



Scope of Services

Team and City Collaboration at all Stages

HDR will provide a road map for the future of condition related improvements to the City of Gillette's WWTF. Our assessment process gives your facility a plan by which HDR:

- Provides an integral role for the City as part of the Assessment Team. No one knows the plant better than your plant personnel.
- Considers short-, medium- and long-term process upgrades. **Our team has experience working with our national experts on local nutrient removal requirements in communities in Wyoming, specifically ammonia removal.** We have worked with the communities and the WDEQ through an economic hardship process. WDEQ has implemented the ability for Communities to apply for a variance in nutrient removal criteria based on economic hardship. Our team of local and national experts such as Dave Clark, Dan Graber, Cory Foreman, and DelRon Peters are ready to assist the City of Gillette in similar regulatory requirements for nutrient removal when necessary.
- Offers experienced wastewater operators and designers to recommend the most suitable choice for equipment replacement to improve reliability.
- Includes industry leaders in corrosion control to evaluate your corrosion issues and recommend remediation.

Our team of wastewater treatment plant experts provide numeric values associated with each asset condition, which are developed to provide a complete picture of the value, condition, risk, and impact of its loss or failure.

Priority for condition-driven improvements will be rated as High, Medium, and Low.

-  **High:** Those assets with a High rating need to be addressed within five years. Often there are assets with a High rating that are identified as "Immediate" where considerations are high risk if failure occurs or work safety is involved. These are the "What keeps you up at night" items.
-  **Medium:** Assets rated as Medium can continue operating, but should be upgraded and/or replaced within the next five to 10 years.
-  **Low:** The Low priority rated assets are assumed to be operational for the next 10 - 20 years.

Our team, including WWTF personnel, considers impact of run-to-fail operations, need for redundancy, risk tolerance, worker safety, etc. We understand that these needs must be recognized, quantified, and prioritized to provide a Capital Improvements Plan (CIP) that is useful for City Council and Plant Operations and Maintenance.

The project scope follows the requirements included in the RFP for the WWTF Condition Assessment.

4.1. Project Management, Coordination Meetings, Expenses

The Scope numbering found here matches and responds to the Request for Proposal Scope.

4.1.1. Project Management

This task includes planning, organizing, and monitoring project team activities.

Led by our local project manager, Heath Turbiville, this team of WWTF experts will drive the condition assessment site visit and subsequent workshops and develop content month-to-month. As project manager, Heath will prepare the City for participation in each session with a meeting agenda and briefing materials that highlight the topics under consideration for City input.

As your trusted local advisor, Heath provides user-friendly project management and project coordination during the course of the study. As the project manager, he will coordinate work, schedule and delivery of tasks and submittals for the entire consultant team. Heath will provide an effective balance and interface between the wastewater treatment assessment team and the City.

Heath will monitor quality control and perform quality assurance of deliverables, request, schedule and coordinate work and deliverables to be performed/provided by the City.

He will prepare, review, and submit monthly progress reports and consultant billing statements in accordance with Section 3.1 of the RFP.

4.1.2. Coordination Meetings

HDR's coordination meetings include Architectural, Structural, Process, Mechanical, Electrical and Instrumentation input required for a true Asset Management System assisting staff in making renewal decisions based on age or condition.

Following the physical assessment of the facilities, our team will develop a concept-level Capital Improvements Plan to be used in creating a budget and making decisions for repairs, replacements, upgrades, expansions, etc. including the potential headworks, UV, and biosolids handling upgrades.



HDR will balance air piping to fully utilize the aeration blowers.

Heath will plan, schedule, organize, and facilitate conference calls and coordination meeting(s) with the City staff as necessary during the course of the study.

Coordination meetings and minutes will serve to identify and report on action items, record conversations, solicit comments, incorporate comments, and distribute minutes summarizing conference calls and coordination meeting(s) during the course of the study.

4.1.3. Travel Expenses

This task includes direct travel, lodging and travel-related expenses within this sub-task for coordination meetings and conference calls. Travel costs for site assessment visits by HDR experts are included in Section 4.2.

HDR Deliverables:

- Project Management Plan (for internal use).
- Monthly status reports and invoices.
- Minutes from kick-off meeting and project coordination meetings.

We will **listen to the City's needs first** and provide expert recommendations from our team of seasoned professionals.



John Koch's troubleshooting experience provides Gillette with understanding of the pitfalls of the different screening equipment.

4.2. Evaluation of Process and Equipment

4.2.1. Existing Headworks

HDR will provide a technical memorandum specifically geared to recommended headworks improvements, with an example outline shown below.

We understand that the influent sewer runs very flat and has scouring velocity issues. This facility contains the original screens and screening is integral to limiting pumps plugging and for a high quality biosolids product.

Plant Headworks Technical Memorandum

Technical Memorandum Outline:

1. Review of Headworks Improvement Alternatives
2. Screening of Alternatives
3. Grit and Grease Removal Options
4. Development of Cost Opinions
5. Review of Financial Impacts
6. Review Non-Financial Advantages of the Recommended Improvements (i.e. elimination of grit accumulation in the influent sewer)
7. Recommendation for Headworks Improvements

HDR built this system in 1985. It has had numerous repairs over the years. The memorandum will provide a comprehensive review of applicable fine screens, grit removal options, replacing sampling units, grease removal, and screening washing and compaction.

Key Headworks Solutions in Plants Similar to Gillette

Dan Graber and DelRon Peters have assessed, planned, and designed numerous headworks facilities. We understand that challenges include aging infrastructure and grit accumulation in the flat influent sewer. Recent and relevant examples include:



Brookings Municipal Utilities WWTP

Solution: Complete reconstruction of influent channels with the installation of two new 12 mgd fine screens complete with washing and dewatering.

Benefits to Gillette: Reduction of grit buildup in influent sewer by removing Parshall Flume and installing FloDar meters; Enhanced screenings removal; Clean, compacted screenings, rehabilitated grit chambers.



City of Rapid City WRF

Solution: Modification of influent channels and installation of two 40 mgd traveling rake fine screens complete with a screenings sluice to a dewatering unit.

Benefits to Gillette: Reduction of grit buildup in influent sewer by removing Parshall Flume and installing FloDar meters; enhanced screenings removal; clean, compacted screenings, reliable equipment, labor savings.



City of Bozeman WRF and City of Coeur d'Alene WWTP

Solution: New headworks with new fine screens

Benefits to Gillette: Applies to option for new headworks installed upstream to limit length of sewer with grit issues. Similar Size facilities. The Bozeman WRF is an EPA award-winning facility.



4.2.2. Primary Clarifier Valves and Vaults

Through discussions with your staff, HDR has listened and understands existing corrosion issues and maintenance concerns regarding piping and valves. We understand the City frequently excavates and repairs these valves to address both corrosion protection and operational issues.

HDR has replaced similar valves with pinch valves or knife gates, installed in vaults and included extensive corrosion protection as long term solutions.

HDR is currently the preferred contractor for corrosion protection on thousands of miles of process lines. See the Additional Services section for HDR's extensive corrosion assessment and protection offerings for underground piping.

Our process design team understands there are issues with grease plugging the lines. HDR's benefit to Gillette is that we have provided options for returning scum/grease both to the head of the plant to be screened or alternatively pumped to the heat exchanger so that it is allowed to be heated and better emulsified in the digester.

For Gillette WWTF, we will look at an option to return to the head of the plant to be screened by the screen and an option to feed directly to the heat exchanger to heat prior to going to the digester.

4.2.3. UV System

The UV system was installed in 2007 and the second channel was set up for sodium hypochlorite disinfection as a backup unit. Due to its age, everything from the water level down was rebuilt in 2018, which seems to have corrected issues that had become a maintenance problem.

HDR has recently conducted a complete UV equipment review for available products and provided means and methods for the City of Rapid City to select a reliable UV system, as the Wedeco system had failed frequently in the past. In this case, the latest Wedeco system was the most cost-effective option, but the client selected Trojan equipment. **HDR required the manufacturer to provide detailed experience, operation and maintenance information as part of the procurement process. This information was scored by the City and tabulated by HDR to determine the best value.** This Owner-led approach allowed the City to get the preferred system. This process benefits the City for equipment selection throughout the plant including headworks, UV and composting equipment.

What does HDR's HydroQual UV Validation Expertise Bring to Gillette?

- Continuous experience with state-of-the art UV technologies
- In-depth knowledge of the process and industry
- Direct operations experience
- Direct understanding of the validation process and how this is used - for system sizing - algorithm development
- Experience with UV system control strategies
- Regulatory interface - education and credibility
- On-site testing done directly to verify or to troubleshoot
- Special protocols (dyed microspheres) to test on-site
- In-field optimization and troubleshooting

June Leng, Ph.D, will bring Gillette key insight into the successes and failures of UV equipment nationwide

Dr. Leng is HDR's Senior Wastewater Treatment Disinfection Lead. June brings a wealth of national and international experience with disinfection process implementations in wastewater treatment and water reuse. June has provided technology evaluation, facility design and startup for over 60 disinfection projects. She is available for early project consultations to establish disinfection needs and related improvements.



Regionally, June has provided expert planning for:

- Rapid City WRF (40 mgd, Dual Channel Trojan UV System that replaced failing Wedeco system)
- Brookings WWTP (18.5 mgd Trojan UV System)
- Billings WWTP (60 mgd UV System)
- Little Blue Valley, KS (100 mgd UV system)

Benefits For Gillette: June provides insight to the potential options for pre-selection and pre-qualification allowing the City to select the UV system based on a detailed Life Cycle Cost Analysis. June provides a direct connection whose opinion the major manufacturers know and trust. She will work with our HydroQual group to achieve Gillette's reliability goals.

A Comprehensive Biosolids Process And Composting Review **Will Yield Safety And Efficiency Improvements**



HDR's biosolids experts include Mike Murray, Ph.D and Adam Parmenter.

They will leverage our understanding of the dewatering and composting facilities. HDR understands that Gillette is challenged with high maintenance on the centrifuge and primarily on the dewatered sludge screw conveyors.

Accessibility to maintain the equipment is problematic and presents as a safety risk.



Benefits For Gillette: Understanding the impact of growing customer base for the composted material, our team will provide recommendations to optimize the composting layout based on experiences in Coeur d'Alene, Missoula, and Bozeman. We have chosen the finest of our wastewater practice group to leverage our knowledge and experience to effectively meet Gillette's conveyance and traffic load needs. HDR's team has provided dewatering material conveyance, material storage and truck loading design.

We understand that the Gillette composting facility is growing in popularity and that there is a large number of smaller users. The HDR team will provide a model for directing and controlling traffic at the Gillette compost facility.

HDR designed Rapid City's composting program that takes the solids with a high moisture content and composts with the landfill yard waste program. HDR's solid waste professionals have done a number of these type of Citizen Campus designs that promote safety when the public is in proximity of composting operations.



HDR's UV experts will conduct a reliability review specific to Gillette WWTF for converting the existing open channel system into a redundant UV system. Considerations shall be given on whether it is best to replace the equipment with new or design the redundant system equipment to match existing so that everything is the same, install motorized valves, flow meters for each channel, generators for standby power, and replace HVAC for UV controls. HDR has conducted similar work in Brookings and Rapid City. Dr. Leng's experience will utilize approaches used nationally for the City and provide a reliable recommended alternative.

If needed, HDR owns a UV water quality testing branch, HDR HydroQual, which can be utilized for further analysis if effluent testing shows risk. HydroQual is also used for second party testing by the major UV manufacturers.

Through a separate contract, the City will be constructing an addition to the existing UV building to relocate existing and future electrical gear and controls. HDR will provide input on best practices learned over the past 25 years of UV installations.

4.2.4. Dewatering Unit

The dewatering unit was installed in 2007 with a single Alfa-Laval centrifuge with a screw conveyor system. It is generally in good condition, but the City has experienced high maintenance costs and significant down-time associated with the conveyor system.

Adam Parmenter will review redundancy for dewatering and improvements for the conveyor systems. Similar process reviews and recommendations have been completed regionally for Missoula, Bozeman, Billings, Las Vegas and Rapid City, in conjunction with Adam's national experience.

HDR understands that the City is open for ideas such as a second centrifuge unit for redundancy and an improved conveyor system and Adam was hand-picked due to his deep resume in dewatering and solids handling equipment.

Our process team is well versed in the alternative dewatering technologies as we have recently designed a screw press for Bozeman and a volute press in Missoula. These alternatives were originally considered due to lower maintenance, power, and operator attention. Within the last couple of months, we have piloted a screw and volute press in Bismarck with great results and feedback and we would propose pilot testing of these units as a second phase activity.

4.2.5. Digester Building

HDR will consider a redundant DAF dewatering unit. Inspect and recommend improvements to the digesters and related

process. Dewatering selection affects biological nutrient removal and Adam's dewatering experience will give Gillette comfort in knowing that the equipment chosen will meet the needs of Gillette into the future.

Through a separate contract, the City will be performing minor repairs and recoating the digester tanks during the spring, 2019. Gillette currently utilizes the gas in the boiler.

Brian Bakke provides unique insight as HDR's Biogas Utilization Planner. When excess gas has been available, Brian has been able to develop programs for Fremont, NE; Lincoln, NE; and Des Moines, IA to name a few where the gas was cleaned and put to beneficial use.

4.2.6. Work Areas, Traffic, and Scale

HDR understands that over 10,000-yard waste customers per year come through the WWTF, leading to traffic congestion and safety issues. The solid waste division is considering routing more food waste into the operation and diverting it from the County landfill. The City is considering the acceptance of biosolids compost from other wastewater treatment facilities.

HDR has traffic specialists who will review the traffic patterns volumes and circulation patterns and provide a preliminary site layout and associated costs to complete. Site improvements including pavement, sidewalk, and fencing shall be evaluated and identified in cost analysis as required.

Options include building a much larger paved concrete area for composting, replacing existing screening equipment with a larger tromel type-screen, paving the access road to yard waste area, and installation of scale and scale house to record yard waste loads received and compost sold.

HDR designed Rapid City's composting program that takes the solids with a high moisture content and composts with the landfill yard waste program. HDR's solid waste professionals have done a number of these type of Citizen Campus designs that promote safety when the public is in proximity of composting operations.

4.2.7. HVAC

HDR designs HVAC systems at WWTFs nationwide and will provide HVAC options from numerous WWTFs across the United States. A mechanical engineer with wastewater facility HVAC experience is included on the team and will be present during the site inspection.

The WWTF currently has Hasting gas fired units. The entire HVAC system is very high maintenance. All units in the plant have been replaced during the last 15 years, but continue to need repair. In the 2006/2007 phase, units were installed on the ground surface, but gases and dust from the composting operation have created operation and maintenance challenges.

Ideas range from major maintenance to re-design and complete replacement of the HVAC systems.

4.2.8. Plant Irrigation System

HDR will provide costs and recommendations for the existing irrigation system and additional landscaping and irrigated areas.



The City will benefit from the fact that our structural and architectural team work on WWTFs for a living. Their experience in these environments **shows in the long-term performance of facilities.** They don't design box stores and schools one day, and wastewater plants the next. This **focus yields results for our clients.**

4.2.9. Architectural and Structural Items

HDR will perform inspections and provide recommendations to plan and budget for major maintenance such as: roof replacement, painting, sealing and caulking, window/door replacement, plumbing fixtures, and other architectural items for each building.

Perform inspections and provide analysis to make sure the building structure(s) are adequate.

4.2.10. Electrical Systems

HDR's team has recently performed electrical inspections at Brookings WWTP, Sioux Falls WRF, Rapid City WRF, and Bismarck WWTP and understands the critical nature of failure and the challenges with getting replacement parts. Shawn Howell will perform inspections and provide recommendations for electrical system replacements and upgrades including panel, conductor, and fixture replacements. As HDR's Arc Flash expert, Shawn can provide these services as detailed in the Proposed Scope Alterations section of this proposal.

4.3. Draft Report

HDR will incorporate the evaluation into a document that City staff will use to plan, budget, and schedule major maintenance and construction projects.

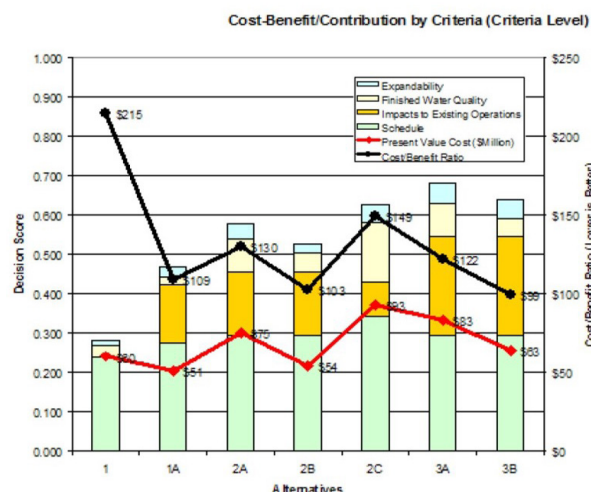
The plan will require a defensible analysis of both economic and non-economic criteria for the developed alternative improvements. HDR uses a form of Cost-Benefit Analysis (CBA), providing view of a project's economic results and going even further by incorporating risk analysis. The evaluation monetizes (converts to monetary terms) all relevant social and environmental impacts of a given project, and provides the equivalent of traditional financial metrics. The tool considers both cash and non-cash costs and benefits: Financial Return on Investment (FROI), Internal Sustainable Return on Investment (ISROI), and Sustainable Return on Investment (SROI).

The simplest description of the overarching goal of the economic/noneconomic analyses is to make sure decisions are made for the right reasons.

As shown in the schedule, there will be a hands-on, focused workshop approach that integrates staff engagement throughout preparation of the capital plan for assessment items. The results of these workshops shown in the schedule will be bound as technical memorandums and included as part of the draft plan appendices.

We will prepare and provide three paper copies and one digital reproducible copy of a Draft Report for review by the City.

IDENTIFYING KEY CRITERIA AND THEIR RELATIVE IMPORTANCE CREATES A BALANCED AND DEFENSIBLE DECISION SUPPORT SYSTEM



The City will receive a **focused and defensible capital improvements plan** supported by the planning team. **User friendly presentation graphics** make presentations easily understandable for City Councils and the public.

HDR's seasoned team will present findings and recommendations to the City Council at a regularly scheduled meeting and answer technical questions. HDR will conduct a review meeting with staff and key stakeholders before the presentation.

HDR Deliverables:

- Council Presentation
- Condition Assessment Report
- Short and Long-term corrosion control concepts

4.4. Final Report

Following review by City staff, HDR will prepare and provide three hard copies and one digital reproducible copy of the Final Report.