February 24, 2015

City of Hot Springs
Engineering Department

133 Convention Blvd.
Post Office Box 700
Hot Springs National Park,
Arkansas 71902
(501) 321-6861
(501) 321-6967 Fax

Arkansas Department of Environmental Quality
Water Division
ATTN: Amy Schluterman
5301 Northshore Drive
North Little Rock, AR 72118

Re: City of Hot Springs Annual Report
CAO LIS No. 08-099

RECEIVED
FEB 27 2015

Ms. Leslie Allen-Daniel,

This annual report is submitted to the Arkansas Department of Environmental Quality (ADEQ) to comply with CAO LIS No. 08-099, Attachment A: Schedule of Compliance Activities, Condition II. 1. The City of Hot Springs (CHS) continues the efforts presented in the document "City of Hot Springs – Response to Consent Administrative Order" dated November 14, 2008 (Response to CAO) with respect to the sanitary sewer collection system. This report is generally submitted in the same format as the previous annual reports which specifically address the Major Goals presented in the aforementioned response from the city.

The City of Hot Springs continues our efforts in addressing the issues facing our wastewater collection and treatment systems. We remain committed to achieving the goals set forth in the CAO and to instilling a value of stewardship among our staff to achieve those goals. Our efforts remain centered on correcting items that have a direct impact on reducing inflow and infiltration, the root cause of the system deficiencies that lead to wastewater overflows and treatment capacity issues. The Consent Administrative Order, which was issued in August, 2008, identifies the aforementioned problems and mandates that the City of Hot Springs address these issues in a defined time frame. The city takes pride in our accomplishments to date and feel that we have and continue to make great strides towards the ultimate goal of preventing wastewater overflows and treatment bypasses through a systematic effort that also insures long term compliance.

The latest annual report presented in February 2014 provided a summary of our efforts to date and our overall plans to achieve compliance with respect to dry weather overflows. In like fashion, this 2015 report will further update our continuing efforts regarding preventing wastewater overflows by utilizing our innovative pump station monitoring system, ongoing pump station replacement and repairs, line rehab and replacement, manhole rehab/replacement, improved maintenance procedures, and internal staff training in process improvement.

Since the issuance of the CAO in 2008, the city has spent and/or encumbered approximately $39 million on projects related to achieving compliance. This funding was made available by the 2009 and 2014 Bond funds. This funding has been effectively administered by carefully prioritizing the system issues and developing projects to resolve the items noted in the August, 2008 CAO. This was primarily made possible through the issuance of bonds in December, 2009 that yielded $26.8 million in funds that were dedicated to this effort. The city achieved the goal to have these funds largely expended on specific projects by end of year 2013, as required by the bond language. We also realized another bond issue would be needed for projects to achieve requirements set forth in the CAO. This second set of projects is funded by the bonds issued in Dec. 30, 2013, in the amount of ~$40MM. This report includes a proposed list of projects funded by the 2014 funding plan that will address the work performed to date and after. It is attached to this report as Appendix A and includes a complete listing of all completed, current, and planned projects indentified at this time along with actual and estimated costs for each. It is important to note that we continually analyze and revise this list of projects with our staff and engineering partners to ensure we are staying the course that best addresses the goal of achieving compliance with our CAO mandates. We have identified some priority changes to future projects based on data provided via the post rehab monitoring results. We remain committed to continually reviewing and updating the project list in order to ensure the most effective solutions based on the most current data.

In the 2012 summary we provided the final component (Chapter 6) of the Sewer Evaluation and Capacity Assurance Plan (SECAP) as well as an Executive Summary, which were included as Appendix B. Post Rehabilitation flow monitoring was conducted in 2013 in areas where extensive infrastructure repairs were made and significant results were achieved. Post rehab flow monitoring will be performed in 2015 to validate work performed in 2014. The City's Wastewater hydraulic model was updated with the post rehabilitation flow monitoring data and updates to the SECAP's capacity projects were made. It is important to note that the list of improvements is extensive and includes substantial projects that are not directly related to elimination of known overflows, and therefore may not be required to meet the requirements of the CAO. City staff will prioritize and phase these projects in order to first perform work that would have a more immediate impact on the wet weather overflows. While staff acknowledges that a portion of this work may not be directly related to system overflows, we are committed to a long term schedule of capital improvements that will continue to improve the overall health of our wastewater system.

We continue to realize benefits from our AMI water meter system completed in 2011. The accuracy in water consumption is directly affecting our revenues for the Wastewater fund. As you are aware, our wastewater rates are based on actual water consumption and not a flat rate charge. We have seen this provide an increase in wastewater revenues and expect that trend to continue in the coming years. Due to projects such as these and other budgetary and operational process improvements, the overall health of our Wastewater Fund continues to be

stable. Annual rate increases approved in 2009 and 2014 continue to provide the funds necessary to meet our debt obligations as well as fund our operating budget. The city's rate consultant will, as appropriate, continue to review our wastewater rates with regard to the current and planned budgetary obligations to further ensure that we are in good condition moving forward.

The City of Hot Springs acknowledges that our efforts cannot stop once compliance is achieved. Our operating budget(s) will include provisions for additional equipment needed to continue and improve our preventive maintenance program. Efforts such as pipeline cleaning and pre-treatment programs continue to be developed, implemented and/or improved. Addressing these components, as well as committing to hire, train and retrain qualified staff, is imperative to continually improve on and preserve the work now being performed. As noted in the 2012 report our reorganization and staffing changes in 2011 continue to add value to this effort. A maintenance planning process has been implemented and is yielding positive results in that pursuit. The City of Hot Springs also remains committed to keeping our customers informed of how the funding from the 2009 Bond Issue is being administered. In 2012 we provided a Wastewater Bond Projects Update detailing our efforts to date. That brochure was included in the 2012 report as Appendix C. In 2013 we produced a video that is intended to update our customers on the current status and our commitment to continue the efforts related to improving our wastewater system. This video is available on several media venues for the public to view. We have utilized our web site and local public information television programs to inform our customers of the projects and progress to date of our CAO related efforts.

We trust you would agree that our continued efforts demonstrate the city's commitment in addressing all of the issues outlined in the CAO. We sincerely appreciate the continued cooperation from ADEQ and EPA in working with us as we progress in our efforts. Please feel free to contact me at (501) 321-6860 if you have any questions or need additional information.

Sincerely,

Bill Burrough
Deputy City Manager City of Hot Springs

cc: City of Hot Springs Board of Directors
David Watkins, City Manager
CAO File

ANNUAL STATUS REPORT

1. ACHIEVE COMPLIANCE WITH REGARDS TO DRY WEATHER OVERFLOWS BY JANUARY 1, 2011.

As mentioned in the cover letter to this report, our previous annual report submitted on Feb. 28, 2012 included a special section dedicated to achieving compliance with regards to dry weather overflows by January 1, 2011 as stated in the CAO. At that time, it was reported that efforts we had made in the twelve (12) month period since the time that funding was actually acquired in December, 2009 were substantial and we felt that we had complied with the mandate. However, it was stated that many of the capital projects and maintenance procedures that had a direct impact on dry weather overflows were ongoing. Since that time, we continue to make great strides in monitoring our large number of pump stations as well as the repair, rehabilitation and maintenance of those stations. This section will provide an update on those projects.

As stated in previous reports and conversations, city staff has defined certain projects and/or practices that will directly impact current issues related to dry weather overflows and allow us to achieve compliance with the order. As these types of overflows in the Hot Springs Wastewater System are almost entirely related to pump station issues (power outage, lack of and/or failing SCADA units, mechanical pump failure, etc.), our efforts are primarily focused on addressing these shortcomings. The only non-pump station related item identified to address dry weather overflows is the development of an effective pipeline flushing/cleaning program. Therefore, the following is an update on those items that staff feels represents the major issues that lead to dry weather overflows.

1. Pump Station Rehabilitation and Backup Power
2. Major Pump Station SCADA System
3. Minor (Grinder Station) SCADA System
4. Preventive Maintenance Program
5. Pipeline Cleaning Program

PUMP STATION REHABILITATION AND BACKUP POWER GENERATORS:

The City of Hot Springs has identified that the primary causes for dry weather overflows include equipment failure/malfunction and the loss of power at a pump station. The City retained Garver, LLC to begin evaluating pump stations that were considered to be critical to the collection system. An initial list of 76 pump stations for evaluation was developed by the City based on the condition of the station, frequency of overflows and station capacity. Garver conducted meetings with City personnel to gather any available information for the pump stations on this list. Garver then began performing field investigations of the listed pump stations. Pump operating performance, influent flowrate, power usage, run hours, site measurements, equipment information, general site notes, and pictures were recorded at each station. Collection information in the field regarding pump characteristics and overall site layout was necessary to progress further with the collection system evaluation.

Once field investigations were completed, the data collected was compiled and developed into a report for each station. The reports included field information, wet well drawdown calculations, photographs, and recommendations for improvements. An example of those reports was included with the Feb. 28, 2012 report.

The approach for evaluating the pump stations has evolved over time and evaluations are now being performed based on drainage basins. This approach allows for measuring the capacity of a particular pump station and determining if the pumps and force mains are adequate. Field evaluations have been completed for over 100 pump stations and reports have been compiled for more than 60 pump stations.

Design phase estimates on household wastewater contributions, inflow and infiltration, and peaking factor are being used to calculate the total peak flow for each pump station rated above 5 HP in the Mazarn basin, starting with pump stations furthest "upstream" from the basin collection point and working "downstream". Total peak flows have been calculated for 60 pump stations in the Mazarn basin. System curves and hydraulic grade lines have been developed for seven major pump stations. After completing system curves for all pump stations, analysis and design can begin on upgrading pump stations and force mains to eliminate wet weather overflows. RJN Group has been retained by Hot Springs and has presented Hot Springs with an accurate model of the collection system. The model serves as the essential tool in verifying pump station capacity calculations by allowing the comparison of predicted flows and calculated flows at a pump station. If these values are in agreement, then a greater level of confidence can be placed in the design effort. If a discrepancy between the two is identified, then additional investigation is required to determine the cause of this disagreement. Other design approaches are being considered in this phase such as consolidating several smaller pump stations into one new pump station or into an upgraded existing station. This approach could reduce operational costs by having fewer pump stations and reducing staffing cost needed for maintenance and inspection. The model developed by

RJN Group was recognized nationally at the annual WEFTEC conference in New Orleans, La. in Oct, 2012. Garver presented a paper on this topic at the 2013 WEFTEC conference.

Currently, we are addressing issues at a number of our wastewater pumping stations related to backup power, mechanical dependability and SCADA monitoring. While the preceding information describes our current efforts, we do realize that it does not address all of our pump stations. In addition to the pump stations detailed above, there are a number of duplex grinder stations used for small subdivisions and commercial businesses that will also be evaluated with regards to mechanical dependability, back-up power and SCADA. These evaluations will be performed once all major stations and individual grinder stations are addressed.

MAJOR PUMP STATION SCADA:

As mentioned in previous reports, the city acknowledges that one of the most critical shortcomings within our wastewater collection system is the remote monitoring of our 3,200+ wastewater pump stations. Historically only a small portion of these stations had remote monitoring and of those that did, many of the units were obsolete and/or were no longer supported by the company that supplied them. This lack of remote monitoring was primarily responsible for the inability of staff to respond to a system fault until after an overflow occurred. For this reason, the City of Hot Springs entered into contract to develop a SCADA Master Plan to provide a comprehensive, standardized remote monitoring system utilizing equipment that incorporates an open architecture that is not proprietary. This would allow us to continue to build upon a stable, standardized system with compatible equipment that can be operated and programmed by anyone who understands basic PLC programming. This plan was completed in 2008 by Brown Engineers. Funds have been budgeted in 2015 to update the current SCADA Master Plan once again.

With regards to implementation of the SCADA Master Plan, the city has installed major components related to the communications backbone and computer hardware and software at the Ouachita Water Treatment Plant. This includes a new Master Radio with connections to the new computer-based Ignition System Platform Human Machine Interface (HMI) system. A new radio repeater was installed at the West Mountain Tower which will provide coverage for the water distribution system and sewer collection system. The first radio-based Remote Telemetry Unit (RTU) has been installed at Music Mountain Pump Station. With the communications system complete and design of the first 80 RTU's complete, construction began in late 2012 to install the RTU's on major lift stations. The cost for this project was $1,600,000.00 and was completed in December 2013. This SCADA RTU Installation Phase 2 was designed and implemented by Brown Engineers and provides SCADA system visibility and alarm/alert capability to truly monitor all of these major sites.

For these first 80 remote sites, The SCADA system remote equipment is split into three categories. The first category is the larger pump stations and tanks which require near real-time information regarding pump status, pressures, flows, and tank levels. There are approximately 20 of these sites. The second category is the wastewater duplex pump stations, and there are approximately 60 of these sites. The Sensus FlexNet metering system, allows these 60 small duplex pump station RTUs to deliver data to the SCADA system HMI computers through another database connection developed by Brown Engineers.

The third category is the Grinder Lift Stations of which there are over 3,200 sites. These are described later in this report under the heading Grinder Lift Station SCADA.

The remote site data consists of both water and wastewater systems. The SCADA system must send the appropriate data to our Ouachita Water Plant and Regional WWTP so the treatment and distribution operators have access to real-time data. Brown Engineers will configure the Human Machine Interface (HMI) computers at each plant for these graphical representations of the remote data as well as historical trending, alarming and reports for these remote facilities. A unified HMI software system is planned so that SCADA system data can be made available at any plant, as well as for management, supervisors, and engineers in other locations who need access to the system information. The Regional WWTP HMI was updated in early 2013, however, further control systems upgrades are required for SCADA operations and those are currently being implemented. The HMI computer system upgrades are critical since they provide visibility into the process for all our staff as well as the HMI computer software can be configured for alerting the staff of process conditions.

GRINDER LIFT STATION SCADA:

As mentioned in the previous annual report, our consultant, Brown Engineers has worked with the SENSUS Company to utilize our existing automated water meter reading communications system through a modified electrical meter socket to provide a cost-effective alarm status for over 3200 individual wastewater grinder stations that we have in our system. Previously, none of these stations were equipped with remote monitoring devices other than visual and/or audible alarms. We were dependent on area residents to notify us of problems with these stations, hopefully, before an overflow event occurred. Many of these stations, however, are located at homes that are not occupied full-time and alarms may go unnoticed for some time if the property owners are not present. Also, the alarm system may be inoperable and we would have had no way of recognizing a fault without individually checking each station.

This system, which utilizes our AMI (automated water meter reading system) includes a modified electrical metering device (Radio Alarm Meter) that will deliver a high level or

power fail alarm to our central SCADA system via the new remote communications network. The new Alert Management System allows us to respond independently without relying on homeowner notification and thereby greatly enhances our ability to prevent overflows on grinder stations. Including the cost of engineering design, application development, programming and system integration, the cost for each installation is approximately $458 per site. This cost is substantially lower than any traditional RTU and will provide the critical data to our staff real-time. This project was awarded to All Service Electric and is complete. The devices that have been installed are working properly and provide alarm status of over 3,000 grinder stations. The cost for this work was $869,504.60.

Again, we did not propose this work in the original scope presented in our response to the CAO as we were not aware of any practical way to effectively monitor these stations at a reasonable cost. We are grateful to our consulting engineer, Brown Engineers, and SENSUS metering company who worked together to craft a solution to this historical issue. This project was recognized in 2012 by the ACEC (American Council of Engineering Companies) and received the Grand Conceptor Award.

Another benefit realized from the SENSUS FlexNet metering system will also be the use of small duplex pump station RTUs that can deliver data to the SCADA system HMI computers through use of another database connection developed by Brown Engineers. These enhancements continue to add value to the Sensus Advanced Metering Infrastructure.

Further power system improvements were put in place at the Purchasing/Finance Building in 2014. A new standby generator was bid in late 2013 and installation completed in 2014. This generator is integral to our overall SCADA collection of data related to our AMI and Grinder Alert systems.

Generator Monitoring Systems have been installed at 16 critical sites to allow for remote monitoring of the generator engine controller and the automatic transfer switches that control power from the electric utility or generator. This project was completed in late 2014.

PREVENTIVE MAINTENANCE PROGRAM:

The City of Hot Springs staff continues to place emphasis on a comprehensive and effective preventive maintenance program as we realize it is critical to ensure pump station(s) and pipeline reliability. Currently, the CHS staff has a new crew dedicated solely to preventive maintenance. This has allowed for the other major station crews to focus on pump station planned maintenance and repair. We have steadily looked to improve and upgrade the process this first full year of our preventive maintenance program.

The Maintenance Control Center's ability to monitor SCADA from their desktops along with email alert notifications has proven to be a valuable asset for the staff. This program has helped reduce response time and thereby greatly reduced the potential for many SSO's. Maintenance Control has also developed preventive and planned maintenance programs and has improved daily operational processes. These improvements have had a direct impact on the group's efficiency. A recent upgrade to the Cityworks software has allowed for improved tracking and reporting. City staff continues to work towards improving our maintenance programs utilizing industry best practices, innovative techniques and Cityworks software.

We continue to gather information on our extensive inventory of pump station equipment. During this first year of implementing the preventive maintenance program we have confirmed what everyone already realized, each station is unique and the "one size fits all" approach does not apply to our vast system and facilities. With input from both our maintenance staff and the vendors who supply our pumps we continually upgrade our information data base and make the necessary changes to better service each station. We realize that this effort will be an ever growing and daunting task; but we know it is a necessity that the City of Hot Springs staff remains steadfast and unremittingly looks for improved ways to ensure the success of this effort.

PIPELINE CLEANING PROGRAM:

Staff continues to evaluate and revise our pipeline cleaning program as situations arise. We continue to update our list of known trouble areas. In 2014, our Wastewater Collections Division cleaned and/or televised approximately 100,000 ft. of wastewater mains to address issues and identify potential problems. This group works closely with the preventive team on flushing mains for problems and also as a preventive maintenance measure. Our staff once again flushed over 96,000 ft. of mains in 2014. We continue these efforts both in response to reported issues and also as part of the monthly schedule to flush mains that are habitually plugging for various reasons. We continually monitor our overflow reports that are a result of grease, etc. Ensuring any of these that appear to be repeat offenders remain on the list to be periodically cleaned as a preventive measure.

The City of Hot Springs Wastewater Pretreatment Department remains diligent in their inspection efforts as they continue to inspect commercial establishments that have food service capable of producing grease waste. All this to ensure that these businesses follow the Pretreatment Ordinance requirements related to trapping and disposing of waste grease. Based on these focused efforts since the passage of an amendment to the Pretreatment Ordinance in 2002 which included strict regulations related to fats, oils and greases, we have seen dramatic improvements. We have experienced a reduction in the occurrences of SSO's and sewer line blockages as a result of regulating the design, installation, cleaning schedule and maintenance of the grease interceptors, oil separators and grease recovery device (GRD)

units. Educating the general public about the hazards associated with the disposal of cooking grease has also had an impact in reducing SSO's. Our Pretreatment Division has taken enforcement action with several businesses in recent years to stress to local businesses that our ordinance will be strictly enforced.

As we complete projects related to reducing inflow and infiltration, we must be aware that these efforts may lower the flow and velocity in the lines which may increase the potential for blockages/build up due to grease. With this said, we must continue to keep our fats, oils and grease program a top priority for our Pretreatment Division.

SUMMARY OF SECTION 1 – DRY WEATHER OVERFLOWS

Given the listing of work mentioned in this report, the City of Hot Springs continues to be proud of our efforts to date targeted at addressing the dry weather overflows. Post rehab monitoring data provided in 2013 had indicated a reduction in I&I of ~21% since early 2014. We fully recognize this is no small achievement .With the additional scope of work currently in progress we remain hopeful the next phase of flow monitoring will continue that trend. Our current plan is to perform the next phase of post rehab flow monitoring in 2015. Now that we have once again raised the bar, we accept the fact our challenge will be to sustain our overall efforts. Everyone involved is committed to accomplish the remainder of the work required as we endeavor to achieve the goal of eliminating overflows. We believe that the work completed to date, in addition to future work (detailed in Appendix A) has shown our commitment to our community to provide a safe and reliable wastewater collection and treatment system(s). We continue to be encouraged by the trends we are seeing related to plant flows, overflow volumes, etc. We are extremely excited about our ability to develop and utilize new technology that allows us to monitor large components of our system. Those items once thought to be impractical due to both the logistics and cost(s). The city owes our gratitude to all the firms who have worked on the vast array of projects to date. By partnering with these groups, we have found innovative and dependable ways to develop cost effective solutions to the problems we face. While we have not eliminated all dry weather overflows, we have seen a reduction in overflow volumes due to our in-house efforts targeted at reducing response times, improving notification methods, etc.

2. ACHIEVE COMPLIANCE WITH REGARDS TO WET WEATHER OVERFLOWS BY JANUARY 1, 2018.

On August 27, 2010, the City of Hot Springs submitted the original System Evaluation and Capacity Assurance Plan (SECAP), along with an update that was current at the time of that correspondence. An updated SECAP, which includes the results and the wastewater collection system assessment and hydraulic capacity analysis dated September 29, 2011 was included with the February 28, 2012 update. That report outlined all of the inflow and infiltration sources found in the field as well as the capacity and structural deficiencies within our system that need to be addressed based on priority.

With respect to our efforts related to wet weather overflows, all items mentioned in the special report related to dry weather overflows contained herein will obviously contribute to satisfying the wet weather overflow issues as well. In addition to those efforts, CHS retained RJN Group, Inc. to perform a Sanitary Sewer Condition Assessment and Capacity Evaluation Study to evaluate the collection system and identify potential deficiencies that may require attention. This study included a system wide flow monitoring program which has been completed. The results, which have been presented to ADEQ and EPA, provided information that allowed us to prioritize our efforts related to the physical inspection of the collection system. Of the manholes inspected, 4,500 will require some type of corrective action, ranging from sealing of the ring to total replacement. The first two of a total of four phases of manhole rehabilitation contracts have been completed totaling $3,410,523. This effort removed approximately 2.98 million gallons of inflow/infiltration for a one year storm event. This project included 1,849 manholes that were rehabilitated and 139 manholes that were completely replaced. Post Rehabilitation flow monitoring occurred in twelve basins in which manhole rehab concluded within the first project and a 22% reduction in overall inflow was observed. Construction began on the remaining two phases in May 2014 and construction will conclude in early 2015. This project included 1,704 manholes that were rehabilitated and 60 manholes which were completely replaced. This project totaled $2,181,111 and will remove an approximate 2.16 million gallons of inflow/infiltration for a one year storm event.

In addition, 662 manholes were identified as good candidates for Uretek, utilizing their patented polymer and $650,000 was awarded to rehabilitate those manholes and this project concluded in early 2014. This project addressed infiltration more than inflow and will have addressed approximately 0.806 million gallons of infiltration. The City of Hot Springs, through its aggressive campaign of repairing all defected manholes across the entire service area, will have spent over $6.20 million dollars and removed over 5.94 million gallons of inflow/infiltration for a one year storm event. The results serve to date further validate that our plan is effective and well thought out. Additional post rehabilitation flow monitoring is scheduled in 2015 to scorecard the construction projects undertaken in 2014.

More than 10,500 linear feet of gravity pipe feeding the Stokes Pump Station has been designed and will begin construction in the early portion of 2015. Leaving the Stokes Pump Station a new 24 inch parallel force main is nearing design and should bid in the latter part of 2015. These two projects will eliminate the choke point of a significant capacity restraint entering and leaving Stokes Pump Station. Along with upgrades to Stokes Pump Station these projects will remove 18 historical overflows the City has along McLeod St.

In addition to the manhole repairs, RJN has completed smoke testing of all the system's gravity pipelines and completed CCTV on the lines that indicated the possibility of problems during the smoke testing and visual pipe efforts. The first phase of pipeline replacement has been completed by The Heller Company totaling $1,748,007. This project addressed 15,227 linear feet of sewer replacement and removed approximately 2.424 million gallons of I/I and improve the overall efficiency of the collection system. An additional 10,100 linear feet of sewer replacement has been designed. This project should remove approximately 0.290 million gallons of I/I, as well as address specific structural deficiencies. Future phases of pipeline replacement projects will be developed and bid in order to comply with the January 1, 2018 deadline related to wet weather overflows and may require that the city obtain additional funding through future bond issues.

Several major projects that will have a direct impact on our efforts to address wet weather overflows are updated below:

Fairwood Force Main/Pump Station Improvements - This project, with a total cost of approximately $3.5 million, was completed in early 2014. This project consisted of upgrading the Fairwood pump station, one of our largest pump stations, and installing a new large diameter force main that will provide additional capacity within our collection system and help prevent capacity related overflows. The force main scope of work for this project, in its entirety, includes over 7 miles of new piping. Most of the piping is 24" diameter. The scope of work has been broken down into (4ea) phases due to the significant size of the effort. The Phase I Force Main project was originally bid in 2009, but due to lack of sufficient funding was placed on hold. It was re-bid in 2010 and was completed in 2012. Phase II, completed in 2013 is in service at this time. Phase III of this project has been designed and construction is scheduled to begin in early 2015. Throughout the design of the final phases our wastewater model has been utilized for various scenarios. All intended to validate the engineering plans and ensure pipe sizing and conveyance plans will result in the most effective design. The final phase has been validated by the model and we expect to complete design of that final phase (Phase IV) in early 2015. The project to construct the final phase of the force main will bid in 2015 with completion expected in late 2016.

Molly Creek Pump Station - This project which involved upgrading and rehabilitation of the Molly Creek Pump station, one of the system's largest, has been completed and is in service.

Hot Springs Creek Pump Installation – City staff installed a new replacement pump at the Hot Springs Creek Pump station in 2011, which is our largest station within our system. This improves the reliability of this pump station in wet and dry conditions.

Stokes Creek Gravity Main/ Force Main – Projects to upsize the existing gravity main feeding the Stokes Lift Station and constructing a parallel force main from the Stokes Lift Station are in the design stages. The gravity main project consists of upsizing approximately 10,700 linear feet of sewer with an estimated construction cost of $3.5 million. The Stokes Force Main project will consist of installing a new parallel force main of approximately 20,000 linear feet. This force main will be routed from the Stokes Lift Station and manifold into the new Fairwood Force Main previously mentioned. It is estimated that the construction cost for this project will be approximately $4.5 million. The completion of this project will eliminate an anticipated 18 wet-weather overflows on the gravity main entering the Stokes Lift Station.

Annual Wastewater Pipeline Replacements – The city currently develops plans and specifications for pipeline replacements based on trouble reports and known deficiencies. Based on our limited funding in the past, we have budgeted a little more than $200,000 over each of the past 2 years.

Appendix A includes projects directly attributed to reliability and/or capacity related issues. Fairwood Force Main Phase I and II have been completed. Five major pump station rehab projects (Fairwood, 10A, 10B, 10D, and Gulpha) have been completed. Improvements at our two wastewater treatment plants are in progress. The Grit Chamber project for our Regional Facility is in the design stage and progressing as planned. The SWWWTP facility Tertiary Filter project is in progress and will complete early 2015.

The projects listed above, as well as a large number of future projects are included in Appendix A along with the status of each. This information represents all of the work to date as well as future projects that may change in size and/or scope based on further evaluation of the system components.

3. DEVELOPMENT OF A COMPREHENSIVE MAINTENANCE PROGRAM FOR ALL WASTEWATER COLLECTION SYSTEM ELEMENTS AND DETERMINE PROPER STAFFING LEVELS TO COMPLETE THE WORK ORDERS ISSUED BY THE SYSTEM.

This item was addressed within item No. 1 in the section titled "Preventive Maintenance Program". Please refer to this section for information regarding the development and staffing of a comprehensive maintenance program. Again, city staff acknowledges that this is perhaps the most vital component of the city's long-term efforts to minimize dry weather overflows due to mechanical problems.

A recent dry weather overflow event involving our Gulpha Basin and pump station area has reinforced the need for an effective maintenance program. The overflow was caused by a line blockage near the station bar screen. This resulted in the manhole just upstream of the station overflowing. Additional measures will be required to monitor this area and mitigate the potential for dry weather overflow events. This occurrence will be used as a lessons learned approach to further refine our procedures for mitigation of dry weather overflows. Staff is currently working with RJN to reassess this entire area and develop a solution that will accomplish that challenge.

4. OBTAIN ADEQUATE FUNDING REQUIRED TO COMPLETE PROJECTS REQUIRED FOR COMPLIANCE.

As mentioned in this and previous reports, the City of Hot Springs Wastewater Fund was basically at a zero fund balance at the time the CAO was issued (2008) and struggled to include substantial capital improvements in the annual budgets. It was obvious that in order to correct the issues included in the CAO, the city would need to obtain funding that was initially estimated in excess of $37 million over the next ten years. In 2009 the city was successful at securing funding exceeding $26 million to address the first round of capital improvements. We have encumbered or spent this allocation on the initial phase of associated projects.

Based on the results of the collection system survey performed by RJN Group and the pump station surveys to date performed by Garver Engineers, it was evident that the original estimate of $37 million was insufficient to resolve the entire issue. Staff continues to refine our prioritized schedule of improvements and funding plans for projects planned for the January, 2018 deadline and beyond.

A current review of the rates by our rate consultant indicates that the schedule of rate increases which were approved in 2009 remain sufficient to fund our existing expenses and debt payments. Our most recent rate increase has enabled us to issue new debt in late 2013

in an amount of approximately $40 million which will fund the next set of projects associated with achieving compliance with the CAO mandate. This report includes a proposed list of projects through the deadline of January, 2018 that is based on the balance of the current bond issue as well as additional funding through future debt issuance.

This planned list of projects is summarized in Appendix A.

5. IMPLEMENT AN INCREASE IN WASTEWATER RATES IN EARLY 2009 TO SUPPORT PAYBACK OF FUNDING MECHANISM.

As mentioned in previous reports, the city was successful in increasing wastewater rates to a level that supported a $26 million bond issue in 2009 as well as future debt issues of approximately $40 million in late 2013. We are optimistic that as we continue to complete major projects to reduce inflow and infiltration, we will see substantial decreases in collection and treatment costs such as pumping power, emergency callout personnel, and pump station repair costs. These reductions, if realized, could enable the city to issue additional debt if required. As mentioned in item No. 4, we have maintained a contract with Economists.com, our rate consultant based in Dallas, Texas, to perform annual rate reviews of our current water and wastewater rates to ensure that we are progressing as projected. The current review indicates that we are in sound financial condition and the existing rate structure has been adjusted to fund our current needs as well as the additional debt added in 2013. The city fully understands that circumstances could change that may require future rate adjustments to insure that we are able to comply with the requirements of the CAO.

6. IMPLEMENT THE RECOMMENDATIONS OUTLINED IN THE RECENTLY DEVELOPED SCADA MASTER PLAN.

These items were addressed in item No. 1 under the "Pump Station SCADA" and "Grinder Lift Station SCADA" items as they are considered to be key elements in addressing the dry weather overflow issues. Please refer to this section for information regarding the implementation of the SCADA Master Plan. All of the projects described within these two sections are listed in Attachment A. City staff acknowledges that these improvements are vital in addressing both dry and wet weather overflows as reporting problems is imperative, regardless of the conditions that create them.

7. DEVELOP CRITICAL INVENTORY LIST AND ENSURE THOSE PARTS ARE IN STOCK.

As stated in previous annual reports, this item has been completed. We continue to monitor the inventory and parts warehouse operations to further insure that our records are accurate and all materials are properly stocked and tracked.

We continue to gain proficiency in the application and use of the Cityworks software program. This enables us to trend repair parts both overall and also for any particular pump. This tool is essential in identifying locations that may have more frequent pump issues unique to that specific area. We are able to identify and stock frequently used repair parts and replacement pumps to immediately replace faulty pumps. This is yet another process improvement for our Lift Station group.

8. EVALUATE EXISTING PERSONNEL WITH REGARDS TO EFFICIENCY, WORKLOAD, JOB DUTIES, ETC. AND IMPLEMENT NECESSARY CHANGES

During 2012, the city began utilizing the Engineering Department staff to improve our Wastewater Utilities and Engineering staff communications. The position of Utilities Director was suddenly vacated in April, 2013; the selection process to fill that vital role was completed in February, 2014. Scott Bundy was selected to fill the position of Utilities Director. Mr. Bundy comes to us with a significant work history and background in the municipal utilities arena. Bobby Harris remains in the position of Field Operations Manager and continues to provide the stability our Wastewater group needs as well as now working among the other groups within the organization. The position of City Engineer, filled in 2011 by Gary Carnahan, whose time is split 50/50 between Utilities and Public Works continues to add value in the overall process. Our staff Project Manager, Larry Merriman, whose time is dedicated 100% to management and inspection of Utilities projects, primarily those associated with the CAO projects remains committed to effectively administering the assigned projects. These key staff positions have proven to be a good resource in supporting the overall effort of the team to administer the large number of contracts and projects related to addressing the CAO as evidenced by the listing of projects included as Attachment A.

As previously mentioned, in Feb., 2014, the position of Utilities Director was filled. As mentioned above, in 2011 the city also established and filled the position of City Engineer. This responsibility had previously been included in the Public Works Directors job duties, but city administration felt it was critical to create a position dedicated to the engineering project development and review process without the responsibilities of general management of four other divisions and associated staff. The position was filled in mid 2011 with Gary Carnahan, an outside applicant with many years of direct management and consulting

experience as well as brief experience as City Engineer of a growing town in Northwest Arkansas. Mr. Carnahan manages the Engineering division which has a staff of seven, including Mr. Merriman, the Project Manager. The development of this division, which includes these two new positions, has had a dramatic impact on our efforts to manage the large number of wastewater projects and staff feels that they are a primary reason that we have been able to manage as many wastewater contracts and projects in such a short period of time. Without this division, the city would have difficulty meeting our aggressive commitments.

We continue to experience positive results as the Field Operations Manager (Bobby Harris) implements innovative approaches within the entire department to improve the overall process. As previously noted, Mr. Harris' past experience as a manager with an extensive background in maintenance and preventative maintenance has proven to be very effective within our organization. Mr. Harris continues to make an impact in this effort since his hire in early 2011. His staff has embraced the changes and continues to improve in all areas. Having the new accurate mapping system along with an exceptional work order software in Cityworks has given them the tools they need to establish a fully operational "service department" which responds quickly to alarms, is properly equipped and trained to address the problems in the field and has a work order software that allows them to build a history on the elements within our system. We expect Mr. Harris to continue to evaluate and benchmark our Utilities Division's efforts and strive to improve in areas of critical importance. In addition he continues to review our current standards and specifications to ensure our requirements are a best practices approach.

9. PROPERLY TRAIN ALL PERSONNEL IN ACCORDANCE WITH EXISTING AND FUTURE POLICIES IN REGARD TO APPLICABLE PROCEDURES IN THE WASTEWATER SYSTEM.

The City of Hot Springs continues to invest time and money to train staff with regard to being informed of and understanding current wastewater regulations, proper operations and maintenance of the system and educating them as to the current technology that is available. The city continues to send key personnel to the annual CMOM conference in Austin, Texas. In 2014, David Watkins (City Manager), Bill Burrough (Deputy City Manager), Larry Merriman (Project Manager), Bobby Harris (Field Operations Manager), and Scott Bundy (Utilities Director) attended the conference. This trip was special in that it provided our staff and engineering partners an opportunity to present our challenges and successes at the conference. The presentation was well received and Hot Springs has been invited to present once again, should we choose to. We believe this opportunity, both in 2013 & 2014, to share our challenges and successes can yield benefits to other Utilities who are addressing similar type issues in their CAO efforts.

We continue to meet with ADEQ and EPA officials and ensure we are current in understanding the rules and regulations that affect our system. We met with EPA Region 6 staff in Aug, 2014 to discuss our annual report and our overall progress. Our relationship with our state and federal officials remains both open and positive and the City of Hot Springs very much appreciates the assistance we have received from both ADEQ and EPA. It is imperative that we, as a team, share a common vision and path forward, especially given the large financial and staffing investment that is being dedicated to this effort.

The city continues to evaluate and attend appropriate training which is applicable to our effort as we must ensure personnel are adequately equipped and trained to perform required duties. Several Lift Station Division staff members have taken the initiative to educate themselves on the Cityworks software program through formal and on the job training. This allows us to better utilize this resource and, coupled with the greatly improved pump station monitoring and implementation of the dispatch center, strongly improves our ability to respond to and track trouble calls. The city is very appreciative of the initiative taken by our Utilities staff as they continue to offer process improvement in establishing an efficient and reliable in-house process to receive, respond to, and record trouble calls in our system. We recognize this is a critical step in achieving the task before us.

10. UTILIZE THE EXISTING GIS DATABASE TO INTEGRATE THE WORK ORDER SYSTEM WITH THE MAP FEATURE TO IMPROVE MANAGER'S ABILITY TO ANALYZE WORKLOAD AND IDENTIFY TROUBLE AREAS.

The city has received mapping data from RJN Group, Inc that was developed during the collection system survey. This information includes accurate horizontal and vertical coordinates of the manholes and inlets and outlets, which was used to develop the hydraulic model. We have incorporated this information into our GIS system and now have accurate maps of our gravity collection system.

The city has also received coordinates of all our grinder pump stations, which were gathered during the project that equipped all of our ~3,200+ grinder stations with remote alarm telemetry as discussed in previous sections of this report. Prior to this project, our mapping data for these stations was essentially nonexistent.

We have also received new aerial base maps flown to 6" pixel resolution of our wastewater service area. All of these improvements have greatly improved the accuracy and dependability of our wastewater mapping system. We continue to work on our ability to graphically tie our work order system to these system features for reporting and ease of historical referencing.

ADDITIONAL INFORMATION:

Schedule of Projects as Provided in Previous Correspondence

The following table lists the proposed projects intended to address the goals described above. Dates have been revised as necessary based on the latest information. A much more detailed listing of these generalized projects is included in this report as Appendix A.

Description	Estimated Percentage Complete	Current Estimated Completion Date
Collection System Survey Phase I – Flow Metering	100%	COMPLETE
Collection System Survey Phase II – MH Inspection	100%	COMPLETE
Collection System Survey Phase III – Smoke Testing	100%	COMPLETE
Fairwood Force Main Phase I	100%	COMPLETE
Pump Station SCADA, Phase I	100%	COMPLETE
Fairwood Force Main Phase II	100%	COMPLETE
Fairwood Force Main Phase III	0%	2015
Development of Wastewater System Model	100%	COMPLETE
Collection System Manhole Repairs, Phases I&II	100%	COMPLETE
Fairwood Pump Station	100%	COMPLETE
Collection System Pipeline Repairs, Phase I	100%	COMPLETE
Stokes Pump Station Revamp	0%	2016
Collection System Manhole Repairs, Phases III&IV	100%	2015
Collection System Pipeline Repairs, Phase III-IV	0%	2016
Pump Station SCADA, Phase II	100%	COMPLETE

Closing Remarks

In closing, the City of Hot Springs Utilities division remains committed to process improvement that will enable us to achieve the overall goal as mandated in our CAO. We will continue to review and refine as appropriate our planned projects utilizing our post rehab data, hydraulic model and other available technology to validate our plan is in fact the best path forward. Long term decision making is paramount to our success. The City of Hot Springs Board of Directors is dedicated to ensuring that staff is fully equipped with the means to meet the requirements of the CAO, as evidenced by the completed and proposed efforts included in this report.

APPENDIX "A" - WASTEWATER PROJECT STATUS REPORT

FIRM/CONTRACTOR	PROJECT	COST	SPENT TO DATE	STATUS	FUNDING SOURCE			
					CHS BUDGET	2009 BOND SPENT TO DATE	2014 BOND PROJECTS Estimated Cost(s)	2014 BOND PROJECTS SPENT TO DATE
CAO PROJECTS (2009-2014)								
Brown Engineers		$ 48,543.00	$ 48,543.00	COMPLETE	$ 48,543.00			
Brown Engineers	SCADA Master Plan	$ 149,400.00	$ 149,400.00	COMPLETE	$ 149,400.00			
Brown Engineers	SCADA RTU Programming	$ 196,700.00	$ 196,700.00	COMPLETE	$ 196,700.00			
Brown Engineers	West Mtn. SCADA Repeater	$ 134,540.00	$ 134,540.00	COMPLETE	$ 25,599.00	$ 108,941.00		
Brown Engineers	Grinder Station Alarm Design	$ 170,967.58	$ 169,257.90	COMPLETE		$ 169,257.90		
All Service Electric	Grinder Station Monitoring	$ 899,171.50	$ 868,782.65	COMPLETE		$ 868,782.65		
Brown Engineers	Grinder Lift Sta. Integration	$ 335,000.00	$ 335,000.00	COMPLETE		$ 335,000.00		
Dell	Computer Equipment	$ 14,867.41	$ 14,867.41	COMPLETE		$ 14,867.41		
Brown Engineers	Regional HMI Upgrades	$ 178,102.00	$ 181,617.48	COMPLETE		$ 181,617.48		
CHS Procurement		$ 16,254.81	$ 16,254.81	COMPLETE	$ 16,254.81			
Brown Engineers	SCADA / RTU	$ 138,375.58	$ 138,375.60	COMPLETE		$ 138,375.60		
Koontz Electric	SCADA / RTU	$ 932,777.00	$ 857,248.74	COMPLETE		$ 857,248.74		
Brown Engineers	Ignition Software/ SCADA Integration	$ 616,025.00	$ 609,864.75	COMPLETE		$ 609,864.75		
Brown Engineers	Ignition/ HMI Interface Software	$ 84,117.00	$ 84,117.00	COMPLETE		$ 84,117.00		
Brown Engineers	Generator Monitoring	$ 144,750.00	$ 144,026.00	COMPLETE		$ 144,026.00		
Brown Engineers	Finance Generator	$ 25,904.00	$ 25,904.00	COMPLETE				$ 25,904.00
Brown Engineers	SCADA Support(ASC)	$ 45,000.00	$ 34,734.57	COMPLETE	$ 34,734.57			
Brown Engineers	SCADA Support(ASC)	$ 45,000.00	$ 36,803.40	COMPLETE	$ 36,803.40			
Brown Engineers	Regional Generator Design	$ 9,910.00	$ 12,408.30	COMPLETE	$ 12,408.30			
Garver, LLC	Pump Station Study	$ 1,202,754.00	$ 1,202,668.13	COMPLETE		$ 1,202,668.13		
H&H Electric	Pump Sta. Project 10A	$ 1,024,104.40	$ 1,024,104.40	COMPLETE		$ 1,024,104.40		
On-Line Const.	Pump Sta. Project 10B	$ 322,594.76	$ 320,118.78	COMPLETE		$ 320,118.78		
VEI General Cont.	Hogan/Lakeside Pump Station	$ 612,013.00	$ 615,183.08	COMPLETE		$ 615,183.08		
Entergy	Hogan/Lakeside Pump Station	$ 8,276.48	$ 8,276.48	COMPLETE		$ 8,276.48		
H&H Electric	Gulpha Pump Station	$ 1,153,412.00	$ 1,153,412.00	COMPLETE		$ 1,153,412.00		
Garver, LLC	Pump Station Study	$ 1,090,000.00	$ 527,421.00	50% COMPLETE		$ 527,421.00		
City Crews		$ 243,000.00	$ 243,000.00	COMPLETE	$ 243,000.00			
Heller Co./City	Molly Creek Pump Station	$ 363,000.00	$ 363,000.00	COMPLETE	$ 363,000.00			
Heller Co./City	Tom Ellsworth Main Replacement	$ 226,765.00	$ 226,765.00	COMPLETE	$ 226,765.00			
Cobar Construction		$ 222,342.26	$ 222,342.26	COMPLETE	$ 222,342.26			
RJN Group	Wastewater Coll. Sysytem Survey Phase 1	$ 412,305.00	$ 412,302.35	COMPLETE	$ 412,302.35			
RJN Group	Wastewater Coll. Sysytem Survey Phase II	$ 350,000.00	$ 350,000.00	COMPLETE	$ 349,449.45	$ 349,449.45		
RJN Group	SSES	$ 3,369,913.00	$ 3,364,206.74	99% Complete		$ 3,364,206.74		
RJN Group	Wastewater Coll. System Survey Phase IV, V & VI	$ 629,505.00	$ 613,160.00	COMPLETE		$ 613,160.00		
RJN Group	Post Rehab Flow Monitoring	$ 73,480.00	$ 71,924.87	COMPLETE		$ 71,924.87		
RJN Group	Stokes Creek Force Main	$ 996,880.00	$ 772,092.00	85% Complete		$ 772,092.00		
Uretek/City	Manhole Rehab	$ 149,000.00	$ 149,000.00	COMPLETE		$ 149,000.00		
City Crews		$ 33,000.00	$ 33,000.00	COMPLETE	$ 33,000.00			
Uretek/City	Manhole Rehab	$ 650,000.00	$ 607,526.30	COMPLETE		$ 607,526.30		
Ark Midland RR	Fairwood Easement(s)	$ 152,000.00	$ 152,000.00	COMPLETE		$ 195,861.07		

Coakley Co.	Fairwood Force Main Phase 1	$ 1,877,257.98	$ 1,784,906.76	COMPLETE		$ 1,784,906.76		
Engineers, Inc.		$ 21,800.00	$ 21,800.00	COMPLETE		$ 21,800.00		
Kim Construction	Manhole Rehab Phase 1 & II	$ 3,410,523.00	$ 3,410,523.00	COMPLETE		$ 3,410,523.00		
Heller Co.	Pipeline Rehab Phase 1	$ 1,439,184.10	$ 1,726,414.14	COMPLETE		$ 1,726,414.14		
Heller, Co.	Troup St. Main Repalcement	$ 15,000.00	$ 15,000.00	COMPLETE	$ 15,000.00			
Garver, LLC	Construction Inspection	$ 276,900.00	$ 201,557.11	COMPLETE		$ 201,557.11		
Engineers, Inc.	Pond St Main Replacement	$ 52,000.00	$ 56,700.00	COMPLETE		$ 56,700.00		
Kraus Const. Co.	Fairwood Pump Station	$ 2,775,600.00	$ 2,836,695.00	COMPLETE		$ 2,836,695.00		
On- Line	Fairwood Pond St. Main Replacement	$ 1,214,652.05	$ 1,231,000.21	COMPLETE		$ 1,231,000.21		
On- Line		$ 27,582.35	$ 27,582.35	COMPLETE		$ 27,582.35		
On- Line	Fairwood Pump Sta. Force Main	$ 730,387.00	$ 816,531.00	COMPLETE	$ 775,000.00			
Kimzey Water Dist.	SWWWTP Water Supply	$ 58,620.00	$ 58,620.00	COMPLETE		$ 58,620.00		
Fournier	SWWWTP Sludge Equipment	$ 375,236.00	$ 366,605.57	COMPLETE		$ 366,605.57		
CDM	SWWWTP Sludge Project	$ 164,810.00	$ 150,119.00	90% Design Review	$ 150,119.00			
Plastic Fusion Inc	EQ Pond Liner Repair	$ 54,930.00	$ 54,930.00	COMPLETE	$ 54,930.00			

2014 Bond Projects

CLB Engineers	SWWWTP Tertiary Filter	$ 49,500.00	$ 48,400.00	Design Complete			$ 49,500.00	$ 48,400.00
Engineers ,Inc	Hogan Force Main	$ 69,000.00	$ 69,000.00	COMPLETE			$ 69,000.00	$ 69,000.00
Boyles Construction	Hogan Force Main	$ 564,418.00	$ 564,418.00	COMPLETE			$ 564,418.00	$ 564,418.00
EPS	SWWWTP Tertiary Filter	$ 583,211.00	$ 503,636.35	In Progress			$ 700,000.00	$ 503,636.35
T.G. Excavating	Manhole Rehab Phase III & IV	$ 2,181,111.00	$ 1,689,562.00	In Progress			$ 2,200,000.00	$ 1,689,562.00
T.B.D.	Stokes Collection System			Construction Cost(s)			$ 3,500,000.00	
Engineers ,Inc	Fairwood Force Main Phase III	$ 24,000.00	$ 2,160.00	Design Complete			$ 24,000.00	$ 2,160.00
Coakley Co.	Fairwood Force Main Phase III	$ 2,139,000.00		Construction Cost(s)			$ 2,200,000.00	
Garver	Stokes Pump Station			Design in progress			$ 2,533,000.00	
RJN	Regional Plant Grit Chamber			Design proposal in progress			$ 3,000,000.00	
T.B.D.	SWWWTP Sludge			Construction Cost(s)			$ 1,500,000.00	
RJN	Post Rehab Flow Monitoring			Scheduled for 2015			$ 100,000.00	
Engineers Inc	Fairwood Force Main Phase IV	$ 40,000.00		Design 70% Complete			$ 40,000.00	
T.B.D.	Fairwood Force Main Phase IV			Construction Cost(s)			$ 12,000,000.00	
T.B.D.	Stokes Force Main			Construction Cost(s)			$ 4,500,000.00	
RJN	Construction Inspection	$ 253,302.00	$ 198,121.00	In Progress			$ 253,302.00	$ 198,121.00
Brown Engineers	Regional HMI	$ 264,392.00	$ 150,115.00	In Progress			$ 264,392.00	$ 150,115.00
T.B.D.	Pipeline Rehab Phase II			Construction Cost(s)			$ 2,000,000.00	

TOTALS		$ 36,132,166.26	$ 32,474,345.49		$ 3,365,351.14	$ 26,208,906.97	$ 35,497,612.00	$ 3,251,316.35

EXECUTIVE SUMMARY

RJN Group, Inc. was retained by the City of Hot Springs to perform a comprehensive Sanitary Sewer Evaluation and Capacity Assurance Plan (SECAP) with hydraulic capacity analysis. The purpose of this study was to identify I/I sources and develop a recommended plan for the elimination of those sources along with recommendations for capacity improvements across the City. The study consisted of field investigations, computer modeling for hydraulic capacity analysis and a plan to reduce I/I and improve the integrity and capacity of the system to remove wet-weather overflows.

The City of Hot Springs contains approximately 2,280,000 linear feet of gravity wastewater mains ranging in size from 6 inches to 48 inches in diameter. Along with the gravity mains exists an extensive pressurized system that includes approximately 290 pump stations, 1,200,000 linear feet of force mains, and over 3,000 grinder pumps. Field activities included:

- Manhole/visual pipe inspection
- GPS survey
- Smoke testing
- Dyed water testing
- TV inspection

Manhole/Cleanout Above and Below Ground Inspections

Manhole below ground and visual pipe inspections included the documentation of locations and an evaluation of the physical conditions of each structure. A total of 10,619 structures were physically inspected.

Smoke Testing/Rainfall Simulation

Smoke testing was performed across 83 percent of the gravity collection system. The portions of the gravity main that were not smoke tested were shown not to have excessive inflow or infiltration during the flow monitoring. Testing identified sources of inflow such as defective cleanouts, service laterals, main lines, storm sewer cross connections, area drains and downspouts. A total of 1,904,329 linear feet of sewer was inspected by smoke testing in the study area.

Dyed Water Flooding

Dyed water flooding was performed on potential main lines, cross connections, and manhole leaks to further pinpoint defect locations identified during smoke testing. A total of 419 dyed water tests were performed.

Television Inspection and Recommended Repairs

Closed circuit television inspection was attempted on 147,844 linear feet of the sewer system in the study area. TV inspection was used to identify the exact location of defects identified from smoke and dyed water testing and to document progressing defects.

Recommended repairs are summarized in Tables 5-C (point repairs) and Table 5-D (Complete line replacement). There are 93 point repairs and 97,723 linear feet of sewer pipe recommended for replacement.

GPS Survey and Mapping

GPS (Global Positioning System) survey was performed on 11,416 sewer manholes. Over 8,000 of the structures were measured to sub-centimeter level, while the remainder were surveyed to sub-meter level.

Mapping corrections were made on all sewer manholes and sewer lines within the study area.

Hydraulic Modeling

A hydraulic capacity analysis was performed on the entire gravity and pressurized system in Hot Springs. Included in this complex hydraulic model were 2.3 million linear feet of gravity mains, 1.2 million linear feet of force mains, over 290 pump stations, and over 3,000 grinders pumps. There were 41 gravity line segments (12,303 lf) 6 force mains (65,445 lf), and 8 pump stations recommended for capacity improvements. This was based on a 2-year design storm and the criteria where overloading of the sewer lines occur when the hydraulic gradient results in a sanitary sewer overflow (SSO).

Recommended Improvement Plan

Financial restraints, coupled with the complexity of the sanitary system led to recommendations built around several parameters. First, solutions were derived to eliminate only the reported overflows and were assigned "Priority 1". These ranged from inflow/infiltration removal projects, limited gravity sewer up-sizing, force main upgrades, and increased capacity at several pump stations. Priority 1 was further broken down to look at costs associated with the City undergoing inflow/infiltration projects and limited capacity improvements and also evaluated without any reduction in inflow/infiltration and only increasing capacities.

Next, solutions were developed for "Priority 2" improvements. These address areas which exhibit excessive surcharging during the design rain event. Priority 2 improvements were also evaluated by reducing inflow/infiltration with limited capacity enhancements and also with no reduction in inflow/infiltration and only capacity projects.

Third, solutions were developed for "Modeled/ Un-Verified" overflows. These were locations that the hydraulic model predicted overflows would occur during the design storm, however no documented overflow had been recorded. These locations need to be studied to see if indeed an overflow does occur. If so, then recommended solutions for these locations have been developed and are described in Chapter 4.

Below is a table which summarizes the recommended "Priority 1" and "Priority 2" solutions:

Table 6-E

SUMMARY OF RECOMMENDED IMPROVEMENT PLAN

Item	I/I Reduction		Estimated Capital Cost[2/] Without I/I Reduction ($ Million)	Estimated Capital Cost[2/] With I/I Reduction ($ Million)
	Inflow[1/] (mgd)	Infiltration (mgd)		
Manhole Rehabilitation (Priority 1)	5.601	1.461	7.022	7.022
Sewer Line Rehabilitation				
Point Repairs				
Priority 1	0.208	0.013	0.193	0.193
Priority 2	0.216	0.014	0.283	0.283
Complete Rehabilitation				
Priority 1	4.138	0.419	7.451	7.451
Priority 2	3.121	0.316	5.527	5.527
Inflow Removal[3/]				
Public Sector (Priority 1)	0.105	0.000	0.037	0.037
Private Sector (Priority 2)	10.405	0.000	2.313	2.313
Capacity Improvements				
Priority 1	N/A	N/A	47.340	27.629
Priority 2	N/A	N/A	28.557	25.175
New Grit Removal Chamber Davidson WWTP			2.300	2.300
Subtotal Priority 1			*62.043*	*42.332*
Subtotal Priority 2			*36.680*	*33.298*
Total	**23.794**	**2.223**	**101.023**	**77.930**

1/ *Based on projected 5-year/60-minute inflow.*

2/ *Includes estimated construction cost plus a 30 percent engineering service and contingency fee.*

3/ *It should be noted that interior building inspections were not included in this scope of services and that there are likely basement drains or sump pumps contributing I/I that were not identified during this study. An evaluation of the private grinder pumps was also not included in the scope of services for this project and are likely sources of I/I that were not identified.*

CHAPTER 6

SUMMARY OF RECOMMENDED IMPROVEMENT PLAN

The recommended improvement plan consists of work to be performed in the public and private sector of the collection system. The plan includes inflow repairs, infiltration repairs, sewer line replacement/rehabilitation, maintenance repairs, and capacity improvements including pipelines, pump stations, and force mains. The cost to perform the recommended plan is given in capital cost which includes construction plus 20 percent contingency and 10 percent engineering costs. Cost for land acquisition for new pump stations is not included. Costs in this report are in 2011 dollars. Any inflation that occurs between the submission of this report and start of construction is not accounted for in this report. The recommended plan is discussed in the following sections.

The estimated cost and improvement plan does not include the cost of other lift station improvements identified by Garver Engineers, Inc. The only lift station and force main improvements included in this plan are for ones requiring capacity improvements. The plan also does not include any cost associated with the Fairwood Pump Station and force main improvements nor the planned SCADA system and backup power system.

RECOMMENDED MANHOLE REHABILITATION

The recommended rehabilitation plan for manholes includes the rehabilitation of 4,735 manholes contributing approximately 1.461 mgd of infiltration and 5.601 mgd of 5-year inflow. The estimated 2011 capital cost is approximately $7.022 million. The manholes recommended for rehabilitation are presented in the computer printout in Appendix H. A summary of the recommended plan for manhole rehabilitation is given in Table 6-A.

RECOMMENDED SEWER LINE REHABILITATION

Sewer line rehabilitation is recommended for 354 line segments totaling 74,287 linear feet and sewer line point repairs at 66 locations. A detailed discussion of the recommended plan for sewer line repair is included in Chapter 5. A summary of the plan is given in Table 6-B. A detailed list of line segments that are recommended for point repairs and rehabilitation is included in Tables 5-C and 5-D.

Table 6-A

SUMMARY OF RECOMMENDED MANHOLE REHABILITATION PLAN

Rehabilitation Description[2/]	Number of Manholes	Estimated Inflow[1/] (mgd)	Estimated Infiltration (mgd)	Estimated Capital Cost[3/] ($)
Replace Cover/Frame/Frame Seal	2,298	2.903	0.050	2,988,960
Install Bolts/Gasket for Bolted Cover	11	0.026	0.000	1,001
Seal Corbel	68	0.055	0.016	44,200
Seal Corbel & Replace Cover/Frame/Frame Seal	68	0.146	0.009	135,915
Seal Corbel & Replace Frame Seal	67	0.102	0.008	109,558
Seal Wall	356	0.089	0.353	388,024
Coat Manhole and Grout Lower 18" of Manhole	310	0.126	0.078	303,295
Grout Lower 18" of Manhole	407	0.000	0.350	158,730
Complete Manhole Rehab w/ New Frame and Cover	275	0.554	0.145	672,173
Complete Manhole Rehab w/o New Frame and Cover	84	0.066	0.076	178,296
Replace Cover/Frame/Frame Seal & Grout Lower 18"	167	0.222	0.076	278,623
Replace Cover/Frame/Frame Seal & Seal Wall	69	0.201	0.033	159,899
Replace Cover/Frame/Frame Seal & Coat Manhole	477	1.030	0.207	1,494,692
Install Bolts/Gasket for Bolted Cover & Seal Walls	1	0.000	0.001	576
Install Bolts/Gasket for Bolted Cover & Coat Manhole	3	0.006	0.001	7,766
Install Bolts/Gasket for Bolted Cover and Grout Lower 18" of Manhole	2	0.003	0.001	962
Repair Frame Seal & Grout Lower 18" of Manhole	72	0.068	0.057	99,060
Total	**4,735**	**5.601**	**1.461**	**7,021,730**

1/ *Based on 5-year/60-minute storm.*

2/ *Final rehabilitation recommendations should be determined in design phase.*

3/ *Includes estimated construction cost plus a 30 percent engineering service and contingency fees.*

Table 6-B

SUMMARY OF RECOMMENDED SEWER REHABILITATION[1/]

Item	I/I Removal		Estimated Capital Cost[2/] ($ Million)
	Inflow[3/]	Infiltration	
Priority 1			
Point Repairs	0.208	0.013	0.193
Complete Rehabilitation	4.138	0.419	7.451
Subtotal	*4.346*	*0.432*	*7.644*
Priority 2			
Point Repairs	0.216	0.014	0.283
Complete Rehabilitation	3.121	0.316	5.527
Subtotal	*3.337*	*3.174*	*5.810*
Total	**7.683**	**0.762**	**13.454**

1/ *Lines recommended for complete rehabilitation to remove I/I, correct structural or maintenance defects and may or may not be directly related to any sanitary sewer overflow elimination.*

2/ *Includes estimated construction cost plus a 30 percent engineering service and contingency fee.*

3/ *Based on 5-year/60-minute storm*

RECOMMENDED INFLOW REMOVAL FROM SERVICE LINE SOURCES

The recommended plan for service line inflow removal includes the repair of all identified sources discovered through field procedures. Each area of rehabilitation is addressed in the following sections.

Public Sector. There are 33 identified public sector sources contributing 0.105 mgd of 5-year/60-minute inflow that are recommended for repair. The capital cost to remove these public sector sources is approximately $0.037 million. A computer printout of the inflow sources recommended for repair is given in Appendix G.

The projected inflow reduction is based on the assumption that comprehensive rehabilitation repairs will be completed for the identified I/I sources and that the repairs will effectively eliminate I/I from those identified sources.

Private Sector. There are 2,291 identified private sector sources contributing 10.405 mgd of 5-year/60-minute inflow. The capital cost to remove these private sector sources is approximately $2.313 million. It should be noted that these repairs and costs are the responsibility of the homeowner and not the City of Hot Springs. A computer printout of the inflow sources recommended for repair is given in Appendix G.

A summary of the recommended plan for inflow removal is given in Table 6-C.

Table 6-C

SUMMARY OF RECOMMENDED PLAN FOR SERVICE LINE INFLOW REMOVAL

Item	Quantity of Sources	5-Year Inflow Reduction (mgd)	Estimated Capital Cost[1/] ($ Million)
Public Sector	33	0.105	0.037
Private Sector[2/]	2,291	10.405	2.313
Total	**2,324**	**10.510**	**2.350**

1/ Includes estimated construction cost plus a 30 percent engineering service and contingency fee.

2/ Private sector defect repairs are the responsibility of the homeowner and not the City of Hot Springs.

It should be noted that interior building inspections were not included in this scope of services and that there are likely basement drains or sump pumps contributing I/I that were not identified during this study. Also, an evaluation of the private grinder pumps was not included in the scope of services for this project and are likely sources of I/I that were not identified.

CAPACITY IMPROVEMENTS

Recommended capacity improvements will eliminate the occurrence of wet-weather overflows during the design storm event and provide improved efficiency in the transportation of the wastewater flow. The recommended Priority 1 capacity improvements include 41 gravity sewer segments containing approximately 12,302 linear feet, 6 force mains totaling approximately 65,445 linear feet, and 8 pump station improvements. The recommended Priority 2 capacity improvements include 308 gravity sewer segments containing approximately 67,424 linear feet and one force main totaling approximately 732 linear feet. There are an additional 93 gravity sewer segments containing approximately 17,909 linear feet and 3 pump stations that would require capacity improvements to eliminate wet-weather overflows predicted by the hydraulic model that have not been observed as actual overflows during storm events. These locations should be investigated further during wet-weather periods to determine if the overflows actually occur or only predicted by the model due to possible inaccurate pipe sizes or slopes. The estimated capital cost of the capacity improvements is approximately $75.897 million accounting for no reduction in inflow and infiltration and $52.804 million if recommended public inflow and infiltration repairs are taken into account. Gravity lines identified for capacity improvements were selected by accounting for I/I reduction. If I/I reduction was not part of the plan an additional $23.083 million dollars would be required to construct additional capacity improvements. As discussed in Chapter 4, additional capacity improvements may be required to eliminate model predicted overflows. A summary of projects that are recommended for capacity improvements is given in Table 6-D.

SUMMARY OF RECOMMENDED PLAN

The recommended plan includes repairing 2,324 inflow sources, rehabilitation of 4,735 manholes, 354 sewer lines, and point repairs at 66 locations. In addition, 359 gravity segments, 7 force main segments, and 8 pump stations are in need of up-sizing for capacity purposes. Approximately 2.223 mgd of infiltration will be eliminated by implementation of the recommended plan. The peak 5-year inflow in the basins is projected to be reduced by 23.794 mgd after rehabilitation of the recommended inflow sources.

The total capital cost to implement the recommended plan is approximately $77.930 million if I/I reduction is accounted for and approximately $101.013 million if not accounted for. The total capital cost consists of $0.037 million for inflow removal in the public sector, $2.313 million for inflow removal in the private sector, $7.022 million for manhole rehabilitation, and $13.454 million for main sewer rehabilitation. Capacity improvements result in a cost of $52.804 million with I/I reduction or $75.897 million without I/I reduction. A summary of the recommended plan is given in Table 6-E.

Although the scope of services for this project ended at the headworks of the wastewater treatment plants, a preliminary analysis of the headwork grit removal chamber at Davidson WWTP was performed. This was done because of the need to utilize the full storage potential of the EQ Basin at the WWTP. It is anticipated that a new grit removal chamber will be required at a construction cost of $2.3 million. Although this cost is included in the recommended improvement plan, it is recommended that the City undertake a more detailed study of the Davidson WWTP headworks and treatment unit prior to proceeding with this project.

Table 6-D

SUMMARY OF RECOMMENDED PLAN FOR CAPACITY IMPROVEMENTS

Project[1/]		Length (ft)	No I-I Reduction Capital Cost[2/] ($)	With I-I Reduction Capital Cost[2/] ($)
PRIORITY 1 PROJECTS				
Gravity Mains				
E. Grand Ave		295		
Upper Gulpha Interceptor		1,873	457,178	457,178
	Gravity Subtotal	*2,168*	*508,950*	*508,951*
Force Main				
Gulpha Pump Station Force Main		16,016	5,621,686	5,205,265
	Force Main Subtotal	*16,016*	*5,621,686*	*5,205,265*
Pump Station				
Gulpha Pump Station			8,360,300	6,999,980
	Pump Station Subtotal		*8,360,300*	*6,999,980*
	Priority 1 Total		14,490,936	12,714,196
PRIORITY 2 PROJECTS				
Gravity Mains				
Gulpha Interceptor		20,192	14,321,445	12,998,981
Ridgeway St		8,159	2,170,446	2,119,174
Spring St & Festival St		247	58,858	58,858
Upper Gulpha Interceptor		4,014	859,905	662,380
	Gravity Subtotal	*32,613*	*17,410,653*	*15,839,393*
	Priority 2 Total		17,410,653	15,839,393
	Gulpha Total		**31,901,589**	**28,553,589**
Hot Springs Creek Pump Station/Davidson WWTP Tributary Area				
Priority 1 Projects				
Gravity Mains				
4th St & Greenwood Ave		321	70,282	70,282
Hot Springs Creek Interceptor		38	25,194	25,194
	Gravity Subtotal	*359*	*95,476*	*95,476*
Force Mains				
Albert Pike Rd Force Main		3,010	449,995	450,055
24-Inch Parallel to Fairwood Force Main[3/]		11,182	3,198,052	N/A
Carpenter Dam Rd Force Main		519	114,655	N/A
	Force Main Subtotal	*14,711*	*3,762,702*	*450,055*

1/ Projects are gravity sewer main only unless otherwise stated.

2/ Includes estimated construction cost plus a 30 percent engineering service and contingency fee.

3/ Does not include cost of Fairwood Force Main with increased diameter of 42-inch from 36-inch currently designed.

Table 6-D

SUMMARY OF RECOMMENDED PLAN FOR CAPACITY IMPROVEMENTS

Project[1/]		Length (ft)	No I-I Reduction Capital Cost[2/] ($)	With I-I Reduction Capital Cost[2/] ($)
Pump Stations				
Highway 270 PS			486,200	486,200
Hot Springs Creek PS			14,453,400	N/A
Molly Creek PS			71,500	71,500
PS20			262,600	262,600
Lakeside PS			725,400	618,800
	Pump Station Subtotal		*15,999,100*	*1,439,100*
	Priority 1 Total		**19,857,278**	**1,984,631**
Priority 2 Projects				
Gravity Mains				
4th St & Greenwood Ave		5,490	1,016,945	782,265
Albert Pike Rd		2,706	604,149	604,149
Hot Springs Creek Interceptor		12,427	6,717,932	5,161,690
Lake Hamliton Dr		1,570	364,801	364,801
Park Ave		775	136,013	136,013
Seneca St		3,354	586,378	586,378
Shady Grove Rd		5,425	1,038,161	1,038,161
Carpenter Dam Rd		1,086	242,951	237,393
	Gravity Subtotal	*32,833*	*10,707,328*	*8,910,850*
Force Main				
Farrs Landing FM		732	109,434	95,160
	Force Main Subtotal	*732*	*109,434*	*95,160*
	Priority 2 Total		**10,816,762**	**9,006,010**
	Hot Springs Creek Total		**30,674,040**	**10,990,641**
Stokes Pump Station Tributary Area				
Priority 1 Projects				
Gravity Main				
Stokes Interceptor		9,775	3,093,202	3,090,202
	Gravity Subtotal	*9,775*	*3,093,202*	*3,090,202*
Force Main				
Stokes Force Main		29,751	8,508,872	8,508,872
	Force Main Subtotal	*29,751*	*8,508,872*	*8,508,872*
	Priority 1 Total		**11,602,073**	**11,599,074**

Table 6-D

SUMMARY OF RECOMMENDED PLAN FOR CAPACITY IMPROVEMENTS

Project[1/]		Length (ft)	No I-I Reduction Capital Cost[2/] ($)	With I-I Reduction Capital Cost[2/] ($)
Priority 2 Projects				
Gravity Main				
W Saint Louis St		1,672	301,334	301,334
	Gravity Subtotal	*1,672*	*301,334*	*301,334*
	Priority 2 Total		**301,334**	**301,334**
	Stokes Total		**11,903,407**	**11,900,408**
Mazarn/Southwest WWTP Tributary Area				
Priority 1 Projects				
Force Main				
Mazarn Force Main		4,966	1,097,486	1,097,486
	Force Main Subtotal	*4,966*	*1,097,486*	*1,097,486*
Pump Stations				
Mazarn #1 PS			45,500	N/A
Mazarn #4 PS			247,000	234,000
	Pump Station Subtotal		*292,500*	*234,000*
	Priority 1 Total		**1,389,986**	**1,331,486**
Priority 2 Projects				
Gravity Main				
Marion Anderson Rd		306	28,080	28,080
	Gravity Subtotal	*306*	*28,080*	*28,080*
	Priority 2 Total		**28,080**	**28,080**
	Mazarn Total		**1,418,066**	**1,359,566**
Gravity Total		***79,726***	***32,145,022***	***28,774,286***
Force Main Total		***66,177***	***19,100,180***	***15,356,838***
Pump Station Total			***24,651,900***	***8,673,080***
	GRAND TOTAL	***145,903***	***75,897,102***	***52,804,204***

Table 6-E

SUMMARY OF RECOMMENDED IMPROVEMENT PLAN

Item	I/I Reduction Inflow[1/] (mgd)	I/I Reduction Infiltration (mgd)	Estimated Capital Cost[2/] Without I/I Reduction ($ Million)	Estimated Capital Cost[2/] With I/I Reduction ($ Million)
Manhole Rehabilitation (Priority 1)	5.601	1.461	7.022	7.022
Sewer Line Rehabilitation				
Point Repairs				
Priority 1	0.208	0.013	0.193	0.193
Priority 2	0.216	0.014	0.283	0.283
Complete Rehabilitation				
Priority 1	4.138	0.419	7.451	7.451
Priority 2	3.121	0.316	5.527	5.527
Inflow Removal[3/]				
Public Sector (Priority 1)	0.105	0.000	0.037	0.037
Private Sector (Priority 2)	10.405	0.000	2.313	2.313
Capacity Improvements				
Priority 1	N/A	N/A	47.340	27.629
Priority 2	N/A	N/A	28.557	25.175
New Grit Removal Chamber Davidson WWTP			2.300	2.300
Subtotal Priority 1			*62.043*	*42.332*
Subtotal Priority 2			*36.680*	*33.298*
Total	**23.794**	**2.223**	**101.023**	**77.930**

1/ *Based on projected 5-year/60-minute inflow.*

2/ *Includes estimated construction cost plus a 30 percent engineering service and contingency fee.*

3/ *It should be noted that interior building inspections were not included in this scope of services and that there are likely basement drains or sump pumps contributing I/I that were not identified during this study. An evaluation of the private grinder pumps was also not included in the scope of services for this project and are likely sources of I/I that were not identified.*

CONSTRUCTION STAGING PLAN

Construction of the recommended improvements must be completed by 2018 for the City of Hot Springs to be in compliance with the schedule submitted as part of the ADEQ Administrative Order. It is recommended that the construction of improvements be completed in stages to allow for the elimination of the most wet-weather sanitary sewer overflows (SSOs) in the quickest time possible. The City-wide improvement plan has been broken down into four areas. These stages are as follows:

1. Stokes Pump Station Tributary Area – Includes all pipeline improvements tributary to the Stokes Pump Station as well as the new force main from Stokes Pump Station to the Davidson WWTP. Improvements in this area will eliminate 18 wet-weather SSOs.

2. Mazarn / Southwest WWTP Tributary Area – The limited amount of work in this area includes the new force main from Mazarn #4 and minor pump station upgrades. Improvements will eliminate 4 wet-weather SSOs.

3. Hot Springs Creek Pump Station Tributary Area – This would consist of all pipeline work tributary to the Hot Springs Creek Pump Station as well as parallel force main to the Davidson WWTP. A total of 4 wet-weather SSOs will be eliminated by these improvements.

4. Gulpha Pump Station Tributary Area – These improvements will include all pipeline and manhole improvements upstream of the Gulpha Lift Station. After completion of this work it is recommended that post-rehabilitation flow monitoring be performed to determine the proper sizing of the new Gulpha Pump Station and parallel force main to the Davidson WWTP. This will eliminate 3 SSOs.

In order to meet the ADEQ AO schedule it is anticipated that much of the design work of the anticipated stages would be concurrently.

A brief summary of the anticipated improvements in each tributary area is given below.

Stokes Pump Station Tributary Area

These improvements will consist of several projects. The main interceptor discharging into Stokes Pump Station will require upsizing from the existing 18-inch diameter to 30 inches in diameter. A new 24-inch force main that flows from the Stokes Pump Station to the Davidson WWTP would be constructed parallel to the existing 24-inch force main. Both gravity and force main line work is required along Albert Pike Road. Additionally, the Highway 270, Molly Creek, and PS20 Pump Stations necessitate minor upsizing. The improvements also include all of the recommended manhole and sewer line replacement/rehabilitation work. The new grit removal chamber at the Davidson WWTP should be completed prior to placing the improvements in service

Mazarn / Southwest WWTP Tributary Area

Mazarn consists of 4 projects. A new 10-inch diameter force main will need to be constructed that from Mazarn PS#4 that manifolds into the existing force main which discharges at the Southwest WWTP from South Rodgers Pump Station. The result of this new force main will prevent additional capacity improvements in Mazarn except for Mazarn PS#1. The additional gravity line work is along Marion Anderson Road. Mazarn PS#1 and Mazarn PS#4 will need to be upsized. If the projected I/I Reduction is achieved, capacity enhancements at Mazarn #1 will not be required.

Hot Springs Creek Pump Station Tributary Area

The Hot Springs Creek Stage consists of 13 projects. The currently designed Fairwood force main needs to include a 42-inch diameter section leading to Davidson WWTP from where Hot Springs Creek Pump Station manifolds into the force main. A new 24-inch force main shall be constructed parallel to the 42-inch Fairwood force main to convey the wet-weather flow from Hot Springs Creek Pump Station to the Davidson WWTP. Additionally, the Lakeside Pump Station requires upsizing. Accounting for full predicted I/I reduction may prevent Hot Springs Creek Pump Station

from requiring modifications. Not accounting for or achieving I/I reduction would necessitate the pump station to be upsized from the current 40 MGD capacity to a capacity of 51 MGD. Additionally, taking credit for the I/I reduction the parallel 24-inch force main would not need to be constructed, but the Fairwood force main still needs to be increased in the downstream sections. Hot Springs Creek Interceptor and several other gravity mains located throughout the Hot Springs Creek Drainage Basin provide insufficient conveyance and therefore require upsizing.

Gulpha Pump Station Tributary Area

The Gulpha Stage consists of multiple projects. Several sewer lines and manholes require replacement/rehabilitation for I/I reduction and structural replacement/rehabilitation. The main interceptor in the Gulpha Drainage Basin requires upsizing from 21-30 inch diameter to 27-42 inches in diameter. In addition, upsizing other various locations of the gravity mains is also necessary. A new 30-inch diameter force main is required from the Gulpha Pump Station to Davidson WWTP to transport wet-weather events. The Gulpha Pump Station requires upsizing to convey the increased flow.

Davidson WWTP

The Davidson WWTP is currently constructed to handle a peak 24-hour volume of 40 MG with an additional 80 MG of available storage and the grit chamber/splitter box has a 53 MGD capacity. With the I/I reduction not accounted for and recommended improvements, the predicted 24-hour peak volume would be approximately 73 MG at the Davidson WWTP. This will exceed the capacity of the current grit chamber/splitter box. A new 50 MGD grit removal system built before the existing headworks of the plant is recommended at a cost of approximately $2.3 million. As previously stated a study of the Davidson WWTP headworks and treatment units prior to proceedings with this project is recommended. This new system will remove grit from wet-weather flows and conveyed directly to the existing equalization basin. The grit should be removed and dewatered in units independent of the headworks.