

Internal Audit Report 15-05
Storm Drainage: Public Works becoming more proactive but better
measures of effectiveness needed
April 2016



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STORM DRAINAGE INTERNAL AUDIT REPORT 15-05

INTRODUCTION

This is the first internal audit performed on the Storm Drainage fund and activities associated with it.

BACKGROUND

The purpose of the City's Storm Drainage Division of Public Works is to safely convey urban runoff to the Big Sioux River. This conveyance is done through open channel drainage ways, storm sewers, and storm water detention and retention ponds. Retention ponds hold water indefinitely while detention ponds, also known as "dry ponds", are a low-lying area that temporarily holds water until the water can drain to another area.

The City owns and operates a Municipal Separate Storm Sewer System (MS4). This MS4 is regulated and controlled by the State of South Dakota Department of Environment and Natural Resources (DENR). An MS4 is a conveyance or system of conveyance such as storm drains and municipal streets that is designed or used for collecting and transporting stormwater. An MS4 General Permit is designed to reduce the amount of sediment and pollution that enters surface and ground water from storm sewer systems to the maximum extent practicable. Through the Permit, the City is required to develop a stormwater pollution prevention program (SWPPP) that incorporates Best Management Practices (BMPs) applicable to the MS4.

Besides improving regional water quality, Storm Drainage activities are intended to maintain the drainage infrastructure and protect private property from flooding. Storm Drainage was recently reorganized to include a newly created Environmental/Storm Water Manager position. Numerous City departments and divisions are involved with Storm Drainage including Engineering, Finance, Public Works Administration, and Water Reclamation. The City Council, as part of the 2016 budget approval process, approved three new full time equivalents (FTEs) to further support storm drainage infrastructure maintenance.

Although classified as a special revenue fund, the Storm Drainage fund functions much like an enterprise fund.¹

Storm Drainage is responsible for maintaining approximately 10,400 storm inlets in the City. Storm Drainage also maintains over 525 miles of storm sewer and drainage channels, 62 detention ponds, and over 68 miles of sump pump collection pipe.

¹ The City's enterprise funds include Water, Water Reclamation, Sanitary Landfill, Electric Light, and Public Parking Facilities. Enterprise funds are intended to be funded primarily by user fees rather than taxes.

Its primary source of revenue is the storm drainage fee which brought in \$6.5 million dollars in 2015. Other revenue sources include special assessments and second penny sales tax (for debt service on capital improvements.) Storm Drainage expenditures in 2015 were \$7.4 million.

OBJECTIVES

The objectives of this audit were to:

1. Determine if typical Best Management Practices related to stormwater and drainage are being used.
2. Determine if efforts are effective to protect regional water quality, maintain the storm drainage system, and protect private property.
3. Determine if the internal control structure is functioning to ensure compliance with the MS4 Permit issued by the South Dakota Department of Environment and Natural Resources (DENR).
4. Determine if the internal control structure is functioning to ensure that operational information contained in the MS4 annual report is accurate.
5. Determine if the Storm Drainage fund has sufficient revenue to fund it operating and capital costs.

SCOPE AND METHODOLOGY

The scope of this audit included internal controls as they currently exist. Operational information in the MS4 2014 Annual Report was verified. Financial trends in the Storm Drainage fund from 2011-2015 were reviewed. River quality data from 2006-2015 was reviewed. Methodology included:

- Interviews with Public Works managers and the City's liaison at the State DENR.
- Review of financial information related to the Storm Drainage fund in the City's financial system.
- Research on typical Best Management Practices related to stormwater and drainage.
- Observations of maintenance and repair activities in the field by Public Works crews.
- Review of source documents related to information in the 2014 MS4 Annual Report.

RESULTS

Typical Best Management Practices

There is no authoritative list of BMPs applicable to every municipality. There are essentially menus of practices that are often grouped into categories such as Public Education and Involvement or Illicit Discharge Detection and Elimination. Municipalities are encouraged to research and implement BMPs in a variety of

categories. A BMP that works well in one part of the country for a particular local situation may be less suited for another situation.

The City appears to have a well-established MS4 program with multiple, widely accepted BMPs in all the typical categories. The City's liaison at the State DENR said the City has a good, comprehensive program in place in her opinion.

Examples of BMPs that we noted being performed by the City were:

- The City conducts street sweeping at least twice a year to reduce amount of debris and pollutants entering the storm drainage system.
- The City organizes citizen volunteers to perform periodic cleanups of the Big Sioux River thus educating the public and removing potential pollutants from the BSR.
- The City conducts inspections of construction sites to determine that structures are in place to protect the storm sewer system.
- The City performs ongoing inspections and cleaning/jetting of stormwater inlets and lines. (Photo of City crew cleaning a storm inlet in October 2015.)



We concluded that the City is using typical Best Management Practices.

Efforts effective to protect water quality, maintain infrastructure, protect property

The City's efforts in repair and maintenance of the storm drainage infrastructure are working to reduce property damage and neighborhood flooding. The City has had the misfortune to experience a number of heavy rain events the past few years. Public Works management has been satisfied with the performance of the infrastructure during these events. The number of calls of sewer backups from major events has decreased. Streets may fill with stormwater during major events but they are designed to convey water in these situations.

There is some indication of reduced pollutants in the Big Sioux River based upon data from the State DENR testing. However, this data is not conclusive for the ten year period we reviewed. Total dissolved solids and conductance readings show a measurable decrease the last three years (2013-2015).² See Appendix One on page 10 of this report for details of this data.

The City is now proposing to purchase properties in existing neighborhoods that still experience flooding during heavy storms. These properties will be razed and green areas will be developed in their place to collect stormwater and slowly release it into the drainage infrastructure. New developments on the perimeter of the city have retention and detention ponds and other infrastructure incorporated in order to hold the stormwater as long as possible in the neighborhood before it is released into the drainage system.

Management can identify specific activities they are performing to improve regional water quality such as providing public education events and operating a household hazardous waste recycling center. These activities likely reduce the pollutants entering the Big Sioux River. However, management does not have specific information about the effectiveness of individual BMPs. Internal Audit is recommending management develop specific ways to evaluate the effectiveness of Best Management Practices related to regional water quality for individual program elements and the overall program. See audit recommendation and management response on page eight of this report.

² Salts and other substances affect the quality of water used for irrigation and drinking. Electrical conductivity and total dissolved solids are closely related measures of salt and other substances when testing bodies of water.



(Photo is that of a City employee preparing to lower a closed circuit video camera into a stormwater line for visual inspection of the condition of the line. Approximately 20% of the lines are video recorded each year with a goal of inspecting the entire system every 5 years.)

Compliance with MS4 Permit issued by State DENR

While the internal control structure lacks formalized, written procedures for major activities of the department, the experience and qualifications of key employees helps compensate for this. There is also regular communication between staff and management and management has identified the risks and associated controls to mitigate these risks. The Storm Drainage Division and associated departments are making best efforts to comply with the MS4 Permit.

We concluded that the internal control structure appears to be functioning to ensure compliance with the MS4 Permit issued by the South Dakota DENR. Written policies and procedures are essential elements of an internal control system. We recommend that management develop these for major activities of the department to ensure compliance with the MS4 in future years. See audit recommendation and management response on page 8 of this report.

Operational information

Overall, we could verify operational information reported in the MS4 2014 Annual Report. However, there were some minor issues of inaccuracies. Management is encouraged to implement a review process before the MS4 Annual Report is released to ensure that it is more thoroughly reviewed. We did not make this a formal audit recommendation as this is a minor issue. We discussed the specific inaccuracies with the management team at the exit meeting.

Sufficient revenue

The Storm Drainage fund balance, the difference between the assets and liabilities, has steadily increased from 2011 to 2015 from \$7.5 million to \$9.5 million. The revenue in 2015, the first year of the rate increase, was 10% more than the revenue in 2014. This met management expectations and is a positive sign. See Appendix Two on page 11 of this report for details on fund balance and revenue and expenditures trends.

Prior to 2015, the drainage fee revenue provided the resources for operating and maintenance costs, capital improvements in existing areas, and capital improvements in developing areas. Platting fee revenue also helps fund capital improvements in developing areas. Operating and maintenance costs includes storm sewer and pond maintenance, personnel costs for maintenance and engineering employees doing storm drainage work, mosquito control, and contractor work. Capital improvements in existing areas include repair and replacement of aging infrastructure, drainage way rehabilitation, and drainage studies. Capital improvements in developing areas include infrastructure oversizing, regional BMPs, and land for regional infrastructure. However, funding structure in place prior to 2015 was not keeping up with the needs such as a backlog in inlet repairs and the need for more drainage channel rehabilitation.



(Photo is a storm inlet in need of repairs on Southeastern Avenue.)

Funding beginning in 2015 and going forward consists of drainage fee revenue paying for operations and maintenance, capital improvements in existing areas, and the new responsibility of flood control system (levees) renewal and replacement. Capital improvements in developing areas will be funded through a combination for drainage fee revenue and platting fee revenue.

Drainage fees and platting fees used to pay for storm drainage costs had not increased in many years. A consultant performed a rate analysis in 2008 with an update in 2013.

Proposed rates were computed for 2015-2017 based upon growth projections, all anticipated capital and operating requirements including the backlog in work. In 2014 the City Council approved rate increases to increase each year for a three-year period beginning in 2015.

We concluded that the Storm Drainage fund appears to have sufficient revenue to fund all its operating and capital costs now and into the near future. Without the rate increases approved by the City Council in 2014 to cover 2015-2017, the fund would likely have been short of the financial resources necessary to fund the infrastructure requirements of the stormwater sewer system and meet the operating costs of the system including addressing the backlog in stormwater inlet repairs and other maintenance. However, rate increases beyond those approved for 2015-2017 may still be necessary to maintain the long-term financial health of the fund.

RECOMMENDATIONS

We made the following recommendations that address the above referenced results.

1. Management should develop specific ways to evaluate the effectiveness of Best Management Practices related to regional water quality for individual program elements and the overall program.

Management's Response: Evaluation of BMP effectiveness for reduction of pollutant loadings would require upstream and downstream sampling during a rain event. The sampling requires specialized equipment, well trained staff, and a lab available to analyze sampling shortly after they are collected. The Environmental Division performs sampling in various locations each year in the drainage system. To establish reliable results on pollutant loading reduction a much larger dataset would be necessary that is currently beyond the resources of the Storm Drainage division. Public Works will continue to work toward additional testing/sampling to better represent the effectiveness of BMPs.

*Management Representative Responding: Andrew Berg,
Environmental/Stormwater Manager*

Date of expected implementation: TBD

2. Management should develop written policies and procedures for major activities of the Division.

Management's Response: Stormwater staff agrees with this recommendation. The personnel involved with this program have significant knowledge of the system to be incorporated into written policies to periodically review/update and preserve for future use. The operations of the flood control system have been written into the O&M Manual provided by the Corps of

Engineers. This provides us a template for assembling similar manuals for our daily/weekly/monthly/annual operations.

*Management Representative Responding: Andrew Berg,
Environmental/Stormwater Manager*

Date of expected implementation: Fall 2016 – Spring 2017

CONCLUSION

Public Works management is transitioning from being reactive to being proactive in repairing and maintaining the storm sewer infrastructure. Best Management Practices related to water quality are in place. Developing methods of determining the specific effectiveness of individual program elements and the overall program is needed to ensure that the Division's efforts at improving regional water quality are maximized. We appreciate management's assistance and cooperation during this audit.

AUTHORIZATION

The Sioux Falls City Council approved this audit by resolution in December 2014 as part of the 2015 Annual Audit Program. The Internal Audit Division operates under the authority of an Internal Audit Charter adopted by City Council resolution 11-13.

AUDIT STANDARDS

This audit was conducted in accordance with the *International Standards for the Professional Practice of Internal Auditing* issued by the Institute of Internal Auditors.

STATEMENT OF INDEPENDENCE

Internal Audit is administratively and operationally independent of the programs and departments it audits, both in appearance and in fact. The Internal Audit Manager is accountable to an Audit Committee appointed by the City Council per section 32.022 of the Code of Ordinances of Sioux Falls, SD.

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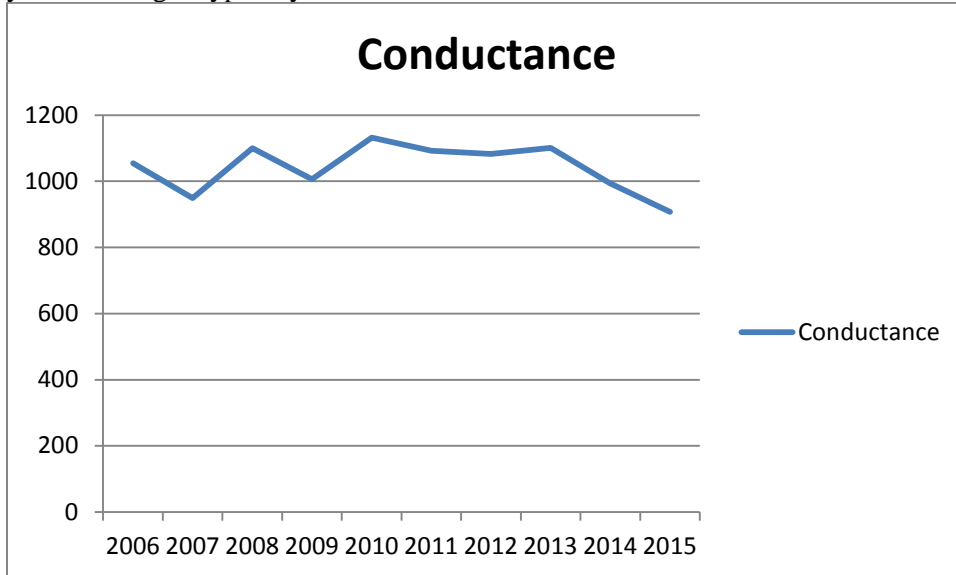
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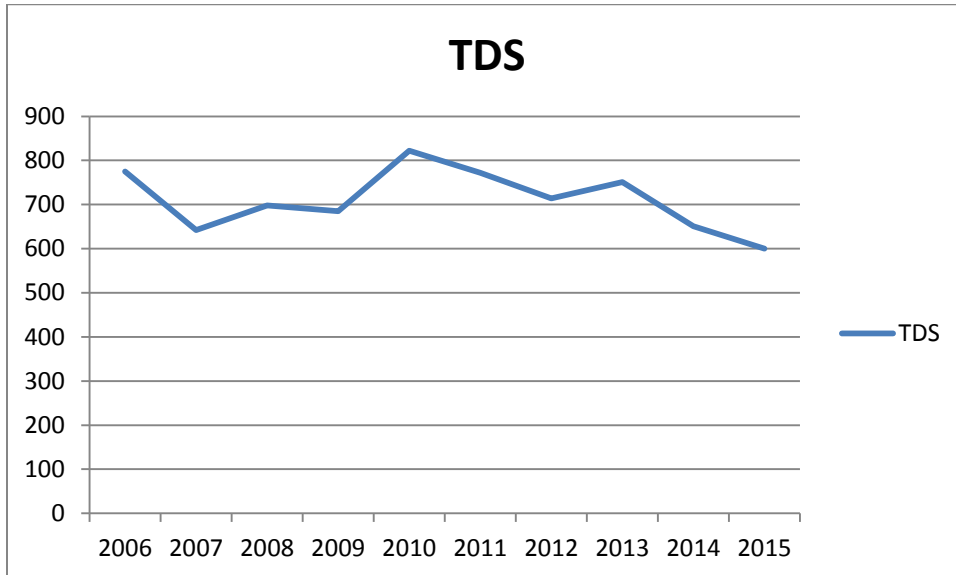
Rich Oksol, CPA. CGAP
Internal Audit Manager

APPENDIX ONE

Data is from water testing of the Big Sioux River (BSR) in Sioux Falls by the State Department of Environment and Natural Resources. Readings represent the average reading tested for the year. Testing is typically done twice a month at various locations on the BSR in Sioux Falls.



Specific conductance measured in micro ohms



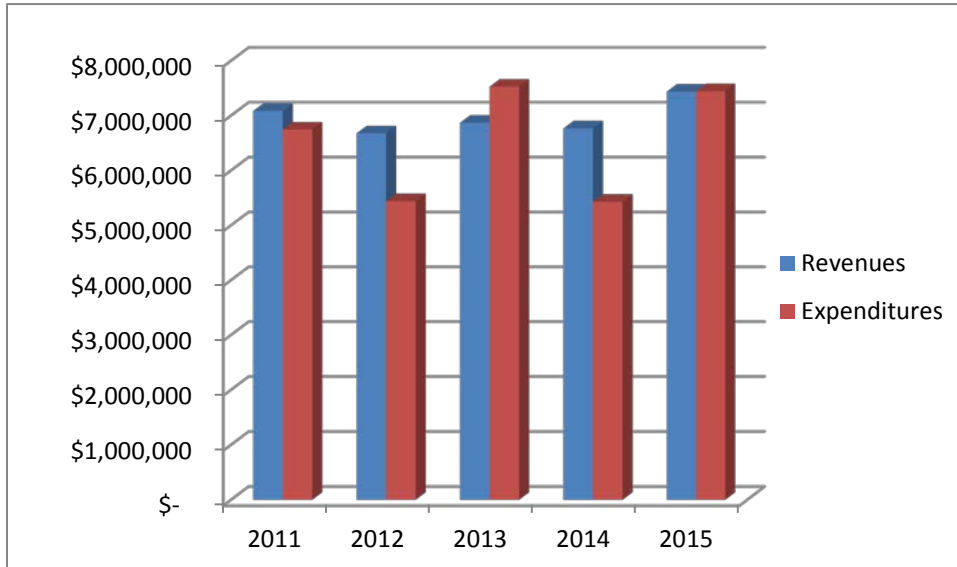
Total Dissolved Solids (TDS) in milligrams per liter

Conductivity is the ability of water to conduct an electrical current. Distilled water or rain water, which is essentially distilled water, will have very low levels of conductivity and total dissolved solids. Readings of 0.5 to 3.0 micro ohms are typical. Freshwater streams will typically have ranges of 100 – 2000 micro ohms. Total dissolved solids in freshwater can vary widely from 110 to 2100 milligrams per liter.

APPENDIX TWO

NOTE: Storm Drainage fund 2011 revenue reflects \$1.2 million loan proceeds from the State Revolving Fund. 2013 expenditures reflect land purchases for drainage improvements in developing areas; \$300,000 was anticipated to be spent for land but \$1.1 million was actually spent.

Revenues	\$ 7,083,465	\$ 6,675,319	\$ 6,868,429	\$ 6,766,365	\$ 7,435,920
Expenditures	\$ 6,745,145	\$ 5,439,712	\$ 7,526,861	\$ 5,428,400	\$ 7,443,179
Year	2011	2012	2013	2014	2015



Storm Drainage fund balance is the difference between assets and liabilities.

Fund balance	\$7,542,613	\$8,778,220	\$8,119,788	\$9,486,303	\$9,479,044
Year	2011	2012	2013	2014	2015

