



**A Report to the  
Audit Committee**

**Mayor**  
David Briley

**Director of Metro Water  
Services**  
Scott Potter

**Audit Committee Members**  
John Cooper  
Charles Frasier  
Talia Lomax-O'dneal  
Bob Mendes  
Brack Reed  
Jim Shulman

**Audit of the Metro Water Services  
Fire Hydrant Inspection, Flow-  
Testing, and Maintenance Process**

November 19, 2018

Metropolitan  
Nashville  
Office of  
Internal Audit

## EXECUTIVE SUMMARY

November 19, 2018



### Why We Did This Audit

The Director of Metro Water Services requested this audit. Proper inspection and maintenance of fire hydrants provides assurance that adequate water flow is delivered when needed by the Nashville Fire Department.

### What We Recommend

- Establish dedicated crews and annual schedules to perform inspections and flow-tests of all fire hydrants within the five-year cycle.
- Improve cooperation with the Nashville Fire Department to ensure follow-up on private hydrants that fail inspections.
- Enhance data integrity controls within the Hansen and the Mobile Workforce Management Systems

# Audit of the Metro Water Services Fire Hydrant Inspection, Flow-Testing, and Maintenance Process

## BACKGROUND

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Metropolitan Nashville Government's Metro Water Services Department, hereafter called Metro Water Services, is responsible for the installation, inspection, and maintenance of public fire hydrants. Metro Water Services is also to inspect or supervise the inspection of private hydrants in accordance with procedures and at intervals established by the Nashville Fire Department Fire Chief. As of March 31, 2018, Metro Water Services was responsible for 20,880 public fire hydrants in its service area of 388 square miles. Additionally, there were 3,127 private fire hydrants as of fall 2017.

## OBJECTIVE AND SCOPE

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The objectives of this audit are to determine if:

- Public and private fire hydrants are inspected in accordance with applicable Metropolitan Nashville Code of Laws, Metro Water Services internal policies, and industry standards as outlined by the National Fire Prevention Association and the American Water Works Association.
- Inspection fees for private hydrants are recorded and collected.
- Data is consistent between the Geographical Information, Mobile Workforce Management, and Hansen Asset Management systems.

The scope of the audit is all public and private fire hydrants in service as of March 2018 and the fall of 2017, respectively.

## WHAT WE FOUND

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Metro Water Services has dedicated management and staff who strive to inspect and maintain fire hydrants properly. They do so by managing the available resources among competing duties and responsibilities. Policies and procedures have been established. Generally, inspection work and maintenance performed was conducted in accordance with internal procedures and industry standards. Fees related to private hydrant inspections were billed and collected.

A portion of public fire hydrants (17 percent) were not inspected or flow-tested within the established five-year period. Opportunities exist to enhance the integrity of data within the Hansen software system. Existing policies and procedures need to be periodically reviewed and updated. Procedures related to the follow up of private hydrants that fail inspection were not followed.

## GOVERNANCE

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Metropolitan Nashville Code of Laws § 15.12.110 charges Metro Water Services with the installation and maintenance of fire hydrants. The Metro Water Services Systems Services Division is tasked with discharging these responsibilities. The Nashville Fire Department uses these hydrants to respond to fire emergencies and other fire safety measures.

The American Water Works Association – *M17* and the National Fire Protection Association – *NFPA 25* are two industry standards for hydrant maintenance and flow-testing. The National Fire Protection Association requires hydrants to be inspected and maintained annually and underground and exposed piping serving hydrants to be flow-tested at minimum five-year intervals.

## INSPECTION, FLOW-TESTING, AND MAINTENANCE OVERVIEW

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Fire hydrants play a critical role in public safety and fire suppression. It is vitally important to have a system in place to properly inspect, flow-test, and maintain fire hydrants to ensure adequate water flow in cases of emergency. Adequate quality controls ensures that fire hydrant readiness will be sufficient and will not put residents and properties in those areas at risk, especially if no fully functional hydrants are within 500 feet as required by the Nashville Fire Department. Moreover, insurance companies collect and evaluate information about hydrant flow-tests and municipal fire suppression efforts in communities throughout the United States as factors in setting rates for premiums. (Refer to Appendix B for a summary of the September 2017 survey report and grades for Nashville.)

### Public Hydrants

Metro Water Services installs, inspects, flow-tests, and maintains all public fire hydrants. Inspection, flow-testing, and maintenance work are performed by employees generally, but contractors are used when necessary. Metro Water Services internal policies require all fire hydrants to be flow-tested every five years.

As of March 2018, Metro Water Services had three Standard Operating Procedures for hydrants: (1) Two-hydrant Flow-Tests, (2) Flow Crews-Mobile Dispatch, and (3) Hydrant Repair and Replacement.

Exhibit A summarizes costs to install, inspect, flow-test, and maintain public hydrants for three fiscal years examined. Labor costs include apportioned Systems Services Division labor costs and costs for labor supplied by contractors.

### **Exhibit A – Costs for Public Fire Hydrant Installation, Inspection, Flow-Testing, and Maintenance**

<b>Fiscal Year Ended</b>	<b>Hydrants Purchased - Complete</b>	<b>Hydrant Purchased - Parts</b>	<b>Labor</b>	<b>Totals</b>
June 30, 2017	\$134,120	\$109,955	\$1,206,395	\$1,450,470
June 30, 2016	219,387	88,798	816,334	1,124,519
June 30, 2015	124,081	122,136	321,381	567,598
<b>Totals</b>	<b>\$477,588</b>	<b>\$320,889</b>	<b>\$2,344,110</b>	<b>\$3,142,587</b>

Source: Metropolitan Nashville Government EnterpriseOne

## Private Hydrants

Private hydrants are installed, inspected, flow-tested, and maintained by private property owners with oversight from Metro Water Services and the Nashville Fire Department. The term ‘private’ is broad and includes private individuals, private companies, Metro Nashville departments/agencies, Tennessee State departments/agencies, and United States departments/agencies that own properties within the Metro Water Services coverage area. Metropolitan Nashville Code of Laws § 15.68.030 requires property owners to perform at least a monthly visual inspection of private hydrants as well as preventive maintenance at six months intervals. As an oversight function, Metro Water Services has a contract with a vendor to observe private hydrant inspections to ensure compliance with Metropolitan Nashville Code of Laws and industry standards. Metro Water Services receives inspections reports from the contractor and submits a list of hydrants that fail inspections to the Nashville Fire Department for follow-up.

Exhibit B shows fees collected from private hydrant owners (revenue) and fees paid to the contractor to monitor inspections.

### **Exhibit B – Private Hydrant Inspection Fee Revenues and Expenses**

<b>Fiscal Year Ended</b>	<b>Inspection Fee Revenue</b>	<b>Inspection Fees Paid to Contractor</b>
June 30, 2017	\$302,508	\$200,290
June 30, 2016	289,308	142,063
June 30, 2015	280,543	177,689
<b>Totals</b>	<b>\$872,359</b>	<b>\$520,042</b>

Source: Metropolitan Nashville Government EnterpriseOne

## Inspection and Flow-Testing

Inspections include checking the appearance to remove obstructions around it, painting, and raising or lowering it because of a change in the ground surface grade. In certain instances, when a hydrant is hit by a vehicle, for example, an inspection may not be necessary since such a hydrant needs repair or outright replacement.

Flow-tests are conducted to determine pressure and flow-producing capabilities at any location within the distribution system, that is to determine how much water is available for fighting fires but the flow-test also serves as a means of determining the general condition of the distribution system.

Hydrant inspections and flow-tests originate in one of three ways:

- *Routine Inspections* - inspections generally originate from Metro Water Services’ System Service Division based on a review of information on the Geographical Information Systems map.
- *On-Demand Inspections* - inspections that are requested by private companies or developers during the planning stages of new developments.
- *Service Request* - inspections that originate from various sources, including the Nashville Fire Department and Metro Water Services Customer Service Center (calls from the public, Metro Police, Metro Office of Emergency Department, and others). These are usually related to hydrants that are damaged, not functioning well, or complaints about the change in watercolor.

**Exhibit C – Public Hydrant Work Orders processed between April 1, 2017, and March 31, 2018**

Inspection Type	Number	Percent of Total
Routine	6,896	82
On-Demand	566	7
Service Request	898	11
<b>Total</b>	<b>8,360</b>	<b>100</b>

Source: Hansen Asset Management System

There were 20,880 public hydrants in operation as of March 2018 and 3,127 private hydrants in operation as of fall 2017 within the Metro Water Services area. The National Fire Protection Association requires hydrants to be inspected and maintained annually and underground and exposed piping serving hydrants to be flow-tested at minimum 5-year intervals. Exhibit D summarizes the inspection and flow-testing activity within the Metro Water Services service area.

**Exhibit D – Public Hydrants Inspected and Flow-Test Completion Rates**

Category	Period	Hydrants	Percent of Total
Up to 3 years	4/1/2015 - 3/31/2018	13,563	65
Over 3 years to 5 years	4/1/2013 - 3/31/2015	3,840	18
Over 5 years	4/1/1999 * - 3/31/2013	3,275	16
Not inspected/flowed	Various	202	1
	<b>Totals</b>	<b>20,880</b>	<b>100</b>

Source: Hansen Asset Management System, \* - Earliest period for which data is available

Information Systems

Metro Water Services uses a variety of systems to track hydrants and activity related to hydrants. These systems include the Geographic Information System, Hansen Asset Management System, Mobile Workforce Management System, and enQuesta.

## OBJECTIVE QUESTIONS AND CONCLUSIONS

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1. *Has Metro Water Services established and effectively implemented policies and procedures to inspect and flow-test fire hydrants within five years?*

**Generally, no.** Metro Water Services has established policies and procedures for the inspection, repair, and flow-test of fire hydrants. Metro Water Services in good faith attempts to implement these policies and procedures. However, there were 3,477 or 17 percent, of fire hydrants that were not inspected or flow-tested during a five-year cycle. (See Observation A.)

2. *Did the Metro Water Services complete hydrant repairs according to priority codes?*

**Generally, yes.** Out of the 580 hydrant repairs scheduled between April 2017 and March 2018, 459 hydrant repairs (79 percent) were completed according to the respective priority codes. The other 121 hydrant repairs (21 percent) were not completed within the priority code time to repair criteria. (See Observation A.)

3. *Did Metro Water Services establish effective policies and procedures to oversee the inspection, flow-testing, and repair of private hydrants?*

**Generally, yes.** Metro Water Services has an agreement with a third party contractor to observe private hydrant inspections that are performed by private owners. Metro Water Services schedules two inspections each year in the spring and fall. However, procedures to follow-up on hydrants that fail inspection were not observed. (See Observations A.)

4. *Did the Metro Water Services establish and implement procedures to recognize annual service charges and inspection fees from private hydrant owners?*

**Generally, yes.** Metro Water Services has established and implemented procedures to collect inspection fees related to private hydrants. A sample of 50 private hydrant inspection tickets demonstrates fees were billed to and received from private owners. However, better utilization of technology could make the billing process more efficient. Annual service charges are not levied because the criteria established by the Metropolitan Nashville Code of Laws § 15.32.170 do not exist according to management. (See Observations B.)

5. *Is data consistent between the Hansen Asset Management, Mobile Workforce Management, and Geographic Information System systems?*

**Generally, yes.** A sample of 60 work orders shows data was consistent between Hansen Asset Management and Mobile Workforce Management systems. However, there is no audit trail for changes to information in the Hansen Asset Management system. Selected Metro Water Services employees have read and write access in Hansen, but the 'log feature' that can be used to document changes made to original data was not used consistently. In addition, management review of changes to data was not performed consistently. (See Observations B.)

6. *Did Metro Water Services perform maintenance work for hydrants in accordance with internal procedures and industry standards?*

**Generally, yes.** A sample of 40 maintenance work orders reviewed showed 37 hydrants (93 percent) were maintained according to internal policies. The remaining 3 (7 percent) hydrants did not have work orders or other supporting documentation to ascertain if the work was completed as required.

According to management, not all maintenance tasks require work orders or another paper trail, but such work is documented in Hansen as was the case with the 3 noted above.

Also, Metro Water Services did not include several inspection and flow-test tasks recommended by industry standards. Management asserts that some of these tasks are being performed during inspections, but there is no documentation to verify the work was performed. The American Water Works Association and National Fire Protection Association both emphasize the need to document the activity or procedure performed for all inspections, flow-tests, and repairs, store the same and make available to the authority having jurisdiction upon request. (See Observations B.)

## AUDIT OBSERVATIONS

Internal control helps entities achieve important objectives to sustain and improve performance. The Committee of Sponsoring Organizations of the Treadway Commission (COSO), Internal Control – Integrated Framework, enables organizations to effectively and efficiently develop systems of internal control that adapt to changing business and operating environment, mitigate risks to acceptable levels, and support sound decision-making and governance of the organization.

### **Observation A – Inspection Activity**

Hydrant inspections, flow-testing, and repair practices do not always comply with the Metro Water Services *Standard Operating Procedures*, American Water Works Association, and National Fire Protection Association’s industry standards, as well as Metropolitan Nashville Code of Laws § 15.12.110 – *Public Fire Protection*.

#### Timely Inspection and Flow-test of Public Hydrants

There were 20,880 public hydrants as of March 2018 of which 17,403 or 83 percent were inspected and flow-tested within the five-year period as established by Metro Water Services and industry standards; 3,477 or 17 percent were not inspected and flow-tested within the five-year time frame (3,275 or 16 percent had not been inspected and flow-tested within a five year period with the remaining 202 or 1 percent having not been inspected and flow-tested at all, or no record was available documenting inspection and flow-testing).

#### Public Hydrants Repairs not in Line with Priority Codes

Out of the 580 hydrants scheduled for repairs between April 2017 and March 2018, 459 (79 percent) were timely completed according to the respective priority codes. Of the, 121 (21 percent ) that were completed late, priority code 2 had 28 out of 59 (47 percent ) and priority code 3 had 57 out of 107 (52 percent), compared to the other 4 priority codes with 87 percent average completion rate.

### **Exhibit E – Metro Water Services Priority Code Completion Rates**

Priority Codes	Hydrants Scheduled for Repair	Hydrants Repaired in Time Criteria	Hydrants not Repaired in Time Criteria	Completion Percentage
1 Emergency Repair *	89	75	14	84
2 Critical Repair (Current Shift)	59	31	28	53
3 Critical Repair (within 24 hours)	109	52	57	48
4 Repair (within 1 week)	89	76	13	85
5 Repair (within 2 weeks)	45	36	9	80
6 Repair (within 4 to 6 weeks)	189	189	0	100
<b>Totals</b>	<b>580</b>	<b>459</b>	<b>121</b>	<b>79</b>

Source: Hansen Asset Management System

\* Excavation work will start immediately following the 2-hour emergency utility location – Tennessee-One-Call (811)

### Inadequate Staffing

The root cause of the issues stated above relates to Metro Water Services not having adequate staff to ensure fire hydrant inspections and flow-tests are completed every five years. Staff allocated to perform these duties also have competing responsibilities and daily tasks reducing their ability to dedicate substantial time for fire hydrant inspections and flow-tests. Jurisdictions with a similar number of fire hydrants (Louisville – 24,000; Memphis – 28,000) have dedicated crews that service all hydrants every year.

#### *Criteria:*

- COSO, Control Activities—Principle 10—The organization selects and develops control activities that contribute to the mitigation of risks to the achievement of objectives to acceptable levels.
- Metropolitan Nashville Code of Laws § 15.12.110 – *Public Fire Protection*
- Metro Water Services Standard Operating Procedures - *Two-Hydrant Flow-Test*
- American Water Works Association’s *M17* and National Fire Protection Association’s *NFPA 25*

#### *Recommendations for management of Metro Water Services:*

1. Establish dedicated crews and annual schedules to perform inspections and flow-tests of all fire hydrants within the five-year cycle.
2. Perform periodic reviews of completion rates to assist with general operational and scheduling decisions.
3. Review repair data over a certain period to determine if priority codes need to be revised to suit current operational conditions.

### ***Observation B – Follow up on Private Hydrants that Fail Inspection***

Private hydrants that fail inspection are not being adequately monitored. Out of 3,082 private hydrants inspected in spring 2017, 2,699 (88 percent) passed, and 383 (12 percent) failed. During fall 2017, 3,127 hydrants were inspected of which 2,854 (91 percent) passed, and 272 (9 percent) failed. Metro Water Services and Nashville Fire Department procedures require private hydrant owners to remediate all failed inspections and notify the Fire Marshall and Metro Water Services within 30 days of the notice. This was generally being performed timely. However, 21 percent of the private hydrants inspected in 2017 received a failing score.

Management stated that there is a monthly meeting during which hydrants, especially private hydrants, are discussed. However, there is no verifiable follow-up communication between Metro Water Services and the Nashville Fire Department after the list of failed private hydrants is submitted to the Nashville Fire Department. This is due to the fact that there is no established mechanism on how the Fire Marshal communicates results back to Metro Water Services. The Fire Marshall does schedule inspectors for follow-ups on failed private hydrants that require repair work but not for failures that are due to low water flows because the criteria used by Metro Water Services/contractor is not consistent with the requirements of the Code. Therefore, the Fire Marshall is reluctant to issue citations to the private owners for failures due to low flow pressure/gallons per minute (GPM). Also, the Fire Marshall only retains follow-up records for one year, so we were unable to verify any information for the audit scope.

According to management, the root cause for lack of follow-up is due to staff shortage and financial constraints. Metro Water Services currently charges a \$40 per hydrant fee to property owners when inspections on private hydrants are conducted. This fee is not sufficient to cover related costs. The Louisville Water Company pays the Louisville Fire Department a nominal fee for inspections. The inter-department fees may be lower than what is paid to the outside contractor.

*Criteria:*

- COSO, Control Activities—Principle 10—The organization selects and develops control activities that contribute to the mitigation of risks to the achievement of objectives to acceptable levels.
- Metropolitan Nashville Code of Laws § 15.12.110 – *Public Fire Protection*
- Metro Water Services Standard Operating Procedures - *Two-Hydrant Flow-Test*
- American Water Works Association’s *M17* and National Fire Protection Association’s *NFPA 25*

*Recommendations for management of Metro Water Services:*

1. Re-establish a verifiable agreement with the Nashville Fire Department to perform regular inspections and follow-ups for private hydrants.
2. Train the Nashville Fire Department to perform regular inspections and follow-up inspections for private hydrants. Use fees collected from private owners to pay the Nashville Fire Department for this service.
3. Request the Metropolitan Nashville Council to increase the \$40 fee per inspected private hydrant to accommodate the cost for follow-up inspections.

***Observation C – Data Integrity Enhancements to the Hansen System and Mobile Workforce Management System***

Controls ensuring the integrity of data retained within the Hansen and Mobile Workforce Management Systems could be enhanced.

The Engineering Division reviews hydrant related data between the Hansen Asset Management system and Geographic Information system and made corrections when needed. However, data processed by crewmembers in the field using Mobile Workforce Management on their laptops is transmitted to Hansen once the crewmember completes the work. This data is considered the primary system of record, and the process depends on access to a reliable internet/network service, which is not always available. Specific areas of concern include:

Lack of an audit trail for the Hansen System

The ‘log feature’ in Hansen where changes to hydrant data can be documented was not used consistently. Consequently, it is not possible to review what changes have been made to the system and by whom.

Inconsistent Hydrant Status Code

Sixty-nine percent of the 202 hydrants that were never inspected or flow-tested were classified as In-Service (IS). However, no in-service and valve ops were performed by the Systems Services Division to add them to inventory. We noted that there is no regular communication from the Planning Division to

advise the Systems Services Division of hydrant project completion so in-service and valve ops can be scheduled. Also, approximately 14 percent of the 202 hydrants were inspected and flowed by third-parties according to management, but no records of the results exist in Hansen.

#### Source Data Retention

Source data for the Mobile Workforce Management System is only retained for one year. Information input into the Mobile Workforce Management system is transmitted by the field crew into the Hansen System. Consequently, it was possible to examine only one-year of data retained in both systems for accuracy.

#### Inconsistent Data on Fire Hydrants Work Performed

There were instances of inconsistent documentation of work performed on hydrants selected for testing. The duration of work, measured as when the crew started and completed work at a hydrant location, was not realistic and comparable to the similar type of work performed at other locations. For example, one 'two-hydrant flow-test' took as little as 2.06 minutes while another two-hydrant flow-test took almost 39 minutes. It is true that not all two-hydrant flow-tests can be completed within the same amount of time but the time disparity was wide and did not appear reasonable.

#### Inspection Fee Information

Inspection fees were being billed and collected from private hydrant owners, but hydrant owner changes were not always captured timely causing delays in billing responsible parties. Bills were needed to be generated more than once because the original bill went to the wrong or previous property owner.

#### *Criteria:*

- COSO, Control Activities—Principle 12—The organization deploys control activities through policies that establish what is expected and procedures that put policies into action.
- Chapter 15.68.030 of the Metro Nashville Government Code – *Private Fire Hydrants: Maintenance Requirements*
- American Water Works Association's *M17* and National Fire Protection Association's *NFPA 25*.

#### *Recommendations for management of Metro Water Services:*

1. Establish use of the 'log feature' in Hansen as a standard operating procedure and periodically review the same for compliance. The documentation should include a historical trail of what has been changed.
2. Ensure adequate documentation is retained regarding activities performed for all inspections, flow-tests, and maintenance of hydrants. This should include revising the 'flushing work order' to include more of the American Water Works Association inspection and repair items. Also, consider retaining information in Mobile Workforce Management system for a longer time period.
3. Periodically sample and review hydrant information in Hansen for reasonableness and retain evidence of such reviews. This should include hydrants that have in-service (IS) status but have no inspection and flow-test data.
4. Enhance procedures to timely capture and update hydrant ownership change information in the Hansen private hydrant asset management system to agree with the billing system. This will reduce billing time and speed up receipts of payment from the owners.

## **GOVERNMENT AUDITING STANDARDS COMPLIANCE**

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We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our observations and conclusions based on our audit objectives.

## **METHODOLOGY**

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To achieve the audit objectives, auditors performed the following steps:

- Interviewed key personnel within the Metropolitan Water Services and the Nashville Fire Department.
- Examined and reviewed documentation related to fire hydrant inspection and maintenance policies and procedures, relevant Metropolitan Nashville Code of Laws and Executive Orders.
- Performed analytical review of completed inspection and maintenance data.
- Reviewed Metro Water Services contracts and other agreements.
- Determined primary functionality of Metro Water Services Geographic Information System, Hansen Asset Management and Mobile Dispatch System.
- Evaluated internal controls currently in place.
- Observed inspection and maintenance processes by Metro Water Services crews to determine the effectiveness of internal controls.
- Reviewed financial related transaction files from JD Edwards EnterpriseOne system
- Considered risk of fraud, waste, and abuse and information technology risks.
- Detail-tested sampled transactions

## **AUDIT TEAM**

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Innocent Dargbey, CPA, CMFO, MBA, MSc, In-Charge Auditor

Laura Henry, CFE, MS, Assisting Auditor

Bill Walker, CPA, CIA, Quality Assurance

Mark Swann, CPA, CIA, CISA, CMFO ACDA, Metropolitan Auditor

DAVID BRILEY  
MAYOR



**METROPOLITAN GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY**

DEPARTMENT OF WATER AND SEWERAGE SERVICES  
Office of the Director  
1600 Second Avenue, North  
Nashville, Tennessee 37208-2206

November 15, 2018

Mark Swann  
Metropolitan Auditor  
Office of Internal Audit  
404 James Robertson Parkway  
Suite 190  
Nashville, TN 37219

RE: Audit of Metro Water Services Fire Hydrant Process

Dear Mr. Swann:

This letter acknowledges Metro Water Services (MWS) received the Fire Hydrant Audit and has reviewed the audit comments and recommendations.

MWS will implement the recommended process improvements.

It was a pleasure working with you and your team on this project. We specifically thank, and extend our admiration to, Mr. Innocent Dargbey for his extraordinary attention to detail reflected in the audit.

Sincerely,

A handwritten signature in blue ink, appearing to read "Scott A. Potter".

Scott A. Potter, P.E.  
Director, Metro Water Services



If you need assistance or an accommodation, please contact Metro Water Services,  
at 615-862-4862, 1600 Second Avenue North, Nashville, Tennessee 37208.

## APPENDIX A – MANAGEMENT RESPONSE AND CORRECTIVE ACTION PLAN

We believe that operational management is in a unique position to understand best their operations and may be able to identify more innovative and effective approaches, and we encourage them to do so when providing their response to our recommendations.

	Concurrence and Corrective Action Plan	Proposed Completion Date
<i>Recommendations for management of Metro Water Services to:</i>		
<b>A-1.</b> Establish dedicated crews and annual schedules to perform inspections and flow-tests of all fire hydrants within the five-year cycle.	<b>Accept</b> – MWS had purchased vehicles for 3 additional fire hydrant flow trucks prior to the audit and have promoted 3 leaders for these crews. We have also advertised for a supervisor over these crews in the Water Maintenance section of System Services.	01/31/2019
<b>A-2.</b> Perform periodic reviews of completion rates to assist with general operational and scheduling decisions.	<b>Accept</b> – MWS prepares a report each Monday that reports action at each hydrant for the previous week. The new supervisor over the Water Quality section will review this report and schedule any follow up needed.	01/31/2019
<b>A-3.</b> Review repair data over a certain period to determine if priority codes need to be revised to suit current operational conditions.	<b>Accept</b> – MWS is currently reviewing products to replace Mobile Workforce Management (MWM). We will review the priority codes when we implement the new software.	06/30/2019
<b>B-1.</b> Re-establish a verifiable agreement with the Nashville Fire Department to perform regular inspections and follow-ups for private hydrants.	<b>Accept</b> – MWS will re-establish the previous agreement with the Nashville Fire Department (NFD) to conduct spring and fall public fire hydrant inspections.	06/30/2019
<b>B-2.</b> Train the Nashville Fire Department to perform regular inspections and follow-up inspections for private hydrants. Use fees collected from private owners to pay the Nashville Fire Department for this service.	<b>Accept</b> – MWS will discuss moving the private hydrant inspection process from a private contractor to the NFD.	06/30/2019
<b>B-3.</b> Request the Metropolitan Nashville Council to increase the \$40 fee per inspected private hydrant to accommodate the cost for follow-up inspections.	<b>Accept</b> – MWS will evaluate the fee to determine if it needs to be increased and supply documentation to justify the amount for cost recovery.	06/30/2019
<b>C-1.</b> Establish use of the ‘log feature’ in Hansen as a standard operating procedure and periodically review the same for compliance. The documentation should include a historical trail of what has been changed.	<b>Accept</b> – MWS has developed and implemented a log-entry SOP. We will evaluate for any other process improvements required.	01/01/2019
<b>C-2.</b> Ensure adequate documentation is retained regarding activities performed for all inspections, flow-tests, and maintenance of hydrants. This should include revising the ‘flushing work order’ to include more of the AWWA inspection and repair items. Also, consider retaining information	<b>Accept</b> – MWS has updated the SOP and flow sheet and we are evaluating software to include checklists of items electronically that are currently on the paper flow sheet.	06/30/2019

## APPENDIX A – MANAGEMENT RESPONSE AND CORRECTIVE ACTION PLAN

<p>in Mobile Workforce Management system for a longer time period.</p>		
<p><b>C-3.</b> Periodically sample and review hydrant information in Hansen for reasonableness and retain evidence of such reviews. This should include hydrants that have in-service (IS) status but have no inspection and flow-test data.</p>	<p><b>Accept</b> – Hydrant data is reviewed but repair times from MWM are not changed. MWS is evaluating new software to replace MWM to address the problems with reliable timestamps. System Services and Engineering will review the in-service process.</p>	<p>06/30/2019</p>
<p><b>C-4.</b> Enhance procedures to timely capture and update hydrant ownership change information in the Hansen private hydrant asset management system to agree with the billing system. This will reduce billing time and speed up receipts of payment from the owners.</p>	<p><b>Accept</b> – Private hydrants are flowed twice per year. Address updates are pulled from the billing system (Enquesta) twice per year when flowing starts.</p>	<p>Occurs twice per year.</p>

**APPENDIX B - SUMMARY OF PPC REVIEW FOR NASHVILLE**

Summary of PPC Review  
for  
Nashville FPSA

FSRS Item	Earned Credit	Credit Available
<b>Emergency Communications</b>		
414. Credit for Emergency Reporting	3.00	3
422. Credit for Telecommunicators	3.88	4
432. Credit for Dispatch Circuits	3.00	3
<b>440. Credit for Emergency Communications</b>	<b>9.88</b>	<b>10</b>
<b>Fire Department</b>		
513. Credit for Engine Companies	6.00	6
523. Credit for Reserve Pumpers	0.00	0.5
532. Credit for Pumper Capacity	3.00	3
549. Credit for Ladder Service	3.38	4
553. Credit for Reserve Ladder and Service Trucks	0.00	0.5
561. Credit for Deployment Analysis	4.46	10
571. Credit for Company Personnel	8.76	15
581. Credit for Training	1.69	9
730. Credit for Operational Considerations	2.00	2
<b>590. Credit for Fire Department</b>	<b>29.29</b>	<b>50</b>
<b>Water Supply</b>		
616. Credit for Supply System	26.77	30
621. Credit for Hydrants	2.98	3
631. Credit for Inspection and Flow Testing	5.46	7
<b>640. Credit for Water Supply</b>	<b>35.21</b>	<b>40</b>
<b>Divergence</b>	<b>-5.89</b>	<b>--</b>
<b>1050. Community Risk Reduction</b>	<b>4.16</b>	<b>5.50</b>
<b>Total Credit</b>	<b>72.65</b>	<b>105.5</b>

**Final Community Classification = 03/3X**

PPC is a registered trademark of Insurance Services Office, Inc.

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*Source: Public Protection Classification grade summary for Nashville from a September 2017 survey. The full report is available upon request from the Metro Fire Department.*