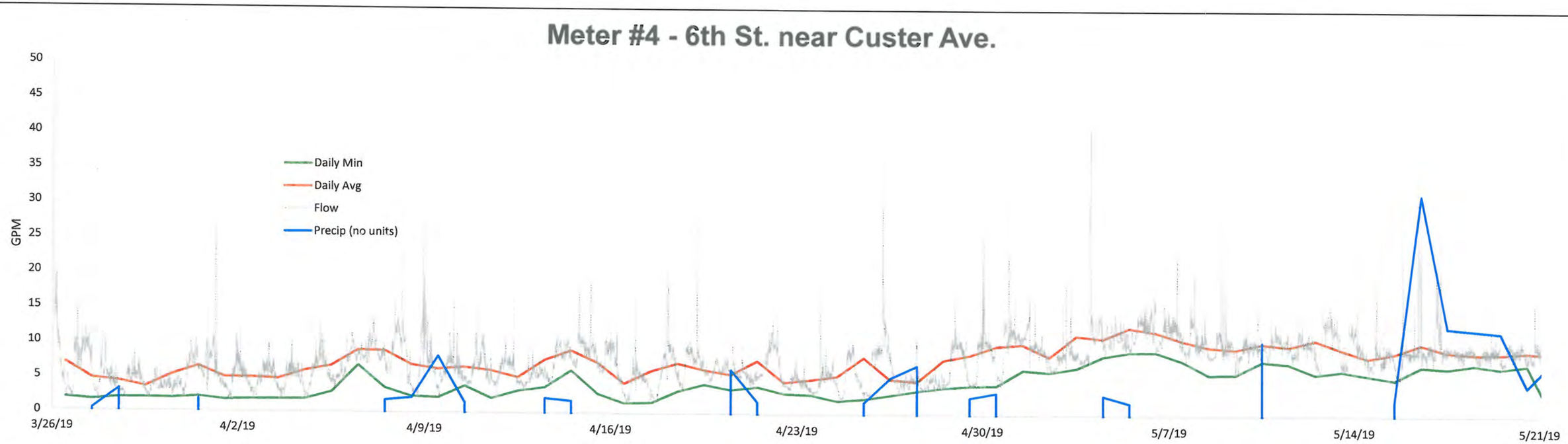
As a result of this investigation, approximately 2,675 feet of concrete sewer pipe and 17 manholes have been identified as in need of rehabilitation or replacement in order to significantly reduce I&I.

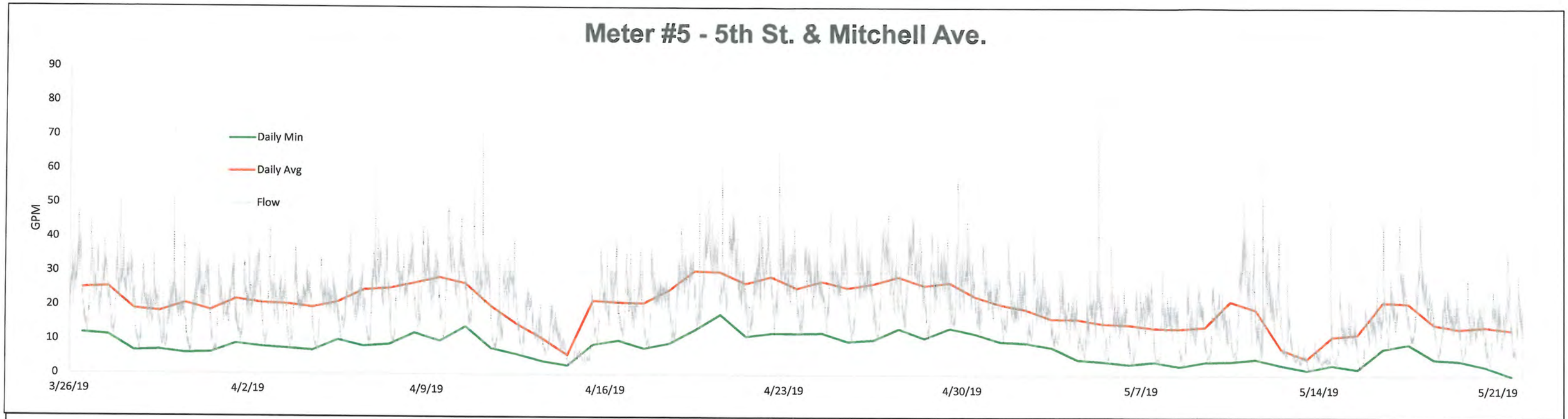
APPENDIX A

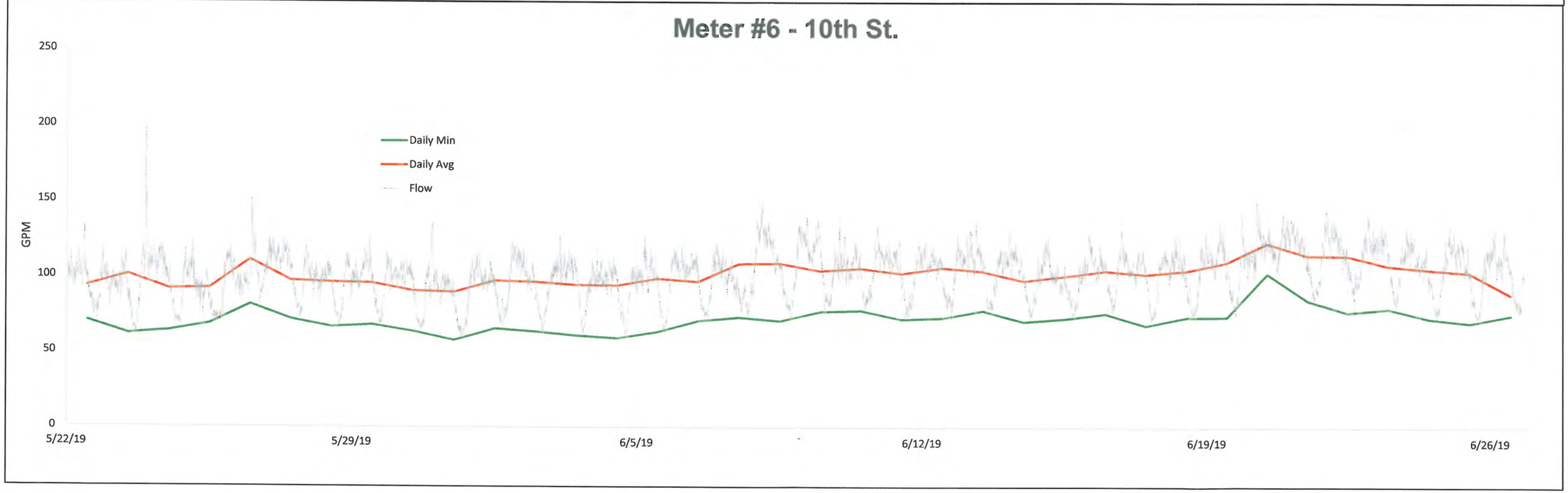

Meter #1 - Detention West
Daily Min
Daily Avg
Flow
Precip (inches - not to scale)
Significant Precipitation Event
GPM
300
250
200
150
100
50
0
3/26/19
4/2/19
4/9/19
4/16/19
4/23/19
4/30/19
5/7/19
5/14/19
5/21/19
5/28/19
6/4/19
6/11/19
6/18/19
6/25/19

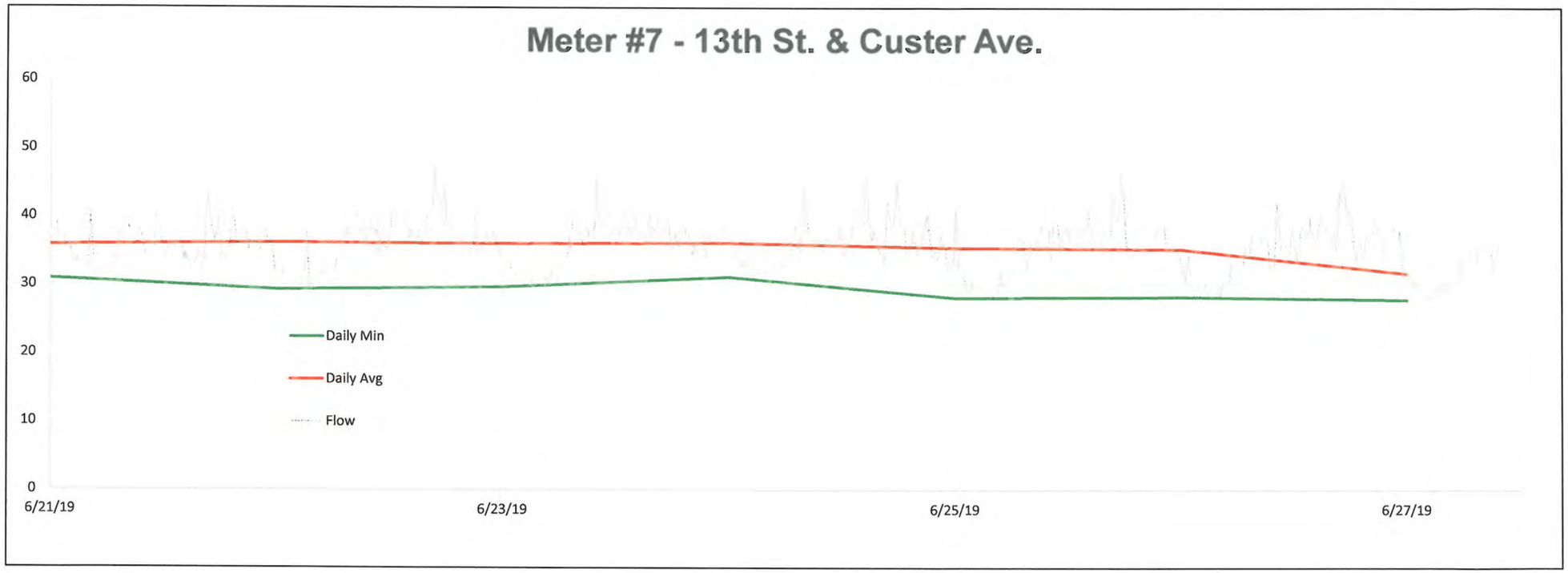

Meter #2 - Detention North
Daily Min
Daily Avg
Flow
Precip (inches - not to scale)
Significant Precipitation Event
GPM
250
200
150
100
50
0
3/26/19
4/2/19
4/9/19
4/16/19
4/23/19
4/30/19
5/7/19
5/14/19
5/21/19
5/28/19
6/4/19
6/11/19
6/18/19
6/25/19


Meter #3 - 6th St. near Cheyenne Ave.
50
45
40
35
30
25
20
15
10
5
0
Daily Min
Daily Avg
Flow
Precip (no units)
4/2/19
4/9/19
4/16/19
4/23/19
4/30/19
5/7/19
5/14/19
5/21/19


Meter #4 - 6th St. near Custer Ave.
GPM
50
45
40
35
30
25
20
15
10
5
0
Daily Min
Daily Avg
Flow
Precip (no units)
3/26/19
4/2/19
4/9/19
4/16/19
4/23/19
4/30/19
5/7/19
5/14/19
5/21/19


Meter #5 - 5th St. & Mitchell Ave.
GPM
90
80
70
60
50
40
30
20
10
0
Daily Min
Daily Avg
Flow
3/26/19
4/2/19
4/9/19
4/16/19
4/23/19
4/30/19
5/7/19
5/14/19
5/21/19


Meter #6 - 10th St.
GPM
250
200
150
100
50
0
Daily Min
Daily Avg
Flow
5/22/19
5/29/19
6/5/19
6/12/19
6/19/19
6/26/19


Meter #7 - 13th St. & Custer Ave.
60
50
40
30
20
10
0
Daily Min
Daily Avg
Flow
6/21/19
6/23/19
6/25/19
6/27/19

APPENDIX B

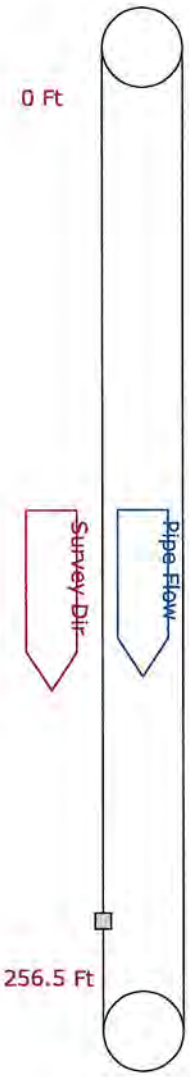
Hardin Precipitation 3/26/19-6/27/19

3/26/2019	0
3/27/2019	0
3/28/2019	0.01
3/29/2019	0.09
3/30/2019	0
3/31/2019	0
4/1/2019	0.05
4/2/2019	0
4/3/2019	0
4/4/2019	0
4/5/2019	0
4/6/2019	0
4/7/2019	0
4/8/2019	0.05
4/9/2019	0.06
4/10/2019	0.23
4/11/2019	0.04
4/12/2019	0
4/13/2019	0
4/14/2019	0.06
4/15/2019	0.05
4/16/2019	0
4/17/2019	0
4/18/2019	0
4/19/2019	0
4/20/2019	0
4/21/2019	0.18
4/22/2019	0.05
4/23/2019	0
4/24/2019	0
4/25/2019	0
4/26/2019	0.05
4/27/2019	0.15
4/28/2019	0.20
4/29/2019	0
4/30/2019	0.07
5/1/2019	0.09
5/2/2019	0
5/3/2019	0
5/4/2019	0
5/5/2019	0.08
5/6/2019	0.05
5/7/2019	0
5/8/2019	0
5/9/2019	0
5/10/2019	0
5/11/2019	0.30
5/12/2019	0
5/13/2019	0
5/14/2019	0
5/15/2019	0
5/16/2019	0.06
5/17/2019	0.90
5/18/2019	0.36
5/20/2019	0.34
5/21/2019	0.12
5/22/2019	0.23
5/23/2019	0.22
5/24/2019	0.29
5/25/2019	0
5/26/2019	0
5/27/2019	0.50
5/28/2019	0
5/29/2019	0
5/30/2019	0
5/31/2019	0.03
6/1/2019	0
6/2/2019	0
6/3/2019	0
6/4/2019	0
6/5/2019	0
6/6/2019	0
6/7/2019	0.03
6/8/2019	0.61
6/9/2019	0.07
6/10/2019	0
6/11/2019	0.24
6/12/2019	0
6/13/2019	0
6/14/2019	0
6/15/2019	0.22
6/16/2019	0.04
6/17/2019	0
6/18/2019	0.10
6/19/2019	0.01
6/20/2019	0.48
6/21/2019	0.31
6/22/2019	0.03
6/23/2019	0.06
6/24/2019	0.10
6/25/2019	0.02
6/26/2019	0.03
6/27/2019	0.13

APPENDIX C

Pipe Graphic Report of PSR 10TH-1 A for STAHLY ENGINEERING

Setup 1	Surveyor RMK	Certificate # 070304597	System Owner		
Drainage	Survey Customer				
P/O #	Date 2019/06/27	Time 8:37	Street 10TH ST		
City HARDIN	Further location details				
Up 10TH-1	Rim to invert	Grade to invert	Rim to grade Ft		
Down 10TH-2	Rim to invert	Grade to invert	Rim to grade Ft		
Use Sanitary	Direction Downstream	Flow control	Media No		
Shape Circular	Height 16 Width ins	Preclean J	Date Cleaned 2019/06/27		
Material Concrete Pipe (non-reinforced)	Joint length Ft	Total length Ft	Length Surveyed 256.50 Ft		
Lining	Year laid	Year rehabilitated	Weather Dry		
Purpose Infiltration/Inflow Investigation	Cat				
Additional info			Structural	O & M	Constructional
Location			Miscellaneous	Hydraulic	
Project CITY OF HARDIN SEWER INSPECTION			Work Order		
Northing	Easting		Elevation		
Coordinate System			GPS Accuracy		



0.0 Ft Start of Survey
Manhole [10TH-1]
Water Level 0%

227.7 Ft Infil Runner 03 o'clock OM: 4

235.5 Ft Water Level 050%

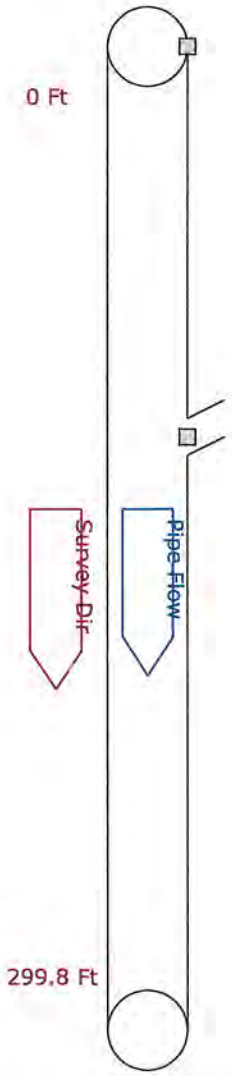
256.5 Ft Manhole [10TH-2]
End of Survey

Tru Pipe

Tru Pipe Inc
Phone:406-702-0609
Fax:406-294-5145

Pipe Graphic Report of PSR 10TH-2 A for STAHLY ENGINEERING

Setup 2	Surveyor RMK	Certificate # 070304597	System Owner		
Drainage	Survey Customer				
P/O #	Date 2019/06/27	Time 9:36	Street 10TH ST		
City HARDIN	Further location details				
Up 10TH-2	Rim to invert	Grade to invert	Rim to grade Ft		
Down 10TH-3	Rim to invert	Grade to invert	Rim to grade Ft		
Use Sanitary	Direction Downstream	Flow control	Media No		
Shape Circular	Height 16 Width	ins Preclean J	Date Cleaned 2019/06/27		
Material Concrete Pipe (non-reinforced)	Joint length Ft	Total length Ft	Length Surveyed 299.80 Ft		
Lining	Year laid	Year rehabilitated	Weather Dry		
Purpose Infiltration/Inflow Investigation	Cat				
Additional info			Structural	O & M	Constructional
Location			Miscellaneous	Hydraulic	
Project CITY OF HARDIN SEWER INSPECTION			Work Order		
Northing	Easting		Elevation		
Coordinate System			GPS Accuracy		



0.0 Ft — Start of Survey
Manhole [10TH-2]
Water Level 25%
Infil Runner 12 o'clock OM: 4

119.1 Ft — Tap Factory 6.000 09 o'clock

227.0 Ft — Water Level 045%

299.8 Ft — Manhole [10TH-3]
End of Survey

Tru Pipe

Tru Pipe Inc
Phone:406-702-0609
Fax:406-294-5145

Pipe Graphic Report of PSR 10TH-3 A for STAHLY ENGINEERING

Setup 3	Surveyor RMK	Certificate # 070304597	System Owner		
Drainage	Survey Customer				
P/O #	Date 2019/06/27	Time 10:25	Street 10TH ST		
City HARDIN	Further location details				
Up 10TH-3	Rim to invert	Grade to invert	Rim to grade Ft		
Down 10TH-4	Rim to invert	Grade to invert	Rim to grade Ft		
Use Sanitary	Direction Downstream	Flow control	Media No		
Shape Circular	Height 18 Width	ins Preclean J	Date Cleaned 2019/06/27		
Material Concrete Pipe (non-reinforced)	Joint length Ft	Total length Ft	Length Surveyed 01.60 Ft		
Lining	Year laid	Year rehabilitated	Weather Dry		
Purpose Infiltration/Inflow Investigation	Cat				
Additional info			Structural	O & M	Constructional
Location			Miscellaneous	Hydraulic	
Project CITY OF HARDIN SEWER INSPECTION			Work Order		
Northing	Easting		Elevation		
Coordinate System			GPS Accuracy		

0.0 Ft Start of Survey
Manhole [10TH-3]
Water Level 45%

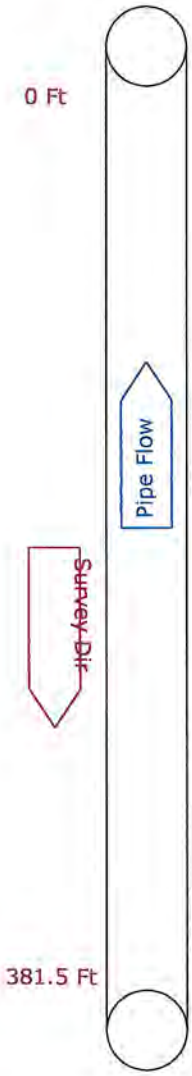
1.6 Ft Abandoned Survey [STUCK IN DEBRIS IN BOTTOM OF PIPE UNABLE TO REACH WITH JET TC

Tru Pipe

Tru Pipe Inc
Phone:406-702-0609
Fax:406-294-5145

Pipe Graphic Report of PSR 10TH-3 B for STAHLY ENGINEERING

Setup 5	Surveyor RMK	Certificate # 070304597	System Owner		
Drainage	Survey Customer				
P/O #	Date 2019/06/27	Time 11:35	Street 10TH ST		
City HARDIN	Further location details				
Up 10TH-3	Rim to invert	Grade to invert	Rim to grade Ft		
Down 10TH-4	Rim to invert	Grade to invert	Rim to grade Ft		
Use Sanitary	Direction Upstream	Flow control	Media No		
Shape Circular	Height 18 Width ins	Preclean J	Date Cleaned 2019/06/27		
Material Concrete Pipe (non-reinforced)	Joint length Ft	Total length Ft	Length Surveyed 381.50 Ft		
Lining	Year laid	Year rehabilitated	Weather Dry		
Purpose Infiltration/Inflow Investigation	Cat				
Additional info			Structural	O & M	Constructional
Location			Miscellaneous	Hydraulic	
Project CITY OF HARDIN SEWER INSPECTION			Work Order		
Northing	Easting		Elevation		
Coordinate System			GPS Accuracy		



0.0 Ft Start of Survey
Manhole [10TH-4]
Water Level 20%

115.4 Ft Water Level 045%

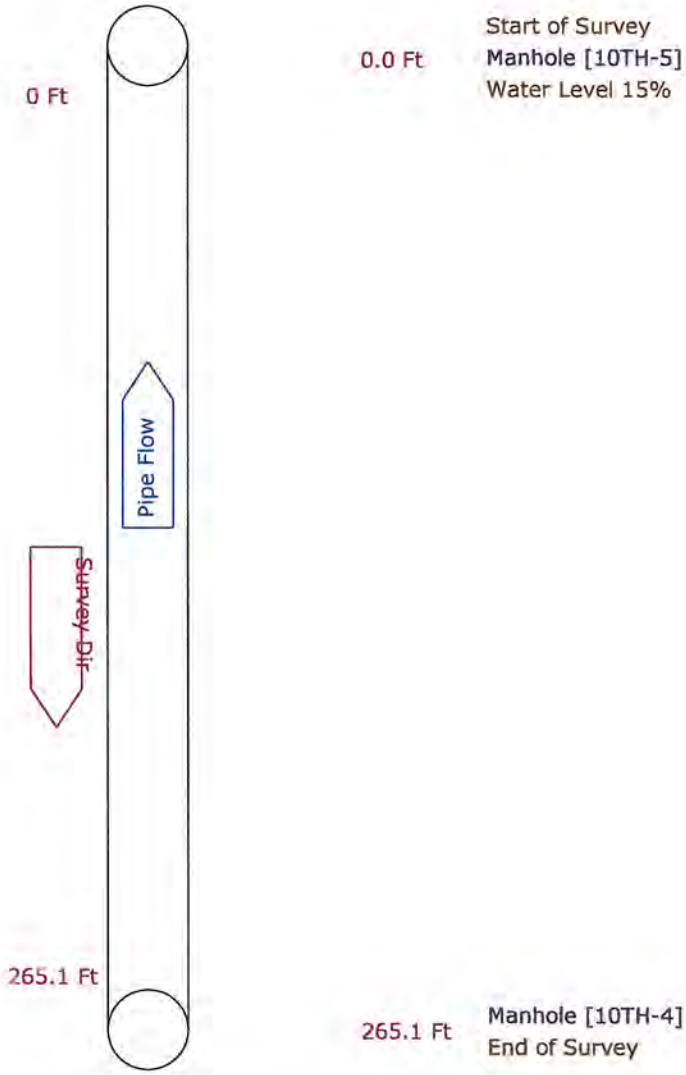
381.5 Ft Abandoned Survey [STUCK IN DEBRIS ON BOTTOM OF PIPE]

Tru Pipe

Tru Pipe Inc
Phone:406-702-0609
Fax:406-294-5145

Pipe Graphic Report of PSR 10TH-4 A for STAHLY ENGINEERING

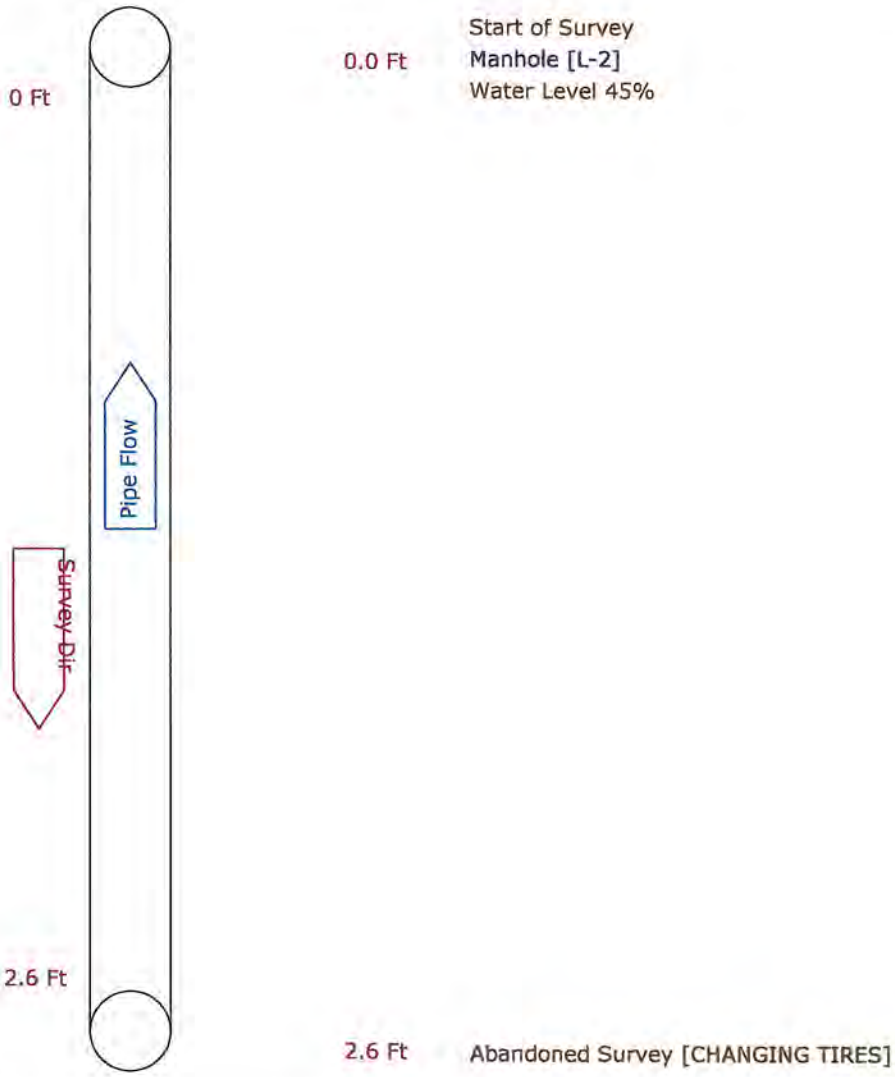
Setup 4	Surveyor RMK		Certificate # 070304597	System Owner	
Drainage		Survey Customer			
P/O #		Date 2019/06/27	Time 11:09	Street 10TH ST	
City HARDIN		Further location details			
Up 10TH-4		Rim to invert	Grade to invert	Rim to grade	Ft
Down 10TH-5		Rim to invert	Grade to invert	Rim to grade	Ft
Use Sanitary		Direction Upstream	Flow control	Media No	
Shape Circular		Height 18 Width	ins Preclean J	Date Cleaned 2019/06/27	
Material Concrete Pipe (non-reinforced)		Joint length Ft	Total length Ft	Length Surveyed 265.10 Ft	
Lining		Year laid	Year rehabilitated	Weather Dry	
Purpose Infiltration/Inflow Investigation			Cat		
Additional info				Structural O & M Constructional	
Location				Miscellaneous Hydraulic	
Project CITY OF HARDIN SEWER INSPECTION				Work Order	
Northing			Easting	Elevation	
Coordinate System				GPS Accuracy	



Tru Pipe
Tru Pipe Inc
Phone:406-702-0609
Fax:406-294-5145

Pipe Graphic Report of PSR L-1 B for STAHLY ENGINEERING

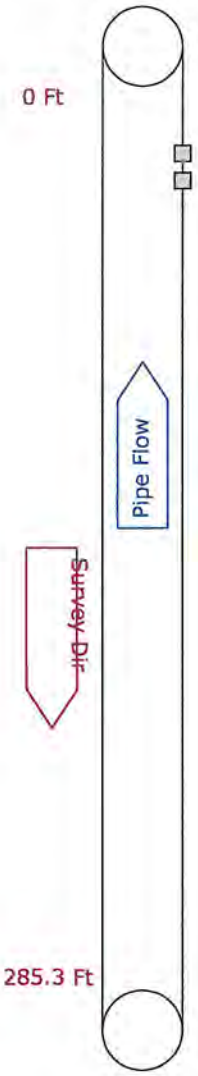
Setup 7	Surveyor RMK		Certificate # 070304597	System Owner	
Drainage		Survey Customer			
P/O #		Date 2019/06/27	Time 13:50	Street LESSARD AVE	
City HARDIN		Further location details			
Up L-1		Rim to invert	Grade to invert	Rim to grade	Ft
Down L-2		Rim to invert	Grade to invert	Rim to grade	Ft
Use Sanitary		Direction Upstream	Flow control	Media No	
Shape Circular		Height 18 Width	ins Preclean J	Date Cleaned 2019/06/27	
Material Concrete Pipe (non-reinforced)		Joint length Ft	Total length Ft	Length Surveyed 02.60	Ft
Lining		Year laid	Year rehabilitated	Weather Dry	
Purpose Infiltration/Inflow Investigation			Cat		
Additional info				Structural O & M Constructional Miscellaneous Hydraulic	
Location					
Project CITY OF HARDIN SEWER INSPECTION				Work Order	
Northing			Easting	Elevation	
Coordinate System				GPS Accuracy	



Tru Pipe
Tru Pipe Inc
Phone:406-702-0609
Fax:406-294-5145

Pipe Graphic Report of PSR L-1 C for STAHLY ENGINEERING

Setup 8	Surveyor RMK	Certificate # 070304597	System Owner		
Drainage	Survey Customer				
P/O #	Date 2019/06/27	Time 14:02	Street LESSARD AVE		
City HARDIN	Further location details				
Up L-1	Rim to invert	Grade to invert	Rim to grade Ft		
Down L-2	Rim to invert	Grade to invert	Rim to grade Ft		
Use Sanitary	Direction Upstream	Flow control	Media No		
Shape Circular	Height 18 Width	ins Preclean J	Date Cleaned 2019/06/27		
Material Concrete Pipe (non-reinforced)	Joint length Ft	Total length Ft	Length Surveyed 285.30 Ft		
Lining	Year laid	Year rehabilitated	Weather Dry		
Purpose Infiltration/Inflow Investigation	Cat				
Additional info			Structural	O & M	Constructional
Location			Miscellaneous	Hydraulic	
Project CITY OF HARDIN SEWER INSPECTION			Work Order		
Northing	Easting		Elevation		
Coordinate System			GPS Accuracy		



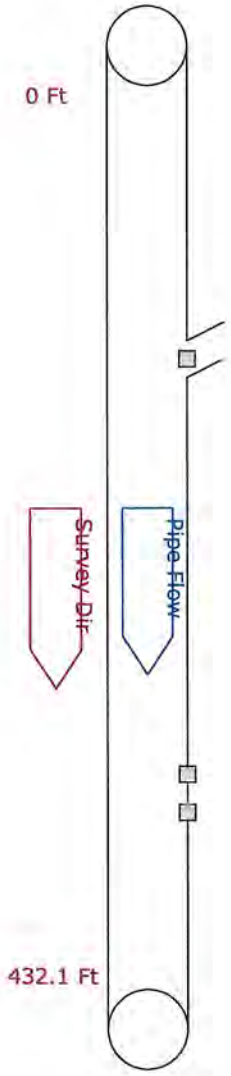
0.0 Ft	Start of Survey Manhole [L-2] Water Level 40%
31.1 Ft	Infil Runner 09 o'clock OM: 4
39.0 Ft	Infil Runner 12 to 03 o'clock OM: 4
46.2 Ft	Water Level 060%
254.8 Ft	General Observation [SOUP CAN ?]
285.3 Ft	Abandoned Survey [CANNOT GET THROUGH PIPE]

Tru Pipe

Tru Pipe Inc
Phone:406-702-0609
Fax:406-294-5145

Pipe Graphic Report of PSR L-2 A for STAHLY ENGINEERING

Setup 9	Surveyor RMK	Certificate # 070304597	System Owner		
Drainage	Survey Customer				
P/O #	Date 2019/06/27	Time 14:59	Street LESSARD AVE		
City HARDIN	Further location details				
Up L-2	Rim to invert	Grade to invert	Rim to grade Ft		
Down L-3	Rim to invert	Grade to invert	Rim to grade Ft		
Use Sanitary	Direction Downstream	Flow control	Media No		
Shape Circular	Height 18 Width	ins Preclean J	Date Cleaned 2019/06/27		
Material Concrete Pipe (non-reinforced)	Joint length Ft	Total length Ft	Length Surveyed 432.10 Ft		
Lining	Year laid	Year rehabilitated	Weather Dry		
Purpose Infiltration/Inflow Investigation	Cat				
Additional info			Structural	O & M	Constructional
Location			Miscellaneous	Hydraulic	
Project CITY OF HARDIN SEWER INSPECTION			Work Order		
Northing	Easting		Elevation		
Coordinate System			GPS Accuracy		



0.0 Ft	Start of Survey Manhole [L-2] Water Level 40%
137.8 Ft	Tap Break-in 4.000 09 o'clock
320.2 Ft	Infil Weeper 09 to 10 o'clock OM: 2
336.9 Ft	Infil Runner 11 o'clock OM: 4
432.1 Ft	Manhole [L-3] End of Survey

Tru Pipe

Tru Pipe Inc
Phone:406-702-0609
Fax:406-294-5145

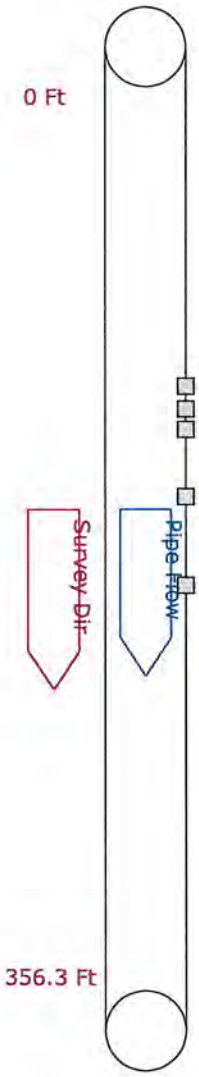
Pipe Graphic Report of PSR L-3 A for STAHLY ENGINEERING

Setup	10	Surveyor	RMK	Certificate #	070304597
System Owner					
Drainage		Survey Customer			
P/O #		Date	2019/06/27	Time	16:02
Street	LESSARD AVE				
City	HARDIN	Further location details			

Up	L-3	Rim to invert	Grade to invert	Rim to grade Ft
Down	L-4	Rim to invert	Grade to invert	Rim to grade Ft

Use	Sanitary	Direction Downstream	Flow control	Media No
Shape	Circular	Height 18 Width ins	Preclean J	Date Cleaned 2019/06/27
Material	Concrete Pipe (non-reinforced)	Joint length Ft	Total length Ft	Length Surveyed 356.30 Ft
Lining		Year laid	Year rehabilitated	Weather Dry
Purpose	Infiltration/Inflow Investigation	Cat		

Additional info	Structural	O & M	Constructional
Location	Miscellaneous	Hydraulic	
Project	CITY OF HARDIN SEWER INSPECTION	Work Order	
Northing	Easting	Elevation	
Coordinate System		GPS Accuracy	



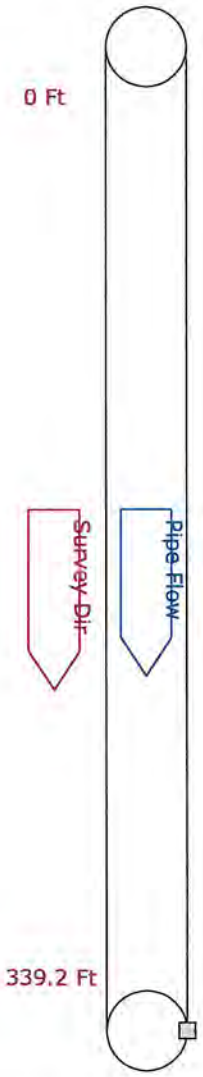
0.0 Ft	Start of Survey Manhole [L-3] Water Level 35%
123.0 Ft	Infil Runner 12 o'clock OM: 4
131.2 Ft	Infil Runner 11 o'clock OM: 4
138.7 Ft	Infil Runner 12 o'clock OM: 4
163.0 Ft	Infil Runner 12 to 01 o'clock OM: 4
195.2 Ft	Infil Runner 12 o'clock OM: 4
356.3 Ft	Manhole [L-4] End of Survey

Tru Pipe

Tru Pipe Inc
Phone:406-702-0609
Fax:406-294-5145

Pipe Graphic Report of PSR L-4 A for STAHLY ENGINEERING

Setup 11	Surveyor RMK	Certificate # 070304597	System Owner		
Drainage	Survey Customer				
P/O #	Date 2019/06/27	Time 16:14	Street LESSARD AVE		
City HARDIN	Further location details				
Up L-4	Rim to invert	Grade to invert	Rim to grade Ft		
Down L-5	Rim to invert	Grade to invert	Rim to grade Ft		
Use Sanitary	Direction Downstream	Flow control	Media No		
Shape Circular	Height 18 Width	ins Preclean J	Date Cleaned 2019/06/27		
Material Concrete Pipe (non-reinforced)	Joint length Ft	Total length Ft	Length Surveyed 339.20 Ft		
Lining	Year laid	Year rehabilitated	Weather Dry		
Purpose Infiltration/Inflow Investigation	Cat				
Additional info			Structural	O & M	Constructional
Location			Miscellaneous	Hydraulic	
Project CITY OF HARDIN SEWER INSPECTION			Work Order		
Northing	Easting		Elevation		
Coordinate System			GPS Accuracy		



0.0 Ft Start of Survey
Manhole [L-4]
Water Level 35%

313.0 Ft General Observation [PIPE CHANGE TO PVC]

Infil Runner 12 o'clock OM: 4 [INFILTRATION AT NEXT PIPE IN MANHOLE]

339.2 Ft Manhole [L-5]
End of Survey

Tru Pipe Inc
Phone:406-702-0609
Fax:406-294-5145

APPENDIX D

EXECUTIVE SUMMARY

Introduction and Background

The City of Hardin is faced with deficiencies throughout its aging wastewater system. The community retained infrastructure specialists Stahly Engineering & Associates to evaluate the wastewater collection and treatment system and determine its adequacy for both current and future conditions. This Preliminary Engineering Report (PER) is the result of this evaluation.

Problem Definition

The current wastewater treatment system was built in 1978, and with the exception of headworks and disinfection upgrades, has not been updated significantly since initial construction. Over the course of the last 40 years, performance requirements and design standards were significantly strengthened across the state (and the nation) in a coordinated effort to improve the nation's water quality. As a result, most of the sub-systems within the existing wastewater treatment facility do not meet Montana Department of Environmental Quality (MDEQ) design standards or Environmental Protection Agency (EPA) regulations. The EPA conducted a compliance evaluation inspection in September of 2017. The findings of this inspection resulted in a "Significant Noncompliance" status for the wastewater treatment facility. The wastewater system deficiencies reported by EPA and the City of Hardin public works staff are summarized below and described in detail later in this PER. Without upgrades to the wastewater system, the local residents will face a series of permit violations, possible enforcement actions, and, in the event a connection moratorium is issued, lost economic opportunities. This development would be a very difficult dilemma for local officials, businesses, and community members.

Problem Summary – The City's wastewater system is inadequate:

a) The collection system has issues with excessive I&I and illicit connections.

b) The facility does not have grit or grease removal systems. The headworks screen is aging. Grease is present throughout the treatment process.

c) The wastewater treatment plant has issues with extreme intermittent surge flows from rain and snowmelt events. The intermittent surge flows contain low levels of nutrients which, in-turn, negatively affects the biology within the oxidation ditch. This has resulted in the need for raw wastewater to be diverted to an old lagoon cell. There is currently no way to reintroduce the bypassed effluent into the treatment process.

d) Secondary Clarifier No. 1 has uneven flows over the weir due to an uneven weir bar. Thus, the clarifier does not operate according to design.

e) The plant operators reported freezing issues in the clarifier inlet channels.

f) Wastewater flow rate logging is unreliable.

g) The wastewater treatment plant does not have backup power generation.

h) The wastewater treatment plant does not have a backup blower for the aerobic digester.

i) The plant operators have reported excessive foaming in the oxidation ditch.

j) The return activated sludge (RAS) pumping station is aging and requires repairs frequently.

k) The waste activated sludge (WAS) pumping station is aging.

l) The wastewater treatment plant does not have backup disinfection on the effluent bypass channel.

m) The existing UV disinfection system is located outdoors, making maintenance difficult during inclement weather.

n) There is currently no way to introduce septage from pumper trucks into the treatment process. Septage is currently dumped in the old lagoon cell that is also utilized as a sludge drying bed.

o) The plant does not have an adequate water supply.

Alternatives Considered

The alternative screening process considered numerous alternatives aimed at resolving the problems faced by the community and to ensure that the best possible solution was not overlooked. This process included consideration of "No Action" collection system, headworks, treatment, and disposal alternatives. Initial evaluations determined that several of the potential alternatives, including "No Action" for collection system, headworks and treatment, were not viable options for Hardin and those were eliminated from further review. Collection system, headworks, treatment, and disposal alternatives that were considered in detail included:

<u>Collection System</u>

- Alternative CS-1: Dig and Replace Mains and Manholes
- Alternative CS-2: Combination Dig and Replace/CIPP Rehab Sewer Mains – Dig and Replace Manholes
- Alternative CS-3: CIPP Rehab of Sewer Mains – Dig and Replace Manholes

Headworks, Backup Generator, and Backup Disinfection

- Alternative HGD-1: Single Mechanical Headworks w/ Manual Bar Screen in Bypass Channel, Backup Generator, and Backup Disinfection
- Alternative HGD-2: Dual Mechanical Headworks, Backup Generator, and Backup Disinfection

Treatment

- Alternative T-1: Various Sub-System Upgrades
- Alternative T-2: New Oxidation Ditch
- Alternative T-3: New ICEAS SBR

Treated Effluent Disposal

- Alternative D-0: No Action Alternative

Preferred Alternative

Each of the alternatives were analyzed in detail. A decision matrix was developed to compare alternatives and help select a preferred alternative. The decision matrix included environmental impacts, technical feasibility, financial feasibility, public health and safety, operation and maintenance, and public opinion. A public meeting was held by the City Council where Stahly Engineering & Associates presented the PER to the public in order to get its opinion and support of the project. Based upon the results of the decision matrix, the preferred alternative was determined to include:

- Alternative CS-1: Dig and Replace Mains and Manholes
- Alternative HGD-1: Single Mechanical Headworks w/ Manual Bar Screen in Bypass Channel, Backup Generator, and Backup Disinfection
- Alternative T-3: New ICEAS SBR
- Alternative D-0: No Action

The selected alternatives combination (CS-1, HGD-1, T-3, and D-0) includes the following upgrades:

Collection System

A comprehensive I&I study conducted by Stahly Engineering for the City in spring and early summer of 2019 identified approximately 2,675 feet of RCP sewer trunk mains and 17 manholes as significant contributors of infiltration into the wastewater system. The preferred collection

system alternative will replace the deteriorated mains and manholes in order to significantly reduce infiltration into the wastewater system.

Headworks, Backup Power, and Backup Disinfection

The preferred headworks alternative will replace the existing headworks structure and grinder/screening system to address all deficiencies and MDEQ/EPA requirements. This includes a new headworks building along with screening, grit removal, and grease removal (likely in a pre-packaged system) on the primary flow channel. A bypass channel with a manual bar screen is included in this alternative to allow for periodic maintenance of the mechanical headworks system. A wash water return system which utilizes treated effluent for the headworks spray system is included. The preferred alternative also includes two other essential components: a backup power generator and a backup UV disinfection unit in a new bypass channel housed within a new climate-controlled building addition. The building addition would also provide dedicated spaces for laboratory and plant controls in order to move them out of the current location within the small plant office space.

Treatment

The preferred treatment alternative will correct the deficiencies of the existing wastewater plant by constructing a new Intermittent Cycle Extended Aeration System (ICEAS) continuous flow sequencing batch reactor (SBR) along with the appurtenances described below.

In the preferred treatment alternative, a flow splitter box is installed post-headworks. A new ICEAS SBR is constructed after the flow splitter box. The existing oxidation ditch is converted to a surge flow equalization tank. The converted oxidation ditch includes upgraded mixing and aeration equipment along with a pumping system to dose flow to the new ICEAS SBR. Under normal operation, the splitter box diverts flow to the flow equalization tank. However, the second channel in the splitter box allows flow to be diverted directly to the ICEAS SBR to allow for maintenance activities in the equalization tank. Two new aeration blowers are installed in the expanded blower building to serve the equalization tank and the ICEAS SBR. A foam mitigation system is installed on the ICEAS SBR.

The ICEAS SBR eliminates the need to upgrade the equipment in the existing clarifiers as clarification is provided in the SBR tanks. Motor-driven decanters are included at the end of the treatment/clarification trains in the ICEAS package. An insulated dome cover is installed over the ICEAS decanters as part of this alternative to prevent freezing issues in the winter months. The incorporated clarification provided by the ICEAS package allows the two existing clarifiers to be repurposed to a second digester and a post-equalization tank respectively. Also, the upgraded WAS pumping system mentioned in the other alternatives is supplied as part of the ICEAS package and installed within the ICEAS tankage; thus, eliminating the need for separate replacement of the existing WAS pumping station. The need to replace the existing RAS pumping station is eliminated as the ICEAS SBR does not require activated sludge return pumping as part of the treatment process.

Following the ICEAS SBR, the equipment within the existing clarifier tanks is removed. As mentioned above, one clarifier is converted to a second aerobic digester and the equipment in the existing aerobic digester is replaced. The other clarifier is converted to a post-equalization tank to dose effluent flows received from the new ICEAS SBR. This involves installation of a pumping system for the post-equalization tank. An insulated dome cover is installed over the post-equalization tank to prevent freezing in the winter months. A backup aerobic digestion blower is installed in an expanded blower building.

Comprehensive plant controls and SCADA are installed/replaced as part of this alternative. The ICEAS SBR package includes a proprietary control system. Incorporated as parts of this package are oxidation reduction potential (ORP) probes, dissolved oxygen (DO) probes, pH probes, and temperature probes along with associated integration and monitoring. Flow monitoring upgrades include integration of influent and effluent flow meters along with installation and integration of flow meters on the WAS lines. Finally, an overall SCADA system is installed incorporating all systems within the treatment process.

In addition to the items listed above, the following upgrades are also included in the preferred alternative:

a) Construction of a new plant water well;
b) Construction of a septage receiving station;
c) Construction of a second aerobic digester.

Project Costs, Budget, and Phasing

The total estimated cost for implementing the preferred alternatives CS-1, HGD-1, T-3, and D-0 is $11,265,000. Various funding scenarios were considered with a variety of grant and low interest loan sources available to the City. The recommended funding strategy includes grant funds from the Montana Department of Commerce (MDOC) Treasure State Endowment Program (TSEP), the Department of Natural Resources and Conservation (DNRC) Renewable Resource Grant and Loan Program (RRGL), the Montana Department of Commerce (MDOC) Community Development Block Grant (CDBG) program, Delivering Local Assistance (DLA), Coal Board, grant and loan funds from USDA Rural Development (RD), and a loan from the MDEQ State Revolving Fund (SRF) Program.

Design of Phases 1 and 2 (Alternatives CS-1 and HGD-1) is anticipated to be completed in January 2020, with the anticipation of bidding the project as early as February 2020. Primarily weather dependent, actual construction of Phases 1 and 2 would begin in late February or March of 2020. Upon completion of Phases 1 and 2, the effects of the upgrades on the wastewater treatment system will be evaluated for approximately one year. Design of Phase 3 (Alternative T-3) would likely commence in October of 2021. Design of Phase 3 would be completed in May of 2022 with the anticipation of bidding the project in June 2022. Construction would likely be completed in November of 2022.

PRELIMINARY ENGINEERING REPORT UPDATE

August 2019

HARDIN, MONTANA

WASTEWATER UPGRADES

Prepared For:
City of Hardin, Montana
406 N Cheyenne
Hardin, Montana 59034
(406) 665-9292

Prepared By:
Stahly Engineering & Associates, Inc.
851 Bridger Dr. Suite 1
Bozeman, MT 59718
(406) 522-9526

MONTANA
GREGORY M. STECKLER
No. 41873PE
LICENSED PROFESSIONAL ENGINEER

08-23-2019

TABLE OF CONTENTS

TABLE OF CONTENTS ..... **i**
LIST OF APPENDICES ..... **v**
LIST OF FIGURES ..... **vi**
LIST OF TABLES ..... **vi**
LIST OF ACRONYMS ..... **viii**
EXECUTIVE SUMMARY **E-1**
Introduction and Background E-1
Problem Definition E-1
Preferred Alternative E-3
Project Costs, Budget, and Phasing E-5
1.0 PROJECT PLANNING **1-1**
1.1 Location 1-1
1.1.1 Project Location 1-1
1.1.2 Land Ownership and Use 1-1
1.1.3 Climate 1-1
1.2 Environmental Resources Present 1-4
1.2.1 Groundwater 1-4
1.2.2 Surface Water 1-4
1.2.3 Geology and Soils 1-4
1.2.4 Air Quality 1-5
1.2.5 Vegetation 1-5
1.2.6 Farmland 1-5
1.2.7 Wetlands 1-5
1.2.8 Floodplains 1-5
1.2.9 Wildlife 1-6
1.2.10 Historical and Cultural Resources 1-9
1.2.11 Future Environmental Concerns 1-10
1.2.12 Environmental Justice Issues 1-10
1.3 Population Trends 1-10
1.3.1 Historical Population 1-10
1.3.2 Population Projections 1-10

1.4 Community Engagement 1-11
2.0 EXISTING FACILITIES 2-1
2.1 Location 2-1
2.1.1 Wastewater Facilities 2-1
2.1.2 Water Facility 2-1
2.2 History 2-1
2.2.1 Brief City History 2-1
2.2.2 System History 2-1
2.3 Condition of Existing Wastewater Facilities 2-3
2.3.1 Collection System Description 2-3
2.3.2 Collection System Analysis 2-5
2.3.3 Existing Wastewater Treatment Plant Flows 2-5
2.3.4 Wastewater Characterization 2-5
2.3.5 Wastewater Treatment System Description 2-5
2.3.5.1 Oxidation Ditch Process Description 2-6
2.3.5.2 Original Wastewater Treatment Design Criteria 2-6
2.3.6 Wastewater Collection and Treatment System Deficiencies 2-6
2.3.7 Discharge Permit 2-7
2.3.8 Compliance History 2-8
2.4. Financial Status of Facilities 2-9
2.4.1 Rates and Charges 2-9
2.4.2 Ledger Summary 2-9
3.0 PROJECT NEED 3-1
3.1 Health, Sanitation, and Security 3-1
3.2 Aging Infrastructure 3-4
3.3 Reasonable Growth 3-4
3.4 Design Flow 3-5
4A ALTERNATIVE DEVELOPMENT 4A-1
4A.1 General Design Requirements 4A-1
4A.1.1 Design Criteria 4A-1
4A.1.2 Applicable Regulations 4A-1
4A.1.3 Discharge Permit Limitations 4A-1
4A.1.4 TMDLs 4A-1

4A.1.5 Numeric Nutrient Standards 4A-2
4A.1.6 Construction Permitting 4A-3
4A.2 Alternative Screening Process 4A-3
4A.2.1 Collection System Alternatives 4A-3
4A.2.2 Headworks, Backup Generator, and Backup Disinfection Alternatives 4A-4
4A.2.3 Wastewater Treatment Alternatives 4A-5
4A.2.4 Wastewater Disposal Alternatives 4A-8
4B ALTERNATIVES EVALUATION 4B-1
4B.1 Collection System Alternatives 4B-1
4B.1.1 Alternative CS-1: Dig and Replace Sewer Mains and Manholes 4B-1
4B.1.2 Alternative CS-2: Combination Dig and Replace/CIPP Rehab Sewer Mains – Dig and Replace Manholes 4B-5
4B.1.3 Alternative CS-3: CIPP Rehab of Sewer Mains – Dig and Replace Manholes 4B-9
4B.2 Headworks, Backup Generator, and Backup Disinfection Alternatives 4B-13
4B.2.1 Alternative HGD-1: Single Mech. Headworks w/ Manual Bar Screen in Bypass Channel, Backup Generator, and Backup Disinfection 4B-13
4B.2.2 Alternative HGD-2: Dual Mechanical Headworks, Backup Generator, and Backup Disinfection 4B-18
4B.3 Wastewater Treatment Alternatives 4B-23
4B.3.1 Upgrades Common to All Alternatives 4B-23
4B.3.2 Alternative T-1: Various Sub-System Upgrades 4B-25
4B.3.3 Alternative T-2: New Oxidation Ditch 4B-30
4B.3.4 Alternative T-3: New ICEAS SBR 4B-35
4B.4 Disposal Alternatives 4B-41
4B.4.1 Alternative D-0: No Action 4B-41
5.0 SELECTION OF ALTERNATIVES 5-1
5.1 Ranking Criteria 5-1
5.1.1 Technical Feasibility 5-1
5.1.2 Environmental Impacts 5-1
5.1.3 Financial Feasibility 5-1
5.1.4 Public Health and Safety 5-2
5.1.5 Operational and Maintenance Considerations 5-2
5.1.6 Public Comments 5-2

5.2 Scoring of Collection System Alternatives 5-2
5.2.1 Technical Feasibility 5-3
5.2.2 Environmental Impacts 5-3
5.2.3 Financial Feasibility 5-3
5.2.4 Public Health and Safety 5-4
5.2.5 Operational and Maintenance Considerations 5-4
5.2.6 Public Comments 5-5
5.3 Scoring of Headworks, Backup Generator, and Backup Disinfection Alternatives 5-5
5.3.1 Technical Feasibility 5-5
5.3.2 Environmental Impacts 5-5
5.3.3 Financial Feasibility 5-6
5.3.4 Public Health and Safety 5-7
5.3.5 Operational and Maintenance Considerations 5-7
5.3.6 Public Comments 5-7
5.4 Scoring of Treatment System Alternatives 5-8
5.4.1 Technical Feasibility 5-8
5.4.2 Environmental Impacts 5-9
5.4.3 Financial Feasibility 5-9
5.4.4 Public Health and Safety 5-10
5.4.5 Operational and Maintenance Considerations 5-11
5.4.6 Public Comments 5-11
5.5 Scoring of Wastewater Disposal Alternatives 5-11
5.5.1 Technical Feasibility 5-11
5.5.2 Environmental Impacts 5-12
5.5.3 Financial Feasibility 5-12
5.5.4 Public Health and Safety 5-12
5.5.5 Operational and Maintenance Considerations 5-13
5.5.6 Public Comments 5-13
5.6 Decision Matrix and Selection of Preferred Alternative 5-14
6.0 DESCRIPTION OF PREFERRED ALTERNATIVE 6-1
6.1 Site Location and Characteristics 6-1
6.2 Operational Requirements 6-1
6.3 Impact on Existing Facilities 6-2

6.4 Design Criteria 6-2
6.4.1 Standards....6-2
6.4.2 Influent Design Basis....6-2
6.4.3 Summary of Major Equipment & Processes....6-2
6.4.4 Wastewater System Description 6-3
6.5 Environmental Impacts and Mitigation....6-7
6.6 Cost Summary....6-8
6.6.1 Opinions of Probable Cost....6-8
6.6.2 Annual Operating Budget 6-12
7.0 RECOMMENDATIONS AND IMPLEMENTATION 7-1
7.1 Funding....7-1
7.1.1 Likely Funding Sources 7-2
7.1.2 Phasing and Funding Strategy 7-3
7.2 Implementation of Option 1 7-4
7.3 Public Participation....7-5
8.0 REFERENCES....8-1

LIST OF APPENDICES

Appendix A PER & Grant Funding Authorizing Resolutions
Appendix B Agency Review Request Letters and Agency Responses
Appendix C Environmental Review Form, Checklist and Resolution of Approval
Appendix D Growth Management Plan (2009)
Appendix E NRCS Soils Data
Appendix F EPA Compliance Evaluation Inspection Report
Appendix G City Accounting Data
Appendix H NPDES Statement of Basis
Appendix I Renewed NPDES Discharge Permit (Effective July 1, 2018)
Appendix J Current NPDES Discharge Permit
Appendix K SRF Priority List Survey
Appendix L Circulars DEQ-12A and 12B Montana Base Numeric Nutrient Standards and Variances
Appendix M Hardin, Montana Target Rate Calculations
Appendix N Preliminary Total Retention System Sizing
Appendix O Preliminary Spray Irrigation System Sizing

Appendix P Effluent Flow Monitoring Reports
Appendix Q Public Participation Documentation
Appendix R FEMA Firm Panel 300143 0375B
Appendix S USGS Seismic Hazard Map for the State of Montana
Appendix T City Response to EPA Regarding Summary of Corrective Actions
Appendix U Hydrogeology of the Northern Bighorn River Valley 2009

LIST OF FIGURES

Figure 1.1 Hardin City Boundary
Figure 1.2 Long-Range Utility Service Area
Figure 2.1 Existing Facilities Map
Figure 4.1 Alternative CS-1 Layout
Figure 4.2 Alternative CS-2 Layout
Figure 4.3 Alternative CS-3 Layout
Figure 4.4 Alternative HGD-1 Layout
Figure 4.5 Alternative HGD-2 Layout
Figure 4.6 Alternative T-1 Layout
Figure 4.7 Alternative T-2 Layout
Figure 4.8 Alternative T-3 Layout
Figure 6.1 Preferred Collection System Alternative Layout
Figure 6.2 Preferred Headworks and Treatment Alternatives Layout

LIST OF TABLES

Table 1.1 Species of Special Concern in Big Horn County, Montana
Table 1.2 Historical Population Summary, Big Horn County and City of Hardin
Table 2.1 2003 Wastewater Collection System Improvements Inventory
Table 2.2 2009 Wastewater Collection System Improvements Inventory
Table 2.3 2018 Average Influent Wastewater Characterization, Hardin, MT
Table 2.4 Hardin WWTP Discharge Permit Limits
Table 2.5 Sanitary Sewer Services
Table 4A.1 Hardin WWTP Discharge Limits
Table 4B.1 Opinion of Probable Cost: Alternative CS-1
Table 4B.2 Present Worth Costs: Alternative CS-1
Table 4B.3 Opinion of Probable Cost: Alternative CS-2
Table 4B.4 Present Worth Costs: Alternative CS-2
Table 4B.5 Opinion of Probable Cost: Alternative CS-3
Table 4B.6 Present Worth Costs: Alternative CS-3
Table 4B.7 Opinion of Probable Cost: Alternative HGD-1

Table 4B.8 Present Worth Costs: Alternative HGD-1
Table 4B.9 Opinion of Probable Cost: Alternative HGD-2
Table 4B.10 Present Worth Costs: Alternative HGD-2
Table 4B.11 Opinion of Probable Cost: Alternative T-1
Table 4B.12 Present Worth Costs: Alternative T-1
Table 4B.13 Opinion of Probable Cost: Alternative T-2
Table 4B.14 Present Worth Costs: Alternative T-2
Table 4B.15 Opinion of Probable Cost: Alternative T-3
Table 4B.16 Present Worth Costs: Alternative T-3
Table 5.1 Collection System Alternatives: Life Cycle Cost Analysis
Table 5.2 Collection System Alternatives: Public Comments Ranking
Table 5.3 Headworks Alternatives: Life Cycle Cost Analysis
Table 5.4 Headworks Alternatives: Public Comments Ranking
Table 5.5 Treatment Alternatives: Life Cycle Cost Analysis
Table 5.6 Treatment Alternatives: Public Comments Ranking
Table 5.7 Disposal Alternatives: Life Cycle Cost Analysis
Table 5.8 Disposal Alternatives: Public Comments Ranking
Table 5.9 Ranking Summary
Table 6.1 Opinion of Probable Cost: Alternative CS-1
Table 6.2 Opinion of Probable Cost: Alternative HGD-1
Table 6.3 Opinion of Probable Cost: Alternative T-3
Table 6.4 Present Worth Analysis: Alternatives CS-1, HGD-1, T-3, D-0
Table 6.5 Preferred Alternative Short-Lived Assets
Table 6.6 Opinion of Incremental Annual O&M Costs
Table 7.1 Simplified Funding Strategy for Preferred Alternative
Table 7.2 Project Implementation Schedule for Funding Option 1

LIST OF ACRONYMS

ARM	Administrative Rules of Montana
ARRA	American Recovery and Reinvestment Act
BLM	US Bureau of Land Management
BMP	best management practices
BOD_5	five day biochemical oxygen demand
CFU	colony forming unit
COD	chemical oxygen demand
DMR	discharge monitoring report
DNRC	Department of Natural Resources and Conservation
E. Coli	Escherichia coli
EDA	Economic Development Administration
EDU	equivalent dwelling unit
ENR	Engineering News Record
EPA	Environmental Protection Agency
EPEDC	Eastern Plains Economic Development Corporation
FEMA	Federal Emergency Management Agency
GPD	gallons per day
gppd	gallons per person per day
HDPE	high density polyethylene
LMI	low to moderate income
MDEQ	Montana Department of Environmental Quality
MDOC	Montana Department of Commerce
MHI	median household income
MPDES	Montana Pollutant Discharge Elimination System
N	ammonia nitrogen
NPDES	National Pollutant Discharge Elimination System
NRIS	Natural Resource Information System
O&M	operations and maintenance
OMB	Office of Management and Budget
OSHA	Occupational Safety and Health Administration
PER	Preliminary Engineering Report
PPE	polypropylene
ppcd	pounds per capita per day
ppd	pounds per day
PVC	polyvinyl chloride
RCP	Reinforced Concrete Pipe
RRGL	Renewable Resource Grant and Loan
SAR	sodium absorption ratio
SBR	sequencing batch reactor
SDR	standard dimension ratio
SHPO	State Historical Preservation Organization
SMH	Sanitary Manhole
SRF	State Revolving Fund
TCLP	toxicity characteristic leaching procedure
TMDL	total maximum daily loads
TP	total phosphorous
TSEP	Treasure State Endowment Program
TSS	total suspended solids
UA	Uniform Application
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UV	ultraviolet
VCP	Vitrified Clay Pipe
VBNC	viable but not culturable
WPCSRF	Water Pollution Control State Revolving Fund

EXECUTIVE SUMMARY

Introduction and Background

The City of Hardin is faced with deficiencies throughout its aging wastewater system. The community retained infrastructure specialists Stahly Engineering & Associates to evaluate the wastewater collection and treatment system and determine its adequacy for both current and future conditions. This Preliminary Engineering Report (PER) is the result of this evaluation.

Problem Definition

The current wastewater treatment system was built in 1978, and with the exception of headworks and disinfection upgrades, has not been updated significantly since initial construction. Over the course of the last 40 years, performance requirements and design standards were significantly strengthened across the state (and the nation) in a coordinated effort to improve the nation's water quality. As a result, most of the sub-systems within the existing wastewater treatment facility do not meet Montana Department of Environmental Quality (MDEQ) design standards or Environmental Protection Agency (EPA) regulations. The EPA conducted a compliance evaluation inspection in September of 2017. The findings of this inspection resulted in a "Significant Noncompliance" status for the wastewater treatment facility. The wastewater system deficiencies reported by EPA and the City of Hardin public works staff are summarized below and described in detail later in this PER. Without upgrades to the wastewater system, the local residents will face a series of permit violations, possible enforcement actions, and, in the event a connection moratorium is issued, lost economic opportunities. This development would be a very difficult dilemma for local officials, businesses, and community members.

Problem Summary – The City's wastewater system is inadequate:

a) The collection system has issues with excessive I&I and illicit connections.

b) The facility does not have grit or grease removal systems. The headworks screen is aging. Grease is present throughout the treatment process.

c) The wastewater treatment plant has issues with extreme intermittent surge flows from rain and snowmelt events. The intermittent surge flows contain low levels of nutrients which, in-turn, negatively affects the biology within the oxidation ditch. This has resulted in the need for raw wastewater to be diverted to an old lagoon cell. There is currently no way to reintroduce the bypassed effluent into the treatment process.

d) Secondary Clarifier No. 1 has uneven flows over the weir due to an uneven weir bar. Thus, the clarifier does not operate according to design.

e) The plant operators reported freezing issues in the clarifier inlet channels.

f) Wastewater flow rate logging is unreliable.

g) The wastewater treatment plant does not have backup power generation.

h) The wastewater treatment plant does not have a backup blower for the aerobic digester.

i) The plant operators have reported excessive foaming in the oxidation ditch.

j) The return activated sludge (RAS) pumping station is aging and requires repairs frequently.

k) The waste activated sludge (WAS) pumping station is aging.

l) The wastewater treatment plant does not have backup disinfection on the effluent bypass channel.

m) The existing UV disinfection system is located outdoors, making maintenance difficult during inclement weather.

n) There is currently no way to introduce septage from pumper trucks into the treatment process. Septage is currently dumped in the old lagoon cell that is also utilized as a sludge drying bed.

o) The plant does not have an adequate water supply.

Alternatives Considered

The alternative screening process considered numerous alternatives aimed at resolving the problems faced by the community and to ensure that the best possible solution was not overlooked. This process included consideration of "No Action" collection system, headworks, treatment, and disposal alternatives. Initial evaluations determined that several of the potential alternatives, including "No Action" for collection system, headworks and treatment, were not viable options for Hardin and those were eliminated from further review. Collection system, headworks, treatment, and disposal alternatives that were considered in detail included:

<u>Collection System</u>

- Alternative CS-1: Dig and Replace Mains and Manholes
- Alternative CS-2: Combination Dig and Replace/CIPP Rehab Sewer Mains – Dig and Replace Manholes
- Alternative CS-3: CIPP Rehab of Sewer Mains – Dig and Replace Manholes

Headworks, Backup Generator, and Backup Disinfection

- Alternative HGD-1: Single Mechanical Headworks w/ Manual Bar Screen in Bypass Channel, Backup Generator, and Backup Disinfection
- Alternative HGD-2: Dual Mechanical Headworks, Backup Generator, and Backup Disinfection

Treatment

- Alternative T-1: Various Sub-System Upgrades
- Alternative T-2: New Oxidation Ditch
- Alternative T-3: New ICEAS SBR

Treated Effluent Disposal

- Alternative D-0: No Action Alternative

Preferred Alternative

Each of the alternatives were analyzed in detail. A decision matrix was developed to compare alternatives and help select a preferred alternative. The decision matrix included environmental impacts, technical feasibility, financial feasibility, public health and safety, operation and maintenance, and public opinion. A public meeting was held by the City Council where Stahly Engineering & Associates presented the PER to the public in order to get its opinion and support of the project. Based upon the results of the decision matrix, the preferred alternative was determined to include:

- Alternative CS-1: Dig and Replace Mains and Manholes
- Alternative HGD-1: Single Mechanical Headworks w/ Manual Bar Screen in Bypass Channel, Backup Generator, and Backup Disinfection
- Alternative T-3: New ICEAS SBR
- Alternative D-0: No Action

The selected alternatives combination (CS-1, HGD-1, T-3, and D-0) includes the following upgrades:

Collection System

A comprehensive I&I study conducted by Stahly Engineering for the City in spring and early summer of 2019 identified approximately 2,675 feet of RCP sewer trunk mains and 17 manholes as significant contributors of infiltration into the wastewater system. The preferred collection

system alternative will replace the deteriorated mains and manholes in order to significantly reduce infiltration into the wastewater system.

Headworks, Backup Power, and Backup Disinfection

The preferred headworks alternative will replace the existing headworks structure and grinder/screening system to address all deficiencies and MDEQ/EPA requirements. This includes a new headworks building along with screening, grit removal, and grease removal (likely in a pre-packaged system) on the primary flow channel. A bypass channel with a manual bar screen is included in this alternative to allow for periodic maintenance of the mechanical headworks system. A wash water return system which utilizes treated effluent for the headworks spray system is included. The preferred alternative also includes two other essential components: a backup power generator and a backup UV disinfection unit in a new bypass channel housed within a new climate-controlled building addition. The building addition would also provide dedicated spaces for laboratory and plant controls in order to move them out of the current location within the small plant office space.

Treatment

The preferred treatment alternative will correct the deficiencies of the existing wastewater plant by constructing a new Intermittent Cycle Extended Aeration System (ICEAS) continuous flow sequencing batch reactor (SBR) along with the appurtenances described below.

In the preferred treatment alternative, a flow splitter box is installed post-headworks. A new ICEAS SBR is constructed after the flow splitter box. The existing oxidation ditch is converted to a surge flow equalization tank. The converted oxidation ditch includes upgraded mixing and aeration equipment along with a pumping system to dose flow to the new ICEAS SBR. Under normal operation, the splitter box diverts flow to the flow equalization tank. However, the second channel in the splitter box allows flow to be diverted directly to the ICEAS SBR to allow for maintenance activities in the equalization tank. Two new aeration blowers are installed in the expanded blower building to serve the equalization tank and the ICEAS SBR. A foam mitigation system is installed on the ICEAS SBR.

The ICEAS SBR eliminates the need to upgrade the equipment in the existing clarifiers as clarification is provided in the SBR tanks. Motor-driven decanters are included at the end of the treatment/clarification trains in the ICEAS package. An insulated dome cover is installed over the ICEAS decanters as part of this alternative to prevent freezing issues in the winter months. The incorporated clarification provided by the ICEAS package allows the two existing clarifiers to be repurposed to a second digester and a post-equalization tank respectively. Also, the upgraded WAS pumping system mentioned in the other alternatives is supplied as part of the ICEAS package and installed within the ICEAS tankage; thus, eliminating the need for separate replacement of the existing WAS pumping station. The need to replace the existing RAS pumping station is eliminated as the ICEAS SBR does not require activated sludge return pumping as part of the treatment process.

Following the ICEAS SBR, the equipment within the existing clarifier tanks is removed. As mentioned above, one clarifier is converted to a second aerobic digester and the equipment in the existing aerobic digester is replaced. The other clarifier is converted to a post-equalization tank to dose effluent flows received from the new ICEAS SBR. This involves installation of a pumping system for the post-equalization tank. An insulated dome cover is installed over the post-equalization tank to prevent freezing in the winter months. A backup aerobic digestion blower is installed in an expanded blower building.

Comprehensive plant controls and SCADA are installed/replaced as part of this alternative. The ICEAS SBR package includes a proprietary control system. Incorporated as parts of this package are oxidation reduction potential (ORP) probes, dissolved oxygen (DO) probes, pH probes, and temperature probes along with associated integration and monitoring. Flow monitoring upgrades include integration of influent and effluent flow meters along with installation and integration of flow meters on the WAS lines. Finally, an overall SCADA system is installed incorporating all systems within the treatment process.

In addition to the items listed above, the following upgrades are also included in the preferred alternative:

a) Construction of a new plant water well;
b) Construction of a septage receiving station;
c) Construction of a second aerobic digester.

Project Costs, Budget, and Phasing

The total estimated cost for implementing the preferred alternatives CS-1, HGD-1, T-3, and D-0 is $11,265,000. Various funding scenarios were considered with a variety of grant and low interest loan sources available to the City. The recommended funding strategy includes grant funds from the Montana Department of Commerce (MDOC) Treasure State Endowment Program (TSEP), the Department of Natural Resources and Conservation (DNRC) Renewable Resource Grant and Loan Program (RRGL), the Montana Department of Commerce (MDOC) Community Development Block Grant (CDBG) program, Delivering Local Assistance (DLA), Coal Board, grant and loan funds from USDA Rural Development (RD), and a loan from the MDEQ State Revolving Fund (SRF) Program.

Design of Phases 1 and 2 (Alternatives CS-1 and HGD-1) is anticipated to be completed in January 2020, with the anticipation of bidding the project as early as February 2020. Primarily weather dependent, actual construction of Phases 1 and 2 would begin in late February or March of 2020. Upon completion of Phases 1 and 2, the effects of the upgrades on the wastewater treatment system will be evaluated for approximately one year. Design of Phase 3 (Alternative T-3) would likely commence in October of 2021. Design of Phase 3 would be completed in May of 2022 with the anticipation of bidding the project in June 2022. Construction would likely be completed in November of 2022.

1.0 PROJECT PLANNING

1.1 Location

1.1.1 Project Location

The boundary of the City of Hardin is depicted in ***Figure 1.1***. This PER addresses the City limits along with the long-range utility service area. The long-range utility service area is depicted in ***Figure 1.2***. This area includes a portion of the incorporated limits of the City of Hardin along with some surrounding agricultural and industrial lands. Hardin is located in Big Horn County along US Interstate 90, 46 miles east of Billings. The Bighorn River parallels the eastern boundary of the City of Hardin. The incorporated area is approximately 2.62 square miles. The location of Hardin is reported as 45°43'55"N latitude 107°36'45"W longitude. The existing wastewater treatment plant site is located 0.9 miles east of the Hardin city limits on the Crow Indian Reservation.

1.1.2 Land Ownership and Use

The economy of Hardin currently revolves around tourism, retail businesses, agriculture, and government services. Agriculture includes sugar beets, wheat, barley, hay production, and rangeland on both dry land and irrigated ground. The Bighorn River and a variety of small streams are the primary source of irrigation water to the many local farms and ranches.

Land use within the City of Hardin consists of residential housing, various "main street" businesses such as restaurants, hotels, bars, a grocery store, variety stores, service stations, auto dealerships, banks, lumber yards, and other businesses. There is also a hospital with nursing home, power plant, asphalt plant, detention facility, laundromat, two car washes, campgrounds, four parks, and a K-12 school system. Land outside Hardin is agricultural including cultivated farmland, hay land, and livestock pastures.

1.1.3 Climate

Hardin's climate is typical of weather patterns experienced on the semi-arid plains of eastern Montana. Warm to hot days with low humidity characterize the summer months. The winter months are typically cold with little precipitation and with occasional extremes of below zero temperatures resulting from artic air masses. The fall and spring months are transition periods between the two extremes with variable weather conditions. General temperature variations range from an average maximum and minimum of 37°F and 12°F in December and January, to 91°F and 57°F in July. Average annual precipitation is about 12 inches with May and June being the wettest months.

Figure 1.1 – Hardin City Boundary

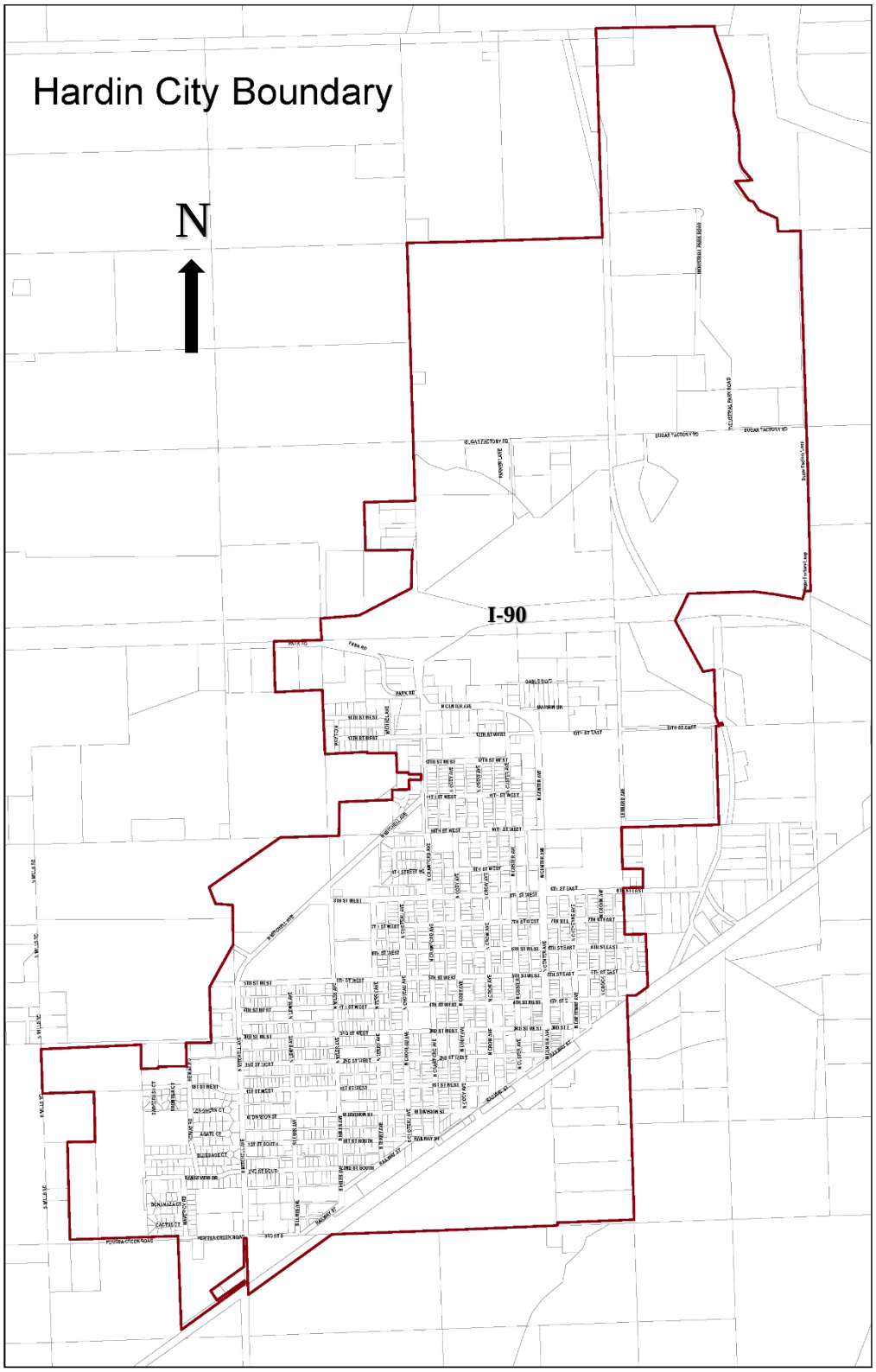
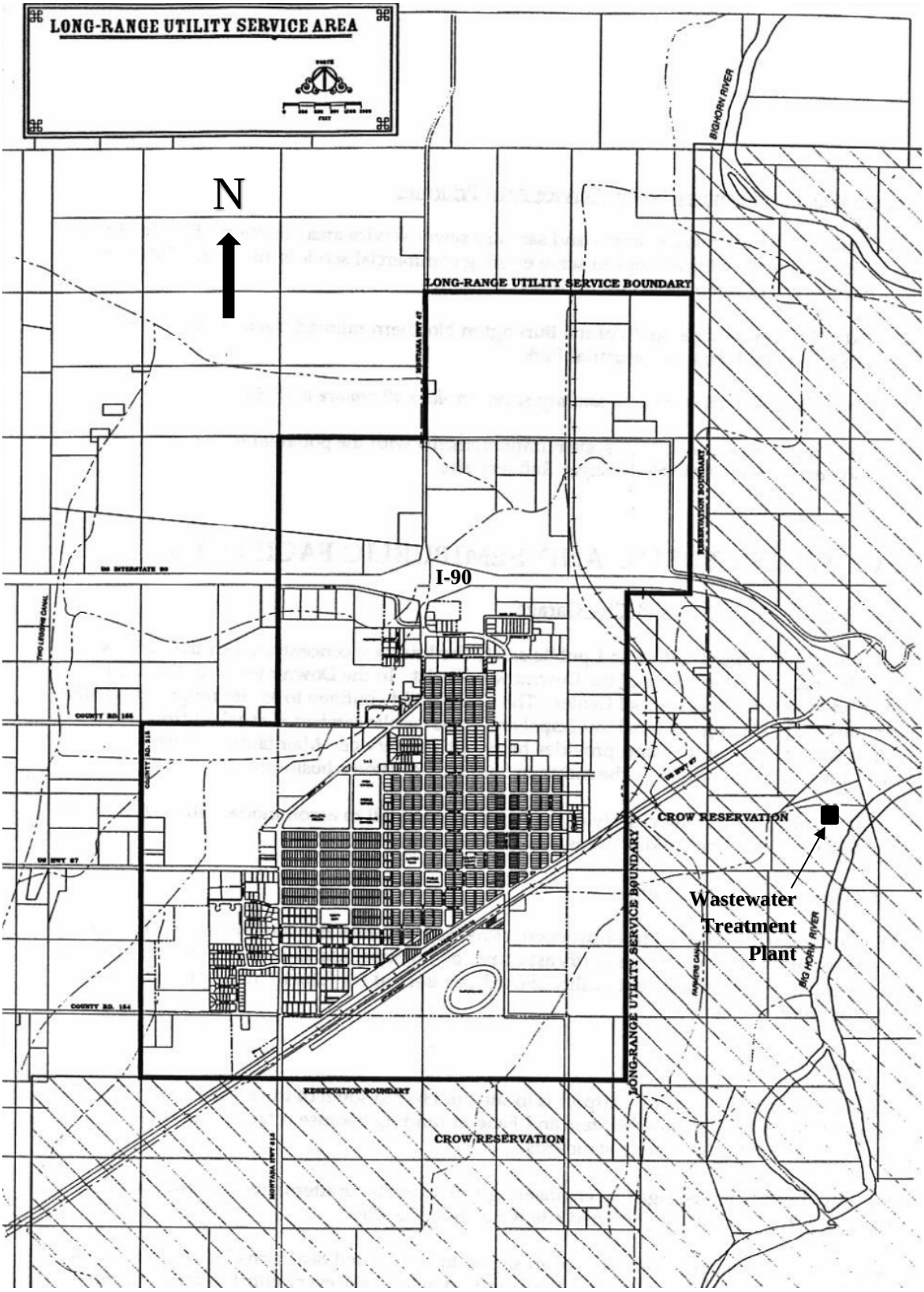


Figure 1.2 – Long-Range Utility Service Area



1.2 Environmental Resources Present

This section identifies and briefly discusses known environmental resources so that they may be further considered in later sections of this report. This analysis was prepared by consulting with the appropriate state and federal reviewing agencies as specified by the Uniform Application (UA) 2017 guidelines. A copy of the inquiry letter sent to each reviewing agency is provided in ***Appendix B***.

1.2.1 Groundwater

A Montana Bureau of Mines and Geology study (2009 by Meredith, Wheaton, and Kuzara) ***(Appendix U)*** characterizes the groundwater resources in Big Horn County as primarily shallow alluvial aquifers. Bedrock aquifers, such as the Pryor Conglomerate and the Mississippian Madison Group, are located at depths to which drilling is often not economical. In Hardin, the primary alluvial aquifer (a combination of the Holocene and Pleistocene) is within approximately 10 to 70 feet of the ground surface and is the source for a variety of private water wells.

1.2.2 Surface Water

The Hardin wastewater treatment system discharges to the Bighorn River through Outfall 001 under a major discharge permit (NPDES# MT-0030759). The outfall is located at latitude 45.734793° N, longitude 107.579082° W.

The Bighorn River is located within the Bighorn River-Hardin watershed (HUC 100800150704). Both the wastewater treatment plant and the discharge outfall to the Bighorn River are located on the Crow Indian Reservation. The Crow Tribe has not established water quality standards for the section of the Bighorn River that is located on the Crow Indian Reservation. However, approximately 9 miles downstream of the wastewater treatment plant outfall at the boundary of the Crow Indian Reservation, the Bighorn River is identified by the United States Environmental Protection Agency (EPA) database as Montana stream segment MT43R001_010. The Bighorn River at this location is classified as B-2 according to Administrative Rules of Montana (ARM) 17.30.611. Waters classified B-2 are to be maintained suitable for drinking, culinary, and food processing purposes, after conventional treatment; bathing, swimming, and recreation; growth and marginal propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply. Pursuant to Montana's Non-Degradation Policy, degradation of high-quality water is not allowed unless authorized by MDEQ. This segment of the Bighorn River is listed as "impaired" for public water supply due to the presence of lead and mercury. No total maximum daily loads (TMDL) data is on file for this segment of the river.

1.2.3 Geology and Soils

The topography of Hardin proper is flat with drainage to the east and the Bighorn River. A significant bench exists along the eastern edge of the Bighorn River adjacent to Hardin. The elevation of the City is approximately 2,900 feet. Soils at the existing treatment site are generally silty sands to a depth of approximately 60 feet. Hardin is located in a seismic zone in

which peak accelerations of two to three percent of gravity are anticipated. See ***Appendix S*** for the USGS seismic hazard map for the State of Montana. These values indicate a low risk of significant seismic activity.

1.2.4 Air Quality

Air quality in this area is very good with no known public health risks or pollution impacts.

1.2.5 Vegetation

The local vegetation consists primarily of natural grassland and irrigated forage such as alfalfa. Closer to the river, native trees and vegetation are more prevalent. ***Table 1.1*** lists all of the species of special concern in Big Horn County, Montana according to information received from United States Fish and Wildlife Service (USFWS), United States Forest Service (USFS) and BLM.

1.2.6 Farmland

The project site and surrounding lands are un-zoned, non-qualified agricultural land.

1.2.7 Wetlands

A search of the United States Fish & Wildlife Service online wetlands inventory showed wetlands near the proposed project site but no wetlands in proposed construction areas.

1.2.8 Floodplains

Research of the floodplain in the vicinity of the existing wastewater treatment plant site shows that flood studies have not been conducted for this area. Federal Emergency Management Agency (FEMA) flood zone maps were reviewed. FIRM Panel 300143 0375B indicates that the City of Hardin and the Crow Reservation (on which the treatment site is located) were not included in the flood study. A copy of the FIRM panel is included in ***Appendix R.*** However, the City of Hardin participates in the National Flood Insurance Program (NFIP).

Although the existing treatment site protective berms are likely located within the 100 and 500-year floodplains of the Bighorn River, no flooding of the facility has been recorded in its history. It has been determined to be technically and economically unfeasible to relocate the wastewater facilities outside of the floodplain as relocation would require construction of a completely new plant along with significant reconfiguration of the collection system. New appurtenances would also need to be constructed to convey treated effluent to the discharge point in the Bighorn River; thus, adding more costs and technical issues to the project.

The minimum surface elevation of existing collection and treatment appurtenances is approximately 8 feet above the high-water mark of the Bighorn River. A berm, matching the elevation (2894.5 feet) of the old lagoon cells to the south, surrounds the existing treatment site. This berm is approximately 12 feet above the high-water mark of the Bighorn River. The

adjacent segment of the Bighorn River is controlled by Yellowtail Dam which is located approximately 35 miles upstream.

Based on the response of "no comment" to the review request letter sent to the DNRC, there are not any concerns with the proposed project location. The Army Corps of Engineers indicated that Department of the Army permits would be required for discharge of fill materials into waters of the U.S. Waters of the U.S. are defined as areas below the ordinary high-water mark of stream channels and lakes or ponds connected to the tributary system, and wetlands adjacent to these waters. The treatment upgrades will be constructed at the existing treatment plant site. No fill is anticipated in the aforementioned jurisdictional areas as part of the upgrades described in this PER. No modifications are planned for the existing berms surrounding the treatment plant site. The planned wastewater appurtenances will not be impacted by the 100 and 500-year flood events due to the existing berms designed as part of the previous treatment projects. By matching the existing system elevations, any new construction will satisfy the Circular DEQ-2 functional requirements for flood protection. The proposed upgrades will not affect the 100 and 500-year floodplains as no fill is proposed outside of the existing protective berms.

1.2.9 Wildlife

Table 1.1 lists all of the species of special concern in Big Horn County, Montana according to information received from United States Fish and Wildlife Service (USFWS), United States Forest Service (USFS) and BLM. The species are split into eight main groups: amphibians, birds, fish, invertebrates, mammals, reptiles, flowering plants (dicots), and flowering plants (monocots).

Table 1.1
Species of Special Concern in Big Horn County, Montana

AMPHIBIANS

Scientific Name	Common Name	USFWS	USFS	BLM
Anaxyrus cognatus	Great Plains Toad		Sensitive	Sensitive
Spea bombifrons	Plains Spadefoot		Sensitive	Sensitive

BIRDS

Scientific Name	Common Name	USFWS	USFS	BLM
Accipiter gentilis	Northern Goshawk	MBTA		
Aquila chrysaetos	Golden Eagle	BGEPA, MBTA, BCC17		Sensitive
Ardea herodias	Great Blue Heron	MBTA		
Athene cunicularia	Burrowing Owl	MBTA, BCC17	Sensitive	Sensitive
Calcarius ornatus	Chestnut-collared Longspur	MBTA, BCC11, BCC17		Sensitive
Catharus fuscescens	Veery	MBTA		Sensitive
Centrocercus urophasianus	Greater Sage-Grouse		Sensitive	Sensitive
Coccyzus americanus	Yellow-billed Cuckoo	PS: LT, MBTA, BCC10	Threaten ed on	Sensitive

			Forests (BRT, LOLO)	
Coccyzus erythropthalmus	Black-billed Cuckoo	MBTA, BCC11, BCC17		
Dolichonyx oryzivorus	Bobolink	MBTA		
Falco peregrinus	Peregrine Falcon	DM, MBTA, BCC10, BCC11, BCC17	Sensitive	Sensitive
Gymnorhinus cyanocephalus	Pinyon Jay	MBTA, BCC17		
Haemorhous cassinii	Cassin's Finch	MBTA, BCC10		
Lanius ludovicianus	Loggerhead Shrike	MBTA, BCC10, BCC17		Sensitive
Melanerpes lewis	Lewis's Woodpecker	MBTA, BCC10, BCC17		
Nucifraga columbiana	Clark's Nutcracker	MBTA		
Numenius americanus	Long-billed Curlew	MBTA, BCC10, BCC11, BCC17		Sensitive
Oreoscoptes montanus	Sage Thrasher	MBTA, BCC10, BCC17		Sensitive
Pipilo chlorurus	Green-tailed Towhee	MBTA		
Spizella breweri	Brewer's Sparrow	MBTA, BCC10, BCC17		Sensitive

FISH

Scientific Name	Common Name	USFWS	USFS	BLM
Oncorhynchus clarkii bouvieri	Yellowstone Cutthroat Trout		Sensitive	Sensitive
Sander canadensis	Sauger			Sensitive

INVERTEBRATES

Scientific Name	Common Name	USFWS	USFS	BLM
Oreohelix pygmaea	Pygmy Mountainsnail			

MAMMALS

Scientific Name	Common Name	USFWS	USFS	BLM
Corynorhinus townsendii	Townsend's Big-eared Bat		Sensitive	Sensitive
Cynomys ludovicianus	Black-Tailed Prairie Dog		Sensitive	Sensitive
Euderma maculatum	Spotted Bat		Sensitive	Sensitive

Lasiurus cinereus	Hoary Bat			
Mustela nigripes	Black-footed Ferret	LE, XN	Endangered, Experimental Nonessential on Forests	Special Status
Myotis lucifugus	Little Brown Myotis			
Myotis thysanodes	Fringed Myotis			Sensitive
Sorex merriami	Merriam's Shrew			
Sorex preblei	Preble's Shrew			

REPTILES

Scientific Name	Common Name	USFWS	USFS	BLM
Apalone spinifera	Spiny Softshell			Sensitive
Chelydra serpentina	Snapping Turtle			Sensitive
Heterodon nasicus	Plains Hog-nosed Snake		Sensitive	Sensitive
Lampropeltis gentilis	Western Milksnake		Sensitive	Sensitive
Phrynosoma hernandesi	Greater Short-horned Lizard		Sensitive	Sensitive

FLOWERING PLANTS - DICOTS

Scientific Name	Common Name	USFWS	USFS	BLM
Astragalus aretioides	Sweetwater Milkvetch			
Astragalus barrii	Barr's Milkvetch		Sensitive	
Cleome lutea	Yellow Beeplant			
Dalea enneandra	Nine-anther Prairie Clover			
Erigeron allocotus	Big Horn Fleabane			
Eupatorium maculatum	Spotted Joepye-weed			
Grayia spinosa	Spiny Hopsage			
Ipomoea leptophylla	Bush Morning-glory			
Lomatium nuttallii	Nuttall Desert-parsley			
Physaria didymocarpa var. lanata	Woolly Twinpod			
Quercus macrocarpa	Bur Oak			

Rorippa calycina	Persistent-sepal Yellow-cress			
Senecio eremophilus	Desert Groundsel			
Sullivantia hapemanii	Wyoming Sullivantia			
Symphyotrichum molle	Soft Aster			
Triodanis leptocarpa	Slim-pod Venus'-looking-glass			
Viburnum lentago	Nannyberry			

FLOWERING PLANTS - MONOCOTS

Scientific Name	Common Name	USFWS	USFS	BLM
Allium geyeri var. geyeri	Geyer's Onion			
Carex gravida	Heavy Sedge		Sensitive	
Sporobolus compositus	Tall Dropseed			
Stipa lettermanii	Letterman's Needlegrass			

Source: Montana Natural Heritage Program (May 3, 2016)
LE--Listed Endangered LT--Listed Threatened PDL--Proposed delisted DM--Delisted, monitored
PS--Partial Status XN--Experimental, Nonessential population MBTA--Migratory Bird Treaty Act
BGEPA--Bald and Golden Eagle Protection Act of 1940
BCC(Year)--Birds of Conservation Concern (Year)

1.2.10 Historical and Cultural Resources

Big Horn County is home to historic sites such as graves, Native American battlefields, stone circles, homesteads, historic mines, and other cultural sites.

Specific to general alternatives under consideration, the State Historical Preservation Office (SHPO) has stated that any structure over 50 years of age is considered historic and is potentially eligible for listing on the National Register of Historic Places. SHPO recommends that if any structures that are over 50 years old are to be altered as part of the project, they be recorded and a determination of their eligibility be made prior to disturbance. SHPO also recommended that the Tribal Historic Preservation Office (THPO) be contacted regarding the project since the site is located on the Crow Indian Reservation. An agency review letter was mailed to the THPO requesting comments and concerns regarding the project. A response is yet to be received.

The proposed project area is located in public right-of-ways and on the existing wastewater treatment site on ground that has been intermittently disturbed over the course of the past century. Therefore, it is unlikely that any historical or cultural resources will be encountered.

1.2.11 Future Environmental Concerns

Hardin's NPDES discharge permit was recently renewed on March 14, 2018. The renewed permit became effective on July 1, 2018 and expires on June 30, 2023. Although base numeric nutrient standards and total maximum daily loads (TMDL's) have not been established for the section of the Bighorn River affected by Hardin's discharge, these standards and regulations could become applicable during the design life of the proposed wastewater treatment upgrades. Therefore, alternatives that are capable of meeting potential future standards and regulations (such as nitrogen and phosphorous limits) will be given preference in this PER.

1.2.12 Environmental Justice Issues

There are no known increases in environment or public health risks to minority or low-income persons due to the improvements proposed in this PER. All customers and residents would benefit from improvements to the wastewater system.

1.3 Population Trends

1.3.1 Historical Population

Table 1.2 presents a summary of historical census population for both the City of Hardin and Big Horn County for the period 1970-2010. Except for the 1990's, both the City and County populations have been increasing although the rate has slowed in the last decade. The 2017 population of Hardin is listed as 3,837 persons. As the largest City or Town in Big Horn County, Hardin contains about one-quarter of all residents. This percentage has remained relatively constant over the last several decades.

1.3.2 Population Projections

The population trends of the City of Hardin have been erratic over the course of the last 40 years. For this project, the City Council has decided that a design population (2020-2040) of 4,868 persons makes economic sense. This figure provides for a residential growth rate of 0.5 percent per year as well as the recently re-opened the detention facility.

Table 1.2 Historical Population Summary Big Horn County and City of Hardin					
POPULATION CENTER AND DATA	**1970**	**1980**	**1990**	**2000**	**2010**
Big Horn County Population	10,057	11,096	11,337	12,671	12,865
Percent Change		+10.3%	+2.2%	+11.8%	+1.5%
City of Hardin Population	2,733	3,300	2,940	3,384	3,505
Percent Change		+20.7%	-10.9%	+15.1%	+3.6%
Percent of County Population	27.2%	29.7%	25.9%	26.7%	27.2%

1.4 Community Engagement

Significant shifts in the population and economic activity seen in other eastern Montana communities has yet to occur in Hardin; however, the City has anticipated these impacts by developing a growth management plan in 2009 (see ***Appendix D***). The policy identifies wastewater infrastructure as one of the top ten priorities. A formal public hearing about this PER and the associated Environmental Assessment was facilitated in March 2018. Subsequent presentations and updates were conducted at public City Council meetings in 2018 and 2019.

2.0 EXISTING FACILITIES

2.1 Location

2.1.1 Wastewater Facilities

The City of Hardin owns and operates a public wastewater collection and treatment facility that includes a gravity collection system and a return activated sludge oxidation ditch treatment system. The treatment facility is located about 0.9 miles east of the City adjacent to the Bighorn River. ***Figure 2.1*** illustrates the general location and layout of these facilities.

2.1.2 Water Facility

The City of Hardin owns and operates a public water treatment facility and distribution system. Supply water is pumped from the Bighorn River to the water treatment facility located on the east side of Hardin. Treated water is then distributed to 1,395 service connections. The City currently has 1,135 residential connections, 247 commercial connections, and 13 irrigation connections. At this time, 1,299 water connections are active.

2.2 History

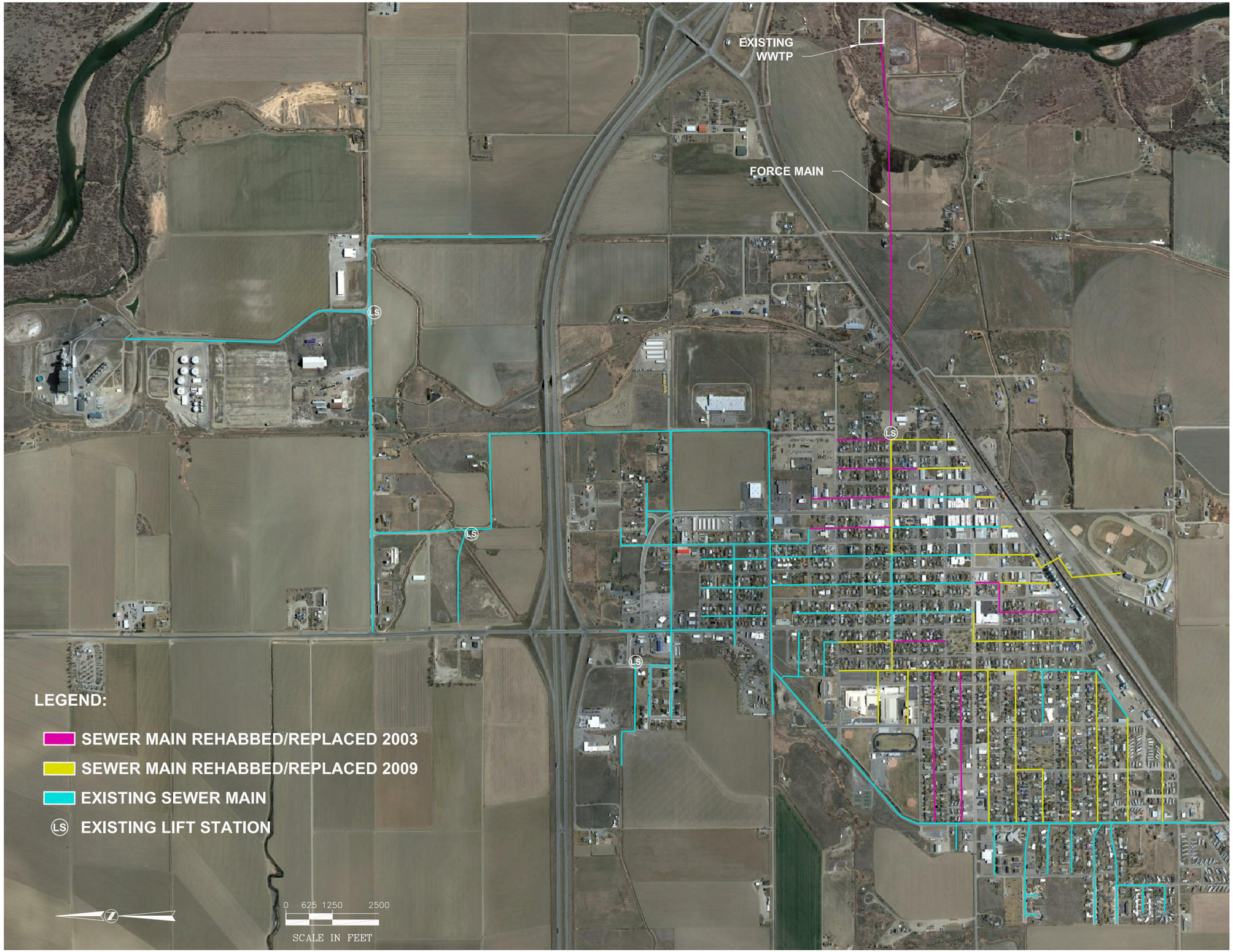
2.2.1 Brief City History

The Town of Hardin was founded in 1906 on land purchased by the Lincoln Land Company of Nebraska. Hardin's namesake is a local cattleman by the name of Samuel H. Hardin. Hardin was later incorporated as a City in 1911.

2.2.2 System History

The original wastewater collection system was constructed in 1916. Extensions to the system were conducted intermittently over the course of the next several decades. By the early 1990's the collection system had grown to include approximately 80,800 linear feet of 8-inch to 18-inch sewers including vitrified clay pipe (VCP), polyvinyl chloride (PVC) pipe, and reinforced concrete pipe (RCP) as well as approximately 235 sanitary manholes (SMH). At this point in time a lift station on the east end of 6th Street pumped wastewater from the collections system to the wastewater treatment plant through 4,700 linear feet of 12-inch asbestos cement force main. By the mid-2000's, many of these lines and appurtenances were in need of replacement. The 6th Street lift station and the force main to the treatment plant were replaced in 2008. In 2009, the City completed a project involving rehabilitation or replacement of 24,044 lineal feet of sewer mains and 82 manholes. In order to address excessive I&I flows in the wastewater system, Stahly Engineering and the City conducted a comprehensive investigation in the spring and early summer of 2019. The investigation identified several sections of deteriorated reinforced concrete pipe (RCP) trunk main and manholes in need of replacement. Replacement/rehabilitation of the deteriorated trunk mains and manholes found to be significant sources of infiltration is included in the project scope of this PER.

Stahly Engineering & Associates, Inc. COPYRIGHT 2015



STAHLY ENGINEERING & ASSOCIATES
PROFESSIONAL ENGINEERS & SURVEYORS
www.seaeng.com

2223 MONTANA AVE.
STE. 201
BILLINGS, MT 59101
Phone: (406)601-4055
Fax: (406)601-4062

3530 CENTENNIAL DR.
HELENA, MT 59601
Phone: (406)442-8594
Fax: (406)442-8557

851 BRIDGER DR. STE. 1
BOZEMAN, MT 59715
Phone: (406)522-9526
Fax: (406)522-9528

ISSUE/REVISION

No.	DATE	BY
1	####	####
DESCRIPTION		
####		

No.	DATE	BY
2		
DESCRIPTION		

No.	DATE	BY
3		
DESCRIPTION		

No.	DATE	BY
4		
DESCRIPTION		

No.	DATE	BY
5		
DESCRIPTION		

PRELIMINARY
NOT FOR CONSTRUCTION

EXISTING FACILITIES MAP

WASTEWATER TREATMENT UPGRADES PER

CITY OF HARDIN, MONTANA

DESIGNED: GMS
DRAWN: PDH
CHECKED: _
DATE: 03-12-2018

FIGURE
2.1

N:\2223-08C17 Hardin WW PER\DWG\Plan Sets\PER Exhibits\OVERALL SYSTEM.dwg, 11x17 (portrait), Plotted: Apr 23, 2018 - 11:38am, pherbst

The original wastewater treatment system was a facultative lagoon facility. The old facultative lagoon cells still exist directly south of the existing wastewater treatment plant. The facultative lagoons were replaced by the current oxidation ditch mechanical plant in 1978. Portions of the old lagoon cells are still utilized as part of the current mechanical treatment system for surge flow bypass, sludge drying beds, and septage receiving.

2.3 Condition of Existing Wastewater Facilities

Based on the recommendations contained in the recently completed EPA wastewater treatment compliance evaluation inspection report and the ongoing issues encountered by the system operators, the City elected to hire Stahly Engineering & Associates to prepare a wastewater system PER to evaluate the capacity and capability of the wastewater facilities. This chapter presents a summary of the existing wastewater collection, treatment, and discharge facilities. The summary is followed by an analysis of the wastewater collection and treatment systems outlining issues with I&I, performance, redundancy, operator safety, and permitting.

2.3.1 Collection System Description

As state above, the original wastewater collection system was constructed in 1916 with additions over the years constructed using a variety of materials such as reinforced concrete pipe (RCP), VCP, and PVC pipe. The existing collection system consists of approximately 80,800 linear feet of 8-inch to 18-inch sewers including vitrified clay pipe (VCP), polyvinyl chloride (PVC) pipe, and reinforced concrete pipe (RCP) as well as approximately 235 sanitary manholes (SMH). The gravity collection system terminates at a lift station which feeds the wastewater treatment plant via a 14-inch diameter HDPE force main. The existing duplex lift station has a design flow of 930 gpm per pump.

To correct deficiencies, the City conducted major collection system rehabilitation and replacement projects in 2003 and 2009. The 2003 project replaced/rehabbed 14,874 feet of sanitary sewer mains and 32 manholes (See ***Table 2.1***). The 2009 project replaced/rehabbed 24,044 feet of sanitary sewer mains and 82 manholes (See ***Table 2.2***). Thus, the City has replaced or rehabbed almost 50 percent of sanitary sewer mains and manholes over the course of the last 15 years.

Table 2.1
2003 Wastewater Collection System Improvements

Name or Location	Length (Feet)	New Size (Inches)	New SMH
Alley East of Crook Ave	697	8"	3
Alley between Cheyenne and Crook	1,052	8"	3
Alley between Cheyenne and Center	1,033	8"	3
Alley between Custer and Center	1,034	8" Rehabbed	0
Alley between Cody and Crawford	733	8"	3
Second Street	699	8"	1
Alley between Cody and Crow	319	8"	1
Alley between Choteau and Crawford	686	8"	2
Alley between 3rd and 4th St.	1,987	8"	6
Alley between 4th and 5th St.	2,004	8"	7
Force Main - 6th St.	4,630	14"	3
Totals	14,874		32

Table 2.2
2009 Wastewater Collection System Improvements

Name or Location	Length (Feet)	Sewer Main Pipe	SMH	
			Replaced	Rehabbed
North School Main	741	8" CIPP	3	0
South School Main	310	8" CIPP	1	1
Alley between Terry and Choteau	2,514	10" CIPP	5	1
Alley between Crawford and Choteau	2,174	8" CIPP	4	2
6th Street West	380	15" CIPP	1	1
6th Street East	1,544	12" CIPP	1	1
Alley between 2nd and 3rd St.	2,000	8" CIPP	3	2
Alley between Cody and Crow	1,453	8" CIPP	4	0
Alley between Crow and Custer	1,595	8" CIPP	4	1
Alley between Center and Cheyenne	274	10" CIPP	1	1
Alley between Crook and Cheyenne	672	8" CIPP	2	0
Alley East of Crook	844	8" CIPP	3	0
Airport Alignment	0	N/A	0	4
Alley between 1st and Division	2,291	8" CIPP	8	0
North Lewis St.	359	8" CIPP	2	0
Alley between 1st and 2nd West	1,948	8" CIPP	3	4
Alley between 1st and 2nd South	1,683	8" CIPP	3	5
3rd Street	380	N/A	1	0
Alley between Custer and Center	0	N/A	1	1
Alley between Crawford and Cody	666	8" CIPP	1	0
Custer St	766	8" CIPP	1	1
11th Street West	213	8" CIPP	3	0
Alley between 2nd and Rankin	1,237	8" CIPP	0	2
Totals	24,044		55	27

2.3.2 Collection System Analysis

A recent comprehensive I&I study conducted by Stahly Engineering and the City identified approximately 2,675 feet of RCP trunk main and 17 manholes that are contributing significant infiltration flows to the wastewater system. The study determined that the rest of the collection system appears to be in good condition with minimal infiltration contributions. The existing lift station and 14-inch force main have adequate capacity to handle the 20-year design flows presented in this report. No overflow or backflow issues have been reported by the City's public works department.

2.3.3 Existing Wastewater Treatment Plant Flows

Wastewater treatment plant flows are currently monitored just prior to the inlet of the existing headworks and at the treated effluent disinfection channel. However, data logging for the inlet flow meter is currently unreliable. Therefore, the following real flow data was acquired from 2017 and 2018 effluent monitoring reports supplied by the lead operator of the wastewater treatment plant. The referenced reports can be found in ***Appendix P*** of this report.

Computing the current average daily per capita flow using a population of 3,837 persons and the average daily flow of 589,000 gallons/day for the year 2018 yields 154 gallons/person-day. This value is considerably higher than the MDEQ design value of 100 gallons/capita-day and is somewhat higher than the EPA standard for non-excessive dry weather infiltration of 120 gallons per capita-day.

2.3.4 Wastewater Characterization

Wastewater treatment plant influent characterization data is shown in ***Table 2.3***. As expected, concentrations were diluted compared to "typical" concentrations observed in other similar communities.

Table 2.3
2018 Average Influent Wastewater Characterization
Hardin, MT – Pop. 3,837 Persons

Parameter (mg/L)	Measured Flow & Average Concentration	"Typical" Concentrations at Other Towns
Flowrate (Gal/day)	589,000	N/A
BOD_5	146	150 to 250
TSS	113	150 to 250

2.3.5 Wastewater Treatment System Description

The existing wastewater treatment system consists of a combination grinder/auger screen headworks followed by activated sludge biological treatment via an oxidation ditch. Wastewater then flows from the oxidation ditch to one of two secondary clarifiers. Activated sludge is pumped from the clarifiers back to the oxidation ditch. Clarified effluent is then disinfected via

open-channel UV units. The treated effluent is then discharged to the Bighorn River. Sludge is wasted from the clarifiers to a single aerobic digestor. Concentrated sludge is then pumped to a sludge drying bed in the nearest abandoned facultative lagoon cell.

2.3.5.1 Oxidation Ditch Process Description

An oxidation ditch (sometimes called by proprietary names such as Carrousel, Pasveer, or Orbal) is an activated sludge complete-mix biological treatment process often incorporated into treatment facilities serving small and medium sized communities. The process usually consists of a circular oval, or "racetrack" shaped tank, constructed in the form of a channel, with horizontal brush or disc surface aerators and submersible mixers. The surface aerators also work to convey the mixed liquor through the flow channel. Oxidation ditches typically have a hydraulic retention time of one to two days and a solids retention time of approximately two to three weeks. Activated sludge is returned to the process from secondary clarification. Oxidation ditches are capable of achieving high levels of BOD removal and nitrification. When modified to incorporate an anoxic tank upstream of the oxidation ditch, partial denitrification can be achieved when combined with a recycle from the oxidation ditch to the anoxic zone.

2.3.5.2 Original Wastewater Treatment Design Criteria

A summary of the known original system design criteria (1977) is presented below:

Population: ~3,300 Persons (estimated from 1980 census)
Flow Rate: 1,200,000 Gallons/Day

2.3.6 Wastewater Collection and Treatment System Deficiencies

The wastewater collection and treatment systems were inspected by the EPA in September of 2017. The resulting inspection report ***(Appendix F)*** identified several deficiencies and items requiring corrective action. Please note that deficiency findings regarding administration and reporting are not listed below as these involve modifications to procedures rather than infrastructure upgrades. The City of Hardin Public Works Department also reported several wastewater treatment plant deficiencies. Areas of concern for the wastewater collection and treatment systems, paraphrased from the EPA inspection report and reports from the Hardin Public Works Department are listed below.

a) The collection system has issues with excessive I&I and illicit connections.

b) The facility does not have grit or grease removal systems. The headworks screen is aging. Grease is present throughout the treatment process.

c) The wastewater treatment plant has issues with extreme intermittent surge flows from rain and snowmelt events. The intermittent surge flows contain low levels of nutrients which, in-turn, negatively affects the biology within the oxidation ditch. This has resulted in the need for raw wastewater to be diverted to an old

lagoon cell. There is currently no way to reintroduce the bypassed effluent into the treatment process.

d) Secondary Clarifier No. 1 has uneven flows over the weir due to an uneven weir bar. Thus, the clarifier does not operate according to design.

e) The plant operators reported freezing issues in the clarifier inlet channels.

f) Wastewater flow rate monitoring is unreliable.

g) The wastewater treatment plant does not have backup power generation.

h) The wastewater treatment plant does not have a backup blower for the aerobic digester.

i) The plant operators have reported excessive foaming in the oxidation ditch.

j) The return activated sludge (RAS) pumping station is aging and requires repairs frequently.

k) The waste activated sludge (WAS) pumping station is aging.

l) The wastewater treatment plant does not have backup disinfection on the effluent bypass channel.

m) The existing UV disinfection system is located outdoors, making maintenance difficult during inclement weather.

n) There is currently no way to introduce septage from pumper trucks into the treatment process. Septage is currently dumped in the old lagoon cell that is also utilized as a sludge drying bed.

o) The plant does not have an adequate water supply.

2.3.7 Discharge Permit

The City of Hardin received a renewed NPDES discharge permit (MT-0030759) on March 14, 2018. The renewed discharge permit became effective on July 1, 2018 and expires on June 30, 2023. The applicable permit limits of the renewed discharge permit are presented in ***Table 2.4***.

Table 2.4
Hardin WWTP Discharge Limits

Parameter	30 and 7 Day Average Concentration (mg/L)	Daily Maximum	30 Day Average Percent Removal
BOD_5	30 / 45	N/A	85 (Note 1)
TSS	30 / 45	N/A	85 (Note 1)
pH (s.u.)	N/A	6.5 to 9 (Note 2)	N/A
E. Coli: April 1– October 31 (cfu/100 mL)	126 / N/A (Note 4)	252 (Note 5)	N/A
E. Coli: November 1 – March 31 (cfu/100 mL)	630 / N/A (Note 6)	1,260 (Note 7)	N/A
Total Residual Chlorine	N/A / N/A	0.5	N/A

Note 1: The arithmetic mean of the concentration for effluent samples collected in a calendar month shall not exceed 15 percent of the arithmetic mean of the concentration for influent samples collected at approximately the same times during the same period (85 percent removal).

Note 2: The pH of the discharge shall not be less than 6.5 standard units (s.u.) or greater than 9.0 s.u. at any time.

Note 3: There shall be no visible sheen in the receiving water. If visible sheen is detected, a grab sample shall be taken immediately and analyzed in accordance with 40 CFR Part 136. The concentration of oil and grease shall not exceed 10 mg/L in any sample taken.

Note 4: From April 1 through October 31, the geometric mean number of *E. coli* may not exceed 126 colony-forming units (cfu) per 100 mL during any calendar month.

Note 5: From April 1 through October 31, no more than 10% of *E. coli* samples taken during any calendar month may exceed 252 cfu per 100 mL.

Note 6: From November 1 through March 31, the geometric mean number of *E. coli* may not exceed 630 cfu per 100 mL during any calendar month.

Note 7: From November 1 through March 31, no more than 10% of *E. coli* samples taken during any calendar month may exceed 1,260 cfu per 100 mL.

2.3.8 Compliance History

The current compliance status of the facility is “Significant Noncompliance” according to the EPA. The significant noncompliance status stems from the findings of the September 2017 EPA compliance evaluation inspection (Appendix F). Out of the last 12 quarters, the facility has been in compliance for five, in noncompliance for six, and in significant noncompliance for one. A combined list of deficiencies from the EPA compliance evaluation inspection report and the City public works staff are presented above in Section 2.3.6.

2.4. Financial Status of Facilities

2.4.1 Rates and Charges

The base sewer rate was raised to $37.34 in 2018 for all service connections. This rate places Hardin well above the current MDOC target wastewater rate of $26.19 ***(Appendix M)***. Although the City applies different base rates according to meter size for water service, the uniform base rate is applied to all sewer connections. Rather than defining different monthly base rates for commercial sewer services based on multiples of equivalent dwelling units (EDU's), the City charges an additional sewer fee of $3.2221 per 1,000 gallons of water consumption after the first 7,200 gallons of water consumption. The City also charges a flat monthly rate of $5.67 for users with sump pumps connected to the wastewater collection system. The current base sewer rate structure brings in approximately $48,500 of revenue per month, as shown in ***Table 2.5***. This amounts to an estimated annual revenue of approximately $582,000.

Table 2.5
Sanitary Sewer Services

Service Type	Base Rate	Quantity	Monthly Income
Residential	$37.34	1,039	$38,796.26
Commercial	$37.34	247	$9,222.98
Sump Pump	$5.67	85	$481.95
Total	**-**	**1,286**	**$48,501.19**
Annual			**$582,014.28**

2.4.2 Ledger Summary

City financial data including utility billing revenue and expenditures can be found in ***Appendix G***. At the present time, there are 1,286 active sewer accounts corresponding to monthly base rate revenues of approximately $47,085 per month, or $565,020 annually. Sanitary sewer expenses for the 2017 fiscal year totaled to $669,713. Sanitary sewer revenues for the 2017 fiscal year totaled to $758,112. The current loan payments on wastewater projects are $184,714 per year. The outstanding balance on wastewater-related loans was $1,415,000 as of January 1, 2018.

Given the current rate structure, Hardin has limited ability to implement any projects without a combination of future rate increases, significant grant funding assistance, and most likely, additional debt.

3.0 PROJECT NEED

The following sections outline the issues and deficiencies of Hardin's existing wastewater system. Health, sanitation, and security deficiencies are based upon reporting from a recent EPA compliance evaluation inspection and reporting from the City's wastewater operators and public works personnel. Several issues were mentioned in both the EPA evaluation and the lists obtained from the City's personnel. Administrative deficiencies from the EPA compliance evaluation such as recordkeeping, sampling, and reporting issues are omitted from the following sections as they can be corrected without the capital improvements proposed in this PER.

3.1 Health, Sanitation, and Security

I&I Reduction and Surge Flow Attenuation

The wastewater system has issues with excessive I&I. The wastewater treatment plant also has issues with extreme intermittent surge flows from rain and snowmelt events. The intermittent surge flows contain low levels of nutrients which, in-turn, negatively affects the biology within the oxidation ditch. The influent to the treatment plant is often bypassed to an old lagoon basin (part of the previous treatment facility) during surge flow events. There is currently no way to reintroduce the bypassed effluent into the treatment process.

Screening, Grit, and Grease Removal

The existing mechanical screen is aging and deteriorated which is causing maintenance and performance issues. The wastewater treatment plant does not have adequate grit and grease removal in the existing headworks facility. Suspended solids, including grease balls, were observed throughout the treatment process during the EPA compliance inspection. According to the operators, the grease often causes excessive foaming due to filamentation in the oxidation ditch. This results in freezing issues during the winter months. There is currently no means to recycle wastewater that has not been adequately treated to the beginning of the process. Therefore, grit and grease contaminated effluent is intermittently discharged to the Bighorn River.

Secondary Clarification

The weir bar in Secondary Clarifier 1 is not level which is causing uneven flow over the weir. Solids, such as grease balls were observed exiting the secondary clarifiers. The City has attempted to level the weir bar with minimal success. Thus, flows over the weir remain uneven. The mechanical equipment in both secondary clarifiers is aging and in need of replacement. The plant operators of the wastewater treatment facility have expressed that the influent flow channels of the secondary clarifiers often freeze during the winter months. Replacement of the secondary clarification equipment along with installation of insulated covers over the secondary clarifiers would improve treatment while reducing O&M costs associated with de-icing of the flow channels and weirs.

Backup Power

As stated in the EPA Compliance Evaluation Inspection Report, the wastewater treatment facility does not have backup power generation. Therefore, in the event of a power outage, all capability to treat wastewater is lost. Currently, the operator receives an alarm if power is lost. Wastewater is then manually diverted to an old lagoon cell until power is restored. There is currently no means of reintroducing the diverted wastewater into the treatment process. The diverted wastewater remains in the old lagoon cell until it disappears due to evaporation/seepage. Installation of a backup power generator would ensure that the wastewater treatment processes would continue to operate during power outages.

Process Controls, Flow Monitoring, and SCADA

Existing controls, flow monitoring, and SCADA for the wastewater treatment facility have been pieced-together over the course of the last 40 years. Many of the current control appurtenances remain from original plant construction. The plant operators have expressed frustration with the existing controls and monitoring equipment. The existing influent and effluent flow monitoring equipment is unreliable. There currently is no flow monitoring on the RAS and WAS systems. There is no adaptive dissolved oxygen (DO) monitoring and adjustment in the existing oxidation ditch. Given the age and rudimentary nature of the existing controls, flow monitoring, and SCADA, modernization is necessary for acceptable process control and data viewing/logging.

Facility Water Supply

The current water supply well for the treatment facility is inadequate. The current well is only capable of intermittently supplying flows of one to two gpm. The City has installed a cistern to allow for storage of potable water that has been hauled from the municipal fill station. The cistern serves the laboratory and restroom at the existing facility. However, the cistern does not store adequate volume for wash-down procedures.

Return Activated Sludge (RAS) Pumping

The existing RAS pumping system is unreliable and needs maintenance/repairs on a regular basis. This system consists of two screw pumps which were installed during original plant construction in 1978. According to the treatment plant operators, the augers have been repaired several times by the staff. This is a dangerous procedure that takes place in a confined space. Treatment is impaired during the maintenance and repair procedures due to the inability to return an adequate amount of sludge to the oxidation ditch.

Aerobic Digester

The wastewater treatment facility currently has only one aerobic sludge digester. MDEQ Circular 2 states that all facilities where the design average flow exceeds 100,000 gpd must have multiple digestion units. Construction of a second aerobic sludge digester will allow the facility to conform with MDEQ design standards while allowing for periodic maintenance without a loss of digestion capacity.

Backup Aerobic Digester Blower and Blower Building Expansion

The wastewater treatment facility currently has only one aeration blower for the aerobic sludge digester. Thus, the ability to aerobically digest sludge is lost during maintenance and repair of the existing blower. MDEQ Circular 2 states that minimum mixing and oxygen requirements must be provided with the largest blower out of service. The existing blower building does not have adequate space for installation of a second blower. Installation of a backup aerobic digestion blower in an expanded building would enhance treatment of waste sludge.

Backup Disinfection

The wastewater treatment facility currently only has one UV disinfection unit located in the primary treated effluent discharge channel. Therefore, when effluent is bypassed in order to clean/maintain/repair the UV unit, the ability to disinfect the treated effluent is temporarily interrupted. The treatment facility currently does not have the infrastructure in-place to recycle effluent to the head of the process that has not been adequately treated or disinfected. Therefore, undisinfected effluent is intermittently discharged to the Bighorn River. Disruptions in disinfection can be prolonged, especially during the winter months, due to the outdoor location of the UV system. Maintenance and repair are extremely difficult and time consuming for the operators during periods of cold weather. MDEQ Circular 2 states that multiple units must be provided to allow for uninterrupted service due to equipment failure or maintenance activities. Without a second UV disinfection system located in a bypass channel, the effluent from Hardin's wastewater treatment system is a potential public health risk for recreational river users and downstream potable water systems.

Because *E. coli* can remain dormant for extended periods of time in the river environment, viable organisms can be transported far downstream in the Bighorn River system, potentially exceeding United States Department of Health limits of 1 colony forming unit (CFU)/100 ml for untreated drinking water and 125 CFU/100 ml for recreational user exposure. According to research on the life cycle and viability of *E.coli* (Flint 1987), these organisms can survive for long time periods in river water at temperatures from 4 to 25 degrees Celsius. In water filtered to remove carbon sources, organism viability was up to 260 days. These long survival times suggest that *E coli* are capable of entering a dormant state (known by researchers as VBNC (viable but not culturable) when introduced into an alien environment such as the Bighorn River. More recent studies (Raloff 2012) show that when stressed, *E. coli* can temporarily suppress its life signs including reproduction.

Because health officials routinely use culturing to determine the viability and subsequently the presence of these organisms, *E. coli* is able to elude detection when dormant. Researchers have concluded that recent and virulent disease outbreaks are the result of health officials incorrectly concluding that water supplies were "safe" when in fact the organisms were in the VBNC state. Upon entering the intestinal tracts of humans, these so called temporarily dormant organisms are able to rapidly reproduce and cause rapid disease outbreaks.

By installing a second effluent disinfection system in a bypass channel along with a heated building to house the disinfection system, the City will be able to consistently meet permit limits, protect public health, and avoid likely enforcement action.

Disinfection Building

As stated above, the existing UV disinfection equipment is located within an open channel which is outdoors. The treatment facility operators have expressed difficulties in maintaining the UV units, especially during periods of inclement weather during winter months. Installation of a heated building to house the disinfection system (along with installation of a second UV system in a bypass channel) would allow the City to consistently meet permit limits, protect public health, enhance operator safety, and avoid likely enforcement action.

Septage Receiving Station

At the existing wastewater treatment plant, septage from pumper trucks is dumped into the old facultative lagoon cell that is also utilized as a sludge drying bed. There are currently no means of discharging septage into the existing treatment process. Installation of a septage receiving station would improve local environmental health while allowing the City to monitor, quantify, and treat the septage that is received from pumper trucks.

3.2 Aging Infrastructure

As discussed elsewhere in this report, the wastewater treatment facilities have numerous deficiencies that do not meet current EPA and DEQ design standards. This facility was constructed in 1978 when wastewater treatment system design and performance standards were significantly different from today's standards. Most significant are the needs for: I&I reduction in the collection system, a properly functioning headworks, surge flow attenuation, properly functioning secondary clarification, secondary UV disinfection in a bypass channel, housing of UV disinfection in a heated building, replacement/elimination of the existing RAS pumping station, backup power generation, and updated monitoring and controls to provide flexibility for maintenance and day to day system operations. This project corrects all deficiencies in accordance with design Circular DEQ-2 as well as providing additional capacity for long term community growth. Growth related issues are discussed below.

3.3 Reasonable Growth

Hardin has selected a design population of 4,868 persons for the wastewater system 20-year planning period (2020-2040). This 4,868-person target equates to an average annual growth rate of 0.5 percent (starting at the 2017 population of 3,837) plus a population increase of 564 people due to the maximum population (464 inmates plus 100 staff) of the recently re-opened Rocky Mountain Regional Detention Facility.

3.4 Design Flow

As previously presented in this PER, real flow data indicates that current average daily per capita flows greatly exceed the 100 gpcd design value from Circular DEQ-2. The current average daily flow of 589,000 gallons/day for the year 2018 yields 154 gpcd. This is likely due to I&I into the aging collection system from groundwater, storm events, and sump pump connections. Therefore, Stahly Engineering and the City conducted a comprehensive I&I study in the spring and early summer of 2019 to identify sections of the existing collection system that need to be replaced/rehabilitated to reduce daily per-capita flows to an acceptable level prior to commencement of the wastewater treatment upgrades. At the 20-year design population of 4,868 residents, the average day design flow can be calculated as follows:

Average Day Design Flow = 100 gpcd X 4,868 residents = 486,800 gpd

The 20-year peak design flow values can be calculated as follows:

Peak Day Design Flow = Average Day Design Flow X Daily Peaking Factor of 2.0

= 486,800 gpd X 2.0 = 973,600 gpd

Peak Instantaneous Design Flow = 973,600 gpd / 1,440 min per day = 676 gpm

The headworks facilities proposed in this PER will need to accommodate the 20-year peak design flows indicated above. Surge flow appurtenances will be designed to either equalize or otherwise attenuate the 20-year peak design flows.

4A ALTERNATIVE DEVELOPMENT

Evaluation of Hardin's wastewater system identified numerous and significant deficiencies. This section will describe the most reasonable alternatives available to correct the wastewater system deficiencies and will then determine which ones are most appropriate for a detailed analysis. The detailed alternatives evaluation is presented in Section 4B of the report.

4A.1 General Design Requirements

4A.1.1 Design Criteria

Alternatives identified to correct deficiencies will need to be sized to handle both existing and anticipated future wastewater flows. Additionally, any improvements to the system will need to comply with applicable local, state, and federal regulations as well as accepted industry standards for the design of wastewater facilities. Values for these design criteria, including population projections, climate, existing and design flows, and organic loading, are based upon the previously presented information.

4A.1.2 Applicable Regulations

The design of any improvements to the wastewater treatment system will need to fully comply with the latest edition of Circular DEQ 2. Plans and specifications will need to be reviewed and approved by the MDEQ before construction can begin.

4A.1.3 Discharge Permit Limitations

The City of Hardin received a renewed NPDES discharge permit (MT-0030759) on March 14, 2018. Please refer to ***Appendix I.*** The renewed discharge permit became effective on July 1, 2018 and expires on June 30, 2023. The applicable permit limits of the renewed discharge permit are presented in ***Table 4A.1***. The discharge location is the Bighorn River.

4A.1.4 TMDLs

The current discharge permit does not include limitations on nitrogen or phosphorous, but requirements could be added to the permit during future renewal processes if total maximum daily loads (TMDLs) are established for this stretch of the Bighorn River. TMDLs are defined as the total amount of a pollutant that a water body may receive from all sources without exceeding water quality standards. Under the Federal Clean Water Act, the MDEQ maintains a list of water bodies that fail to meet water quality standards, called the 303(d) list, after the section of the act, and develops TMDLs for water bodies on the list.

Table 4A.1
Hardin WWTP Discharge Limits

Parameter	30 and 7 Day Average Concentration (mg/L)	Daily Maximum	30 Day Average Percent Removal
BOD_5	30 / 45	N/A	85 (Note 1)
TSS	30 / 45	N/A	85 (Note 1)
pH (s.u.)	N/A	6.5 to 9 (Note 2)	N/A
E. Coli: April 1– October 31 (cfu/100 mL)	126 / N/A (Note 4)	252 (Note 5)	N/A
E. Coli: November 1 – March 31 (cfu/100 mL)	630 / N/A (Note 6)	1,260 (Note 7)	N/A
Total Residual Chlorine	N/A / N/A	0.5	N/A

Note 1: The arithmetic mean of the concentration for effluent samples collected in a calendar month shall not exceed 15 percent of the arithmetic mean of the concentration for influent samples collected at approximately the same times during the same period (85 percent removal).

Note 2: The pH of the discharge shall not be less than 6.5 standard units (s.u.) or greater than 9.0 s.u. at any time.

Note 3: There shall be no visible sheen in the receiving water. If visible sheen is detected, a grab sample shall be taken immediately and analyzed in accordance with 40 CFR Part 136. The concentration of oil and grease shall not exceed 10 mg/L in any sample taken.

Note 4: From April 1 through October 31, the geometric mean number of *E. coli* may not exceed 126 colony-forming units (cfu) per 100 mL during any calendar month.

Note 5: From April 1 through October 31, no more than 10% of *E. coli* samples taken during any calendar month may exceed 252 cfu per 100 mL.

Note 6: From November 1 through March 31, the geometric mean number of *E. coli* may not exceed 630 cfu per 100 mL during any calendar month.

Note 7: From November 1 through March 31, no more than 10% of *E. coli* samples taken during any calendar month may exceed 1,260 cfu per 100 mL.

4A.1.5 Numeric Nutrient Standards

MDEQ is in the process of developing numeric nutrient water quality criteria. These criteria are intended to protect the beneficial uses of surface waters by limiting in-stream concentrations of nitrogen and phosphorus which in turn reduces algae growth during warmer months. These standards are seasonally applied. Circular DEQ-12 Parts A and B (***Appendix L***) provides the latest version of the standards. The numeric nutrient standards will become in-stream water quality standards much like ammonia and other standards and will also be used as a target in the development of future TMDLs.

Hardin discharges to the Bighorn River between Yellowtail Dam and the mouth which is defined as a large river reach under Circular 12A, Table E-1. At this time, numeric nutrient standards have not been developed for the Bighorn River. The Yellowstone River is currently the only large river reach with defined numeric nutrient standards. In-stream numeric nutrient standard limits for total phosphorous and total nitrogen from August 1 through October 31 are 0.055 ppm

and 0.655 ppm respectively for the Yellowstone River from the Bighorn River confluence to the Powder River confluence.

At the present time, Table 12B-1 of Circular DEQ-12B (***Appendix L***) provides for a general variance for dischargers meeting various criteria. In Hardin's case, the City would be considered a "≥ 1.0 million gallons per day" discharger resulting in general variance end-of-pipe monthly average treatment requirements of 6.0 mg/L for nitrogen and 0.3 mg/L for phosphorous. The variance is subject to a variety of factors and the State reserves the right to modify or revoke the variances if, for example, low cost nutrient removal technologies were to become available during the 20-year timeframe. While a more detailed discussion of the waiver process is beyond the scope of this PER, for the current planning horizon, numeric standards do not appear to be a concern.

4A.1.6 Construction Permitting

Permits from MDEQ and the Big Horn County floodplain administrator will need to be procured prior to commencement of construction. During the construction of any improvements, storm water discharge permits will be necessary if greater than one acre of land is disturbed. Permits from the state building inspector and electrical inspector may also be necessary depending upon final design.

4A.2 Alternative Screening Process

The Alternative Screening Process will discuss the available alternatives and determine which ones are viable for detailed consideration in ***Section 4B: Alternative Analysis***.

4A.2.1 Collection System Alternatives

As mentioned earlier in this report, the City of Hardin's wastewater collection system is experiencing high amounts of I&I. A comprehensive I&I study was conducted in the spring and early summer of 2019 to identify sections of the existing collection system that need to be repaired/replaced in order to reduce I&I to an acceptable level prior to conducting treatment system upgrades. The I&I study identified approximately 2,675 feet of concrete sewer pipe and 17 manholes in need of rehabilitation/replacement. Flow monitoring showed significant infiltration (estimated at 130 gpm) within the severely deteriorated concrete trunk mains and manholes. I&I jumped in quantity when the local irrigation canals were activated near the end of May. The deteriorated condition of the concrete trunk main piping was visually confirmed by sewer main video inspection. Significant infiltration of ground water was observed in the video inspection of the concrete trunk main piping and manholes. The following alternatives were considered to replace/rehabilitate the deteriorated portions of the wastewater collection system.

No Action:

The no action alternative must be included and considered in the alternative screening process in accordance with the UA, and can be an attractive alternative to communities facing the high cost of constructing major improvements. However, as discussed in previous sections of this report,

there are system deficiencies that will cause violations of the Clean Water Act. Expected growth could exacerbate these problems. Consequently, the no action alternative is not considered to be a viable option and will be eliminated from further consideration.

Dig and Replace Mains and Manholes:

Complete replacement of deteriorated mains and manholes provides a re-boot on useful life of the infrastructure. This method also allows for re-routes of sewer mains that were installed in undesirable areas. Therefore, this method is carried forward for further evaluation.

Rehabilitate Mains:

Rehabilitation of sewer mains via trenchless methods is an attractive option for municipalities, especially along trunk mains with minimal service connections. This method minimizes ground disturbance, thus reducing construction restoration costs. Therefore, this method is carried forward for further evaluation.

Rehabilitate Manholes:

Rehabilitation of manholes is a viable option when the structure is not deteriorated to the point of complete failure. However, the deteriorated manholes in Hardin have lost most of their structural strength. Many of the targeted manholes have concrete that has disintegrated to a point where the reinforcing rebar is exposed within the manhole. Large infiltration flows have been observed in the targeted manholes through the bases, walls, and pipe penetrations. Consequently, this alternative is not considered to be a viable option and will be eliminated from further consideration.

4A.2.2 Headworks, Backup Generator, and Backup Disinfection Alternatives

No Action:

The no action alternative must be included and considered in the alternative screening process in accordance with the UA, and can be an attractive alternative to communities facing the high cost of constructing major improvements. However, as discussed in previous sections of this report, there are system deficiencies that will cause violations of the Clean Water Act. Expected growth could exacerbate these problems. Consequently, the no action alternative is not considered to be a viable option and will be eliminated from further consideration.

Static Screens:

Static screens were once a standard in the wastewater treatment industry. However, this form of solids removal has essentially become obsolete (except on bypass channels) due to the labor of manually checking/cleaning the screen and the superior performance of self-cleaning mechanical screens. Consequently, static screens are not considered to be a viable option and will be eliminated from further consideration.

Self-Cleaning Mechanical Screens:

Self-cleaning mechanical screens have become the industry standard in wastewater treatment headworks facilities. Automated cleaning and screenings conveyance have reduced day-to-day operational labor as compared to static screens. The wash water systems that are nearly always incorporated into these systems allow for screening of trash and inorganics while returning organic solids to the treatment process. Therefore, this technology is carried forward for further evaluation.

Grit Removal:

Grit removal is required in mechanical plants that receive flows in excess of 100,000 gpd. Mechanical grit removal would protect down-process systems while enhancing overall treatment. Therefore, this technology is carried forward for further evaluation.

Grease Removal:

Mechanical grease removal is a viable method for mitigation in sophisticated treatment plants. As discussed in previous sections of this report, grease is causing system deficiencies that will cause violations of the Clean Water Act. Expected growth could exacerbate these problems. Consequently, this technology is carried forward for further evaluation.

4A.2.3 Wastewater Treatment Alternatives

As discussed in ***Section 2***, the existing treatment system has both treatment-related deficiencies and functional deficiencies. This screening section focuses mainly on the treatment related aspects and less so on the functional aspects which are required to be part of the selected alternative.

No Action:

The no action alternative must be included and considered in the alternative screening process in accordance with the UA, and can be an attractive alternative to communities facing the high cost of constructing major improvements. However, as discussed in previous sections of this report, there are numerous system deficiencies that will cause violations of the Clean Water Act. Expected growth could exacerbate these problems. Consequently, the no action alternative is not considered to be a viable option and will be eliminated from further consideration.

Facultative Lagoon:

Perhaps the most common method of wastewater treatment in central and eastern Montana, facultative lagoons are characterized by their large surface area and shallow design to achieve natural aeration that supports biological waste treatment processes. These lagoons require little operator attention and many have no electrical requirements making them very cost effective to operate. Treated wastewater is removed from facultative lagoons through a variety of methods including continual or controlled discharge, and also land application.

The wastewater in facultative lagoons is stratified into various layers, allowing for both aerobic and anaerobic treatment in the same cell. The lowest layer of a facultative lagoon is anaerobic, receiving very little light and containing almost no dissolved oxygen. Suspended solids and biomass from dead algae and aerobic bacteria settle to the bottom of the lagoons and are slowly digested in this environment by anaerobic bacteria. The bacteria convert nitrate to nitrogen and carbon dioxide, though this process is limited and influenced by temperatures and the carbon source.

With adequate treatment volume, facultative lagoons should produce an effluent capable of meeting current limitations for BOD_5 and suspended solids. However, this form of treatment would be a significant step backwards from the current oxidation ditch process (the City switched from facultative lagoon treatment to oxidation ditch treatment in 1978). Furthermore, there is no guarantee that a facultative lagoon process could meet more stringent future discharge permit limits. Although facultative lagoons are often a viable treatment option for small communities, they most often are not a viable option for medium and large communities due to the large footprint required for the system and the lack of sophisticated treatment required to meet future stringent effluent standards. Therefore, treatment via facultative lagoons has been eliminated from further consideration.

Total Retention:

A total retention lagoon system is sized to contain the entire wastewater flow minus only losses from evaporation and allowable seepage. The design of such a system must also account for the addition of precipitation, based upon the ten-year return period for annual precipitation, in sizing the lagoon system. A total retention system offers some advantages to the City. There would be no discharge, so the O&M costs for sampling and testing the existing discharge could be eliminated. Total retention systems also require minimal monitoring. Furthermore, Circular DEQ-2 requires a total retention system to have only two cells as opposed to the typically mandated three cells.

However, total retention systems have important disadvantages especially as wastewater flows increase from small municipalities to medium and large municipalities. These systems are much larger than other lagoon type systems and require substantially more land acquisition. Secondly, a total retention system does not lend itself easily to expansion. A preliminary evaluation of a total retention system (***Appendix N***) indicates that, in addition to the treatment cell, a 1,256-acre cell would be required to implement the system. Given that the City does not have adequate land in the vicinity of the current treatment site to construct a total retention system, this option is not considered viable and will not be considered further.

Constructed Wetlands:

Constructed wetlands are large, artificially created wetlands using either subsurface or surface horizontal flow. Surface flow constructed wetlands consist of a basin or channels with some type of lining to prevent seepage. Soil is added to the bottom of these basins or channels to support emergent vegetation. The wastewater in these systems is exposed to the surface.

Therefore, they are called free water surface wetlands. Subsurface wetlands are basins or channels that are lined to prevent seepage and are filled with coarse grained material such as sand and gravels. These coarse-grained materials allow wastewater to flow through the system, but below the free surface. The coarse-grained material also supports the aquatic vegetation planted throughout the basin or channels. Typical vegetation planted in constructed wetlands includes cattails, bulrushes, and reeds.

There is limited data available on the performance of these systems and what data is available has shown somewhat inconsistent performance. The systems do not perform well in the winter in northern climates. Accordingly, the design standards for many northern states require storage to get through the winter months. Therefore, constructed wetlands are better suited for small systems. Because of the sheer size, cost, winter performance issues, and unapproved regulatory status, this technology has been eliminated from further consideration.

Aerated Lagoons:

Aerated lagoon systems are similar to facultative lagoon systems with the addition of mechanical aeration. The use of mechanical aeration allows the lagoons to have a shorter detention time and to be deeper than standard facultative lagoon systems. Thus, while aerated systems require increased O&M to maintain the blowers and diffusers and provide the needed power, they generally require less land than a facultative system. However, much like facultative lagoons, this form of treatment would be a significant step backwards from the current oxidation ditch process utilized by the City.

The design requirements for an aerated lagoon differ depending upon the type of disposal for the treated wastewater. Circular DEQ-2 requires a minimum of three aerated cells for either continuous or controlled discharging systems but only one or two aerated cells when land application is the final disposal method.

Although aerated lagoons are often a viable treatment option for small communities, they most often are not a viable option for medium and large communities due to the large footprint required for the system and the lack of sophisticated treatment required to meet future stringent effluent standards. Therefore, treatment via aerated lagoons has been eliminated from further consideration.

Mechanical Treatment Plants:

<u>Oxidation Ditch</u>

The current method of wastewater treatment in Hardin, the oxidation ditch process, uses activated sludge technology which employs high concentrations of microorganisms contained in engineered tanks to provide treatment. The tanks can be configured to provide a variety of environmental conditions (aerobic, anaerobic, or anoxic) necessary for removing conventional pollutants, nitrogen, and phosphorous. Very high treatment levels are possible with these technologies, but with that performance a variety of disadvantages are presented including high capital and operation cost, complex mechanical design, large power consumption, and

continuous production of waste sludge. Highly trained operators are required as well. However, the oxidation ditch treatment process is a viable option. Therefore, this technology will be carried forward for further consideration.

Sequencing Batch Reactor (SBR)

The SBR is a batch process that uses a single reactor for all treatment processes including aeration, anoxic and anaerobic biological treatment, and clarification. Since the SBR treats wastewater in batches, a minimum of two tanks are required. SBR's come in two basic varieties: conventional and continuous flow. In a conventional SBR process, the tanks operate sequentially (while one tank is filling, the second tank is going through the aeration, clarification, and decanting cycles). The operational cycles of each tank switch after each batch. In a continuous flow SBR process, wastewater continuously flows into all basins. This eliminates the need for actuated valves on the influent piping. In most circumstances, a baffle wall is installed between an influent chamber and the biological treatment/clarification tank to buffer the continuous inflow. The continuous flow process then operates with one treatment tank going through an aeration cycle while the other tank is in an anoxic/anaerobic/clarification/decant cycle). When treatment is complete the treated effluent is decanted via motorized decanters to an equalization basin or pond prior to disinfection. Sludge is wasted to a digester before dewatering and disposal. Both SBR varieties do not require return activated sludge pumping. Due to its high treatment efficiencies, this technology is carried forward for further evaluation.

Other Mechanical Treatment Technologies and Processes

Other advanced mechanical treatment technologies and processes such as membrane bioreactors (MBR's), rotating biological contactors (RBC's), Bardenpho processes, and Modified Ludzack-Ettinger (MLE) processes were considered and researched as potential alternatives for Hardin. Although these treatment technologies and processes are capable of producing very high levels of nutrient removal (especially for large-scale treatment plants), they were dismissed from further evaluation due to technical complexity, advanced operational and maintenance requirements, and high capital costs when compared with the other treatment technologies that are considered earlier in this section.

4A.2.4 Wastewater Disposal Alternatives

Treated effluent can continue to be discharged to the Bighorn River through an existing piped (outfall) connection or entirely avoided through either a total retention system or a land application system.

No Action (Continue Discharge into Bighorn River):

This disposal alternative would continue to utilize the existing gravity-piped connection to the Bighorn River. The level of treatment achievable by the headworks and treatment alternatives that are being carried forward for consideration in this PER are adequate to meet current (and likely future) discharge parameters for the Bighorn River. This alternative also is the lowest-cost scenario for the City. Thus, the no action alternative is considered a viable alternative.

Land Application (Spray Irrigation):

This alternative uses a spray irrigation system for disposal of treated effluent. Utilizing it would eliminate the need for a wastewater discharge permit and the uncertainties associated with changing water quality regulations in the Bighorn River. Although not currently necessary, Hardin could switch to spray irrigation now to avoid all future discharge permit requirements.

The most common method of land application is through spray irrigation. Treated effluent is stored in ponds during the winter and then pumped to a hayfield during the growing season. MDEQ requires that a center pivot with automatic controls be utilized. Regulations limit spray irrigation of wastewater to seed or fodder crops.

Although spray irrigation is often a viable alternative for small communities, viability tends to decrease for medium and large communities. Based on Google earth mapping, there appears to be numerous irrigated fields in the vicinity of the existing wastewater treatment plant. However, the sheer volume of treated effluent would require a 96-acre storage pond and approximately 385 acres of spray irrigation land ***(Appendix O)***. Several separate irrigation sites would need to be utilized (approximately three sites containing a total of approximately nine individual pivots) resulting in elevated project costs associated with land acquisition, piping, pumping, and spray equipment.

The main advantages to this solution are the beneficial use of the water and the lack of need for a discharge permit and the associated monitoring requirements. Disadvantages include the capital and O&M costs associated with pumping wastewater and a sprinkler system. Due to the large amount of storage, equipment, and land required to implement spray irrigation disposal in Hardin, this method is not feasible and will not be carried forward for further consideration.

4B ALTERNATIVES EVALUATION

4B.1 Collection System Alternatives

Three collection system alternatives were carried forward from the screening process presented in Section 4A. They include the following:

- CS-1: Dig and Replace Sewer Mains and Manholes
- CS-2: Combination Dig and Replace/CIPP Rehab Sewer Mains – Dig and Replace Manholes
- CS-3: CIPP Rehab of Sewer Mains – Dig and Replace Manholes

4B.1.1 Alternative CS-1: Dig and Replace Sewer Mains and Manholes

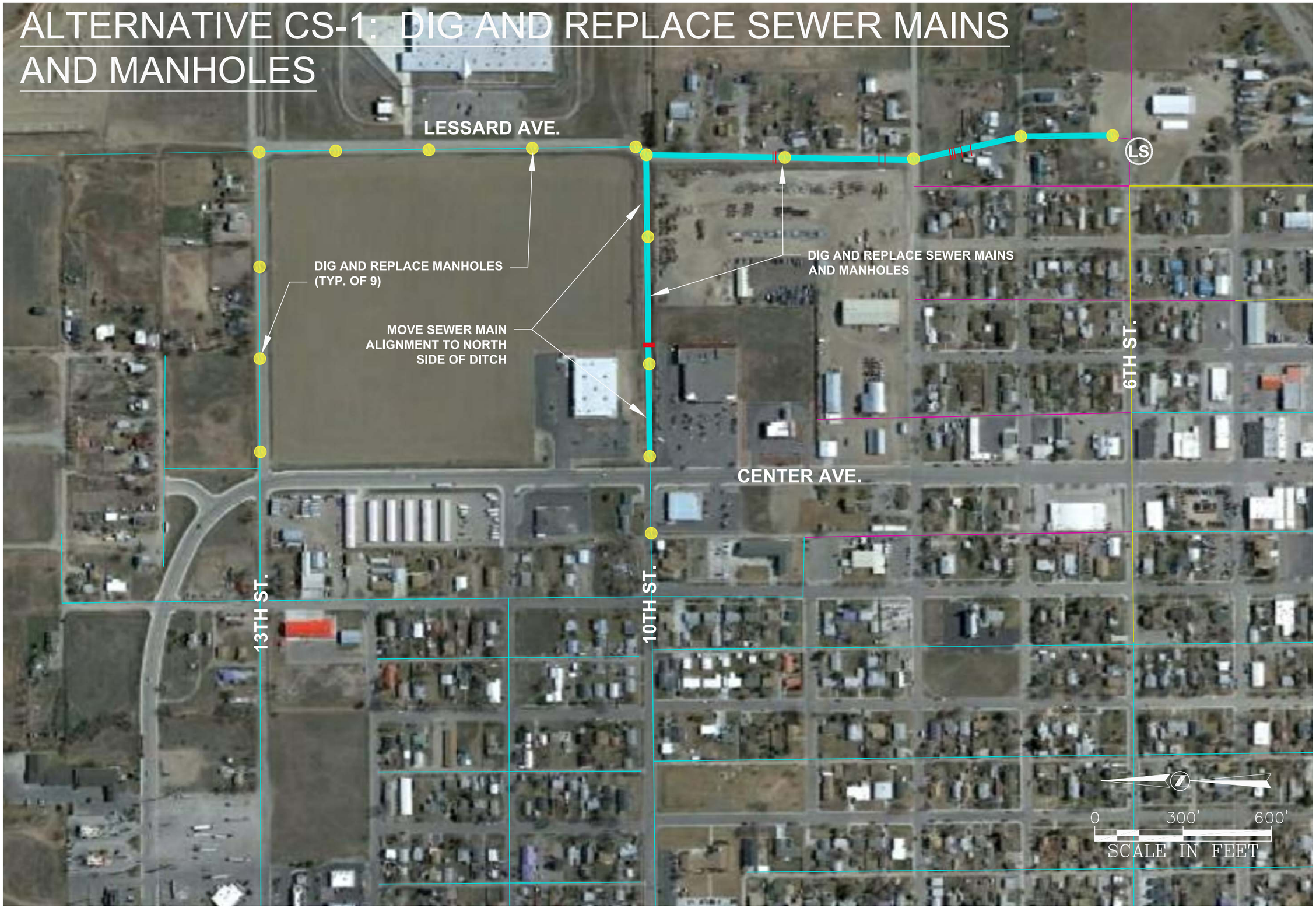
Description and Schematic

This alternative will replace approximately 2,675 feet of deteriorated concrete trunk main piping and 17 manholes. A comprehensive I&I study conducted in the spring and early summer of 2019 identified the deteriorated mains and manholes as contributing significant I&I into the system. Approximately 1,025 feet of deteriorated sewer main in the 10th Street right-of-way is located under/within irrigation and drainage ditches. This alternative includes relocation of the influenced mains outside of the ditch alignments. The realignment will allow for access to manholes that are currently inaccessible. A layout is shown in ***Figure 4.1.***

Operational and Energy Requirements

The improvements included in Alternative CS-1 will not require a change in the operator certification level. Operational requirements will be unchanged. Access to manholes will be improved for periodic inspection and cleaning. A reduction in energy requirements is anticipated as a result of this alternative due to the reduction of I&I flows to the treatment plant.

ALTERNATIVE CS-1: DIG AND REPLACE SEWER MAINS AND MANHOLES



STAHLY ENGINEERING & ASSOCIATES
PROFESSIONAL ENGINEERS & SURVEYORS
www.seaeng.com

2223 MONTANA AVE.
STE. 201
BILLINGS, MT 59101
Phone: (406)601-4055
Fax: (406)601-4062

3530 CENTENNIAL DR.
HELENA, MT 59601
Phone: (406)442-8594
Fax: (406)442-8557

851 BRIDGER DR. STE. 1
BOZEMAN, MT 59715
Phone: (406)522-9526
Fax: (406)522-9528

ISSUE/REVISION

No.	DATE	BY
1	####	####
DESCRIPTION		
####		

No.	DATE	BY
2		
DESCRIPTION		

No.	DATE	BY
3		
DESCRIPTION		

No.	DATE	BY
4		
DESCRIPTION		

No.	DATE	BY
5		
DESCRIPTION		

PRELIMINARY
NOT FOR CONSTRUCTION

ALTERNATIVE CS-1

WASTEWATER UPGRADES PER UPDATE

CITY OF HARDIN, MONTANA

DESIGNED: SJS, GMS
DRAWN: SJS, GMS
CHECKED:
DATE: 07-15-2019

FIGURE
4.1

Stahly Engineering & Associates, Inc. COPYRIGHT 2015
L:\2223-City of Hardin\-2019 WW PER Update for RD\DWG\Plan Sets\PER Exhibits\Figures 4.1-4.3 - Collection Alts Layouts.dwg, Figure 4.1, Plotted: Aug 30, 2019 - 9:51am, gsteckler

Regulatory Requirements and Permits

Implementation of this alternative will reduce I&I; thus, improving the treatment system performance and the ability to avoid violations of the discharge permit limits. The selected contractor will be responsible for submitting a stormwater pollution prevention plan (SWPPP) and obtaining a stormwater discharge permits, as will be indicated in the project specifications. All improvements will be designed, reviewed, and approved prior to construction according to the applicable sections of Circular DEQ-2.

Land Requirements

Implementation of this alternative will occur in public right-of-ways, primarily following existing sewer alignments.

Environmental Considerations

Alternative CS-1 will allow for more effective wastewater treatment resulting in the discharge of higher quality effluent to the Bighorn River. The reliability of the effluent quality will improve and compliance with the wastewater discharge permit will be maintained. Downstream users such as irrigators, recreationalists, and resident fish populations would directly benefit from the upgrades.

Implementation of this alternative will require disturbance of public right-of-way along existing sewer main alignments. Some air quality degradation due to dust may arise during the actual construction period; however, it would be temporary. The contract documents would require that the contractor provide dust control. Similarly, there will be some temporary noise during construction. Once construction is complete, there will be no noise or dust problems arising as a result of the improvements. The contract documents shall also require that BMP's be employed before, during, and after construction until all areas of disturbance have been fully reclaimed and/or re-vegetated.

Constructability

No major construction problems are anticipated with this alternative.

Capital Cost Estimates

Preliminary capital and cost estimates for Alternative CS-1 have been prepared for guidance in project evaluation and comparisons such as present value analysis. Final project costs will depend on a variety of future factors including, but not limited to, regulatory approvals and requirements, actual labor and material costs, and site conditions present at the time of bidding. As a result of all the factors described above, final costs and user rates are expected to vary from those shown.

Construction cost estimates are in 2020 dollars and include labor, materials, equipment, overhead, bonds, insurance, and profit. Estimates were based on actual costs for other similar facilities. Each alternative was assigned a 10 percent contingency factor and a 20 percent

engineering cost. Actual engineering costs may be higher or lower depending on the scope of services performed.

Table 4B.1 presents the opinion of probable construction, engineering, and legal/administrative costs for Alternative CS-1.

Table 4B.1 - Opinion Of Probable Cost City of Hardin Alternative CS-1: Dig and Replace Sewer Mains and Manholes					
#	**BID ITEM**	**QTY**	**UNITS**	**UNIT PRICE**	**TOTAL**
1	Bypass Pumping	1	LS	$60,000.00	$60,000.00
2	Trench Dewatering	1	LS	$90,000.00	$90,000.00
3	18" PS46 ASTM F679 PVC Sewer Main	1,650	LF	$90.00	$148,500.00
4	15" PS46 ASTM F679 PVC Sewer Main	1,025	LF	$85.00	$87,125.00
5	Basic 48" Sanitary Sewer Manhole	17	EA	$3,750.00	$63,750.00
6	Additional Sanitary Sewer Manhole Depth	195	VF	$250.00	$48,750.00
7	Asphalt Restoration	315	SY	$50.00	$15,750.00
8	Concrete Curb and Gutter Restoration	120	LF	$30.00	$3,600.00
9	Gravel Restoration	3,720	SY	$25.00	$93,000.00
Subtotal					**$610,475.00**
Mobilization				10%	$61,048.00
Contingency				10%	$61,048.00
Construction Subtotal					**$732,571.00**
Inflation to 2020				1%	$7,325.00
Erosion Control		1	LS	$5,000.00	$5,000.00
Review Fees and Permits		1	LS	$2,000.00	$2,000.00
Geotechnical Investigation		1	LS	$3,000.00	$3,000.00
Engineering (Design, Bidding Services, and Construction Administration)				20%	$146,514.00
Legal & Administrative				5%	$36,630.00
Project Total					**$933,040.00**

Present Worth Cost Estimates

A present worth analysis that includes the capital, annual, and facility replacement costs was also prepared for each alternative. This computation, commonly referred to as a life cycle analysis, equalizes the O&M costs of the alternatives and then adds them to the capital cost. The result is the total present worth cost. The present worth of the operating costs was computed for twenty-years (2020-2040) using factors developed on the current real discount rate of 1.5 percent published by the United States Office of Management and Budget (OMB). The facility salvage value was determined by classifying the design life of various assets as appropriate. The salvage value at the twenty-year point was then discounted to present value using a present worth factor based on the current OMB discount rate.

Table 4B.2 presents the capital, annual, and present worth costs for the implementation of Alternative CS-1.

Table 4B.2 Present Worth Costs Alternative CS-1	
Capital	$933,040
Annual O&M	$0.00
PW Salvage	$113,968
PW O&M	$0.00
Present Worth	$1,047,008

4B.1.2 Alternative CS-2: Combination Dig and Replace/CIPP Rehab Sewer Mains – Dig and Replace Manholes

Description and Schematic

This alternative will rehabilitate targeted portions of the deteriorated RCP sewer mains via trenchless installation of CIPP. Sections of sewer main where installation of CIPP is not feasible will be replaced via conventional open-trench excavation methods. The portion of deteriorated sewer main in the 10th Street right-of-way will be re-routed away from the influence of the drainage and irrigation ditches. Deteriorated manholes will be replaced via open-trench excavation. A layout is shown in ***Figure 4.2.***

Operational and Energy Requirements

The improvements included in Alternative CS-2 will not require a change in the operator certification level. Operational requirements will be unchanged. Access to manholes will be improved for periodic inspection and cleaning. A reduction in energy requirements is anticipated as a result of this alternative due to the reduction of I&I flows to the treatment plant.

Regulatory Requirements and Permits

Implementation of this alternative will reduce I&I; thus, improving the treatment system performance and the ability to avoid violations of the discharge permit limits. The selected contractor would be responsible for submitting a stormwater pollution prevention plan (SWPPP) and obtaining a stormwater discharge permits, as would be indicated in the project specifications. All improvements will be designed, reviewed, and approved prior to construction according to the applicable sections of Circular DEQ-2.

Land Requirements

Implementation of this alternative will occur in public right-of-ways, primarily following existing sewer alignments.

ALTERNATIVE CS-2: COMBINATION CIPP REHABILITATION/ DIG AND REPLACE

STAHLY ENGINEERING & ASSOCIATES

PROFESSIONAL ENGINEERS & SURVEYORS
www.seaeng.com

2223 MONTANA AVE.
STE. 201
BILLINGS, MT 59101
Phone: (406)601-4055
Fax: (406)601-4062

3530 CENTENNIAL DR.
HELENA, MT 59601
Phone: (406)442-8594
Fax: (406)442-8557

851 BRIDGER DR. STE. 1
BOZEMAN, MT 59715
Phone: (406)522-9526
Fax: (406)522-9528

ISSUE/REVISION

No.	DATE	BY
1	####	####

DESCRIPTION

####

No.	DATE	BY
2		

DESCRIPTION

No.	DATE	BY
3		

DESCRIPTION

No.	DATE	BY
4		

DESCRIPTION

No.	DATE	BY
5		

DESCRIPTION

PRELIMINARY
NOT FOR CONSTRUCTION

ALTERNATIVE CS-2

WASTEWATER UPGRADES PER UPDATE

CITY OF HARDIN, MONTANA

DESIGNED: SJS, GMS
DRAWN: SJS, GMS
CHECKED:
DATE: 07-15-2019

FIGURE
4.2

Stahly Engineering & Associates, Inc. COPYRIGHT 2015

L:\2223-City of Hardin\-2019 WW PER Update for RD\DWG\Plan Sets\PER Exhibits\Figures 4.1-4.3 - Collection Alts Layouts.dwg, Figure 4.2, Plotted: Aug 30, 2019 - 9:56am, gsteckler

Environmental Considerations

Alternative CS-2 will allow for more effective wastewater treatment resulting in the discharge of higher quality effluent to the Bighorn River. The reliability of the effluent quality will improve and compliance with the wastewater discharge permit will be maintained. Downstream users such as irrigators, recreationalists, and resident fish populations would directly benefit from the upgrades.

Implementation of this alternative will require disturbance of public right-of-way along existing sewer main alignments. Some air quality degradation due to dust may arise during the actual construction period; however, it would be temporary. The contract documents would require that the contractor provide dust control. Similarly, there will be some temporary noise during construction. Once construction is complete, there will be no noise or dust problems arising as a result of the improvements. The contract documents shall also require that BMP's be employed before, during, and after construction until all areas of disturbance have been fully reclaimed and/or re-vegetated.

Constructability

No major construction problems are anticipated with this alternative.

Capital Cost Estimates

Preliminary capital and cost estimates for Alternative CS-2 have been prepared for guidance in project evaluation and comparisons such as present value analysis. Final project costs will depend on a variety of future factors including, but not limited to, regulatory approvals and requirements, actual labor and material costs, and site conditions present at the time of bidding. As a result of all the factors described above, final costs and user rates are expected to vary from those shown.

Construction cost estimates are in 2020 dollars and include labor, materials, equipment, overhead, bonds, insurance, and profit. Estimates were based on actual costs for other similar facilities, equipment quotations from suppliers, and published cost curves. Factors were applied to electrical and instrumentation/control costs as appropriate. Each alternative was assigned a 10 percent contingency factor and a 20 percent engineering cost. Actual engineering costs may be higher or lower depending on the scope of services performed.

Table 4B.3 presents the opinion of probable construction, engineering, and legal/administrative costs for Alternative CS-2.

Table 4B.3 - Opinion Of Probable Cost
City of Hardin
Alternative CS-2: Combination Dig and Replace/CIPP Rehab Sewer Mains – Dig and Replace Manholes

#	BID ITEM	QTY	UNITS	UNIT PRICE	TOTAL
1	Bypass Pumping	1	LS	$60,000.00	$60,000.00
2	Trench Dewatering	1	LS	$70,000.00	$70,000.00
3	18" PS46 ASTM F679 PVC Sewer Main	920	LF	$90.00	$82,800.00
4	15" PS46 ASTM F679 PVC Sewer Main	1,025	LF	$85.00	$87,125.00
5	Rehab 18" Sewer Main with CIPP	730	LF	$130.00	$94,900.00
6	Basic 48" Sanitary Sewer Manhole	17	EA	$3,750.00	$63,750.00
7	Additional Sanitary Sewer Manhole Depth	195	VF	$250.00	$48,750.00
8	Asphalt Restoration	315	SY	$50.00	$15,750.00
9	Concrete Curb and Gutter Restoration	120	LF	$30.00	$3,600.00
10	Gravel Restoration	2,745	SY	$25.00	$68,625.00
Subtotal					**$595,300.00**
Mobilization				10%	$59,530.00
Contingency				10%	$59,530.00
Construction Subtotal					**$714,360.00**
Inflation to 2020				1%	$7,150.00
Erosion Control		1	LS	$5,000.00	$5,000.00
Review Fees and Permits		1	LS	$2,000.00	$2,000.00
Geotechnical Investigation		1	LS	$3,000.00	$3,000.00
Engineering (Design, Bidding Services, and Construction Administration)				20%	$142,875.00
Legal & Administrative				5%	$35,725.00
Project Total					**$910,110.00**

Present Worth Cost Estimates

A present worth analysis that includes the capital, annual, and facility replacement costs was also prepared for each alternative. This computation, commonly referred to as a life cycle analysis, equalizes the O&M costs of the alternatives and then adds them to the capital cost. The result is the total present worth cost. The present worth of the operating costs was computed for twenty-years (2020-2040) using factors developed on the current real discount rate of 1.5 percent published by the United States Office of Management and Budget (OMB). The facility salvage value was determined by classifying the design life of various assets as appropriate. The salvage value at the twenty-year point was then discounted to present value using a present worth factor based on the current OMB discount rate.

Table 4B.4 presents the capital, annual, and present worth cost for the implementation of Alternative CS-2.

Table 4B.4 Present Worth Costs Alternative CS-2	
Capital	$910,110
Annual O&M	$0.00
PW Salvage	$115,162
PW O&M	$0.00
Present Worth	$1,025,272

4B.1.3 Alternative CS-3: CIPP Rehab of Sewer Mains – Dig and Replace Manholes

Description and Schematic

This alternative will rehabilitate the deteriorated RCP sewer mains via trenchless installation of CIPP. Deteriorated manholes will be replaced via open-trench excavation. A layout is shown in ***Figure 4.3.***

Operational and Energy Requirements

The improvements included in Alternative CS-3 will not require a change in the operator certification level. Operational requirements will be unchanged. Access to manholes will be improved for periodic inspection and cleaning. A reduction in energy requirements is anticipated as a result of this alternative due to the reduction of I&I flows to the treatment plant.

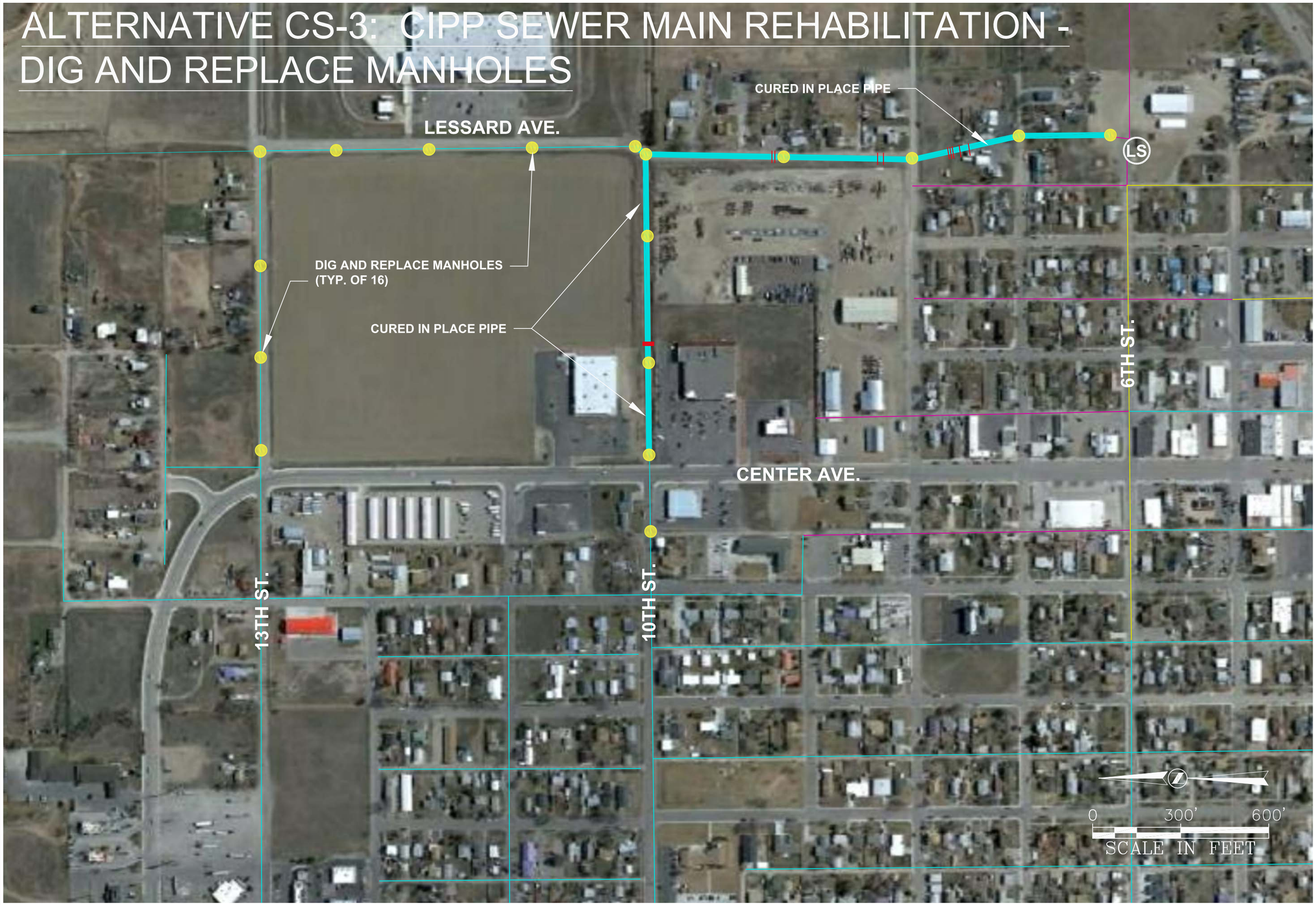
Regulatory Requirements and Permits

Implementation of this alternative will reduce I&I; thus, improving the treatment system performance and the ability to avoid violations of the discharge permit limits. The selected contractor would be responsible for submitting a stormwater pollution prevention plan (SWPPP) and obtaining a stormwater discharge permits, as would be indicated in the project specifications. All improvements will be designed, reviewed, and approved prior to construction according to the applicable sections of Circular DEQ-2.

Land Requirements

Implementation of this alternative will occur in public right-of-ways and follow existing sewer alignments.

ALTERNATIVE CS-3: CIPP SEWER MAIN REHABILITATION - DIG AND REPLACE MANHOLES



STAHLY ENGINEERING & ASSOCIATES
PROFESSIONAL ENGINEERS & SURVEYORS
www.seaeng.com

2223 MONTANA AVE.
STE. 201
BILLINGS, MT 59101
Phone: (406)601-4055
Fax: (406)601-4062

3530 CENTENNIAL DR.
HELENA, MT 59601
Phone: (406)442-8594
Fax: (406)442-8557

851 BRIDGER DR. STE. 1
BOZEMAN, MT 59715
Phone: (406)522-9526
Fax: (406)522-9528

ISSUE/REVISION

No.	DATE	BY
1	####	####

DESCRIPTION

####

No.	DATE	BY
2		

DESCRIPTION

No.	DATE	BY
3		

DESCRIPTION

No.	DATE	BY
4		

DESCRIPTION

No.	DATE	BY
5		

DESCRIPTION

PRELIMINARY
NOT FOR CONSTRUCTION

ALTERNATIVE CS-3

WASTEWATER UPGRADES PER UPDATE

CITY OF HARDIN, MONTANA

DESIGNED: SJS, GMS
DRAWN: SJS, GMS
CHECKED:
DATE: 07-15-2019

FIGURE
4.3

Stahly Engineering & Associates, Inc. COPYRIGHT 2015
L:\2223-City of Hardin\-2019 WW PER Update for RD\DWG\Plan Sets\PER Exhibits\Figures 4.1-4.3 - Collection Alts Layouts.dwg, Figure 4.3, Plotted: Aug 30, 2019 - 9:58am, gsteckler

Environmental Considerations

Alternative CS-3 will allow for more effective wastewater treatment resulting in the discharge of higher quality effluent to the Bighorn River. The reliability of the effluent quality will improve and compliance with the wastewater discharge permit will be maintained. Downstream users such as irrigators, recreationalists, and resident fish populations would directly benefit from the upgrades.

Implementation of this alternative will require disturbance of public right-of-way along existing sewer main alignments. Some air quality degradation due to dust may arise during the actual construction period; however, it would be temporary. The contract documents would require that the contractor provide dust control. Similarly, there will be some temporary noise during construction. Once construction is complete, there will be no noise or dust problems arising as a result of the improvements. The contract documents shall also require that BMP's be employed before, during, and after construction until all areas of disturbance have been fully reclaimed and/or re-vegetated.

Constructability

The CIPP installation associated with this alternative could be affected by the pipe irregularities and extreme deterioration observed during the I&I study.

Capital Cost Estimates

Preliminary capital and cost estimates for Alternative CS-3 have been prepared for guidance in project evaluation and comparisons such as present value analysis. Final project costs will depend on a variety of future factors including, but not limited to, regulatory approvals and requirements, actual labor and material costs, and site conditions present at the time of bidding. As a result of all the factors described above, final costs and user rates are expected to vary from those shown.

Construction cost estimates are in 2020 dollars and include labor, materials, equipment, overhead, bonds, insurance, and profit. Estimates were based on actual costs for other similar facilities, equipment quotations from suppliers, and published cost curves. Factors were applied to electrical and instrumentation/control costs as appropriate. Each alternative was assigned a 10 percent contingency factor and a 20 percent engineering cost. Actual engineering costs may be higher or lower depending on the scope of services performed.

Table 4B.5 presents the opinion of probable construction, engineering, and legal/administrative costs for Alternative CS-3.

Table 4B.5 - Opinion Of Probable Cost
City of Hardin
Alternative CS-3: CIPP Rehab of Sewer Mains - Dig and Replace Manholes

#	BID ITEM	QTY	UNITS	UNIT PRICE	TOTAL
1	Bypass Pumping	1	LS	$60,000.00	$60,000.00
2	Trench Dewatering	1	LS	$50,000.00	$50,000.00
3	Rehab 18" Sewer Main with CIPP	1,650	LF	$130.00	$214,500.00
4	Rehab 15" Sewer Main with CIPP	1,025	LF	$125.00	$128,125.00
5	Basic 48" Sanitary Sewer Manhole	17	EA	$3,750.00	$63,750.00
6	Additional Sanitary Sewer Manhole Depth	195	VF	$250.00	$48,750.00
7	Asphalt Restoration	315	SY	$50.00	$15,750.00
8	Concrete Curb and Gutter Restoration	120	LF	$30.00	$3,600.00
9	Gravel Restoration	445	SY	$25.00	$11,125.00
Subtotal					**$595,600.00**
Mobilization				10%	$59,560.00
Contingency				10%	$59,560.00
Construction Subtotal					**$714,720.00**
Inflation to 2020				1%	$7,150.00
Erosion Control		1	LS	$2,500.00	$2,500.00
Review Fees and Permits		1	LS	$2,000.00	$2,000.00
Geotechnical Investigation		1	LS	$3,000.00	$3,000.00
Engineering (Design, Bidding Services, and Construction Administration)				20%	$142,944.00
Legal & Administrative				5%	$35,736.00
Project Total					**$908,050.00**

Present Worth Cost Estimates

A present worth analysis that includes the capital, annual, and facility replacement costs was also prepared for each alternative. This computation, commonly referred to as a life cycle analysis, equalizes the O&M costs of the alternatives and then adds them to the capital cost. The result is the total present worth cost. The present worth of the operating costs was computed for twenty-years (2020-2040) using factors developed on the current real discount rate of 1.5 percent published by the United States Office of Management and Budget (OMB). The facility salvage value was determined by classifying the design life of various assets as appropriate. The salvage value at the twenty-year point was then discounted to present value using a present worth factor based on the current OMB discount rate.

Table 4B.6 presents the capital, annual, and present worth cost for the implementation of Alternative CS-3.

Table 4B.6 Present Worth Costs Alternative CS-3	
Capital	$908,050
Annual O&M	$0.00
PW Salvage	$120,186
PW O&M	$0.00
Present Worth	$1,028,236

4B.2 Headworks, Backup Generator, and Backup Disinfection Alternatives

Two headworks, backup generator, and backup disinfection alternatives were carried forward from the screening process presented in Section 4A. They include the following:

- HGD-1: Single Mechanical Headworks w/ Manual Bar Screen in Bypass Channel, Backup Generator, and Backup Disinfection

- HGD-2: Dual Mechanical Headworks, Backup Generator, and Backup Disinfection

Both alternatives provide screening, grit removal, and grease removal in the primary flow channel along with a new building to house the equipment. The added grit and grease removal proposed in both alternatives are critical to the correction of the existing treatment plant deficiencies. A backup power generator and a backup disinfection system in a new bypass channel (within a new building expansion) are also provided in both alternatives. The appurtenances included in the following two alternatives are considered to be the most critical upgrades. Therefore, the headworks, backup generator, and backup disinfection appurtenances were lumped together to allow for expedited construction in Phase 2 of the proposed project.

4B.2.1 Alternative HGD-1: Single Mech. Headworks w/ Manual Bar Screen in Bypass Channel, Backup Generator, and Backup Disinfection

Description and Schematic

This alternative will replace the existing headworks structure and grinder/screening system to address all deficiencies and MDEQ/EPA requirements. This includes a new headworks building along with screening, grit removal, and grease removal (likely in a pre-packaged system) on the primary flow channel. A bypass channel with a manual bar screen is included in this alternative to allow for periodic maintenance of the mechanical headworks system. This alternative also includes construction of a wash water return system which utilizes treated effluent for the headworks spray system. As described at the beginning of this section, backup power generation and backup disinfection appurtenances are included in this alternative. A layout is shown in ***Figure 4.4.***

ALTERNATIVE HGD-1: SINGLE MECHANICAL HEADWORKS, BACKUP GENERATOR, AND BACKUP DISINFECTION

SITE INFORMATION

1. ABANDON EXISTING HEADWORKS
2. NEW HEADWORKS STRUCTURE AND EQUIPMENT (SCREEN, GRIT REMOVAL, GREASE REMOVAL)
3. BUILDING EXPANSION TO ADD LABORATORY SPACE AND HOUSE UV DISINFECTION (NEW BACKUP UV DISINFECTION)
4. NEW EMERGENCY GENERATOR

STAHLY ENGINEERING & ASSOCIATES
PROFESSIONAL ENGINEERS & SURVEYORS
www.seaeng.com

2223 MONTANA AVE.
STE. 201
BILLINGS, MT 59101
Phone: (406)601-4055
Fax: (406)601-4062

3530 CENTENNIAL DR.
HELENA, MT 59601
Phone: (406)442-8594
Fax: (406)442-8557

851 BRIDGER DR. STE. 1
BOZEMAN, MT 59715
Phone: (406)522-9526
Fax: (406)522-9528

ISSUE/REVISION

No.	DATE	BY
1	####	####
DESCRIPTION		
####		

No.	DATE	BY
2		
DESCRIPTION		

No.	DATE	BY
3		
DESCRIPTION		

No.	DATE	BY
4		
DESCRIPTION		

No.	DATE	BY
5		
DESCRIPTION		

PRELIMINARY
NOT FOR CONSTRUCTION

ALTERNATIVE HGD-1

WASTEWATER UPGRADES PER UPDATE

CITY OF HARDIN, MONTANA

DESIGNED: GMS
DRAWN: GMS
CHECKED:
DATE: 07-15-2019

FIGURE
4.4

Stahly Engineering & Associates, Inc. COPYRIGHT 2015
L:\2223-City of Hardin\-2019 WW PER Update for RD\DWG\Plan Sets\PER Exhibits\Figure 4.4 - Alternative HGD-1 Layout.dwg, Figure 4.4, Plotted: Aug 30, 2019 - 9:15am, gsteckler

Operational and Energy Requirements

The improvements included in Alternative HGD-1 will not require a change in the operator certification level. Most of the duties will remain similar as to current conditions with the exception of a small amount of time dedicated to grit/grease disposal and maintenance of the grit and grease removal equipment.

Based upon manufacturer data and estimates for the HVAC within the new headworks and disinfection buildings, the power demand would increase from existing conditions by approximately 76,703 kW-hr/year yielding the following increase in annual energy cost. No increase in energy costs is anticipated due to the proposed generator or disinfection units as these are purely for backup of utility power and existing disinfection.

- **76,703 kW-hr/year X $0.10 per kW-hr = $7,671.30 per year**

Regulatory Requirements and Permits

Implementation of this alternative will improve the treatment system capacity, performance, and the ability to avoid violations of the discharge permit limits. Grit and grease removal included in this alternative will also increase the life-span of downstream equipment such as pumps and mixers while decreasing O&M costs attributed to maintenance and cleaning of downstream systems and equipment. The selected contractor will be responsible for submitting a stormwater pollution prevention plan (SWPPP) and obtaining a stormwater discharge permits, as will be indicated in the project specifications. All improvements will be designed, reviewed, and approved prior to construction according to the applicable sections of Circular DEQ-2.

Land Requirements

Implementation of this alternative will require utilization of a small portion of the City-owned wastewater treatment plant site.

Environmental Considerations

The reliability of the effluent quality will improve and compliance with the wastewater discharge permit will be maintained. With respect to treatment and bacterial contamination, the new headworks equipment will improve downstream water quality by removing grit and grease from the wastewater treatment processes. This will allow for more effective treatment, clarification, and disinfection resulting in the discharge of higher quality effluent to the Bighorn River. Downstream users such as irrigators, recreationalists, and resident fish populations would directly benefit from the headworks upgrades.

Implementation of this alternative will require disturbance of a small portion of the City-owned wastewater treatment plant site. Some air quality degradation due to dust may arise during the actual construction period; however, it would be temporary. The contract documents would require that the contractor provide dust control. Similarly, there will be some temporary noise during construction. Once construction is complete, there will be no noise or dust problems arising as a result of the improvements. The contract documents shall also require that BMP's be employed

before, during, and after construction until all areas of disturbance have been fully reclaimed and/or re-vegetated. Other agencies have identified the possible need for permits: The USCOE has requested that a BA permit application be completed to verify that no waters of the state are filled.

Constructability

No major construction problems are anticipated with this alternative. The new headworks and disinfection structures can be built via typical construction practices.

Capital Cost Estimates

Preliminary capital and cost estimates for Alternative HGD-1 have been prepared for guidance in project evaluation and comparisons such as present value analysis. Final project costs will depend on a variety of future factors including, but not limited to, regulatory approvals and requirements, actual labor and material costs, and site conditions present at the time of bidding. As a result of all the factors described above, final costs and user rates are expected to vary from those shown.

Construction cost estimates are in 2022 dollars and include labor, materials, equipment, overhead, bonds, insurance, and profit. Estimates were based on actual costs for other similar facilities, equipment quotations from suppliers, and published cost curves. Factors were applied to electrical and instrumentation/control costs as appropriate. Each alternative was assigned a 10 percent contingency factor and a 20 percent engineering cost. Actual engineering costs may be higher or lower depending on the scope of services performed.

Table 4B.7 presents the opinion of probable construction, engineering, and legal/administrative costs for Alternative HGD-1.

Table 4B.7 - Opinion Of Probable Cost
City of Hardin
Alternative HGD-1: Single Mechanical Headworks, Generator, and Backup Disinfection

#	BID ITEM	QTY	UNITS	UNIT PRICE	TOTAL
1	Process Controls, Flow Monitoring, SCADA, and Electrical	1	LS	$175,000.00	$175,000.00
2	Mechanical and HVAC	1	LS	$350,000.00	$350,000.00
3	Sitework	1	LS	$90,000.00	$90,000.00
4	Headworks Building (30' x 50')	1	LS	$300,000.00	$300,000.00
5	Packaged Headworks (Screening, grit removal, and grease removal)	1	EA	$500,000.00	$500,000.00
6	Bypass Channel w/ Bar Screen	1	LS	$25,000.00	$25,000.00
7	Wash Water Return System (recycled treated effluent)	1	LS	$75,000.00	$75,000.00
8	Emergency Generator & Transfer Gear	1	EA	$200,000.00	$200,000.00
9	Backup UV Disinfection	1	LS	$200,000.00	$200,000.00
10	UV Disinfection and Administrative Building Expansion	1	LS	$400,000.00	$400,000.00
11	Yard Piping, Fittings, and Valves	1	LS	$50,000.00	$50,000.00
Subtotal					**$2,365,000.00**
Mobilization				10%	$236,500.00
Contingency				10%	$236,500.00
Construction Subtotal					**$2,838,000.00**
Inflation to 2022				3%	$85,200.00
Erosion Control		1	LS	$5,000.00	$5,000.00
Review Fees and Permits		1	LS	$7,000.00	$7,000.00
Geotechnical Investigation		1	LS	$5,000.00	$5,000.00
Engineering (Design, Bidding Services, and Construction Administration)				20%	$567,600.00
Legal & Administrative				5%	$141,900.00
Project Total					**$3,649,700.00**

Present Worth Cost Estimates

A present worth analysis that includes the capital, annual, and facility replacement costs was also prepared for each alternative. This computation, commonly referred to as a life cycle analysis, equalizes the O&M costs of the alternatives and then adds them to the capital cost. The result is the total present worth cost. The present worth of the operating costs was computed for twenty-years (2020-2040) using factors developed on the current real discount rate of 1.5 percent published by the United States Office of Management and Budget (OMB). The facility salvage value was determined by classifying the design life of various assets as appropriate. The salvage value at the twenty-year point was then discounted to present value using a present worth factor based on the current OMB discount rate.

Table 4B.8 presents the capital, annual, and present worth costs for the implementation of Alternative HGD-1.

Table 4B.8 Present Worth Costs Alternative HGD-1	
Capital	$3,649,700
Annual O&M	$15,071
PW Salvage	$214,088
PW O&M	$258,736
Present Worth	$3,605,052

4B.2.2 Alternative HGD-2: Dual Mechanical Headworks, Backup Generator, and Backup Disinfection

Description and Schematic

This alternative will replace the existing headworks structure and grinder/screening system to address all identified deficiencies and MDEQ/EPA requirements. This includes a new headworks building along with screening, grit removal, and grease removal (likely in a pre-packaged system) on both the primary and the bypass flow channels. Therefore, this alternative would allow for periodic maintenance of the mechanical headworks system without a temporary reduction in screening, grit removal, and grease removal. This alternative also includes construction of a wash water return system which utilizes treated effluent for the headworks spray system. As described at the beginning of this section, backup power generation and backup disinfection appurtenances are included in this alternative. A layout is shown in ***Figure 4.5.***

Operational and Energy Requirements

The improvements included in Alternative HGD-2 will not require a change in the operator certification level. Most of the duties will remain similar as to current conditions with the exception of a small amount of time dedicated to grit/grease disposal and maintenance of the grit and grease removal equipment.

Based upon manufacturer data and estimates for the HVAC within the new headworks and disinfection buildings, the power demand would increase from existing conditions by approximately 76,703 kW-hr/year yielding the following increase in annual energy cost. No increase in energy costs is anticipated due to the proposed generator or disinfection units as these are purely for backup of utility power and existing disinfection.

76,703 kW-hr/year X $0.10 per kW-hr = $7,671.30 per year

The power consumption increase is estimated to be equal to that of Alternative HGD-1 because only one headworks unit would be online at a time during standard operation of the facility.

ALTERNATIVE HGD-2: DUAL MECHANICAL HEADWORKS, BACKUP GENERATOR, AND BACKUP DISINFECTION

SITE INFORMATION

1. ABANDON EXISTING HEADWORKS
2. NEW HEADWORKS STRUCTURE AND EQUIPMENT (DUAL SCREEN, GRIT REMOVAL, AND GREASE REMOVAL)
3. BUILDING EXPANSION TO ADD LABORATORY SPACE AND HOUSE UV DISINFECTION (NEW BACKUP UV DISINFECTION)
4. NEW EMERGENCY GENERATOR

STAHLY ENGINEERING & ASSOCIATES
PROFESSIONAL ENGINEERS & SURVEYORS
www.seaeng.com

2223 MONTANA AVE.
STE. 201
BILLINGS, MT 59101
Phone: (406)601-4055
Fax: (406)601-4062

3530 CENTENNIAL DR.
HELENA, MT 59601
Phone: (406)442-8594
Fax: (406)442-8557

851 BRIDGER DR. STE. 1
BOZEMAN, MT 59715
Phone: (406)522-9526
Fax: (406)522-9528

ISSUE/REVISION

No.	DATE	BY
1	####	####
DESCRIPTION		
####		

No.	DATE	BY
2		
DESCRIPTION		

No.	DATE	BY
3		
DESCRIPTION		

No.	DATE	BY
4		
DESCRIPTION		

No.	DATE	BY
5		
DESCRIPTION		

PRELIMINARY
NOT FOR CONSTRUCTION

ALTERNATIVE HGD-2

WASTEWATER UPGRADES PER UPDATE

CITY OF HARDIN, MONTANA

DESIGNED: GMS
DRAWN: GMS
CHECKED:
DATE: 07-15-2019

FIGURE
4.5

Stahly Engineering & Associates, Inc. COPYRIGHT 2015
L:\2223-City of Hardin\-2019 WW PER Update for RD\DWG\Plan Sets\PER Exhibits\Figure 4.5 - Alternative HGD-2 Layout.dwg, Figure 4.5, Plotted: Aug 30, 2019 - 9:14am, gsteckler

Regulatory Requirements and Permits

Implementation of this alternative will improve the treatment system capacity, performance, and the ability to avoid violations of the discharge permit limits. Grit and grease removal included in this alternative will also increase the life-span of downstream equipment such as pumps and mixers while decreasing O&M costs attributed to maintenance and cleaning of downstream systems and equipment. The selected contractor would be responsible for submitting a stormwater pollution prevention plan (SWPPP) and obtaining a stormwater discharge permits, as would be indicated in the project specifications. All improvements will be designed, reviewed, and approved prior to construction according to the applicable sections of Circular DEQ-2.

Land Requirements

Implementation of this alternative will require utilization of a small portion of the City-owned wastewater treatment plant site.

Environmental Considerations

The reliability of the effluent quality will improve and compliance with the wastewater discharge permit will be maintained. With respect to treatment and bacterial contamination, the new headworks equipment will improve downstream water quality by removing grit and grease from the wastewater treatment processes. This will allow for more effective treatment, clarification, and disinfection resulting in the discharge of higher quality effluent to the Bighorn River. Downstream users such as irrigators, recreationalists, and resident fish populations would directly benefit from the headworks upgrades.

Implementation of this alternative will require disturbance of a small portion of the City-owned wastewater treatment plant site. Some air quality degradation due to dust may arise during the actual construction period; however, it would be temporary. The contract documents would require that the contractor provide dust control. Similarly, there will be some temporary noise during construction. Once construction is complete, there will be no noise or dust problems arising as a result of the improvements. The contract documents shall also require that BMP's be employed before, during, and after construction until all areas of disturbance have been fully reclaimed and/or re-vegetated. Other agencies have identified the possible need for permits: The USCOE has requested that a BA permit application be completed to verify that no waters of the state are filled.

Constructability

No major construction problems are anticipated with this alternative. The new headworks and disinfection structures can be built via typical construction practices.

Capital Cost Estimates

Preliminary capital and cost estimates for Alternative HGD-2 have been prepared for guidance in project evaluation and comparisons such as present value analysis. Final project costs will depend on a variety of future factors including, but not limited to, regulatory approvals and

requirements, actual labor and material costs, and site conditions present at the time of bidding. As a result of all the factors described above, final costs and user rates are expected to vary from those shown.

Construction cost estimates are in 2022 dollars and include labor, materials, equipment, overhead, bonds, insurance, and profit. Estimates were based on actual costs for other similar facilities, equipment quotations from suppliers, and published cost curves. Factors were applied to electrical and instrumentation/control costs as appropriate. Each alternative was assigned a 10 percent contingency factor and a 20 percent engineering cost. Actual engineering costs may be higher or lower depending on the scope of services performed.

Table 4B.9 presents the opinion of probable construction, engineering, and legal/administrative costs for Alternative HGD-2.

Table 4B.9 - Opinion Of Probable Cost
City of Hardin
Alternative HGD-2: Dual Mechanical Headworks, Generator, and Backup Disinfection

#	BID ITEM	QTY	UNITS	UNIT PRICE	TOTAL
1	Process Controls, Flow Monitoring, SCADA, and Electrical	1	LS	$175,000.00	$175,000.00
2	Mechanical and HVAC	1	LS	$350,000.00	$350,000.00
3	Sitework	1	LS	$90,000.00	$90,000.00
4	Headworks Building (30' x 50')	1	LS	$300,000.00	$300,000.00
5	Packaged Headworks (Screening, grit removal, and grease removal)	2	EA	$500,000.00	$1,000,000.00
6	Wash Water Return System (recycled treated effluent)	1	LS	$75,000.00	$75,000.00
7	Emergency Generator & Transfer Gear	1	EA	$200,000.00	$200,000.00
8	Backup UV Disinfection	1	LS	$200,000.00	$200,000.00
9	UV Disinfection and Administrative Building Expansion	1	LS	$400,000.00	$400,000.00
10	Yard Piping, Fittings, and Valves	1	LS	$50,000.00	$50,000.00
Subtotal					**$2,840,000.00**
Mobilization				10%	$284,000.00
Contingency				10%	$284,000.00
Construction Subtotal					**$3,408,000.00**
Inflation to 2022				3%	$102,200.00
Erosion Control		1	LS	$5,000.00	$5,000.00
Review Fees and Permits		1	LS	$7,000.00	$7,000.00
Geotechnical Investigation		1	LS	$5,000.00	$5,000.00
Engineering (Design, Bidding Services, and Construction Administration)				20%	$681,600.00
Legal & Administrative				5%	$170,400.00
Project Total					**$4,379,200.00**

Present Worth Cost Estimates

A present worth analysis that includes the capital, annual, and facility replacement costs was also prepared for each alternative. This computation, commonly referred to as a life cycle analysis, equalizes the O&M costs of the alternatives and then adds them to the capital cost. The result is the total present worth cost. The present worth of the operating costs was computed for twenty-years (2020-2040) using factors developed on the current real discount rate of 1.5 percent published by the United States Office of Management and Budget (OMB). The facility salvage value was determined by classifying the design life of various assets as appropriate. The salvage value at the twenty-year point was then discounted to present value using a present worth factor based on the current OMB discount rate.

Table 4B.10 presents the capital, annual, and present worth cost for the implementation of Alternative HGD-2.

Table 4B.10 Present Worth Costs Alternative HGD-2	
Capital	$4,379,200
Annual O&M	$18,321
PW Salvage	$207,900
PW O&M	$314,534
Present Worth	$4,272,566

4B.3 Wastewater Treatment Alternatives

Three treatment alternatives were carried forward from the screening process presented in Section 4A. They include the following:

- T-1: Various Sub-System Upgrades
- T-2: New Oxidation Ditch
- T-3: New ICEAS SBR

4B.3.1 Upgrades Common to All Alternatives

Please note that all of the following treatment alternatives, when combined with either of the headworks alternatives from the previous section, address and correct all deficiencies at the wastewater treatment facility. Each of the treatment alternatives described below includes the following upgrades:

Process Controls and SCADA (varies from Alternatives T-1 and T-2 to T-3)

As mentioned earlier in this PER, many of the existing plant controls carry-over from the original installation in 1978. Some of the panels have been adapted over the years to incorporate new equipment while others have been abandoned for new individual control systems. Issues with flow monitoring equipment have also been reported by the operators and were included in the EPA compliance evaluation inspection report. The plant also lacks an overall supervisory control and data acquisition (SCADA) system. An overall SCADA system, integrating all process equipment and telemetry, is essential to efficient operation of a complex mechanical treatment facility. Due to aging and pieced-together controls along with the lack of an overall SCADA system, new controls and SCADA are included in all treatment alternatives. A detailed description of the differences in process controls and flow monitoring between Alternative T-3 and the other two treatment alternatives is included in the Alternative T-3 narrative.

Flow Splitter Box

The flow splitter box will be a cast-in-place structure with weir gates located between the headworks and the surge flow/biological treatment tankage. During standard plant operation, the splitter box will divert flows to a surge tank for flow equalization. This will allow the plant to handle the peak day flows encountered during large rain and snow melt events while improving plant performance under typical flows by smoothing the diurnal inflow curves. When maintenance is required on surge flow equalization equipment, flow can be shut-off to the equalization tank and diverted directly to the biological treatment tankage. The flow splitter box will also have an overflow channel to one of the old existing lagoon cells located adjacent to the treatment facility.

Surge Flow Equalization (method varies in each alternative)

Surge flow equalization is a critical upgrade to address issues due to intermittent surge flows to the plant encountered during rain and snowmelt events. The intermittent surge flows contain low

levels of nutrients which, in-turn, negatively affects the biology within the oxidation ditch. This has resulted in the need for raw wastewater to be diverted to an old lagoon cell. There is currently no means to reintroduce the untreated wastewater into the treatment process. Thus, it remains in the old lagoon cell until it disappears via evaporation and seepage. A surge flow equalization tank with a pumping system is included in each treatment alternative in order to attenuate surge flows while controllably dosing wastewater into the biological treatment tankage. This will allow the plant to handle peak day surge flows during large rain and snow melt events while improving plant performance under typical flows by smoothing the diurnal inflow curves. A detailed description of the method of surge flow equalization is included under each treatment alternative.

Second Aerobic Sludge Digester (method varies from Alternatives T-1 and T-2 to T-3)

The wastewater treatment plant currently has one aerobic sludge digester. According to MDEQ Circular 2, multiple digestion units must be provided for plants were the design average flow exceeds 100,000 gallons per day. Therefore, a second aerobic sludge digester is included in each treatment alternative. A detailed description of the method of providing a second aerobic sludge digester is included under each treatment alternative.

New Aerobic Sludge Digestion Equipment

Due to the age (40-years) of the existing aerobic sludge digestion equipment and the need for a second digester, two sets of new in-tank digestion equipment are proposed for each treatment alternative.

Backup Aerobic Digestion Blower

The wastewater treatment facility currently has only one aerobic digestion blower. According to MDEQ Circular 2, minimum mixing and oxygen requirements must be maintained with the largest unit out of service. At this point, during maintenance and repair procedures, no aeration is provided to the aerobic sludge digester. Therefore, a backup aerobic digestion blower is included as part of each treatment alternative.

Blower Building Expansion

As stated earlier in this PER, the existing wastewater treatment facility has only one aerobic digestion blower which is housed in a small building with no room for additional units. Each treatment alternative will also require aeration blowers for flow equalization and biological treatment. Thus, an expansion of the existing blower building to house a total of four aeration blowers is included as part of each treatment alternative.

New Water Well

A new water well is included in each alternative to correct the lack of flow from the current plant water supply.

Septage Receiving Station

The wastewater treatment plant currently has no means of introducing septage received from pumper trucks into the treatment system. Septage is currently dumped into the old lagoon cell that is also utilized as a sludge drying bed. All of the following treatment alternatives incorporate a septage receiving station with flow monitoring/totalization which is capable of pumping septage to the headworks facility. This will enable the City to totalize the amount of received septage while allowing for introduction of septage into the treatment system.

4B.3.2 Alternative T-1: Various Sub-System Upgrades

Description and Schematic

This alternative would correct the deficiencies of the existing wastewater plant by constructing the appurtenances described below. A layout is provided in ***Figure 4.6.***

In this alternative, a flow splitter box is installed post-headworks as previously described in Section 4B.2.1 above. A new dedicated surge flow equalization tank is constructed after the flow splitter box and prior to the existing oxidation ditch. Under normal operation, the splitter box diverts flow to the new equalization tank. However, the second channel in the splitter box allows flow to be diverted directly to the existing oxidation ditch to allow for maintenance activities in the equalization tank. The new equalization tank includes mixing and aeration equipment along with a pumping system to dose flow to the existing oxidation ditch.

As part of this alternative, the mechanical equipment in the existing oxidation ditch is replaced. This includes replacement of mixers and upgrading the surface aeration rotors to submersed diffused aeration. Two new aeration blowers are installed in the expanded blower building mentioned earlier in Section 4B.2.1 to serve the equalization tank and the upgraded oxidation ditch. A foam mitigation system is installed on the existing oxidation ditch.

Following the oxidation ditch, equipment within the existing clarifier tanks is replaced. Insulated dome covers are installed on both clarifiers to prevent freezing issues in the winter months. Both the return activated sludge (RAS) and the waste activated sludge (WAS) pumping stations are replaced with modern equipment. As part of the WAS upgrades, a second aerobic sludge digester is constructed and the equipment within the existing aerobic digester is replaced. A backup aerobic digestion blower is installed in an expanded blower building as described earlier in Section 4B.2.1.

Comprehensive plant controls, flow monitoring, and SCADA are installed/replaced as part of this alternative. Flow monitoring upgrades include installation and integration of flow meters on the RAS and WAS lines. Oxidation reduction potential (ORP), dissolved oxygen (DO), pH, and temperature probes are installed and integrated at key points in the treatment process. Finally, an overall SCADA system is installed incorporating all systems within the treatment process.

ALTERNATIVE T-1: VARIOUS SUB-SYSTEM UPGRADES

SITE INFORMATION

1. NEW FLOW SPLITTER BOX
2. SURGE FLOW EQUALIZATION TANK (750,000 GALLONS) AND EQUALIZATION PUMPS
3. EXISTING OXIDATION DITCH (TO REMAIN W/ UPDATED EQUIPMENT)
4. REPLACE MECHANICAL EQUIPMENT IN EXISTING CLARIFIER AND ADD INSULATED DOME COVER
5. NEW RETURN ACTIVATED SLUDGE PUMPING STATION (ABANDON EXISTING)
6. NEW WASTE ACTIVATED SLUDGE PUMPING STATION (ABANDON EXISTING)
7. NEW SECOND AEROBIC SLUDGE DIGESTER UNIT
8. BLOWER BUILDING EXPANSION W/ NEW BACKUP DIGESTER BLOWER AND NEW OXIDATION DITCH AERATION BLOWERS
9. NEW SEPTAGE RECEIVING STATION
10. NEW WATER SUPPLY WELL
11. EXISTING TREATED EFFLUENT DISCHARGE OUTFALL (TO REMAIN)
12. EXISTING SLUDGE DRYING BED (TO REMAIN)
13. REPLACE EXISTING AEROBIC DIGESTER MECHANICAL EQUIPMENT
14. NEW PROCESS CONTROLS AND SCADA

STAHLY ENGINEERING & ASSOCIATES, INC. EST. 1970

STAHLY ENGINEERING & ASSOCIATES
PROFESSIONAL ENGINEERS & SURVEYORS
www.seaeng.com

2223 MONTANA AVE.
STE. 201
BILLINGS, MT 59101
Phone: (406)601-4055
Fax: (406)601-4062

3530 CENTENNIAL DR.
HELENA, MT 59601
Phone: (406)442-8594
Fax: (406)442-8557

851 BRIDGER DR. STE. 1
BOZEMAN, MT 59715
Phone: (406)522-9526
Fax: (406)522-9528

ISSUE/REVISION

No.	DATE	BY
1	####	####
DESCRIPTION		
####		

No.	DATE	BY
2		
DESCRIPTION		

No.	DATE	BY
3		
DESCRIPTION		

No.	DATE	BY
4		
DESCRIPTION		

No.	DATE	BY
5		
DESCRIPTION		

PRELIMINARY
NOT FOR CONSTRUCTION

ALTERNATIVE T-1

WASTEWATER UPGRADES PER UPDATE

CITY OF HARDIN, MONTANA

DESIGNED: GMS
DRAWN: GMS
CHECKED:
DATE: 07-15-2019

FIGURE
4.6

Stahly Engineering & Associates, Inc. COPYRIGHT 2015

L:\2223-City of Hardin\-2019 WW PER Update for RD\DWG\Plan Sets\PER Exhibits\Figure 4.6 - Alternative T-1 Layout.dwg, Figure 4.6, Plotted: Aug 30, 2019 - 9:46am, gsteckler

Operational and Energy Requirements

The City of Hardin currently has adequate staff to operate the upgraded wastewater treatment plant. Daily activities will be similar to those conducted at the existing wastewater treatment facility. However, less time will be dedicated to issues such as freezing, foaming, and repair of aging appurtenances. Daily activities would continue to include process data review/process adjustment, equipment inspection/maintenance, process monitoring, influent and effluent sampling, and monthly and annual reporting to EPA. Periodic maintenance work would continue to include changing oil in aeration blowers, changing air filters on the blower intake, pump maintenance, UV disinfection maintenance, sludge disposal, trash disposal, building maintenance, safety training, etc. It is recommended a backup operator be trained and certified to provide relief to the primary operator for regularly scheduled time off.

Based upon manufacturer data, the power demand would decrease from existing conditions by approximately 346,333 kW-hr/year yielding the following decrease in annual energy cost.

(-346,333) kW-hr/year X $0.10 per kW-hr = (-$34,633.30) per year

However, to be conservative regarding O&M cost estimating, a value of "no change from existing" is utilized in this PER with respect to power consumption for Alternative T-1.

Regulatory Compliance and Permits

The upgrades in Alternative T-1 would be designed and constructed in compliance with Circular DEQ-2 and EPA standards and regulations. Discharge to the Bighorn River would continue under the existing NPDES discharge permit as outlined in Disposal Alternative D-0.

Plans would need to be reviewed and approved by MDEQ before bidding and construction could begin. Since more than one acre of land would be disturbed during construction, stormwater discharge permits are also necessary. The construction contractor would be responsible for obtaining these permits and any additional permits including, but not limited to, building, electrical, plumbing, road encroachment, and any necessary easements for sewers.

Land Requirements

A sufficient amount of land is available at the existing treatment plant site located on City-owned property.

Environmental Considerations

There will be no changes in land use associated with this project. All upgrades are planned to be constructed within the boundary of the existing wastewater treatment site. As with most construction, there would be temporary dust and noise problems to consider, but upon completion of the system these problems would go away. The contract documents shall also require that BMP's be employed before, during, and after construction until all areas of disturbance have been fully reclaimed and/or revegetated. For these reasons, environmental impacts are considered minimal and no permanent, negative environmental impacts are anticipated.

Constructability

Alternative T-1 can be constructed adjacent to the existing treatment facilities. However, this alternative likely requires the utilization of temporary wastewater treatment during construction of upgrades within the existing oxidation ditch. Complex upgrades of the mechanical equipment in the existing secondary clarifiers is also necessary as part of Alternative T-1. This system would require a large partially-buried concrete equalization tank which could pose dewatering and buoyancy problems in areas of high groundwater. However, other large partially-buried concrete tanks were previously constructed and still exist on the site. Geotechnical studies will confirm the necessary design requirements. Alternative T-1 is the most complex alternative in respect to constructability.

Capital Cost Estimates

Preliminary capital cost estimates for Alternative T-1 have been prepared for guidance in project evaluation and comparisons such as present value analysis. Final project costs will depend on a variety of future factors including, but not limited to, regulatory approvals and requirements, actual labor and material costs, and site conditions present at the time of bidding. As a result of all the factors described above, final costs and user rates are expected to vary from those shown.

Construction cost estimates are in 2023 dollars and include labor, materials, equipment, overhead, bonds, insurance, and profit. Estimates were based on actual costs for other similar facilities, equipment quotations from suppliers, and published cost curves. Factors were applied to electrical and instrumentation/control costs as appropriate. Each alternative was assigned a 10 percent contingency factor and a 20 percent engineering cost. Actual engineering costs may be higher or lower depending on the scope of services performed.

Table 4B.11 presents the opinion of probable construction, engineering, and legal/administrative costs for Alternative T-1.

Table 4B.11 - Opinion Of Probable Cost
City of Hardin
Alternative T-1: Various Sub-System Upgrades

#	BID ITEM	QTY	UNITS	UNIT PRICE	TOTAL
1	Process Controls, SCADA, and Electrical	1	LS	$325,000.00	$325,000.00
2	Mechanical and HVAC	1	LS	$200,000.00	$200,000.00
3	Sitework	1	LS	$410,000.00	$410,000.00
4	Flow Splitter Box	1	LS	$30,000.00	$30,000.00
5	Modifications to Existing Oxidation Ditch	1	LS	$100,000.00	$100,000.00
6	Replacement of Oxidation Ditch Mechanical Equipment	1	EA	$365,000.00	$365,000.00
7	New Surge Tank (Cast-in-place concrete)	1,090	CY	$750.00	$817,500.00
8	Stairs, Railings, and Walkways	1	LS	$370,000.00	$370,000.00
9	Foam Mitigation System	1	LS	$210,000.00	$210,000.00
10	Clarifier Rebuild	2	EA	$400,000.00	$800,000.00
11	Insulated Clarifier Dome Covers	2	EA	$85,000.00	$170,000.00
12	Return Activated Sludge Pumping Station	1	LS	$150,000.00	$150,000.00
13	Waste Activated Sludge Pumping Station	1	LS	$150,000.00	$150,000.00
14	Backup Aerobic Digestion Blower	1	EA	$45,000.00	$45,000.00
15	Aerobic Digestion Blower Building Expansion	1	LS	$80,000.00	$80,000.00
16	New Aerobic Digestion Equipment	2	EA	$30,000.00	$60,000.00
17	New Aerobic Digester Tank (Cast-in-place concrete)	265	CY	$750.00	$198,750.00
18	New Water Well	1	LS	$35,000.00	$35,000.00
19	Yard Piping, Fittings, and Valves	1	LS	$250,000.00	$250,000.00
20	Septage Receiving Station w/ Lift to Headworks	1	LS	$250,000.00	$250,000.00
21	Temporary Treatment During Construction	1	LS	$750,000.00	$750,000.00
Subtotal					**$5,766,250.00**
Mobilization				10%	$576,625.00
Contingency				10%	$576,625.00
Construction Subtotal					**$6,919,500.00**
Inflation to 2023				4%	$276,780.00
Erosion Control		1	LS	$5,000.00	$5,000.00
Review Fees and Permits		1	LS	$20,000.00	$20,000.00
Geotechnical Investigation		1	LS	$8,000.00	$8,000.00
Engineering (Design, Bidding Services, and Construction Administration)				20%	$1,383,900.00
Legal & Administrative				5%	$345,975.00
Project Total					**$8,959,155.00**

Present Worth Cost Estimates

A present worth analysis that includes the capital, annual, and facility replacement costs was also prepared for each alternative. This computation, commonly referred to as a life cycle analysis, equalizes the O&M costs of the alternatives and then adds them to the capital cost. The result is the total present worth cost. The present worth of the operating costs was computed for twenty-years (2020-2040) using factors developed on the current real discount rate of 1.5 percent published by the United States Office of Management and Budget (OMB). The facility salvage value was determined by classifying the design life of various assets as appropriate. The salvage value at the twenty-year point was then discounted to present value using a present worth factor based on the current OMB discount rate.

Table 4B.12 presents the capital, annual, and present worth costs for the implementation of Alternative T-1.

Table 4B.12 Present Worth Costs Alternative T-1	
Capital	$8,959,155
Annual O&M	$17,000
PW Salvage	$600,497
PW O&M	$291,867
Present Worth	$9,267,785

4B.3.3 Alternative T-2: New Oxidation Ditch

Description and Schematic

This alternative would correct the deficiencies of the existing wastewater plant by adding a new oxidation ditch along with other appurtenances described below. A layout is provided in ***Figure 4.7.***

In this alternative, a flow splitter box is installed post-headworks as previously described in Section 4B.2.1 above. A new oxidation ditch is constructed after the flow splitter box alongside the existing oxidation ditch. New mixers and diffused-aeration equipment are installed in the existing oxidation ditch tank, abandoning the existing aeration rotors. Under normal operation, the splitter box diverts flow to the new oxidation ditch while the upgraded existing oxidation ditch is on standby to accept surge flows. However, both oxidation ditches could be operated in parallel under normal plant operation if deemed advantageous due to future increased flows or more stringent treatment standards. Two new aeration blowers are installed in the expanded blower building mentioned earlier in Section 4B.2.1 to serve the oxidation ditches. A foam mitigation system is installed on both oxidation ditches.

Following the oxidation ditches, equipment within the existing clarifier tanks is replaced. Insulated dome covers are installed on both clarifiers to prevent freezing issues in the winter months. Both the return activated sludge (RAS) and the waste activated sludge (WAS) pumping stations are replaced with modern equipment. As part of the WAS upgrades, a second aerobic sludge digester is constructed and the equipment within the existing aerobic digester is replaced. A backup aerobic digestion blower is installed in an expanded blower building as described earlier in Section 4B.2.1.

Comprehensive plant controls, flow monitoring, and SCADA are installed/replaced as part of this alternative. Flow monitoring upgrades include installation and integration of flow meters on the RAS and WAS lines. Oxidation reduction potential (ORP), dissolved oxygen (DO), pH, and temperature probes are installed and integrated at key points in the treatment process. Finally, an overall SCADA system is installed incorporating all systems within the treatment process.

Operational and Energy Requirements

The City of Hardin currently has adequate staff to operate the upgraded wastewater treatment plant. Daily activities will be similar to those conducted at the existing wastewater treatment facility. However, less time will be dedicated to issues such as freezing, foaming, and repair of aging appurtenances. Daily activities would continue to include process data review/process adjustment, equipment inspection/maintenance, process monitoring, influent and effluent sampling, and monthly and annual reporting to EPA. Periodic maintenance work would continue to include changing oil in aeration blowers, changing air filters on the blower intake, pump maintenance, UV disinfection maintenance, sludge disposal, trash disposal, building maintenance, safety training, etc. It is recommended a backup operator be trained and certified to provide relief to the primary operator for regularly scheduled time off.

Based upon manufacturer data, the power demand would decrease from existing conditions by approximately 346,333 kW-hr/year yielding the following decrease in annual energy cost.

(-346,333) kW-hr/year X $0.10 per kW-hr = (-$34,633.30) per year

However, to be conservative regarding O&M cost estimating, a value of “no change from existing” is utilized in this PER with respect to power consumption for Alternative T-2.

Regulatory Compliance and Permits

The upgrades in Alternative T-2 would be designed and constructed in compliance with Circular DEQ-2 and EPA standards and regulations. Discharge to the Bighorn River would continue under the existing NPDES discharge permit as outlined in Disposal Alternative D-0.

Plans would need to be reviewed and approved by MDEQ before bidding and construction could begin. Since more than one acre of land would be disturbed during construction, stormwater discharge permits are also necessary. The construction contractor would be responsible for obtaining these permits and any additional permits including, but not limited to, building, electrical, plumbing, road encroachment, and any necessary easements for sewers.

ALTERNATIVE T-2: NEW OXIDATION DITCH

SITE INFORMATION

1. NEW FLOW SPLITTER BOX
2. EXISTING OXIDATION DITCH (TO REMAIN) UPGRADE AERATION AND MIXING EQUIPMENT
3. NEW OXIDATION DITCH (TO OPERATE IN PARALLEL WITH EXISTING DITCH)
4. REPLACE MECHANICAL EQUIPMENT IN EXISTING CLARIFIER AND ADD INSULATED DOME COVER
5. NEW RETURN ACTIVATED SLUDGE PUMPING STATION (ABANDON EXISTING)
6. NEW WASTE ACTIVATED SLUDGE PUMPING STATION (ABANDON EXISTING)
7. NEW SECOND AEROBIC SLUDGE DIGESTER UNIT
8. BLOWER BUILDING EXPANSION W/ NEW BACKUP DIGESTER BLOWER AND NEW OXIDATION DITCH AERATION BLOWERS
9. NEW SEPTAGE RECEIVING STATION
10. NEW WATER SUPPLY WELL
11. EXISTING TREATED EFFLUENT DISCHARGE OUTFALL (TO REMAIN)
12. EXISTING SLUDGE DRYING BED (TO REMAIN)
13. REPLACE EXISTING AEROBIC DIGESTER MECHANICAL EQUIPMENT
14. NEW PROCESS CONTROLS AND SCADA

STAHLY ENGINEERING & ASSOCIATES
PROFESSIONAL ENGINEERS & SURVEYORS
www.seaeng.com

2223 MONTANA AVE. STE. 201
BILLINGS, MT 59101
Phone: (406)601-4055
Fax: (406)601-4062

3530 CENTENNIAL DR.
HELENA, MT 59601
Phone: (406)442-8594
Fax: (406)442-8557

851 BRIDGER DR. STE. 1
BOZEMAN, MT 59715
Phone: (406)522-9526
Fax: (406)522-9528

ISSUE/REVISION

No.	DATE	BY
1	####	####
DESCRIPTION		
####		

No.	DATE	BY
2		
DESCRIPTION		

No.	DATE	BY
3		
DESCRIPTION		

No.	DATE	BY
4		
DESCRIPTION		

No.	DATE	BY
5		
DESCRIPTION		

PRELIMINARY
NOT FOR CONSTRUCTION

ALTERNATIVE T-2

WASTEWATER UPGRADES PER UPDATE

CITY OF HARDIN, MONTANA

DESIGNED: GMS
DRAWN: GMS
CHECKED:
DATE: 07-15-2019

FIGURE
4.7

Stahly Engineering & Associates, Inc. COPYRIGHT 2015
L:\2223-City of Hardin\-2019 WW PER Update for RD\DWG\Plan Sets\PER Exhibits\Figure 4.7 - Alternative T-2 Layout.dwg, Figure 4.7, Plotted: Aug 30, 2019 - 9:44am, gsteckler

Land Requirements

Sufficient land is available at the existing treatment plant site located on City-owned property.

Environmental Considerations

There will be no changes in land use associated with this project. All upgrades are planned to be constructed within the boundary of the existing wastewater treatment site. As with most construction, there would be temporary dust and noise problems to consider, but upon completion of the system these problems would go away. The contract documents shall also require that BMP's be employed before, during, and after construction until all areas of disturbance have been fully reclaimed and/or revegetated. For these reasons, environmental impacts are considered minimal and no permanent, negative environmental impacts are anticipated.

Constructability

Alternative T-2 can be constructed adjacent to the existing treatment facilities. Complex upgrades of the mechanical equipment in the existing secondary clarifiers is necessary as part of this alternative. Alternative T-2 requires the construction of a large partially-buried concrete oxidation ditch tank which could pose dewatering and buoyancy problems in areas of high groundwater. Geotechnical studies will confirm the necessary design requirements. Alternative T-2 is the second most complex alternative in respect to constructability.

Capital Cost Estimates

Preliminary capital and cost estimates for Alternative T-2 have been prepared for guidance in project evaluation and comparisons such as present value analysis. Final project costs will depend on a variety of future factors including, but not limited to, regulatory approvals and requirements, actual labor and material costs, and site conditions present at the time of bidding. As a result of all the factors described above, final costs and user rates are expected to vary from those shown.

Construction cost estimates are in 2023 dollars and include labor, materials, equipment, overhead, bonds, insurance, and profit. Estimates were based on actual costs for other similar facilities, equipment quotations from suppliers, and published cost curves. Factors were applied to electrical and instrumentation/control costs as appropriate. Each alternative was assigned a 10 percent contingency factor and a 20 percent engineering cost. Actual engineering costs may be higher or lower depending on the scope of services performed.

Table 4B.13 presents the opinion of probable construction, engineering, and legal/administrative costs for Alternative T-2.

Table 4B.13 - Opinion Of Probable Cost
City of Hardin
Alternative T-2: New Oxidation Ditch

#	BID ITEM	QTY	UNITS	UNIT PRICE	TOTAL
1	Process Controls, SCADA, and Electrical	1	LS	$325,000.00	$325,000.00
2	Mechanical and HVAC	1	LS	$200,000.00	$200,000.00
3	Sitework	1	LS	$410,000.00	$410,000.00
4	Flow Splitter Box	1	LS	$30,000.00	$30,000.00
5	Modifications to Existing Oxidation Ditch	1	LS	$100,000.00	$100,000.00
6	New Oxidation Ditch Equipment	2	EA	$365,000.00	$730,000.00
7	New Oxidation Ditch Tank (Cast-in-place concrete)	1,110	CY	$750.00	$832,500.00
8	Stairs, Railings, and Walkways	1	LS	$370,000.00	$370,000.00
9	Foam Mitigation System	1	LS	$320,000.00	$320,000.00
10	Clarifier Rebuild	2	EA	$400,000.00	$800,000.00
11	Insulated Clarifier Dome Covers	2	EA	$85,000.00	$170,000.00
12	Return Activated Sludge Pumping Station	1	LS	$150,000.00	$150,000.00
13	Waste Activated Sludge Pumping Station	1	LS	$150,000.00	$150,000.00
14	Backup Aerobic Digestion Blower	1	EA	$45,000.00	$45,000.00
15	Aerobic Digestion Blower Building Expansion	1	LS	$80,000.00	$80,000.00
16	New Aerobic Digestion Equipment	2	EA	$30,000.00	$60,000.00
17	New Aerobic Digester Tank (Cast-in-place concrete)	265	CY	$750.00	$198,750.00
18	New Water Well	1	LS	$35,000.00	$35,000.00
19	Yard Piping, Fittings, and Valves	1	LS	$350,000.00	$350,000.00
20	Septage Receiving Station w/ Lift to Headworks	1	LS	$250,000.00	$250,000.00
Subtotal					**$5,606,250.00**
Mobilization Bonding Insurance Overhead Profit				10%	$560,625.00
Contingency				10%	$560,625.00
Construction Subtotal					**$6,727,500.00**
Inflation to 2023				4%	$269,100.00
Erosion Control		1	LS	$5,000.00	$5,000.00
Review Fees and Permits		1	LS	$20,000.00	$20,000.00
Geotechnical Investigation		1	LS	$8,000.00	$8,000.00
Engineering (Design, Bidding Services, and Construction Administration)				20%	$1,345,500.00
Legal & Administrative				5%	$336,375.00
Project Total					**$8,711,475.00**

Present Worth Cost Estimates

A present worth analysis that includes the capital, annual, and facility replacement costs was also prepared for each alternative. This computation, commonly referred to as a life cycle analysis, equalizes the O&M costs of the alternatives and then adds them to the capital cost. The result is the total present worth cost. The present worth of the operating costs was computed for twenty-

years (2020-2040) using factors developed on the current real discount rate of 1.5 percent published by the United States Office of Management and Budget (OMB). The facility salvage value was determined by classifying the design life of various assets as appropriate. The salvage value at the twenty-year point was then discounted to present value using a present worth factor based on the current OMB discount rate.

Table 4B.14 presents the capital, annual, and present worth costs for the implementation of Alternative T-2.

Table 4B.14 Present Worth Costs Alternative T-2	
Capital	$8,711,475
Annual O&M	$17,000
PW Salvage	$628,959
PW O&M	$291,867
Present Worth	$9,048,567

4B.3.4 Alternative T-3: New ICEAS SBR

Description and Schematic

This alternative would correct the deficiencies of the existing wastewater plant by adding a new Intermittent Cycle Extended Aeration System (ICEAS) continuous flow SBR along with other appurtenances described below. A layout is provided in ***Figure 4.8.***

In this alternative, a flow splitter box is installed post-headworks as previously described in Section 4B.2.1 above. A new ICEAS SBR is constructed after the flow splitter box. The existing oxidation ditch is converted to a surge flow equalization tank. The converted oxidation ditch includes upgraded mixing and aeration equipment along with a pumping system to dose flow to the new ICEAS SBR. Under normal operation, the splitter box diverts flow to the flow equalization tank. However, the second channel in the splitter box allows flow to be diverted directly to the ICEAS SBR to allow for maintenance activities in the equalization tank. Two new aeration blowers are installed in the expanded blower building mentioned earlier in Section 4B.2.1 to serve the equalization tank and the ICEAS SBR. A foam mitigation system is installed on the ICEAS SBR.

The ICEAS SBR eliminates the need to upgrade the equipment in the existing clarifiers as clarification is provided in the SBR tanks. Motor-driven decanters are included at the end of the treatment/clarification trains in the ICEAS package. An insulated dome cover is installed over the ICEAS decanters as part of this alternative to prevent freezing issues in the winter months. The incorporated clarification provided by the ICEAS package allows the two existing clarifiers to be repurposed to a second digester and a post-equalization tank respectively. Also, the upgraded WAS pumping system mentioned in the other alternatives is supplied as part of the ICEAS package and installed within the ICEAS tankage; thus, eliminating the need for separate replacement of the existing

WAS pumping station. The need to replace the existing RAS pumping station is completely eliminated as the ICEAS SBR does not require activated sludge return pumping as part of the treatment process.

Following the ICEAS SBR, the equipment within the existing clarifier tanks is removed. As mentioned above, one clarifier is converted to a second aerobic digester and the equipment in the existing aerobic digester is replaced. The other clarifier is converted to a post-equalization tank to dose effluent flows received from the new ICEAS SBR. This involves installation of a pumping system for the post-equalization tank. An insulated dome cover is installed over the post-equalization tank to prevent freezing in the winter months. A backup aerobic digestion blower is installed in an expanded blower building as described earlier in Section 4B.2.1.

Comprehensive plant controls, flow monitoring, and SCADA are installed/replaced as part of this alternative. The ICEAS SBR package includes a proprietary control system. Incorporated as parts of this package are oxidation reduction potential ORP probes, DO probes, pH probes, and temperature probes along with associated integration and monitoring. Flow monitoring upgrades include integration of influent and effluent flow meters along with installation and integration of flow meters on the WAS lines. Finally, an overall SCADA system is installed incorporating all systems within the treatment process.

Operational and Energy Requirements

The City of Hardin currently has adequate staff to operate the upgraded wastewater treatment plant. Daily activities will be similar to those conducted at the existing wastewater treatment facility. However, less time will be dedicated to issues such as freezing, foaming, and repair of aging appurtenances. Daily activities would continue to include process data review/process adjustment, equipment inspection/maintenance, process monitoring, influent and effluent sampling, and monthly and annual reporting to EPA. Periodic maintenance work would continue to include changing oil in aeration blowers, changing air filters on the blower intake, pump maintenance, UV disinfection maintenance, sludge disposal, trash disposal, building maintenance, safety training, etc. It is recommended a backup operator be trained and certified to provide relief to the primary operator for regularly scheduled time off.

Based upon manufacturer data, the power demand would decrease from existing conditions by approximately 431,333 kW-hr/year yielding the following decrease in annual energy cost.

(-431,333) kW-hr/year X $0.10 per kW-hr = (-$43,133.30) per year

However, to be conservative regarding O&M cost estimating, a value of “no change from existing” is utilized in this PER with respect to power consumption for Alternative T-3.

ALTERNATIVE T-3: NEW ICEAS SBR

SITE INFORMATION

1. NEW FLOW SPLITTER BOX
2. CONVERT EXISTING OXIDATION DITCH TO SURGE FLOW EQUALIZATION TANK (INSTALL TANK COVER AND EQUALIZATION PUMPS)
3. NEW INTERMITTENT CYCLE EXTENDED AERATION SYSTEM (ICEAS) SEQUENCING BATCH REACTOR (SBR)
4. CONVERT EXISTING CLARIFIER TO SECOND AEROBIC DIGESTER
5. CONVERT EXISTING CLARIFIER TO POST-EQUALIZATION TANK WITH INSULATED DOME COVER
6. NEW AEROBIC SLUDGE DIGESTER
7. BLOWER BUILDING EXPANSION W/ NEW BACKUP DIGESTER BLOWER AND NEW ICEAS AERATION BLOWERS
8. NEW SEPTAGE RECEIVING STATION
9. NEW WATER SUPPLY WELL
10. EXISTING TREATED EFFLUENT DISCHARGE OUTFALL (TO REMAIN)
11. EXISTING SLUDGE DRYING BED (TO REMAIN)
12. ABANDON EXISTING RETURN ACTIVATED SLUDGE PUMPS (NOT NEEDED FOR ICEAS SBR)
13. REPLACE EXISTING AEROBIC DIGESTER MECHANICAL EQUIPMENT
14. NEW PROCESS CONTROLS AND SCADA
15. ABANDON EXISTING WASTE ACTIVATED SLUDGE PUMPS (INCLUDED IN ICEAS PACKAGE)

STAHLY ENGINEERING & ASSOCIATES
PROFESSIONAL ENGINEERS & SURVEYORS
www.seaeng.com

2223 MONTANA AVE.
STE. 201
BILLINGS, MT 59101
Phone: (406)601-4055
Fax: (406)601-4062

3530 CENTENNIAL DR.
HELENA, MT 59601
Phone: (406)442-8594
Fax: (406)442-8557

851 BRIDGER DR. STE. 1
BOZEMAN, MT 59715
Phone: (406)522-9526
Fax: (406)522-9528

ISSUE/REVISION

No.	DATE	BY
1	####	####

DESCRIPTION

####

No.	DATE	BY
2		

DESCRIPTION

No.	DATE	BY
3		

DESCRIPTION

No.	DATE	BY
4		

DESCRIPTION

No.	DATE	BY
5		

DESCRIPTION

PRELIMINARY
NOT FOR CONSTRUCTION

ALTERNATIVE T-3

WASTEWATER UPGRADES PER UPDATE

CITY OF HARDIN, MONTANA

DESIGNED: GMS
DRAWN: GMS
CHECKED:
DATE: 07-15-2019

FIGURE
4.8

Stahly Engineering & Associates, Inc. COPYRIGHT 2015
L:\2223-City of Hardin\-2019 WW PER Update for RD\DWG\Plan Sets\PER Exhibits\Figure 4.8 - Alternative T-3 Layout.dwg, Figure 4.8, Plotted: Aug 30, 2019 - 9:41am, gsteckler

Regulatory Compliance and Permits

The upgrades in Alternative T-3 would be designed and constructed in compliance with Circular DEQ-2 and EPA standards and regulations. Discharge to the Bighorn River would continue under the existing NPDES discharge permit as outlined in Disposal Alternative D-0.

Plans would need to be reviewed and approved by MDEQ before bidding and construction could begin. Since more than one acre of land would be disturbed during construction, stormwater discharge permits are also necessary. The construction contractor would be responsible for obtaining these permits and any additional permits including, but not limited to, building, electrical, plumbing, road encroachment, and any necessary easements for sewers.

Land Requirements

Sufficient land is available at the existing treatment plant site located on City-owned property.

Environmental Considerations

There will be no changes in land use associated with this project. All upgrades are planned to be constructed within the boundary of the existing wastewater treatment site. As with most construction, there would be temporary dust and noise problems to consider, but upon completion of the system these problems would go away. The contract documents shall also require that BMP's be employed before, during, and after construction until all areas of disturbance have been fully reclaimed and/or revegetated. For these reasons, environmental impacts are considered minimal and no permanent, negative environmental impacts are anticipated.

Constructability

This system can be constructed adjacent to, and independent of, the existing treatment facilities and then brought on-line without disturbing the performance of the existing facilities. No significant problems are expected with the construction of an ICEAS treatment system. ICEAS systems do require large buried concrete tanks which could pose dewatering and buoyancy problems in areas of high groundwater. Geotechnical studies will confirm the necessary design requirements. Secondary clarification is built-in to the ICEAS system. Therefore, unlike the other treatment alternatives, Alternative T-3 does not require complex replacement of the equipment within the existing secondary clarifiers. Alternative T-3 also allows for the existing oxidation ditch to be re-purposed as a surge flow equalization tank. The need for individual replacement of the RAS and WAS pumping stations is eliminated in Alternative T-3. The system does not require RAS pumping. WAS pumping is incorporated in the ICEAS package. Alternative T-3 is the least complex alternative in respect to constructability.

Capital Cost Estimates

Preliminary capital and cost estimates for Alternative T-3 have been prepared for guidance in project evaluation and comparisons such as present value analysis. Final project costs will depend on a variety of future factors including, but not limited to, regulatory approvals and requirements, actual labor and material costs, and site conditions present at the time of bidding.

As a result of all the factors described above, final costs and user rates are expected to vary from those shown.

Construction cost estimates are in 2023 dollars and include labor, materials, equipment, overhead, bonds, insurance, and profit. Estimates were based on actual costs for other similar facilities, equipment quotations from suppliers, and published cost curves. Factors were applied to electrical and instrumentation/control costs as appropriate. Each alternative was assigned a 10 percent contingency factor and a 20 percent engineering cost. Actual engineering costs may be higher or lower depending on the scope of services performed.

Table 4B.15 presents the opinion of probable construction, engineering, and legal/administrative costs for Alternative T-3.

Table 4B.15 - Opinion Of Probable Cost
City of Hardin
Alternative T-3: New ICEAS SBR

#	BID ITEM	QTY	UNITS	UNIT PRICE	TOTAL
1	Process Controls, SCADA, and Electrical	1	LS	$275,000.00	$275,000.00
2	Mechanical and HVAC	1	LS	$180,000.00	$180,000.00
3	Sitework	1	LS	$360,000.00	$360,000.00
4	Flow Splitter Box	1	LS	$30,000.00	$30,000.00
5	Convert Existing Oxidation Ditch to Surge Flow Equalization	1	LS	$150,000.00	$150,000.00
6	New ICEAS SBR Equipment	1	LS	$715,000.00	$715,000.00
7	New ICEAS SBR Tank (Cast-in-place concrete)	1,220	CY	$750.00	$915,000.00
8	Stairs, Railings, and Walkways	1	LS	$370,000.00	$370,000.00
9	Foam Mitigation System	1	LS	$210,000.00	$210,000.00
10	Decanter System Insulated Dome Cover	1	EA	$85,000.00	$85,000.00
11	Backup Aerobic Digestion Blower	1	EA	$45,000.00	$45,000.00
12	Aerobic Digestion Blower Building Expansion	1	LS	$80,000.00	$80,000.00
13	New Aerobic Digestion Equipment	2	EA	$30,000.00	$60,000.00
14	Convert Existing Clarifier to Redundant Aerobic Digester	1	LS	$100,000.00	$100,000.00
15	Convert Existing Clarifier to Post Equalization Tank	1	LS	$100,000.00	$100,000.00
16	Post Equalization Tank Insulated Dome Cover	1	EA	$85,000.00	$85,000.00
17	New Water Well	1	LS	$35,000.00	$35,000.00
18	Yard Piping, Fittings, and Valves	1	LS	$250,000.00	$250,000.00
19	Septage Receiving Station w/ Lift to Headworks	1	LS	$250,000.00	$250,000.00
Subtotal					**$4,295,000.00**
Mobilization				10%	$429,500.00
Contingency				10%	$429,500.00
Construction Subtotal					**$5,154,000.00**

Inflation to 2023			4%	$206,200.00
Erosion Control	1	LS	$5,000.00	$5,000.00
Review Fees and Permits	1	LS	$20,000.00	$20,000.00
Geotechnical Investigation	1	LS	$8,000.00	$8,000.00
Engineering (Design, Bidding Services, and Construction Administration)			20%	$1,030,800.00
Legal & Administrative			5%	$257,700.00
Project Total				**$6,681,700.00**

Present Worth Cost Estimates

A present worth analysis that includes the capital, annual, and facility replacement costs was also prepared for each alternative. This computation, commonly referred to as a life cycle analysis, equalizes the O&M costs of the alternatives and then adds them to the capital cost. The result is the total present worth cost. The present worth of the operating costs was computed for twenty-years (2020-2040) using factors developed on the current real discount rate of 1.5 percent published by the United States Office of Management and Budget (OMB). The facility salvage value was determined by classifying the design life of various assets as appropriate. The salvage value at the twenty-year point was then discounted to present value using a present worth factor based on the current OMB discount rate.

Table 4B.16 presents the capital, annual, and present worth costs for the implementation of Alternative T-3.

Table 4B.16 Present Worth Costs Alternative T-3	
Capital	$6,681,700
Annual O&M	$17,000
PW Salvage	$587,813
PW O&M	$291,867
Present Worth	$6,977,646

4B.4 Disposal Alternatives

One disposal alternative was carried forward from the screening process presented in Section 4A due to the lack of feasibility of total retention and spray irrigation alternatives:

- D-0: No Action

4B.4.1 Alternative D-0: No Action

The No Action alternative continues discharge of treated effluent to the Bighorn River through existing Outfall 001. Therefore, operational and energy requirements, regulatory compliance and permits, land requirements, constructability, capital cost estimates, and present worth cost estimates are not applicable to this alternative. Environmental concerns were considered as previously discussed in this PER.

5.0 SELECTION OF ALTERNATIVES

Each of the collection system, headworks, treatment, and disposal alternatives was designed to meet the applicable design criteria and regulations. This section will examine advantages and disadvantages of each in terms of technical feasibility, environmental impacts, financial feasibility, public health and safety, O&M considerations, and public comment. As previously discussed, there are a variety of collection system, headworks, treatment, and disposal alternatives that can be selected for implementation.

5.1 Ranking Criteria

The following scoring process assigns each alternative a score ranging from 0 to 10 for each of the six criteria identified above. Scoring is subjective and is made based on the Engineer's experience. A zero will represent the most negative impact of the alternatives considered and a score of ten will be assigned to alternatives having the highest relative benefit of the alternatives considered. A score of five is neutral or neither better nor worse than the other alternatives. Alternatives are assigned an initial score of five to begin the scoring process. The six criteria have been weighted to differentiate the importance of the criteria relative to the other criteria. Factors such as financial feasibility and public health and safety have been assigned weightings of 10 and 7 respectively to emphasize their importance in the selection process. The other criteria have been (subjectively) assigned lower weightings based on experience and discussing public works projects with a variety of communities and agency regulatory personnel.

5.1.1 Technical Feasibility

Alternatives that were not technically feasible were removed from consideration during the analysis phase. This ranking category will include remaining technical issues. This criterion will be provided with a weighting factor of **5**.

5.1.2 Environmental Impacts

Considerations for items such as stormwater runoff and impacts to groundwater from construction will need to be considered. However, long-term detrimental environmental impacts are relatively low for all the alternatives. This criterion will be provided with a weighting factor of **3**.

5.1.3 Financial Feasibility

The cost of capital improvements is a great concern to communities with limited budgets and resources. Although a community may be successful in obtaining one-time infrastructure grants, the ongoing O&M costs and impacts on user rates can be significant. As a result, a life cycle cost analysis is presented for each alternative. The life cycle costs include both the estimated capital cost of the alternatives and the associated incremental (in addition to current costs) increase in O&M costs.

A life cycle (present worth) analysis is a financial comparison based on the present-day value of construction, annual, and salvage value costs. The life cycle cost analysis used in this report follow the requirements of the Montana Uniform PER Instructions Part 5a (1)-(10). The criteria include a term of 20 years, real discount rate of 1.5 percent as specified by the OMB website. Other calculation procedures were followed as specified.

This criterion will be provided with the maximum weighting factor of **10** because the public is most concerned with project costs and the corresponding effect on user rates.

5.1.4 Public Health and Safety

All of the alternatives examined in this chapter are designed to meet public health and safety laws, so the scoring for each alternative under this criterion would be expected to be fairly high. This criterion will be provided with a weighting factor of **7**.

5.1.5 Operational and Maintenance Considerations

O&M is an important issue when considering any large capital improvements. The costs for O&M associated with the alternatives is included in the 20-year life cycle costs compared under the financial feasibility, but there are other considerations that should be weighed for the O&M associated with each alternative. The City has limited resources and manpower, and a familiarity with specific collection, headworks, treatment, and disposal types. Therefore, careful consideration must be given in cases where significant impacts on operator responsibilities and resources would result. This criterion will be provided with a weighting factor of **4**.

5.1.6 Public Comments

Efforts such as public hearings are ways to identify public opinions and perceptions. Costs are always a concern with consumers along with the health and safety of their families. This criterion will be provided with a weighting factor of **5**.

5.2 Scoring of Collection System Alternatives

The three wastewater collection system alternatives that will be scored in this section are listed below.

- Alternative CS-1: Dig and Replace Sewer Mains and Manholes
- Alternative CS-2: Combination Dig and Replace/CIPP Rehab Sewer Mains – Dig and Replace Manholes
- Alternative CS-3: CIPP Rehab of Sewer Mains – Dig and Replace Manholes

5.2.1 Technical Feasibility

CS-1: No technical feasibility issues are anticipated for the dig and replace alternative. Therefore, this alternative receives a score of **10**.

CS-2: The combination dig and replace/cured in-place pipe (CIPP) rehab alternative could have technical feasibility issues due to unforeseen deterioration within the pipe segments where CIPP rehabilitation is planned. Therefore, this Alternative receives a score of **7**.

CS-3: The complete rehabilitation with cured in-place pipe (CIPP) alternative allows for rehab of the deteriorated sewer mains with less excavation than the other alternatives. However, the extreme deterioration, pipe offsets, and failed gaskets observed during video inspection of the targeted mains could present problems with installation of the liner material. Offsets and gasket failures would likely need to be repaired by dig and replace methods prior to liner installation. Therefore, this alternative receives a score of **5**.

5.2.2 Environmental Impacts

CS-1: The construction of this alternative will cause a moderate but temporary amount of disturbance such as dust and noise. Therefore, this alternative shall receive a score of **5**.

CS-2: The construction of this alternative will cause less disturbance due to less open-trench excavation. Therefore, temporary dust and noise pollution will more than Alternative CS-3 and less than Alternative CS-1. This alternative shall receive a score of **7**.

CS-3: The construction of this alternative will cause the least amount of temporary disturbance such as dust and noise. Therefore, this alternative shall receive a score of **10**.

5.2.3 Financial Feasibility

Table 5.1 presents the life cycle costs associated with each collection system alternative.

Table 5.1 Collection System Alternatives Life Cycle Cost Analysis			
ITEM	**ALTERNATIVE CS-1 Dig and Replace Sewer Mains and Manholes**	**ALTERNATIVE CS-2 Combo Dig and Replace/CIPP Rehab**	**ALTERNATIVE CS-3 CIPP Rehab of Sewer Mains – Dig & Replace Manholes**
Capital Costs	$933,040	$910,110	$908,050
Annual Incremental O&M Costs	$0.00	$0.00	$0.00
20-Year Salvage Value	$153,492	$155,100	$161,867
Present Worth of Salvage Value	$113,968	$115,162	$120,186
Present Worth of O&M Cost	$0.00	$0.00	$0.00
Present Worth Cost[1,2]	$1,047,008	$1,025,272	$1,028,236

[1] *Present worth O&M based upon a 20-year term using a 1.5 percent discount rate and the corresponding uniform series present worth factor.*

[2] *Present worth salvage based upon a 20-year straight line depreciation using a 1.5 percent discount rate and the corresponding single payment present worth factor.*

CS-1: The Dig and Replace Sewer Mains and Manholes Alternative is the most expensive scenario of the collection system alternatives. This Alternative is scored a **5**.

CS-2: The Combo Dig and Replace/CIPP Rehab Alternative is the second most expensive scenario of the collection system alternatives. This Alternative is scored a **7**.

CS-3: The CIPP Rehab of Sewer Mains – Dig and Replace Manholes Alternative is the least expensive scenario of the collection system alternatives. This Alternative is scored a **10**.

5.2.4 Public Health and Safety

Once construction is completed, all three collection system alternatives increase (and help to continue to ensure) public health and safety by decreasing I&I; thus, improving treatment and the quality of effluent discharged to the Bighorn River. Thus, all three alternatives are scored at **10**.

5.2.5 Operational and Maintenance Considerations

The costs for O&M associated with the various alternatives were included in the 20-year life cycle costs considered under financial feasibility, but O&M considerations must go beyond cost.

The City has adequate manpower to operate and maintain all three collection system alternatives. The anticipated O&M cost increase is equal for all three alternatives. However, Alternatives CS-1 and CS-2 allow for improved maintenance access due to the re-route of the 10th Street trunk main around the drainage ditch that the current alignment runs under. Therefore, Alternatives CS-1 and CS-2 receive a score of **10**. Alternative CS-3 receives a score of **5**.

5.2.6 Public Comments

Based on the public's comments from public meetings, the alternatives were ranked as shown in ***Table 5.2***.

Table 5.2
Public Comments Ranking

	ALTERNATIVE	SCORE	COMMENTS
CS-1	Dig and Replace Sewer Mains and Manholes	10	Community values re-routing the 10th Street main around the drainage ditch. The community also prefers to start with new mains and manholes.
CS-2	Combo Dig and Replace/ CIPP Rehab	7	Community values re-routing the 10th Street main around the drainage ditch.
CS-3	CIPP Rehab of Sewer Mains – Dig & Replace Manholes	5	

5.3 Scoring of Headworks, Backup Generator, and Backup Disinfection Alternatives

The two headworks alternatives that will be scored in this section are listed below.

Alternative HGD-1: Single Mechanical Headworks w/ Manual Bar Rack in Bypass Channel, Backup Generator, and Backup Disinfection

Alternative HGD-2: Dual Mechanical Headworks, Backup Generator, and Backup Disinfection

5.3.1 Technical Feasibility

Alternatives HGD-1 and HGD-2 are equally feasible technically. Therefore, both alternatives receive scores of **5**.

5.3.2 Environmental Impacts

HGD-1: The construction of this alternative will cause a moderate but temporary amount of disturbance such as dust and noise. All of the disturbance will occur inside the building envelope of the existing treatment facilities. As with the other headworks alternative, this scenario upgrades the screening process while providing grit and grease removal. However, unlike Alternative HGD-2, this alternative does not

provide equal redundant headworks facilities. During maintenance of the mechanical headworks in Alternative HGD-1, a temporary reduction in screening, grit removal, and grease removal would occur. Large items would be caught on a manual bar rack in the bypass channel. This could cause lower quality effluent than the other alternative during maintenance procedures. Therefore, this alternative shall receive a score of **5**.

HGD-2: The construction of this alternative will cause a moderate but temporary amount of disturbance such as dust and noise. All of the disturbance will occur inside the building envelope of the existing treatment facilities. Alternative HGD-2 provides mechanical screening, grit removal, and grease removal on both the primary and the bypass flow channels. Therefore, unlike Alternative HGD-1, this alternative would not cause a temporary reduction of headworks functions during maintenance procedures. Alternative HGD-2 is scored at **10**.

5.3.3 Financial Feasibility

Table 5.3 presents the life cycle costs associated with each headworks alternative.

Table 5.3
Headworks, Backup Generator, and Backup Disinfection Alternatives

ITEM	ALTERNATIVE HGD-1 Single Mechanical Headworks w/ Manual Bar Rack in Bypass Channel	ALTERNATIVE HGD-2 Dual Mechanical Headworks
Capital Costs	$3,649,700	$4,379,200
Annual Incremental O&M Costs	$15,071	$18,321
20-Year Salvage Value	$288,333	$280,000
Present Worth of Salvage Value	$214,088	$207,900
Present Worth of O&M Cost	$258,736	$314,534
Present Worth Cost[1,2]	$3,605,052	$4,272,566

[1] *Present worth O&M based upon a 20-year term using a 1.5 percent discount rate and the corresponding uniform series present worth factor.*

[2] *Present worth salvage based upon a 20-year straight line depreciation using a 1.5 percent discount rate and the corresponding single payment present worth factor.*

HGD-1: The Single Mechanical Headworks with Manual Bar Rack in Bypass Channel alternative is the least expensive scenario of the headworks alternatives. This Alternative is scored a **10**.

HGD-2: The Dual Mechanical Headworks alternative is the most expensive scenario of the headworks alternatives. This Alternative is scored a **5**.

5.3.4 Public Health and Safety

HGD-1: As with the other headworks alternative, this scenario upgrades the screening process while providing grit and grease removal. However, unlike Alternative HGD-2, this alternative does not provide equal redundant headworks facilities. During maintenance of the mechanical headworks in Alternative HGD-1, a temporary reduction in screening, grit removal, and grease removal would occur. Large items would be caught on a manual bar rack in the bypass channel. This could cause lower quality effluent than the other alternative during maintenance procedures. Therefore, this alternative shall receive a score of **5**.

HGD-2: Alternative HGD-2 provides mechanical screening, grit removal, and grease removal on both the primary and the bypass flow channels. Therefore, unlike Alternative HGD-1, this alternative would not cause a temporary reduction of headworks functions during maintenance procedures. Alternative HGD-2 is scored at **10**.

5.3.5 Operational and Maintenance Considerations

Although O&M for both headworks alternatives will be close to equal under normal operation due to only one unit being online at a time, it is likely that Alternative HGD-2 will have a slightly higher maintenance cost than Alternative HGD-1. The increased O&M cost of Alternative HGD-2 would likely be due to standard service of the equipment. Therefore, Alternative HGD-1 receives a score of **7** while Alternative HGD-2 receives a score of **5**.

5.3.6 Public Comments

The City Council facilitated a public meeting (***Appendix O***) that presented the alternatives and costs. Based on the public's comments from the meeting, the alternatives were ranked as shown in ***Table 5.4***.

Table 5.4
Public Comments Ranking

	ALTERNATIVE	SCORE	COMMENTS
HGD-1	Single Mechanical Headworks w/ Manual Bar Rack on Bypass Channel	10	Community wants to minimize expenditures.
HGD-2	Dual Mechanical Headworks	5	

5.4 Scoring of Treatment System Alternatives

The three wastewater treatment alternatives that will be scored in this section are listed below.

- Alternative T-1: Various Sub-System Upgrades
- Alternative T-2 New Oxidation Ditch
- Alternative T-3: New ICEAS SBR

5.4.1 Technical Feasibility

All of the following treatment alternatives are technically feasible from an engineering standpoint. However, there are differences in practical feasibility that must be considered.

T-1: The modernization and upgrades of the various sub-systems within the existing system are less technically feasible than the other alternatives. Alternative T-1 requires upgrades of various existing mechanical equipment within existing tanks such as the oxidation ditch, clarifiers, and the sludge digester. This alternative also requires replacement of both the RAS and WAS pumping stations. Also, temporary treatment will likely be required during construction of mechanical equipment upgrades within the existing oxidation ditch. This Alternative therefore receives a score of **5**.

T-2: The New Oxidation Ditch alternative provides redundant biological treatment without the need for temporary treatment during construction. However, this alternative requires technically complex upgrades of the mechanical equipment within the existing clarifiers. Unlike Alternative T-3, the New Oxidation Ditch alternative would require the replacement of the RAS and WAS pumping stations. All factors considered, this Alternative receives a score of **7**.

T-3: The New ICEAS SBR alternative has several technical advantages over the other two treatment alternatives. This system eliminates the need to replace the RAS pumping station as activated sludge return is not necessary for the treatment process. Sludge remains in the combination aeration/anaerobic/anoxic/clarification tank until it is wasted via an integrated WAS pumping system. Therefore, separate upgrade of the existing WAS pumping system is not necessary. Alternative T-3 allows the existing clarifiers to be re-purposed as a redundant aerobic digester and a post-equalization tank respectively due to the built-in clarification process within the ICEAS SBR. This alternative also allows the existing oxidation ditch to be re-purposed as a surge flow equalization tank while still providing two trains of biological treatment for redundancy. Temporary treatment facilities will not be required during construction of Alternative T-3. Due to reduced complexity of the upgrades associated with Alternative T-3 when compared to the other alternatives, this alternative receives a score of **10**.

5.4.2 Environmental Impacts

T-1: The construction of this alternative will cause a moderate but temporary amount of disturbance such as dust and noise. All of the disturbance will occur inside the existing treatment facilities building envelope. As with the other treatment alternatives, this scenario meets current and expected discharge standards. However, unlike Alternatives T-2 and T-3, Alternative T-1 likely requires the utilization of temporary treatment during construction of the upgrades to the existing oxidation ditch. Alternative T-1 is the only alternative that does not provide redundant biological treatment. This could cause lower quality effluent than the other alternatives during the construction process and during maintenance procedures on the oxidation ditch equipment. Therefore, this alternative shall receive a score of **5**.

T-2: The construction of this alternative will cause a moderate but temporary amount of disturbance such as dust and noise. All of the disturbance will occur inside the existing treatment facilities building envelope. As with the other treatment alternatives, this scenario meets current and expected discharge standards. This alternative shall receive a score of **10**.

T-3: The construction of this alternative will cause a moderate but temporary amount of disturbance such as dust and noise. All of the disturbance will occur inside the existing treatment facilities building envelope. As with the other treatment alternatives, this scenario meets current and expected discharge standards. This alternative shall receive a score of **10**.

5.4.3 Financial Feasibility

Table 5.5 presents the life cycle costs associated with each treatment alternative.

Table 5.5 Treatment Alternatives Life Cycle Cost Analysis			
ITEM	**ALTERNATIVE T-1 Various Sub-System Upgrades**	**ALTERNATIVE T-2 New Oxidation Ditch**	**ALTERNATIVE T-3 New ICEAS SBR**
Capital Costs	$8,959,155	$8,711,475	$6,681,700
Annual Incremental O&M Costs	$17,000	$17,000	$17,000
20-Year Salvage Value	$808,750	$847,083	$791,667
Present Worth of Salvage Value	$600,497	$628,959	$587,813
Present Worth of O&M Cost	$291,867	$291,867	$291,867
Present Worth Cost[1,2]	$9,267,785	$9,048,567	$6,977,646

[1] *Present worth O&M based upon a 20-year term using a 1.5 percent discount rate and the corresponding uniform series present worth factor.*

[2] *Present worth salvage based upon a 20-year straight line depreciation using a 1.5 percent discount rate and the corresponding single payment present worth factor.*

T-1: The Various Sub-System Upgrades Alternative is the most expensive scenario of the treatment alternatives. This Alternative is scored a **5**.

T-2: The New Oxidation Ditch Alternative is the second most expensive scenario of the treatment alternatives. This Alternative is scored a **7**.

T-3: The New ICEAS SBR Alternative is the least expensive scenario of the treatment alternatives. This Alternative is scored a **10**.

5.4.4 Public Health and Safety

Once construction is completed, all three treatment alternatives increase (and help to continue to ensure) public health and safety by improving treatment and the quality of effluent discharged to the Bighorn River. However, as stated earlier, Alternative T-1 will likely require the utilization of temporary treatment during construction of the upgrades to the existing oxidation ditch. This is also the only alternative that does not provide redundant biological treatment. Therefore, the opportunity exists for temporary impairment of the treated effluent discharged to the Bighorn River. Thus, Alternative T-1 receives a score of **5** while Alternatives T-2 and T-3 are scored at **10**.

5.4.5 Operational and Maintenance Considerations

The cost for O&M associated with the various alternatives was included in the 20-year life cycle costs considered under financial feasibility, but O&M considerations must go beyond cost. The City has adequate manpower to operate all three treatment alternatives as the proposed treatment processes are similar in complexity to the current treatment process. The O&M cost increase is equal for all three alternatives. Therefore, Alternatives T-1, T-2, and T-3 all receive a score of **5**.

5.4.6 Public Comments

The City Council facilitated a public meeting (***Appendix O***) that presented the alternatives and costs. Based on the public's comments from the meeting, the alternatives were ranked as shown in ***Table 5.6***.

Table 5.6
Public Comments Ranking

	ALTERNATIVE	SCORE	COMMENTS
T-1	Various Sub-System Upgrades	5	
T-2	New Oxidation Ditch	7	
T-3	New ICEAS SBR	10	Community wants to minimize expenditures.

5.5 Scoring of Wastewater Disposal Alternatives

Previous analysis shows that disposal via land application (spray irrigation) is not financially feasible due to the size of the required storage pond and the large number of spray sites (and associated land requirements) located within reasonable distance from the wastewater treatment facility. Upgrades to the existing wastewater treatment process would still need to be conducted to provide the effluent quality required for spray irrigation; thus, compounding costs for this project. Although spray irrigation would eliminate discharge to the Bighorn River (in-turn eliminating current and future discharge permit limits), the upgraded mechanical wastewater treatment facility will be able to meet current and future permit limits for the 20-year design horizon. Therefore, continued discharge of treated effluent to the Bighorn River through the existing outfall makes sense at this time.

- Alternative D-0: No Action

5.5.1 Technical Feasibility

All alternatives are technically feasible from an engineering standpoint.

D-0: The No Action Alternative is technically feasible both from an engineering standpoint and also due to the fact that no land is required. This alternative receives a score of **10**.

5.5.2 Environmental Impacts

D-0: The No Action Alternative continues effluent discharge to the Bighorn River through the existing outfall. However, the treatment system upgrades proposed as part of this project will help to ensure that the discharged effluent meets current and future water quality standards. There are no disturbances due to construction activities for this alternative. This alternative is scored at **5**.

5.5.3 Financial Feasibility

Table 5.7 presents the life cycle cost associated with the no action disposal alternative.

Table 5.7
Disposal Alternatives
Life Cycle Cost Analysis

ITEM	ALTERNATIVE D-0 No Action
Capital Costs	$0.00
Annual Incremental O&M Costs	N/A
20-Year Salvage Value	$0.00
Present Worth of Salvage Value	$0.00
Present Worth of Annual O&M Cost	N/A
Present Worth Cost[1,2]	$0.00

[1] *Present worth O&M based upon a 20-year term using a 1.5 percent discount rate and the corresponding uniform series present worth factor.*

[2] *Present worth salvage based upon a 20-year straight line depreciation using a 1.5 percent discount rate and the corresponding single payment present worth factor.*

D-0: The No Action Alternative incurs no capital costs and minimizes O&M costs which would remain at currently existing values. This alternative is scored at **10**.

5.5.4 Public Health and Safety

D-0: The No Action Alternative continues effluent discharge to the Bighorn River through the existing outfall. However, the treatment system upgrades proposed as part of this project will help to ensure that the discharged effluent meets current and future water quality standards. Thus, there should be no significant impact to public health and safety. This Alternative is scored at **5**.

5.5.5 Operational and Maintenance Considerations

The cost for O&M associated with the various alternatives was included in the life cycle costs considered under financial feasibility, but O&M considerations must go beyond cost. The City has limited manpower and resources; therefore, this must be taken into account when considering the alternatives.

D-0: The No Action Alternative could be viewed as having no O&M. This Alternative is scored a **10**.

5.5.6 Public Comments

The City Council facilitated a public meeting at which the alternatives and costs were presented. Based on the public's comments from the meeting, the alternatives were ranked as shown in ***Table 5.8.***

Table 5.8
Public Comments Ranking

	ALTERNATIVE	SCORE	COMMENTS
D-0	No Action	10	Community wants to minimize project costs.

5.6 Decision Matrix and Selection of Preferred Alternative

Using the criteria, scoring and weighting factors previously described, ***Table 5.9*** was established to provide a comparison of the alternatives.

Table 5.9
Ranking Summary

Alternative	Technical Feasibility		Environmental Impacts		Financial Feasibility		Public Health and Safety		Operation & Maintenance		Public Comment		Total
	Weight: 5		Weight: 3		Weight: 10		Weight: 7		Weight: 4		Weight: 5		
	Score	Wtd.	Score	Wtd.	Score	Wtd.	Score	Wtd.	Score	Wtd.	Score	Wtd.	
CS-1	10	50	5	15	5	50	10	70	10	40	10	50	**275**
CS-2	7	35	7	21	7	70	10	70	10	40	7	35	**271**
CS-3	5	25	10	30	10	100	10	70	5	20	5	25	**270**
HGD-1	5	25	5	15	10	100	5	35	7	28	10	50	**253**
HGD-2	5	25	10	30	5	50	10	70	5	20	5	25	**220**
T-1	5	25	5	15	5	50	5	35	5	20	5	25	**170**
T-2	7	35	10	30	7	70	10	70	5	20	7	35	**260**
T-3	10	50	10	30	10	100	10	70	5	20	10	50	**320**
D-0	10	50	5	15	10	100	5	35	10	40	10	50	**290**

Based on the previous analysis and the results of the scoring, the preferred collection system, headworks, treatment, and disposal project consists of the following components:

- Alternative CS-1: Dig and Replace Sewer Mains and Manholes
- Alternative HGD-1: Single Mechanical Headworks w/ Manual Bar Screen in Bypass Channel, Backup Generator, and Backup Disinfection
- Alternative T-3: New ICEAS SBR
- Alternative D-0: No Action

A detailed analysis of the preferred project is presented in ***Section 6*** of this report.

6.0 DESCRIPTION OF PREFERRED ALTERNATIVE

This section will provide a detailed description of the Preferred Alternative, including site and location characteristics, operational requirements, impacts on existing facilities, design criteria, environmental impacts and mitigation, and a cost summary.

6.1 Site Location and Characteristics

The selected project site is within public right-of-way and the existing City-owned wastewater treatment site. The area is relatively flat with slopes ranging from 1 to 2.5-percent. According to NRCS soils data, the soils are consistent throughout. The work area is within the existing system envelope and is therefore suitable for this project.

6.2 Operational Requirements

The dig and replace collection system alternative, single mechanical headworks, ICEAS SBR treatment, and continued effluent discharge to the Bighorn River have approximately the same operational requirements as the existing wastewater system. Thus, the City can continue to expend the current level of manpower and resources without an immediate increase. In general, cleaning, measuring, and sampling will be similar to current requirements.

Specific duties required to operate the system include the following:

- Daily:
  - Inspect and record UV bulb condition and output. Replace burned out bulbs as required.
  - Inspect the headworks and dispose of screenings, grit, and grease as necessary.
  - Collect, pack, and ship influent and effluent compliance samples as required by EPA and/or the discharge permit.
  - Waste sludge to drying beds as necessary.
- Weekly:
  - Log and analyze the influent and effluent flow stations.
  - Log and record local precipitation and temperature data.
  - Clean UV troughs to remove accumulated biosolids.
  - Clean/calibrate probes.
  - Check oil in aeration blowers.
  - Check aeration blower belts.
  - Grease applicable components.
  - Perform at least weekly visual checks of all system components.
- Monthly
  - Exercise all pumps, valves, gates, and weirs.
  - Prepare and submit discharge monitoring reports to EPA.
- Annually
  - Prepare summary reports.
  - Change aeration blower oil and air filters.
  - Remove and dispose of wasted sludge in drying beds
  - Clean selected collection mains

6.3 Impact on Existing Facilities

The wastewater system upgrade will eliminate deficiencies and compliance issues in-turn provide a cleaner, highly treated, and disinfected effluent for discharge. The upgrades will also allow the operator to better monitor and control the process while enhancing process efficiency and operator safety.

6.4 Design Criteria

6.4.1 Standards

The proposed project will have to comply with standards in Circular DEQ-2. The applicable Chapters in DEQ-2 are:

- Chapter 10: Engineering Reports and Facility Plans
- Chapter 20: Engineering Plans and Specifications
- Chapter 30: Design of Sewers
- Chapter 40: Wastewater Pumping Stations
- Chapter 50: Wastewater Treatment Facilities
- Chapter 60: Screening, Grit Removal, and Flow Equalization
- Chapter 70: Settling
- Chapter 80: Sludge Processing, Storage, and Disposal
- Chapter 90: Biological Treatment
- Chapter 100: Disinfection

6.4.2 Influent Design Basis

The entire system shall be designed for the 20-year (2020-2040) average day design flow of 486,800 gpd resulting in a peak day design flow of 973,600 gpd (from a peaking factor of 2.0). Please refer to Section 4 of this report for overall system design criteria.

6.4.3 Summary of Major Equipment & Processes

Name: Single Mechanical Headworks w/ Manual Bar Rack on Bypass Channel
Type: Mechanical fine screen (1/4" openings), grit removal, and grease removal
Capacity: 66,733 GPH (1,113 GPM)

Name: Surge Flow Equalization Tank (Converted Existing Oxidation Ditch)
Capacity: 1.2 MGD (Volume of Existing Oxidation Ditch)

Name: ICEAS SBR
Capacity: 973,600 GPD

Name:	Backup Disinfection System
Type:	UV light, open channel
Capacity:	973,600 GPD
Rating:	Proprietary

6.4.4 Wastewater System Description

Layouts of the preferred alternative are shown in ***Figures 6.1 and 6.2***.

Collection System

The preferred collection system alternative will replace approximately 2,675 feet of RCP sewer main and 17 manholes via open-trench excavation. These appurtenances were identified as significant contributors of I&I in the recent study conducted by the City.

Headworks

The preferred headworks alternative will replace the existing headworks structure and grinder/screening system to address all identified deficiencies and MDEQ/EPA requirements. This includes a new headworks building along with screening, grit removal, and grease removal (likely in a pre-packaged system) on the primary flow channel. A bypass channel with a manual bar screen is included in this alternative to allow for periodic maintenance of the mechanical headworks system. The preferred alternative also includes construction of a wash water return system which utilizes treated effluent for the headworks spray system.

Treatment

The preferred treatment alternative will address the deficiencies of the existing wastewater plant by adding a new Intermittent Cycle Extended Aeration System (ICEAS) continuous flow SBR along with other appurtenances described below.

In the preferred treatment alternative, a flow splitter box is installed post-headworks as previously described in Section 4B.2.1 above. A new ICEAS SBR is constructed after the flow splitter box. The existing oxidation ditch is converted to a surge flow equalization tank. The converted oxidation ditch includes upgraded mixing and aeration equipment along with a pumping system to dose flow to the new ICEAS SBR. Under normal operation, the splitter box diverts flow to the flow equalization tank. However, the second channel in the splitter box allows flow to be diverted directly to the ICEAS SBR to allow for maintenance activities in the equalization tank. Two new aeration blowers are installed in the expanded blower building mentioned earlier in Section 4B.2.1 to serve the equalization tank and the ICEAS SBR. A foam mitigation system is installed on the ICEAS SBR.

The ICEAS SBR eliminates the need to upgrade the equipment in the existing clarifiers as clarification is provided in the SBR tanks. Motor-driven decanters are included at the end of the

treatment/clarification trains in the ICEAS package. An insulated dome cover is installed over the ICEAS decanters as part of this alternative to prevent freezing issues in the winter months. The incorporated clarification provided by the ICEAS package allows the two existing clarifiers to be repurposed to a redundant digester and a post-equalization tank respectively. Also, the upgraded WAS pumping system mentioned in the other alternatives is supplied as part of the ICEAS package and installed within the ICEAS tankage; thus, eliminating the need for separate replacement of the existing WAS pumping station. The need to replace the existing RAS pumping station is completely eliminated as the ICEAS SBR does not require activated sludge return pumping as part of the treatment process.

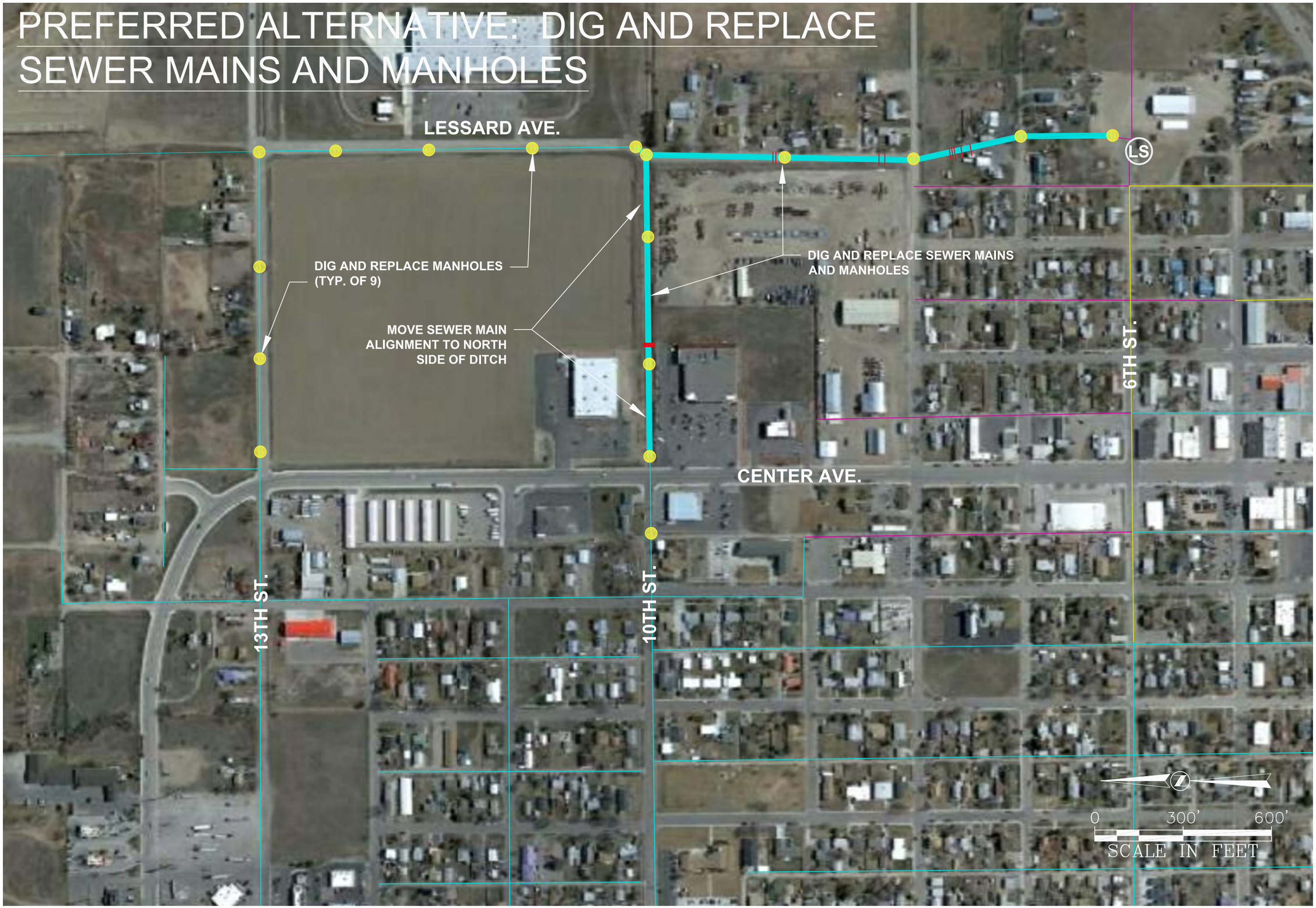
Following the ICEAS SBR, the equipment within the existing clarifier tanks is removed. As mentioned above, one clarifier is converted to a second aerobic digester and the equipment in the existing aerobic digester is replaced. The other clarifier is converted to a post-equalization tank to dose effluent flows received from the new ICEAS SBR. This involves installation of a pumping system for the post-equalization tank. An insulated dome cover is installed over the post-equalization tank to prevent freezing in the winter months. A redundant aerobic digestion blower is installed in an expanded blower building as described earlier in Section 4B.2.1.

Comprehensive plant controls, flow monitoring, and SCADA appurtenances are installed/replaced as part of this alternative. The ICEAS SBR package includes a proprietary control system. Incorporated as parts of this package are oxidation reduction potential ORP probes, DO probes, pH probes, and temperature probes along with associated integration and monitoring. Flow monitoring upgrades include replacement and integration of influent and effluent flow meters along with installation and integration of flow meters on the WAS lines. Finally, an overall SCADA system is installed incorporating all systems within the treatment process.

In addition to the items listed above, the following upgrades are also included in the preferred alternative:

a) Construction of a new plant water well.
b) Construction of a septage receiving station.
c) Installation of a backup power generator.
d) Construction of a backup UV disinfection system.
e) Construction of an administration building addition to house dedicated lab space and the UV disinfection systems.

PREFERRED ALTERNATIVE: DIG AND REPLACE SEWER MAINS AND MANHOLES



STAHLY ENGINEERING & ASSOCIATES
PROFESSIONAL ENGINEERS & SURVEYORS
www.seaeng.com

2223 MONTANA AVE.
STE. 201
BILLINGS, MT 59101
Phone: (406)601-4055
Fax: (406)601-4062

3530 CENTENNIAL DR.
HELENA, MT 59601
Phone: (406)442-8594
Fax: (406)442-8557

851 BRIDGER DR. STE. 1
BOZEMAN, MT 59715
Phone: (406)522-9526
Fax: (406)522-9528

ISSUE/REVISION

No.	DATE	BY
1	####	####
DESCRIPTION		
####		

No.	DATE	BY
2		
DESCRIPTION		

No.	DATE	BY
3		
DESCRIPTION		

No.	DATE	BY
4		
DESCRIPTION		

No.	DATE	BY
5		
DESCRIPTION		

PRELIMINARY
NOT FOR CONSTRUCTION

PREFERRED ALTERNATIVE CS-1

WASTEWATER UPGRADES PER UPDATE

CITY OF HARDIN, MONTANA

DESIGNED: SJS, GMS
DRAWN: SJS, GMS
CHECKED:
DATE: 07-15-2019

FIGURE
6.1

Stahly Engineering & Associates, Inc. COPYRIGHT 2015
L:\2223-City of Hardin\-2019 WW PER Update for RD\DWG\Plan Sets\PER Exhibits\Figures 4.1-4.3 - Collection Alts Layouts.dwg, Figure 6.1, Plotted: Aug 30, 2019 - 10:04am, gsteckler

PREFERRED ALTERNATIVE: SINGLE MECHANICAL HEADWORKS AND ICEAS SBR

SITE INFORMATION

1. ABANDON EXISTING HEADWORKS
2. NEW HEADWORKS STRUCTURE AND EQUIPMENT (SCREEN, GRIT REMOVAL, GREASE REMOVAL)
3. NEW FLOW SPLITTER BOX
4. CONVERT EXISTING OXIDATION DITCH TO SURGE FLOW EQUALIZATION TANK (INSTALL TANK COVER AND EQUALIZATION PUMPS)
5. NEW INTERMITTENT CYCLE EXTENDED AERATION SYSTEM (ICEAS) SEQUENCING BATCH REACTOR (SBR)
6. NEW AEROBIC SLUDGE DIGESTER
7. CONVERT EXISTING CLARIFIER TO SECOND AEROBIC DIGESTER
8. CONVERT EXISTING CLARIFIER TO POST-EQUALIZATION TANK WITH INSULATED DOME COVER
9. BLOWER BUILDING EXPANSION W/ NEW BACKUP DIGESTER BLOWER AND NEW ICEAS AERATION BLOWERS
10. BUILDING EXPANSION TO ADD LABORATORY SPACE AND HOUSE UV DISINFECTION (NEW BACKUP UV DISINFECTION)
11. NEW EMERGENCY GENERATOR
12. NEW SEPTAGE RECEIVING STATION
13. NEW WATER SUPPLY WELL
14. EXISTING TREATED EFFLUENT DISCHARGE OUTFALL (TO REMAIN)
15. EXISTING SLUDGE DRYING BED (TO REMAIN)
16. ABANDON EXISTING RETURN ACTIVATED SLUDGE PUMPS (NOT NEEDED FOR ICEAS SBR)
17. REPLACE EXISTING AEROBIC DIGESTER MECHANICAL EQUIPMENT
18. NEW PROCESS CONTROLS AND SCADA
19. ABANDON EXISTING WASTE ACTIVATED SLUDGE PUMPS (INCLUDED IN ICEAS PACKAGE)

STAHLY ENGINEERING & ASSOCIATES
PROFESSIONAL ENGINEERS & SURVEYORS
www.seaeng.com

2223 MONTANA AVE.
STE. 201
BILLINGS, MT 59101
Phone: (406)601-4055
Fax: (406)601-4062

3530 CENTENNIAL DR.
HELENA, MT 59601
Phone: (406)442-8594
Fax: (406)442-8557

851 BRIDGER DR. STE. 1
BOZEMAN, MT 59715
Phone: (406)522-9526
Fax: (406)522-9528

ISSUE/REVISION

No.	DATE	BY
1	####	####
DESCRIPTION		
####		

No.	DATE	BY
2		
DESCRIPTION		

No.	DATE	BY
3		
DESCRIPTION		

No.	DATE	BY
4		
DESCRIPTION		

No.	DATE	BY
5		
DESCRIPTION		

PRELIMINARY
NOT FOR CONSTRUCTION

PREFERRED ALTERNATIVES HGD-1 AND T-3

WASTEWATER UPGRADES PER UPDATE

CITY OF HARDIN, MONTANA

DESIGNED: GMS
DRAWN: GMS
CHECKED:
DATE: 07-15-2019

FIGURE
6.2

Stahly Engineering & Associates, Inc. COPYRIGHT 2015
L:\2223-City of Hardin\-2019 WW PER Update for RD\DWG\Plan Sets\PER Exhibits\Figure 6.1 - Preferred Alternative Layout.dwg, Figure 6.2, Plotted: Aug 30, 2019 - 9:39am, gsteckler

6.5 Environmental Impacts and Mitigation

General Requirements

A moderate amount of City-owned land and public right-of-way will be disturbed as a result of the proposed wastewater upgrades. There will be some open-trench digging within the existing system envelope to install piping and appurtenances. All of this work will be accomplished in previously disturbed areas. There will be no changes in land use associated with the proposed project.

Some air quality problems with dust may arise during the actual construction period because of earthwork involved and that this work is typically performed during the hot dry times of year. However, impacts would be temporary and the contract documents would require that the contractor provide dust control. Similarly, there will be some temporary noise during construction. Once construction is complete, there will be no noise or dust problems arising as a result of the improvements. The contract documents shall also require that BMP's be employed before, during, and after construction until all areas of disturbance have been fully re-vegetated. For these reasons, environmental impacts are considered minimal and no permanent, negative environmental impacts are anticipated.

All improvements will be designed in accordance with Circular DEQ-2. Plans would need to be reviewed and approved by the MDEQ before bidding and construction could begin. Since more than one acre of land will be disturbed during construction, storm water discharge permits are also necessary. The construction contractor will be responsible for obtaining these permits and any additional permits including but not limited to building, electrical, plumbing, road encroachment, and any necessary easements for sewers.

Agency Reviews

Various state and federal agencies have been sent copies of vicinity maps, site maps, and wetlands maps along with a project description for review and comment. These agencies include the following:

- Montana Department of Environmental Quality
  - Will comment on plans and specifications but not at this stage of the project.
- Montana Department of Fish, Wildlife and Parks
  - Responded with an indication of no comment.
- Montana Department of Natural Resources and Conservation
  - Responded with an indication of no comment.
- Montana State Historic Preservation Office
  - Any structure over 50-years old would likely be considered historic.
  - No know structures over 50-years old exist at the proposed site.
- Tribal Historic Preservation Office (Crow Tribe)
  - No response or comments received to-date.
- United States Army Corps of Engineers

  - Identified requirements for placing fill in state waters and identified the need for a Department of the Army (DA) Permit application.
  - This project does not place fill in wetlands or the river channel.
- United States Fish and Wildlife Service
  - Do not expect adverse impacts to threatened, endangered, or candidate species.
  - Watch for nesting sites for Bald Eagles, Golden Eagles, and Migratory Birds and provide buffers as required.
- Montana Heritage Program
  - Species of concern are listed in Section 1.2.9 of this PER.

Copies of all correspondence with these agencies are included in the ***Appendix B***. Based on comments provided by these agencies, it appears that there are no significant environmental, technical, or other concerns which could delay or prevent the proposed improvements from being carried out. An environmental checklist incorporating the agency comments and agency response letters is included in ***Appendix C***.

6.6 Cost Summary

6.6.1 Opinions of Probable Cost

Tables 6.1, 6.2, 6.3, and 6.4 provide opinions of probable cost and a present worth analysis for the proposed project which includes Collection System Alternative CS-1, Headworks Alternative HGD-1, Treatment Alternative T-3, and Discharge Alternative D-0 utilizing a 20-year (2020-2040) average day design flow of 486,800 gpd resulting in a peak day design flow of 973,600 gpd. ***Table 6.5*** provides the estimated project short-lived asset costs. ***Table 6.6*** provides the estimated project incremental O&M cost increase.

Table 6.1 - Opinion Of Probable Cost
City of Hardin
Alternative CS-1: Dig and Replace Sewer Mains and Manholes

#	BID ITEM	QTY	UNITS	UNIT PRICE	TOTAL
1	Bypass Pumping	1	LS	$60,000.00	$60,000.00
2	Trench Dewatering	1	LS	$90,000.00	$90,000.00
3	18" PS46 ASTM F679 PVC Sewer Main	1,650	LF	$90.00	$148,500.00
4	15" PS46 ASTM F679 PVC Sewer Main	1,025	LF	$85.00	$87,125.00
5	Basic 48" Sanitary Sewer Manhole	17	EA	$3,750.00	$63,750.00
6	Additional Sanitary Sewer Manhole Depth	195	VF	$250.00	$48,750.00
7	Asphalt Restoration	315	SY	$50.00	$15,750.00
8	Concrete Curb and Gutter Restoration	120	LF	$30.00	$3,600.00
9	Gravel Restoration	3,720	SY	$25.00	$93,000.00
Subtotal					**$610,475.00**
Mobilization				10%	$61,048.00
Contingency				10%	$61,048.00
Construction Subtotal					**$732,571.00**
Inflation to 2020				1%	$7,325.00
Erosion Control		1	LS	$5,000.00	$5,000.00
Review Fees and Permits		1	LS	$2,000.00	$2,000.00
Geotechnical Investigation		1	LS	$3,000.00	$3,000.00
Engineering (Design, Bidding Services, and Construction Administration)				20%	$146,514.00
Legal & Administrative				5%	$36,630.00
Project Total					**$933,040.00**

Table 6.2 - Opinion Of Probable Cost
City of Hardin
Alternative HGD-1: Single Mechanical Headworks, Generator, and Backup Disinfection

#	BID ITEM	QTY	UNITS	UNIT PRICE	TOTAL
1	Process Controls, Flow Monitoring, SCADA, and Electrical	1	LS	$175,000.00	$175,000.00
2	Mechanical and HVAC	1	LS	$350,000.00	$350,000.00
3	Sitework	1	LS	$90,000.00	$90,000.00
4	Headworks Building (30' x 50')	1	LS	$300,000.00	$300,000.00
5	Packaged Headworks (Screening, grit removal, and grease removal)	1	EA	$500,000.00	$500,000.00
6	Bypass Channel w/ Bar Screen	1	LS	$25,000.00	$25,000.00
7	Wash Water Return System (recycled treated effluent)	1	LS	$75,000.00	$75,000.00
8	Emergency Generator & Transfer Gear	1	EA	$200,000.00	$200,000.00
9	Backup UV Disinfection	1	LS	$200,000.00	$200,000.00
10	UV Disinfection and Administrative Building Expansion	1	LS	$400,000.00	$400,000.00
11	Yard Piping, Fittings, and Valves	1	LS	$50,000.00	$50,000.00
Subtotal					**$2,365,000.00**
Mobilization				10%	$236,500.00
Contingency				10%	$236,500.00
Construction Subtotal					**$2,838,000.00**
Inflation to 2022				3%	$85,200.00
Erosion Control		1	LS	$5,000.00	$5,000.00
Review Fees and Permits		1	LS	$7,000.00	$7,000.00
Geotechnical Investigation		1	LS	$5,000.00	$5,000.00
Engineering (Design, Bidding Services, and Construction Administration)				20%	$567,600.00
Legal & Administrative				5%	$141,900.00
Project Total					**$3,649,700.00**

Table 6.3 - Opinion Of Probable Cost
City of Hardin
Alternative T-3: New ICEAS SBR

#	BID ITEM	QTY	UNITS	UNIT PRICE	TOTAL
1	Process Controls, SCADA, and Electrical	1	LS	$275,000.00	$275,000.00
2	Mechanical and HVAC	1	LS	$180,000.00	$180,000.00
3	Sitework	1	LS	$360,000.00	$360,000.00
4	Flow Splitter Box	1	LS	$30,000.00	$30,000.00
5	Convert Existing Oxidation Ditch to Surge Flow Equalization	1	LS	$150,000.00	$150,000.00
6	New ICEAS SBR Equipment	1	LS	$715,000.00	$715,000.00
7	New ICEAS SBR Tank (Cast-in-place concrete)	1,220	CY	$750.00	$915,000.00
8	Stairs, Railings, and Walkways	1	LS	$370,000.00	$370,000.00
9	Foam Mitigation System	1	LS	$210,000.00	$210,000.00
10	Decanter System Insulated Dome Cover	1	EA	$85,000.00	$85,000.00
11	Backup Aerobic Digestion Blower	1	EA	$45,000.00	$45,000.00
12	Aerobic Digestion Blower Building Expansion	1	LS	$80,000.00	$80,000.00
13	New Aerobic Digestion Equipment	2	EA	$30,000.00	$60,000.00
14	Convert Existing Clarifier to Redundant Aerobic Digester	1	LS	$100,000.00	$100,000.00
15	Convert Existing Clarifier to Post Equalization Tank	1	LS	$100,000.00	$100,000.00
16	Post Equalization Tank Insulated Dome Cover	1	EA	$85,000.00	$85,000.00
17	New Water Well	1	LS	$35,000.00	$35,000.00
18	Yard Piping, Fittings, and Valves	1	LS	$250,000.00	$250,000.00
19	Septage Receiving Station w/ Lift to Headworks	1	LS	$250,000.00	$250,000.00
Subtotal					**$4,295,000.00**
Mobilization				10%	$429,500.00
Contingency				10%	$429,500.00
Construction Subtotal					**$5,154,000.00**
Inflation to 2023				4%	$206,200.00
Erosion Control		1	LS	$5,000.00	$5,000.00
Review Fees and Permits		1	LS	$20,000.00	$20,000.00
Geotechnical Investigation		1	LS	$8,000.00	$8,000.00
Engineering (Design, Bidding Services, and Construction Administration)				20%	$1,030,800.00
Legal & Administrative				5%	$257,700.00
Project Total					**$6,681,700.00**

Table 6.4 Present Worth Analysis City of Hardin, Montana Alternatives CS-1, HGD-1, T-3, and D-0	
ITEM	**COST**
Capital Costs	$11,265,000
Annual O&M Costs	$32,070
20-Year Salvage Value	$1,233,492
Present Worth of Salvage Value	$915,869
Present Worth of O&M Cost	$550,603
Present Worth Cost[1]	**$11,629,706**

[1]*Present worth based upon a 20-year life cycle using OMB real discount rate of 1.5% and corresponding uniform series and single payment present worth factors.*

6.6.2 Annual Operating Budget

Income

The income must be increased to cover the additional debt service and the incremental increase in system operation and maintenance. The City currently has 1,286 active sewer connections (85 of which have sump pumps), as presented in earlier sections of the report. Current base rate sewer income averages $47,085 per month resulting from a base monthly cost of $37.34 per connection and a $5.67 per month surcharge for sump pumps. Current expenses are nearly equal to current revenue requiring a significant rate increase to implement this project.

Expenses

Table 6.5 presents the short-lived assets for the preferred alternative.

Table 6.5
Preferred Alternative Short-Lived Assets

Asset Description	Asset Life (Years)	# of Replacements (2-15 Years)	Cost Per Replacement	Total Cost (2-15 Years)
Headworks Building Electrical (Light Bulbs)	1	14	$200	$2,800
Headworks Building HVAC (Pumps/Motors and Solenoids)	5	2	$5,000	$10,000
Mechanical Headworks (Motors, Spray Nozzles, and Bearings)	5	2	$8,000	$16,000
Laboratory Equipment	10	1	$3,000	$3,000
Influent Flow Meter	10	1	$5,000	$5,000
Process Probes	5	2	$24,000	$48,000
Flow Equalization Pumps (2 Units)	5	2	$16,000	$32,000
Blower Building Electrical (Light Bulbs)	1	14	$50	$700
Blower Building HVAC (Pumps/Motors and Solenoids)	5	2	$5,000	$10,000
ICEAS Aeration Blower Filters (2 Units)	1	14	$200	$2,800
ICEAS Aeration Diffuser Heads	10	1	$16,600	$16,600
ICEAS Mixers	5	2	$15,000	$30,000
ICEAS Sludge Wasting Pumps (Submersible)	5	2	$16,000	$32,000
Sludge Wasting Flow Meter	10	1	$5,000	$5,000
ICEAS Clarifier Decanters (Limit Switches and Actuators)	5	2	$3,400	$6,800
Post-equalization Pumps (2 Units)	5	2	$16,000	$32,000
UV Disinfection/Control Building Electrical (Light Bulbs)	1	14	$50	$700
UV Disinfection/Control Building HVAC (Pumps/Motors and Solenoids)	5	2	$5,000	$10,000
Effluent Flow Meter	10	1	$5,000	$5,000
UV Disinfection Bulbs	2	7	$3,000	$21,000
UV Disinfection Quartz Sleeves	10	1	$5,000	$5,000
UV Disinfection Ballasts	10	1	$8,000	$8,000
Aerobic Digestion Blower Filters	1	14	$200	$2,800
Aerobic Digestion Diffusers	10	1	$6,000	$6,000
Wash Water Return Pumps	5	2	$2,000	$4,000
Septage Receiving Station Flow Meter	10	1	$5,000	$5,000
Backup Generator	15	1	$100,000	$100,000
			14-Year Total	**$420,200**
			Annual	**$30,014**

Table 6.6 is an opinion of the proposed incremental O&M cost increase for the City.

Table 6.6 Opinion of Incremental Annual O&M Costs City of Hardin, Montana				
ITEM	**QTY**	**UNITS**	**UNIT PRICE**	**TOTAL**
Personnel				No Change
Administrative				No Change
Insurance				No Change
Power	76,703	KWH	$0.10	$7,670
Generator Fuel	100	Gallons	$4.00	$400
Chemicals				No Change
Lubricants	1	LS	$500.00	$500
Outside Services	1	LS	$11,000.00	$11,000
Waste Disposal	1	LS	$7,500.00	$7,500
Inside Laboratory Services				No Change
Outside Laboratory Services				No Change
Reserves	1	LS	$5,000.00	$5,000
			Total	**$32,070**

The current annual O&M budget for the wastewater system is $589,100. Therefore, the anticipated annual O&M increase of $32,070 for the proposed project would only cause an increase on 5.4% from the existing budget. This would result in an increase of $2.08 per connection due to O&M. The proposed base monthly cost is expected to be between $67 and $74 per service connection depending on the results of grant funding applications. Further breakdown of project costs and rate increases can be found in the following Recommendations and Implementation section of this report.

7.0 RECOMMENDATIONS AND IMPLEMENTATION

This section will discuss available funding sources and scenarios. A preferred funding scenario and proposed implementation plan are also presented.

7.1 Funding

The City's limited financial resources will require outside assistance in the form of grants and loans to fund the project. Possible sources of funding are:

- MDOC Treasure State Endowment Program (TSEP)
- DNRC Renewable Resource Grant and Loan Program (RRGL)
- MDOC Community Development Block Grant (CDBG)
- MDEQ State Revolving Fund (SRF)
- USDA Rural Development (RD)
- MDOC Coal Board Grant Program
- United States Economic Development Administration (EDA)
- MDOC Delivering Local Assistance (DLA) Grant
- MDOC INTERCAP Loan Program
- Revenue Bonds

The funding programs have different eligibility requirements. Community income levels are considered as part of the eligibility review for most of the grant programs, either as a primary qualifier or, as in the case of CDBG and TSEP, as a basis for determining the level of financial responsibility the applicant must meet before they qualify for grant funds.

The median household income (MHI) is used by the agencies to make the grant eligibility determination. Target monthly water and sewer rates have been established by the funding agencies as a percentage of the median household income. For the City of Hardin, the MHI is currently $34,917 per year based on the 2015 census (***Appendix M***). The user target sewer rate, based on 0.9% of the MHI, is $26.19 per EDU. The current base sewer rate is set at $37.34/month per connection.

7.1.1 Likely Funding Sources

The following sections provide a brief description of potential funding sources which are *relevant and available* to the Hardin project. This section was developed in concert with the City and is not intended to cover all possible funding opportunities.

Treasure State Endowment Program (TSEP)

TSEP is a state funded grant program, which is administered by the MDOC. TSEP provides financial assistance to local governments for infrastructure improvements. Grants can be obtained from TSEP for up to $500,000 if the projected user rates are less than 125% of the target rate, for up to $625,000 if projected user rates are between 125% and 150% of the target rate, and for up to $750,000 if the projected user rates are over 150% of the target rate. TSEP grant recipients are required to match the grant dollar for dollar, using other grants, loans, or cash contributions. There is also a limit of $20,000 per household.

Since the projected combined water and sewer rate is above the target rate by 138%, Hardin was eligible to apply for up to $625,000 of TSEP funds. Hardin was granted $625,000 by TSEP in the 2018 grant cycle.

Renewable Resource Grant and Loan Program (RRGL)

RRGL is a state program that is funded through interest accrued on the Resource Indemnity Trust Fund and the sale of Coal Severance Tax Bonds and is administered by DNRC. The primary purpose of the RRGL program is to enhance Montana's renewable resources. For public facilities projects that conserve, manage, develop, or protect renewable resources, grants of up $125,000 are available.

The City is managing and protecting a renewable resource, which made them eligible for funding of up to $125,000 through the DNRC RRGL program. In this case, the resource is groundwater and surface water of the Bighorn River ecosystem. Hardin was granted $125,000 by RRGL in the 2018 grant cycle.

Community Development Block Grant (CDBG)

CDBG is a federally funded program that is also administered by the Montana Department of Commerce (MDOC). The primary purpose of CDBG funds is to benefit low to moderate income (LMI) families where they comprise at least 51 percent of the municipality. An income survey may be allowed in some circumstances such as recent major economic changes, or if a community is only slightly under the required LMI percentage.

USDA Rural Development (RD)

RD provides grant and loan funding to municipalities with less than 10,000 residents and a preference for communities under 5,500 residents. Grant eligibility and loan interest rates are based on the community's MHI and user rates.

State Revolving Fund (SRF)

SRF provides low-interest loan funds for wastewater projects through the Water Pollution Control State Revolving Fund (WPCSRF). The current loan interest rate is 2.50% with payment schedules not to exceed a 30-year period. The SRF program has provided some loan forgiveness with a maximum of $500,000 or 30% of the project costs. It is uncertain if this will be available when this project is ready and is therefore not included at this time.

7.1.2 Phasing and Funding Strategy

Based on knowledge of the funding criteria and Hardin's needs and capabilities, several funding scenarios were considered. After calculating various user rate scenarios, Hardin has selected TSEP grant, RRGL grant, CDBG grant, and RD grant/loan in combination with a state-sponsored SRF loan as the base-case financial package.

Table 7.1 presents the required increase and the resulting estimated monthly user fee based on 1,286 sewer connections and implementation of this project. Option 1 assumes all grants are awarded while Option 2 assumes no additional grants (other than TSEP and RRGL) are awarded. As shown, implementation of this project is projected to increase the base sewer rate between $30 and $37 per connection per month. The total wastewater-only user base rate is therefore expected to range between $67 and $74 per connection per month.

Table 7.1
Simplified Funding Strategy
for Preferred Alternative

DESCRIPTION	SCENARIOS	
	OPTION #1	OPTION #2
TOTAL PROJECT COST	$11,265,000	$11,265,000
TSEP Grant	$625,000	$625,000
DNRC RRGL Grant	$125,000	$125,000
CDBG Grant	$450,000	No Award
DLA Grant	$625,000	No Award
Coal Board Grant	$500,000	No Award
USDA RD Grant	$1,500,000	No Award
USDA RD Loan (40 Years @ 3.125%)	$4,500,000	No Award
SRF Loan (30 Years @ 2.50%)	$2,940,000	$10,515,000
Principal + Interest (Annual)	$339,075	$502,360
Estimated Incremental O&M (Annual)	$32,070	$32,070
Estimated Short-Lived Assets (Annual)	$30,014	$30,014
Required Increase ($/Connection/month)	**$30.01**	**$36.58**
Resulting Wastewater Only Rate	**$67.35**	**$73.92**

7.2 Implementation of Option 1

Before the project can be implemented, the funding must first be in place. As noted earlier, the best funding strategy for the City would be to utilize grants from TSEP, RRGL, CDBG, DLA, Coal Board, and RD along with RD and SRF loan funds. TSEP and RRGL granted funds for the project in the 2018 cycle.

Project startup is achieved when all funding is in place, when the MDEQ's environmental assessment is complete and a Finding of No Significant Impact (FONSI) is issued. An approved and properly advertised contract must also be in place with the engineer. The engineering could begin once a contract is completed between the grant agencies and the City, likely in October of 2019.

Design of Phases 1 and 2 (Alternatives CS-1 and HGD-1) is anticipated to be completed in January 2020, with the anticipation of bidding the project as early as February 2020. Primarily weather dependent, actual construction of Phases 1 and 2 would begin in late February or March of 2020. Upon completion of Phases 1 and 2, the effects of the upgrades on the wastewater treatment system will be evaluated for approximately one year. Design of Phase 3 (Alternative T-3) would likely commence in October of 2021. Design of Phase 3 would be completed in May of 2022 with the anticipation of bidding the project in June 2022. Construction would likely be completed in November of 2022. ***Table 7.2*** provides a summary of the implementation schedule.

Table 7.2
Project Implementation Schedule
for Funding Option 1

ACTION	DATE	NOTES
Hired Engineer/Administrator	Fall 2017	
Submitted DNRC Grant Application	May 2018	
Submitted TSEP Grant Application	June 2018	
Results of TSEP, DNRC RRGL, grants known	June, 2019	TSEP Granted $625,000 RRGL Granted $125,000
Submit USDA RD Funding Application	Aug. 2019	
Submit SRF Funding Application	Sept. 2019	
Results of Potential CDBG Grant Transfer Known	Sept. 2019	
Results of USDA RD Funding Application Known	Sept. 2019	
Results of SRF Funding Application Known	Oct. 2019	

Select Bond Council, Hold Bond Election	Oct. 2019	
Start-Up and FONSI Clearance	Oct. 2019	All environmental research already complete.
Begin Design of Phases 1 and 2	Oct. 2019	Alternatives CS-1 and HGD-1
Submit Plans for Phases 1 and 2 to MDEQ	Late Nov. 2019	
MDEQ Approval of Phases 1 and 2	Jan. 2020	Allows 2 full months for review.
Advertise and Bid Phases 1 and 2	Jan. – Feb. 2020	Bid Schedules CS-1 and HGD-1
Construction of Phases 1 and 2	Feb. – Oct. 2020	
Evaluate Results of Phases 1 and 2	Nov. 2020 – Oct. 2021	
11-Month Walk-Through for Phases 1 and 2	Late Sept. 2021	
Begin Design of Phase 3	Oct. 2021	Alternative T-3
Submit Plans for Phase 3 to MDEQ	Late Feb. 2022	
MDEQ Approval of Phase 3	May 2022	Allows 3 full months for review.
Advertise and Bid Phase 3	May – June 2022	Bid Schedule T-3
Construction of Phase 3	July – Nov. 2022	
11-Month Walk-Through	Late Oct. 2023	
Construction Close-out	Nov. 2023	Conditional for TSEP and CDBG pending audits.
Audit and Final TSEP Close-out	Jan. 2024	

7.3 Public Participation

The PER process included a public participation effort that began in 2018. The findings of the PER and the draft Environmental Assessment were presented to the City Council at a noticed public hearing on March 20, 2018 and at subsequent public City Council meetings. The public hearing was advertised with:

- Public Notices (see ***Appendix Q***)

There were no substantive comments from the public made on either the PER or the Environmental Assessment.

8.0 REFERENCES

The following references were utilized in the compilation of the PER:

1 Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture, *Web Soil Survey*, http://websoilsurvey.nrcs.usda.gov/app

2 Montana Bureau of Mines and Geology, Montana Tech of The University of Montana, Groundwater Information Center 2010, http://mbmggwic.mtech.edu/

3 Montana Bureau of Mines and Geology, Big Horn Conservation District, *Hydrogeology of the Northern Bighorn River Valley 2009*, http://www.mbmg.mtech.edu/pdf-open-files/mbmg588-BighornRIverValley.pdf

4 United States Department of Agriculture, http://www.usda.gov/wps/portal/usdahome

5 mt.gov, Natural Resources Information System, Montana Geographic Information Clearinghouse, http://nris.state.mt.us/gis/

6 FEMA Map Service Center, *Flood Insurance Rate Maps (FIRMs) for Big Horn County*

7 U.S. Fish and Wildlife Service, National Wetlands Inventory, http://www.fws.gov/wetlands/

8 Montana Department of Commerce, Census and Economic Information Center, http://ceic.mt.gov/

9 U.S. Census Bureau, American Fact Finder, http://factfinder.census.gov

10 Montana Department of Environmental Quality, *Circular DEQ 4: Montana Standards for Subsurface Wastewater Treatment Systems*, latest Edition

11 Montana Department of Environmental Quality, *Circular DEQ 2: Design Standards for Wastewater Facilities*, latest Edition

12 Stahly Engineering & Associates, Morrison & Maierle Engineers, Dowl-HKM Engineering, Great West Engineering, The Montana Department of Commerce, and Others: *Preliminary Engineering Reports for the communities of Livingston, Terry, Jordan, Fallon County WSD, Polson, Manhattan, Bridger Pines County WSD, and Gallatin Gateway.*

13 United States Geological Survey (USGS), *NWIS Web Data for Montana, Bighorn River,* http://waterdata.usgs.gov/nwis

14 National Oceanic and Atmospheric Administration (NOAA) Western Regional Climate Center, *Historical Climate Information*, http://www.wrcc.dri.edu/NEWWEB.html

15 United States Environmental Protection Agency (EPA), *Process Design Manual for Land Treatment of Municipal Wastewater*, published by EPA Center for Environmental Research Information, Cincinnati, Ohio, October 1981

16 City of Hardin, http://www.hardinmt.com

17 City of Hardin, *Growth Management Plan, Hardin, Montana 2009,* http://www.hardinmt.com/Growth-Management.html

Appendix A

RESOLUTION NO. 2156

A RESOLUTION OF THE CITY OF HARDIN, MONTANA, ADOPTING THE PRELIMINARY ENGINEERING REPORT EVALUATING THE WASTEWATER TREATMENT PLANT OF THE CITY OF HARDIN

WHEREAS, the City of Hardin procured the services of Stahly Engineering and Associates, Inc. to evaluate the City's wastewater treatment options and prepare a Preliminary Engineering Report according to the standards set forth by the State of Montana;

WHEREAS, the City of Hardin has held a public meeting on the issues evident in addressing the City's wastewater treatment, the alternatives for remedy, the selection of the preferred alternative, and the opinion of probable costs associated with renovating the system; and

WHEREAS, the City of Hardin has received the draft Preliminary Engineering Report and finds it satisfactory;

NOW THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF HARDIN, MONTANA:

City of Hardin accepts the Wastewater Treatment Upgrade Preliminary Engineering Report as submitted by Stahly Engineering and Associates, Inc. and formally adopts it as a planning document for its wastewater system whereby Capital Improvement decisions will be made.

PASSED AND ADOPTED by the City Council of the City of Hardin, Montana, and APPROVED this 1ST day of May, 2018.

YEA VOTES 5 NAY VOTES 0

CITY OF HARDIN

BY: Kenton Kepp
Acting Mayor

ATTEST: Michelle Dyckman
City Clerk

CITY OF HARDIN OFFICIAL SEAL BIG HORN COUNTY, MONTANA

DNRC Grant Authorization Statement

A. Grant Authorization

I certify that the information and the statements in this application are true, complete and accurate to the best of my knowledge. I certify that the project or activity as described in this application complies with all applicable state, local and federal laws and regulations. By my signature below, I certify that I have knowledge of and understand the content of this application and that I am fully authorized to apply to DNRC for the grant specified in the submitted materials.

I further declare that, for City of Hardin, montana (Applicant Name), I am legally authorized to enter into a binding contract with the Department of Natural Resources and Conservation to obtain funding if this application is approved. I understand that all funds must be both authorized by the Montana Legislature and available in the natural resources project account before grants are available.

A facsimile, photocopy or electronic copy of the signature below shall have the same force and effect as an original signature and an electronic signature shall be regarded as an original signature. 30-18-102, MCA.

/s/ Joe Purcell — 5/10/18.

Signature and Title of Authorized Representative — Date

Joe Purcell mayor — City of Hardin

Printed Name and Title of Representative — Entity Name

B. Loan Authorization

I certify that the information and the statements in this application are true, complete and accurate to the best of my knowledge. I certify that the project or activity as described in this application complies with all applicable state, local and federal laws and regulations. By my signature below, I certify that I have knowledge of and understand the content of this application and that I am fully authorized to apply to DNRC for the loan specified in the submitted materials.

I understand that all funds must be authorized by the Montana Legislature, that loan funds will become available after the sale of state bonds, and that I will be expected to enter into a loan agreement when funding is available and according to my construction schedule.

I further declare that, for the City of Hardin (Entity Name), I am legally authorized to enter into a binding contract with the Department of Natural Resources and Conservation to obtain loan financing if this application is approved.

A facsimile, photocopy or electronic copy of the signature below shall have the same force and effect as an original signature and an electronic signature shall be regarded as an original signature. 30-18-102, MCA.

/s/ Joe Purcell — 5/10/18

Signature and Title of Authorized Representative — Date

Joe Purcell mayor

Printed Name and Title of Representative

Appendix B

Big Sky. Big Land. Big History.
Montana Historical Society

Historic Preservation
Museum
Outreach & Interpretation
Publications
Research Center

August 15, 2019

Greg Steckler
Stahly Engineering
851 Bridger Drive, Suite 1
Bozeman MT 59715

RE: CITY OF HARDIN WASTEWATER SYSTEM UPGRADES. SHPO Project #: 2019081403

Dear Mr. Steckler:

I have conducted a cultural resource file search for the above-cited project located in Sections 13, 24, T1S R33E. According to our records there have been a few previously recorded sites within the designated search locale. In addition to the sites there have been a few previously conducted cultural resource inventories done in the areas. I've attached a list of these sites and reports. If you would like any further information regarding these sites or reports, you may contact me at the number listed below.

It is SHPO's position that any structure over fifty years of age is considered historic and is potentially eligible for listing on the National Register of Historic Places. If any structures are to be altered and are over fifty years old, we would recommend that they be recorded, and a determination of their eligibility be made prior to any disturbance taking place.

As long as there will be no disturbance or alteration to structures over fifty years of age we feel that the proposed project will have no effect to historic properties. We, therefore, feel that a recommendation for a cultural resource inventory is unwarranted at this time. However, should structures need to be altered or if cultural materials be inadvertently discovered during this project we would ask that our office be contacted, and the site investigated.

If you have any further questions or comments, you may contact me at (406) 444-7767 or by e-mail at dmurdo@mt.gov. Thank you for consulting with us.

Sincerely,

Damon Murdo
Cultural Records Manager
State Historic Preservation Office

File: USDA/RUS/2019

225 North Roberts Street
P.O. Box 201201
Helena, MT 59620-1201
(406) 444-2694
(406) 444-2696 FAX
montanahistoricalsociety.org

Big Sky. Big Land. Big History.

Montana Historical Society

Montana State Historic Preservation Office
1301 E. Lockey Ave, PO Box 201202
Helena, MT 59620-1202
(406)444-7715
montanahistoricalsociety.org

FILE SEARCH INVOICE

DATE: 15-Aug-19

SHPO Invoice #: 2019081403

Bill To:

Contact Name: Greg Steckler
Organization: Stahly Engineering
Address: 851 Bridger Drive, Suite 1
City/State/Zip: Bozeman MT 59715

File Search Fee Structure
$25 / Section
For questions contact: **Damon Murdo** dmurdo@mt.gov **406-444-7767**

Project Name:	CITY OF HARDIN WASTEWATER SYSTEM UPGRADES

Total Cost:	**$50.00**

Total sections searched for SHPO Project #: 2019081403	**2**

Please make all checks payable to:
Montana Historical Society
PO Box 201201
Helena, MT 59620

PAY ONLINE HERE

Due upon receipt. Please pay within 30 days.

STATE HISTORIC PRESERVATION OFFICE
Cultural Resource Information Systems
CRIS Township, Range, Section Report

Report Date:8/15/2019

Site #	Twp	Rng	Sec	Qs	Site Type 1	Site Type 2	Time Period	Owner	NR Status
24BH1999	1S	33E	13	SE	Historic Railroad		Historic More Than One Decade	Other	Eligible
24BH1999	1S	33E	24	NE	Historic Railroad		Historic More Than One Decade	Other	Eligible
24BH3702	1S	33E	24	comb	Historic Energy Development		1950-1959	Combination	Undetermined*

STATE HISTORIC PRESERVATION OFFICE
Montana Cultural Resource Database
CRABS Township,Range,Section Results
Report Date:8/15/2019

Township:1 S Range:33 E Section: 13

BRUMLEY JOHN H. AND PATRICK J. RENNIE

3/21/2000 SELECT PORTIONS OF THE WORDEN TO CROW FIBER OPTIC CABLE PROJECT- CHICAGO, BURLINGTON AND QUINCY RAILROAD

CRABS Document Number: BH 5 22779 Agency Document Number:

Township:1 S Range:33 E Section: 24

BRUMLEY JOHN H. AND PATRICK J. RENNIE

3/21/2000 SELECT PORTIONS OF THE WORDEN TO CROW FIBER OPTIC CABLE PROJECT- CHICAGO, BURLINGTON AND QUINCY RAILROAD

CRABS Document Number: BH 5 22779 Agency Document Number:

Township:1 S Range:33 E Section: 13

SUDMAN NATALIE

7/3/2001 CLASS III CULTURAL RESOURCES INVENTORY OF SIOUX FALLS TOWER SPECIALISTS, INC'S COMMUNICATION TOWERS 268,269,271,273,274,275, & 276, BIG HORN AND YELLOWSTONE COUNTIES MONTANA

CRABS Document Number: ZZ 6 23926 Agency Document Number:

Township:1 S Range:33 E Section: 13

ROM LANCE W.

8/29/2001 VISUAL IMPACTS ASSESSMENT OF PERFORMANCE DEVELOPMENT GROUP INC. PROPOSED COMMUNICATION TOWERS 272 AND 273, BIG HORN COUNTY, MONTANA

CRABS Document Number: BH 6 23930 Agency Document Number:

Township:1 S Range:33 E Section: 24

ROM LANCE W.

8/29/2001 VISUAL IMPACTS ASSESSMENT OF PERFORMANCE DEVELOPMENT GROUP INC. PROPOSED COMMUNICATION TOWERS 272 AND 273, BIG HORN COUNTY, MONTANA

CRABS Document Number: BH 6 23930 Agency Document Number:

Township:1 S Range:33 E Section: 24

THOMAS JENNIFER

11/1/2013 WBI: A CLASS III CULTURAL RESOURCE INVENTORY OF AN EXISTING GAS PIPELINE THROUGH THE CROW RESERVATION IN BIGHORN AND YELLOWSTONE COUNTIES

CRABS Document Number: BH 3 36814 Agency Document Number: CA14-3077

STAHLY ENGINEERING & ASSOCIATES, INC. EST 1970
www.seaeng.com
Engineers and Land Surveyors
851 Bridger Drive, Suite 1, Bozeman, MT 59715 | phone: 406-522-8594 | fax: 406-522-9528

February 1, 2018

United States Army Corps of Engineers
Regulatory Office
10 West 15th Street, Suite 2200
Helena, MT 59626

RE: Review Request for Hardin, Montana Wastewater Project

Dear Regulator:

With this letter I am requesting a review and written response identifying possible impacts and requirements resulting from a proposed wastewater treatment upgrade project located at the Hardin, Montana wastewater treatment facility.

The project will consist of constructing additional wastewater treatment appurtenances and improving existing facilities. The new treatment appurtenances will be constructed at the existing wastewater treatment facility site as outlined on the attached project site map. Improvements include the following:

1. Surge flow attenuation;
2. New process controls;
3. New flow monitoring (influent, effluent, and return activated sludge);
4. New headworks facilities (including grease mitigation, grit removal, and screening equipment);
5. New facility water supply;
6. Possible expansion of the oxidation ditch;
7. Automated dissolved oxygen;
8. Foam control/mitigation;
9. New return and waste activated sludge pumps;
10. Secondary clarification upgrades to prevent freezing;
11. Installation of a redundant aerobic digestor blower (likely including expansion of the blower building);
12. Backup disinfection;
13. A building to house primary and backup disinfection channels and equipment;
14. A backup generator for critical systems;
15. Pumper truck acceptance.

The location of the proposed improvements is shown on the attached maps. The new treatment appurtenances will be constructed on land owned by the City of Hardin and no additional land will be needed. However, the treatment site is located on the Crow Indian Reservation. The proposed improvements will be designed in accordance with Montana DEQ design guidelines and other regulations as appropriate.

This request is required by the 2015 Uniform Application for Montana Public Facility Projects. If you have no comment on this project, please check the box below and countersign at the end of this letter and return to me

in the enclosed self-addressed envelope. Thank you for your assistance with this matter. Please call if you have any questions (522-8594).

Sincerely,

Greg Steckler, P.E.
Project Manager

Enclosure: Project Site Map, Wetland Map

[ ] The United States Army Corps of Engineers has reviewed the letter and enclosures and has no comments.

_____

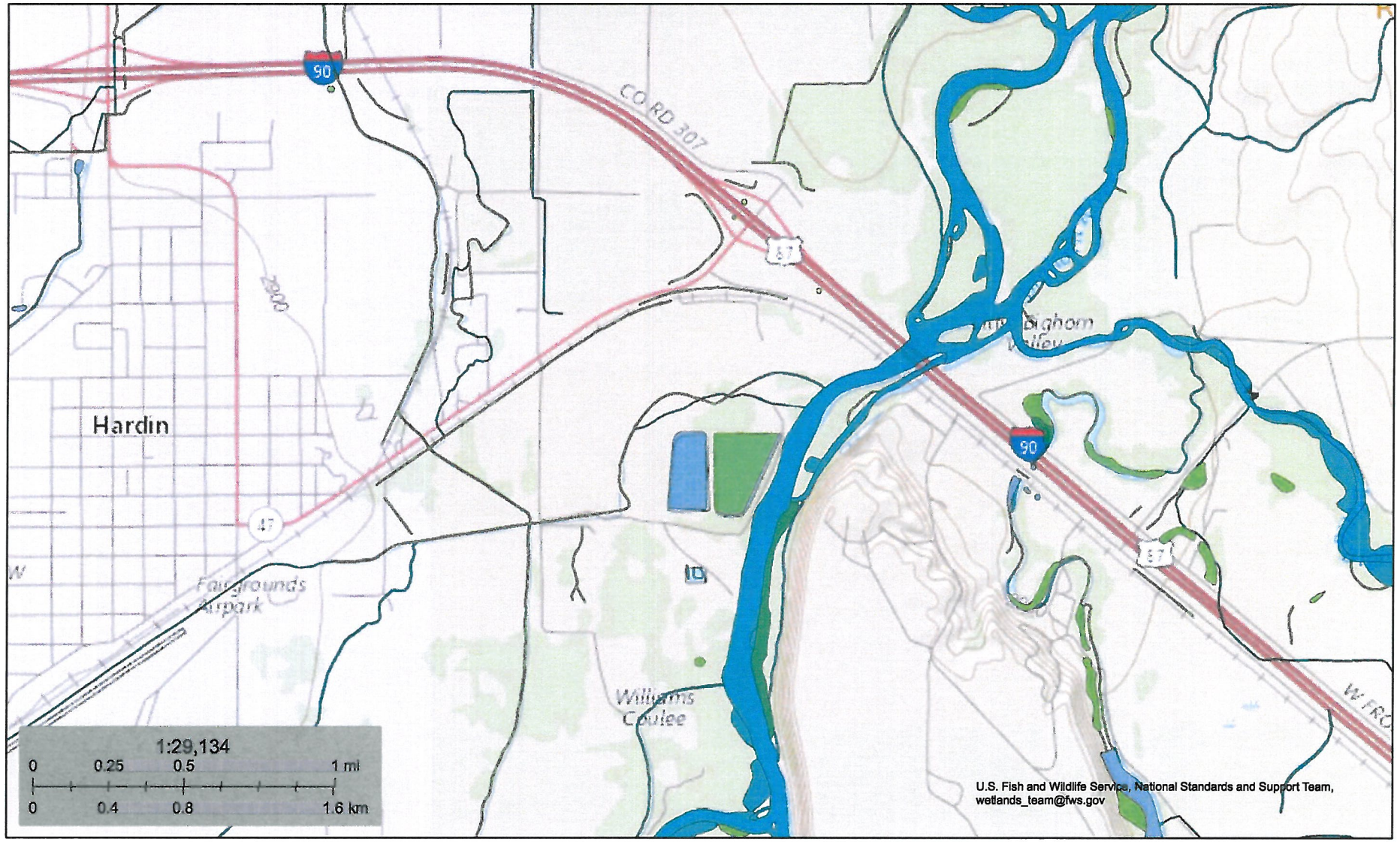
Signature

I-90
PROJECT AREA
THE CROW TRIBE OF INDIANS
HARDIN

U.S. Fish and Wildlife Service

National Wetlands Inventory

Hardin Wetland



January 30, 2018

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
HELENA REGULATORY OFFICE
10 WEST 15TH STREET, SUITE 2200
HELENA, MONTANA 59626

REPLY TO
ATTENTION OF

February 28, 2018

Regulatory Branch
Montana State Program
Corps No. **NWO-2018-00280-MTB**

Subject: City of Hardin - Wastewater System Improvements - Big Horn River - (Big Horn County)

Greg Steckler
Stahly Engineering & Associates, Inc.
851 Bridger Drive, Suite 1
Bozeman, Montana 59715

Dear Mr. Steckler:

We are responding to your request for a review and written response identifying possible impacts and requirements from a proposed wastewater treatment upgrade project. Specifically, the City of Hardin is proposing a possibility of fifteen improvements to the City's wastewater system. The project is located at Latitude 45.733037°, Longitude -107.583159°, on the Bighorn River, within Section 24, Township 1 S, Range 33 E, Hardin, Big Horn County, Montana.

The mission of the U.S. Army Corps of Engineers (Corps) Regulatory Program is to protect the Nation's aquatic resources while allowing reasonable development through fair, flexible and balanced permit decisions. In particular, under Section 404 of the Clean Water Act, we work to protect the biological, physical, and chemical integrity of the Nation's aquatic resources. Projects are evaluated on a case-by-case basis to determine the potential benefits and detriments that may occur as a result of the proposal. In all cases an applicant must avoid and minimize impacts to aquatic resources to the greatest extent practicable.

Under the authority of Section 404 of the Clean Water Act (CWA), Department of the Army (DA) permits are required for the discharge of fill material into waters of the U.S. Waters of the U.S. include the area below the ordinary high water mark of stream channels and lakes or ponds connected to the tributary system, and wetlands adjacent to these waters. Isolated waters and wetlands, as well as man-made channels, may be waters of the U.S. in certain circumstances, which must be determined on a case-by-case basis. The Bighorn River is considered a traditionally navigable water and subject to CWA regulation.

Printed on Recycled Paper

Based on the information provided in your submittal, we are unable to ascertain if regulated activities are proposed or if jurisdictional waters of the U.S, beyond the Bighorn River, are present within the project area. If your final design includes the placement of dredged or fill material in any jurisdictional area described above, or otherwise requires authorization by a DA permit, please submit a permit application to this office prior to starting any work. The application package should include a delineation of waters of the United States and special aquatic sites, including wetlands within the project site. After a review of the materials submitted we will determine what type of permit, if any, will be required. In order to provide the necessary information you may use the Montana Joint Permit Application Form, found at the following address: http://www.dnrc.mt.gov/licenses-and-permits/stream-permitting. If you do not wish to use this form, or do not have internet access please contact our office at the address below to obtain more information.

This project is located within the Crow Indian Reservation. If a DA Permit is required it will require additional coordination with the U.S. Environmental Protection Agency and the Crow Tribe.

Note that this letter is not a DA authorization to proceed. It only informs you of your need to obtain a DA permit if waters of the U.S. will be affected. If waters of the U.S. will not be affected by a jurisdictional activity a DA permit will not be required for the project.

Please refer to identification number NWO-2018-00280-MTB in any correspondence concerning this project. If you have any questions, please contact me at Post Office Box 7032, Billings, Montana 59103, by telephone at (406) 657-5910 or by email at Sage.L.Joyce@usace.army.mil.

Sincerely,

Sage L. Joyce
Regulatory Project Manager

cc:
City of Hardin
406 N Cheyenne Ave
Hardin, Montana 59034-1811

Printed on Recycled Paper

STAHLY ENGINEERING & ASSOCIATES, INC. EST 1970
www.seaeng.com
Engineers and Land Surveyors
851 Bridger Drive, Suite 1, Bozeman, MT 59715 | phone: 406-522-8594 | fax: 406-522-9528

February 1, 2018

Department of Environmental Quality
Permitting and Compliance Division
1520 E. 6th Ave.
PO Box 200901
Helena, MT 59620-0901

RE: Review Request for Hardin, Montana Wastewater Project

Dear Regulator:

With this letter I am requesting a review and written response identifying possible impacts and requirements resulting from a proposed wastewater treatment upgrade project located at the Hardin, Montana wastewater treatment facility.

The project will consist of constructing additional wastewater treatment appurtenances and improving existing facilities. The new treatment appurtenances will be constructed at the existing wastewater treatment facility site as outlined on the attached project site map. Improvements include the following:

1. Surge flow attenuation;
2. New process controls;
3. New flow monitoring (influent, effluent, and return activated sludge);
4. New headworks facilities (including grease mitigation, grit removal, and screening equipment);
5. New facility water supply;
6. Possible expansion of the oxidation ditch;
7. Automated dissolved oxygen;
8. Foam control/mitigation;
9. New return and waste activated sludge pumps;
10. Secondary clarification upgrades to prevent freezing;
11. Installation of a redundant aerobic digestor blower (likely including expansion of the blower building);
12. Backup disinfection;
13. A building to house primary and backup disinfection channels and equipment;
14. A backup generator for critical systems;
15. Pumper truck acceptance.

The location of the proposed improvements is shown on the attached maps. The new treatment appurtenances will be constructed on land owned by the City of Hardin and no additional land will be needed. However, the treatment site is located on the Crow Indian Reservation. The proposed improvements will be designed in accordance with Montana DEQ design guidelines and other regulations as appropriate.

This request is required by the 2015 Uniform Application for Montana Public Facility Projects. If you have no comment on this project, please check the box below and countersign at the end of this letter and return to me

in the enclosed self-addressed envelope. Thank you for your assistance with this matter. Please call if you have any questions (522-8594).

Sincerely,

Greg Steckler, P.E.
Project Manager

Enclosure: Project Site Map, Wetland Map

[ ] The Department of Environmental Quality, Permitting and Compliance Division has reviewed the letter and enclosures and has no comments.

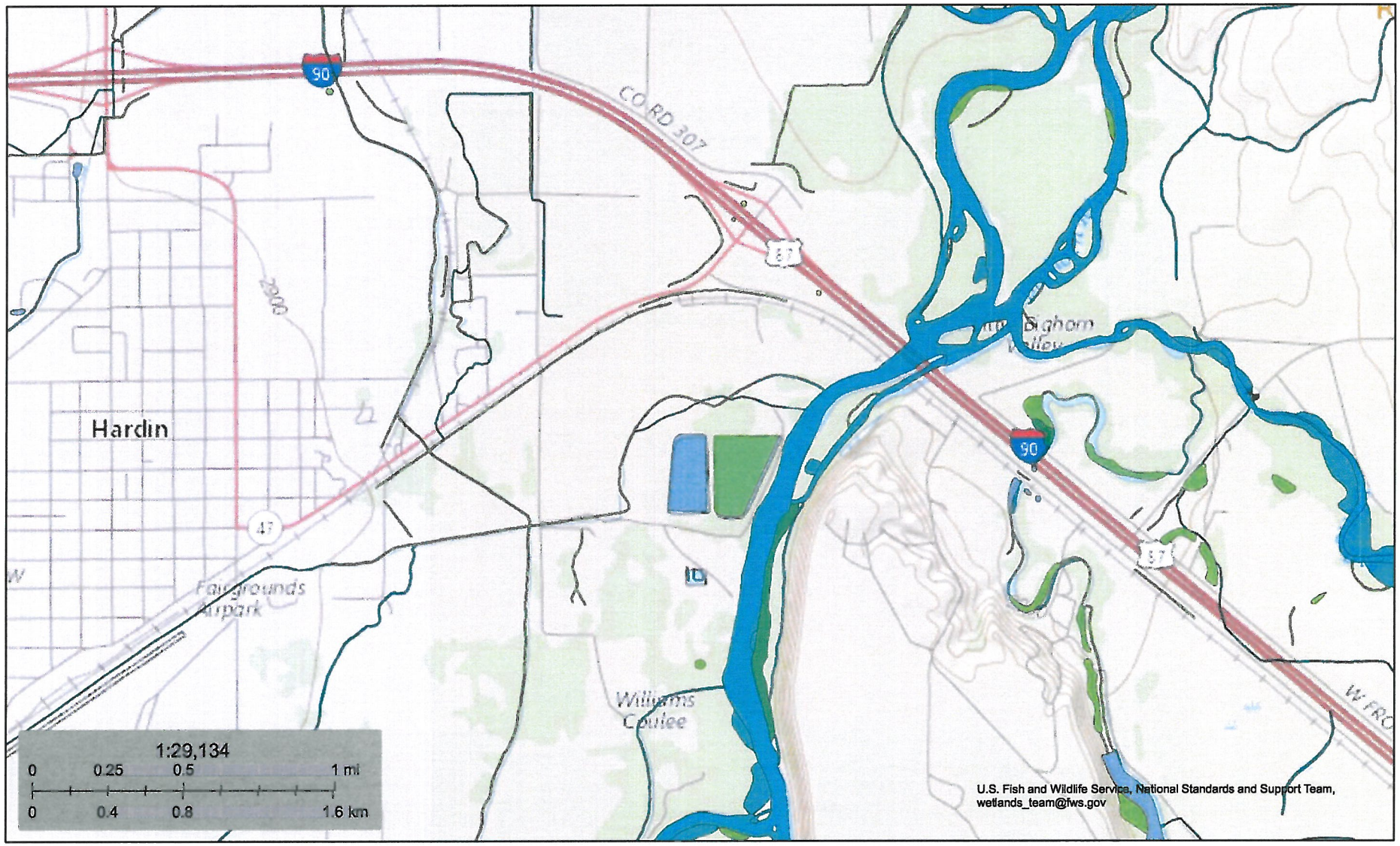
_____
Signature

I-90
PROJECT AREA
THE CROW TRIBE OF INDIANS
HARDIN

U.S. Fish and Wildlife Service

National Wetlands Inventory

Hardin Wetland



January 30, 2018

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

February 22, 2018

DEQ
Montana Department of Environmental Quality

Mr. Greg Steckler, P.E.
Stahley Engineering & Associates
851 Bridger Dr. – Suite 1
Bozeman, MT 59715

Re: Hardin Wastewater System Improvements

Dear Mr. Steckler:

Thank you for the information and request for comments regarding the above referenced proposed project. Since the Department of Environmental Quality (DEQ) will be reviewing environmental documents, the engineering report, plans, and specifications for the proposed project and issuing an approval to construct the new facilities, those reviews will serve as DEQ's comments.

The reviews will be performed by either the Public Water Supply Program or, if DEQ funding is also proposed, the Water Pollution Control State Revolving Fund Program (SRF). Both of these programs are in DEQ's Engineering Bureau. Please keep in mind that other DEQ permits associated with construction of the project may be required and ongoing compliance monitoring is evaluated monthly by the Water Protection Bureau who may have input for your project upon submittal for review.

If you decide to use SRF and have questions please contact Paul LaVigne, Section Supervisor, at (406) 444-5321 or plavigne@mt.gov. If you do not plan to use SRF and have questions please contact Rachel Clark, Section Supervisor, Public Water Supply Engineering, at (406) 444-6722 or rclark@mt.gov.

Sincerely,

Lindsay Ford
Director's Office Support Coordinator
(406) 444-5270

REF# 18-028

STAHLY ENGINEERING & ASSOCIATES, INC. EST. 1970
www.seaeng.com
Engineers and Land Surveyors
851 Bridger Drive, Suite 1, Bozeman, MT 59715 | phone: 406-522-8594 | fax: 406-522-9528

February 1, 2018

Department of Natural Resources and Conservation
1625 11th Ave.
PO Box 201601
Helena, MT 59620-1601

RE: Review Request for Hardin, Montana Wastewater Project

Dear Regulator:

With this letter I am requesting a review and written response identifying possible impacts and requirements resulting from a proposed wastewater treatment upgrade project located at the Hardin, Montana wastewater treatment facility.

The project will consist of constructing additional wastewater treatment appurtenances and improving existing facilities. The new treatment appurtenances will be constructed at the existing wastewater treatment facility site as outlined on the attached project site map. Improvements include the following:

1. Surge flow attenuation;
2. New process controls;
3. New flow monitoring (influent, effluent, and return activated sludge);
4. New headworks facilities (including grease mitigation, grit removal, and screening equipment);
5. New facility water supply;
6. Possible expansion of the oxidation ditch;
7. Automated dissolved oxygen;
8. Foam control/mitigation;
9. New return and waste activated sludge pumps;
10. Secondary clarification upgrades to prevent freezing;
11. Installation of a redundant aerobic digestor blower (likely including expansion of the blower building);
12. Backup disinfection;
13. A building to house primary and backup disinfection channels and equipment;
14. A backup generator for critical systems;
15. Pumper truck acceptance.

The location of the proposed improvements is shown on the attached maps. The new treatment appurtenances will be constructed on land owned by the City of Hardin and no additional land will be needed. However, the treatment site is located on the Crow Indian Reservation. The proposed improvements will be designed in accordance with Montana DEQ design guidelines and other regulations as appropriate.

This request is required by the 2015 Uniform Application for Montana Public Facility Projects. If you have no comment on this project, please check the box below and countersign at the end of this letter and return to me

in the enclosed self-addressed envelope. Thank you for your assistance with this matter. Please call if you have any questions (522-8594).

Sincerely,

Greg Steckler, P.E.
Project Manager

Enclosure: Project Site Map, Wetland Map

[ ] The Department of Natural Resources and Conservation has reviewed the letter and enclosures and has no comments.

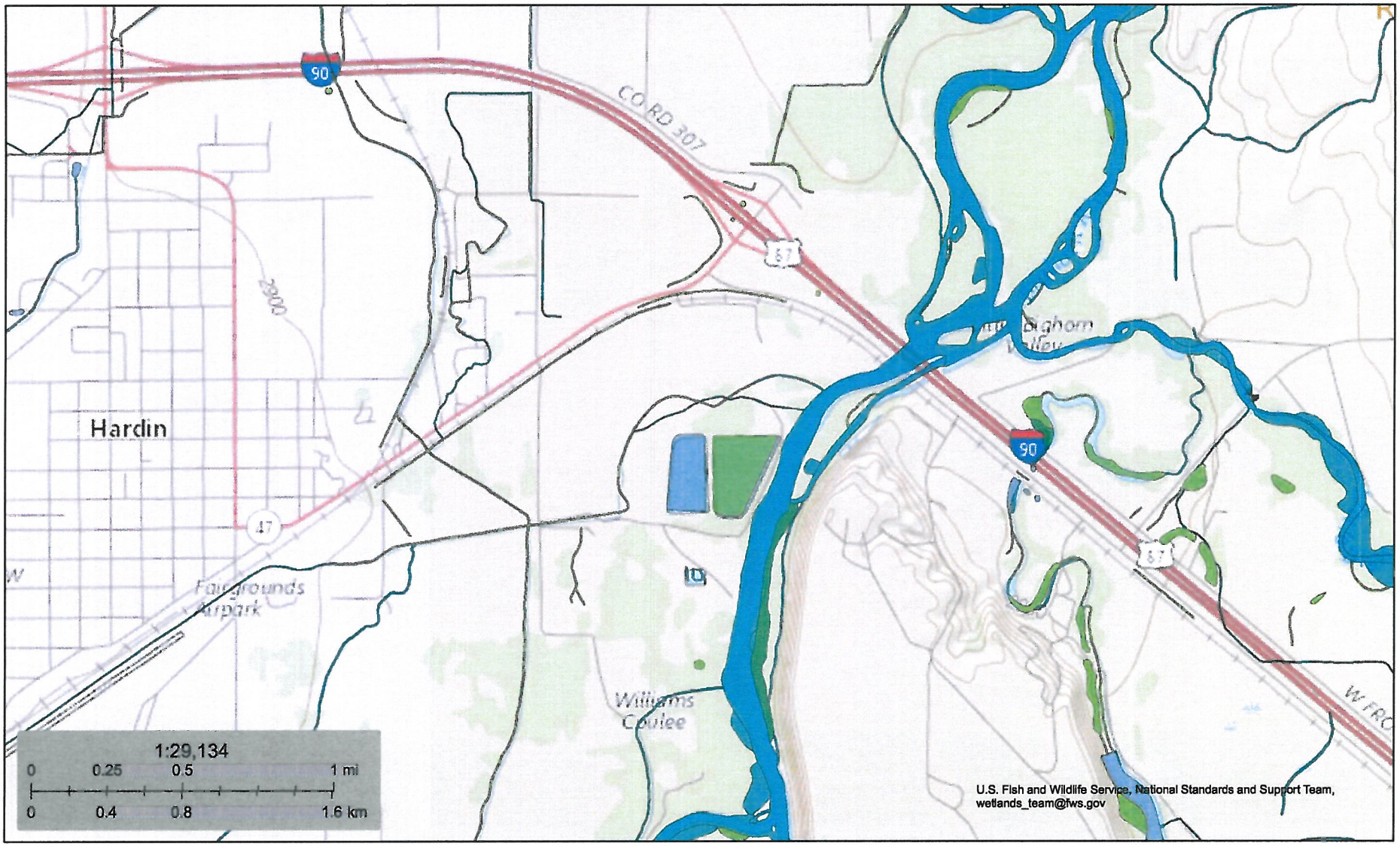
_____
Signature

I-90
PROJECT AREA
THE CROW TRIBE OF INDIANS
HARDIN

U.S. Fish and Wildlife Service

National Wetlands Inventory

Hardin Wetland



January 30, 2018

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

www.seaeng.com
Engineers and Land Surveyors
851 Bridger Drive, Suite 1, Bozeman, MT 59715 | phone: 406-522-8594 | fax: 406-522-9528

RECEIVED
FEB 05 2018
D.N.R.C

February 1, 2018

Department of Natural Resources and Conservation
1625 11th Ave.
PO Box 201601
Helena, MT 59620-1601

RE: Review Request for Hardin, Montana Wastewater Project

Dear Regulator:

With this letter I am requesting a review and written response identifying possible impacts and requirements resulting from a proposed wastewater treatment upgrade project located at the Hardin, Montana wastewater treatment facility.

The project will consist of constructing additional wastewater treatment appurtenances and improving existing facilities. The new treatment appurtenances will be constructed at the existing wastewater treatment facility site as outlined on the attached project site map. Improvements include the following:

1. Surge flow attenuation;
2. New process controls;
3. New flow monitoring (influent, effluent, and return activated sludge);
4. New headworks facilities (including grease mitigation, grit removal, and screening equipment);
5. New facility water supply;
6. Possible expansion of the oxidation ditch;
7. Automated dissolved oxygen;
8. Foam control/mitigation;
9. New return and waste activated sludge pumps;
10. Secondary clarification upgrades to prevent freezing;
11. Installation of a redundant aerobic digestor blower (likely including expansion of the blower building);
12. Backup disinfection;
13. A building to house primary and backup disinfection channels and equipment;
14. A backup generator for critical systems;
15. Pumper truck acceptance.

The location of the proposed improvements is shown on the attached maps. The new treatment appurtenances will be constructed on land owned by the City of Hardin and no additional land will be needed. However, the treatment site is located on the Crow Indian Reservation. The proposed improvements will be designed in accordance with Montana DEQ design guidelines and other regulations as appropriate.

This request is required by the 2015 Uniform Application for Montana Public Facility Projects. If you have no comment on this project, please check the box below and countersign at the end of this letter and return to me

in the enclosed self-addressed envelope. Thank you for your assistance with this matter. Please call if you have any questions (522-8594).

Sincerely,

Greg Steckler, P.E.
Project Manager

Enclosure: Project Site Map, Wetland Map

[X] The Department of Natural Resources and Conservation has reviewed the letter and enclosures and has no comments.

2/13/18 Sam Johnson Billings Regional Office

Signature

STAHLY ENGINEERING & ASSOCIATES, INC. EST. 1970
www.seaeng.com
Engineers and Land Surveyors
851 Bridger Drive, Suite 1, Bozeman, MT 59715 | phone: 406-522-8594 | fax: 406-522-9528

February 1, 2018

Department of Fish, Wildlife and Parks
1420 E. 6th
Helena, MT 59620

RE: Review Request for Hardin, Montana Wastewater Project

Dear Regulator:

With this letter I am requesting a review and written response identifying possible impacts and requirements resulting from a proposed wastewater treatment upgrade project located at the Hardin, Montana wastewater treatment facility.

The project will consist of constructing additional wastewater treatment appurtenances and improving existing facilities. The new treatment appurtenances will be constructed at the existing wastewater treatment facility site as outlined on the attached project site map. Improvements include the following:

1. Surge flow attenuation;
2. New process controls;
3. New flow monitoring (influent, effluent, and return activated sludge);
4. New headworks facilities (including grease mitigation, grit removal, and screening equipment);
5. New facility water supply;
6. Possible expansion of the oxidation ditch;
7. Automated dissolved oxygen;
8. Foam control/mitigation;
9. New return and waste activated sludge pumps;
10. Secondary clarification upgrades to prevent freezing;
11. Installation of a redundant aerobic digestor blower (likely including expansion of the blower building);
12. Backup disinfection;
13. A building to house primary and backup disinfection channels and equipment;
14. A backup generator for critical systems;
15. Pumper truck acceptance.

The location of the proposed improvements is shown on the attached maps. The new treatment appurtenances will be constructed on land owned by the City of Hardin and no additional land will be needed. However, the treatment site is located on the Crow Indian Reservation. The proposed improvements will be designed in accordance with Montana DEQ design guidelines and other regulations as appropriate.

This request is required by the 2015 Uniform Application for Montana Public Facility Projects. If you have no comment on this project, please check the box below and countersign at the end of this letter and return to me

in the enclosed self-addressed envelope. Thank you for your assistance with this matter. Please call if you have any questions (522-8594).

Sincerely,

Greg Steckler, P.E.
Project Manager

Enclosure: Project Site Map, Wetland Map

[ ] The Department of Fish, Wildlife and Parks has reviewed the letter and enclosures and has no comments.

_____

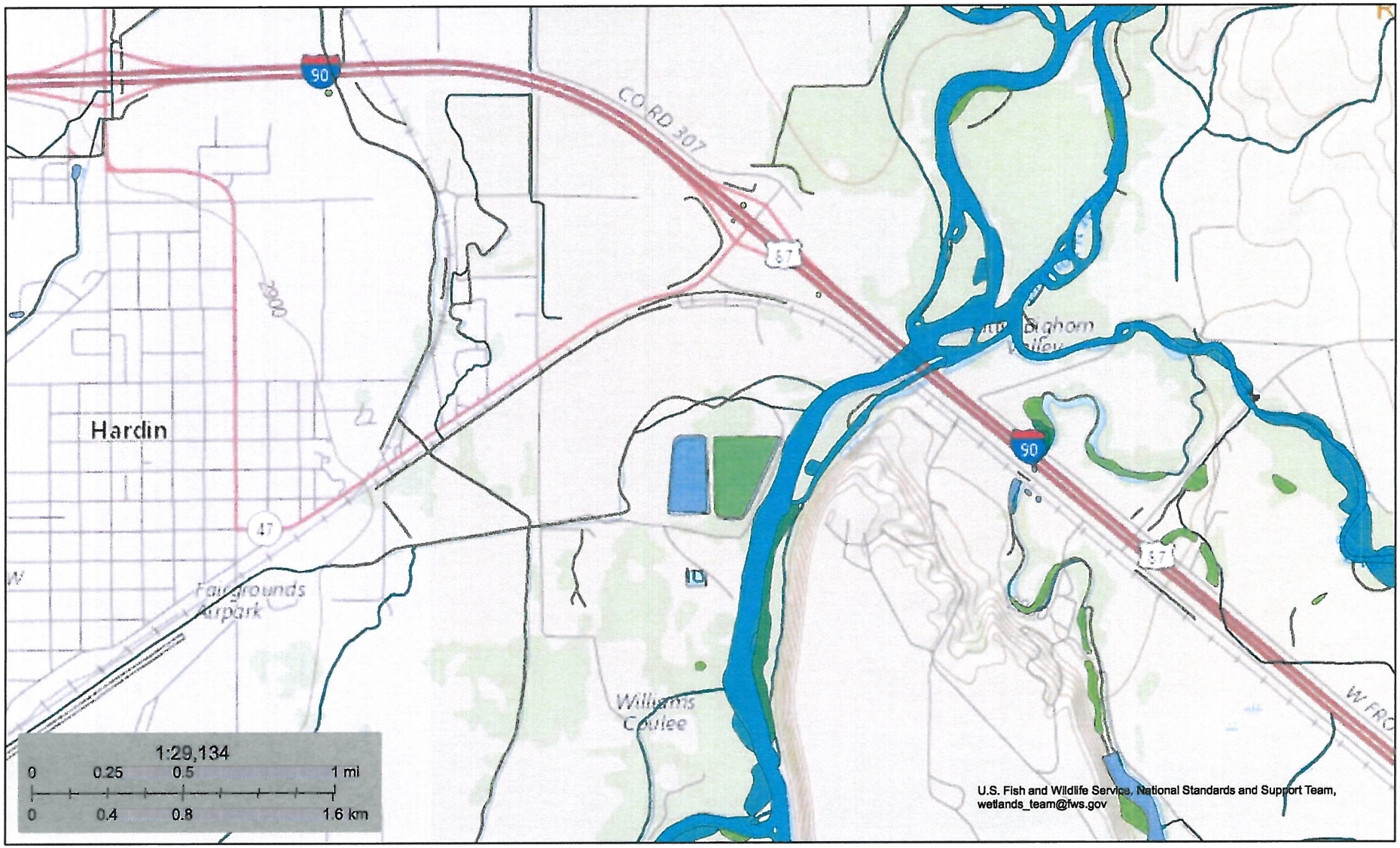
Signature

I-90
PROJECT AREA
THE CROW TRIBE OF INDIANS
HARDIN

U.S. Fish and Wildlife Service

National Wetlands Inventory

Hardin Wetland



January 30, 2018

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

STAHLY ENGINEERING & ASSOCIATES, INC. EST 1970
www.seaeng.com
Engineers and Land Surveyors
851 Bridger Drive, Suite 1, Bozeman, MT 59715 | phone: 406-522-8594 | fax: 406-522-9528

February 1, 2018

Department of Fish, Wildlife and Parks
1420 E. 6th
Helena, MT 59620

RE: Review Request for Hardin, Montana Wastewater Project

Dear Regulator:

With this letter I am requesting a review and written response identifying possible impacts and requirements resulting from a proposed wastewater treatment upgrade project located at the Hardin, Montana wastewater treatment facility.

The project will consist of constructing additional wastewater treatment appurtenances and improving existing facilities. The new treatment appurtenances will be constructed at the existing wastewater treatment facility site as outlined on the attached project site map. Improvements include the following:

1. Surge flow attenuation;
2. New process controls;
3. New flow monitoring (influent, effluent, and return activated sludge);
4. New headworks facilities (including grease mitigation, grit removal, and screening equipment);
5. New facility water supply;
6. Possible expansion of the oxidation ditch;
7. Automated dissolved oxygen;
8. Foam control/mitigation;
9. New return and waste activated sludge pumps;
10. Secondary clarification upgrades to prevent freezing;
11. Installation of a redundant aerobic digestor blower (likely including expansion of the blower building);
12. Backup disinfection;
13. A building to house primary and backup disinfection channels and equipment;
14. A backup generator for critical systems;
15. Pumper truck acceptance.

The location of the proposed improvements is shown on the attached maps. The new treatment appurtenances will be constructed on land owned by the City of Hardin and no additional land will be needed. However, the treatment site is located on the Crow Indian Reservation. The proposed improvements will be designed in accordance with Montana DEQ design guidelines and other regulations as appropriate.

This request is required by the 2015 Uniform Application for Montana Public Facility Projects. If you have no comment on this project, please check the box below and countersign at the end of this letter and return to me

in the enclosed self-addressed envelope. Thank you for your assistance with this matter. Please call if you have any questions (522-8594).

Sincerely,

Greg Steckler, P.E.
Project Manager

Enclosure: Project Site Map, Wetland Map

[X] The Department of Fish, Wildlife and Parks has reviewed the letter and enclosures and has no comments.

Signature

STAHLY ENGINEERING & ASSOCIATES, INC. EST. 1970
www.seaeng.com
Engineers and Land Surveyors
851 Bridger Drive, Suite 1, Bozeman, MT 59715 | phone: 406-522-8594 | fax: 406-522-9528

February 1, 2018

State Historic Preservation Office
1410 8th Ave.
PO Box 201202
Helena, MT 59620

RE: Review Request for Hardin, Montana Wastewater Project

Dear Regulator:

With this letter I am requesting a review and written response identifying possible impacts and requirements resulting from a proposed wastewater treatment upgrade project located at the Hardin, Montana wastewater treatment facility.

The project will consist of constructing additional wastewater treatment appurtenances and improving existing facilities. The new treatment appurtenances will be constructed at the existing wastewater treatment facility site as outlined on the attached project site map. Improvements include the following:

1. Surge flow attenuation;
2. New process controls;
3. New flow monitoring (influent, effluent, and return activated sludge);
4. New headworks facilities (including grease mitigation, grit removal, and screening equipment);
5. New facility water supply;
6. Possible expansion of the oxidation ditch;
7. Automated dissolved oxygen;
8. Foam control/mitigation;
9. New return and waste activated sludge pumps;
10. Secondary clarification upgrades to prevent freezing;
11. Installation of a redundant aerobic digestor blower (likely including expansion of the blower building);
12. Backup disinfection;
13. A building to house primary and backup disinfection channels and equipment;
14. A backup generator for critical systems;
15. Pumper truck acceptance.

The location of the proposed improvements is shown on the attached maps. The new treatment appurtenances will be constructed on land owned by the City of Hardin and no additional land will be needed. However, the treatment site is located on the Crow Indian Reservation. The proposed improvements will be designed in accordance with Montana DEQ design guidelines and other regulations as appropriate.

This request is required by the 2015 Uniform Application for Montana Public Facility Projects. If you have no comment on this project, please check the box below and countersign at the end of this letter and return to me

in the enclosed self-addressed envelope. Thank you for your assistance with this matter. Please call if you have any questions (522-8594).

Sincerely,

Greg Steckler, P.E.
Project Manager

Enclosure: Project Site Map, Wetland Map

[ ] The State Historic Preservation Office has reviewed the letter and enclosures and has no comments.

_____

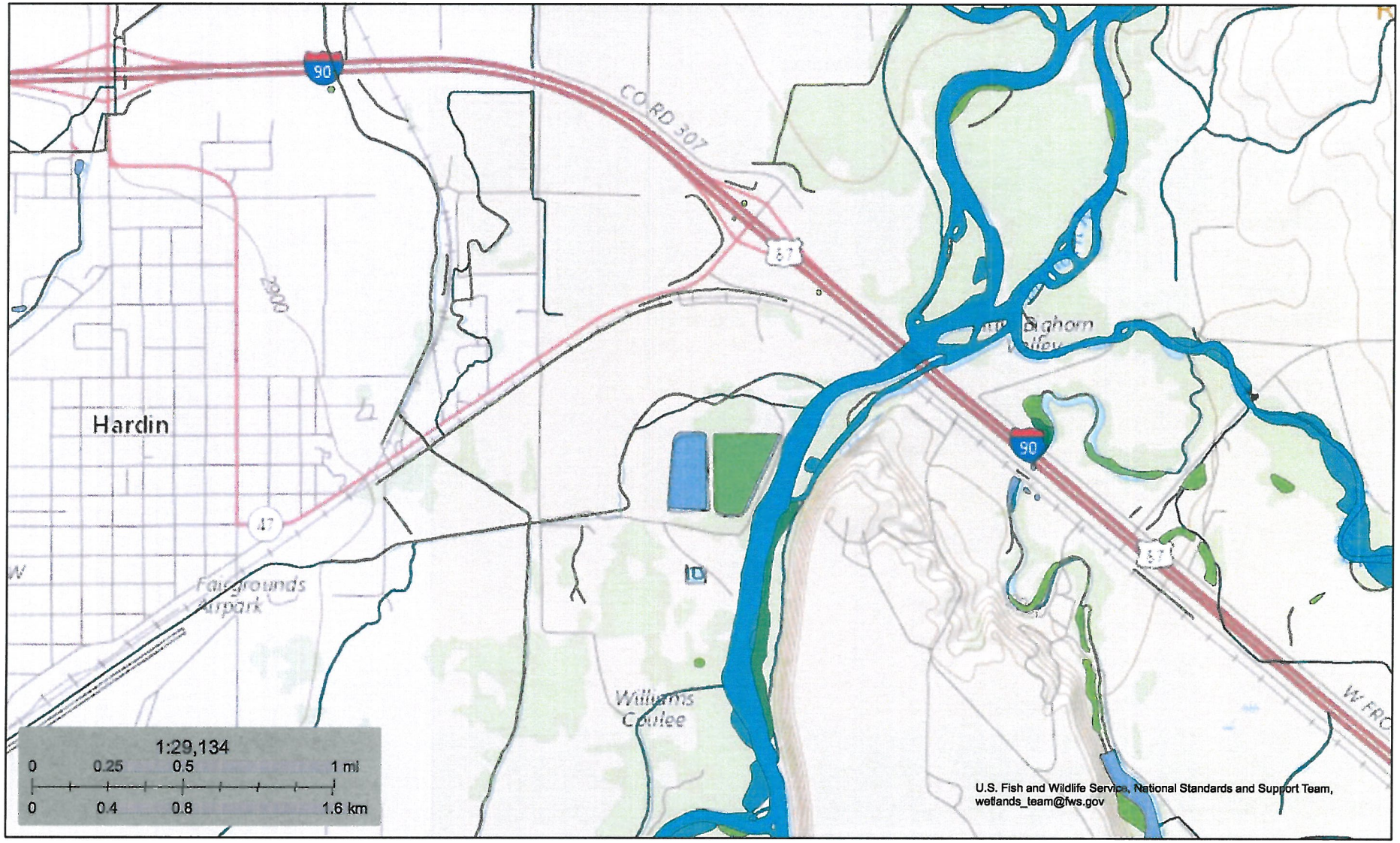
Signature

I-90
PROJECT AREA
THE CROW TRIBE OF INDIANS
HARDIN

U.S. Fish and Wildlife Service

National Wetlands Inventory

Hardin Wetland



January 30, 2018

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

Big Sky. Big Land. Big History.
Montana
Historical Society

Historic Preservation
Museum
Outreach & Interpretation
Publications
Research Center

February 6, 2018

Greg Steckler
Stahly Engineering
851 Bridger Drive, Suite 1
Bozeman MT 59715

RE: HARDIN WASTEWATER PROJECT. SHPO Project #: 2018020506

Dear Mr. Steckler:

It is SHPO's position that any structure over fifty years of age is considered historic and is potentially eligible for listing on the National Register of Historic Places. If any structures are to be altered and are over fifty years old we would recommend that they be recorded and a determination of their eligibility be made prior to any disturbance.

Since this project will be located on the Crow Indian Reservation we would ask that you contact the Tribal Historic Preservation Office for any concerns that they may have. They may be reached at PO Box 159 Crow Agency, MT 59022.

If you have any further questions or comments you may contact me at (406) 444-7767 or by e-mail at dmurdo@mt.gov. Thank you for consulting with us.

Sincerely,

Damon Murdo
Cultural Records Manager
State Historic Preservation Office

File: DEQ/AIR&WATER WASTE MNG/2018

225 North Roberts Street
P.O. Box 201201
Helena, MT 59620-1201
(406) 444-2694
(406) 444-2696 FAX
montanahistoricalsociety.org

STAHLY ENGINEERING & ASSOCIATES, INC. EST. 1970
www.seaeng.com
Engineers and Land Surveyors
851 Bridger Drive, Suite 1, Bozeman, MT 59715 | phone: 406-522-8594 | fax: 406-522-9528

February 1, 2018

The Crow Tribe of Indians
William BigDay, THPO
PO Box 159
Crow Agency, MT 59002

RE: Review Request for Hardin, Montana Wastewater Project

William:

With this letter I am requesting a review and written response identifying possible impacts and requirements resulting from a proposed wastewater treatment upgrade project located at the Hardin, Montana wastewater treatment facility.

The project will consist of constructing additional wastewater treatment appurtenances and improving existing facilities. The new treatment appurtenances will be constructed at the existing wastewater treatment facility site as outlined on the attached project site map. Improvements include the following:

1. Surge flow attenuation;
2. New process controls;
3. New flow monitoring (influent, effluent, and return activated sludge);
4. New headworks facilities (including grease mitigation, grit removal, and screening equipment);
5. New facility water supply;
6. Possible expansion of the oxidation ditch;
7. Automated dissolved oxygen;
8. Foam control/mitigation;
9. New return and waste activated sludge pumps;
10. Secondary clarification upgrades to prevent freezing;
11. Installation of a redundant aerobic digestor blower (likely including expansion of the blower building);
12. Backup disinfection;
13. A building to house primary and backup disinfection channels and equipment;
14. A backup generator for critical systems;
15. Pumper truck acceptance.

The location of the proposed improvements is shown on the attached maps. The new treatment appurtenances will be constructed on land owned by the City of Hardin and no additional land will be needed. However, the treatment site is located on the Crow Indian Reservation. The proposed improvements will be designed in accordance with Montana DEQ design guidelines and other regulations as appropriate.

This request is required by the 2015 Uniform Application for Montana Public Facility Projects. If you have no comment on this project, please check the box below and countersign at the end of this letter and return to me

in the enclosed self-addressed envelope. Thank you for your assistance with this matter. Please call if you have any questions (522-8594).

Sincerely,

Greg Steckler, P.E.
Project Manager

Enclosure: Project Site Map, Wetland Map

[ ] The Crow Tribe of Indians has reviewed the letter and enclosures and has no comments.

_____

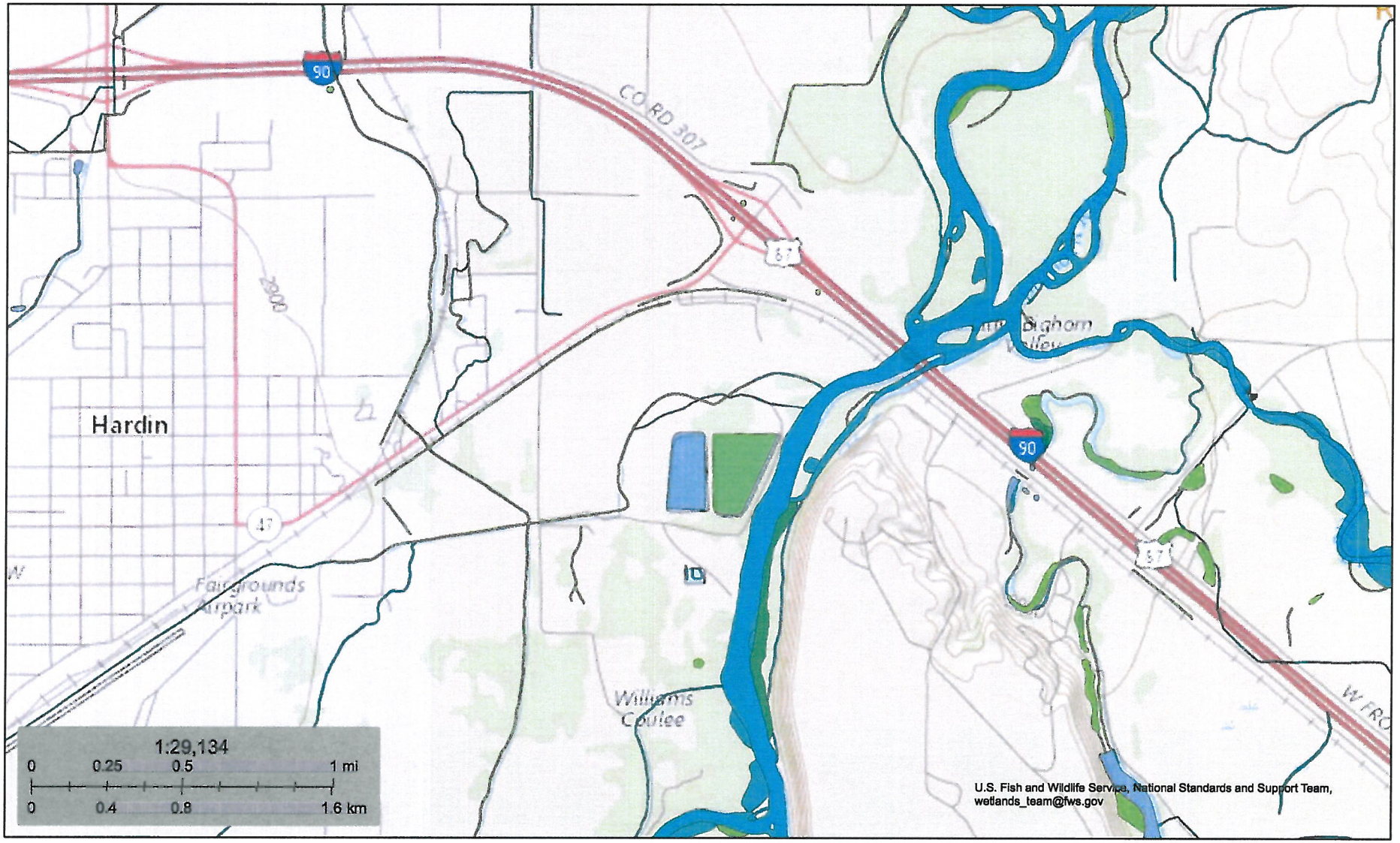
Signature

I-90
PROJECT AREA
THE CROW TRIBE OF INDIANS
HARDIN

U.S. Fish and Wildlife Service

National Wetlands Inventory

Hardin Wetland



January 30, 2018

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

STAHLY ENGINEERING & ASSOCIATES, INC. EST. 1970
www.seaeng.com
Engineers and Land Surveyors
851 Bridger Drive, Suite 1, Bozeman, MT 59715 | phone: 406-522-8594 | fax: 406-522-9528

February 1, 2018

U.S. Fish and Wildlife Service
Ecological Services
585 Shepherd Way
Helena, MT 59601

RE: Review Request for Hardin, Montana Wastewater Project

Dear Regulator:

With this letter I am requesting a review and written response identifying possible impacts and requirements resulting from a proposed wastewater treatment upgrade project located at the Hardin, Montana wastewater treatment facility.

The project will consist of constructing additional wastewater treatment appurtenances and improving existing facilities. The new treatment appurtenances will be constructed at the existing wastewater treatment facility site as outlined on the attached project site map. Improvements include the following:

1. Surge flow attenuation;
2. New process controls;
3. New flow monitoring (influent, effluent, and return activated sludge);
4. New headworks facilities (including grease mitigation, grit removal, and screening equipment);
5. New facility water supply;
6. Possible expansion of the oxidation ditch;
7. Automated dissolved oxygen;
8. Foam control/mitigation;
9. New return and waste activated sludge pumps;
10. Secondary clarification upgrades to prevent freezing;
11. Installation of a redundant aerobic digestor blower (likely including expansion of the blower building);
12. Backup disinfection;
13. A building to house primary and backup disinfection channels and equipment;
14. A backup generator for critical systems;
15. Pumper truck acceptance.

The location of the proposed improvements is shown on the attached maps. The new treatment appurtenances will be constructed on land owned by the City of Hardin and no additional land will be needed. However, the treatment site is located on the Crow Indian Reservation. The proposed improvements will be designed in accordance with Montana DEQ design guidelines and other regulations as appropriate.

This request is required by the 2015 Uniform Application for Montana Public Facility Projects. If you have no comment on this project, please check the box below and countersign at the end of this letter and return to me

in the enclosed self-addressed envelope. Thank you for your assistance with this matter. Please call if you have any questions (522-8594).

Sincerely,

Greg Steckler, P.E.
Project Manager

Enclosure: Project Site Map, Wetland Map

[ ] The U.S. Fish and Wildlife Service has reviewed the letter and enclosures and has no comments.

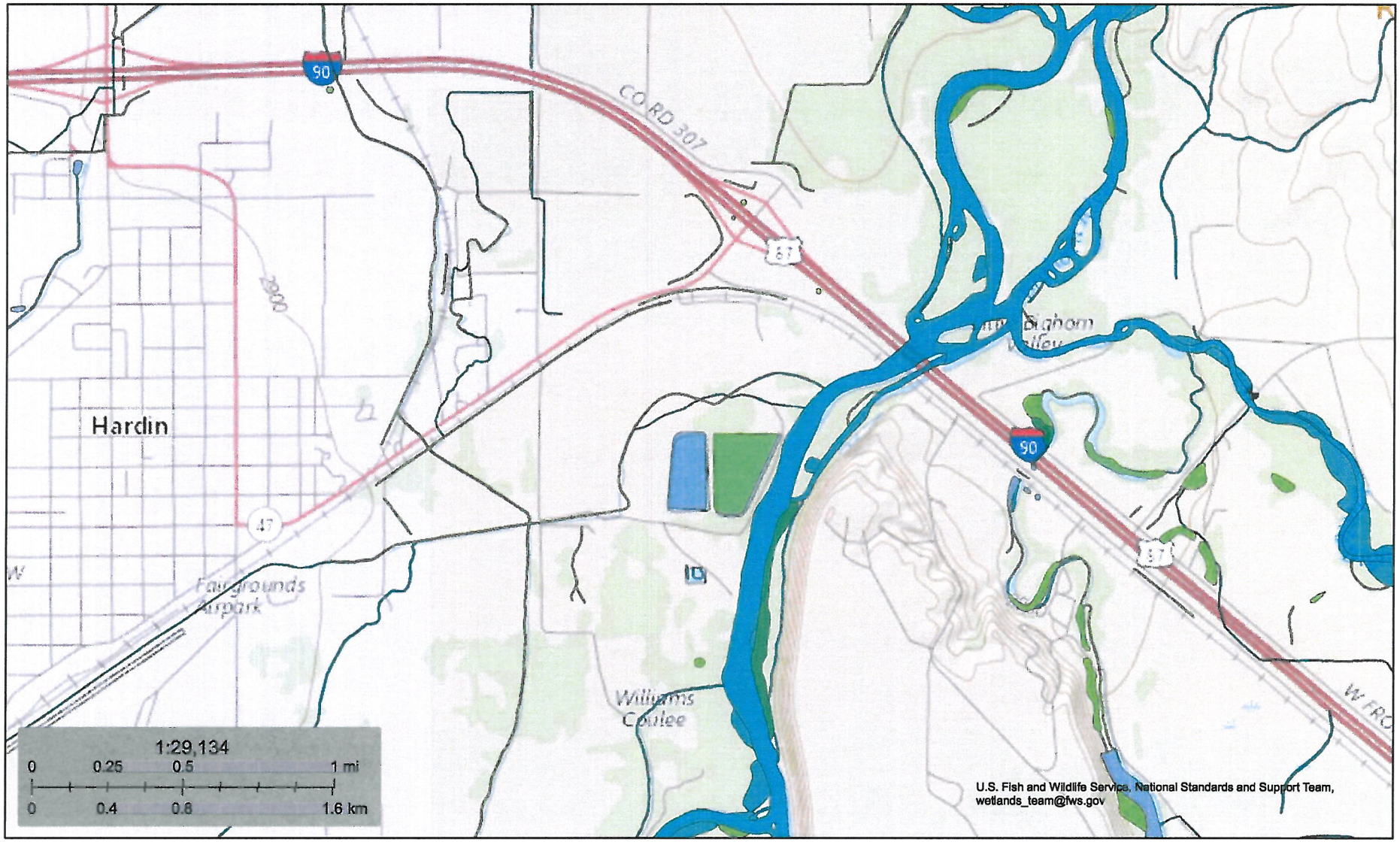
_____
Signature

I-90
PROJECT AREA
THE CROW TRIBE OF INDIANS
HARDIN

U.S. Fish and Wildlife Service

National Wetlands Inventory

Hardin Wetland



January 30, 2018

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Montana Ecological Services Field Office
585 Shephard Way, Suite 1
Helena, Montana 59601-6287

In Reply Refer To:
M.29 Public (I)
06E11000-2018-TA-0235
06E11000-2018-CPA-0047

February 26, 2018

Greg Steckler, P.E.
Stahly Engineering and Associates
851 Bridger Drive, Suite 1
Bozeman, Montana 59715

Dear Mr. Steckler:

Thank you for your letter dated February 1, 2018, requesting U.S. Fish and Wildlife Service (Service) comment on the Hardin Wastewater Treatment Upgrade project. The proposed project will consist of constructing additional wastewater treatment appurtenances and improving existing facilities. The new treatment appurtenances will be constructed at the existing wastewater treatment facility. The proposed project is located on land owned by the City of Hardin within the Crow Indian Reservation. Your letter and maps of the proposed project area were received by our office on February 5, 2018.

Our comments are prepared under the authority of, and in accordance with, the provisions of the Migratory Bird Treaty Act (16 U.S.C. 703 et seq.), Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d, 54 Stat. 250), and the Endangered Species Act (16 U.S.C. 1531 et. seq.). Our comments do not address the overall environmental acceptability of the proposed action. We offer the following comments for your consideration.

Migratory Bird Treaty Act

We have reviewed the provided information on the proposed project and have determined that there could be potential effects to migratory birds. The Migratory Bird Treaty Act (MBTA) prohibits the taking, killing, possession, and transportation, (among other actions) of migratory birds, their eggs, parts, and nests, except when specifically permitted. To the extent practicable, necessary vegetation clearing, grubbing, and filling construction activities should be scheduled so as to avoid and minimize impacts to nesting birds, if present in the project area. If work is proposed to take place in migratory bird habitats that may result in take of migratory birds, their eggs, or active nests, the Service recommends that the project proponent take all practicable measures to avoid and minimize take, such as maintaining adequate buffers, to protect the birds until the young have fledged. Active nests may not be removed. The Service has developed, and continues to revise and develop, general and industry-specific conservation measures for avoiding and minimizing impacts to birds (https://www.fws.gov/birds/management/project-

assessment-tools-and-guidance/conservation-measures.php). We recommend that the proposed project consider and incorporate these measures into project design, construction, and documentation as appropriate.

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (BGEPA) prohibits anyone, without a permit issued by the Secretary of the Interior, from taking bald or golden eagles, including their parts, nests, or eggs. The BGEPA provides criminal and civil penalties for persons who take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof. The BGEPA defines "take" as pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb. "Disturb" means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior. In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagles return, such alterations agitate or bother an eagle to a degree that injures an eagle or substantially interferes with normal breeding, feeding, or sheltering habits and causes, or is likely to cause, a loss of productivity or nest abandonment.

The Service is aware of one known bald eagle nest, active as recent as 2012, and located approximately one mile from the proposed project site. The Service is not aware of the current status of this nest, nor are we aware of any other known bald or golden eagle nests within several miles of the project. If active eagle nests are present within 0.5 mile of the project during construction, we recommend that the proponent comply with seasonal restrictions and construction /development distance buffers specified in the 2010 Montana Bald Eagle Management Guidelines: An Addendum to Montana Bald Eagle Management Plan (1994) in order to avoid/minimize the risk for eagle take.

Threatened and Endangered Species

Based on the location of this proposed project adjacent to an existing municipal setting, we do not anticipate its implementation would result in adverse effects to listed, proposed, or candidate threatened or endangered species, or listed or proposed critical habitat.

Additional Guidance

In addition to coordination with the Service, we recommend coordination with the Montana Natural Heritage Program at 1515 East 6th Avenue, Box 201800, Helena, Montana, 59620-1800. They may be able to provide updated, site-specific information regarding eagle and other raptor nests, as well as all other fish, wildlife, and sensitive plant resources occurring in the proposed project area.

This project should be re-analyzed if new information reveals effects of the action that may affect listed species or designated or proposed critical habitat (1) in a manner or to an extent not considered in this letter, (2) if the action is subsequently modified in a manner that causes an effect to a listed species or designated or proposed critical habitat that was not considered in this letter, and (3) if a new species is listed or critical habitat is designated that may be affected by this project.

If wetlands are impacted by this proposed project, Corps of Engineers Section 404 permits may be required. The Service suggests any proposed or future project be designed to avoid and minimize impacts to wetland areas, stream channels and surrounding vegetation to the greatest extent possible. Direct, indirect and cumulative impacts, along with future activities required to maintain these improvements, should be analyzed.

Thank you for the opportunity to comment on the Hardin Wastewater Treatment Upgrade project. The Service appreciates your efforts to incorporate fish and wildlife resource concerns into your project planning. If you have further questions related to this issue, please do not hesitate to contact Karen Newlon at (406) 449-5225, extension 209.

Sincerely,

for Jodi L. Bush
Office Supervisor

Appendix C

RESOLUTION NO. 2152

A RESOLUTION OF THE CITY OF HARDIN, MONTANA, ADOPTING A FINDING OF NO SIGNIFICANT IMPACT.

WHEREAS, the City of Hardin procured the services of Stahly Engineering and Associates, Inc. to evaluate the City's wastewater treatment options and prepare a Preliminary Engineering Report according to the standards set forth by the State of Montana;

WHEREAS, the Preliminary Engineering Report prepared by Stahly Engineering and Associates, Inc. included an Environmental Assessment of the proposed improvements and recommended a Finding of No Significant Impact;

WHEREAS, the City of Hardin has held a duly advertised public meeting where public comment on environmental issues was requested, the environmental assessment has been available for comment with the City of Hardin;

WHEREAS, the City of Hardin has considered the environmental assessment documentation included in the Preliminary Engineering Report;

NOW THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF HARDIN, MONTANA:

City of Hardin concludes that in accordance with the Montana Environmental Protection Act (MEPA), the City has satisfactorily evaluated the impacts of the proposed project on the environment and concurs with the recommendation and Finding of No Significant Impact. It is the City's opinion that no further assessment is necessary.

The Council further resolves that employees of the City shall have the authority to make any actions necessary to effectively execute this resolution including signing any necessary documents to adopt the Environmental Assessment and the Finding of No Significant Impact.

PASSED AND ADOPTED by the City Council of the City of Hardin, Montana, and APPROVED this 3 day of April, 2018.

YEA VOTES 6 NAY VOTES 0

CITY OF HARDIN

BY: Joe Purcell
Mayor

ATTEST: Michele Dyckman
City Clerk

CITY OF HARDIN OFFICIAL SEAL BIG HORN COUNTY, MONTANA

Montana Department of Commerce
Treasure State Endowment Program
Environmental Assessment

City of Hardin, Montana
Wastewater Improvements

Proposed Action: The proposed project will make improvements to the existing wastewater treatment system as discussed below:

- ☐ Construction of a new headworks including screening, grit removal, and grease removal;
- ☐ Construction of surge flow attenuation;
- ☐ Installation of backup power generation;
- ☐ Installation of new process controls and SCADA;
- ☐ Miscellaneous improvements including flow monitoring, facility water supply, biological treatment expansion/optimization, automated dissolved oxygen, foam control/mitigation, return activated sludge pump replacement, secondary clarification upgrades, a redundant aerobic digestion blower, backup disinfection, an effluent recycle system, a septage receiving station, and associated appurtenances.

UNIFORM ENVIRONMENTAL CHECKLIST

A completed environmental checklist as contained in the Uniform Application for Montana Public Facility Projects, 11th Edition, begins on the next page.

As the engineer that prepared the preliminary engineering report, I, Greg Steckler, P.E. have reviewed the information presented in this checklist and believe that it accurately identifies the environmental resources in the area and the potential impacts that the project could have on those resources. In addition, the required state and federal agencies were provided with the required information about the project and requested to provide comments on the proposed public facility project. Their comments have been incorporated into and attached to the Preliminary Engineering Report.

Engineer's Signature _____ **Date:** 04/03/2018

Key Letter: N – No Impact/Not Applicable **B** – Potentially Beneficial **A** – Potentially Adverse
P – Approval/Permits Required **M** – Mitigation Required

PHYSICAL ENVIRONMENT	
Key N	**1. Soil Suitability, Topographic and/or Geologic Constraints (e.g., soil slump, steep slopes, subsidence, seismic activity)** *Comments and Source of Information:* Soils in the area are suitable for construction of the proposed facilities. The site currently contains similar structures which have functioned without issues. The project site is located in a low-risk seismic zone with peak anticipated accelerations of approximately 2 percent of gravity. Existing ground slopes allow for conventional design and sufficient bearing pressure exists for the structures. Import material may be required for pipe bedding. USGS topo maps, NRCS soil mapping studies, existing treatment system design drawings, and field inspections of proposed construction sites.
Key N	**2. Hazardous Facilities (e.g., power lines, EPA hazardous waste sites, acceptable distance from explosive and flammable hazards including chemical/petrochemical storage tanks, underground fuel storage tanks, and related facilities such as natural gas storage facilities & propane storage tanks)** *Comments and Source of Information:* There are no known hazardous facilities near proposed construction areas. There are power lines and possibly underground utilities that will be called in for location during the design and construction phases. Field Observations, Stahly Engineering

Key Letter: N – No Impact/Not Applicable **B** – Potentially Beneficial **A** – Potentially Adverse
P – Approval/Permits Required **M** – Mitigation Required

Key N	**3. Effects of Project on Surrounding Air Quality or Any Kind of Effects of Existing Air Quality on Project (e.g., dust, odors, emissions)** *Comments and Source of Information:* The construction activities will generate dust during the summer months. These effects can be mitigated with a spray truck when necessary. The wastewater treatment plant is located approximately one mile from high density residential areas, so the occasional odors have not been an issue. Facility maps, Stahly Engineering
Key N	**4. Groundwater Resources & Aquifers (e.g., quantity, quality, distribution, depth to groundwater, sole source aquifers)** *Comments and Source of Information:* Seasonally high groundwater could be encountered during construction. Provisions for groundwater control will be included in the contract documents. A geotechnical study will be conducted prior to commencement of construction activities. The new system will have tank and piping depths similar to existing ones that have worked in the present location for many years. NRCS mapping data, Stahly Engineering, Montana DEQ, Hardin Public Works Department

Key	
B	**5. Surface Water/Water Quality, Quantity & Distribution (e.g., streams, lakes, storm runoff, irrigation systems, canals)** *Comments and Source of Information*: Treated effluent is discharged to the Bighorn River. Effluent disinfection will be made more reliable with the addition of bypass equipment. Grease and grit mitigation will also improve the quality of the treated effluent discharged to the Bighorn River. Surge flow attenuation will prevent the wastewater treatment facility from becoming overwhelmed during rain and snowmelt events; thus, improving the quality of effluent discharged to the Bighorn River. During construction, the contractor will be required to file an erosion control plan and prepare a storm water pollution prevention plan. EPA Statement of Basis, Montana Natural Heritage Program, Stahly Engineering, US Fish & Wildlife Service
N	**6. Floodplains & Floodplain Management (Identify any floodplains within one mile of the boundary of the project.)** *Comments and Source of Information*: The City of Hardin has designated the City Building Inspector as the City Floodplain Administrator. The engineer contacted the Montana DNRC floodplain specialist (Sam Johnson, DNRC Floodplain Program Billings Regional Office) who had no comments or concerns about the proposed project. The section of the Bighorn River adjacent to the wastewater treatment plant is dam-controlled (Yellowtail Dam) and lies up-stream of the confluence with the Little Bighorn River. The project location is reflected in FIRM Panel 3001430375B Big Horn County, Montana, but is not included and has no designation as it lies within the Crow Indian Reservation. Circular DEQ 2 requires wastewater facilities to be protected from the 1% flood. The project will be designed to comply with all Circular DEQ-2 design standards. Montana DEQ Circular-2, Hardin Floodplain Administrator, Montana DNRC Floodplain Section.

Key Letter: N – No Impact/Not Applicable **B** – Potentially Beneficial **A** – Potentially Adverse
P – Approval/Permits Required **M** – Mitigation Required

Key	
N	**7. Wetlands Protection (Identify any wetlands within one mile of the boundary of the project.)** *Comments and Source of Information*: There are no known jurisdictional wetlands known to be present on the existing wastewater treatment plant site or within the specified project boundary. However, wetlands are located within 1 mile of the project site. All construction is to take place on the existing wastewater plant site and on adjacent City-owned property which also does not contain jurisdictional wetlands. Any disturbance of jurisdictional wetlands or placement of fill in state waters requires a Section 404 permit. US Fish & Wildlife Service online mapping, Stahly Engineering, US Army Corps of Engineers.

Key	
N	**8. Agricultural Lands, Production, & Farmland Protection (e.g., grazing, forestry, cropland, prime or unique agricultural lands) (Identify any prime or important farm ground or forest lands within one mile of the boundary of the project.)** *Comments and Source of Information*: There are no areas of prime farmland located within the project boundary. All construction is at the existing wastewater plant site and on an existing City-owned parcel. PER, City of Hardin
Key N	**9. Vegetation & Wildlife Species & Habitats, Including Fish (e.g., terrestrial, avian and aquatic life and habitats)** *Comments and Source of Information*: The proposed construction occurs on existing City-owned property adjacent to existing wastewater treatment facilities. A summertime construction season will mean that any birds or animals entering the site are in their best condition and will be less susceptible to stress. Montana FWP, Montana Natural Heritage Program, Stahly Engineering

Key Letter: N – No Impact/Not Applicable B – Potentially Beneficial A – Potentially Adverse
P – Approval/Permits Required M – Mitigation Required

Key	
N	**10. Unique, Endangered, Fragile, or Limited Environmental Resources, Including Endangered Species (e.g., plants, fish or wildlife)** *Comments and Source of Information*: The Montana Natural Heritage Program identified several species of concern, but does not identify any mitigation measures. The species of concern are listed below: o 2 Amphibian species of concern (Great Plains Toad and Plains Spadefoot) o 20 Bird species of concern (Northern Goshawk, Golden Eagle, Great Blue Heron, Burrowing Owl, Chestnut-collared Longspur, Veery, Greater Sage-Grouse, Yellow-billed Cuckoo, Black-billed Cuckoo, Bobolink, Peregrine Falcon, Pinyon Jay, Cassin's Finch, Loggerhead Shrike, Lewis's Woodpecker, Clark's Nutcracker, Long-billed Curlew, Sage Thrasher, Green-tailed Towhee, and Brewer's Sparrow) o 2 Fish species of concern (Yellowstone Cutthroat Trout and Sauger) o 1 Invertebrate species of concern (Pygmy Mountainsnail) o 9 Mammal species of concern (Townsend's Big-eared Bat, Black-Tailed Prairie Dog, Spotted Bat, Hoary Bat, Black-footed Ferret, Little Brown Myotis, Fringed Myotis, Merriam's Shrew, and Preble's Shrew) o 5 Reptile species of concern (Spiny Softshell, Snapping Turtle, Plains Hog-nosed Snake, Western Milksnake, and Greater Short-horned Lizard) o 17 Dicot Flowering Plant Species of concern (Sweetwater Milkvetch, Barr's Milkvetch, Yellow Beeplant, Nine-anther Prairie Clover, Big Horn Fleabane, Spotted Joepye-weed, Spiny Hopsage, Bush Morning-glory, Nuttall Desert-parsley, Woolly Twinpod, Bur Oak, Persistent-sepal Yellow-cress, Desert Groundsel, Wyoming Sullivantia, Soft Aster, Slim-pod Venus'-looking-glass, and Nannyberry) o 4 Monocot Flowering Plant Species of concern (Geyer's Onion, Heavy Sedge, Tall Dropseed, and Letterman's Needlegrass) The United States Fish and Wildlife Service (USFWS) provided a letter stating that they "do not expect adverse impacts to any (TEC) threatened, endangered, or candidate species. USFWS did ask project personnel to watch for nesting sites for migratory birds, Golden Eagles, and Bald Eagles while providing buffers as required. The USFWS also stated that provisions of both the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) be acknowledged and followed on the project. The Montana Department of Fish, Wildlife, and Parks provided an acknowledgement of "no comment" on the project. Our estimate is that here are no significant impacts for the following reasons: • Agency input above • Effluent quality is improved resulting in decreased impacts to fishes. • No construction in the river and no fill in wetlands or the Bighorn River • Summer construction is when animals are in their best condition and when ground animals have the most mobility. • Birds can fly and can easily avoid construction activities. Montana Natural Heritage Program, Montana FWP, US Fish & Wildlife Service, Stahly Engineering
Key	**11. Unique Natural Features (e.g., geologic features)**
N	*Comments and Source of Information*: None known or thought to be present. Historical agency correspondence, Stahly Engineering site survey.

Key	
B	**12. Access to, and Quality of, Recreational & Wilderness Activities, Public Lands and Waterways (including Federally Designated Wild & Scenic Rivers), and Public Open Space** *Comments and Source of Information*: No impacts to access or quality of recreational and/or wilderness activities is expected. The quality of the Bighorn River will be improved providing a benefit to resident fishes, and river users such as irrigators and recreationalists. Stahly Engineering
HUMAN POPULATION	
Key N	**1. Visual Quality – Coherence, Diversity, Compatibility of Use and Scale, Aesthetics** *Comments and Source of Information*: The proposed project is in or directly adjacent to existing wastewater treatment areas. The existing wastewater outfall terminal structure may be visible to river floaters. Stahly Engineering

Key Letter: N – No Impact/Not Applicable **B** – Potentially Beneficial **A** – Potentially Adverse
P – Approval/Permits Required **M** – Mitigation Required

Key	
N	**2. Nuisances (e.g., glare, fumes)** *Comments and Source of Information*: A properly operated wastewater facility does not produce nuisance conditions. Stahly Engineering
Key N	**3. Noise – suitable separation between noise sensitive activities (such as residential areas) and major noise sources (aircraft, highways & railroads)** *Comments and Source of Information*: The proposed facilities should not be a significant source of noises. Some temporary increases should be expected during construction. Stahly Engineering
Key N	**4. Historic Properties, Cultural, and Archaeological Resources** *Comments and Source of Information*: No impacts expected. Montana State Historic Preservation Office, Stahly Engineering

Key	
B	**5. Changes in Demographic (population) Characteristics (e.g., quantity, distribution, density)** *Comments and Source of Information*: Implementation of the project will provide the wastewater treatment capacity needed by the community to grow as economic conditions require. Stahly Engineering
N	**6. Environmental Justice – (Does the project avoid placing lower income households in areas where environmental degradation has occurred, such as adjacent to brown field sites?)** *Comments and Source of Information*: The project does not locate or cause the location of any lower income households into unacceptable areas. Stahly Engineering

Key Letter: N – No Impact/Not Applicable **B** – Potentially Beneficial **A** – Potentially Adverse
P – Approval/Permits Required **M** – Mitigation Required

Key	
B	**7. General Housing Conditions - Quality, Quantity, Affordability** *Comments and Source of Information*: The system upgrades will provide capacity to support the future growth and development of the community which in turn provides more economic opportunity for local residents. Stahly Engineering
N	**8. Displacement or Relocation of Businesses or Residents** *Comments and Source of Information*: No businesses or residences will be relocated. Stahly Engineering
B	**9. Public Health and Safety** *Comments and Source of Information*: Implementation of this project will improve the quality of discharged effluent to the Bighorn River. Stahly Engineering

Key	
N	10. **Lead Based Paint and/or Asbestos** *Comments and Source of Information*: No impact expected. The City Public Works Department indicates no hazardous materials exist at the proposed construction site. The contractor will be required to take normal precautions when demolishing any old facilities. Public Works Department, Stahly Engineering
Key N	11. **Local Employment & Income Patterns - Quantity and Distribution of Employment, Economic Impact** *Comments and Source of Information:* The construction phase will provide numerous temporary positions. Stahly Engineering

Key Letter: N – No Impact/Not Applicable **B** – Potentially Beneficial **A** – Potentially Adverse
P – Approval/Permits Required **M** – Mitigation Required

Key	
B	12. **Local & State Tax Base & Revenues** *Comments and Source of Information*: Construction activities will increase the tax base temporarily Stahly Engineering
Key N	13. **Educational Facilities - Schools, Colleges, Universities** *Comments and Source of Information*: No impacts expected. Stahly Engineering
Key N	14. **Commercial and Industrial Facilities - Production & Activity, Growth or Decline** *Comments and Source of Information*: No impacts expected. Stahly Engineering
Key N	15. **Health Care – Medical Services** *Comments and Source of Information*: No impacts expected Stahly Engineering

Key	
N	**16. Social Services – Governmental Services (e.g., demand on)** *Comments and Source of Information*: No impacts expected. Stahly Engineering

Key Letter: N – No Impact/Not Applicable **B** – Potentially Beneficial **A** – Potentially Adverse
P – Approval/Permits Required **M** – Mitigation Required

Key	
N	**17. Social Structures & Mores (Standards of Social Conduct/Social Conventions)** *Comments and Source of Information*: No impacts expected. Stahly Engineering
B	**18. Land Use Compatibility (e.g., growth, land use change, development activity, adjacent land uses and potential conflicts)** *Comments and Source of Information*: The proposed project will improve the quality of the effluent discharged to the Bighorn River. Stahly Engineering
N	**19. Energy Resources - Consumption and Conservation** *Comments and Source of Information*: The proposed project may consume more electricity than the current system. Stahly Engineering
N	**20. Solid Waste Management** *Comments and Source of Information*: There are no known impacts to the solid waste system other than increased biosolids and screened inorganics that will occur as a result of normal growth. Stahly Engineering
B	**21. Wastewater Treatment - Sewage System** *Comments and Source of Information*: The proposed project upgrades a deteriorating wastewater treatment system and improves local water quality. Stahly Engineering

Key Letter: N – No Impact/Not Applicable **B** – Potentially Beneficial **A** – Potentially Adverse
P – Approval/Permits Required **M** – Mitigation Required

Key	
N	**22. Storm Water – Surface Drainage** *Comments and Source of Information*: No impacts anticipated. The contractor will be required to obtain a storm water permit during construction. Stahly Engineering
B	**23. Community Water Supply** *Comments and Source of Information*: No impacts anticipated. Implementation of this project will improve the quality of effluent discharged to the Bighorn River. Stahly Engineering
N	**24. Public Safety – Police** *Comments and Source of Information*: No impacts anticipated. Stahly Engineering
N	**25. Fire Protection – Hazards** *Comments and Source of Information*: No impacts anticipated. Stahly Engineering
N	**26. Emergency Medical Services** *Comments and Source of Information*: No impacts anticipated. Stahly Engineering
N	**27. Parks, Playgrounds, & Open Space** *Comments and Source of Information*: No impacts anticipated Stahly Engineering

Key Letter: N – No Impact/Not Applicable **B** – Potentially Beneficial **A** – Potentially Adverse
P – Approval/Permits Required **M** – Mitigation Required

Key	
N	**28. Cultural Facilities, Cultural Uniqueness & Diversity** *Comments and Source of Information*: No impacts anticipated. Stahly Engineering
Key N	**29. Transportation Networks and Traffic Flow Conflicts (e.g., rail; auto including local traffic; airport runway clear zones - avoidance of incompatible land use in airport runway clear zones)** *Comments and Source of Information*: No impacts anticipated. Stahly Engineering
Key B	**30. Consistency with Local Ordinances, Resolutions, or Plans (e.g., conformance with local comprehensive plans, zoning, or capital improvement plans)** *Comments and Source of Information*: The proposed improvements are modifications to existing facilities all of which are compliant with local regulations and zoning (where zoning exists). Montana DEQ, City of Hardin
Key N	**31. Is There a Regulatory Action on Private Property Rights as a Result of this Project? (Consider options that reduce, minimize, or eliminate the regulation of private property rights.)** *Comments and Source of Information*: No impacts anticipated. Stahly Engineering

CITY OF HARDIN OFFICIAL SEAL BIG HORN COUNTY, MONTANA

See Additional Required Information Starting on the Next Page

REQUIRED ENVIRONMENTAL QUESTIONS

On a separate piece of paper, please answer the following as they apply to your proposed project:

1. **Alternatives:** Describe reasonable alternatives to the project.

2. **Mitigation:** Identify any enforceable measures necessary to reduce any impacts to an insignificant level.

3. **Is an EA or Environmental Impact Statement (EIS) required?** Describe whether or not an EA or EIS is required, and explain in detail why or why not.

4. **Public Involvement:** Describe the process followed to involve the public in the proposed project and its potential environmental impacts. Identify the public meetings -- where and when -- the project was considered and discussed, and when the City approved the final environmental assessment.

5. **Person(s) Responsible for Preparing:** Identify the person(s) responsible for preparation of this checklist.

6. **Other Agencies:** List any state, local, or federal agencies that have over-lapping or additional jurisdiction or environmental review responsibility for the proposed action and the permits, licenses, and other authorizations required; and list any agencies or groups that were contacted or contributed information to this Environmental Assessment (EA).

Joe Purcell _____ 4-3-18. _____

Authorized Representative
City of Hardin, Montana

Date

CITY OF HARDIN OFFICIAL SEAL BIG HORN COUNTY, MONTANA

Alternatives

The Preliminary Engineering Report provides an Alternative Screening and Evaluation Process which considers all reasonable and economical alternatives for upgrading the existing wastewater treatment facility.

Alternatives considered were:

Headworks Alternatives
H-0: No Action
H-1: Single Mechanical Headworks
H-2: Dual Mechanical Headworks

Treatment Alternatives
T-0: No Action
T-1: Various Sub-System Upgrades
T-2: New Oxidation Ditch
T-3: New ICEAS SBR

Disposal Alternatives
D-0: No Action
D-1: Spray Irrigation

After calculating project costs, operation and maintenance costs, and determining a present value cost, the options were ranked using a matrix scoring process. In conjunction with environmental considerations, the preferred alternatives were selected. Based on this analysis, the City has determined that alternatives H-1, T-3, and D-0 are the best options for meeting both current and future environmental regulations and for providing the necessary capacity for Hardin's future growth.

Mitigation
The checklist provided above finds no significant impacts to the environment resulting from this project. Best management practices (BMP's) will be implemented to prevent dust and storm water runoff during construction. The contract documents will contain these requirements. Sediment control fencing will be placed on the downhill edge of all disturbances. The existing treatment plant and proposed improvements are within the floodplain. However, the adjacent section of the Bighorn River is dam-controlled. The treatment plant area is also protected by existing berms. USF&W has requested that we notify them of any nesting sites for several bird species if encountered during construction. All Circular DEQ-2 regulations for flood risk mitigation will be incorporated into the design. The selected alternative has no impacts to wetlands due to the project location which is inside an existing wastewater treatment plant site. The improved effluent quality reduces any impacts to fish and other aquatic species. Birds, ground animals, and wildlife visiting the site could be temporarily impacted during construction, but this is not expected due to their mobility—especially during the warmer summer months. There is no requirement for a cultural resource at this time. However, if cultural relics are encountered during construction, the Montana Historical Preservation Office will be contacted.

Is an Environmental Assessment (EA) or Environmental Impact Statement (EIS) required?

The Montana Environmental Policy Act requires than an environmental review be performed whenever a state agency takes an action; whenever that action is not exempt or excluded from MEPA; and whenever the action may impact the human environment. As this project is not anticipated to have a significant adverse effect, an EA

is adequate for this project and it is recommended that the City adopt this recommendation.

Public Involvement

The Preliminary Engineering Report (PER) process included a public participation effort that began in 2018. The findings of the PER were presented to the City Council at a noticed public meeting on March 20, 2018. The City Council members attended the meeting.

The agenda for this public meeting was to discuss:

a) The condition and capacity of the existing system
b) Existing and future discharge permit requirements
c) Design alternatives
d) Project Costs
e) User Rate Impacts
f) Environmental considerations
g) Project implementation

The conclusions of the City Council were:

a) The existing system is aging, failing, and needs to be upgraded.
b) A new ICEAS SBR system including upgrades/replacement of related support facilities was the best alternative for moving forward,

The availability of the Draft Uniform Environmental Checklist was advertised in the local newspaper starting on March 8, 2018 and continuing as required by TSEP requirements. Comments were accepted orally at the hearing and were allowed to be submitted in writing to cityclerk@hardinmt.com or 406 North Cheyenne, Hardin, MT 59034 before March 20, 2018 at 4:00 pm. None were received. A public hearing was held on March 20, 2018 at 6:45 pm in the City Council Chambers to discuss the PER and the EA. No comments on the EA were received. The City Council approved the Environmental Assessment at the following Council meeting on April 3, 2018. Meeting minutes and other documentation can be found in the appendices of the PER.

Person(s) Responsible for Preparing

Greg Steckler, PE - Project Engineer at Stahly Engineering

Other Agencies

Army Corps of Engineers
Environmental Protection Agency (EPA)
Montana Department of Environmental Quality (MDEQ)
Department of Natural Resources and Conservation (DNRC)
Department of Fish, Wildlife and Parks (FWP)
State Historic Preservation Office (SHPO)
The Crow Tribe of Indians – Tribal Historic Preservation Office (THPO)
U.S Fish and Wildlife Service (USFWS)

Appendix D

GROWTH MANAGEMENT PLAN

HARDIN, MONTANA

2009

HARDIN BIG-HORN CITY-COUNTY PLANNING BOARD

Tom Zelka, Chair

Cyndy Maxwell

Carla Colstad

Debbey Warren

Verna Santistevan

Jim Eshleman

Michael Martinsen

Linda Greenwalt

Bill Hodges

Gloria Menke, Administrative Assistant
Cal Cumin, AICP, Planner

HARDIN ~~TOWN~~ COUNCIL

Mayor Ronald E. Adams

Carla Colstad

William Hert

Kenton Kepp

Harry Kautzman

William Stobaugh

Harry Steinmetz, Jr.

BIG HORN COUNTY COMMISSIONERS

John Doyle, Chair

John Pretty On Top

Chad Fenner

GROWTH MANAGEMENT PLAN
HARDIN, MONTANA

TABLE OF CONTENTS

	Title	Page
1.	INTRODUCTION AND GOALS AND OBJECTIVES	1
2.	PLANNING AREA BACKGROUND AND SETTING	3
3.	POPULATION	12
4.	ECONOMY	16
	HOUSING	29
5.	LAND USE	34
6.	TRAFFIC CIRCULATION	56
7.	UTILITY INFRASTRUCTURE AND PUBLIC FACILITIES RECOMMENDATIONS	65
8.	PARK AND RECREATION	78
9.	IMPLEMENTATION AND RECOMMENDATIONS	83
10.	EVALUATION AND REVISION PROVISIONS	95
11.	LOCAL INTERGOVERNMENTAL COOPERATION	96

1. INTRODUCTION AND COMMUNITY PRIORITIES

STATISTICS

Latitude: 45.717623
Longitude: -107.618685
Elevation: 2902 feet
Persons per household: 3.34
Population: 3406
Households: 1411
Income per household: 73% of national average
Average house value: 63% of national average
Urban vs. Rural population: 74.3%
Married couples with children: 54.4%
Married: 59.3%
Speak only English: 82.3%
From out of state: 62.7%
Foreign born: 1.5%
Moved in the last 5 years: 50.1%
Work at home: 2.6%
Average travel time to work: 20 minutes
People enrolled in school (to gr 12): 30%
People with a Bachelor's degree or higher: 11.9%
People in the military + veterans: 20.6%
Unemployment: 9.2%
People below poverty line: 26.9%
Number of vacant housing units: 9.8%
Urban vs. rural housing: 74.7%
Homes owned by occupant: 63.2%
Rooms per home: 5.2
Detached homes: 67.6%
Median year structures were built: 1968
Median rent: 101% of national average
Rent as % of income: 25.1%
Median home owner cost: 80% of national average
Home owner cost of income: 20.7%

---Source: US Govt. Census 2000 (www.pikpuk.com)

In May 2008 the City of Hardin prepared a consultant-administered Needs Assessment and Income Survey and ultimately received 349 responses. The survey consisted of 45 questions taken from formats suggested by funding agencies as well as questions of particular concern to Hardin and covering a broad spectrum of issues; the opportunity to make other comments was also included in the survey-questionnaire format.[1]

At the end of the survey, the results were summarized with the question, "Please indicate what you feel should be the top five priorities for the County or City to improve on in the Hardin area?" The results are as follows in order of priority:

1. Police protection
2. Attracting new business
3. Drug control
4. Streets-road repair
5. School-quality of education
6. Recreation-teen activities
7. School-structural repairs
8. Animal control
9. Wastewater
10. Sidewalks, curbs and gutters

The 2003 Growth Management Plan for the City also included a survey of the civic interests of the populace. Of the findings of that survey, the importance of addressing wastewater and emergency services survive in the top priorities of the respondents.

[1] Great West Engineering

2. PLANNING AREA BACKGROUND AND SETTING

Before the coming of the white man, the area of what is now Hardin and its environs was the home of the Absaroka or Crow Indians. The first white man to enter what is now the Hardin-Big Horn County area was probably Chevalier de la Verendrye who passed through in 1743 seeking a route to the Pacific. About 1804 a few hardy trappers and miners passed through as did William Clark's party of the Lewis and Clark Expedition. The increase of the white population did not start to accelerate until about 1864 and the opening of the Bozeman Trail, a short cut between the North Platte and the Three Forks of the Missouri. Fort C.F. Smith was built just below where Yellowtail Darn is located to protect white emigrants using the trail. In an attempt to appease the Crows, this fort was abandoned in 1868. After the defeat of white troops 15 miles east of Hardin at what is today Little Bighorn Battlefield National Monument, Fort Custer was constructed as a "preventive action" fort at the confluence of the Bighorn and Little Bighorn Rivers. This fort overlooked the present site of Hardin.

The town of Hardin was founded in 1907 and is, accordingly, one of Montana's younger towns. The land on which the community is located was purchased in 1906 by the Lincoln Land Company of Nebraska, and the original plats were surveyed by A. G. Smith and his nephew, Carl Rankin. Nearby Fort Custer was abandoned in 1902. For its 20-year existence, Fort Custer, with its hospital, opera house, military band, and tree-lined avenues, was the general hub of the area; Paddlewheel river boats brought tourists up the river, contributing mightily to area commerce.[1] The C. B. & Q. Railroad Depot which had been located across the Little Big Horn River was moved to its present site on the south side of Hardin; the morse key for the Hardin Station is still "FC" (Fort Custer).

Although several Indian names were considered for the new community, the present name comes from Samuel H. Hardin, an area cattleman and close friend of the president of Lincoln Land Company.

The first lot was sold to M. C. Spencer on May 30, 1907 for $900. The Big Horn Motor Company was located on this site for many years, then a trucking company, and now it is abandoned. Hitching rails accommodated the primary means of travel in early—day Hardin, and broad Center Avenue hosted many a furious and dusty horse race.

In 1910, 63 residents circulated a petition to incorporate Hardin. After a favorable vote, the community became incorporated on January 3, 1911. Tom Mouat became the first mayor and A. N. Mitchell the first city clerk. Big Horn County was formed in 1913 from parts of Rosebud and Yellowstone Counties, and Hardin became the county seat. The County Courthouse was moved five times in Hardin before it located on its present site in 1936.

[1] Carla Colstad, former member, Hardin Centennial Committee, correspondence

As the service area for the surrounding farm and ranch land, Hardin grew and prospered, the population increasing to over 2,500 people. When Carla Colstad's mother moved to Hardin in 1938 there were 3000 people here—about the same today. Fort Smith had a larger population in the 1960's when Yellowtail Dam was under construction. When the Sugar Factory closed the coal mine started hiring. At that time you could drive from Boston to Seattle on Interstate 90; the only part not completed was at Hardin where all traffic halted at the City's lone stoplight. There were three drugstores, department stores, men's clothing store, ladies clothing store, jewelry store, two flower shops, two grocery stores, and a furniture store, all on Center Avenue. When the interstate highway was completed, the stores folded.[1]

In May of 1969 the City of Hardin, by Resolution 869 of the City council, expressed its wishes to conduct a city planning program under enabling legislation granted by the State of Montana in Section 11, Chapter 38, Revised Codes of Montana, 1947. Lawrence Koebbe was mayor and Cedric Bond was city clerk at this time. The inclusion of a portion of the county area surrounding Hardin as allowed under state law was initiated by the Big Horn County Commissioners June 3, 1969. John Besel, Dick Gregory, and C. A. Nayes, Jr. were the commissioners on the board and Joyce Lippert was county clerk and recorder.

The jurisdictional area of the Hardin-Big Horn City-County Planning Board was delineated and a map thereof filed with the County Clerk and Recorder October 7th, 1969. This jurisdictional area includes the incorporated area of the City of Hardin and those areas extending out from the city limits one mile south, two miles north, one mile east, and three miles west.

The Hardin-Big Horn City-County Planning Board was formed and, as was outlined in the Revised Codes of Montana (76-1-201—76-1-224) contained nine members appointed as follows:

-two official members appointed by the city council;
-two citizen members appointed by the mayor;
-two official members appointed by the county commissioners;
-two citizen members appointed by the county commissioners; and
-a ninth member selected by the above eight.

The first official meeting of the Board was held in the Commissioners' Office in the Big Horn County Courthouse June 6th, 1969. Financial planning assistance was obtained from the U. S. Department of Housing and Urban Development under provisions of the 1954 Housing Act as amended.

[1] Carla Colstad, former member, Hardin Centennial Committee, correspondence

2.A. PHYSICAL SETTING

The City of Hardin is located on flat bottom lands and low terraces approximately one mile west of the confluence of the Bighorn and Little Bighorn Rivers. Most of the planning area rests on alluvial deposits. The terrain within central Hardin is very level (which contributes to the drainage problems that affect portions of the community). Elevation in the Hardin area ranges from 2,902 feet east of downtown Hardin to approximately 3,018 feet at the water tower on the bench west of Town.

Hardin is located at the confluence of the Bighorn and Little Bighorn Rivers in southcentral Montana. A sub-regional system of highways extends outward from the City in four directions, and a spur line of the Burlington-Northern-Santa Fe Railroad that extends westward to Billings 50 miles away and southward 55 miles to Wyoming is located at the southern edge of the community. The City's growth has been steady and the development relatively compact. Except for the County Fairgrounds, some light industrial development, and the County Airport, all development has been north of the railroad tracks. Interstate Highway 90 is located immediately north of the existing community, and the river junction lies less than one mile east of the City limits. Although Hardin's growth has traditionally been to the west, the location in 1970 of the interstate highway provided further impetus to continue the growth pattern. There are two accesses from the interstate: one directly north of the City and another three quarters of a mile east of the City limits.

Immediately east and south of Hardin are the borders of the Crow Indian Reservation. The Northern Cheyenne Indian Reservation is about 40 miles east of the community. Custer Battlefield National Monument is 15 miles southeast of Hardin, and the Big Horn National Recreation Area and Yellowtail Dam are located 45 miles to the south.

Big Horn County contains an area of 5,055 square miles and contains a topography of high mountains, deep canyons, rolling hills and plateaus, and relatively level bottom lands. Elevations vary from 2,900 feet along the lower Big Horn River to more than 9,000 feet in the Big Horn Mountains. Mountainous areas cover the southern half of the County and the flatter lands extend northward toward the Yellowstone River valley. Hardin's townsite is in flat bottom land adjacent to the river.

The climate of the Hardin area is continental and semi-arid. Although temperatures can vary considerably both from day to day and season to season, general characteristics of the area are low relative humidity, moderate winds, generally sunny, and relatively light precipitation. Temperatures in the summer easily reach the nineties and often go higher with July generally the hottest month. The low humidity keeps even the hot daytime temperatures bearable and the nights are usually cool. In winter the coldest month is usually January with temperatures below zero not uncommon. Warm Pacific winds, a

welcome change in the cold winter months, are known locally as the Chinook and usually herald short warming trends. Year around winds at Hardin are generally westerly or northwesterly. Precipitation records have been kept at Hardin for 31 years and indicate a normal annual moisture rate of 12.19 inches. In moisture as in temperature, however, there are wide variations--as much as 30 percent over or under the norm. Over the past ten recording years, killing frosts have occurred as early as August and as late as June. The middle of May is the average for the last frost with a frost free growing season averaging about 125 days, sufficient length for most small grains, alfalfa, and hay crops. At one time, 95,000 acres was leased by the Campbell Farming Corporation, mostly in Big Horn County, and was the largest wheat farming operation in the world. Sugar beets, a major product of the area, declined drastically with the closing of the Holly Sugar Refinery at Hardin in 1971. Diversified crops such as corn--silage and grain--and sunflowers have replaced sugar beets, and there is a potential for even more specialized crops such as bird seed and popcorn. Because of the semi-arid climate and the wide moisture variations, irrigation has an important role as a moisture stabilizer and in increasing land productivity. The completion of Yellowtail Dam 45 miles southwest of Hardin has greatly increased the irrigation potential in the area, and is also protection against spring flooding from heavy snow melt. The production of livestock, mainly prime beef, is the contribution of the ranchlands and feedlots around Hardin.

The natural vegetation of the Hardin area is typical of that found in the upper Great Plains area. Short grasses, primarily western wheatgrass and blue gramma, are the dominant varieties. The soils in and around Hardin are covered in detail in the 1972 Comprehensive Plan.

2.B. EARLY SETTLEMENT

For many centuries before the arrival of explorers and settlers of European background, the area around Hardin was visited and intermittently settled by various Indian tribes. The first known European explorer to visit the area was the French explorer Chevalier de la Verendrye who was seeking a trade route to the Pacific. In the early nineteenth century, fur trappers and traders entered the region. In 1803 and 1804, the Lewis and Clark Expedition passed north of the area in their explorations and search for a route to the Pacific.

Apart from early hunters and trappers, most of the non-Indian people who traveled to the Big Horn area in the 1850's and 1860's were enroute to mining areas in western Montana or the Black Hills of South Dakota. In 1864, John F. Bozeman established the Bozeman Trail which provided a route to mining settlements in southwestern Montana. Fort C.F. Smith was established above the Bighorn River in 1866 to protect travelers along the Bozeman Trail**.**

The conflicts between the expanding non-Indian culture and the native Indians resulted in numerous negotiated treaties between the Federal government and the Plains Indian tribes. The most well-known of these conflicts was the Battle of Little Bighorn which occurred in 1876 when Lt. Col. George Custer was dispatched to the Little Bighorn Valley to locate, engage**,** and return Cheyenne and Sioux to reservations**.** After the defeat of Custer at the Battle of Little Bighorn, the Federal government focused more of its resources on defeating the Indian tribes and resettling the Indian peoples to reservation lands. The battle effectively marked the demise of the traditional buffalo cultures of the Great Plains Indians. Fort Custer, one of the fortifications built by the Federal government after the Battle of Little Bighorn, was constructed in 1877 just east of the confluence of the Little Bighorn and Bighorn Rivers overlooking the site of the present City of Hardin.

In the 1880's and 1890's, the area around Hardin was settled by cattle ranchers and later by sheep ranchers. In 1904, tribal lands adjacent to the Yellowstone River and the lower Bighorn Valley were ceded to the Federal government, and in 1906 this area was opened to homesteading. Within the next two decades the area around Hardin was fully settled.

The Town of Hardin was officially founded in 1906 and 1907 when the land on which the community is located was purchased by the Lincoln Land Company of Nebraska**.** The first lot, which is located at the site of what was the to become Big Horn Motor Company, was sold in 1907. At about this time, the original railroad depot, which had been located across the Little Bighorn River, was moved to the present depot site on the south side of Hardin.

In 1911, the City of Hardin was incorporated, and in 1913 Big Horn County was re-configured. Many of the original ranchers in the Hardin area came to Big Horn County via Texas cattle drives. Some arrived from other states to the east and from the declining mining regions to the west**.** As with elsewhere in the Great Plains, the railroad was instrumental in promoting homesteading in the region.

Most of the emigrants to the region came from Nordic and Central European backgrounds. There was a large population of German-Russians who moved into the area at the start of the sugar beet growing era in the early 1900's. After 1937 when Holly Sugar built its refinery north of Hardin there was a significant influx of sugar beet workers from Mexico.

2.C. DRAINAGE AND FLOODING

The major natural drainageways in the Hardin area consist of Whitman Coulee, which is located north of Hardin, and Peritsa Creek and Williams Coulee, which are located west and south of Hardin. Several small intermittent drainageways flow directly into the

Bighorn River. Peritsa Creek, and Williams Coulee drain into the southwest side of Hardin, and overflowing water from these drainages has periodically caused flood damage on both the west and east sides of the City.

There is a channeled floodplain adjacent to the Bighorn River, but most of the flooding in the Hardin area is caused by overflows from the tributary creeks and drainage channels and ground water rising to the surface.

The natural drainage pattern has been extensively modified by man-made drainage irrigation canals and drainage ditches, the largest of which are the Two Leggin Canal located approximately one mile west of Hardin and the Farmers Canal located east of Hardin.

It should be noted that the floodplain and wetland delineation shown on the Environmental Constraints Map herein are from the USDA--Soil Conservation Service (SCS) and reflect historic flooding patterns. Drainage ditch and channel modifications have altered these historic floodplain boundaries. There are no completely accurate contemporary floodplain or wetland maps that reflect the most recent channel modifications.

As new areas are proposed for development, the USDA-SCS office should be consulted on flooding potential.

SOILS

Much of the Hardin area lies on level, poorly-drained silty clay soils underlain by a mantle of heavy clays at depths of 15 to 20 feet. The porous gravel underneath the clay mantle is generally saturated with ground water. These conditions contribute to the poor drainage of the area.

The silty clay soils are formed from alluvial materials deposited by the stream flows. The soils are generally rated as having severe to very severe limitations for private sewage treatment systems and are a major consideration for new subdivisions proposing to use both well water and a septic tank/drainfield system for sewage treatment and disposal.

The soils along the Bighorn River consist of deep and moderately deep loam, silt loam, and sandy loam soils underlain by gravel and sand. The soils in and around Hardin are covered in detail in the 1972 Comprehensive Plan.

2.D. GROUND WATER

The groundwater levels in Hardin vary throughout the area, but in some places ground water is only four feet from the surface. In most places, the groundwater level is less than ten feet below the surface. The water level also fluctuates with the yearly irrigation season. The City has investigated various dewatering strategies to address the high groundwater problems.

The quality of the ground water in the vicinity of Hardin is generally high in total dissolved solids with a considerable concentration of salts and non-carbonate hardness. There are also areas near Hardin where bacteriological contamination of the private water supply is likely due to the use of private septic systems and drain fields in areas with soil conditions unsuitable for private septic systems that rely on soil filtration.

Because of the poor water quality, some of the private water supplies in the Hardin area are not potable and are also unsuitable for some types of industrial processing. Due to these conditions, many water users outside the current service area are desirous of connecting to Hardin's municipal water supply.

2.C. VEGETATION

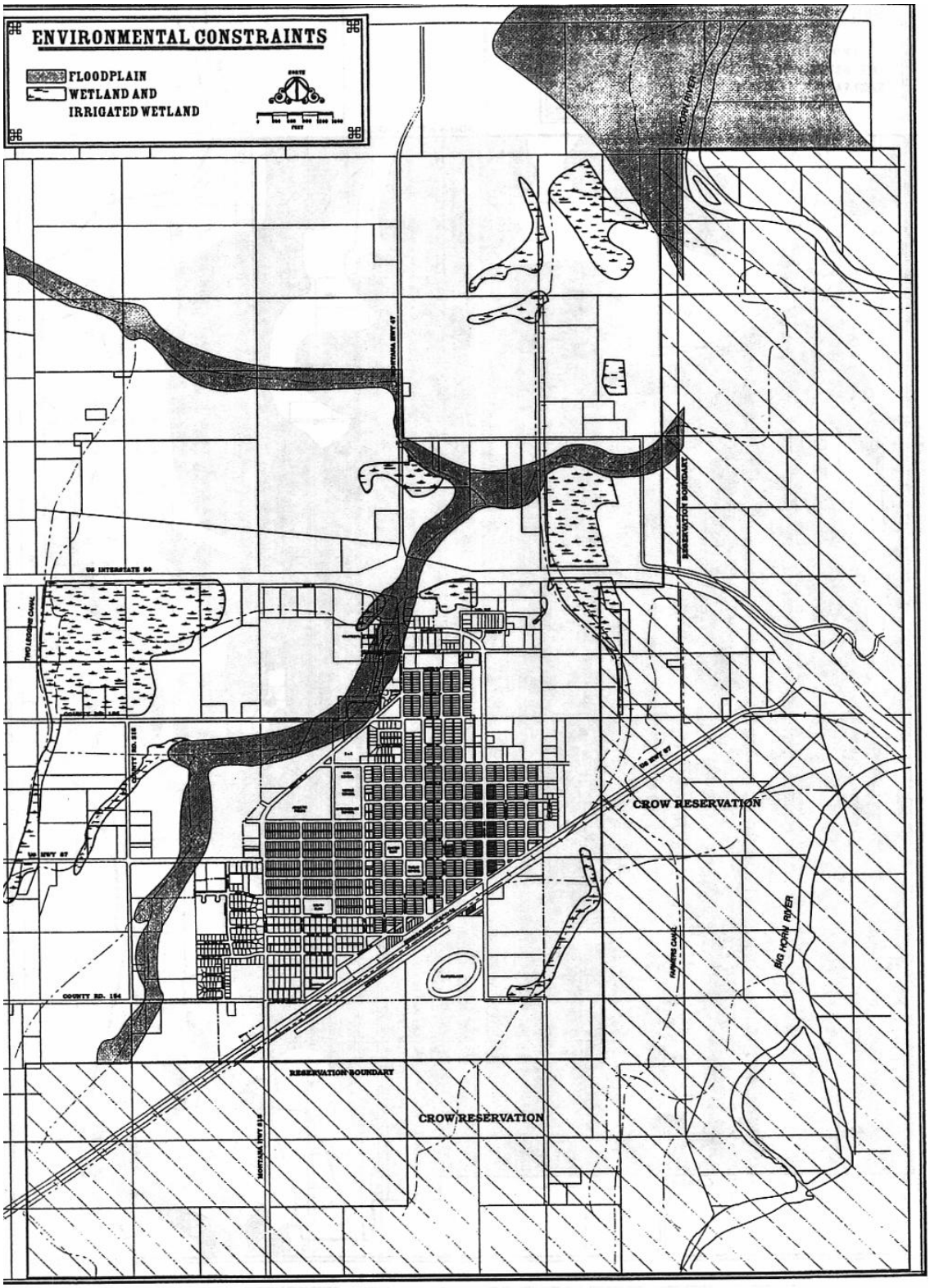
The natural vegetation of the Hardin area is typical of that found throughout the drier sections of the Upper Great Plains. Short grasses, primarily western wheat grass and blue gramma, are the dominant varieties. The less loamy soils, such as those found on the upland areas, support wheatgrasses and sedges. Overgrazed shallow soil bases and abandoned farm areas in the uplands usually revert to weedy, non-native, invader species grasses. Vegetative varieties on the heavier soils include black sage, meadow barley, sunflower, foxtail, and gumweed. Short grasses, primarily western wheatgrass and blue gramma, are the dominant varieties.

The leading cultivated crops in the Hardin area are wheat, barley, sugar beets, and hay.

2.E. FISHERIES

The Bighorn River is an excellent trout stream from Yellowtail Dam downstream to St. Xavier. The completion of the Yellowtail Dam, 45 miles south of Hardin has greatly reduced the heavy sediment loads, specifically silt, carried by the Bighorn River. Because

of this, the aquatic biota in these receiving waters has improved significantly over the past two decades. Nearer Hardin, the Bighorn River becomes a warmer water habitat, due primarily to the influx of sediment from the tributary creeks. Sauger and channel catfish are common in the reach near Hardin along with some walleyes and brown trout.



HARDIN • MONTANA

3. POPULATION

The City of Hardin has maintained a steady to slightly increasing population over the last several decades, Increasing from 2,789 in 1960, 2,940 in 1990, 3,384 in 2000, to an estimated population of 3,514 in 2006; the increase from 2000 to 2006 was 3.8 percent. During this period the population of Big Horn County increased from approximately 10,007 in 1960 to 13,035 in 2006, an increase of 2.9 percent. The Montana Association of Counties currently has Big Horn County at 13,035 people (2008). The Montana Department of Commerce projected the County population to increase to 12,770 by 2010. Based on recent population trends, the City of Hardin population is projected to range from (3,300 low growth scenario) to 3,600 (high growth scenario) by the year 2010.

Table 3-1
Population

	1960	1970	1980	1990	2000	2006	%Chg 2000-6	2010*
Hardin City	2,789	2,733	3,300	2,940	3,406	3,514	3.8	3,603
County	10,007	10,057	11,096	11,337	12,671	13,035	2.9	12,770
Montana				799,065	902,195	946,638	4.9	

Sources: Montana Department of Commerce, Census and Economic Information Center
*Cumin Associates Estimates

3.A. AGE DISTRIBUTION

In 1990 the median age of Big Horn County was 28.0, and the City of Hardin median age was 34.0. This is difference is influenced by the median age on the adjacent Crow Reservation, 25.5--the lowest median age in Montana. The same could be said for those 36.7 percent of the Big Horn County population and 31 percent of the City of Hardin population under 18 years of age. The young population of the Reservation is also reflected in the approximately 9.0 percent of the Big Horn County population and 17.2 percent of the City of Hardin population in the 65 years of age or older category. *The population has grown older since 1990. The median age in 2000 was 29.8 years, up from 28.1 years in 1990. Although data for 2006 is not available for Hardin, the County's percent of those 65 years of age and older went from 8.6 percent in 2000 to 9.4 percent estimated in 2006 by Headwaters Economics, in their analysis of Big Horn County. The latter also, notes that the largest age category is 10 to 14 years old (1,322 people or 10.4*

percent of the total. The age group that has grown the fastest, as a share of the County total, is 50 to 54 years, up 275 people; their share of total rose by 1.7 percent.[1]

Table 3-2
Age Distribution

1990	18-24	25-44	45-64	65+	Median
City of Hardin	247 (8.4%)	778 (26.5%)	550 (18.7%	485 (16.5%)	25.6 yrs
Big Horn Co	1,379 (12.4%)	3,027 (27.3%)	1,756 (15.8%)	901 (7.2%)	33.8 yrs
State of Montana	13.2%	28.1%	18.4%	10.7%	29.0 yrs

2000	18+Years	21+Years	62+Years	65+Years	Median
City of Hardin	2,336 (69.0%)	2,214 (65.4%)	543 (16.0%)	472 (13.9%)	33.8 yrs
Big Horn Co	8,137 (64.2%)	7,595 (59.9%)	1,337 (10.6%)	1,089 (8.6%)	29.8 yrs
Montana	(74.5%)	(70.0%)	(15.8%)	(13.4%)	37.5 yrs

Race

1990	White	American Indian/Alaskan	Asian	Other
Hardin	2,247 (76.4%)	632 (21.5%)	16 (0.5%)	45 (1.5%)
Big Horn Co	5,769 (52.0%)	126 (46.2%)	21 (0.2%)	421(3.7%)
Montana	94.2%	4.8%	0.4%	2.1%
2000				
Hardin	(3,227 counted) 2,107 (65.3%)	1,069 (33.1%)	12 (0.4%)	39 (1.2%)
Big Horn Co	4,486 (35.4%)	7,678 (60.6%)	63 (0.5%)	443 (3.5%)
Montana	90.8%	6.4%	0.6%	2.2%
2006				
Hardin	NA	NA	NA	NA
Big Horn Co	4,614 (35.4%)	7,899 (60.6%)	0.5%	NA
Montana	90.8%	6.4%	0.6%	NA

Gender

Male	1387	100	1592	100
Female	1553	100	1792	100
Median Age			33.8	

*Not Available

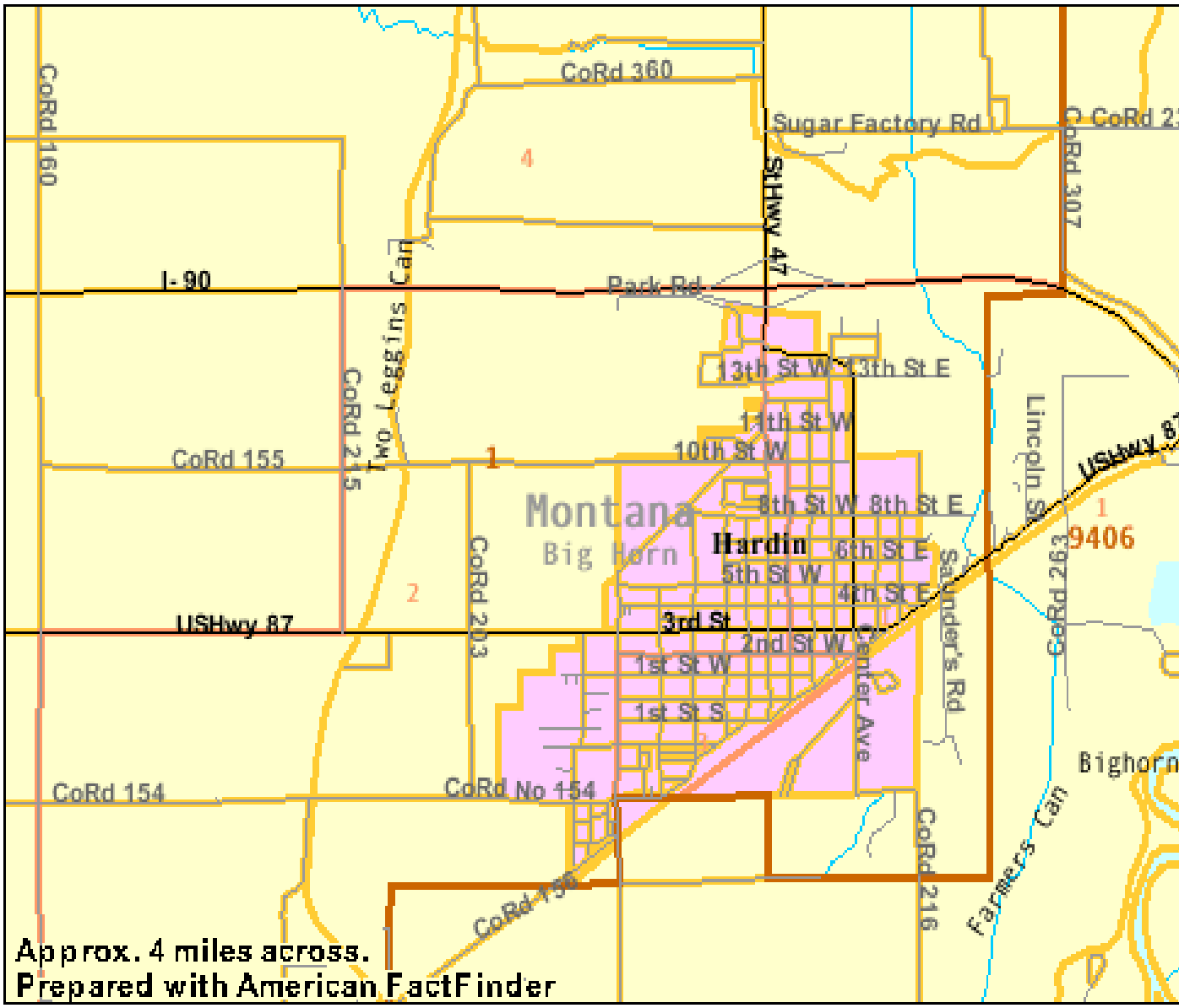
Sources: 1. U.S. Census Bureau, 1990, 2000, and 2006 Estimates
2. Cumin Associates

[1] www.headwaterseconomics.org, November 30, 2007

3.B. RACIAL COMPOSITION

The most significant aspect of recent population trends in Big Horn County has been the sharp increase in birth rates among the Native American population, particularly on the Crow and Northern Cheyenne Reservations and the relatively stable population of the non-Native Americans.

In 1990, the population of Big Horn County was approximately 52 percent White and 46 percent Native American, with approximately 3.9 percent making up other races such as Asian and Hispanic. The City of Hardin is approximately 76 percent White and 22 percent Native American; approximately 2.0 percent of the population consisted of other races In 2000, Hardin was 65 percent, 33 percent Native American, and 1.6 percent others. However, only 3,227 of the total estimated 3,514 people in the City were counted, and the percentages are skewed. Many Native Americans living in Hardin use Crow Agency as their official address. In 2000 in the County the White population dropped from 52 percent to 35 percent, and the Native American population increased over the previous decade from 46 percent to 61 percent of the total population.



HARDIN GENERAL AREA/CENSUS TRACTS MAP

4. ECONOMY[1]

The economy of the Hardin area is based on a combination of commercial and governmental services, agriculture, and tourism. While mining is an important component of the economy in Big Horn County and provides a substantial number of jobs in the area, little of the processing or value-added activity occurs in Hardin.

The largest employers and sources of revenue in the community are primarily government and nonprofit services. In Hardin, the Hardin School District (251 full-time and 30 part-time employees), Big Horn Memorial Hospital/Heritage Acres Nursing Home (155 employees), and Big Horn County (135 full-time and 9 seasonal employees) are the three largest employers.

Morrison-Knudsen Company, Inc. employs approximately 103 workers at the Absaloka coal mine located east of Hardin. Other major employers in Big Horn County are the Bureau of Indian Affairs, Indian Health Service, Crow Tribe, and the U.S. Department of Interior.

4.A. RETAIL SALES AND COMMERCIAL SERVICES

Hardin functions as a sub-regional commercial center serving most of Big Horn County. Goods and services purchased in Hardin include day-to-day groceries, convenience items, clothing, hardware supplies, building materials, and automotive supplies. Area residents travel to Billings or Sheridan, the nearest regional economic centers, for many of their larger purchases and for many specialty items.

The retail and service base in Hardin has remained relatively stable over the past two decades. The non-specialty retail sales and service sector has relatively little potential to expand significantly because of the proximity and easy access to regional centers.

4.B. TOURISM SALES AND SERVICES

The greatest potential for growth lies in retail sales and services and tourism-related businesses. In recent years, tourism has been the fastest growing sector of the local economy--other than governmental services.

Hardin has three geographic areas or commercial nodes that interact with the tourism economy—the highway-oriented commercial services near the Interstate Highway interchanges, the Downtown specialty shopping district, and Highway 313 to Bighorn Canyon National Recreation Area.

[1] See www.headwaterseconomics.org for in-depth analysis of Big Horn County

The highway-oriented commercial services include motels, restaurants, service stations, and entertainment located near the interstate. These services are oriented to serve both through-travelers and destination visitors. Hardin's west end commercial includes two campgrounds, motel, Laundromat, car wash, convenience store, two veterinary clinics, bait shop, pool and pizza parlor, coffee and gift shop, beauty shops, nursing home, and a oxygen and medical equipment supplier.

The Downtown specialty businesses include galleries, specialty clothing shops, restaurants, and gift shops. These businesses are generally dependent on drawing tourists and through-travelers from 1-90 into the Downtown area. Most of the specialty businesses are oriented towards promoting the historic "authentic western" character of Hardin. The preservation of the historic character of the Downtown area is essential to many of these businesses.

All three components of the tourism industry have increased in recent years and represent some of the best opportunities for revenue generation and job creation in the area.

4.C. MANUFACTURING AND INDUSTRY

The area lacks a strong manufacturing or industrial base. The major private-sector employer in the region is Morrison-Knudsen Company, Inc. which operates the Absaloka Coal Mine east of Hardin. Employment and production at the Morrison-Knudsen operation and other mines in Big Horn County are significantly lower than in the mid-1980s. Today the employment is relatively stable.

While many resource economists predict future production increases in eastern Montana's large sub-bituminous coal fields, the prospects for a resurgence of the mining district are dependent on national market conditions. The mining industry will always have "boom-bust" characteristics.

The closure of the Holly Sugar Refinery in the early 1970's resulted in the loss of the largest single source of industrial employment based in Hardin. No major employer has replaced the facility.

Today Hardin and Big Horn County are focusing economic development efforts on attracting manufacturing, resource-processing, and distributive industries into the area. There is high unemployment in the region, particularly on the Reservation, and a large available labor force. Hardin has a full-time staff position focused on attracting viable, sound business into the area. Successful promotion of Hardin for industry is partly dependent on having diverse, readily available, industrial sites with appropriate infrastructure. The Two Rivers Industrial Site--that area around the old sugar refinery--provides excellent heavy commercial and light and heavy industrial sites. These available, City-serviced sites combined with imaginative economic incentives have

attracted the power generating plant with expressed interest in other projects ranging from ethanol processing to coal-to-oil operations.

The Two Rivers Site is removed from residential neighborhoods and located far enough from the City to avoid significant land use conflicts between industrial and non-industrial uses. Most jobs generated in the Two Rivers Site are primary jobs; this means that the dollars made in such jobs are original dollars coming from outside the established local economy. As such, these dollars turn over up to two times more in the local area as expenditures for groceries, housing, food, and similar items are purchased.

Other sites in the Hardin area are suitable for lighter industries and resource processing and discussed later in this Plan.

4.D. GOVERNMENT AND NONPROFIT SERVICES

The government and nonprofit service sectors are the largest source of jobs in the area. The largest employers in Big Horn County are the Bureau of Indian Affairs and tribal facilities on the Reservation. Government and nonprofit services will probably continue to be the largest source of jobs in the community, with the largest employment being in health care and education.

The potential for attracting new government and non-profit services to Hardin may be limited by the fact that many of the health care and social service needs in the region occur on the Reservation and many of the tribal-related services that were formerly located in Hardin and Billings are likely to be located in Crow Agency or Lodge Grass.

Table 4-1
Farm Income and Expenses
(Thousands of Dollars)
Big Horn County

Item	**1990**	**1995**	**1999**
Total Cash Receipts from Marketings ($000)	$83,456	$73,716	$56,426
Cash Receipts: Livestock and Products	$57,810	$43,163	$35,543
Cash Receipts: Crops	$25,646	$30,453	$20,883
Other Income:	$10,247	$8,699	$16,809
Government Payments	$4,382	$3,140	$10,178
Imputed and Misc Income Received*	$5,865	$5,559	$6,631
Total Production Expenses	$80,596	$78,634	$72,024
Total Net Income Including Corp Farms	$14,841	$6,260	$333
Less Net Income of Corp Farms	$2,638	$632	<$50
Total Net Farm Proprietors Income	$12,203	$5,628	$321
Plus Farm Wages and Perquisites	$5,135	$5,131	$4,119
Plus Farm Other Labor Income	$298	$449	$307
Total Farm Labor and Proprietors' Income	$17,636	$11,208	$4,474

*Consists of imputed income, such as gross rental value of dwellings and value of home consumption, and other farm-related income components, such as machine hire and custom work income, rental income, and income from forest products (1978 to present).

Source: Regional Economic Information System, Bureau of Economic Analysis, US Census; May 2001 (Table CA45)

Table 4-2
Gross Income, Expenses, and Net Income
From Farming and Ranching*
(in 000s of 2005 dollars)

	1970	**2005**	**Change**
Gross Income (Cash + Other)	$138,331	$86,401	$51,930
Cash Receipts fr Marketings	$123,995	$72,925	-5%
Livestock & Products	$92,440	$46,949	-12%
Crops	31,555	$25,976	7%
Other Income	$14,335	$13,476	5%
Govt Payments	$10,807	$$9,359	3%
Inputed rent & rent rec'd	$3,528	$4,117	2%
Production Expenses	$100,383	$84,458	
Realized Net Income (Inc-Exp's)	$37,948	$1,943	
Value of Inventory Change	$126	$3,427	4%
Total Net Income (Incl Corp Farms)	$37,781	$5,370	

*Farming includes ranching but not agricultural services such as soil preparation or veterinary services. This table represents farming enterprises and does not reflect income earned by individuals—both proprietors and wage and salary employees who work in farming.

Source: Bureau of Economic Analysis and Headwaters Economics

From 1970 to 2005, 2,468 new jobs were created with the majority of 82 percent of such jobs in the wage and salary employment category (people who work for someone else.) In 1970, proprietors represented 26.4 percent of total employment; by 2005, they represented 23.1 percent. (Proprietors include sole proprietors, partnerships, and tax-exempt cooperatives.) Of the 1,060 proprietors in 1970 the number of nonfarm proprietors was 481 in the County, and the number of farm proprietors was 579. In 2005 of the 1,499 proprietors, 900 were non-farm and 599 farm propritors. In the last 35 years, wage and salary disbursements grew at an annual rate of 2.2 percent, outpacing proprietors' income which shrank at a 3.7 percent.[1]

Transfer payments contributed $14.4 million to Big Horn County in 1970. By 2005, payments had increased to $65.4 million. Welfare represented 20.3 percent of the payments and 4.9 percent of total personal income—up from both 1970 and 1980.

[1] www.headwaterseconomics.org

Table 4-3
Transfer Payments

	1970	2005
Total (in millions of dollars)	14.4	65.4
Retirement, disability insurance Benefit payments	13.1	62.3
Medical payments	1.3	15.5
Income maintenance benefit payments (welfare)	1.2	13.2
Unemployment insurance benefit Payments	0.5	1.6
Veterans benefit payments	1.7	1.0
Federal education and training Assistance payment (not Vets)	0.1	0.8
Other payments to individuals	2.6	1.3
Payments to nonprofit institutions	0.7	2.2
Business payments to individuals	0.5	0.9
Age-related (retirement, disability, Medicare)	6.1	22.9

Souce: U.S. Census Bureau, Bureau of Economic Analysis, Regional Economic Information System

Table 4-4
Firms by Size and Industry 2005

	Total	1-4	5-9	10-19	20-49	50-99	100-249
Forestry, fish, hunting, ag	3	2	1	0	0	0	0
Mining	5	1	1	0	1	0	2
Utilities	4	2	1	1	0	0	0
Construction	22	17	4	1	0	0	0
Manufacturing	3	1	0	2	0	0	0
Wholesale trade	6	4	1	1	0	0	0
Retail trade	40	16	8	11	4	1	0
Trans & warehousing	14	12	0	1	1	0	0
Information	3	2	1	0	0	0	0
Finance & insurance	10	6	1	1	2	0	0
Real estate, rental, leasing	11	7	3	1	0	0	0
Prof, scientific,tech services	15	10	5	0	0	0	0
Admin, spt, waste mgt, remed. Services	4	4	0	0	0	0	0.
Educational services	2	1	1	0	0	0	0
Health care and social assist	18	8	3	2	2	2	0*
Arts, entertain, recreation	13	10	1	0	1	1	0
Accommo, food services	25	8	7	6	0	0	0
Other services (except public Administration	22	20	2	0	0	0	0
Unclassified establishments	1	1	0	0	0	0	0
TOTAL	221	132	40	25	17	4	2

*One between 250-499

Sources: U.S. Census, County Business Patterns
Headwaters Economics

In 2006, the unemployment rate in Big Horn County was 6.2 percent compared to 3.2 percent in the State and 4.6 percent for the Nation. Since 1990, the unemployment rate varied from a low of 6.2 percent in 2006 to a high of 14.0 percent in 1992. Based on Bureau of Economic Analysis, Headwaters Economics estimates that commuting data suggests that the County is an employment hub. (Income derived from people commuting into the County to work exceeds the income from people commuting out.) The net difference represents 7.3 percent of the total income of the County.[1]

[1] Headwaters Economics

Table 4-5
County Wages and Employment 2005

	Employment	% of Total	Avg Annual Wages
Total Public and Private	4,444	100	$30,721
Total Private	2,199	49	$44,038
Goods-Producing	865	19	$56,260
Natural Res & Mining	455	10	$56,325
Ag, For, Fish, & Hunting	70	2	$22,472
Mining	386	9	$62,449
Construction	391	9	$57,634
Manufacturing (Incl Forest)	19	0	$25,886
Service-Providing	1,334	30	$17,973
Trade, Trans, & Util	468	11	$18,415
Information	28	1	$12,006
Financial Activities	100	2	$27,995
Prof & Bus Services	71	2	$24,901
Educ and Health Services	227	5	$21,529
Leisure & Hospitality	387	9	$11,709
Other Services	46	1	$16,631
Unclassified	8	0	$37,389
Total Public	2,244	50	$28,460
Federal Govt	497	11	$47,197
State Govt	50	1	$32,817
Local Govt	1,697	38	$22,838

Source: Bureau of Labor Statistics Quarterly Census of Employment and Wages

Of the major categories, the highest paying sector is Construction, accounting for 17.8 percent of total employment and paying $57,634 annually in 2005. The largest employment sector is Local Government, accounting for 38.2 percent of total employment and paying $22,833 per year in 2005. Goods producing employees were paid an average of $56,260, while service producing employees received an average of $17,973. Wages in the private sector ($33,038) exceeded wages in the public sector ($28,460) by 16.1 percent. This data does not include proprietors or benefits.

Table 4-6
Employment Sector Comparison
2000

Sector	County %	State %
Public administration	15	5
Agriculture, forestry, fishing and hunting	12	1
Educational services	16	9
Health care and social assistance	15	11
Mining	3	0
Arts, entertainment, and recreation	3	2
Utilities	1	1
Construction	7	7
Accommodation and food services	6	6
Real estate and rental and leasing	1	2
Transportation and warehousing	2	4
Other services (except public administration)	3	5
Admin & support & waste management services	1	3
Wholesale trade	1	4
Finance and insurance	2	5
Information	0	3
Retail trade	9	12
Professional, scientific, and technical services	2	6
Manufacturing	1	14

Source: U.S. Census 2000, SF3 Table P49

Table 4-7
Big Horn County Personal Income
by Major Source and Earnings by Industry
(Thousands of Dollars)

Item	1990	1995	1999
Personal Income	$122,713	$150,122	$168,296
Nonfarm	$105,077	$138,914	$163,549
Farm(1)	$17,636	$11,208	$4,747
Population Counted	11,311	12,169	12,573
Per Capita Personal Income (dollars)	$10,849	$12,336	$13,386
Wage and Salary Disbursements	$74,559	$93,669	$107,396
Other Labor Income	$12,702	$17,065	$18,362
Proprietors' Income (Including Farm)(2)	$18,808	$14,177	$10,349
Earnings by Industry:			
Farm Earnings	$17,636	$11,208	$4,747
Non-farm Earnings	$88,433	$113,703	$131,360
Private Earnings	$57,436	$74,277	$84,609
Ag Services, Forestry, Fishing, Others	$1,205	$1,393	$1,618
Mining	$28,580	$29,102	$31,933
Construction	$3,064	$2,578	$4,042
Manufacturing	$924	$1,171	$1,059
Transportation and Public Utilities	$3,172	$4,464	$3,461
Wholesale Trade	$1,413	$1,753	$2,170
Retail Trade	$5,935	$7,763	$8,255
Finance, Insurance, and Real Estate	$1,581	$1,828	$4,217
Services (including educ., bus., & health)	$11,562	$24,225	$27,854
Government	$30,997	$39,426	$46,751

(1) Farm income consists of proprietors' income; the cash wages, pay-in-kind, and other labor income of hired farm workers; and the salaries of officers of corporate farms.

(2) Proprietors income includes the inventory valuation adjustment and capital consumption adjustment.

Source: Regional Economic Information System, Bureau of Economic Analysis, US Census, May 2001 (Table CA05.2)

Table 4-8
Source of Personal Earnings by Industry Classification*
$000

	2000	**2006**
Total Personal Income	202,034	260,315
Per Capita Personal Income (dollars)	15,956	20,449
Farm	6202	12,337 (2005)
Non-Farm	151,807	207,793
Private Earnings	70,887 (2001)	105,907
Mining	30,981	48,524
Construction	2370 (1999)	10,003
Manufacturing	1157 (1999)	883
Wholesale Trade	2461 (2001)	2778
Retail Trade	6352 (2001)	6809
Transportation and Warehousing	5283	2908 (2003)
Information	462 (2001)	591
Finance and Insurance	2507	3462
Real Estate and Rental and Leasing	420 (2001)	801
Professional and Technical Services	2908 (2001)	3525
Administration and Waste Services	321 (2001)	292
Health Care and Social Assistance	***	***
Ambulatory Health Care Service	605 (2001)	825
Social Assistance	642 (2001)	642
Government and Gov't Enterprises	81,436	101,886
Federal, Civilian	29,626	37,810
Military	983	2271
State	1730	61,805
Local	49,097	59,482

*Based on 2002 North American Industry Classification System (NAICS); all dollars are current dollars and not adjusted for inflation.
**Not available
***Not shown to avoid disclosure of confidential information

Source: U.S. Department of Commerce, Bureau of Economic Analysis with calculations and table prepared by the Montana Regional Economic Analysis Project, April 2008

Table 4-9
Full-Time and Part-Time Employment by Industry
(Number of Jobs)

Big Horn County

Item	1990	1995	1999
Total Full and Part-Time Employment	4,850	5,666	6,244
By Type:			
Wage and Salary Employment	3,790	4,324	4,762
Proprietors' Employment	1,060	1,342	1,482
Farm Proprietors	496	561	634
Non-Farm Proprietors*	564	781	848
By Industry:			
Farm Employment	839	798	804
Non-Farm	4,011	4,868	5,440
Private Employment	2,771	3,673	4,161
Ag Services, Forestry, Fisheries, Other	139	174	180
Mining	599	530	511
Construction	173	204	205
Manufacturing	84	83	72
Transportation and Public Utilities	129	155	119
Wholesale Trade	78	67	84
Retail Trade	520	714	727
Finance, Insurance, and Real Estate	144	140	237
Services	905	1,606	2,026
Government and Govt Services	1,240	1,195	1,279
Federal, Civilian	428	439	434
Military	87	73	71
State and Local	725	683	774
State	43	51	49
Local	682	632	725

*Excludes limited partners.

Source: Regional Economic Information System, Bureau of Economic Analysis, US Census; May 2001 (Table CA25)

Table 4-10
Earnings by Place of Work
Part and Full-time
Big Horn County

Item (in thousands)	**1990**	**1995**	**1999**
Earnings by Place of Work	$106,069	$124,911	$136,107
Wage and Salary Disbursements	$74,559	$93,669	$107,396
Other Labor Income	$12,702	$17,065	$18,362
Proprietors' Income	$18,808	$14,177	$10,349
Nonfarm Proprietors' Income	$6,605	$8,549	$10,028
Farm Proprietors' Income	$12,203	$5,628	$321
Total Full/Part-Time Employment	4,850	5,666	6,244
Wage and Salary Jobs	3,790	4,324	4,762
Number of Proprietors	1,060	1,342	1,482
Number of Nonfarm Proprietors	564	781	848
Number of Farm Proprietors	496	561	634
Average Earnings Per Job	$21,870	$22,046	$21,798
Avg wage and salary disburse	$19,673	$21,663	$22,553
Avg Nonfarm Proprietors' Income	$11,711	$10,946	$11,825
Per Capita Personal Income	$10,849	$12,336	$13,386

*Excludes limited partnerships.

Source: Regional Economic Information System, Bureau of Economic Analysis, US Census; May 2001 (Tables CA30 and CA1-3)

In 1999, for every household that made over $100,000, there 25.4 households that made under $30,000. Ten years earlier, for every household that made over $100,000, there were 99.7 households that made under $30,000. (Not adjusted for inflation.)[1] As shown in Table 4-8, personal income in the County increased by 28.8 percent ($58,281,000 total dollars) between 2000 and 2006, while farm earnings totals increased 99 percent (from $6202 to 12,337,000) for the same period. Wholesale and retail trade have remained relatively steady. In Table 4-8, other industries are categorized under non-farm earnings—such as forestry, utilities, and agricultural support services, but the data is too spotty to correlate or show any patterns. From this University of Montana data (Table 4-8), "Educational Services" only provides data for 2005 ($208,000).

[1] www.headwaterseconomics.org

HOUSING

In 1990, the housing stock in the City of Hardin included a total of 1,303 housing units, of which 920 (71 percent) were single-family homes, 183 were mobile homes or trailers, and 200 were apartment units. The mean number of rooms per dwelling unit was 5.2, and there was a median of 2.25 persons per housing unit. Approximately 87 persons live in group quarters, primarily nursing homes. The vacancy rate in 1990 was 16.3 percent for rental units and 14.6 percent for owner-occupied units. Table 4-11 shows the change for 2000. (Table 4-12 shows that, between 2000 and 2007, 39 new dwellings were constructed in Hardin.) The 2008 Needs Assessment for Hardin showed 2.4 people per household but did not indicate whether that was for owner-occupied or rental-occupied units. The Assessment also indicated that 93 percent of respondents owned their own home. In 1990, the median value for owner-occupied units in the City of Hardin was $43,500 and the median rent was $220.

Table 4-11
Hardin Housing Stock

	1990		*2000*		
Item	**Number**	**Percent**	**Number**	**Percent**	**Change**
Households Total	1303	100	1411	100	8.3%
Occupied	1113	85.4	1295	91.8	16.4%
Owner Occupied	708	54.3	757	58.5	6.9%
Renter Occupied	405	31.1	538	41.5	32.8%
Vacant	190	14.6	116	8.2	-38.9%
Seasonal	8	0.6	5	0.4	-37.5%
Persons/Owner Occupied Unit		2.59		2.51	
Persons/Renter Occupied Unit		2.51		2.61	

Source: U.S. Bureau of Census, Housing Census, 2000

Specified owner-occupied housing units median value in 1990 was $53,096 and $61,400 in 2000. In 1990 the percent of median income necessary to buy the median house was 16 percent and 14 percent in 2000. The income required to qualify for the median house was $17,908 in 1990 and $17,350 in 2000. Median household income in 1989 was $25,166 and $27,684 in 2000--adjusted for inflation. Median family income was $27,505 in 1989 and, adjusted for inflation, $31,095 in 1999.[1] Median value of a home in Hardin

[1] Headwaters Economics

in 2000 was $60,300 compared to Montana with a $95,800 value. [1] The median value of home equity is $82,113 (State: $90,186), and the median mortgage debt is $31,444 for Hardin and $35,329 for Montana. [2] Median dwelling age for Hardin is 32 years (Montana 29 years). (The 2008 Needs Assessment indicated an average age of residences of 45 years.) Average household income is $34,686 and $47,318 for Hardin and Montana respectively. The median cost of rent in Hardin in 2000 was $353, and the monthly homeownership cost for people with mortgages was $644.[3]

In 2000 43 percent of single-family homeowners had only a first mortgage. Those holding a second mortgage constituted 16 percent, and those with no mortgage at all—41 percent.[4]

Table 4-12
Single-family New House Construction Building Permits--Hardin

- 1997: 10 buildings, average cost: $71,500
- 1998: 1 building, cost: $72,000
- 1999: 3 buildings, average cost: $73,000
- 2000: 0 buildings
- 2001: 1 building, cost: $76,000
- 2002: 6 buildings, average cost: $81,500
- 2003: 6 buildings, average cost: $81,500
- 2004: 6 buildings, average cost: $122,300
- 2005: 7 buildings, average cost: $86,100
- 2006: 8 buildings, average cost: $125,900
- 2007: 5 buildings, average cost $116,400

Source: www.city-data.com/County/Big Horn-MT

Table 4-13
Residence in 1995

	Number	Hardin	Montana	U.S.
Same house	1426	46.4%	53.6%	54.1%
Different house, same county	1023	33.3%	22.5%	24.9%
Different county, same state	260	8.5%	9.9%	9.7%

Sources: U.S. Census, 2000; ePodunk

[1] US Bureau of Census, Census of Housing, 2000
[2] www. Realestate.com
[3] US Bureau of Census, Census of Housing, 2000
[4] Census of Housing, Ibid.

Table 4-14

Homeowner's Income and Housing Debt--Hardin

	Hardin	**Montana**
Median Dwelling Age	32 years	29 years
Average Household Income	$37,686	$47,318
Median Value of Home Equity	$82,113	$90,186
Median Mortgage Debt	$31,444	$35,329

Source: www.realestate.com (2008—estimated)

The 2008 Needs Assessment found that 58 percent of the respondents felt the condition of housing in Hardin to be average while 31 percent felt it was below average. Fifty-four percent of the respondents felt additional, subsidized, low-cost housing for lower income families or senior citizens is needed. Those feeling that the City needs additional rental housing constituted 61 percent of the respondents. Those indicating that their neighborhood suffered from various forms of blight amounted to 61 percent. In a question concerning additional health service needs in Hardin, the Assessment respondents overwhelmingly (54 percent) indicated a need for assisted living facilities.

In April 2008, the State of Montana prepared a white paper on housing affordability problems for Montana counties—projected out to 2020. This white paper indicated the County had 4,030 households in 2006(?), a figure which would increase by 11.4 percent by 2020. This study is the latest to deal with housing in the area but fails to reflect or correlate with the more comprehensive U.S. Housing Census data.

Table 4-15
500 New Jobs by 2010
Housing Needs

Total dwelling units:	1,750
Single-family (71%):	1,250
Apartments/multi-family (20%):	340
Mobile homes (9%):	160

Source: Cumin Associates

Although only about 40 new housing units were built in Hardin over the past eight years, this timeframe was basically before the City took a very active roll in promoting economic development; the most visible part of this effort is the Two Rivers Port Authority, the tax increment financing district (TIFD) established mostly north of the interstate, and the annexation of that area into the community. The new prison facility just south of the interstate has also been recently constructed. The TIFD industrial district is now a prime location for new industry, and the City's Economic Development Office has been very active in promoting the site and economic development in general. Because the industrial site already has much of the needed infrastructure of paved streets and utilities in place, the area could easily become the location of large new industries in a very short timeframe—industries that will provide good-paying jobs and the demand for community services, the primary one which is housing. If the housing demand is not planned for and met by the City in a timely manner, the workers will drive the 45 minutes to Billings and take with that move all the incidentals that make for a sound economy including housing tax base, groceries, insurance needs, etc.

The Table 4-15 represents the housing needs if 500 new jobs were introduced into the Hardin economy, and the City worked hard to keep most of those workers in Hardin—for example 400. It is assumed each worker would need a place to live. Accordingly 400 new dwelling units (80 percent of the total demand) are added to the current housing totals to amount to a new total of 1,750 dwellings. If the same proportion of single-family to the rest of housing units as was the ratio in 2000 (71 percent) is used, approximately 285 new single-family homes will be needed. The number of trailers allowed in the City is slightly reduced from 2000 levels. The number of additional apartments or multi-family units needed is estimated at 80.

A standard City-sized, single-family, lot in Hardin is 7,000 square feet (50 feet wide by 140 feet long) which are usually found 12 per 300-foot square City block—six on one side with a 20-foot alley separating the lots. An idea of the impact of 400 new jobs with the workers staying in Hardin can be visualized when the 285 single-family units are divided by the average size City block: approximately 24 new blocks of single-family housing—and this does not include the needs for streets and parks! Add to this area the need for multi-plexes or apartments.

Hopefully, through careful planning and subdivision development standards, such housing will be integrated with multi-family units in new, clustered, residential neighborhoods. It is also important for the integrity of the City and its existing services infrastructure to fill in the presently vacant areas of the City and to renovate or replace those areas of the City needed rehabilitation or replacement. It is also important from a marketing position to require quality development in the new subdivisions and housing projects. Such improvements as paved streets, boulevard sidewalks, even lighting should be a standard requirement. If the housing market is viable, such as with the need of 400 new workers, builders and developers can provide the niceties in their projects to make Hardin an attractive place to live. Such good developments can become the springboard

from which other community service improvements can be justified, such as to law enforcement.

It is through the extension of City utilities and streets that City Leaders guide the growth of the community, and it is important for the City to decide where and how it wants to grow prior to having to face new development proposals. This will be addressed further later in this Plan.

If, for some reason, only 100 new housing units are needed over whatever timeframe demand occurs, then approximately 70 of these will be single-family homes and 30 will be apartments or some other sort of related housing or clustered housing. The single-family alone would require about five and a half new city blocks of land, or, as noted above, good infill or replacement projects.

If the need for hundreds of new housing facilities should suddenly occur, such as in 2009 or 2010, the City should consider aggressive and innovative measures to capture the housing demand market as much as possible. Such measures should include using City-owned land such as that north of the prison (also recommended for residential use by the Hardin Industrial Park Master Plan)[1]or the old trailer court in the heart of the City's west end (between Third and Fourth Streets and Lewis and Miles). The City could offer such parcels up for development through the Two Rivers Authority and take a second position to the development financing required to construct the projects. Benefit to the City would come from the increased tax base, the control of the site the position could give them (as to aesthetics, types of housing, quality, etc.), and monetary return as the projects mature, units are sold, or the developer moves the City out of the projects via payments of some sort.

Although current land use is shown on the 2009 Land Use Maps included in the following Section—and which includes vacant areas of Town, the City Planning Office should specifically inventory vacant residential lots in the community as well as analyze potential redevelopment sites. Tax incentives for redevelopment should be considered from the City for such potential redevelopment sites or some other kind of incentives involving providing available community infrastructure services. Cities that only promote new development on their periphery undermine their own physical integrity and, as decay continues in their interior, sprawl continues outward. The latter costs the taxpayer and the City more and more dollars in the continuing extension of everything from fire service to utility lines. In neglecting older, rundown areas of town, the core of a community will remain weak and the ability to provide quality central services difficult.

[1] Hardin Industrial Park Master Plan, January 2006, Interstate Engineering, Inc.; pg. 10

5. LAND USE

Figure 1 shows the land uses in the area of the City-County Planning Board's jurisdiction as last inventoried. As can be readily surmised, over 95 percent of the land is in agriculture use or is lying vacant. Map 1 shows the Board's jurisdiction and certain salient features of the planning area. Figure 2 further refines land use by showing the breakdown for Hardin. Map 2 indicates the location of presently existing land uses in the City. The map illustrates Hardin's compactness and the relative exclusiveness of the residential areas; neighborhoods such as those between Terry and Crow Avenues are almost entirely free of non-residential uses such as commercial establishments. The map also shows the tendency for strip commercial developments along major transportation routes such as the western end of Third Street and the north end of Crawford Avenue.

Table 5-1
Planning Board Jurisdictional Area Land Uses--1972

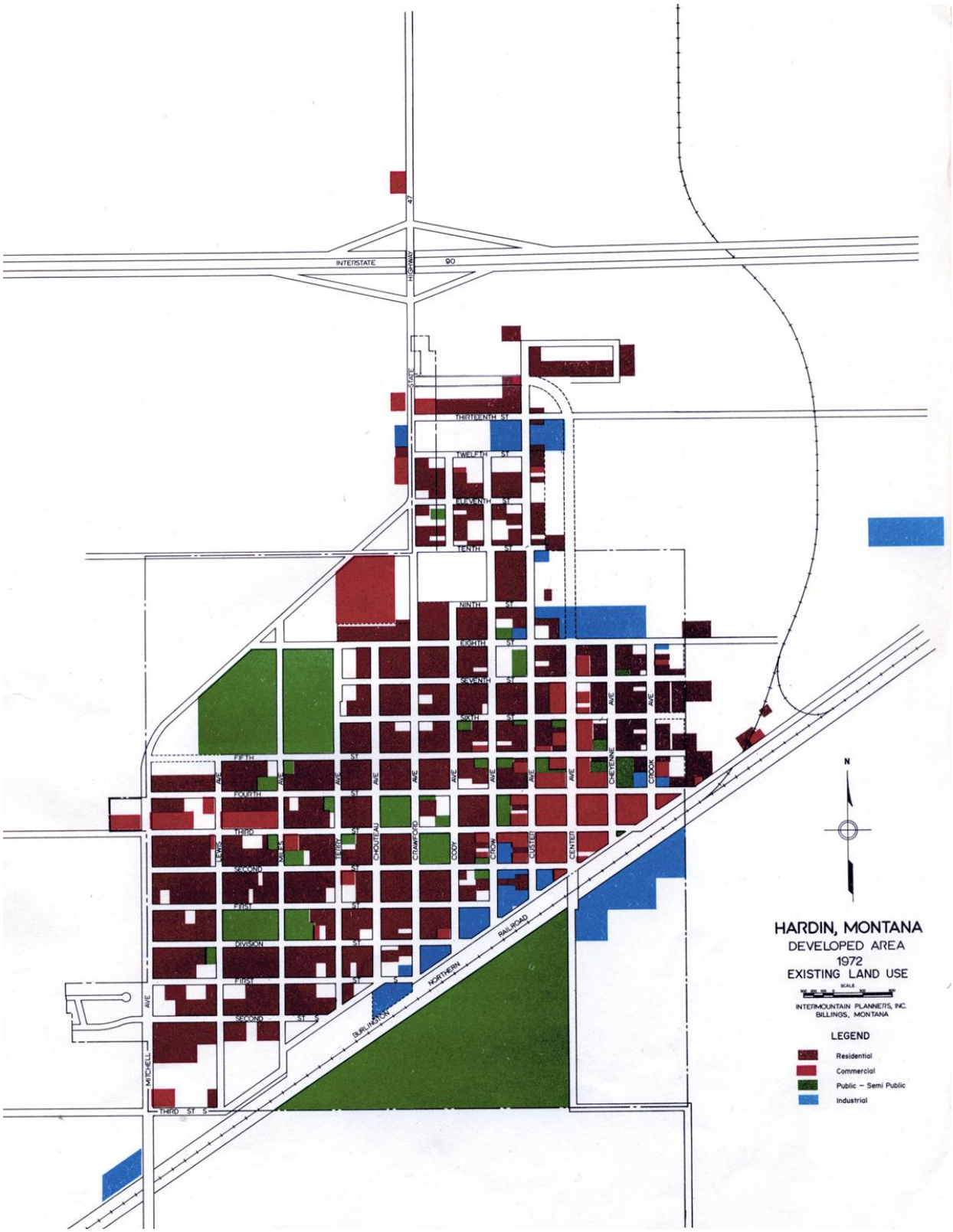
Land Use	Acres	Percent
Commercial	17.102	0.13
Residential	4.935	0.03
Industrial	73.426	0.57
Primary/Secondary Hwys	252.387	1.97
Interstate Hwy	138.348	1.09
Railway	110.101	0.87
Subtotal	596.299	4.66
Agriculture or Vacant	12,203.701	95.43
Total	12,800.000	100.00

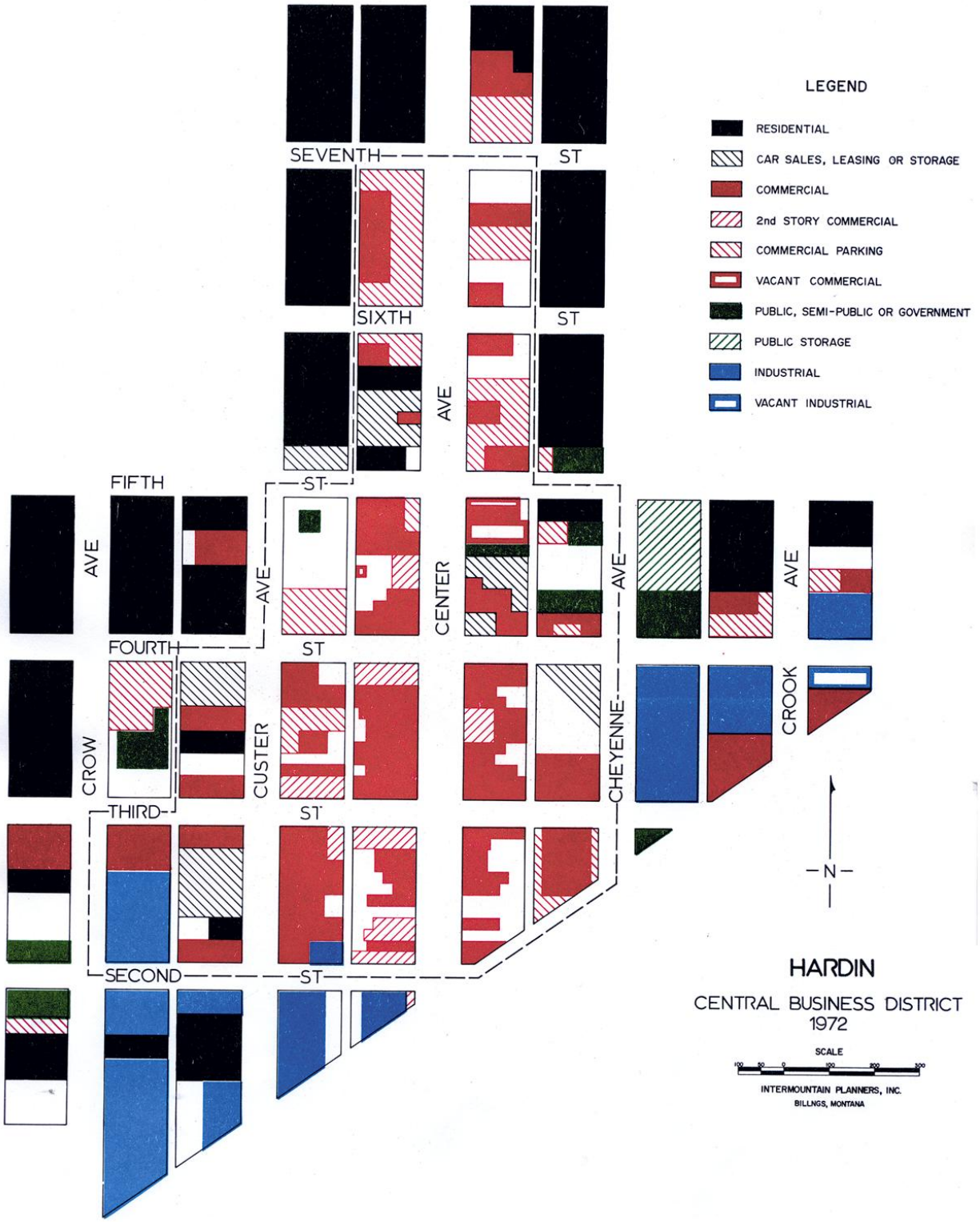
Source: Hardin Comprehensive Plan, 1972

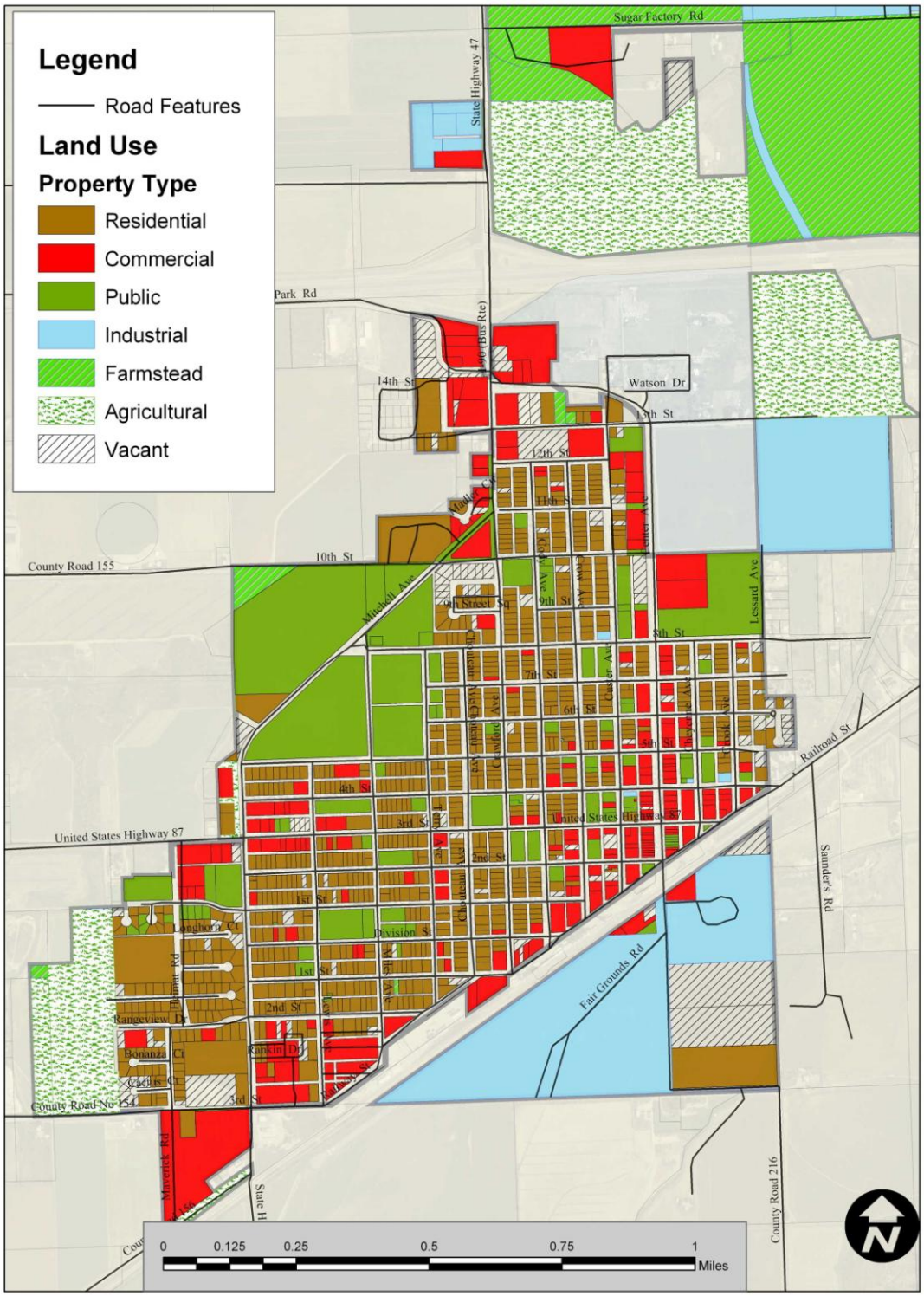
Table 5-2
City of Hardin Land Use--1972

Land Use	Acres	Percent
Street/Alley Right-of-Way	158.7	23.62
Railroad Right-of-Way	33.7	5.02
Residential	160.0	23.82
Vacant	139.4	20.75
Semi-Public	4.6	0.68
Commercial	30.4	4.52
Industrial	7.5	1.12
Public	137.5	20.47
Total	671.8	100.00
LAND USE ANALYSIS OF DEVELOPED AREA—1972		
Street/Alley Right-of-Way	158.7	29.81
Railroad Right-of-Way	33.7	6.33
Residential	160.0	30.05
Semi-Public	4.6	0.86
Commercial	30.4	5.71
Industrial	7.5	1.41
Public	137.5	25.83
Total	532.4	100.00

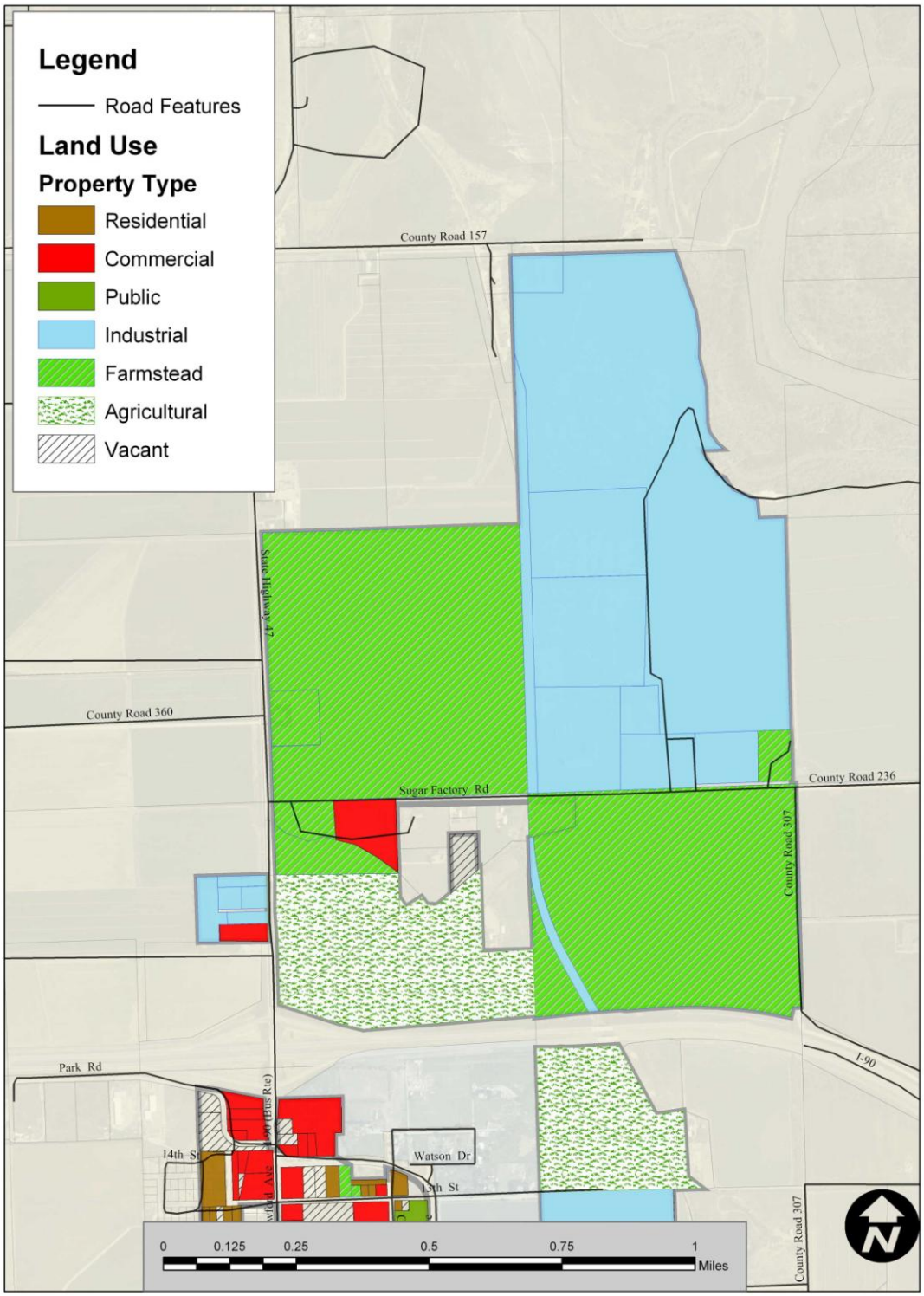
Source: Hardin Comprehensive Plan--1972


HARDIN, MONTANA
DEVELOPED AREA
1972
EXISTING LAND USE
INTERMOUNTAIN PLANNERS, INC.
BILLINGS, MONTANA
LEGEND
Residential
Commercial
Public – Semi Public
Industrial
INTERSTATE
90
HIGHWAY
47
STATE
THIRTEENTH ST
TWELFTH ST
ELEVENTH ST
TENTH ST
NINTH ST
EIGHTH ST
SEVENTH ST
SIXTH ST
FIFTH ST
FOURTH ST
THIRD ST
SECOND ST
FIRST ST
DIVISION ST
FIRST ST
SECOND ST S
THIRD ST S
MITCHELL AVE
LEWIS AVE
TURK AVE
BUTLER AVE
CHOUTEAU AVE
CRAWFORD AVE
COOY AVE
CROW AVE
CUSTER AVE
CENTER AVE
CHEYENNE AVE
CROOK AVE
BURLINGTON NORTHERN RAILROAD
N


LEGEND
RESIDENTIAL
CAR SALES, LEASING OR STORAGE
COMMERCIAL
2nd STORY COMMERCIAL
COMMERCIAL PARKING
VACANT COMMERCIAL
PUBLIC, SEMI-PUBLIC OR GOVERNMENT
PUBLIC STORAGE
INDUSTRIAL
VACANT INDUSTRIAL
SEVENTH ST
SIXTH ST
FIFTH ST
FOURTH ST
THIRD ST
SECOND ST
CROW AVE
CUSTER AVE
CENTER AVE
CHEYENNE AVE
CROOK AVE
N
HARDIN
CENTRAL BUSINESS DISTRICT
1972
SCALE
INTERMOUNTAIN PLANNERS, INC.
BILLNGS, MONTANA



Hardin Land Use 2009



Hardin Land Use 2009

Table 5-3
2009 Land Use

Land use	Acres
farmstead	512.640795
industrial	113.702719
commercial	96.589119
agricultural	84.470259
vacant	79.333925
public	131.000677
residential	216.688018

Source: Cumin Associates with mapping by Global Positions, LLC, Bozeman, Montana

A. PRIME RESIDENTIAL DEVELOMENT AREAS

(1) Southwest Planning Area:

This residential growth area consists of the area south of 10th Street and west of Mitchell Avenue. The major subdivisions are the Westlich Heimat Subdivision and the Dorn Subdivision. There are numerous rural residences outside the City limits on Third Street (Highway 87) and County Roads 215 and 154. The newer housing that has been constructed in the Southwest Planning Area consists of a mixture of single-family and apartment construction. Most of the apartments have been concentrated in the vicinity of 1st Street and Heimat Avenue.

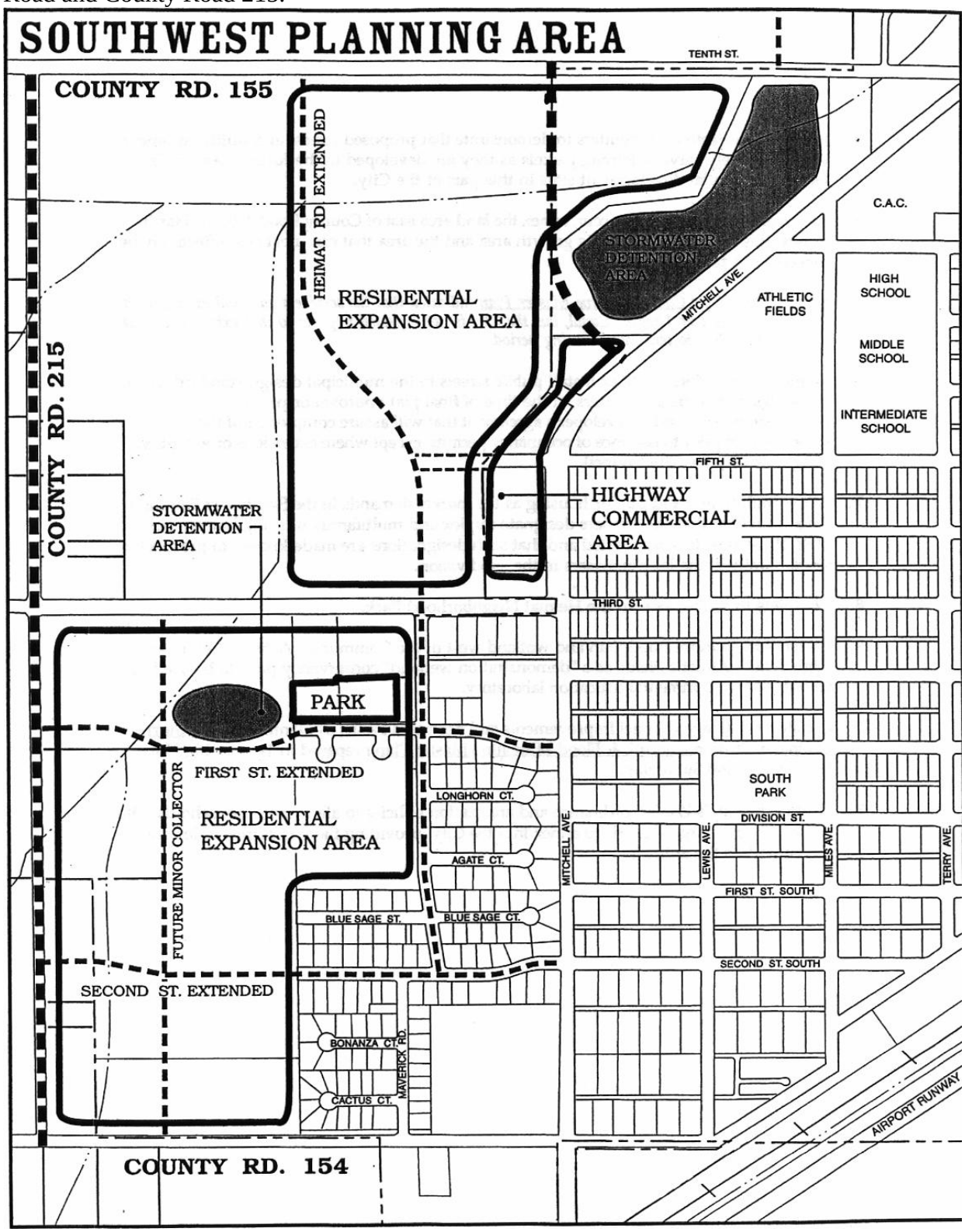
The major deficiency in the development of this area has been the lack of adequate through-streets and the fact that some of the streets have not been paved or brought up to City design standards prior to acceptance. There is ample area for further expansion to the west, and new subdivisions in the area need to assure provision of adequate infrastructure to service this area.

Southwest Planning Area Development Guidelines

(a) Construct 1st Street and Rangeview Drive as minor collectors extending as through-streets between Mitchell Avenue and County Road 215. Both of these streets will need to cross the Northwest Drainage Ditch which drains a broad agricultural area on the west side of the City.

(b) Complete Heimat Road as a north-south minor collector street serving this neighborhood. As the Southwest Planning Area develops, a second north-south minor collector street and through-street will be needed midway between Heimat

Road and County Road 215.



(c) Discourage further unsewered development in this area. Further expansion of septic tank and drainfield sewage treatment systems will make future extension of public utilities more costly and complex.

(d) The land area east of County Road 215 is A probable growth area and one that can most cost-effectively be served with public utilities. Require prospective subdividers to demonstrate that proposed streets and utility easements will adequately serve adjoining parcels as they are developed in the future. Avoid "land-locking" potential development sites in this part of the City.

(e) Require subdividers to either install public streets to the municipal design standard, with required improvements such as water, sewer, sidewalks/curbs/gutters, and lighting, at the time of final plat approval or provide a performance bond and a developer's agreement that will assure completion of the infrastructure prior to issuance of occupancy permits--except where extensions or exceptions are granted by the City Council.

(f) Allow multifamily and duplex housing as the market demands in the Southwest Planning Area, provided that subdividers designate duplex and multifamily housing lots on the plats at the time lots are created and that such designations are made known to prospective single-family-home lot purchasers in the subdivision.

(g) Complete improvements to the Heimat Neighborhood Park.

(h) Preserve the natural floodplain and wetland west of the Community Activity Center and High School Athletic Fields as a "demonstration wetland" conservancy park to be used as an outdoor environmental education laboratory.

(i) Construct drainage channel improvements and detention basins as identified in the Storm Drainage, Erosion Control, & Flood Mitigation Master Plan prepared in 1986.

(j) Modify the City's Zoning Ordinance and annexation policies to allow rural households with horses or other large animals to annex into the City, providing there is sufficient lot area to accommodate the animals.

(2) Northwest Planning Area

The Northwest Planning Area is a mixed-use area located north of 10th Street and west of Crawford Avenue. The area currently contains a variety of uses including highway commercial development along the Crawford Avenue frontage, two older mobile home park and trailer courts, and approximately 20 residences--including both single-family homes and duplexes--in the Wagner Subdivision. There are several rural residences on Park Road and County Road 155.

The area is crossed by a major drainage channel that runs in a generally north-south direction. The Northwest Planning Area lacks a defined street pattern. With the commercial development along the Crawford Avenue frontage, the options for extending through-collector streets are limited. The City needs to take positive steps to assure that sufficient right-of-way corridors are reserved to construct 13th as an east-west minor collector street and 10th Street as a major collector. The vacant land adjacent to the City here is prime residential development, and the City may want to consider some sort of incentives to properly develop this land in the manner it desires.

Northwest Planning Area Development Guidelines

(a) Reserve sufficient right-of-way for the extension of 13th Street as a through-minor collector street.

(b) Reserve sufficient right-of-way for a north-south through-minor collector street approximately one-quarter mile west of Crawford Avenue.

(c) Reserve sufficient right-of-way for a second north-south collector street approximately one-half mile west of Crawford Avenue that would connect 10th Street (County Road 155) and Park Road.

(d) Limit commercial development to those areas currently zoned C-2 Highway Commercial.

(e) Maintain the lots in the 1-90 Park Subdivision as commercial sites.

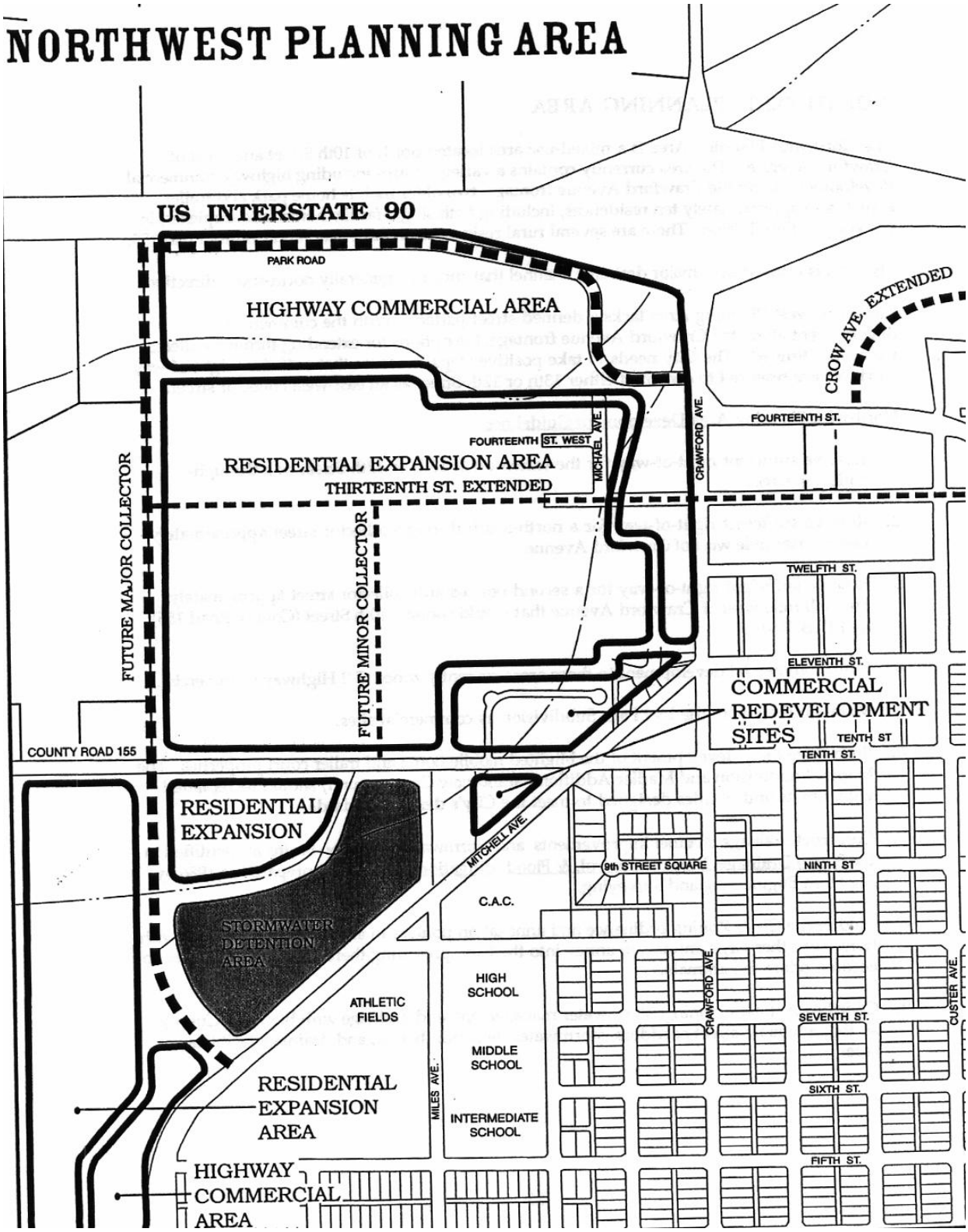
(f) Encourage the redevelopment of the blighted mobile home and trailer court properties. The Madler Subdivision and Madler Addition (Grandview Campground) should be replatted or redeveloped with streets and utilities designed to meet City standards.

(g) Construct drainage channel improvements and stormwater detention basins as identified in the Storm Drainage. Erosion Control. & Flood Mitigation Master Plan.

(h) Modify the City's Zoning Ordinance and annexation policies to allow rural households with horses or other large animals to annex into the City, providing there is sufficient lot area to accommodate the animals.

(i) Coordinate street planning, stormwater management, and drainage with Big Horn County, so that adequate street corridors, stormwater detention basins, and drainage facilities are planned for.

(j). Future developments along 10th Street (County Road 155) need to allow for the extension westward of this street as a major collector, as it will eventually serve the new County Airport about a mile away.


NORTHWEST PLANNING AREA
US INTERSTATE 90
PARK ROAD
HIGHWAY COMMERCIAL AREA
CROW AVE. EXTENDED
FOURTEENTH ST.
FOURTEENTH ST. WEST
MICHAEL AVE.
CRAWFORD AVE.
RESIDENTIAL EXPANSION AREA
THIRTEENTH ST. EXTENDED
FUTURE MAJOR COLLECTOR
FUTURE MINOR COLLECTOR
TWELFTH ST.
ELEVENTH ST.
COMMERCIAL REDEVELOPMENT SITES
TENTH ST
COUNTY ROAD 155
RESIDENTIAL EXPANSION
MITCHELL AVE.
9th STREET SQUARE
NINTH ST
C.A.C.
STORMWATER DETENTION AREA
HIGH SCHOOL
ATHLETIC FIELDS
CRAWFORD AVE.
CUSTER AVE.
SEVENTH ST.
MIDDLE SCHOOL
MILES AVE.
RESIDENTIAL EXPANSION AREA
SIXTH ST.
INTERMEDIATE SCHOOL
FIFTH ST.
HIGHWAY COMMERCIAL AREA

B. OTHER RESIDENTIAL AREAS

There is an area of approximately 17 single-family homes located in the northeast corner of the City north of County Road 24 and east of Center Avenue. This area, called "The Watson Drive Area," is presently outside the City Limits. All of the properties are on private septic systems and wells. Some of the residences have reportedly experienced septic system and water supply problems. As funding becomes available from either State or Federal grants or special assessments, the City will annex this area and provide streets and public utilities constructed to meet the City's design standards.

The City's central residential areas are in pretty good shape but with isolated lots and dwellings in blighted and deteriorated condition, and the City should continue its policy of encouraging the maintenance and improvement of these problems in this central area. The areas that need renovation need to be inventoried and prioritized. Incentives such as waiving review fees or grant-and-aid programs for such rehabilitation need to be utilized.

The most serious concentrations of substandard housing are in the mobile home parks. The older parks lack paved streets and connecting circulation. The City has taken positive action against the worst of these situations. The City needs to continue a strenuous policy of controlling the movement of mobile units around and into the City, and nonconforming mobile home parks should not be permitted to increase the number of units unless the parks are brought into full compliance with the code. The City has also tried to prevent renewing the State license of mobile home parks unless they comply with City codes. This get very complex, because of the overlapping jurisdictions, statutes, and fair and equitable housing policies and issues.

The areas designated as Agricultural and Rural Residential on the Land Use Plan Maps are areas outside the City limits that would be costly to serve with municipal utilities and are not likely to be annexed in the near future. While these areas are outside the regulatory jurisdiction of the City, the City should support the City-County Planning Board not approving land divisions and development that would be likely to result in septic system failures or have inadequate potable water supply. The area should generally be reserved for agricultural production and large-lot rural residences. Minimum lot sizes should be five acres.

General Residential Development Guidelines

(a) Preserve the quality and property values of existing residential neighborhoods.

(b) Plan for the expansion of housing development in the west side of the City as the primary residential growth area. Eventual residential development may also occur west of Highway 47 north of the interstate.

(c) Attract more middle-income single-family housing in order to achieve a greater proportion of market-rate non-subsidized housing relative to publicly-assisted housing.

(d) Modify the City's Zoning Ordinance to allow rural residences with opportunities for having horses within the City limits for those areas unsuitable for private wells and septic tank treatment systems..

(e) Require residential developers to provide paved streets, sidewalks, parks, and public utilities at the time land is platted. The improvements may be phased corresponding to market demand and absorption of lots. Extensions and exceptions to this policy may be granted at the discretion of the City Council.

(f) Require residential developers and land dividers to provide for the extension of streets and utilities to serve future adjoining development parcels.

(g) Require residential developers to provide paved streets and public sidewalks at the time that residential lots are platted.

(h) Continue to seek State and Federal funding to provide affordable housing in the community.

(i) Continue to enforce residential property building codes and maintenance standards.

(j) Maintain a policy of requiring annexation or a waiver of opposition to annexation as a precondition for receiving municipal utilities.

(k) Officially map future streets and drainageways and require new subdivision plats and surveys to reflect the mapped corridors.

C. HIGHWAY COMMERCIAL PLANNING AREA

The Highway Commercial Planning Area consists of the commercial sites oriented toward 1-90 and frontage sites on Crawford Avenue, 14th Street (Center Avenue), north of the interstate along the west side of Highway 47. Businesses in this area include a number of fast-food restaurants, service stations, motels, and casinos.

In the future, it is anticipated there will be additional highway-oriented commercial development on the northwest and northeast quadrants of the Highway 47 interchange. At the present time, the north side of the interchange is outside the City limits and does not receive municipal services. The number and size of the highway-oriented businesses near the I-90/Highway 47 interchange are expected to increase over the next decade.

The east interchange at Old Highway 87 is on the Crow Indian Reservation. Future business development at this location is uncertain in part because of jurisdictional and taxation issues, and lack of community service infrastructure. Although a majority of the tourist traffic approaches the Hardin area from the east, the I-90/Highway 87 interchange is not expected to become as well developed as the 1-90/Highway 47 interchange.

Highway Commercial Planning Area Development Guidelines

(a) Maintain at least a 150-foot separation between commercial driveways in order to maintain safe and efficient traffic movement on 14th Street (Center Avenue, Crawford Avenue, and Highway 47 north of the interstate. Where feasible, encourage shared driveways and access from existing side streets.

(b) Maintain 300' driveway and street intersection setbacks from the 1-90 access ramps for all new driveway and street access permits; this also reflects Montana Highway Department policies.

(c) Pave all driveways and parking areas with bituminous asphalt or other comparable hard surface material.

(d) Reconstruct the Mitchell Avenue and Crawford Avenue intersection to create a 90-degree intersection as shown in the Hardin Street and Highway Master Plan prepared by Leigh, Scott & Cleary. The improvements that have been done to this intersection, i.e., making Mitchell Avenue the through street and stopping Crawford at Mitchell, will probably be the extent of foreseeable improvements to this intersection.

(e) Reserve sufficient right-of-way for the future extension of 12th Street west of Crawford Avenue as an east-west through-minor collector street.

(f) At the time public streets are reconstructed, install curbs and boulevard sidewalks.

(g) Allow improvement of the existing private commercial driveway north of the Pizza Hut on Crawford Avenue to enable access to the property behind the Super 8, Dairy Queen, and Taco John's.

(h) Construct drainage channel improvements and stormwater detention basins as shown in the City's Storm Drainage. Erosion Control,. & Flood Mitigation Master Plan.

(i) Construct a stormwater storage basin within the southeast quadrant of the 1-90/Highway 47 Interchange behind the Dairy Queen and Taco John's to handle stormwater runoff.

(j) Construct a catchment basin on-site to contain oil-laden runoff from Broadway Flying J Truck Stop.

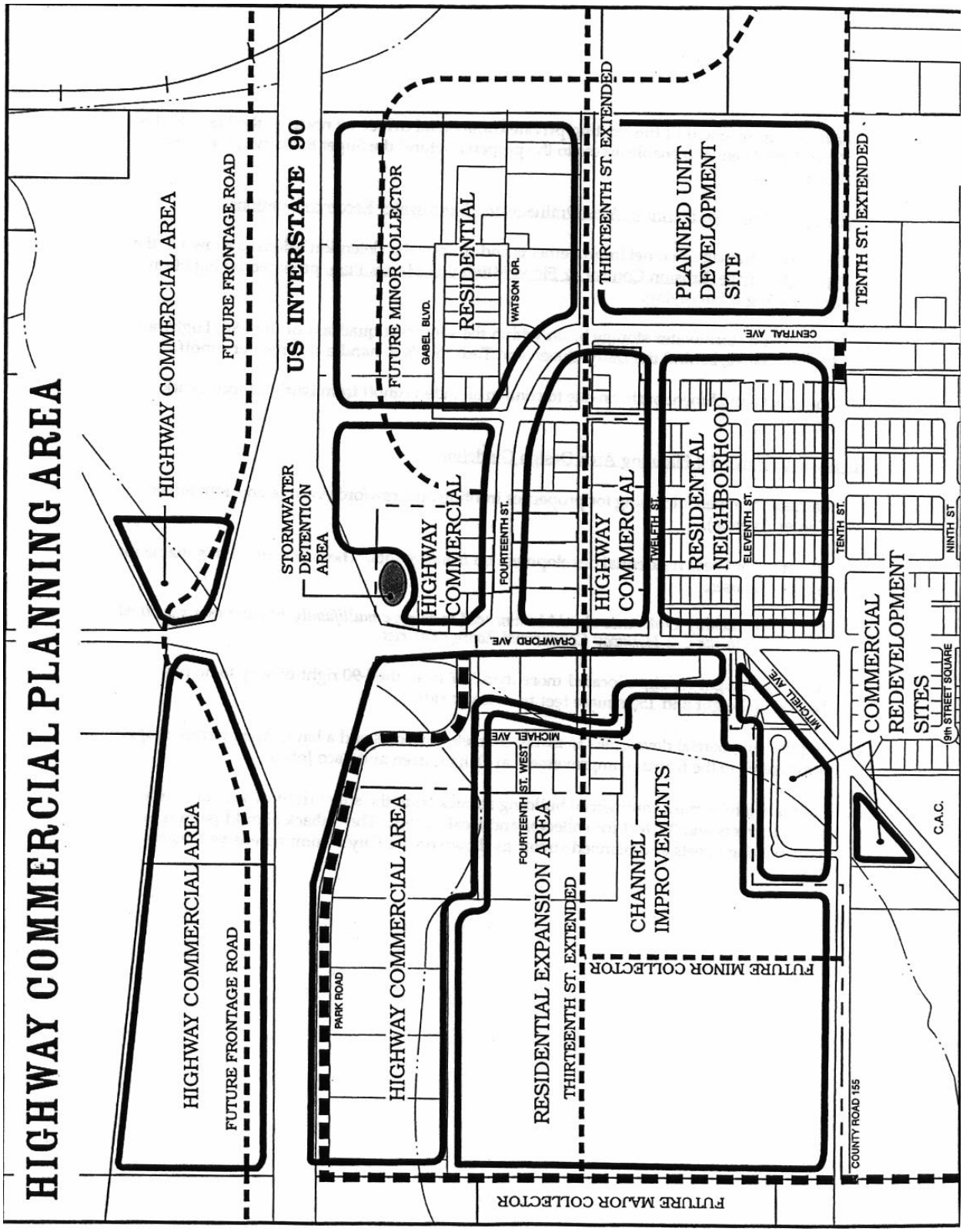
(k) Maintain commercial zoning for properties fronting on Crawford Avenue and 14th Street (Center Avenue), and institute it along the west side of Highway 47 north of the interstate.

(l) Do not permit new residential development on frontage lots.

(m) Limit sign height for signs located more than 300' from the 1-90 right-of-way to no more than 30 feet in height and 150 square feet in area per side.

(n) Require commercial developers to install concrete curb cuts and a landscaped terrace strip, comparable to the frontage improvement at Dairy Queen and Taco Johns.

(o) Maintain a minimum commercial building setback from the street right-of-way of 50 feet on arterial streets and 30 feet for collector and local streets.


HIGHWAY COMMERCIAL PLANNING AREA
HIGHWAY COMMERCIAL AREA
FUTURE FRONTAGE ROAD
US INTERSTATE 90
FUTURE MINOR COLLECTOR
GABEL BLVD.
RESIDENTIAL
WATSON DR.
THIRTEENTH ST. EXTENDED
PLANNED UNIT DEVELOPMENT SITE
TENTH ST. EXTENDED
CENTRAL AVE.
STORMWATER DETENTION AREA
HIGHWAY COMMERCIAL
FOURTEENTH ST.
HIGHWAY COMMERCIAL
TWELFTH ST.
RESIDENTIAL NEIGHBORHOOD
ELEVENTH ST.
TENTH ST.
NINTH ST.
CRAWFORD AVE
MITCHELL AVE
COMMERCIAL REDEVELOPMENT SITES
9th STREET SQUARE
MICHAEL AVE
FOURTEENTH ST. WEST
HIGHWAY COMMERCIAL AREA
FUTURE FRONTAGE ROAD
HIGHWAY COMMERCIAL AREA
PARK ROAD
RESIDENTIAL EXPANSION AREA
THIRTEENTH ST. EXTENDED
CHANNEL IMPROVEMENTS
FUTURE MINOR COLLECTOR
C.A.C.
COUNTY ROAD 155
FUTURE MAJOR COLLECTOR

D. INDUSTRIAL DISTRICTS

One of the City's primary strategic goals has been to broaden the industrial base of the Hardin area. The City has extensive areas zoned for industrial use, and the former Holly Sugar Refinery site located one mile north of Hardin is being redeveloped for heavy industrial users. Industrial users coming into communities typically look for sites that are "ready to go" and do not require either extensive site work or utility extensions.
There are four distinct industrially-zoned areas in the Hardin area, each offering varying types of site characteristics requiring different marketing and servicing approaches.

(1) Two Rivers Port Authority Site (The TIF District)

This area has been referred to in previous Hardin planning documents as the Holly Sugar Refinery Industrial Site. In deciding to make this area a first class industrial park, Hardin created a port authority under State statute and annexed 800 acres of land including a small parcel south of the intestate highway and in the very northeastern part of the community; the rest of the area lies north of the interstate and east of State Highway 47. As a method of funding improvements and administering the taxes for the Park, the City created a tax increment finance industrial district (TIFD) as provided in Statute. The TIFID freezes the taxes in the Park at the time it was formed, and all subsequent improvements made in the Park—and the taxes over and above the base amount at the TIFD creation--within the TIFD go into the Park development coffers. (Statute does require a set amount to also go the local school district.) The Park already contains the Rocky Mountain Power Generation Plant, an asphalt plant, and space for an ethanol production facility. Although these industries are more than are found in most new industrial parks, there is still a lot of additional area for expansion and new business.

The area has been zoned Heavy Industrial. The City has provided trunk water and sewer main, the start of a park-wide, on-site, storm drainage system, and a paved transportation network for the central park area (Sugar Factory Road and Power Plant Avenue). It is planned to have complete sidewalk, curb and gutter, and lighting as well as a sound landscaping standard for the park to insure its long-term attractiveness to modern industries. The lighting will be part of a Lighting Special Improvement District that will construct, energize, maintain, and administer the lights. The latter will find the planned, central wireless distribution facility that is in place particularly useful. The City-owned Telecommunications Pathway System will be located within the Park so as all businesses will be within 1.5 miles of the high-speed network provider.

There is a power substation just to the north of the power plant with room for expansion that has the capacity to serve any new industries in the park. South of the interstate is served by the Hardin Substation. Power service in the area is flexible in that either provider can go underground and across the interstate where the railroad presently crosses.

Part of the Two Rivers Site lies south of the interstate in the northeast part of the community. The most visible feature of this area is the Detention Facility located on Slammer Avenue directly northeast of the IGA Store and served by the recently paved extension eastward of 13th Street. This Facility consists of 92,000 square feet of a standard construction prison on 40 acres. When it opens it will employ 105 persons making approximately $2.6 million, with total operational income estimated at $8.9 million. Not only will these monies turn over several times in the local economy, the food services will be out-sourced, generating even more jobs and positive impact.[1]

Water for use in the Park comes from the City's two wells and water rights from the Bighorn River. In 1982 a new raw water intake facility and pump station were constructed by Hardin that added to the original 1920 facilities located about 300 feet east of the new construction along the river. The water treatment plant consists of two sedimentation basins with a combined capacity (with existing pumps) of about two million gallons per day (gpd). When planned new, high-speed pumps are installed, the capacity is expected to increase to about three or four million gpd. Most of the City's distribution system consists of 66,136 lineal feet (lf) of six-inch asbestos cement pipe. There is also 22,794 lf of eight-inch, 5069 lf of ten inch, and 1, 461 lf of 12 inch. In addition to the asbestos cement pipe, there are 716 lf of 12-inch PVC and 14,364 lf of 16-inch PVC. Although the entire water distribution system holds 340,000 gallons of potable water, the City's actual finished storage consists of two 500,000-gallon storage reservoirs located west of the City—connected to the distribution system by two 16-inch transmission mains.

In the Industrial Park, the City has the option of hooking into RMP's water treatment plant which produces 125 to 150 gpm. (RMP has two water rights on the river.) This is not enough to fully develop the Park plus provide for fire flow but remains an option for the Authority. RMP has requested the City purchase a raw water intake and treatment plant.

Engineering models of the water flow available from RMP coupled with a 500,000-gallon reservoir show that the RMP treatment plant could address day-to-day use within the Park; however, a major fire (3,000 gpm for a three-hour duration fire) would deplete the supply and come up short about 13,000 gallons—and this is assuming no water use elsewhere in the Park during the fire.

The City has constructed a 12-inch water main from the existing water treatment plant south of the interstate with a ten-inch loop main opening up the central part of the Park as part of its main road construction; portions of this new construction will also serve that portion of the Park south of the interstate—probably for multi-family housing. This water main will serve projected Park needs and fire flow for a couple of decades.

---

[1]Ted Lewis, Assistant Warden, Two Rivers Regional Detention Facility, 1015 N. Lessard Avenue, Hardin, Montana

The Two Rivers Authority Industrial Park will utilize Hardin's sewage system, the latter which consists of collection, lift station, and treatment. The City completed a Facility Plan for wastewater in 2003 which showed sufficient capacity in the existing treatment plant for flows generated by the Industrial Park. In addition the City constructed a new 12-inch force main from the main lift station to the treatment facility in 2004. The Facility Plan did not detail Park population projections—only development of the power and ethanol plants. Population figures were developed in the 2006 Hardin Industrial Park Master Plan based on trip generation analysis of anticipated, developed land uses in the Park. The minimum flow was estimated at 15 gpm, the maximum at 208 gpm, and the average design daily flow at 50 gpm—based on a Park population of 6000, including motel/hotel guests, workers, etc.). Although collection mains must be designed to accommodate design flows, the Park's estimated build-out is 50 years. The City must balance desired design demand with premature over-building.

Burlington Northern Santa Fe Railroad built and extended to the old Sugar Factory site in the Park a Multi-Modal Transportation Facility from the railroad mainline on the south side of Hardin. This rail spur has been purchased by Rocky Mountain Ethanol (RME) and is to be reconstructed to serve the future plant; it will also be available to other industries in the Industrial Park. RME plans a large circular siding with storage and loading and unloading facilities for complete unit trains.[1]

Hardin is on the El Camino Real International Highway (and the Industrial Park is adjacent thereto) envisioned to connect Canada across the U.S. to Mexico as part of the original North American Free Trade Agreement plans. In the Park, Sugar Factory Road intersects Highway 47 a half-mile north of the interstate and extends east through the center of the Park. It is a paved 24-foot wide driving surface road that eventually ends at the East Hardin Interstate Interchange. County Road 157 runs east-west in the north Park area, intersecting Highway 47 about 1.5 miles north of I-90. Land south of the interstate in the Park is accessed by 13th Street East about a quarter mile east of North Center Avenue.

Highway 47, which currently carries 800 vehicles per day (cpd) is planned for reconstruction by the State Department of Transportation. Such reconstruction of this important access road will adequately serve the Industrial Park well into its expected 50-year build-out plan. However, as the Park does fill up, traffic is expected to reach to the 19,000 vhp range, and the Authority needs to look at securing and planning for at least four lanes of traffic on Highway 47 plus turning lanes before the land builds-up along the roadway. Traffic on I-90 measured just west of its connection with I-94 east of Billings currently measures about 7,000 vpd with 3,800 vpd measured at Lodge Grass. The difference is probably those at Hardin and an estimated 800 vpd going east on U.S. 212.

[1] Greg Smith, Economic Development Director, City of Hardin; interview

The size, location, existing and planned improvements, and administration of the Two Rivers Authority Industrial Park is a credit to the City and an attractive, competitive opportunity in industrial siting.

(2) South Hardin Industrial Park

The area south of the BNSF Railroad tracks on the east side of South Center Street (County Road 216) is in the City and zoned for industrial use. The area consists of approximately 45 acres owned by several different property owners. There are several older structures used for light industrial and storage purposes. This area is suitable for a variety of light industries and agribusinesses.

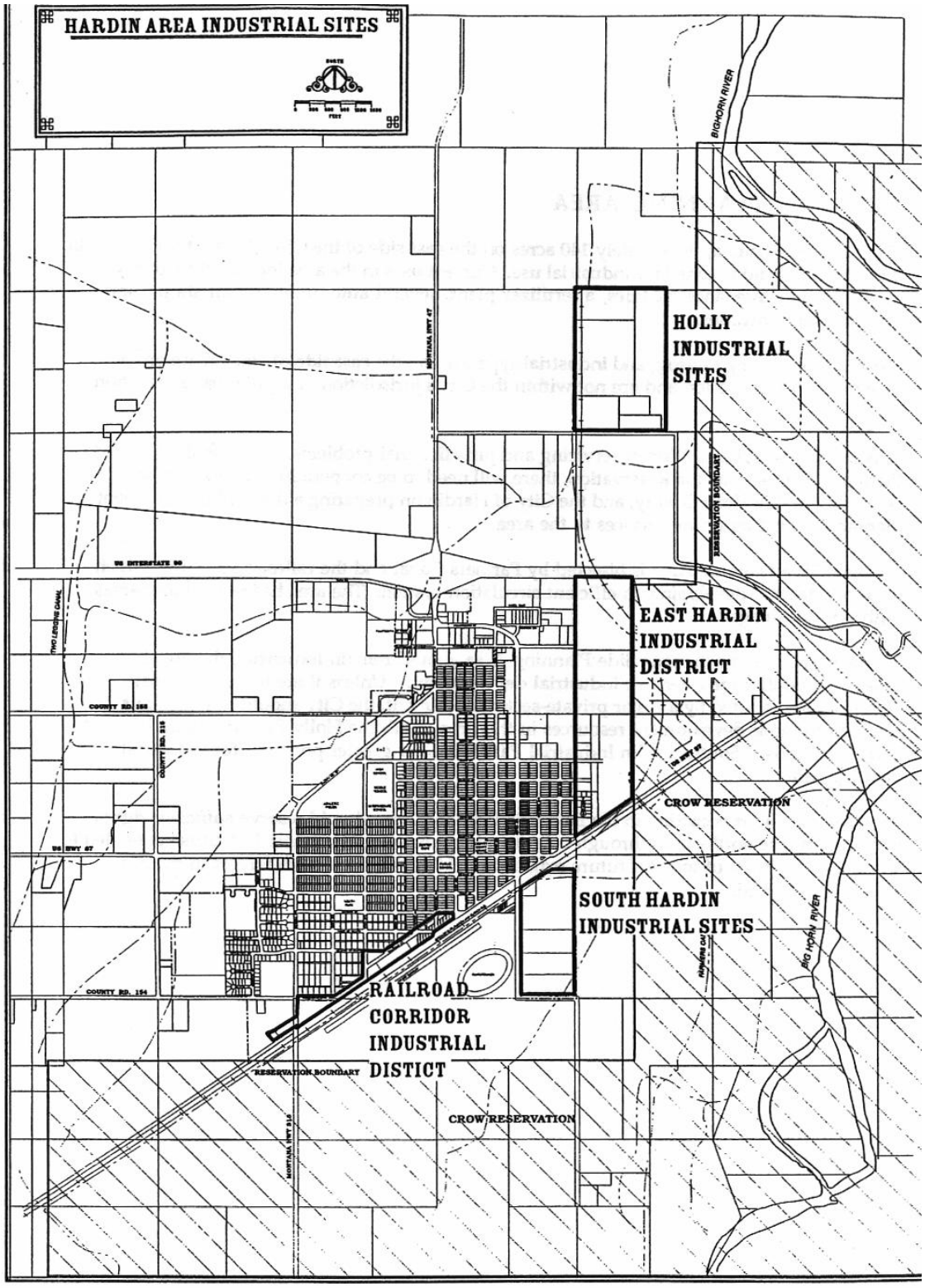
To maximize the potential use of the entire site, the area should be master planned and served by a looped road (the location to be specified in the master plan). This road would not have to be built at the initial phase of development, but a right-of-way of at least 60' should be reserved for future construction. It also needs to be noted that the County Fair Board is looking to revitalize the Fairgrounds area, and any future planning in the neighborhood needs to be coordinated with the Fair Board, land owners, the County, etc. to maximize effort and reduce confusion and wasting of funds.

In order to make the area more marketable, the property should be served with municipal utilities and preliminarily platted as a light industrial park with lots averaging five acres in size. The lots could be combined or divided into smaller lots, pending industrial commitments. This area is second in importance to the Two Rivers area, and the community's focus, until the Two River's site fills up, will be that area north of the interstate. However, the City should work with any private landowners wanting to develop the area and even the use of a second TIFD is possible, such as Billings is and has been using to develop blighted areas of that city. As with the Holly Site, however, the use of TIF should be conditioned on the commitment of a private investment of sufficient magnitude to justify the project costs.

(3) Railroad Corridor Industrial Area

The BNSF Railroad corridor has historically been the site for industries and agribusinesses dependent on rail access. While rail dependency has declined for most of the businesses in this area, uses along Railway Street remain industrial or heavy commercial.

There is relatively little land available for additional industrial uses in this area unless the existing industrial sites are redeveloped. The City should retain the current industrial zoning but should not rezone any land to expand this district northward into predominantly residential neighborhoods.



HARDIN • MONTANA

E. FUTURE LAND USE PLANNING

Hardin can expect commercial and industrial growth to occur west of Highway 47 north of the Interstate, although, with the incentive of fully developed industrial sites being available in the Two Rivers Industrial Park, the latter area should be more attractive than land outside of it. The City should do what it can to control commercial and industrial development outside the area of City services. This area west of Highway 47, further west of the road development corridor itself, will also see residential subdivision development, and, again, the City should influence land uses through the extension of services and inclusion in the City limits.

When the new County Airport develops, the City needs to work with the County to limit commercial and industrial development around the Airport to aviation oriented enterprises. Otherwise the existing commercial areas in the City and industrial sites will suffer. Likewise, Tenth Street needs to be zoned west of the developed area of town to prevent strip development such as occurs along Grand Avenue in Billings. Allowing such commercial activity to creep out along this street adversely impacts adjacent residential areas, requires more community services than its lineal tax base justifies, and adversely impacts existing and planned commercial areas elsewhere in the City.

The areas north and south of Tenth Street immediately west of the developed area of the City are the future prime residential growth areas of the community, and as these lands develop this potential must be kept in mind. Hardin needs well designed and served residential subdivisions, and such standards need to be carefully weighed and enforced during proposed subdivision review processes.

The City should encourage infill in vacant and dilapidated areas of the community as described earlier in this Plan. This includes the City-owned property north of the Detention Facility and the old trailer park. No other major areas of growth or activity are anticipated over the next five years.

6. TRAFFIC CIRCULATION

A. FUNCTIONAL CLASSIFICATIONS

The roadways in the Hardin area are categorized into four basic functional classes:

Arterials
Major Collectors
Minor Collectors
Local Streets

1-90 constitutes a special category of roadway that greatly influences development in the area but is not managed or controlled by the local government. There are no current plans for significant modifications or changes to 1-90 or the interstate interchanges.

(1) Arterial Streets

Arterial streets are defined as major traffic-carrying roadways that carry through-traffic over relatively long distances—generally over one mile. The arterial street system in Hardin consists of the roadways on the Montana Highway System and includes:

State Highway 47 (Center Avenue -14th Street north of Third Street)
- Extending from Third Street in the Downtown to north of 1-90
Old Highway 87 (Third Street)
Montana Highway 313 (Mitchell Avenue)

Arterials in urban areas generally require 80' to 120' of right-of-way and should be designed to enable future widening to four lanes with additional turn lanes, as needed. Driveway access points and other sources of "traffic friction" should be reduced in order to maintain traffic movement efficiency.

(2) Major Collectors

Major collectors are the heavily traveled "spine" streets that serve as through-streets connecting residential neighborhoods and business districts with the arterial street system. In business and industrial areas, the major collectors need to be designed to handle truck traffic. The roadways classified as major collectors include:

(a) North-South Major Collectors

Crawford Avenue
Center (south of Third Street)
Power Plant Avenue

(b) East-West Major Collectors

Railway Street
Third Street South
10th Street/VanZandt Road/County Road 155
Park Road (Frontage Road)
Sugar Factory Road

Center Street south of the railroad tracks and Third Street South extended west of Mitchell Avenue are currently lightly-traveled roadways constructed to a rural road standard. County Road 215, located west of Hardin, should be considered a major collector in terms of long-range development planning. As development occurs on the periphery of Hardin, these roads should be considered part of the "spine system" of major collectors and upgraded to urban collector status.

Generally, major collectors should have a minimum right-of-way of 80' and a minimum roadway width of 36 feet. Most major collectors require a roadway width sufficient to accommodate at least two lanes of moving traffic, curbside parking, and turn lanes at major intersections.

(3) Minor Collectors

Minor collectors are a second class of collectors that function primarily as neighborhood through-streets. Designated minor collectors should be designed to maintain a continuous access corridor linking residential neighborhoods with major collectors and arterials. Offset intersections and sharp corners should be avoided, where feasible, in designing minor collectors.

In Hardin, the major deficiencies in the street system are associated with discontinuities in the minor collector system. The City needs to place greater emphasis on requiring continuous collector streets through newly developing neighborhoods. The roadways classified as minor collectors include:

(a) North-South Minor Collectors

Heimat Road
Miles Avenue
Crow Avenue
Custer Avenue
Cheyenne Avenue

(b) East-West Minor Collectors

Rangeview Drive
1st Street

8th Street
13th Street

Rights-of-way for minor collectors range from 60' to 80', depending on the type and volume of traffic, with a minimum roadway width of 26'. Minor collectors should not be terminated in cul-de-sacs or have severe curvature that would impede continuous traffic movement unless such design is unavoidable due to topographic constraints.

B. FUTURE THROUGH-STREETS

The following is a list of future through-streets that are identified on the Circulation Plan. The rights-of-way for these roads should be reserved at the time that areas are platted or surveyed.

(1) Future North-South Through Streets

-Future East Side Major Collector
-Future Minor Collector (10th Street to 13th Street, west of Grandview Campground)
-Future West Side Major Collector (Mitchell Avenue to Park Road)
-Heimat Road (extended north to County Road 155)
-Future Westside Minor Collector (County Road 154 to Highway 87--west of Dorn Subdivision

(2) Future East-West Through Streets

-13th Street (west of Crawford Avenue and east of Center Avenue)
-12th Street (west and east of Center Avenue)
-11th Street (west and east of Center Avenue)
-10th Street (between Custer and Center Avenue, east of Center Avenue), west to new airport via VanZandt Road, County Road 155
-8th Street (east of Center Avenue)
-5th Street (east of Mitchell Avenue)
-1st Street (west of Heimat Road to County Road 215)
-2nd Street South (west to County Road 215)

C. FRONTAGE ROADS

New minor collector frontage roads on the north side of the 1-90/Highway 47 interchange.

D. LOCAL STREETS

The remainder of the public streets in Hardin are considered local streets. The construction standard for these streets is a minimum of a 50' right-of-way on level land with 24' pavement width. Cul-de-sacs are permitted provided a minimum turning radius of 40' is designed.

In Hardin, the major deficiency in the local street system is that the City has accepted a number of public streets without complete paving or curb, gutter, and sidewalk improvements. In some cases, this practice has resulted in the costly and complicated process of creating Special Improvement Districts (SID's) after the homes are already in place to complete the street and sidewalk infrastructure. The City should require performance bonding to insure completion of uncompleted streets and sidewalk infrastructure prior to the filing of the final subdivision plat.

E. GUIDELINES FOR CITY ACCEPTANCE OF LOCAL STREETS AS PUBLIC STREETS

1. Completion or performance bonding for completion within a fixed time frame of all streets and infrastructure to minimum municipal design standards.

2. Construction of curb, gutter, and boulevard sidewalks at the time of initial street construction. The municipal design standards should be amended to reflect current curb, gutter, and sidewalk construction practices by simple reference to currently accepted State of Montana construction standards. There should be uniformity in the design of these improvements.

3. Where feasible, local streets should be designed for future extension to adjoining parcels. Right-of-way for future extension should be reserved and dedicated at the time of platting.

4. Local streets designed as permanent cul-de-sacs should have paved cul-de-sacs constructed and improved to the City's design standard at the time of acceptance as a public street or, if a new subdivision, prior to the filing of the final plat (or with a performance bond provided if the construction is not complete).

5. Local streets should be platted and designed to avoid "dog-legs" or off-set alignments.

6. The minimum spacing between local streets intersections should be 150 feet.

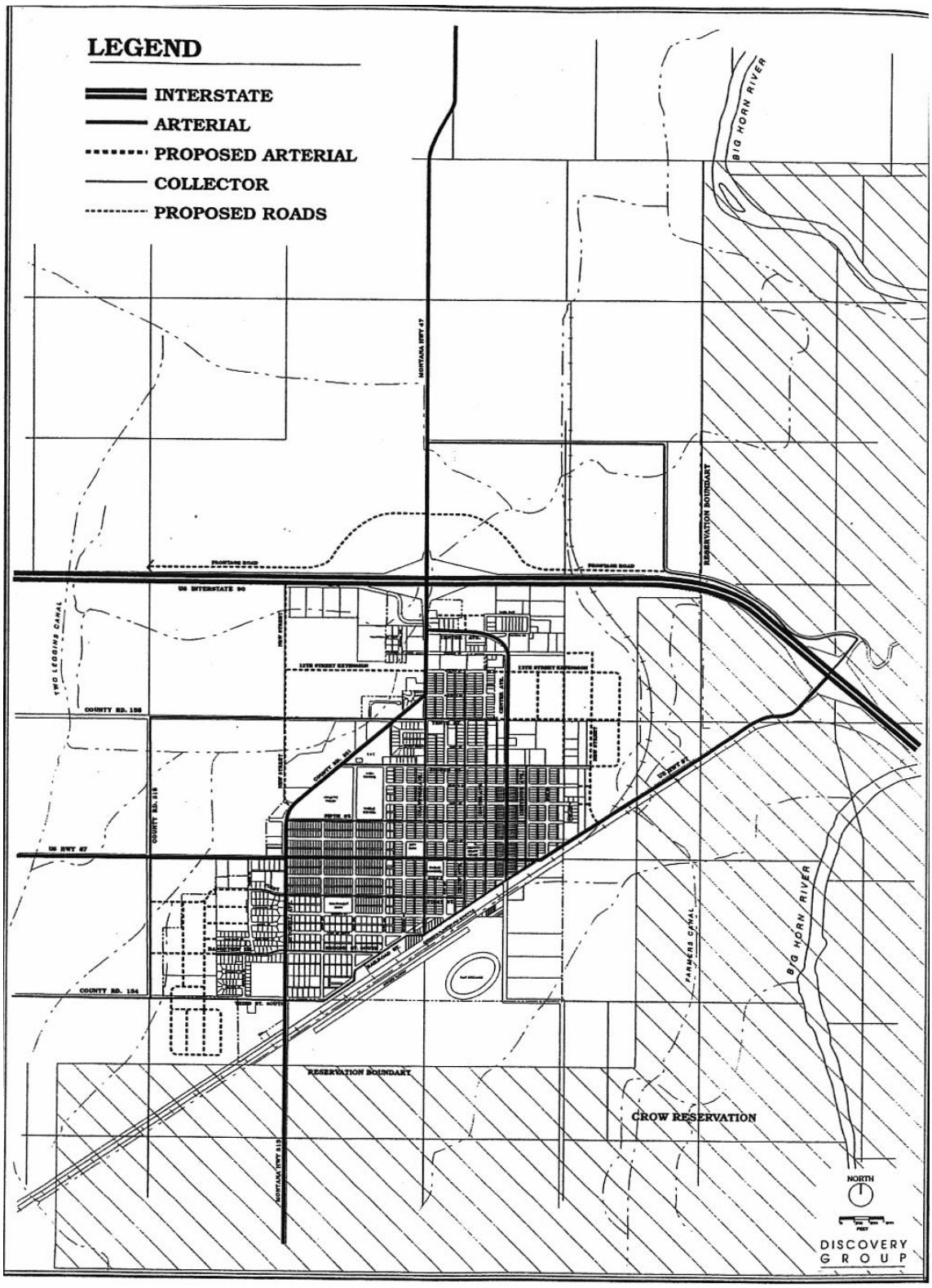
7. The City should not accept cul-de-sacs longer than 500 feet unless there are exceptional topographic features that would make a looped street or a shorter cul-de-sac unfeasible.

6.F. PRIORITY ARTERIAL AND COLLECTOR STREET SYSTEM IMPROVEMENT RECOMMENDATIONS

The City of Hardin Department of Public Works has been diligently upgrading the street system in accordance with the Street and Highway Master Plan prepared in 1986. This plan has served as a good guide for improvements and should continue to be followed as funding allows.

As the Two Rivers Industrial Site continues to grow and fill in, interest in the land to the west of Highway 47 will increase. At the time this land develops, Hardin must obtain arterial right-of-way widths. With the successful in-fill of the Two Rivers Industrial Site, Sugar Factory Road will grow into an arterial and will require widening as traffic increases. Highway 47 currently carries about 800 vehicles per day near the Industrial Park. Montana Department of Transportation has slated Highway 47 here for reconstruction based on a 20-year traffic volume expectation of 1000 vehicles per day. This does not include the traffic expected to be generated by the Industrial Park.[1]
A complete traffic analysis along with various land use trip generation scenarios is included in the Master Plan of the Industrial Park.

[1] Hardin Industrial Park Master Plan, January 2006, Interstate Engineering, Inc.



HARDIN, MONTANA

The following list of recommended improvements is a priority list of projects that have either not been fully implemented or represent traffic and circulation problems that have arisen since the preparation of the 1986 plan:

1. Preserving Collector Street Rights-of-Way in the Southwest Residential Neighborhood

The most important priority is for the City to require all landowners and subdividers to adhere to the Street and Highway Master Plan, particularly with respect to preserving sufficient right-of-way for the collector streets identified in the plan. All building permits should reflect the legal setbacks that would be required with the completion of the proposed collector streets.

The preservation of the right-of-way is particularly critical in the developing neighborhoods in the Southwest Planning Area. The rights-of-way for Rangeview Drive, South 2nd Street, 1st Street, and Heimat Road should be preserved. The concept map for development of this part of the City included in this Growth Management Plan illustrates a potential street alignment that would preserve the collector street corridors.

2. 13th or 12th Street Extension (East of Crawford Avenue)

13th Street has been mapped as a major east-west collector on nearly all previous planning documents. The street has recently been improved between Crawford and 14th Avenues (Center Avenue). As both the Northwest and Northeast Planning Areas develop, 13th Street should be extended west of Crawford Avenue and east of 14th Avenue (Center Avenue) as shown on the Circulation Plan Map in this report

The recent construction of the Far West has put into question the feasibility of extending 13th Street west of Crawford Avenue. An alternative to extending 13th Street would be the designation of 12th Street as the major east-west collector serving the Northwest Planning Area. This approach would require the acquisition of the right-of-way west of Crawford Avenue. The parcel needed for right-of-way is presently for sale as a commercial development site.

3. Reconstruction of the Mitchell and Crawford Avenue Intersection

The Mitchell and Crawford Avenue intersection at the Town Pump is a dangerous "Y" intersection with poor traffic visibility. The intersection should be reconstructed so that Crawford Avenue intersects Mitchell Avenue at a 90-degree angle, as shown in the Street and Highway Master Plan prepared by Leigh, Scott & Cleary. This is a high priority improvement due to the safety hazard that is currently present at this intersection.

4. Intersection Improvement at Crawford and 14th Street (Center Avenue)

The intersection of Crawford Avenue and 14th Street (Center Avenue) is the busiest intersection in the City and is the "point of entry" for most visitors to Hardin. Most

residents of Hardin believe the intersection is a safety hazard. It is also very confusing for out-of-town visitors to find the way into the Downtown area from the 1-90/Highway 47 Interchange.

At the request of the City, the Montana Department of Transportation (MDT) has conducted a traffic study to determine if current conditions warrant intersection improvements, such as channelization or signals. At this time, MDT has not found sufficient traffic volume or accident rates to warrant State-financed improvements.

The City has the option of locally financing improvements using either general revenues or special assessments against commercial property owners in the highway commercial district.

Using local financing sources, the City should implement the channelization plan drawn by Leigh, Scott & Cleary as part of the Street and Highway Maser Plan. Signalization at this time is probably not necessary but should be considered as traffic volumes increase.

5. Adopt an Access Control Ordinance for Arterial Streets

A major contributor to congestion and unsafe traffic movement in Hardin is an excessive number of driveway entrances onto the arterial streets, particularly on Crawford Avenue between Mitchell and Interstate 90. The City and Big Horn County should adopt an Access Control Ordinance that limits the number of driveway entrances. Because of the irregular jurisdictional boundaries the requirements would need to be applied to areas both within and outside the City limits in order to be effective.

The following corridors require access controls:

-14th Street (Center Avenue)--Crawford Avenue to 10th Street
-Crawford Avenue /Mitchell Avenue (Highway 313)--Interstate 90 to RR
-Third Street--east City limits to Interstate 90 Interchange

6.G. HIGHWAY SIGNAGE AND ENTRY FEATURE RECOMMENDATIONS

Interstate 90 Signage

The City should petition the Montana Highway Department to install signs on Interstate 90 for both eastbound and westbound traffic indicating the exits for “Historic Downtown Hardin.” The signs should be standard historical marker signs, which typically have a brown background.

Entry Features

The Chamber of Commerce should install landscaped entry signs indicating the direction to “Historic Downtown Hardin.” The signs should be designed to reflect the Historic

Downtown Hardin logo and should match the colors and design themes used in the Downtown streetscape furnishings. Consistent use of the same sign design, logoture and lettering is extremely important in this type of promotion.

The entry feature signs should be located at the following locations:

-14th (Center Avenue) and Crawford Avenue (faced toward southbound traffic coming from I-90)

-Mitchell Avenue (Highway 313) and Third Street South (facing toward northbound traffic on Highway 313)

-Third Street and Railway Street (facing toward westbound traffic coming from I-90)

6.H. TWO RIVERS TIFD MULTI-MODAL TRANSPORTATION FACILITIES[1]

The old Chicago, Burlington & Quincy Railroad used to serve the sugar factory area and all the way north to Custer. About two miles of that rail line is still there, cutting up through the center of the Industrial Site. What remains is owned by Burlington Northern Santa Fe Railroad. It is a part of the Two Rivers planning that Rocky Mountain Ethanol will purchase and reconstruct the remaining spur for production service to and from the ethanol facility. The owners of the latter plan to build a large circular rail siding to the west of the rail spur for storage and loading/unloading of complete train units, and this facility will be available to other industries in the site.

[1] Hardin Industrial Park Master Plan, January 2006, Interstate Engineering. Inc.

7. UTILITY INFRASTRUCTURE AND PUBLIC FACILITIES

The City's 1986 Comprehensive Master Plan (Volumes I through V) remains the basic long-range facility planning document. The following section identifies priority projects that have either not been fully implemented or are projects that address new problems that have arisen since the completion of the 1986 plan. The City Public Works Department has the ability to produce the maps herein at larger scale.

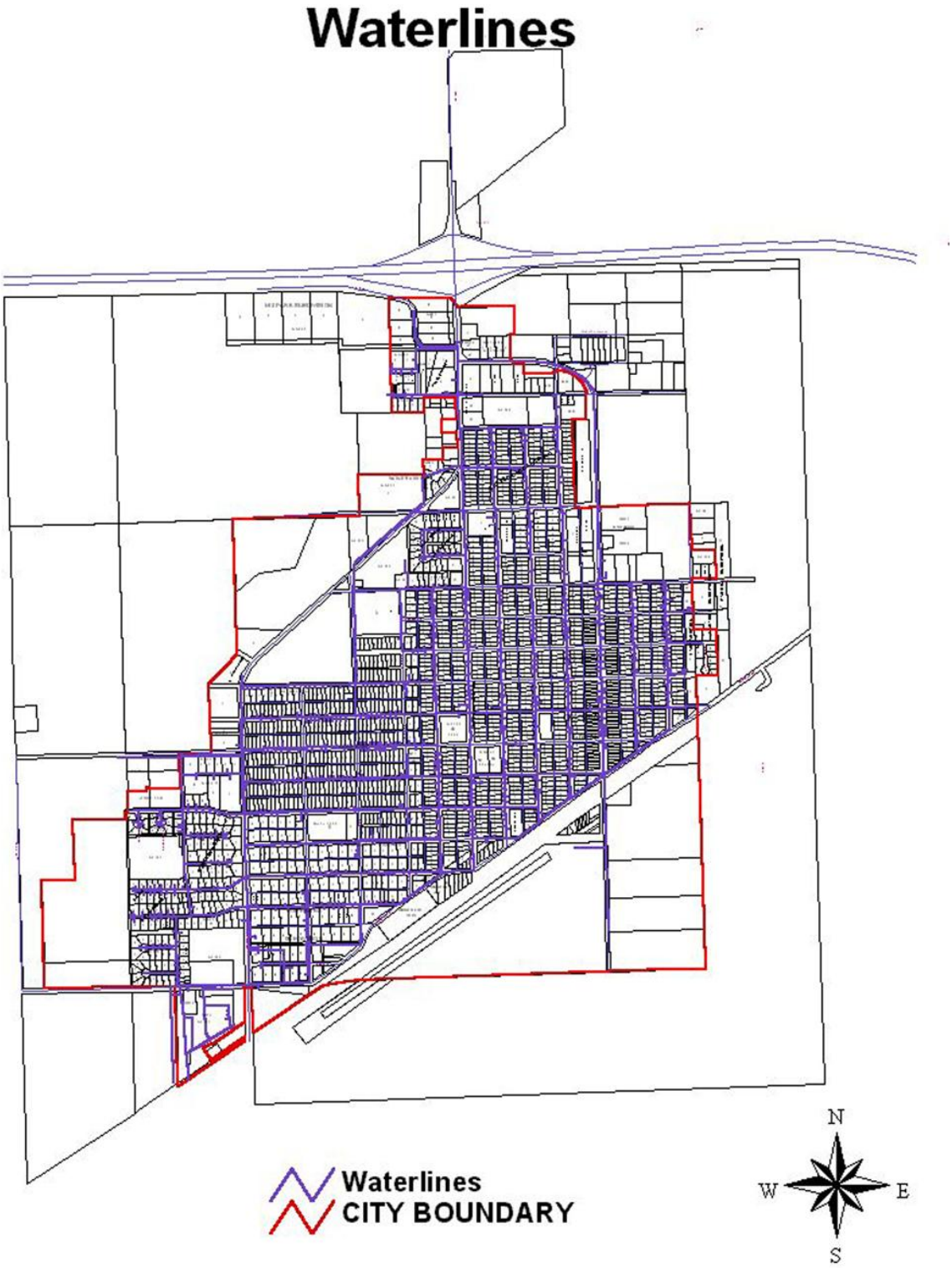
No attempt is made in this Plan to reproduce the utility improvements the City has completed in the Two Rivers Industrial Site, because the area has a separate Master Plan already adopted by the City. At some time in the future when more planning dollars are available, a comprehensive community-wide planning document can be prepared.

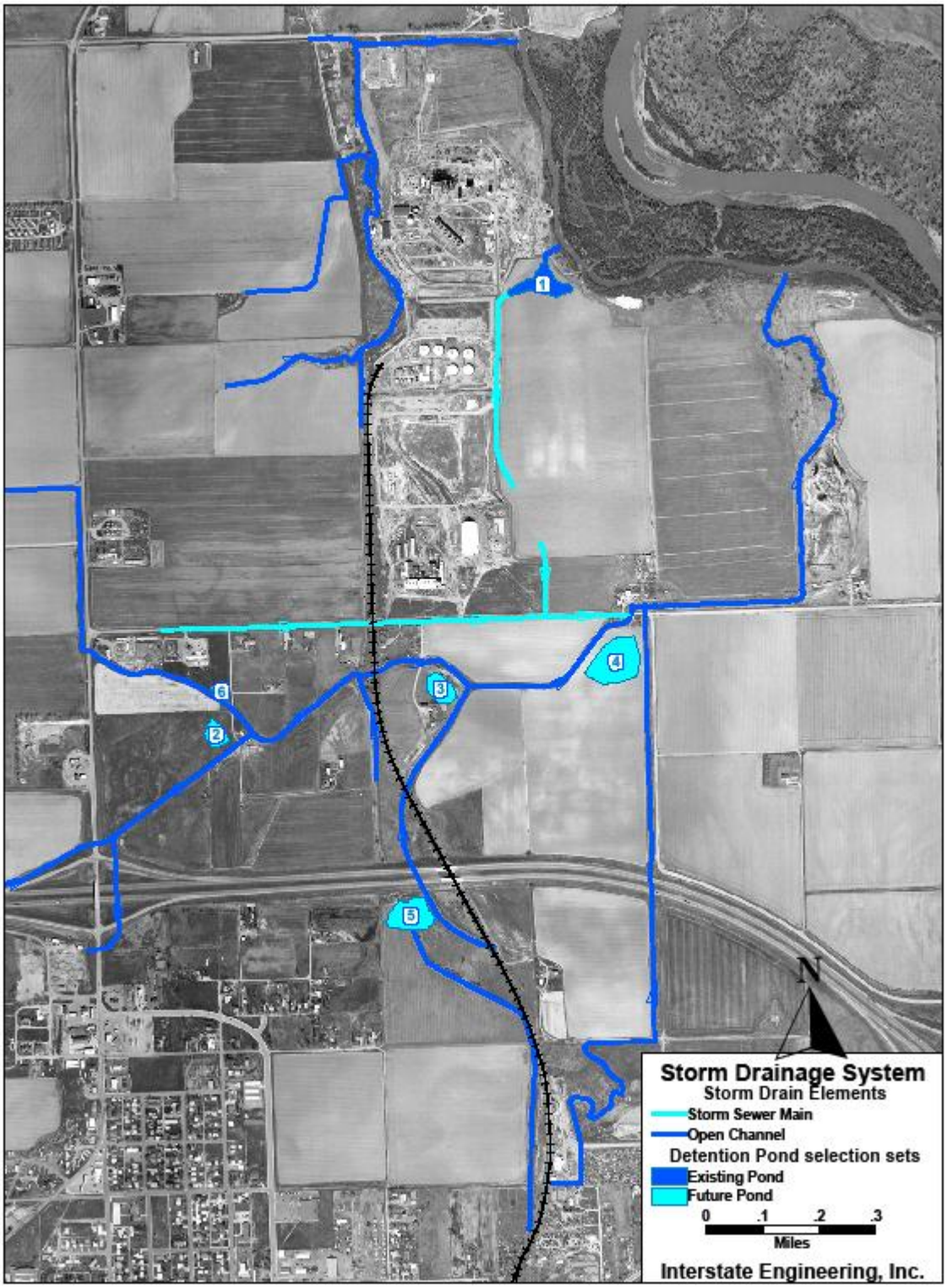
A. STORMWATER AND DRAINAGE MANAGEMENT

The Storm Drainage. Erosion Control & Flood Mitigation Master Plan prepared in 1986 by Big Horn Engineering & Surveying is the basic stormwater and drainage facility planning report of the City of Hardin. The recommendations and prioritization of projects listed below supplement the findings of the 1986 report and are based on recent development trends and facility needs that have not been fully addressed since the completion of the 1986 plan.

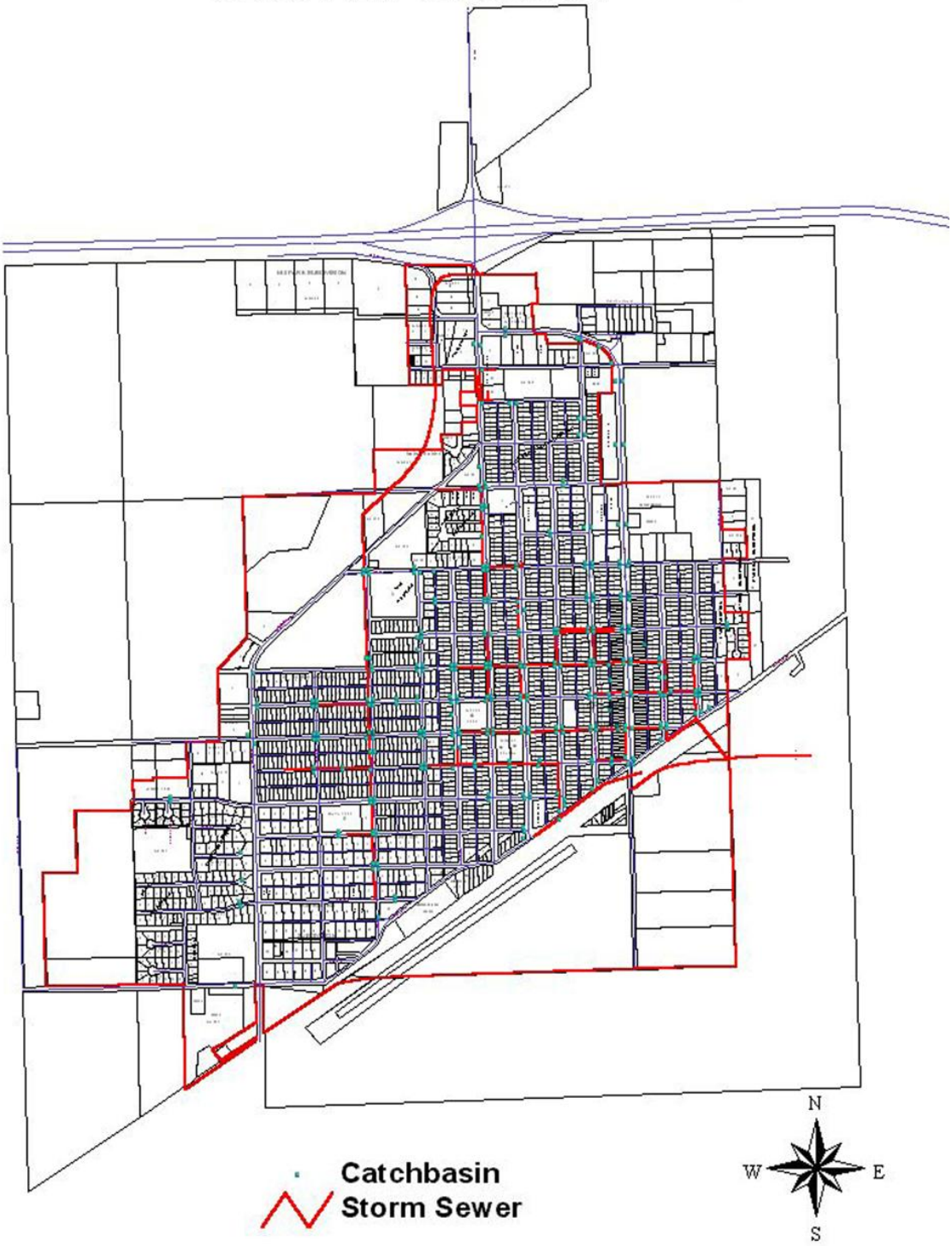
A key problem identified in the Storm Drainage. Erosion Control & Flood Mitigation Master Plan is the lack of a unified agency responsible for stormwater and drainage management in the Hardin area. Many of the severe drainage problems in Hardin result from drainage and irrigation practices outside the City and require coordination between rural and urban interests.

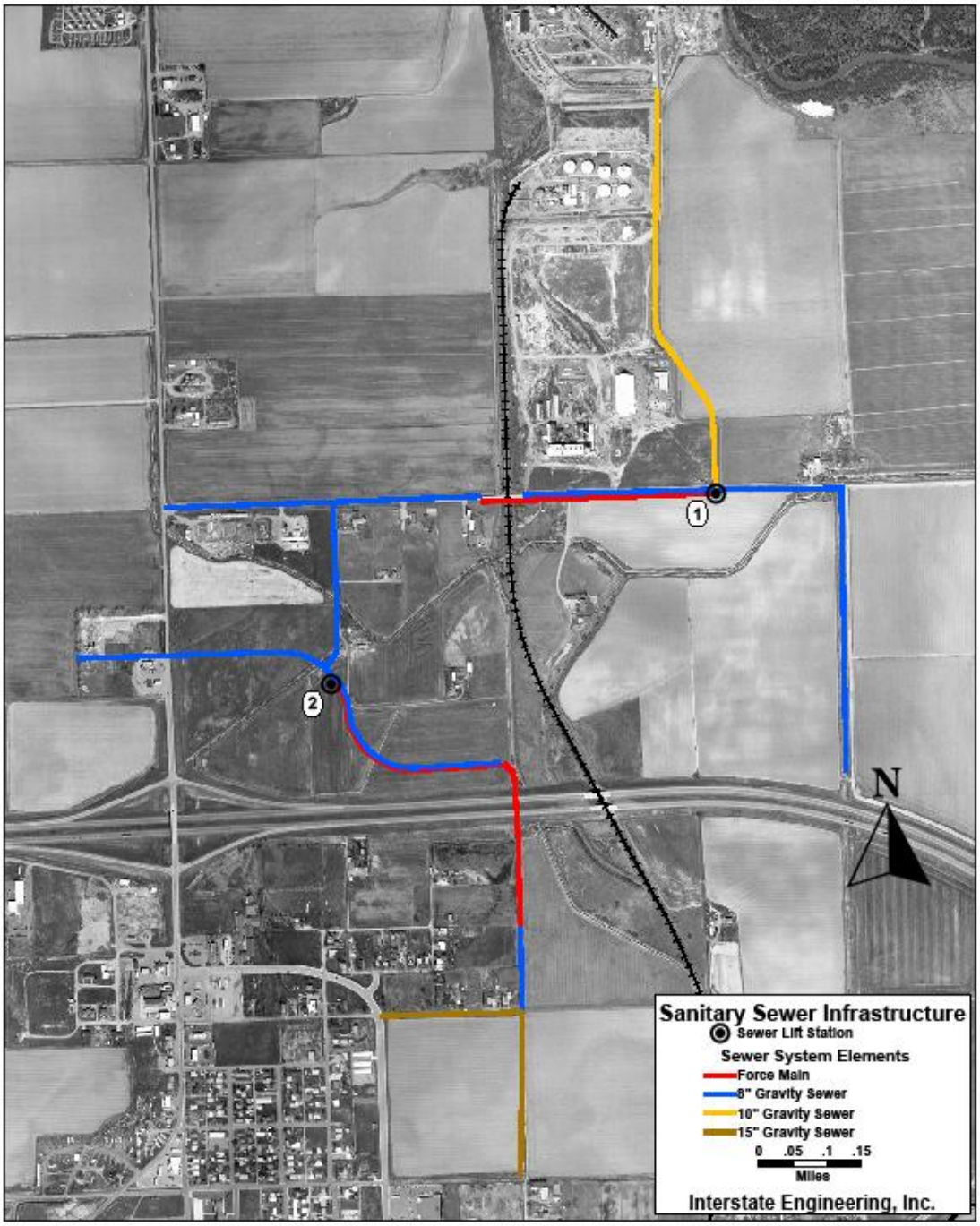
N
Water Distribution System
Water System Elements
8" Water Main
10" Water Main
12" Water Main
0
.1
.2
.3
Miles
Interstate Engineering, Inc.


Waterlines
Waterlines
CITY BOUNDARY
N
W
E
S

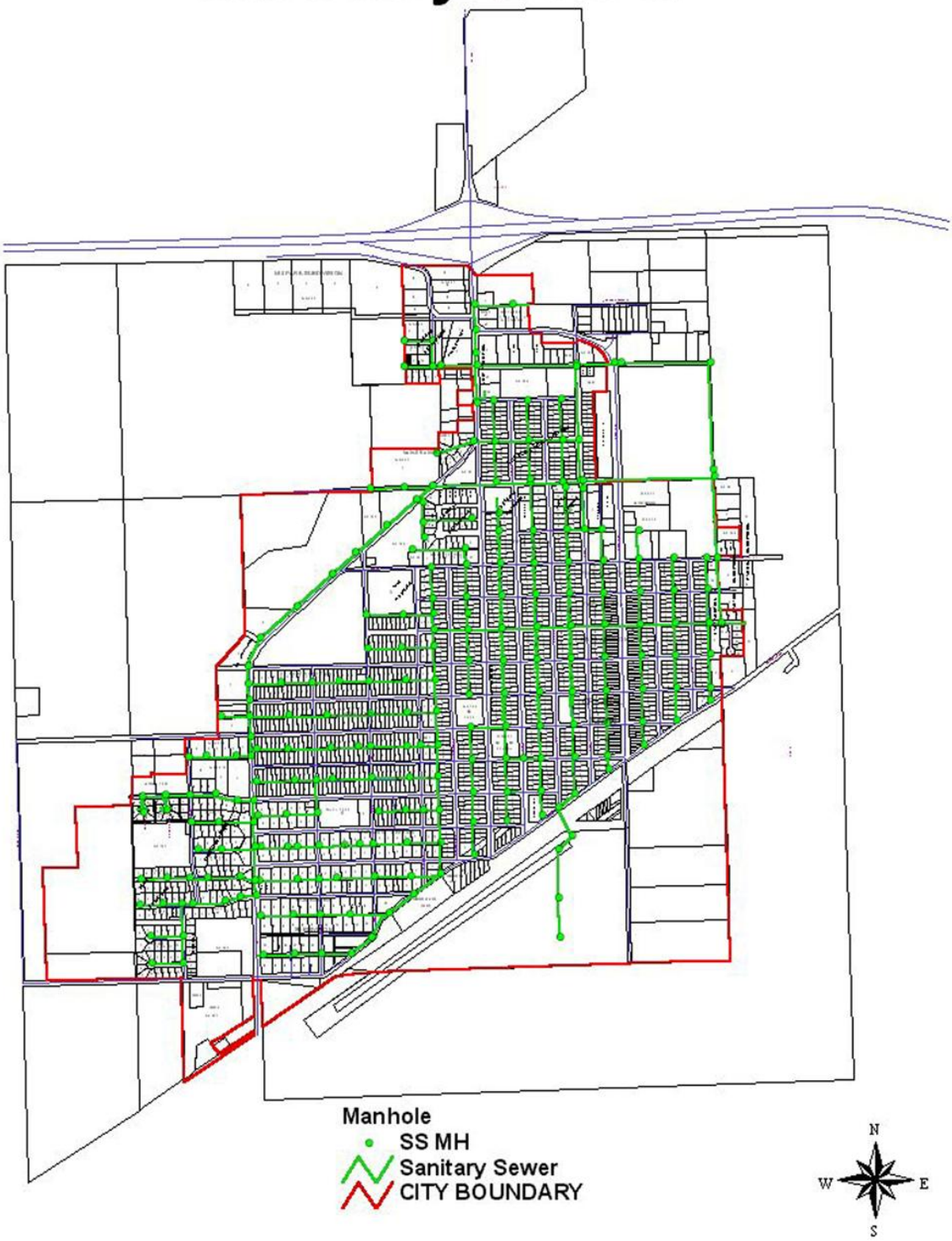

1
2
3
4
5
6
N
Storm Drainage System
Storm Drain Elements
Storm Sewer Main
Open Channel
Detention Pond selection sets
Existing Pond
Future Pond
0 .1 .2 .3
Miles
Interstate Engineering, Inc.

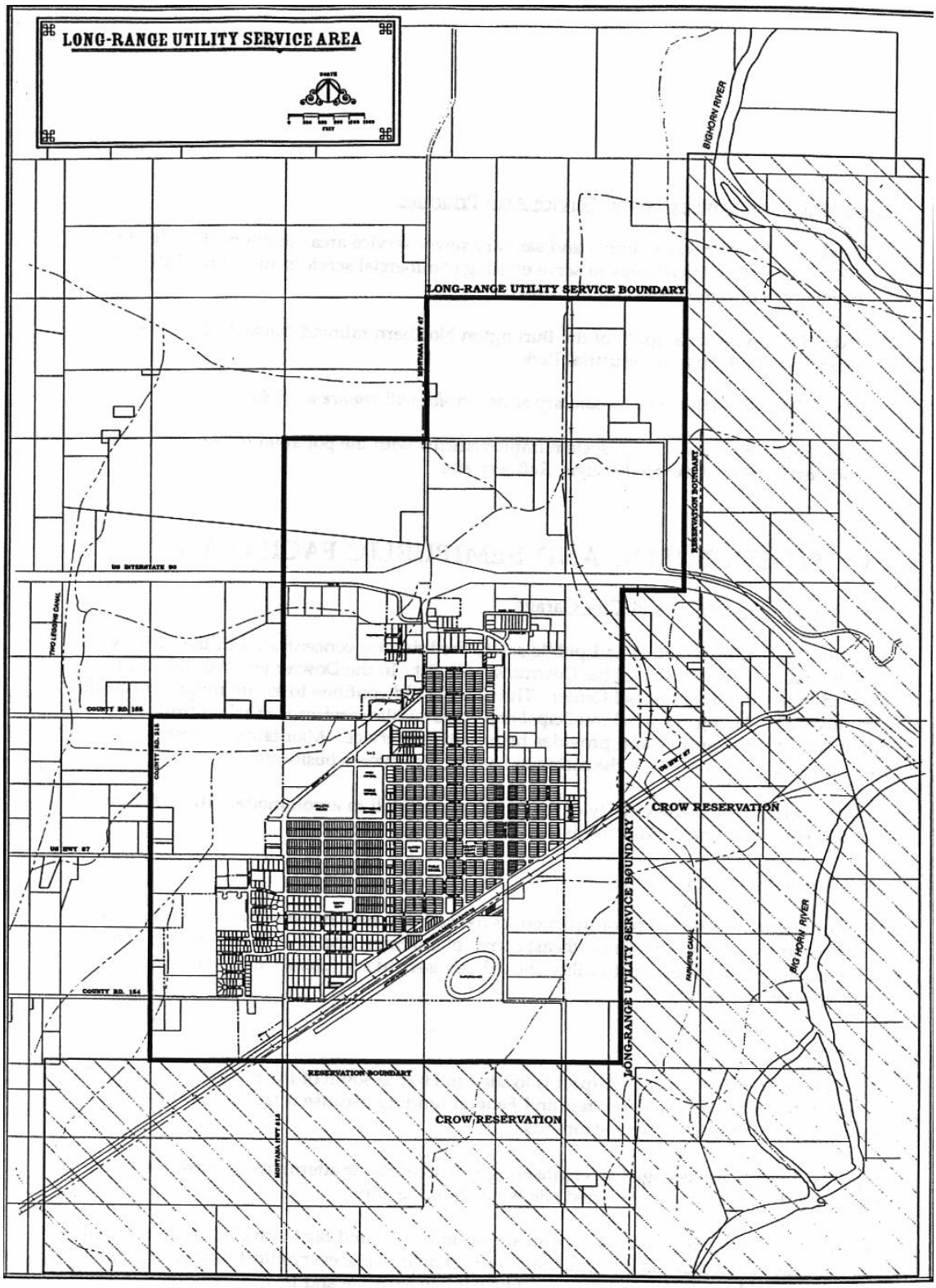
Storm Sewer




1
2
N
Sanitary Sewer Infrastructure
Sewer Lift Station
Sewer System Elements
Force Main
8" Gravity Sewer
10" Gravity Sewer
15" Gravity Sewer
0 .05 .1 .15
Miles
Interstate Engineering, Inc.

Sanitary Sewer





HARDIN · MONTANA

In the absence of effective regional drainage controls, the City needs to place greater emphasis on preserving and maintaining stormwater detention or retention basins in or near the City and reserving sufficient channels for efficient movement of stormwater through the City. The best opportunities for reservation of stormwater storage areas are at the time land is platted or surveyed into lots. The City needs to adopt local stormwater regulations so that these reservations are a required part of the platting process.

Where problems already exist or where there is a need for a basin-wide stormwater facility, the City should consider creating Special Improvement Districts (SID's) to finance stormwater management and drainage facility improvements.

Stormwater Management Priority Projects

1. Coordinate the control and maintenance of major culverts and drainage ditches and flood channels through drainage districts.

2. Adopt a City Stormwater Management Ordinance.

3. Construct stormwater detention basins as recommended in the Storm Drainage. Erosion Control & Flood Mitigation Master Plan.

4. Reserve the natural wetland and floodplain west of Mitchell Avenue, across from the Community Activity Center and High School Athletic Fields, as a permanent stormwater storage basin. The site should also function as a wetland/conservancy educational project for the school system. This will become more important as this area develops residentially with new City growth.

B. PUBLIC WATER SUPPLY AND SANITARY SEWER SYSTEM

The Water and Sanitary Sewer Master Plan prepared by Big Horn Engineering & Surveying in 1986 remains the City's long-range planning document for the municipal sanitary sewer and public water supply systems, particularly with respect to facility upgrades and design issues. The recommendations in this section refer primarily to financing policies and service areas.

Hardin's water collection and treatment facilities are closely monitored by the City and by agencies such as State Department of Environmental Quality (DEQ). Such facilities constantly need upgrading because of new standards or technology or because of factors caused by increased demand or age. A Comprehensive Performance Evaluation was made of the water treatment plant in October 2007 by Montana Rural Water Systems (MRWS) and DEQ. Engineering consultant, Interstate Engineering, Inc. also prepared an

update of the Treatment Plant in June 2008. The consulting engineer estimated the costs of addressing his findings at $680,000 to $1,200,000.[1]

In reviewing the current condition of the Water Treatment Plant, the Facility Operator notes the biggest needs are for more settling time for water from the intake--to reduce turbidity and sedimentation without overloading the present capacity of equipment; the need for additional, better filters, and the need for larger filters. The centrifugal pumps at the Water Plant need to be replaced with submersible ones. (The existing pumps are getting so old that replacement parts are impossible to get.) The Facility Operator also indicated that there are many more issues with the water treatment system than just the major ones listed here. He feels that not addressing these needs now will greatly impact the City's ability to deal with future growth. [2]

A key issue with respect to public water and sanitary sewer service is clarifying the policy with respect to expanding the service areas. Because of the physical conditions of high ground water and poor groundwater quality, it is desirable to minimize the use of private septic systems and private wells for domestic water use. Most of the Hardin area is rated as having "severe limitations" for private septic systems in the Big Horn County Soil Survey.

The City has received numerous requests for utility service extension. As a public policy, the City has not extended service unless the serviced properties annex or enter into a waiver agreement with respect to opposition to future annexations. With the exception of connections allowed at the time easements were granted for the Westside water storage facility, all utility extensions have been financed by the private property owners or developers.

The reason for the policy requiring annexation is to preserve and enhance the tax base of the City. Without annexation, the City's tax base will deteriorate, and the City will be unable to continue to support needed services and facility expansions. This principal applies to nearly every city. Where immediate annexation is not feasible due to lack of contiguity to the City and intervening unincorporated areas, waivers of objection to annexation should continue to be required.

The financing policy requiring private financing of water and sewer line extensions is also the only equitable means to finance utility service line extensions. It would be neither fair nor practical for the City to expect existing taxpayers living within the City to shoulder the burden for extensions. The costs of these improvements should be borne by the benefiting property owners and/or developers, unless State or Federal funding is made available to address specific problem areas or unless a tax incremental financing district is created to provide services to prospective industries.

With both of these policies in mind, the City should nevertheless anticipate future service area expansion to accommodate new development, particularly in the planned industrial areas and the

[1] William G. Enright, PE, Interstate Engineering, Inc., Technical Memorandum No. 2, Update of Items Completed, Hardin Water Treatment Plant, June 4, 2008
[2] Tony Maxwell, Water Treatment Plant Supervisor, interview

1-90/Highway 47 interchange area. The City should actively encourage landowners in these areas to annex into the City.

Public Water and Sanitary Sewer Service Area Priorities

1. Continue to support the Two Rivers Industrial site by further extention of City services.

2. Provide for long-range development by extending utility services south of the BNSF Railroad tracks to serve the proposed South Hardin Industrial Park. *Note: Providing this area with sanitary sewer service will require a lift station.*

3. Work with residential developers as the area along Cemetery Road/VanZandt Road grows in response to the development of the new County Airport.

7.C. OTHER PUBLIC AND SEMIPUBLIC FACILITIES

City Hall, Water Utility, and City Garage

The municipal administrative and public safety facilities are concentrated in the vicinity of the City Hall on the east side of the Downtown district. In the Downtown Plan this area is referred to as Hardin Municipal Center. The City should continue to locate municipal facilities into this area. Having clustered municipal and other public services is efficient from an administrative perspective and provides better citizen service. Maintaining these facilities Downtown also helps maintain the customer base for Downtown businesses.

There is ample area in the vicinity of the existing City Hall to accommodate the City's future building expansion and parking needs.

New Fire Station Construction

The City should proceed with construction, as needed, of a new fire station on the property acquired for this purpose on the northeast corner of 5th Street and Cheyenne Avenue. The site of the existing Fire Department facility should be reserved for future City Hall expansion and/or municipal parking.

Airport

The current Hardin Airport is owned by Big Horn County and located Fairgrounds south of the BNSF Railroad tracks east of Center Avenue on 64 acres of ground. Hangers,

Fairground structures, above ground fuel storage tanks, and grain elevators have all encroached on the airspace of the Airport.

The pavement at the Airport was chip sealed in 1986. Runway 04/22 is approximately 60 feet wide and 3,542 feet long with a gross weight rating of 15,000 pounds for single wheel and 23,000 pounds for dual wheel configurations. Displaced thresholds consist of 224 feet on Runway 04—without lighting--and 168 feet on Runway 22. (The information concerning both the existing and planned airports is taken from Morrison-Maierle's *Hardin Airport Relocation, Environmental Assessment Report, December 2006.)*

The Airport is classified by the Federal Aviation Commission (FAA) as Airport Reference Code (ARC) A-1 but does not meet those standards. Issues that affect the rating—and the non-compliance with FAA Standards include, but are not limited to, inadequate setbacks from the centerline of the runway for everything from buildings to power poles, lack of adequate taxiways and the locations of the existing taxiways, and grass growing on the runways. Recently a new cell tower was constructed which enters the Airport's Horizontal Surface Zone, an FAA-required, protected airspace. Furthermore, any future expansion of this site is restricted by existing facilities and roadways.

The Airport is an uncontrolled facility for Visual Flight Rules (VFR) use only and is mainly used by area agriculture, small business, and some pleasure flying. Existing amenities at the Airport include a lighted wind indicator, airport beacon (currently out of service indefinitely), Unicom (122.80), and a non-standard runway-edge lighting system. Among the ten sites reviewed by the airport engineering consultants, the existing Airport location is the worst. The closest airline carrier is at Billings' Logan International Airport.

The *Environmental Assessment* for the new airport states:

> "The need for development of a new airport is largely based on safety issues and not the need for additional capacity. Ultimate development of the airport will allow for a larger variety of aircraft resulting in potential increase in the number of operations. However, such an increase in operations without an increase in local economic drivers would likely be small so as to be negligible.
>
> Big Horn County desires to provide safe and adequate aviation services and facilities to serve the existing and future needs of the flying public as well as being able to accommodate the area's economic development and growth. The current airport location, with its numerous airspace obstructions, cannot meet that criteria."

The new airport (the I-90/Fairview Cemetery Site) is planned approximately 2.5 miles west of where Highway 47 crosses I-90 and will be at an elevation of 3050 feet above sea level. The primary runway (75-feet wide by 4,950-feet long) will be a little less than a

quarter mile south of and parallel to I-90. It will provide an aircraft turn-around area at each runway end (or partial parallel taxiway), aircraft parking apron, runway and taxiway edge lights, airport beacon, Precision Approach Path Indicator, wildlife perimeter fence, hangar access taxi lane, and entrance road—all in compliance with FAA Standards. The new airport will be designed to handle small airplanes with less than ten passenger seats. No crosswind runway is planned; the planned runway will catch 93.45 percent of the wind.

St. Vincent Health Care/Hardin Clinic

The Hardin Clinic, located on the southwest side of Hardin, needed additional land area for clinic expansion and parking. A proposed expansion area consisting of the eastern 140 feet of South Park was approved by voter referendum.

At the time the clinic facility is built, a sufficient landscape buffer should be constructed on the west side of the parking area to buffer the remaining portion of South Park from the clinic and parking areas. A chain link fence separates the Clinic property from the ice skating areas.

8. PARK AND RECREATION FACILITIES

The City's park system consists of three developed park sites, a partially developed playground, and an undeveloped site at the corner of Mitchell Avenue and 10th Street used for materials storage.

The Community Activity Center (CAC) is a state-of-the-art School District-owned community recreational facility with an Olympic-sized indoor swimming pool, wading pool, hot tub, weight room, and running track. This facility is exceptional for a community the size of Hardin. There are approximately two acres north of the CAC that are an improved open space with landscaping and pedestrian paths.

The High School and Middle School Athletic Fields and Tennis Courts and the Kid's World Playground at the Primary School on Third Street supplement the City's recreational resources.

The Big Horn County Fairgrounds located south of Downtown Hardin contains two baseball diamonds and ample parking.

8.A. COMMUNITY AND NEIGHBORHOOD PARK NEEDS

Park Service Standards

Recommended park service standards for smaller communities typically range from 8 to 12 acres of improved parkland per 1,000 population. There are two broad categories of parks—neighborhood parks, which serve a specific residential neighborhood, and community parks, which serve the entire community.

Generally, neighborhood parks are equipped with playground equipment and enough room for informal field games. Neighborhood parks typically have a service area with a radius of 1/4 to 1/2 mile. Community parks usually have improved athletic facilities, play field, basketball courts, and tennis courts. Generally, community parks have a service area with a radius of one to two miles. With the inclusion of the athletic facilities at the High School and Middle School and the Big Horn County Fairgrounds, the City meets the general service standards in terms of overall park and recreational facility acreage.

The only existing neighborhood in Hardin lacking adequate neighborhood park access is the residential neighborhood east of Center Avenue. This residential neighborhood is relatively small and it would be difficult to justify a full-sized municipal neighborhood park of two to six acres in this part of the City. However, as vacant lots become available, this neighborhood would be a suitable location for a small neighborhood playground with some open play area and playground equipment. Such a neighborhood playground would

be a good project for either service organizations such as Kiwanis or neighborhood parent groups.

Future Neighborhood Parks

Additional neighborhood parks may be needed as the Southwest Planning Area, located between Highway 87 and County Road 155, and the Northwest Planning Area, located north of County Road 155, as these areas are more fully developed as residential neighborhoods. The acreage for each of these neighborhood parks should be approximately four acres.

Typically, these types of neighborhood recreational facilities are acquired through land dedications at the time of platting. State and local subdivision law require each subdivider to dedicate a specific amount of land per dwelling or an equivalent fee-in-lieu-of-land to finance future park improvements. Many communities are also charging additional "developer impact fees" to finance future neighborhood park improvements.

8.B. SPECIFIC PARK IMPROVEMENT RECOMMENDATIONS

The following specific park recommendations should be considered by the City:

Custer Park (City Park)

Custer Park is an excellent central park that is fully improved and approximately 2.1 acres in size. When combined with the Kid's World Playground and the facilities at South Park, the central residential neighborhood is well-served.

Custer Park was dedicated on June 25, 1921, the 45th Anniversary of the Battle of the Little Bighorn. The granite monument has a bronze tablet on one side bearing General Custer's military record. On the other side is a bronze medallion bearing his likeness. Montana Governor Joseph Dixon gave the dedication address. Other notables present were 7th Cavalry Veterans—including General Godfrey and Custer's Crow Scouts—along with the former mayor of Monroe, Michigan (Custer's home town). While Hardin was eulogizing General Custer, Monroe dedicated a bronze of his military record for his equestrian statue on the same day. The dedication was a huge undertaking for the City of Hardin, which had been founded 14 years earlier. Adjacent Third Street was once part of the Custer Battlefield Highway which originated in Omaha, Nebraska and ended in Glacier National Park.[1]

The major improvements needed at Custer Park are modernization of the playground equipment to meet current recreational equipment standards.

[1] Carla Colstad, former member, Hardin Centennial Committee; correspondence

South Park (Southwest Park)

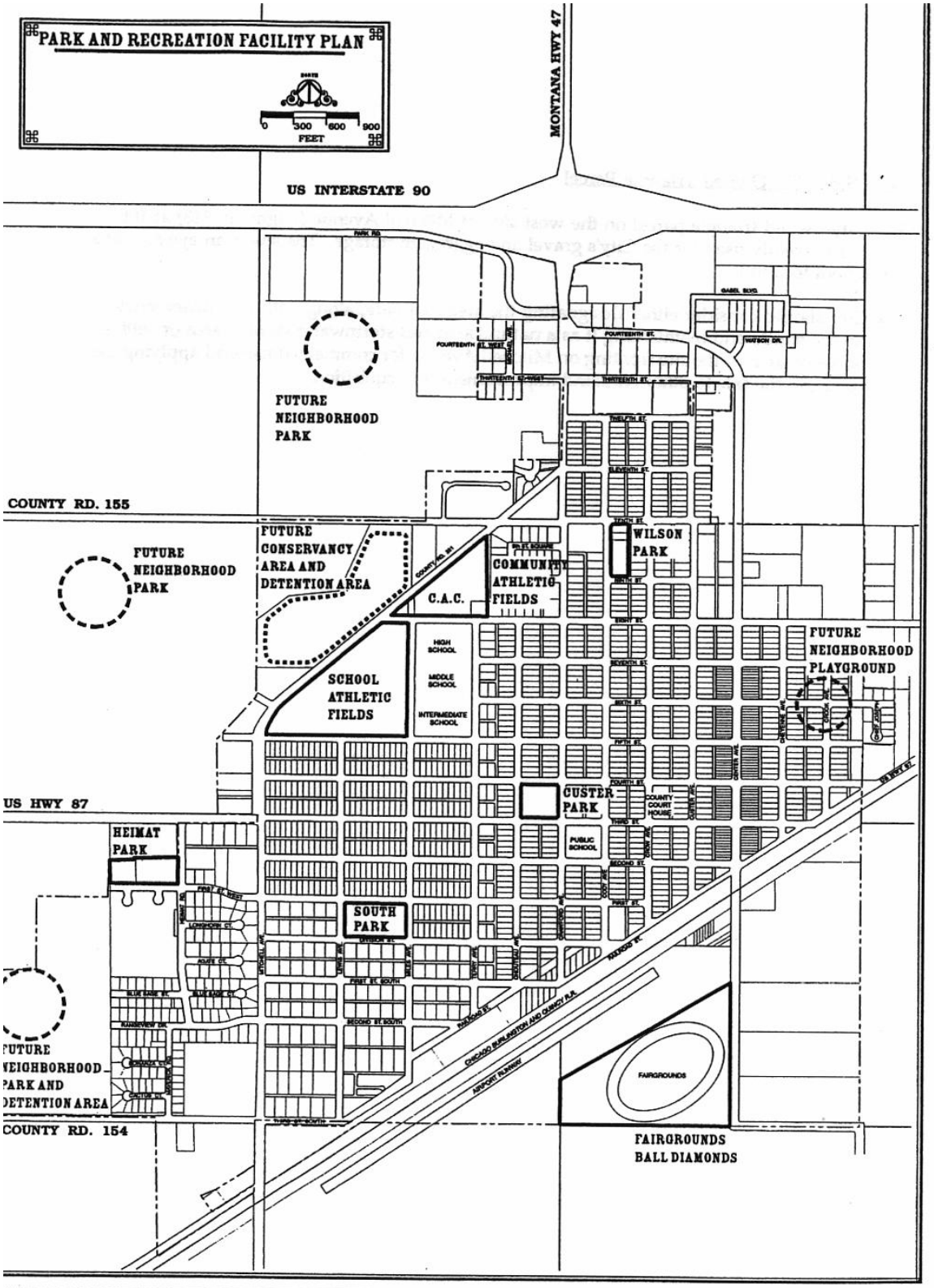
South Park is a 3.80-acre neighborhood park serving the Highland Park Addition and Southwest Addition part of the City. South Park contains playground equipment, picnic facilities, decorative security lighting, restrooms, and ice skating area.
St. Vincent Healthcare has purchased approximately 0.86 acres of the park fronting on Miles Avenue for a proposed clinic and parking. The remaining 2.94-acre park will be of sufficient size to serve the neighborhood, providing the facilities are well-designed and maintained.

Other recommended improvements to South Park include installation of sidewalks on First Street and Lewis Avenue and modernizing the playground equipment.

Heimat Park

Heimat Park is a 2.25-acre neighborhood park with an additional 1.31-acre parcel to the west planned for future park improvements. The park adjoins land planned for a future extension of First Street westward. Existing improvements at Heimat Park include playground equipment and landscaping. Most of the park is maintained as a mowed open area.

Recommended improvements include planting a row of buffer trees along the north property line and installing sidewalks along Heimat Avenue. Sidewalk should be installed along First Street when it is extended west.



HARDIN • MONTANA

The lowland property to the west of Heimat Park should be acquired as a stormwater management area and maintained as either open mowed areas or a natural area.

Wilson Park

Wilson Park is a 1.5-acre neighborhood park with wooden playground equipment and a basketball court serving the neighborhood northwest of Downtown Hardin. No improvements are needed in this park.

Community Activity Center

The open space area to the north of the CAC. The low area at the north end of the triangle should be maintained in native vegetation as a stormwater storage area. A split rail fence, matching the fence around other school property on Mitchell Avenue, should be installed around the CAC open space area. A walking path, picnic tables, and trees are in place.

Proposed West Side Conservancy Area

The large natural wetland and floodplain area on the west side of Mitchell Avenue across from the CAC and the High School Athletic Fields should be maintained as a conservancy park and outdoor environmental education laboratory. The area needs to be reserved for stormwater storage and could serve multiple functions as a recreation/educational/stormwater storage area. The area should be accessed by nature trails and boardwalks and maintained in natural wetland vegetation.

9. IMPLEMENTATION RECOMMENDATIONS

The City will need to consider a variety of implementation measures to incorporate the recommendations included in this Growth Management Plan and its Goals and Objectives. As with all municipal plans of this nature, implementation will not occur immediately. Many of the recommendations are long-range objectives that will be implemented incrementally as development occurs and as funding is available. Many of the recommendations in this document require coordination between multiple units of government and between the public and private-sectors.

9.A. MUNICIPAL ORDINANCES AND POLICIES

The City's main role in implementing the land use and development recommendations of this plan are through developing appropriate land use regulations and ordinances, so that as development occurs it will contribute to the overall well-being of the community.

Most of the administrative responsibility for implementing these regulations and policies currently rests with the Hardin-Big Horn County City-County Planning Board.

9.B. INTERGOVERNMENTAL COORDINATION AND ADMINISTRATION

A key issue that the City of Hardin and Big Horn County need to address in the near future is achieving more effective coordination in the areas of land use and development regulation. While the City-County Planning Board serves as the City's planning agency with respect to administering the zoning and subdivision ordinance, the ultimate authority with respect to approvals lies with the Common Council.

If the City-County Planning Board continues to function as the primary planning body for the City, the City staff, specifically the Zoning Administrator/Building Inspector, the Superintendent of Public Works, and the Community and Economic Development Director, need to function as support staff to the Planning Board. Likewise, the County Sanitarian, who helps administer the Subdivision Regulations, needs to closely coordinate his efforts with City officials.

While at a personal level there appears to be excellent cooperation and communication between individual staff members, the job descriptions and official responsibilities of each of these officials do not reflect the level of coordination required. In most communities the size of Hardin, City departments or appropriate staff provide report analysis to the Planning Board on all significant zoning and land division applications to assure that the Planning Board makes its decisions based on sound technical input. This practice should be adopted in Hardin and may require the Planning Board Secretary or other staff to request review of zoning, subdivision, and similar growth or change development applications much in the same way the County Sanitarian/Subdivision Coordinator presently requests input for new subdivisions in the whole County area.

9.C. LAND USE REGULATION AND ORDINANCE CHANGES

In addition to administrative coordination, there are a number of specific municipal ordinance changes that the City should consider to modernize the ordinances and bring them into compliance with MCA 76-1-601 through 76-1-606, the State-mandated growth policy laws. The following are specific ordinance recommendations that the City should consider to implement this Growth Management Plan.

1. The Zoning Ordinance needs substantial revision to bring it up to modern standards. As an alternative to piece-meal amendment of the existing Zoning Ordinance, the City should consider adopting the Model Municipal Zoning Ordinance prepared by the Montana Department of Commerce, with modifications to fit local situations in Hardin. This model is technically strong and meets all of the Montana statutory standards.

The Zoning Ordinance needs specific amendments or new language in the following areas:

a. The City and County need to establish the extra-territorial jurisdictional area for zoning around the City. State statute allows extra-territorial zoning administration for third class cities such as Hardin to regulate, with the County's permission, zoning out one mile from its municipal limits. The City already does this but not to the full extent. Exploration of zoning enforcement in the area east of the City on the Reservation should also be explored with the Crow Tribe.

b. The City needs to appoint a Board of Adjustment that will serve as an appeals board for disputed zoning issues; criteria for determining "hardship" should be incorporated in the appeals process. The City-County Planning Board can act as a Board of Adjustment if so designated and if the membership thereof complies with statute. The City Council may also want to limit the jurisdiction of such Board of Adjustment to dimensional or non-land use issues, and reserve the latter to itself with recommendations only coming from the Planning Board.

c. Creation of a new Rural Residential (RR) District that would allow homeowners to maintain horses and other large domestic animals on large City lots. The Rural Residential District should require a minimum lot size of three acres, plus one acre for each additional large animal kept on the premises. *(For example, a homeowner wishing to maintain three horses would require three acres for the first animal and two additional acres for second and third horse.)*

d. Requirements for commercial and industrial yards and setbacks should be included in the Zoning Ordinance.

e. The Zoning Ordinance should establish site plan review provisions for all commercial, industrial, and multifamily developments.

f. The commercial sign requirements should be made more restrictive to reduce the "sign clutter" in the C-2 Highway Commercial District.

g. Historic preservation design guidelines should be incorporated into the regulations for a "core historic area" in Historic Downtown Hardin.

h. Multifamily residential uses should be excluded from the C-2 Highway Commercial District.

i. Conditional use provisions should be incorporated as a means of allowing conditional approvals for certain specific uses that have nuisance potential.

j. The City should work with the County to establish a Community Entryway Zone providing for setbacks or other control of billboards and other unsightly development along the interstate beyond the one-mile jurisdiction out from the City. The City and County should encourage landowners to grant open-space easements that would keep the view along such an entryway open and in current ranching and farming uses. (Such easements may provide tax incentives for donors.)

k. The City and the County should adopt a ordinance to control new communication tower expansion with a provision that new cell towers can not be located within one mile of existing cell towers. The use of the interim zoning provisions in State statute would be useful in this instance.

l. Modify the existing Zoning Ordinance to encourage development near existing services, in or adjacent to the City, and on less productive land and in consideration of the existing flood plain in Hardin and those areas of wet soils or surface water; also encourage cluster development, affordable housing, landscaping, and energy conservation. Discourage strip commercial development and development in undesirable locations on prime agricultural land, wildlife habitat areas, and on floodplains and wetlands.

2. The subdivision review area around Hardin in which proposed developments are reviewed is The City-County Planning Board Jurisdictional Area is the land area around Hardin in which the Big Horn County Commissioners have designated the City-County Planning Board to review new developments such as subdivisions. The Planning Board reviews such developments, holds public hearings if necessary, and makes recommendations to the appropriate local government. The Jurisdictional Area extends to the Reservation boundary on the east and south, approximately two miles north (specifically including Sections 8, 9, 10, 11 and the west ½ of 12), approximately three miles west (specifically including Sections 8, 17, 20, and 29), and includes all of Sections 28 and 29 to the southwest. This is also the area to which the mill levy is applied for planning funds.

3. All subdivisions proposed in the City-County Planning Board Jurisdictional Area are reviewed per 76-3-604 MCA, must be in compliance with this Growth Management Plan, and in accordance herewith as per 76-1-606 MCA.

4. The City has adopted subdivision regulations based on the State model thereof—modified to address. The biggest issue in subdivision administration is the lack of coordinate processing of subdivision applications; a situation complicated by the subdivisions outside the Hardin Planning Jurisdictional Area being administered by the County Health Department, the area within the City being administered by the City Public Works Director, and the area outside the City but in the Planning Jurisdictional Area being in a kind of a grey area. Add to this the fact that, every two years, the applicable laws change from the State Legislature. It should be noted that both the County Health Department and the City Public Works are trying hard to address the

coordination issue. A planning consultant currently advises the two governments involved on the subdivision review process.

Nobody likes to do subdivision administration because it is complicated, somewhat exacting, and can get local governments in a lot of trouble if not done properly. Two areas are especially important. One is that standards for development, such as paved roads, sidewalks, central water and sewer systems, etc., must be enforced uniformly. The second is the requirement for enforcing the first problem. Currently a subdivision improvements agreement is being used to list all required improvements, who is responsible for construction thereof, when the improvements are to be constructed—and when. The only enforcing authority short of court that local governments have in applying standards is the withholding the filing of the final plat (and therefore the transfer of any land in the subdivision) until all its requirements are met. The only flexibility to encourage proper installation of improvements is allowing delays in construction (such as might be based on number of houses sold), requiring the initial landowners to sign a waiver that he/she will not protest any improvement districts being formed by the City to pave the roads (for example), and the posting of performance bonds by the developer guaranteeing the promises made by the subdivider or approval conditions required by the City.

5. The City needs to adopt Access Control Restrictions for Collector and Arterial Streets, as recommended in the 1986 Street and Highway Master Plan.

6. The City should adopt a Stormwater Management Manual and Stormwater Management Ordinance as recommended in the 1986 Storm Drainage. Erosion Control and Flood Mitigation Master Plan. The Master Plan recommends adoption of the City of Billings Stormwater Manual as a model.

GOALS AND OBJECTIVES--IMPLEMENTATION

	RESPONSIBILITY:		TOOLS:					TIMING:
GOALS AND OBJECTIVES	CITY	COUNTY	ZONING	SUB REGS	GEN REVIEW	BLDG CODES	CIP	
1. Accomplish the collection, treatment, and disposal of wastes in a safe, efficient, economical, and nuisance-free manner.	X	X					X	CURRENT
2. Provide adequate facilities to permit the maintenance of necessary and efficient levels of emergency services.	X	X		X	X		X	CURRENT
2. Encourage the continual and orderly development of the wastewater treatment plant commensurate with the growth of sanitary and industrial waste requirements	X						X	CURRENT
3. Minimize pollution of air and water by industrial wastes.	X	X			X			CURRENT
4. Recognize the importance of agriculture to the economic base of Hardin.	X	X	X	X	X			CURRENT
5. Prevent the spread of blight and deterioration within existing residential areas and encourage the removal of all blighted and deteriorated structures within the planning area.	X	X				X		CURRENT/ I YEAR

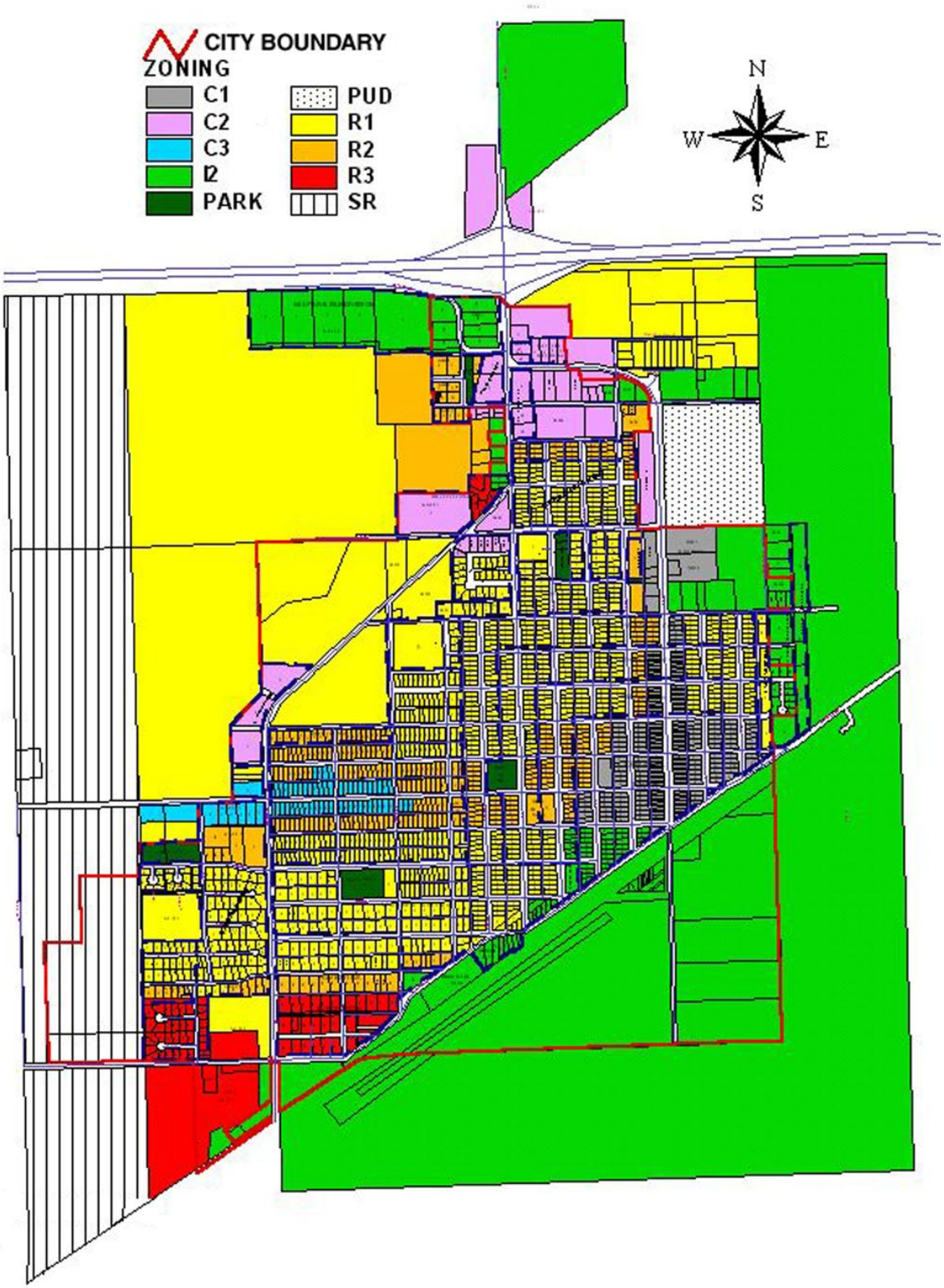
GOALS AND OBJECTIVES	CITY	COUNTY	ZONING	SUB REGS	GEN REVIEW	BLDG CODES	CIP	**TIMING**
6. Discourage the indiscriminate placing of mobile homes on an isolated basis among inconsistent land uses and encourage well-designed and located mobile home parks.	X	X	X	X				CURRENT
7. Preserve the character of Hardin as a hard-working "western" community.	X	X	X			X		CURRENT
7. Require residential developers and land dividers to provide for the extension of streets and utilities to serve future adjoining development parcels.	X	X		X		X		CURRENT
8. Coordinate land use planning and development with Big Horn County.	X	X	X	X	X		X	CURRENT
9. Plan the west I-90 interchange area as a prime location for highway commercial businesses, such as service stations, restaurants, drive-ins, entertainment, and lodging.	X	X	X	X				CURRENT

10. Commercial areas characterized by proper location, adequate sites, sufficient parking and service areas, good design, and visual attractiveness.	X	X	X	X	X	X	CURRENT

GOALS AND OBJECTIVES	CITY	COUNTY	ZONING	SUB REGS	GEN REVIEW	BLDG CODES	CIP	**TIMING**
11. Provide for the proper location of industrial uses according to the demand they generate for transportation, personnel housing, utilities, and public facilities.	X	X	X	X	X	X	X	CURRENT
11. Provide a park and recreation system with a sufficient diversity of areas and facilities to serve effectively a population with varied characteristics, needs, and interest, and minimize incompatible uses bordering park and recreation areas.	X	X		X				CURRENT
12. Protect the agricultural economy by adequate control of leap-frogging urban development.	X	X	X	X				CURRENT
13. Plan school sites relatively free from such external disturbing factors as heavy traffic, excessive noise, offensive odors, and in-compatible land uses.	X	X	X		X	X	X	CURRENT
14. Promote cooperation and coordination between the City of Hardin and the Crow Indian Reservation.	X				X			1 YEAR

15. Support properly designed industrial subdivisions to reduce site costs, promote efficient use of land, and minimize any adverse effects upon adjacent non-industrial uses.	X	X		X	X	X	CURRENT
16. Neighborhood integrity should be maintained and not disturbed by the creation of additional traffic corridors or the intrusion of incompatible uses.	X	X	X	X			CURRENT
17. Coordinate between the planning and development of water resources and land use planning.	X	X	X	X	X		CURRENT
18. Promote economically viable uses of upper levels of downtown buildings.	X					X	1 YEAR
19. Encourage the development of underground utilities before the construction of streets and highways.	X			X			CURRENT
20. Develop residential areas having a full complement of public and private facilities adequate in quantity, quality, design, and location to meet the service and social needs of Hardin residents.	X			X		X	CURRENT

GOALS AND OBJECTIVES	CITY	COUNTY	ZONING	SUB REGS	GEN REVIEW	BLDG CODES	CIP	**TIMING**
21. Develop a strong central core that functions as the administrative, financial, cultural, and major commercial center of the urban area and the surrounding region with adequate parking facilities and a functional transportation network designed to increase its efficiency.	X		X			X	X	CURRENT
21. Plan government administrative facilities, through location, design, and appearance to contribute to civic and community identities.	X	X			X	X	X	CURRENT
22. Discourage strip commercial development.	X	X	X	X		X		CURRENT
23. Protect existing and proposed industrial lands from encroachment by residential and other incompatible development.	X	X	X	X	X			CURRENT


CITY BOUNDARY
ZONING
C1
C2
C3
I2
PARK
PUD
R1
R2
R3
SR
N
W
E
S

9.D. ANNEXATION AND UTILITY EXTENSION POLICIES

The City should formally adopt policies that will clearly indicate the City's policies with respect to annexation and financing utility extensions. The issue of utility extensions is going to be an ongoing concern due to the physical conditions of the Hardin area that affect water quality and limit the use of private septic systems.

It is recommended that the City continue to require annexation, or signature of waivers of opposition to annexation, as a precondition to receiving municipal services. All utility line extensions should be financed by the property owners and/or developers unless a State or Federal grant is received for the expressed purpose of serving an area or the area is part of a tax incremental finance district formed to promote economic development

The amendment of the Zoning Ordinance to create a Rural Residential District in the City which would allow homeowners to keep horses and other large animals would remove a major impediment to annexation which is keeping may landowners from coming into the City. *(See Zoning Ordinance recommendations on previous page.)*

9.E. BUILDING CODE INSPECTION AREA--EXPANSION

The City and County should cooperate on the expansion of the building code inspection program to include the zoning jurisdictional area.

10. EVALUATION AND REVISION PROVISIONS

After review and approval by the City-County Planning Board, this Growth Management Plan will be forwarded to the City and County governments for adoption. It is expected that such adoption will be completed by July 2002. Should local conditions change due to major development impacts, such as that from the construction of an electrical generation plant, this GMP will be reviewed for continued applicability or needed revision. If no such major development occurs that triggers review of this GMP, it will be reviewed again in January 2006.

11. INTERLOCAL GOVERNMENTAL COOPERATION

Cooperation between Big Horn County and the City of Hardin is premised on the creation of the joint City-County Planning Board officially called The Hardin-Big Horn County City-County Planning Board. This cooperative arrangement allows the City of Hardin to review developments such as subdivisions in the jurisdictional area around the City and to make recommendations to either the City, if within the municipal limits, or to the County if within County lands.

For subdivisions, the basis for the local government's decision to approve, conditionally approve, or disapprove shall be based on whether the preliminary plat of the subdivision, its environmental impact assessment, the public hearing therefore, and City-County Planning Board's recommendation meets the requirements of the Subdivision Law; other issues may also be considered if the Planning Board or local governments feel the information is pertinent to making good decisions.

The local government shall issue written findings of fact after reviewing the impact on the following primary criteria, the information for which must be provided by the development being reviewed as part of the application process: agriculture, agricultural water user facilities, local services (such as the provision of water, sewer, police, education, and fire services), the natural environment, wildlife and wildlife habitat, and public health and safety. Further review specifics are detailed in the City-County Subdivision Regulations.

Through the Planning Board and local government public hearing and development information review process, the local governments must weigh the information provided, the recommendation of the Planning Board, and public hearing input. It must make its decision based on the cumulative evaluation of all information and its impact on the primary criteria listed in the preceding paragraph and for the public good. The public hearings for proposed subdivisions will be advertised in the local newspaper of general circulation in the County not less than 15 days prior to the date of the hearing. The subdivider, each property owner of record, and each purchaser under contract for deed of property immediately adjoining the land included in the plat must be notified of the hearing by registered or certified mail not less than 15 days prior to the date of the hearing.

At the public hearing, the City-County Planning Board will officially open the public hearing and ask for a presentation by the developers of the proposed subdivision; other proponents of the development may then also speak after identifying themselves along with their addresses for the record being kept by the Planning Board Secretary. After the proponents have spoken, any opponents will be allowed to speak, again after providing identification and address. After any opponents to a development have spoken, the developers have a right to rebuttal, after which the public hearing shall be closed. The Planning Board may then discuss the proposed development and decided whether to table their recommendation decision until the next regularly scheduled meeting, to approve, to approve subject to conditions, or to deny the development. Their decision must then be transferred in writing to the appropriate governing body and to the developers.

Appendix E

Physical Soil Properties

This table shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In this table, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In this table, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, saturated hydraulic conductivity (Ksat), plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3- or 1/10-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute linear extensibility, shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates in the table are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity (Ksat) is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. The amount and type of clay minerals in the soil influence volume change.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In this table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter. The content of organic matter in a soil can be maintained by returning crop residue to the soil.

Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in the table as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and Ksat. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind and/or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are described in the "National Soil Survey Handbook."

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Reference:
United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. (http://soils.usda.gov)

Report—Physical Soil Properties

Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Physical Soil Properties–Big Horn County Area, Montana														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
Hfa—Haverson loam, 0 to 2 percent slopes														
Haverson	0-12	-44-	-40-	10-16- 22	1.15-1.25 -1.35	4.00-9.00-14.00	0.16-0.18-0. 20	0.0- 1.5- 2.9	0.5- 1.3- 2.0	.32	.32	5	5	56
	12-60	-39-	-37-	18-24- 30	1.30-1.43 -1.55	4.00-9.00-14.00	0.14-0.16-0. 18	0.0- 1.5- 2.9	0.5- 0.8- 1.0	.32	.32			
Hfc—Haverson loam, saline														
Haverson	0-12	-42-	-37-	15-21- 27	1.30-1.40 -1.50	1.40-8.00-14.00	0.10-0.11-0. 12	0.0- 1.5- 2.9	1.0- 1.5- 2.0	.28	.28	5	6	48
	12-60	-38-	-36-	18-27- 35	1.40-1.50 -1.60	4.00-9.00-14.00	0.10-0.11-0. 12	0.0- 1.5- 2.9	0.5- 0.8- 1.0	.32	.32			
Hfd—Haverson silty clay loam														
Haverson	0-12	-18-	-49-	27-34- 40	1.25-1.35 -1.45	1.40-3.00-4.00	0.14-0.16-0. 18	3.0- 4.5- 5.9	0.5- 1.3- 2.0	.32	.32	5	6	48
	12-60	-38-	-36-	18-27- 35	1.35-1.45 -1.55	4.00-9.00-14.00	0.14-0.16-0. 18	0.0- 1.5- 2.9	0.5- 0.8- 1.0	.32	.32			

Physical Soil Properties–Big Horn County Area, Montana														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
Hff—Haverson silty clay, thick surface														
Haverson	0-12	- 6-	-47-	40-48- 55	1.20-1.30 -1.40	0.42-1.00-1.40	0.12-0.14-0. 16	6.0- 7.5- 8.9	0.5- 1.3- 2.0	.24	.24	5	4	86
	12-60	-39-	-37-	18-24- 30	1.40-1.50 -1.60	4.00-9.00-14.00	0.14-0.16-0. 18	0.0- 1.5- 2.9	0.5- 0.8- 1.0	.32	.32			
HGa—Haverson and Glenberg soils														
Glenberg	0-5	-69-	-22-	5-10- 15	1.40-1.50 -1.60	14.00-28.00-42. 00	0.10-0.12-0. 13	0.0- 1.5- 2.9	0.5- 1.3- 2.0	.24	.24	5	3	86
	5-60	-84-	- 5-	5-12- 18	1.35-1.48 -1.60	14.00-28.00-42. 00	0.10-0.12-0. 13	0.0- 1.5- 2.9	0.5- 0.8- 1.0	.20	.20			
Haverson	0-12	-44-	-40-	10-16- 22	1.15-1.25 -1.35	4.00-9.00-14.00	0.16-0.18-0. 20	0.0- 1.5- 2.9	0.5- 1.3- 2.0	.32	.32	5	5	56
	12-60	-39-	-37-	18-24- 30	1.30-1.43 -1.55	4.00-9.00-14.00	0.14-0.16-0. 18	0.0- 1.5- 2.9	0.5- 0.8- 1.0	.32	.32			
HK—Haverson soils, saline														
Haverson	0-12	-18-	-49-	27-34- 40	1.30-1.40 -1.50	1.40-3.00-4.00	0.10-0.11-0. 12	3.0- 4.5- 5.9	1.0- 1.5- 2.0	.32	.32	5	6	48
	12-60	-38-	-36-	18-27- 35	1.40-1.50 -1.60	4.00-9.00-14.00	0.10-0.11-0. 12	0.0- 1.5- 2.9	0.5- 0.8- 1.0	.32	.32			
Havre	0-12	-42-	-37-	15-21- 27	1.30-1.40 -1.50	1.40-8.00-14.00	0.10-0.11-0. 12	0.0- 1.5- 2.9	1.0- 1.5- 2.0	.28	.28	5	6	48
	12-60	-38-	-36-	18-27- 35	1.40-1.50 -1.60	4.00-9.00-14.00	0.10-0.11-0. 12	0.0- 1.5- 2.9	0.5- 0.8- 1.0	.32	.32			

Physical Soil Properties–Big Horn County Area, Montana														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
Hla—Heldt silty clay loam, 0 to 2 percent slopes														
Heldt	0-4	-18-	-49-	27-34- 40	1.20-1.30 -1.40	1.40-3.00-4.00	0.16-0.18-0. 20	3.0- 4.5- 5.9	1.0- 1.5- 2.0	.32	.32	5	6	48
	4-10	- 8-	-52-	35-40- 45	1.30-1.40 -1.50	0.42-1.00-1.40	0.14-0.16-0. 18	6.0- 7.5- 8.9	0.5- 0.8- 1.0	.37	.37			
	10-22	- 8-	-52-	35-40- 45	1.30-1.43 -1.55	0.42-1.00-1.40	0.14-0.16-0. 18	6.0- 7.5- 8.9	0.5- 0.8- 1.0	.37	.37			
	22-60	- 8-	-52-	35-40- 45	1.30-1.43 -1.55	0.42-1.00-1.40	0.14-0.16-0. 18	6.0- 7.5- 8.9	0.5- 0.8- 1.0	.37	.37			
Ks—Kyle silty clay, 0 to 2 percent slopes														
Kyle	0-5	- 5-	-45-	40-50- 60	1.25-1.35 -1.45	0.42-1.00-1.40	0.14-0.16-0. 18	6.0- 7.5- 8.9	0.5- 1.3- 2.0	.20	.20	5	4	86
	5-10	-22-	-28-	40-50- 60	1.30-1.40 -1.50	0.01-0.21-0.42	0.12-0.14-0. 16	6.0- 7.5- 8.9	0.5- 0.8- 1.0	.24	.24			
	10-62	-22-	-28-	40-50- 60	1.30-1.43 -1.55	0.01-0.21-0.42	0.12-0.14-0. 16	6.0- 7.5- 8.9	0.0- 0.3- 0.5	.24	.24			

Physical Soil Properties–Big Horn County Area, Montana														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
Kw—Kyle clay, saline														
Kyle	0-5	-28-	-29-	40-43- 45	1.20-1.30 -1.40	0.42-1.00-1.40	0.14-0.16-0. 17	3.0- 4.5- 5.9	1.0- 2.0- 3.0	.15	.15	5	4	86
	5-10	- 8-	-52-	35-40- 45	1.25-1.35 -1.45	0.42-1.00-1.40	0.10-0.12-0. 13	3.0- 4.5- 5.9	1.0- 1.5- 2.0	.37	.37			
	10-22	- 8-	-52-	35-40- 45	1.30-1.40 -1.50	0.42-1.00-1.40	0.10-0.12-0. 13	3.0- 4.5- 5.9	0.5- 0.8- 1.0	.37	.37			
	22-62	- 8-	-52-	35-40- 45	1.30-1.40 -1.50	0.42-1.00-1.40	0.06-0.07-0. 08	3.0- 4.5- 5.9	0.0- 0.3- 0.5	.37	.37			
Rk—Richfield silty clay loam, 0 to 2 percent slopes														
Richfield	0-9	-18-	-51-	27-31- 35	1.15-1.25 -1.35	1.40-3.00-4.00	0.16-0.18-0. 20	3.0- 4.5- 5.9	1.0- 2.0- 3.0	.43	.43	5	6	48
	9-19	- 8-	-52-	35-40- 45	1.30-1.40 -1.50	0.42-1.00-1.40	0.12-0.14-0. 15	6.0- 7.5- 8.9	1.0- 1.5- 2.0	.37	.37			
	19-65	-18-	-50-	25-33- 40	1.30-1.40 -1.50	0.42-1.00-1.40	0.16-0.18-0. 20	3.0- 4.5- 5.9	0.5- 0.8- 1.0	.43	.43			
RM—Riverwash														
Riverwash	—	—	—	—	—	—	—	—	—					
SOa—Shale outcrop														
Rock outcrop, shale	—	—	—	—	—	—	—	—	—					

Physical Soil Properties–Big Horn County Area, Montana														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
TCa—Terrace escarpments, gravelly														
Terrace escarpments	0-4	-46-	-43-	7-11- 15	1.20-1.30 -1.40	14.00-28.00-42. 00	0.11-0.13-0. 14	0.0- 1.5- 2.9	0.7- 1.4- 2.0	.20	.43	5		
	4-60	-94-	- 1-	0- 5- 10	1.45-1.55 -1.65	42.00-92.00-14 1.00	0.01-0.02-0. 02	0.0- 1.5- 2.9	0.0- 0.3- 0.5	.02	.05			
Tinsley	0-4	-69-	-24-	5- 8- 10	1.30-1.40 -1.50	14.00-28.00-42. 00	0.08-0.10-0. 11	0.0- 1.5- 2.9	0.7- 1.4- 2.0	.15	.24	5	5	56
	4-60	-94-	- 1-	0- 5- 10	1.45-1.55 -1.65	42.00-92.00-14 1.00	0.01-0.02-0. 02	0.0- 1.5- 2.9	0.0- 0.3- 0.5	.02	.02			
Va—Vananda clay, 0 to 1 percent slopes														
Vananda	0-3	-22-	-28-	40-50- 60	1.25-1.35 -1.45	0.01-0.21-0.42	0.08-0.10-0. 12	6.0- 7.5- 8.9	0.5- 1.3- 2.0	.17	.17	5	4	86
	3-60	-23-	-29-	35-48- 60	1.30-1.40 -1.50	0.01-0.21-0.42	0.08-0.10-0. 12	6.0- 7.5- 8.9	0.0- 0.3- 0.5	.28	.28			
W—Water														
Water	—	—	—	—	—	—	—	—	—					
Wb—Wages loam, 2 to 4 percent slopes														
Wages	0-6	-39-	-37-	20-24- 27	1.20-1.30 -1.40	4.00-9.00-14.00	0.16-0.18-0. 20	0.0- 1.5- 2.9	1.0- 2.0- 3.0	.28	.28	5	6	48
	6-13	-34-	-37-	25-30- 35	1.30-1.40 -1.50	4.00-9.00-14.00	0.14-0.16-0. 18	3.0- 4.5- 5.9	0.5- 0.8- 1.0	.32	.32			
	13-60	-40-	-38-	15-23- 30	1.30-1.40 -1.50	4.00-9.00-14.00	0.16-0.17-0. 18	3.0- 4.5- 5.9	0.0- 0.3- 0.5	.37	.37			

Data Source Information

Soil Survey Area: Big Horn County Area, Montana
Survey Area Data: Version 13, Sep 21, 2017

Roads and Streets, Shallow Excavations, and Lawns and Landscaping

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. This table shows the degree and kind of soil limitations that affect local roads and streets, shallow excavations, and lawns and landscaping.

The ratings in the table are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer.

Information in this table is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this table. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Report—Roads and Streets, Shallow Excavations, and Lawns and Landscaping

[Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The table shows only the top five limitations for any given soil. The soil may have additional limitations]

Roads and Streets, Shallow Excavations, and Lawns and Landscaping–Big Horn County Area, Montana							
Map symbol and soil name	Pct. of map unit	Lawns and landscaping		Local roads and streets		Shallow excavations	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Hfa—Haverson loam, 0 to 2 percent slopes							
Haverson	90	Somewhat limited		Very limited		Somewhat limited	
		Flooding	0.60	Flooding	1.00	Flooding	0.60
		Dusty	0.09	Frost action	0.50	Dusty	0.09
						Unstable excavation walls	0.01
Glenberg	8	Somewhat limited		Somewhat limited		Somewhat limited	
		Low exchange capacity	0.50	Frost action	0.50	Dusty	0.11
		Dusty	0.11			Unstable excavation walls	0.01
Somewhat poorly drained soils	2	Not rated		Not rated		Not rated	
Hfc—Haverson loam, saline							
Haverson	90	Very limited		Somewhat limited		Somewhat limited	
		Salinity	1.00	Frost action	0.50	Depth to saturated zone	0.61
		Dusty	0.10	Flooding	0.40	Dusty	0.10
						Unstable excavation walls	0.01
Glenberg	8	Somewhat limited		Somewhat limited		Somewhat limited	
		Low exchange capacity	0.50	Frost action	0.50	Dusty	0.11
		Dusty	0.11			Unstable excavation walls	0.01
Poorly drained soils	2	Not rated		Not rated		Not rated	
Hfd—Haverson silty clay loam							
Haverson	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.15	Frost action	0.50	Dusty	0.15
				Flooding	0.40	Unstable excavation walls	0.01
Hysham	10	Very limited		Very limited		Somewhat limited	
		Sodium content	1.00	Low strength	1.00	Dusty	0.39
		Salinity	1.00	Frost action	0.50	Unstable excavation walls	0.01
		Dusty	0.39	Shrink-swell	0.50		

Roads and Streets, Shallow Excavations, and Lawns and Landscaping–Big Horn County Area, Montana							
Map symbol and soil name	Pct. of map unit	Lawns and landscaping		Local roads and streets		Shallow excavations	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Hff—Haverson silty clay, thick surface							
Haverson	90	Very limited		Somewhat limited		Somewhat limited	
		Too clayey	1.00	Flooding	0.40	Dusty	0.17
		Dusty	0.17			Unstable excavation walls	0.01
Hysham	10	Very limited		Very limited		Somewhat limited	
		Sodium content	1.00	Low strength	1.00	Dusty	0.39
		Salinity	1.00	Frost action	0.50	Unstable excavation walls	0.01
		Dusty	0.39	Shrink-swell	0.50		
HGa—Haverson and Glenberg soils							
Glenberg	45	Somewhat limited		Very limited		Somewhat limited	
		Flooding	0.60	Flooding	1.00	Flooding	0.60
		Low exchange capacity	0.50	Frost action	0.50	Unstable excavation walls	0.06
Haverson	45	Somewhat limited		Very limited		Somewhat limited	
		Flooding	0.60	Flooding	1.00	Flooding	0.60
		Dusty	0.09	Frost action	0.50	Dusty	0.09
						Unstable excavation walls	0.01
Havre	4	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.10	Frost action	0.50	Dusty	0.10
				Flooding	0.40	Unstable excavation walls	0.01
Riverwash	4	Not rated		Not rated		Not rated	
Somewhat poorly drained soils	2	Not rated		Not rated		Not rated	

Roads and Streets, Shallow Excavations, and Lawns and Landscaping–Big Horn County Area, Montana							
Map symbol and soil name	Pct. of map unit	Lawns and landscaping		Local roads and streets		Shallow excavations	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
HK—Haverson soils, saline							
Haverson	45	Very limited		Very limited		Somewhat limited	
		Salinity	1.00	Flooding	1.00	Depth to saturated zone	0.61
		Flooding	0.60	Frost action	0.50	Flooding	0.60
		Dusty	0.15			Dusty	0.15
						Unstable excavation walls	0.01
Havre	45	Very limited		Very limited		Somewhat limited	
		Salinity	1.00	Flooding	1.00	Depth to saturated zone	0.61
		Flooding	0.60	Frost action	0.50	Flooding	0.60
		Dusty	0.10			Dusty	0.10
						Unstable excavation walls	0.01
Glenberg	8	Somewhat limited		Somewhat limited		Somewhat limited	
		Low exchange capacity	0.50	Frost action	0.50	Dusty	0.11
		Dusty	0.11			Unstable excavation walls	0.01
Lallie	2	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Flooding	1.00	Shrink-swell	1.00	Depth to saturated zone	1.00
		Too clayey	1.00	Frost action	1.00	Flooding	0.80
		Depth to saturated zone	0.99	Flooding	1.00	Unstable excavation walls	0.51
		Dusty	0.08	Low strength	1.00	Too clayey	0.28

Roads and Streets, Shallow Excavations, and Lawns and Landscaping–Big Horn County Area, Montana							
Map symbol and soil name	Pct. of map unit	Lawns and landscaping		Local roads and streets		Shallow excavations	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Hla—Heldt silty clay loam, 0 to 2 percent slopes							
Heldt	90	Somewhat limited		Very limited		Somewhat limited	
		Dusty	0.28	Shrink-swell	1.00	Unstable excavation walls	0.51
				Low strength	1.00	Dusty	0.28
Lohmiller	10	Somewhat limited		Very limited		Somewhat limited	
		Flooding	0.60	Shrink-swell	1.00	Flooding	0.60
		Dusty	0.27	Flooding	1.00	Unstable excavation walls	0.51
				Low strength	1.00	Dusty	0.27
						Too clayey	0.13
Ks—Kyle silty clay, 0 to 2 percent slopes							
Kyle	85	Very limited		Very limited		Somewhat limited	
		Too clayey	1.00	Shrink-swell	1.00	Unstable excavation walls	0.51
		Dusty	0.28	Low strength	1.00	Too clayey	0.50
						Dusty	0.28
Vananda	15	Very limited		Very limited		Somewhat limited	
		Sodium content	1.00	Shrink-swell	1.00	Unstable excavation walls	0.51
		Too clayey	1.00	Low strength	1.00	Too clayey	0.28
		Dusty	0.26			Dusty	0.26
		Salinity	0.13				
		Droughty	0.01				

Roads and Streets, Shallow Excavations, and Lawns and Landscaping–Big Horn County Area, Montana							
Map symbol and soil name	Pct. of map unit	Lawns and landscaping		Local roads and streets		Shallow excavations	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Kw—Kyle clay, saline							
Kyle	90	Very limited		Very limited		Somewhat limited	
		Sodium content	1.00	Low strength	1.00	Depth to saturated zone	0.61
		Too clayey	1.00	Frost action	0.50	Dusty	0.28
		Dusty	0.28	Shrink-swell	0.50	Unstable excavation walls	0.01
Vananda	8	Very limited		Very limited		Somewhat limited	
		Sodium content	1.00	Shrink-swell	1.00	Unstable excavation walls	0.51
		Too clayey	1.00	Low strength	1.00	Too clayey	0.28
		Dusty	0.26			Dusty	0.26
		Salinity	0.13				
		Droughty	0.01				
Mckenzie	2	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	1.00	Shrink-swell	1.00	Unstable excavation walls	0.51
		Salinity	0.13	Low strength	1.00	Too clayey	0.50
		Dusty	0.08			Dusty	0.08
Rk—Richfield silty clay loam, 0 to 2 percent slopes							
Richfield	85	Somewhat limited		Very limited		Somewhat limited	
		Dusty	0.23	Low strength	1.00	Dusty	0.23
				Shrink-swell	0.92	Unstable excavation walls	0.01
Hydro	9	Very limited		Very limited		Somewhat limited	
		Sodium content	1.00	Shrink-swell	1.00	Dusty	0.41
		Dusty	0.41	Low strength	1.00	Too clayey	0.13
						Unstable excavation walls	0.01
Allentine	6	Very limited		Very limited		Somewhat limited	
		Sodium content	1.00	Shrink-swell	1.00	Unstable excavation walls	0.51
		Dusty	0.43	Low strength	1.00	Dusty	0.43
						Too clayey	0.13

Roads and Streets, Shallow Excavations, and Lawns and Landscaping–Big Horn County Area, Montana							
Map symbol and soil name	Pct. of map unit	Lawns and landscaping		Local roads and streets		Shallow excavations	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
RM—Riverwash							
Riverwash	95	Not rated		Not rated		Not rated	
Glenberg	3	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Flooding	0.80
		Low exchange capacity	0.50	Frost action	0.50	Unstable excavation walls	0.06
Haverson	2	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Flooding	0.80
		Dusty	0.09	Frost action	0.50	Dusty	0.09
						Unstable excavation walls	0.01
SOa—Shale outcrop							
Rock outcrop, shale	80	Not rated		Not rated		Not rated	
Eltsac	10	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	1.00	Shrink-swell	1.00	Too clayey	1.00
		Depth to bedrock	0.42	Low strength	1.00	Unstable excavation walls	0.51
		Dusty	0.17			Depth to soft bedrock	0.42
						Dusty	0.17
Norbert	10	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to soft bedrock	1.00
		Too clayey	1.00	Shrink-swell	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to soft bedrock	1.00	Unstable excavation walls	0.51
		Droughty	0.61	Low strength	1.00	Dusty	0.17
		Dusty	0.17				

Roads and Streets, Shallow Excavations, and Lawns and Landscaping–Big Horn County Area, Montana							
Map symbol and soil name	Pct. of map unit	Lawns and landscaping		Local roads and streets		Shallow excavations	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
TCa—Terrace escarpments, gravelly							
Terrace escarpments	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Droughty	1.00			Unstable excavation walls	1.00
		Low exchange capacity	0.50				
		Gravel content	0.22				
Tinsley	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Droughty	1.00			Unstable excavation walls	1.00
		Low exchange capacity	0.75				
		Gravel content	0.22				
Clapper	8	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Low exchange capacity	0.50			Dusty	0.27
		Gravel content	0.50			Unstable excavation walls	0.01
		Dusty	0.27				
		Droughty	0.10				
Busby	7	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Low exchange capacity	0.50	Frost action	0.50	Dusty	0.02
		Dusty	0.02			Unstable excavation walls	0.01

Roads and Streets, Shallow Excavations, and Lawns and Landscaping–Big Horn County Area, Montana							
Map symbol and soil name	Pct. of map unit	Lawns and landscaping		Local roads and streets		Shallow excavations	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Va—Vananda clay, 0 to 1 percent slopes							
Vananda	90	Very limited		Very limited		Somewhat limited	
		Sodium content	1.00	Shrink-swell	1.00	Unstable excavation walls	0.51
		Too clayey	1.00	Low strength	1.00	Too clayey	0.28
		Dusty	0.26			Dusty	0.26
		Salinity	0.13				
		Droughty	0.01				
Bone	5	Very limited		Very limited		Somewhat limited	
		Sodium content	1.00	Shrink-swell	1.00	Unstable excavation walls	0.51
		Too clayey	1.00	Low strength	1.00	Too clayey	0.28
		Droughty	0.56			Dusty	0.26
		Salinity	0.50				
		Dusty	0.26				
Kyle	5	Very limited		Very limited		Somewhat limited	
		Too clayey	1.00	Shrink-swell	1.00	Unstable excavation walls	0.51
		Dusty	0.27	Low strength	1.00	Too clayey	0.50
						Dusty	0.27
W—Water							
Water	100	Not rated		Not rated		Not rated	

Roads and Streets, Shallow Excavations, and Lawns and Landscaping–Big Horn County Area, Montana							
Map symbol and soil name	Pct. of map unit	Lawns and landscaping		Local roads and streets		Shallow excavations	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Wb—Wages loam, 2 to 4 percent slopes							
Wages	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.14	Frost action	0.50	Dusty	0.14
				Shrink-swell	0.50	Unstable excavation walls	0.01
				Low strength	0.01		
Thedalund	6	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to bedrock	0.65	Low strength	0.78	Depth to soft bedrock	0.64
		Dusty	0.18	Frost action	0.50	Dusty	0.18
				Shrink-swell	0.14	Unstable excavation walls	0.01
Nelson	4	Somewhat limited		Somewhat limited		Somewhat limited	
		Depth to bedrock	0.54	Frost action	0.50	Depth to soft bedrock	0.54
		Low exchange capacity	0.50	Slope	0.04	Slope	0.04
		Slope	0.04			Dusty	0.04
		Dusty	0.04			Unstable excavation walls	0.01
		Droughty	0.01				

Data Source Information

Soil Survey Area: Big Horn County Area, Montana
Survey Area Data: Version 13, Sep 21, 2017

Appendix F

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 Wynkoop Street
Denver, CO 80202-1129
Phone 800-227-8917
www.epa.gov/region8

DEC 19 2017

Ref: 8ENF-W-NP

CERTIFIED MAIL NO.
RETURN RECEIPT REQUESTED

Rock Massine
Assistant Public Works Superintendent
406 N Cheyenne Ave.
Hardin, Montana 59034

Re: Compliance Evaluation Inspection for the City of Hardin Wastewater Treatment Plant
NPDES Permit: MT0030759

Dear Mr. Massine:

Enclosed is a copy of the inspection report for the Environmental Protection Agency's (EPA's) compliance evaluation inspection performed on September 12 and 13, 2017 at the City of Hardin Wastewater Treatment Plant. Deficiencies were noted during the inspection and are summarized in the enclosed report. Within **thirty (30) days** of receipt of the report, please provide the EPA with a summary of corrective actions taken to address each of the findings identified in the report and any information that may change the findings. This summary should be sent to:

Emilio Llamozas (8ENF-W-NP)	Connie Howe
U.S. EPA Region 8	Environmental Director
NPDES Enforcement Unit	Crow Environmental Protection Program
1595 Wynkoop Street	P.O. Box 159
Denver, Colorado 80202-1129	Crow Agency, Montana 59022-0400

Please contact me at 303-312-6407, or llamozas.emilio@epa.gov if you have any questions regarding this letter or the enclosed documents.

Sincerely,

Emilio Llamozas

Emilio Llamozas
NPDES Enforcement Unit
Office of Enforcement, Compliance
and Environmental Justice

Enclosures

cc: The Honorable Alvin Not Afraid, Jr., Chairman, Crow Tribe
Connie Howe, Environmental Director, Crow Environmental Protection Program

Municipal Wastewater and SSO Report

NATIONAL DATABASE INFORMATION	
Inspection Date: 9/12/17 & 9/13/17	Inspection Type: CEI & SSO
Entry/Exit Time: 9/12/17 8:40 -18:00; 9/13/17 9:00 – 13:45	NPDES ID Number: MT0030759
Type of WWTP: Municipal Wastewater	Inspection ID Number: 201709_MT0030759
Lead Inspector and affiliation: Kort Kirkeby – PG Environmental	
Inspector and affiliation: Emilio Llamozas – EPA Region 8	

WWTP Location Information	
Site/WWTP Location: City of Hardin WWTP 377 Woodley Ln. Hardin, Montana 59034	Mail Report to: Rock Massine Assistant Public Works Superintendent 406 N Cheyenne Ave. Hardin, Montana 59034

Contact Information		
WWTP Contacts: *(indicate primary lead and present during inspection)*	Name(s)/Title	Telephone
	Rock Massine – Asst. Public Works Superintendent (primary collection system lead)	406-598-0802
	John Stanich – Lead Wastewater Operator (primary WWTP lead)	406-665-1080
	Jack Lane – Mayor (present)	406-665-9290
	Dean Baker – Operator in training (present)	406-665-1080

Areas Evaluated During Inspection		
Permit	**Self-Monitoring Program**	Pretreatment
Records	Compliance Schedule	Pollution Prevention
Facility Site Review	**Laboratory**	Storm water
Effluent/Receiving Waters	**Operations and Maintenance**	Combined Sewer Overflow
Flow Measurement	**Sludge Handling/Disposal**	**Sanitary Sewer Overflow**

Report Review and Signature		
Reviewer Signature/Name	Address/Phone Number	Date
Emilio Llamozas	**U.S. EPA Region 8** **1595 Wynkoop Street** **8ENF-W-NP** **Denver, Colorado 80202**	12/19/17
Emilio Llamozas	**303-312-6407**	
Reviewer Signature/Name	Address/Phone Number	Date
Mon Ben-K	**U.S. EPA Region 8** **1595 Wynkoop Street** **8ENF-W-NP** **Denver, Colorado 80202**	12/19/17
Monia Ben-Khaled	**303-312-6209**	

Inspection Narrative and Site Description

On September 12 and 13, 2017, the United States Environmental Protection Agency (EPA), with assistance from an EPA contractor, PG Environmental (hereinafter, Inspection Team), inspected the City of Hardin's (City's or Permittee's) sanitary sewer collection system and wastewater treatment plant (WWTP). The Inspection Team met with the Facility contacts listed above and proceeded to have an opening conference to explain the purpose of the inspection, present their inspector credentials, and discuss questions pertaining to the operation of the Facility. The Inspection Team also explained that an inspection report would be generated and provided to the City with any findings identified during the inspection.

The Inspection Team evaluated the City's compliance as it relates to the operation and maintenance of the City's wastewater collection, conveyance, and treatment system, as well as the City's record keeping and reporting procedures. The inspection consisted of the following major activities:

- Discussions with representatives from the City regarding the operation and maintenance (O&M) of the wastewater collection and conveyance system, reporting procedures, and capital improvement program;
- A physical inspection of the City's collection system assets, including the City's main sewer lift station;
- A physical inspection of the WWTP; and
- Records review of standard operating procedures for the City's wastewater collection system, conveyance system, and WWTP, as well as maintenance, reporting, and laboratory documentation.

The Permittee is authorized to discharge from the WWTP under NPDES Permit No. MT0030759 (Permit). The WWTP is located within the boundaries of the Crow Tribe Indian Reservation, but is owned and operated by the City of Hardin and only serves the City (population of approximately 4,000).

The City's Department of Public Works is responsible for the operation of the City's collection system and WWTP, as well as for compliance with the Permit. Public Works staff conducts NPDES-required monitoring activities and are responsible for submitting periodic compliance reports to the EPA. The WWTP is staffed from 8:00 a.m. to 5:00 p.m., Monday through Friday. The WWTP and main lift station are equipped with critical alarm dialers to notify operators of emergencies during unmanned hours.

Currently, the Department of Public Works has five staff for operating and maintaining both the sanitary sewer and water systems within the City. Their primary roles are to perform monitoring and maintenance of the water system and sanitary sewer collection system, including the four wastewater lift stations. The Public Works staff will also assist with WWTP maintenance, as needed.

The WWTP has two dedicated operators; one is a Montana Department of Environmental Quality (DEQ) Class 1c-certified wastewater operator, the other is in the process of qualifying for an operator-in-training (OIT) certificate. Operator duties include operating and maintaining all WWTP assets, monitoring wastewater discharges, and conducting laboratory analyses for reporting purposes.

The WWTP provides wastewater treatment for the City of Hardin, Montana. The WWTP's dry-weather design flow is 1.0 million gallons per day (mgd). The Lead Operator stated that the average

dry-weather flow from the WWTP is approximately 0.6 mgd and the flow decreases in the winter months. The treatment process consists of the following:

- Influent screening (one grinder/auger; in operation at the time of the inspection).
- Oxidation ditch (in operation at the time of the inspection).
- Two secondary clarifiers (both in operation at the time of the inspection).
- An aerobic digester (in operation at the time of the inspection).
- Ultraviolet (UV) light disinfection (in operation at the time of the inspection).

Final effluent from the WWTP is discharged to the Bighorn River through Outfall 001 (photo 1566).

Operators are able to divert influent flow from the WWTP to a lagoon basin (which is part of the old lagoon system) if the plant is overwhelmed. The five lagoon basins are located south of the current WWTP, and were part of the City's old wastewater treatment facility. The Lead Operator stated that the lagoon system is lined with bentonite. In addition to influent bypass scenarios, there is a lagoon basin that is used for sewage sludge drying and storage. Septage is also stored in that same lagoon basin. Three lagoon basins are used for the City's water treatment plant waste discharge (backwash ponds). Discharges to the first lagoon basin/emergency bypass pond are treated as bypasses, and the raw wastewater influent is left in the lagoon basin to evaporate. The Inspection Team viewed the lagoon basin/emergency bypass pond as a component of the inspection, and noted that it had a large capacity and was dry at the time of the inspection (photos 1554 and 1555). Bypass events appear to have been reported to the EPA as well as noted in the Permittee's monthly Discharge Monitoring Reports (DMRs). Section 3.7.1 of the Permit states, "The Permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Parts 3.7.2 and 3.7.3."

Solids from the WWTP are sent to an aerobic digester and then to a lagoon basin for further drying (photo 1558). The Lead Operator stated the sewage sludge is removed from the lagoon basin approximately every 2 to 4 years by the City and hauled to a nearby landfill. According to the Lead Operator, septic trucks also offload raw sewage into this lagoon basin (photo 1557). He added that there are no identified significant industrial users contributing wastewater to the WWTP.

Power to the WWTP is provided by Rural Electric Association. The WWTP does not have a backup generator, which is further discussed in the *WWTP Operation and Maintenance Evaluation* section of this report.

Permit Verification

The current NPDES Permit No. MT0030759 was to expire September 30, 2011, but has been administratively extended. The permit was available onsite at the time of the inspection.

Recordkeeping Evaluation

As part of the inspection, records, plans, reports, and documentation specifically required by the Permit or NPDES Region 8 Statement of Basis was viewed on site or shortly following the inspection. The onsite review was not a thorough review of each record, plan, or report, and its inclusion in the following list as being reviewed does not indicate complete adequacy and acceptance by the permitting agency. The records review is conducted to identify issues with record keeping, verify proper monitoring and reporting practices, identify required reports that have not been completed as specified in the Permit, identify recent effluent limitation exceedances, and identify other compliance issues that may become apparent through onsite reviews. The findings from the records review are further discussed in the *Sampling and Reporting Evaluation* section of this report. Records, plans, reports, and documentation requested on the date of the inspection included the following:

- Copy of the Permit and Statement of Basis;
- Operator daily log book;
- Three recent months (June – August 2017) of Discharge Monitoring Reports (DMRs) with chain of custodies and laboratory analytical data;
- DMR Quality Assurance (QA) for Energy Lab Inc. (dated July 28, 2017);
- DMR QA 37 – MT DEQ Water Protection Bureau for City of Hardin, MT (closed July 7, 2017); and
- Flow meter installation records.

Sampling and Reporting Evaluation

The two WWTP operators collect all influent and effluent samples for analysis. Influent samples are collected immediately prior to the headworks influent screening. Effluent samples are collected from a recently-installed spigot located immediately after the UV light disinfection system (photo 1595). It should be noted that the Permittee's Statement of Basis states that effluent samples are to be collected at a weir located after the chlorine contact chamber. The Lead Operator stated that he installed the spigot sample location to limit the sample's exposure to outside air; the City had not alerted EPA of the new effluent sampling location.

The WWTP operators also conduct laboratory analyses for pH, total suspended solids (TSS), and temperature at the City's onsite laboratory. Total residual chlorine is not analyzed, as the WWTP no longer utilizes chlorine for disinfection. It should be noted that the onsite laboratory is not certified, and the operators conducting the laboratory analyses do not have laboratory certifications. An outside contract laboratory, Energy Lab, Inc. out of Billings, Montana, conducts analyses for biochemical oxygen demand (BOD), E. coli, and the annual parameters required in section 1.3.2 of the Permit.

Influent flow (not a specific Permit-required parameter) to the WWTP is measured by a magmeter. The influent flow meter was recently installed and was not operating correctly at the time of the inspection. The Lead Operator stated that the WWTP was working with the installer to provide totalizer data; no timeline was provided on when the influent flow meter would be fully operational. Effluent flow is measured by a Parshall flume and ultrasonic transducer located immediately prior to Outfall 001.

Finding 1. The accuracy of the WWTP effluent flow measurement could not be verified because the effluent flow meter was not routinely calibrated.

The Lead Operator stated that the effluent flow meter had not been calibrated since its installation in 2011; therefore, the accuracy of the measurement could not be verified. He was unaware of the need to calibrate the flow meter, and stated that he would look into calibrating the meter. He added that he occasionally checks the staff gage in the effluent flume to ensure that the electronic flow measurements appear to be reasonable.

Permit requirement:

Section 1.3.2 of the Permit, *Self-Monitoring Requirements – Outfall 001*, requires total effluent flow to be measured continuously, and footnote b of section 1.3.2 states, "Flow measurements of effluent volume shall be made in such a manner that the Permittee can affirmatively demonstrate that representative values are being obtained."

Corrective action:

Calibrate the effluent flow meter to demonstrate that representative values are being obtained. Provide the EPA and the Crow Tribe with the date and the results of the effluent flow meter calibration.

Finding 2. The Permittee had not implemented adequate laboratory controls or appropriate quality control procedures for the onsite laboratory.

The City's onsite laboratory did not have written standard operating procedures (SOPs) or a quality control guidance document to describe proper analysis procedures for the permit-required analyses conducted in-house. The Lead Operator stated that he had started writing an SOP for the lab, but had not completed or implemented it. The Inspection Team made multiple observations of inconsistent or inappropriate laboratory procedures, including using white-out on a laboratory bench sheet to correct data in April 2017. Additionally, bench sheet information was observed to be crossed out without documentation of the individual that made the correction (e.g., initialing). The City did not keep a record of laboratory refrigerator temperature, and there was no calibrated thermometer in the refrigerator to verify temperature. Further, there was no documentation or set protocol for benchtop meter probe maintenance or replacement.

The Permittee was not calibrating the pH meter used for effluent pH readings per manufacturer specifications. Specifically, the Lead Operator stated that effluent samples for Outfall 001 are analyzed for pH with an in-house YSI Pro Plus multimeter. The Inspection Team reviewed the YSI operator manual for the pH meter, which stated, "the pH calibration should be verified every day the instrument is used. However, a new pH sensor may be capable of holding its calibration for several days." The Inspection Team reviewed the laboratory calibration book for the pH meter for entries in 2017, and noted meter calibrations recorded on the following dates: January 20, May 24, and September 8. The Lead Operator stated that the pH meter is compared to a standard blank approximately one time every week or so, but calibrations are not conducted on a regular basis and are not always documented.

Permit requirement:

Section 3.5 of the Permit, *Proper Operation and Maintenance*, states, "Proper operation and maintenance also includes adequate laboratory controls and appropriate quality control procedures."

Corrective action:
Finalize the onsite laboratory standard operating procedures and ensure that the procedures are followed when analyzing samples. Ensure that the pH meter calibrations are performed per the manufactures recommendations and that the calibrations be recorded and retained as required by the Permit.

Finding 3. The Permittee did not record daily visual observations of oil and grease as required by the Permit.
The Lead Operator stated that visual observations are conducted by the operators at the effluent sample location, but the observations are not documented or recorded. Further, as noted in the *WWTP Operation and Maintenance Evaluation* section of this report, gray and white balls, identified by the Lead Operator as grease balls, were observed in the final effluent and were observed flowing through Outfall 001 and into the Bighorn River. He added that the WWTP has not conducted oil and grease sampling or analysis because they have not identified a sheen and therefore, were unsure when to sample and analyze for oil and grease.

Permit requirement:
Footnote c. of section 1.3.2 of the Permit, *Self-Monitoring Requirements – Outfall 001*, states that for oil and grease, "A daily visual observation is required. If a visible sheen is detected, a grab sample shall be taken and analyzed immediately."

Corrective action:
Perform and document daily visual oil and grease observations. If a visible sheen is detected, collect an oil and grease sample and analyze it immediately.

Discharge Monitoring Reports Evaluation

As part of the inspection, the Inspection Team reviewed the last three months (June – August 2017) of laboratory bench sheets and contract laboratory results, and compared them to reported values in EPA's NetDMR monthly reporting website.

Transcription errors were noted between the WWTP's laboratory bench sheets and data submitted in DMRs in June and July 2017. The following transcription errors were noted:

Date	Parameter	Bench Sheet Result	DMR Reported Value
06/09/17	pH	7.42 standard units (s.u.)	7.41 s.u.
06/19/17	pH	7.40 s.u.	7.42 s.u.
07/05/17	pH	7.52 s.u.	7.53 s.u.

The Lead Operator stated that he transfers the laboratory bench sheet information to an electronic spreadsheet, and also enters the information into the EPA NetDMR website for submittal. He stated that he conducts all of the quality assurance checks of the data, and was unsure why the transcription errors occurred. It should be noted that the transcription errors did not result in effluent exceedances. Due to time constraints, the Inspection Team was unable to review additional DMRs for transcription errors.

Finding 4. The total suspended solids (TSS) DMR loading calculation appeared to not be calculated correctly for July 2017.

The average flow for July 2017 was 0.559 MGD and the average TSS concentration for the month was 6 mg/l. The total TSS loading reported for the month was 27 lbs/day. The Inspection Team performed the July 2017 TSS loading calculation and obtained a value of 27.97 lbs/day.

TSS loading = Flow (MGD) x TSS concentration (mg/l) x 8.34

TSS loading = 0.559 MGD x 6 mg/l x 8.34 = 27.97 lbs/day

Permit requirement:

Part 2.4 of the Permit states, "Effluent monitoring results obtained during the previous month shall be summarized and reported on one Discharge Monitoring Report Form (EPA No. 3320), postmarked no later than the 28th day of the month following the completed reporting period."

Corrective action:

Ensure that accurate information is reported in the DMRs. Submit DMR corrections to the EPA via the e-DMR system for the July 2017 TSS DMR loading calculations.

Collection System Evaluation

The City's wastewater collection system services primarily residential areas within the City of Hardin as well as a few small industrial and commercial users such as a power plant, an asphalt plant, a truck stop, small restaurants, and two car washes. The Assistant Superintendent explained that much of the wastewater within the City flows via gravity to the 6th Street Lift Station. The City also has three smaller lift stations located on the north side of the City. These smaller stations lift wastewater to the 6th Street Lift Station. The 6th Street Lift Station pumps all wastewater through a 14-inch force main to the WWTP.

At the time of the inspection, the Permittee had not reported any sanitary sewer overflows (SSOs) within the collection system. The City representatives stated that they have not had issues with SSOs in the past. The City has reported bypasses to EPA in phone calls and in NetDMR reports, but all events have been related to bypasses from the main trunk line to the influent bypass lagoon at the WWTP to prevent an upset to the plant. As noted previously, section 3.7.1 of the Permit states, "The Permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Parts 3.7.2 and 3.7.3."

Finding 5. The Inspection Team made several observations related to collection system O&M.

a. *Proactive O&M and maintenance tracking*

The Permittee did not have a proactive maintenance approach or maintenance tracking mechanism for the collection system O&M. Specifically, the Permittee did not have a complete inventory of collection system assets or a system in place to document and track scheduled and unscheduled maintenance activities. As a result, many of the process control and maintenance activities conducted on the collection system were performed based on institutional knowledge and were not formally tracked or scheduled. During the inspection, City representatives stated that, while certain known problem areas are addressed via an increased maintenance frequency, there are no established or written SOPs for ensuring all assets in the collection system receive the necessary

level of maintenance to ensure proper operation. The Assistant Superintendent added that the City does not have formal written documentation of schedules for lift station cleaning and repairs. Further, the City does not maintain operator logs for lift station inspections; rather, operators decide each morning which lift stations need to be checked based on weekly rounds, pump run times, and alarms. The Assistant Superintendent was aware of the need to better document and track maintenance of the City's collection system assets, and stated that the City would look into improving its asset management approach and record keeping.

b. Inflow and Infiltration (I&I) and Illicit Connections

The City's collection system has issues with excessive I&I and illicit connections, which can restrict the designed capacity of the system. Specifically, City representatives stated that I&I has been a known issue within the collection system for a number of years, but the City has not conducted a comprehensive assessment of the system since the 1980s. Further, the City has not quantified the volume of I&I that occurs in the collection system. The Assistant Superintendent stated that I&I occurs in the system during dry periods from groundwater influences, but increases dramatically after rainfall. He added that some of the City's sanitary sewer lines are composed of old brick tiles from the 1950s; he was unsure of the last time any particular section of sewer lines had undergone a condition assessment or been repaired or replaced. City representatives were unsure if any repairs or replacements had been done as a result of the 1980s study.

As a component of the inspection, on September 12, 2017 the Inspection Team viewed a manhole located off of Lessard Avenue on the north side of the City (45.740771, -107.601713). A significant amount of water was observed to be actively flowing from a crack in the side of the manhole and into the sanitary sewer waste stream (photos 1552 and 1553). The Assistant Superintendent stated that the water entering the manhole was likely groundwater, and I&I has been observed at this particular manhole in the past, even during dry periods such as those conditions experienced during the inspection. The Assistant Superintendent added that the manhole had been leaking like this for at least eight years; as long as he could remember. The Assistant Superintendent stated that the City has looked into some re-lining options in the past, but no plans or timelines have been established for sewer scoping evaluations or re-lining efforts.

In addition to I&I, the Permittee also has an issue with illicit connections to the collection system. The Assistant Superintendent explained that some homes and businesses have sump pumps or rain gutters that discharge directly to the wastewater collection system. Specifically, there is a bulk water fill station located within the City (owned and operated by the City) whose outdoor drains discharge directly to the City's sanitary sewer system instead of discharging to the stormwater collection system (photos 1549 and 1550). The City representatives stated that the City has an ordinance against illicit connections to the collection system; however, the ordinance is typically not enforced unless there is a need for a maintenance project or a building remodel permit application is submitted for a particular home or business.

Proper operation and maintenance of the collection system includes maintaining its design capacity in order to minimize WWTP upsets, bypasses, and SSOs. Excess I&I and illicit connections restrict the design capacity of the collection system, and in the City's case, could contribute to unnecessary bypasses and upsets at the WWTP (e.g., untreated influent sent to the lagoon basin/emergency bypass pond).

Permit requirements:

Section 122.41(e) of the Clean Water Act (CWA) and section 3.5 of the Permit, *Proper Operation and Maintenance*, states, "The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit. However, the permittee shall operate, at a minimum, one complete set of each main line unit treatment process whether or not this process is needed to achieve permit effluent compliance."

Section 3.7.1 of the Permit states, "The Permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Parts 3.7.2 and 3.7.3."

Corrective actions:

Properly operate and maintain the wastewater collection system. Perform and I&I study of the wastewater collection system to detected areas of I&I. In order to complete the I&I study, the City should review EPA's Guide for Evaluating Capacity, Management, Operation, and Maintenance (CMOM) Programs at Sanitary Sewer Collection System
https://www3.epa.gov/npdes/pubs/cmom_guide_for_collection_systems.pdf

WWTP Operation and Maintenance Evaluation

As a component of the inspection, the Inspection Team along with the WWTP representatives conducted a tour of the WWTP, reviewed Permit-related documents, and toured the Permittee's onsite laboratory.

Finding 6. The Permittee was not properly operating and maintaining the WWTP.

The Inspection Team made the following observations during the inspection related to O&M of the WWTP:

a. Secondary Clarifier No. 1 had uneven flows over the weir due to an uneven weir bar. The Lead Operator stated that he was aware that the clarifier weir was not level, and noted that the clarifiers are old. The uneven weir in Secondary Clarifier No. 1 did not allow for the secondary clarifier to operate according to design. The Lead Operator did not have a timeframe for when the weir would be repaired.

b. The WWTP has had issues with insufficient influent treatment capacity. Specifically, the Lead Operator stated the average flow into the WWTP is approximately 0.6 mgd, and the plant gets immediately overwhelmed at flows exceeding 1.0 mgd, which often occur during rain or snowmelt events. He added that the oxidation ditch and both secondary clarifiers constantly run at maximum capacity (even during dry weather), and the WWTP does not have extra treatment capacity for large surges of influent flow. As a result, the Permittee often needs to use the lagoon basin for bypass.

c. Algae, large and small floating solids, and a white and gray floc identified by one of the WWTP operators present during the inspection as grease balls, were observed obstructing flow over the secondary clarifier weir and causing uneven flow over the weir (photo 1562).

The Inspection Team also observed algae, floating solids, and floc passing over the secondary clarifier weirs. Further, the Lead Operator stated that the WWTP's influent grinder/auger is not effective at removing all floating solids and grit prior to sending flow to the oxidation ditch. Additionally, the Lead Operator stated that operators spray the secondary clarifier weirs with high pressure water every week to remove floc and algae build-up. He also stated that the channel downstream of the UV light disinfection system, located after the WWTP's effluent sample location and immediately prior to Outfall 001, is occasionally washed out with high pressure water to remove grease balls and any other solids or algae that accumulate within the chamber. These solids are not collected or returned to the headworks, and are ultimately left to be discharged through Outfall 001 to the Bighorn River.

The WWTP's operator daily log book had a note of completed work on August 22, 2017, stating, "wash UV weir with pressure washer. No testing." The Lead Operator noted that the WWTP does not collect samples during washing activities. He added that the WWTP does not have the ability to collect, filter, or recycle the wash water from the waste stream and prevent it from discharging. The City does not monitor the effluent through Outfall 001 during these washing events.

Floating solids and the white and gray floc were observed actively discharging through Outfall 001 and into the Bighorn River at the time of the inspection (photos 1564 and 1566). The Lead Operator stated that the algae and white and gray grease balls are often observed in the secondary clarifier and he had observed solids and grease balls discharging through Outfall 001 in the past. He stated that this occurs mostly when the WWTP becomes overwhelmed and cannot properly treat the influent flows, prior to manually opening the bypass valve. The Lead Operator stated that the City is evaluating options for better grit and floating solids removal. A timeline was not provided for remedying the issues observed at the time of the inspection.

d. The WWTP did not have a backup power source to continue operations in case of power failure. Bypass to the lagoon basin is controlled via a manual valve near the head of the WWTP (photo 1556). If a power failure were to occur, the oxidation ditch or UV light disinfection system would be inoperable, causing the potential for partially-treated wastewater to discharge through Outfall 001. The Lead Operator stated that he receives an alarm if there is a power failure at the WWTP during off hours, and either he or his assistant will drive out and open the bypass channel to the lagoon basin if the power failure continues. It should be noted that the City's main lift station is equipped with a backup generator and continues to operate during an outage, sending flow to the WWTP.

Permit requirement:

Section 3.5 of the Permit, *Proper Operation and Maintenance*, states, "The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality control procedures. This provision requires the operation of a back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit. However, the Permittee shall operate, at a minimum, one complete set of each main line unit treatment process whether or not this process is needed to achieve permit effluent compliance."

Corrective action:
Properly operate and maintain the wastewater treatment plant by addressing the issues identified above. Provide a response to the EPA on how the City plans to address each of the issues.

Finding 7. The City used partially-treated wastewater from its secondary clarifier to irrigate the WWTP lawn.

During the inspection, the Inspection Team noted a pump located in one of the WWTP's secondary clarifiers (photo 1561). The Lead Operator stated that the pump was used to pull water from the clarifier and use it to irrigate the WWTP lawn. He was unaware of an issue with using partially-treated wastewater to irrigate, and stated that they were using the water as a cost savings over using well water or City water. The Inspection Team observe partially-treated wastewater being used for irrigation at the time of the inspection. The Lead Operator stated that they would stop using the partially-treated wastewater for irrigation unless they obtained a permit to do so.

Permit requirement:
Section 1.2 of the Permit, *Description of Discharge Point(s)*, authorizes discharge from the City of Hardin's wastewater treatment plant to the Bighorn River through Outfall 001 only, and states, "Discharges at any location not authorized under an NPDES permit is a violation of the Clean Water Act and could subject the person(s) responsible for such discharge to penalties under Section 309 of the Act."

Corrective action:
Do not use partially treated wastewater to irrigate the WWTP lawn. Provide a response to the EPA and the Crow Tribe on how the City plans to address this issue.

Finding 8. The Permittee did not have an up-to-date O&M manual for the WWTP.

The Permittee did not have a current O&M manual that describes proper operational procedures and maintenance requirements of activities at the WWTP. The Lead Operator was aware of the Permit requirement, and stated that the WWTP has an O&M manual from the 1980s that is not regularly used or updated, and does not reflect all current operations at the plant. He added that the City was in the process of updating and developing a manual to describe current O&M procedures. No timeline was provided on the estimated completion of the updated manual.

Permit requirement:
Section 3.5.1.1 of the Permit requires the Permittee to "Have a current O&M Manual(s) that describes the proper operational procedures and maintenance requirements of the wastewater treatment facility."

Corrective action:
Update the O&M manual for the WWTP with the current O&M procedures used at the WWTP. Provide the EPA and the Crow Tribe with a copy of the updated O&M manual for the WWTP.

Finding 9. The Permittee did not have a schedule for routine O&M activities at the WWTP.

The Permittee did not have documentation or schedules developed for routine operation and maintenance of the WWTP and associated assets. Further, the Permittee did not have a complete inventory of its WWTP assets or a mechanism to document, track, or schedule repairs.

The Lead Operator stated that maintenance of the WWTP assets is conducted on an as-needed basis (i.e., reactive). He stated that pumps and other equipment such as the UV light disinfection system undergo maintenance when issues arise. The Lead Operator added that certain components are inspected on a daily or weekly basis during routine rounds, but very little preventative maintenance is conducted at the WWTP. He stated that the City has attempted to use an asset management software in the past, but was unable to implement it due to its inability to track maintenance at the individual component level. The Permittee did not provide a timeline for implementation or state whether a schedule for routine O&M activities would be developed.

Permit requirement:
Section 3.5.1.3 of the Permit requires the Permittee to "Have a schedule(s) for routine operation and maintenance activities at the wastewater treatment facility." Further, section 3.5.1.4 of the Permit requires the City to, "perform the routine operation and maintenance requirements in accordance with the schedule(s)."

Corrective action:
Implement an operation and maintenance schedule for the WWTP.

Finding 10. The Permittee was storing sewage sludge in one of the lagoon basins for over 2 years.
Solids from the WWTP are sent to an aerobic digester and then to a lagoon basin for further drying (photo 1558). The Lead Operator stated the sewage sludge is removed from the lagoon basin approximately every 2 to 4 years by the City and hauled to a nearby landfill. According to the Lead Operator, septic trucks also offload raw sewage into this lagoon basin (photo 1557).

If sewage sludge remains on land for longer than 2 years, this land is considered an active sewage sludge unit and the surface disposal requirements in Part 503 have to be met. An active sewage sludge unit is the area, trench, waste pile, or lagoon where sewage sludge are currently being placed. Please note, however, that sewage sludge can remain on the land for longer than 2 years, but the person who prepares the sewage sludge must demonstrate that the site is not an active sewage sludge unit. The demonstration must include the following information:

- the name and address of the person who prepares the sewage sludge;
- the name and address of the person who either owns the land or leases the land;
- the location, by either street address or latitude and longitude, of the land;
- an explanation of why sewage sludge needs to remain on the land for longer than 2 years prior to final use or disposal, or why a site is used for longer than 2 years to store batches of sewage sludge for less than 2 years (e.g., storage of individual batches of sewage sludge for several months during a given 2-year period before final use or disposal); and
- the approximate time when sewage sludge will be transferred from storage to their final use or disposal destination.

This demonstration information must be retained by the person who prepares the sewage sludge for the period that the sewage sludge remains on the land.

Permit requirement:
40 C.F.R. 503.9(y) *Store or storage of sewage sludge* is the placement of sewage sludge on land on which the sewage sludge remains for two years or less. This does not include the placement of sewage sludge on land for treatment.
40 C.F.R. 503.20 Applicability. (a) This subpart applies to any person who prepares sewage sludge that is placed on a surface disposal site, to the owner/operator of a surface disposal site, to sewage sludge placed on a surface disposal site, and to a surface disposal site.
(b) This subpart does not apply to sewage sludge stored on the land or to the land on which sewage sludge is stored. It also does not apply to sewage sludge that remains on the land for longer than two years when the person who prepares the sewage sludge demonstrates that the land on which the sewage sludge remains is not an active sewage sludge unit. The demonstration shall include the following information, which shall be retained by the person who prepares the sewage sludge for the period that the sewage sludge remains on the land:
(1) The name and address of the person who prepares the sewage sludge.
(2) The name and address of the person who either owns the land or leases the land.
(3) The location, by either street address or latitude and longitude, of the land.
(4) An explanation of why sewage sludge needs to remain on the land for longer than two years prior to final use or disposal.
(5) The approximate time period when the sewage sludge will be used or disposed.

Corrective action:
Properly dispose or land apply the sewage sludge stored for greater than 2 years as require by 40 C.F.R. 503 or provide the justification to store sewage sludge for greater than 2 years as required by 40 C.F.R. 503.20(b).

Photographs for City of Hardin Wastewater Treatment Plant - 201709_MT0030759

Inspection Type: Compliance Evaluation Inspection

Photo number 1549 taken by Emilio Llamozas on 9/12/2017.

The direction of the photo is Northeast.

Description:

Overview of Hardin's water pumping station. The water pumping station has two manhole drains to capture water spills from the water truck tanks during loading activities. These drains are connected to the sanitary sewer. When it rains, stormwater flows into the sanitary sewer.

Photo number 1550 taken by Emilio Llamozas on 9/12/2017.

The direction of the photo is Southeast.

Description:

Overview of Hardin's water pumping station. The water pumping station has two manhole drains to capture water spills from the water truck tanks during loading activities. These drains are connected to the sanitary sewer. When it rains, stormwater flows into the sanitary sewer.

Photographs for City of Hardin Wastewater Treatment Plant - 201709_MT0030759

Inspection Type: Compliance Evaluation Inspection

Photo number 1551 taken by Emilio Llamozas on 9/12/2017.

Description:

View inside of the wet well for the 6th Street Lift Station. Note the grease floating on top of the wastewater towards the top of the photo.

Photo number 1552 taken by Emilio Llamozas on 9/12/2017.

Description:

View inside of manhole next to the abandoned correctional facility on Lessard Avenue. Note the manhole had several cracks and groundwater was observed flowing into the sanitary sewer from the cracks during the inspection.

Photographs for City of Hardin Wastewater Treatment Plant - 201709_MT0030759

Inspection Type: Compliance Evaluation Inspection

Photo number 1553 taken by Emilio Llamozas on 9/12/2017.

Description:

Close up of one of the cracks in the manhole shown in photo 1552. Groundwater staining can be seen in the top left of the photo. Groundwater was observed flowing from the cracks into the sanitary sewer during the inspection.

Photo number 1554 taken by Emilio Llamozas on 9/12/2017.

The direction of the photo is South.

Description:

Overview of the Emergency Bypass Pond. When the City of Hardin Wastewater Treatment Plant cannot treat all of the wastewater, it is diverted to the Emergency Bypass Pond. The Emergency Bypass Pond was one of the cells in the old lagoon system.

Photographs for City of Hardin Wastewater Treatment Plant - 201709_MT0030759

Inspection Type: Compliance Evaluation Inspection

Photo number 1555 taken by Emilio Llamozas on 9/12/2017.

The direction of the photo is South.

Description:

Overview of the Emergency Bypass Pond. When the City of Hardin Wastewater Treatment Plant cannot treat all of the wastewater, it is diverted to the Emergency Bypass Pond. The Emergency Bypass Pond was one of the cells in the old lagoon system.

Photo number 1556 taken by Emilio Llamozas on 9/12/2017.

The direction of the photo is West.

Description:

Overview of butterfly valve for the Emergency Bypass Pond. The operators determine the bypass percentage flow going to the Emergency Bypass Pond by the number of turns to the butterfly valve. It takes twenty turns to completely open the valve.

Photographs for City of Hardin Wastewater Treatment Plant - 201709_MT0030759

Inspection Type: Compliance Evaluation Inspection

Photo number 1557 taken by Emilio Llamozas on 9/12/2017.

The direction of the photo is Southeast.

Description:

Overview of septage hauler dumping station. Note this was one of the cells in the old lagoon system. There was a small berm to separate septage from the sewage sludge drying beds to the east.

Photo number 1558 taken by Emilio Llamozas on 9/12/2017.

The direction of the photo is Southwest.

Description:

Overview of sewage sludge drying beds. Note this was one of the cells in the old lagoon system.

Photographs for City of Hardin Wastewater Treatment Plant - 201709_MT0030759

Inspection Type: Compliance Evaluation Inspection

Photo number 1559 taken by Emilio Llamozas on 9/12/2017.

The direction of the photo is East.

Description:

Overview of the headworks grinding and auger system. Note there is no settling of grit at the headworks before the wastewater goes to the oxidation ditch.

Photo number 1560 taken by Emilio Llamozas on 9/12/2017.

The direction of the photo is North.

Description:

Overview of oxidation ditch. Note the oxidation ditch weir had recently been repaired.

Photographs for City of Hardin Wastewater Treatment Plant - 201709_MT0030759

Inspection Type: Compliance Evaluation Inspection

Photo number 1561 taken by Emilio Llamozas on 9/12/2017.

The direction of the photo is West.

Description:

Overview of irrigation pumps drawing water from Clarifier #2 to water the grass around the wastewater treatment plant. The sprinklers were operating and watering the grass during the inspection.

Photo number 1562 taken by Emilio Llamozas on 9/12/2017.

The direction of the photo is South.

Description:

Overview of Clarifier #2. Note solids in the clarifier were moving in a circular motion.

Photographs for City of Hardin Wastewater Treatment Plant - 201709_MT0030759

Inspection Type: Compliance Evaluation Inspection

Photo number 1563 taken by Emilio Llamozas on 9/12/2017.

Description:

Close up of the solids in Clarifier #2 shown in photo1562. Note some of the solids were suspended and were moving in a circular motion.

Photo number 1564 taken by Emilio Llamozas on 9/12/2017.

Description:

Wastewater after the clarifiers, but prior to the UV disinfection system. Note the solids floating in the wastewater.

Photographs for City of Hardin Wastewater Treatment Plant - 201709_MT0030759

Inspection Type: Compliance Evaluation Inspection

Photo number 1565 taken by Emilio Llamozas on 9/12/2017.

The direction of the photo is South.

Description:

Overview of effluent sampling port. Note the sampling port is perpendicular to the effluent flow, which is located on the other side of the concrete wall.

Photo number 1566 taken by Emilio Llamozas on 9/12/2017.

The direction of the photo is Northeast.

Description:

Overview of outfall from the City of Hardin Wastewater Treatment Plant into the Bighorn River. Note there were some solid particles coming out with the effluent.

Appendix G

CITY of HARDIN
STATEMENT OF NET POSITION
FISCAL YEAR ENDING JUNE 30, 2017

	Primary Government			Component Units
	Governmental Activities	Business-type Activities	Total	Two Rivers Trade Port Authority
ASSETS				
Cash and cash equivalents	1,894,422.00	983,238.99	2,877,660.99	37.93
Investments	0.00	0.00	0.00	
Petty Cash	150.00	350.00	500.00	
Restricted Assets:				
Cash and cash equivalents	125,695.06	3,808,610.47	3,934,305.53	6,016.49
Investments (at fair value)	590,002.92	0.00	590,002.92	
Taxes/Assessments Receivable - (net of allowance for uncollectibles)	3,451,539.45	275,443.53	3,726,982.98	
Accounts/other receivables - (net of allowance for uncollectibles)	5,095.43	190,228.04	195,323.47	
Internal Balances	0.00	0.00	0.00	
Due from other governments	0.00	0.00	0.00	
Prepaid expense	0.00	0.00	0.00	
Inventories	115,298.75	78,726.11	194,024.86	
Real Estate Asset Held for Sale - Investment	146,378.00	0.00	146,378.00	
Capital assets not being depreciated				
Land	511,285.95	463,192.80	974,478.75	257,377.38
Construction in progress	37,129.67	0.00	37,129.67	
Capital assets being depreciated (net of accumulated depreciation)	15,356,616.69	11,046,780.35	26,403,397.04	16,142,129.36
Total Assets	22,233,613.92	16,846,570.29	39,080,184.21	16,405,561.16
DEFERRED OUTFLOWS OF RESOURCES				
Deferred Outflows of Resources	90,449.37	140,044.80	230,494.17	
Deferred Outflows of Resources	0.00	0.00	0.00	
Total Deferred Outflows of Resources	90,449.37	140,044.80	230,494.17	0.00
LIABILITIES				
Accounts payable and other current liabilities	93,229.64	121,878.35	215,107.99	193,282.01
Matured bonds and interest payable	2,326,377.48	127,000.00	2,453,377.48	
Due to others/governments	50.00	0.00	50.00	
Revenues collected in advance	0.00	40,621.68	40,621.68	
Contracts/Loans/Notes Payable	0.00	0.00	0.00	
Noncurrent liabilities:				
Due within one year	760,802.70	40,887.87	801,690.57	25,375,588.79
Due in more than one year	18,926,964.11	3,378,008.66	22,304,972.77	18,830,000.00
Pension Liability	541,077.89	837,763.11	1,378,841.00	
Total Liabilities	22,648,501.82	4,546,159.67	27,194,661.49	44,398,870.80
DEFERRED INFLOWS OF RESOURCES				
Deferred Inflows of Resources	22,614.88	35,015.12	57,630.00	
Deferred Inflows of Tax Resources	0.00	0.00	0.00	
Total Deferred Inflows of Resources	22,614.88	35,015.12	57,630.00	0.00
NET POSITION				
Net Investment in Capital Assets	(5,981,345.17)	9,302,973.15	3,321,627.98	(26,929,689.27)
Restricted for:	1,584,979.13		1,584,979.13	
Debt Service	2,084,290.05	307,559.75	2,391,849.80	
Bond Indenture Requirements (Construction)		227,981.23	227,981.23	
General Government	35,649.96		35,649.96	
Public Safety			0.00	
Public Works	722,068.77		722,068.77	
Public Health			0.00	
Culture/Recreation			0.00	
Economic Development	84,828.18		84,828.18	
Other: Replacement & Depreciation		2,296,469.72	2,296,469.72	
Non-spendable (other than Perm Fund)	1,829,292.22		1,829,292.22	
Permanent Fund principal			0.00	
Unrestricted	(706,816.55)	270,456.45	(436,360.10)	(1,063,620.37)
Total Net Position	(347,053.41)	12,405,440.30	12,058,386.89	(27,993,309.64)
Balance check w/GW Statement (should equal zero):	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00

5. CURRENT DEBT (Refer to the instructions and example on pages 23-24)

Year Issued	Purpose	Type of Bond/ Security	Amount	Maturity Date (mo/yr)	Debt Holder	Coverage Requirement	Avg. Annual Payment Amount	Outstanding Balance
2003	Wastewat	Revenue	2,050,000	7/1/23	DNRC	125%	133,188	748,000
2010	Wastewat	Revenue	359,300	1/1/30	DNRC	125%	9,717	230,000
2010	Wastewat	Revenue	625,000	1/1/30	DNRC	125%	41,809	437,000
2006	TIFD	Tax Rever	20,920,000	9/1/31	US Bank,		2,078,419	20,920,000
2012	Water	Revenue	279,500	7/1/32	DNRC	125%	15,377	184,000
2009	Landfill Co	Revenue	1,664,000	7/1/24	DNRC	125%	94,527	608,000

6. CURRENT ASSETS (Indicate if assets are obligated.) (Refer to the instructions on pages 23-24.)

Cash $_____
(Details) _____

~~Investments~~ $_____
(Details) _____

~~Certificates of Deposit~~ $_____
(Details) _____

Accounts Receivable $_____
(Details) _____

Any other current assets not specifically indicated above $_____
(Details) _____

7. BALANCE SHEET (Submit if applying to RD; contact the other programs to determine if or when this information is needed.)

☐ Balance Sheet (Check if attached)

8. INCOME AND EXPENSE STATEMENT (Submit if applying to RD; contact the other programs to determine if or when this information is needed.)

☐ Income and Expense Statement (Check if attached)

CITY of HARDIN
STATEMENT OF ACTIVITIES
FISCAL YEAR ENDING JUNE 30, 2017

Functions/Programs	Expenses	Program Revenues: Charges for Services, Fines, Forfeitures, etc.	Program Revenues: Operating Grants and Contributions	Program Revenues: Capital Grants and Contributions	Net (Expense) Revenue and Changes in Net Position: Primary Government: Governmental Activities	Primary Government: Business-type Activities	Primary Government: Total	Component Units: Two Rivers Trade Port Authority
Primary government:								
Governmental activities:								
General government	499,510.75	75,612.91	4,108.69	0.00	(419,789.15)		(419,789.15)	
Public safety	586,998.18	25.00	7,518.48	0.00	(579,454.70)		(579,454.70)	
Public works	945,244.97	478,535.09	48,267.35	29,812.33	(388,630.20)		(388,630.20)	
Public health	43,362.91	0.00	450.51	0.00	(42,912.40)		(42,912.40)	
Social and economic services	0.00	0.00	0.00	0.00	0.00		0.00	
Culture and recreation	134,673.93	0.00	414.05	0.00	(134,259.88)		(134,259.88)	
Housing/Community Development	97,424.46	0.00	19.67	13,451.35	(83,953.44)		(83,953.44)	
Conservation of Natural Resources	0.00	0.00	0.00	0.00	0.00		0.00	
Interest on long-term debt	1,326,380.25	0.00	0.00	0.00	(1,326,380.25)		(1,326,380.25)	
Miscellaneous	0.00	0.00	0.00	0.00	0.00		0.00	
Unallocated costs	0.00				0.00		0.00	
Total governmental activities	3,633,595.45	554,173.00	60,778.75	43,263.68	(2,975,380.02)		(2,975,380.02)	
Business-type activities:								
Hospital						0.00	0.00	
Water	842,218.07	771,648.29		91,531.14		20,961.36	20,961.36	
Sewer	669,713.38	661,938.61		96,174.53		88,399.76	88,399.76	
Solid Waste - Collection	274,103.46	379,944.05				105,840.59	105,840.59	
Solid Waste - Landfill	740,491.52	663,895.46				(76,596.06)	(76,596.06)	
Total business-type activities	2,526,526.43	2,477,426.41	0.00	187,705.67	0.00	138,605.65	138,605.65	
Total primary government	6,160,121.88	3,031,599.41	60,778.75	230,969.35	(2,975,380.02)	138,605.65	(2,836,774.37)	
Component Units:								
Two Rivers Trade Port Authority	2,532,022.98	4,376.95						(2,527,646.03)
Total component units	2,532,022.98	4,376.95	0.00	0.00				(2,527,646.03)
General revenues:								
Property taxes					554,014.66	0.00	554,014.66	
Local option taxes					960,375.97		960,375.97	
Licenses and permits					48,254.80		48,254.80	
Unrestricted Federal/State shared revenues					746,337.14	15,535.95	761,873.09	
Unrestricted grants and contributions					0.00		0.00	
Unrestricted investment earnings					17,119.48	15,956.75	33,076.23	
Miscellaneous					18,579.75	15,098.05	33,677.80	
Gain on sale of capital assets					109,461.52	1,000.00	110,461.52	
Transfers					0.00	0.00	0.00	
Special/Extraordinary items					0.00	0.00	0.00	
							0.00	
Total general revenues and transfers					2,454,143.32	47,590.75	2,501,734.07	0.00
Change in net position					(521,236.70)	186,196.40	(335,040.30)	(2,527,646.03)
Total net position - July 1, 2016 as previously reported					174,183.29	12,219,243.90	12,393,427.19	(25,465,663.61)
Prior period adjustments					0.00	0.00	0.00	
Total net position - July 1, 2016 as restated					174,183.29	12,219,243.90	12,393,427.19	(25,465,663.61)
Total net position - June 30, 2017					(347,053.41)	12,405,440.30	12,058,386.89	(27,993,309.64)

Appendix H

STATEMENT OF BASIS FOR THE
CITY OF HARDIN WASTEWATER TREATMENT PLANT
NPDES PERMIT MT-0030759

March 2018

PERMITTEE:	City of Hardin
FACILITY NAME AND ADDRESS:	City of Hardin Wastewater Treatment Plant 406 N. Cheyenne Hardin, MT 59034 (406) 655-9292
PERMIT NUMBER:	MT-0030759
RESPONSIBLE OFFICIAL:	Russell Dill Superintendent of Public Works
FACILITY CONTACT:	John Stanich, WWTP Operator
PERMIT TYPE:	Indian country, major permit, renewal
TYPE OF TREATMENT:	Oxidation ditch, clarifier, aerated sludge digestion, ultra-violet light disinfection
FACILITY LOCATION:	North ½, Section 24, Township 1 South, Range 33 East; 45.734722° N 107.580278° W
DISCHARGE LOCATION:	45.734793° N 107.579082° W
RECEIVING WATER:	Bighorn River

1. Permit Status

This statement of basis is for the renewal of the National Pollutant Discharge Elimination System (NPDES) Permit (MT0030759) authorizing discharge from the City of Hardin Wastewater Treatment Plant (Facility or WWTP). The previous Permit was issued in 2011, with an effective date of October 1, 2011, and an expiration date of September 30, 2016. The application for permit renewal was dated January 29, 2016 and the conditions of the Permit issued in 2011 have been administratively continued until the renewal Permit is issued and in effect.

The Facility is located on the Crow Reservation and is thus in "Indian country" as defined at 18 U.S.C. 1151. The EPA has not approved the Tribes or the State of Montana to implement the Clean Water Act (CWA) NPDES program in Indian country within the State of Montana. The EPA directly implements the CWA NPDES program on Indian country lands within the State of Montana.

2. Facility Information

This Permit is for the discharge from the City of Hardin WWTP that serves approximately 3,505 residents of the City of Hardin.

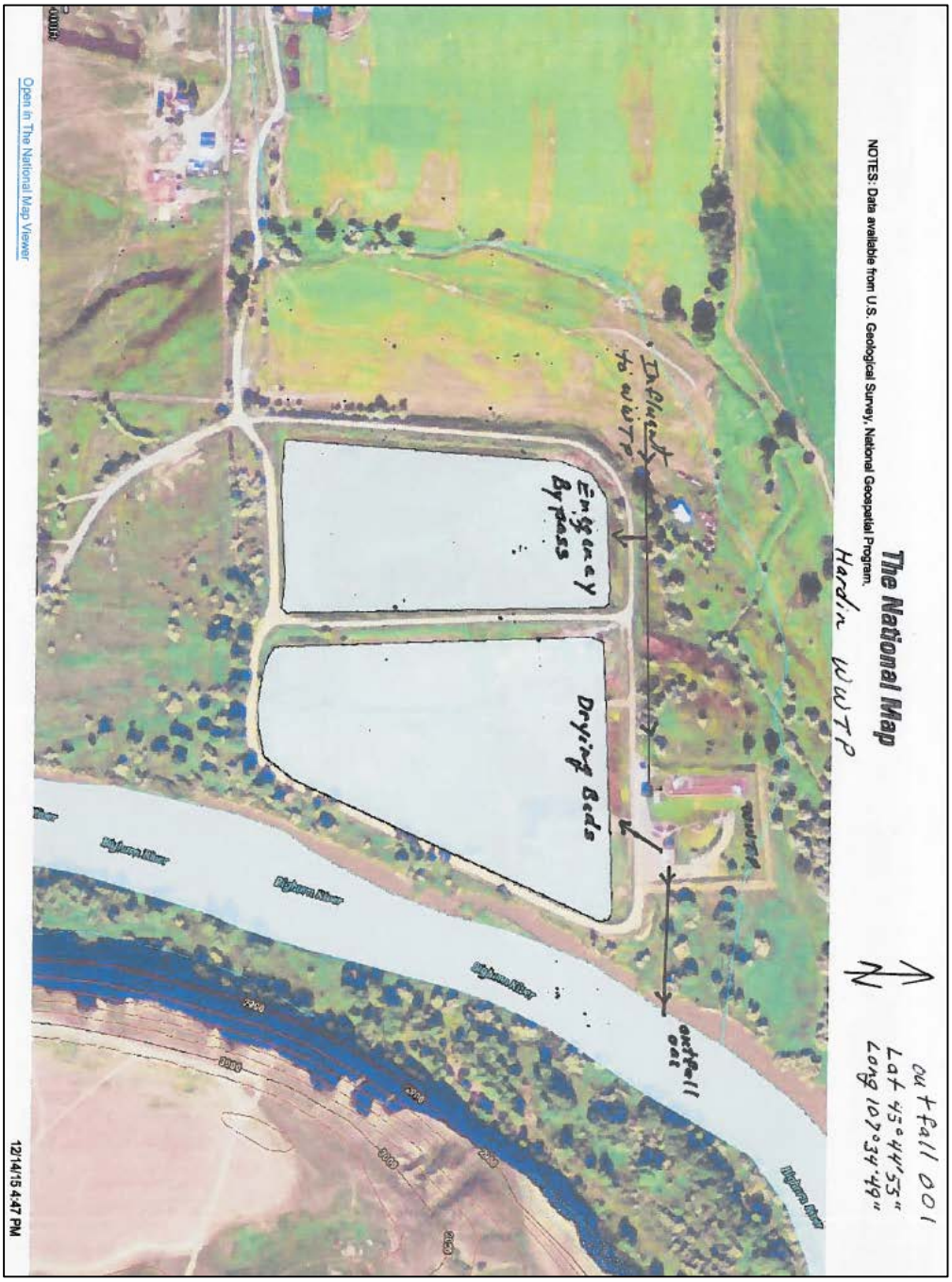
Domestic sewage is conveyed to the facility, which has a design flow of 1.1 million gallons per day (MGD), through a gravity sewer system. Treatment consists of influent screening, an oxidation ditch, two secondary clarifiers, an aerobic digester and ultraviolet (UV) disinfection prior to discharge via pipeline to a point in the Bighorn River. Prior to installation of the UV disinfection system, the Facility disinfected effluent using chlorine.

As depicted on the Google Earth image included with the permit application (Figure 1), raw influent undergoes screening upon entering the Facility, then is conveyed to the oxidation ditch. Sewage from the oxidation ditch flows through two secondary clarifiers prior to aerobic digestion and is finally disinfected by UV disinfection before being discharged to the Bighorn River at a point due east of the facility. The discharge pipe terminates in the River approximately one foot below the surface of the river and extends approximately one foot from the shoreline.

A second image of the Facility included with the permit application (Figure 2) shows two lagoons that are no longer in use for sewage treatment. The first lagoon can be used, in emergency situations, to hold influent that has bypassed the Facility. Figure 2 also shows the second lagoon, now used for sludge drying prior to landfill disposal.

Figure 1. City of Hardin WWTP Flow Diagram

Figure 2. City of Hardin WWTP, Including Lagoons



2.1 Effluent Characteristics

A summary of self-monitoring effluent data for the period of record (POR) from October 2011 through December 2016 is included in Table 1.

Table 1. Summary of Self-Monitoring Data for October 2011 – December 2016

	Value Reported a/				
Parameter	**Minimum**	**Maximum**	**Average**	**No. of Values Reported**	**No. of Exceed-ances** b/
BOD_5, mg/L	3.8	45	5.16	61	0
BOD_5, lbs/day	16	55.7	23.06	62	0
BOD_5, % removal	92	98	96.81	62	0
Total Suspended Solids, mg/L	2.3	14	6.92	62	0
Total Suspended Solids, lbs/day	2.4	93	35.72	62	0
TSS, % removal	86	98	93.43	62	0
pH, s.u.	6.91	7.77	N/A	62	0
E. coli, Apr-Oct, #/100 mL	1	360	16.50	36	1
E. coli, Nov-Mar, #/100 mL	1	303	23.17	25	0
Total Residual Chlorine, mg/L c/	0	0	0	62	0
Total Flow, mgd	0.05	0.77	0.59	62	N/A
Oil & Grease, visual	0	0	0	62	N/A
Oil & Grease, mg/L c/	0	0	0	62	N/A
Total Arsenic, mg/L	0.001	0.001	0.001	4	N/A
Total Cadmium, mg/L	0.001	0.001	0.001	3	N/A
Total Chromium, mg/L	0.001	0.001	0.001	3	N/A
Total Copper, mg/L	0.005	0.008	0.0065	4	N/A
Total Lead, mg/L	0.005	0.005	0.005	3	N/A
Total Molybdenum, mg/L	0.004	0.012	0.0095	4	N/A
Total Nickel, mg/L	0.0005	0.005	0.0035	3	N/A
Total Selenium, mg/L	0.002	0.004	0.003	4	N/A
Total Silver, mg/L	0.005	0.005	0.005	3	N/A
Total Zinc, mg/L	0.005	0.03	0.019	4	N/A
Total Cyanide, mg/L	0.005	0.005	0.005	3	N/A
Total Phenols, mg/L	0.01	0.03	0.015	4	N/A
Volatile Organic Pollutants, mg/L	0	5.72	0.903	8	N/A
Semi-Volatile, Acid, mg/L d/	--	--	--	0	N/A
Semi-Volatile, Base-Neutral, mg/L	0.5	10	5.25	2	N/A
Ammonia Nitrogen, mg/L	0.05	0.09	0.07	3	N/A
Nitrate-Nitrogen, mg/L	4.74	26.2	18.36	4	N/A
Nitrite-Nitrogen, mg/L	0.02	0.25	0.115	4	N/A
Total Kjeldahl Nitrogen, mg/L	0.5	1.2	0.95	4	N/A
Total Nitrogen, mg/L	0.5	26.3	12.82	4	N/A
Total Phosphorus, mg/L	2.08	2.98	2.44	4	N/A

a/ This table shows the minimum, maximum, and average of values reported on the Discharger's monthly reports. The values are: sample averages for BOD_5, TSS and Flow; geometric mean values

for *E. coli* (though these values were reported as averages); and single sample values for all other parameters.

b/ Number of exceedances is the number of reported values that exceeded at least one of the numeric limits provided in the Permit. For example, if a single value reported on the Discharge Monitoring Report exceeded both the 30-day average and the 7-day average, it is counted as a single exceedance in the summary.

c/ The Discharger submitted monitoring results for Total Residual Chlorine and Oil & Grease concentrations for all reporting periods though these parameters are only required to be monitored during certain conditions. Based on the information provided, it did not appear that monitoring was required for these parameters during the POR.

d/ No monitoring results for this parameter were included in the electronically reported data for the POR.

2.2 Compliance History

Based on Discharge Monitoring Report (DMR) data, there was a single effluent violation during the POR: the *E. coli* value reported on the April 2013 DMR of 360 #/100 mL exceeded the effluent limitation of 252 #/100mL.

3. Technology-Based Effluent Limits (TBELs)

Treated effluent from the City of Hardin WWTP is subject to the Secondary Treatment Regulations found at 40 CFR Part 133. Regulations at 40 CFR § 133.102 require that the minimum level of effluent quality for secondary treatment is 30-day average concentrations of BOD_5 and TSS that do not exceed 30 mg/L, 7-day average concentrations of these parameters that do not exceed 45 mg/L and a minimum 30-day removal of 85 percent for each parameter. These standards are expressed as average monthly and average weekly limitations based on requirements found at 40 CFR § 122.45(d).

The secondary treatment regulations also provide a limit for pH to be maintained between 6.0 and 9.0 standard units. The limit for pH contained in this Permit is more stringent than required by the secondary treatment regulations in order to protect downstream water quality, as discussed below.

Table 2. Technology-Based Effluent Limitations

Effluent Characteristic	Effluent Limitation		
	Average Monthly a/	Average Weekly a/	Daily Maximum a/
BOD_5, mg/L b/	30	45	N/A
Total Suspended Solids, mg/L b/	30	45	N/A
The pH of the discharge shall not be less than 6.5 or greater than 9.0 at any time.			

a/ See Definitions, Part 1.1 of the Permit, for definition of terms.

b/ Percentage Removal Requirements (TSS and BOD_5 Limitation): In addition to the concentration limits for Total Suspended Solids (TSS) and BOD_5 indicated above, the arithmetic mean of the concentration for effluent samples collected in a calendar month shall not exceed 15 percent of the arithmetic mean of the concentration for influent samples collected at approximately the same times during the same period (85 percent removal).

4. Water Quality-Based Effluent Limits (WQBELs)

WQBELs, which are based on water quality standards, must be established for any parameters where TBELs are not sufficient to ensure water quality standards will be attained in the receiving water (40 CFR § 122.44(d)). The parameters that must be limited are those that are or may be discharged at a level that will cause, have the reasonable potential to cause, or contribute to an exceedance of water quality standards.

4.1 Receiving Waters

The discharge from the facility enters the Bighorn River via pipeline at a point due east of the UV disinfection system. The pipe extends approximately one foot past the shoreline and is positioned approximately one foot below the surface of the water.

4.2 Water Quality Considerations

The Crow Tribe has not established water quality standards (WQS) for the Reservation. However, the Bighorn River from the downstream border of the Reservation to the Yellowstone River has been classified as a B-2 water by the State of Montana. Waters classified B-2 are to be maintained suitable for drinking, culinary and food processing purposes after conventional treatment; bathing, swimming and recreation; growth and marginal propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply. For the purpose of this Permit renewal, Montana State WQS are applied to the discharge in order to protect water quality and designated uses downstream of the Reservation.

Pollutants typically present in treated effluent from domestic wastewater treatment facilities that may cause or contribute to exceedances of water quality standards include conventional pollutants such as biological material (measured by BOD_5), TSS, oil and grease and pH; and non-conventional pollutants such as *E. coli*, total residual chlorine, ammonia, total nitrogen, total phosphorous, dissolved oxygen and total dissolved solids.
Available DMR data for the City of Hardin discharge includes sample results for organic and inorganic pollutants collected from October 2011 to December 2016. A reasonable potential analysis is not necessary for BOD_5, pH, and TSS because these are technology-based limits.

For most of the pollutants, the maximum detected concentration is less than the State WQS, which results in a conclusion of no reasonable potential before any available dilution is considered. The maximum detected concentration of cadmium (0.001 mg/L), copper (0.008 mg/L), silver (0.0005 mg/L), and nitrate as N (26.2 mg/L) are greater than applicable downstream WQS. However, the receiving water for the discharge is the Bighorn River. Streamflow data from United States Geological Survey (USGS) gaging station 06288400 (Bighorn River at Two Leggins Bridge, near Hardin), located approximately 10 miles upstream from the facility discharge, indicates that the minimum reported mean daily flow between April 1, 2012 and July 23, 2017 is 1340 cfs. The maximum facility design flow is 1.78 MGD (3.31 cfs); based on the lowest daily mean streamflow (1340 cfs), the available minimum dilution at the point where the facility discharge enters the receiving water is approximately 400 to 1. Dilution of this magnitude allows for a determination of no reasonable potential for cadmium, copper, silver, and nitrate as N.

4.2.1 Conventional Pollutants

4.2.1.1 *BOD_5, TSS, and pH* – The Montana State WQS do not include numeric criteria for BOD_5 or TSS, so no WQBELs will be applied for these pollutants. The downstream water quality criterion established by Montana for pH is 6.5 to 9.0 standard units, which is more stringent than the TBEL, and will apply as the WQBEL.

4.2.1.2 *Oil and Grease* – The 2011 Permit has an effluent limitation for oil and grease of 10 mg/L. Due to the domestic nature of the discharge, this limit is continued to the current Permit term to protect water quality in Bighorn River downstream of the Reservation. The effluent limits are included in the reissued Permit as both the numeric limit of 10 mg/L and narrative limitation stating that "[there shall be no] visible sheen in the receiving water." Sampling for compliance with the numeric limit is required only when visual monitoring results in the detection of a visible sheen in the receiving water. Enter the appropriate No Discharge (NODI) code on the electronic DMR if chlorine is not used as part of the disinfection process.

4.2.1.3 *Dissolved Oxygen* – Numeric criteria for dissolved oxygen are established by the State of Montana WQS for the Bighorn River downstream of the Reservation. These criteria are based on the presence or absence of early life stages of freshwater aquatic life. Monitoring and numeric limits have not been established for dissolved oxygen in previous permits; however, the result of monitoring required for the permit renewal application was 3.84 mg/L. The least stringent standard for downstream B-2 waters, as established in the State WQS is 4.0 mg/L. Monitoring for dissolved oxygen will be required quarterly for the duration of this Permit to determine if WQBELs will be required for dissolved oxygen in future permits.

4.2.2 Non-conventional Pollutants

4.2.2.1 *E. coli* – The Montana State WQS establish numeric criteria for *E. coli* that vary according to season. From April 1 through October 31, the geometric mean number of *E. coli* may not exceed 126 colony-forming units per 100 mL and 10% of total samples may not exceed 252 cfu per 100 mL during any 30-day period for waters designated B-2 by the State. From November 1 through March 31, the geometric mean number of *E. coli* may not exceed 630 cfu per 100 mL and 10% of the samples may not exceed 1,260 cfu per 100 mL during any 30-day period. The numeric criteria for *E. coli* established by the WQS will be established as numeric effluent limitations applied at end-of-pipe for the duration of this Permit to protect downstream uses.

4.2.2.2 *Temperature* – The Montana State WQS for waters designated B-2 include numeric criteria for temperature that allow a 1ºF maximum increase above naturally occurring water temperature within the range of 32ºF to 66ºF; within the naturally occurring range of 66ºF to 66.5ºF, no discharge is allowed which will cause the water temperature to exceed 67ºF; and where the naturally occurring water temperature is 66.5ºF or greater, the maximum allowable increase in water temperature is 0.5ºF. Effluent temperatures from the Facility (55.0ºF and 64.0ºF winter and summer averages; 55.8ºF and 64.6ºF winter and summer maxima) are within the range of temperatures reported for the Bighorn River at the Yellowtail Dam (34.9ºF to 66.74ºF at USGS gaging station #06287000), allowing for a determination that the temperature of the effluent discharge would not cause, have the reasonable potential to cause, or contribute to an excursion above downstream water quality criteria.

4.2.2.3 *Total Residual Chlorine* (TRC) – The Facility uses ultraviolet (UV) disinfection, however chlorine is used for filamentous algae control in the aerobic digester so monitoring for total residual chlorine is included as a requirement in this Permit. The numeric limit included in the previous Permit of 0.5 mg/L TRC will be retained in this Permit.

4.2.2.4 *Ammonia* – Montana WQS established for ammonia are dependent on the presence or absence of fish early life stages as well as the temperature and pH of the receiving water. The highest concentration of ammonia monitored during the previous permit term was 0.09 mg/L, which is significantly less than the most stringent temperature- and pH-dependent ammonia limitation provided by the State WQS of 0.179 mg/L. Based on the results of monitoring during the previous permit term, there is no limitation included in this Permit for ammonia. Monitoring for ammonia will be continued, on an annual basis to ensure continued protection of water quality downstream of the Facility.

4.2.2.5 *Nitrate & Nitrite* – The State designated uses of the Bighorn River downstream of the Reservation include drinking water. The human health standard for nitrate established in State standards is 10 mg/L, and the drinking water human health standard for nitrite is 1 mg/L. Three of the four nitrate samples tested during the previous permit term were above the criteria of 10 mg/L (18.3-26.2 mg/L). However, the dilution provided by the Bighorn River is approximately 400 to 1, allowing for a determination that there is no reasonable potential for nitrate discharges from the facility to cause or contribute to an exceedance of downstream water quality standards. Nitrite results ranged from 0.05 to 0.25 mg/L. Annual monitoring for nitrate and nitrite will continue during this Permit to ensure continued protection of downstream water quality.

4.2.2.6 *Total Kjeldahl Nitrogen, Total Nitrogen, Total Phosphorus and Total Dissolved Solids* – Permit application requirements at 40 CFR § 122.21(j)(4)(iii) require monitoring of these pollutants. Total Kjeldahl nitrogen, total nitrogen and total phosphorus monitoring requirements were included in the previous Permit and these parameters will continue to be monitored as part of this Permit. Monitoring for total dissolved solids, also required for the permit renewal application, will be added for this Permit. Monitoring for these permit application parameters will occur annually.

4.2.2.7 *Tetrachloroethene* – The WQS for the State of Montana that apply downstream of the Reservation include numeric human health criteria for tetrachloroethene of 5 micrograms per liter (µg/L). The Permittee reported a maximum daily result of 5.4 µg/L tetrachloroethene as part of the testing required for permit renewal. Monitoring for tetrachloroethene will be

required annually for this Permit to ensure protection of downstream water quality and to determine if WQBELs will be required for tetrachloroethene in future permits.

4.2.2.8 *Others* – The 2011 issuance of this Permit required annual monitoring of the following parameters under the requirements of 40 CFR Part 403: arsenic; cadmium; chromium; copper; cyanide; lead; molybdenum; nickel; selenium; silver; zinc; phenols; volatile organic pollutants; semi-volatile organic compounds, acid; and semi-volatile organic compounds, base neutral. The Discharger indicated in the permit renewal application that no industrial facilities are discharging to the Facility and therefore there is no requirement to develop and administer a pretreatment program. The monitoring of these parameters will continue on an annual basis to provide a means of detecting new industrial discharges.

Permit application requirements at 40 CFR § 122.21(j)(4)(iii) require monitoring of antimony, beryllium and mercury. Data for these parameters was not provided as part of the permit application; annual monitoring for antimony, beryllium and mercury has been added to ensure data collection to meet the permit application requirements.

Effluent monitoring data provided for cadmium, copper and silver showed results exceeding the criteria for these parameters established by the Montana WQS for waters downstream of the Reservation. As discussed at section IV.B, dilution provided by the Bighorn River allows for a determination that there is no reasonable potential for these parameters to cause, have the reasonable potential to cause, or contribute to an exceedance of downstream water quality standards. Monitoring for these parameters will continue on an annual basis to meet requirements for future permit renewal applications, to provide a means of detecting new industrial dischargers, and to continue to ensure protection of downstream water quality.

4.3 Antidegradation

The Administrative Rules of Montana (ARM) include a Nondegradation Policy (Title 17, Chapter 30, Subchapter 7). The policy applies to activities resulting in new or increased sources which may cause degradation. This Permit allows an increase in Facility design flow of 0.10 MGD, but does not allow any new or increased concentrations of pollutants from the Facility to the Bighorn River; therefore this Permit would not result in significant degradation and no further analysis is necessary.

5. Final Effluent Limitations

The effluent limitations in Table 5 will be applied to the discharge at Outfall 001 for the duration of the Permit term. Limits are based on the most stringent of either the TBELs or WQBELs presented in Sections III and IV, respectively.

Table 3. Effluent Limitations Included in the Permit

Effluent Characteristic	Effluent Limitation		
	Average Monthly a/	Average Weekly a/	Daily Maximum a/
BOD_5, mg/L b/	30	45	N/A
Total Suspended Solids, mg/L b/	30	45	N/A
E. coli, cfu/100 mL, April 1 – October 31	126 c/	N/A	252 d/
E. coli, cfu/100 mL, November 1 – March 31	630 e/	N/A	1,260 f/
Total Residual Chlorine, mg/L	N/A	N/A	0.5
The pH of the discharge shall not be less than 6.5 standard units (s.u.) or greater than 9.0 s.u. at any time.			
There shall be no visible sheen in the receiving water. If visible sheen is detected, a grab sample shall be taken immediately and analyzed in accordance with 40 CFR Part 136. The concentration of oil and grease shall not exceed 10 mg/L in any sample taken.			

a/ See Definitions, Part 1.1 of the Permit, for definition of terms.

b/ Percentage Removal Requirements (TSS and BOD_5 Limitation): In addition to the concentration limits for Total Suspended Solids (TSS) and BOD_5 indicated above, the arithmetic mean of the concentration for effluent samples collected in a calendar month shall not exceed 15 percent of the arithmetic mean of the concentration for influent samples collected at approximately the same times during the same period (85 percent removal).

c/ From April 1 through October 31, the geometric mean number of *E. coli* may not exceed 126 colony-forming units (cfu) per 100 mL during any calendar month.

d/ From April 1 through October 31, no more than 10% of *E. coli* samples taken during any calendar month may exceed 252 cfu per 100 mL.

e/ From November 1 through March 31, the geometric mean number of *E. coli* may not exceed 630 cfu per 100 mL during any calendar month.

f/ From November 1 through March 31, no more than10% of *E. coli* samples taken during any calendar month may exceed 1,260 cfu per 100 mL.

6. Self-Monitoring and Reporting Requirements – Outfall 001

The self-monitoring requirements in Table 6 apply to Outfall 001. Monitoring for parameters for which were not sampled for the permit application process has been added to comply with permit renewal application requirements and to determine whether the discharge will cause, have the reasonable potential to cause or contribute to an exceedance of downstream water quality standards.

Table 4. Monitoring Requirements – Outfall 001

Effluent Characteristic	Frequency	Sample Type a/
Total Flow, mgd b/	Continuous	Recorder
BOD_5, mg/L	Weekly	Composite
Total Suspended Solids, mg/L	Weekly	Composite
pH, standard units (s.u.)	Weekly	Instantaneous
E. coli, cfu/100 mL	Weekly	Grab
Total Residual Chlorine, mg/L	Daily c/	Instantaneous
Oil and grease, visual	Daily d/	Observation
Oil and grease, mg/L	d/	Grab
Ammonia Nitrogen, mg/L	Annually	Composite
Nitrate-Nitrogen, mg/L	Annually	Composite
Nitrite-Nitrogen, mg/L	Annually	Composite
Total Kjeldahl Nitrogen, mg/L	Annually	Composite
Total Nitrogen, mg/L	Annually	Calculated
Total Phosphorus, mg/L	Annually	Composite
Total Dissolved Solids, mg/L	Annually	Grab
Dissolved Oxygen, mg/L	Quarterly	Grab
Tetrachloroethene, µg/L	Annually	Grab
Total Antimony, µg/L	Annually	Composite
Total Arsenic, µg/L	Annually	Composite
Total Beryllium, µg/L	Annually	Composite
Total Cadmium, µg/L	Annually	Composite
Total Chromium, µg/L	Annually	Composite
Total Copper, µg/L	Annually	Composite
Total Cyanide, µg/L	Annually	Grab
Total Lead, µg/L	Annually	Composite
Total Mercury, µg/L	Annually	Composite
Total Molybdenum, µg/L	Annually	Composite
Total Nickel, µg/L	Annually	Composite
Total Selenium, µg/L	Annually	Composite
Total Silver, µg/L	Annually	Composite
Total Zinc, µg/L	Annually	Composite

Effluent Characteristic	Frequency	Sample Type a/
Total Phenols, µg/L	Annually	Grab
Volatile Organic Pollutants, µg/L	Annually	Grab
Semi-Volatile Organic Compounds, Acid, µg/L	Annually	Composite
Semi-Volatile Organic Compounds, Base-Neutral, µg/L	Annually	Composite

a/ See Definitions, Part 1.1 of the Permit, for definition of terms.

b/ Flow measurements of effluent volume shall be made in such a manner that the Permittee can affirmatively demonstrate that representative values are being obtained. The average flow rate (in million gallons per day) during the reporting period and the maximum flow rate observed (in mgd) shall be reported.

c/ Monitoring is only required if chlorine is used in the treatment process.

c/ A daily visual observation is required. If a visible sheen is detected, a grab sample shall be taken immediately and analyzed in accordance with the requirements of 40 CFR Part 136. The concentration of oil and grease shall not exceed 10 mg/L in any sample.

The self-monitoring requirements in Table Seven apply to influent entering the Facility. Influent monitoring is required to determine compliance with percent removal standards established at 40 CFR §§ 133.102(a)(3) and 133.102(b)(3).

Table 5. Monitoring Requirements – Influent

Influent Characteristic	Frequency	Sample Type a/
Influent Flow, mgd	Continuous	Recorder
Influent BOD_5, mg/L	Weekly	Composite
Influent Total Suspended Solids (TSS), mg/L	Weekly	Composite

a/ See Definitions, Part 1.1 of the Permit, for definition of terms.

6.1 Discharge Monitoring Reports

As of December 21, 2016, Permittees must electronically report DMRs using *NetDMR*. For any questions or concerns regarding DMRs or *NetDMR*, please contact the EPA's Policy, Information Management and Environmental Justice Program, DMR Coordinator at (303) 312-6056. See Section 2.3 of the Permit for additional information.

7. Endangered Species Act Requirements

Section 7(a) of the Endangered Species Act requires federal agencies to ensure that any actions authorized, funded or carried out by an agency are not likely to jeopardize the continued existence of any federally-listed endangered or threatened species or adversely modify or destroy critical habitat of such species.

According to U.S. Fish & Wildlife Service, Information for Planning and Conservation (IPaC) website (https://ecos.fws.gov/ipac/), there are no federally listed endangered species found in the vicinity of the facility, or downstream from the discharge. The EPA determines this Permit will have

no effect on any of the species listed by the U.S. Fish and Wildlife Service under the Endangered Species Act.

8. National Historic Preservation Act (NHPA) Requirements

Section 106 of the National Historic Preservation Act (NHPA), 16 U.S.C. § 470(f) requires that federal agencies consider the effects of federal undertakings on historic properties. The EPA has evaluated its planned reissuance of the NPDES Permit for the City of Hardin WWTP to assess this action's potential effects on any listed or eligible historic properties or cultural resources. This correspondence is typically conducted with the Tribal Historic Preservation Office (THPO).

The EPA does not anticipate any impacts on listed/eligible historic or cultural properties because this Permit is a renewal and will not be associated with any new ground disturbances or changes to the volume or point of discharge. During the public comment period, the EPA notified the THPO of the Crow Tribe of the planned issuance of this NPDES Permit and requested their input on potential effects on historic properties and EPA's preliminary determination in this regard. The EPA did not receive any comments.

9. Miscellaneous

The effective date and the expiration date of the Permit will be determined at the time of Permit issuance. The intention is to renew the Permit for a period not to exceed five years.

Permit drafted by Kristy Allen, Environmental Scientist, TetraTech.
Permit reviewed and edited by David Rise, 406.457.5012.

ADDENDUM:

PUBLIC NOTICE AND RESPONSE TO COMMENTS

The permit and statement of basis were public noticed in the Bighorn County News on December 28, 2017. The EPA did not get any comments on this Permit.

Appendix I

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 WYNKOOP STREET
DENVER, COLORADO 80202-1129

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Clean Water Act, as amended, (33 U.S.C. § 1251 et seq; "the Act"),

the City of Hardin, Montana

is authorized to discharge from its wastewater treatment facility located in the N 1/2 of Section 24, Township 1S, Range 33E, latitude 45.734793° N and longitude 107.579082° W, Big Horn County,

to **the Bighorn River**,

in accordance with discharge point(s), effluent limitations, monitoring requirements and other conditions set forth herein. Authorization for discharge is limited to those outfalls specifically listed in the Permit.

This Permit shall become effective July 1, 2018

This Permit and the authorization to discharge shall expire at midnight, June 30, 2023

Signed this 14th day of March, 2018

Authorized Permitting Official

Darcy O'Connor
Assistant Regional Administrator
Office of Water Protection

TABLE OF CONTENTS

1. EFFLUENT LIMITATIONS ND MONITORING REQUIREMENTS 3
1.1. Definitions 3
1.2. Description of Discharge Point 4
1.3. Specific Limitations and Self-Monitoring Requirements 5
1.3.1. Effluent Limitations 5
1.3.2. Self-Monitoring Requirements 6
1.3.3. Reporting Period 7

2. MONITORING, RECORDING AND REPORTING REQUIREMENTS 7
2.1. Representative Sampling 7
2.2. Monitoring Procedures 7
2.3. Reporting of Monitoring Results 8
2.4. Records Contents 8
2.5. Twenty-four Hour Notice of Noncompliance Reporting 8

3. COMPLIANCE RESPONSIBILITIES 9
3.1. Proper Operation and Maintenance 9
3.2. Removed Substances 10
3.3. Notice of Bypass 10
3.4. Industrial Waste Management (Minor POTWS in Indian Country) 10

4. GENERAL REQUIREMENTS 12
4.1. Planned Changes 12
4.2. Signatory Requirements 12
4.3. Penalties for Falsification of Reports 13
4.4. Availability of Reports 13
4.5. Oil and Hazardous Substance Liability 13
4.6. Property Rights 13
4.7. Severability 13
4.8. Transfers 14
4.9. Permittees in Indian Country 14
4.10. Reopener Provision 14
4.11. Toxicity Limitation-Reopener Provision 14

5. ADDITIONAL STANDARD CONDITIONS 14
5.1. Duty to Comply 14
5.2. Duty to Reapply 15
5.3. Need to Halt or Reduce Activity Not a Defense 15
5.4. Duty to Mitigate 15
5.5. Proper Operation and Maintenance 16
5.6. Permit Actions 16
5.7. Property Rights 16
5.8. Duty to Provide Information 16
5.9. Inspection and Entry 16
5.10. Monitoring and Records 16
5.11. Signatory Requirement 17
5.12. Reporting Requirements 17
5.13. Bypass 20
5.14. Upset 21

1. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1.1. Definitions

The *average monthly* (or 30-day) limitation, other than for microbiological organisms (e.g., bacteria, viruses, etc.), is the arithmetic mean of all samples collected during a calendar month (or consecutive 30-day period if applicable). Geometric means shall be calculated for microbiological organisms unless specified otherwise in the Permit. The calendar month shall be used for purposes of reporting self-monitoring data on discharge monitoring reports.

The *average weekly* (or 7-day) limitation, other than for microbiological organisms (e.g., bacteria, viruses, etc.), is the arithmetic mean of all samples collected during a calendar week (or consecutive 7-day period if applicable). Geometric means shall be calculated for microbiological organisms unless specified otherwise in the Permit. The calendar week, which begins on Sunday and ends on Saturday, shall be used for purposes of reporting self-monitoring data on discharge monitoring reports. If a calendar week overlaps two months (i.e., the Sunday is in one month and the Saturday in the following month), the weekly average calculated for that calendar week shall be included in the data for the month that contains the Saturday.

Composite samples shall be flow proportioned. The composite sample shall, at a minimum, contain at least four (4) samples collected over the compositing period. Unless otherwise specified, the time between the collection of the first sample and the last sample shall not be less than six (6) hours, nor more than twenty-four (24) hours. Acceptable methods for the preparation of composite samples are as follows:

a. Constant time interval between samples, sample volume proportional to flow rate at the time of sampling;

b. Constant time interval between samples, sample volume proportional to total flow (volume) since last sample. For the first sample, the flow rate at the time of the first sample was collected may be used;

c. Constant sample volume, time interval between samples proportional to flow (i.e., sample taken every “X” gallons of flow); and,

d. Continuous collection of sample with sample collection rate proportional to flow rate.

CWA means the Clean Water Act (formerly referred to as either the Federal Water Pollution Control Act or the Federal Water Pollution Control Act Amendments of 1972), Pub. L. 92-500, as amended by Pub. L. 95-217, Pub. L. 95-576, Pub. L. 96-483, Pub. L. 97-117, and Pub. L. 100-4. In this Permit the CWA may be referred to as “the Act.”

Daily Maximum (*Daily Max.*) is the maximum measured value for a pollutant discharged during a calendar day or any 24-hour period that reasonably represents a calendar day for purposes of sampling. For pollutants with daily maximum limitations expressed in units of mass (e.g., kilograms, pounds), the daily maximum is calculated as the total mass of pollutant discharged over the calendar day or representative 24-hour period. For pollutants with limitations expressed in other units of measurement (e.g., milligrams/liter, parts per billion), the daily maximum is calculated as the average of all measurements of the pollutant over the calendar day or representative 24-hour period. If only one measurement or sample is taken during a calendar day or representative 24-hour period, the single

measured value for a pollutant will be considered the daily maximum measurement for that calendar day or representative 24-hour period.

Daily Minimum (*Daily Min*.) is the minimum value allowable in any single sample or instantaneous measurement collected during the course of a day.

Director means the Regional Administrator of the EPA Region 8 or an authorized representative.

EPA means the United States Environmental Protection Agency.

Geometric mean is defined as the value obtained by taking the nth root of the product of the number (n) measured values where zero values for measured values are taken to be the detection limit.

Grab sample, for monitoring requirements, is defined as a single "dip and take" sample collected at a representative point in the discharge stream.

Instantaneous measurement, for monitoring requirements, is defined as a single reading, observation, or measurement.

Sewage Sludge is any solid, semi-solid or liquid residue generated during the treatment of domestic sewage in a treatment works. Sewage sludge includes, but is not limited to, domestic septage; scum or solids removed in primary, secondary or advanced wastewater treatment processes; and a material derived from sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screenings generated during preliminary treatment of domestic sewage in a treatment works.

Whole Effluent Toxicity (WET) is the total toxic effect of an effluent measured directly with a toxicity test. Acute toxicity occurs when 50 percent or more mortality is observed for either species (see Part 1.3) at any effluent concentration. Mortality in the control must simultaneously be 10 percent or less for the effluent results to be considered valid.

1.2. Description of Discharge Point

The authorization to discharge provided under this Permit is limited to the outfall specifically designated below as the discharge location. Discharge at any location not authorized under an NPDES Permit is a violation of the Clean Water Act and could subject the person(s) responsible for such discharge to penalties under Section 309 of the Act.

Outfall Serial Number(s)	Description of Discharge Point(s)
001	Any discharge from the pipe that conveys discharge due east from the facility to the Bighorn River, discharging approximately one foot from the shore and one foot below the surface of the river. Approximate location of this discharge point is 45.734793° N, 107.579082° W.

1.3. Specific Limitations and Self-Monitoring Requirements

1.3.1. Effluent Limitations – Outfall 001

Effective immediately and lasting through the life of this Permit, the quality of effluent discharged by the facility shall, at a minimum, meet the limitations as set forth below:

Effluent Characteristic	Effluent Limitation		
	Average Monthly a/	**Average Weekly a/**	**Daily Maximum a/**
BOD_5, mg/L b/	30	45	N/A
Total Suspended Solids, mg/L b/	30	45	N/A
E. coli, cfu/100 mL, April 1 – October 31	126 c/	N/A	252 d/
E. coli, cfu/100 mL, November 1 – March 31	630 e/	N/A	1,260 f/
Total Residual Chlorine, mg/L g/	N/A	N/A	0.5
The pH of the discharge shall not be less than 6.5 standard units (s.u.) or greater than 9.0 s.u. at any time.			
There shall be no visible sheen in the receiving water. If visible sheen is detected, a grab sample shall be taken immediately and analyzed in accordance with 40 CFR Part 136. The concentration of oil and grease shall not exceed 10 mg/L in any sample taken.			

a/ See Definitions, Part 1.1, for definition of terms.

b/ Percentage Removal Requirements (TSS and BOD_5 Limitation): In addition to the concentration limits for Total Suspended Solids (TSS) and BOD_5 indicated above, the arithmetic mean of the concentration for effluent samples collected in a calendar month shall not exceed 15 percent of the arithmetic mean of the concentration for influent samples collected at approximately the same times during the same period (85 percent removal).

c/ From April 1 through October 31, the geometric mean number of *E. coli* may not exceed 126 colony-forming units (cfu) per 100 mL during any calendar month.

d/ From April 1 through October 31, no more than 10% of *E. coli* samples taken during any calendar month may exceed 252 cfu per 100 mL.

e/ From November 1 through March 31, the geometric mean number of *E. coli* may not exceed 630 cfu per 100 mL during any calendar month.

f/ From November 1 through March 31, no more than 10% of *E. coli* samples taken during any calendar month may exceed 1,260 cfu per 100 mL.

1.3.2. Self-Monitoring Requirements – Influent and Outfall 001

At a minimum, upon the effective date of this Permit, the following constituents shall be monitored at the frequency and with the type of measurement indicated; samples or measurements shall be representative of the volume and nature of the monitored discharge or influent. If no discharge occurs during the entire monitoring period, it shall be stated on the electronic Discharge Monitoring Report (DMR) that no discharge or overflow occurred. Monitoring samples will be collected at the monitoring tap located after all treatment and disinfection processes.

Influent Characteristic	**Frequency**	**Sample Type a/**
Influent Flow, mgd	Continuous	Recorder
Influent BOD_5, mg/L	Weekly	Composite
Influent Total Suspended Solids (TSS), mg/L	Weekly	Composite

Effluent Characteristic	**Frequency**	**Sample Type a/**
Total Flow, mgd b/	Continuous	Recorder
BOD_5, mg/L	Weekly	Composite
Total Suspended Solids, mg/L	Weekly	Composite
pH, standard units (s.u.)	Weekly	Instantaneous
E. coli, cfu/100 mL	Weekly	Grab
Total Residual Chlorine, mg/L	Daily c/	Instantaneous
Oil and grease, visual	Daily d/	Observation
Oil and grease, mg/L	d/	Grab
Ammonia Nitrogen, mg/L	Annually	Composite
Nitrate-Nitrogen, mg/L	Annually	Composite
Nitrite-Nitrogen, mg/L	Annually	Composite
Total Kjeldahl Nitrogen, mg/L	Annually	Composite
Total Nitrogen, mg/L	Annually	Calculated
Total Phosphorus, mg/L	Annually	Composite
Total Dissolved Solids, mg/L	Annually	Grab
Dissolved Oxygen, mg/L	Quarterly	Grab
Tetrachloroethene, µg/L	Annually	Grab
Total Antimony, µg/L	Annually	Composite
Total Arsenic, µg/L	Annually	Composite
Total Beryllium, µg/L	Annually	Composite
Total Cadmium, µg/L	Annually	Composite

Effluent Characteristic	Frequency	Sample Type a/
Total Chromium, µg/L	Annually	Composite
Total Copper, µg/L	Annually	Composite
Total Cyanide, µg/L	Annually	Grab
Total Lead, µg/L	Annually	Composite
Total Mercury, µg/L	Annually	Composite
Total Molybdenum, µg/L	Annually	Composite
Total Nickel, µg/L	Annually	Composite
Total Selenium, µg/L	Annually	Composite
Total Silver, µg/L	Annually	Composite
Total Zinc, µg/L	Annually	Composite
Total Phenols, µg/L	Annually	Grab
Volatile Organic Pollutants, µg/L	Annually	Grab
Semi-Volatile Organic Compounds, Acid, µg/L	Annually	Composite
Semi-Volatile Organic Compounds, Base-Neutral, µg/L	Annually	Composite

a/ See Definitions, Part 1.1, for definition of terms.

b/ Flow measurements of effluent volume shall be made in such a manner that the Permittee can affirmatively demonstrate that representative values are being obtained. The average flow rate (in million gallons per day) during the reporting period and the maximum flow rate observed (in mgd) shall be reported.

c/ Monitoring only required if chlorine is used in the treatment process.

d/ A daily visual observation is required. If a visible sheen is detected, a grab sample shall be taken immediately and analyzed in accordance with the requirements of 40 CFR Part 136. The concentration of oil and grease shall not exceed 10 mg/L in any sample.

1.3.3. Reporting Period
For the duration of this Permit, the discharger shall submit Discharge Monitoring Reports (DMRs) monthly as described in section 2.3.

2. MONITORING, RECORDING AND REPORTING REQUIREMENTS

2.1. Representative Sampling: Samples taken in compliance with the monitoring requirements established under Part 1 shall be collected from the effluent stream prior to discharge into the receiving waters. Samples and measurements shall be representative of the volume and nature of the monitored discharge. Sludge samples shall be collected at a location representative of the quality of sludge immediately prior to use-disposal practice.

2.2. Monitoring Procedures: Monitoring must be conducted according to paragraph 5.10.4, unless other test procedures have been specified in this Permit. Sludge monitoring procedures shall be those specified in 40 CFR Part 503, or as specified in the Permit.

2.3. Reporting of Monitoring Results: Upon the effective date of this Permit, the Permittee must electronically report DMRs using *Net*DMR. Electronic submissions by Permittees must be sent to the EPA Region 8 no later than the 28th of the month following the completed reporting period. The Permittee must sign and certify all electronic submissions in accordance with the requirements of Part 4.2 of this Permit (Signatory Requirements). *Net*DMR is accessed from the internet at https://netdmr.zendesk.com/home.

Legible copies of all other reports required herein, shall be signed and certified in accordance with the Signatory Requirements (see Part 4.2), and submitted to the EPA Region 8 Policy, Information Management & Environmental Justice Program and the Crow Tribe at the addresses given below:

Original to: U.S. EPA, Region 8
Policy, Information Management and Environmental Justice Program (8ENF-PJ)
Attention: DMR Coordinator
1595 Wynkoop Street
Denver, Colorado 80202-1129

Copy to: Crow Tribe
Natural Resources and Public Safety Department
P.O. Box 159
Crow Agency, MT 59022

2.4. Records Contents: In addition to those requirements specified in paragraph 5.10.3, records of monitoring information shall include:

2.4.1. References and written procedures, when available, for the analytical techniques or methods used (5.10.3.5); and,

2.4.2. The results of such analyses, including the bench sheets, instrument readouts, computer disks or tapes, etc., used to determine these results (5.10.3.6).

2.5. Twenty-four Hour Notice of Noncompliance Reporting: Reporting required by section 5.12.6 shall be made to the following offices:

2.5.1. The Permittee shall report any noncompliance which **may endanger health or the environment** as soon as possible, but no later than twenty-four (24) hours from the time the Permittee first became aware of the circumstances. The report shall be made to the EPA, Region 8, Site Assessment/Emergency Response Program at (303) 293-1788 and the Tribe at (406) 638-3912.

2.5.2. Occurrences of noncompliance noted at section 5.12.6.2 of this Permit shall be reported by telephone to the EPA, Region 8, NPDES Enforcement Unit at (800) 227-8917 (8:00 a.m. - 4:30 p.m. Mountain Time), the NPDES Program, and the Tribe at (406) 638-3912 (8:00 a.m. - 4:30 p.m. Mountain Time) by the first workday following the day the Permittee became aware of the circumstances:

2.5.3. A written submission of all reports shall also be provided to the EPA, Office of Enforcement, Compliance and Environmental Justice, and to the Tribe within five days of the time that the Permittee becomes aware of the circumstances. The written submission shall contain:

2.5.3.1. A description of the noncompliance and its cause;

2.5.3.2. The period of noncompliance, including exact dates and times;

2.5.3.3. The estimated time noncompliance is expected to continue if it has not been corrected; and,

2.5.3.4. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

2.5.4. The Director may waive the written report on a case-by-case basis for an occurrence of noncompliance listed under Part 5.12.6.2., if the incident has been orally reported in accordance with the requirements of Part 2.5.2.

2.5.5. Reports shall be submitted to the addresses in Part 2.3, Reporting of Monitoring Results.

3. COMPLIANCE RESPONSIBILITIES

3.1. Proper Operation and Maintenance: In addition to the operation and maintenance requirements outlined at Part 5.5, the Permittee shall operate, at a minimum, one complete set of each main line unit treatment process whether or not this process is needed to achieve Permit effluent compliance.

3.1.1 The Permittee shall, as soon as reasonable and practicable, but no later than six (6) months after the effective date of this Permit, do the following as part of the operation and maintenance program for the wastewater treatment facility:

3.1.1.1. Have a current O & M Manual(s) that describes the proper operational procedures and maintenance requirements of the wastewater treatment facility;

3.1.1.2. Have the O & M Manual(s) readily available to the operator of the wastewater treatment facility and require that the operator become familiar with the manual(s) and any updates;

3.1.1.3. Have a schedule(s) for routine operation and maintenance activities at the wastewater treatment facility; and,

3.1.1.4. Require the operator to perform the routine operation and maintenance requirements in accordance with the schedule(s).

3.1.2. The Permittee shall maintain a daily log, in either paper (bound notebook) or electronic format, containing a summary record of all operation and maintenance activities at the wastewater treatment facility. At a minimum, the notebook shall include the following information:

3.1.2.1. Date and time;

3.1.2.2 Name and title of person(s) making the log entry;

3.1.2.3. Name of the persons(s) performing the activity;

3.1.2.4. A brief description of the activity; and,

3.1.2.5. Other information, as appropriate.

The Permittee shall maintain the notebook in accordance with proper record-keeping procedures and shall make the log available for inspection, upon request, by authorized representatives of the U.S. Environmental Protection Agency or the Crow Tribe.

3.2. Removed Substances: Collected screenings, grit, solids, sludge (including sewage sludge), or other pollutants removed in the course of treatment shall be buried or disposed in a manner consistent with all applicable federal and tribal regulations (i.e. 40 CFR Part 257, 40 CFR Part 258, 40 CFR Part 503). Sludge/digester supernatant and filter backwash shall not be directly blended with or enter either the final plant discharge and/or waters of the United States.

3.3. Notice of Bypass (See 5.13.3):

3.3.1. Anticipated bypass: If the Permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible, at least 10 days before the date of the bypass to the EPA, Technical Enforcement Program, and the Tribe.

3.3.2. Unanticipated bypass: The Permittee shall submit notice of an unanticipated bypass as required under Part 2.5, Twenty-four Hour Notice of Noncompliance Reporting, to the EPA, Technical Enforcement Program, and the Tribe.

3.4. Industrial Waste Management (Minor POTWs in Indian Country)

3.4.1. The Permittee has the responsibility to protect the Publicly-Owned Treatment Works (POTW) from pollutants which would inhibit, interfere, or otherwise be incompatible with operation of the treatment works including interference with the use or disposal of municipal sludge.

3.4.2. Pretreatment Standards (40 CFR § 403.5) developed pursuant to Section 307 of the Federal Clean Water Act (the Act) require that the Permittee shall not allow, under any circumstances, the introduction of the following pollutants to the POTW from any source of nondomestic discharge:

3.4.2.1. Any other pollutant which may cause Pass Through or Interference.

3.4.2.2. Pollutants which create a fire or explosion hazard in the POTW, including, but not limited to, waste streams with a closed cup flashpoint of less than sixty (60) degrees Centigrade (140 degrees Fahrenheit) using the test methods specified in 40 CFR § 261.21;

3.4.2.3. Pollutants which will cause corrosive structural damage to the POTW, but in no case discharges with a pH of lower than 5.0 s.u., unless the treatment facilities are specifically designed to accommodate such discharges;

3.4.2.4. Solid or viscous pollutants in amounts which will cause obstruction to the flow in the POTW, or other interference with the operation of the POTW;

3.4.2.5. Any pollutant, including oxygen demanding pollutants (e.g., BOD), released in a discharge at a flow rate and/or pollutant concentration which will cause Interference with any treatment process at the POTW;

3.4.2.6. Heat in amounts which will inhibit biological activity in the POTW resulting in Interference, but in no case heat in such quantities that the temperature at the POTW treatment plant exceeds forty (40) degrees Centigrade (104 degrees Fahrenheit) unless the Approval Authority, upon request of the POTW, approves alternate temperature limits;

3.4.2.7. Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause Interference or Pass Through;

3.4.2.8. Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity that may cause acute worker health and safety problems;

3.4.2.9. Any trucked or hauled pollutants, except at discharge points designated by the POTW; and,

3.4.2.10. Any specific pollutant which exceeds a local limitation established by the Permittee in accordance with the requirements of 40 CFR §§ 403.5(c) and (d).

3.4.3. For the POTWs covered by this Permit, the EPA presently is the Approval Authority for the Pretreatment Program and the mailing address for all reporting and notifications to the Approval Authority shall be: U.S. EPA – Region 8, NPDES Enforcement Unit (8ENF-W-NP), 1595 Wynkoop Street, Denver, CO 80202-1129.

3.4.4. In addition to the general limitations expressed above, more specific Pretreatment Standards have been and will be promulgated for specific industrial categories under Section 307 of the Act (40 CFR Part 405 et. seq.).

3.4.5. The Permittee must notify the Approval Authority of any new introductions by new or existing industrial users or any substantial change in pollutants from any industrial user within sixty (60) days following the introduction or change. Such notice must identify:

3.4.5.1. Any new introduction of pollutants into the POTW from an industrial user which would be subject to §§ 301, 306, or 307 of the Act if it were directly discharging those pollutants; or,

3.4.5.2. Any substantial change in the volume or character of pollutants being introduced into the POTW by any industrial user.

3.4.5.3. For the purposes of this section, adequate notice shall include information on:

3.4.5.3.1. The identity of the industrial user;

3.4.5.3.2. The nature and concentration of pollutants in the discharge and the average and maximum flow of the discharge to be introduced into the POTW; and,

3.4.5.3.3. Any anticipated impact of the change on the quantity or quality of effluent to be discharged from or biosolids or sludge produced at such POTW.

3.4.5.4. For the purposes of this section, an industrial user shall include:

3.4.5.4.1. Any discharger subject to Categorical Pretreatment Standards under § 307 of the Act and 40 CFR Chapter I and Subchapter N;

3.4.5.4.2. Any discharger which has a process wastewater flow of 25,000 gallons or more per day;

3.4.5.4.3. Any discharger contributing five percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant;

3.4.5.4.4. Any discharger who is designated by the Approval Authority as having a reasonable potential for adversely affecting the POTW's operation or for violating any Pretreatment Standard or requirements.

3.4.6. At such time as a specific Pretreatment Standard or requirement becomes applicable to an industrial user of the Permittee, the Approval Authority may, as appropriate:

3.4.6.1. Amend the Permittee's NPDES discharge Permit to specify the additional pollutant(s) and corresponding effluent limitation(s) consistent with the applicable national Pretreatment Standards;

3.4.6.2. Require the Permittee to specify, by ordinance, order, or other enforceable means, the type of pollutant(s) and the maximum amount which may be discharged to the Permittee's POTW for treatment. Such requirement shall be imposed in a manner consistent with the program development requirements of the General Pretreatment Regulations at 40 CFR Part 403; and/or,

3.4.6.3. Require the Permittee to monitor its discharge for any pollutant which may likely be discharged from the Permittee's POTW, should the industrial user fail to properly pretreat its waste.

3.4.7. The Approval Authority retains, at all times, the right to take legal action against any source of nondomestic discharge, whether directly or indirectly controlled by the Permittee, for violations of a permit, order or similar enforceable mechanism issued by the Permittee, violations of any Pretreatment Standard or requirement, or for failure to discharge at an acceptable level under national standards issued by the EPA under 40 CFR, Chapter I, Subchapter N. In those cases, where a NPDES permit violation has occurred because of the failure of the Permittee to properly develop and enforce Pretreatment Standards and requirements as necessary to protect the POTW, the Approval Authority shall hold the Permittee and/or industrial user responsible and may take legal action against the Permittee as well as the industrial user(s) contributing to the Permit violation.

4. GENERAL REQUIREMENTS

4.1. Planned Changes: In addition to the requirements outlined at 5.12.1, the Permittee shall give the Director notice, at least 30 days prior to implementation, when there are any planned substantial changes to the existing sewage sludge facilities, the manner of its operation, or to current sewage sludge management practices of storage and disposal.

4.2. Signatory Requirements: All applications, reports or information submitted to the Director shall be signed and certified.

4.2.1. All permit applications shall be signed by either a principal executive officer or ranking elected official.

4.2.2. All reports required by the Permit and other information requested by the Director shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

4.2.2.1. The authorization is made in writing by a person described above and submitted to the Director; and,

4.2.2.2. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)

4.2.3. Changes to authorization: If an authorization under Part 4.2.2 is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Part 4.2.2 must be submitted to the Director prior to or together with any reports, information, or applications to be signed by an authorized representative.

4.2.4. Certification: Any person signing a document under this section shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

4.3. Penalties for Falsification of Reports: The Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this Permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both.

4.4. Availability of Reports: Except for data determined to be confidential under 40 CFR Part 2, Subpart B, all reports prepared in accordance with the terms of this Permit shall be available for public inspection at the offices of the Director. As required by the Act, permit applications, permits and effluent data shall not be considered confidential.

4.5. Oil and Hazardous Substance Liability: Nothing in this Permit shall be construed to preclude the institution of any legal action or relieve the Permittee from any responsibilities, liabilities, or penalties to which the Permittee is or may be subject under section 311 of the Act.

4.6. Property Rights: The issuance of this Permit does not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of federal, state, tribal or local laws or regulations.

4.7. Severability: The provisions of this Permit are severable, and if any provision of this Permit, or the application of any provision of this Permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this Permit, shall not be affected thereby.

4.8. Transfers: This Permit may be automatically transferred to a new permittee if:

4.8.1. The current Permittee notifies the Director at least 30 days in advance of the proposed transfer date;

4.8.2. The notice includes a written agreement between the existing and new Permittees containing a specific date for transfer of Permit responsibility, coverage, and liability between them; and,

4.8.3. The Director does not notify the existing Permittee and the proposed new Permittee of his or her intent to modify, or revoke and reissue the Permit. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in Part 4.8.2.

4.9. Permittees in Indian Country: The EPA is issuing this Permit pursuant to the Agency's authority to implement the Clean Water Act NPDES program in Indian Country, as defined at 18 U.S.C. § 1151.

4.10. Reopener Provision: This Permit may be reopened and modified (following proper administrative procedures) to include the appropriate effluent limitations (and compliance schedule, if necessary), or other appropriate requirements if one or more of the following events occurs:

4.10.1. Water Quality Standards: The water quality standards of the receiving water(s) to which the Permittee discharges are modified in such a manner as to require different effluent limits than contained in this Permit.

4.10.2. Wasteload Allocation: A wasteload allocation is developed and approved by the Tribe and/or the EPA for incorporation in this Permit.

4.10.3. Water Quality Management Plan: A revision to the current water quality management plan is approved and adopted which calls for different effluent limitations than contained in this Permit.

4.11. Toxicity Limitation-Reopener Provision: This Permit may be reopened and modified (following proper administrative procedures) to include whole effluent toxicity limitations if whole effluent toxicity is detected in the discharge.

5. ADDITIONAL STANDARD CONDITIONS

5.1. Duty to comply: The Permittee must comply with all conditions of this Permit. Any Permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for Permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

5.1.1. The Permittee shall comply with effluent standards or prohibitions established under § 307(a) of the Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the Permit has not yet been modified to incorporate the requirement.

5.1.2. The Clean Water Act provides that any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under section 402, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed $51,570 per day for each violation. The Clean Water Act provides that any person who negligently violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, or any requirement imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than 1 year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than 2 years, or both. Any person who knowingly violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than 3 years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both. Any person who knowingly violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.

5.1.3. Any person may be assessed an administrative penalty by the Administrator for violating section 301, 302, 306, 307, 308, 318 or 405 of this Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Administrative penalties for Class I violations are not to exceed $21,393 per violation, with the maximum amount of any Class I penalty assessed not to exceed $53,484. Penalties for Class II violations are not to exceed $21,393 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $267,415.

5.1.4. The Federal Civil Penalties Inflation Adjustment Act of 1990, as amended by the Debt Collection Improvement Act of 1996 and the Federal Civil Penalties Inflation Adjustment Act Improvement Act of 2015, requires the EPA to adjust the civil monetary penalties for inflation on a periodic basis. The EPA has adjusted its civil monetary penalties seven times since 1996, most recently on January 10, 2018 (83 Fed. Reg. 1190-1194). The penalties noted in Parts 5.1.2 and 5.1.3 are the civil and criminal penalties for violations of the Act (including permit conditions) as of January 15, 2018.

5.2. Duty to reapply: If the Permittee wishes to continue an activity regulated by this Permit after the expiration date of this Permit, the Permittee must apply for and obtain a new Permit.

5.3. Need to halt or reduce activity not a defense: It shall not be a defense for a Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Permit.

5.4. Duty to mitigate: The Permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this Permit which has a reasonable likelihood of adversely affecting human health or the environment.

5.5. Proper operation and maintenance: The Permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this Permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a Permittee only when the operation is necessary to achieve compliance with the conditions of the Permit.

5.6. Permit actions: This Permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Permittee for a Permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any Permit condition.

5.7. Property rights: This Permit does not convey any property rights of any sort, or any exclusive privilege.

5.8. Duty to provide information: The Permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Permit or to determine compliance with this Permit. The Permittee shall also furnish to the Director upon request, copies of records required to be kept by this Permit.

5.9. Inspection and entry: The Permittee shall allow the Director, or an authorized representative (including an authorized contractor acting as a representative of the Administrator), upon presentation of credentials and other documents as may be required by law, to:

5.9.1. Enter upon the Permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Permit;

5.9.2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Permit;

5.9.3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Permit; and,

5.9.4. Sample or monitor at reasonable times, for the purposes of assuring Permit compliance or as otherwise authorized by the Clean Water Act, any substances or parameters at any location.

5.10. Monitoring and records:

5.10.1. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

5.10.2. Except for records of monitoring information required by this Permit related to the Permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by 40 CFR Part 503), the Permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Permit, and records of all data used to complete the application for this Permit, for a period of at least three years from the date of the sample, measurement, report or application. This period may be extended by request of the Director at any time.

5.10.3. Records of monitoring information shall include:

5.10.3.1. The date, exact place, and time of sampling or measurements;

5.10.3.2. The individual(s) who performed the sampling or measurements;

5.10.3.3. The date(s) analyses were performed;

5.10.3.4. The individual(s) who performed the analyses;

5.10.3.5. The analytical techniques or methods used; and

5.10.3.6. The results of such analyses.

5.10.4. Monitoring must be conducted according to test procedures approved under 40 CFR Part 136 unless another method is required under 40 CFR Subchapters N or O.

5.10.5. The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this Permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both.

5.11. Signatory requirement:

5.11.1. All applications, reports, or information submitted to the Director shall be signed and certified. (See 40 CFR § 122.22)

5.11.2. The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this Permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

5.12. Reporting requirements:

5.12.1. Planned changes. The Permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the Permitted facility. Notice is required only when:

5.12.1.1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR § 122.29(b); or

5.12.1.2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the Permit, nor to notification requirements under 40 CFR § 122.42(a)(1).

5.12.1.3. The alteration or addition results in a significant change in the Permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of Permit conditions that are different from or absent in the existing Permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan;

5.12.2. Anticipated noncompliance. The Permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with Permit requirements.

5.12.3. Transfers. This Permit is not transferable to any person except after notice to the Director. The Director may require modification or revocation and reissuance of the Permit to change the name of the Permittee and incorporate such other requirements as may be necessary under the Clean Water Act. (See 40 CFR § 122.61; in some cases, modification or revocation and reissuance is mandatory.)

5.12.4. Monitoring reports. Monitoring results shall be reported at the intervals specified elsewhere in this Permit.

5.12.4.1 Monitoring results must be reported on a Discharge Monitoring Report (DMR) or forms provided or specified by the Director for reporting results of monitoring of sludge use or disposal practices. As of December 21, 2016 all reports and forms submitted in compliance with this section must be submitted electronically by the Permittee to the Director or initial recipient, as defined in 40 CFR § 127.2(b), in compliance with this section and 40 CFR Part 3 (including, in all cases, Subpart D to Part 3), 40 CFR § 122.22, and 40 CFR Part 127. Part 127 is not intended to undo existing requirements for electronic reporting. Prior to this date, and independent of Part 127, permittees may be required to report electronically if specified by a particular permit.

5.12.4.2. If the Permittee monitors any pollutant more frequently than required by the Permit using test procedures approved under 40 CFR Part 136, or another method required for an industry-specific waste stream under 40 CFR Subchapters N or O, the results of such monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Director.

5.12.4.3. Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Director in the Permit.

5.12.5. Compliance schedules. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this Permit shall be submitted no later than 14 days following each schedule date.

5.12.6. Twenty-four hour reporting.

5.12.6.1. The Permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Permittee becomes aware of the circumstances. A report shall also be provided within 5 days of the time the Permittee becomes aware of the circumstances. The report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times), and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. For noncompliance events related to combined sewer overflows, sanitary sewer overflows, or bypass events, these reports must include the data described above (with the exception of time of discovery) as well as the type of event (combined sewer overflows, sanitary sewer overflows, or bypass events), type of sewer overflow structure (e.g., manhole, combine sewer overflow outfall), discharge volumes untreated by the treatment works treating domestic sewage, types of human health and environmental impacts of the sewer overflow event, and whether the noncompliance was related to wet weather. As of December 21, 2020 all reports related to combined sewer overflows, sanitary sewer overflows, or bypass events submitted in compliance with this section must be submitted electronically by the Permittee to the Director or initial recipient, as defined in 40 CFR § 127.2(b), in compliance with this section and 40 CFR Part 3 (including, in all cases, Subpart D to Part 3), 40 CFR § 122.22, and 40 CFR Part 127. Part 127 is not intended to undo existing requirements for electronic reporting. Prior to this date, and independent of Part 127, Permittees may be required to electronically submit reports related to combined sewer overflows, sanitary sewer overflows, or bypass events under this section by a particular permit. The Director may also require Permittees to electronically submit reports not related to combined sewer overflows, sanitary sewer overflows, or bypass events under this section.

5.12.6.2. The following shall be included as information which must be reported within 24 hours under this paragraph.

5.12.6.2.1. Any unanticipated bypass which exceeds any effluent limitation in the Permit. (See 40 CFR § 122.41(g).

5.12.6.2.2. Any upset which exceeds any effluent limitation in the Permit.

5.12.6.2.3. Violation of a maximum daily discharge limitation for any of the pollutants listed by the Director in the Permit to be reported within 24 hours. (See 40 CFR § 122.44(g))

5.12.6.3. The Director may waive the written report on a case-by-case basis for reports under paragraph 5.12.6.2 if the oral report has been received within 24 hours.

5.12.7. Other noncompliance. The Permittee shall report all instances of noncompliance not reported under paragraphs 5.12.4, .5, and .6, at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph 5.12.6. For noncompliance events related to combined sewer overflows, sanitary sewer overflows, or bypass events, these reports shall contain the information described in paragraph 5.12.6 and the applicable required data in

appendix A to 40 CFR Part 127. As of December 21, 2020, all reports related to combined sewer overflows, sanitary sewer overflows, or bypass events submitted in compliance with this section must be submitted electronically by the Permittee to the Director or initial recipient, as defined in 40 CFR § 127.2(b), in compliance with this section and 40 CFR Part 3 (including, in all cases, Subpart D to Part 3), 40 CFR § 122.22, and 40 CFR Part 127. Part 127 is not intended to undo existing requirements for electronic reporting. Prior to this date, and independent of Part 127, Permittees may be required to electronically submit reports related to combined sewer overflows, sanitary sewer overflows, or bypass events under this section by a particular permit. The Director may also require Permittees to electronically submit reports not related to combined sewer overflows, sanitary sewer overflows, or bypass events under this section.

5.12.8. Other information. Where the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Director, it shall promptly submit such facts or information.

5.12.9. Identification of the initial recipient for NPDES electronic reporting data. The owner, operator, or the duly authorized representative of an NPDES-regulated entity is required to electronically submit the required NPDES information (as specified in appendix A to 40 CFR Part 127) to the appropriate initial recipient, as determined by the EPA, and as defined in 40 CFR § 127.2(b). The EPA will identify and publish the list of initial recipients on its Web site and in the Federal Register, by state and by NPDES data group [see 40 CFR § 127.2(c)]. The EPA will update and maintain this listing.

5.13. <u>Bypass:</u>

5.13.1. Definitions.

5.13.1.1. Bypass means the intentional diversion of waste streams from any portion of a treatment facility.

5.13.1.2. Severe property damage means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

5.13.2. Bypass not exceeding limitations. The Permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs 5.13.3 and 5.13.4.

5.13.3. Notice

5.13.3.1. Anticipated bypass. If the Permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of the bypass. As of December 21, 2020 all notices submitted in compliance with this section must be submitted electronically by the Permittee to the Director or initial recipient, as defined in 40 CFR § 127.2(b), in compliance with this section and 40 CFR Part 3 (including, in all cases, Subpart D to Part 3), 40 CFR § 122.22, and 40 CFR Part 127. Part 127 is not intended to undo existing requirements for electronic reporting. Prior to this date, and independent of Part 127, Permittees may be required to report electronically if specified by a particular permit.

5.13.3.2. Unanticipated bypass. The Permittee shall submit notice of an unanticipated bypass as required in paragraph 5.12.6 (Twenty-four hour reporting). As of December 21, 2020 all notices submitted in compliance with this section must be submitted electronically by the Permittee to the Director or initial recipient, as defined in 40 CFR § 127.2(b), in compliance with this section and 40 CFR Part 3 (including, in all cases, Subpart D to Part 3), 40 CFR § 122.22, and 40 CFR Part 127. Part 127 is not intended to undo existing requirements for electronic reporting. Prior to this date, and independent of Part 127, Permittees may be required to report electronically if specified by a particular permit.

5.13.4. Prohibition of bypass.

5.13.4.1. Bypass is prohibited, and the Director may take enforcement action against a Permittee for bypass, unless:

5.13.4.1.1. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

5.13.4.1.2. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

5.13.4.1.3. The Permittee submitted notices as required under paragraph 5.13.3.

5.13.4.2. The Director may approve an anticipated bypass, after considering its adverse effects, if the Director determines that it will meet the three conditions listed above in paragraph 5.13.4.1.

5.14. <u>Upset:</u>

5.14.1. Definition. Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

5.14.2. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph 5.14.3 are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

5.14.3. Conditions necessary for a demonstration of upset. A Permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

5.14.3.1. An upset occurred and that the Permittee can identify the cause(s) of the upset;

5.14.3.2. The permitted facility was at the time being properly operated; and

5.14.3.3. The Permittee submitted notice of the upset as required in paragraph 5.12.6.2.2 (Twenty-four hour reporting).

5.14.3.4. The Permittee complied with any remedial measures required under paragraph 5.4.

5.14.4. Burden of proof. In any enforcement proceeding the Permittee seeking to establish the occurrence of an upset has the burden of proof.

Appendix J

Permit No.: MT0030759

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 WYNKOOP STREET
DENVER, COLORADO 80202-1129

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Clean Water Act, as amended, (33 U.S.C. §1251 et seq; "the Act"),

the City of Hardin, Montana

is authorized to discharge from its wastewater treatment plant located in the N1/2 of Section 24, Township 1S, Range 33E, latitude 45° 44' 5" N and longitude 107° 34' 49" W, Big Horn County,

to the Bighorn River,

in accordance with discharge point(s), effluent limitations, monitoring requirements and other conditions set forth herein. Authorization for discharge is limited to those outfalls specifically listed in the permit.

This permit shall become effective October 1, 2011

This permit and the authorization to discharge shall expire at midnight, September 30, 2011.

Signed this 28th day of September 2011

Authorized Permitting Official

for Stephen S. Tuber, Assistant Regional Administrator
Offices of Partnerships and Regulatory Assistance

MUN-MECH (Rev.02/06)

TABLE OF CONTENTS

1. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS
   1.1. Definitions
   1.2. Description of Discharge Point(s)
   1.3. Specific Limitations and Self-Monitoring Requirements
      1.3.1. Effluent Limitations
      1.3.2. Self-Monitoring Requirements

2. MONITORING, RECORDING AND REPORTING REQUIREMENTS
   2.1. Representative Sampling
   2.2. Monitoring Procedures
   2.3. Penalties for Tampering
   2.4. Reporting of Monitoring Results
   2.5. Additional Monitoring by the Permittee
   2.6. Records Contents
   2.7. Retention of Records
   2.8. Twenty-four Hour Notice of Noncompliance Reporting
   2.9. Other Noncompliance Reporting
   2.10. Inspection and Entry

3. COMPLIANCE RESPONSIBILITIES
   3.1. Duty to Comply
   3.2. Penalties for Violations of Permit Conditions
   3.3. Need to Halt or Reduce Activity not a Defense
   3.4. Duty to Mitigate
   3.5. Proper Operation and Maintenance
   3.6. Removed Substances
   3.7. Bypass of Treatment Facilities
   3.8. Upset Conditions
   3.9. Industrial Waste Management (Minor POTWS in Indian country)

4. GENERAL REQUIREMENTS
   4.1. Planned Changes
   4.2. Anticipated Noncompliance
   4.3. Permit Actions
   4.4. Duty to Reapply
   4.5. Duty to Provide Information
   4.6. Other Information
   4.7. Signatory Requirements
   4.8. Penalties for Falsification of Reports
   4.9. Availability of Reports
   4.10. Oil and Hazardous Substance Liability
   4.11. Property Rights
   4.12. Severability
   4.13. Transfers
   4.14. Permittees in Indian Country
   4.15. Reopener Provision
   4.16. Toxicity Limitation-Reopener Provision

1. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1.1. Definitions.

The *30-day (and monthly) average*, other than for microbiological organisms (e.g., bacteria, viruses, etc.), is the arithmetic average of all samples collected during a consecutive 30-day period or calendar month, whichever is applicable. Geometric means shall be calculated for microbiological organisms unless specified otherwise in the permit. The calendar month shall be used for purposes of reporting self-monitoring data on discharge monitoring report forms.

The *7-day (and weekly) average*, other than for microbiological organisms (e.g., bacteria, viruses, etc.), is the arithmetic mean of all samples collected during a consecutive 7-day period or calendar week, whichever is applicable. Geometric means shall be calculated for microbiological organisms unless specified otherwise in the permit. The 7-day and weekly averages are applicable only to those effluent characteristics for which there are 7-day average effluent limitations. The calendar week, which begins on Sunday and ends on Saturday, shall be used for purposes of reporting self-monitoring data on discharge monitoring report forms. Weekly averages shall be calculated for all calendar weeks with Saturdays in the month. If a calendar week overlaps two months (i.e., the Sunday is in one month and the Saturday in the following month), the weekly average calculated for that calendar week shall be included in the data for the month that contains the Saturday.

Daily Maximum (*Daily Max.*) is the maximum measured value for a pollutant discharged during a calendar day or any 24-hour period that reasonably represents a calendar day for purposes of sampling. For pollutants with daily maximum limitations expressed in units of mass (e.g., kilograms, pounds), the daily maximum is calculated as the total mass of pollutant discharged over the calendar day or representative 24-hour period. For pollutants with limitations expressed in other units of measurement (e.g., milligrams/liter, parts per billion), the daily maximum is calculated as the average of all measurements of the pollutant over the calendar day or representative 24-hour period. If only one measurement or sample is taken during a calendar day or representative 24-hour period, the single measured value for a pollutant will be considered the daily maximum measurement for that calendar day or representative 24-hour period.

Daily Minimum (*Daily Min.*) is the minimum value allowable in any single sample or instantaneous measurement collected during the course of a day.

Grab sample, for monitoring requirements, is defined as a single "dip and take" sample collected at a representative point in the discharge stream.

Instantaneous measurement, for monitoring requirements, is defined as a single reading, observation, or measurement.

Composite samples shall be flow proportioned. The composite sample shall, at a minimum, contain at least four (4) samples collected over the compositing period. Unless otherwise specified, the time between the collection of the first sample and the last sample shall not be less than six (6) hours, nor more than twenty-four (24) hours. Acceptable methods for the preparation of composite samples are as follows:

a. Constant time interval between samples, sample volume proportional to flow rate at the time of sampling;

b. Constant time interval between samples, sample volume proportional to total flow (volume) since last sample. For the first sample, the flow rate at the time of the first sample was collected may be used;

c. Constant sample volume, time interval between samples proportional to flow (i.e., sample taken every "X" gallons of flow); and,

d. Continuous collection of sample with sample collection rate proportional to flow rate.

Bypass means the intentional diversion of waste streams from any portion of a treatment facility.

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

Severe property damage means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

Director means the Regional Administrator of the EPA Region 8 or an authorized representative.

The EPA means the United States Environmental Protection Agency.

Storm Water means storm water runoff, snow melt runoff, and surface runoff and drainage.

CWA means the Clean Water Act (formerly referred to as either the Federal Water Pollution Act or the Federal Water Pollution Control Act Amendments of 1972), Pub. L. 92-500, as amended by Pub. L. 95-217, Pub. L. 95-576, Pub. L. 96-483, Pub. L. 97-117, and Pub. L. 100-4. In this permit the CWA may be referred to as "the Act".

Sewage Sludge is any solid, semi-solid or liquid residue generated during the treatment of domestic sewage in a treatment works. Sewage sludge includes, but is not limited to, domestic septage; scum or solids removed in primary, secondary or advanced wastewater treatment processes; and a material derived from sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screenings generated during preliminary treatment of domestic sewage in a treatment works.

Whole Effluent Toxicity, Acute occurs when 50 percent or more mortality is observed for either species (see Part 1.3) at any effluent concentration. Mortality in the control must simultaneously be 10 percent or less for the effluent results to be considered valid.

1.2. Description of Discharge Point(s). The authorization to discharge provided under this permit is limited to those outfalls specifically designated below as discharge locations. Discharges at any location not authorized under an NPDES permit is a violation of the Clean Water Act and could subject the person(s) responsible for such discharge to penalties under Section 309 of the Act.

Outfall Serial Number(s)	Description of Discharge Point(s)
001	Any discharge from the City of Hardin's wastewater treatment plant to the Bighorn River.

1.3. Specific Limitations and Self-Monitoring Requirements

1.3.1. Effluent Limitations - Outfall 001. Effective immediately and lasting through the life of this permit, the quality of effluent discharged by the facility shall, at a minimum, meet the limitations as set forth below:

Effluent Characteristic		Effluent Limitation		
		30-Day Average a/	7-Day Average a/	Daily Maximum a/
BOD_5, mg/L		30	45	N/A
BOD_5, lbs/day		250	375	N/A
Total Suspended Solids, mg/L		30	45	N/A
Total Suspended Solids, lbs/day		250	375	N/A
E. coli, # org/100 ml	April 1 – Oct. 31	126	252	N/A
	Nov. 1 – March 31	630	1,260	N/A
Total Residual Chlorine, mg/L b/		N/A	N/A	0.5
The pH of the discharge shall not be less than 6.0 or greater than 9.0 at any time.				
There shall be no acute toxicity in the discharge.				

a/ See Definitions, Part 1.1, for definition of terms.

b/ Limits for Total Residual Chlorine apply only when chlorine is being used for disinfection.

Percentage Removal Requirements (TSS and BOD_5 Limitation): In addition to the concentration limits for total suspended solids and BOD_5 indicated above, the arithmetic mean of the concentration for effluent samples collected in a 30-day consecutive period shall not exceed 15 percent of the arithmetic mean of the concentration for influent samples collected at approximately the same times during the same period (85 percent removal).

1.3.2. Self-Monitoring Requirements - Outfall 001. At a minimum, upon the effective date of this permit, the following constituents shall be monitored at the frequency and with the type of measurement indicated; samples or measurements shall be representative of the volume and nature of the monitored discharge. If no discharge occurs during the entire monitoring period, it shall be stated on the Discharge Monitoring Report Form (EPA No. 3320-1) that no discharge or overflow occurred. Samples will be taken at the weir just after the discharge from the chlorine contact chamber.

Effluent Characteristic	**Frequency**	**Sample Type a/**
Total Flow b/	Continuous	Recorder
Effluent BOD_5	Weekly	Composite
Effluent TSS	Weekly	Composite
Influent BOD_5	Weekly	Composite
Influent TSS	Weekly	Composite
E. coli	Weekly	Grab
pH, standard units	Weekly	Instantaneous
Oil and Grease, Visual	Daily	Observation
Oil and Grease	c/	Grab
Total Residual Chlorine	Daily d/	Instanteous
Total Arsenic	Annually	Composite
Total Cadmium	Annually	Composite
Total Chromium	Annually	Composite
Total Cooper	Annually	Composite
Total Lead	Annually	Composite
Total Molybdenum	Annually	Composite
Total Nickel	Annually	Composite
Total Selenium	Annually	Composite
Total Silver	Annually	Composite
Total Zinc	Annually	Composite
Total Cyanide	Annually	Composite
Total Phenols	Annually	Composite
Volatile Organic Pollutants	Annually	Composite
Semi-Volatile, Acid	Annually	Composite
Semi-Volatile, Base neutral	Annually	Composite
Ammonia nitrogen, mg/L	Annually	Composite
Nitrate-Nitrogen, mg/L	Annually	Composite
Nitrite-Nitrogen, mg/L	Annually	Composite
Total K Nitrogen, mg/L	Annually	Composite
Total Nitrogen, mg/L	Annually	Calculated
Total phosphorus, mg/L	Annually	Composite

a/ See Definitions, Part 1.1., for definition of terms.

b/ Flow measurements of effluent volume shall be made in such a manner that the permittee can affirmatively demonstrate that representative values are being obtained. The average flow rate (in million gallons per day) during the reporting period and the maximum flow rate observed (in MGD) shall be reported.

c/ A daily visual observation is required. If a visible sheen is detected, a grab sample shall be taken and analyzed immediately. The concentration of oil and grease shall not exceed 10 mg/L in any sample.

d/ Monitoring for total residual chlorine applies only when chlorine is being used for disinfection.

2. MONITORING, RECORDING AND REPORTING REQUIREMENTS

2.1. Representative Sampling. Samples taken in compliance with the monitoring requirements established under Part 1 shall be collected from the effluent stream prior to discharge into the receiving waters. Samples and measurements shall be representative of the volume and nature of the monitored discharge. Sludge samples shall be collected at a location representative of the quality of sludge immediately prior to use-disposal practice.

2.2. Monitoring Procedures. Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit. Sludge monitoring procedures shall be those specified in 40 CFR 503, or as specified in the permit.

2.3. Penalties for Tampering. The Act provides that any person who knowingly falsifies, tampers with, or renders inaccurate, any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than two years, or by both. Second conviction is punishable by a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four years, or both.

2.4. Reporting of Monitoring Results. Effluent monitoring results obtained during the previous month shall be summarized and reported on **one** Discharge Monitoring Report Form (EPA No. 3320-1), postmarked no later than the 28th day of the month following the completed reporting period. If no discharge occurs during the reporting period, "no discharge" shall be reported. Until further notice, sludge monitoring results may be reported in the testing laboratory's normal format (there is no EPA standard form at this time), but should be on letter size pages. Whole effluent toxicity (biomonitoring) results must be reported on the most recent version of the EPA Region 8's Guidance For Whole Effluent Reporting. Legible copies of these, and all other reports required herein, shall be signed and certified in accordance with the Signatory Requirements (see Part 4), and submitted to the EPA Region 8 Montana Office and the Crow Tribe at the addresses given below:

original to: U.S. EPA, Region 8
NPDES Program
10 West 15th Street, Suite 3200
Helena, MT 596626

copy to: Crow Tribe
Natural Resources and Public Safety Department
P.O. Box 159
Crow Agency, MT 59022

2.5. Additional Monitoring by the Permittee. If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR 136, 40 CFR 503, or as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR. Such increased frequency shall also be indicated.

2.6. Records Contents. Records of monitoring information shall include:

2.6.1. The date, exact place, and time of sampling or measurements;

2.6.2. The initials or name(s) of the individual(s) who performed the sampling or measurements;

2.6.3. The date(s) analyses were performed;

2.6.4. The time(s) analyses were initiated;

2.6.5. The initials or name(s) of individual(s) who performed the analyses;

2.6.6. References and written procedures, when available, for the analytical techniques or methods used; and,

2.6.7. The results of such analyses, including the bench sheets, instrument readouts, computer disks or tapes, etc., used to determine these results.

2.7. Retention of Records. The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three years from the date of the sample, measurement, report or application. Records of monitoring required by this permit related to sludge use and disposal activities must be kept at least five years (or longer as required by 40 CFR 503). This period may be extended by request of the Director at any time. Data collected on site, data used to prepare the DMR, copies of Discharge Monitoring Reports, and a copy of this NPDES permit must be maintained on site.

2.8. Twenty-four Hour Notice of Noncompliance Reporting.

2.8.1. The permittee shall report any noncompliance which may endanger health or the environment as soon as possible, but no later than twenty-four (24) hours from the time the permittee first became aware of the circumstances. The report shall be made to the EPA, Region 8, Site Assessment/Emergency Response Program at (303) 293-1788, the Tribe at (406) 638-3912.

2.8.2. The following occurrences of noncompliance shall be reported by telephone to the EPA, Region 8, NPDES Enforcement Unit at (800) 227-8917 (8:00 a.m. - 4:30 p.m. Mountain Time) NPDES Program, EPA Region 8 Montana Operations Office, at (406) 457-5000 (toll-free 866-457-2690) (8:00 a.m. - 4:30 p.m. Mountain Time) and the Tribe at (406)638-3912 (8:00 a.m. - 4:30 p.m. Mountain Time) by the first workday following the day the permittee became aware of the circumstances:

2.8.2.1. Any unanticipated bypass which exceeds any effluent limitation in the permit (See Part 3.7, Bypass of Treatment Facilities.);

2.8.2.2. Any upset which exceeds any effluent limitation in the permit (See Part 3.8, Upset Conditions.); or,

2.8.2.3. Violation of a maximum daily discharge limitation for any of the pollutants listed in the permit to be reported within 24 hours.

2.8.3. A written submission shall also be provided to the USEPA, Montana Office, and to the Tribe within five days of the time that the permittee becomes aware of the circumstances. The written submission shall contain:

2.8.3.1. A description of the noncompliance and its cause;

2.8.3.2. The period of noncompliance, including exact dates and times;

2.8.3.3. The estimated time noncompliance is expected to continue if it has not been corrected; and,

2.8.3.4. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

2.8.4. The Director may waive the written report on a case-by-case basis for an occurrence of noncompliance listed under Part 2.8.2 above, if the incident has been orally reported in accordance with the requirements of Part 2.8.2.

2.8.5. Reports shall be submitted to the addresses in Part 2.4, Reporting of Monitoring Results.

2.9. Other Noncompliance Reporting. Instances of noncompliance not required to be reported within 24 hours shall be reported at the time that monitoring reports for Part 2.4 are submitted. The reports shall contain the information listed in Part 2.8.3.

2.10. Inspection and Entry. The permittee shall allow the Tribe or the Regional Administrator, or authorized representative (including an authorized contractor acting as a representative of the Administrator) upon presentation of credentials and other documents as may be required by law, to:

2.10.1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

2.10.2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

2.10.3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and,

2.10.4. Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by the Act, any substances or parameters at any location.

3. COMPLIANCE RESPONSIBILITIES

3.1. Duty to Comply. The permittee must comply with all conditions of this permit. Any failure to comply with the permit may constitute a violation of the Clean Water Act and may be grounds for enforcement action, including, but not limited to permit termination, revocation and reissuance, modification, or denial of a permit renewal application. The permittee shall give the director advance notice of any planned changes at the permitted facility that will change any discharge from the facility, or of any activity that may result in failure to comply with permit conditions.

3.2. Penalties for Violations of Permit Conditions. The Clean Water Act provides for specified civil and criminal monetary penalties for violations of its provisions. However, the Federal Civil Penalties Inflation Adjustment Act of 1990, as amended by the Debt Collection Improvement Act of 1996, requires the EPA to adjust the civil monetary penalties for inflation on a periodic basis. The EPA previously adjusted its civil monetary penalties on December 31, 1996 (61 Fed. Reg. 69359-69365), with technical corrections and additions published on March 20, 1997 (62 Fed. Reg. 13514-13517), June 27, 1997 (62 Fed. Reg. 35037-35041) and February 13, 2004 (69 Fed. Reg. 7121-7127). On December 11, 2008 (73 Fed. Reg. 75340-75346) the EPA once again adjusted its civil monetary penalties. The civil and criminal penalties, as of January 12, 2009, for violations of the Act (including permit conditions) are given below:

3.2.1. Any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under section 402, or any requirement imposed in a pretreatment program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed $37,500 per day for each violation.

3.2.2. Any person who *negligently* violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, or any requirement imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment for not more than 1 year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment for not more than 2 years, or both.

3.2.3. Any person who *knowingly* violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, or any requirement imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than 3 years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment for not more than 6 years, or both.

3.2.4. Any person who *knowingly* violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment for not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment for not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the CWA, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.

3.2.5. Any person may be assessed an administrative penalty by the Administrator for violating section 301, 302, 306, 307, 308, 318 or 405 of this Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Where an administrative enforcement action is brought for a Class I civil penalty, the assessed penalty may not exceed $16,000 per violation, with a maximum amount not to exceed $37,500. Where an administrative enforcement action is brought for a Class II civil penalty, the assessed penalty may not exceed $16,000 per day for each day during which the violation continues, with the maximum amount not to exceed $177,500.

3.3. Need to Halt or Reduce Activity not a Defense. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

3.4. Duty to Mitigate. The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

3.5. Proper Operation and Maintenance. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit. However, the permittee shall operate, at a minimum, one complete set of each main line unit treatment process whether or not this process is needed to achieve permit effluent compliance.

3.5.1 The permittee shall, as soon as reasonable and practicable, but no later than six (6) months after the effective date of this permit, do the following as part of the operation and maintenance program for the wastewater treatment facility:

3.5.1.1. Have a current O & M Manual(s) that describes the proper operational procedures and maintenance requirements of the wastewater treatment facility;

3.5.1.2. Have the O & M Manual(s) readily available to the operator of the wastewater treatment facility and require that the operator become familiar with the manual(s) and any updates;

3.5.1.3. Have a schedule(s) for routine operation and maintenance activities at the wastewater treatment facility; and,

3.5.1.4. Require the operator to perform the routine operation and maintenance requirements in accordance with the schedule(s).

3.5.2. The permittee shall maintain a daily log in a **bound notebook(s)** containing a summary record of all operation and maintenance activities at the wastewater treatment facility. At a minimum, the notebook shall include the following information:

3.5.2.1. Date and time;

3.5.2.2 Name and title of person(s) making the log entry;

3.5.2.3. Name of the persons(s) performing the activity;

3.5.2.4. A brief description of the activity; and,

3.5.2.5. Other information, as appropriate.

The permittee shall maintain the notebook in accordance with proper record-keeping procedures and shall make the log available for inspection, upon request, by authorized representatives of the U.S. Environmental Protection Agency or the Crow Tribe.

3.6. Removed Substances. Collected screenings, grit, solids, sludge, or other pollutants removed in the course of treatment shall be buried or disposed in a manner consistent with all applicable federal and tribal regulations (i.e., 40 CFR 257, 40 CFR 258, 40 CFR 503) and in a manner so as to prevent any pollutant from entering any waters of the United States or creating a health hazard. **In addition, the use and/or disposal of sewage sludge shall be done under the authorization of an NPDES permit issued for the use and/or disposal of sewage sludge by the appropriate NPDES permitting authority for sewage sludge.** Sludge/digester supernatant and filter backwash shall not be directly blended with or enter either the final plant discharge and/or waters of the United States.

3.7. Bypass of Treatment Facilities.

3.7.1. Bypass not exceeding limitations. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Parts 3.7.2 and 3.7.3.

3.7.2. Notice:

3.7.2.1. Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least 10 days before the date of the bypass to the USEPA, Montana Office, and the Crow Tribe.

3.7.2.2. Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required under Part 2.8, Twenty-four Hour Noncompliance Reporting, to the USEPA, Montana Office, and the Crow Tribe.

3.7.3. Prohibition of bypass.

3.7.3.1. Bypass is prohibited and the Director may take enforcement action against a permittee for a bypass, unless:

3.7.3.1.1. The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

3.7.3.1.2. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgement to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and,

3.7.3.1.3. The permittee submitted notices as required under Part 3.7.2.

3.7.3.2. The Director may approve an anticipated bypass, after considering its adverse effects, if the Director determines that it will meet the three conditions listed above in Part 3.7.3.1.

3.8. <u>Upset Conditions</u>

3.8.1. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with technology based permit effluent limitations if the requirements of Part 3.8.2 are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review (i.e., Permittees will have the opportunity for a judicial determination on any claim of upset only in an enforcement action brought for noncompliance with technology-based permit effluent limitations).

3.8.2. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

3.8.2.1. An upset occurred and that the permittee can identify the cause(s) of the upset;

3.8.2.2. The permitted facility was at the time being properly operated;

3.8.2.3. The permittee submitted notice of the upset as required under Part 2.8, Twenty-four Hour Notice of Noncompliance Reporting; and,

3.8.2.4. The permittee complied with any remedial measures required under Part 3.4, Duty to Mitigate.

3.8.3. Burden of proof. In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

3.9. Industrial Waste Management (Minor POTWs in Indian country)

3.9.1. The Permittee has the responsibility to protect the Publicly-Owned Treatment Works (POTW) from pollutants which would inhibit, interfere, or otherwise be incompatible with operation of the treatment works including interference with the use or disposal of municipal sludge.

3.9.2. Pretreatment Standards (40 CFR Section 403.5) developed pursuant to Section 307 of the Federal Clean Water Act (the Act) require that the Permittee shall not allow, under any circumstances, the introduction of the following pollutants to the POTW from any source of nondomestic discharge:

3.9.2.1. Any other pollutant which may cause Pass Through or Interference.

3.9.2.2. Pollutants which create a fire or explosion hazard in the POTW, including, but not limited to, wastestreams with a closed cup flashpoint of less than sixty (60) degrees Centigrade (140 degrees Fahrenheit) using the test methods specified in 40 CFR Section 261.21;

3.9.2.3. Pollutants which will cause corrosive structural damage to the POTW, but in no case discharges with a pH of lower than 5.0 s.u., unless the treatment facilities are specifically designed to accommodate such discharges;

3.9.2.4. Solid or viscous pollutants in amounts which will cause obstruction to the flow in the POTW, or other interference with the operation of the POTW;

3.9.2.5. Any pollutant, including oxygen demanding pollutants (e.g., BOD), released in a discharge at a flow rate and/or pollutant concentration which will cause Interference with any treatment process at the POTW;

3.9.2.6. Heat in amounts which will inhibit biological activity in the POTW resulting in Interference, but in no case heat in such quantities that the temperature at the POTW treatment plant exceeds forty (40) degrees Centigrade (104 degrees Fahrenheit) unless the Approval Authority, upon request of the POTW, approves alternate temperature limits;

3.9.2.7. Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause Interference or Pass Through;

3.9.2.8. Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity that may cause acute worker health and safety problems;

3.9.2.9. Any trucked or hauled pollutants, except at discharge points designated by the POTW; and

3.9.2.10. Any specific pollutant which exceeds a local limitation established by the Permittee in accordance with the requirements of 40 CFR Section 403.5(c) and (d).

3.9.3. For the POTWs covered by this permit, the EPA presently is the Approval Authority for the Pretreatment Program and the mailing address for all reporting and notifications to the Approval Authority shall be: USEPA - Region 8, NPDES Enforcement Unit (8ENF-W-NP), 1595 Wynkoop Street, Denver, CO 80202-1129.

3.9.4. In addition to the general limitations expressed above, more specific Pretreatment Standards have been and will be promulgated for specific industrial categories under Section 307 of the Act (40 CFR Part 405 et. seq.).

3.9.5. The Permittee must notify the Approval Authority of any new introductions by new or existing industrial users or any substantial change in pollutants from any industrial user within sixty (60) days following the introduction or change. Such notice must identify:

3.9.5.1. Any new introduction of pollutants into the POTW from an industrial user which would be subject to Sections 301, 306, or 307 of the Act if it were directly discharging those pollutants; or

3.9.5.2. Any substantial change in the volume or character of pollutants being introduced into the POTW by any industrial user;

3.9.5.3. For the purposes of this section, adequate notice shall include information on:

3.9.5.3.1. The identity of the industrial user;

3.9.5.3.2. The nature and concentration of pollutants in the discharge and the average and maximum flow of the discharge to be introduced into the POTW; and

3.9.5.3.3. Any anticipated impact of the change on the quantity or quality of effluent to be discharged from or biosolids or sludge produced at such POTW.

3.9.5.4. For the purposes of this section, an industrial user shall include:

3.9.5.4.1. Any discharger subject to Categorical Pretreatment Standards under Section 307 of the Act and 40 CFR chapter I and subchapter N;

3.9.5.4.2. Any discharger which has a process wastewater flow of 25,000 gallons or more per day;

3.9.5.4.3. Any discharger contributing five percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant;

3.9.5.4.4. Any discharger who is designated by the Approval Authority as having a reasonable potential for adversely affecting the POTW=s operation or for violating any Pretreatment Standard or requirements;

3.9.6. At such time as a specific Pretreatment Standard or requirement becomes applicable to an industrial user of the Permittee, the Approval Authority may, as appropriate:

3.9.6.1. Amend the Permittee's NPDES discharge permit to specify the additional pollutant(s) and corresponding effluent limitation(s) consistent with the applicable national Pretreatment Standards;

3.9.6.2. Require the Permittee to specify, by ordinance, order, or other enforceable means, the type of pollutant(s) and the maximum amount which may be discharged to the Permittee's POTW for treatment. Such requirement shall be imposed in a manner consistent with the program development requirements of the General Pretreatment Regulations at 40 CFR Part 403; and/or,

3.9.6.3. Require the Permittee to monitor its discharge for any pollutant which may likely be discharged from the Permittee's POTW, should the industrial user fail to properly pretreat its waste.

3.9.7. The Approval Authority retains, at all times, the right to take legal action against any source of nondomestic discharge, whether directly or indirectly controlled by the Permittee, for violations of a permit, order or similar enforceable mechanism issued by the Permittee, violations of any Pretreatment Standard or requirement, or for failure to discharge at an acceptable level under national standards

issued by the EPA under 40 CFR, chapter I, subchapter N. In those cases where a NPDES permit violation has occurred because of the failure of the Permittee to properly develop and enforce Pretreatment Standards and requirements as necessary to protect the POTW, the Approval Authority shall hold the Permittee and/or industrial user responsible and may take legal action against the Permittee as well as the Industrial user(s) contributing to the permit violation.

4. GENERAL REQUIREMENTS

4.1. Planned Changes. The permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

4.1.1. The alteration or addition could significantly change the nature or increase the quantity of pollutant discharged. This notification applies to pollutants which are not subject to effluent limitations in the permit; or,

4.1.2. There are any planned substantial changes to the existing sewage sludge facilities, the manner of its operation, or to current sewage sludge management practices of storage and disposal. The permittee shall give the Director notice of any planned changes at least 30 days prior to their implementation.

4.1.3. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source.

4.2. Anticipated Noncompliance. The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

4.3. Permit Actions. This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

4.4. Duty to Reapply. If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. The application should be submitted at least 180 days before the expiration date of this permit.

4.5. Duty to Provide Information. The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit.

4.6. Other Information. When the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or any report to the Director, it shall promptly submit such facts or information.

4.7. Signatory Requirements. All applications, reports or information submitted to the Director shall be signed and certified.

4.7.1. All permit applications shall be signed by either a principal executive officer or ranking elected official.

4.7.2. All reports required by the permit and other information requested by the Director shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

4.7.2.1. The authorization is made in writing by a person described above and submitted to the Director; and,

4.7.2.2. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)

4.7.3. Changes to authorization. If an authorization under Part 4.7.2 is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Part 4.7.2 must be submitted to the Director prior to or together with any reports, information, or applications to be signed by an authorized representative.

4.7.4. Certification. Any person signing a document under this section shall make the following certification:

> "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

4.8. Penalties for Falsification of Reports. The Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both.

4.9. Availability of Reports. Except for data determined to be confidential under 40 CFR Part 2, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Director. As required by the Act, permit applications, permits and effluent data shall not be considered confidential.

4.10. Oil and Hazardous Substance Liability. Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Act.

4.11. Property Rights. The issuance of this permit does not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of federal, state, tribal or local laws or regulations.

4.12. Severability. The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

4.13. Transfers. This permit may be automatically transferred to a new permittee if:

4.13.1. The current permittee notifies the Director at least 30 days in advance of the proposed transfer date;

4.13.2. The notice includes a written agreement between the existing and new permittees containing a specific date for transfer of permit responsibility, coverage, and liability between them; and,

4.13.3. The Director does not notify the existing permittee and the proposed new permittee of his or her intent to modify, or revoke and reissue the permit. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in Part 4.13.2.

4.14. Permittees in Indian Country. The EPA is issuing this permit pursuant to the Agency's authority to implement the Clean Water Act NPDES program in Indian country, as defined at 18 U.S.C. 1151.

4.15. Reopener Provision. This permit may be reopened and modified (following proper administrative procedures) to include the appropriate effluent limitations (and compliance schedule, if necessary), or other appropriate requirements if one or more of the following events occurs:

4.15.1. Water Quality Standards: The water quality standards of the receiving water(s) to which the permittee discharges are modified in such a manner as to require different effluent limits than contained in this permit.

4.15.2. Wasteload Allocation: A wasteload allocation is developed and approved by the Tribe and/or the EPA for incorporation in this permit.

4.15.3. Water Quality Management Plan: A revision to the current water quality management plan is approved and adopted which calls for different effluent limitations than contained in this permit.

4.16. Toxicity Limitation-Reopener Provision. This permit may be reopened and modified (following proper administrative procedures) to include a new compliance date, additional or modified numerical limitations, a new or different compliance schedule, a change in the whole effluent protocol, or any other conditions related to the control of toxicants if one or more of the following events occur:

4.16.1. Toxicity was detected late in the life of the permit near or past the deadline for compliance.

4.16.2. The TRE results indicate that compliance with the toxic limits will require an implementation schedule past the date for compliance and the permit issuing authority agrees with the conclusion.

4.16.3. The TRE results indicate that the toxicant(s) represent pollutant(s) that may be controlled with specific numerical limits, and the permit issuing authority agrees that numerical controls are the most appropriate course of action.

4.16.4. Following the implementation of numerical controls on toxicants, the permit issuing authority agrees that a modified whole effluent protocol is necessary to compensate for those toxicants that are controlled numerically.

4.16.5. The TRE reveals other unique conditions or characteristics which, in the opinion of the permit issuing authority, justify the incorporation of unanticipated special conditions in the permit.

Appendix K

WPCSRF PROJECT PRIORITY LIST SURVEY

Revision 3/23/11

Proposed stormwater, non-point-source or wastewater system improvement needs, excluding operation & maintenance, and growth development.

Name of Community or System: Hardin, MT Wastewater Treatment Plant

County or Counties: Big Horn

Population of Service Area: 3,829

Median Household Income of Service Area: $34,917

Current Average Monthly Residential Water Rate: $19.85

Current Average Monthly Residential Sewer Rate: $36.25

Name of Contact Person: Michelle Dyckman Date: 04/30/2018

Title of Contact Person: Finance Officer/City Clerk

Address: 406 N. Cheyenne
Hardin, MT 59034

Telephone: (406) 665-9292 Fax: (406) 665-2719 Email cityfinance@hardinmt.com

==========

Please provide the following information (*As a guideline, do not exceed approximately 200 words per question*):

1. **Provide a brief description of the proposed project. Include the reason(s) for the project.**

   The following are the descriptions of deficiencies in the existing wastewater treatment system:

   Grit and Grease Removal

   The wastewater treatment facility does not have adequate grit and grease removal in the existing headworks facility. Suspended solids, including grease balls, were observed throughout the treatment process during the recent EPA compliance inspection. According to the operators, the grease often causes excessive foaming due to filamentation in the oxidation ditch. This results in freezing issues during the winter months. There is currently no means to recycle wastewater that has not been adequately treated to the beginning of the process. Therefore, grit and grease contaminated effluent is intermittently discharged to the Bighorn River.

   Hydraulic Capacity and Surge Flow

   The wastewater treatment plant has issues with insufficient influent treatment capacity. The plant is immediately overwhelmed by surge flows exceeding 1.0 MGD which occur often during rain and snowmelt events. The oxidation ditch and secondary clarifiers run at maximum capacity during average flows of approximately 0.6 MGD. The influent to the treatment plant is often bypassed to an old lagoon basin (part of the previous treatment facility) during surge flow events. There is no way to reintroduce the bypassed effluent into the treatment process. Therefore, capacity upgrades will help to ensure that the discharge permit conditions are consistently met while ensuring public health and safety.

Secondary Clarification

The weir bar in Secondary Clarifier 1 is not level which is causing uneven flow over the weir. Solids, such as grease balls were observed exiting the secondary clarifiers. The mechanical equipment in both secondary clarifiers is aging and in need of replacement. The plant operators of the wastewater treatment facility have expressed that the influent flow channels of the secondary clarifiers often freeze during the winter months. Replacement of the secondary clarification equipment along with installation of insulated covers over the secondary clarifiers would improve treatment while reducing O&M costs associated with de-icing of the flow channels and weirs.

Backup Power

As stated in the EPA Compliance Evaluation Inspection Report, the wastewater treatment facility does not have backup power generation. Therefore, in the event of a power outage, all capability to treat wastewater is lost. Currently, the operator receives an alarm if power is lost. Wastewater is then manually diverted to an old lagoon cell until power is restored. There is currently no means of re-introducing the diverted wastewater into the treatment process. The diverted wastewater remains in the old lagoon cell until it disappears due to evaporation/seepage. Installation of a backup power generator would ensure that the wastewater treatment processes would continue to operate during power outages.

Process Controls, Flow Monitoring, and SCADA

Existing controls, flow monitoring, and SCADA for the wastewater treatment facility have been pieced-together over the course of the last 40 years. Many of the current control appurtenances remain from original plant construction. The plant operators have expressed frustration with the existing controls and monitoring equipment. The existing influent and effluent flow monitoring equipment is unreliable. There currently is no flow monitoring on the RAS and WAS systems. There is no adaptive dissolved oxygen (DO) monitoring and adjustment in the existing oxidation ditch. Given the age and rudimentary nature of the existing controls, flow monitoring, and SCADA, modernization is necessary for acceptable process control and data viewing/logging.

Facility Potable Water Supply

The current water supply well for the treatment facility is inadequate. The current well is only capable of intermittently supplying flows of one to two gpm.

Return Activated Sludge (RAS) Pumping

The existing RAS pumping system is unreliable and needs maintenance/repairs on a regular basis. This system consists of two screw pumps which were installed during original plant construction in 1978. According to the treatment plant operators, the augers have been repaired several times by the staff. This is a dangerous procedure that takes place in a confined space. Treatment is impaired during the maintenance and repair procedures due to the inability to return an adequate amount of sludge to the oxidation ditch.

Redundant Aerobic Digester Blower and Blower Building Expansion

The wastewater treatment facility currently has only one aeration blower for the aerobic sludge digester. Thus, the ability to aerobically digest sludge is lost during maintenance and repair of the existing blower. The existing blower building does not have adequate space for installation of a redundant blower. Installation of a redundant aerobic digestion blower in an expanded building would enhance treatment of waste sludge.

Redundant Aerobic Digester

The wastewater treatment facility currently has only one aerobic sludge digester. MDEQ Circular 2 states that all facilities where the design average flow exceeds 100,000 gpd must have multiple digestion units. Construction of a redundant aerobic sludge digester will allow the facility to conform with MDEQ design standards while allowing for periodic maintenance without a loss of digestion capacity.

Backup Disinfection

The wastewater treatment facility currently only has UV disinfection in the primary treated effluent discharge channel. Therefore, when effluent is bypassed in order to clean/maintain/repair the UV unit, the ability to disinfect the treated effluent is temporarily interrupted. The treatment facility currently does not have the infrastructure in-place to recycle effluent to the head of the process that has not been adequately treated or disinfected. Therefore, undisinfected effluent is intermittently discharged to the Bighorn River. Disruptions in disinfection can be prolonged, especially during the winter months, due to the outdoor location of the UV system. Maintenance and repair is extremely difficult and time consuming for the operators during periods of cold weather. Without a redundant disinfection system, the effluent from Hardin's wastewater treatment system is a potential public health risk for recreational river users and downstream potable water systems. By installing a redundant effluent disinfection system in a bypass channel along with a heated building to house the disinfection system, the City will be able to consistently meet permit limits, protect public health, and avoid a likely enforcement action.

Disinfection Building

As stated above, the existing UV disinfection equipment is located within an open channel which is outdoors. The treatment facility operators have expressed difficulties in maintaining the UV units, especially during periods of inclement weather during winter months. Installation of a heated building to house the disinfection system (along with installation of a redundant UV system in a bypass channel) would allow the City to consistently meet permit limits, protect public health, enhance operator safety, and avoid likely enforcement action.

Septage Receiving Station

At the existing wastewater treatment plant, septage from pumper trucks is dumped into the old facultative lagoon cell that is also utilized as a sludge drying bed. There is currently no means of discharging septage into the existing treatment process. Installation of a septage receiving station would improve local environmental health while allowing the City to monitor, quantify, and treat the septage that is received from pumper trucks.

The following is a description of the proposed project:

Headworks

The preferred headworks alternative will replace the existing headworks structure and grinder/screening system to meet all identified deficiencies and MDEQ/EPA requirements. This includes a new headworks building along with screening, grit removal, and grease removal (likely in a pre-packaged system) on the primary flow channel. A bypass channel with a manual bar screen is included in this alternative to allow for periodic maintenance of the mechanical headworks system. The preferred alternative also includes construction of a wash water return system which utilizes treated effluent for the headworks spray system.

Treatment

The preferred treatment alternative will correct the deficiencies of the existing wastewater plant by adding a new Intermittent Cycle Extended Aeration System (ICEAS) continuous flow SBR, converting the existing oxidation ditch to surge flow equalization, and correcting individual issues within the system.

In the preferred treatment alternative, a flow splitter box is installed post-headworks. A new ICEAS SBR is constructed after the flow splitter box. The existing oxidation ditch is converted to a surge flow equalization tank. The converted oxidation ditch includes upgraded mixing and aeration equipment along with a pumping system to dose flow to the new ICEAS SBR. Under normal operation, the splitter box diverts flow to the flow equalization tank. However, the second channel in the splitter box allows flow to be diverted directly to the ICEAS SBR to allow for maintenance activities in the equalization tank. Two new aeration blowers are installed in an expanded blower building to serve the equalization tank and the ICEAS SBR. A foam mitigation system is installed on the ICEAS SBR.

The ICEAS SBR eliminates the need to upgrade the equipment in the existing clarifiers as clarification is provided in the SBR tanks. Motor-driven decanters are included at the end of the treatment/clarification trains in the ICEAS package. An insulated dome cover is installed over the ICEAS decanters as part of this project to prevent freezing issues in the winter months. The incorporated clarification provided by the ICEAS package allows the two existing clarifiers to be repurposed to a redundant digester and a post-equalization tank respectively. Also, an upgraded waste activated sludge (WAS) pumping system is supplied as part of the ICEAS package and installed within the ICEAS tankage; thus, eliminating the need for separate replacement of the existing WAS pumping station. The need to replace the existing RAS pumping station is completely eliminated as the ICEAS SBR does not require activated sludge return pumping as part of the treatment process.

Following the ICEAS SBR, the equipment within the existing clarifier tanks is removed. One clarifier is converted to a second aerobic digester and the equipment in the existing aerobic digester is replaced. The other clarifier is converted to a post-equalization tank to dose effluent flows received from the new ICEAS SBR. This involves installation of a pumping system for the post-equalization tank. An insulated dome cover is installed over the post-equalization tank to prevent freezing in the winter months. A redundant aerobic digestion blower is installed in the expanded blower building mentioned above.

Comprehensive plant controls, flow monitoring, and SCADA appurtenances are installed/replaced as part of this project. The ICEAS SBR package includes a proprietary control system. Incorporated as parts of this package are oxidation reduction potential ORP probes, DO probes, pH probes, and temperature probes along with associated integration and monitoring. Flow monitoring upgrades include replacement and integration of influent and effluent flow meters along with installation and integration of flow meters on the WAS lines. Finally, an overall SCADA system is installed incorporating all systems within the treatment process.

In addition to the items listed above, the following upgrades are also included as part of this project:

a) Construction of a new plant potable water well.
b) Construction of a septage receiving station.
c) Installation of a backup power generator.
d) Construction of a redundant UV disinfection system.
e) Construction of an administration building addition to house dedicated lab space and the UV disinfection systems.

Make sure to address the following specific items, where applicable:

a. Does the project protect public health (i.e. reducing sewer back-ups, sewering on-site systems, reduce drinking water impacts, enhance contact recreation safety or enhance operator safety)?

The project protects public health by reducing drinking water impacts, by enhancing contact recreation safety, and by enhancing operator safety.
Treated effluent is currently discharged to the Bighorn River. The water supply for the City of Hardin is treated surface water from the Bighorn River. The proposed upgrades to the City of Hardin wastewater treatment system will improve the effluent discharge from the plant to the Bighorn River and thereby will improve the long-term water quality for drinking water and recreational usages.

Operators at the existing plant are currently exposed to elements and conditions that could result in health and safety issues. These issues may also prove costly to the City of Hardin and, consequently, the taxpayers of the City if illness or accidents occur among operators at the plant. Construction of a new headworks building meeting modern code requirements will provide a safe environment for Public Works personnel. Likewise, providing a heated building that protects the UV disinfection system will keep personnel who operate the equipment out of the elements when performing maintenance and repairs on that equipment. Insulated dome covers on clarification tanks will also prevent freezing in the winter months. Operators currently manually break up ice on the tanks when necessary.

Maintenance and repairs on the return activated sludge pumping station are currently also a risk to plant operators. Operators must enter the pit of the pumping station to repair and maintain pump screws, risking exposure to untreated sewage. With this project the return activated sludge (RAS) pumping station is eliminated due to the change from an oxidation ditch biological treatment process to an ICEAS SBR biological treatment process.

b. Will project reduce toxic effects to aquatic life (e.g. chlorine, ammonia or metals to riparian areas)?

The proposed upgrades to the City of Hardin wastewater treatment system will improve the effluent discharge from the plant to the Bighorn River and thereby will improve the long-term water quality for aquatic life.

c. Does the project reduce sediment and/or nutrient loads to surface waters or riparian areas?

The project will reduce sediment and nutrient loads to the Bighorn River. The headworks of the existing wastewater treatment plant does not currently have grit or grease removal equipment. The proposed project includes installation of grit and grease removal equipment along with upgrades to secondary clarification. New biological treatment via an ICEAS (Intermittent Cycle Extended Aeration System) is also proposed as part of the project and will improve nutrient removal.

d. Does the project improve water use efficiency or enhance wildlife habitat?

The proposed upgrades to the City of Hardin wastewater treatment system will improve the effluent discharge from the plant to the Bighorn River and thereby will improve wildlife habitat.

e. Are permit compliance issues being addressed?

Yes. Hardin's wastewater treatment system currently has a designation of "significant

noncompliance". The proposed project addresses all of the infrastructure-related compliance issues stated in the recent EPA compliance evaluation inspection report.

f. Is the system under formal enforcement action?

The system is not currently under a formal enforcement action. However, if compliance issues are not resolved, a formal enforcement action could be imminent and should be expected.

g. Does the proposed project help meet a TMDL?

Although TDMLs are not currently in-place for the affected section of the Bighorn River, the proposed upgrades will help to meet future TDMLs if they are imposed. The ICEAS SBR system, along with other upgrades proposed as part of this project, will allow for enhanced nitrogen and phosphorous removal.

h. Does the project propose to correct infiltration or inflow in the collection system? (Please describe what is known about the levels of infiltration and inflow into the system).

No. This project only proposes upgrades to the wastewater treatment system. The plant is immediately overwhelmed by surge flows exceeding 1.0 MGD which occur often during rain and snowmelt events. This project proposes surge flow attenuation to deal with large intermittent increases in flow. However, I&I reduction measures have been (and will continue to be) conducted separately by the City. To correct deficiencies, the City conducted major collection system rehabilitation and replacement projects in 2003 and 2009. The 2003 project replaced/rehabbed 14,874 feet of sanitary sewer mains and 32 manholes (See Table 2.1). The 2009 project replaced/rehabbed 24,044 feet of sanitary sewer mains and 82 manholes (See Table 2.2). Thus, the City has replaced almost 50 percent of sanitary sewer mains and manholes over the course of the last 15 years. The City is in the process of planning for a comprehensive I&I study of the wastewater collection system. The City also currently has 85 reported sump pump connections to the wastewater collection system. A sewer surcharge rate of $5.50 per month is charged to the owner for each of these connections.

2. For effluent reuse projects or total retention systems, have water rights or diversion of the point of use been addressed with DNRC?

Not applicable. The project does not involve effluent reuse (outside of the treatment system) or a total retention system.

3. Will the project address capacity and/or reliability issues with a unit process and or equipment in the existing system?

Yes. The proposed project upgrades existing components within the system while re-purposing the existing oxidation ditch and secondary clarification tanks.

4. Does the project reduce energy consumption or include energy reducing principles or technologies (explain)?

Yes. According to manufacturer's data, it is anticipated that the proposed project will reduce energy consumption by approximately 354,500 kW-hr per year. The decrease in power consumption is due to upgrades of aging existing equipment to more efficient/lower horsepower equipment along with upgraded intelligent system monitoring and controls.

5. Is the water system metered?

   Yes.

6. Is an active, on-going I/I reduction program in place? If so describe actions taken to reduce/monitor I/I.

   I&I reduction measures have been (and will continue to be) conducted by the City. To correct deficiencies, the City conducted major collection system rehabilitation and replacement projects in 2003 and 2009. The 2003 project replaced/rehabbed 14,874 feet of sanitary sewer mains and 32 manholes (See Table 2.1). The 2009 project replaced/rehabbed 24,044 feet of sanitary sewer mains and 82 manholes (See Table 2.2). Thus, the City has replaced almost 50 percent of sanitary sewer mains and manholes over the course of the last 15 years. The City is in the process of planning for a comprehensive I&I study of the wastewater collection system.

7. Provide an estimated project budget, including potential funding sources and the status of all funding applications. Include engineering, legal, and administrative costs in addition to construction related costs.

   The following tables show opinions of probable cost for the preferred combination of alternatives along with funding strategy options. No funding applications have been submitted to-date.

Table 6.1 - Opinion Of Probable Cost
City of Hardin
Alternative H-1: Single Mechanical Headworks w/ Manual Bar Rack in Bypass Channel

#	BID ITEM	QTY	UNITS	UNIT PRICE	TOTAL
1	Headworks Building (30' x 50')	1	LS	$600,000.00	$600,000.00
2	Packaged Headworks (Screening, grit removal, and grease removal)	1	EA	$500,000.00	$500,000.00
3	Bypass Channel w/ Bar Screen	1	LS	$25,000.00	$25,000.00
4	Wash Water Return System (recycled treated effluent)	1	LS	$75,000.00	$75,000.00
Subtotal					**$1,200,000.00**
Mobilization Bonding Insurance Overhead Profit				17.00%	$204,000.00
Contingency				15.00%	$180,000.00
Construction Subtotal					**$1,584,000.00**
Inflation to 2020				3.00%	$47,520.00
Erosion Control		1	LS	$2,500.00	$2,500.00
Review Fees and Permits		1	LS	$2,000.00	$2,000.00
Geotechnical Investigation		1	EA	$3,000.00	$3,000.00
Engineering, Legal & Administrative				25%	$396,000.00
Project Total					**$2,035,020.00**

Table 6.2 - Opinion Of Probable Cost City of Hardin Alternative T-3: New ICEAS SBR					
#	BID ITEM	QTY	UNITS	UNIT PRICE	TOTAL
1	Process Controls, Flow Monitoring, SCADA, and Electrical	1	LS	$450,000.00	$450,000.00
2	Mechanical and HVAC	1	LS	$230,000.00	$230,000.00
3	Sitework	1	LS	$450,000.00	$450,000.00
4	Emergency Generator & Transfer Gear	1	EA	$200,000.00	$200,000.00
5	Flow Splitter Box	1	LS	$30,000.00	$30,000.00
6	Convert Existing Oxidation Ditch to Surge Flow Equalization	1	LS	$150,000.00	$150,000.00
7	New ICEAS SBR Equipment	1	LS	$715,000.00	$715,000.00
8	New ICEAS SBR Tank (Cast-in-place concrete)	1,220	CY	$750.00	$915,000.00
9	Stairs, Railings, and Walkways	1	LS	$370,000.00	$370,000.00
10	Foam Mitigation System	1	LS	$210,000.00	$210,000.00
11	Decanter System Insulated Dome Cover	1	EA	$85,000.00	$85,000.00
12	Redundant Aerobic Digestion Blower	1	EA	$45,000.00	$45,000.00
13	Aerobic Digestion Blower Building Expansion	1	LS	$80,000.00	$80,000.00
14	New Aerobic Digestion Equipment	2	EA	$30,000.00	$60,000.00
15	Convert Existing Clarifier to Redundant Aerobic Digester	1	LS	$100,000.00	$100,000.00
16	Convert Existing Clarifier to Post Equalization Tank	1	LS	$100,000.00	$100,000.00
17	Post Equalization Tank Insulated Dome Cover	1	EA	$85,000.00	$85,000.00
18	Redundant UV Disinfection	1	LS	$200,000.00	$200,000.00
19	UV Disinfection and Administrative Building Expansion	1	LS	$400,000.00	$400,000.00
20	New Water Well	1	LS	$35,000.00	$35,000.00
21	Yard Piping, Fittings, and Valves	1	LS	$300,000.00	$300,000.00
22	Septage Receiving Station w/ Lift to Headworks	1	LS	$250,000.00	$250,000.00
Subtotal					**$5,460,000.00**
Mobilization Bonding Insurance Overhead Profit				17.00%	$928,200.00
Contingency				15.00%	$819,000.00
Construction Subtotal					**$7,207,200.00**
Inflation to 2020				3.00%	$216,216.00
Erosion Control		1	LS	$5,000.00	$5,000.00
Review Fees and Permits		1	LS	$25,000.00	$25,000.00
Geotechnical Investigation		1	EA	$10,000.00	$10,000.00
Engineering, Legal & Administrative				25%	$1,801,800.00
Project Total					**$9,265,216.00**

Table 7.1 Simplified Funding Strategy for Preferred Alternative		
DESCRIPTION	**SCENARIOS**	
	OPTION #1	**OPTION #2**
TOTAL PROJECT COST	$11,300,236	$11,300,236
TSEP Grant	$625,000	No Award
DNRC RRGL Grant	$125,000	No Award
CDBG Grant	$450,000	No Award
SRF Loan (30 Years @ 2.50%)	$10,100,236	$11,300,236
Principal + Interest (Annual)	$478,898	$535,796
Estimated Incremental O&M (Annual)	$37,670	$37,670
Required Increase ($/Connection/month)	**$33.48**	**$37.17**
Resulting Wastewater Only Rate	**$69.73**	**$73.42**

8. Provide a project schedule (month/year) for each key task of the proposed project. (e.g., bond election, P&S submittals, bid date, bid opening, award, construction start, etc.)

Project Implementation Schedule		
ACTION	**DATE**	**NOTES**
Hire Engineer/Administrator	Fall 2017	
Submit TSEP Grant Application	June 2018	
Submit DNRC Grant Application	May 2018	
Select Bond Council, hold Bond Election	Sept. 2018	
Results of TSEP, DNRC RRGL, CDBG grant known	April – June, 2019	If insufficient funding, re-apply or phase project to meet available project funding.
Begin Design Phase	June 2019	
Start-Up and FONSI Clearance	June 2019	All environmental research already complete.
Submit Plans to MDEQ	Dec. 2019	
MDEQ Approval	Feb. 2020	Allows 2 full months for review.
Advertise and Bid Project	Feb. – Mar., 2020	Bid Schedules H-0, T-3
Construction	Apr. – Oct., 2020	
Close-out	Dec. 2020	Conditional for TSEP and CDBG pending audits.
Audit	Jan. 2021	
Audit and Final TSEP Close-out	Jan. 2021	
11-Month Walk-Through	Sept. 2021	

9. Has a planning document or preliminary engineering report (PER) been prepared and submitted to SRF for review? Has the PER been approved by SRF?

   No. Submittal of the PER is forthcoming in the 2018 cycle.

10. Has engineer been hired following applicable State of Montana laws for public projects for design and construction management? If yes, please provide contact information.

    An engineer has not been hired for design and construction management. The City will procure an engineer following applicable State of Montana procurement laws once grant and loan sources are confirmed and financial viability of the project has been evaluated/confirmed.

11. Have plans and specifications been prepared and submitted to the WPCSRF program? What is the status of plan and specification submittal?

    Plans and specifications have not been prepared and submitted to the WPCSRF program. Upon determination of grant funding, the City will evaluate financial feasibility of the project. If the City chooses to move forward with the project, plans and specifications will likely be submitted to WPCSRF

in December of 2019.

12. Are user rates and charges in place to allow for additional debt service? Have rates and charges been submitted and reviewed by the SRF and found to be adequate?

    User rates and charges are not yet in place to allow for the additional debt service. User rates will be adjusted once financial feasibility of the project is confirmed after grants are awarded in 2019. The proposed user rates will be submitted to SRF for review at this point.

13. All other funding in place (If so, please identify in budget summary)?

    No. The City is submitting grant applications to TSEP, RRGL, and CDBG in the 2018 cycle.

14. Is project driven by growth issues? Is the project proposing to support development that is less than 50% occupied?

    No. The project is primarily driven by deficiencies in the aging wastewater treatment system. However, the proposed project is designed for a 20-year growth horizon based upon an annual growth rate of 0.5% and the possibility of a detention facility being occupied by 600 inmates and staff. The project is not proposing to support development that is less than 50% occupied.

15. If a wastewater project, does it extend service to areas now served by septic systems and especially failed on-site septic systems?

    No.

16. Has a county water and/or sewer district been formed? Do you anticipate that a District will be formed and if so when?

    No. A county sewer district has not and will not be formed as the project is in the existing Hardin municipality.

17. Does the project result in better stormwater management, which reduces potential for sediment or other pollutants to reach surface water?

    The proposed project does not involve stormwater management outside of temporary management during construction activities. However, the proposed grit and grease removal systems will reduce the discharge of sediments and grease to the Bighorn River.

18. Does project help conserve irrigation water or reduce livestock impacts to riparian zones?

    No.

19. Additional Information:

    No additional information.

Appendix L

Montana Department of
ENVIRONMENTAL QUALITY

DEPARTMENT CIRCULAR

DEQ-12A

Montana Base Numeric Nutrient Standards

GENERAL INTRODUCTION

This circular (DEQ-12A) contains information pertaining to the base numeric nutrients standards (§75-5-103(2), MCA) and their implementation. This information includes the standards' concentration limits, where the standards apply, and their period of application. DEQ-12A is adopted by the Board of Environmental Review under its rulemaking authority in §75-5-301(2), MCA.

Circular DEQ-12B contains information about variances from the base numeric nutrient standards and is a separate document available from the Department. DEQ-12B addresses effluent treatment requirements associated with general nutrient standards variances, as well as effluent treatment requirements for individual nutrient standards variances and to whom these apply. Unlike DEQ-12A, DEQ-12B is not adopted by the Board of Environmental Review; DEQ-12B is adopted by the Department following its formal rulemaking process, pursuant to §75-5-313, MCA.

The Department has reviewed a considerable amount of scientific literature and has carried out scientific research on its own in order to derive the base numeric nutrient standards (see **References** in this circular). Because many of the base numeric nutrient standards are stringent and may be difficult for MPDES permit holders to meet in the short term, Montana's Legislature adopted laws (e.g., §75-5-313, MCA) allowing for the achievement of the standards over time via the variance procedures in Circular DEQ-12B. This approach should allow time for nitrogen and phosphorus removal technologies to improve and become less costly and to allow time for nonpoint sources of nitrogen and phosphorus pollution to be better addressed.

Circular DEQ-12A

JULY 2014 EDITION

1.0 Introduction

Elements comprising Circular DEQ-12A are found below. These elements are adopted by the Montana Board of Environmental Review. The nitrogen and phosphorus concentrations provided here have been set at levels that will protect beneficial uses and prevent exceedences of other surface water quality standards which are commonly linked to nitrogen and phosphorus concentrations (e.g., pH and dissolved oxygen; see Circular DEQ-7 for those standards). The nitrogen and phosphorus concentrations provided here also reflect the intent of the narrative standard at ARM 17.30.637(1)(e) and will preclude the need for case-by-case interpretations of that standard in most cases.

1.1 Definitions

1. **Ecoregion** means mapped regions of relative homogeneity in ecological systems derived from perceived patterns of a combination of causal and integrative factors including land use, land surface form, potential natural vegetation, soils, and geology. See also Endnote 1.

2. **Large river** means a perennial waterbody which has, during summer and fall baseflow (August 1 to October 31 each year), a wadeability index (product of river depth [in feet] and mean velocity [in ft/sec]) of 7.24 ft^2/sec or greater, a depth of 3.15 ft or greater, or a baseflow annual discharge of 1,500 ft^3/sec or greater. See also, Endnote 6.

3. **Total nitrogen** means the sum of all nitrate, nitrite, ammonia, and organic nitrogen, as N, in an unfiltered water sample. Total nitrogen in a sample may also be determined via persulfate digestion or as the sum of total kjeldahl nitrogen plus nitrate plus nitrite.

4. **Total phosphorus** means the sum of orthophosphates, polyphosphates, and organically bound phosphates, as P, in an unfiltered water sample. Total phosphorus may also be determined directly by persulfate digestion.

5. **Wadeable stream** means a perennial or intermittent stream in which most of the wetted channel is safely wadeable by a person during baseflow conditions.

2.0 Base Numeric Nutrient Standards

Table 12A-1 contains the base numeric nutrient standards for Montana's flowing waters. In **Table 12A-1** nutrient standards for wadeable streams are grouped by ecoregion, either at level III (coarse scale) or level IV (fine scale). Following the ecoregional standards is a list of wadeable streams with reach-specific standards. These waterbodies have characteristics disimilar from those of the ecoregions in which they reside and have therefore been provided reach-specific values. **For wadeable streams, the standards should be applied in this order: named stream reach first (if applicable) then level IV ecoregion (if applicable) then level III ecoregion. Table 12A-1** also contains a list of large river segments for which base numeric nutrient standards have been developed. Note that the ecoregional values in **Table 12A-1** do not apply to large rivers within those ecoregions. See Endnote 6 for a list of all large Montana rivers. If a particular large river reach is not listed in **Table 12A-1**, standards for it have not yet been developed.

Table 12A-2 is a placeholder table for future base numeric nutrient standards for Montana's lakes and reservoirs. The Department has not yet developed regional lake criteria, but it is expected that when they are developed they will be grouped by ecoregion. As such, placeholders for future ecoregionally-based criteria are provided in the table. The table also provides for lake-specific standards. The Department anticipates that reservoir standards will generally be developed case-by-case and, therefore, will be individually listed, as provided for in the table.

Table 12A-1. Base Numeric Nutrient Standards for Wadeable Streams in Different Montana Ecoregions. If standards have been developed for level IV ecoregions (subcomponents of the level III ecoregions) they are shown in italics below the applicable level III ecoregion. Individual reaches are in the continuation of this table.

			Numeric Nutrient Standard[4]	
Ecoregion[1,2] (level III or IV) and Number	**Ecoregion Level**	**Period When Criteria Apply[3]**	**Total Phosphorus (µg/L)**	**Total Nitrogen (µg/L)**
Northern Rockies (15)	III	July 1 to September 30	25	275
Canadian Rockies (41)	III	July 1 to September 30	25	325
Idaho Batholith (16)	III	July 1 to September 30	25	275
Middle Rockies (17)	III	July 1 to September 30	30	300
Absaroka-Gallatin Volcanic Mountains (17i)	IV	July 1 to September 30	105	250
Northwestern Glaciated Plains (42)	III	June 16 to September 30	110	1300
Sweetgrass Upland (42l), Milk River Pothole Upland (42n), Rocky Mountain Front Foothill Potholes (42q), and Foothill Grassland (42r)	IV	July 1 to September 30	80	560
Northwestern Great Plains (43) and Wyoming Basin (18)	III	July 1 to September 30	150	1300
River Breaks (43c)	IV	See Endnote 5	See Endnote 5	See Endnote 5
*Non-calcareous Foothill Grassland (43s), Shields-Smith Valleys (43t), Limy Foothill Grassland (43u), Pryor-Bighorn Foothills (43v), and Unglaciated Montana High Plains (43o)**	IV	July 1 to September 30	33	440

*For the Unglaciated High Plains ecoregion (43o), criteria only apply to the polygon located just south of Great Falls, MT.

[1] See Endnote 1

[2] See Endnote 2

[3] See Endnote 3

[4] See Endnote 4

Table 12A-1, Continued. Base Numeric Nutrient Standards for Individual Wadeable Streams (and Wadeable-stream Reaches), and Large-river Reaches.

		Numeric Nutrient Standard[4]	
Individual Stream or Reach Description[2]	**Period When Criteria Apply[3]**	**Total Phosphorus (µg/L)**	**Total Nitrogen (µg/L)**
Wadeable Streams: Clark Fork River basin			
Flint Creek, from Georgetown Lake outlet to the ecoregion 17ak boundary (46.4002, -113.3055)	July 1 to September 30	72	500
Wadeable Streams: Gallatin River basin			
Bozeman Creek, from headwaters to Forest Service Boundary (45.5833, -111.0184)	July 1 to September 30	105	250
Bozeman Creek, from Forest Service Boundary (45.5833, -111.0184) to mouth at East Gallatin River	July 1 to September 30	76	270
Hyalite Creek, from headwaters to Forest Service Boundary (45.5833,-111.0835)	July 1 to September 30	105	250
Hyalalite Creek, from Forest Service Boundary (45.5833,-111.0835) to mouth at East Gallatin River	July 1 to September 30	90	260
East Gallatin River between Bozeman Creek and Bridger Creek confluences	July 1 to September 30	50	290
East Gallatin River between Bridger Creek and Hyalite Creek confluences	July 1 to September 30	40	300
East Gallatin River between Hyalite Creek and Smith Creek confluences	July 1 to September 30	60	290
East Gallatin River from Smith Creek confluence mouth (Gallatin River)	July 1 to September 30	40	300
Large Rivers[6]:			
Yellowstone River (Bighorn River confluence to Powder River confluence)	August 1 -October 31	55	655
Yellowstone River (Powder River confluence to stateline)	August 1 -October 31	95	815

[2] See Endnote 2

[3] See Endnote 3

[4] See Endnote 4

[6] See Endnote 6

Table 12A-2. Base Numeric Nutrient Standards and Other Standards for Lakes and Reservoirs.

		Numeric Nutrient Standard[7]		
Ecoregion[1] (level III) and Number, or Individual Lake or Reservoir Description	**Period of Application**	**Total Phosphorus (µg/L)**	**Total Nitrogen (µg/L)**	**Other Standards[8]**
LAKES/RESERVOIRS by ecoregion:				
Middle Rockies (17)	Year-round	[]	[]	
Northern Rockies (15)	Year-round	[]	[]	
Canadian Rockies (41)	Year-round	[]	[]	
Idaho Batholith (16)	Year-round	[]	[]	
LAKE SPECIFIC CRITERIA:				
	Year-round	[]	[]	
RESERVOIR SPECIFIC CRITERIA:				
	Year-round	[]	[]	

[1] See Endnote 1

[7] See Endnote 7

[8] See Endnote 8

2.1 Required Reporting Values for Base Numeric Nutrient Standards

Table 12A-3 presents the required reporting values (RRVs) for total phosphorus and total nitrogen, as well as the RRVs for nitrogen fractions that can be used to compute total nitrogen.

Table 12A-3. Required reporting values[a,b] for total nitrogen and phosphorus measurements.

Nutrient		Method of Measurement	Required Reporting Value
Total phosphorus		Persulfate digestion	3 µg/L
Total nitrogen		Persulfate digestion	70 µg/L
Total nitrogen	Sum of:	(a) total kjeldahl nitrogen	225 µg/L
		(b) nitrate + nitrite	See RRVs below
Nitrate- as N			20 µg/L
Nitrite- as N			10 µg/L
Nitrate + Nitrite-as N			20 µg/L

[a] See definition for required reporting values found in footnote 19 of Department Circular DEQ-7.

[b] Concentrations in Table 12A-3 must be achieved unless otherwise specified in a permit, approval, or authorization issued by the Department (DEQ-7; ARM 17.30.702).

2.2 Developing Permit Limits for Base Numeric Nutrient Standards

For total nitrogen and total phosphorus, the critical low-flow for the design of disposal systems shall be based on the seasonal 14Q5 of the receiving water (ARM 17.30.635(2)). When developing permit limits for base numeric nutrient standards, the Department will use an average monthly limit (AML) only, based on a calendar month, using methods appropriate for criterion continuous concentrations (i.e., chronic concentrations). Permit limits will be established using a value corresponding to the 95th percentile probability distribution of the effluent. Nitrogen and phosphorus concentrations of the receiving waterbody upstream of the discharge may be characterized using other frequency distribution percentiles. The Department shall use methods that are appropriate for criterion continuous concentrations which are found in the document "*Technical Support Document for Water Quality-based Toxics Control*," Document No. EPA/505/2-90-001, United States Environmental Protection Agency, 1991.

3.0 Endnotes

(1) Ecoregions are based on the 2009 version (version 2) of the U.S. Environmental Protection Agency maps. These can be found at: http://www.epa.gov/wed/pages/ecoregions/mt_eco.htm . For Geographic Information System (GIS) use within the Department, the GIS layers may be found at: L:\DEQ\Layers\Reference\Ecoregions.lyr

(2) Within and among the geographic regions or watersheds listed, base numeric nutrient standards of the downstream reaches or other downstream waterbodies must continue to be maintained. Where possible, modeling methods will be utilized to determine the limitations required which provide for the attainment and maintenance of water quality standards of downstream waterbodies.

(3) For the purposes of ambient surface water monitoring and assessment only, a ten-day window (plus/minus) on the beginning and ending dates of the period when the criteria apply is allowed in order to accommodate year-specific conditions (an early-ending spring runoff, for example).

(4) The average concentration during a period when the standards apply may not exceed the standards more than once in any five-year period, on average.

(5) In this level IV ecoregion, the narrative standard for nuisance aquatic life (ARM 17.30.637(1)(e)) applies in lieu of specific base numeric nutrient standards.

(6) **Table E-1** below shows the beginning and ending locations for large rivers in Montana.

Table E-1. Large river segments within the state of Montana.

River Name	Segment Description
Big Horn River	Yellowtail Dam to mouth
Clark Fork River	Bitterroot River to state-line
Flathead River	Origin to mouth
Kootenai River	Libby Dam to state-line
Madison River	Ennis Lake to mouth
Missouri River	Origin to state-line
South Fork Flathead River	Hungry Horse Dam to mouth
Yellowstone River	State-line to state-line

(7) No lake or reservoir in **Table12A-2** shall have a total nutrient concentration that exceeds the values shown, as an annual average, more than once in any three year period, on average. The Department will determine on a case-by-case basis whether or not a permitted discharge to a stream or river is likely to be affecting any downstream lake or reservoir. If so, the permittee would be required to meet its average monthly nutrient limit year-round.

(8) Parameters listed under this column are standards specific to lakes and reservoirs.

4.0 References

The following are citations for key scientific and technical literature used to derive the base numeric nutrient standards. This is not a complete list; rather, it contains the most pertinent citations. Many other articles and reports were reviewed during the development of the standards.

Biggs, B.J.F., 2000. New Zealand Periphyton Guideline: Detecting, Monitoring and Managing Enrichment in Streams. Prepared for the New Zealand Ministry of the Environment, Christchurch, 122 p.

Dodds, W.K., V.H. Smith, and B. Zander, 1997. Developing Nutrient Targets to Control Benthic Chlorophyll Levels in Streams: A Case Study of the Clark Fork River. Water Research 31: 1738-1750.

Dodds, W.K., V.H. Smith, and K. Lohman, 2002. Nitrogen and Phosphorus Relationships to Benthic Algal Biomass in Temperate Streams. Canadian Journal of Fisheries and Aquatic Sciences 59: 865-874.

Dodds, W.K, V.H. Smith, and K. Lohman, 2006. Erratum: Nitrogen and Phosphorus Relationships to Benthic Algal Biomass in Temperate Streams. Canadian Journal of Fisheries and Aquatic Sciences 63: 1190-1191.

Elser, J.J., M.E.S. Bracken, E.E. Cleland, D.S. Gruner, W.S. Harpole, H. Hillebrand, J.T. Ngai, E.W. Seabloom, J.B. Shurin, and J.E. Smith, 2007. Global Analysis of Nitrogen and Phosphorus

Limitation of Primary Producers in Freshwater, Marine and Terrestrial Ecosystems. Ecology Letters 10: 1135-1142.

Flynn, K., and M.W. Suplee, 2010. Defining Large Rivers in Montana using a Wadeability Index. Helena, MT: Montana Department of Environmental Quality, 14 p.

Flynn, Kyle and Michael W. Suplee. 2013. Using a Computer Water Quality Model to Derive Numeric Nutrient Criteria: Lower Yellowstone River. WQPBDMSTECH-22. Helena, MT: Montana Dept. of Environmental Quality. http://deq.mt.gov/wqinfo/standards/NumericNutrientCriteria.mcpx

McCarthy, P.M., 2005. Statistical Summaries of Streamflow in Montana and Adjacent Areas, Water years 1900 through 2002. U.S. Geological Survey Scientific Investigations Report 2004-5266, 317 p.

Omernik, J.M., 1987. Ecoregions of the Conterminous United States. Annals of the Association of American Geographers 77: 118-125.

Smith, R.A., R.B. Alexander, and G.E. Schwarz, 2003. Natural Background Concentrations of Nutrients in Streams and Rivers of the Conterminous United States. Environmental Science and Technology 37: 3039-3047.

Sosiak, A., 2002. Long-term Response of Periphyton and Macrophytes to Reduced Municipal Nutrient Loading to the Bow River (Alberta, Canada). Canadian Journal of Fisheries and Aquatic Sciences 59: 987-1001.

Stevenson, R.J, S.T. Rier, C.M. Riseng, R.E. Schultz, and M.J. Wiley, 2006. Comparing Effects of Nutrients on Algal Biomass in Streams in Two Regions with Different Disturbance Regimes and with Applications for Developing Nutrient Criteria. Hydrobiologia 561: 149-165.

Suplee, M., R. Sada de Suplee, D. Feldman, and T. Laidlaw, 2005. Identification and Assessment of Montana Reference Streams: A Follow-up and Expansion of the 1992 Benchmark Biology Study. Helena, MT: Montana Department of Environmental Quality, 41 p.

Suplee, M.W., A. Varghese, and J. Cleland, 2007. Developing Nutrient Criteria for Streams: An Evaluation of the Frequency Distribution Method. Journal of the American Water Resources Association 43: 453-472.

Suplee, M.W., V. Watson, A. Varghese, and J. Cleland, 2008. Scientific and Technical Basis of the Numeric Nutrient Criteria for Montana's Wadeable Streams and Rivers. Helena, MT: Montana Department of Environmental Quality, 86 p. http://deq.mt.gov/wqinfo/standards/NumericNutrientCriteria.mcpx

Suplee, M.W., and V. Watson, 2013. Scientific and Technical Basis of the Numeric Nutrient Criteria for Montana's Wadeable Streams and Rivers—Update 1, *and addendums*. Helena, MT: Montana Dept. of Environmental Quality. http://deq.mt.gov/wqinfo/standards/NumericNutrientCriteria.mcpx

Suplee, M.W., V. Watson, M. Teply, and H. McKee, 2009. How Green is too Green? Public Opinion of what Constitutes Undesirable Algae Levels in Streams. Journal of the American Water Resources Association 45: 123-140.

Suplee, M.W., and R. Sada de Suplee, 2011. Assessment Methodology for Determining Wadeable Stream Impairment Due to Excess Nitrogen and Phosphorus Levels. Helena, MT: Montana Department of Environmental Quality

Suplee, M.W., V. Watson, W.K. Dodds, and C. Shirley, 2012. Response of Algal Biomass to Large Scale Nutrient Controls on the Clark Fork River, Montana, United States. Journal of the American Water Resources Association 48: 1008-1021.

U.S. Environmental Protection Agency, 2000. Nutrient Criteria Technical Guidance Manual, Rivers and Streams. United States Environmental Protection Agency, EPA-822-B00-002. Washington, D.C.

Varghese, A., and J. Cleland, 2005. Seasonally Stratified Water Quality Analysis for Montana Rivers and Streams-Final Report. Prepared by ICF International for the Montana Department of Environmental Quality, 44 p plus appendices.

Varghese, A., J. Cleland, and B. Dederick, 2008. Updated Statistical Analyses of Water Quality Data, Compliance Tools, and Changepoint Assessment for Montana Rivers and Streams. Prepared by ICF International for the Montana Department of Environmental Quality under agreement No. 205031, task order 5.

Woods, A.J., J.M. Omernik, J.A. Nesser, J. Shelden, J.A. Comstock, and S. J. Azevedo, 2002. Ecoregions of Montana, 2nd edition. (Color Poster with Map, Descriptive Text, Summary Tables, and Photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,500,000).

Montana Department of Environmental Quality

DEPARTMENT CIRCULAR

DEQ-12B

Nutrient Standards Variances

JUNE 2017 EDITION

GENERAL INTRODUCTION

This circular (DEQ-12B) contains information about variances from the base numeric nutrient standards. This information includes details on effluent treatment requirements associated with general nutrient standards variances, as well as effluent treatment requirements for individual nutrient standards variances and to whom they apply.

Circular DEQ-12A contains the base numeric nutrient standards, where the standards apply, and their period of application. Circular DEQ-12A is in a separate document also available from the Department. Circular DEQ-12A is adopted by the Board of Environmental Review under its rulemaking authority in §75-5-301(2), MCA. Unlike DEQ-12A, DEQ-12B (this circular) is not adopted by the Board of Environmental Review. DEQ-12B is adopted by the Department following its formal rulemaking process, pursuant to §75-5-313, MCA.

The Department has reviewed a considerable amount of scientific literature and has carried out scientific research on its own in order to derive the base numeric nutrient standards (see References in DEQ-12A). Because many of the base numeric nutrient standards are stringent and may be difficult for MPDES permit holders to meet in the short term, Montana's Legislature adopted laws (e.g., §75-5-313, MCA) allowing for the achievement of the standards over time via the variance procedures found here in Circular DEQ-12B. This approach should allow time for nitrogen and phosphorus removal technologies to improve and become less costly, and to allow time for nonpoint sources of nitrogen and phosphorus pollution to be better addressed.

Circular DEQ-12B

JUNE 2017 EDITION

1.0 Introduction

Elements comprising Circular DEQ-12B are found below. These elements are adopted by the Department following the Department's formal rulemaking process. Montana state law (§75-5-103 (22), MCA and 75-5-313, MCA) allows for variances from the base numeric nutrient standards (found in Circular DEQ-12A) based on a determination that the base numeric nutrient standards cannot be achieved because of economic impacts, the limits of technology, or both.

1.1 Definitions

1. **Monthly average** means the sum of the daily discharge values during the period in which the base numeric nutrient standard applies divided by the number of days in the sample. See also, "*Technical Support Document for Water Quality-based Toxics Control*," Document No. EPA/505/2-90-001, United States Environmental Protection Agency, 1991.
2. **Pollutant minimization program** means a structured set of activities to improve processes and pollutant controls that will prevent and reduce nutrient loadings.

2.0 General Nutrient Standards Variances

The general variance treatment requirements in **Table 12B-1** (below) apply to permittees where the Department has demonstrated that immediate compliance with the base numeric nutrient standards, where applicable, would result in substantial and widespread economic impacts. A list of permittees likely to need a general variance is maintained on the Department's website on the Water Quality Standards webpage. The requirements in **Table 12B-1** represent the highest attainable condition treatment requirements and must be reviewed by the Department before July 1, 2020. The Department will process the general variance request through the discharge permit and include information on the period of the variance and the interim requirements. A person may apply for a general variance for either total phosphorus (TP) or total nitrogen (TN), or both. §75-5-313(8), MCA, authorizes the general variance for a period not to exceed 20 years. Through the permitting process and the specific details of each facility, the time required must be as short as possible to meet the highest attainable condition (HAC). A compliance schedule to meet the treatment requirements shown in **Table 12B-1** may also be granted on a case-by-case basis. The final permit limit must be expressed as a load only, and when developing monthly average permit limits for general variances for the ≥1MGD and <1MGD discharge categories, a coefficient of variation (CV) of 0.6 may be used to determine the Table 5-2 multiplier. Table 5-2 is a component of the permit calculation process and is found in the *Technical Support Document for Water Quality-based Toxics Control* (U.S. EPA, 1991) which is cited in Endnote 1.

Cases will arise in which a permittee is or has been discharging effluent with nitrogen and/or phosphorus concentrations lower than (i.e., better than) the minimum requirements of a general variance found in **Table 12B-1**, but the resulting concentrations at the edge of the mixing zone still exceed the base numeric nutrient standards. Such permitted discharges are within the scope of the general variance.

For permittees whose effluent concentrations were, before July 1, 2017, lower than the concentrations in **Table 12B-1**, the general variance must be based on the actual total N and/or total P concentrations of their effluent. The Department will determine if a permittee's actual effluent concentrations are lower than those in **Table 12B-1** by calculating the 95th percentile of representative monthly average effluent concentration data and comparing the result to the applicable values in **Table 12B-1**. For permittees who, after July 1, 2017, attain or do better than the **Table 12B-1** values, the **Table 12B-1** values must be used to establish the permit limit, unless and until the Department revises **Table 12B-1** to reflect a HAC treatment requirement that results from the triennial review.

In a permitted discharge, the interim limits provided for under a variance apply, even if such limits differ from those that might otherwise apply based on a wasteload allocation derived in a Total Maximum Daily Load (TMDL). The interim limits apply during the time period over which the variance is applicable.

Table 12B-1. General variance end-of-pipe treatment requirements.

	Monthly Average	
Discharger Category[2]	**Total P (µg/L)**	**Total N (µg/L)**
≥ 1.0 million gallons per day[3,4]	300	6,000
< 1.0 million gallons per day[3,4]	1,000	10,000
Lagoons not designed to actively remove nutrients	Maintain long-term average[5] and implement the PMP	Maintain long-term average[5] and implement the PMP

[2] See Endnote 2
[3] See Endnote 3
[4] See Endnote 4
[5] See Endnote 5

Sections 75-5-313(7) and (8), MCA, require the Department to review the general variance treatment requirements every three years to assure that the justification for their adoption remains valid. The purpose of the review is to determine whether there is new information that supports modifying (e.g., revising the interim effluent treatment requirements) or terminating the variance. The review must occur triennially and must be carried out at a state-wide scale, i.e., the Department will consider the aggregate economic impact to dischargers within a category (the ≥1 MGD category, for example). The Department, in consultation with the Nutrient Work Group, must consider whether a pollutant control

technology for treating nitrogen and phosphorus is (1) now feasible to attain (i.e., the cost of such pollutant control technology shall not cause substantial and widespread social and economic impacts) using all existing and readily available information, and (2) would result in a more stringent treatment requirements than the requirements in **Table 12B-1**. The Department shall initiate rulemaking to adopt general variance treatment requirements that reflect any proposed changes to the HAC treatment requirements consistent with this review, and revised effluent limits must be included with the permit during the next permit cycle, unless the demonstrations discussed in **Section 3.0** below are made. A compliance schedule may also be granted to provide time to achieve compliance with revised effluent limits.

Based on the triennial review, the Department shall issue a solicitation for public comment on the nutrient concentrations and conditions associated with the general variance. This solicitation must be conducted through: (1) a rulemaking if changes to the general variance are proposed; or (2) a request for public comment if no changes to the general variance are proposed. (If the Department fails to conduct the triennial review as specified at Section 75-5-313(8), MCA, or if the results of the triennial review are not submitted to EPA within 30 days of the completion of the review, the variance will not be applicable for purposes of the Federal Clean Water Act until such time as the review is completed and submitted to EPA.)

2.1 Time to Achieve the Treatment Requirements in Table 12B-1

Through the MPDES permitting process for each facility, the Department shall establish the time necessary to meet the treatment requirements in **Table 12B-1.** The time for the general variance must only be as long as necessary to meet the treatment requirements in **Table 12B-1**, but could take up to 17 years from the date of approval of the general variances in this circular. The Department has identified up to nine steps for facilities in the ≥1MGD and <1MGD discharge categories to achieve the **Table 12B-1** treatment requirements. These steps are shown in **Table 12B-2**. The steps are a combination of advanced operational strategies using existing facility infrastructure and capital improvements; approximate times (in years) for each step are shown. If a facility were to achieve the **Table 12B-1** treatment requirements using a subset of the steps in **Table 12B-2**, the Department would expect the discharger to need less time to complete that subset of steps. The purpose of **Table 12B-2** is to provide an outline of potential steps needed to achieve the **Table 12B-1** treatment requirements. The actual time period for individual steps may vary between each facility; however, the total time necessary to meet the treatment requirements in **Table 12B-1** may not exceed the remaining variance period.

For the lagoon discharge category, the Department and permittee shall complete the pollutant minimization program requirements described in **Section 2.2** and **Section 2.2.1.2** no later than July 1, 2027.

Table 12B-2. Steps and approximate times for permittees in the ≥1MGD and <1MGD discharge categories to achieve the treatment requirements in Table 12B-1.

Description of Step	Approximate Time to Complete Step (years)
1. Implementation of advanced operational strategies to reduce nutrients using existing infrastructure. Evaluate effects of operational changes and fine tune as necessary. Operations staff identify potential minor capital improvements, if any, that could be made to further advance operational strategies. Preliminarily assess the feasibility of trading, reuse, etc.	**2**
2. If **Table 12B-1** treatment requirements are not achieved, hire an engineer to prepare a preliminary engineering report (PER) that evaluates options for minor and/or major facility improvements, trading or reuse that lead to further nutrient reductions that build upon developed operational strategies, if appropriate. Continue to fine-tune operational strategies. Begin discussion with funding agencies and submit PERs to those agencies, if necessary (for major upgrades).	**1**
3. Go through funding agency timelines and requirements for planning, if necessary. This may involve legislative approval, depending upon the funding sought. Implement minor facility improvements, if appropriate, and fine tune operations for further TN and TP reductions.	**2**
4. Design major capital improvements. Go through the Department (DEQ) and other funding agency review and approval processes for the design/bidding phase, including MEPA analysis, adjustments of rates and charges, legal opinions, etc. Bid major capital project.	**2**
5. Construct major capital project, including trading and/or reuse, if appropriate. Begin operating new infrastructure and fine tuning operations. Continue with advanced operational training with new infrastructure. Evaluate nutrient reductions achieved with major capital project and operator optimization.	**4**
6. If **Table 12B-1** treatment requirements are still not achieved, hire engineer to evaluate alternatives in a PER for next steps to meet **Table 12B-1** treatment requirements for TN and TP.	**1**
7. Submit PER to funding agencies for review, approval, MEPA, etc. Legislative approval required? Obtain funding.	**2**
8. Design and bid capital project to meet **Table 12B-1** treatment requirements for TN and TP.	**1**
9. Construct capital upgrades, including trading, reuse, etc., if appropriate. Continue with operational optimization to meet **Table 12B-1** treatment requirements.	**2**

2.2 Wastewater Facility Optimization Study: Pollutant Minimization Program

Upon achieving a discharge that meets the requirements of **Table 12B-1**, a permittee shall evaluate current facility operations and develop discharger-specific pollutant minimization activities and implement the pollutant minimization program. Permittees shall consider a full array of reasonable options including, but not limited to, facility advanced operational strategies, reuse, recharge, and land application.

2.2.1 Pollutant Minimization Program: General Requirements

A pollutant minimization program (PMP) is a structured set of activities to improve processes and pollutant controls that will prevent and reduce pollutant loadings. Where no additional feasible pollutant control technology to reduce pollutant loadings can be identified, the highest attainable condition – that is, the general treatment requirements in **Table 12B-1** or the HAC treatment requirements determined for an individual variance (**Section 3.0**) – along with the adoption and implementation of a PMP reflect the greatest pollutant reduction achievable. For either a general or an individual variance, a permittee shall submit a PMP to the Department once the permittee achieves the identified HAC treatment requirements. The Department, following review and approval of the PMP, shall incorporate the PMP into the permittee's next MPDES permit as further set forth in **Sections 2.2.1.1** and **2.2.1.2**. If a permittee achieves the HAC treatment requirement for only one nutrient parameter (i.e., either TN or TP), but not both, then the permittee shall develop and implement a PMP for the achieved nutrient parameter (while continuing to work toward the HAC treatment requirement for the other nutrient parameter).

2.2.1.1. Pollutant Minimization Requirements for Mechanical Plants

Permittees with mechanical treatment systems shall:

- Examine all possible pollutant minimization activities including, but not limited to: documentation, in the Operations and Maintenance Manual, of process control strategies identified and implemented through optimization; ongoing training of operations staff in advanced operational strategies; minor changes to infrastructure to complement and further advance operational strategies; and implementation of pollutant trading and the reuse of effluent if feasible.
- During the permit application and review process, a permittee shall submit a report to the Department describing the activities examined; and a list of the activities the permittee proposes to implement, along with an implementation schedule and rationale for selecting the activities and the time required. After review and approval of the PMP activities, the Department will, as provided in subchapter 13, incorporate the PMP and associated schedule into the permittee's MPDES permit.

2.2.1.2. Pollutant Minimization Requirements for Wastewater Lagoons

For lagoons, the Department and the permittees shall implement the PMP described below to examine potential treatment technologies. Permittees shall implement specific PMP activities identified through the examination of pollutant control technologies.

Requirements of the Department's PMP include:

- Implementing pilot studies before the 2020 triennial review to examine the use of novel, low-maintenance technologies to reduce nutrient concentrations in lagoon system effluent. Based on final results from these studies, the Department shall publish results demonstrating the efficiency of the tested technologies in reducing nutrients in lagoon systems.
- Conducting and completing a statewide review of lagoon performance by 2022 to evaluate effective operational methods and identify those lagoons that require additional improvements. For each facility, within 1 year of completing the review of operational methods, the Department shall begin requiring implementation of the improvements at those facilities that do not require substantial investment or additional study.
- Evaluating the facility-specific recommendations and documentation submitted by each lagoon permittee as part of its optimization activities. The Department and the permittee shall also evaluate the capability of each discharger to implement feasible nutrient reduction strategies.

Permittees that receive a general variance shall:

- Provide sufficient information to allow the Department to evaluate the performance of all PMP activities. Feasible activities will, as provided in subchapter 13, be incorporated into each discharger's PMP through the renewal process for each facility's MPDES permit.

3.0 Individual Nutrient Standards Variances

The following sections describe (1) the basis for an individual nutrient standards variance ("individual variance"), and (2) an alternate method for deriving appropriate interim effluent limits for an individual discharger. For both of these types of individual variances, the final permit limit will be expressed as a load only, and when developing monthly average permit limits for individual variances for the ≥1MGD and <1MGD discharge categories, a coefficient of variation (CV) of 0.6 may be used to determine the Table 5-2 multiplier. Table 5-2 is a component of the permit calculation process and is found in the *Technical Support Document for Water Quality-based Toxics Control* (U.S. EPA, 1991) which is cited in Endnote 1.

3.1 Individual Variance Based on Substantial and Widespread Economic Impacts

Montana law allows for the granting of nutrient standards variances based on the particular economic and financial situation of a permittee (§75-5-313(1), MCA). Individual variances may be granted on a

case-by-case basis because the attainment of the base numeric nutrient standards is precluded due to economic impacts, limits of technology, or both. Individual variances discussed in this section are generally intended for permittees who would have financial difficulties meeting the general variance treatment requirements and are seeking individual nitrogen and phosphorus permit limits tailored to their specific economic situation.

Like the general variance in **Section 2.0**, Section 75-5-313(8), MCA, authorizes individual variances for a period not to exceed 20 years, and each must be reviewed by the Department every three years to ensure that the justification remains valid. Unlike the general variances discussed in **Section 2.0**, the Department may only grant an individual variance to a permittee after the permittee has made a demonstration to the Department that meeting the underlying standards in Circular DEQ-12A would require water quality-based controls that result in substantial and widespread social and economic impacts. The variance must identify the lowest (i.e., best) effluent concentration that is feasible based on achieving the highest attainable condition (HAC). A permittee, as part of this assessment process, must also demonstrate to the Department that there are no reasonable alternatives including, but not limited to, trading, compliance schedules, reuse, recharge, and land application that would allow compliance with the base numeric nutrient standards. If no reasonable alternatives exist, then an individual variance is justifiable and becomes effective and may be incorporated into a permit following the Department's formal rulemaking process. At the time that the facility achieves its HAC treatment requirements, the permittee shall submit a pollution minimization program (PMP) to the Department (see details on PMPs in **Section 2.2**). Like any variance, individual variances must be adopted as revisions to Montana's water quality standards and submitted to EPA for approval. Individual variances the Department adopts in the future must be documented in **Table 12B-3** below.

Since the basis of this type of individual variance is related to the economic status of a community or permittee, or to the limits of technology, at each triennial review the Department shall consider if the basic economic status of that community or permittee, or the limits of technology, has substantially changed. The same parameters used to justify the original individual variance must be considered. If new, low-cost nutrient removal technologies have become feasible, or if the economic status of the community or permittee has sharply improved, the treatment requirement component of the variance may no longer be justified. When the review of any individual variance longer than five years identifies that a more stringent highest attainable condition is feasible to attain, the Department shall revise the individual variance to reflect the new, more stringent highest attainable condition consistent with the Department's reevaluation schedule for the individual variance or pursue other options such as a permit compliance schedule, trading, reuse, recharge, land application, or a general variance.

Based on the triennial review, the Department shall issue a solicitation for public comment on individual variances. This solicitation must be conducted through: (1) a rulemaking if changes to an individual variance are proposed; or (2) a request for public comment if no changes to an individual variance are proposed. (If the Department fails to conduct the triennial review as specified at Section 75-5-313(8), MCA, or if the results of the triennial review are not submitted to EPA within 30 days of the completion of the review, the variance will not be applicable for purposes of the Federal Clean Water Act until the review is completed and submitted to EPA.)

3.2 Individual Variance Effluent Limits Based on Site-specific Water Quality Modeling

Generally, the interim effluent limits in any variance, general or individual, will be based on achieving the highest attainable condition within the receiving water. In some cases a permittee may be able to demonstrate, using water quality modeling and reach-specific data, that greater emphasis on reducing one nutrient (target nutrient) will achieve the highest attainable condition, since it would produce comparable water quality and biological conditions in the receiving water as could be achieved by emphasizing the equal reduction of both nutrients (i.e., both nitrogen and phosphorus). Requiring such a permittee to immediately install sophisticated nutrient-removal technologies to reduce the non-target nutrient to levels in **Table 12B-1** may not be the most prudent nutrient control expenditure, and could cause the discharger to incur unnecessary economic expense. In such a case, the interim effluent limits for the individual discharger may be adjusted to reflect greater emphasis on controlling one of the parameters, so long as the highest attainable condition is maintained within the receiving water. The permittee will be required to submit the demonstration with the proposed interim effluent limits to the Department for review and will be required to provide monitoring water quality data that can be used to determine if the justifications for the interim effluent limits continue to hold true (i.e., status monitoring). Because status can change, for example due to substantive nonpoint source cleanups upstream of the discharger, status monitoring by the discharger is required. The Department shall review the basis of model-based variances triennially. At the time that the receiving waterbody achieves the highest attainable condition, the permittee must submit a pollutant minimization program (PMP) to the Department (see details on PMPs in **Section 2.2**).

Based on the triennial review, the Department shall issue a solicitation for public comment on individual variances. This solicitation must be conducted through: (1) a rulemaking if changes to an individual variance are proposed; or (2) a request for public comment if no changes to an individual variance are proposed. (If the Department fails to conduct the triennial review as specified at Section 75-5-313(8), MCA, or if the results of the triennial review are not submitted to EPA within 30 days of the completion of the review, the variance will not be applicable for purposes of the Federal Clean Water Act until the review is completed and submitted to EPA.)

The nutrient concentrations identified via this modeling may eventually be adopted as site-specific standards under the Board of Environmental Review's rulemaking authority in §75-5-301(2), MCA, but would require an analysis of their downstream effects prior to adoption.

Table 12B-3. Table for individual variances that may be adopted.

MPDES Number	Facility Name	Discharge Latitude	Discharge Longitude	Receiving Waterbody	Receiving Waterbody Classification	Monthly Average Total P (µg/L)	Monthly Average Total N (µg/L)	Start Date	Sunset Date (maximum)	Review Schedule (year)	Review Outcome

4.0 Endnotes

(1) United States Environmental Protection Agency. 1991. *Technical Support Document for Water Quality-based Toxics Control.* EPA/505/2-90-001, PB91-127415. Office of Water, Washington, D.C. March 1991.

(2) Based on facility design flow.

(3) Facilities that are already meeting the treatment requirements for one or both nutrients in **Table 12B-1** must continue to meet these levels and are required to implement the pollutant minimization program in **Section 2.2** of this Circular.

(4) If the Department believes that a non-POTW permittee can achieve a treatment level better than (i.e., at a lower concentration than) the general variance requirements in **Table 12B-1**, then the permittee and the Department shall discuss what treatment level can be achieved and the Department, in consultation with the permittee, will identify the highest attainable condition and level of treatment.

(5) For lagoons, the long term average is calculated as the arithmetic average of representative facility data from the past 3 years, or up to the past 5 years if those data are also representative.

Appendix M

COMMUNITY DEVELOPMENT DIVISION

Census & Target Rate Info

Search below for 2015 American Communities Survey data used to calculate target rates when applying to the **Treasure State Endowment Program** and **Community Development Block Group Grant Program.**

Select a Location:

City/Designated location Hardin city ▼ **or** County Choose County ▼

City	Hardin city
County	*Big Horn County*
Total Population	3,754
Total Households	1,174
Median Household Income	$34,917
Low & Moderate Income Percent	57.82%
Percent Poverty	22.6 %

Target Rates

Water & Waste Water	$66.92
Water Only	$40.74
WasteWater Only	$26.19
Solid Waste Only	$8.73

Amounts are computed using the 2015 census and target percentage rationale reviewed biennially by Commerce. The target percentages are:

2.3% combined (water and wastewater)
1.4% for water alone
0.9% for wastewater alone
0.3% for solid waste

For example: Community median household income is $25,000 and the residents pay both water and wastewater rates, the calculation would be: $25,000 times 2.3% divided by 12 equals monthly target rate of $47.92. (25,000 x 2.3%)/12 = $47.92)

Having trouble finding data for your community? Some communities may not be listed in the resources above because the American Community Survey (ACS) did not provide 2015 MHI data for those areas. Please contact us at (406) 841-2770 or email **TSEP** or **CDBG** if you have any questions about this information.

Mapping

To see maps of the City/Town/CDP or County in which you are interested, please go to **http://ceic.mt.gov/**. For more information about the maps or tools available, please contact the Census and Economic Information Bureau at (406) 841-2713 or email **ceic@mt.gov**.

Contacts

Treasure State Endowment Program (TSEP)	406 841-2770
Community Development Block Grant Program (CDBG)	406 841-2770
Census & Economic Information Center	406 841-2740

Definitions

Census Designated Place (CDP): Census designated places (CDPs) have been created for each decennial census as the statistical counterparts of incorporated places. CDPs are delineated to provide census data for concentrations of population, housing, and commercial structures that are identifiable by name but are not within an incorporated place. CDP boundaries usually are defined in cooperation with state, local, and tribal officials. These boundaries, which usually coincide with visible features or the boundary of an adjacent incorporated place or other legal entity boundary, have no legal status, nor do these places have officials elected to serve traditional municipal functions.

Household: A household includes all the people who occupy a housing unit as their usual place of residence.

Income of households: This includes the income of the householder and all other individuals 15 years old and over in the household, whether they are related to the householder or not.

Low and Moderate Income Percent: Low and Moderate Income Percent is calculated by U.S. Housing and Urban Development (HUD) using data from the U.S. Census Bureau's Decennial Census, specifically for the Community Development Block Grant Program (CDBG). LMI families are defined as those families whose income does not exceed 80% of the county median income for the previous year or 80% of the median income of the entire non-metropolitan area of the State of Montana, whichever is higher.

Median income: The median income divides the income distribution into two equal groups, one having incomes above the median, and other having incomes below the median.

Notes: Total Population and Total Households are from Summary File (SF) 1, 100% data. Poverty Rates and Median Household Income are from Summary File (SF) 3, Sample data. Low and Moderate Income Percentage was developed by HUD using Census 2010 data.

Sources: U.S. Census Bureau & HUD
Median Household Income
Census Bureau, American Community Survey 2011 - 2015 Estimates

Total Population & Households
U.S. Census Bureau, 2015 Census - Summary File 1 (SF1) 100% Data

Low to Moderate Income Percent
HUD 2014 Low and Moderate Income Data

Target Rates for 2010 Census Data

View 2010 Census data rates for comparison purposes.

Appendix N

EVAPORATION WATER BALANCE

Design WW Flow
760,000 *gpd*
101,604 *cfd*

Precipitation Area
60,795,172 *ft ²*

Evaporation Area
54,715,655 *ft²*

Seepage Area
54,715,655 *ft²*

Total Pond Area
1256.1 ACRES

		Wastewater	Precipitation		Evaporation			Seepage		Net	Storage Volume	
		Volume	*Wettest in 10*	Volume	Pan	River (70%)	Volume		Volume			
		ft³	*in*	*ft³*	*in*	*in*	*ft³*	*in*	*ft³*	*ft³*	*ft³*	*Gallons*
Jan	31	3,149,733	0.91	4,592,352	0	0.00	0	0.00	0	7,742,085	32,541,375	243,409,485
Feb	28	2,844,920	0.75	3,791,039	0	0.00	0	0.00	0	6,635,959	39,177,334	293,046,457
Mar	31	3,149,733	1.10	5,564,980	0	0.00	0	0.00	0	8,714,713	47,892,046	358,232,507
Apr	30	3,048,128	1.65	8,377,865	5.03	3.52	16,054,485	0.00	0	-4,628,492	43,263,554	323,611,386
May	31	3,149,733	4.31	21,823,343	6.71	4.70	21,416,619	0.00	0	3,556,456	46,820,010	350,213,677
Jun	30	3,048,128	1.90	9,637,860	7.40	5.18	23,618,924	0.00	0	-10,932,936	35,887,074	268,435,317
Jul	31	3,149,733	0.96	4,852,088	8.88	6.22	28,342,709	0.00	0	-20,340,889	15,546,186	116,285,470
Aug	31	3,149,733	1.44	7,316,816	8.15	5.71	26,012,734	0.00	0	-15,546,186	0	0
Sep	30	3,048,128	1.92	9,737,333	5.10	3.57	16,277,907	0.00	0	-3,492,446	-3,492,446	-26,123,493
Oct	31	3,149,733	2.24	11,356,538	0.00	0.00	0	0.00	0	14,506,271	11,013,825	82,383,413
Nov	30	3,048,128	0.64	3,266,041	0	0.00	0	0.00	0	6,314,169	17,327,994	129,613,398
Dec	31	3,149,733	0.85	4,321,563	0	0.00	0	0.00	0	7,471,296	24,799,290	185,498,693
	365	*37,085,561*	*18.68*	*94,637,818*	*41.27*	*28.89*	*131,723,379*	*0.00*	*0*	*0*		

Appendix O

Part 2 - SPRAY IRRIGATION WATER BALANCE

Design WW Flow
760,000 *gpd*
101,604 *cfd*

Precipitation Area
734,323 *ft²*

Evaporation Area
702,847 *ft²*

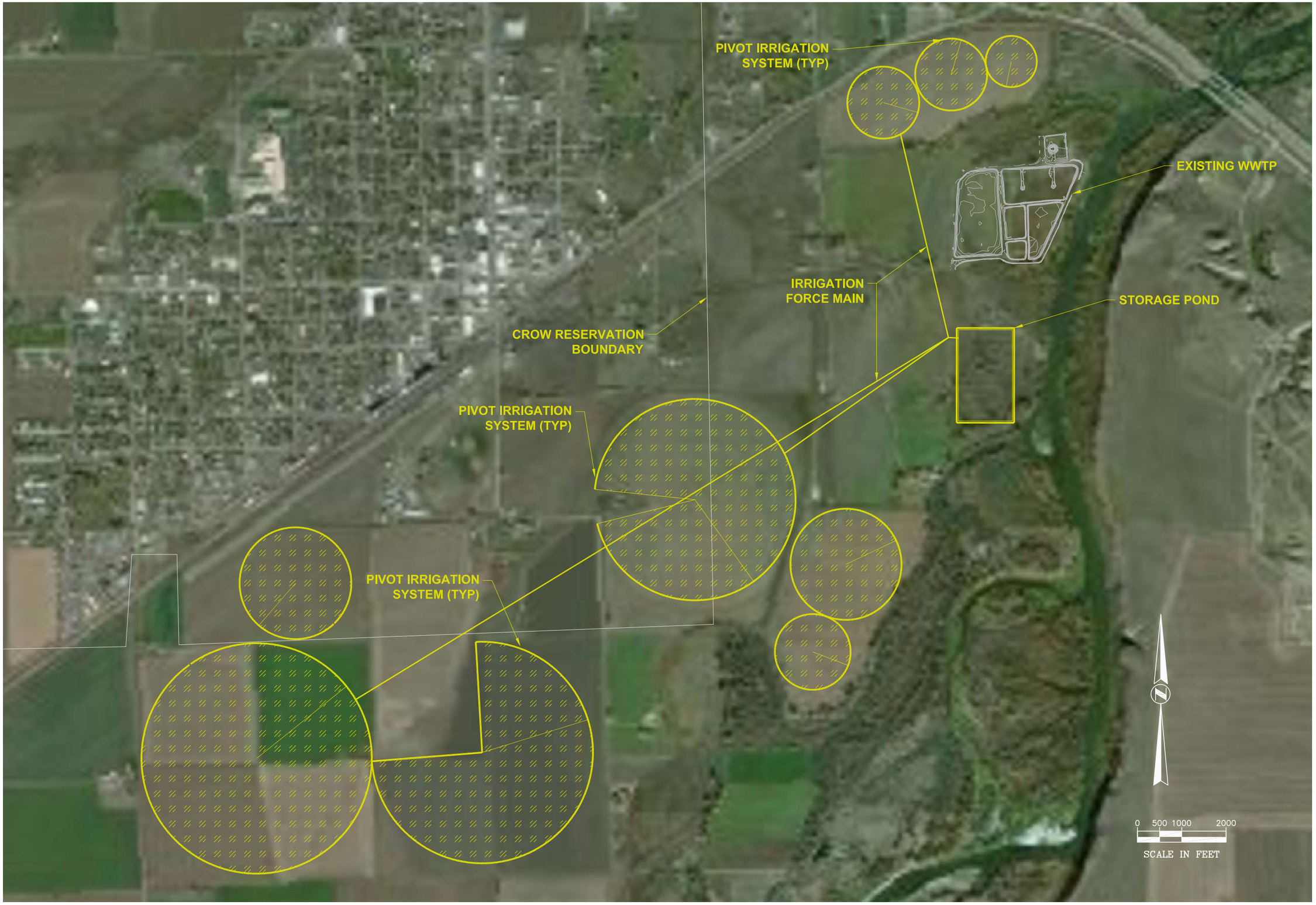
Irrigation Area
16,774,770 *ft²*
385.10 *acres*

From Nitrogen & Hydraulic Loading (Part 1)

		Wastewater	Precipitation		Evaporation			Irrigation		Net	Storage Volume	
		Volume		Volume	Pan	River (70%)	Volume		Volume			
		ft³	*in*	*ft³*	*in*	*in*	*ft³*	*in*	*ft³*	*ft³*	*ft³*	*Gallons*
Jan	31	3,149,733	0.91	55,469	0	0	0	0.00	0	3,205,202	12,781,615	95,606,481
Feb	28	2,844,920	0.75	45,791	0	0	0	0.00	0	2,890,710	15,672,326	117,228,995
Mar	31	3,149,733	1.10	67,217	0	0	0	0.00	0	3,216,950	18,889,276	141,291,781
Apr	30	3,048,128	1.65	101,193	5.03	3.52	206,227	0.00	0	2,943,095	21,832,370	163,306,129
May	31	3,149,733	4.31	263,596	6.71	4.70	275,106	0.00	0	3,138,223	**24,970,593**	**186,780,037**
Jun	30	3,048,128	1.90	116,412	7.40	5.18	303,396	7.58	10,600,373	-7,739,228	17,231,365	128,890,612
Jul	31	3,149,733	0.96	58,607	8.88	6.22	364,075	8.25	11,531,621	-8,687,356	8,544,009	63,909,188
Aug	31	3,149,733	1.44	88,377	8.15	5.71	334,145	6.05	8,453,880	-5,549,915	2,994,094	22,395,822
Sep	30	3,048,128	1.92	117,614	5.10	3.57	209,097	4.26	5,950,739	-2,994,094	0	0
Oct	31	3,149,733	2.24	137,172	0.00	0.00	0	0.00	0	3,286,904	3,286,904	24,586,043
Nov	30	3,048,128	0.64	39,449	0	0	0	0.00	0	3,087,578	6,374,482	47,681,124
Dec	31	3,149,733	0.85	52,199	0	0	0	0.00	0	3,201,931	9,576,413	71,631,570
	365	*37,085,561*	*18.68*	*1,143,096*	*41.27*	*28.89*	*1,692,045*	*26.14*	*36,536,613*	*0*		

**Sepage assumed to be zero (Synthetic Liner)*
Pan to River = 70%
Huntley, MT Evap. Data)

Stahly Engineering & Associates, Inc. COPYRIGHT 2015



STAHLY ENGINEERING & ASSOCIATES, INC. EST. 1970

STAHLY ENGINEERING & ASSOCIATES
PROFESSIONAL ENGINEERS & SURVEYORS
www.seaeng.com

2223 MONTANA AVE.
STE. 201
BILLINGS, MT 59101
Phone: (406)601-4055
Fax: (406)601-4062

3530 CENTENNIAL DR.
HELENA, MT 59601
Phone: (406)442-8594
Fax: (406)442-8557

851 BRIDGER DR. STE. 1
BOZEMAN, MT 59715
Phone: (406)522-9526
Fax: (406)522-9528

ISSUE/REVISION

No.	DATE	BY
1	####	####
DESCRIPTION		
####		

No.	DATE	BY
2		
DESCRIPTION		

No.	DATE	BY
3		
DESCRIPTION		

No.	DATE	BY
4		
DESCRIPTION		

No.	DATE	BY
5		
DESCRIPTION		

PRELIMINARY
NOT FOR CONSTRUCTION

SPRAY IRRIGATION ALTERNATIVE

WASTEWATER TREATMENT UPGRADES PER

CITY OF HARDIN, MONTANA

DESIGNED: GMS
DRAWN: PDH
CHECKED:
DATE: 03-12-2018

ALTERNATIVES
SPRAY

N:\2223-08C17 Hardin WW PER\DWG\Plan Sets\PER Exhibits\SPRAY IRRIGATION.dwg, 11x17 (landscape), Plotted: Apr 23, 2018 - 11:37am, pherbst

Appendix P

MONTHLY DATA 2018

MONTH		EFF M.G.D.	Inf BOD MG/L	Inf TSS MG/L	EFF Temp	Eff BOD MG/L	Eff TSS MG/L	E-COLI COUNT	TOTAL CL-2	PH	B.O.D. %	T.S.S. %
JAN.	AVG. TOTAL	0.493	215	133	10.5	4	8	8.0	0.0	7.30	98.0%	94.0%
FEB.	AVG. TOTAL	0.492	183	133	9.1	4	9	10.0	0.0	7.26	98.0%	94.0%
MARCH	AVG. TOTAL	0.720	160	118	10.6	5	14	19.0	0.0	7.34	96.0%	87.0%
APRIL	AVG. TOTAL	707.000	125	86	11.9	4	9	22.0	0.0	7.53	97.0%	90.0%
MAY	AVG. TOTAL	0.628	123	119	15.8	4	13	26.5	0.0	7.54	97.0%	89.0%
JUNE	AVG. TOTAL	0.604	109	89	17.6	4	8	1809.0	0.0	7.48	96.2%	90.3%
JULY	AVG. TOTAL	0.599	123	91	18.8	4	8	3.0	0.0	7.45	97.0%	92.0%
AUGUST	AVG. TOTAL	0.584	134	102	18.8	4	5	5.4	0.0	7.41	97.0%	95.0%
SEP.	AVG. TOTAL	0.597	138	117	17.8	6	5	66.0	0.0	7.37	96.0%	96.0%
OCT.	AVG. TOTAL	0.538	138	107	15.4	4	4	432.0	0.0	7.35	97.0%	96.0%
NOV.	AVG. TOTAL	0.617	152	133	13.1	4	7	13.0	0.0	7.38	97.0%	95.0%
DEC.	AVG. TOTAL	0.484	150	128	11.2	4	4	6.3	0.0	7.15	97.0%	97.0%
	AVG. TOTAL						TOTAL	2363.9				
	YEAR 2018	59.446	146	113	14.2	4.2	7.8	201.7	0.0	7.38	96.9%	92.9%

2018

EFF MONTHLY FLOW DATA

	JAN.	FEB.	MARCH	APRIL	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
	M.G.D.	M.G.D.	M.G.D.	M.G.D.	M.G.D.	M.G.D.	M.G.D.	M.G.D.	M.G.D.	M.G.D.	M.G.D.	M.G.D.
MAX.	0.906	2.140	1.320	1.340	1.070	2.048	0.927	1.252	0.064	0.951	0.872	0.975
MIN.	0.053	0.086	0.050	0.043	0.401	0.029	0.614	0.012	1.700	0.044	0.415	0.032
AVG.	0.493	0.492	0.720	0.707	0.628	0.604	0.599	0.584	0.597	0.538	0.617	0.484
year MAX.	1.155											
year MIN.	0.290											
yearAVG.	0.589											

2018

INF MONTHLY FLOW DATA

JAN.	FEB.	MARCH	APRIL	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.

	M.G.D.	M.G.D.	M.G.D.	M.G.D.	M.G.D.	M.G.D.	M.G.D.	M.G.D.	M.G.D.	M.G.D.	M.G.D.	M.G.D.
MAX.	1.000	1.080	1.140	1.160	0.990	1.190	0.920	1.120	1.440	1.370	1.330	1.350
MIN.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AVG.	0.433	0.410	0.660	0.670	0.537	0.490	0.638	0.513	0.523	0.481	0.432	0.410
year MAX.	1.174											
year MIN.	0.000											
yearAVG.	0.516											

MONTHLY DATA 2017

MONTH		EFF M.G.D.	Inf BOD MG/L	Inf TSS MG/L	EFF Temp	Eff BOD MG/L	Eff TSS MG/L	E-COLI COUNT	TOTAL CL-2	PH	B.O.D. %	T.S.S. %
JAN.	AVG. TOTAL	0.517	160	103	10.0	4	10	5.0	0.0	7.43	97.0%	86.0%
FEB.	AVG. TOTAL	0.620	124	110	10.5	4	4	17.0	0.0	7.37	96.0%	93.0%
MARCH	AVG. TOTAL	0.681	117	115	12.1	5	8	4.0	0.0	7.50	95.0%	89.0%
APRIL	AVG. TOTAL	0.687	112	108	13.2	4	15	3.0	0.0	7.49	95.0%	80.0%
MAY	AVG. TOTAL	0.620	128	132	15.4	6	13	5.0	0.0	7.54	92.0%	80.0%
JUNE	AVG. TOTAL	0.658	133	109	17.8	4	7	24.0	0.0	7.51	97.0%	85.0%
JULY	AVG. TOTAL	0.559	140	98	19.9	4	6	2.0	0.0	7.51	97.0%	87.0%
AUGUST	AVG. TOTAL	0.582	148	108	19.8	4	4	2.0	0.0	7.57	97.0%	94.0%
SEP.	AVG. TOTAL	0.580	150	113	18.2	5	4	3.0	0.0	7.44	95.0%	95.0%
OCT.	AVG. TOTAL	0.648	150	125	15.3	4	9	4.0	0.0	7.44	97.0%	90.0%
NOV.	AVG. TOTAL	0.617	175	118	13.7	4	6	4.0	0.0	7.42	97.0%	91.0%
DEC.	AVG. TOTAL	0.472	164	136	12.0	4	9	2.0	0.0	7.35	97.0%	88.0%
	AVG. TOTAL						TOTAL	43.0				
	YEAR 2017	0.603	142	115	14.8	4.3	7.9	6.3	0.0	7.46	96.0%	88.2%

2017

EFF MONTHLY FLOW DATA

	JAN. M.G.D.	FEB. M.G.D.	MARCH M.G.D.	APRIL M.G.D.	MAY M.G.D.	JUNE M.G.D.	JULY M.G.D.	AUG. M.G.D.	SEP. M.G.D.	OCT. M.G.D.	NOV. M.G.D.	DEC. M.G.D.
MAX.	1.150	1.183	1.440	1.560	1.190	0.913	1.000	1.490	1.170	0.795	0.872	1.410
MIN.	0.082	0.194	0.096	0.339	0.205	0.528	0.053	0.000	0.020	0.442	0.415	0.059
AVG.	0.517	0.620	0.681	0.687	0.620	0.658	0.559	0.582	0.580	0.648	0.617	0.472
year MAX.	1.181											
year MIN.	0.203											
yearAVG.	0.603											

Appendix Q

AFFIDAVIT OF PUBLICATION

State of Montana
County of Big Horn

I, Danielle Eshleman, being duly sworn, upon oath, say: That I am over the age of twenty-one years, and a citizen of the United States of America; that I am not a party to, nor in anywise interested in the matter referred to in the attached notice; that I am now Office Manager of the Big Horn County News.

That the annexed printed notice,

ENVIRONMENTAL ASSESSMENT NOTICE OF AVAILABILITY AND PUBLIC HEARING

The City of Hardin is preparing an application for a Treasure State Endowment Program (TSEP) grant from the Montana Department of Commerce (DOC) as well as other potential applications to various state and federal agencies. TSEP grants are a state action subject to the Montana Environmental Policy Act (MEPA). As required by MEPA and DOC regulations, the City has prepared a draft Environmental Assessment (EA) meant to evaluate the potential environmental affects and consequences of the proposed project. This notice announces the availability of the draft EA for public review and comments. The proposed action generally relates to upgrading the City of Hardin wastewater treatment system. Copies of the draft EA are available for review by contacting the City of Hardin. The City of Hardin will consider all substantive comments received in response to the draft EA and make decisions at a public meeting to be held on March 20, 2018 at 6:45 pm in conjunction with the project's public hearing.

At the public hearing, the proposed project will be explained, including the purpose and proposed area of the project activities, budget, possible sources of funding, the environmental

is a true copy (in identical terms and format) which was printed and published in full in the regular and entire issue of said newspaper (and not in any supplement thereof) on **March 8 & 15, 2018**

Danielle Eshleman
DANIELLE ESHLEMAN, Office Manager
Big Horn County News

SUBSCRIBED AND SWORN to before me this 15th day of March, 2018 by Danielle Eshleman.

Rita Rae Pratt

RITA RAE PRATT NOTARIAL SEAL STATE OF MONTANA

RITA RAE PRATT
NOTARY PUBLIC for the
State of Montana
Residing at Hardin, Montana
My Commission Expires
March 17, 2019

AFFIDAVIT OF PUBLICATION

State of Montana
County of Big Horn

I, Danielle Eshleman, being duly sworn, upon oath, say: That I am over the age of twenty-one years, and a citizen of the United States of America; that I am not a party to, nor in anywise interested in the matter referred to in the attached notice; that I am now Office Manager of the Big Horn County News.

That the annexed printed notice,

any costs that may affect local citizens as a result of the project.

In addition, the City of Hardin will decide that either:

1. An Environmental Impact Statement (EIS) is necessary;

2. The Environmental Assessment did not adequately reflect the issues raised by the proposed action and must be revised; or

3. An EIS is not necessary and make a final decision on the proposed action (submitting the application to TSEP and other appropriate agencies for funding).

All interested persons will be given the opportunity to ask questions and to express their opinions regarding this proposed project and environmental impacts. For further information, contact Greg Steckler, PE, Stahly Engineering, 406-522-8594. Comments may be given orally at the hearing or submitted in writing to cityclerk@hardinmt.com or 406 North Cheyenne, Hardin, MT 59034 before March 20, 2018 at 4:00 pm.

A general location map of the proposed improvements can be reviewed at the City of Hardin Administrative Offices.

Publish: March 8 & 15, 2018
MNAXLP
****

is a true copy (in identical terms and format) which was printed and published in full in the regular and entire issue of said newspaper (and not in any supplement thereof) on **March 8 & 15, 2018**

Danielle Eshleman
DANIELLE ESHLEMAN, Office Manager
Big Horn County News

SUBSCRIBED AND SWORN to before me this 15th day of March, 2018 by Danielle Eshleman.

Rita Rae Pratt

RITA RAE PRATT NOTARIAL SEAL STATE OF MONTANA

RITA RAE PRATT
NOTARY PUBLIC for the
State of Montana
Residing at Hardin, Montana
My Commission Expires
March 17, 2019

AFFIDAVIT OF PUBLICATION

State of Montana
County of Big Horn

I, Danielle Eshleman, being duly sworn, upon oath, say: That I am over the age of twenty-one years, and a citizen of the United States of America; that I am not a party to, nor in anywise interested in the matter referred to in the attached notice; that I am now Office Manager of the Big Horn County News.

That the annexed printed notice,

CITY OF HARDIN
WASTEWATER
PROJECT MEETING

Hardin, Montana, March 20, 2018 – On Tuesday, March 20th, the City of Hardin will host a meeting to discuss the City's upcoming Wastewater System Improvement Project with specific discussion related to the Preliminary Engineering Report findings, upcoming grant applications, and environmental assessment findings. The meeting will begin at 6:45 pm at the City Council Chambers, 401 North Cheyenne, Hardin, MT 59034. The Council will be hearing recommendations from Stahly Engineering regarding the adoption of the Preliminary Engineering Report (PER) with Environmental Assessment (EA) and submittal of grant applications to the Treasure State Endowment Program (TSEP), Department of Natural Resources & Conservation (DNRC), and possibly the State Revolving Loan Fund and/or USDA/Rural Development. Anyone interested in the City's wastewater system is encouraged to attend the meeting, ask questions, and offer their comments. Information gathered during the hearing will be included in the PER being prepared for the City by Stahly Engineering & Associates.

The PER, prepared by Stahly Engineering, will provide the City with a document used in grant applications to the various funding sources including TSEP and DNRC, subject

is a true copy (in identical terms and format) which was printed and published in full in the regular and entire issue of said newspaper (and not in any supplement thereof) on **March 8 & 15, 2018**

Danielle Eshleman
DANIELLE ESHLEMAN, Office Manager
Big Horn County News

SUBSCRIBED AND SWORN to before me this 15th day of March, 2018 by Danielle Eshleman.

Rita Rae Pratt

RITA RAE PRATT NOTARIAL SEAL STATE OF MONTANA

RITA RAE PRATT
NOTARY PUBLIC for the
State of Montana
Residing at Hardin Montana
My Commission Expires
March 12, 2019

AFFIDAVIT OF PUBLICATION

State of Montana
County of Big Horn

I, Danielle Eshleman, being duly sworn, upon oath, say: That I am over the age of twenty-one years, and a citizen of the United States of America; that I am not a party to, nor in anywise interested in the matter referred to in the attached notice; that I am now Office Manager of the Big Horn County News.

That the annexed printed notice,

the Montana Legislature and the Governor. Both applications are expected to have May 2018 deadlines. Additional grant and/or loan applications may be made to the State Revolving Fund and/or USDA/Rural Development.

Each TSEP application and DNRC application will be ranked by the Department of Commerce (DOC) and DNRC respectively, and presented to the Legislature in January for its consideration. The grant process is extremely competitive. To be successful, applicants must demonstrate that their project will solve urgent and serious health or safety problems, is vital to their economy, is financially feasible, and enjoys strong public support. When City of Hardin residents take an active role in selecting and planning the replacement of vital infrastructure that they rely on for their safety and the safety of their families, friends, and neighbors, the likelihood of success goes up significantly. People that are unable to attend the meeting on March 20th are encouraged to send their written comments to the City of Hardin, 406 North Cheyenne, Hardin, MT 59034.

For more information please contact Michelle Dyckman, City of Hardin Clerk / Finance Officer at 406-665-9293 or Greg Steckler, PE, Stahly Engineering at 406-522-8594.

Publish: March 8 & 15, 2018
MNAXLP

is a true copy (in identical terms and format) which was printed and published in full in the regular and entire issue of said newspaper (and not in any supplement thereof) on **March 8 & 15, 2018**

Danielle Eshleman
DANIELLE ESHLEMAN, Office Manager
Big Horn County News

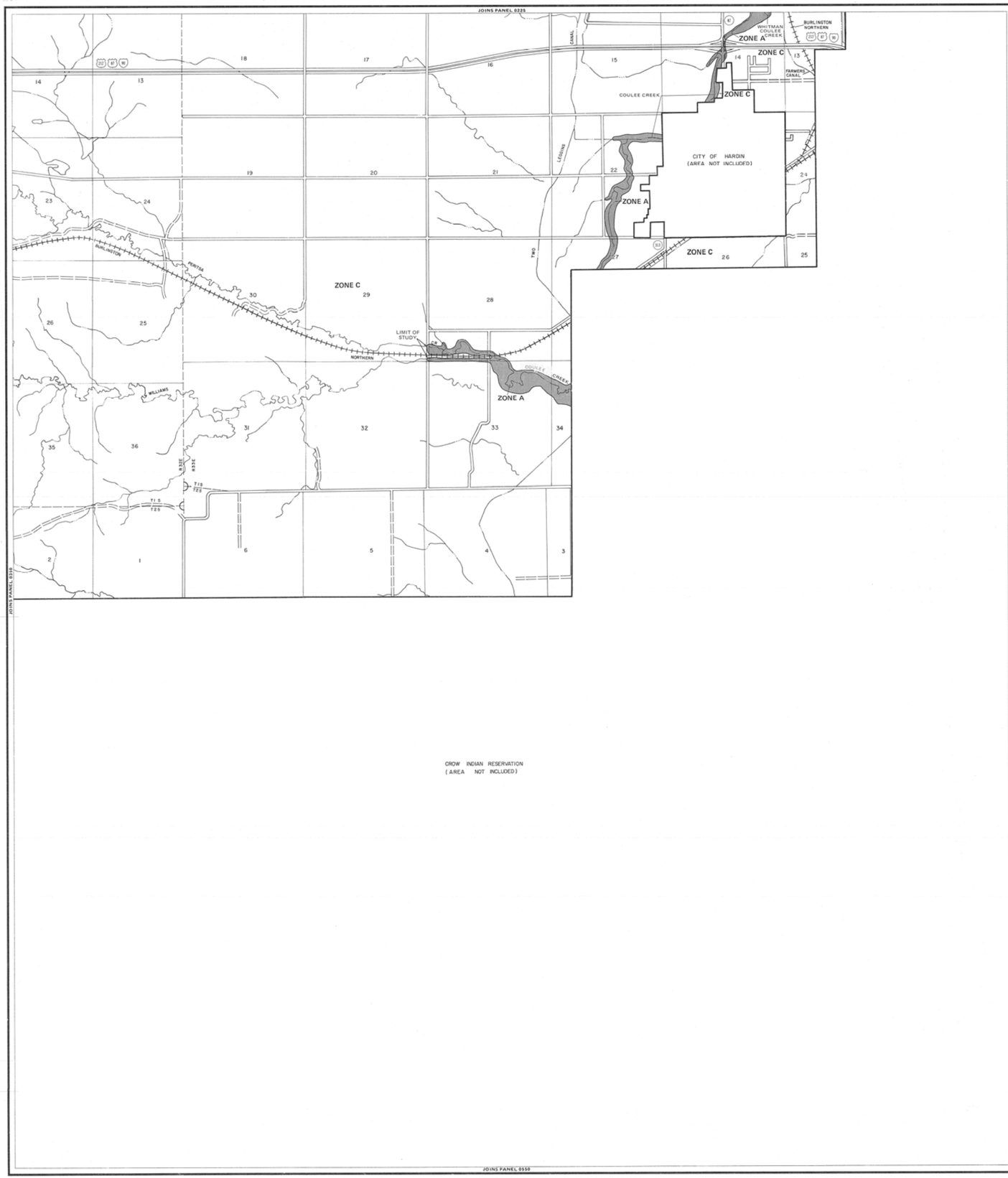
SUBSCRIBED AND SWORN to before me this 15th day of March, 2018 by Danielle Eshleman.

Rita Rae Pratt

RITA RAE PRATT NOTARIAL SEAL STATE OF MONTANA

RITA RAE PRATT
NOTARY PUBLIC for the
State of Montana
Residing at Hardin, Montana
My Commission Expires
March 17, 2019

Appendix R



KEY TO MAP

500-Year Flood Boundary	ZONE B
100-Year Flood Boundary	ZONE A1 DATE
Zone Designations* With Date of Identification e.g., 12/2/74	ZONE A5 DATE
100-Year Flood Boundary	
500-Year Flood Boundary	ZONE B
Base Flood Elevation Line With Elevation In Feet**	513
Base Flood Elevation In Feet Where Uniform Within Zone**	(EL 987)
Elevation Reference Mark	RM7 ×
River Mile	• M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

For adjoining map panels, see separately printed Index To Map Panels.

INITIAL IDENTIFICATION:
FEBRUARY 7, 1978

FLOOD HAZARD BOUNDARY MAP REVISIONS:

FLOOD INSURANCE RATE MAP EFFECTIVE:
SEPTEMBER 2, 1981

FLOOD INSURANCE RATE MAP REVISIONS:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE date shown on this map to determine when actuarial rates apply to structures in the zones where elevations or depths have been established.

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program, at (800) 638-6620.

APPROXIMATE SCALE
2000 0 2000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

BIG HORN COUNTY, MONTANA
(UNINCORPORATED AREAS)

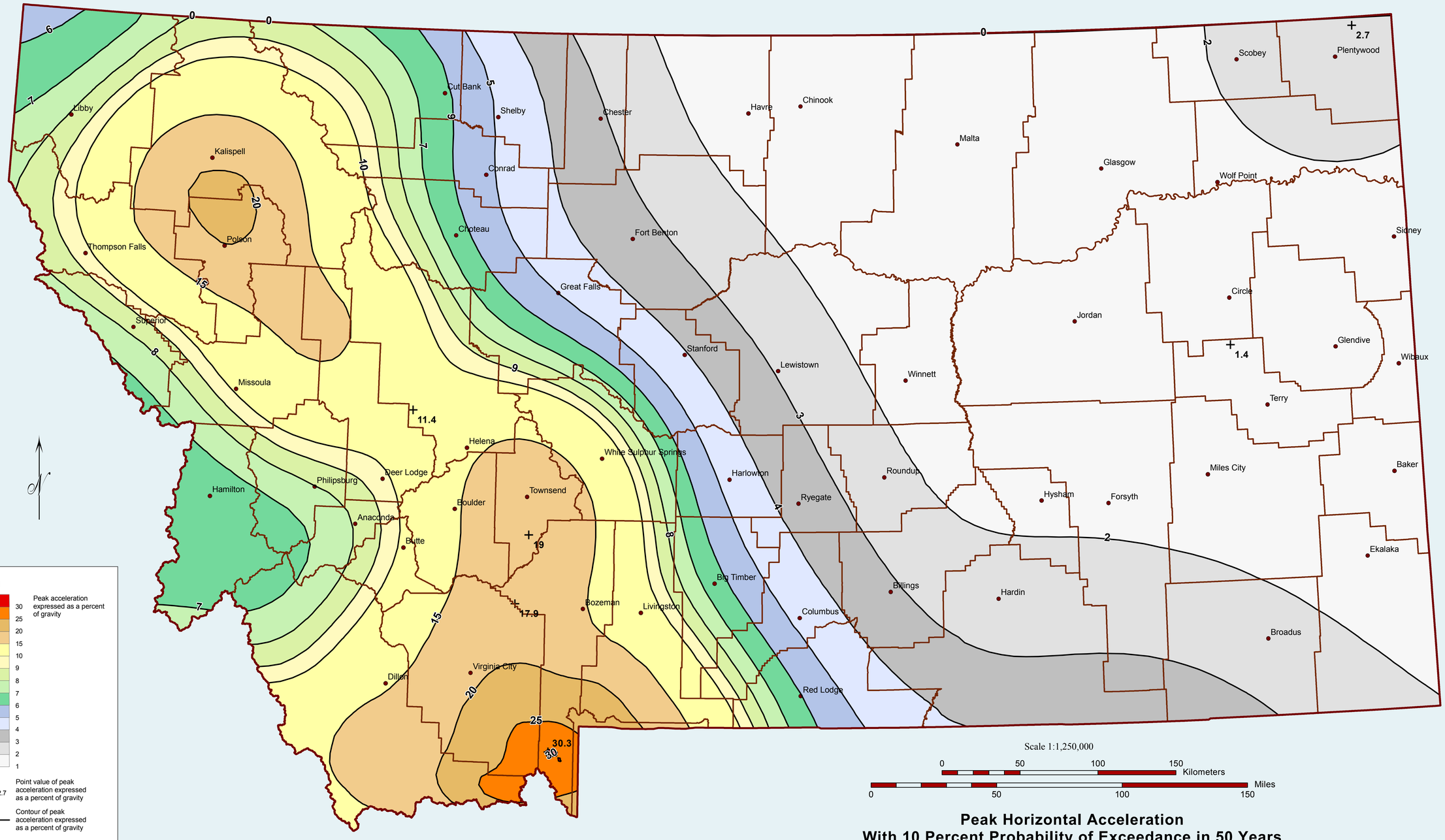
PANEL 375 OF 1450
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
300143 0375 B

EFFECTIVE DATE:
SEPTEMBER 2, 1981

federal emergency management agency
federal insurance administration

Appendix S



Peak Horizontal Acceleration
With 10 Percent Probability of Exceedance in 50 Years

Seismic-Hazard Map for the State of Montana

Source and Reference Material: USGS - http://pubs.usgs.gov/sim/2005/2883/pdf/2883-1.pdf

Appendix T

CITY OF HARDIN

406 N Cheyenne Ave

Hardin Mt 59034

US EPA region 8
1595 Wynkoop St.
8ENF-W-NP

Denver C0.80202

To: Emilio Llamozas

Find enclosed the response/corrective actions to the September 2017 inspection report from US EPA. The response is structured by finding/corrective action numbers.

Finding #1 The Company (MET) that installed and calibrated the Influent and effluent meters has been contacted and has agreed to check the accuracy of both meters annually. They are developing a schedule to do the accuracy check in 2018. Records of the check will be documented and records kept on site at the WWTP.

Finding #2 (a) An SOP for pH and temperature with the Hach 30d meter (our equivalent of a dedicated bench meter) is in place as is an SOP for daily calibration of the same meter.

(b) Whiteout is not available in any form for use by our technicians.

(c) All corrections are single line crossed out and initialed by the tech responsible.

(d) The laboratory refrigerator is used for sample storage only, not used for any analysis procedure. A thermometer is outside (digital) and inside (independent) to ensure accurate storage temperature control.

(e) The pH meter is a Hach 30d portable with refillable probe and is dedicated to pH and temperature only and is treated as a bench meter. The meter is calibrated daily as per manufacturer specifications. See copies of calibration log book.

Finding #3 The visual observations of oil and Grease are performed daily as the effluent sample is taken. Any visible "sheen" is the trigger point for immediate sampling. Sample bottles are kept on site for such situations with spares bottles available. To date no cause for sampling has been seen or recorded. Some particulate matter has been noticed in the effluent and sampling was implemented for analysis, all samples have come back as ND (non detect), see sample results included. Discussion with the EPA is ongoing.

Finding #4 The monthly report has been corrected to reflect the changes required on the monthly bench sheets of June 2017 and July 2017. The July 2017 DMR using NETDMR has been corrected, submitted and signed as of 01/14/2018.

CITY OF HARDIN

406 N Cheyenne Ave

Hardin Mt 59034

Finding#5 We will submit past I& I information and studies for review as requested by the EPA. We will implement plans to continue the study in a timely fashion after discussion with the city officials and the EPA.

Finding#6 (a) We will evaluate the clarifier weirs to address and adjust the level status for even flow. This will take place during the scheduled inspection and maintenance of clarifier #1 this spring/summer (2018). Clarifier #2 will be addressed during the scheduled inspection and maintenance in the spring/summer of 2019.

Finding#6 (b) The influent flow situation described continues to exist. The bypass solution is the only available solution for the high flow situation. Other solutions are being discussed and will be shared with the EPA. Influent by passes are monitored by plant effluent and are adjusted to keep the plant treating as much flow as possible without upsetting the processes. Full by passes are kept to a minimum.

Finding#6 (c) The situation described happens during scheduled maintenance of the Clarifiers which is cleaning. During cleaning a partial by pass is opened to divert flow from the effluent stream to the wet well designated to the drying beds pre-disinfection. This is used only during maintenance (once per week) and is approximately 10 to 15% of the surface flow. This procedure is currently in place. Other options will be discussed in the future for improvement to the influent treatment equipment to remove the grease situation and improve overall treatment. Timeline unknown.

Finding#6 (d) The WWTP does not currently have access to an alternative power source for total plant operation. A current plan is being discussed and a PER being developed to address this and other WWTP additions. Timeline unknown.

Finding#7 The lawn pump is being moved to a location that is post disinfection and will be used for watering and cleaning.

Finding#8 Maintenance manuals exist for all equipment and are used as needed for inspection and maintenance, Individual log sheets are kept for each piece of equipment and updated regularly. SOP's are being developed for maintenance, laboratory procedures, inspection, day to day duties, and other aspects of operations. Some of these SOP's exist and are implemented, they are always being updated as needed.

Finding #9 A Maintenance program exists, including proactive inspection and maintenance, and is tracked on individual equipment forms but is not wholly in SOP format. We do have procedures that adhere to manufacturer specifications as outlined in the manuals. We are looking into a computer based maintenance program, such as CUPSS, but have not found one that is suitable to our needs.

CITY OF HARDIN

406 N Cheyenne Ave

Hardin Mt 59034

Finding #10 Our sludge drying beds consist of old sealed lagoons separated by berms. We have one large lagoon divided in two separate areas, one for active disposal and one for storage to be disposed. When we can access the beds for disposal analysis is done and reported prior to actual removal. The beds are switched after disposal and cleanup. These are large areas and work well for these purposes. The beds can only be accessed during winter when the area is frozen and will accommodate the disposal equipment. Because of these access limitations due to weather and the large size, we are going to apply for a variance to storage time frames in our plant.

1-23-18

John Stanich - Lead Operator

1/23/18

Rock Massine – Asst Superintendent

1/23/18

Joe Purcell - Mayor

MONTHLY REPORT

MONTH: JULY **YEAR 2017** **OPERATOR: JS /**

use 6/30 for 7/1

DATE	INFLUENT					OXIDATION DITCH								CLARIFIER EFFLUENT		EFFLUENT								
	ABB/SIEMANS METER	M.G.D.	TIME	B.O.D. MG/L	T.S.S.	TEMP. OX.	DIG.	pH OX.	DIG.	ATC%	S.V.I.	1 HR SLUDGE	T.S.S. MG/L	B.O.D. MG/L	T.S.S. MG/L	E-COLI COUNT	TOTAL CL-2	TOTALIZER GALLONS	ABB MGD	PH	B.O.D.%	T.S.S.%	EFF. TEMP.	OIL GREASE
1	O/S			120	102									4	2.00	5	0.00				97	98		0.00
2	761.20																							
3			9:26			20.4		7.46		3.9	85	330	4835					129491	0.790	7.13			19.7	0.00
4																								
5			9:10			19.6		7.49		4.1	80	310	5150					129612	0.511	7.53			19.9	0.00
6			13:54	140	76	19.5		7.42		4.5	84	380	4870	4	10.00	1		129685	0.600	7.50	97	87	20.0	0.00
7			9:17			19.6		7.40		3.8	88	340	4670					129733	0.545	7.44			19.8	0.00
8																								
9																								
10			9:10			20.1		7.39		4.5	80	390	5105					129914	0.748	7.47			21.2	0.00
11			9:00			19.7		7.49		4.5	93	380	4730					129970	0.640	7.51			19.9	0.00
12			9:15			19.4		7.49		4.5	91	360	4735					130030	0.625	7.49			19.8	0.00
13			12:40	140	112	19.6		7.45		4.3	91	370	4755	4	8.00	2		130091	0.509	7.50	97	93	19.9	0.00
14			9:03			20.4		7.42		4.2	103	360	3790					130137	0.519	7.46			20.3	0.00
15																								
16																								
17			10:30			20.1		7.69		1.1	130	100	915					130245	0.748	7.38			19.9	0.00
18			9:08			19.3		7.70		1.2	120	100	1000					130300	0.704	7.54			19.7	0.00
19			9:13			19.9		7.73		1.2	106	130	1230					130359	0.704	7.68			20.3	0.00
20			9:35	150	110	19.8		7.65		1.1	104	120	1350	4	6.00	2		130417	0.655	7.62	97	95	20.4	0.00
21			9:09			19.1		7.64		1.1	106	110	1325					130475	0.584	7.56			19.6	0.00
22																								
23																								
24			8:58			19.1		7.70		1.3	160	150	1060					130641	0.441	7.63			19.6	0.00
25			15:30			19.3		7.69		1.5	95	110	1575					130714	0.609	7.60			19.8	0.00
26			9:10			18.9		7.67		1.6	89	160	1795					130755	0.525	7.66			19.4	0.00
27			14:35	150	90	19.4		7.69		1.6	96	180	1770	4	4.00	4		130825	0.739	7.60	97	96	20.1	0.00
28			9:02			20.0	24.0	7.70	5.63	1.7	140	160	1430					130870	0.720	7.47			17.6	0.00
29																								
30	761.24																							
31			9:21			19.9		7.66		1.1	144	180	1315					131064	0.601	7.52			20.2	0.00
	MAX.		MAX.	150	112	20.4	24.0	7.73	5.63	4.5	160	390	5150	4	10	5	0	131064	0.790	7.68	97	96	21.2	TOTAL
	MIN.		MIN.	120	76	18.9	24	7.39	5.63	1.1	80	100	915	4	2	1	0	129491	0.441	7.13	97	87	17.6	0
	AVG.	0.890	AVG.	140	98	19.7	24.0	7.58	5.63	2.6	104	236	2870	4	6	3	0	130266	0.626	7.51	97	92	19.9	
	Jul-16		Inf lbs/d	1039	727.4								eff lbs/d	18.65	27.97	2.40225	GEO	AVG						

flow meter max 1.000
min 0.053
avg 0.559

MONTHLY REPORT

MONTH: July **YEAR** 2017 **OPERATOR:** JS

use 4/29 for 7/1

DATE	INFLUENT ABB/SIEMANS METER	M.G.D.	TIME	B.O.D. MG/L	T.S.S. MG/L	OXIDATION DITCH TEMP. OX.	TEMP. DIG.	pH OX.	pH DIG.	ATC%	S.V.I.	1 HR SLUDGE	T.S.S. MG/L	EFFLUENT B.O.D. MG/L	T.S.S. MG/L	E-COLI COUNT	TOTAL CL-2	TOTALIZER GALLONS	ABB MGD	PH	BOD%	TSS%	EFF. TEMP.	OIL GREASE
	O/S																							
1	761.20			120	102						85			4	2	5	0							N-O
2											85													
3	0926	-	0926			20.4		7.46		3.9	410	330	4835					129491	0.790	7.13			19.7	N-O
4	—		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5	761.20		0910			19.6		7.49		4.1	480	310	5130					129612	0.511	7.53			19.9	N-O
6	761.21		1354	140	76	19.5		7.42		4.5	84	380	4870	4	10	1		129685	.600	7.50			20.0	N-O
7	761.21		0917			19.6		7.40		3.8	88	340	4670					129733	0.545	7.46			19.8	N-O
8																								
9																								
10	761.21		0910			20.1		7.39		4.5	80	390	5105					129914	0.748	7.47			21.2	N-O
11	761.21		0900			19.7		7.49		4.5	93	380	4730					129970	0.640	7.51			19.9	N-O
12	761.21		0915			19.4		7.49		4.5	91	360	4735					130030	0.625	7.49			19.8	N-O
13	761.21		1240	140	112	19.6		7.45		4.3	91	390	4755	4	8	2		130091	0.509	7.50			19.9	N-O
14	761.22		0903			20.4		7.42		4.2	103	360	3790					130137	0.519	7.46			20.3	N-O
15																								
16																								
17	761.22		1030			20.1		7.69		1.1	130	100	915					130245	0.748	7.38			19.9	N-O
18	761.22		0908			19.3		7.70		1.2	120	100	1000					130300	0.704	7.54			19.7	N-O
19	761.22		0913			19.9		7.73		1.2	106	130	1230					130359	0.704	7.68			20.3	N-O
20	761.22		0935	150	110	19.8		7.65		1.1	104	120	1350	4	6	2		130417	0.655	7.62			20.4	N-O
21	761.22		0909			19.1		7.64		1.1	106	110	1325					130475	0.584	7.56			19.6	N-O
22	761.23		0858																					
23																								
24	761.23		0858			19.1		7.70		1.3	160	150	1060					130641	0.441	7.63			19.6	N-O
25	761.23		1530			19.3		7.69		1.2	95	110	1575					130714	0.609	7.60			19.8	N-O
26	761.23		0910			19.9		7.67		1.6	89	160	1795					130755	0.525	7.66			19.4	N-O
27	761.23		0935	150	90	19.4		7.69		1.6	96	180	1770	4	3	4		130825	0.739	7.60			20.1	N-O
28	761.23		0902			20.0	5.63	7.70	24.0	1.7	140	160	1430					130870	0.720	7.47			17.6	N-O
29	761.24	DB	0921																					
30																								
31	76.24		0921			19.9		7.66		1.1	144	180	1315					131064	0.601	7.52			20.2	N-O
MAX.			MAX.																					
MIN.			MIN.																					
AVG.	0.89		AVG.														0							
	Inf lbs/d												eff lbs/d	0		#NUM!	GEO	AVG	Meter	MAX	1.0			
																2.4				MIN	.053			
																				AVG	0.559			

use 7/14 Inf flow

MONTHLY REPORT

MONTH: JUNE **YEAR 2017** **OPERATOR: JS /**

use 6/29 for 7/1

DATE	INFLUENT					OXIDATION DITCH								CLARIFIER EFFLUENT		EFFLUENT								
	ABB/SIEMANS METER	M.G.D.	TIME	B.O.D. MG/L	T.S.S.	TEMP. OX.	DIG.	pH OX.	DIG.	ATC%	S.V.I.	1 HR SLUDGE	T.S.S. MG/L	B.O.D. MG/L	T.S.S. MG/L	E-COLI COUNT	TOTAL CL-2	TOTALIZER GALLONS	ABB MGD	PH	B.O.D.%	T.S.S.%	EFF. TEMP.	OIL GREASE
1	O/S		10:15	120	98	16.8		7.42		1.2	98	140	1530	4	3	3	0.00	127394	0.553	7.47	97	97	17.5	0.00
2	761.15		9:00			17.0		7.42		1.6	88	170	2040					127455	0.634	7.46			17.4	0.00
3																								
4																								
5			9:00			18.1		7.42		1.6	87	160	1955					127650	0.793	7.49			18.9	0.00
6			9:08			17.4		7.46		1.0	94	110	1165					127715	0.606	7.46			17.2	0.00
7			9:00			17.5		7.42		2.2	88	230	2825					127780	0.835	7.48			17.5	0.00
8			9:01	130	84	17.8		7.45		1.6	89	160	1790	4	4	130		127846	0.799	7.61	97	95	18.3	0.00
9			9:16			18.0		7.44		1.6	88	180	2035					127915	0.656	7.41			18.4	0.00
10																								
11																								
12																		128126	0.806					
13			9:29			17.6		7.41		3.1	88	310	4310					128202	0.688	7.50			17.6	0.00
14			9:02			16.4		7.42		3.5	88	310	4455					128269	0.913	7.56			16.6	0.00
15			9:00	120	109	16.8		7.56		3.8	100	340	4405	4	17	31		128336	0.528	7.53	97	85	17.4	0.00
16			8:57			17.4		7.40		3.5	97	340	4350					128400	0.764	7.56			17.4	0.00
17																								
18																								
19			9:30			18.8		7.46		2.6	73	190	2730					128598	0.761	7.42			16.3	0.00
20			9:05			17.4		7.54		2.9	87	230	3090					128661	0.558	7.55			18.0	0.00
21			9:30			18.4		7.52		4.1	94	360	4690					128721	0.597	7.64			18.6	0.00
22			8:40	160	145	16.6		7.57		3.5	92	330	4555	4	3	26		128780	0.673	7.52	98	98	18.0	0.00
23			9:08			16.9		7.52		4.0	98	320	4375					128846	0.792	7.62			17.2	0.00
24																								
25																								
26			9:13			18.2		7.49		4.3	108	370	4635					129039	0.565	7.41			18.5	0.00
27			9:03			17.8		7.56		2.3	121	240	3060					129100	0.592	7.58			18.4	0.00
28			9:13			18.1		7.42		4.5	95	350	4625					129170	0.804	7.56			18.2	0.00
29			8:58			18.1	20.6	7.48	5.51	4.0	85	300	4840					129236	0.789	7.47			18.4	0.00
30	761.20		9:00			18.1		7.43		3.7	85	330	4820					129302	0.658	7.40			18.2	0.00
31																								
	MAX.	0.276	MAX.	160.0	145.0	18.8	20.6	7.57	5.51	4.5	121	370	4840	4	17	130	0	129302	0.913	7.64	97.5	97.9	18.9	TOTAL
	MIN.		MIN.	120.0	84.0	16.4	20.6	7.4	5.51	1.0	73	110	1165	4	3	3	0	127394	0.528	7.40	96.7	84.8	16.3	0
	AVG.	0.457	AVG.	132.5	108.9	17.6	20.6	7.47	5.51	3.0	93	260	3442	4	7	48	0	128388	0.698	7.51	97.0	92.7	17.8	
: 5/16 for inf flow			Inf lbs/d	505.01	414.964								eff lbs/d	22.0	36.4	23.678	GEO	AVG						

flow meter	max	0.913
	min	0.528
	avg	0.658

MONTHLY REPORT

MONTH: June **YEAR** 2017 **OPERATOR:** JS

DATE	INFLUENT					OXIDATION DITCH								EFFLUENT										
	ABB/SIEMANS METER	M.G.D.	TIME	B.O.D. MG/L	T.S.S. MG/L	TEMP. OX.	DIG.	pH OX.	DIG.	ATC%	S.V.I.	1 HR SLUDGE	T.S.S. MG/L	B.O.D. MG/L	T.S.S. MG/L	E-COLI COUNT	TOTAL CL-2	TOTALIZER GALLONS	ABB MGD	PH	BOD%	TSS%	EFF. TEMP.	OIL GREASE
1	761.14		1015	120	98	16.8	~~16.6~~	7.42		1.2	98	140	1530	4	3	3	0	127394	.5532	7.47			17.5	N-O
2	761.15		0900			17.0		7.42		1.6	88	170	2040					127455	.6338	7.46			17.4	N-O
3																								
4																								
5	761.15		0900			18.1		7.42		1.6	87	160	1955											
6	761.16		0908			17.4		7.46		1.0	94	110	1165					127650	.7929	7.49			18.9	N-O
7	761.16		0900			17.5		7.42		2.2	88	230	2825					127715	.60162	7.46			17.2	N-O
8	761.16		0901	130	84	17.8		7.45		1.6	89	160	1890	4	4	130		127780	.8349	7.48			17.5	N-O
9	761.16		0916			18.0		7.44		1.6	88	180	2035					127846	.7992	7.61			18.3	N-O
10																		127915	.6555	7.41			18.4	N-O
11																								
12																								
13	761.17		0929			17.6		7.41		3.1	88	310	4310					128126	.8060					
14	761.17		0902			16.4		7.42	~~.15~~	3.5	88	310	4455					128202	0.688	7.50			17.6	N-O
15	761.17		0900	120	109	16.8		~~16.8~~	7.56	3.8	100	340	4405	4	17	31		128269	0.913	7.56			16.6	N-O
16	761.18		0857			17.4		7.40		3.5	97	340	4350					128336	0.528	7.53			17.4	N-O
17																		128400	0.764	7.56			17.4	N-O
18																								
19	761.18		0930			18.8		7.46		2.6	73	190	2730											
20	761.18		0905			17.4		7.54		2.9	87	230	3090					128598	0.761	7.42			16.3	N-O
21	761.18		0930			18.4		7.52		4.1	94	360	4690					128661	0.558	7.55			18.0	N-O
22	761.18		0840	160	145	16.6		7.57		3.5	92	330	4555	4	3	26		128721	~~0.597~~ 0.597	7.64			18.6	N-O
23	761.19		0908			16.9		7.52		4.0	98	320	4375					128780	0.473	7.52			18.0	N-O
24																		128846	0.792	7.62			17.2	N-O
25																								
26	761.19		0913			18.2		7.49		4.3	108	370	4635										18.5	
27	761.19		0903			17.8		7.56		2.3	121	200	3060					129039	0.565	7.41			~~18.8~~	N-O
28	761.19		0913			18.1		7.42		4.5	95	350	4625					129100	0.592	7.58			18.4	N-O
29	761.20		0858			18.1	20.6	7.48	5.51	4.0	85	300	4840					129170	0.854	7.56			18.2	N-O
30	761.20		0900			18.1		7.43		3.7	85	330	4820					129236	0.789	7.47			18.4	N-O
31																		129302	0.658	7.40			18.2	N-O
	MAX.	1.12	MAX.																					
	* MIN.	0	MIN.																					
	AVG.	~~0.886~~	AVG.																					
		Inf lbs/d											eff lbs/d	0		#NUM!	GEO	AVG	Meter	MAX				
																				MIN				
																				AVG				

use ~~5.46~~ 6/16 for Inf flow

98

Inf flow meter 0/5

MONTHLY REPORT

MONTH: NOVEMBER **YEAR 2017** **OPERATOR: JS**

DATE	INFLUENT FLEXIM METER	M.G.D.	TIME	B.O.D. MG/L	T.S.S.	OXIDATION DITCH TEMP. OX.	TEMP. DIG.	pH OX.	pH DIG.	ATC%	S.V.I.	1 HR SLUDGE	T.S.S. MG/L	EFFLUENT B.O.D. MG/L	T.S.S. MG/L	E-COLI COUNT	TOTAL CL-2	TOTALIZER GALLONS	ABB MGD	PH	B.O.D.%	T.S.S.%	EFF. TEMP.	OIL GREASE
1	19139437.00	0.95	9:08			14.3		7.50		3.4	189	590	4030				0	136245	0.859	7.56			14.5	0
2	19784938.00	0.84	9:30	140.0	113.0	13.8		7.51		3.7	193	580	3980	4	10	1		136313	0.629	7.41	97%	91%	15.5	0
3	20187461.00	0.85	9:25			13.8		7.52		3.8	175	500	4050					136358	0.551	7.47			13.5	0
4																								
5																								
6	21609068.00	0.09	8:54			12.3		7.53		3.5	204	640	3920					136515	0.616	7.46			12.5	0
7	22079291.00	0.06	9:17			12.2		7.46		3.3	221	630	3615					136559	0.794	7.43			11.9	0
8	22653615.00	0.87	9:02			12.6		7.42		3.5	172	600	4650					136612	0.415	7.37			12	0
9	23107216.00	0.08	13:06	210.0	127.0	12.9	14.3	7.45	6.76	3.7	212	650	3913	4	5	9		136671	0.682	7.32	98%	96%	12.7	0
10																								
11																								
12																								
13	24927807.00	0.81	9:02			14.2		7.39		3.7	207	630	3965					136881	0.872	7.38			14.1	0
14	25411986.00	0.9	9:06			14.0		7.49		3.6	204	590	3970					136934	0.450	7.42			13.9	0
15	25883877.00	0.86	9:15			13.8		7.49		3.7	201	540	3890					136989	0.461	7.42			13.4	0
16	26360700.00	0.87	9:04			13.8		7.50		3.7	191	620	4130					137044	0.677	7.40			13.7	0
17	26836052.00	0.85	9:03	180.0	128.0	14.4		7.43		4.0	191	600	4165	4	5	18		137079	0.665	7.40	98%	96%	14.5	0
18																								
19																								
20	28229656.00	0.86	9:01			13.7		7.47		4.0	190	680	4370					137258	0.529	7.43			13.7	0
21	28770146.00	0	11:45	170.0	103.0	13.5		7.49		4.0	189	680	4380	4	5	1		137317	0.593	7.38	98%	95%	15.5	0
22	29181090.00	0.86	9:10			14.2		7.49		4.0	203	700	4280					137364	0.654	7.46			13.9	0
23																								
24	30128466.00	0.86	9:14			14.8		7.48		4.1	202	640	4265					137467	0.586	7.46			14.6	0
25																								
26																								
27	31478569.00	0.88	9:27			14.3		7.41		4.0	197	700	4270					137617	0.463	7.42			14.1	0
28	31933974.00	0.67	9:24			13.9		7.46		3.6	208	680	4130					137667	0.724	7.39			13.5	0
29	32385027.00	0.14	9:16			13.8		7.50		4.0	201	760	4185					137716	0.615	7.45			13.3	0
30	32823266.00	0.8	9:55			12.5		7.45		4.2	192	780	4580					137766	0.509	7.29			12.9	0
31																								
MAX.		MAX.		210.0	128.0	14.8	14.3	7.53	6.76	4.2	221	780	4650	4	10	18	0	137766	0.872	7.56	98%	96%	15.5	TOTAL
MIN.		MIN.		140.0	103.0	12.2	14.3	7.39	6.76	3.3	172	500	3615	4	5	1	0	136245	0.415	7.29	97%	91%	12.9	0
AVG.	0.656	AVG.		175.0	117.8	13.6	14.3	7.47	6.76	3.8	197	640	4137	4	6	7	0	137019	0.617	7.42	98%	95%	13.685	
	Inf lbs/d			685.5	447.8								eff lbs/d	20.8	32.2	3.5676	GEO.	AVG.						

Avg. 468

Flow Meter yes

MAX	0.872	.912
MIN	0.415	.05
AVG	0.617	.524

corrected 1-14-18

MONTHLY REPORT

MONTH: NOV **YEAR** 2017 **OPERATOR:** JS

DATE	INFLUENT ABB/SIEMANS METER	M.G.D.	TIME	B.O.D. MG/L	T.S.S. MG/L	OXIDATION DITCH TEMP. OX.	DIG.	pH OX.	DIG.	ATC%	S.V.I.	1 HR SLUDGE	T.S.S. MG/L	EFFLUENT B.O.D. MG/L	T.S.S. MG/L	E-COLI COUNT	TOTAL CL-2	TOTALIZER GALLONS	ABB MGD	PH	BOD%	TSS%	EFF. TEMP.	OIL GREASE
1	19139437	0.95	0908			14.3		7.50		3.4	189	590	4030					136245	0.859	7.56			14.5	N-O
2	19784938	0.84	0930	140	113	13.8		7.51		3.7	193	580	3980	4	10	1		136313	0.629	7.41			15.5	N-O
3	20187461	0.85	0925			13.8		7.52		3.8	175	500	4050					136358	0.557	7.47			13.5	N-O
4	~~21609068~~	~~0.09~~																~~136515~~	~~0.616~~					
5																								
6	21609068	0.09	0854			12.3		7.53		3.5	204	640	3920					136515	0.616	7.46			12.5	N-O
7	22079291	0.06	0917			12.2		7.46		3.3	221	630	3415					136559	0.744	7.43			11.9	N-O
8	22653615	0.87	0902			12.6		7.42		3.5	172	600	4650					136612	0.415	7.37			12.0	N-O
9	23107216	0.08	1306	210	127	12.9	14.3	7.45	6.76	3.7	212	650	3913	4	5	9		136671	0.682	7.32			12.7	N-O
10																								
11																								
12																								
13	24927807	0.81	0902			14.2		7.39		3.7	207	630	3965					136881	0.872	7.38			14.1	N-O
14	25411986	0.90	0906			14.0		7.49		3.6	204	590	3970					136934	0.450	7.42			13.9	N-O
15	25883807	0.86	0915			13.8		7.49		3.7	201	540	3890					136989	0.461	7.42			13.4	N-O
16	26360700	0.87	0904			13.8		7.50		3.7	191	620	4130					137044	0.477	7.40			13.7	N-O
17	26836052	0.89	0903	180	128	14.4		7.43		4.0	191	600	4165	4	5	18		137099	0.665	7.40			14.5	N-O
18	~~28229656~~	~~0.86~~																						
19																								
20	28229656	0.86	0901			13.7		7.47		4.0	190	680	4370					137258	0.529	7.43			13.7	N-O
21	28790146	0	1145	170	103	13.5		7.49		4.0	189	680	4390	4	5	1		137317	0.593	7.38			15.5	N-O
22	29181090	0.86	0910			14.2		7.49		4.0	203	700	4280					137364	0.654	7.46			13.9	N-O
23	—	—	—			—		—		—	—	—	—					—	—	—			—	—
24	30128446	0.86	0914			14.8		7.48		4.1	202	640	4265					137467	0.586	7.46			14.6	N-O
25	~~31429~~																							
26																								
27	31478569	0.88	0927			14.3		7.41		4.0	197	700	4270					137617	0.463	7.42			14.1	N-O
28	31933974	0.67	0924			13.9		7.46		3.6	208	680	4130					137668	0.724	7.39			13.5	N-O
29	32365027	0.14	0916			13.8		7.50		4.0	201	~~740~~	760/4185					137716	0.615	7.45			13.3	N-O
30	32823266	0.80	0955			12.5		7.45		4.2	192	740	4580					137766	0.509	7.29			12.9	N-O
31																								
	MAX.		MAX.																					
	MIN.		MIN.																					
	AVG. ~~0.456~~		AVG.																					
	Inf lbs/d Avg 3,468												eff lbs/d	0		#NUMI	GEO	AVG	Meter ~~NO~~ yes	MAX	.975	~~.872~~		
																				MIN	.05	~~.445~~		
																				AVG	.524	~~.677~~		

corrected 1-14-18

View Certification | Download COR

DMR Copy of Submission

Permit

Permit ID:	MT0030759	**Major:**	✔
Permittee:	HARDIN, CITY OF	**Permittee Address:**	406 N. CHEYENNE AVE. HARDIN , MT59034
Facility:	HARDIN, CITY OF	**Facility Location:**	406 N. CHEYENNE AVENUE HARDIN , MT59034
Permitted Feature:	001 - External Outfall	**Discharge:**	001-A - Bighorn River

Report Dates & Status

Monitoring Period:	From 07/01/17 to 07/31/17	**DMR Due Date:**	08/28/17
Status:	**NetDMR Validated**		

Considerations for Form Completion

If no discharge occurs during the entire monitoring period, it shall state that no discharge or overflow occurred.

Principal Executive Officer

First Name:	Russell	**Last Name:**	Dill
Title:	SPW	**Telephone:**	406-665-9292

No Data Indicator (NODI)

Form NODI: -

Parameter		NODI	Quantity or Loading			Quality or Concentration				# of Ex.	Freq. of Analysis	Smpl. Type
Code	Name		Value 1	Value 2	Units	Value 1	Value 2	Value 3	Units			
00310	BOD, 5-day, 20 deg. C	Smpl.	=19	=19	26 - lb/d		=4	=4	19 - mg/L	0	01/07 - Weekly	CP - COMPOS
1 - Effluent Gross												
Season: 0		Req.	<=250 30DA AVG	<=375 7 DA AVG	26 - lb/d		<=30 30DA AVG	<=45 7 DA AVG	19 - mg/L		01/07 - Weekly	CP - COMPOS
NODI: -		NODI										
00310	BOD, 5-day, 20 deg. C	Smpl.					=140		19 - mg/L	0	01/07 - Weekly	CP - COMPOS
G - Raw Sewage Influent												

Parameter		NODI	Quantity or Loading			Quality or Concentration				# of Ex.	Freq. of Analysis	Smpl. Type
Code	Name		Value 1	Value 2	Units	Value 1	Value 2	Value 3	Units			
Season: 0		Req.					Req Mon 30DA AVG		19 - mg/L		01/07 - Weekly	CP - COMPOS
NODI: -		NODI										
00400	pH	Smpl.				=7.13		=7.68	12 - SU	0	01/07 - Weekly	IN - INSTAN
1 - Effluent Gross												
Season: 0		Req.				>=6 MINIMUM		<=9 MAXIMUM	12 - SU		01/07 - Weekly	IN - INSTAN
NODI: -		NODI										
00530	Solids, total suspended	Smpl.	=27.97	=27.97	26 - lb/d		=6	=6	19 - mg/L	0	01/07 - Weekly	CP - COMPOS
1 - Effluent Gross												
Season: 0		Req.	<=250 30DA AVG	<=375 7 DA AVG	26 - lb/d		<=30 30DA AVG	<=45 7 DA AVG	19 - mg/L		01/07 - Weekly	CP - COMPOS
NODI: -		NODI										
00530	Solids, total suspended	Smpl.					=98		19 - mg/L	0	01/07 - Weekly	CP - COMPOS
G - Raw Sewage Influent												
Season: 0		Req.					Req Mon 30DA AVG		19 - mg/L		01/07 - Weekly	CP - COMPOS
NODI: -		NODI										
00556	Oil & Grease	Smpl.						=0	19 - mg/L	0	09/99 - See Permit	GR - GRAB
1 - Effluent Gross												
Season: 0		Req.						<=10 DAILY MX	19 - mg/L		09/99 - See Permit	GR - GRAB
NODI: -		NODI										
50050	Flow, in conduit or thru treatment plant	Smpl.	=0.559	=1	03 - MGD					0	99/99 - Continuous	CN - CONTIN
1 - Effluent Gross												
Season: 0		Req.	Req Mon 30DA AVG	Req Mon DAILY MX	03 - MGD						99/99 - Continuous	CN - CONTIN
NODI: -		NODI										
50060	Chlorine, total residual	Smpl.						=0	19 - mg/L	0	01/01 - Daily	IN - INSTAN
1 - Effluent Gross												
Season: 0		Req.						<=.5 DAILY MX	19 - mg/L		01/01 - Daily	IN - INSTAN
NODI: -		NODI										
51040	E. coli	Smpl.					=2	=2	13 -	0	01/07 -	GR -

Parameter		NODI	Quantity or Loading			Quality or Concentration				# of Ex.	Freq. of Analysis	Smpl. Type
Code	Name		Value 1	Value 2	Units	Value 1	Value 2	Value 3	Units			
1 - Effluent Gross												
Season: 0		Req.					<=126 30DA AVG	<=252 7 DA AVG	13 - #/100mL		01/07 - Weekly	GR - GRAB
NODI: -		NODI										
51415	Volatile Organic Compound [VOC]	Smpl.						=0	19 - mg/L	0	01/YR - Annual	CP - COMPOS
1 - Effluent Gross												
Season: 0		Req.						Req Mon ANNL AVG	19 - mg/L		01/YR - Annual	CP - COMPOS
NODI: -		NODI										
81010	BOD, 5-day, percent removal	Smpl.				=97			23 - %	0	01/07 - Weekly	CA - CALCTD
K - Percent Removal												
Season: 0		Req.				>=85 MINIMUM			23 - %		01/07 - Weekly	CA - CALCTD
NODI: -		NODI										
81011	Solids, suspended percent removal	Smpl.				=87			23 - %	0	01/07 - Weekly	CA - CALCTD
K - Percent Removal												
Season: 0		Req.				>=85 MINIMUM			23 - %		01/07 - Weekly	CA - CALCTD
NODI: -		NODI										
84066	Oil and grease visual	Smpl.		=0	9P - N=0;Y=1					0	01/01 - Daily	VI - VISUAL
1 - Effluent Gross												
Season: 0		Req.		<=0 INST MAX	9P - N=0;Y=1						01/01 - Daily	VI - VISUAL
NODI: -		NODI										

Submission Note

If a parameter row does not contain any values for the Sample nor Effluent Trading, then none of the following fields will be submitted for that row: Units, Number of Excursions, Frequency of Analysis, and Sample Type.

Edit Check Errors

No errors.

Comments

7/10 power out 16:45, by pass open 100% at 16:55, 17:30 power on, 1740 by pass closed. 7/14 power out 01:29 to01:54. no by pass. 7/18 power out 0433 to 04:57, no by pass. corrected 1/16/18 by JS

Attachments

No attachments

Report Last Saved By

HARDIN, CITY OF

User:	MTL020834
Name:	john stanich
E-Mail:	wwtp@hardinmt.com
Date/Time:	2018-01-16 12:13 (Time Zone:-07:00)

Report Last Signed By

User:	MTL020834
Name:	john stanich
E-Mail:	wwtp@hardinmt.com
Date/Time:	2018-01-16 12:16 (Time Zone:-07:00)

©2008 NetDMR

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Hardin City of
Project: WWTP DMR 9-21-17
Lab ID: B17091847-003
Client Sample ID: Effluent

Report Date: 09/30/17
Collection Date: 09/21/17 11:38
DateReceived: 09/21/17
Matrix: Waste Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MICROBIOLOGICAL							
Bacteria, E coli	<1	CFU/100ml		1.0		E1603	09/21/17 15:49 / ldv
ORGANIC CHARACTERISTICS							
Oil & Grease (HEM)	ND	mg/L		1		E1664A	09/28/17 08:45 / eli-g

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Hardin City of
Project: WWTP DMR 10-5-17
Lab ID: B17100474-004
Client Sample ID: Effluent

Report Date: 10/16/17
Collection Date: 10/04/17 13:32
DateReceived: 10/05/17
Matrix: Waste Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
ORGANIC CHARACTERISTICS							
Oil & Grease (HEM)	ND	mg/L		1		E1664A	10/12/17 08:29 / eli-g

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Hardin City of
Project: WWTP DMR 12-21-17
Lab ID: B17121776-003
Client Sample ID: Effluent

Report Date: 12/29/17
Collection Date: 12/21/17 11:50
DateReceived: 12/21/17
Matrix: Waste Water

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MICROBIOLOGICAL							
Bacteria, E coli	1.0	CFU/100ml		1.0		E1603	12/21/17 15:21 / cjm
ORGANIC CHARACTERISTICS							
Oil & Grease (HEM)	ND	mg/L		1		E1664A	12/28/17 08:39 / eli-g

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

			pH	Temp
9/19	Calibrate YSI pH Meter standards	CS		
		4	4.00	24.4
		7	7.01	24.5
		10	10.00	24.8
	slope			
	QC check 7.02		7.02	24.7
	% Rec		100	
9/20	Calibrate YSI pH Meter standards	CS	0804	
		4	4.00	20.8
		7	7.01	20.9
		10	10.04	21.0
	slope			
	QC check 7.02		7.01	20.9
	% Rec		99.9	
9/21	Calibrate YSI pH meter standards	CS		0801
		4	4.00	22.9
		7	7.01	22.9
		10	10.01	22.9
	slope			
	QC check 7.02		6.99	22.6
	% Rec		99.6	
9/22	Calibrate YSI pH meter standards	DB	08 CS	0804
		4	4.00	21.2
		7	7.02	21.1
		10	10.05	21.1
	Slope			
	QC Check 7.02		7.02	20.8
	% Rec		100%	

9/25	Calibrate
	QC ch
9/26	Calibrate
	QC Ch
9/27	Calibra
	QC chec
9/28	Calibrate
	QC chec

Temp				PH	Temp
	9/25	Calibrate YSI pH Meter	DB	~~GS~~ 0800	
24.4		Standards	4	4.00	18.5
24.5			7	7.03	18.5
24.8			10	10.00	18.5
		Slope			
24.7		QC check 7.02		7.03	19.2
		% Rec		100.1	
	9/26	Calibrate YSI pH Meter	DB	0802 ~~GS~~	
20.8			4	4.00	20.8
20.9			7	7.02	20.8
21.0			10	10.05	20.8
		Slope			
20.9		QC Check 7.02		7.02	20.4
		% Rec		100	
0801	9/27	Calibrate YSI pH Meter	~~GS~~	0810	
22.9		standards	4	4.00	21.5
22.9			7	7.01	21.5
22.9			10	10.01	21.6
		slope			
22.6		QC check 7.02		7.01	21.7
		% Rec		99.9	
0804	9/28	Calibrate YSI pH Meter	~~GS~~	0800	
21.2		standards	4	4.00	23.0
21.1			7	6.99	23.0
21.1			10	10.00	22.9
		slope			
20.8		QC check 7.02		7.04	22.6
		% Rec		100.3	

Dedicate Hach 30d to pH/temp only

pH	Temp
4.00	22.5
7.01	22.5
10.03	22.5
7.01	22.3
99.9	
~~4.00~~ 98	20.4
4.00	20.5
7.00	20.5
10.00	20.4
7.03	
~~7.03~~ 100.1	20.5
4.00	22.1
7.01	22.2
10.04	22.2
98	
7.04	22.2
100	
4.00	18.3
7.02	18.2
10.04	18.5
96%	
7.02	19.1
100%	

			pH	temp
10/4	calibrate Hach pH Meter	JS	0800	
	standards	4	4.00	19.8
		7	7.02	20.0
		10	10.06	19.9
	slope %		98	
	QC check 7.02		7.01	19.7
	% Rec		99.9	
10/5	calibrate Hach pH Meter	JS	~~0755~~ JS 0653	
	standards	4	4.00	22.1
		7	7.01	22.3
		10	10.03	22.2
	slope %		99.0	
	QC check 7.02		7.02	22.0
	% Rec		100	
10/5	Calibrate YSI DO Meter	JS		
	note: meter reading incorrect			
	after calibration - 86% of 100%			
	saturated air. Changed membrane and			
	recalibrated saturated air 99% of 100%			
10/6	Calibrate Hach pH Meter	JS	0802	21.4
	standards	4	4.00	21.4
		7	7.01	21.4
		10	10.04	
	% slope		97	
	QC check 7.02		10.98	
	% Rec		99.4	

2017

			pH	temp
12/19	calibrate Hach pH meter	DB	0756	
	standards	4	4.00	23.5
		7	7.00	23.6
		10	10.01	23.4
	% slope		97	23.1
	QC check 7.02		7.04	23.2
	% rec		100.3	
12/19	clean & refill pH probe	DB		
12/20	calibrate Hach pH meter	4		
	standards	7		
		10		
	% slope			
	QC check 7.02			
	% rec			
12/20	Calibrate Hach pH meter	DB	0759	
	Standards	4	4.00	23.3
		7	7.01	23.1
		10	10.04	23.2
	% Slope		95	
	Qc check 7.02		7.04	
	% Rec		100.3	
12/21	calibrate Hach pH meter	DB	0658	
	standards	4	4.00	21.7
		7	7.01	21.9
		10	10.03	22.0
	% slope		96	
	QC check 7.02		6.99	21.9
	% rec		99.6	

12/22 calibrate pH meter

9

QC check 7.02

%

12/26 calibrate Hach pH

fresh standard

%

QC check 7.02

%

12/27 Calibrate pH me

Qc check 7.02

12/28 Calibrate Hach pH me

standar

QC check 7.02

%

Appendix U

HYDROGEOLOGY OF THE NORTHERN BIGHORN RIVER VALLEY

OPEN FILE REPORT ***588***

A JOINT PROJECT BETWEEN:

BIG HORN CONSERVATION DISTRICT

AND

MONTANA BUREAU OF MINES AND GEOLOGY

FUNDED BY:

MONTANA DEPARTMENT OF NATURAL RESOURCES

AND CONSERVATION RENEWABLE RESOURCES GRANT

Elizabeth L. Meredith

John R. Wheaton

Shawn L. Kuzara

MBMG

2009

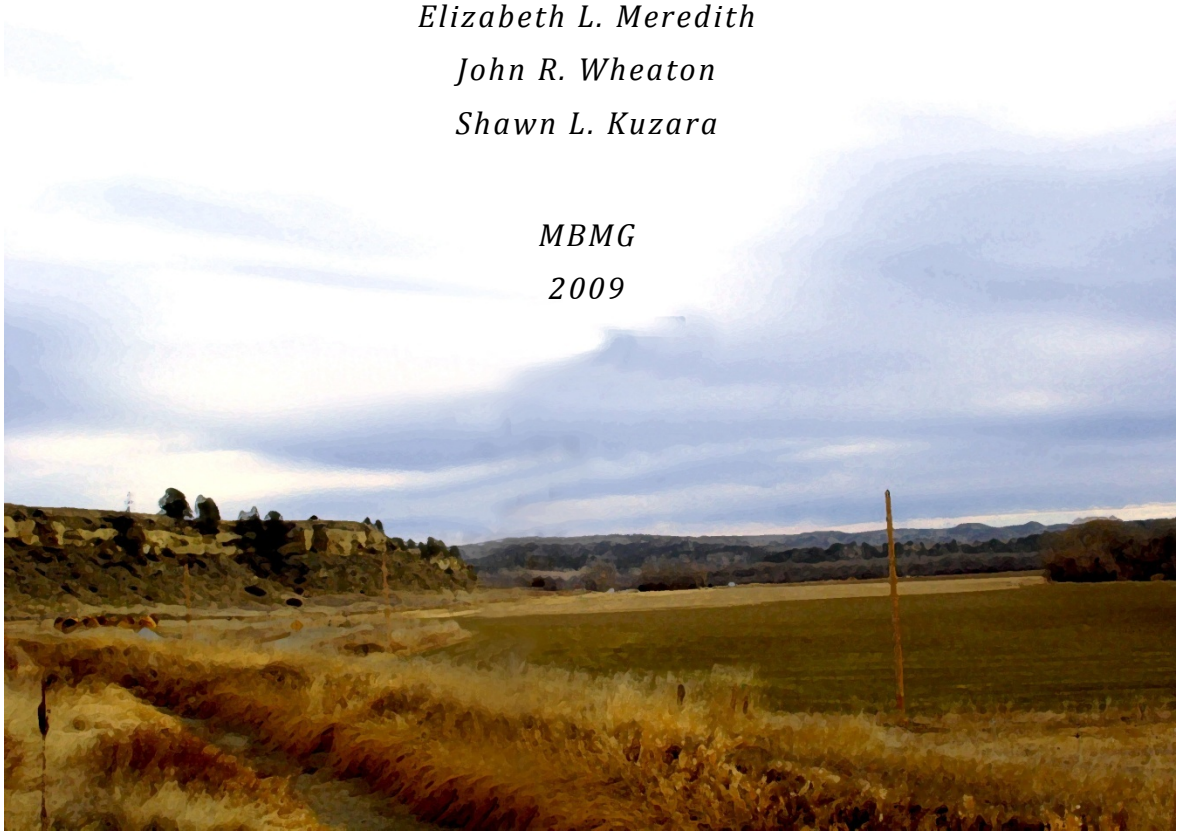


TABLE OF CONTENTS

Abstract 1
Introduction 2
Purpose and Scope of Research 3
Funding source 3
Research Methods 4
Inventory and Sampling 4
Well installation 6
Aquifer testing 6
Hydrogeologic Setting 6
Climate 6
Aquifer System 7
Stratigraphic components 7
Bedrock aquifers 8
High terrace aquifers 9
Low terrace and alluvial aquifers 9
Alluvial aquifer properties 10
Alluvial groundwater flow 11
Groundwater quality 15
Nitrate and Nitrite Concentrations 15
Salinity 17
Common-ion geochemistry 19
Recharge Evaluation 20
Groundwater level fluctuation 21
Water isotope analysis 23
Chloride tracer evaluation 25
Tritium analyses 26
Conclusions 28
Groundwater availability 28
Groundwater quality 28
Recommendations 28

Acknowledgements.....29
References 29

TABLES

1 Nitrate and nitrite concentration in groundwater 16
2 Nitrate and nitrite concentration in surface water 16
3 Recharge rates estimated from change in water levels 22
4 Light stable isotope data 24
5 Chloride concentrations in groundwater and surface water 25
6 Tritium in groundwater and surface water 27

FIGURES

1 Location of study area 2
2 Inventoried sites 4
3 Locations of monitored wells 5
4 Precipitation deviation for Hardin, Montana 7
5 Watson site cross section showing water level gradients 12
6 Hydrograph of monitoring wells WAT-1, -2 and -3 (altitude) 13
7 Hydrograph of monitoring wells WEB-1, -2, -3 and -4 (altitude) 14
8 Correlation between TDS and SC 17
9 Water-quality sample locations 19
10 Chemistry of alluvial groundwater 20
11 Hydrographs of monitored wells 21
12 Oxygen and hydrogen stable isotope ratios 23
13 Comparison of chloride concentrations to stable isotope ratios 26

APPENDICES

A Inventory data from MBMG field visits

B Inventory data from USGS field visits

C Inorganic water quality data from groundwater and surface-water sites

- C1 Alluvial and terrace groundwater quality
- C2 Bedrock groundwater and surface-water quality

PLATES

1. Geology of the northern Bighorn River valley

2. Hydrogeologic maps for the alluvial aquifer in the northern Bighorn River valley: alluvial aquifer thickness; land use; and potentiometric surface and groundwater flow directions.

3. Geochemistry maps for the alluvial aquifer in the northern Bighorn River valley: nitrate and nitrite concentrations in groundwater; specific conductance values of groundwater measured in 2006 and 2007; specific conductance values of groundwater measured from 1957 through 1960.

ABSTRACT

Residents of the northern Bighorn River valley are primarily – in many cases entirely – dependent upon the alluvial aquifer system as their source of potable water. Over 70 percent of the residents of Big Horn County live outside the city limits of Hardin. In these rural areas, groundwater is typically the only source of drinking water. The thin, locally recharged terrace and alluvial aquifers are susceptible to contamination, drought and changes in land use and irrigation practices. The terrace and alluvial aquifers encompassed by this study extend north from Hardin, Montana to the Big Horn County line.

This project was initiated to evaluate the potential impacts of land-use change to the Bighorn River alluvial aquifer system in the valley north of Hardin. Field work for this project was conducted between March, 2006 and July, 2008. Research methods consisted of compiling previously existing data, measuring groundwater elevations and field parameters, collecting surface- and groundwater samples for water quality and environmental isotope analysis, and performing aquifer tests at two locations.

Seventy-seven wells, six stream sites, and three springs within the project area were inventoried and the data entered into the Montana Bureau of Mines and Geology's Groundwater Information Center (GWIC). Inventory data includes location, altitude, total depth, static water level, temperature, specific conductivity, and, on some wells, pH, redox potential, and nitrate. Within this set of wells, eight private wells were visited periodically to monitor temporal changes in static water level. The water quality, including major ions and trace elements, was determined for eleven well and five stream samples. The stable oxygen and hydrogen isotope ratios were determined for 25 samples including 17 well and 8 surface-water samples. Tritium analyses were performed on 8 well samples and one surface-water sample. Chloride concentrations were measured on 27 samples including 22 well and 5 surface water samples. The majority of water samples had nitrate concentrations less than the national drinking water standard.

Seven monitoring wells were installed for aquifer tests. Water levels were monitored by continuous recorders (both digital and analog) and manually during monthly visits. Hydraulic conductivities estimated from aquifer tests ranged from 65 to 208 feet/day. These highly conductive gravels allow groundwater levels to respond almost immediately to the introduction of water from irrigation ditches; one well rose eight feet in four months. Groundwater moves through the alluvium from the edge of the valley toward the river at an approximate rate of 0.1 to 0.2 miles per year. Isotope and chloride analysis indicates the majority of recharge to the groundwater is through leakage from irrigation ditches.

In the 1950s and 1960s, the United States Geological Survey (USGS) inventoried 150 wells throughout the valley and within this set analyzed 33 groundwater samples for water chemistry. Twenty-two of these wells were within the study area of this project and were used for historical analysis of groundwater change over 50 years. While the salinity levels of groundwater in most of the valley are above the recommended drinking water standard, the overall salinity in alluvial groundwater has improved since the 1960s.

INTRODUCTION

Residents of the northern Bighorn River valley are primarily – in many cases entirely – dependent upon the alluvial aquifer system as their source of potable water. Over 70 percent of the residents of Big Horn County live outside the city limits of Hardin. In these rural areas, groundwater is typically the only source of drinking water. The thin, locally recharged terrace and alluvial aquifers are susceptible to contamination, drought and changes in land use and irrigation practices. The terrace and alluvial aquifers encompassed by this study extend north from Hardin, Montana to the Big Horn County line (Figure 1).

This study provides detailed information on the groundwater availability, water level fluctuations, water quality, and groundwater/surface water interactions for the Bighorn River valley aquifer north of Hardin (Figure 1). The compilation of data in this report is intended to provide the information necessary to allow land-use and water resource decisions that will protect the primary source of groundwater for the area.

The northern Bighorn River valley is used almost entirely for agricultural purposes, including both ranching and farming. Cultivated crops in this area include spring and winter wheat, corn, oats, barley, sugar beets, alfalfa, and hay. In 2007 in Big Horn County, 91,700 acres of winter wheat were harvested, 900 acres of corn, 500 acres of oats, 17,400 acres of barley, and 9,670 acres of sugar beets, producing 257,000 tons of beets (National Agricultural Statistics Service, 2008). The majority of these crops are irrigated through a series of ditches that serve as the source of flood irrigation. The ditches divert water from the Bighorn River to the middle or western edge of the valley, returning to the Bighorn River down stream.

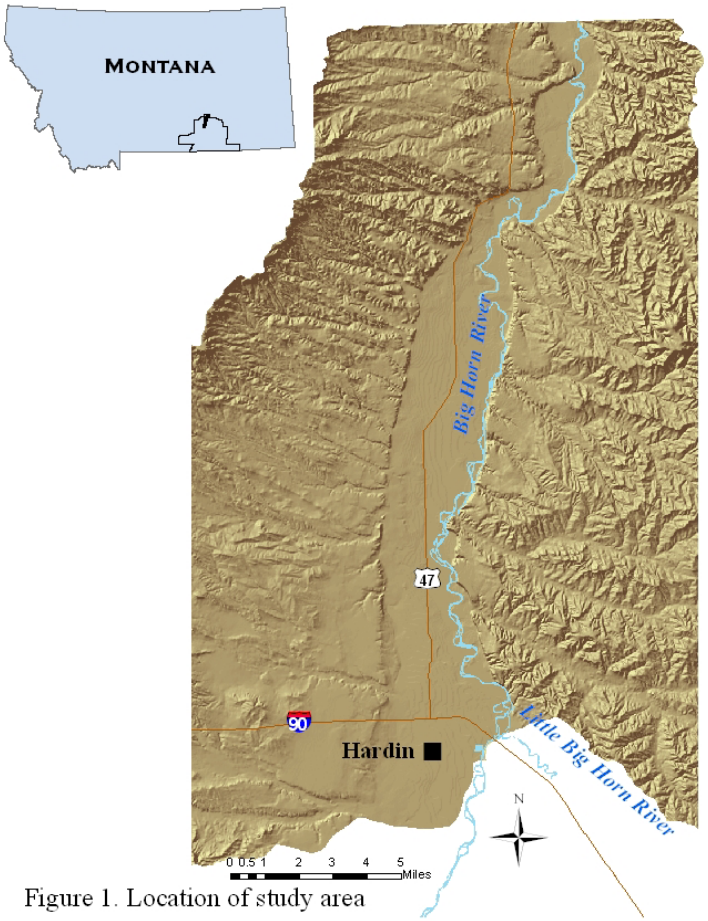


Figure 1. Location of study area

Construction of the Yellowtail Dam in southern Big Horn County near Fort Smith was completed during 1966. The dam was constructed with the purpose of, among other reasons, stabilizing flows in the Bighorn River and providing a reliable supply of irrigation water. Prior to completion of the dam, the United States Geological Survey (USGS) collected groundwater data and published a report describing the gravel aquifers of the Bighorn River valley (Hamilton and Paulson, 1968). This study included the Bighorn River Valley from the mouth of the canyon at Fort Smith (T6S R31E) to the

confluence with the Yellowstone River (T5N R34E), providing water levels for eight wells over approximately ten years (1957-1966, some missing data) including wells on both irrigated and non-irrigated lands. Samples were collected for 33 water-chemistry analyses and 121 measurements of specific conductance.

The current study provides a unique opportunity to observe and compare water quality and quantity changes, 40 years after the USGS study. This study includes an evaluation of the changes brought about by the dam construction and increased agricultural activity, providing a better understanding of the long-term effects of flood irrigation. This information will be used for more accurate predictions of the effects that switching to sprinkler irrigation or changing land use may have upon groundwater quantity and quality.

PURPOSE AND SCOPE OF RESEARCH

This project was conducted to evaluate the potential impacts of land-use change to the Bighorn River alluvial aquifer system in the valley north of Hardin. Field work for this project was conducted between March, 2006 and July, 2008. Research methods consisted of compiling previously existing data, measuring groundwater elevations and field parameters, collecting surface- and groundwater samples for water quality and environmental isotope analysis, and performing aquifer tests at two locations.

FUNDING SOURCE

Funding for this project was provided by a Renewable Resources Grant to the Big Horn Conservation District administered by the Montana Department of Natural Resources and Conservation. Technical assistance was provided by the Montana Bureau of Mines and Geology (MBMG), a department of Montana Tech of The University of Montana. The Montana Legislature established these grants to fund "the conservation, management, development and preservation of Montana's renewable resources" (Montana Department of Natural Resources and Conservation, 2008).

RESEARCH METHODS

Data collection for this project included database compilation, surface- and groundwater measurements, and sampling for water-quality, stable isotopes of hydrogen and oxygen, and tritium analyses. Data collected for this project are available on the MBMG on-line Ground Water Information Center database (GWIC; http://mbmggwic.mtech.edu/). Private wells and dedicated monitoring wells are identified in this report by their GWIC identification number.

INVENTORY AND SAMPLING

Seventy-seven wells, 6 stream sites, and 3 springs identified within the project area were inventoried and the data entered into GWIC under the project group Regional Water Resource Investigations and the project code BHORN. Inventory data include location, altitude, total depth, static water level, temperature, specific conductivity, and, on some wells, pH, redox potential, and nitrate concentration. Locations of inventoried wells are shown on Figure 2 and data are listed in Appendix A. Within this set of wells, 8 private wells were visited periodically to monitor temporal changes in static water level (Figure 3). Twenty-two wells were inventoried by the USGS during the 1950's and 1960's. Data from these inventories are included in Appendix B and have been added to GWIC in order to consolidate data for future uses.

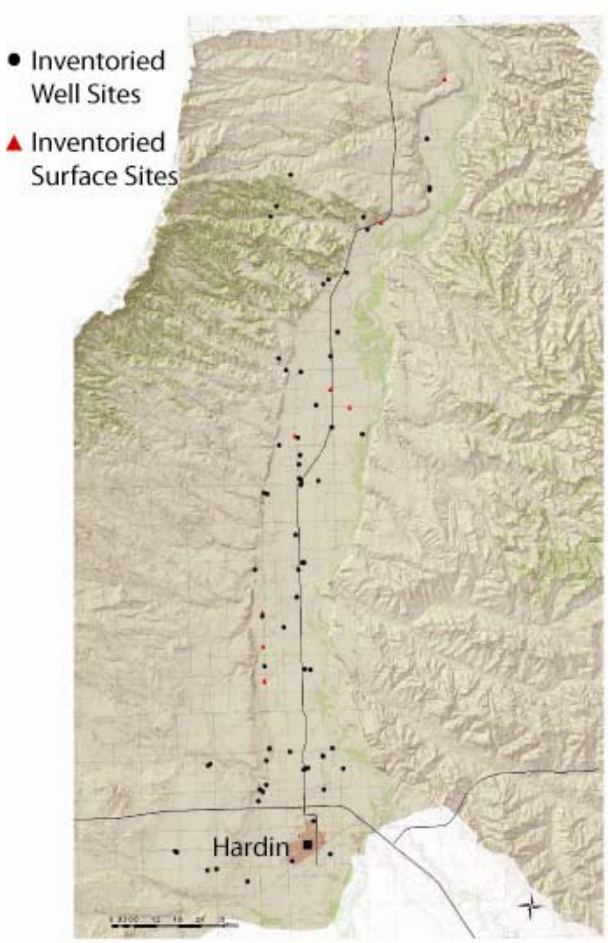


Figure 2. Inventoried sites in the northern Bighorn River Valley.

The water quality, including major ions and trace elements, was determined for 11 well and 5 stream samples (Appendix C; also available online in the GWIC database). The stable oxygen and hydrogen isotope ratios were determined for 25 samples including 17 well and 8 surface water samples. Tritium analyses were performed on 8 well samples and 1 surface water sample. Chloride concentrations were measured on 27 samples including 22 well and 5 surface water samples.

Water sampling for nitrate and nitrite, chloride, major and trace elements, and isotope analysis included pumping three casing volumes of water from a well to ensure that collected water represented the aquifer. River water samples were collected at fishing access points using a rowboat to ferry across the river 4 times to create a composite depth and width integrated sample. Samples were collected with a peristaltic pump and clean tubing attached to a probe. Samples from smaller ditches were collected using a grab-sampling method. Field parameters of temperature, pH and redox potential were taken using calibrated electronic probes and field instruments. Samples for laboratory analysis include raw, filtered (0.45 micron), filtered and preserved with HNO_3 and filtered and preserved with H_2SO_4.

Major ion and trace element analyses were performed by the MBMG analytical laboratory. Nitrate + nitrite and chloride analyses were performed by Energy Labs in Billings, Montana. Oxygen and hydrogen isotopes were analyzed by the Light Stable Isotope Laboratory at the University of Wyoming and the University of Waterloo, Ontario. Tritium analyses were performed by the University of Waterloo, Ontario.

Figure 3. Location of monitored wells

WELL INSTALLATION

The majority of wells utilized for this project were existing domestic and stock wells. However, two pumping wells and five observation wells were installed for this project (Plate 1). These wells were used to perform aquifer tests and for regular water-level monitoring beginning in October, 2007 including some hourly datalogger and F-chart monitoring. The locations for the well sites were chosen to represent flood irrigated land and non-irrigated land. Locations were chosen based on land-use and land-owner cooperation. The non-irrigated aquifer test was performed on well WAT-1 (GWIC ID# 239729) with the observation wells WAT-2 and WAT-3 (239727 and 239728). Wells near the flood irrigated field include the aquifer test well WEB-1 (239730) and observation wells WEB-2, WEB-3 and WEB-4 (239731, 239733 and 239734).

AQUIFER TESTING

Aquifer tests were performed to determine hydraulic parameters of the aquifer. Aquifer tests can provide information on the aquifer's hydraulic conductivity (and transmissivity), specific storage, specific yield and the presence of aquifer boundaries such as a recharge and no-flow boundaries (Fetter, 2001). During the aquifer tests, water was pumped from the test wells at constant rates and water levels monitored in the pumping wells and nearby observation wells. At each of the two aquifer tests sites, 24-hour tests were performed with data loggers monitoring the water levels in the wells in addition to periodic hand measurements made with sounders. Water-level recovery data were collected until the water levels in the pumped well had recovered to 90 percent of baseline.

HYDROGEOLOGIC SETTING

CLIMATE

The Governor's Drought Advisory Committee has listed Big Horn County under dry conditions from February 2006 through June 2008, excepting summer of 2007, including three months of severely dry conditions (Montana National Resource Information System, 2008). Average total annual precipitation from July 1948 to June 2007 in Hardin is 11.85 inches (including 21.2 inches of snow). Overall, precipitation in Hardin over the last five years has been below average (Figure 4). Average temperatures range from 7.7°F to 33.5°F in January and 55.4°F to 90.6°F in July (Western Regional Climate Center, 2008).

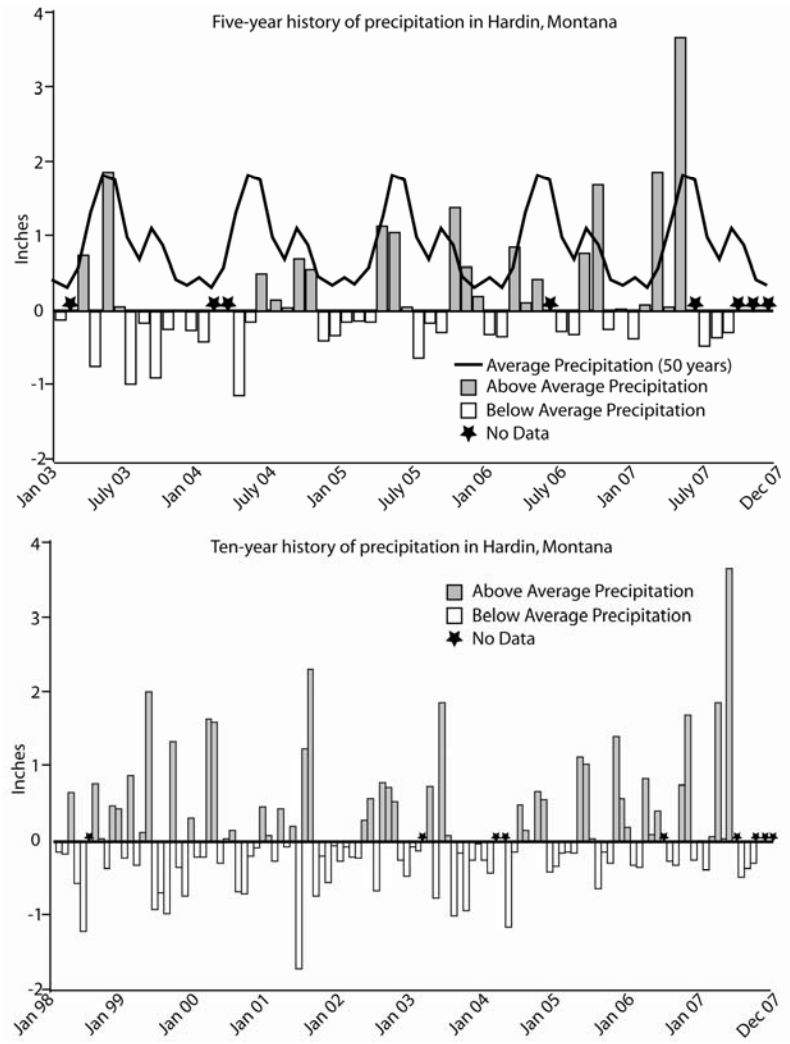


Figure 4. Deviation from monthly average precipitation in Hardin, Montana (Western Regional Climate Center, 2008).

AQUIFER SYSTEM

STRATIGRAPHIC COMPONENTS

Bedrock units present beneath the northern Bighorn River valley area include Precambrian basement through Upper Cretaceous formations. In the valley floor and on some benches above the valley the Cretaceous bedrock formations are overlain by unconsolidated Pleistocene and Holocene deposits (Plate 1). The potential aquifers in the area include: Madison Group; Tensleep Sandstone; Pryor Conglomerate; and the terraces and alluvium.

BEDROCK AQUIFERS

Bedrock aquifers are not a focus of this study but are briefly mentioned to describe the relationships with the shallow alluvial aquifer system. Aquifer characteristics for the bedrock units can be found in Hamilton and Paulson (1968). Bedrock aquifers exist throughout the area but are found at depths that make drilling expensive. The Pryor Conglomerate at the base of the Cretaceous Kootenai Formation and the Mississippian Madison Group limestone are regional aquifers in eastern Montana. The Madison limestone is recharged along the periphery of the Pryor and Bighorn Mountains and regional groundwater flows to the north in the project area. Wells targeting the Madison Group would likely be about 3,400 feet deep in the south and over 4,000 feet deep in the north of the study area. The hydrostatic pressure in the Madison would cause wells completed in it to flow at ground surface throughout the project area (Feltis, R.D., 1980a). The quality of the water in the Madison deteriorates with increasing distance from recharge areas, however, beneath the project area, water quality is likely useable for some purposes (Feltis, R.D., 1980b).

The Pryor Conglomerate Member of the Kootenai Formation is a dependable aquifer to the southwest of this study area (Wheaton and Lopez, 1999) and, while it is not currently used, it likely could be utilized in the project area. Within the study area, drilling depths to reach the Pryor Conglomerate would be in the range of 1,500 feet in the south to 2,300 feet in the north.

Overlying the Kootenai Formation is a series of Cretaceous shales that separate the shallow, unconsolidated alluvial aquifers from deeper bedrock aquifers. During the Cretaceous Period, approximately 2,000 feet of shale was deposited in the area where the Bighorn River valley is located (Hamilton and Paulson, 1968). The shale forms the majority of the bedrock units directly underlying and surrounding the valley fill (Plate 1). These shale sequences are typically dry or extremely low-yielding aquifers with unsuitable water quality.

The Judith River sandstone is a potential aquifer in some areas of eastern Montana, but its occurrence in the Bighorn River valley is limited to low yielding shale and siltstone layers exposed in a thin strip north of Hardin. The Bearpaw, Claggett, Gammon and Niobrara shales and siltstones underlie most of the northern Bighorn River valley. In the areas underlain by these formations, groundwater resource development is limited to the alluvial and terrace aquifers. North of the Sorrel House Road turnoff (near the border between townships 2 and 3 north), the valley fill is underlain by the Upper Cretaceous Lance Formation which is composed mostly of sandstone. Where it is saturated, the Lance is typically an adequate aquifer and is used as an aquifer by the residents of the northern Bighorn River valley.

HIGH TERRACE AQUIFERS

Alluvial deposits have been cut into and deposited over bedrock in the 3-to-4-mile-wide river valley (Vuke and others, 2000; 2003). Six Pleistocene alluvial terraces are evident in the southern part of the valley, while in the northern part of the valley encompassed by this study, three to four terrace levels are present (Plate 1). Pleistocene alluvial terraces lie higher than approximately 6 feet above the current river level. The geologic cross sections on Plate 1 show the relationship between the alluvium and the alluvial terraces, with as many as 4 terraces shown on the individual cross sections.

For the most part, the higher terraces are not irrigated and are underlain by shale aquitards. Therefore, the only source of recharge to the terrace gravels is snow melt and short duration, intense rainfall that exceeds evapotranspiration demand. Groundwater discharges intermittently at springs along the side of the valley or is lost to transpiration. The gravel deposits of the terraces are discontinuous with each terrace separated from the next by escarpments (Plate 1). It is unlikely that any movement of groundwater can occur from higher terraces to the lower terraces.

LOW TERRACE AND ALLUVIAL AQUIFERS

The primary aquifer in the north valley is the combined Holocene alluvium and the lowest Pleistocene alluvial terrace (Plate 1). These combined units are referred to in the remainder of this report as the alluvial aquifer and are shown on Plate 1 as the combined tan Qat and pink Qal formations. These units are, in essence, a single aquifer with continuous groundwater flow from the terrace edge to the Bighorn River. As described by Vuke and others (2000; 2003), the alluvium in this area is up to 35-feet thick and includes the unit that lies no more than 6 feet above the level of the river. The alluvium is in direct hydrologic connection with the Bighorn River, as is the lowest terrace through its connection to the alluvium. Underlying the unconsolidated alluvial material in most of the valley are the Cretaceous shale formations, through which very little water flows. These units do not provide recharge to the alluvial groundwater system, nor are they recharged by the overlying, unconsolidated system.

Within the project area the total depth of the alluvial deposits beneath the valley floor ranges from less than 10 feet to about 70 feet (Plate 2A). The area having generally the least alluvial thickness is where the river is currently flowing along the east side of the valley. Alluvial thickness increases to the west, where land surface is higher. Along cross-section B on Plate 1, where the thickest alluvium is found, the land surface altitude near the river is 2820 feet, whereas near the west edge of the valley it is about 2890 feet, a difference of 70 feet. Saturated sandy gravel layers that are a few feet thick (up to a maximum of 30 feet) are the target aquifers in the alluvial system.

Near the southern edge of township 3 north, where the river crosses the contact between the Bearpaw Shale and the sandstones of the Lance Formation, the valley narrows noticeably. The total thickness of alluvium is less to the north of this contact than to the south. The cross-sectional area of total alluvial sediment decreases from over 500,000 square feet (ft^2) along line B-B' on Plate 1, to about 100,000 ft^2 along line A-A'. The transmission of water through the alluvial aquifer must similarly decrease and, though not quantified by river-flow measurements, it is assumed that much of the groundwater discharges to the river along this area.

ALLUVIAL AQUIFER PROPERTIES

Hydraulic conductivity is a measure of the ease with which water can move through an aquifer along a flow path or to a discharge point such as a well. Gravel aquifers typically have hydraulic conductivity values in the range of 30 to 3,000 feet per day (ft/d) (Fetter, 1980). The alluvial aquifer in the project area is moderately sorted, containing significant sand among the gravel, and is therefore expected to be in the lower end of the theoretical range of hydraulic conductivity values. As part of a previous study, an aquifer-pumping test of 1.5 hours provided a value of 495 ft/d for a well in T2N, R33E, Section 35 (Hamilton and Paulson, 1968). This well is completed in the alluvium and located near the river.

Two aquifer tests were conducted by MBMG as part of this project. The Watson test site included a pumping well with observation wells completed near the river in the alluvium (labeled "Wat Site" on Plate 1, T1S, R33E, Section 1). The Watson site is near an irrigation ditch, but not immediately near irrigated fields. At the second site, the Webber test site, the pumping and observation wells were completed in the low terrace gravels near the western edge of the valley floor (labeled "Web Site" on Plate 1, T1N, R33E, Section 4). This site is completely surrounded by flood irrigated fields.

During the test at the Watson site, the production well was pumped at 48 gallons per minute (gpm) for about 24 hours. The calculated hydraulic conductivity was 208 ft/d. At the pumping well the maximum drawdown was 6.5 feet, indicating a specific well capacity of about 7 gallons per minute per foot of drawdown. The aquifer is unconfined at this site with a saturated gravel thickness of 10 feet.

The pumping rate at the Webber site during the 24 hour test was 75 gpm and the hydraulic conductivity was calculated to be 62 ft/d. Maximum drawdown while pumping the production well was 25.2 feet, indicating a specific well capacity of about 3 gallons per minute per foot of drawdown. The saturated thickness of the tested gravel aquifer at the Webber site is 17 feet. The alluvial aquifer in this part of the valley is semi-confined. The initial head, prior to the start of the aquifer test, was 65 feet above the base of the aquifer. The tested gravel aquifer is 14 feet thick (bottom of the aquifer is 72 feet below ground surface) and is separated from the overlying saturated gravel by 15 feet of clayey silt and sand. Water levels were measured at a nested set of observations wells located 22 feet from the pumped well. The maximum drawdown measured in the observation wells for the

tested gravel layer was 21.8 feet. The water level in the upper gravel also responded to the aquifer test, but with a maximum drawdown of 0.5 feet.

Another important physical parameter for unconfined aquifers is specific yield, which is the quantity of water that can be drained from a unit volume of material (unitless). For clean, well sorted gravel, specific yield can be as high as 0.25 (Fetter, 1980). Considering the poor sorting of the gravel in the tested aquifer – significant sand was noted during drilling – the specific yield for gravels in the north valley project area is likely much less than 0.25. For the purpose of this report, a value in the lower range of expected values, 0.15, is assumed for specific yield.

ALLUVIAL GROUNDWATER FLOW

Groundwater flows from aquifer recharge areas to discharge areas. In alluvial aquifers, recharge can occur by seepage from the river or irrigation ditches, infiltration of precipitation or applied irrigation water, or from upward gradients from underlying bedrock aquifers. Recharge is heavily influenced by land use, which is largely agricultural in the project area – predominantly irrigated fields. Primary irrigation ditches, sources of seep recharge, are shown on Plate 1. Land use for the project area, including agricultural land, is shown on Plate 2B (Natural Resource Information System, 2006). In the northern Bighorn River valley, an insignificant quantity of groundwater moves from bedrock aquifers to the alluvial aquifer system due to the shale content of the bedrock (cross sections on Plate 1).

Seepage from the river to the alluvial aquifer can only occur when the level of the river is higher than the adjacent water table. Plate 2C shows the water table elevation of the valley during late summer and fall, when groundwater levels are at their highest. At this time, groundwater flows from the edges of the valley toward the river. During spring, groundwater levels are at the lowest level of the year, however the gradient does not appear to shift such that the river feeds the alluvial system.

The seasonal high and low water levels for groundwater and surface water at the Watson site are shown on Figure 5. A side channel of the Bighorn River, shown on the cross-section, parallels the main channel of the river for three miles. The groundwater gradient is toward the river during the entire one-year monitoring period; the river, therefore, serves as a discharge area and never a recharge area.

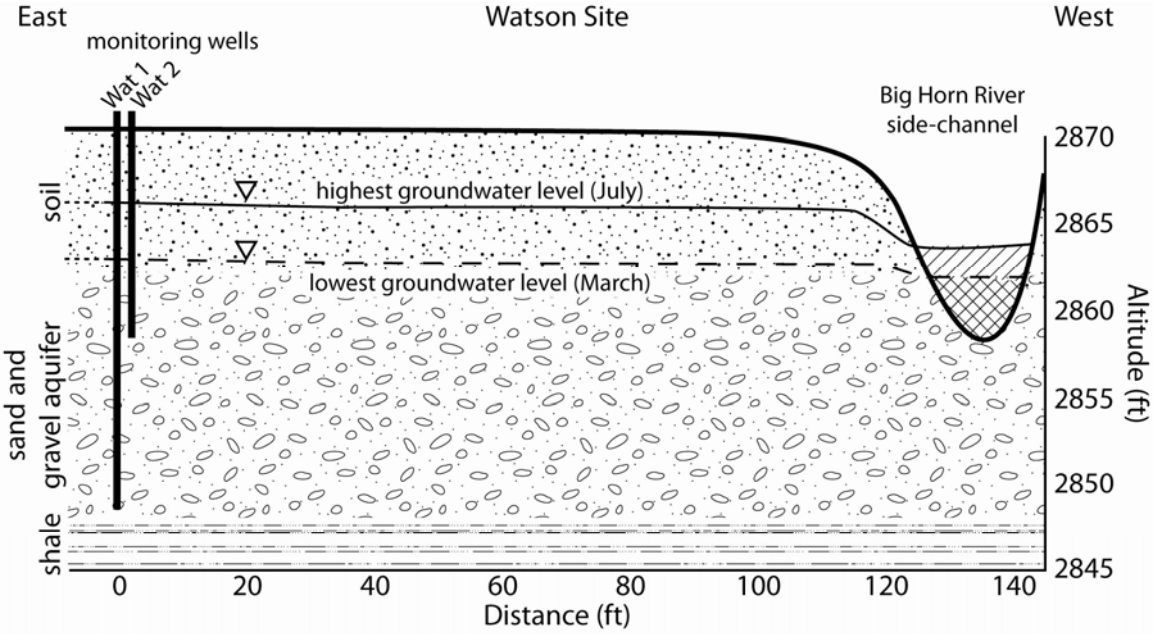


Figure 5. Cross-section view of the Watson Site, including 2 of 3 monitoring wells and a side-channel of the Big Horn River. Groundwater levels are 1.5 feet higher than the river in July and 0.3 feet higher than the river in March indicating a gradient towards, and discharge to, surface water. (Note: vertical scale is not equal to horizonal scale)

Within gravel aquifers, vertical and horizontal hydraulic conductivity values are likely similar. Water levels at both WAT-1 and WAT- 2 monitoring wells respond to recharge that occurs some distance away from the site at irrigation ditches and irrigated fields. The Watson site is approximately 1,800 feet downgradient from the nearest irrigated field and the water level response in the monitoring wells is due to groundwater recharge from these fields migrating toward the river. Water elevations are identical in the nested monitoring wells including the well completed near the top of the gravel (WAT-2) and those completed at the base of the gravel (WAT-1, -3), indicating horizontal flow toward the river (Figures 5 and 6). The irrigation season in this area began in 2008 around April 9, when water was diverted into the Two Leggins Canal from the Bighorn River. The water levels began to rise at the Watson site May 21 (figure 6), lagging 42 days behind the Two Leggins Canal; however, the timing of irrigation applications and ditch usage in the immediate area is not known.

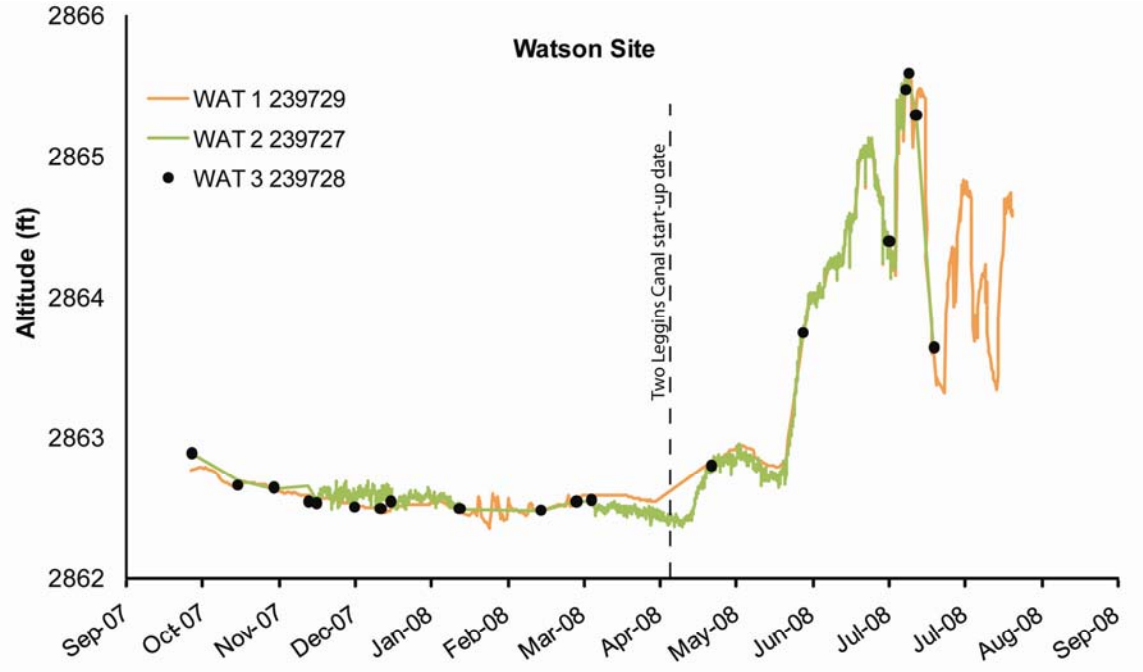


Figure 6. Watson site hydrograph showing no vertical gradient between deeper wells (Wat-1 and Wat-3) and the shallow well (Wat-2).

The set of nested terrace-aquifer-monitoring wells at the Webber Site is within 50 feet of irrigated fields and 200 feet of the Two Leggins canal. Wells WEB-2 and WEB-4 are completed in an overlying gravel unit that is separated from the zone monitored by wells WEB-1 and WEB-3 by a semi-confining layer. Within one day, water levels in both gravel layers rise in response to water entering the Two Leggins Canal (Figure 7). The upper gravel, under water table conditions, responds to the arrival of infiltrating water. The lower gravel, under semi-confined conditions, may respond to infiltrating water or to the pressure transmitted through the intermediate material.

Groundwater elevations measured between late August and early October in 2006 and 2007 and the altitude of the Bighorn River were used to contour the potentiometric surface of the terrace and alluvial aquifer for the fall season (Plate 2C). In the study area, the hydraulic gradient is generally east – northeast. Groundwater in the alluvium generally flows toward, and then parallel to, the river. The valley narrows where the Bighorn River crosses the Lance Sandstone – Bearpaw Shale contact causing the hydraulic gradient, and therefore the groundwater flow rate, to decrease above the narrows. Through the narrows the groundwater gradient increases. Throughout the study area, the Bighorn River is a gaining stream: groundwater flows into the river, increasing its discharge.

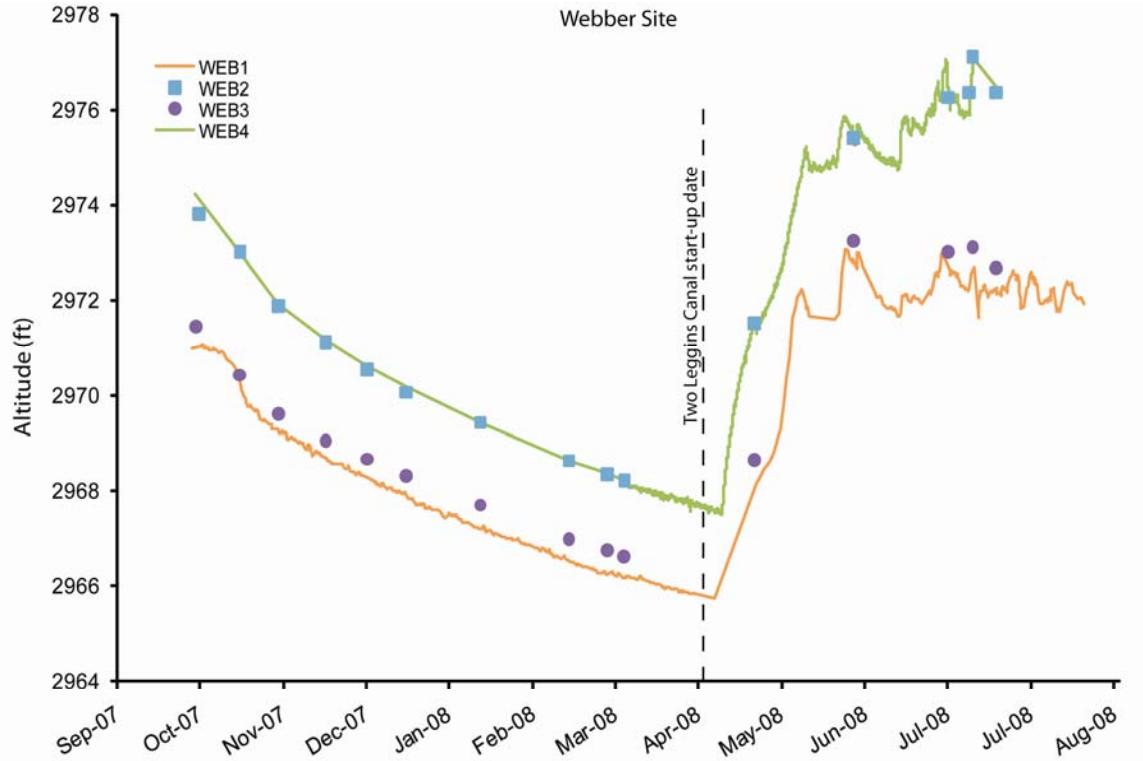


Figure 7. Hydrograph for the Webber Site showing a semi-confined lower aquifer (WEB-1 and -3) and an unconfined overlying aquifer (WEB-2 and -4).

Hamilton and Paulson (1968) estimated the rate of groundwater movement in the Bighorn River valley as less than 350 feet per year (ft/yr). They describe the typical range of rates for most aquifers as generally less than 1 ft/yr for shale to greater than 20,000 ft/yr for clean gravel. Based on the hydraulic conductivity values discussed above in the aquifer test section, values for the Webber and Watson sites were calculated using the standard formula:

$$v = \frac{365 * i * K}{S_y}$$

Where:

v = average linear velocity (ft/yr)
K = hydraulic conductivity (ft/d)
i = gradient (ft/ft)
S_y = Specific yield (dimensionless)

At the Webber site, the gradient is about 0.01 (Plate 2C) and the average velocity is estimated at 4 ft/d or about 1,500 ft/yr. At the Watson site, the gradient is less, about 0.005 and the average velocity is estimated at 7 ft/d or about 2,600 ft/yr. When irrigation water is rapidly infiltrating at the start of the growing season, the gradient will steepen and the velocity will increase. In late winter and early spring, when the water level is lowest, the gradient will be less and the velocity will decrease.

Groundwater travel times were calculated for each flow line on Plate 2C. The calculated time required for groundwater to flow from the extreme western edge of the alluvium to the river was based on an assumed average hydraulic conductivity value of 255 ft/d and specific yield value of 0.15. Estimated times of travel range from 1.1 years in the north to 16.8 years in the center of the valley. The average calculated travel time is 8.6 years. Actual rates of groundwater movement throughout the valley will vary widely depending upon hydraulic conductivity and gradient.

GROUNDWATER QUALITY

NITRATE AND NITRITE CONCENTRATIONS

Nitrate and nitrite are health concerns for infants (younger than 6 months) who may experience shortness of breath and blue-baby syndrome from drinking contaminated water (United States Environmental Protection Agency, 2008). Potential anthropogenic sources of nitrate in groundwater include septic systems, sewage, agricultural fertilizers, animal manure and land use changes. Nitrate impacts from septic systems will depend upon soil characteristics, system design and efficiency, and housing density. The impacts of nitrate from other sources are largely controlled by plant uptake, agricultural practices and soil characteristics. The United States Environmental Protection Agency (2008) sets a maximum contaminant level for nitrate to 10 mg/L and nitrite to 1 mg/L (both measured as nitrogen).

Nitrate and nitrite concentrations in groundwater in the northern Bighorn River valley range from below detection to 17 mg/L with an average of 2.8 mg/L (Table 1; Plate 3A). Of the 55 groundwater samples, 4 (7.3%) exceeded the recommended human health limit of 10 mg/L and 6 (10.9%) approached that limit by exceeding 5 mg/L. Higher concentrations of nitrate in samples 226395 (10.4 mg/L) and 94475 (16.2 mg/L) correspond to a mixture of older and younger water and older water samples respectively (see tritium discussion), however there are not enough tritium data to support a general conclusion that older water samples will have higher nitrate concentrations. The few groundwater samples that exceed the drinking water standard are generally isolated cases, which implies high nitrate concentrations are controlled by local sources (septic systems, nearby feed lots), rather than an extensive pollution source.

Surface-water samples collected from irrigation ditches and drains throughout the study area predominantly had nitrate and nitrite concentrations less than 1 mg/L and therefore pose little nitrogen-based risk to human health (Table 2). Of the 29 surface-water samples, nitrate and nitrite concentrations range from 0.01 to 2.38 mg/L with an average of 0.7 mg/L. Samples were collected in the spring and fall along several large drains and irrigation ditches. For those samples collected in both spring and fall, the latter samples show slightly higher nitrate and nitrite concentrations.

Table 1. Nitrate and nitrite in groundwater

GWIC ID	Sample Date	Nitrate and Nitrite (mg/l)	GWIC ID	Sample Date	Nitrate and Nitrite (mg/l)
6997	5/4/2006	8.86	234891	3/15/2007	3.16
11817	9/18/2006	0.69	234905	3/16/2007	0.59
11825	11/21/2006	2.77	234927	5/5/2006	6.38
11838	3/16/2007	0.01	234943	3/31/2006	0.06
11839	3/16/2007	0.01	234948	3/31/2006	<0.01
11843	4/25/2007	0.35	234954	4/20/2006	0.01
14074	4/12/2006	1.08	234958	4/20/2006	6.68
14078	3/16/2007	0.66	234959	4/20/2006	<0.01
14094	9/18/2006	0.72	234983	11/21/2006	0.23
14095	4/10/2007	0.10	234984	11/21/2006	0.24
94349	9/18/2006	1.95	234993	5/4/2006	7.51
94355	4/26/2006	5.39	235032	11/21/2006	0.11
94355	6/1/2006	3.87	235034	11/21/2006	1.09
94391	5/4/2006	17.10	235037	4/27/2006	0.01
94392	5/4/2006	2.14	235069	4/5/2006	0.13
94440	5/2/2007	2.84	235095	6/1/2006	0.05
94475	5/4/2006	16.20	235099	9/18/2006	2.60
124168	5/2/2007	0.13	235100	9/18/2006	4.28
127752	4/25/2007	0.02	235102	11/21/2006	3.45
156833	9/18/2006	0.83	235476	5/2/2007	0.37
208709	4/26/2006	1.07	236871	4/27/2006	1.85
212402	11/21/2006	1.48	236872	5/16/2007	3.39
212723	3/16/2007	0.15	238665	5/2/2007	0.05
226392	4/26/2006	2.05	238689	5/2/2007	12.60
226395	4/14/2006	10.40	238692	5/2/2007	7.78
226396	5/5/2006	0.64	238702	5/2/2007	0.05
234889	3/15/2007	1.98	244831	5/16/2007	2.09

Table 2. Nitrate and nitrite in surface water

Site Name	Sample Date	Nitrate and Nitrite (mg/l)	Site Name	Sample Date	Nitrate and Nitrite (mg/l)
Com School at Highway	4/14/2006	1.37	Vanzandt	4/14/2006	0.02
Com School (ditch)	11/22/2006	1.64	Vanzandt	11/22/2006	0.14
Com School West	11/22/2006	2.38	Whitman at Dorn	11/22/2006	1.29
Com School at Community	4/18/2007	0.39	Whitman at Arapooish Fishing Access	4/14/2006	0.13
Com School Branch	4/18/2007	1.37	Webber Drain	11/22/2006	1.81
General Custer Drain	4/13/2006	0.38	Webber Drain	4/18/2007	0.70
Kingley East	11/22/2006	1.45	Grant Marsh Drain	4/13/2006	0.96
Lone Tree at Highway	4/13/2006	0.45	Grant Marsh Drain	11/22/2006	2.00
Lone Tree at Highway	4/18/2007	0.27	Two Leggins at Railroad	5/19/2006	0.19
Lone Tree at Upper Road	4/13/2006	0.01	Two Leggins at Tunnel Exit	5/25/2006	0.14
South Lone Tree	4/18/2007	0.03	Two Leggins at T1N R33E S32-33 along Upper Road	4/13/2006	0.03
South Lone Tree at Center Road	11/22/2006	0.46			
Lowline at General Custer Fishing Access	5/25/2006	0.24	Two Leggins at T1N R33E S29-28 along Upper Road	4/13/2006	0.02
Low Line at Lind	5/25/2006	0.24	Two Leggins at General Custer Fishing Access	5/25/2006	0.13
Drain at T2N R33E S22-23 along Highway	4/14/2006	1.78	Drain at Lower Road / Highway 47 Y	4/13/2006	0.47

For example Grant Marsh drain increased from spring to fall (0.96 to 2.00 mg/L) as did Vanzandt (0.02 to 0.14 mg/L). South Lone Tree and Webber drain had higher nitrate and nitrite concentrations in the fall of 2006 (0.46 and 1.81 mg/L respectively) than in spring of 2007 (0.03 and 0.70 mg/L respectively). This is most likely due to the increasing use of fertilizers during the growing season, which, with time, migrate to the ditches. It should be noted that all samples collected from the irrigation ditches and drains were below the health standard of 10 mg/L. Of the 30 samples measured for water-quality parameters in the 1960 USGS study (Hamilton and Paulson, 1968), nitrate values were generally very low and the authors identified only one sample as exceeding drinking water standards.

SALINITY

A general indication of water quality can be assessed by its salinity as measured by the total dissolved solids (TDS), which can be approximated by measuring specific conductance (SC). The TDS is the sum of all the dissolved constituents in the water, whereas SC is a measure of the electrical conductivity of the water – generally directly related to the TDS of the water. Drinking water has a secondary standard for TDS of 500 mg/L (an approximate SC of 800 micro Siemens/cm). Secondary standards are non-enforceable regulations based on aesthetic or cosmetic effects (United States Environmental Protection Agency, 2008). Limits on the TDS of irrigation water vary by crop and constituent composition. In general, dissolved solids should be less than 2,000 mg/L, which, in this area, is approximately equivalent to 2,400 micro Siemens/cm. Using 15 water quality samples and their field SC measurements, a conversion chart was generated to assist in converting SC measured in the Northern Bighorn Valley to TDS (Figure 8).

Salinity of groundwater accessed by domestic and stock wells varies by aquifer and location within the valley (Plate 3B). In general, groundwater is freshest near the irrigation ditches and the river. This is most likely due to low-salinity river water and irrigation water – which is diverted river water – infiltrating through the river bed and ditches into the near-surface alluvial aquifers. As the water moves down-gradient away from the ditches it picks up salts and agricultural additives, increasing its salinity. There are three locations in the northern valley where the groundwater salinity is higher than the surrounding area. The reason for these high salinity areas is not clear; however, data collected for the 1960 study (Hamilton and Paulson, 1968) exhibit the same pattern and to a greater extent (Plate 3C). Maximum SC

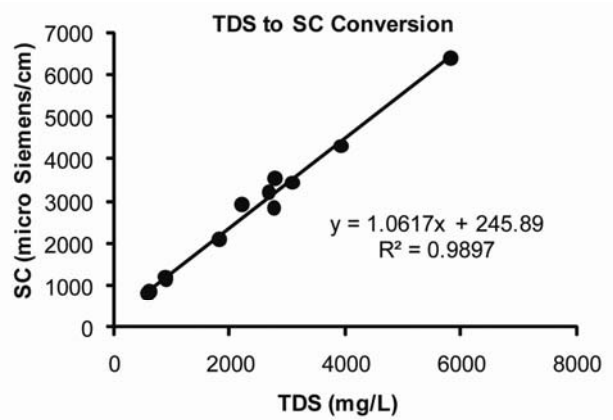


Figure 8. Conversion between TDS and SC using measured field SC values and laboratory TDS values for water samples collected in the northern Big Horn valley (data from MBMG GWIC, 2008).

values in the 1960 study exceeded 8000 micro Siemens/cm (8000 micro Siemens/cm was the maximum detection limit of their sensors) in the same three locations that reached between 5000 and 6000 micro Siemens/cm in this investigation.

There are several causes that may have precipitated the improved water quality seen in this study as compared to the 1960 USGS study (Hamilton and Paulson, 1968):

- Construction of the Yellowtail Dam (near Fort Smith) between 1961 and 1966 may have improved the consistency and volume of irrigation water, allowing for more effective flushing of salts added though agricultural practices and salts that naturally accumulate in soil.

- The main irrigation ditch, the Two Leggins Canal, was expanded and improved in the mid 1990s, which would increase the amount of irrigation water that could be added to the fields.

- Much of the land under cultivation and irrigation has been shifted away from grain crops, such as barley, to sugar beets in recent years. Sugar beets require more irrigation during their growing season than do cereals, which would allow better flushing of salt from the soil.

- Introduction of improved agricultural practices, such as yearly soil analyses, reduces the amount of fertilizers applied to the soil. Applied fertilizers are specific to plant and soil needs, which reduces the amount of fertilizer that reaches the water table.

- The USGS study outlined the problem of water logging below irrigated lands, especially on the higher terraces. They recommended improving drainage ditches. Water logging can cause increases in salinity by bringing the water table to the surface, which, when transpired or evaporated, leaves salt near the surface. The salt can then be mobilized by the introduction of irrigation water. Improving drainage and return flow ditches can improve the water quality by reducing water logging on cultivated land.

The primary source of groundwater salinity is salt that has been dissolved and mobilized along its flow path. Higher water levels lead to thicker saturation zones and potentially more dissolution of salt. Water moving along a flow path should flush the available salts and the salinity should eventually decrease. Salt mobilization and flushing has been studied in coal mine spoils in eastern Montana for several decades (Van Voast and Reiten, 1988). Speculation on the required number of pore volumes before a decrease occurs varies from a few (Van Voast and Reiten, 1988) to several thousand (Davis, 1984). Using the time of travel calculations presented in the Alluvial Groundwater Flow section, between 2 and 35 pore volumes of water have moved through and improved the aquifer since the Yellowtail Dam was completed and the USGS study was released about 40 years ago.

Laboratory data for major and minor inorganic constituents for water samples collected in the study area are listed in Appendix C. The TDS for alluvial samples collected from 2006 through 2008 range from 729 to 5,842 mg/L, with an average of 2,320 mg/L. Sodium adsorption ratio (SAR) is a measure of the ratio of sodium to calcium and magnesium concentrations and is useful for evaluating water for irrigation uses. For the same samples, the SAR values range from 1.5 to 21.1. Samples collected from the Bighorn River during December baseflow showed much lower values, with TDS average of 602 mg/L and SAR value of 2. Even this limited comparison of river water and groundwater indicates the dissolution of salts, particularly sodium salts, as the irrigation water is applied to fields and moves along groundwater flow paths.

The major ion concentrations (calcium, magnesium, sodium, bicarbonate, sulfate, chloride) for groundwater samples (figure 9) are compared in the Piper diagram presented in Figure 10. The samples are broken into three families: 1) western or upgradient side of the aquifer (in orange); 2) middle area (in green); and 3) downgradient or discharge side near the river (in blue). One sample collected from an upper terrace (94475) is in red. Cation concentrations are mixed, with sodium domination increasing along the flow paths. This is not surprising, considering the Cretaceous shales that cover much of the upland areas and have contributed sediment to the valley material. These shales no doubt provide an ample source of sodium.

Figure 9. Water-qualiy sample locations.

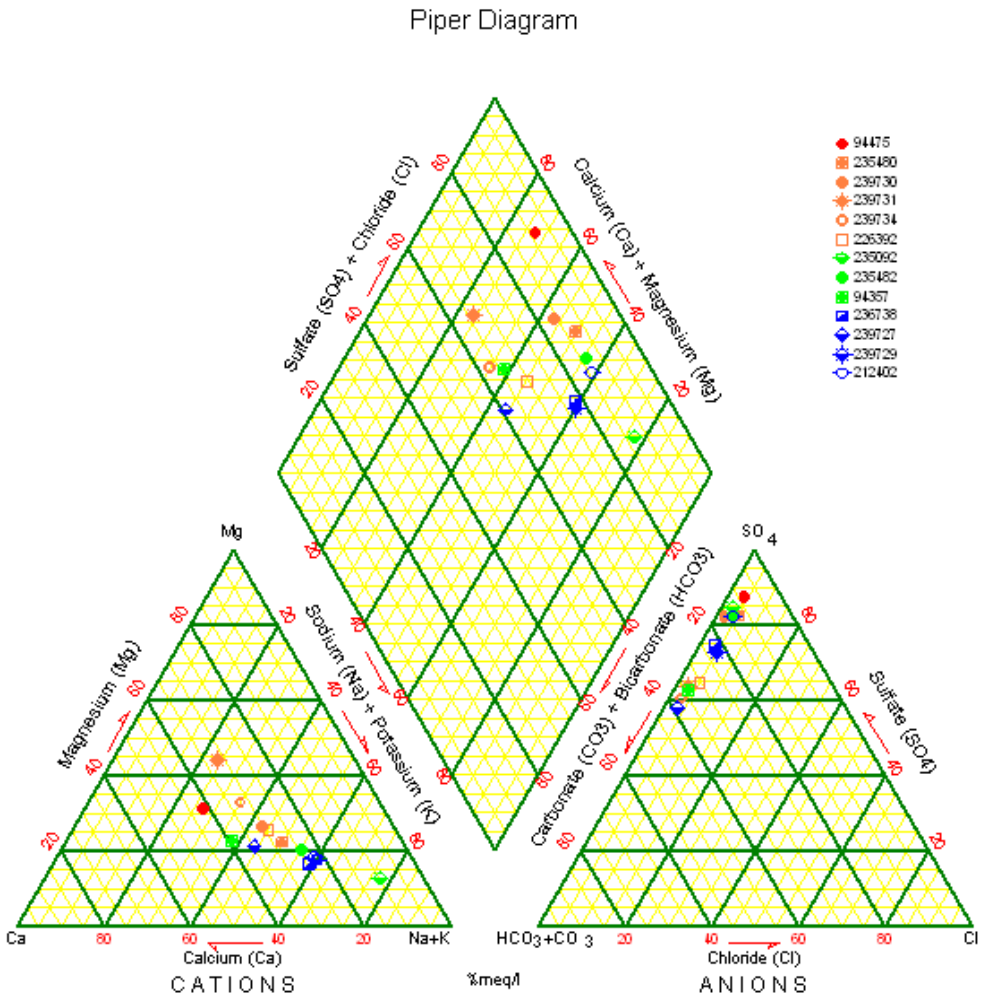


Figure 10. Chemistry of alluvial groundwater. Color of point indicates relative position along the flow path. Orange is along the western (recharge) edge, green is mid-path, and blue is near the down-gradient (discharge) edge. The red sample was taken from an upper terrace.

RECHARGE EVALUATION

Groundwater recharge to the alluvial aquifer was evaluated by assessing groundwater level fluctuations, oxygen and hydrogen isotopes, chloride concentrations, and tritium isotope analysis.

Water levels change over an annual cycle that reflects recharge (primarily irrigation water during the spring and summer) and discharge throughout the year to the river and to evaporation and transpiration. Water levels measured regularly at eight wells illustrate that the timing of recharge is very fast (Figure 11). As shown by the hydrographs in Figures 6, 7, and 11, water levels, in some instances, responded to irrigation water within a day or two. Figure 11 presents annual hydrographs with water levels compared to the lowest water altitude reached in the spring. All wells reached their lowest point immediately before ditches were turned on. This may indicate that water levels would have continued to fall if water had not been introduced to the irrigation ditches and fields. Figure 11 illustrates the rate of change of the water levels, which, in monitored wells, rose between 1.8 and 8.1 feet during the year.

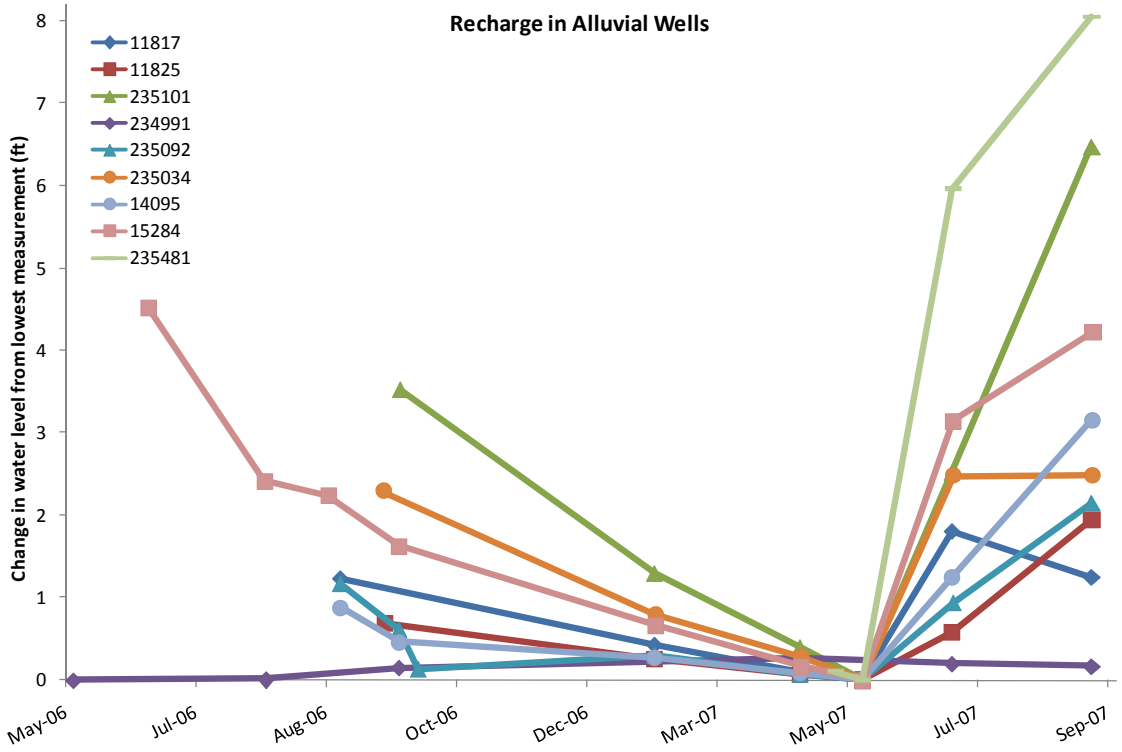


Figure 11. Example hydrographs for nine wells showing the influence of irrigation water on water levels.

At the end of the irrigation season, alluvial groundwater levels decrease throughout the winter and early spring. When the irrigation ditches are turned on in the spring, the water levels quickly rise to the levels attained during the previous irrigation season or higher. The quick response of the groundwater level to the introduction of irrigation water indicates a responsive aquifer with a predominantly local recharge source: the irrigation ditches and the irrigated fields.

The single exception to these trends is well 234991, which does not show seasonal water level changes. This well is on the second terrace above the main terrace of the valley, which is not actively irrigated. Well 234991 is close (less than half a mile) to well 94475, which was analyzed for tritium isotope concentrations. Well 94475 – we conclude well 234991 is similar – contains older water (see tritium section) that is not isotopically similar to irrigation water (see water isotope analysis section). The groundwater of this second terrace is not from irrigation water and the hydrograph indicates a lack of irrigation-driven recharge.

The water level responses to infiltration of irrigation water, as illustrated in Figures 6, 7, and 11, can be used to estimate the quantity of recharge using the formula:

$$R = 12\frac{in}{ft} S_y \frac{dh}{dt}$$

Where:
R = recharge (in/yr)
dh/dt = change in water level over time (ft/yr)
S_y = specific yield, assumed 0.15

Within the alluvial aquifer, calculated recharge rates range from 3.3 to 17.3 inches per year (in/yr). The average of the 10 wells on the alluvial aquifer (not including well 234991 on the second terrace) is 7.8 in/yr (Table 3). Outside of irrigated areas, such as on the second terrace, recharge occurs through infiltration of precipitation from storms that exceed the evapotranspiration demand. Recharge in well 234991 was 0.5 inches, which is about 4% of the annual precipitation. In eastern Montana, recharge has been estimated as averaging 0.1% to 3% of annual precipitation (Rose, 1996; Miller, 1978; 1981). However, these studies were performed on bedrock aquifers, not terrace aquifers, and would therefore have different associated soils and different recharge rates. Recharge from precipitation in eastern Montana typically only occurs during wetter-than-normal years (Van Voast and Reiten, 1988). The marked difference in recharge rates and groundwater availability in areas with irrigation (7.8 in/yr) as opposed to precipitation dependent recharge (0.5 in/yr) is illustrated by well 234991.

Table 3. Recharge rates estimated from change in water levels

Well	Sy	SWL high	SWL low	SWL change (ft)	R (in/yr)	Comment *	Year
11817	0.15	2833.50	2831.69	1.81	3.3	NI, margin area	2007
11825	0.15	2849.83	2847.88	1.95	3.5	NON, margin area	2007
235101	0.15	2891.12	2884.64	6.48	11.7	NI	2007
235092	0.15	2812.88	2810.73	2.15	3.9	ND, margin area	2007
235034	0.15	2835.33	2832.84	2.49	4.5	NI ND	2007
14095	0.15	2827.73	2824.57	3.16	5.7	NI	2007
15284	0.15	2768.48	2763.95	4.53	8.2	NI	2007
235481	0.15	2880.55	2872.60	7.95	14.3	ND	2007
239734	0.15	2977.12	2967.50	9.62	17.3	WEB-4 NI ND	2008
239727	0.15	2865.55	2862.35	3.20	5.8	WAT-2 NI ND	2008
234991	0.15	2,998.17	2,997.90	0.27	0.5	Upper terrace, NON	2007

* NI - near irrigated fields, ND - near irrigation ditches, NON - not near irrigation

Oxygen and hydrogen isotopes can be useful tracers of a water's origin. Oxygen and hydrogen isotopes are measured as ratios of the heavy isotope to the light: $^{18}O/^{16}O$ and $^{2}H/^{1}H$. These ratios are then compared to standard mean ocean water to produce a number which represents the variation away from this standard. This variation is the del value (represented as $\delta^{18}O$ and δD), with more negative numbers representing higher ratios (more heavy isotopes) as compared to ocean water and positive numbers representing lower isotope ratios (more light isotopes) compared to ocean water. By measuring the isotope ratios of groundwater in the northern Bighorn River valley and of potential recharge sources, it is possible to discern the source of the groundwater.

In a given location, precipitation that falls as snow has more negative $\delta^{18}O$ and δD values than precipitation that falls as rain. Additionally, precipitation that falls at higher altitudes and latitudes have generally more negative $\delta^{18}O$ and δD values than precipitation that falls at lower elevations and latitudes. Precipitation, in the form of rain or snow, generally has a predictable ratio of $\delta^{18}O$ to δD and will fall along a straight line on a graph of $\delta^{18}O$ versus δD (figure 12). The world-wide average of the oxygen and hydrogen isotopes in precipitation is known as the Global Meteoric Water Line. However, many groups have produced meteoric water lines for more localized areas including a water line for Butte, Montana (Gammons and others, 2006) and a water line for southeastern Idaho, western Wyoming, and south-central Montana (Benjamin and others, 2004). Currently, there is no defined water line specific to the Bighorn River valley; therefore the data collected for this study were compared to the Global Meteoric Water Line, and the local meteoric water lines for Butte, Montana and south-central Montana (Figure 12).

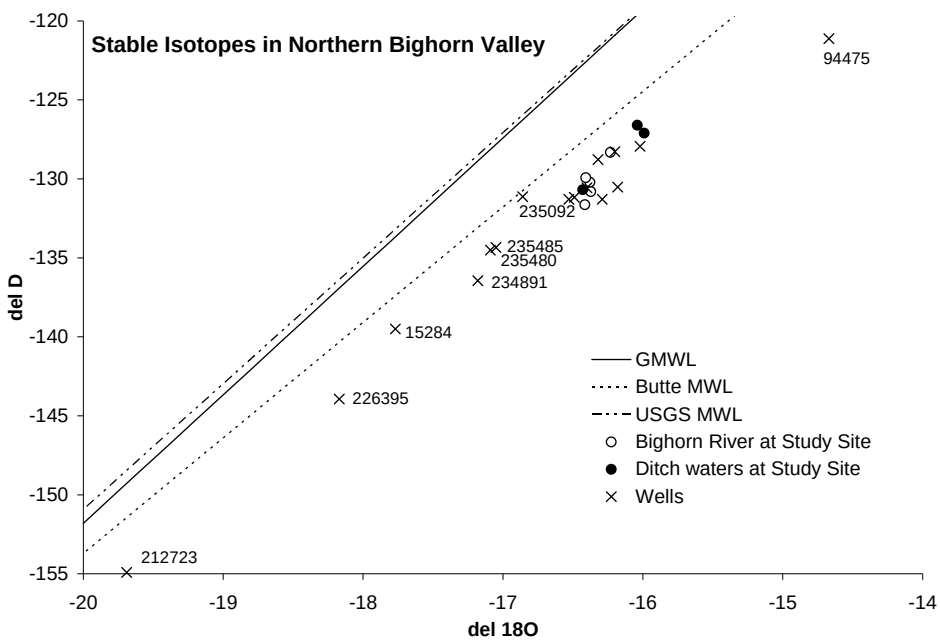


Figure 12. Oxygen and hydrogen stable isotope ratios for surface water and groundwater collected in the northern Bighorn Valley.

Samples were collected from several wells throughout the valley and from three irrigation ditches and five locations along the Bighorn River (Figure 12; Table 4). The Bighorn River and irrigation ditches have very similar isotope ratios because very little modification (evaporation, additional water input) happens along the length of the ditches. The surface-water samples fall slightly off the meteoric water lines because of the influence of evaporation. Most of the groundwater samples have oxygen and hydrogen ratios very similar to the Bighorn River and irrigation ditches. This implies that the original source of the majority of the groundwater in the alluvial aquifer is leakage from irrigation ditches or application of irrigation water. Ditch leakage in Agency Canal near Crow Agency south of Hardin was computed to vary between 100 and 400 gallons per day per linear foot of canal. Leakage from the Two Leggins Canal is predicted to be less due to a higher sediment load in the water causing the canal to seal more effectively (Hamilton and Paulson, 1968).

Table 4. Light stable isotope composition of groundwater and surface water

GWIC ID #	Date Collected	^{18}O	D	
WELLS				
11838	3/16/2007	-16.32	-128.78	
11843	4/26/2007	-16.40	-130.56	
15284	6/8/2006	-17.77	-139.50	
94475	6/8/2006	-14.67	-121.13	
212401	10/26/2006	-16.49	-131.17	
212723	3/16/2007	-19.69	-154.91	
226392	6/9/2006	-16.20	-128.28	
226395	6/8/2006	-18.17	-143.94	
226396	6/8/2006	-16.29	-131.30	
234891	3/15/2007	-17.18	-136.44	
234905	3/16/2007	-16.18	-130.52	
235092	9/6/2006	-16.86	-131.12	
235101	10/4/2006	-16.02	-127.94	
235480	4/26/2007	-17.05	-134.34	
235482	5/2/2007	-16.43	-130.69	
235485	4/26/2007	-17.09	-134.51	
238692	5/2/2007	-16.53	-131.30	
SURFACE WATER				Site Name
	5/2/2007	-16.43	-130.69	Low Line at Lind
	10/26/2006	-15.99	-127.10	Two Leggins at Railroad
	10/26/2006	-16.04	-126.60	Two Leggins at Tunnel
240468	12/13/2007	-16.23	-128.3	BHR at Two Leggins FA
240466	12/13/2007	-16.37	-130.8	BHR at Arapooish FA
240469	12/14/2007	-16.38	-130.2	BHR at Grant Marsh FA
240471	12/14/2007	-16.41	-131.6	BHR at General Custer FA
240472	12/14/2007	-16.41	-129.9	BHR at Manuel Lisa FA

Those samples that do not fall near the isotope ratios of the irrigation water tend to have more negative oxygen and hydrogen isotope values. The samples from wells 212723 and 226395, which are on the western-most edge of the valley in the northern-most extent of the study area, represent groundwater which is primarily recharged from snow melt. Additionally, sample 212723 shows very little evaporation or transpiration indicating little time spent as surface water (see chloride section). The age of sample 226395 is a mixture

of older and modern water (see tritium section) and may therefore be a mixture of old snow-melt and a small contribution of modern irrigation water. Samples taken from wells 15284, 234891, 235480 and 235485, have stable isotope ratios only slightly lower than the irrigation water and are therefore most likely mixtures of snow melt and irrigation water. However, because there is no defined local meteoric water line for this area it is not possible at this time to calculate the relative contribution of each source. The sample collected from well 94475, in contrast to the other groundwater samples, has more positive stable isotope values than the irrigation water. Additionally, this sample is the oldest of the samples analyzed for tritium (see tritium section) at approximately 30 to 40 years old and shows no influence of irrigation water input (see groundwater level fluctuation section). This well, unlike the other sampled wells, is on the second terrace above the river valley. The stable isotope values in the groundwater on this terrace indicate a highly evaporated recharge source and/or a source that was not originally from snow melt. These higher terraces, therefore, will be less susceptible to changes in irrigation practices and drought conditions because the source of recharge is neither from recent snow melt nor recent application of irrigation water.

CHLORIDE TRACER EVALUATION

Chloride in rain water varies inversely with distance from the oceans from 0.6 mg/l near the Pacific Coast to 0.08-0.17 mg/l in Montana (Drever, 1997). Chloride in water is conserved during evaporation because it does not precipitate except at high salinities (Drever, 1997) nor is it taken up in plants. Chloride was analyzed in 24 samples to identify the influence of evaporation on the groundwater (Table 5). The source of high chloride concentrations in groundwater in most locations is due to evaporative concentration of chloride in irrigation water and dissolution of chloride salts in the soil. The source of groundwater that shows little evaporation (14078) is most likely primary recharge from precipitation (Clark and Fritz, 1997).

Table 5. Chloride concentrations in groundwater and surface water

GWIC ID / Site Name	Sample Date	Chloride (mg/l)	GWIC ID / Site Name	Sample Date	Chloride (mg/l)
WELLS					
11838	3/16/2007	267	235032	11/21/2006	22
11839	3/16/2007	193	235034	11/21/2006	20
14078	3/16/2007	5	235099	9/18/2006	26
14094	9/18/2006	26	235100	9/18/2006	17
14095	4/10/2007	34	235476	5/2/2007	25
94440	5/2/2007	123	236872	5/16/2007	13
156833	9/18/2006	16	238665	5/2/2007	31
212723	3/16/2007	20	238692	5/2/2007	244
234889	3/15/2007	142	238702	5/2/2007	17
234891	3/15/2007	170	244831	5/16/2007	146
234905	3/16/2007	13			
SURFACE WATER					
Two Leggins	9/18/2006	13	South Lone Tree	4/18/2007	64
Com Ditch	4/10/2007	57	Webber drain	4/18/2007	36
Com Branch	4/18/2007	25			

Separating the affect of transpiration and evaporation can be done by comparing the concentration of chloride to the stable isotope ratios. Transpiration will cause the chloride concentrations to increase without changing the hydrogen and oxygen isotope ratios. In contrast, evaporation will also increase the concentration of chloride, but will also cause the stable isotope ratios to increase. Figure 13 shows that, in the northern Bighorn valley, the increasing groundwater chloride concentrations are not associated with a corresponding increase in stable isotope ratios. This lack of correlation suggests that transpiration, not evaporation, plays the dominant role in groundwater consumption. Lack of evaporation evidence in groundwater implies that very little water infiltrates from the surface of the fields, where evaporation would be significant. Most of the groundwater is recharged by the irrigation ditches and is subsequently transpired by crops.

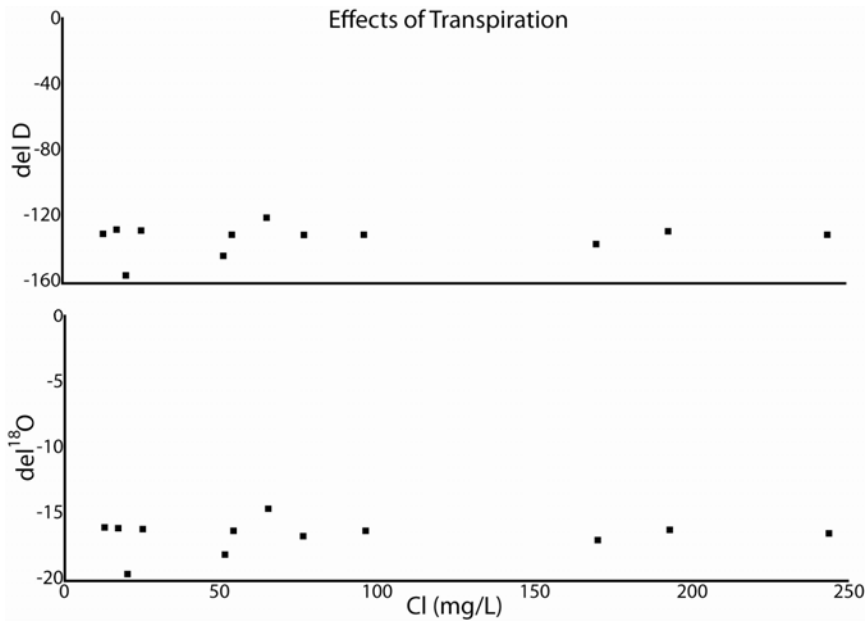


Figure 13. Chloride in groundwater versus stable isotope ratios. No correlation between isotope ratios and chloride concentrations implies the greatest influence on groundwater is transpiration, not evaporation.

TRITIUM ANALYSES

The age of groundwater, considered to be the time since the water fell as rain or was last in contact with the atmosphere, can be a useful measurement to determine characteristics of an aquifer. Estimation of the age of water in an aquifer can be done in a number of ways; one common way is through measurement of the tritium concentration of the aquifer water. Tritium is a radioactive isotope of hydrogen that is produced in low levels naturally in the atmosphere and also during nuclear power generation. Tritium was also produced in great quantities during nuclear bomb testing prior to The Partial Test Ban

Treaty of 1963. The radioactive decay of tritium to helium-3 occurs relatively rapidly with a half life of 12.5 years. Due to this short decay time, tritium is not present in measureable quantities in water that is over 60 years old. The spike in tritium levels produced during nuclear testing in the 1950s allows the identification of water that originated as meteoric water during that time frame. Tritium is measured in Tritium Units (or TU).

As a general rule:

- Water with no measureable tritium recharged the aquifer prior to 1952.
- Water with intermediate tritium concentrations of 0.8 to 4 TU is most likely a mixture of modern water and older, tritium dead, water.
- Water with measured 5 to 15 TU is young, less than 10 years old.
- Water that has TU values of 15 to 30 shows some influence of "bomb" era tritium indicating at least some of the water originated after bomb testing.
- Water with over 30 TU shows a considerable amount of tritium from the 1960s and 1970s.
- Water with over 50 TU most likely recharged the aquifer during the peak of nuclear testing (Clark and Fritz, 1997).

The results of the tritium sampling and analyses for the northern Bighorn valley indicate the majority of the groundwater recharged the aquifer recently; these results support the interpretation of the stable isotope and chloride analyses that the majority of groundwater in the valley originated with infiltrating irrigation water (Table 6). However, some of the wells which are over a mile down-gradient from the western edge of the terrace, such as 212401 and 235092, are measurably older than wells in close proximity to the irrigation ditches along the western edge of the terrace aquifer. This may give an indication of the rate of groundwater movement at approximately 1/10th of a mile or less per year (14.5 ft/d). This is less than was estimated by the Webber aquifer test of 62 ft/d.

The tritium analyses have supported conclusions drawn from the light stable isotope analyses. Well 94475 is on the second terrace above the main valley terrace and is the oldest sample at approximately 30 to 40 years old. Water levels in this well do not vary seasonally and have light stable isotope ratios dissimilar to irrigation water. Well 2269395 is a mixture of old and modern water, an observation supported by the stable isotope analysis which indicates groundwater at this site is a mixture of snow melt and infiltrating irrigation water.

Table 6. Tritium in groundwater and surface water

GWIC ID / Site Name	^{3}H (TU)	error	era	approximate age (years)
WELL				
15284	8.2	0.7	modern	less than 10
94355	9.7	0.9	modern	less than 10
94475	26.6	1.9	50s-70s	approximately 30
212401	19.1	1.4	70s-90s	10 to 30 years
226395	3.5	0.5	mixture	
226396	12.5	1.0	modern	less than 10
235092	14.8	1.1	70s-90s	10 to 30 years
235101	9.8	0.9	modern	less than 10
SURFACE WATER				
Two Leggins at Railroad	8.0	0.7	modern	less than 10

CONCLUSIONS

GROUNDWATER AVAILABILITY

The majority of groundwater in the alluvial aquifers in the northern Bighorn River valley originates from the irrigation water in the ditches. The relationship between ditch leakage and aquifer recharge must be taken into account before changes to the ditches are made. Lining ditches or reducing the amount of water they carry could potentially reduce the available groundwater used domestically and for stock water. Reducing the area of irrigated land, on the other-hand, may not impact the groundwater levels significantly so long as the irrigation ditches are maintained. Additional private wells, if installed in moderation and consuming a modest amount of water for domestic use, should not impact the groundwater availability significantly; however, further monitoring of water levels would be necessary to ensure protection of this resource.

GROUNDWATER QUALITY

Water quality in the valley has improved over the last 50 years and should not degrade so long as alluvial groundwater levels are kept at their current levels. Allowing the water levels to fluctuate greatly, or increase over the current levels, will mobilize more soil salts thereby increasing salinity in the groundwater. Further improvements in salinity may be possible by closely monitoring agricultural amendments to ensure they do not exceed plant uptake and to allow the ditches to maintain a constant water level throughout most of the year, irrespective of irrigation usage.

Nitrate concentrations, a health concern especially in children and infants, are low throughout most of the valley. High nitrate levels in individual wells are likely due to localized sources such as high animal concentrations or septic systems in close proximity to the well.

RECOMMENDATIONS

Continuing the monitoring program established for this project would help further establish the alluvial aquifer characteristics including discerning the respective influences of ditch leakage versus irrigation water application on the quantity of water recharging the aquifer. Taking the data collected for this project, continuing the monitoring and running more long-term aquifer tests would allow the development of a predictive groundwater model. A model such as this would be useful in predicting drawdown in theoretical situations such as increased development, reduced irrigation and possible effects of contaminant spills.

ACKNOWLEDGEMENTS

The authors wish to thank John Olson for organizing and starting the project and for his work during the project. We also thank all landowners that allowed access to their wells and ditches – we are especially grateful to the Watson and Webber families that allowed the installation of monitoring wells.

REFERENCES

Benjamin, L., Knobel, L.L., Hall, L.F., Cecil, L.D., and Green, J.R., 2004, Development of a local meteoric water line for southeastern Idaho, western Wyoming, and south-central Montana: U.S. Geological Survey, Scientific Investigations Report 2004-5126, 23p.

Clark, I.D, and Fritz, P. 1997, Environmental isotopes in hydrogeology: CRC Press LLC, Boca Raton, FL.

Davis, R.E., 1984, Geochemistry and geohydrology of the West Decker and Big Sky coal-mining areas, southeastern Montana: U.S. Geological Survey Water-Resources Investigations Report No. 83-4225, 109 p.

Drever, J. I., 1997, The geochemistry of natural waters, surface and groundwater environments, third edition: Prentice Hall, Upper Saddle River, NJ.

Feltis, R.D., 1980a, Potentiometric surface map of water in the Madison Group, Montana: Montana Bureau of Mines and Geology, Hydrogeologic Map 2, 1 sheet(s), 1:1,000,000.

Feltis, R.D., 1980b, Dissolved-solids and ratio maps of water in the Madison Group, Montana: Montana Bureau of Mines and Geology, Hydrogeologic Map 3, 3 sheet(s), 1:1,000,000.

Fetter, C. W., 1980, Applied hydrogeology: Charles E. Merrill Publishing, Co., Columbus, OH, 488 pgs.

Gammons, C.H., Poulson, S.R., Pellicori, D.A., Reed, P.J., Roesler, A.J., and Petrescu, E.M., 2006. The hydrogen and oxygen isotopic composition of precipitation, evaporated mine water, and river water in Montana, USA: Journal of Hydrology, v. 328, p. 319-330.

Hamilton, L.J., and Paulson, Q.F., 1968, Geology and ground-water resources of the lower Bighorn valley Montana: US Geological Survey Water Supply Paper 1876, 39 p., 1 sheet.

Miller, W.R., 1978, Water resources of the central Powder River area of southeastern Montana: U. S. Geological Survey Open-File Report 78-237, 27 p.

Miller, W.R., 1981, Water resources of the central Powder River area of southeastern Montana: Montana Bureau of Mines and Geology Memoir 47, 53 p.

Montana Department of Natural Resources and Conservation, 2008, http://dnrc.mt.gov/cardd/ResDevBureau/renewable_grant_program.asp. Accessed June 17, 2008.

Montana National Resource Information System, 2008, Montana County Drought Status. http://nris.state.mt.us/Drought/status/ Accessed June 17, 2008.

National Agricultural Statistics Service, United States Department of Agriculture, 2007, Montana Statistics by County: http://www.nass.usda.gov/Statistics_by_State/Montana/index.asp. Accessed August 15, 2008.

Natural Resource Information System, 2006, GAP Analysis: http://nris.mt.gov/gis/ Accessed 2006.

Rose, James C., 1996, Estimating recharge to groundwater in eastern Montana: Master's thesis, Montana Tech of The University of Montana, 212 pgs.

United States Environmental Protection Agency (US EPA), 2008, Drinking water contaminants: http://www.epa.gov/safewater/contaminants/index.html Accessed July 21, 2008.

Van Voast, W.A., and Reiten, J.C., 1988, Hydrogeologic responses twenty years of surface coal mining in southern Montana: Montana Bureau of Mines and Geology Memoir 62, 30 p.

Vuke, S.M., Wilde, E.M, and Bergantino, R.N., 2000, Geologic map of the Hardin 30' x 60' quadrangle, Montana: Montana Bureau of Mines and Geology, Geologic Map 57. 1 sheet, 1:100,000.

Vuke, S.M., Wilde, E.M., and Bergantino, R.N., 2003, Geologic map of the Hysham 30' x 60' quadrangle, eastern Montana: Montana Bureau of Mines and Geology, Open-File Report 486, 10 p., 1 sheet(s), 1:100,000.

Western Regional Climate Center, 2008, Montana precipitation; Monthly totals: http://www.wrcc.dri.edu/summary/Climsmemt.html Accessed July 21, 2008.

Wheaton, J., and Lopez, D.A., 1999, Hydrogeology of the Upper Pryor Creek Basin, Bighorn and Yellowstone counties, Montana: Montana Bureau of Mines and Geology, Report of Investigation 5, 26 p., 7 sheet(s).

Appendix A. Site Inventories

Gwic Id	Latitude	Longitude	T	R	S	Qsect	Site Type	Altitude (ft)	Well Depth (ft)	Inventory Date	Aquifer	Inventoried Water Level (ft)	Temp (C)	Field SC	Field pH	Redox
6997	45.7302	-107.6843	01S	33E	19	DAAD	WELL	3035	24	5/4/2006	112TRRC	20.48	11.3	2984	7.33	
11817	45.8695	-107.6100	01N	33E	3	BBBB	WELL	2841	38	9/6/2006	112TRRC	8.33	13.6	2214	7.37	
11825	45.8503	-107.6138	01N	33E	9	ADAB	WELL	2862	50	9/27/2006	112TRRC	14.93	10.7	1550	7.4	
11838	45.7987	-107.6072	01N	33E	27	CCDA	WELL	2854	20	3/16/2007	112TRRC	7.75	9.8	6040	6.87	-7.7
11839	45.7990	-107.6105	01N	33E	27	CCCB	WELL	2855	28	3/16/2007	112TRRC	7.95	6.4	3740	8.24	-72.3
11843	45.8004	-107.6329	01N	33E	29	DDAA	WELL	2875	30	4/26/2007		8.75	10.3	4237	7.37	6.7
14074	45.9274	-107.5873	02N	33E	14	BBAB	WELL	2800	28	4/12/2006	112TRRC	10.11	11.7	1731	7.39	
14076	45.9177	-107.6209	02N	33E	16	DBC	WELL		32	6/28/2007		10.43	10.9	7590	7.51	
14078	45.9131	-107.6170	02N	33E	21	ABAA	WELL	2880	40	3/16/2007	112TRRC	17.7	9.2	1156	7.74	-47.5
14080	45.8997	-107.6005	02N	33E	22	CDDA	WELL	2890	65	9/6/2006	112TRRC	8.53				
14095	45.8706	-107.6002	02N	33E	34	DCCC	WELL	2831	28	9/6/2006	112TRRC	6.65				
15284	46.0003	-107.5346	03N	34E	18	DCDD	WELL	2775	16	6/8/2006	112TRRC	7.22	10.6	1743	7.6	
94349	45.7676	-107.6195	01S	33E	3	DDDD	WELL	2893	30	9/21/2006	112TRRC	8.42	12.7	3714	7.2	
94355	45.7533	-107.6370	01S	33E	10		WELL	2948	48	4/26/2006	112TRRC		12.3	2755	7.46	
94357	45.7604	-107.6121	01S	33E	11		WELL	2900	31	10/4/2006	110TRRC	9.84	14	1163	7.37	
94392	45.7307	-107.6853	01S	33E	19	DAAB	WELL	3034	45	5/4/2006	112TRRC	23.42	11.9	2986	7.55	
94440	45.7258	-107.6198	01S	33E	23	CC	WELL	2910	26	5/2/2007	110TRRC	7.47	13.5	5013	7.96	-26
124168	45.7605	-107.5901	01S	33E	12		WELL		25	5/2/2007		12.2	10.68	1583	7.57	5
156833	45.9500	-107.5814	02N	33E	2	BDDD	WELL	2827	55	9/18/2006	112TRRC	12.73	14.3	1200	7.54	
208709	45.8873	-107.6111	02N	33E	27	CCBC	WELL	3835	37	4/26/2006	112TRRC	9.93	11.9	1836	7.52	
212401	45.7655	-107.6010	01S	33E	11	AADA	WELL	2887	35	10/4/2006		13.13	12	1145	7.09	
212402	45.7656	-107.6013	01S	33E	11	AAAC	WELL	2885	35	10/4/2006	112TRRC	14.1	12.6	4320	7.02	
212723	45.9710	-107.5714	03N	33E	35	AAAD	WELL	2878	240	3/16/2007	211LNCE	113.09	12.5	2040	8.72	-100.4
226392	45.7552	-107.6333	01S	33E	10	CDAC	WELL	2920	85	6/9/2006	112TRRC	7.07	12.6	1223	7.49	
226395	45.8374	-107.6368	01N	33E	17	AACC	WELL	2905	100	4/12/2006	211BRPW	18.02	10.6	2421	7.64	
226396	45.7636	-107.6645	01S	33E	8	ADBA	WELL	3010	60	6/8/2006	211BRPW		15	2115	7.05	
234889	46.6941	-107.6389	02S	33E	3	BBAA	WELL	2929	30	3/15/2007	112TRRC	11.07	10.9	3938	6.98	-12.1
234891	45.6936	-107.6380	02S	33E	3	BBAA	WELL	2929	44	3/15/2007	112TRRC	11.5	11.2	4596	6.62	-3.7
234905	45.9661	-107.5690	03N	33E	36	BCBB	WELL	2815	75	3/16/2007	211LNCE	30	12.9	1000	7.66	-43.9
234927	45.7630	-107.6658	01S	33E	8	ADBC	SPRING	3020		5/5/2006	112TRRC		12.3	2600	7.17	
234943	45.8396	-107.6101	01N	33E	15	BBBC	WELL	2845	26	3/31/2006	112TRRC	3.42	12.3	3999	8.97	
234948	45.8395	-107.6093	01N	33E	15	BBBC	WELL	2845		3/31/2006	112TRRC		11.3	2856	9.47	
234954	45.9458	-107.5947	02N	33E	3	DACC	WELL	2855	100	4/20/2006	211BRPW		8.87	2417	7.3	

Appendix A. Site Inventories

Gwic Id	Latitude	Longitude	T	R	S	Qsect	Site Type	Altitude (ft)	Well Depth (ft)	Inventory Date	Aquifer	Inventoried Water Level (ft)	Temp (C)	Field SC	Field pH	Redox
234958	45.9759	-107.6202	03N	33E	28	DBCA	SPRING	3010		4/20/2006	211LNCE		10.06	2796	6.81	
234983	45.9815	-107.5337	03N	34E	30	AACC	WELL	2790	20.5	9/26/2006	112TRRC	14.53	10.6	1109	8.1	
234984	45.9181	-107.5917	02N	33E	15	DADA	WELL	2815		9/27/2006	112TRRC		10.8	2127	8.29	
234991	45.7233	-107.6625	01S	33E	29	AAAD	WELL	3010	25	5/4/2006	112TRRC	16.5	10.2	3720	7.31	
234993	45.7184	-107.6450	01N	33E	28	ADCA	WELL	2935		5/4/2006	112TRRC	18.15	11.3	5930	7.16	
235030	45.8719	-107.6109	02N	33E	34	CCBC	WELL	2841	38	9/26/2006	112TRRC	8.33	12.9	1375	7.49	
235032	45.8714	-107.6102	02N	33E	34	CCBC	WELL	2841		9/26/2006	112TRRC					
235034	45.8772	-107.6109	02N	33E	34	BCCD	WELL	2837	20	9/26/2006	112TRRC	3.57	11.4	2397	7.69	
235037	45.8266	-107.6138	01N	33E	16	DDDC	WELL	2852	36	4/27/2006	112TRRC	12.15	11.9	2181	7.31	
235067	45.7688	-107.6311	01S	33E	3	CDDD	WELL	2915	7	4/5/2006	112TRRC	3.85	10	1183	7.51	
235069	45.7690	-107.6309	01S	33E	3	CDDD	WELL	2915	11	4/5/2006	112TRRC	7.55				
235092	45.8910	-107.5919	02N	33E	27	DAAC	WELL	2817	25	9/6/2006	112TRRC	7	16.5	6930	7.5	
235095	45.9806	-107.5335	03N	34E	30	AACC	WELL	2788	35	6/1/2006	112TRRC	13.5	12.5	783	7.28	
235099	45.9124	-107.6085	02N	33E	15	CCCD	WELL	2851		9/21/2006	112TRRC		14	1900	7.63	
235100	45.9877	-107.6117	02N	33E	27	BBCB	WELL	2839	24	9/18/2006	112TRRC	8.85	13.5	1234	7.33	
235101	45.7609	-107.6111	01S	33E	11	BCCA	WELL	2898	30	10/4/2006	112TRRC	9.84		1163		
235102	45.7611	-107.6098	01S	33E	11	BCCB	WELL	2898		10/4/2006	112TRRC	12.91	11.9	3365	6.72	
235476	45.7644	-107.6332	01S	33E	10	BACA	WELL	2916		4/26/2007		7.1	10.9	978	9.11	10
235480	45.8195	-107.6335	01N	33E	20	ADDB	WELL	2874		4/26/2007		2.9	10.43	2936	7.5	78
235482	45.8370	-107.6126	01N	33E	16	ADAA	WELL	2847	29.6	4/26/2007		8.33	11.84	3492	7.62	-71
235485	45.8150	-107.6217	01N	33E	21	DBCD	WELL	2857		4/26/2007		4.43	10.63	4510	7.81	-127
236738	45.8880	-107.5748	02N	33E	26	DBDD	WELL			6/28/2007	111ALVM	8.85	11.5	3458	7.14	
236871	47.7680	-107.6080	01S	33E	2	DCDC	WELL	2890	35	4/27/2006			11.5	4780	7.09	
236872	45.7525	-107.6354	01S	33E	15		WELL	2920	24	5/16/2007		6.05		1013		
238664	45.8807	-107.6101	02N	33E	34	BBCD	WELL	2835	42.5	8/24/2007	112TRRC	0.41	11.4	4313		
238665	45.7409	-107.6073	01S	33E	14	DCAC	WELL	2900	26.5	5/2/2007	112TRRC	9.44	13	1972	9.54	
238689	45.7489	-107.6380	01S	33E	15	BC	WELL	2930	16	5/2/2007	112TRRC	11.99	8.75	7118	7.16	
238692	45.7491	-107.6379	01S	33E	15	BCBA	WELL	2930	58	5/2/2007		11.02	9.29	6297	7.25	-21
238694	45.7143	-107.6430	01S	33E	28	DADB	WELL	2935		5/4/2006		12.46				
238702	45.7529	-107.6012	01S	33E	13	BBBB	WELL	2878		5/2/2007			13.01	1482	7.84	31.2
239727	45.7684	-107.5959	01S	33E	1		WELL	2870	12.4	7/1/2008		7.29	11.7	2606		
239728	45.7684	-107.5958	01S	33E	1		WELL	2870	21.6	7/1/2008		6.95	10.2	2421		
239729	45.7685	-107.5959	01S	33E	1		WELL	2870	23.4	7/1/2008		7.26	10.5	3572		

Appendix A. Site Inventories

Gwic Id	Latitude	Longitude	T	R	S	Qsect	Site Type	Altitude (ft)	Well Depth (ft)	Inventory Date	Aquifer	Inventoried Water Level (ft)	Temp (C)	Field SC	Field pH	Redox
239730	45.8661	-107.6290	01N	33E	4		WELL	2980	74	7/1/2008		8.65	10.4	3211		
239731	45.8660	-107.6291	01N	33E	4		WELL	2980	32	7/1/2008		5.06	10.4	1450		
239733	45.8660	-107.6290	01N	33E	4		WELL	2980	68.6	7/1/2008		8.29	10.7	3360		
239734	45.8660	-106.6290	01N	33E	4		WELL	2980	22.6	7/1/2008		5.12	10.3	1163		
240466	45.7562	-107.5645	01S	34E	7	D	STREAM			12/13/2007			3.3	863	8.37	
240468	45.6443	-107.6562	02S	33E	21	BDC	STREAM			12/13/2007			4.5	837	8.3	
240469	45.8441	-107.5823	01N	33E	11	C	STREAM			12/14/2007			3.3	831	8.49	
240471	45.9273	-107.5740	02N	33E	14	A	STREAM			12/14/2007			3.4	832	8.74	
240472	46.1447	-107.4635	05N	34E	34	BCB	STREAM	2690		12/14/2007			2	871	8.51	
240474	45.7685	-107.5959	01S	33E	1		STREAM	2859		5/28/2008			6.5	1063		
244831	45.7281	-107.5986	01S	33E	24	CCBA	WELL			5/16/2007		6.26		2360		
244839	45.8847	-107.6218	02N	33E	28	CDDD	WELL			7/8/2008		7.41	15.7	2273	7.32	-266

Appendix B. USGS WSP 1876 Site Inventories

Gwic Id	Latitude	Longitude	T	R	S	Qsect	Site Type	Well Depth (ft)	Inventory Date	Aquifer	Agency	Field SC
244993	45.8463	-107.6095	01N	33E	10	CB	WELL	17.6	1/1/1967	110TRRC	USGS	5900
244994	45.8536	-107.5888	01N	33E	11	BB	WELL	11	1/1/1967	110TRRC	USGS	3600
244995	45.8281	-107.6301	01N	33E	16	CC	WELL	65	1/1/1967	110TRRC	USGS	2550
244996	45.8281	-107.6145	01N	33E	16	DD	WELL	65	1/1/1967		USGS	6000
244997	45.8208	-107.6350	01N	33E	20	AD	WELL	75	1/1/1967	211BRPW	USGS	6000
244998	45.8209	-107.6144	01N	33E	21	AD	WELL		1/1/1967		USGS	5100
244999	45.8246	-107.6247	01N	33E	21	BA	WELL	44	1/1/1967	211BRPW	USGS	500
245000	45.7993	-107.6093	01N	33E	27	CC	WELL	20	1/1/1967	111ALVM	USGS	8000
245001	45.7992	-107.6247	01N	33E	28	CD	WELL	18	1/1/1967	110TRRC	USGS	5470
245002	45.7848	-107.6666	01N	33E	31	CD	WELL	27	1/1/1967	110TRRC	USGS	700
245003	45.7849	-107.6350	01N	33E	32	DD	WELL	60	1/1/1967	211BRPW	USGS	1380
245004	45.7921	-107.6248	01N	33E	33	BD	WELL	21	1/1/1967	110TRRC	USGS	8000
245005	45.7849	-107.6248	01N	33E	33	CD	WELL		1/1/1967		USGS	2900
245006	45.7849	-107.6145	01N	33E	33	DD	WELL	30	1/1/1967	110TRRC	USGS	8000
245007	45.9513	-107.5835	02N	33E	2	BD	WELL	55	1/1/1967	110TRRC	USGS	1400
245008	45.9440	-107.5887	02N	33E	2	CC	WELL	42	1/1/1967		USGS	2350
245009	45.9439	-107.5937	02N	33E	3	DD	WELL	120	1/1/1967	211BRPW	USGS	6100
245010	45.9368	-107.5782	02N	33E	11	AC	WELL	20	1/1/1967	111ALVM	USGS	3400
245011	45.9405	-107.5885	02N	33E	11	BB	WELL	45	1/1/1967	110TRRC	USGS	1490
245012	45.9224	-107.5833	02N	33E	14	BD	WELL	40	1/1/1967	110TRRC	USGS	4000
245013	45.9261	-107.5937	02N	33E	15	AA	WELL	47	1/1/1967	110TRRC	USGS	2100
245014	45.9151	-107.6093	02N	33E	15	CC	WELL	54	1/1/1967	110TRRC	USGS	2100
245015	45.9005	-107.6145	02N	33E	21	DD	WELL	65	1/1/1967	110TRRC	USGS	1500
245016	45.9116	-107.5937	02N	33E	22	AA	WELL	40	1/1/1967	110TRRC	USGS	3400
245017	45.9006	-107.5989	02N	33E	22	DC	WELL	55	1/1/1967	110TRRC	USGS	2400
245018	45.8971	-107.6093	02N	33E	27	BB	WELL	45	1/1/1967	110TRRC	USGS	2500
245019	45.8862	-107.6041	02N	33E	27	CD	WELL	15	1/1/1967	110TRRC	USGS	3000
245020	45.8860	-107.6145	02N	33E	28	DD	WELL	15	1/1/1967	110TRRC	USGS	1800
245021	45.8716	-107.6302	02N	33E	33	CC	WELL	80	1/1/1967	211BRPW	USGS	1950
245022	45.8826	-107.5989	02N	33E	34	AB	WELL	28	1/1/1967	110TRRC	USGS	8000
245023	45.8753	-107.5938	02N	33E	34	DA	WELL	25	1/1/1967	110TRRC	USGS	8000
245024	45.8788	-107.5681	02N	33E	36	BC	WELL	120	1/1/1967	211HLCK	USGS	1150
245025	46.0128	-107.5314	03N	34E	18	AA	WELL	30	1/1/1967	111ALVM	USGS	2500
245026	46.0057	-107.5366	03N	34E	18	DB	WELL	48	1/1/1967		USGS	940
245027	45.9873	-107.5316	03N	34E	19	DD	WELL	100	1/1/1967	211HLCK	USGS	3900
245028	45.9694	-107.5420	03N	34E	31	BA	WELL	38	1/1/1967	211HLCK	USGS	1600
245029	46.0925	-107.5105	04N	34E	17	DA	WELL	10	1/1/1967	111ALVM	USGS	1400
245030	45.7735	-107.6141	01S	33E	2	CA	WELL	30	1/1/1967	110TRRC	USGS	5500
245031	45.7696	-107.6141	01S	33E	2	CD	WELL	27	1/1/1967	110TRRC	USGS	4400
245032	45.7773	-107.6231	01S	33E	3	AD	WELL	21	1/1/1967		USGS	5000
245033	45.7694	-107.6231	01S	33E	3	DD	WELL	33	1/1/1967	110TRRC	USGS	3900
245034	45.7659	-107.6342	01S	33E	10	BA	WELL	12	1/1/1967	110TRRC	USGS	1250
245035	45.7585	-107.6342	01S	33E	10	CA	WELL		1/1/1967		USGS	1650
245037	45.7548	-107.6342	01S	33E	10	CD	WELL	55	1/1/1967		USGS	1100
245036	45.7585	-107.6295	01S	33E	10	DB	WELL	32	1/1/1967	110TRRC	USGS	3900
245038	45.7442	-107.6094	01S	33E	14	DB	WELL	28	1/1/1967	110TRRC	USGS	3000
245039	45.7258	-107.6039	01S	33E	23	DD	WELL		1/1/1967		USGS	8000
245040	45.7183	-107.5983	01S	33E	25	BC	WELL	7	1/1/1967	111ALVM	USGS	3200
245041	45.7222	-107.6038	01S	33E	26	AA	WELL	20	1/1/1967		USGS	8000

Appendix B. USGS WSP 1876 Site Inventories

Gwic Id	Latitude	Longitude	T	R	S	Qsect	Site Type	Well Depth (ft)	Inventory Date	Aquifer	Agency	Field SC
245042	45.7185	-107.6242	01S	33E	27	AD	WELL	32	1/1/1967	110TRRC	USGS	3000
245043	45.6964	-107.6542	01S	33E	33	CD	WELL	26	1/1/1967	110TRRC	USGS	2000
245044	45.7002	-107.6390	01S	33E	34	CB	WELL	24	1/1/1967	110TRRC	USGS	1300
245045	45.7003	-107.6192	01S	33E	35	CB	WELL	16	1/1/1967		USGS	3200
245046	45.6966	-107.6088	01S	33E	35	DC	WELL	9	1/1/1967	110TRRC	USGS	1900
245047	45.6962	-107.5983	01S	33E	36	CC	WELL	16	1/1/1967	111ALVM	USGS	2900
245048	45.7515	-107.5783	01S	34E	18	BB	WELL	20	1/1/1967	111ALVM	USGS	3500
245049	45.7367	-107.5783	01S	34E	19	BB	WELL	10	1/1/1967	111ALVM	USGS	1300
245050	45.6652	-107.7053	02S	32E	12	DD	WELL	55	1/1/1967	110TRRC	USGS	1600
245051	45.6932	-107.6129	02S	33E	2	BA	WELL	24	1/1/1967	110TRRC	USGS	1850
245052	45.6932	-107.6187	02S	33E	2	BB	WELL	18	1/1/1967	110TRRC	USGS	3200
245053	45.6820	-107.6129	02S	33E	2	CD	WELL	11	1/1/1967	110TRRC	USGS	2400
245054	45.6929	-107.6396	02S	33E	3	BB	WELL	50	1/1/1967	110TRRC	USGS	2000
245055	45.6819	-107.6396	02S	33E	3	CC	WELL	16	1/1/1967	110TRRC	USGS	3400
245056	45.6927	-107.6808	02S	33E	5	BB	WELL	30	1/1/1967	110TRRC	USGS	1900
245057	45.6674	-107.6446	02S	33E	9	DD	WELL	20	1/1/1967	110TRRC	USGS	1100
245058	45.6749	-107.6396	02S	33E	10	BC	WELL	21	1/1/1967	110TRRC	USGS	3600
245059	45.6676	-107.6343	02S	33E	10	CD	WELL		1/1/1967		USGS	2500
245060	45.6676	-107.6291	02S	33E	10	DC	WELL	9	1/1/1967	110TRRC	USGS	3300
245061	45.6676	-107.6239	02S	33E	10	DD	WELL	50	1/1/1967	111ALVM	USGS	4300
245062	45.6786	-107.6127	02S	33E	11	BA	WELL	22	1/1/1967	111ALVM	USGS	2500
245063	45.6641	-107.6332	02S	33E	15	BA	WELL	17	1/1/1967	110TRRC	USGS	2100
245064	45.6566	-107.6547	02S	33E	16	CA	WELL	9	1/1/1967	110TRRC	USGS	1250
245065	45.6637	-107.7009	02S	33E	18	BB	WELL	55	1/1/1967	110TRRC	USGS	1400
245066	45.6382	-107.6698	02S	33E	20	DC	WELL	26.2	1/1/1967	111ALVM	USGS	2000
245067	45.6235	-107.6694	02S	33E	29	DC	WELL	11	1/1/1967	111ALVM	USGS	1950
245068	45.6125	-107.6690	02S	33E	32	DB	WELL	13	1/1/1967	111ALVM	USGS	2600
245069	45.5211	-107.7039	03S	32E	36	DD	WELL	70	1/1/1967		USGS	8000
245070	45.5938	-107.6741	03S	33E	5	CD	WELL	20	1/1/1967	111ALVM	USGS	6200
245071	45.5832	-107.6635	03S	33E	8	DA	WELL		1/1/1967		USGS	6500
245072	45.5904	-107.6533	03S	33E	9	BA	WELL	70	1/1/1967	110TRRC	USGS	6500
245073	45.5613	-107.6683	03S	33E	20	AB	WELL		1/1/1967		USGS	600
245074	45.5467	-107.6682	03S	33E	29	AB	WELL	80	1/1/1967	110TRRC	USGS	2200
245075	45.5467	-107.6785	03S	33E	29	BB	WELL	49	1/1/1967	110TRRC	USGS	8000
245076	45.5466	-107.6835	03S	33E	30	AA	WELL	49	1/1/1967	110TRRC	USGS	8000
245077	45.5138	-107.7039	04S	32E	1	AD	WELL	40	1/1/1967	110TRRC	USGS	6200
245078	45.4921	-107.7038	04S	32E	12	DD	WELL	56	1/1/1967	110TRRC	USGS	8000
245079	45.4777	-107.7194	04S	32E	13	CC	WELL		1/1/1967		USGS	4800
245080	45.4704	-107.7241	04S	32E	23	AD	WELL	26	1/1/1967	110TRRC	USGS	3000
245081	45.4741	-107.7035	04S	32E	24	AA	WELL	29	1/1/1967		USGS	4000
245082	45.4633	-107.7190	04S	32E	24	CC	WELL	55	1/1/1967	110TRRC	USGS	2900
245083	45.4633	-107.7087	04S	32E	24	DC	WELL	7	1/1/1967	110TRRC	USGS	4600
245084	45.4597	-107.7189	04S	32E	25	BB	WELL	55	1/1/1967	110TRRC	USGS	2500
245085	45.4559	-107.7239	04S	32E	26	AD	WELL	60	1/1/1967	110TRRC	USGS	2600
245086	45.4523	-107.7239	04S	32E	26	DA	WELL	45	1/1/1967	110TRRC	USGS	2800
245087	45.4451	-107.7237	04S	32E	35	AA	WELL	38	1/1/1967	110TRRC	USGS	2600
245088	45.4451	-107.7289	04S	32E	35	AB	WELL	34	1/1/1967	110TRRC	USGS	2000
245089	45.4379	-107.7083	04S	32E	36	DB	WELL	66	1/1/1967	110TRRC	USGS	2500
245090	45.5174	-107.6835	04S	33E	6	AA	WELL	60	1/1/1967		USGS	2600

Appendix B. USGS WSP 1876 Site Inventories

Gwic Id	Latitude	Longitude	T	R	S	Qsect	Site Type	Well Depth (ft)	Inventory Date	Aquifer	Agency	Field SC
245091	45.5065	-107.6987	04S	33E	6	CC	WELL	50	1/1/1967	110TRRC	USGS	5900
245092	45.5029	-107.6886	04S	33E	7	AB	WELL	70	1/1/1967	110TRRC	USGS	1900
245093	45.5029	-107.6987	04S	33E	7	BB	WELL	66	1/1/1967	110TRRC	USGS	3800
245094	45.4814	-107.6935	04S	33E	18	CA	WELL	80	1/1/1967	110TRRC	USGS	4700
245095	45.3534	-107.8565	05S	31E	35	BD	WELL	50	1/1/1967		USGS	2400
245096	45.3535	-107.8254	05S	31E	36	AD	WELL	50	1/1/1967		USGS	1450
245097	45.4305	-107.7235	05S	32E	2	AA	WELL	38	1/1/1967	110TRRC	USGS	3100
245098	45.4269	-107.7235	05S	32E	2	AD	WELL	43	1/1/1967	110TRRC	USGS	5900
245099	45.4157	-107.7745	05S	32E	9	BA	WELL	25	1/1/1967	110TRRC	USGS	2200
245100	45.4122	-107.7592	05S	32E	10	BC	WELL	100	1/1/1967	110TRRC	USGS	2300
245101	45.4122	-107.7540	05S	32E	10	BD	WELL	45	1/1/1967	110TRRC	USGS	2300
245102	45.3901	-107.7643	05S	32E	16	DD	WELL	80	1/1/1967	110TRRC	USGS	1800
245103	45.3901	-107.8002	05S	32E	17	CC	WELL	33	1/1/1967	111ALVM	USGS	1750
245104	45.3791	-107.8052	05S	32E	19	DA	WELL	32	1/1/1967	111ALVM	USGS	2300
245105	45.3721	-107.7845	05S	32E	29	AA	WELL	65	1/1/1967	110TRRC	USGS	1400
245106	45.3719	-107.8051	05S	32E	30	AA	WELL	45	1/1/1967	110TRRC	USGS	2400
245107	45.3719	-107.8051	05S	32E	30	AA	WELL	25	1/1/1967	110TRRC	USGS	2000
245108	45.3719	-107.8204	05S	32E	30	BB	WELL	8	1/1/1967	111ALVM	USGS	2300
245109	45.3609	-107.8051	05S	32E	30	DD	WELL	60	1/1/1967	110TRRC	USGS	2400
245110	45.3574	-107.8049	05S	32E	31	AA	WELL	37	1/1/1967	110TRRC	USGS	3200
245111	45.3206	-107.8752	06S	31E	11	DC	WELL	30	1/1/1967	110TRRC	USGS	1000
245112	45.3062	-107.9215	06S	31E	16	CD	WELL	395	1/1/1967	110TRRC	USGS	840

Appendix C1. Alluvial and Terrace Groundwater Quality

	Gwic Id	Location						County	Site Type	Aquifer	Depth (ft)	Agency	Sample Date
		Latitude	Longitude	T	R	S	Qsect						
Alluvial and Terrace Ground Water	114	45.8113	-107.6105	01N	33E	27	BBBB	Big Horn	WELL	110ALVM	12	USGS	9/18/1916
	115	45.8113	-107.6105	01N	33E	27	BBBB	Big Horn	WELL	110ALVM	10	USGS	4/14/1960
	116	45.7988	-107.6238	01N	33E	28	CD	Big Horn	WELL	110TRRC	17	USGS	4/14/1960
	117	45.7919	-107.6344	01N	33E	32	ADD	Big Horn	WELL	110TRRC	24	USGS	4/14/1960
	1012	45.9294	-107.5930	02N	33E	10	DD	Big Horn	WELL	110TRRC	43	USGS	8/25/1960
	1015	45.8716	-107.5827	02N	33E	35	CD	Big Horn	WELL	110ALVM	11	USGS	8/25/1960
	1211	46.0016	-107.5361	03N	34E	18	DC	Big Horn	WELL	110TRRC	18	USGS	9/18/1916
	6994	45.7527	-107.6005	01S	33E	14	ABBB	Big Horn	WELL	110TRRC	20	USGS	4/14/1960
	6994	45.7527	-107.6005	01S	33E	14	ABBB	Big Horn	WELL	110TRRC	20	USGS	8/25/1960
	6995	45.7394	-107.6230	01S	33E	15	DDD	Big Horn	WELL	110TRRC	28	USGS	4/14/1960
	6997	45.7302	-107.6843	01S	33E	19	DAAD	Big Horn	WELL	112TRRC	24	USGS	1/11/1935
	6997	45.7302	-107.6843	01S	33E	19	DAAD	Big Horn	WELL	112TRRC	24	USGS	5/31/1945
	6997	45.7302	-107.6843	01S	33E	19	DAAD	Big Horn	WELL	112TRRC	24	USGS	1/11/1935
	6997	45.7302	-107.6843	01S	33E	19	DAAD	Big Horn	WELL	112TRRC	24	USGS	5/31/1945
	6999	45.7333	-107.5986	01S	33E	24	BCB	Big Horn	WELL	110TRRC	28	USGS	8/25/1960
	7000	45.7147	-107.6186	01S	33E	26	CB	Big Horn	WELL	110TRRC	16	USGS	8/25/1960
	7001	45.7130	-107.6250	01S	33E	27	D	Big Horn	WELL	110TRRC	37	USGS	10/20/1921
	7002	45.7202	-107.6872	01S	33E	30	A	Big Horn	WELL	110TRRC	18	USGS	10/10/1921
	7217	45.6325	-107.7263	02S	32E	26	AB	Big Horn	WELL	110TRRC	21	USGS	10/11/1921
	7350	45.5858	-107.6722	03S	33E	8	BDD	Big Horn	WELL	110TRRC	28	USGS	8/25/1960
	7552	45.5183	-107.7225	04S	32E	2	AAA	Big Horn	WELL	110TRRC	52	USGS	8/24/1960
	7553	45.4630	-107.7288	04S	32E	23	DC	Big Horn	WELL	110TRRC	30	USGS	8/24/1960
	7554	45.4633	-107.7294	04S	32E	23	DCAD	Big Horn	WELL	110TRRC	45	USGS	10/18/1921
	7555	45.4550	-107.7322	04S	32E	26	BDD	Big Horn	WELL	110TRRC	35	USGS	4/15/1960
	7556	45.4413	-107.7127	04S	32E	36	BD	Big Horn	WELL	110TRRC	38	USGS	4/15/1960
	7556	45.4413	-107.7127	04S	32E	36	BD	Big Horn	WELL	110TRRC	38	USGS	8/24/1960
	7725	45.3505	-107.8327	05S	31E	36	DBB	Big Horn	WELL	110TRRC	44	USGS	4/15/1960
	7726	45.4161	-107.7394	05S	32E	11	BBB	Big Horn	WELL	110TRRC	35	USGS	4/15/1960
	7727	45.3869	-107.7930	05S	32E	20	BAA	Big Horn	WELL	110TRRC	47	USGS	4/15/1960
	15284	46.0003	-107.5346	03N	34E	18	DCDD	Big Horn	WELL	112TRRC	16	MBMG	6/8/2006
	94357	45.7604	-107.6121	01S	33E	11		Big Horn	WELL	110TRRC	31	MBMG	10/4/2006
	94475	45.7231	-107.6674	01S	33E	29	ABAD	Big Horn	WELL	112TRRC	28	MBMG	6/8/2006
	212402	45.7656	-107.6013	01S	33E	11	AAAC	Big Horn	WELL	112TRRC	35	MBMG	10/4/2006
	226392	45.7552	-107.6333	01S	33E	10	CDAC	Big Horn	WELL	112TRRC	85	MBMG	6/9/2006
	235092	45.8910	-107.5919	02N	33E	27	DAAC	Big Horn	WELL	112TRRC	25	MBMG	9/6/2006
	235480	45.8195	-107.6335	01N	33E	20	ADDB	Big Horn	WELL			MBMG	4/26/2007
	235482	45.8370	-107.6126	01N	33E	16	ADAA	Big Horn	WELL		29.6	MBMG	4/26/2007
	236738	45.8880	-107.5748	02N	33E	26	DBDD	Big Horn	WELL	111ALVM		MBMG	6/28/2007
	239727	45.7684	-107.5959	01S	33E	1		Big Horn	WELL		12.4	MBMG	7/18/2008
	239729	45.7685	-107.5959	01S	33E	1		Big Horn	WELL		23.4	MBMG	7/9/2008
	239730	45.8661	-107.6290	01N	33E	4		Big Horn	WELL		74	MBMG	7/10/2008
	239731	45.8660	-107.6291	01N	33E	4		Big Horn	WELL		32	MBMG	7/8/2008
	239734	45.8660	-106.6290	01N	33E	4		Big Horn	WELL		22.6	MBMG	7/18/2008

Appendix C1. Alluvial and Terrace Groundwater Quality

					Cations (mg/L)					Anions (mg/L)					
	Gwic Id	Water Temp	Lab pH	Lab SC	Ca	Mg	Na	K	Fe	Mn	SiO_2	HCO_3	CO_3	SO_4	Cl	NO_3	F
Alluvial and Terrace Ground Water	114				183	23					22	317	0	392	28	0.013	
	115	3.8	7.4	3320	202	143	410	5.7	0.21		17	583	0	1390	86	0.113	0.3
	116	8.9	7.5	5470	190	101	1060	18	0.17		25	338	0	2700	135	1.11	0.5
	117	8.3	7.3	2010	188	81	193	4.1	0.12		21	347	0	900	21	0.75	0.5
	1012	11.1	7.4	2160	73	50	372	5.6	0.07		25	521	0	725	20	2.49	0.6
	1015	18.8	7.2	2320	175	59	304	6.1	0.42		24	432	0	933	31	0.07	0.7
	1211				123	89					24	1160	0	1340	48	4.06	
	6994	8.3	7.1	6590	470	235	1020	13	0.11		26	603	0	3580	143	2.1	0.3
	6994	10	7	5830	439	198	908	13	0.03		27	602	0	3250	116	1.69	0.4
	6995	6.7	7.3	3380	249	124	410	8.8	0.13		27	290	0	1730	33	0.023	0.4
	6997				138	58			<.01		20	316	0	365	80	<.023	
	6997				112	28			1.2		37	406	0	249	43	<.023	
	6997				138	58			<.01		20	316	0	365	80	<.023	
	6997				112	28			1.2		37	406	0	249	43	<.023	
	6999	11.1	7.2	7010	315	137	1380	20	0.82		28	415	0	3580	280	0.14	0.8
	7000	11.1	7.2	2190	142	50	300	7.8	2		26	347	0	885	30	0.07	0.7
	7001				103	39	329 K		0.12		28	325	0	771	43	<.023	
	7002				74	35	70 K		1.3		30	270	0	202	20	0.68	
	7217				91	54	215 K		0.12		35	285	0	630	22	0.29	
	7350	11.1	7.1	7520	428	273	1290	19	0.08		28	493	0	4400	111	2.94	0.5
	7552	12.8	7	6670	524	249	1000	10	0.09		27	455	0	3930	155	1.99	0.5
	7553		7	2720	419	84	200	6.8	1.3		22	446	0	1360	24	0.14	0.6
	7554				286	114	275 K		1.6		21	425	0	1376	22	<.023	
	7555	10	7.3	3780	213	189	490	9.2	0.14		26	471	0	1930	38	2.1	0.7
	7556	10.6	7.1	2130	259	82	168	5.9	0.34		20	457	0	938	16	0.75	0.5
	7556	11.7	6.9	2690	377	121	197	6.8	0.17		24	516	0	1330	19	1.63	0.6
	7725	8.9	7.5	1180	55	41	148	3.3	0.08		25	304	0	365	11	1.08	0.7
	7726	10	7.1	6030	458	282	775	14	0.16		30	430	0	3450	65	27.56	0.6
	7727	8.9	7.2	1640	168	71	118	4.5	0.18		27	458	0	550	17	4.97	0.4
	15284	10.6														7.00 P	
	94357	14	7.26	1282	112	39.7	123	3.79	0.404	0.008	16.8	307.4	0	448	16.9	<0.5 P	<0.5
	94475		7.25	3460	393	180	291	10.4	0.028	<0.005	27.6	252.5	0	2007	64.7	15.5 P	<2.5
	212402	12.6	6.98	4520	272	137	815	10.5	0.113	0.399	23.9	511.2	0	2352	78.7	<2.5 P	<2.5
	226392	12.6	7.3	1254	84.8	45	147	3.57	0.011	<0.001	15	264.3	0	444	24.9	0.886 P	<0.5
	235092		7.68	6410	172	131	1511	10.1	0.449	0.686	18	688.1	0	3579	76.7	<2.50 P	<2.50
	235480	10.43	7.98	2540	188	91.7	380	4.56	0.021	0.03	24.4	261.9	0	1351	58.3	<2.5 P	<1.0
	235482		7.76	3240	200	101	521	7.32	0.647	0.463	17.9	340.4	0	1616	53.7	<2.5 P	<1.0
	236738		7.16	3560	210	85.4	575	7.29	1.28	0.761	15	579.5	0	1560	55.7	<1.0 P	<2.5
	239727	18.8	7.44	1044	80.7	29.9	109	13.4	0.184	0.017	12	282.2	0	330	13.2	1.078 P	0.544
	239729	11.2	7.42	2840	151	73.1	463	10.8	1.93	0.752	21	435.5	0	1111	52.1	<0.5 P	0.613
	239730	11.5	7.64	3390	278	147	444	14.1	0.99	0.19	22.4	475.8	0	1935	34.2	9.838 P	0.331
	239731	12.1	7.58	1234	101	85.9	85	5.68	0.178	0.294	9.78	316.2	0	472	14.6	0.682 P	<0.5
	239734	13.7	7.54	1110	87.3	54.2	104	6.85	0.251	1.24	11.1	327.9	0	424.4	12.9	<0.5 P	<0.5

Appendix C1. Alluvial and Terrace Groundwater Quality

		Trace Elements (ug/L)																
	Gwic Id	As	B	Ba	Br	Cu	Li	Mo	Ni	Pb	Se	Sn	Sr	Ti	Tl	U	V	Zn
Alluvial and Terrace Ground Water	114																	
	115		290															
	116		920															
	117		490															
	1012		420															
	1015		270															
	1211																	
	6994		1600															
	6994		1600															
	6995		650															
	6997																	
	6997																	
	6997																	
	6997																	
	6999		1000															
	7000		520															
	7001																	
	7002																	
	7217																	
	7350		1500															
	7552		810															
	7553		450															
	7554																	
	7555		1100															
	7556		530															
	7556		830															
	7725		230															
	7726		1300															
	7727		240															
	15284																	
	94357	1.06	224	10.8	<500	14.2	66.8	<10	<2	<2	3.99		1187	3.05	<5	9.56	<5	24.1
	94475	6.24	677	29	<2500	<10	140	<50	<10	<10	105		4093	<5	<25	57.8	<25	24
	212402	<10	1128	<20	<2500	<20	229	<100	<20	<20	<10		3901	<10	<50	47.9	<50	95.4
	226392	<1	217	11.8	<500	3.09	52.2	<10	<2	<2	10.5		1026	<1	<5	12.8	<5	3.77
	235092	<10	1021	<20	<2500	<20	155	<100	<20	<20	<10		3693	<10	<50	22.1	<50	20.5
	235480	1.82	7.04	7.25	<1000	3.18	136	6.74	1.52	<1.0	4.84		2406	2.76	<0.5	15.4	0.81	52.1
	235482	2.25	418	27.1	<1000	<1.0	131	5.09	0.883	<1.0	<2.5		2708	<5	<0.5	21.5	<0.5	3.79
	236738	1.05	546	11.9	<2500	<1.0	110	<5.0	0.887	2.03	<2.5		3688	17.1	<0.5	4.63	<0.5	9.55
	239727	<1.0	195	12.3	<500	<0.5	54.4	3.9	<0.5	<0.5	3.82	<0.5	787	4.61	<0.5	5.77	<0.5	0.945
	239729	4.6	683	12.7	285	<1.0	154	6.96	<1.0	<1.0	<5.0	<1.0	1806	21	<1.0	10.6	<1.0	12.8
	239730	2.03	624	11.4	237	1.06	167	6.94	<1.0	2.84	<5.0	1.32	4957	31.2	<1.0	26.4	<1.0	3.86
	239731	<1.0	263	15.5	<500	0.625	82.9	14	1.1	<0.5	<2.5	<1.0	1222	7.24	<1.0	14.3	<1.0	39.7
	239734	<1.00	270	37	<500	<0.5	42.9	14.6	1.76	<0.5	<2.5	<0.5	913	6.15	<0.5	6.62	<0.5	25.5

Appendix C2. Bedrock Groundwater and Surface-Water Quality

	Gwic Id	Location: Latitude	Longitude	T R S Qsect	County	Site Type	Aquifer	Depth (ft)	Agency	Sample Date	Water Temp	Lab pH	Lab SC
Bedrock Groundwater	113	45.8350	-107.6138	01N 33E 16 AD	Big Horn	WELL	211BRPW	190	USGS	9/9/1916			
	1014	45.9258	-107.6086	02N 33E 15 BB	Big Horn	WELL	211HLCK	81	USGS	12/2/1914			
	1210	46.0016	-107.5361	03N 34E 18 DC	Big Horn	WELL	211HLCK	62	USGS	10/17/1921			
	6990	45.7305	-107.7311	01S 32E 23 BD	Big Horn	WELL	330MDSN	4000	USGS	11/17/1960	39.4	7.6	3040
	7356	45.5658	-107.4391	03S 35E 18 DC	Big Horn	WELL	211PRKM	120	USGS	12/19/1945			
	7724	45.3447	-107.8627	05S 31E 35 CCC	Big Horn	WELL	217PRYR	1033	USGS	8/24/1960	20	8	825
	226395	45.8374	-107.6368	01N 33E 17 AACC	Big Horn	WELL	211BRPW	100	MBMG	6/8/2006	13	7.24	3020
	226396	45.7636	-107.6645	01S 33E 8 ADBA	Big Horn	WELL	211BRPW	60	MBMG	6/8/2006	15	7.06	2260

	Gwic	Cations (mg/L): Ca	Mg	Na	K	Fe	Mn	Anions (mg/L): SiO_2	HCO_3	CO_3	SO_4	Cl	NO_3	F
Bedrock Groundwater	113	62	18					18	396	0	105	2480		
	1014	33	22					48	654	0	527	12		
	1210	27	18			0.07		33	431	28	338	15	<.023	
	6990	665	136	14	24	1.5		18	180	0	1980	4	<.023	4
	7356	12	9			1		11	393	35	954	32		
	7724	0.3	0.4	186	0.9	0.23		10	319	0	125	7.9	0.02	1.4
	226395	439	143	230	8.52	<0.005	0.006	12.8	445.3	0	1669	51.4	19.3 P	<2.5
	226396	247	86.5	194	6.41	0.05	0.036	16.3	316.4	0	1029	96.2	<2.5 P	<1.0

	Gwic	Trace Elements (ug/L): As	B	Ba	Br	Co	Cu	Li	Mo	Ni	Pb	Se	Sr	Ti	Tl	U	V	Zn	Zr
Bedrock Groundwater	113																		
	1014																		
	1210																		
	6990		140																
	7356																		
	7724		80																
	226395	<10	835	13.8	<2500	<20	<20	266	<10	2.14	<10	90.8	4045	1.07	28.7	<50	<10	50.1	<2
	226396	<5	350	30.6	<1000	<2	<5	100	<10	<2	<10	8.9	2367	1.26	<20	5.07	<10	5.61	<2

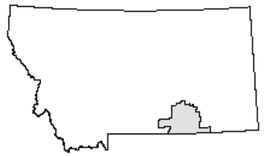
Appendix C2. Bedrock Ground-Water and Surface-Water Quality

	Gwic Id	Location Latitude	Longitude	T R S Qsect	County	Site Type	Agency	Sample Date	Water Temp	Lab pH	Lab SC
Surface Water	240466	45.7562	-107.5645	01 S 34E 7 D	Big Horn	Stream	MBMG	12/13/2007		8.09	879
	240468	45.6443	-107.6562	02S 33E 21 BDC	Big Horn	Stream	MBMG	12/13/2007	4.5	8.03	873
	240469	45.8441	-107.5823	01N 33E 11 C	Big Horn	Stream	MBMG	12/14/2007	3.3	8.11	868
	240471	45.9273	-107.5740	02N 33E 14 A	Big Horn	Stream	MBMG	12/14/2007	3.4	8.21	857
	240472	46.1447	-107.4635	05N 34E 34 BCB	Yellowstone	Stream	MBMG	12/14/2007	2	8.14	899

	Gwic	Cations (mg/L) Ca	Mg	Na	K	Fe	Mn	Anions (mg/L) SiO_2	HCO_3	CO_3	SO_4	Cl	NO_3	F
Surface Water	240466	82.4	29.1	81.3	4.3	<0.005	0.009	7.37	231.8	0	283	11.1	0.571 P	0.438
	240468	79.9	27.9	78.8	4.49	<0.005	0.011	7.36	219	0	277	10.4	0.49 P	0.457
	240469	79.1	28.3	75.9	4.13	<0.005	0.008	6.96	226	0	270	10.2	0.427 P	0.416
	240471	79.2	28.3	76.5	4.09	<0.005	0.007	6.8	221.1	0	273	10.2	0.426 P	0.398
	240472	81.8	29.8	78.8	4.17	<0.005	0.006	6.98	223.3	0	287	11	0.509 P	0.429

	Gwic	Trace Elements (ug/L) As	B	Ba	Br	Co	Cu	Li	Mo	Ni	Pb	Se	Sn	Sr	Ti	Tl	U	V	Zn	Zr
Surface Water	240466	1.59	102	60.3	<100	0.229	0.636	41.6	2.18	1.3	0.232	2.29	<0.1	1023	3.62	<0.1	5.56	1.62	1.15	0.434
	240468	1.59	97.7	60.3	<100	0.219	0.56	41.6	2.18	1.28	<0.2	2.26	<0.1	995	3.62	<0.1	5.55	1.63	0.573	0.118
	240469	1.93	97.9	59.8	<100	0.238	0.645	37.9	2.13	1.49	<0.2	3.19	<0.1	971	3.91	<0.1	5.23	1.62	0.649	0.406
	240471	2.03	97.8	59.4	<100	0.232	0.686	37.4	2.16	1.35	1.25	3.48	<0.1	967	3.68	<0.1	5.26	1.54	1.2	0.172
	240472	1.49	100	59.1	<100	0.239	0.573	39.3	2.15	1.39	<0.2	2.26	<0.1	1016	3.98	<0.1	5.5	1.42	1.08	0.182

Plate 1



Legend

*	Qal	Alluvium	Gravel, sand, silt and clay. Thickness as much as 35 feet.
*	Qat	Terrace	Gravel, sand, silt and clay. Thickness 15 to 50 feet.
	Tft	Tullock Member of the Fort Union Formation	Yellowish-gray, massive sandstone. Thickness 195 to 230 feet.
**	Kl	Lance Formation	Brownish-grey sandstone. Thickness 400 to 500 feet.
	Kb	Bearpaw Shale	Dark grey shale. Thickness up to 860 feet.
**	Kjr	Judith River Formation	Yellow-grey, brown-grey sandstone. Thickness up to 260 feet.
	Kcl	Clagett Shale	Brown-grey shale. Thickness 150 to 200 ft.
	Kga	Gammon Formation	Yellow-brown siltstone. Thickness 0 to 860 feet.
	Kn	Niobrara Shale	Dark brown-grey shale. Thickness 390 to 410 feet.

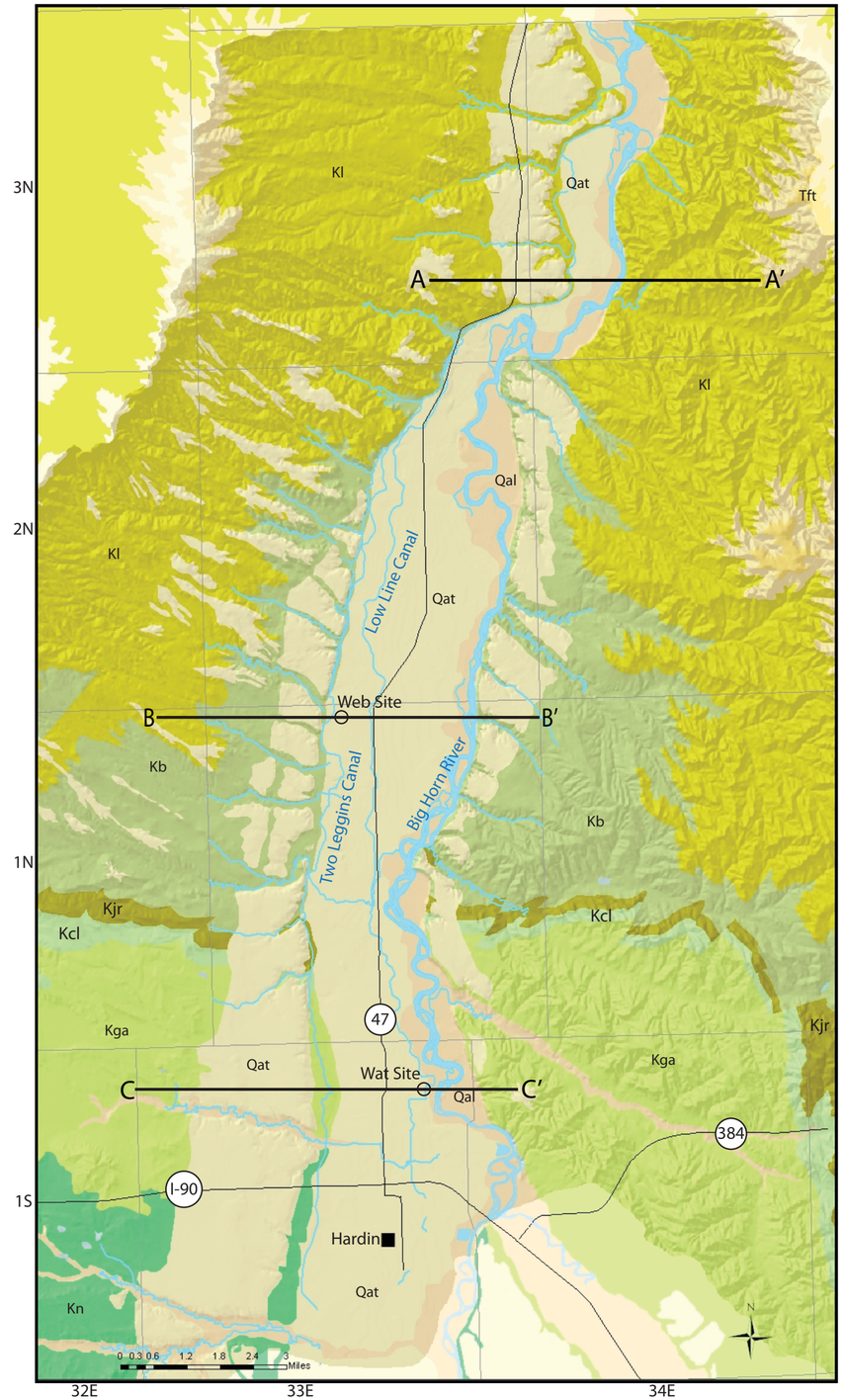
* Regional aquifer

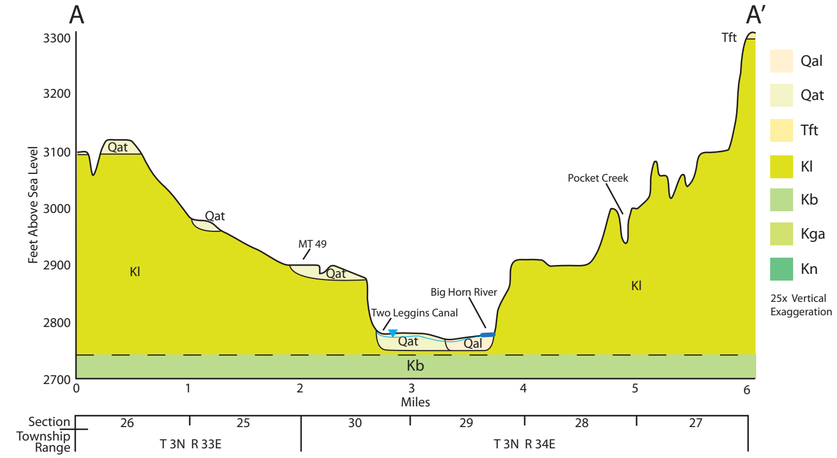
** Possible aquifer

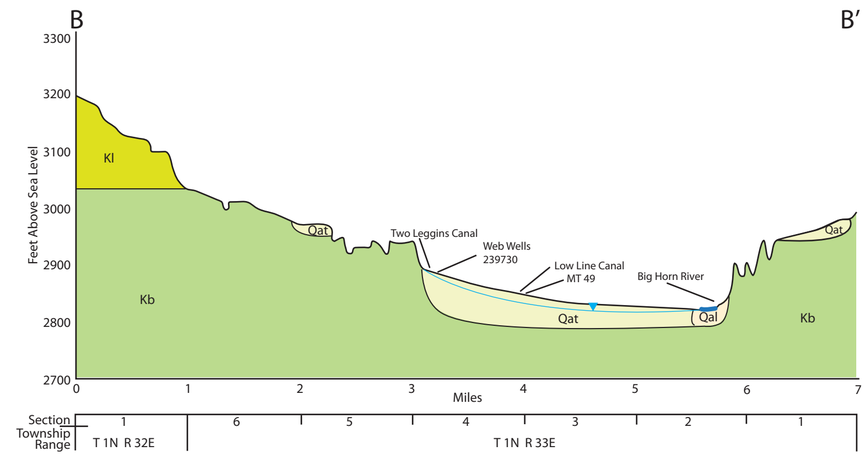
Approximate water table, top of saturated material (cross-section only)

Roads

Rivers, streams and ditches







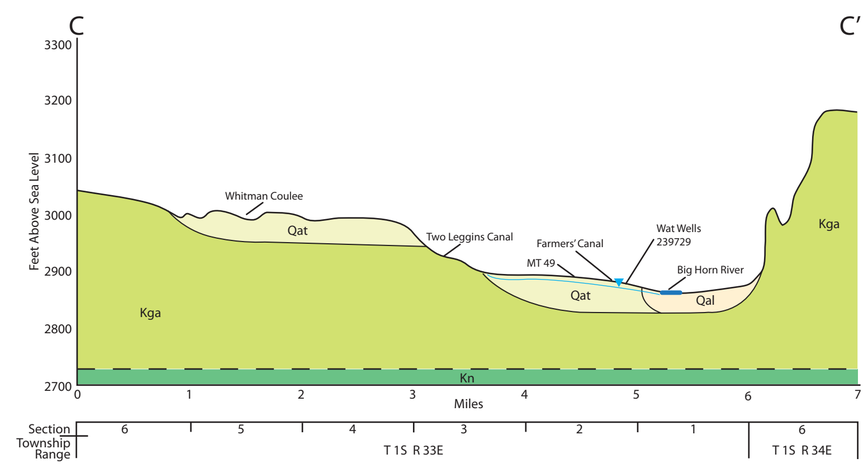
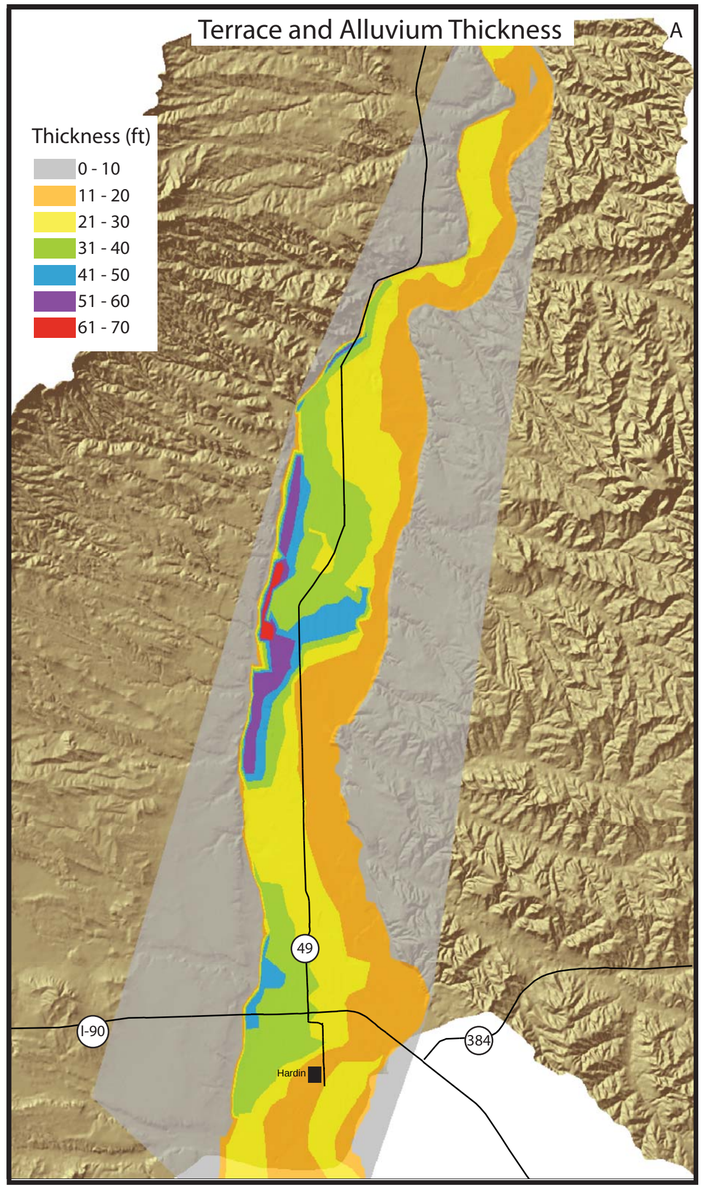
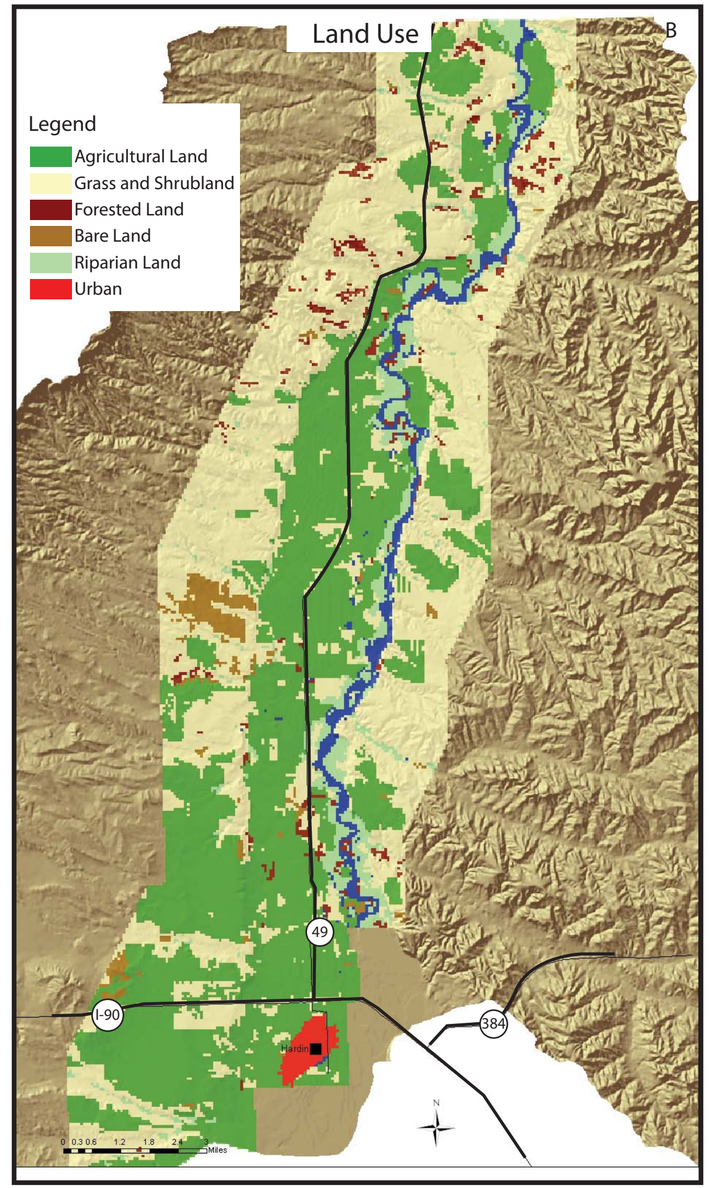


Plate 2


Terrace and Alluvium Thickness
A
Thickness (ft)
0 - 10
11 - 20
21 - 30
31 - 40
41 - 50
51 - 60
61 - 70
49
I-90
384
Hardin


Land Use
B
Legend
Agricultural Land
Grass and Shrubland
Forested Land
Bare Land
Riparian Land
Urban
49
I-90
384
Hardin
N
0 0.3 0.6 1.2 1.8 2.4 3
Miles

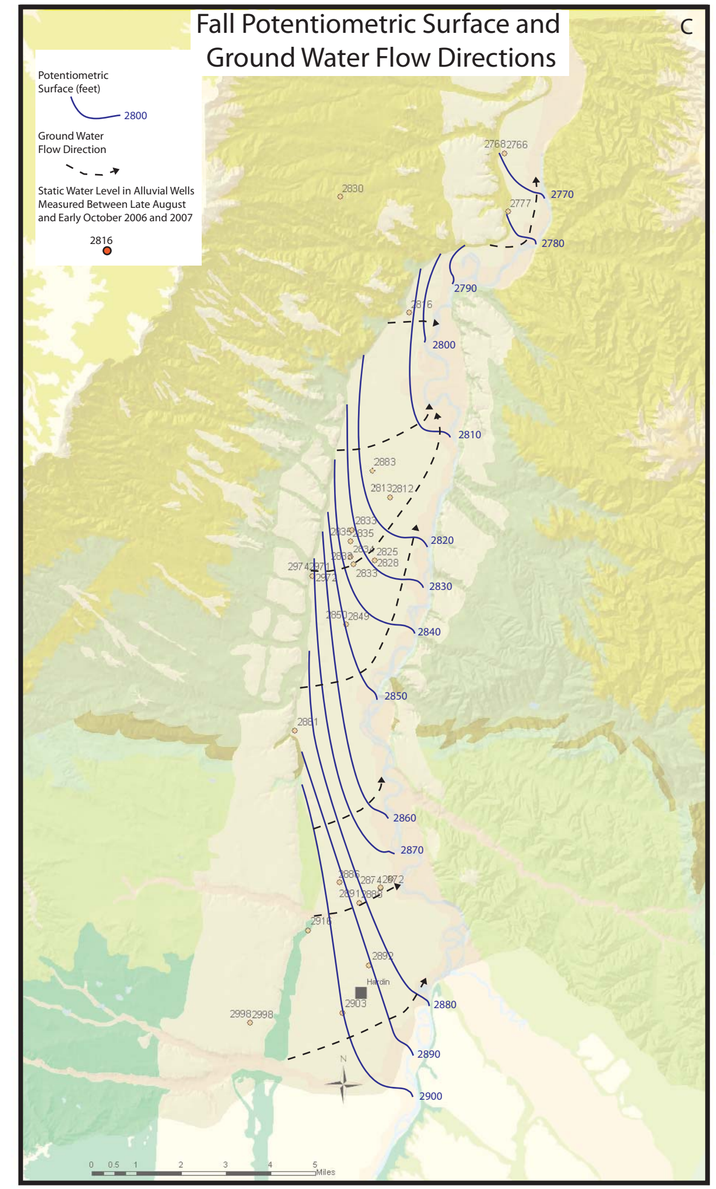
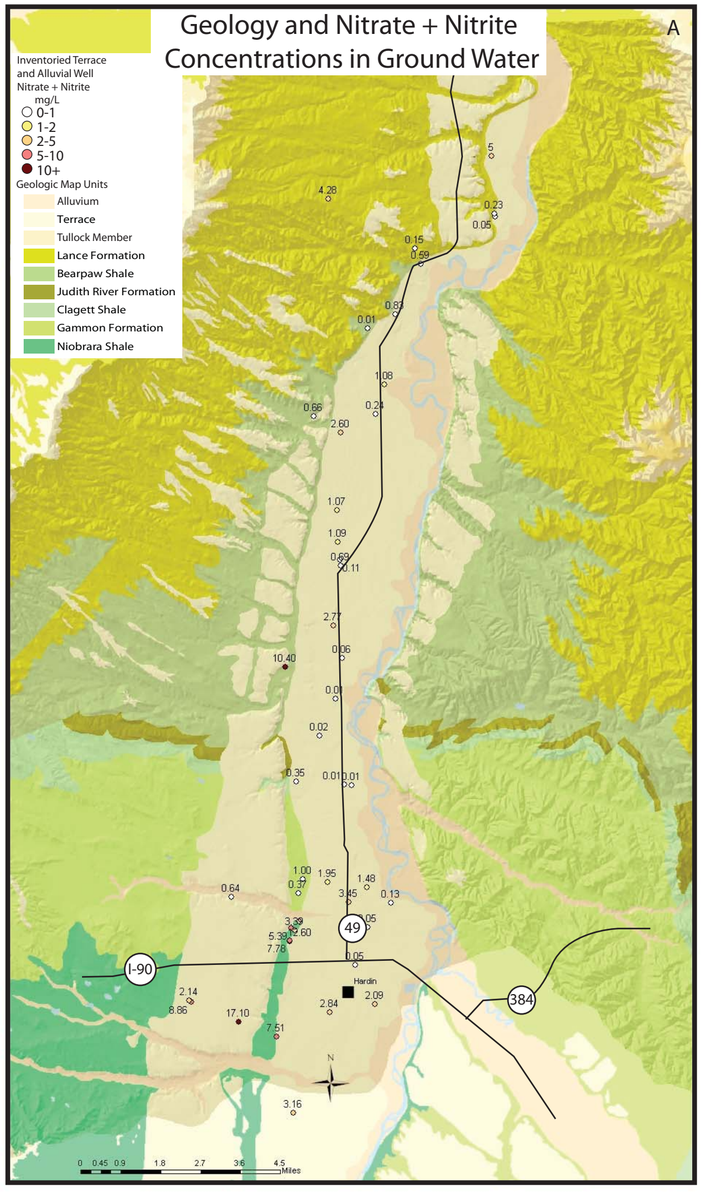
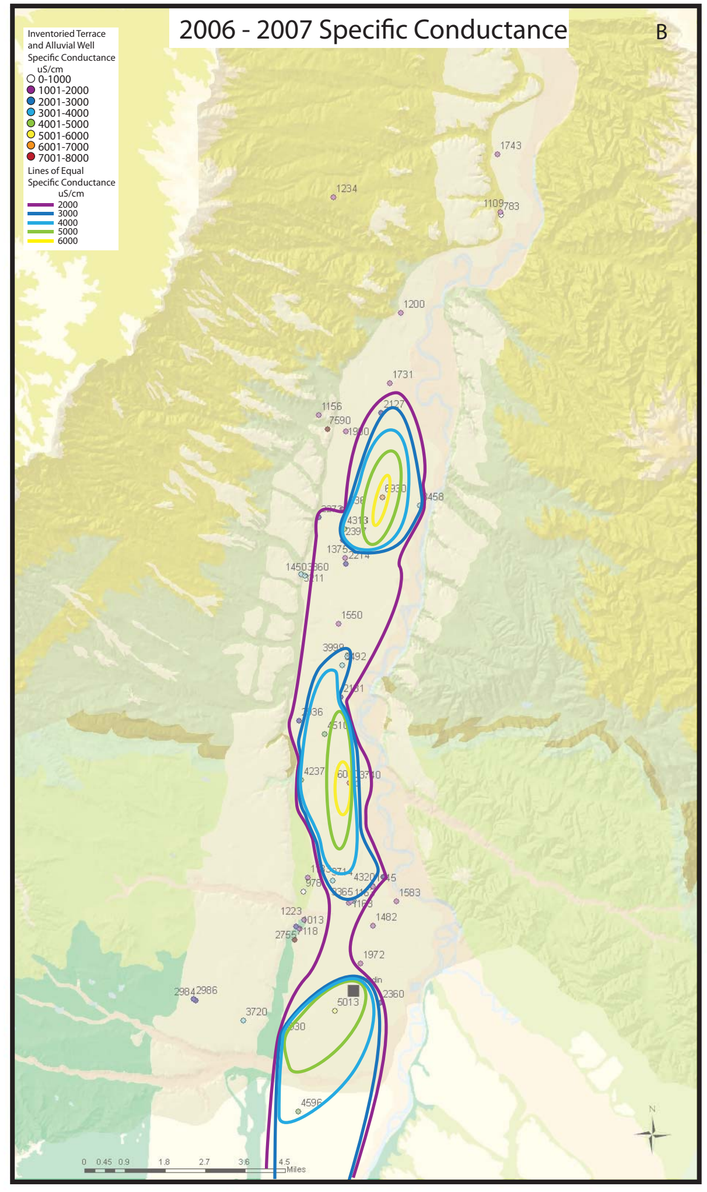
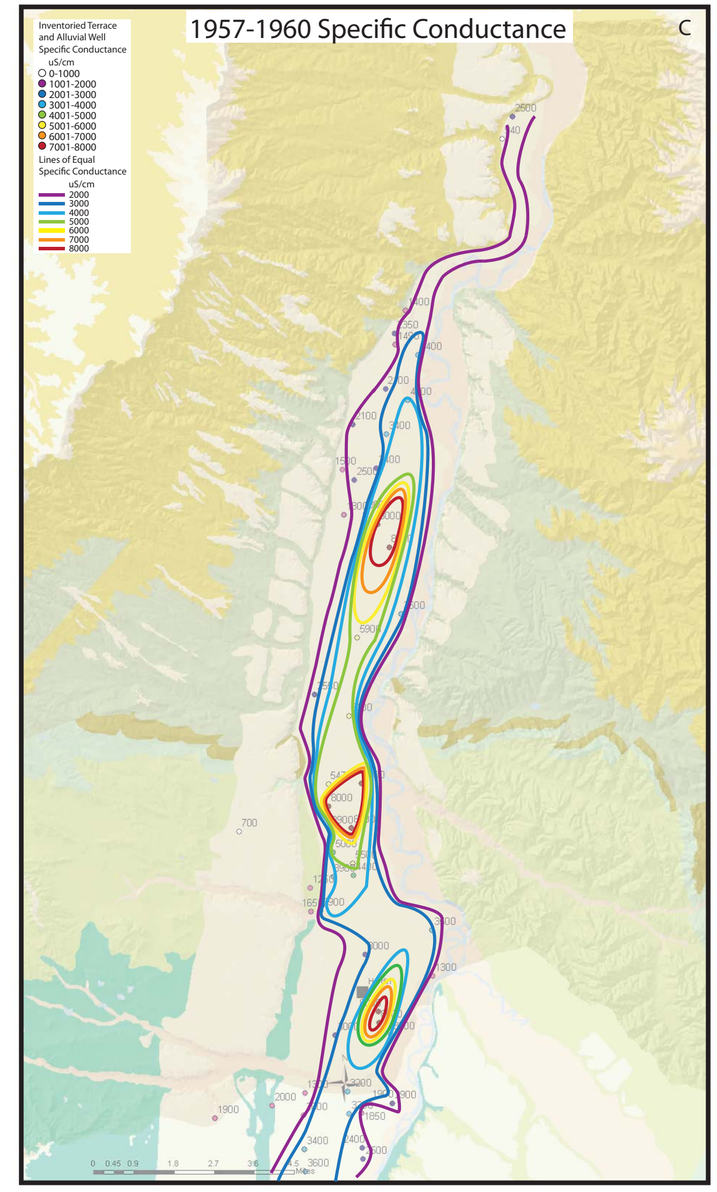

Fall Potentiometric Surface and
Ground Water Flow Directions
C
Potentiometric
Surface (feet)
2800
Ground Water
Flow Direction
Static Water Level in Alluvial Wells
Measured Between Late August
and Early October 2006 and 2007
2816
2770
2780
2790
2800
2810
2820
2830
2840
2850
2860
2870
2880
2890
2900
Hardin
N
0 0.5 1 2 3 4 5
Miles

Plate 3


Geology and Nitrate + Nitrite Concentrations in Ground Water
A
Inventoried Terrace and Alluvial Well Nitrate + Nitrite mg/L
0-1
1-2
2-5
5-10
10+
Geologic Map Units
Alluvium
Terrace
Tullock Member
Lance Formation
Bearpaw Shale
Judith River Formation
Clagett Shale
Gammon Formation
Niobrara Shale
I-90
49
384
Hardin
N
0 0.45 0.9 1.8 2.7 3.6 4.5 Miles


2006 - 2007 Specific Conductance
B
Inventoried Terrace and Alluvial Well Specific Conductance uS/cm
0-1000
1001-2000
2001-3000
3001-4000
4001-5000
5001-6000
6001-7000
7001-8000
Lines of Equal Specific Conductance uS/cm
2000
3000
4000
5000
6000
N
0 0.45 0.9 1.8 2.7 3.6 4.5 Miles


1957-1960 Specific Conductance
C
Inventoried Terrace and Alluvial Well Specific Conductance uS/cm
0-1000
1001-2000
2001-3000
3001-4000
4001-5000
5001-6000
6001-7000
7001-8000
Lines of Equal Specific Conductance uS/cm
2000
3000
4000
5000
6000
7000
8000
0 0.45 0.9 1.8 2.7 3.6 4.5 Miles

MEMO

To: Coal Board Members and Commerce Staff
From: Division Engineer
Subject: Hardin – wastewater system improvements
Meeting: December 2019, revised for March of 2020 (highlighted sections indicate revisions)

History – The City's wastewater treatment plant was originally built in 1978. Treated effluent is discharged to the Bighorn River. Several components of the treatment plant need upgrades to meet discharge standards. An EPA inspection in 2017 included findings of 'significant noncompliance' for the treatment facility. A letter, dated 1/25/20, from the City's engineering consultant was included with the most recent Coal Board application.

Problem – Problems identified in the application included the following:

- the collection system has infiltration and inflow problems and illicit connections,
- the treatment system has multiple deficiencies such as lack of grit or grease removal capability, solids loss over the clarifier to the UV channel, no backup power generation, and inadequate influent treatment capacity.

Solution – The overall proposed project includes the following:

- replace collection mains and manholes determined to be contributing to infiltration and inflow (phase 1);
- design and construction of improvements to wastewater treatment facility including new headworks, backup power generator, redundant UV disinfection system, and administration/UV building (phase 2); and
- design and construction of wastewater treatment improvements including adding a new sequencing batch reactor and converting existing oxidation ditch to a surge flow equalization basin (phase 3).

Note: The current Coal Board funding request is for phase 1 only.

****

The purpose of the project is to upgrade components of the wastewater collection system and treatment plant in order to meet EPA and DEQ standards.

The Coal Board grant request is for $500,000. Phase 1 funds would potentially come from the Coal Board, RRGL and a Coal Tax Loan and/or RD. Attachment 1 of the 1/25/20 letter indicated a phase 1 cost estimate of $933,040. Of that amount, Coal Board funds are being specifically requested for $348,125 in construction and for $151,514 in engineering, geotechnical and fees/permits.

The funding proposal includes two sources of funding, DLA which was not awarded, and HB 652 TSEP which does not have remaining revenue sufficient for this project, even if it could comply with other TSEP start up conditions.

The overall total cost is $11,265,000. Other funding sources may include TSEP, RRGL, SRF, CDBG, DLA, USDA RD and the City.

A preliminary engineering report (PER) was prepared in 2018 as part of a TSEP application. The PER was reviewed by Commerce engineers as part of the TSEP process and received top scores for technical design. The PER attached to the Coal Board application was labelled as an update and was dated August 2019. The difference between the two was the update contained results of an infiltration and inflow study completed in 2019. Also new is the current plan to phase the project with phases 1 and 2 including replacement of mains and manholes plus installing new headworks, backup generator and backup disinfection. After completion of phases 1 and 2, the system will be evaluated for one year before proceeding to phase 3 which includes the new sequencing batch reactor.

The phasing appears to be logical from a design standpoint as the replacement of mains and manholes could have a significant impact on the design flows. Environmental documents were contained in Appendix C of the PER update.

MEMO

To: Coal Board Members and Commerce Staff
From: Division Engineer
Subject: Hardin – wastewater treatment plant improvements
Meeting: December 2019

History – The City's wastewater treatment plant was originally built in 1978. Treated effluent is discharged to the Bighorn River. Several components of the treatment plant need upgrades to meet discharge standards. An EPA inspection in 2017 included findings of 'significant noncompliance' for the treatment facility.

Problem – Problems identified in the application included the following:

- the collection system has infiltration and inflow problems, and illicit connections; and
- the treatment system has multiple deficiencies such as lack of grit or grease removal capability, solids loss over the clarifier to the UV channel, no backup power generation, and inadequate influent treatment capacity.

Solution – The proposed project includes the following:

- replace deteriorated mains and manholes;
- replace headworks structure;
- install sequencing batch reactor;
- convert oxidation ditch to surge flow equalization basin; and
- upgrade plant with new well, septage receiving station, backup power generator, redundant UV disinfection system, and administration building.

****

The purpose of the project is to upgrade components of the wastewater collection system and treatment plant in order to meet EPA and DEQ standards.

The Coal Board grant request is for $500,000. The total cost is $11,265,000. Other funding sources may include TSEP, RRGL, SRF, CDBG, DLA, USDA RD and the City.

A preliminary engineering report (PER) was prepared in 2018 as part of a TSEP application. The PER was reviewed by Commerce engineers as part of the TSEP process and received top scores for technical design. The PER attached to the Coal Board application was labelled as an update and was dated August 2019. The difference between the two was the update contained results of an infiltration and inflow study completed in 2019. Also new is the current plan to phase the project with phases 1 and 2 including replacement of mains and manholes plus installing new headworks, backup generator and backup disinfection. After completion of phases 1 and 2, the system will be evaluated for one year before proceeding to phase 3 which includes the new sequencing batch reactor.

The phasing appears to be logical from a design standpoint as the replacement of mains and manholes could have a significant impact on the design flows. Environmental documents were contained in Appendix C of the PER update.