

City of Columbia Phase 2 Integrated Management Plan for Wastewater and Stormwater

FINAL IMP

Columbia, MO
February 15, 2026



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1. Introduction and Vision

In 2019, the City of Columbia (City) developed a system-wide integrated management plan (IMP) to inform future capital improvement projects that address wastewater collection, treatment, and stormwater management programs and meet Clean Water Act requirements. The goal of the IMP was to create a long-term investment strategy that prioritized and balanced projects that address critical public health and environmental issues, solve infrastructure challenges, and provide important benefits to the community. Through the IMP process, the City developed an investment schedule by considering revenue requirements and affordability to the community, community benefits, and the City's ability to deliver major future capital improvement projects. The IMP was developed following the US EPA's Integrated Municipal Stormwater and Wastewater Planning Approach Framework¹ (Framework) authorized in the Clean Water Act and memorialized in the City's National Pollutant Discharge Elimination System (NPDES) permit, MO-0097837, issued by the Missouri Department of Natural Resources (MDNR) on July 1, 2020. The IMP serves as a roadmap that guides the City's project and investment schedule over a 20-year planning period.

As long-term plans are implemented, an adaptive management approach is needed to address evolving drivers and system information and refine the plan accordingly. Element 6 of the Framework addresses how municipalities should improve the integrated plan over time. The City has selected to review and refine their IMP every five years in coordination with their NPDES permit renewal period. Consistent with Element 6, the City developed a process for identifying, evaluating, and selecting proposed new projects or modifications to the ongoing or planned projects and implementation schedules based on changing circumstances; and collected the appropriate information to support the modification consistent with Elements 1 – 5 of the Framework.

The 2019 IMP will be referred to as Phase 1 IMP and this update is Phase 2 IMP. In addition to the five-year review, the City submits an annual report to MDNR to maintain transparency and coordinate on important issues.

The Phase 1 IMP was created to address increasingly stringent regulatory requirements and wet weather issues impacting the streams and neighborhoods throughout the City. In the early development of the IMP, the City conducted a visioning workshop to develop a vision that would guide the implementation of the long-term IMP. This vision has been the foundation for the planning process going forward for Phase 1 and Phase 2 of the IMP.

Columbia IMP Vision Statement

The stormwater and wastewater Integrated Management Plan is a community-driven, affordable infrastructure plan that enhances human health and safety, water quality, economic vitality, and environmental resources by leveraging existing assets and implementing innovative solutions.

To achieve this vision and guide the successful development of the IMP, the City and its stakeholders determined that several key considerations should be addressed during the planning process. During the Phase 2 IMP visioning session held on April 15, 2024, the City confirmed that due to the success of the Phase 1 IMP, the overall vision and key considerations originally established for the Phase 1 IMP still apply. Additionally, the Phase 2 IMP should consider new and evolving regulatory drivers, incorporate additional high-priority projects, and confirm the community's priorities for project implementation.



Consistent with the Phase 1 IMP, key considerations that should be addressed by the Phase 2 plan include those listed below.

- The plan should provide regulatory certainty so that the City can conduct important system condition assessments, develop asset management tools, and undertake improvements that are necessary to develop an effective, long-term asset management and capital improvement program.
- Financial impacts on all City ratepayers, and specifically disadvantaged communities, must be carefully considered as IMP alternatives are developed, scheduled, and implemented.
- Integrated planning is a community-driven process. Therefore, stakeholder and community involvement is critical to developing an effective IMP.
- The IMP recommendations should focus on identifying projects that have multiple benefits and are technically feasible, prioritized, funded, and supported by the community.

During the Phase 2 IMP visioning session, the City reviewed their high priority projects for incorporation and developed a project list (Table 1) for the wastewater treatment, collection system, stormwater systems and the City's financial priorities. The high priority projects will be incorporated into the Phase 2 IMP project schedule.

Table 1. New High Priority Projects for the Phase 2 IMP.

Wastewater Treatment	Wastewater Collection	Stormwater	Financial
• Biosolids treatment evaluation and expansion • Wetlands maintenance • Facilities asset management	• Targeted flow monitoring and inflow and infiltration reductions • Asset management software implementation • Sewer hydraulic model refinement • Continued rehabilitation of system infrastructure	• Flood management improvements • Design manual updates • MS4 program updates • Continued rehabilitation of infrastructure	• Update short (5-year) and long (20-year) long term capital projections and rate impacts • Cost of service study • Incentivize private inflow and infiltration work

Similar to the approach used in Phase 1, Phase 2 IMP will include a 20-year capital improvements plan that reflects the City's current understanding of infrastructure and regulatory needs and priorities given the information currently available. The 20-year plan will include a 5-year Action Plan that outlines more specific improvements and planning studies that the City intends to pursue during the five year period. Implementation progress will be reported to MDNR annually in accordance with requirements in the City's NPDES permit. The annual progress report will include a summary of work performed, work planned for the following year, and any proposed updates to the 5-Year Action Plan or 20-year IMP. At the end of the 5-Year Action Plan, the City will revise the 20-year IMP.

An overview of the City's Phase 1 progress and accomplishments, as well as details regarding supporting data, information, and analyses used to identify the Phase 2 IMP recommendations and actions are documented throughout the remainder of this report.

2. Phase 1 IMP Review

The Phase 1 IMP was driven by the 5-Year Action Plan that focused on collecting critical data needed to more precisely forecast future needs while continuing to implement the City's capital improvement plan. The City's 5-Year IMP Action Plan addressed a range of wastewater and stormwater program needs that were identified during the IMP planning process. Several high priority, early actions were identified to directly and expeditiously reduce significant public health risks, improve water quality, and enhance customer service. The City delivered the Action Plan to the extent possible given impacts and project management constraints caused by the COVID-19 pandemic. The accomplishments were documented within annual reports that were posted to the City's IMP website¹ and provided to MDNR. A summary of significant accomplishments are included in the sections that follow.

2.1 Phase 1 IMP Wastewater Collection Accomplishments

In Phase 1 Action Plan, the City determined that addressing wet-weather issues, eliminating hydraulic capacity limitations in the existing treatment and collection systems, and eliminating private common collector systems were high priorities to address specific issues within the wastewater collection system. A significant focus was on reducing inflow and infiltration by continuing to implement planned system inspection, rehabilitation, repair, and replacement efforts within the collection system. In addition to these renewal efforts, the City worked to update their existing hydraulic model to sufficiently characterize long-term capacity improvement needs with a higher degree of confidence. The City successfully accomplished a majority of the Action Plan collection system work identified in Phase 1 (Table 2).

Table 2. Phase 1 IMP Wastewater Collection Accomplishments.

Category	Project / Program
System renewal	- Completed: - Sewer Model - Rehabilitated 348 sanitary structures 452,984 feet of sanitary sewer mains – CIPP lining - Repaired/replaced 943 sewer structures 1,310 feet of sewer pipe - CCTV Inspected 746,961 feet of sewer pipe - Cleaned 2,978,786 feet of sewer pipe
Reduce Building Backups	- Obtained council approval for backflow prevention program with allocation of \$100,000 per year for 5 years. - Implemented community outreach to build awareness of modified program. - Received nine building backup prevention applications between 2018 – 2023
System Capacity Enhancements and Private I&I Reduction	- Revised ordinance for Cost Reimbursement Program for Private Source I&I Reduction. - Received and processed 13 applications for reimbursement. - Secured \$50,000 annually for reimbursements. - Discovered and removed 24" sewer pipes adjacent to Hinkson Creek. - Removed two manholes and abandoned pipes - Eliminated 380 feet of leaking 12" VCP.
Private Common Collector Elimination (PCCE)	Initiated or completed approximately 24 PCCE projects
System Expansion	- Completed four sewer extension and upgrade projects - Completed Tupelo Larch relocation.

¹ <https://www.como.gov/utilities/sewer/sewer-imp/>

Category	Project / Program
Wet Weather Planning	- Developed a wastewater collection system model using InfoSWMM (transitioning to InfoWorks ICM) - Completed dry and wet weather calibration of the InfoSWMM software - Collected 3 months of flow data - Hired new Sewer Hydraulic Modeling Technician for managing model and obtaining InfoWorks ICM training
System Cleaning	- Purchased 3 Jet Trucks - Purchased CCTV truck 2,153,050 feet of sewer cleaned by City staff - Ace Pipe Cleaning cleaned 148,869 feet of sewer

Reducing wet weather sanitary sewer overflows (SSO) was one of the primary drivers for the City's Phase 1 IMP. Prior to finalizing Phase 1, the City had already made significant progress addressing overflows and building backups through a combination of operational improvements at the Wastewater Treatment Plant (WWTP) influent pump station, inflow and infiltration (I/I) reduction efforts, and capacity improvement projects. These improvements dramatically reduced surcharging and SSOs in the collection system upstream of the WWTP during the 2015-2017 timeframe. By implementing the Action Plan projects, the City has continued to make additional progress reducing SSOs and building backups throughout the system which improve water quality, increase public health and safety protections, and improve overall customer service. Since 2017, the City has generally experienced less than five SSOs per 100 miles annually despite above average annual rainfall totals in some of those years. In fact, the City recorded zero wet weather SSOs or backups in four of the seven years since the Phase 1 IMP was established (Figure 1).

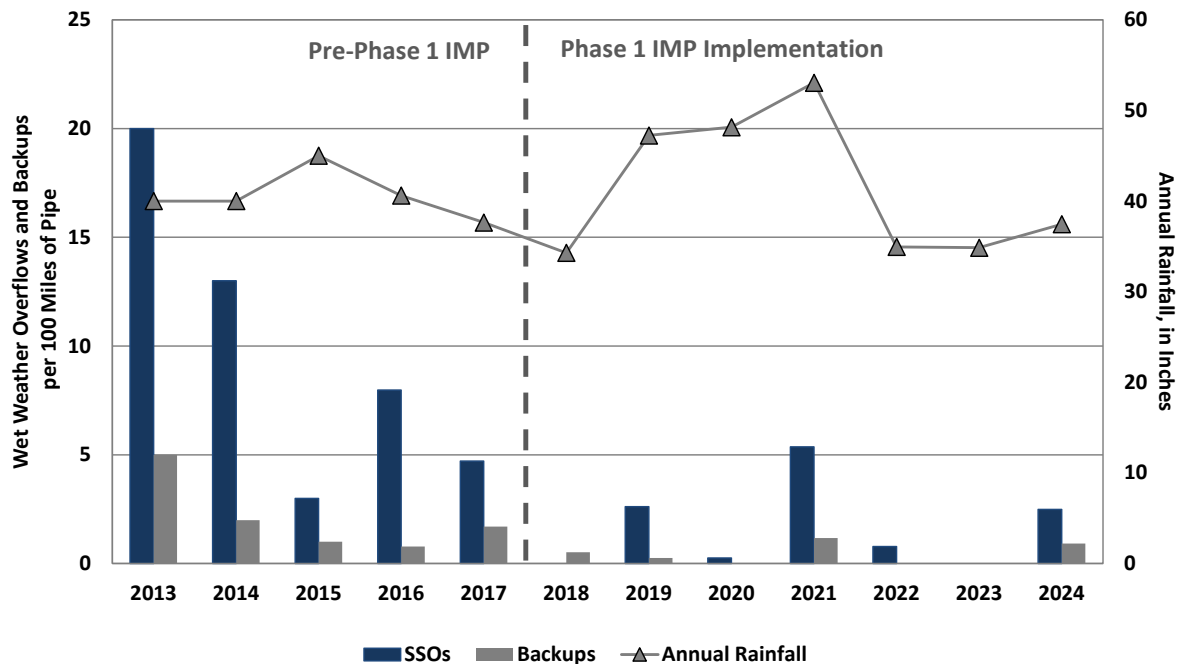


Figure 1. Wet Weather SSOs and Building Backups per 100 Miles since 2013.

Not only have the frequency of SSOs and building backups declined, but the density of SSOs has also declined city-wide since the Phase 1 IMP was completed and implemented (Figure 2). These results clearly indicate the reduction of SSOs throughout the community and highlight the SSO reductions that have occurred in the southwestern area of the City, specifically around the WWTP.

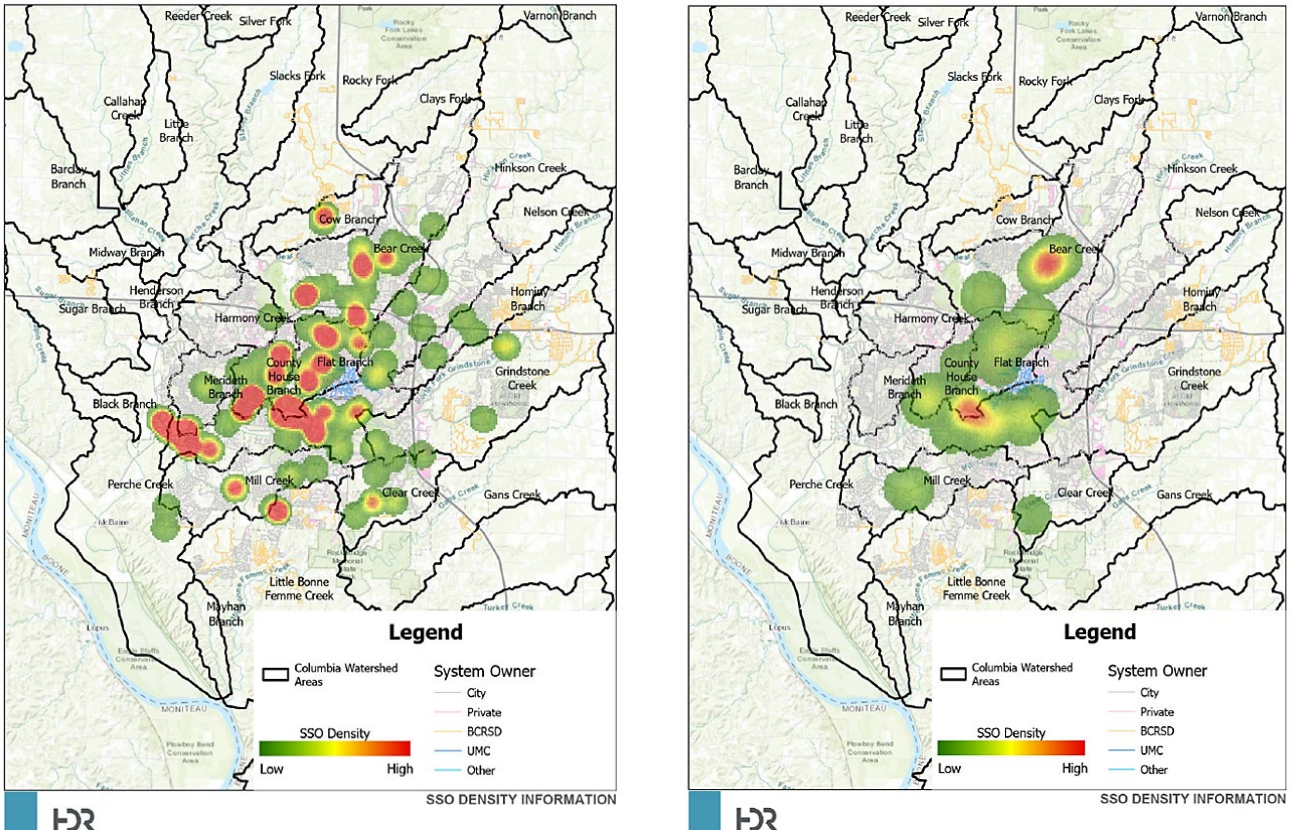


Figure 2. Pre-IMP (2007 – 2017) and Post IMP (2019 – 2024) SSO Density.

2.2 Phase 1 IMP Wastewater Treatment Accomplishments

Early action projects specific to the WWTP included those to improve wet weather capacity at the WWTP and influent pump station, rehabilitate the digester, and perform maintenance activities at the constructed wetlands complex. The City successfully achieved the objectives of the Phase 1 Action Plan through a series of capital and maintenance improvements in each of these systems (Table 3). Notably, the City improved the influent pump station and repurposed a sludge storage lagoon to add peak flow capacity. These improvements, combined with the collection system work discussed in the previous section, contributed to the successful reduction of SSOs in the system.

Table 3. Phase 1 IMP Wastewater Treatment Accomplishments.

Category	Project
Wet weather improvements	• Installed slide gate valve at the WWTP outlet box • Repurposed sludge storage lagoon to add peak flow capacity for inflow and infiltration • Installed SCADA and telemetry at pump stations
Digester rehabilitation	• Replaced roof and mixing equipment for digestors
Constructed wetlands maintenance	• Repaired the WTU 2 emergency berm due to June 2021 flooding. • Initiated conversations with Geotechnical engineers to discuss potential disturbance impacts during wetland maintenance. • Monitored constructed wetlands for E.coli removal.

2.3 Phase 1 Stormwater Management

In the Phase 1 IMP, the City determined that addressing runoff treatment into Hinkson Creek and stream erosion control, system renewal focusing on the aging corrugated metal pipes (CMP), flood reduction, MS4 program enhancements, and condition assessments were the high stormwater priorities. Many of the long-term stormwater management and system improvements identified in the 20-year plan were contingent on voter approval of a stormwater rate increase to raise revenues that would be required to implement the identified Phase 1 projects. Due to impacts of the COVID-19 pandemic and concerns associated with rate affordability during that time, the City deferred pursuing stormwater rate increases.

In the interim, the Action Plan primarily focused on enhancing the municipal separate storm sewer system (MS4) program, inspecting and addressing failing corrugated metal pipe (CMP), funding the Hinkson Creek stream gage, and developing a water quality monitoring program to help establish water quality baseline conditions and measure future improvements. The City successfully completed these Action Plan items (Table 4) as well as a number of other system inspection, renewal, and flood reduction improvements.

Table 4. Phase 1 IMP Stormwater Management Accomplishments.

Category	Project / Program
MS4 Program Enhancements	• Published 12 articles in various local media sources. • Published an education and outreach website. • Completed 114 illicit discharge investigations. • Completed 1,689 outfall inspections. • Inspected 706,500 feet of stormwater line for damage. • Worked with MS4 partners to update SWMP. • Implemented Annual MS4 meeting, for training City Staff. • CAM Chloride Report Completed.
System Renewal	• Repaired 96 storm structures. • Replaced 4,000 feet of storm pipe. • Addressed failing CMP and structures beyond physical effective life. • Completed the Greenwood South CMP replacement • Addressed the failing culverts at Leslie Lane • Enhanced stormwater conveyance at Capri Drive • Awarded \$796,446 ARPA funding for CMP pipe lining.
Condition Assessment	• CCTV inspected 192,290 feet of storm pipe • Executed a contract to perform CMP condition assessment and prioritize system renewal. • Completed condition assessment on 746 stormwater pipe locations. • Inspected 276 CMP of 36" or greater. • Completed condition assessment on "unknown" pipes. Evaluated 236 locations with 124 characterizations completed.
Flood Reduction	• Developed a ranking system. • Revised funding and CIP based on new ranking system. • Completed design and construction on Hickman & 6th. • Completed design and construction on Quail Drive. • Completed swale modification and storm pipe replacement at Bray and Longwell • Completed design and construction on Ross St. • Completed box culvert replacements at Garth/Oak Tower and Hirth Ave • Applied for and awarded \$619,660 in ARPA funds, began Nebraska Ave. stormwater improvements.
Runoff Treatment	• Developed a ranking system for runoff projects. • Evaluated projects and revised CIP based on ranking system. • Completed Hinkson Creek Synoptic Sampling • Completed USGS Chemical Analysis • Applied for and received \$2,219,928 in ARPA funding for Calvert Drive stormwater improvement • Completed chloride study
Stream Erosion Control	• Constructed the upper Merideth Sewer Relocation and Stream Stabilization Project. • Completed construction of Hinkson Creek Bank Stabilization at Clear Creek Force Main. • Completed Flood Study for Mill Creek. Begun continued monitoring for Mill Creek stream erosion.
Planning and Program Support	• Completed Cost of Service Study. • Contracted to develop a water quality monitoring plan. • Renewed funding for Hinkson Creek flow gage. • Developed Water Quality Monitoring Plan

3. Regulatory Review

New and evolving federal and state Clean Water Act (CWA) policies and regulations are one of the drivers for the City's wastewater and stormwater management needs. An overview of these regulatory drivers is presented in this section. Items identified in this section are based on the City's current understanding of the magnitude and timing of known regulatory drivers. During future phases of the IMP, it may be necessary to reprioritize projects and implementation schedules based on new or changing regulations as they are developed and implemented at the state or federal level.

3.1 *Waterbody Impairments*

There are approximately 300 miles of streams and more than 100 public and private lakes within the 200 square miles of watersheds that adjoin or intersect the City. The number of streams and lakes in Columbia listed on the 303(d) list has not changed since Phase 1 IMP (Table 5). The most common impairment in the Columbia area continues to be whole-body contact recreation or swimming. These recreational impairments are related to high bacteria levels that may pose health risks to users.

Table 5. Current Waterbody Impairments (based on 2022 303(d) list).

Waterbody	Impaired Designated Beneficial Use	Impairment Source	Pollutant	TMDL Status
Hinkson Creek	Swimming and Wading	Nonpoint and Urban Runoff	Escherichia coli	Not Developed
Hinkson Creek	Aquatic Life Support	Nonpoint and Urban Runoff	Unknown	Approved TMDL & CAM Initiated
Hominy Branch	Swimming and Wading	Nonpoint and Urban Runoff	Escherichia coli	Not Developed
Grindstone Creek	Swimming and Wading	Nonpoint and Urban Runoff	Escherichia coli	Not Developed
Little Bonne Femme Creek	Swimming and Wading	Unknown	Escherichia coli	Not Developed
Perry Phillips Lake	Human Health Protection	Atmospheric Deposition	Mercury	Not Developed
Lake of the Woods	Human Health	Atmospheric Deposition	Mercury	Not Developed

3.2 *NPDES Permits*

Under the CWA, one of the primary mechanisms to protect or improve surface water quality is to limit or prohibit discharges of contaminants with an NPDES permit. The CWA authorizes the MDNR to set limits or prohibit discharges of pollutants through technology-based effluent limitations and standards and through water quality-based effluent limitations established through water quality standards and criteria. The City has an NPDES permit and an MS4 permit, both of which are described below.

3.2.1 **Columbia WWTP**

The Columbia WWTP consists of a mechanical treatment plant followed by a series of four treatment wetland units that provide additional treatment. The treatment wetlands are a unique feature that use natural physical, biological, and chemical processes to remove a wide array of pollutants, including organics, nutrients, ammonia, metals, and bacteria. The treated effluent from the wetlands units is pumped to the Missouri Department of Conservation's (MDC) Eagle Bluff Conservation Area to support Eagle Bluff's wetland area as its primary water source.

The permit for the Columbia WWTP (Permit No. MO0097837), effective on July 1, 2020, authorizes the discharge of domestic effluent to be pumped from the wetlands pump station to the Eagle Bluffs Conservation Area wetland (Outfall #001). The facility has a design flow of 25.2 million gallons per day (MGD) and a design biosolids production of 3,948 dry tons per year. Biosolids generated at the Columbia WWTP are land-applied, landfilled, or hauled to a permitted sludge/biosolids disposal facility. There are a total of four permitted emergency discharge outfalls for flood relief located in Treatment Wetland Unit 1 (#005) and Treatment Wetland Unit 3 (#006, #007, #008).

Discharge monitoring report (DMR) data were compiled for the July 2020 through May 2024 period of record. This period of record corresponds with the issuance of the existing NPDES permit. Over this period, there were seven permit limit exceedances (Table 6) related to total suspended solids. Exceedances of TSS are likely due to large numbers of waterfowl on the constructed treatment wetlands and neighboring Eagle Bluffs wetlands. These birds agitate sediments in the wetlands, causing elevated TSS concentrations that occasionally exceed permitted TSS limits. During months with TSS excursions, MDNR requires the City to submit documentation of heavy waterfowl use. With this documentation submitted, the City is in compliance with permit limits and conditions. There were no other permit limit exceedances during the period of record.

Table 6. WWTP Permit Compliance (July 2020 – May 2024).

Parameter	Units	Averaging Period	Limit	Monthly Results		Exceedances
				Avg	Max	
Biochemical Oxygen Demand (BOD ₅)	mg/L	Monthly	30	8.1	17.6	0
		Weekly	45	11.1	27.4	0
Total Suspended Solids (TSS)	mg/L	Monthly	30	14	40	3 ¹
		Weekly	45	23	60	4 ²
Ammonia Nitrogen ³	mg/L	Daily	12.1	1.5	6.4	0
Oil & Grease	mg/L	Monthly	10	5.3	9.6	0
		Daily	15	5.3	9.6	0
pH	S.U.	Discrete	6.0 (min)	7.4	6.4	0
		Discrete	9.0 (max)	7.7	8.4	0

1. Exceeded the Average Monthly Limit (AML) in July 2021, August 2021, and May 2023.
2. Exceeded the Weekly Average Limit in July 2021, August 2021, September 2021, and May 2023.
3. The ammonia nitrogen limit became effective July 1, 2021; therefore, data evaluated for ammonia nitrogen are from the period of record July 2021 through May 2024.

3.2.2 Columbia Phase II MS4 (Permit No. MO-0136557)

The City, Boone County (County), and the University of Missouri (MU) are permitted together as co-permittees under a Phase II MS4 permit (Permit No. MO-0136557) issued by the MDNR. The three entities are collectively responsible for compliance with their MS4 permit. The most recent permit issued was effective on July 1, 2020, with an expiration date of June 30, 2025. Federal (40 CFR 122.34) and state (10 CSR 20-6.200(5)(A)1-6)) regulations stipulate that MS4 permits include provisions for developing, implementing, and enforcing a stormwater management program and plan (SWMP) to reduce pollutant discharges to the maximum extent practicable (MEP).

The City's ability to fulfill its commitments to the other co-permittees and maintain compliance with the requirements of the MS4 permit is an important consideration for the Phase 2 IMP. The following summarizes an assessment of the co-permittee's compliance with the MS4 permit requirements, the SWMP, the Collaborative Adaptive Management (CAM) Implementation Schedule and Agreement for Hinkson Creek TMDL, dated March 2012, and the recent MS4 Phase II Stormwater Annual Reports. Additional information about the City's Stormwater Program was also obtained from the City's website.

In fulfilling MS4 permit requirements, the City, County, and MU revised the SWMP in March 2022, and MDNR approved the revised SWMP in April 2022. The co-permittees' MS4 Phase II Stormwater Annual Reports, available for years 2020 (year 1 of the current MS4 permit) through 2023 (year 4 of the current MS4 permit) include best management practices (BMPs) the City implemented to achieve measurable goals addressing the MS4 permit's six minimum control measures (MCMs). BMPs implemented by the City are summarized below.

The City completed or continued to implement the following BMPs for MCM 1, Public Education and Outreach:

- Maintained a list of all K-12 public and private schools, in collaboration with the County.
- Held several stormwater-related events to engage with the public, including visits to local schools.
- Published stormwater-related articles in the City Source Newsletter.
- Installed City storm drain markers and tracked and repaired City watershed signs as applicable.

The City completed or continued to implement the following BMPs for MCM 2, Public Involvement and Participation:

- Solicited public comment during revision and approval of the SWMP in 2022.
- Progressed in implementing Columbia's Climate Action and Adaptation Plan (CAAP), including development of an Erosion and Sediment Control Guide.
- Progressed in IMP goals, including (1) annual City MS4 meetings, (2) assessment of 746 corrugated metal pipes (CMP) locations to prioritize Capital Improvement Plan (CIP) funding, and (3) development of a draft water quality monitoring plan.

The City completed or continued to implement the following BMPs for MCM 3, Illicit Discharge Detection and Elimination (IDDE):

- Maintained the City storm sewer map.
- Investigated and documented all IDDE complaints, including gathered information and how issues were resolved.
- Reviewed and discussed ordinances and regulatory mechanisms related to IDDE.
- Inspected approximately 20% of MS4 outfalls annually (aligned with the measurable goal).
- Disseminated brochures about IDDE that covered common topics such as pool discharges and yard waste disposal.

The City completed or continued to implement the following BMPs for MCM 4, Construction Site Runoff Control:

- Conducted several building and site inspections that included review of erosion and sediment control.
- Reviewed and discussed ordinances.
- Issued several land disturbance permits.
- Addressed all received complaints and concerns.

The City completed or continued to implement the following BMPs for MCM 5, Post-Construction Stormwater Management in New Development and Redevelopment:

- Added new private and City-owned BMPs to the City's database; confirmed receipt of self-inspection reports for private BMPs.
- Inspected all City-owned BMPs and performed maintenance on a majority of the BMPs; created a budget for future BMP maintenance.

The City completed or continued to implement the following BMPs for MCM 6, Pollution Prevention and Good Housekeeping for Municipal Operations:

- Conducted City employee training on Spill Prevention, Control, and Countermeasure (SPCC).
- Annually trained all City employees in stormwater pollution prevention and reduction.
- Reviewed and discussed each City department's SPCC plan.

With respect to the CAM for the Hinkson Creek TMDL, the City actively participated in monthly meetings as part of the Action Team. In 2020, the City provided funding for the Hinkson Creek stream gage at South Providence Road in cooperation with the USGS Missouri Water Science Center, and the City continued funding the gage in the following years. The Hinkson Creek Bank Stabilization Project at the Clear Creek Force Main was completed in 2022. Additionally, the City gave tours of the City's 3M Hinkson/Flat Branch Wetland outdoor classroom to different groups.

3.3 Criteria Updates

Water quality criteria are expressed as constituent concentrations, levels, or narrative statements, and are designed to be protective of a designated use. The CWA requires that EPA periodically review and update criteria recommendations based on the latest scientific information. Additionally, the CWA requires states to conduct a triennial review of their water quality standards based on EPA's latest criteria recommendations. This is called a triennial review period.

MDNR initiated its most recent triennial review in early 2023. This triennial review initially included updates to seven water quality standards including 304(a) human health criteria, ammonia, aluminum, bacteria, cadmium, cobalt, and selenium. Through robust stakeholder engagement, the Department decided to exclude rulemaking on cadmium, cobalt, selenium, and human health criteria this triennial review, while indicating intent to update fish consumption and water ingestion rates during this triennial review (anticipated to impact human health criteria in the future). The Department has released pre-draft rulemaking language for ammonia, while continuing to consider bacteria (*E. coli*).

3.3.1 Ammonia

In 2013, EPA finalized new water quality criteria recommendations based on new toxicity data demonstrating that some organisms, particularly some species of gill-breathing snails and freshwater mussels, are more sensitive to ammonia than other organisms in the national toxicity dataset used in the previous recommendations. MDNR is considering updating the state's existing ammonia criteria based on EPA's 2013 recommendations. Based on MDNR's default pH and temperature assumptions for the Interior River Valleys and Hills ecoregion, ammonia criteria would become more stringent if adopted (Figure 3). It is anticipated that MDNR will adopt the recommended criteria within the next five years.

Columbia's permit is unique due to its effluent discharges to Eagle Bluffs Conservation Area (EBCA) wetlands. The permit issued in 2020 only considers the acute toxicity of ammonia and was issued with a maximum daily limit (MDL) of 12.1 mg/L. No average monthly limit was established. It is assumed that MDNR will continue to use the current approach through the next permit cycle. Figure 3 below details the

current MDL compared to the forecasted MDL based on EPA's 2013 recommended ammonia criteria for acute toxicity. However, it is currently unclear whether the new criteria would apply to the EBCA wetlands due to the anticipated lack of mussels and snails in the area.

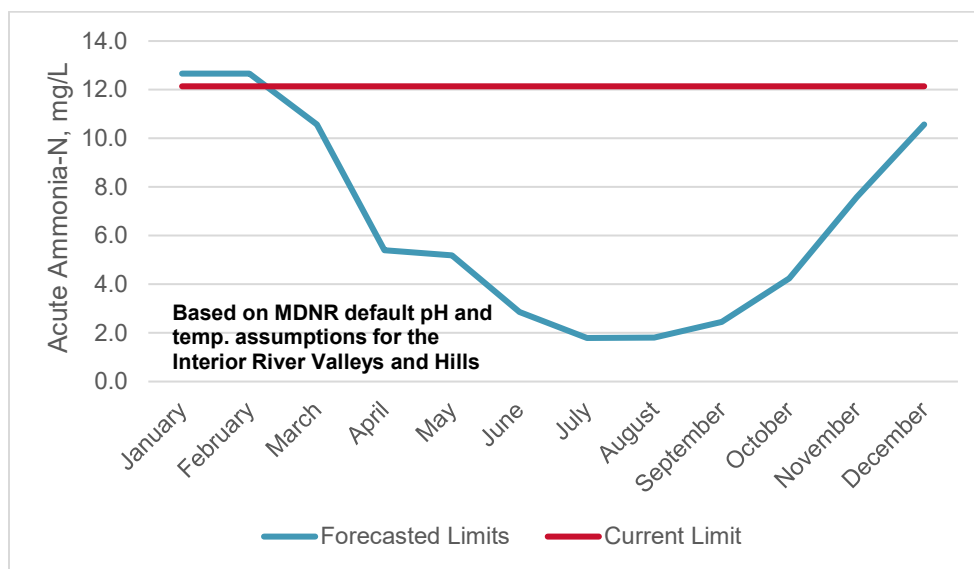


Figure 3. Current vs. Forecasted EPA Ammonia Maximum Daily Limits.

3.3.2 *E. coli*

Missouri currently has *E. coli* criteria for tiered recreational uses based on EPA's 1986 recommended water quality criteria for bacteria. The current NPDES permit requires monitoring only at Outfall #001 as the discharge does not cause an exceedance of Missouri's Water Quality Standards for Secondary Contact Recreation as a recreation season geometric mean. Additionally, the designated use of Secondary Contact Recreation in the Eagle Bluff Conservation Area wetlands has not been affected due to the ongoing use of the public wetlands.

In 2012, EPA revised its bacteria criteria recommendations for recreational waters based on updated research. Significant changes to the *E. coli* criteria recommendations include the following:

- **Magnitude** – The revised recommendations no longer include tiered recreational uses, and effectively apply an *E. coli* criterion of 126 cfu/100 mL to all waters;
- **Statistical Threshold Value (STV)** – Updates include recommendations for use of a STV of 410 cfu/100 mL to be used in conjunction with the recommended geometric mean; and
- **Duration and Frequency** – The duration of the geometric mean averaging period was reduced from the entire recreational season to a 30-day interval. Additionally, there should not be greater than a ten percent excursion frequency of the selected STV magnitude in the same 30-day interval.

For planning purposes, the IMP assumes MDNR will adopt EPA's 2012 recommendations into rule within the 20-year planning period. If adopted, average monthly *E. coli* limits at the Columbia WWTP would likely be permitted at 126 cfu/100 mL with potential average weekly *E. coli* limits implemented to the STV value of 410 cfu/100 mL.

3.4 Nutrient Effluent Regulations

The state recently adopted total phosphorus (TP) removal requirements within the State's Effluent Regulations, 10 CSR 20-7.015(9)(B)2.A. The rule establishes that TP reductions shall be implemented as follows:

- TP target level of 1 mg/L, as an annual average; or
- TP annual mass loading target level equal to 1 mg/L based on the design flow. Combined sewer systems may request alternate considerations or calculations, if approved in an operating permit; or
- An overall reduction of TP from influent to effluent by 75% based on a one-time calculation of two years of representative monitoring or process influent and effluent data; or
- An overall reduction of annual load of TP discharged by 75% based on a one-time calculation of adequately representative effluent data; and
- The assessment of compliance with these levels will be based on actual flows annually, but monthly monitoring and reporting of the rolling annual average will be conducted.

The rule requires domestic point sources greater than 15 MGD, which includes the Columbia WWTP, to achieve TP reductions no later than January 1, 2029. However, 10 CSR 20 – 7.015(9)(B)2.D.(IV)(b) provides for alternative schedules to be requested based on an integrated plan. The City intends to use the IMP and annual progress reports to establish the schedule of compliance date for TP reductions to be met at the Columbia WWTP. There are currently no nitrogen removal requirements. For purposes of planning, total nitrogen (TN) limitations of 8 to 10 mg/L as an annual average should be anticipated within the next 10 to 20 years.

3.5 PFAS

In recent years, there has been heightened concern over Per- and Polyfluoroalkyl Substances (PFAS) due to its widespread use and persistence in the environment. In 2021, EPA released its strategic roadmap, detailing new research, regulatory and remedial steps it plans to take to address PFAS. As part of the roadmap, EPA is considering potentially developing surface water quality criteria for PFAS and is currently evaluating the risks of PFAS in biosolids.

At the time this Phase 2 IMP report was being developed, the industry anticipated that EPA would initiate a Publicly-Owned Treatment Works (POTW) Influent PFAS Study and National Sewage Sludge Survey (NSSS) in 2025, following two public comment periods on the Information Collection Request (ICR) held in 2024. EPA's anticipated schedule and series of actions as understood at the time is outlined below. As of January 2026, when this report was finalized, EPA had not yet finalized their PFAS strategy.

EPA intends to use data collected to identify and quantify PFAS sources, prioritize industries for regulation, and establish an updated sewage sludge dataset. The ICR is currently with the Office of Management and Budget (OMB) for review. Upon initiation of the study, the City will be sent a required questionnaire, as a POTW with a design flow greater than 10 MGD and may be selected as part of a subset of POTWs required to conduct PFAS sampling. For the selected POTWs, the study is anticipated to include sampling of industrial user effluent, domestic wastewater, POTW influent, POTW effluent, and POTW sewage sludge.

The following timeframes associated with the studies are preliminary and remain subject to finalization following OMB review:

- The questionnaire was tentatively slated to be sent to POTWs in early 2025 but has not yet been provided
- EPA will select POTWs from the questionnaire respondents for PFAS sampling. POTWs selected for sampling will be placed in four groups with distinct, staggered windows for sampling, in consideration of laboratory capacity for PFAS analysis.
- Sampling was tentatively scheduled to start in spring or summer 2025 and extend into mid-2026. These dates will be modified to align with the new sampling approach.
- Biosolids sampling is tentatively scheduled to start in mid-2026. These dates will be modified to align with the new sampling approach.

MDNR has also taken steps to initiate PFAS regulation and permit discussions. During their November 2024 Water Protection Forum, MDNR released a draft eight-step PFAS roadmap for Missouri and noted their intent to continue discussions with stakeholders. The draft steps with proposed implementation dates are as follows:

1. Voluntary PFAS Monitoring of Industrial Sources – Established in 2022, provides special condition language to be incorporated into an NPDES permit for POTWs that volunteer to require sampling.
2. Industrial Land Application Rule – Effective 2025, the rule will require industrial land applicators to sample the material to be land applied, and the soil if PFAS is detected in material.
3. Sampling, Evaluation, and Monitoring – Proposed discussions begin Spring 2026. MDNR recommends Step 3 should include an evaluation of potential PFAS sources, sampling of industrial contributors, and PFAS influent and effluent sampling.
4. Protection of Drinking Water and Groundwater Supply – Proposed discussions begin 2025 – 2026. MDNR will review the PFAS MCLs for incorporation into Water Quality Standards for the protection of drinking water and groundwater supply.
5. Biosolids Federal Requirement – Proposed discussions begin in 2028. MDNR will review EPA's Biosolids Risk Assessment prior to further discussion.
6. Aquatic Life Criteria – Proposed discussions begin in 2028. EPA adopted aquatic life criteria in 2024. MDNR will assess the criteria for adoption during the next triennial review.
7. Human Health Criteria – Proposed discussions begin 2029 – EPA has not released Human Health Criteria but is expected to late 2024 or early 2025.
8. Permit requirements for Monitoring and Assessment – Proposed 2035. MDNR proposes 2035 for the implementation of adopted criteria. This would include permitted effluent limits, assessment of waterbodies, and likely special or standard conditions limiting PFAS compounds from entering waterbodies.

In early 2025, MDNR confirmed that they do not plan to implement any of the Missouri roadmap activities unless they are needed to maintain consistency with federal legislative or regulatory requirements. As PFAS policies and tools continue to take shape in the coming months and years, the regulatory implications for the City will become clearer. While it may take years to finalize PFAS policies and regulations due to various complexities and challenges, the City may face several implications related to biosolids, water quality standards, and permitting and pretreatment. The potential impacts are discussed below.

3.5.1 Biosolids

Potential PFAS policies and regulations could significantly impact the City's ability to dispose of its biosolids. In February 2024, EPA proposed designating nine PFAS substances (PFOA, PFOS, PFBS, PFHxS, PFNA, GenX, PFBA, PFHxA, and PFDA) as hazardous substances under the Resource Conservation and Recovery Act (RCRA). In April 2024, EPA finalized designating two PFAS substances (PFOS and PFOA) as hazardous substances under the Comprehensive Environmental Response,

Compensation, and Liability Act (CERCLA, or Superfund). Additionally, EPA is actively studying the health risks associated with PFAS in sewage sludge and published their Draft Risk Assessment for PFAS in Biosolids in January 2025. Further EPA has indicated that they may require POTW biosolids sampling potentially in 2026 as part of EPA's POTW Influent PFAS Study/NSSS. As EPA continues to study the issue, some states have enacted their own policies and restrictions with respect to PFAS and biosolids. MDNR intends to review other state approaches and guidance relative to the management of PFAS in biosolids and begin stakeholder discussion over the next several years.

3.5.2 Water Quality Standards

In 2024, EPA finalized the recommended aquatic life criteria based on a critical review of PFOA and PFOS toxicity data and their effects on aquatic life. Table 7 provides a summary of the criteria components. The EPA derived the criteria recommendations using available data on the toxicological effects of PFOA and PFOS on aquatic life with chronic criteria expressed as tissue-based concentrations to protect aquatic life from PFOA or PFOS bioaccumulation.

Table 7. Final Recommended Freshwater Aquatic Life Water Quality for PFOA and PFOS.

Criteria Component	Acute Water Column (mg/L)	Chronic Water Column (mg/L)	Invertebrate Whole-Body (mg/kg ww ¹)	Fish Whole-Body (mg/kg ww ¹)	Fish Muscle (mg/kg ww ¹)
PFOA Magnitude	3.1	0.10	1.18	6.49	0.133
PFOS Magnitude	0.071	0.00025	0.028	0.201	0.087
Duration	1-hour average	4-day average	Instantaneous	Instantaneous	Instantaneous
Frequency	Not to be exceeded more than once in three years, on average	Not to be exceeded more than once in three years, on average	Not to be exceeded	Not to be exceeded	Not to be exceeded

1. ww – wet weight

The human health criteria will consider drinking water, fish consumption, and a bioaccumulation factor. Based on EPA's recent PFAS Roadmap publications, the human health criteria are anticipated to be significantly more stringent than the recommended aquatic life criteria. In addition to the anticipated human health PFAS criteria, EPA finalized their National Primary Drinking Water Regulation to establish legally enforceable levels, called Maximum Contaminant Levels (MCLs), for six PFAS compounds in drinking water – PFOA and PFOS as individual contaminants, and PFHxS, PFNA, PFBA, and HFPO-DA as a PFAS mixture (Table 8). The MCLs could contribute to the development of the human health criteria as the criteria can be adopted as organism only or organism plus water, and are therefore included within this report.

Table 8. EPA's Final National Primary Drinking Water Regulation (NPDWR) for six PFAS.

Compound	Final Maximum Contaminant Level Goal (MCLG)	Final Maximum Contaminant Level (MCL)
PFOA	0	4 ppt (ng/L)
PFOS	0	4 ppt (ng/L)
PFHxS	10 ppt	10 ppt
PFNA	10 ppt	10 ppt
HFPO-DA Gen X Chemicals	10 ppt	10 ppt
Mixture of two or more PFHxS, PFNA, HFPO-DA, PFBS	1 (unitless, hazardous index)	1 (unitless, hazardous index)

The ambient aquatic life and human health criteria for PFAS could have NPDES-permitting implications for the City. Depending on how PFAS policies and regulations evolve, water quality-based effluent limits may be very low and will likely be below the approved analytical laboratory method's detection levels. Compliance with very low levels of PFAS effluent limits will be a challenge for most domestic wastewater treatment plants and may result in the need for costly treatment plant upgrades. Currently, it is unclear how

state and federal regulators will resolve such complex and challenging issues, but pragmatic solutions will likely revolve around industrial pretreatment and source control.

3.5.3 Permitting and Pretreatment

While PFAS effluent limits could be a requirement in the future, the current priority of EPA and Missouri is to use the NPDES permitting mechanism to voluntarily encourage monitoring, identification, and characterization of PFAS sources. In December 2022, EPA issued a memorandum addressing PFAS discharges in NPDES permits through the pretreatment program and monitoring programs. Recommendations in the memorandum reflect EPA's commitment in the PFAS Strategic Roadmap to leverage NPDES permits to reduce PFAS discharges to waterways "at the source and obtain more comprehensive information through monitoring on the sources of PFAS and quantify PFAS discharged by these sources."

In line with the proposed approach and Step 1 of Missouri's PFAS Roadmap, POTWs can voluntarily request that MDNR include specific language within their NPDES permits requiring them to monitor, identify, and characterize industrial sources of PFAS. Step 3 of Missouri's PFAS Roadmap will apply industrial source monitoring and assessment to all Missouri NPDES permit holders, requiring the City to take several actions, including (1) characterizing PFAS loadings from priority potential sources, (2) reducing or eliminating PFAS loadings from those sources, and (3) making necessary adjustments to their approach based on the findings.

3.6 Current and Projected Effluent Limitations

Effluent limitations within approximately the next 20 years were projected for the Columbia WWTP (Table 9). The projections are based on previously discussed anticipated criteria and effluent regulation revisions.

Table 9. City of Columbia's WTP Current and Project Effluent Limits.

Parameter	Units	Current Limits			Projected Limits ¹			Estimated Timing
		Daily Maximum	Weekly Average	Monthly Average	Daily Maximum	Weekly Average	Monthly Average	
BOD ₅	mg/L	--	45	30	--	45	30	Currently applicable
TSS	mg/L	--	45	30	--	45	30	Currently applicable
E. coli	cfu/100mL	--	Monitoring only	Monitoring Only	--	410	126	2030 - 2035
Ammonia (Jan)	mg/L	12.1	--	--	12.7	--	--	2030 - 2035
Ammonia (Feb)	mg/L	12.1	--	--	12.7	--	--	2030 - 2035
Ammonia (Mar)	mg/L	12.1	--	--	10.6	--	--	2030 - 2035
Ammonia (Apr)	mg/L	12.1	--	--	5.4	--	--	2030 - 2035
Ammonia (May)	mg/L	12.1	--	--	5.2	--	--	2030 - 2035
Ammonia (Jun)	mg/L	12.1	--	--	2.9	--	--	2030 - 2035
Ammonia (Jul)	mg/L	12.1	--	--	1.8	--	--	2030 - 2035
Ammonia (Aug)	mg/L	12.1	--	--	1.8	--	--	2030 - 2035
Ammonia (Sept)	mg/L	12.1	--	--	1.8	--	--	2030 - 2035
Ammonia (Oct)	mg/L	12.1	--	--	2.5	--	--	2030 - 2035
Ammonia (Nov)	mg/L	12.1	--	--	4.2	--	--	2030 - 2035
Ammonia (Dec)	mg/L	12.1	--	--	7.6	--	--	2030 - 2035
pH	SU	Min = 6.0, Max = 9.0			Min = 6.0, Max = 9.0			Currently applicable
Oil & Grease	mg/L	15	--	10	15	--	10	Currently applicable
TP (Option 1)	mg/L	Monitoring only			Annual average = 1.0			Jan. 1, 2029 ²
TN	mg/L	Monitoring only			Annual average = 8 - 10			2035 - 2040

1. Projected ammonia limits are based on default pH and temperature assumptions for the Interior River Valleys and Hills ecoregion. Projected limits were capped to match current limits to comply with anti-backsliding.
2. The rule allows for alternative implementation schedules based on the schedule provided within an integrated plan.

4. System Needs and Solutions

During the Phase 1 IMP, the City spent considerable time and resources comprehensively characterizing system needs and identifying wastewater treatment, collection, and stormwater management improvement solutions to meet those needs over the 20-year IMP planning period (Table 10). Cost estimates were developed for each project category to quantify the investments and resources needed **in addition to** those already expended by the Sewer and Storm Water Utilities. The planning level cost estimates included potential additional capital costs, operation and maintenance costs, and costs associated with necessary planning or data collection activities needed over the 20-year IMP planning period.

Table 10. Phase 1 IMP Wastewater and Stormwater Project Categories.

Wastewater Treatment	Wastewater Collection	Stormwater Management
• Wet Weather Improvements • Expanded Nitrification • Biological Nutrient Removal • Chemical Disinfection • Constructed Wetlands Maintenance • Digester Rehabilitation • Digester Capacity Improvements	• Wet Weather Program Planning • Asset Management • System Renewal • System Capacity • Reducing Building Backups • Private Common Collector Elimination • System Expansion • Cleaning Program • Pump Station Repair • Annual Sewer Improvements	• Stormwater Planning • System Assessment and Cleaning • System Renewal • Flood Control • Stream Erosion • Runoff Treatment to Improve Water Quality • Stormwater Management Program

Project categories and funding assumptions were refined during a series of workshops and then optimized to appropriately balance costs with community objectives over the 20-year IMP planning period. Community priorities were established through the Phase 1 outreach program and were used as the basis for ranking and scoring individual projects to quantify a community benefit score for each project. Using this approach, the City established an optimized suite of project alternatives that provide the greatest value to the community at the lowest cost.

By implementing the Action Plan projects and initiatives outlined in Section 2, the City has already made important progress towards addressing the system needs and delivering the community benefits outlined in Phase 1. However, many of the capital and programmatic solutions previously identified are characterized by routine or continuous actions that are intended to incrementally improve the systems over time. As such, the City is proposing to generally maintain the Phase 1 project categories, relative implementation schedules, and investment levels during Phase 2, with some modifications to address new system drivers and collect additional data that will be needed to more precisely forecast future improvements.

A summary of the Phase 2 treatment, collection, and stormwater management alternatives, assumptions, and cost estimates are included in the sections that follow. All cost estimates are provided in 2024 dollars.

4.1 Wastewater Treatment

On August 19, 2024, representatives from the City and HDR met at the WWTP to discuss current operations and identify projects for inclusion within the Phase 2 IMP. Discussion included addressing upcoming regulatory requirements such as disinfection, nutrient removal, and stricter ammonia limits, while also identifying strategies to enhance current operations, maintain efficient and effective treatment practices, and conduct studies to provide a comprehensive understanding of present and future operational demands.

The following projects and studies were cooperatively identified:

- Instrumentation and Control (I&C) Upgrades at the Influent Pump Station (IPS)
- Expanded Nitrification Expansion
- Biological Nutrient Removal Expansion
- Effluent Wetland Evaluation and Cleanout
- Digester Capacity Improvements
- Biosolids Master Plan
- Sludge Dewatering and Thickening Equipment Replacement
- Implementation of Disinfection
- Facility Repair and Replacement (R&R)
- PFAS Influent Sampling
- Peak Flow Storage Standard Operating Procedure (SOP)
- Facility and Energy Optimization Studies
- Dual Fuel Boiler System Upgrade

Planning level capital costs and operations and maintenance (O&M) costs, when applicable, were developed for these alternatives by updating estimates from the Phase 1 IMP, as well as using recent experience with similar projects in the region. HDR met with City staff on November 22, 2024, to review and confirm information and assumptions used to formulate the final alternatives presented within this section. Details regarding each of the alternatives, relevant assumptions, and estimated capital and O&M costs are presented in the sections that follow. Implementation and scheduling for these projects is discussed in more detail in Section 6 and presented in Table A.1.

4.1.1 Instrumentation and Control Upgrades at the Influent Pump Station

The City is planning to implement instrumentation and control upgrades to replace outdated equipment and improve operations and performance of the IPS. The City has allocated \$3,000,000 for this project. An independent estimate was not developed for the purposes of the IMP.

4.1.2 Nitrification Expansion

In 2013, the WWTP was upgraded to meet an average monthly ammonia effluent limit of 6.0 mg/L at a design flow of 25.2 MGD. This was achieved by combining partially nitrified effluent from Trains 1 and 2 with fully nitrified effluent from Trains 3 and 4. Trains 1 and 2, designed during the 2009 Phase 1 Improvements project, are each rated for 6.3 MGD of biochemical oxygen demand treatment and 2.2 MGD for nitrification. Trains 3 and 4, also built during Phase 1, are each rated for 6.3 MGD of nitrification and denitrification.

At the current flows, the system produces high-quality effluent with ammonia concentrations typically below 1.0 mg/L. This performance is expected up to flow rates of approximately 17 MGD, with potential for further optimization to increase capacity. As flows increase, ammonia effluent concentrations will rise, and future regulatory changes may reduce limits. MDNR has indicated the potential for a 30% reduction in the current

maximum daily limit. Additionally, MDNR is considering adopting stricter ammonia criteria proposed by the EPA in 2013 to protect freshwater mussels and snails, which could reduce the limit by 80%.

To meet stricter limits and increased flows beyond 17 MGD, additional nitrification capacity will be required. This would involve constructing two new activated sludge treatment trains (Trains 5 and 6) with supporting infrastructure, including primary clarifiers, aeration basins, final clarifiers, and upgraded blower systems. Foundations for these structures would require auger cast piles due to soil conditions. Adding these trains would increase the plant's nitrification capacity to 29.6 MGD annual average flow, ensuring compliance with future ammonia limits and flow demands.

Costs for this project were developed during the Phase 1 IMP and were adjusted to 2024 dollars utilizing the Engineer-News Record (ENR) Construction Cost Index (CCI) for capital improvements and 3% annually for O&M (Table 11). The total capital cost for this project is \$80,580,000 and annual O&M is \$820,000.

Table 11. Nitrification Expansion OPCC.

Item Description	2016 Dollars ¹	2024 Dollars
Primary Clarifiers	\$2,306,200	\$4,074,990
New Aeration Basin	\$4,792,700	\$8,468,566
Final Clarifiers	\$2,660,600	\$4,701,205
RAS/WAS Pump Station	\$1,200,000	\$2,120,366
Primary Sludge Pump Station (Train 3)	\$704,900	\$1,245,538
Primary Sludge Pump Station (Train 4)	\$260,600	\$460,473
Blower Replacement	\$846,800	\$1,496,272
Piles	\$3,274,300	\$5,785,596
Electrical and I&C	\$3,209,300	\$5,670,743
Mechanical	\$1,123,300	\$1,984,839
Sitework	\$2,407,000	\$4,253,101
Subtotal		\$40,261,690
Mobilization	5%	\$2,013,084
Overhead and Profit	15%	\$6,341,216
Bonds and Insurance	2%	\$972,320
Contingency	30%	\$14,876,493
Legal, Admin, and Engineering	25%	\$16,116,201
Grand Total		\$80,581,004
Grand Total (Rounded)		\$80,580,000

Notes:

1. Costs escalated from the 2018 Columbia IMP utilizing Engineering News-Record (ENR) Construction Cost Index (CCI).

4.1.3 Biological Nutrient Removal Expansion

Currently, the WWTP is neither required nor designed to remove nutrients. However, some reduction of total nitrogen (TN) and TP occurs within the WTUs and EBCA wetlands before the effluent is discharged into the Missouri River. As described in Section 2, MDNR recently adopted a rule that requires domestic point sources greater than 15 MGD to achieve TP reductions no later than January 1, 2029, but that requirement and schedule can be modified based on the result of an integrated plan. Given the City's unique

discharge location to the EBCA, the City does not anticipate that they will be required to achieve TP reductions by 2029. Instead, the City intends to first perform an optimization study to evaluate the level of reduction that can be achieved with the current system. For planning purposes however, the Phase 2 IMP assumes that improvements may be needed for both TP and TN reductions in the future.

Modifications to Trains 3 and 4, along with future Trains 5 and 6, will expand nitrification capacity to meet potential BNR requirements. These requirements are assumed to be <1 mg/L ammonia as nitrogen, total 10 mg/L for nitrogen, and 1 mg/L for phosphorus. Trains 1 and 2 are excluded from these modifications. Implementing this alternative would provide a total BNR plant capacity of 25.2 MGD annual average. The following components are included with this project:

- New pre-anoxic, anaerobic, and anoxic zones to Trains 5 and 6.
- Adding pre-anoxic and anaerobic zones to Trains 3 and 4.
- Modifying existing gravity thickeners for use as fermenters.
- New polymer tote system for waste-activated sludge centrifuges in an existing building.
- Construction of a new facility for chemical phosphorus removal.
- Miscellaneous improvements to site piping, electrical, I&C, mechanical, and site civil.

Costs for this project were developed during the Phase 1 IMP and were adjusted to 2024 dollars utilizing the CCI for capital improvements and 3% annually for O&M (Table 12). The total capital for this project is \$30,790,000 and annual O&M is \$248,496.

Table 12. Biological Nutrient Removal Expansion OPCC.

Item Description	2016 Estimate ¹	2024 Estimate
New Anaerobic/Pre-anoxic Zones	\$4,007,300	\$7,080,786
Site Piping	\$90,000	\$159,027
New Anoxic Zones for Trains 5 & 6	\$1,516,800	\$2,680,143
Chemical Feed System (Polymer)	\$97,000	\$171,396
Chemical Feed System (Ferric)	-	\$1,053,591
Electrical and I&C	\$1,142,300	\$2,018,412
Mechanical	\$399,800	\$706,435
Sitework	\$856,700	\$1,513,765
Subtotal		\$15,383,555
Mobilization	5%	\$769,178
Overhead and Profit	15%	\$2,422,910
Bonds and Insurance	2%	\$371,513
Contingency	30%	\$5,684,147
Legal, Admin, and Engineering	25%	\$6,157,826
Grand Total		\$30,789,129
Grand Total (Rounded)		\$30,790,000

Notes:

1. Costs escalated from the 2018 Columbia IMP utilizing Engineering News-Record (ENR) Construction Cost Index (CCI).

4.1.4 Constructed Wetland Evaluation and Cleanout

The constructed Wetland Treatment Units (WTUs) play a critical role in providing additional treatment to the plant effluent before being discharge into Eagle Bluffs. The Phase 1 IMP established costs to remove accumulated sludge in WTU 1 and 4, as well as replace the earthen liner in WTU1, based on a 2008 solids accumulation study conducted by the City.

For this report, the Phase 1 data was extrapolated to 2024 to estimate the depth of existing sludge deposits. Results indicate an annual increase in sludge volume of approximately 5%, which equates to a total estimated sludge increase of approximately 35% between 2017 and 2024. The Phase 1 IMP also included costs for clearing existing vegetation (\$4,800 per WTU cell), removing and disposing of sludge (\$500 per dry ton), and replanting vegetation (\$24,000 per WTU cell).

Initially, Phase 1 IMP costs for this project were adjusted to 2024 dollars utilizing the CCI for capital improvements and then scaled up to account for the potential 35% increase in potential sludge volume accumulation (Table 13). The total capital estimate using this approach is \$73,220,000.

Table 13. Effluent Wetland Cleanout OPCC.

Item Description	2016 Dollars ¹	2024 Dollars
Cattail Removal	\$62,400	\$110,259
Sludge Removal ²	\$9,500,000	\$22,661,413
Lining Cost	\$7,504,000	\$13,259,356
Cattail Planting	\$312,000	\$551,295
Subtotal		\$36,582,324
Mobilization	5%	\$1,829,116
Overhead and Profit	15%	\$5,761,716
Bonds and Insurance	2%	\$883,463
Contingency	30%	\$13,516,986
Legal, Admin, and Engineering	25%	\$14,643,401
Grand Total		\$73,217,007
Grand Total (Rounded)		\$73,220,000

Notes:

1. Costs escalated from the 2018 Columbia IMP utilizing Engineering News-Record (ENR) Construction Cost Index (CCI).
2. A 35% adder has been included with sludge removal to account for an increase in sludge volume from the previous cost estimate.

Given the significant uncertainty regarding sludge volumes and liner conditions in the WTUs, the City chose to maintain the Phase 1 estimate of \$23,592,700 for the Phase 2 plan as a placeholder until anticipated improvement costs could be confirmed. Prior to undertaking the cleanout, liner, and planting project, the City intends to conduct a pre-design study to further analyze and quantify the wetlands' capacities, sludge quality, and overall functionality. This study is estimated at \$250,000. Cleanout and improvement estimates will be revised following completion of that study.

4.1.1 Digester Capacity Improvements

The City is planning to implement digester capacity improvements outlined in Phase 1 to accommodate additional organic loadings and increase digester performance. The City has allocated \$11,700,000 for this project. An independent estimate was not developed for the purposes of the IMP.

4.1.2 Biosolids Master Plan

During the August 19, 2024, site visit, WWTP staff expressed a desire to gain a better understanding of their biosolids process and develop plans for the future biosolids management. The study is expected to include the following activities:

- Background evaluation of the current system and future requirements;
 - Development of solids mass balance and process model
 - Interviews with WWTP staff
 - Regulatory evaluation
 - Biosolids market analysis
- Solids Handling Alternatives and Evaluation;
 - Technology identification and screening
 - Development of biosolids management scenarios
- Biogas Utilization Plan; and
- Development of Biosolids Master Plan.

The total cost for the biosolids master plan is estimated at \$350,000.

4.1.3 Sludge Dewatering and Thickening Equipment Replacement

The City desires to replace both the dewatering centrifuges and the waste-activated sludge (WAS) thickening centrifuges. This project may be modified in the future based on the results of the biosolids master planning study.

Dewatering Replacement

For dewatering, the City desires to replace the existing centrifuges with a screw press. A screw press provides several benefits over centrifuges for sludge dewatering:

- Energy Efficiency
 - Operating at lower speeds, screw presses consume less energy, reducing operational costs and supporting the City's energy reduction goals.
- Simplified Maintenance
 - With fewer moving parts, screw presses require less maintenance and experience reduced downtime, enhancing reliability.
- Improved Adaptability
 - Screw presses perform consistently across a wide range of sludge consistencies, making them well-suited for varying operational conditions.
- Potential Cost Savings
 - The system's lower polymer demand and reduced energy consumption contribute to overall cost efficiency.
- Compact Design
 - Screw presses require less space for installation, making them an ideal choice for facilities with spatial constraints.

WAS Thickening

The City currently employs centrifuges for thickening waste-activated sludge prior to digestion. Although the existing centrifuges remain operational, sourcing replacement parts has become increasingly challenging, leading to extended downtime that adversely impacts the continuous operation of the digesters. To enhance system resilience and maintain reliable operations, the City should replace the existing centrifuges with new thickening equipment.

The total estimated capital cost for the Sludge Dewatering and Thickening projects is \$14,510,000 (Table 14). These may choose to implement these as a single project or two successive projects, depending on the final Phase 2 IMP implementation schedule.

Table 14. Sludge Dewatering and Thickening Equipment Replacement OPCC.

Item Description	Quantity	Units	Unit Cost	Extension
Demolition				
Demo Existing System	1	LS	\$150,000	\$150,000
Process - Equipment				
<i>Sludge Dewatering</i>				
Sludge Dewatering Screw Press (2000 lb/hr)	3	EA	\$933,333	\$2,800,000
Polymer System	1	LS	\$100,000	\$100,000
Installation			30%	\$870,000
<i>Sludge Thickening</i>				
Sludge Thickening Centrifuges (2000 lb/hr)	2	EA	\$533,333	\$1,066,667
Installation			30%	\$320,000
Process - Piping/Valves/Gates				
Misc. Piping and Valves			10%	\$396,667
Electrical and I&C				
Electrical and I&C			30%	\$1,547,000
Subtotal				\$7,250,333
Mobilization			5%	\$362,517
Overhead and Profit			15%	\$1,141,928
Bonds and Insurance			2%	\$175,096
Contingency			30%	\$2,678,962
Legal, Admin, and Engineering			25%	\$2,902,209
Grand Total				\$14,511,044
Grand Total (Rounded)				\$14,510,000

4.1.4 Disinfection

The WWTP is not currently required or designed to perform disinfection because bacteria criteria are not applied to the effluent wetlands. As described in Section 3, the City assumes MDNR would consider adopting updated bacteria criteria during the 20-year planning period. If Missouri adopts the updated criteria, the WWTP may face stricter bacteria effluent limits.

To prepare, both ultraviolet (UV) and chlorine disinfection options were assessed. Chlorine disinfection offers several advantages over UV disinfection for the WWTP: it is more cost-effective, less operationally demanding, and more effective at inactivating bacteria and viruses. The proposed approach involves introducing chlorine into the mechanical plant effluent through the conveyance line to the WTUs, ensuring adequate chlorine contact time. It is assumed that chlorine residuals will naturally dissipate within the WTUs before discharge to Eagle Bluffs.

Costs for the UV disinfection project were developed during the Phase 1 IMP and were adjusted to 2024 dollars utilizing the CCI for capital improvements and 3% annually for O&M (Table 15). The total capital for UV disinfection is \$62,420,000 and annual O&M is \$109,244, both in 2024 dollars.

Table 15. UV Disinfection OPCC.

Item Description	2016 Dollars ¹	2024 Dollars
UV Disinfection Facility	\$5,356,900	\$9,465,491
UV Disinfection Equipment	\$2,140,300	\$3,781,850
Intermediate Pump Station	\$4,462,500	\$7,885,112
Intermediate Pump Station Equipment	\$1,438,700	\$2,542,142
Electrical and I&C	\$2,679,700	\$4,734,954
Mechanical	\$937,900	\$1,657,243
Sitework	\$635,000	\$1,122,027
Subtotal		\$31,188,819
Mobilization	5%	\$1,559,441
Overhead and Profit	15%	\$4,912,239
Bonds and Insurance	2%	\$753,210
Contingency	30%	\$11,524,113
Legal, Admin, and Engineering	25%	\$12,484,456
Grand Total		\$62,422,278
Grand Total (Rounded)		\$62,420,000

Notes:

1. Costs escalated from the 2018 Columbia IMP utilizing Engineering News-Record (ENR) Construction Cost Index (CCI).

As a disinfection alternative to UV Disinfection, costs for implementing disinfection via chemical disinfection were developed during the Phase 1 IMP and were adjusted to 2024 dollars utilizing the CCI for capital improvements and 3% annually for O&M (Table 16). The total capital for chemical disinfection is \$8,880,000 and annual O&M is \$376,014, both in 2024 dollars. For planning purposes, the Phase 2 IMP assumes chemical disinfection will be implemented.

Table 16. Chemical Disinfection OPCC.

Item Description	2016 Dollars ¹	2024 Dollars
Chlorination/De-Chlorination Facility	\$1,768,000	\$3,124,006
Electrical and I&C	\$353,600	\$624,801
Mechanical	\$123,800	\$218,751
Sitework	\$265,200	\$468,601
Subtotal		\$4,436,159
Mobilization	5%	\$221,808
Overhead and Profit	15%	\$698,695
Bonds and Insurance	2%	\$107,133
Contingency	30%	\$1,639,139
Legal, Admin, and Engineering	25%	\$1,775,734
Grand Total		\$8,878,668
Grand Total (Rounded)		\$8,880,000

Notes:

1. Costs escalated from the 2018 Columbia IMP utilizing Engineering News-Record (ENR) Construction Cost Index (CCI).

4.1.5 Facility Repair and Replacement

As the WWTP continues to age, City staff anticipate that routine facility repair and replacement projects will become more common. Over the last several years, the City has budgeted or spent approximately \$100,000 annually to serve these needs. The Phase 2 IMP assumes this is the minimum level of investment that will be needed going forward.

4.1.6 Peak Flow Storage Standard Operating Procedure

During the site visit on August 19, 2024, WWTP staff noted that the peak flow storage basins are infrequently utilized due to challenges in redirecting all stored flow back into the mechanical plant and the associated difficulties in cleaning the basins. Additionally, the City has observed significant improvements in managing wet weather events, largely attributed to successful efforts in mitigating I/I.

To optimize the use of the peak flow storage basins, the City should develop a peak flow storage standard operating procedure (SOP). This SOP will provide the City with a better understanding of the role of peak flow storage basins within the treatment process and provide detailed guidance on their operation during periods of necessity. The estimated cost for developing this SOP is \$100,000.

4.1.7 Dual Fuel Boiler System Upgrade

To deliver on the City's commitment to sustainability and energy reduction, replacing the existing natural gas boiler system for the anaerobic digesters with dual-fuel boilers was identified as a project. Utilizing dual-fuel boilers at an anaerobic digester facility offers several key benefits:

- 1) Fuel Flexibility - Dual-fuel boilers can run on biogas produced by the digesters or natural gas. This provides flexibility and promotes continuous operation, even if biogas production is temporarily low.
 - a) Energy Efficiency - They allow for efficient use of the biogas generated onsite, reducing reliance on external energy sources and potentially lowering energy costs.

- b) Operational Reliability - The ability to switch between fuel sources allows the facility to maintain heating requirements for the digesters, which is critical for optimal digestion and biogas production.
- c) Potential Cost Savings - By utilizing biogas as a fuel source, the facility can offset natural gas or other fuel costs, potentially making operations more economical.
- d) Environmental Benefits - Utilizing biogas reduces greenhouse gas emissions compared to fossil fuels, helping the facility meet sustainability goals and reduce its carbon footprint.
- e) Operational Resilience - Dual-fuel capability provides a backup option, allowing from uninterrupted operation during maintenance, biogas shortages, or unexpected issues with a fuel source.

The total estimated cost for this project (Table 17) is approximately \$2,300,000.

Table 17. Dual Fuel Boiler System Upgrade OPCC.

Item Description	Quantity	Units	Unit Cost	Extension
Demolition				
Demo Existing System	1	LS	\$75,000	\$75,000
Process - Equipment				
Dual Fuel Boiler	2	EA	\$300,000	\$600,000
Installation			30%	\$180,000
Process - Piping/Valves/Gates				
Misc. Piping and Valves			10%	\$60,000
Electrical and I&C				
Electrical and I&C			30%	\$234,000
Subtotal				\$1,149,000
Mobilization			5%	\$57,450
Overhead and Profit			15%	\$180,968
Bonds and Insurance			2%	\$27,748
Contingency			30%	\$424,550
Legal, Admin, and Engineering			25%	\$459,929
Grand Total				\$2,299,645
Grand Total (Rounded)				\$2,300,000

4.1.8 Additional Planning Studies

The City intends to undertake a number of new planning studies to enhance operations, meet regulatory requirements, and inform future utility needs. First, the City aims to enhance operational efficiency and reduce energy consumption at the WWTP by conducting a series of Facility Optimization and Energy Reduction Studies. The three major areas of study are as follows:

- 1) Aeration System Optimization Study - The aeration system is one of the largest energy consuming processes at a wastewater treatment facility due to the electrical demand from the blowers. An optimization study will evaluate current aeration philosophy/performance and identify opportunities to

optimize controls, improve overall treatment efficiency, and reduce energy consumption while remaining compliant with permit requirements. This study will also include evaluating the blower control system and provide recommendations for operating scenarios which have previously required WWTP staff to operate the blowers manually. The total estimated cost for this study is \$100,000.

- 2) Gas Cleaning System Study - A detailed review of the existing gas cleaning system will be conducted to determine what would be required to utilize the gas cleaning system. This study will evaluate the existing system and provide recommendations on what would be required for equipment repair/replacement in order to use the gas cleaning system which in turn would provide biogas for energy recovery. The total estimated cost for this study is \$75,000.
- 3) Energy Optimization and Reduction Study - The overall energy usage of the Facility will be analyzed to identify opportunities for optimization and reduction. This study will explore process improvements, equipment upgrades, and operational strategies that can reduce energy demand, lower operational costs, and support the City's optimization efforts. The total estimated cost for this study is \$230,000.
- 4) In addition to these optimization studies, the Phase 2 IMP includes funding to support PFAS sampling efforts, consistent with EPA's anticipated POTW Influent PFAS Study and National Sewage Sludge Survey (NSSS). This study assumes at least one influent, effluent, and biosolids sample will be required from the WWTP, as well as up to 10 industrial contributors. Additionally, the study assumes two different laboratory analyses will be required on each sample. The total estimated cost for this study is approximately \$20,000.

4.2 Wastewater Collection

The wastewater collection system is an important component of the infrastructure owned and operated by the City's Sewer Utility. Effective management of the collection system is vital for meeting important goals like reducing SSOs, achieving regulatory compliance, efficiently managing wastewater, and improving customer satisfaction.

While the City has made significant improvements in the collection system to date, a number of capital and programmatic needs and data gaps were identified during the Phase 1 wastewater collection system assessment that will continue to require investment from the City during Phase 2. A summary of those needs, modified to reflect new information and system drivers, is included below.

- Continue to implement strategies to support system renewal and maintenance efforts using an asset management approach, including a mechanism to establish sufficient dedicated funding for these efforts. Implementation should consider an asset management software that can be implemented across departments.
- On a routine basis, refine a hydraulic model to identify improvements that will address remaining system capacity limitations and reduce I/I, building backups, and SSOs caused by wet weather flows.
- Maintain collection system maintenance performance to limit dry weather backups and SSOs due to blockages despite the challenges presented by aging infrastructure and community growth. Ensure adequate funding is available to achieve this performance and continue targeted flow monitoring to track I/I reductions.
- Update collection system goals to ensure they reflect the City's short and long-term priorities. Progress towards achieving these goals could be measured through actionable Key Performance Indicators (KPIs) that support the City in making business decisions, allocating resources, system

expansion, and identifying challenges that could negatively impact performance and service levels.

- Continue systematic elimination of Private Common Collector (PCC) projects. Sixteen projects identified in upcoming Capital Improvement Plan.

Planning level capital costs were developed to meet these needs by updating estimates from the City's Phase 1 IMP, as well as using recent experience with similar projects in the region. HDR met with City staff on October 1, 2024, to review and confirm information and assumptions used to formulate the final alternatives presented within this section. Details regarding each of the alternatives, relevant assumptions, and estimated capital and O&M costs are presented below. Implementation and scheduling for these projects is discussed in more detail in Section 6 and presented in Table A.2.

- Private common collectors (PCC) are privately-owned collection systems that serve multiple homes or businesses. PCCs typically consist of small diameter pipes that have generally not been maintained by the property owners since they were installed. Consistent with the Phase 1 IMP, Phase 2 assumes the City will fund specific, known projects through 2029 and allocate approximately \$215,000 per year for undefined projects annually thereafter.
- System expansion includes funding for gravity conveyance and pump station projects necessary to expand the system for new growth areas or to increase existing system capacity to accommodate the increased wastewater flows generated by growth in the City. Consistent with the Phase 1 IMP, Phase 2 assumes the City will fund specific, known projects through 2031. After 2031, the City plans to allocate \$1 million annually for undefined expansion projects.
- Specific system capacity enhancement and private I/I reduction will be identified and refined through future routine hydraulic model updates. Until those updates are complete and consistent with the Phase 1, the Phase 2 IMP assumes the City will fund existing known projects through 2032 and allocates approximately \$2,000,000 per year for undefined projects annually thereafter.
- Pump station R&R improvements are intended to address mechanical, electrical, process, and structural repairs needed as pumps age. This funding is not intended to address normal O&M maintenance needs. Consistent with Phase 1, the Phase 2 IMP includes R&R cost estimates for the City's three largest pump stations. R&R for small pump stations is assumed to be included in normal O&M expenditures.
- Building backup alleviation efforts in Phase 1 allocated \$500,000 for backflow prevention valves and other plumbing improvements. The Phase 2 IMP assumes this funding will be continued.
- Cleaning recommendations in Phase 1 included adding additional crews, trucks, and programmatic support to implement an asset management-based approach to scheduling and executing the cleaning program. Recently, the City has been challenged to hire qualified new staff for these and other field positions within the Sewer and Stormwater Utilities. As a result, Phase 2 funding level assumes the City will supplement their current cleaning crews with a contracted cleaning company (\$250,000/year) through 2034. Following 2034, Phase 2 assumes the City will add two staff, one new CCTV truck, and one new jet truck.
- System renewal projects are generally focused on rehabilitation of public infrastructure in areas that experience high I/I. Trenchless rehabilitation and point repairs make up the majority of work in

this project category. Consistent with the Phase 1, the Phase 2 IMP assumes the City will fund existing known projects and allocates approximately \$2,700,000 per year for undefined projects annually thereafter. This level of funding is expected to address projected renewal needs with the next 30 years.

- Wet-weather program planning and management efforts in Phase 1 primarily included funding to calibrate and update the City's hydraulic model, inform I/I and SSO reduction efforts, and provide annual program support, and conduct flow monitoring to facilitate future model updates. In Phase 2, the City is focused on conducting targeted flow monitoring for at least 10 years (\$150,000 annually) and providing annual funding for (\$100,000) external support.
- Asset management program development and implementation will require additional internal and external resources. For initial planning purposes and consistent with Phase 1, funding for this project assumes that external consultants will be retained annually (\$75,000) to assist with asset management support. As the program develops over time, these estimates can be refined to incorporate the appropriate mix of internal and external resources.
- Annual sewer improvements include funding to address unanticipated sewer improvements and repairs that may be needed in any given year. The Phase 2 IMP assumes \$500,000 per year for this category.
- The City is interested in conducting several near-term planning studies in the Phase 2 IMP:
 - Pump Station Capacity Study (\$150,000)
 - Flat Branch Flood Study and Smoke Testing (\$200,000)
 - Cost of Service Study (\$150,000)
 - Perche Creek Flood Study (\$150,000)

4.3 Stormwater Management

Effective management and efficient implementation of the stormwater program is necessary for meeting important environmental and public safety goals such as improving water quality, minimizing flooding impacts, and reducing property damage. Unlike many other communities across the country, the City has a dedicated stormwater fee that was last approved by voters in 2015. Despite the fee however, the City still lacks the funding required to fully meet their base stormwater management needs. This was one important conclusion of the Phase 1 IMP.

In the Phase 1 IMP, the City established four overarching goals that captured the needs and priorities of the Stormwater Utility. These goals formed the basis for capital and programmatic improvement recommendations and will continue to require investment from the City during Phase 2.

1. Provide Public Safety - The City's highest stormwater priority is to provide services that maintain public health, welfare, and safety. From a stormwater perspective, the greatest threats to public safety include infrastructure failures such as street collapses and flooding. Improving system renewal and assessment management activities will help achieve this goal.
2. Improve Environmental Integrity – The City attempts to provide a minimum level of environmental protection and improve environmental integrity in areas that have already been impacted. Correspondingly, the City strives to meet their MS4 permit requirements.
3. Renew and Maintain the Stormwater Conveyance System – The significant backlog of structurally deficient pipes makes the City reactive and reduces public safety.

4. Adequately Fund and Staff the Stormwater Utility – With the resources currently available, necessary system renewal, flood reduction, and water quality improvement activities must be deferred. This deferment will make the system less reliable, less safe, and will increase the number and cost of emergency repairs going forward.

Despite the chronic funding challenges, the City's most recent capital improvements plan (CIP) commits between \$1.4 million and \$4.3 million to stormwater infrastructure improvements annually over the next five years to address critical flooding, rehabilitation, and water quality needs (Table 18). The City will maintain these planned investments as they implement Phase 2. Any new or increased Phase 2 stormwater investments will be programmed after 2029 and implementation will be subject to available funding.

Table 18. FY2026-2030 Stormwater Capital Improvement Plan.

Project Name	FY2026	FY2027	FY2028	FY2029	FY2030
1 Annual CAM Projects - SS114	\$30,000	\$30,000	\$30,000	\$30,000	\$30,000
2 Annual Projects - SS017					
3 Annual Property Acquisition - SS118					
4 Annual Water Quality Improvements - SS115	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000
5 Battle Riparian Buffer Enhancement [ID: 2381]					
6 Bourn Avenue - SS165			\$650,000		
7 Braemore Drainage - SS152		\$2,300,000			
8 Brandon Road Culvert Replacement - SS160	\$815,000				
9 Greenwood Stewart Phase 2 SS156	\$1,700,000				
10 Hinkson Avenue - SS168			\$300,000		
11 Proctor Drive Stormwater Improvement - SS177	\$1,750,000				
12 Royal Lytham - Fallwood - SS090					
13 Sexton/McBaine Drainage - SS154					
14 Stormwater Lining D614D92DQ391 [ID: 2425]					
15 Hickman to Wilkes Stormwater - SS167		\$50,000		\$250,000	
16 Lakeshire Estates Lake Modification - SS169]				\$150,000	
17 Leawood Subdivision - SS173				\$200,000	\$1,575,000
18 Mary Jane Jamesdale - SS170		\$300,000			
19 Mill Creek Phase 3 - SS111				\$210,000	
20 Rollins/Cowan/Ridge Drainage - SS171				\$170,000	
21 Seventh and Locust - SS164			\$380,000		
22 Sexton Road at Jackson - SS162					\$300,000
23 West Worley Storm System Replacement - SS119				\$230,000	
24 Worley Again East Phase I - SS155				\$965,000	
25 English/Subella/Jake Drainage - SS172				\$18,000	
26 Highridge Stormwater Improvements - SS176					
27 Parkade Blvd and Plaza [ID: 1630]					
28 Stewart Park Drainage - SS174				\$100,000	
29 Crestridge Drive Culvert Replacement – SS151					
Total	\$4,320,000	\$2,705,000	\$1,385,000	\$2,348,000	\$1,930,000

Planning level capital costs were developed to meet needs beyond 2030 by updating estimates from the City's Phase 1 IMP, as well as using recent experience with similar projects in the region. HDR met with City staff on October 1, 2024, to review and confirm information and assumptions used to formulate the final alternatives presented within this section. Details regarding each of the alternatives, relevant assumptions, and estimated capital and O&M costs are presented below. Implementation and scheduling for these projects is discussed in more detail in Section 6 and presented in Table A.3.

- Flood control funding allocations in Phase 1 were developed to address known flood reduction needs (\$22.5 million total), add staff, and add equipment. The Phase 2 plan continues to assume at least \$22.5 million (\$1.5 million annually over 15 years) is needed over the 20-year planning period but does not include funding for additional staff or equipment currently.

- System renewal costs target repair or replacement of 16 miles of CMP (\$825,000 annually) and approximately 3,300 structures (\$1.3 million annually). These allocations are approximately half of what was assumed in Phase 1.
- Condition assessment improvements are focused on establishing a more systematic approach to assessing and maintaining the stormwater conveyance system. Investments include the addition of a new CCTV crew (\$130,000 annually) and \$100,000 over five years to enhance the assessment program by using a subcontractor to assess approximately half of the CMP.
- Stream erosion improvement estimates were established to address stream erosion in watersheds with a high frequency of erosion complaints (>5 complaints per mile). Consistent with the Phase 1 IMP, the Phase 2 IMP assumes approximately \$172,500 annually will be needed.
- Runoff treatment alternatives were focused on addressing stormwater runoff from impervious areas owned by the City; it does not include the cost to treat runoff from private property. The Phase 1 IMP assumed approximately \$2.7 million annually to treat runoff in all Hinkson Creek tributary watersheds. Given the significant cost and effort that would be required to implement these projects, Phase 2 assumes only half of the projects could be implemented over the planning period. Investments include the addition of a new staff engineer (\$90,000 annually).
- MS4 program investments in Phase 1 included funding to enhance outreach and education, implement stream walks, and conduct more frequent erosion control inspections. Going forward, the City sees the most value in continuing to enhance their education and outreach programs (\$75,000 annually), participate in Hinkson Creek Collaborative Adaptive Management (CAM) activities (\$30,000), and focusing on existing IDDE efforts to address illegal dumping in City streams.
- Long-term planning and program support activities included funds to develop an updated stormwater master plan and model and provide data management support. Consistent with Phase 1, the Phase 2 IMP assumes \$650,000 over five years (\$130,000 annually) for the master plan and \$50,000 annually for program support.

5. Community Engagement

Element 3 of EPA's Framework requires that municipal utilities open and maintain channels of communication with relevant community stakeholders in the planning process and during the implementation of the IMP. Specifically, the EPA's Framework suggests municipalities:

- Provide appropriate opportunities that allow for meaningful input during the identification, evaluation, and alternative selection phases of the planning effort;
- Make new information available and provide opportunities for input into the development of proposed modifications of the plan;
- Allow public involvement to assist in evaluating the opportunities and effectiveness of potential green infrastructure alternatives, if they are relevant to the plan.

For the Phase 1 IMP, the City held a series of four workshops and conducted an online survey to gain meaningful feedback from Columbia's stakeholders. The City used the results to identify and weight the five community IMP objectives (Figure 1) and subobjectives. The IMP objective weights were paired with wastewater treatment, collection, and stormwater projects to be analyzed through a multicriteria decision analysis (MCDA) process. This process identified high priority projects that the City should implement in the short term and assisted with long-term schedule development. For a more detailed discussion of the MCDA process, see Technical Memorandum 9 from Phase 1.

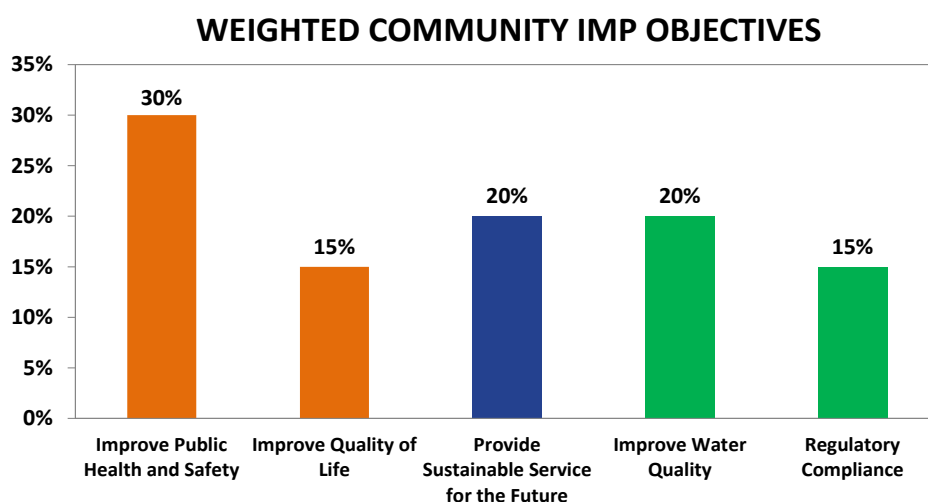


Figure 4. Phase 1 Weighted Community IMP Objectives.

For Phase 2 IMP, the City decided to focus on community-wide engagement through a focused workshop, an online survey, and a presentation to the Hinkson CAM stakeholder group. Each activity was structured to educate the community about the IMP objectives and implementation, solicit meaningful feedback from stakeholders, and reaffirm that prioritization criteria used to develop the Phase 1 MCDA process continue to be appropriate and aligned with community priorities.

5.1 Community Engagement Workshop

The City hosted a community engagement workshop on August 21, 2024, at the Columbia Activity and Recreation Center. Over 50 community members and stakeholders attended. KOMU reporters covered the content of the workshop during a 7 PM news segment². The workshop was held as an open house that allowed community members and stakeholders to talk to City staff and receive educational materials about the wastewater and stormwater systems. The workshop set up consisted of wastewater, stormwater, and collection system displays and staff located around the room to show Phase 1 IMP progress and generate discussions with workshop attendees.

To gain quantitative feedback, workshop attendees were provided with five stickers and a list of future city projects. The projects were further grouped into one of the five IMP objectives as identified in Phase 1: public health and safety, quality of life, sustainable services, water quality, and regulatory compliance. The participants were instructed to place a sticker next to five projects that would fulfill a community priority or need. Results of the exercise (Figure 5) showed that the priorities of the attendees align with the previous weights provided to each IMP objective during the development of Phase 1 IMP.

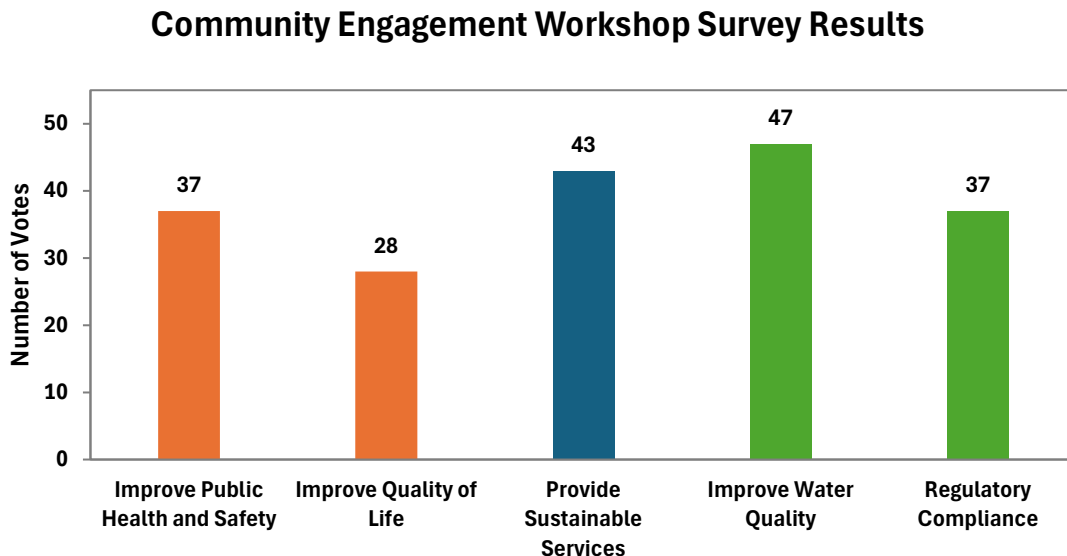


Figure 5. Results of the August 21, 2024, Community Engagement Workshop Survey.

5.2 Phase 2 IMP Outreach Survey

The customer feedback survey was launched on May 1, 2024, and remained open until September 30, 2024. It was accessible to customers through the City's survey platform and received a total of 718 responses, with 707 participants indicating that they live in Columbia. To confirm feedback was representative of the entire community, the City asked respondents to provide their ward number or to specify if they were a Boone County resident or a Columbia business owner who did not live within the City. The results showed that the survey was completed by a diverse group of individuals from across the community.

² [Columbia plans to update waste and stormwater management | Mid-Missouri News | komu.com](https://www.komu.com/news/columbia-plans-to-update-waste-and-stormwater-management/)

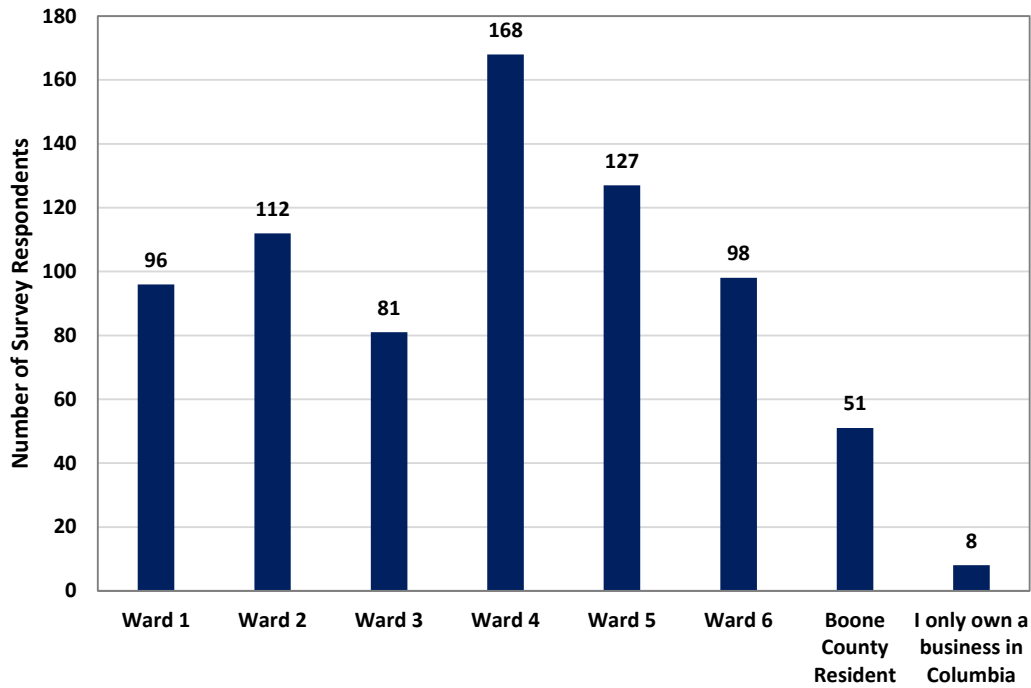


Figure 6. Distribution of Survey Respondents Reported Place of Residence.

In the context of EPA’s integrated planning framework, community outreach should be an ongoing process that is used to inform and refine goals and outcomes over time. Therefore, the survey questions were designed to allow customers to rank the importance of Columbia’s Phase 1 community objectives (Figure 4) to confirm if they are still appropriate for use in Phase 2.

In general, the City found that the survey results did confirm the Phase 1 findings. Improving public health and safety is still the most important objective, while the remaining four objectives are generally equally important (Table 19). Similarly, the relative importance of subobjectives were relatively consistent with those used in Phase 1. Minor refinements were made to the weightings of two objectives and two subobjectives to better reflect the survey input, but these changes do not significantly impact the overall weights or shift Phase 2 project priorities relative to Phase 1.

Table 19. MCDA Update for Phase 2 based on Community Survey Feedback.

Community Objective Updates				
Objective		Phase 1 Criteria Weight	Phase 2 Criteria Weight*	Survey Results – Average Rank
Improve Public Health and Safety		0.3	0.3	3.41
Improve Quality of Life		0.15	0.175	2.79
Provide Sustainable Services for the Future		0.2	0.175	2.8
Improve Water Quality		0.2	0.2	3.11
Regulatory Compliance		0.15	0.15	2.7
Community Subobjective Updates				
Objective	Subobjective	Phase 1 Subcriteria Weight	Phase 2 Subcriteria Weight	Survey Results - % Important or Very Important
Improve Public Health and Safety	Reduce Pathogen Exposure	0.5	0.5	94%
	Reduce Safety Hazards from System Failures	0.5	0.5	95%
Improve Quality of Life	Provide Community-Wide Benefits	0.5	0.5	82%
	Reduce Potential for Property Damage	0.5	0.5	85%
Provide Sustainable Services for the Future	Renew Systems Beyond Effective Life	0.5	0.5	91%
	Improve Services to Underserved and Redeveloping Areas	0.3	0.3	65%
	Provide Adequate Services to Growing Areas	0.2	0.2	54%
Improve Water Quality	Protect or Improve Water Quality in City Streams	0.6	0.5	89%
	Protect Important Regional Waterbodies	0.4	0.5	84%
Regulatory Compliance	Meet Clean Water Act Requirements	1	1	82%

*Note red text indicates values that differ from those applied in Phase 1.

5.3 Hinkson CAM Stakeholder Meeting

On December 10, 2024, the City and HDR presented information on the Phase 2 update to the Hinkson Creek CAM Stakeholder Committee³. The presentation provided an overview of Phase 1 progress and Phase 2 priorities, including results of the public survey described in the previous section. Although no official actions were requested or taken, the City generally received supportive comments from the Committee.

³ [Hinkson Creek 65th Stakeholder Meeting Agenda](#)

6. Project Scheduling and Implementation

Element 4 of EPA's Framework specifies that municipalities identify an implementation schedule for their integrated planning projects. In Phase 1, the City developed an optimized, 20-year investment plan using the MCDA tool described previously. In that evaluation, community objectives established through the outreach program (Figure 4) were used to quantify benefits produced by individual projects and investments. From there, the City selected the suite of treatment, collection, and stormwater projects that provided the highest benefits for the lowest costs. The analysis also demonstrated that the optimized plan was affordable to a majority of ratepayers for at least the first 10 years.

As discussed in the previous sections, community priorities and their relative importance have not materially changed since Phase 1. Because the City is proposing to generally maintain the same relative implementation schedules and investment levels during Phase 2, with some modifications to address new system drivers and data needs, it is reasonable to assume that the updated 20-year IMP schedule described below also maximizes benefits and provides the best value for the community and ratepayers. Therefore, individual Phase 2 projects were not rescored or ranked to recharacterize benefits. A summary of the updated 20-year IMP schedule, affordability considerations, and the proposed 5-Year Action Plan is included in the sections that follow.

6.1 Updated 20-Year IMP Schedule

The updated 20-Year IMP schedule features approximately \$416 million (in 2024 dollars) of additional treatment, collection, and stormwater system investments (Figure 7, Table A.1). Treatment investments are the largest expenditure (\$191 million) and make up approximately 45% of the total additional costs. Approximately 70% (\$132 million) of those treatment costs are intended to address new regulatory requirements related to ammonia, nutrients, and bacteria while the remaining 30% satisfy routine operation, maintenance, and replacement needs. This imbalance highlights the critical need to pursue regulatory flexibilities to reduce treatment investment needs and still meet environmental objectives.

Collection system costs make up approximately \$140 million of the total additional cost (Figure 7, Table A.2). With the exception of system expansion (\$17 million), a majority of collection system investments are targeted at maintaining or improving the current systems more efficiently and effectively. Consistent with Phase 1, system renewal and capacity improvements represent the largest investments. This reflects the City's goals of continuing to eliminate I/I and reduce SSOs and building backups in the system. Notably, pump station R&R estimates have increased significantly since Phase 1 (from \$2 million in 2017 dollars to \$7.2 million in 2024 dollars), which represents the City's understanding of the need to evaluate pump stations more closely going forward.

The 20-year IMP includes approximately \$85 million in additional improvements to address stormwater system renewal needs, flooding issues, and water quality improvements through runoff treatment (Figure 7, Table A.3). The implementation of these additional improvements is highly dependent on the City's ability to raise additional future revenues. The 2015 voter-approved stormwater rates have remained steady since 2020. The City is reevaluating the need to increase stormwater rates but has no plans to do so at this time. In the interim, the City will focus on implementing the currently planned 5-year CIP while preparing to undertake comprehensive stormwater management, planning, and modeling tool evaluations in 2030 that will be needed to maintain level of service into the future.

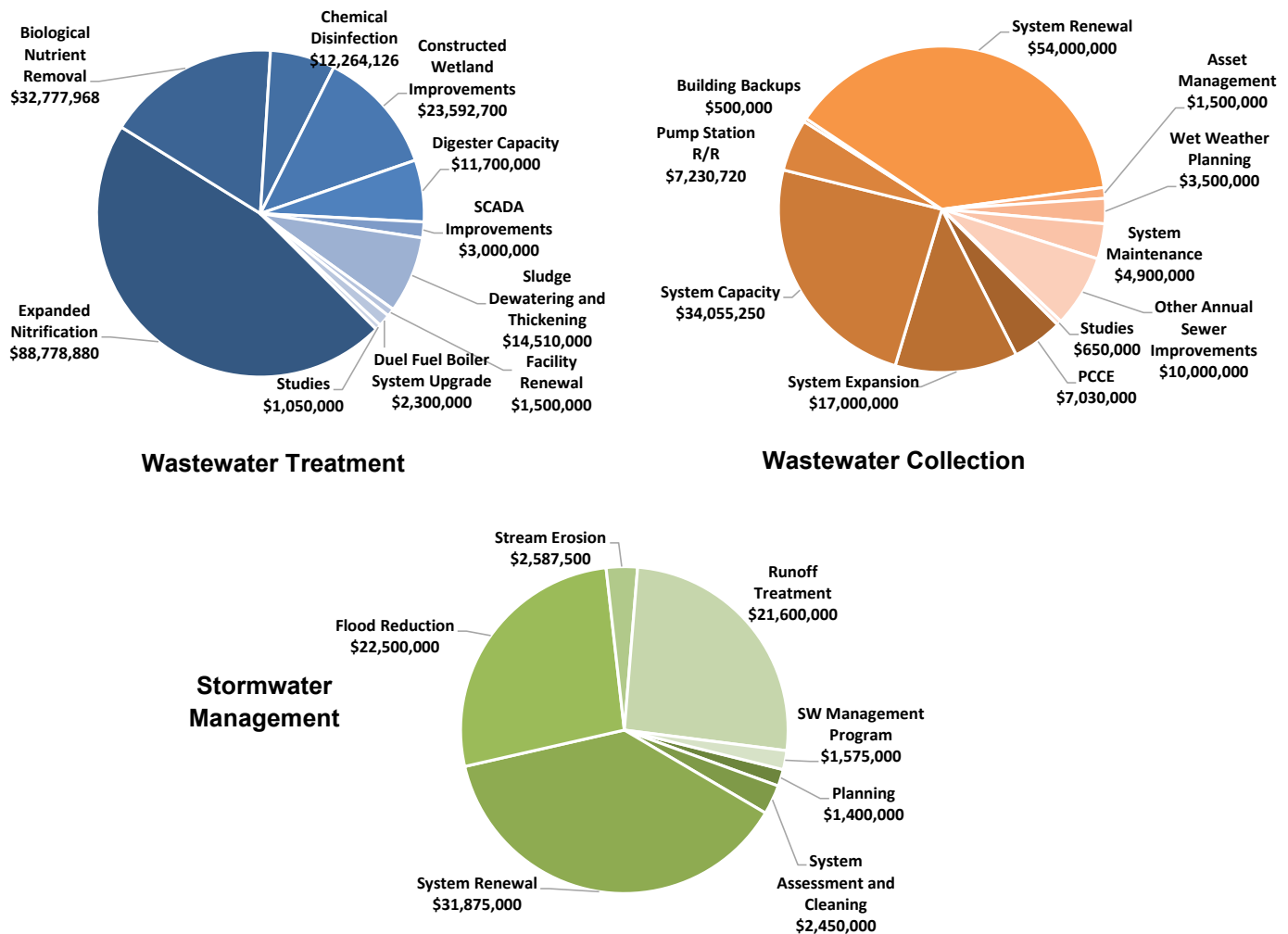


Figure 7. Summary of 20-Year IMP Costs.

6.2 Customer Affordability Considerations

EPA's Framework recognizes that establishing a sustainable financial strategy to fund integrated plan implementation often requires municipal utilities to balance many important economic and social objectives, sometimes based on limited information or assumptions about future conditions. As a result, the Framework and recently updated Financial Capability Assessment Guidance⁴ allows utilities to evaluate the community's financial capability and identify potential customer impacts that could inform future revisions to the plan or implementation schedule using the principles of adaptive management outlined in Element 6. In particular, the guidance focuses on characterizing impacts on disadvantaged segments of the community that may be disproportionately impacted by increased bills.

The City was at the forefront of applying these same types of affordability evaluations in Phase 1. In that assessment, the City conducted a comprehensive socioeconomic evaluation of the City and translated the optimized funding scenario into an approximate average monthly bill for median and low-income users over

⁴ [CWA Financial Capability Assessment Guidance \(epa.gov\)](https://www.epa.gov/financial-capability/financial-capability-assessment-guidance)

the 20-year planning timeline. Results from the socioeconomic and residential billing impact evaluation were combined into an overall affordability analysis to characterize the spatial extent of potential economic impacts and affordability issues associated with implementing the Optimized IMP alternative. At the time, the analysis indicated that if rate increases were needed to implement IMP projects, three Census tracts (Tract 9, 11.01, and 21) had the potential to experience affordability issues within 10 to 15 years.

Since 2017 when the Phase 1 IMP was established, median household incomes (MHI) in those three Census tracts have increased by more than 50% based on US Census Bureau American Community Survey 5-Year Estimates. In comparison, existing sewer and stormwater rates were established in 2018 and 2019, respectively, and have not increased as was assumed in the Phase 1 evaluation. Therefore, it is reasonable to assume that the Phase 2 schedule, which generally maintains the Phase 1 implementation schedules and investment levels, is affordable in the near term.

Although the current implementation schedule appears to be affordable based on the information currently available, the City will continue to reevaluate affordability impacts in future iterations of the IMP. As part of the Phase 2 Action Plan, the City will be completing a cost-of-service study to estimate rate increases and structures needed to fund current and future sewer and stormwater needs. Consistent with the adaptive management principles of integrated planning, results from that study will directly inform future project scheduling, financial planning decisions, and customer affordability evaluations.

6.3 Adaptive Management and 5-Year Action Plan

The updated 20-Year IMP implementation schedule reflects the City's understanding of long-term infrastructure and regulatory needs and priorities with respect to the information currently available. However, priorities may change as additional needs or regulatory requirements are identified over time. Therefore, the forecasted timing and cost of wastewater and stormwater program improvements currently included in the plan should be considered planning level estimates that must be reevaluated periodically.

Accordingly, EPA's Framework requires municipalities to establish milestones that will be used to measure progress as integrated plans are implemented (Element 5) and provide opportunities to apply new data and information to adapt or revise plans over time (Element 6). Consistent with Elements 5 and 6, the City will continue to implement the IMP in a phased approach using a 5-Year Action Plan. This updated 5-Year plan helps provide investment certainty over the next five years but allows flexibility to respond to new regulatory or non-regulatory needs that arise over the 20-year planning horizon. Specifically, the City will pursue the following actions over the next five years:

- **Wastewater Treatment (Table A.1)**
 - Initiate digester capacity improvements
 - Initiate IPS instrumentation and control upgrades
 - Initiate sludge dewatering and thickening improvements
 - Initiate dual fuel boiler system conversion/upgrade
 - Conduct PFAS monitoring as required by EPA
 - Conduct nutrient removal optimization evaluation
 - Develop biosolids master plan
 - Conduct energy optimization evaluation
 - Continue to implement existing programs

- **Wastewater Collection (Table A.2)**
 - Implement identified PCCE projects
 - Implement identified capacity enhancement projects
 - Secure funding for backflow prevention program
 - Rehabilitate up to 1% of system per year, depending on contractor availability and cost. Establish focused (e.g., reinforced concrete pipe only) rehabilitation and replacement plans, if necessary.
 - Secure cleaning contract to supplement existing programs
 - Establish annual sewer flow monitoring approach
 - Initiate asset management improvements planning
 - Conduct cost of service study
 - Continue to implement existing programs
- **Stormwater System (Table A.3)**
 - Implement 5-Year CIP (Table 18)
 - Continue existing programs

The City will pursue these actions to the extent possible but acknowledge that funding, staff availability, and other resource constraints or unanticipated needs may impede complete implementation of the action plan. The City will provide MDNR with an annual update that includes a summary of work performed, work planned for the following year, and any proposed updates to the 5-Year Action Plan or 20-year IMP. Every five years, the City will submit a revised IMP and new 5-year Action Plan to MDNR. Each revision will incorporate additional information and knowledge gained within the previous five years to set anticipated actions and measurable goals. Additionally, each subsequent action plan will use the added information to revise IMP projections with respect to evolving regulatory requirements and program needs. In addition to implementing the 5-Year Action Plan, the City will measure progress towards improving water quality by opportunistically applying, as funding allows, the water quality monitoring framework developed in Phase 1 to track water quality improvements and adjust future IMP activities, if necessary.

The annual update and five-year revision process will be used to inform future permit limit and schedule of compliance negotiations with MDNR. The most significant regulatory issues that could drive significant investment in the wastewater treatment system are ammonia, nutrients, and bacteria. With this IMP, the City proposes the following with respect to these drivers:

- **Total Phosphorus** – Missouri’s effluent rule requires domestic point sources greater than 15 MGD to achieve TP reductions no later than January 1, 2029, unless an alternative implementation date is established in an IMP. The City proposes to initially extend their compliance date to January 1, 2033, consistent with other domestic facilities greater than 1 MGD. In the interim, the City will conduct their nutrient optimization study to more adequately characterize existing TP discharge concentrations and necessary reductions. After completing the optimization study the City may determine that an alternative schedule (earlier or later) is needed to make TP reductions or comprehensive TP/ TN reductions.
- **Ammonia** – The IMP does not currently establish a schedule of compliance for ammonia because MDNR has not finalized a new regulation that would reduce permit limits. When the regulation is finalized, the City will work with MDNR to establish an appropriate schedule based on the information provided in this IMP, as well as future annual or five-year updates. The City may also be interested in conducting a mussel field survey in the EBCA to establish the presence or absence of sensitive species that would drive limits lower in the future.

-
- Bacteria - The IMP does not currently establish a schedule of compliance for bacteria MDNR is not currently considering a new regulation that would reduce permit limits. When a new regulation is finalized, the City will work with MDNR to establish an appropriate schedule based on the information provided in this IMP, as well as future annual or five-year updates.

Attachment A. Detailed Cost Forecasts.

Table A1. Wastewater Treatment Facility Capital and Programmatic Cost Forecast, in 2024 Dollars. Estimates include potential capital, operation and maintenance, and planning costs that may be required in addition to the City's current programs based on information currently available. Note that project costs were allocated to specific years for planning purposes only. Consistent with the adaptive management framework embodied in the integrated planning process, actual project costs and timing will continue to be refined as the City implements the IMP over time.

Columbia Phase 2 IMP - Wastewater Treatment																					
Project	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	Total
Nitrification	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 81,399,888	\$ 819,888	\$ 819,888	\$ 819,888	\$ 819,888	\$ 819,888	\$ 819,888	\$ 819,888	\$ 819,888	\$ 819,888	\$ 88,778,880
	Capital	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 80,580,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 80,580,000
	O&M	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 819,888	\$ 819,888	\$ 819,888	\$ 819,888	\$ 819,888	\$ 819,888	\$ 819,888	\$ 819,888	\$ 819,888	\$ 819,888	\$ 8,198,880
Nutrient Removal, BNR	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 31,038,496	\$ 248,496	\$ 248,496	\$ 248,496	\$ 248,496	\$ 248,496	\$ 248,496	\$ 248,496	\$ 32,777,968
	Capital	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 30,790,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 30,790,000
	O&M	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 248,496	\$ 248,496	\$ 248,496	\$ 248,496	\$ 248,496	\$ 248,496	\$ 248,496	\$ 248,496	\$ 1,987,968
Disinfection	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 9,256,014	\$ 376,014	\$ 376,014	\$ 376,014	\$ 376,014	\$ 376,014	\$ 376,014	\$ 376,014	\$ 376,014	\$ 12,264,126
	Capital	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 8,880,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 8,880,000
	O&M	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 376,014	\$ 376,014	\$ 376,014	\$ 376,014	\$ 376,014	\$ 376,014	\$ 376,014	\$ 376,014	\$ 376,014	\$ 3,384,126
Constructed Wetlands Improvements	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,359,270	\$ 2,359,270	\$ 2,359,270	\$ 2,359,270	\$ 2,359,270	\$ 2,359,270	\$ 2,359,270	\$ 2,359,270	\$ 2,359,270	\$ 2,359,270	\$ 2,359,270	\$ -	\$ -	\$ 23,592,700
	Capital							\$ 2,359,270	\$ 2,359,270	\$ 2,359,270	\$ 2,359,270	\$ 2,359,270	\$ 2,359,270	\$ 2,359,270	\$ 2,359,270	\$ 2,359,270	\$ 2,359,270	\$ 2,359,270	\$ -	\$ -	\$ 23,592,700
	O&M	\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Sludge Dewatering and Thickening	\$ -	\$ -	\$ -	\$ 14,510,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 14,510,000
	Capital	\$ -	\$ -	\$ -	\$ 14,510,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 14,510,000
	O&M	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Digester Capacity Improvements	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 1,700,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 11,700,000
	Capital	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 1,700,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 11,700,000
	O&M	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
SCADA Improvements	\$ -	\$ 3,000,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3,000,000
	Capital	\$ -	\$ 3,000,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3,000,000
	O&M	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Facility Rehabilitation and Renewal	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 1,500,000
	Capital	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 1,500,000
	O&M	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Duel Fuel Boiler System Upgrade	\$ -	\$ -	\$ -	\$ -	\$ 2,300,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,300,000
	Capital	\$ -	\$ -	\$ -	\$ -	\$ 2,300,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,300,000
	O&M	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
WWTP Planning Studies	\$ 10,000	\$ 110,000	\$ 350,000	\$ 75,000	\$ 230,000	\$ 350,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,125,000
	Aeration System Optimization	\$ -	\$ 100,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 100,000
	Constructed Wetlands	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 250,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 250,000
	PFAS Influent Study	\$ 10,000	\$ 10,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 20,000
	Peak Flow Storage SOP	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 100,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 100,000
	Biosolids Master Plan	\$ -	\$ -	\$ 350,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 350,000
	Gas Cleaning Study	\$ -	\$ -	\$ -	\$ 75,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 75,000
	Energy Optimization	\$ -	\$ -	\$ -	\$ -	\$ 230,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 230,000
	Total	\$ 2,010,000	\$ 5,110,000	\$ 2,350,000	\$ 16,585,000	\$ 4,530,000	\$ 2,150,000	\$ 100,000	\$ 2,459,270	\$ 2,459,270	\$ 2,459,270	\$ 83,859,158	\$ 12,535,172	\$ 34,693,668	\$ 3,903,668	\$ 3,903,668	\$ 3,903,668	\$ 3,903,668	\$ 1,544,398	\$ 1,544,398	\$ 1,544,398

Table A2. Wastewater Collection Capital and Programmatic Cost Forecast, in 2024 Dollars. Estimates include potential capital, operation and maintenance, and planning costs that may be required in addition to the City’s current programs based on information currently available. Note that project costs were allocated to specific years for planning purposes only. Consistent with the adaptive management framework embodied in the integrated planning process, actual project costs and timing will continue to be refined as the City implements the IMP over time.

Columbia Phase 2 IMP - Wastewater Collection																					
	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	Total
PCCE	\$ 915,000	\$ 245,000	\$ -	\$ 1,255,000	\$ -	\$ 870,000	\$ 685,000	\$ 480,000	\$ 215,000	\$ 215,000	\$ 215,000	\$ 215,000	\$ 215,000	\$ 215,000	\$ 215,000	\$ 215,000	\$ 215,000	\$ 215,000	\$ 215,000	\$ 215,000	\$ 7,030,000
Undefined PCCE Projects	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 215,000	\$ 215,000	\$ 215,000	\$ 215,000	\$ 215,000	\$ 215,000	\$ 215,000	\$ 215,000	\$ 215,000	\$ 215,000	\$ 215,000	\$ 215,000	\$ 215,000	\$ 215,000	\$ 215,000	\$ 3,225,000
PCCE #34 - Forest Hill Court & Ridge Road -SW533 [ID: 1905]	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 655,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 655,000
PCCE #38 - North Eighth Street-SW534 [ID: 1903]	\$ 535,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 535,000
PCCE #40-Sunset Dr, Prospect St, Crestland Ave SW535 [ID: 1902]	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 470,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 470,000
PCCE #41 - W Stewart Road & West Blvd - SW536 [ID: 1901]	\$ 380,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 380,000
PCCE #44 - Club Ct & Vine St - SW546 [ID: 2283]	\$ -	\$ 130,000	\$ -	\$ 730,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 860,000
PCCE #46 Fredora Maupin - SW551 [ID: 2297]	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
PCCE #47 W Ash Street - SW547 [ID: 2298]	\$ -	\$ 35,000	\$ -	\$ 125,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 160,000
PCCE #48 S West Blvd - SW548 [ID: 2299]	\$ -	\$ 35,000	\$ -	\$ 200,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 235,000
PCCE #49 N William Street - SW552 [ID: 2300]	\$ -	\$ 45,000	\$ -	\$ 200,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 245,000
PCCE #50 N Country Club Dr Club Ct - SW553 [ID: 2301]	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 265,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 265,000
System Expansion	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,000,000	\$ 2,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 17,000,000
Undefined projects	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 13,000,000
Henderson Branch	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,000,000	\$ 2,000,000														\$ 4,000,000
System Capacity Enhancement	\$ -	\$ 945,250	\$ -	\$ 1,160,000	\$ 1,275,000	\$ 2,225,000	\$ 2,225,000	\$ 2,225,000	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 34,055,250
B-8 Relief Sewer - Rangeline & Vandiver [ID: 794]	\$ -	\$ -	\$ -	\$ -	\$ 250,000	\$ 2,000,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,250,000
B-9 Relief Sewer - Garth & Vandiver [ID: 795]	\$ -	\$ 675,000	\$ -	\$ -	\$ 75,000	\$ 225,000	\$ 225,000	\$ 225,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,425,000
5th and Wilkes Relief Sewer Phase 2-SW542 [ID: 2284]	\$ -	\$ 270,250	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 270,250
FBRS - 4th Street - Elm to Rogers/Broadway - SW258 [ID: 1864]	\$ -	\$ -	\$ -	\$ -	\$ 400,000	\$ -	\$ 2,000,000	\$ 2,000,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 4,400,000
Upper Bear Creek Sewer Replacement - SW554 [ID: 1529]	\$ -	\$ -	\$ -	\$ 60,000	\$ 550,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 610,000
Nelson Creek Outfall	\$ -	\$ -	\$ -	\$ 500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 500,000
Mill Creek Trunk Sewer	\$ -	\$ -	\$ -	\$ 600,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 600,000
- Capacity Enhancement/I&I Reduction Program - Undefined Projects	\$ -	\$ -	\$ -	\$ -	\$ -				\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 24,000,000
Pump Station R/R	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,500,000	\$ 330,720	\$ -	\$ 600,000	\$ 2,800,000	\$ -	\$ -	\$ 500,000	\$ -	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 7,230,720
i. Clear Creek PS	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,500,000	\$ 330,720	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,830,720
ii. Little Bonne Femme	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 500,000	\$ -	\$ 1,500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,000,000
iii. Cow Branch	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 600,000	\$ 2,800,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3,400,000
Neighborhood Building Backup Allevation	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 500,000
Undefined projects	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 500,000
System Renewal Program	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 54,000,000
Annual Sewer Main and Manhole Rehab	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 2,700,000	\$ 54,000,000
Asset Management	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 1,500,000
Undefined Projects	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 1,500,000
Wet-Weather Program Planning and Management	\$ 250,000	\$ 250,000	\$ 250,000	\$ 250,000	\$ 250,000	\$ 250,000	\$ 250,000	\$ 250,000	\$ 250,000	\$ 250,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 3,500,000
Annual Flow Monitoring	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000	\$ 150,000											\$ 1,500,000
Annual Program Support	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 2,000,000
Cleaning Program	\$ 175,000	\$ 175,000	\$ 250,000	\$ 250,000	\$ 250,000	\$ 250,000	\$ 250,000	\$ 250,000	\$ 250,000	\$ 250,000	\$ 880,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 630,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 4,900,000
Contracted Cleaning Services	\$ 175,000	\$ 175,000	\$ 250,000	\$ 250,000	\$ 250,000	\$ 250,000	\$ 250,000	\$ 250,000	\$ 250,000	\$ 250,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,350,000
CCTV Truck	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 750,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 750,000
Jet Truck	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 500,000
Staff (2)	\$ -	\$ -	\$ -	\$ -	\$ -						\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 1,300,000
Other - Annual Sewer Improvement Cost	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 10,000,000
Annual Sewer System Improvements	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 10,000,000
Other Planning Studies	\$ -	\$ -	\$ 150,000	\$ -	\$ -	\$ 150,000	\$ -	\$ 200,000	\$ -	\$ -	\$ 150,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 650,000
Pump Station Capacity Study	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 150,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 150,000
Flat Branch Flood Study and Smoke Testing	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 200,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 200,000
Cost of Service/Rate Study	\$ -	\$ -	\$ 150,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 150,000
Perche Creek Flood Study	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 150,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 150,000
Total	\$ 4,715,000	\$ 4,990,250	\$ 4,025,000	\$ 6,290,000	\$ 5,150,000	\$ 10,520,000	\$ 9,015,720	\$ 7,680,000	\$ 7,590,000	\$ 9,790,000	\$ 7,620,000	\$ 6,720,000	\$ 7,220,000	\$ 6,720,000	\$ 8,720,000	\$ 6,720,000	\$ 6,720,000	\$ 6,720,000	\$ 6,720,000	\$ 6,720,000	\$ 140,365,970

Table A3. Stormwater Management Capital and Programmatic Cost Forecast, in 2024 Dollars. Estimates include potential capital, operation and maintenance, and planning costs that may be required in addition to the City’s current programs based on information currently available. Note that project costs were allocated to specific years for planning purposes only and are highly dependent on voter approval future stormwater rate increases. Consistent with the adaptive management framework embodied in the integrated planning process, actual project costs and timing will continue to be refined as the City implements the IMP over time.

Project	Columbia IMP Phase 2 - Stormwater Management																				Total
	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	
Flood Control Projects	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 22,500,000
<i>i. Projects beyond 2030</i>						\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 22,500,000
System Renewal Program	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,125,000	\$ 2,125,000	\$ 2,125,000	\$ 2,125,000	\$ 2,125,000	\$ 2,125,000	\$ 2,125,000	\$ 2,125,000	\$ 2,125,000	\$ 2,125,000	\$ 2,125,000	\$ 2,125,000	\$ 2,125,000	\$ 2,125,000	\$ 2,125,000	\$ 31,875,000
<i>i. Lining or Replacment of 100% of CMPs</i>						\$ 825,000	\$ 825,000	\$ 825,000	\$ 825,000	\$ 825,000	\$ 825,000	\$ 825,000	\$ 825,000	\$ 825,000	\$ 825,000	\$ 825,000	\$ 825,000	\$ 825,000	\$ 825,000	\$ 825,000	\$ 12,375,000
<i>ii. Replacement 50% of Structures</i>						\$ 1,300,000	\$ 1,300,000	\$ 1,300,000	\$ 1,300,000	\$ 1,300,000	\$ 1,300,000	\$ 1,300,000	\$ 1,300,000	\$ 1,300,000	\$ 1,300,000	\$ 1,300,000	\$ 1,300,000	\$ 1,300,000	\$ 1,300,000	\$ 1,300,000	\$ 19,500,000
Condition Assessment	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 230,000	\$ 230,000	\$ 230,000	\$ 230,000	\$ 230,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 2,450,000
<i>i. 1 New CCTV Crew</i>						\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 1,950,000
<i>ii. CCTV Subcontractor (27.1 miles)</i>						\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 500,000
SW Master Plan	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 1,400,000
<i>i. Program and Data Management Support</i>						\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 750,000
<i>ii. SW Master Planning Efforts</i>						\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000	\$ 130,000		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 650,000
Stream Erosion	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 172,500	\$ 172,500	\$ 172,500	\$ 172,500	\$ 172,500	\$ 172,500	\$ 172,500	\$ 172,500	\$ 172,500	\$ 172,500	\$ 172,500	\$ 172,500	\$ 172,500	\$ 172,500	\$ 172,500	\$ 2,587,500
<i>i. Capital Improvement Costs</i>						\$ 172,500	\$ 172,500	\$ 172,500	\$ 172,500	\$ 172,500	\$ 172,500	\$ 172,500	\$ 172,500	\$ 172,500	\$ 172,500	\$ 172,500	\$ 172,500	\$ 172,500	\$ 172,500	\$ 172,500	\$ 2,587,500
Runoff Treatment	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,440,000	\$ 1,440,000	\$ 1,440,000	\$ 1,440,000	\$ 1,440,000	\$ 1,440,000	\$ 1,440,000	\$ 1,440,000	\$ 1,440,000	\$ 1,440,000	\$ 1,440,000	\$ 1,440,000	\$ 1,440,000	\$ 1,440,000	\$ 1,440,000	\$ 21,600,000
<i>i. 1 New Staff (Engineer)</i>						\$ 90,000	\$ 90,000	\$ 90,000	\$ 90,000	\$ 90,000	\$ 90,000	\$ 90,000	\$ 90,000	\$ 90,000	\$ 90,000	\$ 90,000	\$ 90,000	\$ 90,000	\$ 90,000	\$ 90,000	\$ 1,350,000
<i>ii. Capital Improvement Costs</i>						\$ 1,350,000	\$ 1,350,000	\$ 1,350,000	\$ 1,350,000	\$ 1,350,000	\$ 1,350,000	\$ 1,350,000	\$ 1,350,000	\$ 1,350,000	\$ 1,350,000	\$ 1,350,000	\$ 1,350,000	\$ 1,350,000	\$ 1,350,000	\$ 1,350,000	\$ 20,250,000
MS4 Program	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 105,000	\$ 105,000	\$ 105,000	\$ 105,000	\$ 105,000	\$ 105,000	\$ 105,000	\$ 105,000	\$ 105,000	\$ 105,000	\$ 105,000	\$ 105,000	\$ 105,000	\$ 105,000	\$ 105,000	\$ 1,575,000
<i>i. Annual CAM projects</i>	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 450,000
<i>ii. Outreach and Education</i>	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 75,000	\$ 1,125,000
Total	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 5,752,500	\$ 5,752,500	\$ 5,752,500	\$ 5,752,500	\$ 5,752,500	\$ 5,522,500	\$ 5,522,500	\$ 5,522,500	\$ 5,522,500	\$ 5,522,500	\$ 5,522,500	\$ 5,522,500	\$ 5,522,500	\$ 5,522,500	\$ 5,522,500	\$ 83,987,500



3610 Buttonwood Drive
Suite 243
Columbia, MO 65201-3721
(573) 886-8931

hdrinc.com

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