

## Memorandum

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To: City of Laramie Stormwater Focus Group  
From: WSP Environment and Infrastructure  
CC: City of Laramie Public Works and Engineering  
Date: December 1, 2023  
Ref: Stormwater Funding Feasibility Study  
Issues and Challenges in Stormwater Services

### Drainage System Issues and Challenges:

*Master Drainage Plan Capital Improvements:* The recently completed Citywide Storm Drainage Master Plan identified drainage system infrastructure improvements needed to address capacity and performance issues within the network. The approximate value of capital projects needed to solve flow capacity problems for existing and future development was \$135M and construction costs have increased since the Master Plan was completed in 2022.

These projects address replacement of undersized system components and construction of detention ponds to decrease peak flows to reduce impacts on downstream systems. Water quality improvements are included in some identified projects.

Implementation of the improvement program for the drainage network will take years and requires staff and financial resources; meanwhile, drainage system capacity issues and limited maintenance will continue to create conditions in the system that limit runoff flow, causing localized flooding and system failures.

Additionally, the identified capital improvement projects do not account for replacement or rehabilitation of aging pipes, which may have adequate capacity now, but could fail due to age or damage from debris. Use of revenue from the Special Purpose Tax (SPT) does not provide the City the ability to forecast and plan project implementation over a period of years due to the nature of the SPT process. Very little money is available from the City's general fund, or other sources. Consistency in funding is necessary to effectively address infrastructure reinvestment.

*Routine Maintenance:* Daily ongoing maintenance and operation of the system goes hand-in-hand with an investment in infrastructure improvements. Optimizing performance of the drainage network through routine and proactive maintenance, such as pipe inspection, cleaning, and rehabilitation (e.g., pipe relining), is often the best value for the dollars of expenditures. Components of the drainage network are aging, and deterioration issues required inspection of the underground network.

Current staffing and equipment resources do not support a routine inspection program.

*Underserved Communities:* There are areas within Laramie that do not have public drainage systems. A lack of drainage infrastructure can result in overwhelming neighborhoods with excessive runoff during minor or major storm events. West Laramie includes approximately 15 miles of unpaved roads without a storm sewer system, resulting in frequent nuisance flooding during minor storm events. In addition, the Laramie River has experienced flooding during recent spring and summer runoff events typically caused by snow melt in combination with spring rains or increasing intense summer storms.

*Erosion:* Both large and small construction projects exhibit erosion that contributes significant sediment into the City's stormwater system, which fills stormwater pipes, reducing the system capacity. Both within and upstream of the City, Spring Creek and its tributaries have areas where erosion has occurred during moderate events, resulting in bank instability and instability of the channel slopes. Upstream of the Laramie River, farming and ranch operations contribute sediment along with erosion from areas previously experiencing fires that result in unstable soils.

*Flooding:* Nuisance and street inundation have resulted in property damage as well as general inconvenience. There are localized flooding issues at specific locations throughout the City. These include nuisance flooding during frequent storms (e.g., West Laramie, 1st Street), flooding during less than rainfall from a storm that has a 10 percent chance of occurrence in any year (e.g., N. 4th Street) and riverine flooding (Laramie River and potentially Spring Creek). Most of the flooding issues are due to undersized system capacity, as well as clogged pipes. Flooding typically occurs first within the pipe and followed by street cover and on to private property. There are open conveyance issues in West Laramie as well.

*Water Quality Protection/Improvements:* The natural environment is an important asset in the City and over time, the quality of the water flowing within the Laramie River as well as Spring Creek, is impacted by stormwater runoff carrying sediment and debris. Recent evaluation of the overall water quality in the river system indicates that nutrients and sediment, caused by bank erosion as well as incoming flows, are impacting receiving waters resulting in non-attainment of narrative water quality criteria. There are several sources of concern, including urban stormwater runoff.

Overall, the drainage system is exhibiting stress and increasing system failure, with a growing risk to businesses and residents due to nonexistent, undersized and/or aging drainage system components. Water quality adds an additional challenge in managing flows from the drainage system into receiving waters.

#### Stormwater Program Identified Needs:

Through staff completion of a questionnaire prepared by WSP, key issues were identified defining barriers to effectively operating and maintaining the storm

drainage system. Program areas were documented that may improve overall water quality for natural systems. The following needs were discussed. In general, it is recognized that resources are limited and improvements in system performance, targeted for water quantity control and water quality improvement, require additional staff and equipment.

### *Capital Project Investments*

The Citywide Storm Drainage Master Plan compiled capital improvement projects from previous stormwater studies, resulting in a prioritized list of over \$100M in projects needed to provide the capacity to safely convey runoff through the City from existing and future development. Projects were prioritized into high, medium, and low priority categories using several factors, including cost, flood reduction benefits, recreational benefits, water quality benefits, ease of construction, and community development priorities. The following table lists the high-priority projects.

| Project Title   | 2022 Capital Cost | Predecessor(s)  | Status                               |
|---|-------------------|---|--------------------------------------|
| Regency Pond  | \$1,653,000       | None  | Constructed                          |
| Optimize pond outlet structure, Nighthawk and 22 <sup>nd</sup> Street*  | \$116,000         | None  | Constructed                          |
| Enlarge Pond CM02, Beaufort & 10 <sup>th</sup>  | \$274,000         | None  |                                      |
| Enlarge Pond NE of 30 <sup>th</sup> and Reynolds Street   | \$274,000         | None  |                                      |
| New Pond east of Jacoby GC  | \$11,604,000      | None  |                                      |
| Upgrade existing storm sewer to 54" in Beaufort St. from 8 <sup>th</sup> to 9 <sup>th</sup> and along 9 <sup>th</sup> to Downey | \$890,000         | Upgrade existing storm sewer to 6'x8' RCBC  |                                      |
| Install new 24" storm sewer from Van Buren Street and Lincoln to Polk and Lincoln   | \$181,000         | Buchanan & Wyoming to Adams & Madison; Van Buren & Colorado to Van Buren & Buchanan |                                      |
| Optimize pond outlet structure, Binford and 22 <sup>nd</sup> Street   | \$33,000          | None  | Design Complete<br>Construction FY24 |
| Optimize pond outlet structure, 22 <sup>nd</sup> and Reynolds Street*   | \$77,000          | None  | Design Complete<br>Construction FY24 |
| Upgrade existing storm sewer to 60" RCP along Canby Street  | \$440,000         | New 5'x8' RCBC along Canby Street   |                                      |

| Project Title   | 2022 Capital Cost | Predecessor(s)  | Status  |
|---|-------------------|---|---|
| LaBonte Park Pond Improvements  | \$5,499,000       | None  | Budgeted FY24-25, if pending grant application is successful. |
| New 36" storm sewer from Madison and Adams to Madison and Lincoln   | \$905,000         | None  |   |
| New 24" storm sewer in Polk from Fillmore to Taylor, 36" north to Van Buren                               | \$242,000         | Buchanan & Wyoming to Adams & Madison   |   |
| Upgrade to 30" and 36" storm sewer on Harrison from Lincoln to Buchanan                                   | \$298,000         | None  |   |
| New Pond RM02, SW of 30th and Reynolds  | \$1,540,000       | None  |   |
| Upgrade existing storm sewer to 60" RCP along 6 <sup>th</sup> Street                                      | \$1,036,000       | Upgrading existing storm sewer to 4'x10' RCBC along Harney Street                   |   |
| Enlarge Pond LM01, NE of 15 <sup>th</sup> & Harney  | \$235,000         | None  |   |
| Upgrade existing storm sewer to 60" RCP along 11 <sup>th</sup> Street                                     | \$440,000         | Upgrade existing storm sewer to 60" RCP along Canby Street                          |   |
| New 36" - 48" storm sewer from Wyoming Avenue and Schrader Street to Colorado Avenue and Van Buren Street | \$1,562,000       | Buchanan & Wyoming to Adams & Madison; Van Buren & Colorado to Van Buren & Buchanan |   |
| Restore 36" Culvert under UPRR at 1 <sup>st</sup> & Sanders   | \$401,000         | None  |   |
| New 30" storm sewer from Franklin and Arthur to Snowy Range Road and Arthur                               | \$251,000         | None  |   |
| New storm sewer in Buchanan from Wyoming to Van Buren, new 48" in Van Buren from Colorado to              | \$2,833,000       | None  | Construction Underway – complete FY24                         |

| Project Title  | 2022 Capital Cost | Predecessor(s)                               | Status |
|--|-------------------|--|--------|
| Adams, new box culvert in Adams from Van Buren to Madison                |                   |  |        |
| New Pond on W Boundary of Turner Tract                                   | \$484,000         | None   |        |
| Install structures in Grays Gable to maximize flow to Jacoby Golf Course | \$297,000         | 30 <sup>th</sup> Street Storm Sewer Upgrades |        |

\*Project includes water quality treatment.

### *Operation and Maintenance*

Optimizing system performance is limited due to a minimal system cleaning and restoration program.

- Street sweeping is recognized as a key service to remove sediment and debris from the drainage system, not only for water quality protection, but to limit the build-up that reduces capacity within the underground systems. Over the past two decades as more and more communities developed and expanded their street sweeping programs, studies were completed to identify best practices for establishing sweeping schedules and frequencies. Much has been learned about how the use of street sweeping program to achieve goals in system maintenance. In addition to evaluation of schedules and frequencies, studies focused on the best equipment for the targeted objectives.

Twice a year is a minimal standard for removal of contaminants carried in stormwater. To improve street sweeping, as a best practice to remove sediment and debris, an increase in staff and equipment is needed. The two sweepers in use today (both acquired in 2015) operate without backup. When equipment is upgraded, a current sweeper should be kept as backup, maintained in good repair, so the sweeping program is not impacted by normal maintenance on a primary vehicle (or when a major repair is needed).

- Cleaning of the pipe network and its component parts (sumps, catch basins, inlets) is critical to optimizing system performance. The equipment available to flush and vacuum accumulated sediment from the system is aging. To address the build-up of sediment on an annual basis, one third of the system can be cleaned annually. This is an optimal metric. The goal can be achieved with two investments:
  - a new vacuum truck that has a larger capacity and greater power to flush and vacuum has been ordered and delivery is expected in Summer 2024.
  - a new two-person crew in the Streets Department dedicated to the pipe vacuum cleaning program from mid-March to November

During the winter months, the two-person crew can focus on inspection of the underground system components.

The Streets Department obtained a used camera system and trailer from the Utilities Department. Inspecting the underground system over the winter months provides key information for the following March-November sediment removal program as well as identity of potential pipe failures. Grading the condition of the pipes and adding details for pipe inventory asset management informs the City of priority repairs or rehabilitation needed before a pipe collapse occurs. A backup camera system should be considered, in the future, as the equipment transferred from the Utilities Department ages. Retiring the older CCTV system to a backup role can be done when replacement equipment is acquired.

- Pipe lining is a tool to enhance the longevity of the underground pipe network. It can add decades to functionality. To install, the pipe targeted for improvement must be cleaned and inspected first. A routine pipe inspection program is not currently in place, as inspection efforts are limited by lack of staff and inspection equipment. This maintenance rehabilitation strategy is contracted and typically occurs in late spring to early fall, during construction season. The City made limited investment in pipe lining and additional resources are needed to expand the program.

Rehabilitation of the pipe through lining is less costly than total replacement and it has a role in the maintenance program for those underground pipes that are not stressed by lack of capacity to carry the flow. Expanding investment in this program is a cost-effective solution to increasing the performance life of the pipe network. Pipe lining projects have not been included in previous capital improvement project planning.

- Green Infrastructure is considered an important component in the management of stormwater on the parcel site, creating appropriate infiltration to reduce stress on the public drainage system. GI protects/enhances water quality. However, it is recognized in the industry that use of such treatment facilities requires appropriate ongoing maintenance.

Encouraging the use by private development may facilitate overall system improvements and implementation but it is noted that local governments typically require maintenance commitments by property owners to ensure ongoing effective outcomes. If this does not occur, GI facilities often fail and increase the burden on the public system due to flows intended to be handled by the treatment works.

Oversight, through measures such as executed maintenance agreements as a condition of development, is the key to long-term system performance. Engineering staff are needed to oversee effective installation of onsite GI treatment facilities designed to handle stormwater flows. Public investment in these facilities requires annual and long-term maintenance and inspection.

City maintenance crews need training on approved GI facilities to ensure long term functionality.

### *Engineering Services*

- Addressing Green Infrastructure, as a key tool for both site development as well as an approach for City projects, places an increased demand for inhouse engineering services, both to educate the private developers on acceptable practices and to review designs and implementation of such facilities. Green stormwater practices can be effective in dealing with both runoff impacts and restoring natural systems; however, not all practices are appropriate for use in all climates and rainfall conditions. Engineering staff need to provide oversight during construction to ensure successful installation. Additionally, training of local contractors in green infrastructure installation practices may be required.
- Implementation of a capital investment program, based on analysis of recent master plans and consolidation into a citywide plan to capture long-term investment requirements, place additional burden on the engineering services needed to effectively oversee the design and implementation. Current engineering staff are at full capacity, managing \$10-\$12M in capital improvements for all city projects, which typically includes \$2M or less in stormwater projects.
- As investment in operations and maintenance increases, assistance to support expanding the pipe-lining program requires technical support needed from Engineering. Coordination with Operations staff is key to executing effective remedial maintenance of existing systems.
- Current staffing for Engineering should be augmented to ensure that bottlenecks in program and project implementation do not occur.

### *Water Quality Protection*

- Current conditions within Spring Creek and the Laramie River are potential targets for improvement. Staff recognizes the need to protect the receiving waters and have taken a step by testing Gutter Bins for the collection of trash and other debris. Continued investment by installation of structural treatments (such as GI that captures and treats stormwater runoff) is a best practice solution. Long-term improvements require systematic planning to optimize use of effective treatments that are designed for similar climatic conditions. GI systems require routine maintenance and periodic rehabilitation to ensure functionality over the projected performance period.
- As Laramie grows, it is anticipated that WYPDES regulations will be mandated. Developing a water quality protection strategy, like the approach underway in Jackson and Teton County, demonstrates commitment to protecting the water resource assets of the City and can create opportunities to partner with WYDEQ. To address water quality in a comprehensive manner, the City may consider an evaluation of water quality treatment systems during the

development of its Stormwater Manual. Starting these efforts now would ease the transition of meeting a future municipal stormwater permit.

### *Funding*

- Infrastructure management for long-term performance and appropriate reinvestment for capital projects to maintain capacity and performance of the drainage system requires a stable funding source that can be relied upon to meet operational needs. Drainage system operations and maintenance competing for General Fund resources limits long-range planning along with proactive best practices that sustains the useful life of the infrastructure.
- Stabilizing funding allows the City to provide effective water quality protection and improve the natural environment, important assets contributing to sustainability of the quality of life within the community. Funding is needed to improve the quality of the drainage system discharges, to address currently impacted natural systems, and protect the long-term water quality within the City.
- Operation and maintenance of the drainage network and facilities protects the investment in place, made by the private sector as well as public expenditures. Funding that is stable and consistent from year to year is needed to shift from a reactive posture to a more proactive strategy that minimizes further degradation of the infrastructure.

Use of methods such as lining underground pipe systems is more cost effective than having to address pipe collapse and rebuild. Preventative measures such as expanding the use of Gutter Bins requires additional resources to increase capacity to clean the Bins on a routine basis; however, trapping debris and trash at the point of entry into the drainage network is more efficient than cleaning clogged pipes and restoring stream conditions impacted by the pollution. To make a change in level of service requires additional funding that is stable and consistent over time.

- Lack of predictable, dedicated, stable funding of all areas of stormwater management within the City results in a continuing decline in control of stormwater runoff and the performance integrity of the drainage infrastructure meant to protect public and private property as well as the natural environment.