CITY WATER & LIGHT

JONESBORO, ARKANSAS

2018 PROGRESS REPORT
CORRECTIVE ACTION PLAN

SANITARY SEWER OVERFLOWS: SUMMARY OF ONGOING ACTIONS
AND PLAN FOR ADDITIONAL CORRECTIVE MEASURES

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CITY WATER & LIGHT

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I certify under penalty of law that this document and all appendices were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment for knowing violations.

Jake Rice III, Manager
City Water and Light
Jonesboro, AR

12/4/18
Date

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Acronyms

ADEQ - Arkansas Department of Environmental Quality
CAP – Corrective Action Plan
CCTV – Closed Circuit Television Video
CIPP – Cured-In-Place Pipe
CMOM - Capacity, Management, Operations, and Maintenance Program
CWL - City Water and Light Plant of the City of Jonesboro, Arkansas
FOG - Fats, Oils and Grease
FSE – Food Service Establishment
GIS – Geographic Information System
I&I – Inflow and Infiltration
MACP – Manhole Assessment Certification Program
MGD – Million Gallons per Day
MW&Y - McGoodwin, Williams & Yates, Inc.
NASSCO – National Association of Sewer Service Companies
NPDES - National Pollutant Discharge Elimination System
PACP – Pipeline Assessment Certification Program

PLC - Programmable Logic Controller
RAS – Return Activated Sludge
RJN - RJN Group, Inc.
SCADA – Supervisory Control and Data Acquisition
SL-Rat® - Sewer Line Rapid Assessment Tool by InfoSense, Inc.
SSES – Sanitary Sewer Evaluation Study
SSO – Sanitary Sewer Overflow
SSR – Smith Seckman Reid, Inc.
UV - Ultraviolet
WAS – Waste Activated Sludge
WWTP – Wastewater Treatment Plant

1. Executive Summary

CWL has maintained a longstanding effort in the effective and continuous management, operation, and maintenance of the collection system capacity and performance. This ongoing effort continued in 2018 through the corrective action activities that CWL committed to in both the CWL CAP submitted to the ADEQ on March 28, 2016 and Addendum to CWL CAP submitted to the ADEQ on April 14, 2016. As of November 1, 2018, the corrective actions outlined in CWL's CAP and follow-up Addendum have been accomplished or are on schedule to be achieved prior to the respective target completion date. For 2018, these activities included:

i. Root Control Program Refinement
ii. Progress on Phase I Capital Improvements
iii. Selection of CMOM Software Solution & Consulting Firm for GIS Implementation Support
iv. NASSCO's PACP Implementation
v. Acquisition and Installation of Lift Station Emergency Power
vi. Progress toward FOG Management Program Expansion
vii. Progress toward Lift Station & Force Main Evaluation & Maintenance Program
viii. Performed SSES of Approximately 25 Miles of the Collection System
ix. Performed Resultant Repairs for 2016, 2017, and 2018 SSES Basins

In addition to the corrective actions performed this year, CWL continued ongoing comprehensive SSO mitigation efforts through the routine inspection and maintenance programs for the collection system and lift stations and the CMOM programs and processes currently in place and active.

CWL, for many years, has demonstrated a culture of compliance and a commitment to SSO mitigation and, as outlined in this progress report, 2018 was no exception. For the period of November 1, 2017 thru October 31, 2018, CWL has documented CMOM expenses totaling over **$1,460,000** and capital costs totaling over **$3,698,000**. Also, CWL has made significant progress on Phase I capital improvements to-date in 2018 and, based on updated figures, estimates additional capital expenditures over **$21,000,000** to achieve the Phase I goals.

The ADEQ understands that SSO mitigation is an iterative and ongoing activity. CWL is pleased to present the activities outlined in this report as evidence of CWL's ongoing efforts in SSO mitigation. CWL believes that these proactive efforts and associated capital expenses, as well as the future corrective actions identified in CWL's CAP, demonstrate CWL's dedication to collection system improvements.

This CAP report constitutes CWL's sincere interest in ongoing and transparent communication with the ADEQ beyond the fulfillment of our voluntary commitment of a Progress Report every two years, as presented in item IV of the Addendum to CWL CAP.

2. Corrective Action Plan Activities – 2018

CWL is pleased to report the corrective actions, as presented in the following sections, achieved in 2018 toward efforts to further mitigate SSOs in the collection system. To-date, the milestones outlined in CWL's CAP submitted to the ADEQ on March 28, 2016 and Addendum to CWL CAP submitted to the ADEQ on April 14, 2016 have been achieved or are on schedule to be achieved prior to the respective target completion date. For the period of November 1, 2017 thru October 31, 2018, CWL has documented CMOM expenses totaling over **$1,460,000** and capital costs totaling over **$3,698,000**.

2.1. Root Control Program Refinement

CWL provided Root Control Program Refinement as Milestone #3 of Phase I (1st Quarter 2016 thru 4th Quarter 2020) in the Addendum to CWL CAP. This refinement was targeted for completion by December 31, 2018.

CWL reviewed maintenance, evaluation, and inspection methods used to identify and remove root intrusions within the collection system. CWL is pleased to report that this review, coupled with CWL's knowledge of the collection system and optimum root control activities, allowed CWL to develop a written Root Control Program. The Program identifies preventative maintenance measures utilized for root intrusions as part of the CMOM program and defines methods for the tracking, evaluating and ongoing improvement of the program.

The goal of the Root Control Program is to protect the integrity of the collection system, prolong the life expectancy of line segments, and provide adequate hydraulic capacity in the sewer system through proactive maintenance procedures. Elements of the Root Control Program include: collection system operation and maintenance; sewer rates and budgeting; root intrusion identification; mechanical root control methods; chemical root control methods; sewer main and private service line remedial measures; and program tracking and improvement methods. A copy of CWL's Root Control Program is available upon request.

Section 3.3 outlines the root control activities achieved in the collection system for the period of November 1, 2017 thru October 31, 2018.

2.2. Phase I Capital Improvements Status

In the 2017 CAP Progress Report, CWL summarized four capital improvement projects as part of Phase 1 of the CAP. CWL provided the completion of Phase I Capital Improvements as Milestone #5 of Phase I in the Addendum to CWL CAP. These projects were targeted for completion by December 31, 2020. CWL is pleased to report that the Phase I improvements are on schedule to be achieved by the target completion date.

Table 2-1 provides the updated cost estimates and the current project status for each improvement. The following sections also briefly describe each project's current status. In addition, see Appendix A for conceptual maps summarizing the in-progress or planned improvements.

Table 2-1: Phase I Capital Improvements (As of November 1, 2018)

Capital Improvement	Updated Cost Est.	Current Status
Eastside WWTP Wet Weather Hydraulic Upgrade	$15 million	Construction in Progress
Midtown Interceptor	$5.9 million	Easement Acquisition/ Permitting/Design in Progress
Ridgecrest Lift Station & Gravity Sewer	$2 million	Property Acquisition/Design in Progress
Kitchen Gravity Sewer	$800,000	Contingent on Midtown Interceptor Completion

2.2.1. Eastside WWTP Wet Weather Hydraulic Upgrade

While the CWL Eastside WWTP biological treatment capacity remains more than sufficient as currently designed, the plant's hydraulic capacity under wet weather flows was identified for certain capital improvements to optimize operation. Plans and specifications for a hydraulic upgrade were developed by Olsson Associates and included an 18-MGD head works pump addition, bar screen replacement to increase hydraulic throughput, and construction of one 100'-diameter clarifier and one 120'-diameter clarifier. An automated inlet flow-proportioning weir, RAS and WAS pumps, UV disinfection and additional structures and piping are also included in the upgrades.

The plans were approved by the ADEQ, and the construction permit became effective June 8, 2018. Van Horn Construction from Russellville, Arkansas was the successful bidder for the project and was issued a formal Notice to Proceed on July 23, 2018. Work is progressing on schedule despite significant rainfall amounts since construction started. CWL has spent over **$893,000** with Olsson through October 31, 2018 for their work on this project. This amount does not include significant in-house costs for work performed by CWL Engineering and Management personnel. Van Horn's contract price for construction is over **$13 million,** including change orders through October 30, 2018, and CWL has paid Van Horn over **$2 million**

to date. The total projected cost for this project has been updated to approximately **$15 million**. The project is planned for completion in the last quarter of 2019.

2.2.2. Midtown Interceptor

In an effort to address capacity constraints in the midtown Jonesboro (i.e. E. Nettleton Ave, Kitchen St, E. Matthews Ave and Arkansas State University) area, CWL has contracted Olsson to assist in the design of the Midtown Interceptor. The targeted area is defined by sanitary sewer basins JB18, JB19, JB20, and JB21, as shown in Appendix B, Basin Delineation. The survey and design work are complete for the approximately four-mile gravity sewer, which will be a 24"-diameter line connecting the midtown area to the Northeast Interceptor sewer, placed in service September 2014. Easement acquisition and permitting for railroad and highway crossings are underway. CWL has projected a total cost of approximately **$5.9 million** for the project and plans to begin construction approximately June 1, 2019, allowing CWL to take advantage of the normally dryer weather. This should result in a completion date in late 2019.

2.2.3. Ridgecrest Lift Station & Gravity Sewer

CWL has contracted with Crist Engineers, Inc., and continues to work with RJN utilizing the CWL sewer hydraulic model, on the third capital project identified for Phase I, the Ridgecrest Lift Station and associated gravity sewer. This project will serve to optimize the functionality of the lift station through a redesign to a lower hydraulic grade line. This modification is proposed to address capacity constraints in the Ridgecrest St, Sims Ave, Owens Ave, and Parkview St area (basin JB26; see App B, Basin Delineation).

Surveying on the project is nearing completion and the preliminary design and cost estimates have been approved. Depending on the final design of the lift station, gravity sewer upgrades may be required as part of this project to increase upstream conveyance capacity and remove a potential hydraulic throttle downstream of the force main. Crist and CWL have projected, contingent on the final scope of the modifications, a total cost of approximately **$2 million** for the project. CWL plans to begin construction in 2019 and has invested over **$19,000** on this project to date.

2.2.4. Kitchen Gravity Sewer

Currently, the final significant capital improvement project scheduled for construction during Phase I involves various upgrades to the existing gravity sewer network in the midtown area bordered by E. Nettleton Ave, Kitchen St, Osler Dr, and E. Washington Ave (JB19 and JB20; see App B, Basin Delineation). The current scope of work is anticipated to include over 4,000 feet of gravity sewer, ranging in size from 10" to 15". However, survey work for model calibration has yet to be performed. CWL has projected a total cost of approximately **$800,000** for these upgrades. As a gravity system upstream of the proposed Midtown Interceptor, the projected

start date for these sewer network improvements is contingent on the completion of the interceptor construction and, therefore, tentatively planned for 2019.

2.3. Selection of CMOM Software

As reported in the 2017 Progress Report, CWL selected ESRI/ArcGIS to develop GIS-based mapping for the sanitary sewer system as the necessary first step toward a long term solution for CMOM data management. The goal, as previously reported, is to further develop internal databases and data collection processes that allow integration with CWL's IBM i server and to develop software and mapping solutions that would add value to CWL's existing system and avoid duplication of many processes.

On March 15, 2018, ESRI conducted a Needs Assessment with CWL leadership and key team members from the majority of CWL departments. The follow up executive briefing provided to the CWL leadership team on May 8, 2018 provided a high level overview of CWL goals, strengths, and challenges as it relates to GIS implementation and a potential road map to this end. As a result of this assessment, CWL identified the need to partner with an experienced consulting firm to assist in developing the GIS strategic plan, geodatabase design and system architecture, and implementation plan. CWL developed and issued a Request for Proposal in August of this year and has selected CDM Smith Inc. as the consulting firm to assist in the project. CWL and CDM Smith have scheduled to begin strategic planning in December 2018.

2.3.1. NASSCO PACP Implementation

Through CWL's research into CMOM software solutions, CWL identified NASSCO PACP training as an important skill in the identification and ranking of resultant repairs in the SSES basins. CWL also quickly realized, as stated by NASSCO, the value of providing standardization and consistency to the methods in which pipeline and manhole conditions are identified, evaluated and managed. As reported in the 2017 Progress Report, CWL contracted with Hydromax USA to perform in-house training for 10 CWL Operations and Engineering employees in PACP and MACP coding certification in November 2017. CWL successfully implemented the NASSCO PACP forms for the smoke testing of the 2018 SSES Basins. As camera work is completed, CWL is utilizing the PACP coding to define the 51 potential defects identified.

2.4. 2019 CAP Milestone Status

CWL is pleased to report the corrective action progress, as presented in the following sections, accomplished in 2018 toward efforts to achieve Milestone #4 of Phase I, targeted for completion by December 31, 2019. To-date, these milestones, as outlined in CWL's CAP Addendum, are on schedule to be achieved prior to the 2019 target completion date.

2.4.1. Emergency Lift Station Operation Equipment Installations

In the 2016 Progress Report for the CWL CAP, 13 lift stations were identified for permanent generator and transfer switch installations. A summary of the evaluation for lift station emergency power needs (Phase I, Milestone #1 of CAP Addendum) and a prioritized schedule was presented in Section 2.2.3 and Appendix A of the 2016 Report, respectively. The generator acquisitions began in 2017 and the subsequent installations are part of the scheduled fulfillment of the Emergency Lift Station Operation Equipment Installations proposed for the end of 2019 (Phase I, Milestone #4 of CAP Addendum).

As scheduled in the 2017 Progress Report, CWL installed new standby generators at the Turtle Creek, Northwest, and Minx Hill lift stations. CWL has purchased and received an additional generator and has issued a purchase order for another generator, each planned for installation in late 2018 or early 2019, depending on weather conditions and personnel availability. Due to planned capital improvements, property acquisitions, and ongoing residential development the locations and timing for installations of any remaining generators have been adjusted. An updated summary of existing generator and scheduled generator installations is provided in Appendix C. In the last two years, CWL has invested approximately **$221,000** toward this effort, with over **$163,000** in capital expenditures for the period of November 1, 2017 thru October 31, 2018.

2.4.2. FOG Management Program Expansion

As presented in the CAP, CWL's FOG Management Program monitors FSEs through quarterly grease interceptor inspections while also conducting FOG public outreach by means of educational brochures, company website, customer billing, newspaper, and/or other media outlets. Since the initial CAP, CWL has made significant efforts to further enhance its FOG Management Program, as presented in the 2016 Progress Report, with the expansions of quarterly grease interceptor inspections and residential FOG outreach while also beginning FOG outreach to public schools.

CWL has established a FOG Management Team, which is comprised of representatives from the following departments: Water and Sewer Service/Maintenance, Water and Wastewater Treatment, Laboratory, and General Operations. The FOG Management Team meets routinely to review and evaluate current FOG Management Program elements while also further examining potential ways to enhance the program and implementing the previously mentioned inspection and outreach activities. The FOG Management Team has worked diligently this past year to develop a residential FOG brochure and enhance FSE monitoring activities within the collection system.

The efforts of the FOG Management Team will allow CWL to improve the current components of the FOG Management Program and also expand program outreach to further heighten its effectiveness.

2.4.3. Lift Station & Force Main Evaluation & Maintenance Program

While the proper operation and maintenance and adequate capacity of CWL's lift stations and force mains have been and will remain a priority for CWL, the Lift Station and Force Main Evaluation and Maintenance Program was proposed by CWL as a milestone in the CAP Addendum as an opportunity for current staff to thoroughly re-evaluate the suitability, overall performance and condition of the system and enhance and formalize the maintenance program. To ensure a holistic evaluation, CWL has formed a team composed of Engineering, Operations, and Wastewater Treatment personnel to achieve this goal.

The team began periodic meetings in 2018 and identified key tasks (with assignments) including, but not limited to: lift station inventory; force main inventory; lift station dry-weather critical response time; lift station firm capacity through field measurement; identification of any lift station remedial measures; identification of any force main remedial measures; review and potential enhancement of lift station maintenance program; and full implementation of a computerized lift station maintenance program.

Concerning the task of the lift station dry-weather critical response time, CWL worked with RJN, utilizing the CWL sewer hydraulic model, to develop a Failure Assessment Summary for 22 of CWL's now 26 lift stations. The remaining 4 lift stations are scheduled for upgrades or decommissioning and were therefore not included in the evaluation. RJN's report is available upon request. CWL has spent over **$4,000** with RJN through October 31, 2018 for their work on this project. This amount does not include the costs associated with the final report or the significant in-house costs for work performed by CWL Engineering and Operations personnel.

Key team members have also worked to enhance CWL's Lift Station Maintenance Program through the development of written standardized procedures and the use of Ignition, CWL's water and wastewater SCADA software. The Ignition software allows CWL employees to document and track routine and non-routine maintenance activities. Ignition also allows CWL employees to set-up reminders for upcoming maintenance tasks.

2.5. Phase I SSES Status

As a portion of Milestone #5 of Phase I of CAP Addendum, CWL provided a target completion date of December 31, 2020 for achieving an SSES on 1/3 of the CWL collection system, with an average of approximately 27 miles per year. CWL prioritized basins JB21, JB30, and JB31 to study in 2018 (App B, Basin Delineation) for an estimated total of approximately 25 miles of the sewer system. The status and results of the 2018 activities under this milestone, as of November 1, 2018, are

briefly outlined in the following section. CWL has now completed inspection of approximately 97 miles of the collection system under the CAP and has completed evaluation and resultant repair identification of approximately 72 miles of the system in the last 2 ½ years.

2.5.1. SSES Activities - Status & Results

The following Table 2-2 provides a summary for SSES activities and current results for JB21, JB30, and JB31.

Table 2-2: 2018 SSES Activities (As of November 1, 2018)

Service	Quantity			
	JB 21	JB 30	JB 31	2018 Basins Total
Manhole Inspections (1)	**187**	**169**	**321**	**677**
Line Testing and Repairs				
Smoke Test (ft) (2)	**43,664**	**26,004**	**60,788**	**130,456**
Dye Test	**6**	**1**	**0**	**7**
CCTV (ft) (3)	**1,608**	**1,717**	**938**	**4,263**
Main Cleaned (ft)	**11,162**	**2,357**	**1,724**	**15,243**
Roots Cut (ft)	**285**	**0**	**0**	**285**
SL-Rat® (ft) (4)	**44,714**	**30,119**	**66,986**	**141,819**
Replace Clean Out Caps	**56**	**13**	**95**	**164**
Laterals Identified/Repaired (5)	**In Progress**	**In Progress**	**In Progress**	
Resultant Main Repairs	**In Progress**	**In Progress**	**In Progress**	

Notes:

(1) Manhole inspections are 100% complete

(2) 100% of each JB was smoke tested

(3) CCTV footage shown from SL-Rat® assessments.
CCTV footage from smoke test defects In Progress.

(4) SL-Rat® assessments of 12" lines and smaller.
Footage includes line segments that were re-assessed due to SL-Rat® score following cleaning of lines.

(5) Customers notified of lateral defects / Laterals repaired by customers and inspected by CWL.

For the 2018 SSES activities, CWL began with 100% inspection of the manholes in each of the three basins selected. As of November 1, 2018, manhole inspections for the three basins are 100% complete. Detailed inspection results are available upon request. The inspections identified 135 manhole resultant repairs. Details and statuses of the repairs are available upon request.

In addition to the manhole inspections, CWL crews cleaned main lines within each basin. The segments cleaned were identified as having potential obstructions based on SL-Rat® evaluations. See Section 3.2 for evaluation method utilized.

Smoke testing is 100% complete in each basin. Through the smoke testing process, CWL replaced 164 clean out caps within the three basins. Smoke testing also identified 51 potential defects within the collection system. Crews are currently in the process of further reviewing possible defects identified from smoke testing through CCTV, with the aid of dye testing. Once CCTV review is PACP coded and complete, CWL will determine appropriate rehab for any identified main line defects. Lateral defects identified and verified will be coordinated through CWL's Sewer Lateral Repair Program, in which property owners will be notified of necessary lateral repairs with appropriate follow up.

2.6. Phase I SSES Resultant Repairs

As a portion of Milestone #2 of Phase II (1st Quarter 2021 thru 4th Quarter 2025) of CAP Addendum, CWL provided a target completion date of December 31, 2025 for achieving Phase I SSES Resultant Repairs. The following sections briefly describe the status of Phase I resultant repairs, as of November 1, 2018.

2.6.1. Manhole SSES Resultant Repairs

As described in Section 2.5.1., CWL identified 135 manhole repairs in 2018. As previously reported, CWL identified 345 manhole resultant repairs for the 2017 basins of JB17, JB18, and JB32 and 91 manhole resultant repairs for the 2016 basins of JB07, JB24, JB25, and JB26. CWL is pleased to report that as of November 1, 2018, 54% of the 571 manholes identified have been repaired. Detailed spreadsheets regarding the status of the repairs identified in 2016, 2017 and 2018 are available upon request.

As stated in previous reports, CWL conducted an evaluation of the brick manholes previously rehabbed in the late 1980s and early 1990s for updated rehab needs. CWL determined that the optimum course of action at this time, considering the current available information, was to contract out a complete rehabilitation of all brick manholes, both previously rehabbed and untouched, within the basins studied. This decision was based on the evaluation and consultation with other utilities and engineering consultants.

As mentioned in CWL's 2017 Progress Report, CWL worked with SSR, in late 2017 and well into 2018, to develop detailed contract specifications for the cementitious lining of the 326 and 223 (adjusted from 228 in last year's report) brick manholes from the 2016 and 2017 basins, respectively. CWL determined that economies of scale might be realized through inclusion of the 119 brick manholes identified in the 2018 basins into the contract. (Note that, several of the brick manholes for each year's basins were also identified as in need of resultant repairs and, as such, are included in the resultant repair totals presented above.)

CWL plans to let this combined contract out for bids by the end of 2018. It is estimated that this contract will cost approximately **$550,000**, excluding consulting services and in-house labor

expenses. Detailed spreadsheets regarding the manholes identified for rehabilitation are available upon request.

As reported in 2017, CWL also determined that replacing the older-style, heavy ring and lids under the influence of sheet flow in rain events had the potential to significantly reduce I&I. Between November 1, 2017 and October 31, 2018, CWL utilized in-house personnel to replace the remaining 10 of the 164 heavy ring and lids within the 2016 basins, 90 of the 95 within the 2017 basins, and 30 within the 2018 basins. This work is now complete (excluding 3 private and 2 CWL manholes in the 2017 basins) and the current balance shows CWL has invested over **$292,000** toward this effort. Detailed spreadsheets regarding the manhole ring and lid replacements are available upon request.

2.6.2. Lateral SSES Resultant Repairs

As described in Section 2.5.1., CWL is currently in the process of evaluating through CCTV and dye testing the 51 possible defects identified from smoke testing within the 2018 basins. Lateral defects identified and verified will be coordinated through CWL's Sewer Lateral Repair Program, in which property owners will be notified of necessary lateral repairs with appropriate follow up.

As previously reported, CWL identified 29 and 52 sewer lateral resultant repairs for the 2017 and 2016 basins, respectively. CWL is pleased to report that as of November 1, 2018, 74% of the 81 laterals identified have been repaired. Detailed spreadsheets regarding these repairs are available upon request.

2.6.3. Main Line SSES Resultant Repairs

As described in Section 2.5.1. and 2.6.2., CWL is currently in the process of evaluating the 51 possible defects identified this year. Once CCTV review is PACP coded and complete, CWL will determine appropriate rehab for any identified main line defects.

As previously reported, CWL identified 8 and 19 main line resultant repairs for the 2017 and 2016 basins, respectively. CWL is pleased to report that as of November 1, 2018, 24 of the 27 mains identified have been repaired. Detailed spreadsheets regarding these repairs are available upon request.

In conjunction with these repair efforts, CWL continues to evaluate main line repairs for potential candidates for CIPP lining. CWL is further developing a list of prospective mains from identified repairs both within and outside the 2016, 2017, and 2018 basins. CWL is currently working, with SSR's earlier assistance, to finalize contract specifications for CIPP lining bids. CWL tentatively plans to let a contract for bids on these repairs in 2019. A detailed spreadsheet regarding the main lines identified for potential CIPP lining is available upon request.

3. Routine Collection System Maintenance

In addition to the SSES activities of the three 2018 basins and all SSES resultant repairs outlined in the previous section, CWL performed the SSO corrective actions summarized in Table 3-1 as part of the routine inspection and maintenance of the collection system in various other areas throughout the system.

Table 3-1: 2018 Routine Collection System Maintenance (November 1, 2017 thru October 31, 2018)

Service	Quantity
	Routine Maintenance
Manhole Improvements	
Repair/Seal Manhole	**9**
Adjusted Manhole	**12**
Replace Manhole Ring	**2**
Line Testing and Repairs	
Smoke Test (ft)	**1,800**
Dye Test	**93**
CCTV (ft)	**48,228**
Main Cleaned (ft)	**394,114**
Roots Cut (ft)	**8,813**
SL-Rat® (ft) (1)	**2,028,613**
Laterals Identified / Repaired (2)	**7/3**
Point Patch	**60**
Repaired Sewer Main	**4**
Chemical Root Treatment (ft)	**47,297**
Capped Abandoned Laterals	**10**
CWL Repaired Laterals	**2**
Ditch Crossings Inspected	**48**
Air Relief Valves Inspected	**4**
Back-Lot Lines Inspected	**31**

Notes:

(1) SL-Rat® assessments of 12" lines and smaller. Footage includes lines segments that were re-assessed due to SL-Rat® score following cleaning of lines.

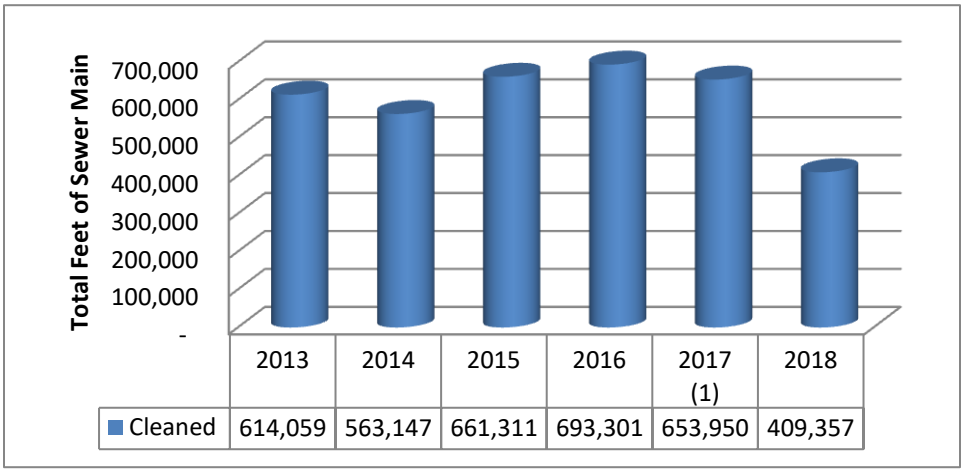
(2) Customers notified of lateral defects / Laterals repaired by customers and inspected by CWL.

The following sections briefly provide further details for some of these SSO corrective actions.

3.1. Sewer Mains Cleaned

As presented in the CAP, CWL sewer service trucks maintain the system through routine cleaning. Graph 3-1 provides a summary of the past 5 year totals, along with the total footage cleaned for January 1st thru October 31st of 2018.

Graph 3-1: Sewer Mains Cleaned (2013 thru October 31, 2018)



Note:
In the 2017 Progress Report, Total Feet of Sewer Main Cleaned was reported as 568,538'. November (52,887') and December (32,525') 2017 is included in the 2017 total above.

The reduced cleaning footage for 2018, as shown in Graph 3-1 above and in Table 2-2 for SSES basin cleaning footage, can be attributed to the efficiencies CWL is realizing through use of the SL-Rat®. See the following Section 3.2 for additional details.

3.2. SL-Rat® Activities

As previously reported, CWL began utilizing the SL-Rat® in July of 2016 to increase efficiency of sewer line blockage assessment. CWL is currently utilizing the following method: the line is assessed using the SL-Rat® and if the line segment scores a 5 or lower (poor to blocked), the line is hydro cleaned; the line is then re-assessed and if the line continues to score less than a 5, the line segment is then inspected through CCTV to further evaluate the apparent blockage.

As CWL has refined procedures for the effective use of the data produced for different main sizes and material, CWL has found this tool allows for more efficient hydro cleaning efforts and CCTV inspections and thus increased SSES productivity and SSO mitigation. The reduced cleaning footage in both the SSES basins and in CWL's routine maintenance of the collection system illustrates how effective this tool is to concentrate cleaning efforts in locations warranting the effort. The reduced root cutting footage from previous years also, in CWL's opinion, points to the effectiveness of SL-Rat® usage.

Based on these results, CWL continued use of the SL-Rat® to test 100% of the three 2018 SSES basins and increased usage to test 100% of the collection system. In March of 2018, CWL purchased, at a cost of almost **$49,000**, two additional SL-Rats® (bringing total in use to 4) to facilitate the expanded efforts in efficient assessment and cleaning of the collection system.

Table 3-2 shows the ratings of the total line segments, including the almost 142,000' in the 2018 SSES basin segments, tested with the SL-Rat® from November 1, 2017 thru October 31, 2018. A detailed report of the line segments tested in the 2018 SSES basins and a complete report of all line segments tested in 2018 are available upon request.

Table 3-2: SL-Rat® Sewer Line Assessment Results (November 1, 2017 thru October 31, 2018)

SL-Rat® Data for Total System	
Rating (1)	**Quantity (line segments)**
10-6	8,280
5-0	2,265
Footage= 2,170,432	

Note: Scale for rating is 0= Block, 1-3= Poor, 4-6= Fair, 7-10= Good

3.3. Root Control Activities

Through CWL's contract with Duke's Root Control, Inc, 47,297' of sewer mains were chemically treated in 2018 at a cost of over **$76,000**. A detailed report of the line segments, located throughout the collection system, chemically treated in 2018 is available upon request.

In addition to chemical treatment, CWL has continued its practice of using a sewer rodding machine and sewer trucks equipped with jetter nozzles for controlling roots within the collection system. Approximately 9,100' of sewer mains were root cut throughout the 40 basins of the system to-date in 2018. The reduced root cutting footage for 2018, also shown in Table 2-2 for SSES basin cleaning footage, can be attributed to the efficiencies CWL is realizing through use of the SL-Rat®, as detailed in the previous Section 3.2.

4. Lift Station Maintenance and Improvements

From November 1, 2017 thru October 31, 2018, CWL has invested, including material and labor, over **$380,000** on lift station operation and maintenance.

In 2018, CWL completed the upgrade of the Minx Hill (Hwy 226) lift station from, as previously reported, an almost 30-year-old Crown Triple D station with 15HP pumps to a Smith & Loveless

above ground complete station with 20HP pumps. The upgrade included the addition of a manual transfer switch, flow meter, generator, hydro ranger and PLC for SCADA communication. The cost for this project was over **$202,000**, not including final landscaping of the residential site.

CWL also completed an important upgrade at the Northwest (Main) lift station to facilitate critical maintenance and improvements, now underway at the 1977 station. CWL contracted with Interstate Tapping Service Inc. to perform a temporary line stop on the Main Lift force main. This temporary line stop allowed CWL to install a 20"x16" valve and tee assembly, giving CWL the ability to "pump around" the Main Lift station, if needed, and also regain the ability to replace/repair valves and pumps at the station. The final cost for this project was almost **$100,000**.

As part of a residential developer's gravity sewer installation in 2017, CWL was able to decommission the Sunset Hills lift station. CWL invested approximately **$6,000**, realized in 2018, to eliminate the station. As seen in Appendix C, CWL is planning for the potential decommission of three lift stations as a positive effect of the installation of the Midtown Interceptor and for the potential decommission, upgrade or relocation of up to four other lift stations as a positive result of residential developments.

Beyond this planning, CWL continues to evaluate and prioritize future lift station needs and will determine if any lift station projects should be scheduled for 2019 in addition to the Ridgecrest lift station discussed in Section 2.2.3.

5. Westside WWTP Study & Design

In keeping with CWL's culture of effectively managing the sanitary sewer system and ensuring that the future wastewater capacity and treatment needs are adequate well into the foreseeable future, CWL continuously examines where engineering time and resources should be focused to evaluate capital improvement project needs and ensure the appropriate timing of the design process. As with the capital improvement projects already identified, CWL's hydraulic model and consulting firm's evaluations, combined with CWL system knowledge, allowed CWL to identify the Westside WWTP for further study regarding the adequacy of the 1977 trickling filter Plant's biological and hydraulic capacity for the long term system needs. Preliminary efforts with MW&Y (now Olsson) toward this effort actually began in the first quarter of 2015.

As previously reported, CWL utilized the sanitary sewer system Hydraulic Model and Preliminary Collection System Evaluation, developed in conjunction with RJN and MW&Y respectively, coupled with CWL's knowledge of the collection and WWTP systems to identify

the Phase I capital improvements, as defined in Section 2.2. MW&Y provided, as reported previously, a high-level analysis of the potential collection system improvements identified by RJN and either gave their concurrence or recommended modifications. In addition, MW&Y also provided estimates of probable costs for the improvements, as well as a general recommendation on the order of construction of the alternatives.

To build on these initial analyses, CWL contracted with Olsson in 2018 to prepare a detailed Engineering report for the Westside WWTP. CWL is now in the process of reviewing this report and have scheduled additional discussions with Olsson to discuss potential improvements and determine the appropriate timing of any preliminary design work. This should place CWL in a good position to fully define when full scale design and potential construction should begin. CWL has spent over **$176,000** with Olsson (MW&Y) from 2015 through October 31, 2018 for their work on this project. This amount does not include significant in-house costs for work performed by CWL Engineering and Management personnel.

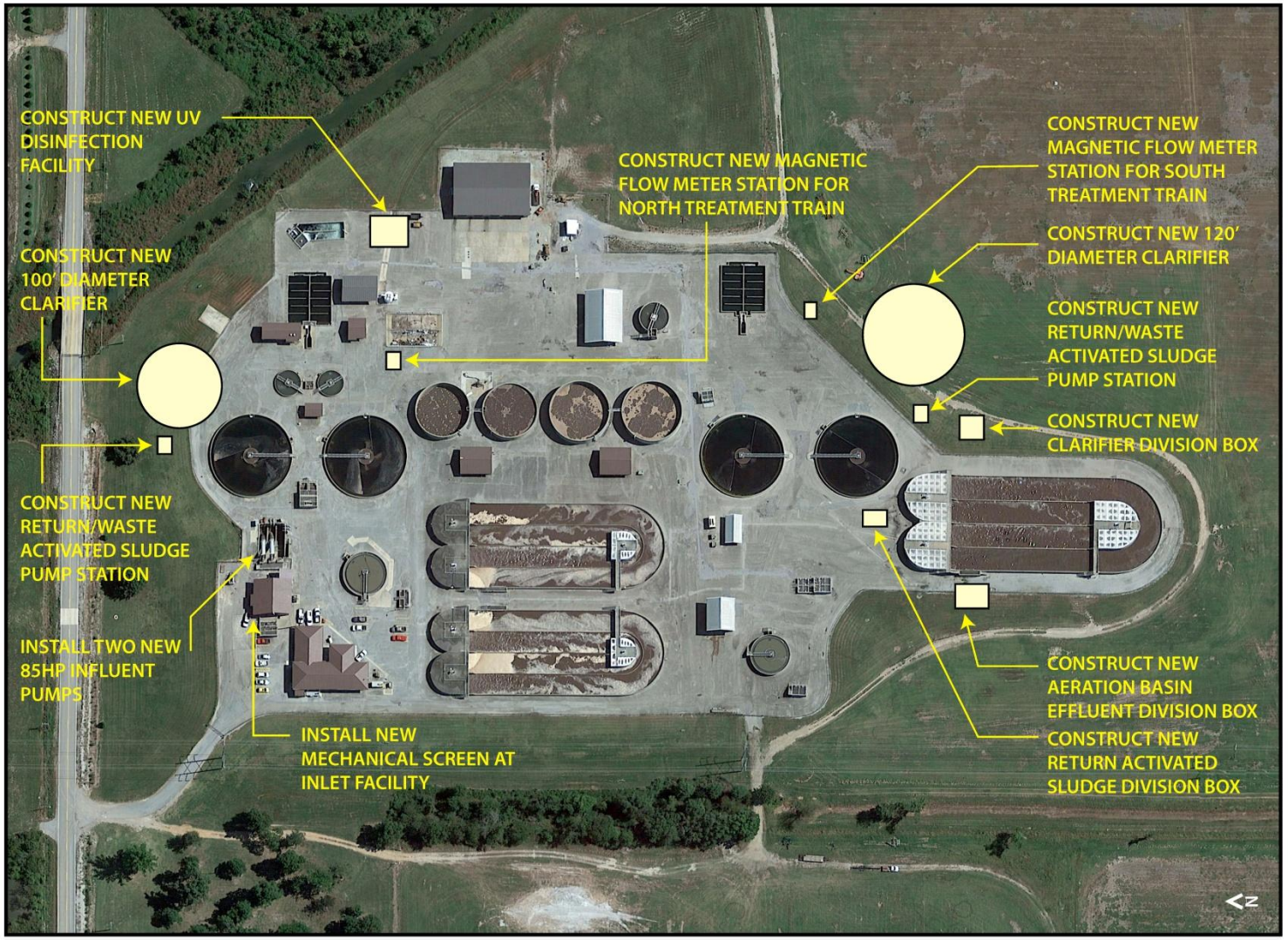
6. Conclusion

CWL is pleased to present the activities outlined in this report as evidence of CWL's ongoing efforts in SSO mitigation. As stated in the CAP, CWL fully understands the iterative, ongoing nature of this process and is committed to continual improvement of the management and operation of the collection system and maintaining adequate capacity of the system. CWL believes that these proactive efforts and associated capital expenses, as well as the future corrective actions identified in CWL's CAP, demonstrate CWL's dedication to collection system improvements.

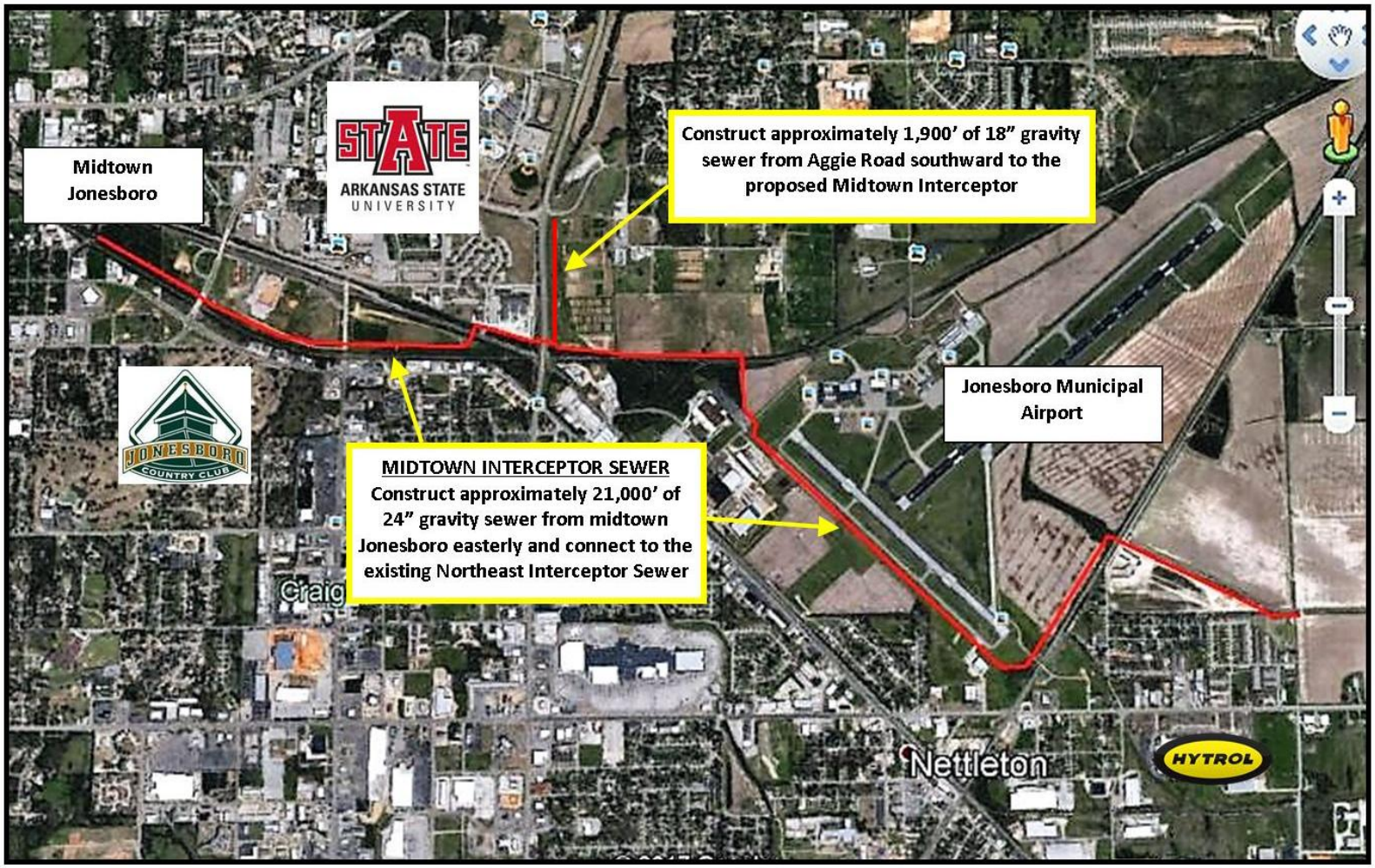
This CAP report constitutes CWL's sincere interest in ongoing and transparent communication with the ADEQ beyond the fulfillment of our voluntary commitment of a Progress Report every two years, as presented in item IV of the Addendum to CWL CAP.

Appendix A

Phase I Capital Improvements



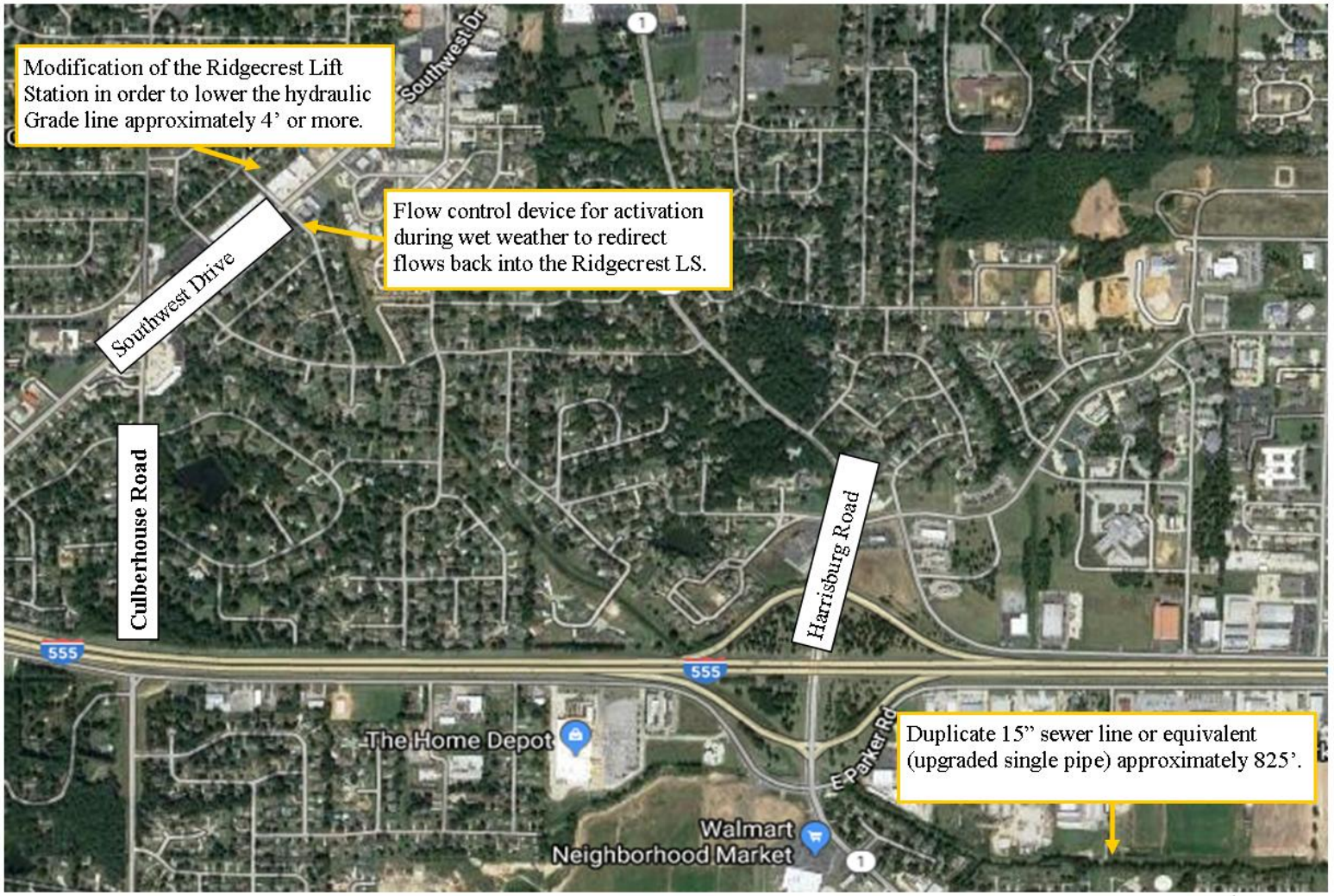
EASTSIDE WASTEWATER TREATMENT PLANT IMPROVEMENTS



Midtown Interceptor Sewer

N

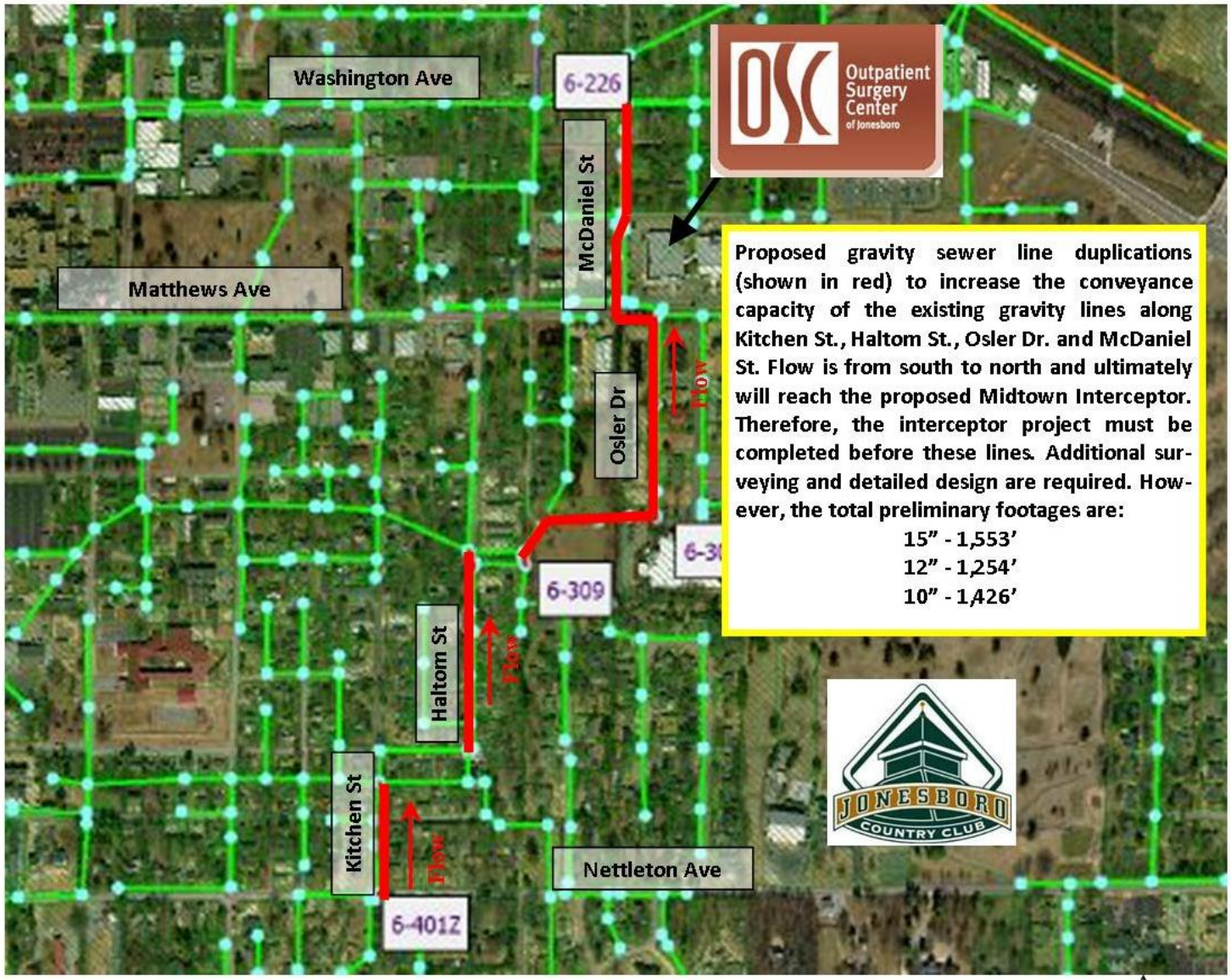
No Scale



Ridgecrest Lift Station and Gravity Sewer

N

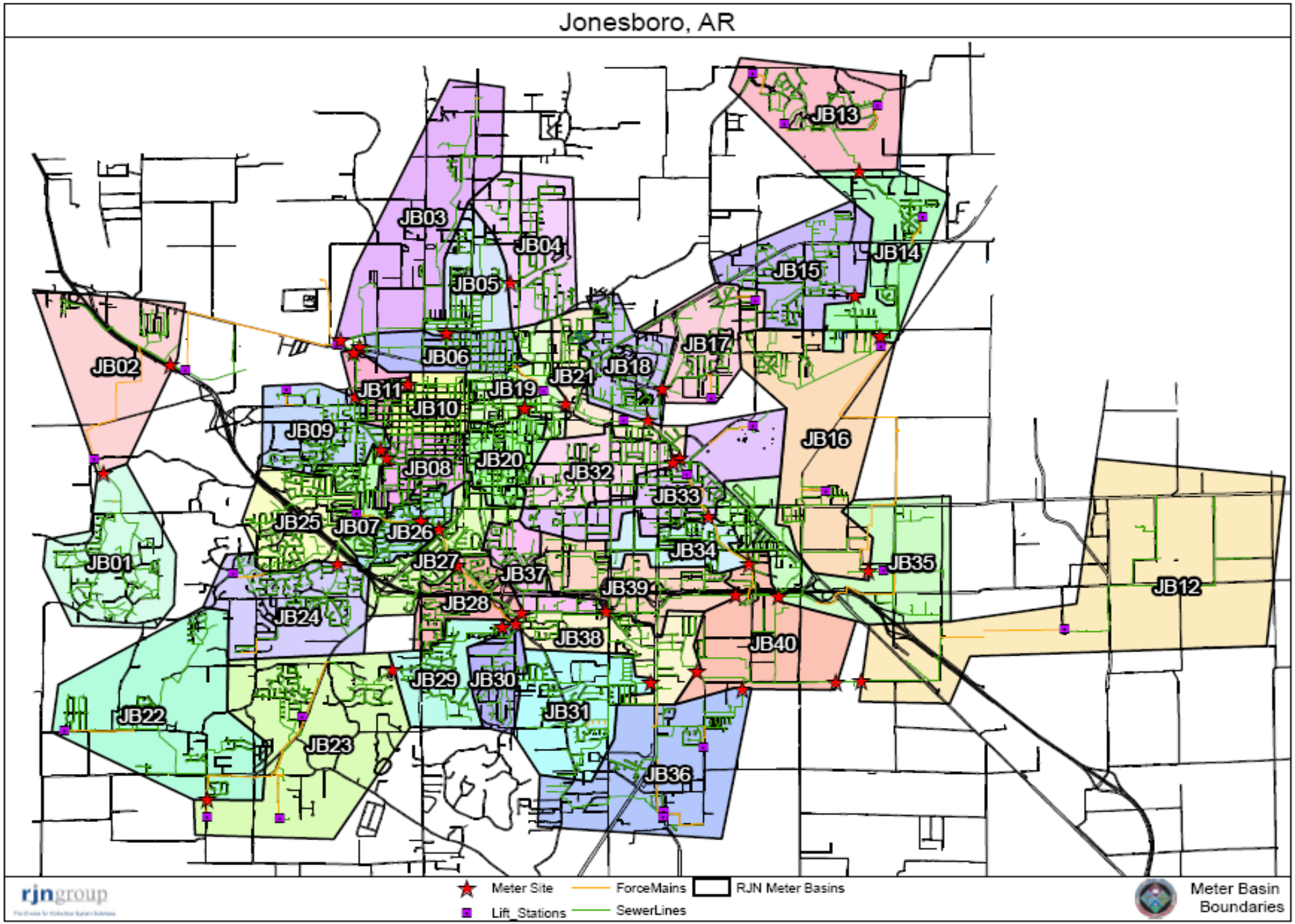
No Scale



Kitchen Gravity Sewer

Appendix B

Basin Delineation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rjngroup
Meter Site
Lift_Stations
ForceMains
SewerLines
RJN Meter Basins
Meter Basin Boundaries

Appendix C

CWL Lift Station Emergency Power

CWL Lift Station Emergency Power						
LIFTSTATION			Station Standby Power			
	Transfer Switch	Quick Connect for Pump	Status	Type	Date (1)	Comments
Airport	No	No	Absent	On-site generator	2019	Decommissioned pending sewer improvements
Beaver Creek/Prairie Meadow	No	Yes	Absent	On-site generator	2019	To be decommissioned/moved pending development
Clinton School	Yes	Yes	Present	On-site generator	2013	
Colony Park	No	No	Absent	On-site generator	2019	
Commerce Dr	Yes	Yes	Present	On-site generator	2011	
Congress Cir.-W.Washington	No	No	Absent	On-site generator	2019	
Dorton Rd	Yes	No	Present	On-site generator	1990	
Hereford	Yes	Yes	N/A	On-site generator	N/A	To be decommissioned pending gravity sewer improvements
Horseshoe Trail	No	No	Absent	On-site generator	2019	Generator purchased 2017. Property purchased 2018.
Minx Hill (Hwy 226)	Yes	Yes	Present	On-site generator	2018	
Morton & Mitchell	No	No	N/A	Portable generator	N/A	To be decommissioned pending gravity sewer improvements
Northwest (Main Lift)	Yes	Yes	Present	On-site generator	2018	Original installation 1977. Replacement generator purchased 2017.
Oak Park	Yes	Yes	Present	On-site generator	2011	
Ridgecrest	No	No	Absent	On-site generator	2019	Generator purchase pending planned upgrades to station
Sage Meadows #1 (Southern Hills)	No	No	Absent	On-site generator	2019	To be decommissioned/moved pending development
Sage Meadows #2 (Hwy 351)	No	No	Absent	On-site generator	2019	Generator purchase pending planned upgrades to station due to development
Sage Meadows #3 (Lochmoor)	No	No	Absent	On-site generator	2019	Generator purchased 2018
South Bend	No	No	N/A	Portable generator	N/A	To be decommissioned pending development
Southeast (2 generators)	Yes	No	Present	On-site generator	1977	
	Yes	No	Present	On-site generator	2008	1990 model
Southwest	Yes	No	Present	On-site generator	1999	
Sports Complex	Yes	Yes	Present	On-site generator	2011	
Spring Valley	No	No	Absent	On-site generator	2019	Property Issues
Strawfloor	Yes	No	Present	On-site generator (Manual)	2011	
~~Sunset Hills~~	~~No~~	~~No~~	~~N/A~~	~~Portable generator~~	~~N/A~~	~~Decommissioned by gravity sewer 2017~~
Turtle Creek	Yes	No	Present	On-site generator	2018	Generator purchased 2017
Valley View	Yes	Yes	Present	On-site generator	2012	
Wimpy Ln	Yes	No	Present	On-site generator	2011	

Notes: **Revised: 11/27/2018**

(1) Year indicates the time standby power was provided or target for permanent standby power to be operational.