



DeKalb County Water Metering And Billing Audit Report



Draft for Discussion Only

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Contents

1. Executive summary	2
2. Introduction	5
3. Background	7
4. Administration and Organization	15
5. Account Set Up	25
6. Meter Reading	40
7. Billing	59
8. Field Services	92
9. Looking Forward	104
Appendix 1: Glossary	111
Appendix 2: Summary of Issues and Recommendations	113

1. Executive summary

As a result of both internal and external factors discussed throughout this report, DeKalb County encountered a series of organizational, operational and technical issues over the past years, limiting its ability to consistently provide effective and efficient meter reading, meter billing, field services, and customer service. Outputs from the County's water metering and billing operations resulted in an increase in meter reading inaccuracies, estimated and inaccurate customer bills, and delays in performing routine field service activities.

In January 2017, new DeKalb County Chief Executive Officer Michael Thurmond was sworn into office and began efforts to identify and resolve issues related to inaccurate water bills. The County Executive has named the project "New Day" – with the objective of providing a plan for addressing the water billing crisis. KPMG did not evaluate or assess the New Day project. KPMG is encouraged by the formal initiative being led by the CEO to correct the current environment and the County's support to conduct this assessment.

This report provides a "deep-dive" analysis into factors contributing to the County's current state, identifying root causes and next steps to enable the County to enhance its water metering and billing operations.

Scope and Approach

The DeKalb County Office of Independent Internal Audit and the Audit Oversight Committee engaged KPMG to conduct an assessment of County water metering and billing through the authority it derives from Georgia House Bill 599 (HB 599). HB 599 notes that the Office of Internal Audit shall be completely independent and shall not be subject to the control or supervision by the Chief Executive, the Commission, or any other official, employee, department or agency of the County government. The assessment reviewed meter and billing data, system capabilities, technology enablement, asset management and utilization, staffing models, resource management and training, processes and controls, and customer service to develop recommendations to rectify current issues, support positive transformation, and enhance the County's water metering and billing operation.

KPMG's project objectives were aimed at determining the root causes related to the inaccuracy of water meter readings and water billings and to recommend actions to help correct and mitigate the identified issues. Project tasks included review of key water meter reading and billing processes, technologies, controls, and people. KPMG reviewed:

- Water metering and billing technology
- Business processes related to meter reading, billing, customer account management, field services, and back office data analysis
- Water metering and billing procedures and governance
- Water metering and billing staffing
- Water metering and billing personnel and training
- Water metering and billing customer service

KPMG developed a phased project approach to accomplish project objectives. KPMG's project approach included the following three phases:

- **Phase 1: Project planning and kickoff** – In Phase 1, KPMG met with key project stakeholders to reaffirm project goals, milestones and objectives.

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

- **Phase 2: Information gathering and analysis** – In Phase 2, KPMG gathered information to understand the County's water metering and billing operation. Phase 2 activities included:
 - Assessing current state of operations, technology, processes, procedures, and organization
 - Conducting interviews with more than 50 County staff and third party vendors
 - Conducting one field site tour
 - Conducting ride-along observations with meter reading and field services personnel
 - Analyzing current state documentation
 - Reviewing industry and functional benchmarks
 - Analyzing metering and billing data, both current and historic
 - Reviewing daily water metering and billing operations
 - Assess operational metrics and processes
 - Evaluating use and effectiveness of technology
 - Evaluating use and quality of water metering and billing data
- **Phase 3: Reporting and Validation** – In Phase 3, KPMG developed this report to summarize our project approach, root causes and observations, and recommendations for future state to support the further enhancement of the County's water metering and billing operation.

Contributing Factors

Aging infrastructure, manual processes, limited use of technology, and lack of proactive staff development has limited the County's ability to accurately bill residents for water consumption. The County's inability to clearly articulate and resolve root causes of past billing inaccuracies has exacerbated the problem over the past 2 years. The County is in the process of trying to regain the trust of citizens and rectify past water metering and billing failings.

Based on fieldwork, observations and recommendations, we have identified complex challenges with DeKalb County's water metering and billing operations. KPMG has identified numerous observations and recommendations in this report for rectifying historic and current meter reading and billing issues. There are numerous issues, as opposed to a single event, that contributed to the abnormally high volume of inaccurate water bills. Below is a succinct summary of contributing issues causing inaccurate water metering and billing:

- Governance, management, organizational reporting, and operations are bifurcated between two departments – the Department of Watershed Management and the Finance Department's Utility Customer Operations Division. The two functions reside in differing departments reporting to differing department directors which does not allow for a single person to be accountable and manage end-to-end water metering and billing processes
- Many business processes are manual and use hardcopy forms (as opposed to electronic) which results in mistakes by human error
- Many business processes are inefficient and ineffective causing rework and delays
- There are multiple disparate (not integrated) technology systems supporting various functions of operations causing duplicative data entry and lack of a consolidated view of work order status in a single system
- Key operations such as meter installation is reliant on a third party contractor which without strong vendor management protocols limits the County's control over the process and personnel performing the process

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

- There is heavy use of temporary employees, as opposed to full time employees within operations. Temporary employees are prone to higher turnover rates causing less consistency in service delivery and knowledge retention
- A significant portion of current water meters are aged resulting in an increased need for manual readings (more prone to human error)
- Meter read routes are not optimized or workload balanced across meter readers resulting in certain routes having less budgeted time per meter read
- Existing technology has the capability to produce multiple operational/exception reports that are not being utilized
- There are multiple types of water meters with different methods for reading and recording meter data
- There is limited documentation/desktop procedures for estimating, correcting or releasing bills

This report should be read in its entirety to understand the details for each of the 22 issues, corresponding 22 recommendations, and strategic next steps contained in this report.

Next Steps

The County should review, consider, and implement numerous recommendations contained in this report and other potential recommendations identified from the New Day Project to begin to correct the meter reading and billing issues. As the County's path to success is dependent on successfully implementing a multitude of recommendations spanning operations, organization structure, technology, personnel, vendor management, and communication; the County must have a formal and transparent method to effectively implement recommendations and positive change that is sustainable, meaningful, and impactful.

The County should establish a formal transformation program aimed at implementing numerous recommendations to rectify historical and current water meter reading and billing issues. Any such program should have formal methods for promoting accountability and transparency. Periodic status reports including progress to-date and key performance measures should be published and presented to governing bodies and the public. Section 9 describes in detail the suggested governance and implementation framework needed to successfully transform the County's water metering and billing operations.

2. Introduction

Water supplies and water quality represent valuable resources to the citizens of DeKalb County (County). The County, its Department of Watershed Management, and water metering and billing operations are front line stewards responsible for managing and delivering these resources to DeKalb County citizens and its more than 192,000 customers.

As a result of both internal and external factors discussed throughout this report, DeKalb County encountered a series of organizational, operational and technical issues over the past years, limiting its ability to consistently provide effective and efficient meter reading, meter billing, field services, and customer service. Outputs from its Watershed and Finance operations resulted in an increase in meter reading inaccuracies, estimated and inaccurate customer bills, and delays in performing routine field service activities.

This report provides a “deep-dive” analysis into factors contributing to the County’s current state, identifying root causes and next steps to enable the County to enhance its water metering and billing operations.

Project Overview

The DeKalb County Office of Independent Internal Audit engaged KPMG to conduct an assessment of County water metering and billing. The assessment reviewed meter and billing data, system capabilities, technology enablement, asset management and utilization, staffing models, resource management and training, processes and controls, and customer service to develop recommendations to support transformation and enhance the County’s water metering and billing operation. KPMG’s assessment focused on the following functional areas that comprise the metering and billing process:

- Account Set Up
- Meter Reading
- Billing
- Field Services

In addition, we reviewed the administration and organization of the departments providing meter reading and billing functions.

KPMG’s project objectives were aimed at determining the root causes related to the inaccuracy of water meter readings and water billings and to recommend actions to help correct and mitigate the identified issues. Project tasks included review of key water meter reading and billing processes, technologies, controls, and people. KPMG reviewed:

- Water metering and billing technology
- Business processes related to meter reading, billing, customer account management, field services, and back office data analysis
- Water metering and billing procedures and governance
- Water metering and billing staffing
- Water metering and billing personnel and training
- Water metering and billing customer service

Our Approach

KPMG developed a phased project approach to accomplish project objectives. KPMG's project approach included the following three phases:

Exhibit 2.1



Project Reporting and Communication

- **Phase 1: Project planning and kickoff** – In Phase 1, KPMG met with key project stakeholders to reaffirm project goals, milestones and objectives.
- **Phase 2: Information gathering and analysis** – In Phase 2, KPMG gathered information to understand the County's water metering and billing operation. Phase 2 activities included:
 - Assessing current state of operations, technology, processes, procedures, and organization
 - Conducting interviews with more than 50 County staff and third party vendors
 - Conducting one field site tour
 - Conducting ride-along observations with meter reading and field services personnel
 - Analyzing current state documentation
 - Reviewing industry and functional benchmarks
 - Analyzing metering and billing data, both current and historic
 - Reviewing daily water metering and billing operations
 - Assess operational metrics and processes
 - Evaluating use and effectiveness of technology
 - Evaluating use and quality of water metering and billing data
- **Phase 3: Reporting and Validation** – In Phase 3, KPMG developed this report to summarize our project approach, root causes and observations, and recommendations for future state to support the further enhancement of the County's water metering and billing operation.

Project Objectivity and Fieldwork

The County's Office of Independent Internal Audit and the Audit Oversight Committee engaged and authorized KPMG to perform the assessment through the authority it derives from Georgia House Bill 599 (HB 599). HB 599 notes that the Office of Internal Audit shall be completely independent and shall not be subject to the control or supervision by the Chief Executive, the Commission, or any other official, employee, department or agency of the County government. HB 599 provides the Office of Independent Internal Audit and the Audit Oversight Committee with unrestricted access to employees, information, and records required to conduct an audit.

The assessment was conducted during the period of March 17, 2017 through July 13, 2017. Our methodology for developing this report focuses on the identification of issues through research, interviews, and analysis. Our observations and recommendations are presented to facilitate discussion of management options.

3. Background

Overview

DeKalb County's water metering and billing operation is managed and executed on a daily basis between two organizational entities:

- The Department of Watershed Management (DWM)
- The Utility Customer Operations (UCO) Division with the Department of Finance/Treasury

The Department of Watershed Management (DWM)

The DWM is the primary operational, regulatory, and metering entity that ensures the effective and safe distribution of water throughout the County as well as the safe collection and treatment of the County's wastewater. The DWM is comprised of three units

- Finance and Administration: responsible for overall day to day operational oversight of DWM including personnel management, financial planning, executive management and compliance
- Construction and Maintenance Operations: responsible for maintaining the water distribution and wastewater collection (sewer) systems
- Engineering and Construction Management: responsible for the consent decree program management, capital improvements program management, construction management, design services, technical services, compliance, and planning and development.

As it relates to water metering and billing, the DWM is primarily responsible for field service operations, maintenance and meter reading. The Finance and Administration function within the Department of Watershed Management is primarily responsible for preparing and managing DWM's operations and performance. The DWM's finance activities are distinct from the finance activities completed by the UCO. The DWM's finance activities are focused on capital plan financing and the DWM is dependent on receiving cash flow and revenue generation reports on a monthly basis from the UCO. The DWM does not have a direct role in managing or overseeing the County's water billing activities completed by the UCO.

The Utility Customer Operations Division (UCO)

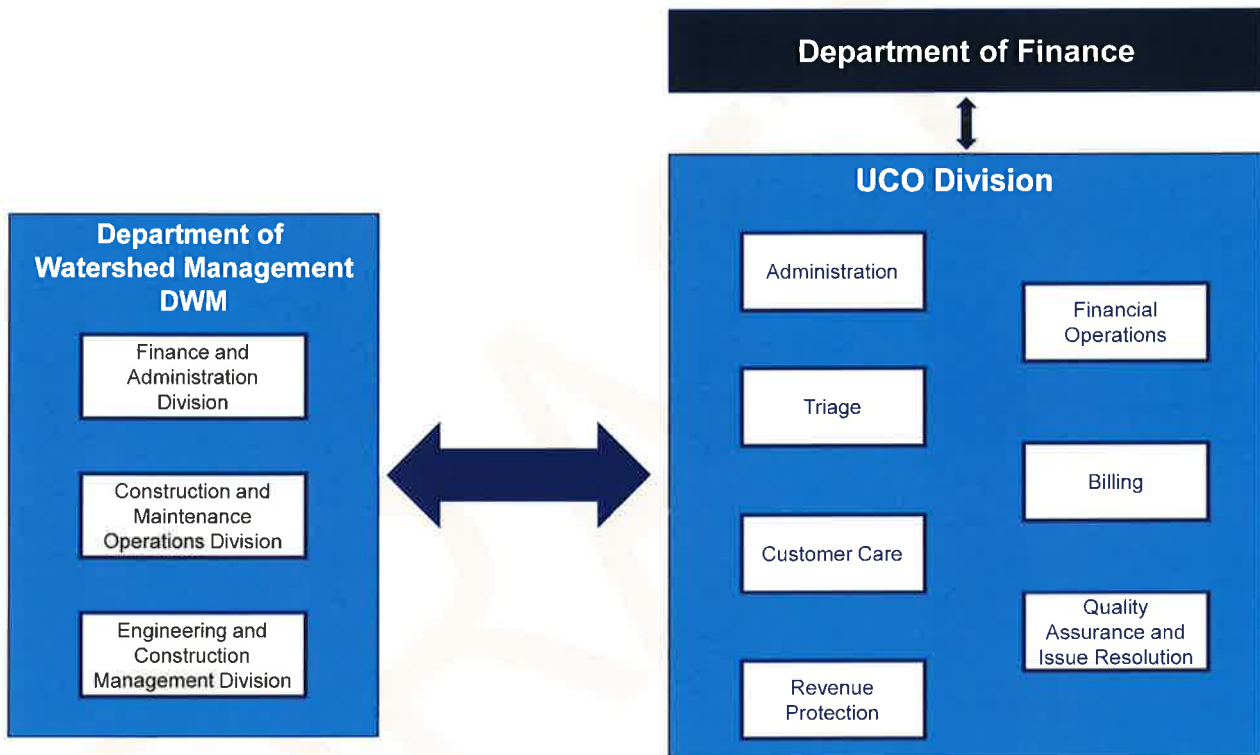
The UCO is the financial and administrative component supporting the County's water metering and billing operations. Primarily, the UCO focuses on the back office and customer facing billing processes that support daily execution of the County's water utility operations. The UCO is comprised of seven core units:

- Administration: responsible for communications and project management, managing to utility operations metrics and industry standards, productivity performance measurement, reporting/data analytics, and process improvement
- Financial Operations: responsible for payments, fraud monitoring, rentals (hydrants), remittance, and UCO policy and procedures
- Triage: responsible for updating accounts per Field Services, change meter set-ups, root cause analysis, resident communication, billing impact analysis, and dispute table management
- Billing: responsible for bill production, service orders in response to bill variances, billing exceptions, billing analysis, management of print/mailling vendor, bill presentation, ACH registrations, and credit adjustments

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

- Customer Care: responsible for new account set-up, account updates, generative service orders from customer contacts, manage all incoming customer contact, peer-to-peer training, quality call monitoring and coaching
- Quality Assurance and Issue Resolution: responsible for UCO training, call monitoring, coaching, customer care of escalated customers, customer billing appeals process, credit adjustments (as applicable),
- Revenue Protection: responsible for collections, liens program management, bankruptcies, commercial account disputes, revenue protection, write-offs, late notices, 3rd party collection (vendors), management of delinquent accounts, theft of service monitoring, monitoring of payment arrangements, return mail account maintenance

Exhibit 3.1
UCO and DWM Units



Historical Context - Consent Decree and Rate Increases

DeKalb County's sewer system is one of the largest and oldest in the Southeast United States. Most of the sewer collection system was built in the 1960s, '70s, and '80s. The system spans more than 2,600 miles of sewer lines and a large portion of the system is over 50 years old. As the County grows, the maintenance of the sanitary sewer system has become a critical task. Over time the system experienced sewer spills, which are prohibited by federal law. As a result of the spills, DeKalb County was put under consent decree by the federal government which mandated identifying root causes for the sewer spills, infrastructure repairs/replacement, and monitoring.

The U.S. Environmental Protection Agency (EPA) began auditing the County's wastewater system in 2006. In 2011 with funding in place for a \$1.4 billion capital improvement program, DeKalb County finalized a consent decree with the U.S. Environmental Protection Agency and Georgia Environmental Protection Division. The EPA ordered the County to upgrade its sanitary sewer collection system infrastructure, reduce the number of sanitary sewer overflows (SSOs) and comply with the Federal Clean Water Act and the Georgia Water Control Act. The consent decree is to be completed by mid-2020. To fund the additional capital improvement projects associated with the consent decree, the

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

County Commissioners approved three years of 11% water and sewer rate increases beginning in 2012 through 2014. The 11% annual increase beginning in 2012 was in addition to a 16% annual increase beginning in 2008 through 2011.

The County has dedicated Department of Watershed Management staff responsible for overseeing the day-to-day management of consent decree compliance. Water metering and billing staff and resources are not impacted by the County's consent decree. The impact to water customers is the increased rates to pay for the capital costs. Due to steady annual water/sewer rates increases beginning in 2008, County customers would typically experience higher bills each year without any change to consumption.

Current Environment

Aging infrastructure, manual processes, limited use of technology, and lack of proactive staff development has limited the County's ability to accurately bill residents for water consumption. The County's inability to clearly articulate and resolve root causes of past billing inaccuracies has exacerbated the problem over the past 2 years. The County is in the process of trying to regain the trust of citizens and rectify past water metering and billing failings.

To contextualize KPMG's assessment of root causes and recommendations to meter reading and billing issues, we provide a brief summary of events that led to the County's current issues. Several significant events occurred that exacerbated current issues and led to the current state. Below is a historical perspective and timeline of events that led to current issues in DeKalb's water metering and billing.

Historical Perspective

DeKalb County's Water Meters (1970 – Present)

DeKalb County began installing Sensus Brass Meters starting in the 1970s. The County continued upgrading its water meters as metering technology evolved over time. In 1993, the County began replacing brass meters with electronic meter reading known as Automated Meter Read (AMR) TouchRead technology in an effort to improve meter reading accuracy and efficiency. AMR TouchRead technology allowed the County to obtain electronic meter readings through a handheld device without opening the meter lid to visually observe the meter odometer and document the customer's consumption. The County continued to install various AMR TouchRead meter models as part of the County's meter replacement program.

The County selected the Sensus iPERL TouchRead meter in 2011 as the County's standard AMR TouchRead residential water meter. The County continued installing Sensus iPERL meters from 2011 through 2016 when it was discovered that some iPERL meters may contain manufacturing defects, potentially leading to inaccurate water bills. The County's new standard AMR TouchRead residential meters became the Sensus accuSTREAM.

As the County continued to install AMR TouchRead meter technology, the County also began installing water metering technology known as Advanced Metering Infrastructure (AMI), installing the FlexNet AMI meter in 2012. FlexNet AMI technology remotely transmits meter data to the County using radio towers and communication networks (often referred to as 'fixed base' system). FlexNet AMI allowed the County to begin reading water meters without deploying Meter Readers to the field to obtain reads. The County continues to install AMI water meters.

The County continues to install both accuSTREAM and FlexNet meters as part of the County's meter replacement program.

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

Department of Watershed Management Director Turnover

Since 2003, DeKalb County's Director of Watershed Management position has been held by six different individuals, with one interim DWM Director serving twice and being terminated both times (April 2013, 2015). The County's current DWM Director has been employed by the County since 2015. Turnover at the Director level has led to instability throughout the DMW as priorities shift and new initiatives are developed as Department leadership changes.

2014

Customers Complaints of High Water Bills Begin

DeKalb County residents voiced concerns that the bills they received for water service did not match the level of consumption at their homes, implying high or inaccurate water bills.

County staff performed a Water Overbilling Audit that was completed in September 2014 in an effort to address potential water billing issues that customers were experiencing. Findings included:

- Customer Account Reviews: In analysis of County-wide customer accounts, the County identified 5,570 residents (approximately 2.9% of total customers) who were issued bills that were in total twice their normal amount or more
- Billing Variances and Root Causes of High Bills for the 5,570 customers:
 - Customer water usage explained the increase in 71% of the identified customers according to the County
 - Water leaks and irrigation systems accounted for another 16% of the identified customers
 - The County was responsible for water billing errors for the remaining 13% of the identified customers for the following reasons: meter reading error, meter malfunction, billing error and estimations, catch-up (previous underbilling), stopped meter, meter leak, vacant property, and crossed meter.

To address the overbilling issues, the County stated it would: increase its number of Customer Service Representatives, provide additional training to Customer Service Representatives, improve communications to customers, educate customers on leak detection and water conservation, and improve quality control over meter readings, billing system data uploads, and perform an audit of bills issued to customers to help ensure accuracy. Additionally, the County committed to customers that it would reduce consecutive monthly/bi-monthly Bill estimates.

The County instated a temporary moratorium on customer water disconnections spanning September 30, 2014 through October 15, 2014 as part of the concern over increased water bills.

2015

Billing issues continued in 2015 as some customers continued receiving bills that represented spikes in water consumption that were not in line with their historical usage. Outside of increased consumption by customers, the County continued attributing inaccurate bills to meter reading errors, meter data, and meter malfunctions without immediate plans for addressing the root causes.

Reorganization and Loss of Institutional Knowledge

In 2015 the County initiated an organizational realignment in an effort to enhance cross-functional collaboration between the Department of Watershed Management and the other functions involved in the water metering and billing process. In an effort to better align service delivery, water meter reading and field services was moved from the Treasury Department to DWM. The remaining billing functions within Treasury were reorganized and renamed the Utility Customer Operations, reporting to the CFO. The reorganization was intended to be rolled out in 3 phases, however only one phase was completed. Competing project priorities and data quality billing issues led the County to halt the reorganization after the first phase.

The County assessed the skills of the employees who were performing the duties before the reorganization began and required staff to reapply for their jobs under the new operating structure as part of the reorganization. Some employees were terminated or reassigned. There was not existing

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

documented standard operating or desktop procedures detailing how to perform certain key tasks. When numerous employees departed from the County, they, unfortunately took the institutional knowledge with them leaving no documented prescribed workflow behind. The County experienced loss of institutional knowledge from the turnover at the billing, metering and field services positions. The County then began filling vacant positions with less experienced and temporary employees.

The County realized shortly after the departure of billing employees who were not retained as part of the reorganization the high level of effort that former billing staff members were undertaking in order to issue bills to customers. In many instances, billing staff members were estimating bills and applying other short-term, quick fixes to resolve billing exceptions in an effort to help ensure the County was able to keep pace with the deadlines associated with the County's billing cycle.

The 2015 reorganization and associated turnover compounded the impact that a May 2010 Early Retirement Plan had on water metering and billing operations. DeKalb offered employees an early retirement package to incentivize long-tenured and generally higher paid employees the opportunity to retire early in an effort to cut operating budgets County-wide. The Department of Watershed Management lost approximately 75 employees, or approximately 10% of its total workforce, from different segments of the organization as a result. The County did not have a formal knowledge transfer process and plan in place and some of the most experienced Department of Watershed Management employees were able to leave the organization without documenting key process and workflows, policies and important procedures for their colleagues.

Since the County lacked formal succession planning policies and procedures for transitioning employees out of the workforce, the 2010 Early Retirement Plan and the 2015 reorganization did not achieve the desired results of enhancing operational efficiency and the County lost important institutional knowledge.

Billing Exception Threshold

The County made a policy decision in 2015 to lower the consumption variance that would trigger a billing exception in the CPAK system. Previously, the consumption level would have to be 500% greater or less than the previous billing cycle's meter reading to trigger an exception to be resolved by Billing Specialists. This type of exception is known as a High/Low exception. As a result of inaccurate bills coming in under the threshold, the County lowered the High/Low exception threshold to a 300% variance to help ensure additional vetting by billing specialists and analysts before bills with an initial 300-500% variance are issued to customers. Below are examples of how the High/Low exception is applied to the review of a customer bill.

Examples:

Historic Policy: Exception Level of 500%

If a customer has a previous meter reading of 1,000 gallons for the previous billing cycle and a subsequent meter reading of 6,000 gallons, then a high/low exception would be triggered because the usage is 500% or more of the previous usage of 1,000 gallons. Any meter reading less than 6,000 gallons would not trigger a high/low exception and the customer would receive their bill without additional investigation into increased consumption. For example, if the meter reading was 4,000 gallons, then no high/low exception would be triggered because the increased consumption is only 300% greater than the previous meter read of 1,000 gallons.

Current Policy: Exception Level of 300%

If a customer has a previous meter reading of 1,000 gallons for the previous billing cycle and then a subsequent meter reading of 4,000 gallons, then a high/low exception would be triggered because the usage is 300% greater than the previous usage of 1,000 gallons. Any meter reading less than 4,000 gallons would not trigger a high/low meter reading exception.

In comparing the two examples using 4,000 gallons of consumption, the lower threshold of 300% triggers a high/low exception for the same increase of water consumption that the 500% threshold would have allowed to be billed as is.

DeKalb County Water Metering and Billing Audit Report

Draft for Discussion Only

By lowering the exception percentage threshold, the Billing Specialists began receiving a significantly larger number of exceptions to review on a daily basis. The larger volume of exceptions to review was more than staff could manage which resulted in a backlog of unresolved billing exceptions and delays in issuing bills. The County continues to experience large backlogs of billing exceptions that are a result of the 2015 decision to lower the exception threshold, which is discussed in further detail in the Billing section of this report.

2016

The County continued to face serious issues with water metering and billing during the course of 2016. The issue continued over the summer months when customer complaints regarding high water bills increased.

Meter Replacements

At the outset of 2016, the County aimed to replace 40,000 residential water meters with new, Sensus iPERL meters outfitted with MXU (Meter Transmitter Unit) transmitters that enable wireless transmission of meter readings to attempt to address ongoing issues with meter reading errors, meter data, and meter malfunctions. The proposed replacement of 40,000 residential water meters represented approximately 22% of the County's 180,000 installed residential meters. These "smart" meters do not require Meter Readers to physically and manually retrieve meter readings at the location of the meter. Rather, the wireless meters allow for automatic meter reading (AMR). AMR (Automated Meter Reading) technology allows the County to capture consumption information and additional data from the water meter and transfers the information to a central database for billing and analysis purposes. Meter readings can be captured remotely from a central location and do not need to be obtained from the field. Generally, water utilities leverage AMR technology to remotely read meter data in place of sending Meter Readers to the physical location of water meters to obtain readings. AMR technology generally provides meter readings in real time, which facilitates the billing process by avoiding the need to send Meter Readers out to the field for re-reads or to estimate readings if an actual read cannot be obtained from the meter. AMR can also decrease the opportunities for human error and are generally seen as more accurate than their manual meter and TouchRead counterparts in addition to reducing the number of staff required to read meters.

The County was able to perform approximately 8,000 of the 40,000 intended meter replacements in 2016. The low completion rate was due in part because the County did not have a coordinated plan and associated staffing levels (both internal resources and external contractors) to complete 40,000 replacements in the timeframe that was provided by County leadership. The County's water meter change out program was placed on hold in October of 2016 as the County shifted its focus to responding to ongoing water metering and billing issues.

Defective Meters and Moratorium on iPERL Installations

In October 2016, the DeKalb County Board of Commissioners voted to suspend installation of the Sensus iPERL meters which were identified by the manufacturer as potentially defective. Since 2011, DeKalb County had installed approximately 70,000 Sensus iPERL meters with both MXU wireless transmission and autoread capabilities. Sensus identified meters installed prior to July 2014 as being susceptible to a defect that allows moisture to enter the meter and disrupt the meter's internal mechanisms – leading to inaccurate meter reads. The inaccurate meter reads would then have the potential to lead to inaccurate water bills. The County introduced Sensus AccuSTREAM meters as the alternative to Sensus iPERLs moving forward as part of new meter installation and meter replacements. The Sensus AccuSTREAM model was selected as the replacement for the Sensus iPERL partly because the meter is compatible with the County's current billing software CPAK.

Moratorium on Service Disconnects

Customers continued voicing complaints about receiving high and inaccurate water bills from DeKalb County even as the County continued installing and operating new water meters. Ongoing customer inquiries over high and inaccurate water bills during June, July and August of 2016 led the County to place a moratorium on disconnecting water service for non-payment.

Held Bills

In September, Customers who formally contested their water bills through the County's dispute resolution process had their bills "held" or prevented from being sent until the County could verify a range of water consumption their water usage by estimating their consumption over the last 12 billing cycles. To estimate a customer's usage, CPAK automatically drops both the highest and lowest bill while taking the average of the remaining 10 bills to arrive at the average water consumption during the time period. The County can then provide a customer an estimated bill for the period in dispute based on the average water consumption from 10 out of the 12 previous cycles. Though the County had the ability to use CPAK for billing estimates, the County held customer accounts until April of 2017 when some customer bills were released for January and February. All held customer bills from September through December are still being suppressed from being sent. The County established a separate "Dispute Resolution" customer service team to handle all inquiries related to held customer accounts until bills could be issued to customers in dispute.

In November, the former County CEO stated in a letter that the County would send a field technician to test the water meter accuracy of all residential customers within three business days. Additionally, customers disputing their bills would have the opportunity to meet the field technician onsite to discuss their meter reading and dispute. The County's field technicians were not properly staffed to perform water meter accuracy confirmation promised by the CEO, nor did they possess the billing knowledge to discuss disputed customer accounts.

The water metering and billing issues the County experienced in 2016 led JD Power and Associates to rank DeKalb County as the second-lowest ranking water utility for residential customer satisfaction in the United States. Rankings were based on the following factors (listed in order of importance): delivery; price; conservation; billing and payment; communications; and customer service¹.

January 2017 to June 2017

New Day Project

In January 2017, new DeKalb County Chief Executive Officer Michael Thurmond was sworn into office and began efforts to identify and resolve issues related to inaccurate water bills. The County Executive has named the project 'New Day' – with the objective of providing a plan for addressing the water billing crisis.

The New Day project team believes that systemic defects in leadership, management and oversight are the causes of the following four items:

1. Inaccurate bills
2. Increased exceptions contributing to delayed bills and higher customer bills
3. Ineffective customer service and flawed dispute resolution process
4. Erosion of trust in DeKalb officials to identify and correct problems

The New Day project team meets on a weekly basis and the CEO has updated the public on the project team's progress in trying to address billing issues. KPMG did not evaluate or assess the New Day project, but is encouraged by the formal initiative being led by the CEO to correct the current environment.

Release of Held Bills

In April 2017, after analysis of the underlying estimates and exceptions, the County released bills for approximately 8,000 of the approximately 37,000 held accounts. The bills issued in April 2017 was for consumption that occurred in the January – March 2017 cycles. As of the date of this report, the 37,000 bills that were held from September 1 – December 31, 2016 have not been issued to

¹ J.D. Power 2017 Water Utility Residential Customer Satisfaction Study

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

customers and the County has not reached a decision as to whether those bills will be retroactively issued.

The County has approximately 25,000 customer accounts that are still in held status for the September 1 – December 31, 2016 billing cycles.

Report Format

Section 4 describes the current administration and organizational structure supporting water metering and billing. Sections 5 - 8 describe key processes and workflow for the following functional areas that comprise the metering and billing lifecycle:

- Account Set Up
- Meter Reading
- Billing
- Field Services



KPMG organized sections 5 - 8 of this report based on the typical water metering and billing customer lifecycle to best present and explain the County's current environment related to end to end processes. As we detail processes from the beginning of the lifecycle to the end, there will be certain topics (account set up, work orders, etc.) that are discussed multiple times during different stages of the lifecycle but within the context of the water metering and billing subject being discussed.

Sections 4 through 8 contain narrative descriptions, supporting data, identified issues, and corresponding recommendations. Section 9 describes a recommended framework for implementing the recommendations contained in this report.

4. Administration and Organization

One of the greatest assets a customer service delivery focused organization such as DeKalb County has is the employees that support the daily processes and operations of the organization. Recently, the County's most visible customer service function has been the DWM and UCO and their role in water metering and billing services.

Managing employees is critical to the DWM and UCO's success as the utility's overall performance is dependent upon the ability of its employees to consistently and proficiently execute their daily roles and responsibilities. Successfully managing DWM and UCO employees require attracting talented and committed employees, overseeing their professional development, positioning staff to succeed in their respective roles, proactively identifying skills gaps, fostering an environment that encourages longevity and retention, and valuing the individual contributions of the workforce to work towards a common mission.

KPMG evaluated three components regarding water metering and billing Administration and Organization:

- Organizational Design
- Workforce Strategy
- Skillsets

Organizational Design

DeKalb County currently has 753 FTEs directly supporting water management activities throughout the County. Water metering and billing activities are supported by the Department of Watershed Management and the Finance Department's Division of Utility Customer Operations.

The **Department of Watershed Management** protects the public health, safety and welfare through the provision of safe drinking water and quality wastewater treatment. The Department of Watershed Management has 633 FTEs working within seven internal divisions: Engineering and Construction Management, Construction and Maintenance, Administration, Business Development, Engineering and Asset Management, Finance, and Regulatory Compliance.

DWM's Meter Reading and Field Services are the two units directly involved in DeKalb County's metering and billing issues. The Meter Reading Unit and Field Services Unit are comprised of 21 full-time employees and four temporary employees, all reporting to the Field Services Supervisor.

Utility Customer Operations is responsible for activating accounts for new service turn-ons, billing, account management, customer service, issue resolution and educating DeKalb County on water usage and conservation. UCO has 120 FTEs working with seven internal divisions: Administration, Financial Operations, Triage Team, Billing, Customer Care Center, Quality Assurance, and Revenue Protection.

UCO's Billing Unit is directly involved in DeKalb County's metering and billing issues. The Billing Unit has 14 staff including a Supervisor, three Billing Analysts and 10 Billing Specialists. Of the 10 current Billing Specialists, four are County employees and six are contractor employees. DWM and the UCO operate as independently managed functions, formulating their own strategies, priorities and work plans in parallel with other business functions. Business functions that operate independently are susceptible to functioning in "silos" - a term used to describe inter-departmental relationships where lack of communication and resistance to collaboration can lead to service delivery inefficiencies in both organizations.

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

The County's Water Metering, Field Services and Billing Units have historically functioned separately. DWM and UCO employees identified their respective organizations functioning in silos as a continued cause of operational inefficiency and ineffective organizational performance.

The organizational structure is not supported by strong communication channels between the various divisions and units.

The current organizational structure was first developed in 2015 when the County initiated an organizational realignment in an effort to enhance cross-functional collaboration between the DWM and the other functions involved in the water metering and billing process. In an effort to better align service delivery, water meter reading and field services was moved from the Treasury Department to DWM. The remaining billing functions within Treasury were reorganized and renamed the Utility Customer Operations, reporting to the CFO. The reorganization was intended to be rolled out in 3 phases, however only the initial reorganization of moving Metering and Field Services to DWM as part of phase one was completed. The goal of the reorganization was to ensure that the Department of Watershed Management had full oversight and responsibility for all segments of water metering and billing. The reorganization's goal was to integrate all customer service, billing and revenue management under the DWM to meet the needs of the County's water customers. Competing project priorities and data quality billing issues led the County to halt the reorganization after the first phase.

Inter-departmental Collaboration

The working relationships in the water metering and billing function have continued to function in silos. As a result, the County's water metering and billing function lacks a common leadership structure to promote accountability and consistent service delivery.

The County created the UCO to bill customers for their water consumption, previously completed by the County's Treasury Department. The UCO includes positions for Customer Service Representatives, Billing Specialists and Analysts, and Revenue Protection. The UCO reports to the County's Chief Financial Officer. Additionally, the County moved Field Services and Meter Reading staff from the Department of Treasury to Department of Watershed Management. The Field Services and Meter Reading staff report to the Director of Watershed Management.

Within the UCO, the Billing Unit works and coordinates with other UCO and DWM units to address billing issues. DWM and UCO each provide critical roles in obtaining source data for processing the data for billing. However, as previously discussed, existing silos and organizational bifurcation result in limited communication and process integration between the two entities.

Although the UCO and DWM operate under different organizational structures, they rely heavily on one another for process execution. For example, UCO's day-to-day billing activities as well as non-routine triage and dispute resolution work rely heavily on DWM's Field and Technical Services units. Examples of day-to-day billing activities relating to DWM Technical Services include processing routine exceptions created by meter reading, calculating re-reads, issuing final reads and handling disputes and verifications. Meter Reading, Field Services and other Units provide the source data used in Billing and interact among themselves and with UCO routinely.

Over the last year, UCO and DWM staff have been responding to shifting priorities and increased workload related to the County's water billing issues. There has also been changes in management, staffing, policies/procedures, and technology. Management, decision-making and flow of information among these operations present significant challenges to UCO and DWM in addressing the routine and non-routine billing issues. Communication and coordination was cited by both DWM and UCO staff as a barrier to effective change management in responding the County's water billing issues.

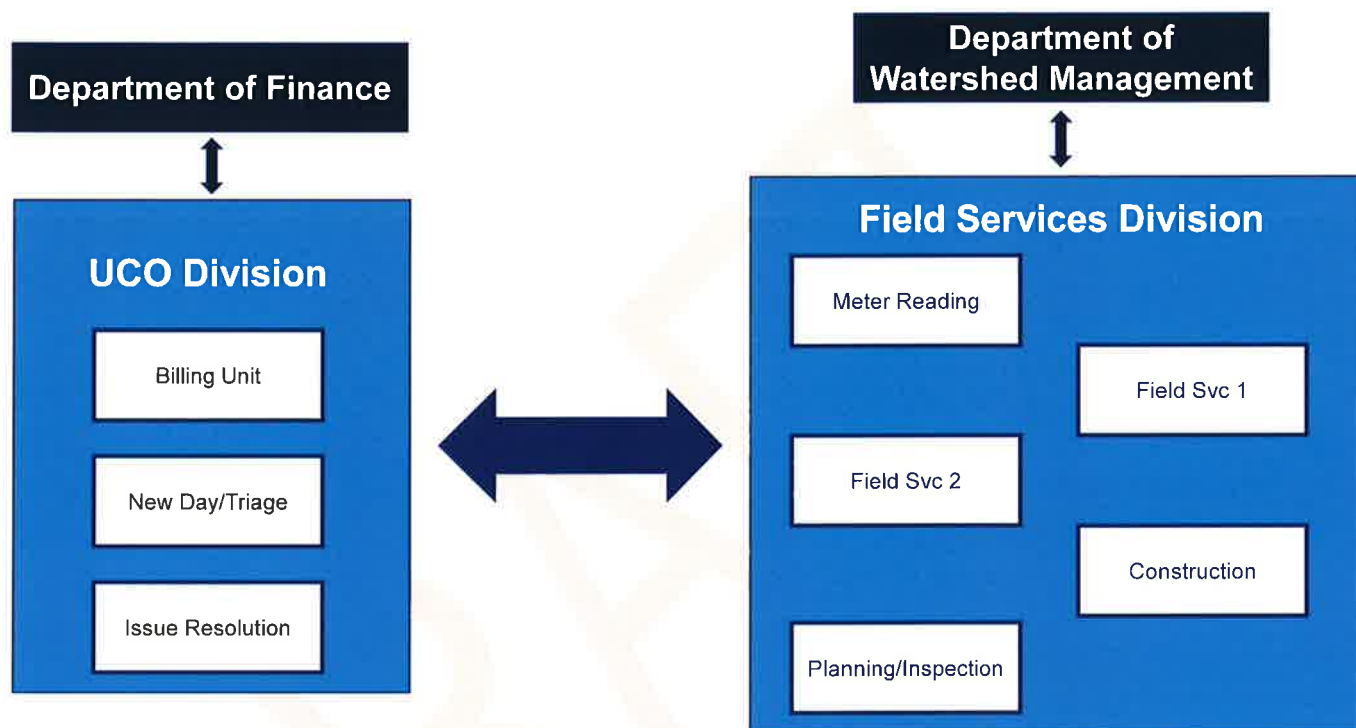
For example, the Billing Unit works and coordinates with other UCO and DWM units working on billing issues. The two organizations each provide critical roles from obtaining source data to processing the data for billing but also work from three different locations (Roadhaven with three separate buildings, Jordan Lane, and Memorial Drive). UCO's day-to-day billing activities as well as non-routine triage and dispute resolution work rely heavily on DWM Field Services units. Meter reading, field services and other units provide the source data used in billing and interact among themselves and with UCO

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

routinely. Consistent data integrity has been an on-going issue involving different operations, technologies and procedures among the units. Fragmentation of operations and lack of active communication between the UCO and DWM is affecting data integrity. Management reporting and flow of information among these Units presents significant challenges to UCO and DWM in addressing the routine and non-routine billing issues.

DWM's current organization chart is outdated and does not accurately capture the current manner in which the Department functions. The chart below represents the structure of the primary roles responsible for water meter and billing based on interviews and position lists provided by the County.

Exhibit 4.1



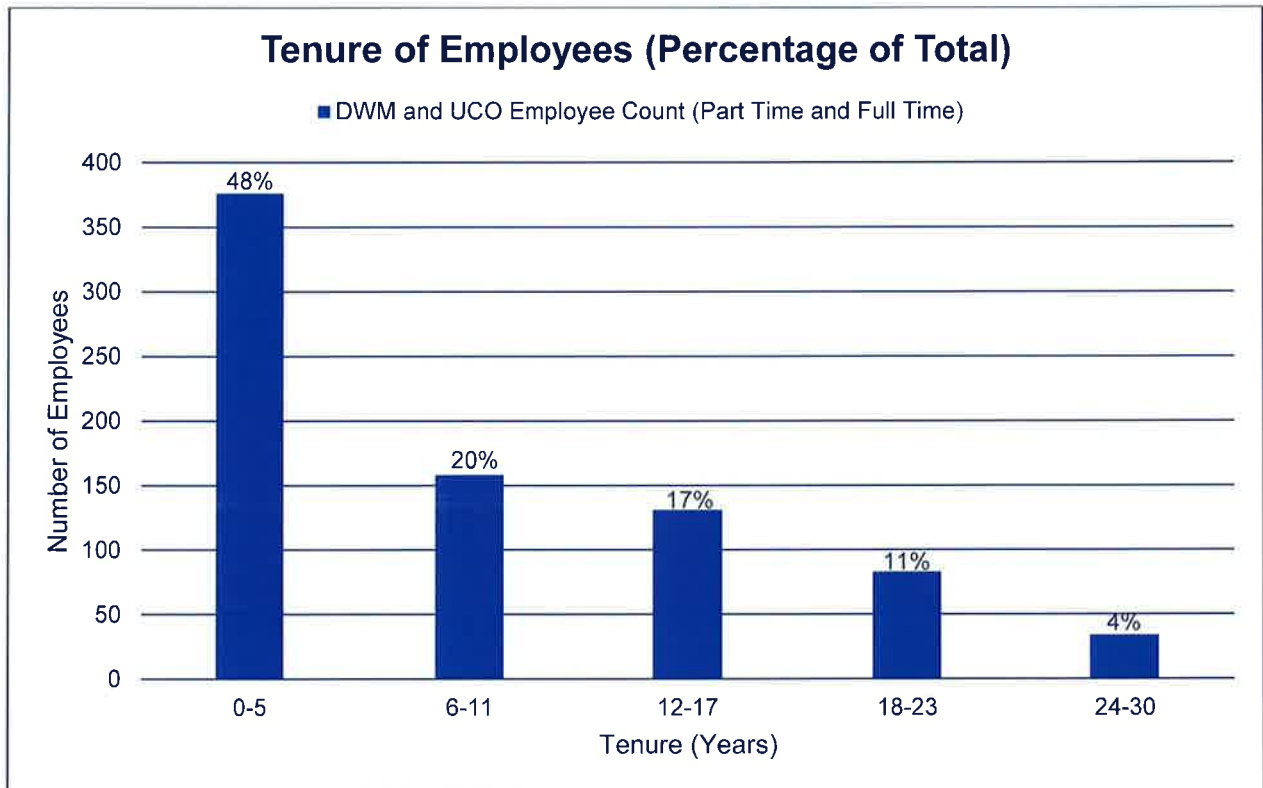
Workforce Strategy

DWM and UCO's staffing practices are not aligned with the leading practices of customer service oriented organizations. The hiring process is reliant on temporary employees, average employee tenure is low, management reporting is sporadic, and there is limited formal training specific to water metering and billing needs.

Staffing Tenure and Practices

Exhibit 4.2 below shows that nearly half of DWM and UCO staff have been with the organization for less than five years. Like many organizations, entry level employees often join the organization with limited skillsets and utilize on-the-job experience to become proficient at key tasks. DWM and UCO employees generally reported that the primary training for new employees was on the job training.

Exhibit 4.2



Employee Turnover

Department Leadership

It is the responsibility of DWM and UCO leadership to recognize Departmental silos and create effective, long-term solutions that are achievable, enhance communication, and inspire collaboration organization-wide. The ability of developing long-term solutions is generally correlated with leadership's ability to remain stable over sustained periods of time. Leadership stability offers the consistency that employees and stakeholders need to inspire a shared vision as to the organization's strategic direction. Conversely, a lack of stability may harm culture, erode employee buy-in and trust, and make it difficult to attract and retain talented employees.

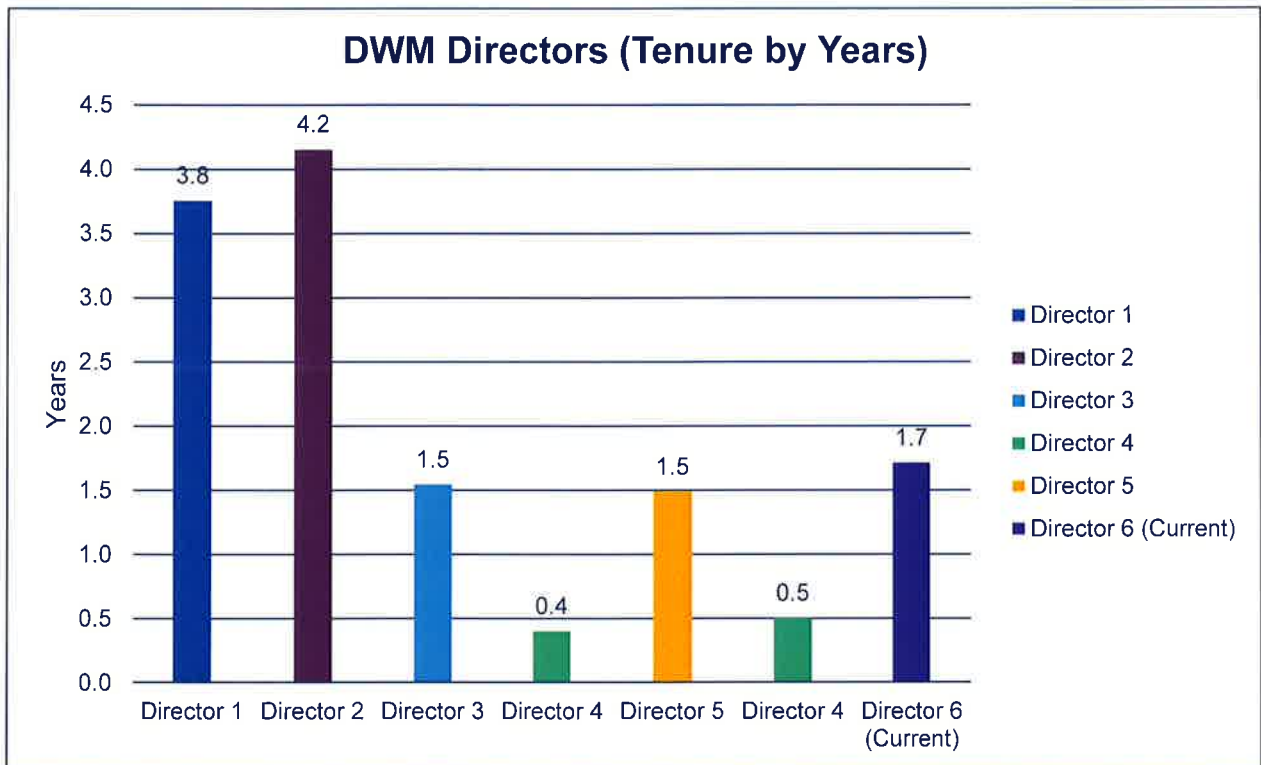
Since 2003, DeKalb County's Director of Watershed Management position has been held by six different individuals, with one interim DWM Director serving twice and being terminated both times (April 2013, 2015). Directors 3, 4, 5 and 6 listed below represent 4 different DWM Directors since 2011.

DeKalb County Water Metering and Billing Audit Report
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The graphic below highlights the ongoing turnover at the DWM Director position.

Exhibit 4.3 displays the last six Watershed Management Directors and the number of years each Director served.

Exhibit 4.3



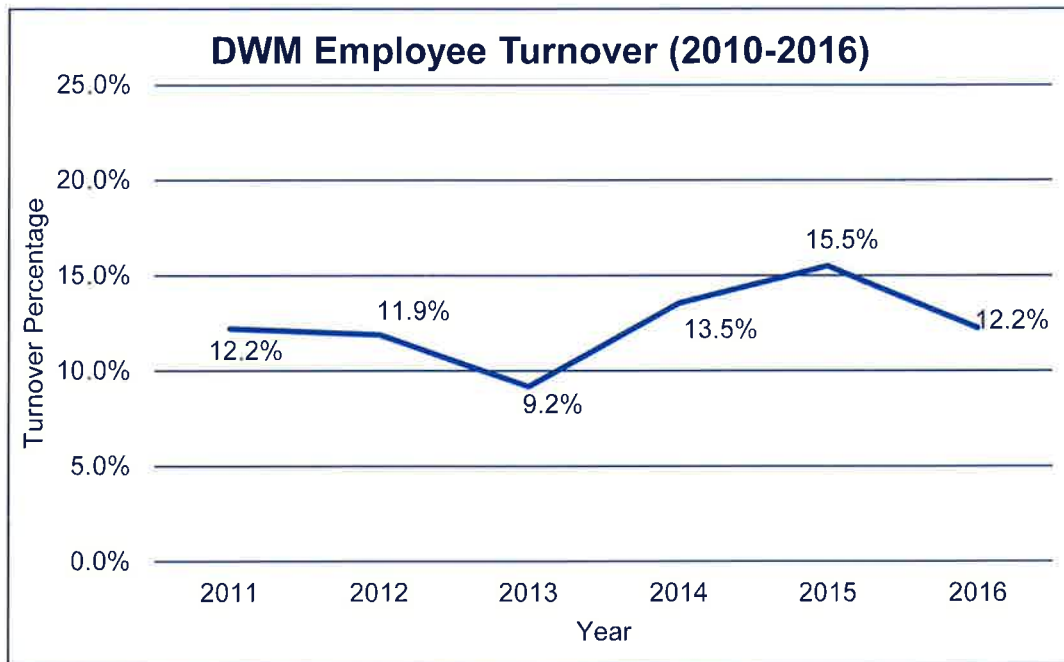
The DWM Directors, along with former County Leadership, have been responsible for the performance and vision of the agency. Changes in County and DWM leadership prompted shifting priorities without effective management and oversight as to how the changes were impacting the overall performance of the water metering and billing function. Additionally, the rationale behind management decisions has not always been consistently and accurately communicated to the employees they impact.

Staff turnover at both the DWM and UCO has fluctuated since 2011, reaching a high point during 2015.

Turnover for DWM decreased 3.3% in 2016, the first time turnover has decreased at the DWM since 2013, as displayed in Exhibit 4.4 below. The turnover rate for DWM staff is slightly higher than industry standards.

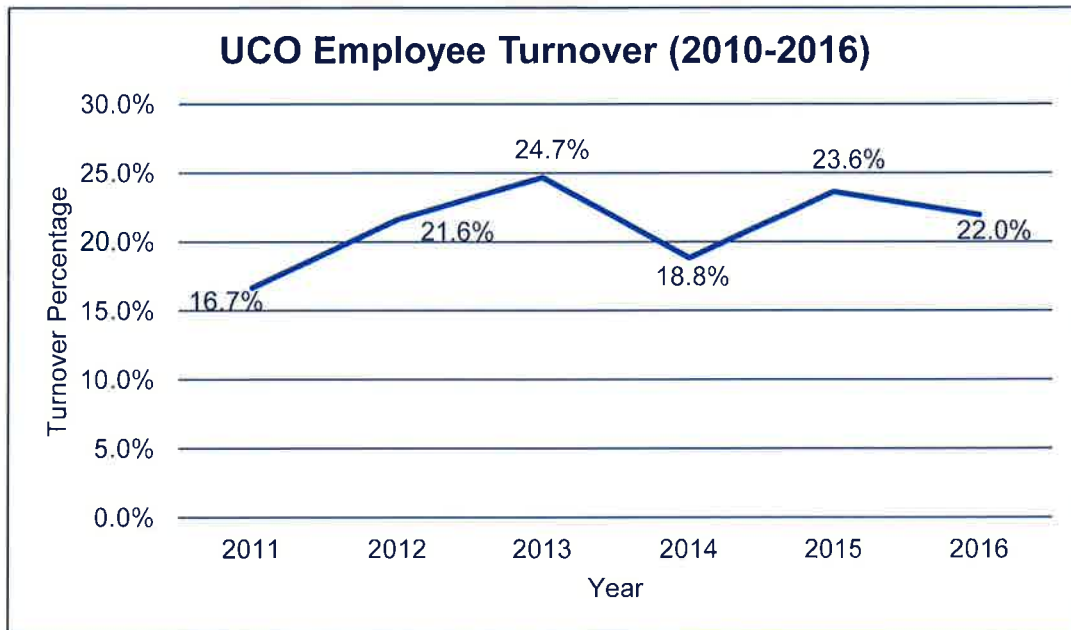
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Exhibit 4.4



Comparatively, UCO has experienced a higher turnover rate over the same period of time. Like DWM, turnover percentage dropped from 2015 to 2016. Both departments experienced their highest turnover during the 2015 reorganization.

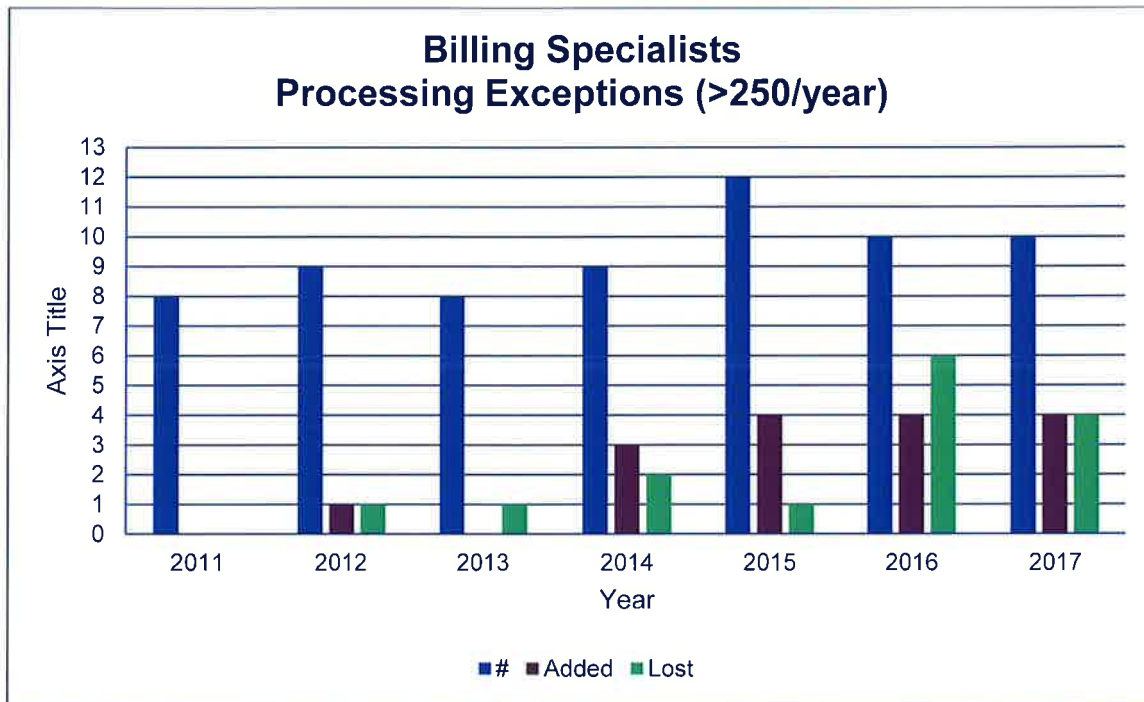
Exhibit 4.5



DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

One contributing factor to high UCO turnover ratio is related to staffing of the Billing Specialists position, which has experienced a higher turnover rate compared to other UCO positions beginning in 2014 and continuing through this year, as shown in Exhibit 4.6 below. Since 2014, 13 existing Billing Specialists exited the organization and 16 were added.

Exhibit 4.6



*This data includes only staff processing a material number of exceptions since there are some staff that process a few exceptions on an as needed basis.

As Exhibit 4.6 represents, the number of Billing Specialists has ranged from eight to 12 personnel but has consistently seen turnover ranging from 10 – 40% of total Specialists. The ability of UCO to effectively process exceptions is significantly hindered by the number of Billing Specialists, turnover in staffing, skills/experience required and processing volumes. New exceptions are continuing to be generated from the manual processes and other issues outside of UCO affecting data integrity and accurate billing. This combination of factors presents a serious and complex challenge for resolving the County's billing issues.

Increased turnover results in higher personnel costs for the organization as it works to train and onboard new employees to fill vacancies on a more frequent basis than organizations with low turnover. Additionally, the County lost important institutional knowledge because the organization lacked formal knowledge transfer policies and procedures for transitioning employees out of the workforce in recent years. For example, the County assessed employee skillsets and performance prior to the 2015 reorganization mentioned above and required staff to reapply for their jobs under the new organizational structure. Employees that were not retained left the organization without documenting key processes, workflows or policies and procedures. As a result, the County experienced loss of institutional knowledge at the Billing, Meter Reading and Field Services positions.

Reliance on Temporary Employees

The high turnover ratio in DWM and UCO is due in part to temporary employees being hired to fill vacant positions at both the staff and management levels. The UCO has 26 temporary employees and this number continues to rise, as seen in Exhibit 4.7 below. Of the 10 current Billing Specialists, four are full time County employees and six are temporary employees.

Exhibit 4.7



According to interviews, DWM has historically used temporary staff in the water metering division. When an organization loses critical members of their staff, temporary employees may provide part-time assistance in relieving workload volume from the organization's fulltime employees. Temporary employees perform the same job responsibilities as full-time staff. It is common for temporary employees to enter organizations without a full understanding of how the organization functions. Considerable time, effort and training is spent on acclimating temporary employees to their new job duties and their role within the organization. Temporary employees are often quick to leave organizations for fulltime employment opportunities.

The County has chosen to employ temporary employees at key positions (including three Customer Service employee Supervisors). The technical nature of the water metering and billing job responsibilities requires substantial training and oversight by management to help ensure that temporary employees are performing their job duties correctly and consistently. Temporary employees who perform poorly can substantially impair the County's ability to produce accurate water bills. As discussed in the Billing section of this report, workflow and processes performed by Billing Specialists are highly depending on individual skillset of employees. As a result, the use of temporary employees increases the risk that Billing Specialists will not have the required skillsets.

Employees hired on a temporary basis can develop institutional knowledge over time in the same manner as a fulltime employee would. High performing temporary staff and managers have voluntarily left the organization to pursue fulltime employment opportunities at other organizations. The County does not have a formal policy or program that allows high-performing temporary employees to transition to full-time employees.

There is both a loss of institutional knowledge and an impact to employee morale when competent employees leave an organization. Employee morale suffers when key figures in the organization who are respected by their colleagues for their competency and job performance capabilities leave the organization. The decrease in morale is due in part to no longer having colleagues who are perceived as subject matter experts that can help their fellow colleagues improve their job performance or assist with their workload.

Skillsets

Prevalence of Skill Gaps

The DWM and UCO job roles require a diverse set of skillsets to execute the responsibilities associated with the water metering and billing processes.

Many of the organizational leaders at the DWM and UCO have ascended to their positions by learning entry level positions and working their way up during the course of their career to management. These leaders have knowledge and experience in performing the day-to-day tasks that their divisions contribute to the water metering and billing process. Managers receive minimal management training before being promoted and ongoing professional development is inconsistent once they begin acting in a management capacity. Some key management positions lack the critical skillsets necessary to perform daily management responsibilities and rely on others for guidance with important Department functions (i.e. reporting, analysis, etc.).

The advantage of maintaining comprehensive skillsets in key operational areas allows all management and staff to maintain focus on their daily roles and responsibilities rather than shifting time and resources to a specific management needs. In addition, staff professional development is not closely monitored or communicated to ensure career progression and employee satisfaction.

There is a lack of standardized training and professional development opportunities for current and newly hired personnel within the UCO and DWM. Training is primarily done "on the job" and as a result is highly dependent upon who the employee is working with rather than a standard training program. Additionally, there is a lack of cross training between functions to educate employees on overall organizational objectives. Cross-training helps retain knowledge in an organization prior to employees retiring or leaving and also provides employees with a better understanding of overall organizational goals.

Key Issues and Recommendations

This section presents key issues and recommendations related to Administration and Organization processes, staffing and technology.

Key Issue 4.1: Lack of a Common Leadership Structure

Water metering and billing governance, management, organizational reporting, and operations are bifurcated between two departments – the Department of Watershed Management and the Finance Department's Utility Customer Operations Division. The two functions reside in differing departments reporting to differing department directors. Organizational and operational silos reduce the efficiency and effectiveness of water metering and billing.

Recommendation 4.1

The County should merge the two bifurcated water metering and billing functions into a single organizational unit governed by a single department director that can oversee and manage end-to-end water metering and billing processes for the County. Key operational processes and procedures within DWM and UCO are interrelated and dependent upon one another due to the nature of the services performed by each department/division. Having a bifurcated organizational structure between two departments performing functions supporting a common service delivery goal creates strained communication, inconsistent execution of daily processes and procedures, and limited accountability for personnel performing tasks that cross departmental and divisional lines.

Having a single point of governance over end-to-end water metering and billing processes, will allow for holistic management of customer service delivery, increased visibility into and control over internal/external reporting, and process standardization and consistency.

The County should consolidate the water metering and billing function under the DWM and create a new organizational structure through the addition of a fourth division within DWM focused on water

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

billing and customer service. The director of the newly created water billing and customer service unit should report directly to the DWM director to help elevate the importance of water billing and customer service and help ensure strategic focus on related processes.

Key Issue 4.2: Reliance on Temporary Employees and Internal Promotion

The County often relies on temporary staff to support key processes and does not proactively recruit externally to identify and acquire talent for vacancies. In addition, temporary employees are, at times, employed in managerial positions. Temporary employees in managerial positions receive no formal managerial training from the County. Further, many management positions within DWM and UCO are the result of internal promotions of personnel that were previously employed in a field or line service capacity. Executing the necessary tasks of a managerial position requires a different skill set than those needed to perform service delivery tasks.

Recommendation 4.2

The County should implement a program to promote high performing temporary staff to full-time positions. By creating a formal career path program, DWM and UCO will encourage staff to perform at high levels and produce quality work products in an effort to receive a fulltime job opportunities at the DWM and UCO that offers security and a career path. The County should also develop an annual recruiting plan inclusive of forecasted activities and priorities to limit the need for temporary staffing solutions for full-time vacancies. The plan should ensure recruiting is timely implemented and allows DWM and UCO to be more competitive and proactive, avoiding the need to rely on temporary employees. DWM and UCO should define the skills and character traits needed to improve staff retention levels and improve employee morale. Defined skill needs and gaps will allow DWM and UCO to tailor job postings and recruitment strategies to fill high need and high impact positions within the Department.

Finally the County should perform a formal skills gap assessment to determine areas of greatest deficit as well as to assess the future workforce needs against current staff availability and competencies, particularly related to management level positions. The County should also prepare formal training material and conduct formal training sessions with personnel in order to educate towards organization goals, objectives, roles, responsibilities and relationships with other Departments. The County should prioritize management training.

Key Issue 4.3: Insufficient Knowledge Retention

When DWM loses critical members of their workforce, temporary employees may provide part-time assistance in relieving workload volume from the organization's fulltime employees. Temporary employees have the same workload as full-time staff, however they lack the security and benefits associated with a full-time position. Temporary employees also often lack the institutional knowledge necessary to analyze billing exceptions, circumstances, and potential resolutions.

Recommendation 4.3

DWM and UCO should prioritize filling vacancies with personnel who possess the necessary skill sets and ensure incoming staff are receiving adequate knowledge of daily roles and responsibilities. DWM and UCO should implement formal succession planning to facilitate effective knowledge transfer from staff leaving the organization to existing or new staff. Additionally, as mentioned throughout the report, the County should formally document policies and procedures throughout its water metering and billing functions to facilitate knowledge transfer.

5. Account Set Up



Account Set Up is the initial process for establishing water users. Properly establishing customer accounts is the first step in the process of accurately metering and billing water consumption. Accounts can be established for commercial and residential customers. Account set up is performed by UCO customer service representatives (CSRs) during the application processes and DWM Field Services staff and vendors during the meter activation and installation process. In addition, various other County organizational units such as the County Permitting department are involved during new construction customer set ups. Account set-up requires coordination and process integration among multiple organizational components within the County as well as outside vendors and contractors. This section presents the following topics:

- Applying for water service at established addresses where water service previously existed
- Applying for water service at new construction sites where water service did not previously exist
- Use of data and data quality

Applying for Water Service at Established Addresses Where Water Service Previously Existed

Customers applying for water service at addresses with prior water service requires the transferring of service at the property from the former occupant to the new occupant. The application for water service can be found on the Department of Watershed Management's website. The County provides an online "Checklist for Water Service" (Checklist) to assist customers in completing the application. The Checklist details the necessary documentation to submit during the application process such as government issued picture identification and various other proof of ownership/occupancy related documentation depending on the applicant type.

The following list includes the types of applicants that complete the application for water service at addresses where water service was previously established:

- Property Owners
- Tenants
- Management Company
- Realtors

The applicant must provide all necessary application materials – photo ID, lease agreement (if necessary) and service application to begin the set up process. Applications can be emailed, faxed, mailed or submitted in-person at the Utility Customer Operations (UCO) Jordan Lane facility – which serves as the UCO's headquarters and the only location for customers to apply for water service at established addresses where water service previously existed.

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

The Application for Water/Sewer Service is shown below. *

Exhibit 5.1

APPLICATION FOR WATER/SEWER SERVICE

For Office Use Only	
Account Number	Closing Date/Beginning Lease Date
Please Print	
Name: _____ (Last, First MI OR Business Name)	
C/O: _____	
☐ OWNER ☐ TENANT ☐ MANAGEMENT COMPANY ☐ REALTOR	
Service Address: _____ (Street Address) (City, State, and Zip Code)	
Mailing Address: _____ (If different than Service Address) (City, State, and Zip Code)	
Telephone Number: _____ Cell Phone Number: _____	
Email Address: _____ Enroll in E-Billing*: ☐ Yes ☐ No	
Social Security Number/Tax ID: _____ Driver's License/ID Number: _____	
Previous Address(If DeKalb County): _____	
Leave on at Previous Address: ☐ Yes ☒ No – Please disconnect on: _____ (If DeKalb County)	

UCO Customer Service Representatives (CSR) review the provided supporting documentation in an effort to verify that the applicant is the party who will ultimately be responsible for meeting the financial obligations associated with new service (owner, tenant or property occupant). The objective of the initial review is to prevent people from fraudulently obtaining water service under the name of other people. The CSRs are trained to research the DeKalb County Tax Commissioner's website to validate ownership of the applicant's property.

UCO CSRs research the applicant's Social Security Number in the CPAK system to confirm whether the applicant has an outstanding balance associated with another address. CPAK is the County's customer service and billing system use by members of both the Department of Watershed Management and Utility Customer Operations in executing water metering and billing responsibilities. The CSR begins the process of creating a new account for the applicant after determining that the applicant does not have any outstanding financial obligations to the County from previous water service. If it is determined that the applicant (tenant, owner or property occupant) has an outstanding financial obligation and owes the County money, the County requires that applicants resolve any financial liabilities before establishing a new account for service. New water service can be established once it is confirmed the applicant has no prior financial obligations to the County or the applicant's outstanding financial obligation has been paid.

The CSR generates a CPAK work order to turn on new service at the address listed in the application. The CSR must correctly populate the applicant's personal information into CPAK and ensure the applicant's electronic record is accurately registered and saved in the CPAK system. The CSR will notate the applicant's account in CPAK with notes that document the interaction between the CSR and the applicant. Notes may include whether the applicant still owes the County updated supporting documentation or that the CSR received copies of the applicant's photo ID or leasing documents if applicable. Water service at the applicant's address can begin once the new applicant account has been established and Field Services has performed the work order to turn on water service. Meter Readers will begin reading the meter at the address during the next billing cycle.

Applying For Water Service at New Construction Sites Where Water Service Did Not Previously Exist

The Account Set Up process also includes establishing water service for customers who submit applications as part of new residential and commercial construction where water services did not previously exist. The next subsections presents the work processes, data outputs/analysis and technology associated with new customer construction set up as related to meter reading, billing and watershed field services.

Initial Intake

New customer installations begin in-person at the DeKalb County Administration Building (Maloof Center). Applicants are required to complete the "Application for Water Meter Installation" (Application) for new service in-person at the Maloof Center. New applicants are provided the opportunity to speak with a County Permitting Technician who can assist the applicant by addressing any questions the applicant may have. The application is in hardcopy paper format and cannot be completed electronically or submitted online. The current new construction customer set up process does not offer customers the ability to initiate or complete the process online.

The current application has four duplicate pages – one original hard copy and three carbon copy pages. The application includes:

- White copy (original copy): routed internally to the County's Watershed GIS (GIS) function to ensure the new applicant's address is ready for service,
- Yellow copy: retained by the County's Meter Application and Installation group in the Department of Watershed Management,
- Pink copy: retained by customer; and
- Manila copy: provided to external meter contractor installer

The applicant specifies in writing whether the meter use is residential, business, manufacturing, or irrigation. The applicant and the Permitting Technician use the applicant's personal and property information to assist the applicant in completing the following information on the Application for Water Meter Installation:

Exhibit 5.2

General Information	Meter Purchaser	Billing Information
— Service address,	— Name,	— Name,
— Lot number,	— Owner,	— Phone number,
— Name of subdivision (if applicable),	— Contractor	— Address,
— City,	— Phone number.	— City,
— Zip,		— Zip,
— Nearest intersecting streets		— Location of meter stub
		— Whether or not the lot is paved

The application also requires the following information: Whether the property is on a sewer line or septic tank, meter size, meter cost and the number of units, office stories or apartments anticipated to be served by the meter. The Permitting Technician confirms the information related to the meter size and meter cost depending on the applicant type (residential or commercial) and the meter use at the address.

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

Once the application is complete, the prospective customer must pay a service fee. The service fee by meter size is outlined below:

Exhibit 5.3

Meter Size	Service Fee	Customer Type
¾ inch	\$1,100	Residential
1 inch	\$1,300	Residential
1 ½ inch	\$2,600	Residential
2 inch – 10 inch	\$4,975 – \$25,575	Commercial

The transaction information is entered into the County's Oracle Financial Management Information System to record the financial transaction that occurs for accounting purposes.

Internal Routing

After the payment is received and processed in the County's Oracle system, the application is sent in hardcopy form via interoffice mail to the Department Watershed Management Technical Services staff located at DWM's Memorial Road location. It can take up to two days for the interoffice mail to arrive to the Memorial Road location from the Maloof Center. Electronic routing (email, fax, other electronic workflow) is not utilized. New customer applications are received by Meter Applications & Installations function within the Department of Watershed Management. The applicant's address is entered into the County's GIS system to verify that the address is ready to receive new service from DWM.

The Application and Installations staff create a work order in Cityworks for new meter installation. Cityworks is one of the County's technology systems that creates, routes and tracks work order progress for Department of Watershed Management. Previously, the DWM used Oracle WAM to create, route and track work order progress for new meter installation. The DMW discontinued the use of Oracle WAM for new construction water meter work orders in December 2016. The County still has an undetermined number of Oracle WAM work orders that are still in process of being closed with all new water meter work orders now being generated by Cityworks (as of December 2016).

Currently the Meter Applications & Installations function has only one staff member who executes the intake responsibilities and facilitate the new meter installation process. The work order number is documented and a copy of the initial Application for Water Meter Installation is attached to the work order. The work order is sent to the Manager of the Application and Installation group for quality assurance review and approval before being routed via hardcopy to the County's meter install contractor – an outside vendor. The County currently has one outside meter install contractor who is responsible for new construction meter installations.

Handoff for Contractor Installation

The Application and Installation office makes hardcopy work orders available for contractor pick up at DWM's office on Memorial Drive. The County does not offer the contractor the ability to receive work orders in electronic form.

The meter install contractor first drives to the DWM's Memorial Drive location to obtain the hardcopy work order and the manila colored copy of the Application for Water Meter Installation. The meter install contractor then drives from Memorial Drive to the DWM's Roadhaven Warehouse to obtain the meters to be installed.

Before the DWM releases the meter from inventory and the chain of custody is transferred to the contractor, DWM records the meter serial number and registration number. The meter identification includes information that helps facilitate the inventorying and deployment of meters.

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

The meter install Contractor then leaves the warehouse with the following:

1. New meter for installation
2. Hardcopy of the work order form from either Oracle WAM or Cityworks
3. Manila copy of the Application for Water Meter Installation form

New Meter Installation

The meter install contractor completes the meter installation at the address on the Application for New Meter Installation. As outside contractors, the County has no direct managerial oversight as to how the contractor performs the work. Lack of managerial oversight prevents the County from training, developing and directly managing the performance of the people who are installing the new construction application meters. The County must rely on vendor management measures to drive the quality of services received by the installation contractors. The County does not have currently have strong measures in place to drive contractor performance and accountability.

The meter install contractor must ensure that the meter is installed and programmed properly. It is the responsibility of the contractor to ensure that the initial reading on the meter is recorded correctly on the work order. Not all new meters are installed in the ground with a "0" meter reading. The DWM will test meters before deploying them in the field to help ensure the meters are working properly, which leads to some meters having a minimal amount of water being registered on the meter odometer.

Exhibit 5.4 below is an example of an installed meter that has a handwritten new meter start reading that is not zero (note this example is from an MXU Meter Retrofit, not a new construction meter set up)

Exhibit 5.4

New Meter Start Reading (IF NOT ZERO):							
0	0	0	0	0	0	2	

The meter install contractor handwrites remarks regarding the installation on the work order form (either Oracle WAM or Cityworks) and the back of the manila copy of the Application for Water Meter Installation form after the meter installation is complete. Remarks include the following:

- Meter size
- New meter number
- New meter reading

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

Below is an example of the additional information included on a Cityworks work order:

Exhibit 5.5

Additional Information:

Description	RE: 151125
Meter Number	151125
Meter Size	3/4"
MKU Number	
Meter Reading	151125
Turn On/Turn Off Meter	151125

Installed meter
long side
ok
8-4-06
8-4-06

The contractor recorded the meter number, size, initial meter reading and noted that the water was turned on at the location.

Comments include that the contractor installed the meter, valve box and the meter box and lid at the property. A second commenter provided additional notes specifying that the meter is on the "long side" of the street – meaning that the meter was installed on the opposite side of the street from the water main.

Additional remarks may be provided on the back of the manila copy of the Application for Water Meter Installation as well, including descriptions as to where on the property the meter box is located.

Exhibit 5.6

REMARKS

32ft off left pl
15ft off curb
28ft left of power pole

METER LOCATION

DRAW SKETCH

Power Pole
15ft
32ft
28ft

The contractor recorded that the meter was installed 32 feet from the left power line, 15 feet from the curb and 28 feet left of the power pole. The diagram marks the location of the meter with a circle near the middle of the sketch.

Contractors consistently provide remarks to assist the County and its staff in locating meter boxes. Writing critical information by hand on hardcopy work orders and on the Application can lead to issues

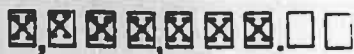
DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

for back office staff who are tasked with inputting the critical handwritten information into the County's billing system. Handwriting can be illegible or install contractors may incorrectly transpose the information from the meter identification sticker to the paperwork that is returned to the County. Additionally, notes are often written with abbreviations or "short hand" that may not be intuitive for back office staff. The degree of diligence in preparing the remarks and ensuring their completeness and accuracy is dependent upon the individual competency of the meter installer. The County will generally include the remarks that have been written on the work orders and the Application for Water Meter Installation in the Cityworks and CPAK billing systems to streamline future service by the DWM should they be called out to the address for field service or during the course of normal meter reading. There is no interface between Cityworks and CPAK.

The water meter install contractor places the meter identification sticker on the manila copy of the Application for Water Meter Installation form. Critical information is included on the meter identification sticker, such as:

- **Meter Description** – includes the size of the meter (3/4 inch, 1 inch, etc.) and whether it is a TouchRead meter, manual or FlexNet AMR
- **Sensus Meter Serial Number and Barcode** – contains an 8 digit number that helps distinguish meters from one another
- **Customer Identification Number** – contains 8 digit identification number included on the sticker at the direction of DeKalb County and programmed by the factory prior to shipment to the Roadhaven warehouse
- **Meter Odometer Configuration or "Config:"** – contains an odometer graphic with a series of "Xs." The X's signify the odometers wheels that have been programmed to be read electronically. Meters often display more digits than they are programmed to read. For example, an odometer may be set to display 9 digits but only configured to read 7. See below:

Exhibit 5.7

Config: 

The Meter Serial Number and the Customer Identification Number are both 8 digits, which may lead to confusion for contractor meter installers when they try to populate the meter number on the work order and Application for Water Meter Installation.

Once installation is complete and all the associated documentation has been completed, the meter install contractor must return both the work order and manila copy of the Application for Water Meter Installation to the Department of Watershed Management at Memorial Drive. The ability to set up new customer accounts is dependent upon the new meter install contractor returning the paperwork. Using a manual and paper-based process provides the opportunity for paperwork to get lost or otherwise go unreturned. The County has experienced instances where contractors did not return the paperwork timely following meter installation or where paperwork was lost. The work order is closed in Cityworks or Oracle WAM once the hardcopy work order is returned to DWM.

Customer Account Creation

The DWM staff at Memorial Drive send a copy of the work order and the manila copy of the Application for Water Meter Installation form via inter-office mail to the Roadhaven facility for customer account set up in CPAK. Staff at the Memorial Drive location do not have access to CPAK. CPAK access is granted, only to the staff at Roadhaven facility and the Utility Customer Operations (UCO) at the Jordan Lane facility.

Once the manila copy of the Application for Water Meter Installation is received, the first step in setting up a new customer profile in CPAK is adding the applicant's property address into the CPAK system. The County has one staff member who has access to CPAK and is also trained on entering the new construction customer's information into CPAK and finalizing set up.

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

The DWM will cross reference the address for new water service against the existing meter reading routes the County uses to deploy its Meter Readers in CPAK. The customer address must first be added to a water meter reading route before the new customer can be connected to the CPAK billing system.

DWM staff will search routes in CPAK to see if the street where the new customer resides has already been placed on a meter reading route. With new construction, it is not always clear as to which route the area where the new service is going to be provided will be added. For example when a new street is created as part of the construction of a subdivision, there are no pre-existing neighbors who are already part of a meter reading route that the new applicant can be added to. The DWM relies on the County's GIS team to update County maps to confirm the geographic location of the new address and its proximity to the existing meter reading routes. If the street is already established in GIS, then the County staff can easily add the new address to a CPAK route because the address' geographic location has been confirmed and there are existing DWM customers on the street. If the street and address of the new applicant is not in the County's GIS, then DWM staff performs the following:

1. Searches County property tax records
2. Views the final plat maps
3. Uses Google as a research tool to determine the location of the new meter set up
4. Contacts DWM Construction Inspector for potential answer

There is no interface between CPAK and the County's GIS.

DWM assigns the new meter location to the meter reading route in CPAK that is located near/around the general geographic location of the service address after the new customer's address has been confirmed.

Once the meter has been assigned to a route for future reading, the County will add the meter number and directions for accessing the meter from the Application for Water Meter Installation form into CPAK. The DWM staff reference the meter identification sticker that is attached to the Application for Water Meter Installation when setting up the customer profile.

The meter number on the sticker that is associated with the new meter install should already be in CPAK's inventory of meters though not connected with a customer account. The County generally uses CPAK to log all the meters that are sent from the meter supplier to the Roadhaven warehouse to document receipt and to more easily link the meters in inventory to meters that will be installed in the field. Having a pre-populated inventory list to select meters to assign to new customers reduces the opportunity that a new customer account will be set up with the wrong meter number as DWM staff is able to "cut and paste" the new meter number from inventory directly into CPAK. Issues leading to billing inaccuracies and high bills can occur if the new meters are not in the CPAK inventory and new customer accounts are set up by manually typing the meter number into CPAK. Issues arise when staff members mistype meter numbers into the new customer's account, rather than transferring the meter number directly from the CPAK inventory list. To address issues related to meter inventory, the County has adopted a policy that new meter set up cannot be completed if the meter number is not in CPAK's inventory list. The objective of this policy was to stop the manual entry of water meter numbers in an effort to decrease the opportunity for human error. If a meter number is not in inventory, DWM staff now email a copy of the work order and the meter number associated with the meter installation on the work order to the Superintendent of Distribution. The Superintendent contacts the water meter supplier directly so that the supplier can create an inventory file with the missing meter's attributes. Once the file is sent to the DWM, it is uploaded to CPAK so DWM staff can pull the meter information directly from the inventory file and into the applicant's new customer profile. The process of obtaining a new, updated inventory list with the missing meter number can take more than one week.

Issues related to meter inventorying and CPAK customer account updating can be found in more detail in the Billing section of this report as the issue impacts both new meter set ups and meters that are replaced for existing customers.

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

After the customer profile is populated with the address and meter number, DWM staff enters the attributes of the meter that has been installed, including: meter size, type of service (residential, commercial or irrigation) and rate of billing. The rate of billing and billing multiplier is automatically populated by CPAK once the service type and size of the meter have been inputted.

The DWM staff responsible for the new customer account creation in CPAK is not inputting any information related to the billing multiplier. Billing issues may arise if the applicant chooses the wrong type of service or more than one service type on the Application for Water Meter Installation because monthly and bi-monthly "commodity charges" and "readiness to serve" charges are based on the type of service the applicant chooses.

Commodity charges are the rate at which each 1,000 gallons of usage is charged. The graphic below shows the variation in rates for water, sewer and irrigation usage. The most applicable charges as related to this report is the variation between the rates charged for water and irrigation. If a customer is being charged at the irrigation rate for household usage, then the customer will receive a much higher bill than if they had correctly specified the water type as water.

Exhibit 5.8

----- CURRENT CUSTOMERS -----
(Based on volume of water metered, tiered conservation rates).

(A) COMMODITY CHARGES:
Bi-Monthly Billing*

	Water		Sewer	Irrigation
	<i>per 1000 gals.</i>	<i>per 1000 gals.</i>	<i>per 1000 gals.</i>	<i>per 1000 gals.</i>
Bi-Monthly Consumption	$\frac{3}{4}$" Meter	All Other Meters	All Meters	All Meters
0 – 4,000	\$2.16	\$3.08	\$11.34	\$8.08
4,001 – 20,000	\$3.08	\$3.08	\$11.34	\$8.08
20,001 – 40,000	\$4.63	\$3.08	\$11.34	\$8.08
> 40,001	\$8.08	\$3.08	\$11.34	\$8.08

The readiness to serve charge is a base charge for providing water service availability to customers based on the size of the meter installed. Readiness to serve charges are the same for water and irrigation usage.

Exhibit 5.9

(B) READINESS TO SERVE CHARGE: (A base charge for providing service availability regardless of volume used, based on the size of the meter.)

Bi-Monthly Billing*

	Meter Size									
	$\frac{3}{4}$ " (or less)	1"	1-1/2"	2"	3"	4"	6"	8"	10"	12"
Water	\$5.71	\$9.50	\$19.01	\$30.41	\$56.99	\$94.98	\$189.93	\$303.88	\$436.86	\$816.71
Irrigation	\$5.71	\$9.50	\$19.01	\$30.41	\$56.99	\$94.98	\$189.93	\$303.88	\$436.86	\$816.71
Sewer	\$13.77	\$22.97	\$45.93	\$73.48	\$137.78	\$229.62	\$459.23	\$734.77	\$1,056.21	\$1,974.66

*Note: Most residential and low consumption users are on a bi-monthly meter reading and billing cycle. This consists primarily of meters 2" and under and constitutes approximately 99% of all meters in the water system.

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

The exhibit below shows a customer who chose both residential and irrigation use on their Application for Water Meter Installation which may prompt additional follow up from DWM staff to determine whether the applicant intends to have both a residential and irrigation meters installed at their location or whether the applicant only wishes to install an irrigation meter at the residence.

Exhibit 5.10

METER USE	
<u>RESIDENTIAL</u>	☒
BUSINESS	☐
MANUFACTURING	☐
IRRIGATION ONLY	☒
PROPERTY ON:	
SEWER LINE	☒
SEPTIC TANK	☐
METER SIZE	<u>3/4</u>
METER COST	\$ <u> </u>
NUMBER OF UNITS, OFFICE, STORIES OR APARTEMENTS SERVED BY THIS METER <u> </u>	

DWM staff will contact the DWM Construction Inspector Supervisor by either phone or email and ask for DWM staff to revisit the property to confirm the service type if it is not clear on the Application for Water Meter Installation.

DWM staff will also input the initial meter reading captured by the contractor at the time of meter installation. The initial reading serves as the foundational data used to generate the customer's first water bill.

New meter set up is complete once the address has been confirmed, the meter has been added to a meter reading route, the proper meter information has been updated in CPAK, and the initial meter reading has been populated. The meter can then be read the next time the Meter Reader is deployed to read the route which the new meter has been assigned.

The County relies on two key DWM staff members in Meter Applications and Installations and the Filter Plant Warehouse to perform nearly all the paperwork and data entry associated with the new construction meter set-up process. The timeline for completing the process is partially dependent upon the availability of these key staff members and the County does not have contingency plans or a strategy in place should either staff member be unavailable. The County has not developed a succession plan for either position.

The County's goal is to have new service set up within four to six weeks of receiving a completed application and associated meter fees. At the time of project fieldwork, the installation process was taking an average nine to ten weeks – three to six weeks beyond its current goal.

Use of Data and Data Quality

The use of data and data quality is an integral part of establishing accounts for new customers. The County relies on a various stakeholders to populate the data that helps ensure that meters are read properly and accurate bills are produced for customers in a timely manner.

The County relies on data and data quality during the course of the account set up at new construction sites where water service did not previously exist in the following ways:

Customer Account Information Prepared by the Applicant

The new customer account set up process is dependent upon the applicant providing complete and accurate information on the Application for Water Meter Installation. If the applicant provides incorrect address information, it may lead to DWM being unable to validate the address for service and properly add the new meter to a route for meter reading. Additionally, if the applicant specifies a request for both irrigation and residential meter use, the DWM may generate a work order to have DWM visit the address in-person due to the conflicting nature of having both services at the same residential address without clearly stating that the applicant is requesting both meter types on the Application. The field visit requires additional time, effort and resources of the DWM to staff to resolve issues.

GIS Mapping Updates and Accuracy

The Department of Watershed Management depends on GIS to confirm that water service can be provided to the applicant's address and to help validate the meter reading route to which the meter should be added. The process is dependent upon the County's GIS system having up-to-date maps that reflect new construction occurring in the County. If the GIS maps are not up-to-date, then the DWM staff spend additional time researching and confirming information that should be easily pulled from the GIS system. The additional time and effort of the DWM staff provides an opportunity for human error related to the service address of the new applicant and may prevent the customer's account from being established properly and read by Meter Readers.

Information Provided by Contractors During New Meter Installations, Including Meter Numbers and Ancillary Account/Address Details

The meter number is the most important piece of information that is added to a customer account during the course of new meter set up. The meter number is the critical data point that allows the County to distinguish customers from one another. Each customer's bill is associated with the meter reading output connected to the meter number on the customer's account. If the meter number is wrong, there is the potential for the Meter Reader to be unable to register a reading or for an incorrect meter reading to be applied to the wrong customer account, which in turns causes billing exceptions and inaccurate bills respectively. During the course of new account set up, there is multiple opportunities for various process stakeholders to incorrectly note the meter serial number. They include:

- Handwritten notes and details provided by water meter install contractor on work orders and the Application for Water Meter Installation
- Entry of water meter serial numbers into CPAK using the inventory list from the meter supplier (could be incorrectly pasted into a customer's account profile or incorrectly manually entered if not on the inventory list in years past)

Mismatched meter numbers are one of the root causes of the inaccurate water metering and billing issues. Additional information related to data quality for meter inventorying and CPAK updating can be found in more detail in the Billing section of this report.

Additionally, poorly transcribed property details can lead to the customer's account inaccurately reflecting where the water meter box is located. If a Meter Reader is sent to the property and directed to look in a specific area and cannot find the meter box, it may prompt a billing exception for a "non-read" and new work order for a member of Field Service to locate the box. The box must be located and the meter read before a bill can be generated for the account. The field visit requires additional time, effort and resources of the DWM to staff to resolve issues that could be mitigated during the installation process by the water meter install contractor.

Key Issues and Recommendations

This section presents key issues and recommendations related to Account Set Up processes, staffing and technology. No issues were identified related to the process of "Applying for water service at

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

established addresses where water service previously existed". Issues and recommendations were identified related to the process of "Applying for water service at new construction sites where water service did not previously exist".

Key Issue 5.1: Inefficiencies and Risks of Paper-based and Manual Processes

The process for new construction meter set-up is paper-based and manual from the initial intake process through the return of hardcopy work orders and customer forms, such as the Application for Water Meter Installation, increasing risk for human error and process inconsistency.

The opportunity for human error begins at the outset of the process when the County relies on members of the public to complete information regarding their new meter set up. As discussed, the County then routes four separate copies of the Application for Water Meter Installation to stakeholders around the County and then to outside contractors. Routing the documents in hardcopy form takes extended time and leaves the County staff with limited insight into the status of the documents as they wait for inter-office mail to be delivered or for contractors to return work orders and other forms. Additionally, work orders and Application for Water Meter Installation forms have been lost by contractors and County staff, causing delays and additional work for those staff members responsible for fulfilling the new water meter set-up requests.

In addition to the inefficiencies and increased risk of the paper-based processes, much of the information populated for new construction meter set up in either handwritten or manually input into information systems without opportunities for quality assurance and accuracy review. Handwritten notes often cause issues in interpreting the intention of the information provider – resulting in information later being incorrectly inputted into the County's information systems.

The manual entry of important customer information and meter data offers the opportunity for human error to affect the accuracy of water bills because the accuracy of water bills is inextricably linked to the meter number being correctly connected to customer accounts in CPAK. The jobs and responsibilities of Meter Readers and the Billing Unit are impacted by the accuracy of customer account information in CPAK. If meter numbers are not connected with the correct address, then the subsequent meter readings and billings for that meter number will not reflect with the usage on the customer's account who is being billed.

Recommendation 5.1

- The County should make initial application and intake steps electronic so that information can be routed electronically rather than via paper-based form. Enabling technology can decrease the paper-based processes utilized by the County and third party contractors, decrease the risk that important paperwork will be lost and delay the new customer set up process, and remove data entry process steps. If the County continues to maintain paper-based processes, they should, at minimum, enable technology to distribute the paper forms around the County rather than using inter-office mail. Inter-office mail adds multiple days to the overall set up process whereas scanning and sending key documents or enabling shared drive capabilities allows key staff to receive documents instantaneously and at the same time as other key stakeholders. Additionally, leveraging technology to route important application paperwork provides the County and its contractors an electronic trail of where the documents are located and the status of the documents.
- The County should provide Contractors copies of meter applications and work orders in electronic format, avoiding the need for contractors to travel to multiple locations around the County before starting performance. Electronic work orders decrease processing time, improve security of work order documentation, and provide greater transparency into the location and status of work orders. Electronic work orders also mitigate the opportunity that the contractor will lose the application and work order paperwork the County requires to be returned before the new customer set up process can continue. As the County begins developing RFP requirements for the upcoming new construction meter installation services contract, the County should require that respondents have the capabilities to receive work orders electronically and have a process for electronically routing

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

the work orders to their individual employees. Additionally, the County's procurement function should prioritize the electronic capability requirement during the response evaluation.

- The County should no longer accept handwritten notes and information from contractors in the field because manual entry has the potential to lead to inaccuracies when updating customer meter information into the County's billing software.

Key Issue 5.2: Limited Customer Service Focus

The process for new construction meter set-up is not focused on the customer experience. Generally, the County is dictating the form in which it wants to receive key information from the new construction meter applicant without first considering the applicant's preferred method for communicating the information or providing multiple options to meet the preferences of a diverse set of stakeholders.

Further, once the County obtains the initial information from the applicant, there is no additional touchpoints with the applicant to provide status of the meter installation. The applicant must proactively contact the County for an update regarding the timeframe for receiving water service, which is common as the County is averaging nine to ten weeks to complete the process as compared to an established goal of providing service in four to six weeks.

Recommendation 5.2

- The County should offer the Application for Water Meter Installation forms online so that the information may be submitted online or completed ahead of the applicant visiting the Maloof Center for submission – doing so allows the customer to do any research necessary to complete the information requested accurately and also decreases the amount of time that the public needs to spend in person trying to receive new water meter service. Electronic entry of key customer data makes the process easier for applicants and decreases the opportunity for key information to be incorrectly populated and transposed by County staff.
- The County should offer customers a more readily-available status of meter applications and installations. The County should consider a self-service website for applicants that does not require the applicant contacting the County directly for an update on the standing of their Application for Water Meter Installation. Developing a comprehensive knowledge base in conjunction with an online self-service website would improve customer satisfaction and reduces time and effort required by County staff.
- The County should provide a comprehensive knowledge base for UCO Customer Service Representatives to access to answer questions related to new construction meter set up status and other frequent customer inquiries to increase the rate of first call resolution.
- The County should consider co-locating some Meter Application and Installation personnel to help expedite the process of sharing application information through the County. Co-locating key stakeholders may help expedite the intake, routing and data entry process by providing a "one stop shop" for stakeholders to address questions, interact with customers and better direct the efforts of outside contractors.

Key Issue 5.3: Lack of Optimization of Information Systems

The County uses multiple technology systems which are not fully optimized to support the account set up process. Additionally, County processes are not fully stabilized due to recent and upcoming transitions of multiple technology systems.

The County recently implemented Cityworks in December of 2016, with the technology currently being rolled out to additional DWM staff over the last 2 months. The County is also in the process of procuring a new billing system to replace CPAK.

The implementation of Cityworks offers the County additional capabilities to improve and enhance the process in which new construction meters are deployed. The County is continuing to provide outside contractors with hardcopy work orders that drive the services provided. As discussed, maintaining the

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

paper process does not allow the contractor the ability to upload pictures of newly installed meters that members of the DWM's Field Services are beginning to do, albeit inconsistently.

In addition, key members of the new construction meter set up process do not have access to both CPAK and Cityworks, making it difficult to address applicant questions when received and assist with the set up process as needed.

As mentioned above, the County is in the process of replacing the CPAK billing system which will require DWM staff to alter the current business processes to align with the capabilities of the new billing system. Current CPAK technology and capabilities do not offer interface capabilities with the County's other systems that support the new construction water meter set up – namely Cityworks and WAM.

Recommendation 5.3

- The County should consider providing access to key portions of the County's billing system to Meter Application and Installation personnel. Access to customer notes can enhance the ability of personnel to answer questions without needing to contact other DWM or UCO staff when trying to address questions or clarify account set up issues.
- The County is currently evaluating RFP responses for a new billing system (CIS) to replace CPAK. The County should establish processes to integrate related data components in the current billing system and work order system into the selected billing system. Billing and work order system integration is key to managing new meter set up workflow and can add efficiency to the process by eliminating the need to operate in multiple systems (CPAK and Cityworks) that do not interface. Integration also offers the ability to reduce risk of billing errors and inaccuracies by reducing conflicting data in the various systems.
- The County should require photos be taken of meter installations and then uploaded to Cityworks to ensure that the County has a comprehensive database of meter pictures, regardless of which party is installing meters.

Key Issue 5.4: Overreliance on Third Party Contractor

The County relies on the meter installation contractor to perform meter installations as part of the new construction meter set up process. The County has high level insight to the volume of installations the contractor is performing but is not leveraging data or other KPIs to provide more strategic oversight and management of the contractor's performance and the quality of the meter installation.

The County has one supervisor who oversees the management of the new construction meter installation contract. The contractor manages the performance of its employees and interacts with DWM management regularly during the process of obtaining new work orders. Generally, the County believes there is opportunity for the vendor to improve performance by hiring additional employees and providing stricter oversight of the current employees.

County employees reported having issues in holding the new construction meter installation contractor accountable for performance and it was reported by the County that the contractor continues to have issues in returning important paperwork, causing delays in the overall customer set up process.

Recommendation 5.4

- The County should develop robust vendor management protocols within their contract terms and conditions and contract management processes to ensure that contractors are evaluated on the volume of successful meter installations and the quality of services performed.

For example, the County should have insight into how frequently they need to send out DWM Field Services staff to address issues or mistakes generated by the contractor. Metrics should be developed and used to ensure that the contractor or contractors are incentivized to address water metering and billing issues, not creating additional issues that lead to billing inaccuracies. Billing

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

inaccuracies can stem from improper meter set up, configuration and misidentification of meter numbers – all of which can take place during the new construction meter set up process.

- The County should establish a stronger end-to-end contract management function in DWM to manage all aspects of third party vendors, specifically the contractors who are installing or replacing new meters. DWM should work more closely with the County Purchasing and Contracting Department to establish comprehensive vendor standards and performance measurements. The County will benefit from enhanced vendor accountability and the critical role the contractors play in the overall success of the water metering and billing function requires full-time oversight and commitment of at least one individual.
- The County should conduct a feasibility study to determine and measure the pros and cons of outsourcing new construction meter installations as opposed to performing the installations internally with County personnel.

Key Issue 5.5: Limited Staffing Capacity

The County relies on the contributions of a small number of staff members to fulfill the new construction meter set up responsibilities. Generally, the staff members performing key functions operate individually and not in collaboration with other staff members or with oversight provided by their function managers. Additionally, there is no formal succession planning or desktop procedures and job aids that would facilitate the transition of institutional knowledge during turnover.

Recommendation 5.5

- The County should develop formal desktop procedures, knowledge base content and succession planning to help ensure that the skill and experience of tenured staff members is maintained within the Department.
- The County should cross-train key members of the new construction meter set up process to better understand the technology and the end-to-end process to foster a redundancy in human resource capabilities should staff members be out of the office. Cross-training will help ensure that the new construction meter set up does not stop should someone be out of the office.

6. Meter Reading



Water meter reading is the process of measuring the volume of water supplied by a public water system and used by residential and commercial customers. An accurate meter reading process can help facilitate business process consistency throughout the organization and help the County protect against revenue loss. The meter reading function is performed by personnel within the Meter Reading unit within the Field Services function reporting to a Superintendent within the Department of Watershed Management's Construction and Maintenance Division. Meter reading activities are driven by the routine billing cycle schedules and there are approximately 21 FTEs within the Meter Reading unit. This section presents the following topics:

- Meter Reading Overview
- Types of Meters
- Historic Meter Usage in DeKalb County
- Manual Process for Meter Reading
- Automated Meter Reads – Advanced Meter Infrastructure (AMI)
- Group/Route Optimization
- Meter Reading Technology
- Meter Read Quality Assurance
- Data Utilization and Quality
- Translating Meter Readings to Billings
- Issues with Inventory

These topics include discussion of current (and historical) processes, procedures, data outputs/analysis, staffing levels and information systems associated with meter reading.

Meter Reading Overview

A water meter is a device that measures the volume of water delivered to a property. DeKalb County measures user consumption in gallons and bills its customers (mostly bi-monthly) for water, sewer and/or irrigation based on the water usage.

Meter Readers locate and read residential and commercial water meters manually through observation and a handheld device. Some meter readings can be obtained through radio frequency that retrieves customer water usage data and electronically transmits the information to the County.

The objective of meter reading is to provide the data necessary to accurately bill customers and collect revenue for water usage. Meter Readers record customer water usage to provide the data necessary for customer billing by utilizing meter-reading equipment to obtain and record data regarding monthly or bi-monthly residential and commercial consumer water consumption.

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

Meter Readers are equipped with multiple items in the field, including the following:

- Handheld Meter Reader (Handheld) – Tracks and stores electronic meter data in a mobile computer device
- Touch Gun/Wand – Records the reading of the meter and electronically sends data to the Handheld
- Hook/Squeegee – Removes meter lid and opens for manual meter reading
- Large Screw Driver – Removes debris from meter boxes as needed, for manual meter readings
- Spray Paint – Guides Meter Reader to hidden/hard to find meters for the next time a reading is required

Most residential water meters are located near the street curb or sidewalk at the front of the property in a metal box with a metal or plastic lid. While most meters are accessible and readable via the Touch Gun, there are several explanations for why a Meter Reader would be unable to properly read an AutoRead meter from the top of the box without opening the actual meter box lid - dirt, debris, or disconnected/damaged wiring inside the box are common reasons for not obtaining an AutoRead. If a Meter Reader cannot obtain a meter reading, the Meter Reader will make a note in the Handheld indicating the issue.

Types of Meters

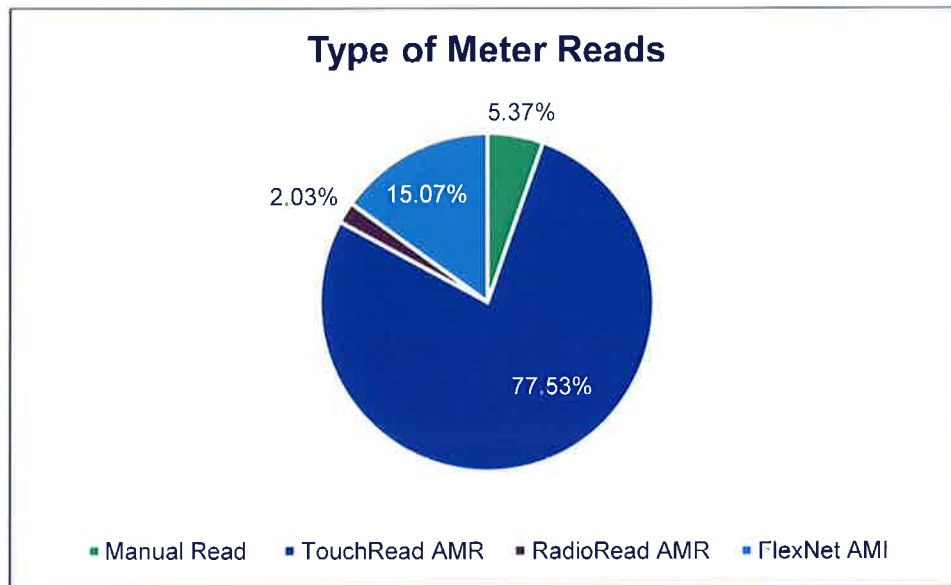
DeKalb County has approximately 185,000 residential meters and 6,100 commercial meters. Residential meters are identified by 1" and smaller meters while commercial meters are identified as 1 ½" and larger (up to 10").

In order to bill a customer, a meter read must first be obtained from the field. The County has multiple methods for obtaining meter readings, including:

- Manual Meter Reads – Visual reading of the digits on the odometer that capture the customer's water consumption. Digits must be entered manually into the handheld.
- TouchRead – Automated Meter Reading (AMR) – Electronic reading is captured from meter via a touch gun/wand and handheld and the readings are posted electronically by the unique Meter ID on each meter (More than 75% of DeKalb County's meters are TouchRead).
- Drive-by RadioRead – Automated Meter Reading (AMR) – Meter is read electronically and transmitted to vehicle receiver (approximately 2,500 of the County's commercial meters are read with vehicle radio system).
- FlexNet RadioRead - Advanced Metering Infrastructure (AMI) – Meter is read electronically and transmitted by a fixed antenna. Data is transmitted via Regional Network Interface (RNI) to Sensus Analytics who forwards information to CPAK.

Exhibit 6.1 displays the percentage breakdown of the types of meter reads

Exhibit 6.1



Historical Meter Usage in DeKalb County

The following paragraphs outline the County's evolution of water meter purchases over the last 40 years. The typical determining factors for replacing residential meters are age and operability. Once a meter reaches 15-20 years of age, it should be designated for replacement in order to have the most accurate metering device deployed to capture a customers' water consumption. The types of meters are:

- Brass Meters
- TouchRead
- iPERL
- FlexNet AMI
- Sensus accuSTREAM

Brass Meters

The County selected the Sensus Bronze Chamber SR meter (or SR) in 1974. At the time, the Sensus SR meter was recognized for providing enhanced accuracy and craftsmanship that guarded against water moisture reaching the meter's internal mechanisms and causing meter inaccuracies. Testing revealed the meter maintained accuracy above 95% for 20 years. From 1974 through 1993 all of the County's new and replacement meters were Sensus Bronze Chamber SR meters.

TouchRead

The County began replacing SR meters with an electronic reading register meter, also known as TouchRead, in an effort to improve the accuracy and speed of the meter reading function. The benefits of TouchRead allowed Meter Readers to capture each meter reading without lifting the meter box lid or visually reading a meter odometer, increasing reading speed and accuracy. The County started installing TouchRead meters with the goal of minimizing the opportunity for human error during meter reading by posting the reading to the system electronically without requiring the manual entry of meter digits into the handheld device.

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

iPERL

The County began a new meter change out program in 2011 and selected the iPERL meter manufactured by Sensus to continue replacing old brass meters with TouchRead meters. The County selected the iPERL as the new standard model for residential meters (the iPERL model the County selected did not come in sizes large than 1", and as a result, were not used for commercial customers). Currently, there are over 70,000 iPERL meters installed in DeKalb County. The iPERL meter is offered with both TouchRead technology described above and the FlexNet technology described below.

FlexNet AMI

The County selected FlexNet for fixed based installation (AMI system) in 2012. The FlexNet AMI system reads meters hourly and transmits data to a collection antenna. The Board of County Commissioners directed DWM to discontinue the installation of iPERL meters. According to the County, the Sensus manufacturer acknowledged the potential for some meters to be defective in 2016.

Sensus accuSTREAM

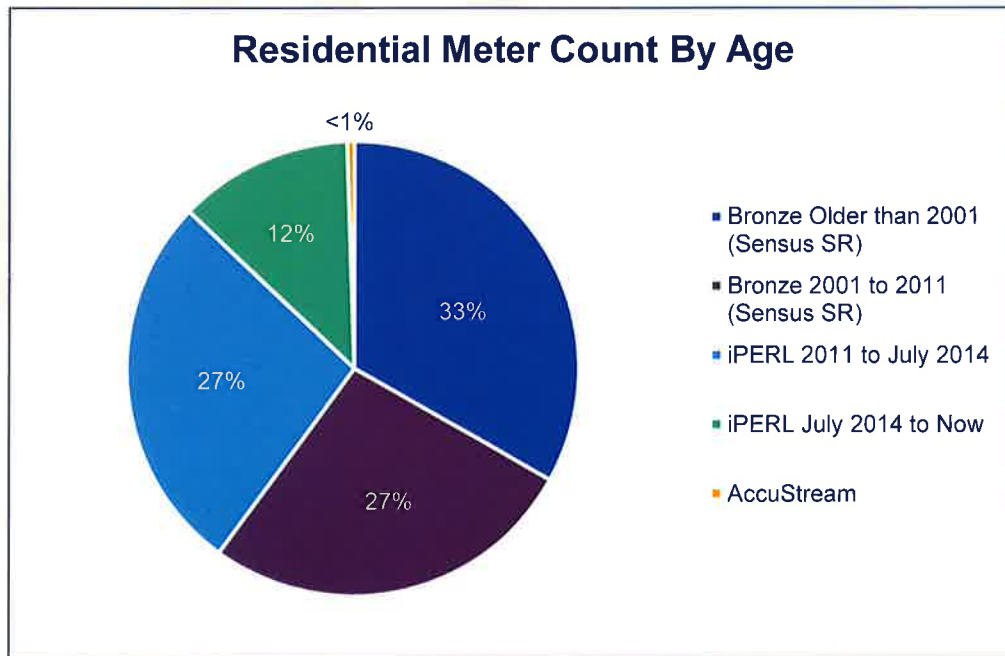
The County began installing Sensus accuSTREAM meters in December of 2016 to enhance sensitivity in measuring a wide range of water flows for a variety of residential applications, including irrigation.

In summary, DeKalb County's residential meters can be classified into five categories by age:

- Bronze Older than 2001 (Sensus SR)
- Bronze 2001 to 2011 (Sensus SR)
- iPERL 2011 to July 2014
- iPERL July 2014 to 2016, and
- Sensus accuSTREAM.

The distribution of residential meters and age can be seen in Exhibit 6.2 below.

Exhibit 6.2

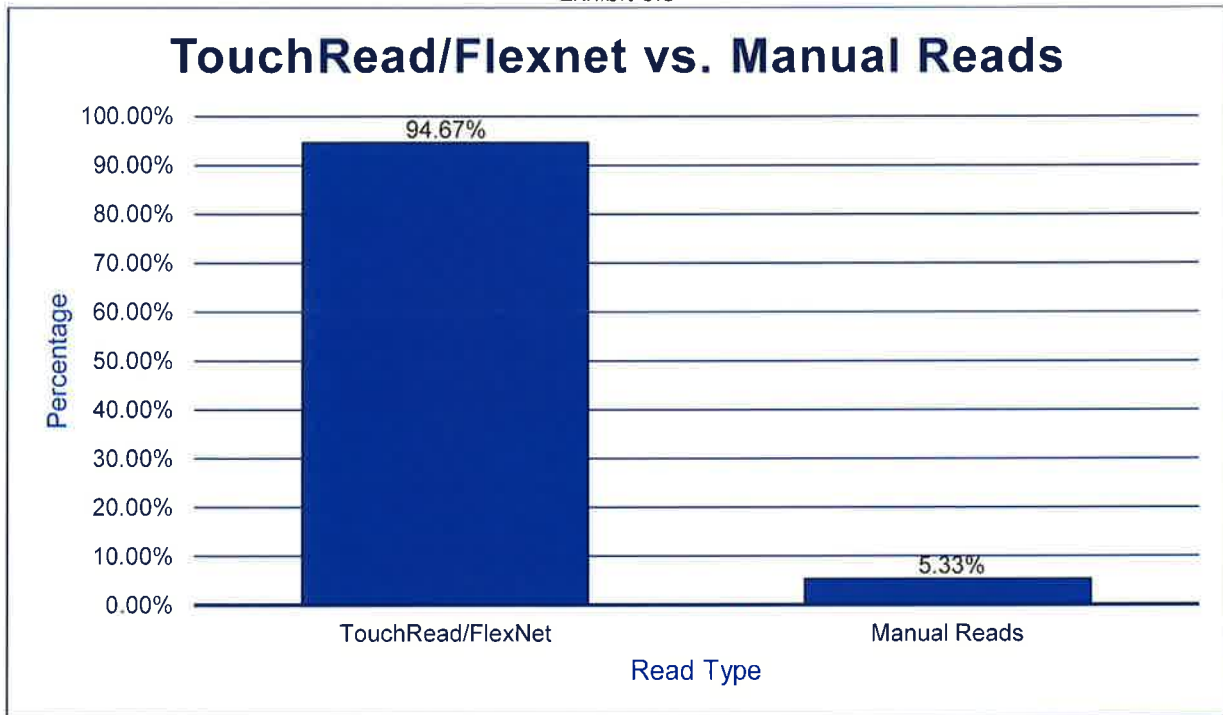


The graph above shows that 33% of residential meters in the ground are over 15 years old and nearly past their useful life. While a meter's useful life may be 20 years, it is best practice to begin replacing meters before they reach their useful life and show signs of deterioration and inaccuracy.

Manual Processes for Meter Reading

As noted earlier, there are two different types of manual reads. First, a manual meter read involves lifting the meter box lid and visually reading the meter odometer and entering the reading manually into a handheld. There are 10,275 manual read meters in DeKalb County today representing more than 5% of the county's reads, which can be seen in Exhibit 6.3 below.

Exhibit 6.3



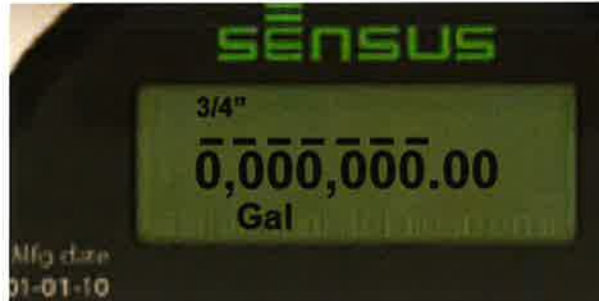
The County's TouchRead meter readings are assigned a "B," while manual meter readings are assigned an "M" in the CPAK billing system and Meter Reader Handhelds.

Second, a manual read occurs when a Meter Reader attempts to obtain a reading through TouchRead but the reading is not transmitted. Reasons for the meter not transmitting include, but are not limited to: cut wires, damaged TouchRead meters, or meter mismatches. These types of manual reads have an increased chance for human error which is partially attributed to the different types (programming variations and digital display appearance) of TouchRead meters in the ground. Meter Readers may have a difficulty reading the correct number of digits on TouchRead meters if they are not properly trained to identify the variables and adjust accordingly. Meter Readers who incorrectly record the wrong digits or wrong number of digits risks populating CPAK with inaccurate meter readings to be used for billing purposes. If the inaccurate meter reading does not flag an exception for Billing Specialists to review or the Billing Specialist decides to release the bill without further investigation into the increased/decreased water consumption, then the customer will receive a bill that is based on either too high or too low of water consumption resulting in underbilling or overbilling.

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

Exhibit 6.4 below displays an example of how a 7 digit TouchRead meter would look in the field while Exhibit 6.5 provides an example of how a 5 digit meter would appear in the field. Meter Readers are instructed to read all the digits under the dash marks or “-” as displayed in the Exhibits below.

Exhibit 6.4 (Sensus accuSTREAM – 1 gallon – 7 digit)



To properly record the reading in the meter above, Meter Readers would only record the numbers under the dash marks (7 digits), even though 9 digits are shown, and would omit the 2 digits to the right of the decimal place.

Exhibit 6.5 (Sensus iPERL – 100 gallon – 5 digit)



To properly record the reading for the meter above, Meter Readers would only record the numbers under the dash marks (5 digits), even though 9 digits are shown, and would omit the 2 digits to the left and the 2 digits to the right of the decimal place.

Exhibit 6.5 reads “00844”, however if a Meter Reader incorrectly interpreted the digits when entering the reading in the HandHeld (i.e. 84461), a high/low exception will be created in the CPAK billing software due to human error.

Automated Meter Reads – Advanced Metering Infrastructure (AMI)

In an effort to enhance meter reading accuracy, the County began a project to test AMI fixed based systems in 2012. The meter distribution network can be continuously monitored in hourly intervals with an AMI system. The County installed over 30,000 FlexNet meters from 2012 to 2016. Additionally, the County decided to move forward with converting to 1 gallon billing increments (instead of 100 gallon increments) for all FlexNet routes. The transition of billing increments applied to the currently installed FlexNet, new FlexNet installation and retrofit (MXU installation) routes. The infrastructure for FlexNet fixed based system has the ability to provide coverage for over 98% of the County. See Exhibit 6.6 for commonly accepted industry benefits of an AMI system.

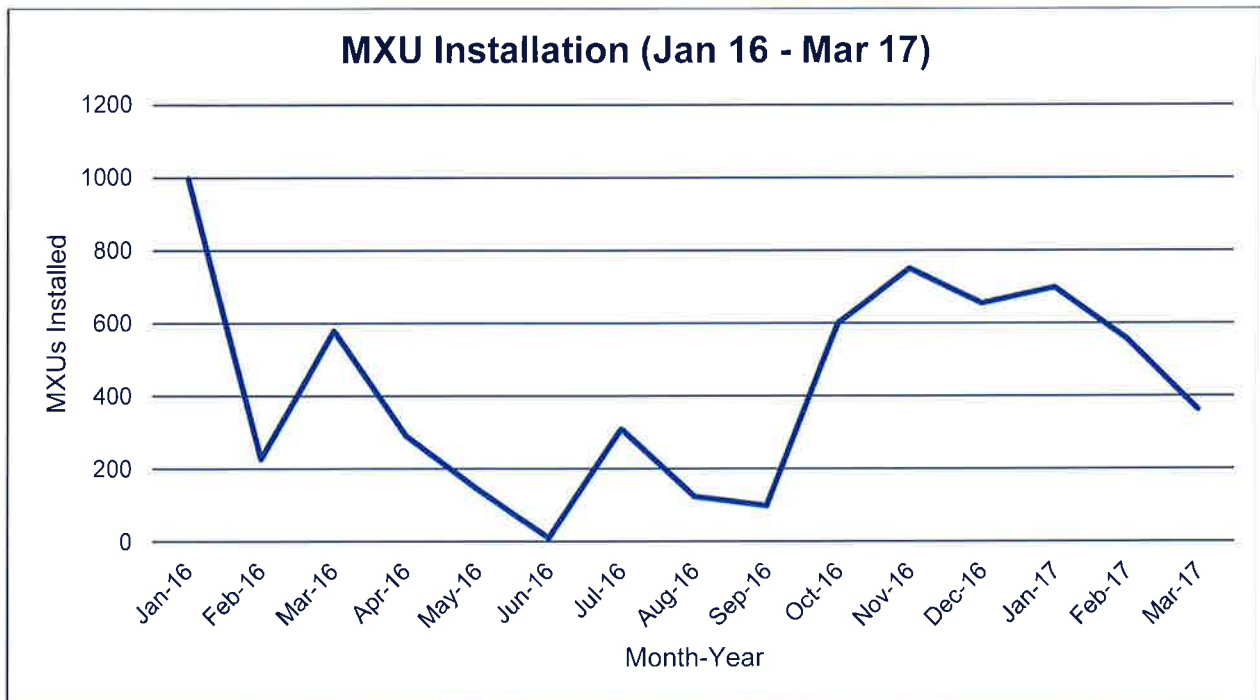
DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

Exhibit 6.6

Better Leak Detection	Improve reading and billing accuracy
Remove the manual labor intensive task of meter read collections	Detect unauthorized water usage and water theft
Proactive customer service	Migrate to monthly billing for all customers
Reduce carbon footprint	Longer meter life with new meter accuracy
Water conservation	Minimum to zero maintenance

When DeKalb County selected the Sensus iPERL in 2011 for new meter replacements, the iPERLs did not contain the AMI transmitter needed for use with the FlexNet system, however the meter has the capability to support the FlexNet system via a transmitter unit called an MXU. An MXU must be installed/"retrofitted" for iPERL meters to use the FlexNet system. The graph below displays 6,400 MXU installations have been completed since January 2016.

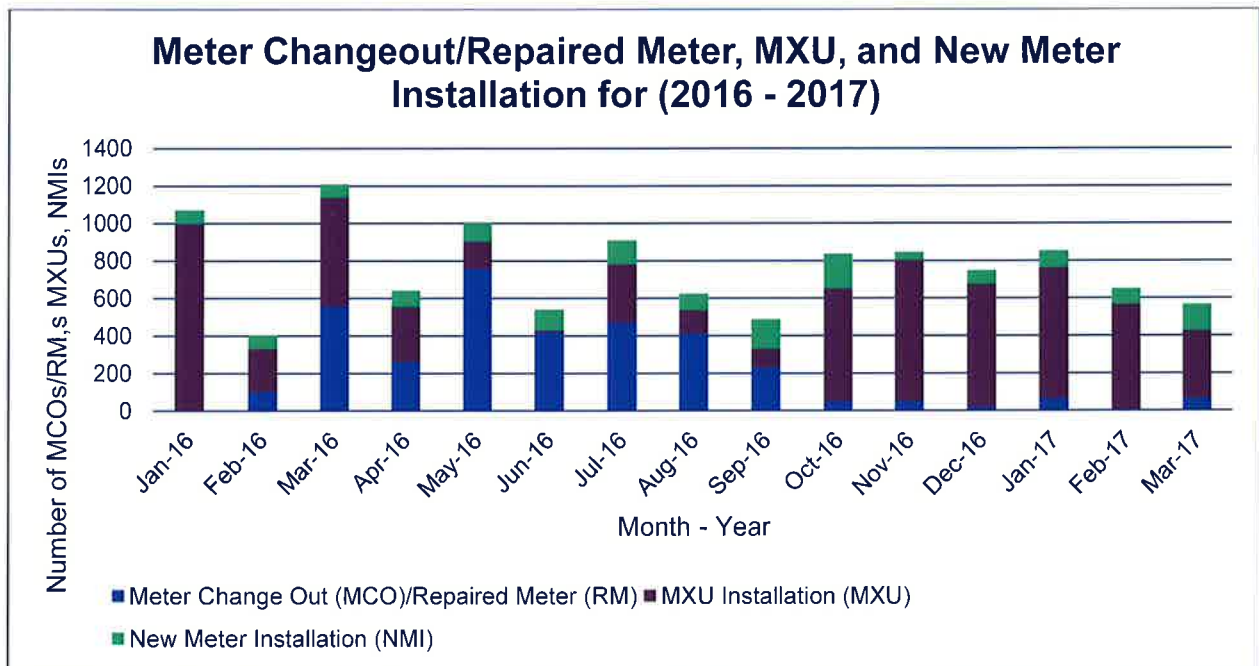
Exhibit 6.7



The residential meter replacement program is currently performed by an outside contractor, Metals & Materials Engineers (MM&E). The contractor has been directed by the Department of Watershed Management to replace the oldest meters in the field first with new accuSTREAM meters. The DWM provides the contractor lists of meters to be replaced by meter routes. The two major activities performed by the outside contractor are meter change out/replacement, and transmitter (MXU) installation and programming. The contractor has been replacing the older (non-iPERL) meters with AccuStream meters and retrofitting installed iPERL meters with MXU and programming to read via the FlexNet fixed based system.

Exhibit 6.8 shows all meter changeouts/repairs, new meter installations, and MXU installations from January 2016 to March 2017.

Exhibit 6.8



Group/Route Optimization

Meters are aggregated into different subsets in order for the County to accurately read meters on a timely basis. First, meters are aggregated into specific groups based on billing cycles with each group typically containing 11-13 routes and are organized by:

- TouchRead Meters
- FlexNet Meters

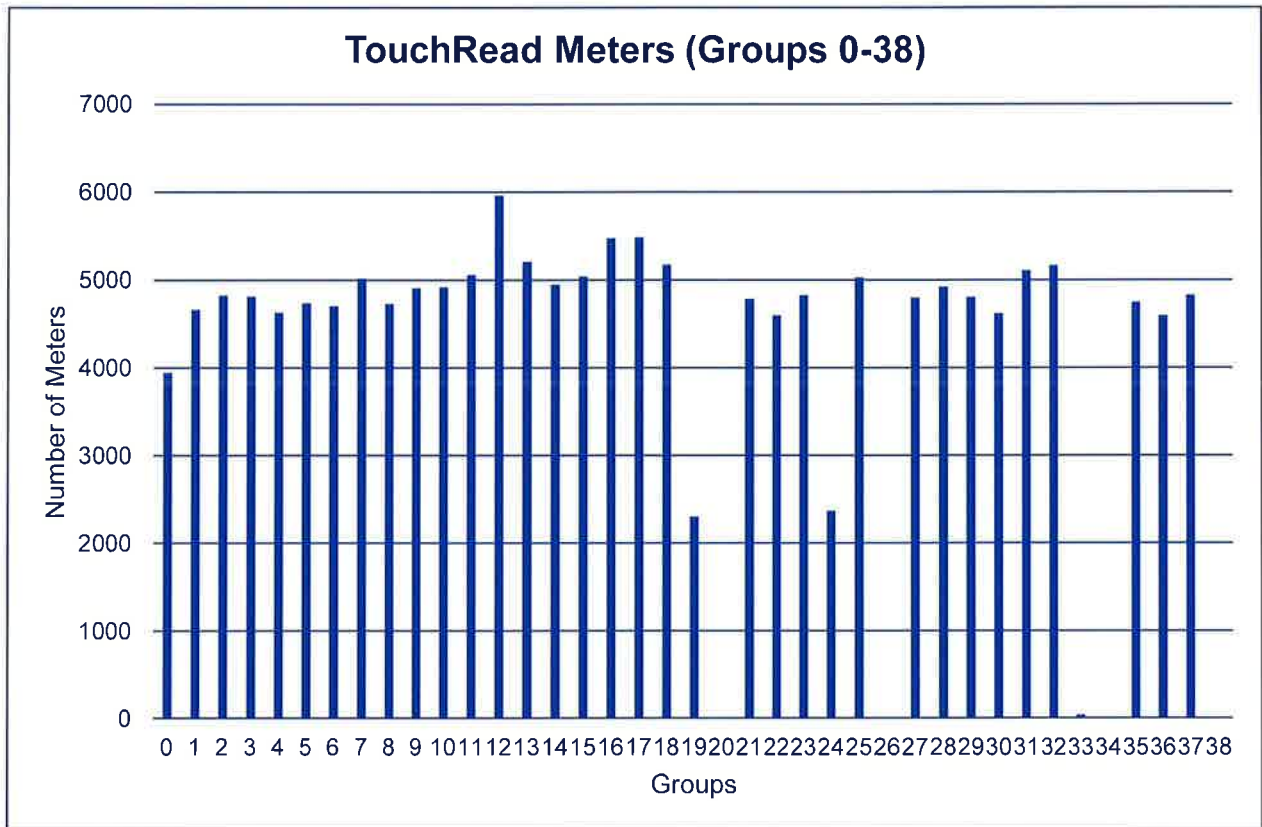
TouchRead Meters

There are 39 different groups of TouchRead meters, representing approximately 85% of the total meters in the County. These 39 groups of meters also include manual meter reads, representing approximately 5% of the County's meters. Many TouchRead meter groups have a disproportionate number of meters per group, with some groups having as little as zero TouchRead meters and other groups having up to approximately 5,900 TouchRead meters.

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

Exhibit 6.9 below shows the variability in the number of TouchRead meters contained within meter groups. Numbers on the x-axis indicate individual meter groups and the numbers on the y-axis indicate the number of meters that are assigned to the meter group.

Exhibit 6.9



As a result of the current group distribution there is a disproportionate share of workload among meter readers and the County has the opportunity to optimize the way TouchRead meters are assigned to groups to drive more consistency in the number of meters per group. This includes potentially adding TouchRead meters to routes 20, 26, 33, 34, and 38 that have less than 4000 TouchRead meters assigned. Optimizing meter groups will help standardize and balance the level of effort and time required for Meter Reader to perform their duties in the field.

FlexNet Meters

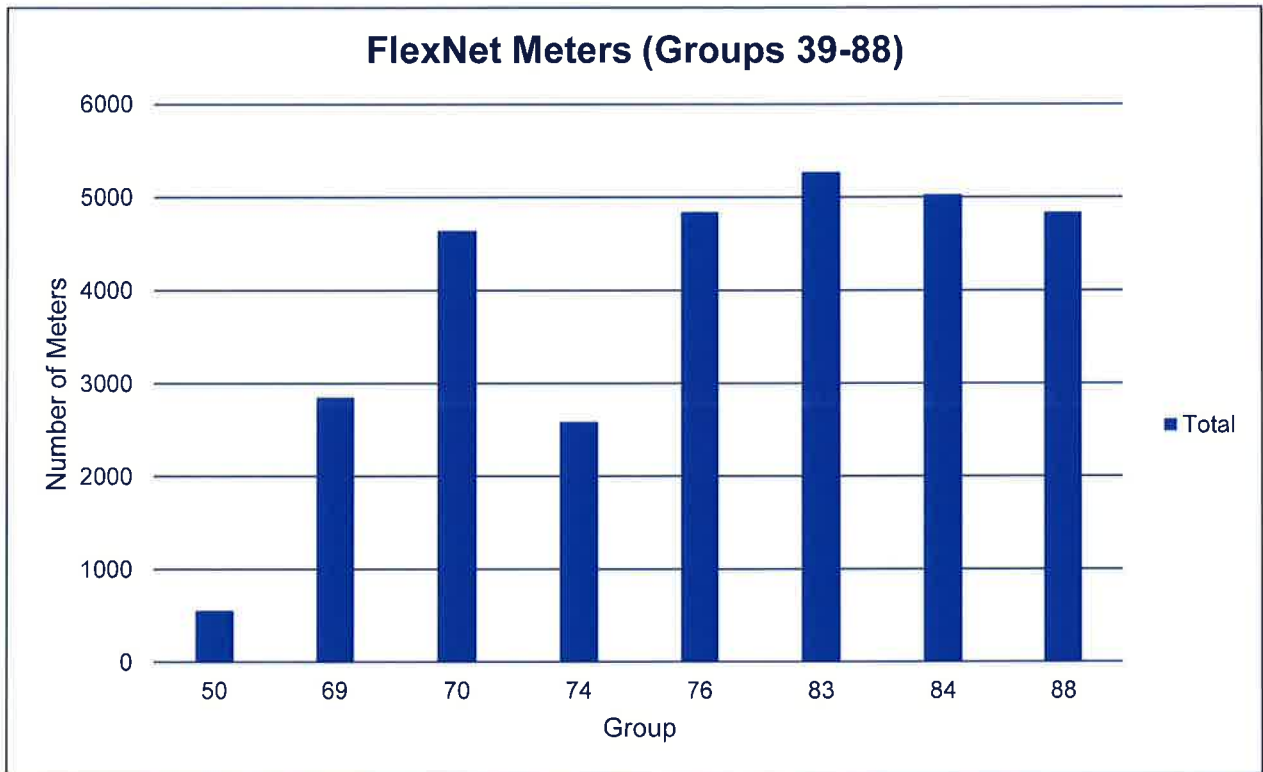
The County has 39 FlexNet meter groups in addition to the 39 TouchRead meter groups previously discussed. FlexNet meters make up 15% of the County's meters. Of the 39 FlexNet meter groups identified by the County, 31 meter groups have 21 or less FlexNet meters assigned to the meter group.

The disparity among the number of FlexNet meters assigned to the remaining eight FlexNet meter groups that have more than 21 FlexNet meters assigned ranges from 552 to 5,269 FlexNet meters.

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

Exhibit 6.10 below represents the eight groups of FlexNet meters with more than 21 FlexNet meters. The numbers on the x-axis indicate individual meter groups and the numbers on the y-axis indicate the number

Exhibit 6.10

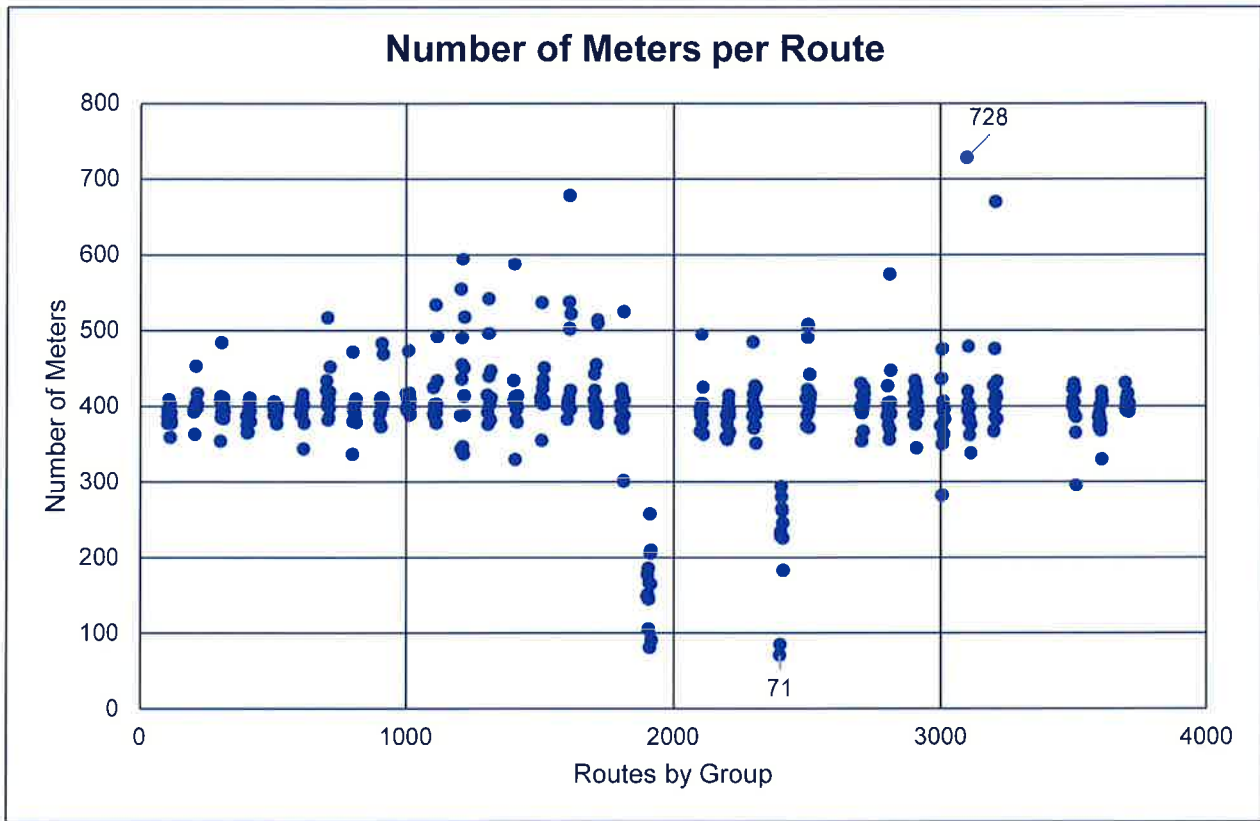


Each of the TouchRead and FlexNET meter groups, contain approximately 11-13 routes that are read by Meter Readers. Generally, two Meter Readers are assigned to each route within the meter group. Meter routes can contain approximately 100 – 700 meters per route, with most routes containing approximately 400 meters.

Exhibit 6.11 shows that number of meters per TouchRead route as represented by the blue dots that comprise the route group numbers along the x-axis. The blue dots representing the individual routes are clustered around the 400 mark of the y-axis.

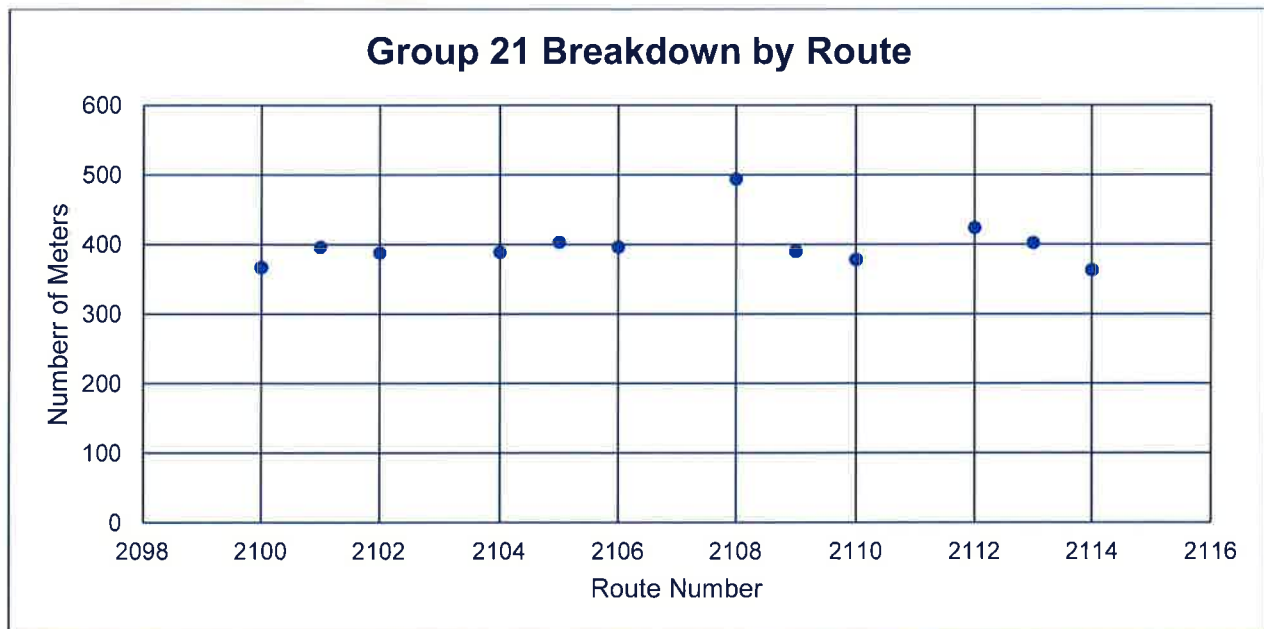
DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

Exhibit 6.11



As mentioned above, meter groups generally contain 11-13 routes. The blue dots in the exhibits below represent the 12 routes assigned to meter group 21 and the 11 routes assigned to meter group 24 respectively. The x-axis represents the route number and the y-axis represents the number of meters per route.

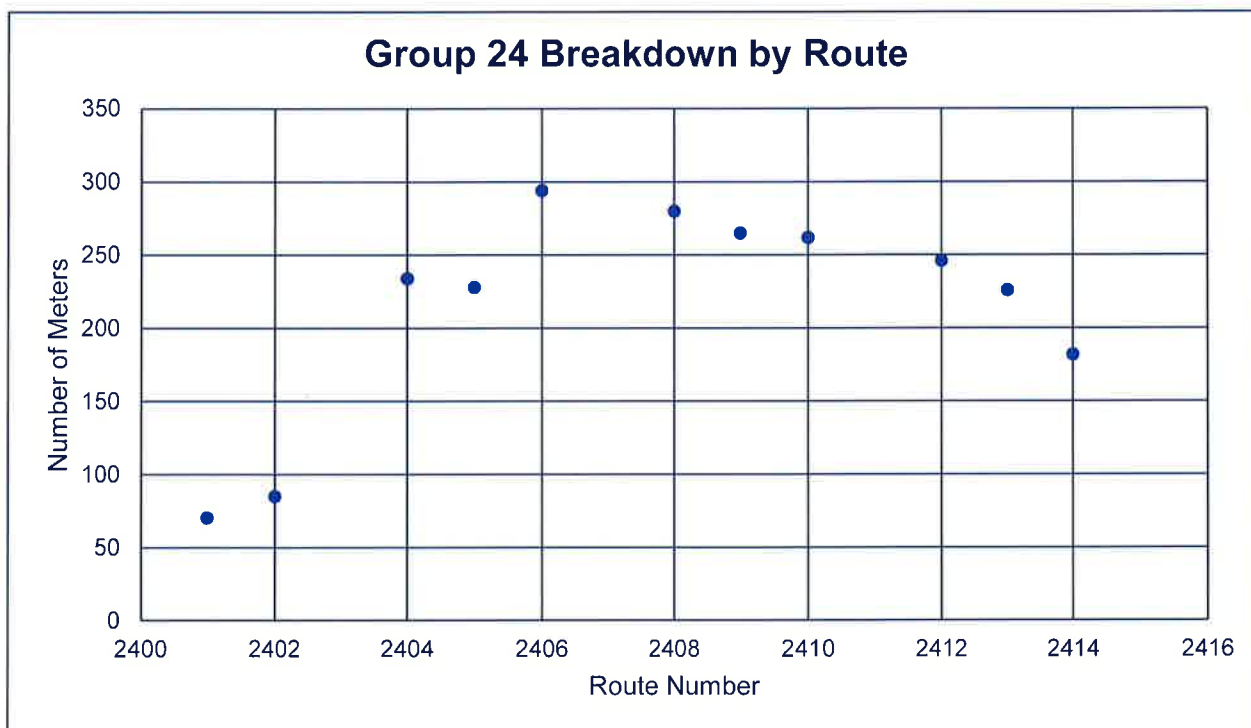
Exhibit 6.12



DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

Group 21 provides an example of routes that have a consistent volume of meters for Meter Readers to read, however there are multiple groups of meters that have an unequal distribution of routes. The graphic below displays group 24 and the unequal distribution of routes within the group.

Exhibit 6.13



Meter Readers assigned to routes 2406 and 2408 may read 2-3 times the number of meters in a day compared to their counterparts who are responsible for reading routes 2401 and 2402. The meter variation per route in group 24 spans from 70-300 meters. DWM has not recently assessed Group and route size and efficiency and may benefit from performing an assessment of the distribution of meters by group and route.

Meter Reading Technology

Meter Readers use the following equipment in the field:

- **Sensus Model 5501 HandHelds:** Device used to collect and store meter readings in the field. DWM uploads pre-programmed route information to the handheld to be distributed to each Meter Reader.
- **Sensus 4090 AutoGuns (TouchRead Wands):** Device used to obtain meter readings by TouchRead or manual read. The Sensus 4090 wirelessly transmits readings to the Sensus Model 5501 device.

DWM is not leveraging the most up-to-date technology and staff noted it was their biggest challenge on a daily basis. For example, DWM staff noted issues with devices holding a power charge, limited storage capacity and GPS capabilities. The Model 5501 was discontinued last year and DWM currently has 2 years remaining in their equipment maintenance program, which covers parts and labor on equipment that has failed to perform during normal usage. Before using the Model 5501, Meter Readers leveraged an older version of the handheld, the Model 5001. The Model 5001 was discontinued four years ago and is no longer repairable, however all Model 5001s were passed down to be used in Field Services. DWM should consider new technology that will support daily functionalities, provide technical assistance, and give DWM the greatest chance for success.

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

Further, in order for DWM staff to properly perform daily job responsibilities, devices must be fully charged and contain the pre-programmed route information in the handheld. The current devices being used by DWM have had problems holding a charge for an extended amount of time, in part due to the amount of usage the devices have seen over the past few years. If devices do not contain a full charge before being handed over to Meter Readers and Field Services personnel, staff are unable to perform daily tasks of reading meters and fulfilling work orders.

In addition to the issues with devices holding a charge, DWM identified areas for improvement associated with Sensus 4090 Touch Gun functionality. The current Touch Guns used by Meter Readers do not provide sufficient storage/memory to perform daily readings efficiently. If a Meter Reader reads one extra meter than the Touch Gun is able to store, all previous readings on the route will be erased and the Meter Reader will have to re-read each meter. Additional storage capacities would allow staff to perform readings at a more advanced level and increase work productivity.

Finally, the handheld devices used by DWM staff do not have the ability to pinpoint exact meter locations by GPS, leading to many staff entering a "Meter Not Found" code in the handheld and creating an exception. Allowing staff to pinpoint the exact location of a meter can help eliminate exceptions and future work orders that may be unnecessary.

Meter Read Quality Assurance (Sensus AutoRead)

Sensus AutoRead is the system used for interfacing between the FlexNet communication network, AMR and TouchRead system, and the CPAK billing system. The AutoRead system eliminates the need to manually transfer meter data. Instead, it uploads and prepares the meter data gathered from the Sensus handheld unit to be transferred to the CPAK billing system.

After reading a route, a supervisor reviews each handheld before downloading into the AutoRead system to determine if greater than 95% of reads on the route were completed and can be imported to CPAK. A DWM manager will assign a more experienced Meter Reader to return to the route the next day and obtain greater than the 95% completion if a Meter Reader does not meet the 95% goal. The handheld is docked and meter read data is uploaded into the AutoRead System and imported to the CPAK billing software after supervisor review.

AutoRead generates management reports that provide an overview of DWM's meter reading activities, staff activities and service issues. The management report information can help DWM gauge Meter Readers' progress and also provides useful statistics/metrics to help identify and reduce errors. Prior to importing data into CPAK, the County has an opportunity to leverage AutoRead management reports in multiple capacities to provide quality assurance, however DWM employees indicated that the primary AutoRead generated report being utilized by the County was the Master Route Report (defined below)

Master Route Report – The Master Route Report lists all events recorded during the reading of a route. It is sorted by read time, indicating each meter, address, register reading and status (such as Malfunction) and provides documentation regarding how the Meter Reader conducted the route. In short, the Master Route tells a story of how and why a Meter Reader performed their actions.

The Master Route Report can help identify malfunctions, notes, readings, work performed, and/or bad reads. The Master Route tells a story of the Meter Readers work day and a supervisor would be able to review the report and understand how staff are performing.

However, given that the Master Route Report is generated on an individual route basis and contains every meter read transaction, it is often detailed and cumbersome to use at a supervisory level to identify meter reading issues.

Key reports generated by AutoRead that the County is not currently utilizing include:

Route Statistical Summary –The Route Statistical Summary lists the success of the reading process and any deficiencies that occurred.

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

The Route Statistical Summary report displays total reads taken, total unread meters, average time between reads, number of manual reads, number of TouchReads, and number of notes/issues with meters. The Route Statistical Summary report shows the amount of time elapsed between meter readings, as well as the date and time that each reading occurred.

Register Malfunction Report – The Register Malfunction Report displays the locations where the meter register has failed to transmit all the reading dials to the handheld. A question mark symbol (?) identifies the dial that has failed to send a numerical digit. Continual dial failures from the register will occur once a register malfunction has happened due to loose wiring or worn down mechanisms in the meter.

The Register Malfunction Report identifies meters past their useful life. Increased utilization of the Register Malfunction report, would allow the County to identify problematic meters, issue a work order and prioritize a change out.

MXU worksheet - The MXU Worksheet provides a description of all activity on MXU's that are not working properly.

The MXU Worksheet provides the County the opportunity to deploy work orders to the MXU locations for investigation and repair before billing issues are created as a result of malfunctioning meters.

Route Exception – The Route Exception Report identifies meters that did not import into the handheld correctly. The report provides the reviewer the account number to allow the reviewer to investigate and determine what data is missing. Examples of missing data may include missing meter ID or other missing fields of data such as meter address.

The Route Exception Report displays all meters that did not import into the handheld and provides account number for review purposes.

Route Note – The Route Note Report lists the notes entered by the Meter Reader. A Route Note report can provide the County with information from the field regarding issues with particular meters.

The Route Note report provides rationale for why a meter could not be read on a given day. Route notes entered by Meter Readers can describe the issue and help identify the problem.

AMR ID/Meter ID Mismatch - The AMR ID/Meter ID Mismatch report lists meters for which the imported MXU number from CPAK differs from the actual MXU device ID in the field (the one from which the reading occurred.).

The Meter ID Mismatch Report, if used correctly, could ensure that all meters in the ground have correct ID numbers help mitigate future exceptions created by an incorrect ID.

Non-Read Exception - The Non-Read Exception Report lists all meters assigned to the route that did not receive readings.

The Non-Read Exception Report can inform a reviewer of all meters that were not read on a given day.

Non-Route Exception - The Non-Route Exception Report lists readings received from meters that were not assigned to the route. This may occur when a meter has been installed, but a new customer account has not yet been established, or if a meter ID was entered improperly into the billing system.

Regularly monitored Non-Route Exception reports could help ensure all meters are in the ground with the meter numbering aligning to the customer information in CPAK.

By relying solely on the Master Route Report generated by AutoRead, DWM is not leveraging the capabilities of other existing AutoRead reports to help identify and mitigate mistakes or errors. In the past, DWM had an employee tasked with reviewing AutoRead reports to identify and solve issues. The

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

DWM employee reviewing AutoRead reports was moved to a different part of the organization with a different role as DWM determined Billing Specialists were able perform their own analysis to identify metering issues that contribute to billing inaccuracies. However, Billing Specialists are not using AutoRead reports nor are they consistently analyzing meter readings to identify meter reading mistakes and errors leading to high and inaccurate water bills.

Data Utilization and Quality

Meter data quality is a critical success factor for achieving the County's overarching goal of providing timely and accurate water billing. Obtaining accurate data available through meter reading must be established as a priority with adequate systems, staffing, procedures and accountability. Meter Reading and Field Services personnel have access to a range of AutoRead reports, however staff are not fully utilizing these reports to help perform analysis on meter conditions and services. .

DWM and UCO job responsibilities require staff to have the ability to determine, calculate, tabulate, or summarize data while also requiring the exercise of some personal judgment. Staff are not leveraging AutoRead reports to assist in performing in-depth analysis on customer exceptions in CPAK leading to the same exceptions being created on a monthly/bi-monthly basis and significantly contributing to the County's reactive strategy regarding billing exceptions.

The reactive nature of exception processing is also due in part to DWM supervisors not effectively working together to identify, prioritize, and fix meter issues in the field. DWM is not currently prioritizing meter issues using future business requirements but rather working to fulfill DWM's daily roles and responsibilities. DWM staff indicated that the Department does not have a strategy for consistently identifying the potential root causes of meter issues in the field despite the increasing number of exceptions. The number of billing exceptions created may be reduced if DWM supervisors analyzed available reports to identify meter issues and actively prioritize and fix meter issues encountered in the field.

Translating Meter Readings to Billings

Data quality and integrity is also highly dependent upon effectively managing and controlling input variables and processes to reduce errors. The process of translating meter readings to customer bills can create errors in billings for a variety of reasons including the number of register digits entered, the multiplier used, or issues with the meter ID being incorrectly entered into CPAK.

Residential meters require staff to enter between 4-7 digits and leverage two different multipliers (1 gallon and 100 gallon multiplier). The meters must be initially entered accurately in inventory with the correct register type, digits and multiplier to be read and processed correctly by the CPAK billing software. If the meter ID is not correctly assigned to a meter in the field, exceptions may be created due to the number of digits read or the multiplier used. The issue will continue generating an exception until the Meter ID is correct in the system.

Exhibit 6.14 displays the types of residential meters, the number of register digits to be read, and the multiplier associated with each type of meter (making up 181,000 of the County's total 192,000 meters). If DWM or UCO misinterprets the multiplier or number of register digits, an exception is created in CPAK and a customer could be billed inaccurately.

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

Exhibit 6.14
Number of ¾" Meter with Register Digits and Multiplier

Register Digits	AMR Touch	AMI Flexnet	Manual	Total	Multiplier
4	50,101	52	983	51,136	100
5	88,588	355	517	89,460	100
6	1,996	38	7,387	9,421	100
7	1,887	29,121		31,008	1

Currently, Meter Readers & Supervisors are not being held accountable for entering poor manual data. If a manual read is misinterpreted and entered incorrectly into the handheld, an exception is created in CPAK. As handhelds are not linked to Meter Readers by name, it is difficult holding Meter Readers accountable. Once the data is transferred to CPAK, a high/low exception will be created and a Billing Specialist will work the exception. If a Meter Reader misinterprets the number of digits each time he/she goes out to read the meter, the same exception will be created each time. DWM should consider linking a Meter Reader with a specific handhelds to help hold the Meter Reader accountable for mistakes and errors.

Issues with Inventory

The County's meter supplier, Kendall Supply, sends an inventory file to DWM as well as the system administrator for CPAK when meters are ordered and delivered to the warehouse. The DWM employee will update the inventory in CPAK. See Exhibit 6.15 below for the CPAK inventory process flow.

Exhibit 6.15



Under the current process, there are instances when meters input into the CPAK system by DWM employee does not match the information on original inventory file (inventory list either lost, forgot to be entered, or there was a time gap for entering information into the system) leading to meter mismatches in the field. A meter mismatch occurs when CPAK contains a different Meter ID than the Meter ID stored in the Meter Reader's handheld.

Meter mismatches lead to problems in both DWM and the UCO. DWM has the ability to run a Meter Mismatch Report that displays meters for which the imported Meter ID number from Billing differs from the actual Meter ID in the field but is not utilizing the Meter Mismatch Report. DWM could eliminate unnecessary exceptions related to meter mismatches if DWM used the Meter Mismatch Report regularly.

Key Issues and Recommendations

This section presents key issues and recommendations related to Meter Reading processes, staffing and technology.

Key Issue 6.1: Aging Meters

Approximately 33% of residential meters are over 15 years old and nearly past their useful life. The County does not currently have a clear replacement plan. The County began in 1993 with the installation of the TouchRead meters in order to decrease the opportunity for human error during meter reading. The implementation of TouchRead increased billing accuracy and reduced meter reading expenses, however many of these meters are still in the ground today and have been in place past their useful life. Meters that have been in the ground for more than 20 years run the risk of delivering faulty or incorrect water usage data, and inaccurate bills.

Recommendation 6.1

The County should replace manually read and other older meters based on their age (more than 30% of meters in the ground are 2001 or older). DeKalb County should prioritize replacing older manually read meters in addition to routine meter changeouts for meter failure. Planning and management of the overall meter changeout program should integrate replacement of older manual meters and ensure accurate meter data is recorded and provided in electronic form for CPAK updates.

Key Issue 6.2: Lack of Route Optimization

DWM has not recently reviewed and appropriately redistributed the number of meters assigned per routes, creating inconsistent meter reading workloads. Over the past 3 years, approximately 3,000 new metered accounts have been added to the system and assigned to routes based on proximity. This 'ad hoc' growth in meters per route does not consider specific workloads per route or a balancing of meters and types read by route and group. This results in routes that contain zero to ten meters and some that contain over 5,000 meters.

Recommendation 6.2

The County should review and appropriately redistribute the number of meters assigned per routes to ensure routes are being read in the most efficient and effective manner. DWM can benefit from performing an assessment of the distribution of meters by group/route considering factors such as the type of meters, route characteristics, read times, and travel distances. Each Group should contain roughly the same amount of meters. In addition to group optimization, the route should be revamped to ensure equal distribution. An unequal distribution can create an unequal workload for Meter Readers.

Key Issue 6.3: Minimal Use of AutoRead System Reports

DWM does not leverage the existing AutoRead reports to proactively mitigate mistakes on the front end. In the past, DWM had an employee in charge of looking through AutoRead reports to identify and help resolve issues and Billing Specialists performed their own analysis. However, the DWM employee working through AutoRead reports was moved to a different part of the organization as DWM determined Billing Specialists were able perform their own analysis, though this occurs on a limited basis.

Recommendation 6.3

The County should leverage existing AutoRead System Reports to control errors and omissions prior to CPAK upload. The County is not currently leveraging existing reports for individual routes. Outside of the Master Route Report, there is little utilization of AutoRead exception reports, such as Non-Read Exception Report, Route Exception Report or Register Malfunction Report, to actively identify meter

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

reading issues before they develop into billing issues. DWM should leverage a full-time employee to help analyze these AutoRead reports and proactively resolve potential billing issues.

Key Issue 6.4: AMI/AMR Technology Capability

DWM has the ability to read meters from a group of single antennas across the County, eliminating the need for physical meter reading. However, the County has not fully deployed AMI/AMR technology.

From 2012 to 2016 over 30,000 FlexNet meters were installed. Additionally, the County decided to move forward with converting to 1 gallon for billing (instead of 100 gallon) for all FlexNet routes. This applied to the current installed FlexNet, new FlexNet installation and retrofit (MXU installation) routes. The infrastructure for FlexNet fixed based system has the ability to provide coverage for over 98% of the County, however that coverage has not yet been achieved.

Recommendation 6.4

The County should expand AMI/AMR technology capability system-wide to eliminate time-intensive manual processes, reduce meter reading errors, and identify leaks timely. With an AMI system, the distribution network can be continuously monitored by hourly interval reads. Recent advancements in meter data management have allowed a water utility to find evidence of leaks before they hit the surface. With automated meters, the County will have the opportunity to detect problems earlier and thus intervene to help customers only pay for what they actually use while at the same time reducing the need for physical meter reading.

Key Issue 6.5: Frequent Malfunction with Handheld Technology

DWM staff noted malfunction or other issues with handheld technology as their biggest challenge on a daily basis. DWM noted issues with devices holding a power charge, limited storage capacity and GPS capabilities. With such a high reliance on technology, it is imperative for DWM to have devices and systems that are functioning to the highest level and ensuring consistency in their work.

Recommendation 6.5

The County should ensure equipment is in serviceable condition before being deployed to the field and develop a program with parameters regarding replacing equipment that is nearing the end of its useful life. DWM should upgrade/replace outdated equipment to help eliminate errors caused by non-functioning technology. The meter reading function relies heavily on technology to perform job responsibilities on a daily basis and current technology has led to inefficiencies in the Meter Reading and Field Services daily job responsibilities.

Key Issue 6.6: Inconsistent Ability to Effectively Read Meters

UCO and DWM staff are not routinely trained on performing manual reads and there is no staff accountability associated with an incorrect reading. As discussed, Manual and TouchRead meters look different in the field, use different combinations of digits, and also leverage several different multipliers. Meter Readers may have a difficult time identifying the number of digits to read on a meter in the field and will enter the incorrect consumption, leading to a high/low exception in CPAK.

Recommendation 6.6

The County should develop and provide Meter Readers with a quick reference card for manual meter reads. A large number of manual readings still occur from older manual meters and TouchRead meters that do not transmit. Developing quick reference cards for all meter types in the field will help ensure Meter Readers have a "single source of truth" regarding the varying types of meters and the number of digits to be read. DWM should also ensure Meter Readers are consistently following policies and procedures and leverage existing technology to supplement decisions in the field. Accurate meter reading processes can help ensure accurate customer bills and consistency throughout the billing lifecycle.

7. Billing



Water meter billing is a critical part of the County's overall management and oversight of the effective delivery of water to its citizens. Sound billing processes enable effective revenue realization, management and a positive customer service experiences. The Billing Unit is a part of UCO and one of three units that are addressing the County's billing issues. The two additional units addressing the County's billing issues are the: Issue Resolution Unit created to interface with customers over disputed and held bills and the New Day/Triage Unit created to oversee, resolve and release Held bills

The Billing Unit has 14 staff including a Supervisor, three Billing Analysts and 10 Billing Specialists (no vacancies). Issue Resolution has six customer care positions to focus on disputed bills. The New Day/Triage Unit consists of mostly Billing Analysts and Specialists but currently has only six filled positions and 15 vacant positions.

This section presents the following topics:

- Billing Processes
- Billing Data and exceptions
- Billing Technology

These topics include discussion of current and historical work flows, procedures, data outputs/analysis, staffing levels and information systems associated with Billing processes as related to meter reading and field services.

Billing Processes

The billing process, managed by the UCO, is highly reliant on staffing, procedures, technology and data inputs from various groups within DWM, Department of Innovation and Technology (IT) and several outside vendors. Due to the numerous differing stakeholders involved, all processes impacting billing and data quality, must be tightly coordinated among the multiple groups to produce accurate customer bills. The coordination includes not only meter reading but work by Field Services, new services installed by contractors, and purchasing/inventory of meters.

UCO primarily uses the technology system CPAK to execute core daily billing processes. The CPAK billing system serves as the core system and data repository for customer, meter reading and billing information. The system also provides a framework for employee work processes used in customer service, bill calculation and payment processing. CPAK is a client server system hosted and managed by IT and supported by an outside software vendor.

The following components of the Billing Process is discussed below:

- Routine Billing
- Timeline of Routine Billing and Billing Exception Processing
- Large Scale Exceptions – Held Bills
- Billing Data and Exceptions
- Pending Exceptions

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Routine Billing

The routine billing process begins after the daily upload of meter reading data from the AutoRead system. CPAK processes the meter data, calculates bills, filters billing exceptions and releases the bills with no exceptions to the Bill Print/Mail Vendor. UCO has designated a 5 day target after meter reading for the Vendor to mail bills that have no exceptions and a total of 11 days for customers to receive mailed bills after processing exceptions and any related field work.

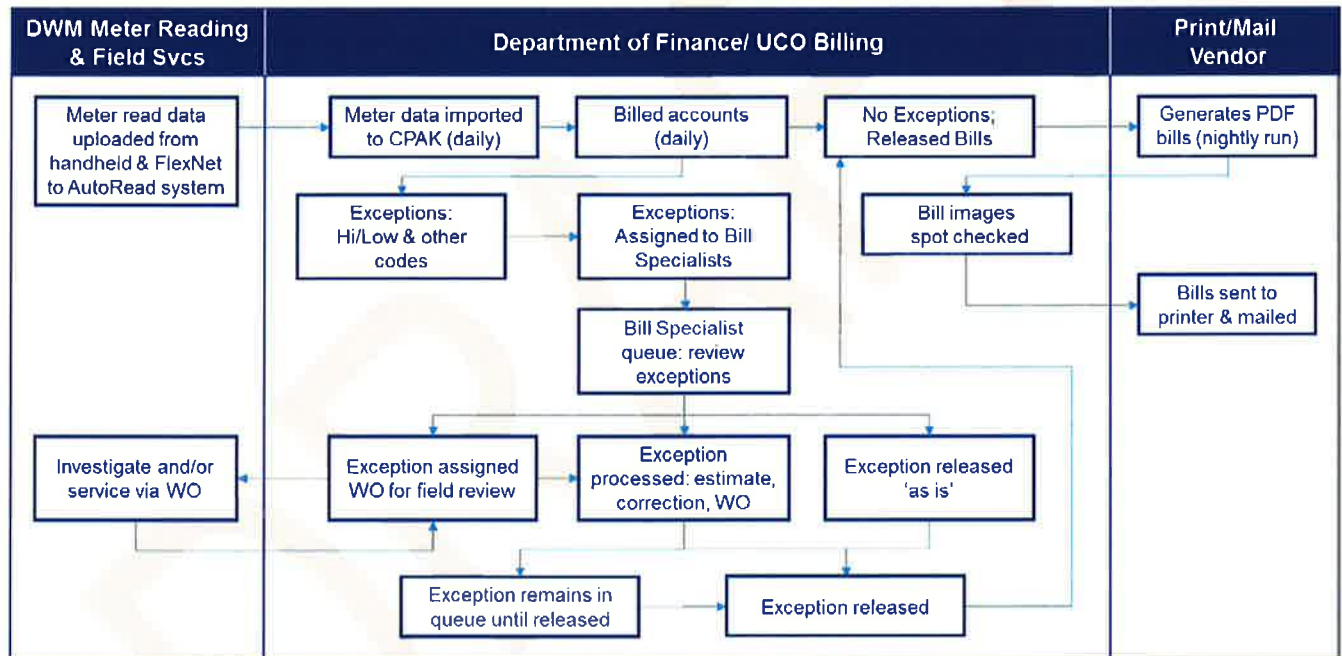
This routine process (see Exhibit 7.1) can be divided into two (2) areas:

- Bill Print/Mail for 'released' bills (with Vendor)
- Exception Processing by UCO Billing Specialists

Within both processes, quality control steps have been developed to help identify and address billing issues:

- Bill images from the Bill Print/Mail Vendor are spot checked by UCO prior to mailing and
- Exceptions are assigned to Billing Specialists for review and resolution

Exhibit 7.1



Bill Print/Mail for 'released' bills (with Vendor)

UCO's Print/Mail Vendor is responsible for generating bills from CPAK and mailing them to the customers. The following steps are taken after the 'released' bills are forwarded to the Vendor:

- Data file is submitted daily by UCO through CPAK to the Vendor (typically on day 3 after reading)
- Vendor generates image files of bills and forwards back to UCO
- UCO conducts spot reviews of bills and approves through the Vendor portal
 - Bill issues are flagged, reviewed and re-billed (or assigned as an exception)
 - Re-bills are submitted back to Vendor
- Approved bills are mailed to customers

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Exception Processing by UCO Billing Specialists

Billing exceptions are generated via either AMI/AMR AutoRead system when meters are read by Meter Readers or by CPAK after meter reading data is uploaded and processed by the CPAK system based on pre-determined billing system exception settings. As shown in Exhibit 7.2, these exceptions, not sent to the Print/Mail Vendor, are assigned by the Billing Supervisor to individual Billing Specialists. Meter read exceptions may also be assigned to Field Service staff (e.g., repair or servicing of meters) as well as processed by the Billing unit (e.g., estimate the bill if no reading).

There are a large number of exception codes within the CPAK system for meter reading and billing functions (77), however, only 12 are used routinely. The following are a sample of key exception codes that frequently flag readings for review (in order of frequency):

Exhibit 7.2

Top Exceptions Generated by AutoRead	Top Exceptions Generated by CPAK
1 Meter Not Found	1 Reading Higher Or Lower Than Previous Reading
2 Covered By Landscape	2 No Reading Returned
3 Covered By Trash	3 Import Error
4 Covered By Water	4 Other Reading Pending
5 Cut Bushes	5 Current Less Than Previous
6 Replace Service (Needs To Be TouchRead)	6 No Previous Reading

Once assigned to a queue, the Billing Specialist reviews individual records within CPAK's reading table to obtain an understanding of the customer's history in relation to the current exception. After review, the Billing Specialist has the following options in processing the exception:

- Release for invoicing the reading as-is
- Prepare a an estimated reading and release it to invoice
- Issue a work order to Field Services to help resolve the issue (e.g., re-read, check meter, check for leaks, replace the meter)
- Prepare a corrected reading based on an additional reading from the field or other actual readings in customer's history

Billing Specialists will continue to manually check and review the exception queue and reading history for work orders completed with new/updated information. Each Billing Specialist may refresh the queue at different intervals leading to inconsistent dissemination of exception and work order status. There is not a flag or feature showing records with updated work order data and the history of individual exceptions must be reviewed manually. As a result, the Billing Specialist uses a spreadsheet to track accounts where work order data is pending.

The CPAK system is equipped with the "CSR Audit" functionality that would allow UCO Customer Service Representatives (CSRs) and Billing Specialists to assign customer accounts to CSRs to follow-up on work outstanding or past due. However, the County has not used the CSR Audit functionality consistently and is currently exploring the option of utilizing the capability. The County could not provide a timeframe or rationale for not requiring that billing personnel consistently use utilizing the CSR Audit function. Items such as work order status and exception history would be available if the CSR Audit function was fully utilized on a daily basis.

Understanding and resolving an exception requires the Billing Specialist to assess several conditions affecting the meter readings (see Exhibit 7.3 below), including identifying consistencies/inconsistencies and using personal judgment to choose whether to make computations to correct or estimate the reading.

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Each exception may have unique conditions that contributed to the exception. The customer's account data history will reflect changes in circumstances that may confirm the exception's cause and assist the Billing Specialist in resolving the exception.

Exhibit 7.3

Typical Conditions Affecting Readings

— New customer	— No reading
— Meter changeout	— Meter register rollover
— High/low reading	— Work order pending
— Automated or manual reading	— Work order completed
— Seasonal conditions	

A relatively high level of experience, skill and training is required of Billing Specialists to efficiently and effectively evaluate, process and release billing exceptions under a range of unique conditions and data. The Billing Specialist must also be proficient in using various features within the CPAK system. The system is viewed by several experienced users as complex and difficult to intuitively accomplish billing tasks. There are a large number of codes and configurations for exceptions, audit and work orders that have accumulated during the County's many years of utilizing CPAK – making it more complicated to manage work flows and produce useful for reporting tools.

Individual judgment of multiple conditions and several manual calculations are generally used to resolve a bill exception as seen during interviews with Billing Specialists and demonstrations of actual bill corrections. There is flexibility on the part of the Billing Specialist on how to conduct the estimate or calculation based on given conditions. The UCO has several Microsoft Excel templates including one for making corrections but this template is not consistently used by all Billing Specialists.

When a billing exception is flagged, the Billing Specialist will perform the following steps in determining the customer's estimated water usage for a billing cycle:

- 1) Identify the last 2 accurate or reliable meter readings based on customer's water consumption history
- 2) Determine the time periods between the 2 readings
- 3) Calculate the consumption between the 2 readings using the meter multiplier
- 4) Calculate the number of billing cycles between the time periods
- 5) Divide the consumption by number of cycles to determine the cycle consumption
- 6) Apply the consumption and revised/estimated new reading

Billing Specialists routinely issue work orders for Field Services to obtain additional or more accurate data via automated reads (if available for the meter type) for billing. Billing exceptions remain in the exception queue while work orders are deployed to Field Services and the Billing Specialist awaits updated meter readings. The Billing Specialist must continue manually monitoring the exceptions queue for the updated meter reading necessary for the Billing Specialist to resolve the exception. The Billing Specialist is not automatically notified once the work order is complete and the updated meter reading is available for the Billing Specialist to review. The Billing Specialist can generally resolve the exception once the new meter reading is returned from the field. It is not common for the Billing Specialist to issue another work order before resolving the billing exception.

Manual meter readings generate more exceptions than automated readings as manual readings have been shown to be less accurate in that they require manual data entry by a Meter Reader on handheld keypads that can be prone to human error. Work orders are often issued by the Billing Specialist if recent actual reading history is not available (or previous exceptions were estimated or corrected). Billing Specialists also indicated readings being updated by Field Services through work orders are often manual readings as well.

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Billing Specialists indicated that if a meter read for an exception appears reasonable compared to history, based on individual judgment, they will release it "as is". A large portion of historical High/Low bills with automated reads have been released as such, shown in the data analysis that follows, whereas most High/Low exceptions released with estimates or corrections are manual reads.

Billing Specialists have estimated or corrected significantly more customer readings in 2016 than in 2015 as will be further discussed in the Billing Data and Exceptions portion of this section, including a batch of 10,100 bills in August 2016 that were auto-estimated. UCO elected to calculate and release estimated bills in a batch due to a backlog in billing exceptions that accumulated over prior months. These estimates were calculated primarily based on usage from the same time last year and, in some cases, were released based on latest reading either imported from a Meter Reader's handheld and into CPAK or adjusted by a Billing Specialist. Estimated bills based on imported and adjusted readings would generally require more recent meter readings than estimates based on consumption at the same time last year. The batch processes contributed to the increase in number of High/Low exceptions created in 2016 (see following data analysis).

Further, exception generation and queues have increased over the last several months with an average of almost 600 per queue for each Billing Specialist. This is reflective in the data analysis showing increases in pending exceptions presented later in this section. Billing Specialists have indicated there is substantial stress and pressure placed on this position due to the volume and complexity of exceptions.

CPAK has an auto-estimate feature that calculates consumption for individual customers based on the last 12 cycles omitting the lowest and highest readings. This feature is not currently being used due to the frequency of inaccurate data over the last several years. If there is no historical reading for a new customer, an initial bill may be based on EPA consumption estimate of 100 gal/capita/day.

Timeline of Routine Billing and Billing Exception Processing.

Exhibit 7.4 below summarizes the County's timeline for processing routine customer bills and billing exceptions that require additional touchpoints by Billing Specialists and Field Service staff. The following table shows how customers whose accounts are flagged with billing exceptions receive their bills later than those customers whose bills are the product of the routine billing process. Additionally, if resolving exceptions takes a longer amount of time beyond the window defined below, the timeline for a customer receiving their bill is even longer than the table below depicts. Customers have limited insight into whether their meter reading caused billing exceptions that may cause delays in the customer receiving their bill if the exception is not routinely resolved. As such, customers who are accustomed to receiving their water bill at a specific time of the month may be concerned that they have service issues if they do not receive their bill at the same time each cycle. Customer concern and dissatisfaction may increase when bills are not issued and received on the County's 11 day schedule or held for extended period of time.

The table below displays three scenarios for the timing of a customer receiving their bill:

- 1). Routine Billing (no exceptions) – activities occurring on days one through five with a customer receiving their bill on average on day 11. Highlighted in green below.
- 2). Print/Mail Vendor Exception – activities occurring on days one through seven with customers receiving their bill on average on day 13. Highlighted in yellow below.
- 3). Billing Exceptions – activities occurring on days one through ten with customers receiving their bills on average on day 16. Highlighted in red below.

DeKalb County Water Metering and Billing Audit Report
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Exhibit 7.4

Timing	General Steps	Routine Billing	Billing Exceptions
Day 1 Routine Billing (No Exceptions) Print/Mail Vendor Exception Billing Exceptions	— Meter Readers enter the field with pre-populated routes that include the customer addresses, stop sequences and associated meters to be read that day — Meter reading takes place and meter data is uploaded to Sensus AutoRead system database via handhelds at the end of the day		
Day 2 Routine Billing (No Exceptions) Print/Mail Vendor Exception Billing Exceptions	— Meter reading data is imported by the CPAK billing system — The AutoRead data may include some exceptions (as determined by the Meter Reader) with the imported meter data — In processing the data, CPAK flags customer accounts with billing exceptions such as High/Low or No Read based on the meter read data	— If the meter read does not trigger an exception, billing information is released for invoicing and sent to the County's print vendor for bill generation	— If a meter read exception is flagged by the CPAK billing software, the reading exception is passed to the UCO Billing Unit to review and resolve the exception
Day 3 Routine Billing (No Exceptions) Print/Mail Vendor Exception Billing Exceptions		— Printer finalizes a draft of the customer bill via an image file and sends the file back to UCO billing for approval. — The UCO reviews the proposed bills to identify any problems or issues with the proposed bill's appearance, including how the water charges are displayed and the general formatting of the bill. — Files that have issues after UCO review need to be reprocessed in CPAK.	— If the Billing Specialist cannot resolve the exception, they will issue a work order in CPAK for DMW Field Services to investigate and resolve the issue – ex: meter re-read. — Field Services has three days to perform the work order and update information in CPAK to show that work order has been completed.

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Timing	General Steps	Routine Billing	Billing Exceptions
Day 4 Routine Billing (No Exceptions) Print/Mail Vendor Exception Billing Exceptions		— The UCO approves customer bill files that did not have issues during UCO review and clears them for printing — Print vendor prints final bills — Customer bills flagged as having issues after UCO review on Day 3 are re-generated by CPAK and sent to the print vendor	— Days 4 -6 are used by Field Services to be deployed to the field to address the work order associated on the account with the exception — The Field Service representatives perform their services and must update CPAK to show that the work order is complete
Day 5 Routine Billing (No Exceptions) Print/Mail Vendor Exception Billing Exceptions		— Bills that did not have issues during UCO review are mailed to customers by print vendor. — The customer receives the bill on average about 6 days later — Customer bills flagged as having issues during UCO review on Day 3 are again finalized as a draft by the print vendor for a second time and sent back to UCO billing for approval	SAME AS DAY 4 — Opportunity for Field Services to be deployed to the field to address the work order associated on the account with the exception — The Field Service representatives perform their services and must update CPAK to show that the work order has been completed

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Timing	General Steps	Routine Billing	Billing Exceptions
Day 6 Routine Billing (No Exceptions) Print/Mail Vendor Exception Billing Exceptions		— Customer bills flagged as having issues after UCO review on Day 3 are approved by the UCO, cleared for printing by the UCO and printed by the print vendor	— Day 6 is the drop dead date for work orders associated with billing exceptions to be completed, updated in CPAK by Field Services and returned to the UCO as completed — Once the work order is completed, the Billing Specialist must update the customer account with information that helps resolves the previously triggered exception — Once completed, the customer's billing data may be released by the UCO for billing
Day 7 Routine Billing (No Exceptions) Print/Mail Vendor Exception Billing Exceptions		— Customer bills flagged as having issues during UCO review on Day 3 are mailed to customers by print vendor and received on average about 6 days later	— Billing information is populated in CPAK and sent to the County's print vendor for bill generation
Day 8 Routine Billing (No Exceptions) Print/Mail Vendor Exception Billing Exceptions			— Printer finalizes a draft of the customer bill via an image file and sends the file back to UCO billing for approval

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Timing	General Steps	Routine Billing	Billing Exceptions
Day 9 Routine Billing (No Exceptions) Print/Mail Vendor Exception Billing Exceptions			— The UCO reviews the proposed bills to identify any problems or issues with the proposed bill's appearance, including how the water charges are displayed and the general formatting of the bill. — The UCO approves customer bill files and clears them for printing — Print vendor prints final bills
Day 10 Routine Billing (No Exceptions) Print/Mail Vendor Exception Billing Exceptions			— Bills mailed to customers by print vendor. The customer receives the bill on average about 6 days later from this day (approximately 16 days since the meter reading)
Day 11 Routine Billing (No Exceptions) Print/Mail Vendor Exception Billing Exceptions		— Customer receives bill in the mail for non-exception billing	
Day 12 Print/Mail Vendor Exception Billing Exceptions			

DeKalb County Water Metering and Billing Audit Report
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Timing	General Steps	Routine Billing	Billing Exceptions
Day 13 Print/Mail Vendor Exception Billing Exceptions		— Customer receives bill in the mail for Print/Mail error if UCO identified any problems or issues with the proposed bill	
Day 14 Billing Exceptions			
Day 15 Billing Exceptions			
Day 16 Billing Exceptions			— Customer receives bill in the mail for exception billing

As the discussion and table above summarize customers whose bills have exceptions may receive their mailed bill up to 5 days after a customer would receive a routine bill.

Large Scale Exceptions - Held Bills

The County decided in September 2016 to withhold bills for 37,000 customer accounts due to abnormally high bills generated over the past year. These Held Bills consisted of statements from September 1 to December 31, 2016. In April 2017, the County released 7,800 accounts in April for statements in January and February 2017. Account records for customers with Held Bills are being evaluated separately from the routine exception process by a Triage team with field verifications and meter re-reads. Field verifications and meter re-reads require Field Service staff to physically visit the location of the meter that prompted the exceptions and Held Bills, making the process highly manual and labor intensive. As most of these accounts have not been released at this time, exceptions related to the Held Bills continue to remain pending until evaluated, processed and released.

Billing Data and Exceptions

Bills that meet certain exceptions are not invoiced or mailed to customers, but reviewed by Billing Specialists within UCO before being released and invoiced. Billing Specialists can process and release the bill in one of three ways:

- As is (if readings appear consistent with history)
- Estimated (generally based on prior year actual bill or average of last 12 cycles omitting highest/lowest readings)
- Corrected or revised based on updated readings from the field or other actual readings

Exceptions that are estimated or corrected represent more skill-based and time intensive transactions for Billing Specialists as they require independent individual judgment of Billing Specialists and often require updated meter readings from work orders.

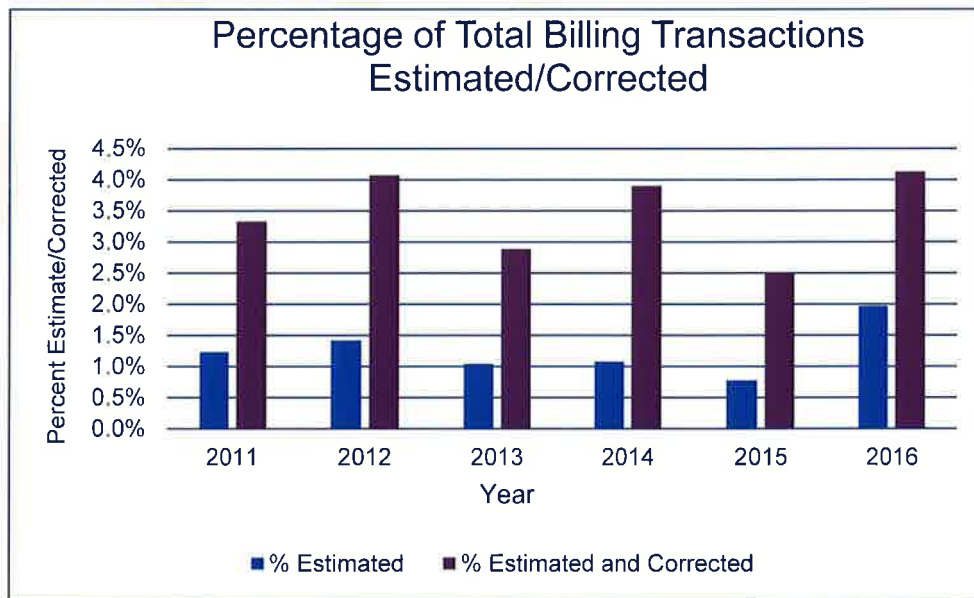
The following pages detail exceptions by type and causes and cover the following areas:

- Exception Volume and Frequency
- Estimated Bills
- Pending Exceptions

Exception Volume and Frequency

Exhibit 7.5 shows the historical percentage of billing transactions either estimated or corrected by Billing Specialists. The County currently bills over 192,000 accounts, mostly on a bi-monthly basis. The percentage of bills estimated or corrected ranged from 2.5% in 2015 to 4.1% in 2016. A recent billing audit with the City of Atlanta (May 2013) cited estimated and forced readings at 1% of bills (down from 10% in 2009). The City converted 99% of its meter to automated meter technology by 2012 which contributed significantly to this improvement. The Dallas Water Utilities also conducted a water billing audit (August 2015) which cited estimated and forced readings at 3.8% of bills.

Exhibit 7.5



The most frequent exception types include:

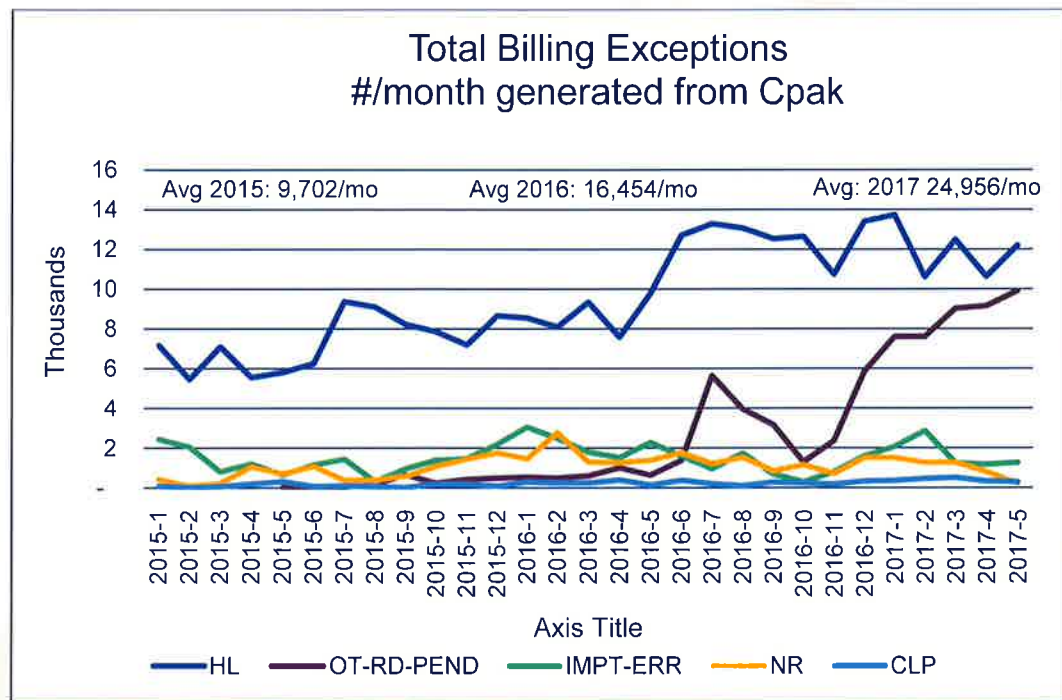
- Reading Higher or Lower Than Previous Reading (i.e., reading is more than 300% of prior)
- Other Read Pending (i.e., waiting on work order reading)

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- No Reading Returned (i.e., meter not read)
- Import Error (i.e., CPAK import error from bad code or data from handheld)
- Current Reading Less than Previous (i.e., imported reading less than prior reading; negative consumption)

Exhibit 7.6 below shows the total and average monthly exceptions generated from CPAK since 2015 (2017 is based on January -May data). In the last six months, the average exception rate per month has increased significantly from 2015. High/Low exceptions have been the highest type in the past, and as shown, in mid-2015, High/Low exceptions increased after the indicator was reduced from 500% to 300%. The large increase in Other Reads Pending exceptions is reflective of UCO's efforts to obtain additional meter read data to investigate Held and Disputed Bills, as well as a more proactive approach to addressing routine meter reading issues (e.g., more work orders being issued from Billing Specialists). The number of monthly exceptions triggered by Held and Disputed Bills should decline as more accurate reading histories are recorded.

Exhibit 7.6

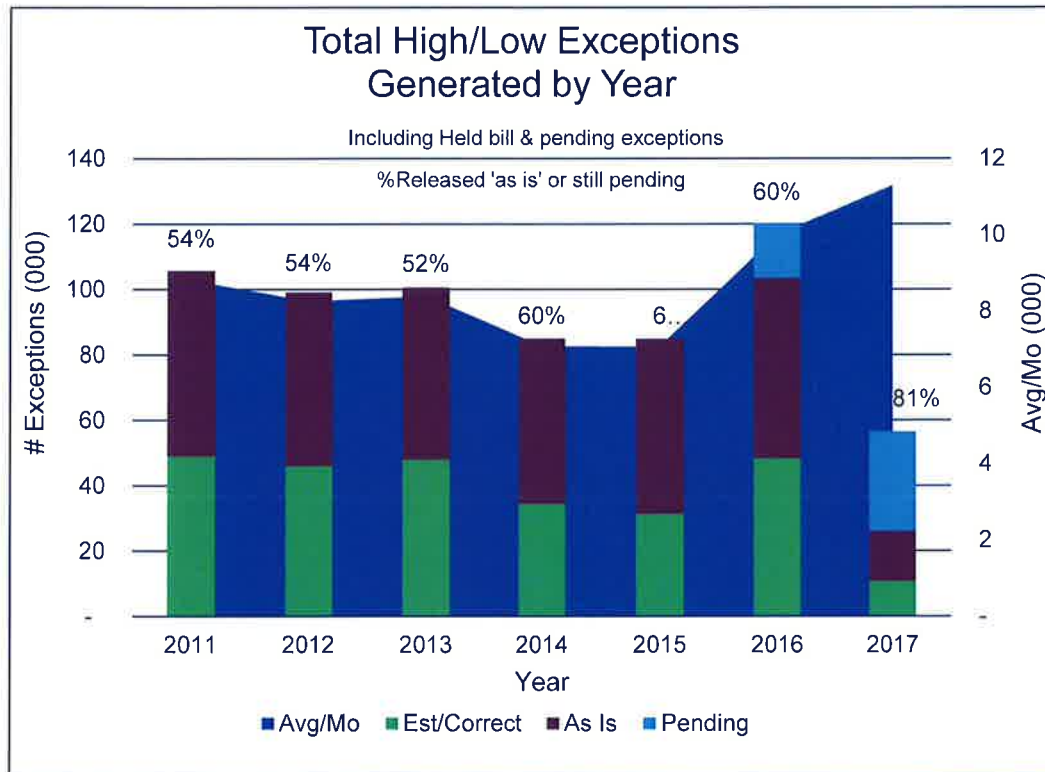


Note: HL: High/Low; OT-RD-PEND: Other Read Pending; IMPT-ERR: Import Error; NR: No Read; CLP: Current Less than Previous

Exhibit 7.7 below provides a history of High/Low exceptions generated by type over the last 6 years (including January – May of 2017). The High/Low exception threshold change from 500% to 300% resulted in a greater number of exceptions in 2016. The chart shows the percentage of High/Low exceptions estimated, corrected or still pending to be released. Held bills that are not being invoiced are currently not worked by Billing Specialists and continue to generate exceptions until they are released for billing. The Held Bills have been segregated into a separate queue to prevent Billing Specialists from working to resolve the exceptions while the County considers the plan and timeline for issuing the Held Bills. Exceptions for 2015 shows lower overall volume but higher percentage (63%) released “as is”. This is partially related to the UCO reorganization and turnover in billing staff.

DeKalb County Water Metering and Billing Audit Report
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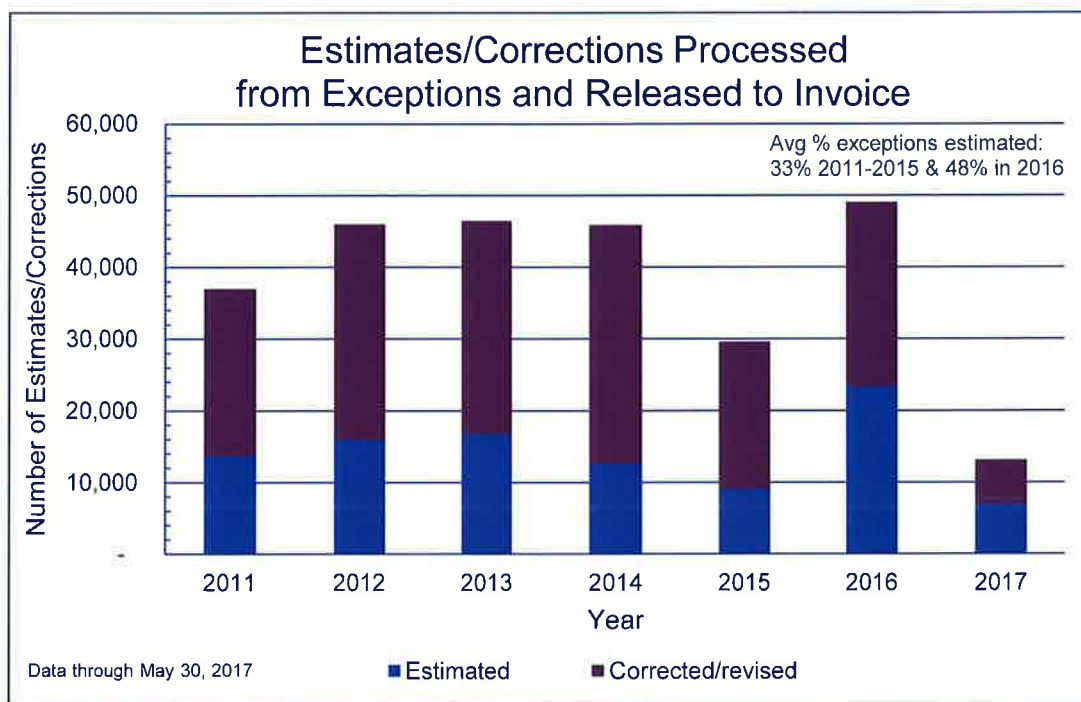
Exhibit 7.7



As discussed earlier, High/Low and other exceptions are processed and released by Billing Specialists (either "as is" or after estimated or corrected). The following chart (Exhibit 7.8) shows that UCO has processed – as estimated or corrected, a high volume of billing exceptions per year over the last 6 years other than the decline to 29,000 in 2015. This 2015 decline in exceptions processed can be attributed to staffing changes during the re-organization and a larger portion of exceptions released "as is" compared to previous years. The chart also shows the relative portion of exceptions released through estimation. The estimated bills in 2016 represented 48% of the total or 23,380 exceptions processed and includes an auto-estimate batch of 10,100 meter locations in August 2016. This increase in 2016 is reflective of a backlog in work orders and exceptions that accumulated during the year and in many cases beginning in 2015.

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Exhibit 7.8



The chart in Exhibit 7.9 below displays the number of customers related to the exceptions processed in the previous chart. In 2016, 30,200 customers had bills that were estimated or corrected out of 192,000 (or almost 16%). In 2012, there was an average of two exceptions processed per customer. This average declined to 1.6 (2015 and 2016) and 1.4 exceptions per customer in 2017. This trend appears to indicate that repetitive billing issues (i.e., exceptions) per customer are being reduced. However, the data is based on exceptions processed by estimate or correction and does not including pending exceptions from 2016 and 2017 (see subsequent discussion). Since there are no pending exceptions from 2015 remaining, the 1.4 exceptions per customer shows an improvement over 2014, however the number of customers affected is greater in 2016.

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Exhibit 7.9

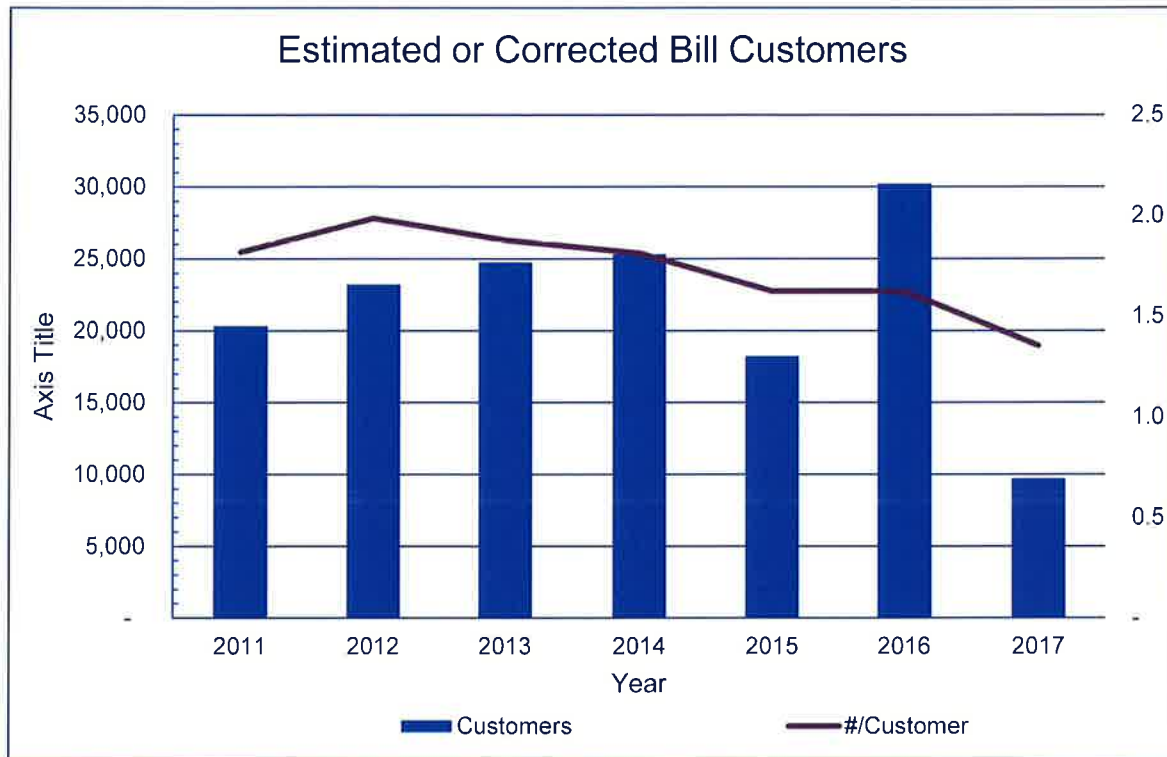
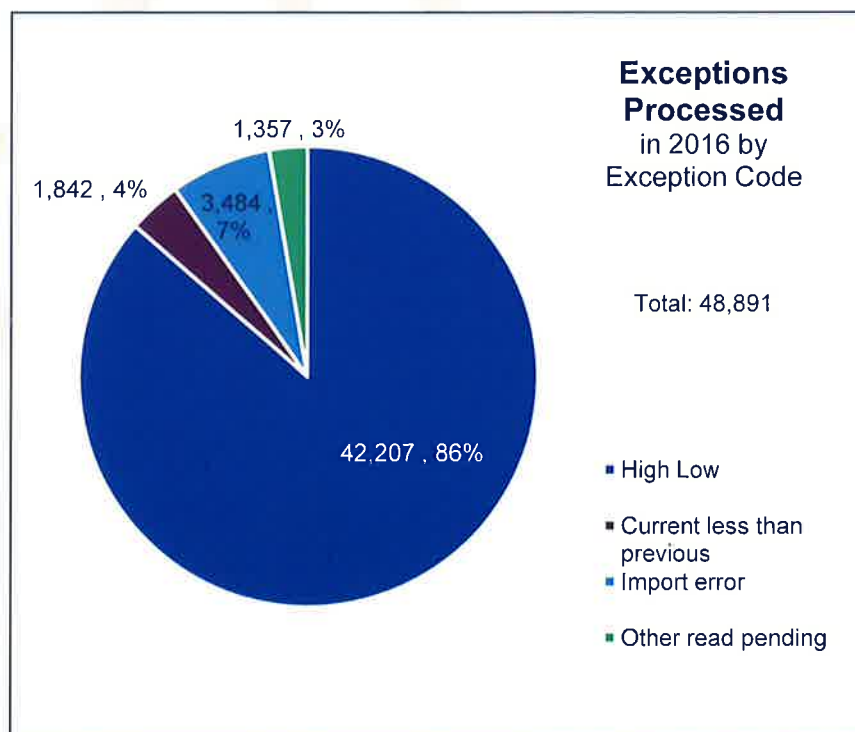


Exhibit 7.10 provides a breakdown of exceptions processed and released in 2016 by exception. Of the over 49,000 exceptions shown, 86% were related to High (or Low) readings.

Exhibit 7.10



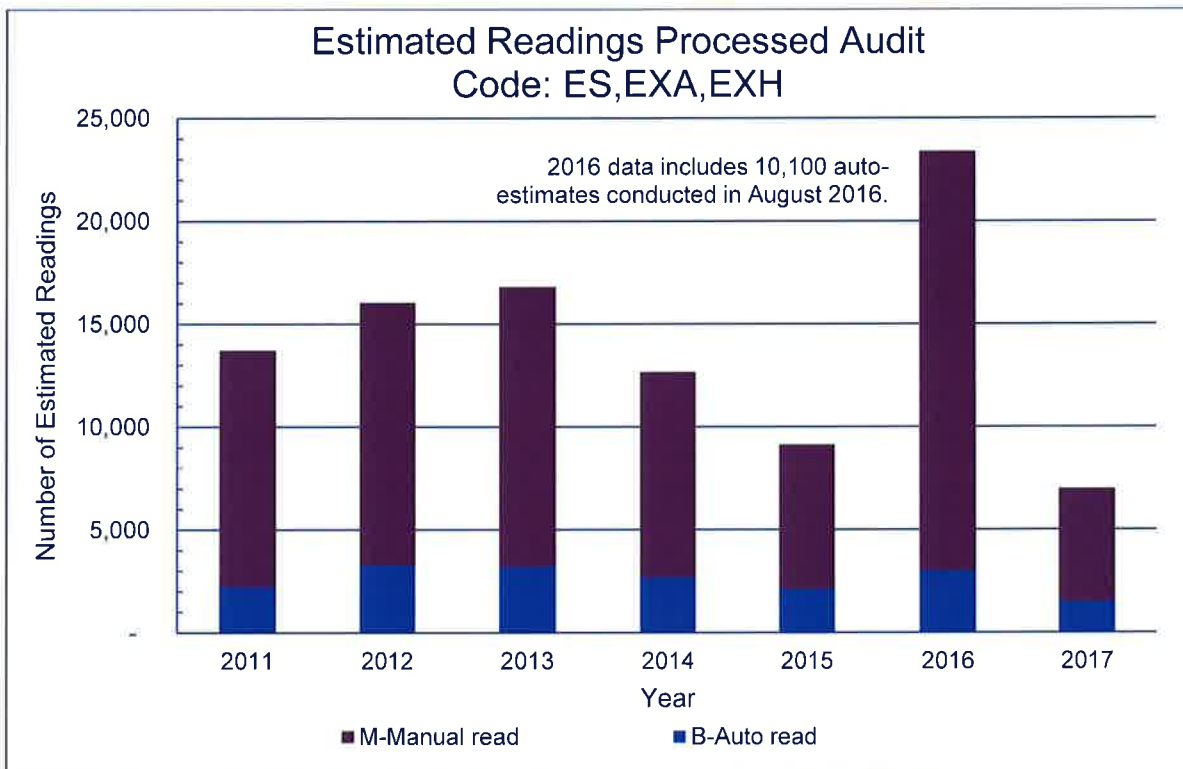
Estimated Bills

Estimates are prepared for resolving High/Low and other exceptions when actual historical data is not available or determined inaccurate. Estimated billing is an accepted practice within the utility industry and includes using estimated readings in conjunction with actual readings to “catch up” or correct the consumption on the following bill. Typical industry guidelines used in bill estimation include:

- Methods based on prior actual consumption and adjusted by seasonal variations
- Avoiding 2 or more estimates in a row
- Actual readings at least every other cycle

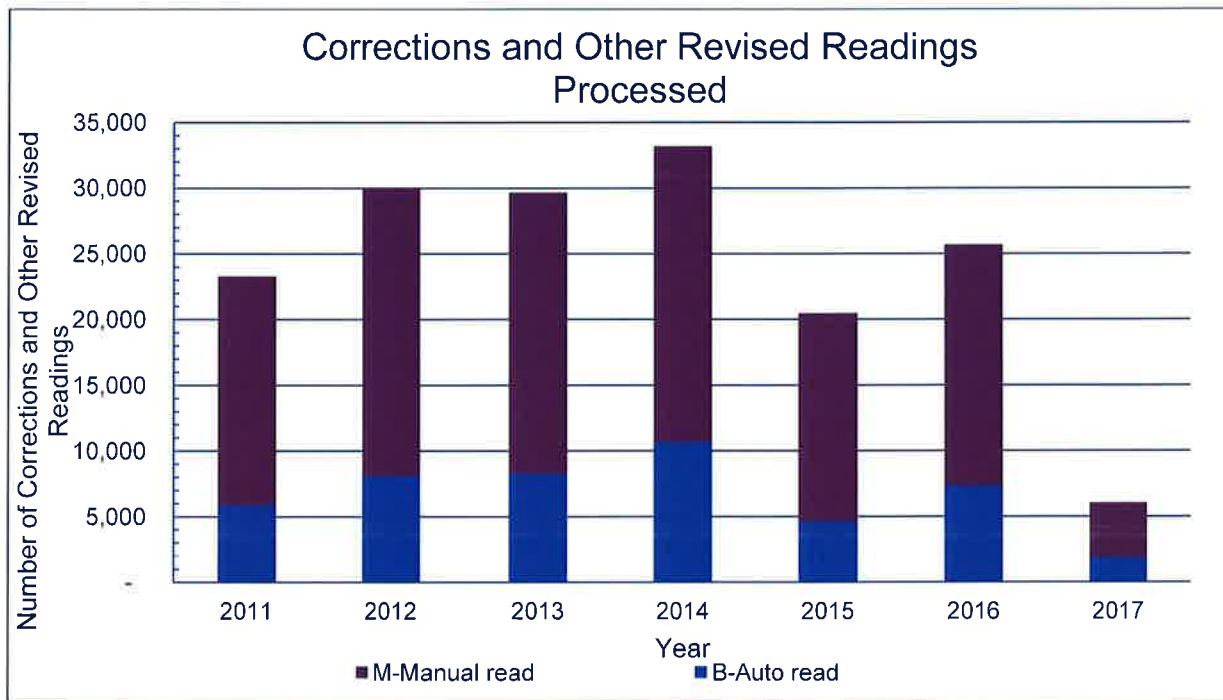
Exhibit 7.11 provides a history of estimated bills processed over the last 6 years. In 2016, the batch of 10,100 auto-estimated bills were generated as reflected in the large increase in exceptions processed in 2016. As discussed earlier, this batch estimate was conducted to help clear the backlog of unprocessed billing exceptions (as well as a backlog of unprocessed work orders).

Exhibit 7.11



As shown in the following Exhibit 7.12, significantly more exceptions were processed without estimates from 2011 through 2015. Discussions with Billing Specialists have indicated that priority is being given to process High/Low exceptions using recent actual billing data and more re-reads and other verifications from Field Services.

Exhibit 7.12

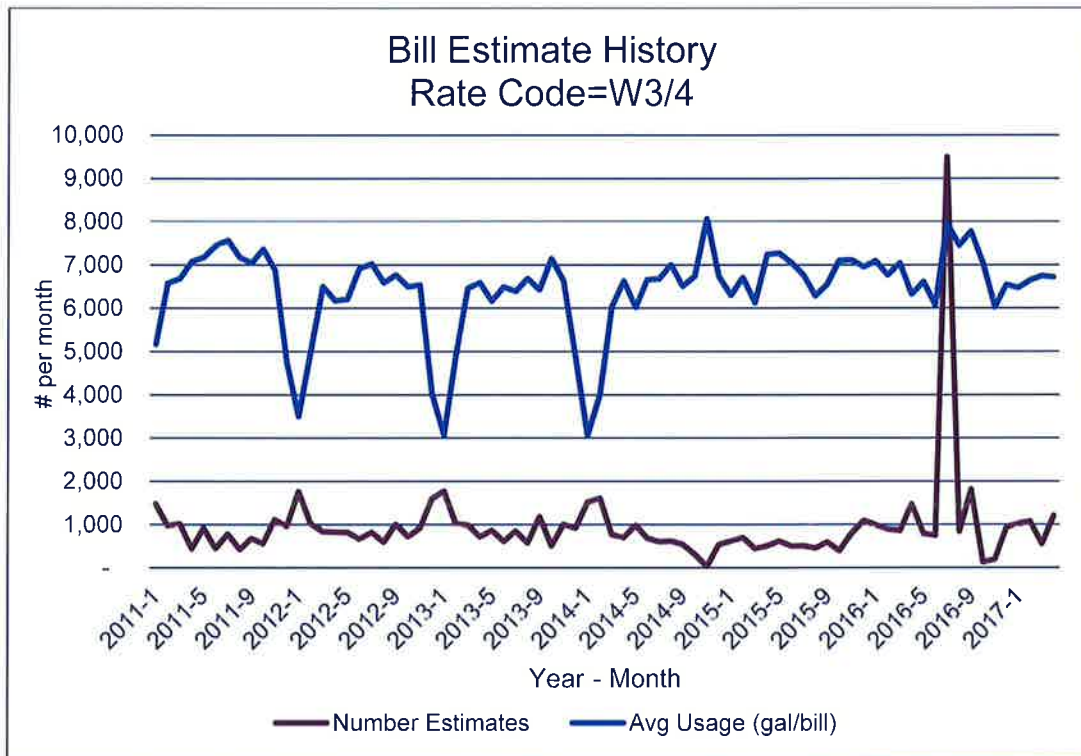


A more detailed view of bill estimates is shown in Exhibit 7.13 below with number of estimates and average consumption for a 3/4" meter customer (typical of a residential account) per month since 2011. In addition to high estimate volume in August 2016, key observations from the exhibit include significant declines in average consumption estimates occurring in February 2011, 2012 and 2013. Based on review of the data during these periods, 89% of the estimates are generated by import data with negative or zero consumption (HL: High/Low exception). The estimate methodology is primarily based on the prior year consumption during that month or season and low consumption data (actual estimate methods used vary and are not available for this history).

The estimate volume also increased during these periods as shown in the exhibit. Estimated data shows an increase in exceptions at the end of December (for 2011, 2012 and 2013). It is assumed that these estimates were part of a previous County policy to help clear backlog exceptions at the end of each year. These peaks in estimates did not occur in December of 2014 or 2015 (the auto-estimate peak in August 2016 is shown below). Thus, it appears that an accumulation of exceptions during 2015 and 2016 contributed to the large batch exception in August 2016.

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Exhibit 7.13

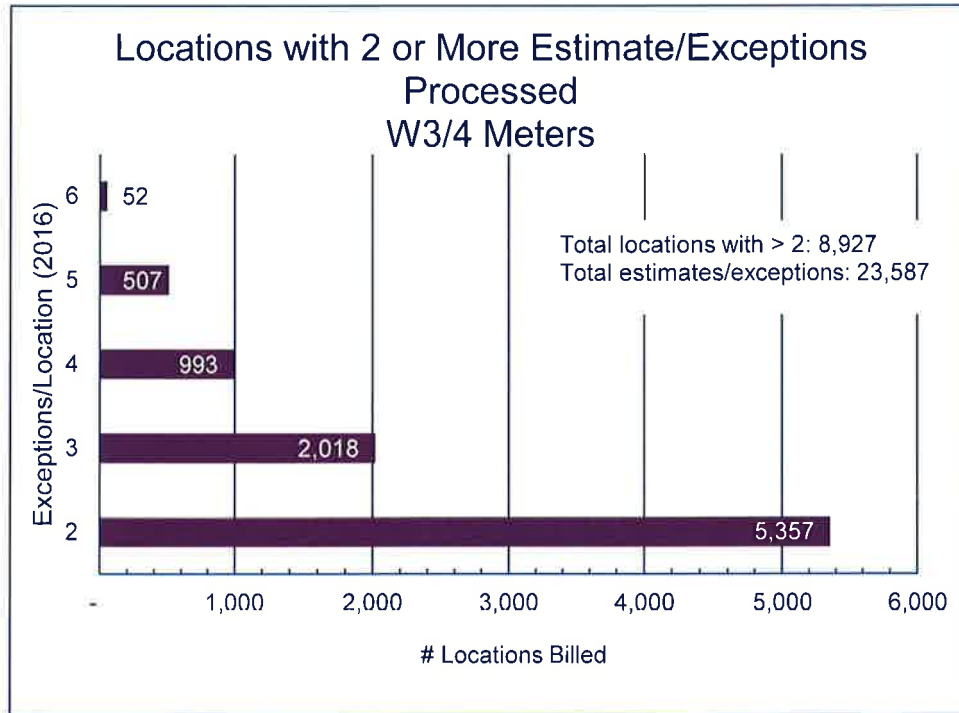


If an estimate is lower than an actual usage, then a following correct reading will result in a higher "catch up" bill that may also generate an exception (difference between actual reading and prior estimated reading) based on the 300% High/Low exception trigger discussed in this section. As a result, multiple consecutive estimates can produce multiple exceptions once actual reads are acquired for "catch up" bills.

An analysis of calendar year 2016 exceptions was conducted to identify "locations" with multiple estimations and exceptions processed during the year. CPAK tracks meters and customers by a unique location field that is affiliated with the address. The following Exhibit 7.14 below shows that 8,827 locations with $\frac{3}{4}$ " meter had more than one exception or estimate over the year, accounting for over 23,500 of the exceptions processed. Duplicate exceptions account for 58% of the 40,884 total exceptions for $\frac{3}{4}$ " meters. Repetitive exceptions may also be caused by lower than average estimates followed by an actual "catch up" reading.

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Exhibit 7.14



A key factor affecting exceptions was found to be whether meters are read manually or automatically through TouchRead or transmitted (Flexnet) technologies. The data indicated that manual readings (and other manual processes) are the primary causes affecting data integrity and accuracy of consumption and billing. Manual readings occur for the 10,000 older meters on routes and when a TouchRead is not obtained because of a read issue. Manual data entry of meter data and readings also occur during meter changeouts and new meter installations. From 2011 to May 2017, manual readings accounted for 76% of all exceptions estimated or corrected.

The following table (Exhibit 7.15) provides an example of a manually read account (Type=M) with several errors and estimated/corrected readings over the past year for a ¾" residential meter. The imported reading history (representing the latest meter read from field) shows at least four inaccurate readings (highlighted in red within the imptreading column) with one extra or one missing digit (usage is based on the "meter reading" column that is estimated/corrected by the Billing Specialist). In this case, it appears that the Billing Specialist relied on previous readings that were estimated or corrected and did not apply some imported readings that may be accurate based on the account history. It also appears that the usage in the final three bills may not be based on historical data and may be underestimated. The highlighted rows in the last column (audit_code) indicate where the Billing Specialist estimated the read instead of accepting the import. This example also demonstrates the complexity in receiving an accurate meter reading and bill with an accumulation of errors and the individual discretion a Billing Specialist may have in attempting to correct or estimate a bill using individual judgements.

Exhibit 7.15

Sample Read History for Estimated Account

meter_de	reading_date	utility_usage	meter_reading	impt_reading	prv_reading	impt_read_type	audit_code
382818961	06-Apr-16	13,100	29,930	30,467	29,799	M	ES
382818961	09-Jun-16	16,900	30,099	30,840	29,930	M	OK
382818961	10-Aug-16	21,400	30,313	303,130	30,099	M	EXA
382818961	10-Oct-16	26,400	30,577	304,775	30,313	M	OK

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Draft for Discussion Only

meter_de	reading_date	utility_usage	meter_reading	impt_reading	prv_reading	impt_read_type	audit_code
382818961	12-Dec-16	8,300	30,660	3,246	30,577	M	ES
382818961	03-Feb-17	6,000	30,720	3,072	30,660	M	ES
382818961	06-Apr-17	7,000	30,790	32,466	30,720	M	ES

The following table provides an interpretation of what likely occurred in the processing of these seven readings.

Exhibit 7.16

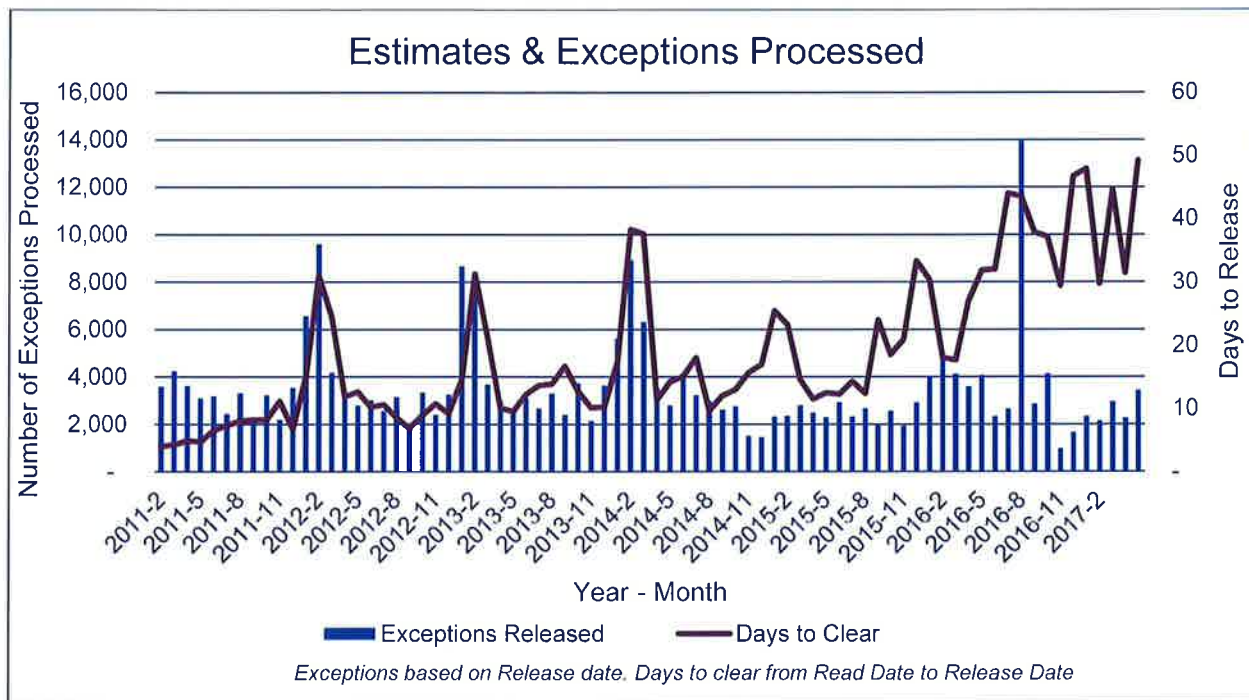
06-Apr-16: The imported meter reading of 30,467 was not used by Billing Specialist (usage instead estimated at 13,100). Previous reading may have been estimated/corrected. The reading of 30,467 appears accurate based on the history but would have resulted in consumption of 66,800 gal (high bill for residential account).
09-Jun-16: The imported reading of 30,840 was not used by Billing Specialist (usage instead corrected/estimated at 16,900).
10-Aug-16: The imported reading was erroneous with an extra digit added. The batch auto-estimate (EXA) generated a consumption of 21,400 gal.
10-Oct-16: The imported reading was erroneous with an extra digit added. The usage was corrected to 26,400 gal by Billing Specialist.
12-Dec-16: The imported reading was erroneous with a digit missing. The usage was estimated at 8,300 gal by Billing Specialist.
03-Feb-17: The imported reading was erroneous with a digit missing. The usage was estimated at 6,000 gal by Billing Specialist.
06-Apr-17: The imported meter reading of 30,467 was not used by Billing Specialist (usage instead estimated at 7,000).

If/when a final "catch up" bill is prepared for this account based on actual readings, it would likely reflect a significant amount of water usage and billing amount for this customer.

Historically, the time to process exceptions is related to the volume of exceptions generated. As shown in Exhibit 7.17 below, spikes in exception volume resulted in increased times for processing. The number of estimates/exceptions processed was significantly lower during months of Oct 2014 to Oct 2015 (averaging 2,300/mo. whereas overall average is 3,400/mo.). The time shown represents time from when the meter is read to when exception is released and does not necessarily reflect the processing time when assigned to individual Billing Specialist. The data shows an increase in days to process exceptions over the past 12 months and (data does not include Held bills released in April 2017 or other pending exceptions).

DeKalb County Water Metering and Billing Audit Report
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Exhibit 7.17



The CPAK software contains a feature that limits the number of estimations a single account can have cumulatively or in a row. The feature was turned off in August 2009. If it was activated, once the meter registered the maximum number of estimated readings permitted under CPAK system rules and an estimated reading tried to bill, it would not bill but rather the bill would be assigned to a user defined to handle these accounts. If that person then approved the estimated reading, it would bill in the next bill run.

However, the County has elected to “turn off” this feature in CPAK and as a result, Billing Specialists are able to estimate bills cycle after cycle indefinitely. By deactivating and not reinstating this available workflow within CPAK, the County is not fully leveraging the technology tools at its disposal and enabling a process that supports bill estimation rather than bill investigation.

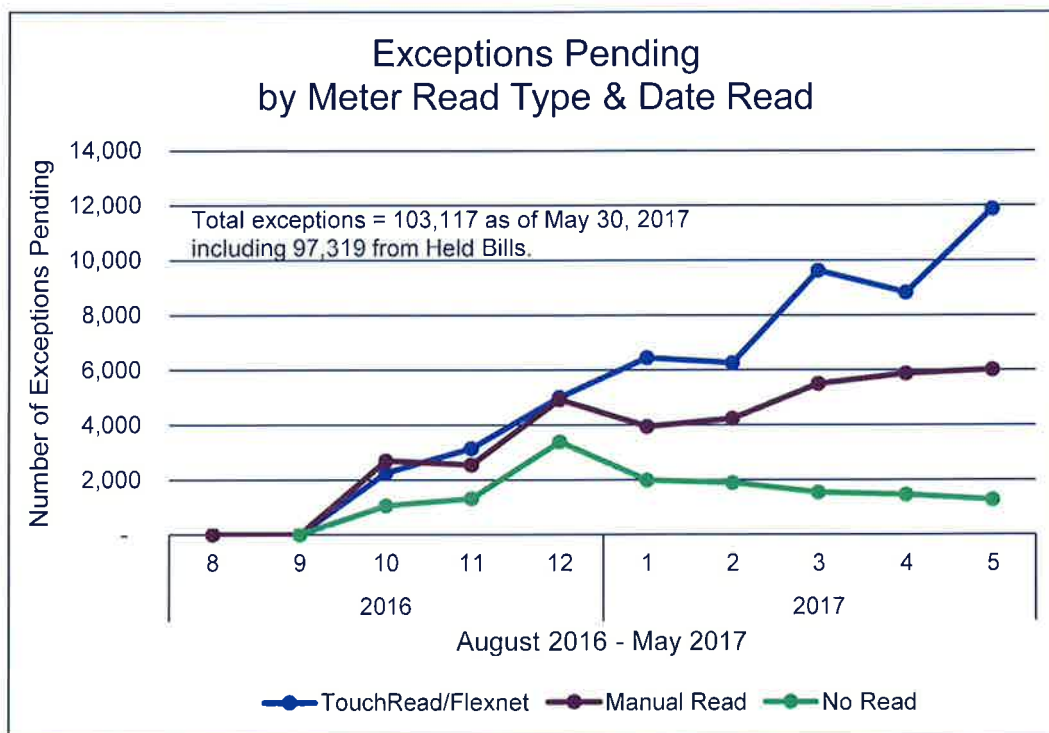
Pending Exceptions

Bills with exceptions to be processed are assigned to queues of Billing Specialists by a UCO Supervisor. The exceptions are viewed and processed using CPAK’s CSR work process (open items). Exhibit 7.18 below shows the total exceptions pending including Held Bills from September-December 2016 for special review. All exceptions not held are being worked by approximately 10 Billing Specialists to estimate, correct, revise and update meter reading data as previously discussed.

The chart shows the pending exceptions created by month of meter reading. The large majority of exceptions over the period are related to Held Bills (97,319). The trend data shows more exception records having B-Auto readings being created over the last 5 months than M-Manual readings. The County’s TouchRead meter readings are assigned a “B,” while manual meter readings are assigned an “M” in the CPAK billing system and Meter Reader Handhelds. The abbreviations for auto readings and manual readings is universally adopted throughout the County. The increase in B-Auto readings reflects more effort by Field Services in getting more touch and actual electronic readings to provide basis for releasing Held Bills using more reliable actual usage data – as opposed to using manual reads.

DeKalb County Water Metering and Billing Audit Report
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Exhibit 7.18



The following pie charts show the meter read types for Held Bills and other non-Held exceptions to be processed by UCO. The time period for the exceptions shown in the pie charts below is August 2016 through May 2017.

The charts show that Held Bills have more automated B-reads than Other Exceptions Pending which indicates the coordinated effort between the UCO and Meter Readers (i.e., re-read work orders using Handhelds) to obtain more accurate consumption data.

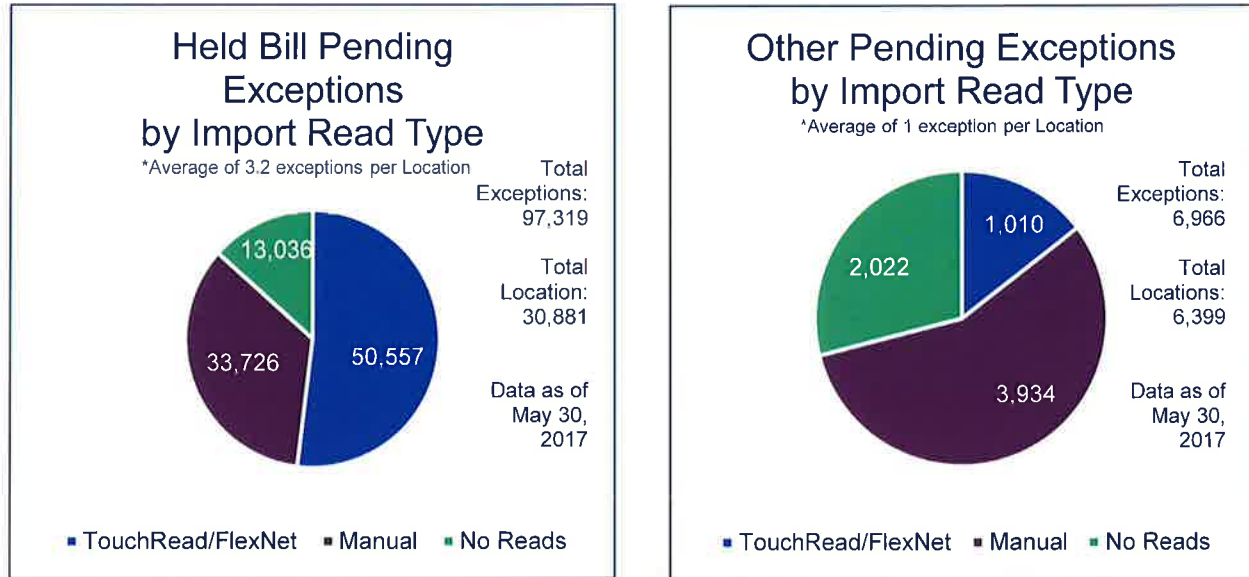
The portion of manual M-reads for Other Pending Exceptions is higher than that of Held Bills and more typical of routine exceptions being processed because the initial read was provided in AutoRead format even though the meter has AutoRead capabilities.

The pie chart on the left shows the number of Held Bill exceptions is 97,319 total exceptions for 30,515 locations (or addresses) which is an average of 3.2 per location ($97,319 \text{ exceptions} / 30,515 \text{ locations} = 3.18$, rounded up to 3.2). Multiple exceptions per locations is reflective of additional work orders being issued for meter re-readings at the same location as the exceptions wait to be resolved.

The pie chart on the right shows Other Pending Exceptions is 6,966 total exceptions for 6,759 locations (or addresses) which is an average of 1 exception per location ($6,966 \text{ exceptions} / 6,759 \text{ locations} = 1.03$, or rounded down to 1.0). The pie chart shows that the exceptions being processed by Billing Specialists for the Other Pending Exceptions are predominantly driven by resolving exceptions that have been triggered by manually read meter rather than via AutoRead. The Billing Specialists are not sending Field Services staff out to the field to perform multiple re-reads for the same customer accounts.

DeKalb County Water Metering and Billing Audit Report
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Exhibit 7.19



The chart in Exhibit 7.20 displays how the 6,965 pending exceptions to be processed have been assigned among various Billing Specialists. Eight of the 11 Billing Specialists who are routinely working these exceptions have substantial backlogs.

Exhibit 7.20



An analysis was conducted showing how many exceptions were estimated or corrected and released for each Billing Specialist during 2017. As shown in Exhibit 7.21 below, the Billing Specialists process on average 10-20 exceptions per day with an overall average of 15. This data does not include exceptions that may be assigned and released "as is" by a Billing Specialist (such as No Consumption and No Reads) and thus does not reflect the full workload related to the review and release of pending exceptions.

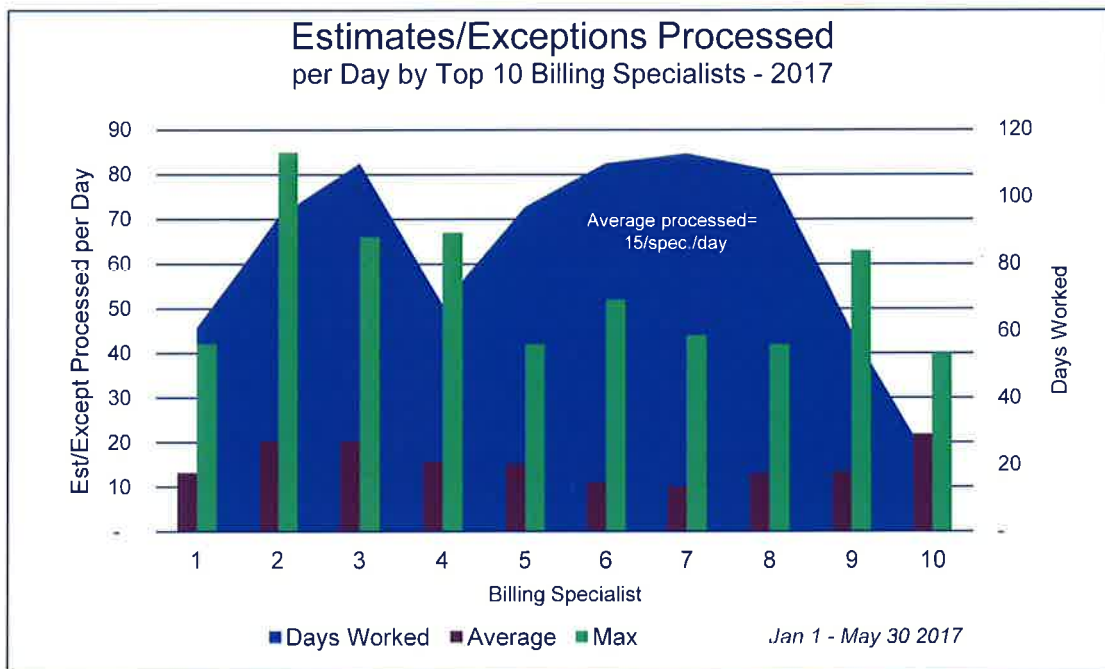
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On average of 78% of exceptions assigned to Billing Specialists are released "as is" with 22% being estimated or corrected (based on the 15 per day average shown).

During the 5-month period shown, there are 108 weekdays including holidays and 4 of the 10 employees worked 108 days or more indicating high level of utilization for these employees. With increases in exceptions being generated in 2017, the workload for Billing Specialists is significant and accumulating as assigned exceptions.

The inability to review and resolve billing exceptions rapidly will cause a backlog of exceptions that prevent timely billing to customers. The County has performing mass batch auto-estimate bills in the past to clear significant billing exception backlogs.

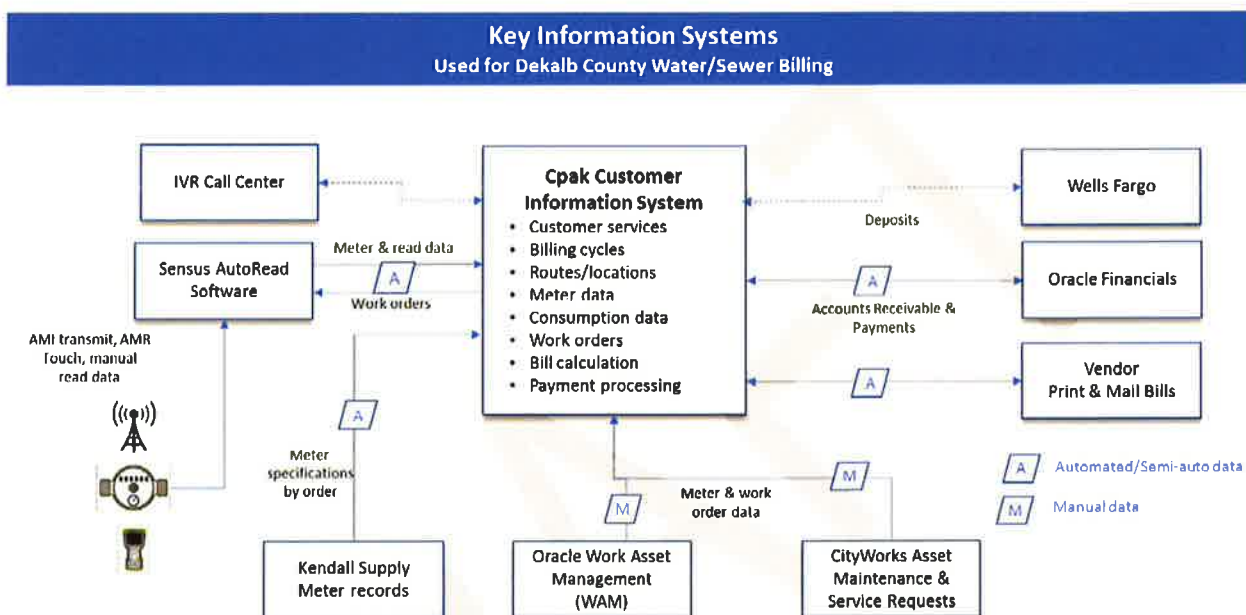
Exhibit 7.21



Billing Technology

The billing function relies heavily on technology and information systems for meter reading, billing, work order and customer service data and work processes. As shown in Exhibit 7.22 below, CPAK serves as the core customer billing and information system having meter, meter reading and work order information inputs from several sources. Data is generated and transmitted from a variety of automated and manual methods to create the specific consumption information necessary for calculating a water and sewer bill within the CPAK system. Other systems are also relied upon for bill printing, payments and receipt accounting as shown below.

Exhibit 7.22



The County is currently in the procurement process for a new customer information system (CIS) for customer services, billing, collections and payments. The new system is envisioned to bring a host of enhancements with business processes, robust features, reporting, user experience, security and integration with other systems.

CPAK Customer Information System (CIS)

As mentioned above, the CPAK billing system, installed in 2003, serves as the core system and data repository for customer, meter reading and billing information. The system also provides a framework for employee work processes used in customer services, bill calculation and payment processing. CPAK is a client server system hosted and managed by County's Department of Innovation and Technology (IT) and supported by its vendor, AdaptToSolve, Inc.

The key features of the CPAK system include:

- Customer services – customer accounts, contacts and billing/payment history
- Billing cycles – calendar of billing dates and periods
- Routes/locations – route numbers with locations assigned
- Meter data – inventory of meters with specifications
- Consumption data – calculated/estimated from current minus previous readings
- Work orders – created within CPAK and processed via Sensus handheld devices
- Bill calculation – applies consumption and rate code to current rates

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

- Exception processing – identifies irregularities in meter reading data and enables review prior to billing
- Payment processing – bills, due dates, payments, accounts receivable

Though the CPAK system is the data repository for all data elements used in creating bills, much of the data inputs are derived from the meter reading information systems and other County systems. DeKalb County employs a range of different systems, processes and data sources to produce a bill through CPAK. CPAK has features for identifying and processing exceptions to 'normal' usage and billing amounts and is configured to flag these exceptions for UCO Billing Specialists to review, adjustment/estimate and release. However, reliance on 'outside' data inputs and quality controls after data is received by CPAK creates significantly more effort in identifying and resolving data issues.

Data quality and integrity is highly dependent upon effectively managing and controlling these inputs and processes to reduce errors and omissions. Errors and inconsistencies in data are resulting from meter identifications, meter readings, manual and paper processes both from routine meter reading as well as field services related to meter work. The following represents key data elements necessary to consistently generate accurate bill calculations:

- Meter identification (e.g. ID, serial number)
- Meter size/type
- Register type and digits
- Multiplier to calculate usage
- Meter register reading
- Current reading (imported)
- Current reading (estimated or adjusted)
- Previous reading
- AMR, AMI or Manual reading
- Usage or consumption in gallons
 - Water consumption
 - Irrigation
 - Wastewater consumption
- Routes
 - Billing calendar/cycles
 - Assigned locations
 - Assigned meters

Configuration of Data

The CPAK system must be properly configured for these data elements and the business logic used by the system to accurately interface with the AutoRead system, calculate bills and issue work orders. The County has installed a variety of meter types over the years that must be accurately recorded in inventory, assigned to correct address and include the appropriate register type and multiplier for consumption calculations. For example, Exhibit 7.23 provides the different types of ¾" meters that must be read (making up 181,000 of 192,000 total meters). The meters must be entered accurately in inventory with correct register type, digits and multiplier and assigned to the correct location to be read and processed correctly. If the meter ID is not correctly assigned, errors could result from the digits read and/or multiplier used.

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

Exhibit 7.23

Number of ¾" Meter with Register Digits and Multiplier

Register Digits	AMR Touch	AMI Flexnet	Manual	Total	Multiplier
4	50,101	52	983	51,136	100
5	88,588	355	517	89,460	100
6	1,996	38	7,387	9,421	100
7	1,887	29,121		31,008	1

Within the CPAK system, there are 100 audit codes, 77 exception codes and 88 work order codes – the majority are not used routinely, some are inactive and some are duplicated. Over time, codes are created on ad hoc basis and not routinely managed or maintained. Audit and exception codes can be configured to trigger work flow tasks such as a work order or bill review/release. Codes are important for management and operational reporting. Examples of configurations that affect operational work flows include:

- Audit codes being configured for releasing bills and closing work orders
- Exception codes assigned to work order types
- Work order types assigned to users for processing

Sensus AutoRead System

The Sensus AutoRead system provides routine meter reading and consumption data necessary for bill calculation. The system also processes work orders generated via CPAK including activities such as meter changeouts, re-reads, turn on/off and check for leaks. In all of these transactions, meter and read data is transmitted to and from CPAK via AutoRead interfaces through batch file transfers.

- AMR (Automated Meter Reading) system utilizes handheld devices that retrieve meter readings via radio transceiver. If a reading cannot be obtained the user can enter the reading manually on the device keypad. There are 147,435 AMR meters in DeKalb County.
- AMI (Advanced Metering Infrastructure) system transmits meter readings to a remote system (FlexNet) and provides real time monitoring of meter status and reading. AMI meters have been installed for many larger meter customers and selected locations that are more difficult to read (and where transmission is available). There are 34,905 AMI meters in DeKalb County.
- Manual readings are from older meters with data entered using the AMR device and route and location information stored on the device. There are 10,113 manual meters in DeKalb County.

AutoRead relies on Kendall Supply for meter identification data and CPAK for routes and locations that need to be accurate and properly configured before loading into AutoRead. CPAK maintains the route, location, meter data that is downloaded to the handhelds daily. When an AMR device reads the meter, it captures the 'actual' meter identification in addition to the register reading. CPAK stores the meter IDs received from the Kendall Supply vendor in its inventory. It does not store actual meter IDs read by the handhelds and thus does not provide for a 'mismatch' meter exception.

CityWorks and Oracle WAM Systems

The County currently uses both CityWorks and Oracle WAM for asset, maintenance and work management applications and is in the process of migrating away from Oracle WAM in favor of utilizing CityWorks exclusively moving forward. Historically, the Oracle WAM system has been used for overall maintenance and work order functions. Oracle WAM is a module with the County's Oracle enterprise system. In Spring 2016, DWM chose to use CityWorks for its primary asset and maintenance system to provide GIS mapping, construction cost management, and other features to help comply with USEPA Consent Decree obligations. This system went live in December 2016 and was initially

DeKalb County Water Metering and Billing Audit Report
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deployed for the wastewater collection system with water distribution and metering currently under deployment.

Important features driving the use of CityWorks includes a mobile tablet application, image capture and GIS mapping and mobile computing. DWM is planning to use CityWorks for its warehouse inventory system in the future. CityWorks was first used in creating work orders for new service installations being conducted primarily by an outside contractor. Meter changeouts and other work orders initiated through dispatch began using CityWorks since May 2017. The CityWorks contractor (CH2MHill) conducted intensive training, deployed 140 tablets and indicated positive acceptance and use from field staff.

CityWorks is currently a standalone system having no automated interfaces with other County systems (including CPAK). Meter and read data must be entered manually in CityWorks and then upon completion, data from a CityWorks work order is entered again into CPAK for billing. The work processes related to these steps are discussed further in Account Setup and Field Services sections of this report.

Other Systems Used to Support Billing

As shown earlier in Exhibit 7.22, there are a number of other systems that support CPAK and the billing function. A summary of each follows:

- Kendall Meter Orders. For each order of meters, Kendall supply prepares a data file of individual meters with meter specifications and submits to the CPAK vendor to update the meter inventory. Then as meters are installed, the user will assign the meter from inventory to the account location.
- Bill Print/Mail Vendor. Data files of bills approved by UCO are forwarded to the Print Vendor. The Vendor submits back to UCO image files for approval. The vendor submits image files of bills back to UCO Billing to review and approve before final billing.
- Wells Fargo Reconciliations. Payments collected by UCO (checks/cash) are reconciled with CPAK, submitted to Wells Fargo (e.g., checks scanned) and then reconciled with receipts from the bank. Collections from telecheck, payment partners and online services are also captured and reconciled with Wells Fargo receipts.
- IVR (Interactive Voice Response). The UCO Call Center uses an IVR system to monitor and manage its calls and provide automated information to customers. The system captures calls serviced, dropped and times as well as call reasons. The IVR system is integrated with CPAK to provide customer balance and related information.

Key Issues and Recommendations

This section presents key issues and recommendations related to Billing processes, staffing and technology.

Key Issue 7.1: High Volume of Exceptions

A high number of meter read exceptions result from a combination of factors: inaccurate data from meter reading, field services, and contractor installments; estimates and other methods to correct or normalize meter reads in previous cycles; and staff turnover and experience. The number of High/Low exceptions increased in 2016 by over 40% from 2015. High numbers of exceptions result in increased workloads for Billing Specialists and delayed resolution times for customers. As discussed, key factors influencing the recent increases include:

- The High/Low threshold being reduced from 500% of the previous reading to 300% in mid-2015.
- The Held Bill policy that covers statements from September to December 2016.
- An auto-estimated batch of over 10,000 accounts conducted in August 2016.

DeKalb County Water Metering and Billing Audit Report

Draft for Discussion Only

In addition, staff turnover over the past three years contributed to the ability of UCO to effectively process exceptions apparently resulting in 68% in 2015 and 65% in 2016 of exceptions released “as is” compared to 55% in 2013 and 48% in 2014.

The backlog of pending “routine” exceptions to be processed by Billing Specialists is almost 7,000 with an average of 625 each for the 10 Billing Specialists. Held bills which are being processed separately by the Triage team accounting for 97,000 exceptions pending (for 30,500 accounts).

Recommendation 7.1

- The County should develop realistic performance indicators that reflect work outstanding/completed. Billing Specialists process exceptions that are released “as is” or after estimated/corrected work. Exceptions released after estimated/corrected work take significantly longer than exceptions released “as is”. As such, performance metrics are needed for both exception types to assess staffing needs relative to current workload and exception backlogs. Examples of metrics include number in queue, days in queue, released per day and work orders outstanding.
- The County should improve the detail and flexibility of exception reporting to meet the needs of multiple purposes and users, specifically for Billing Specialists. Many of the existing reports are oriented by route group which are useful for investigators, Meter Readers or field staff. However, performance reporting related to exception processing by Billing Specialists is needed in conjunction with the metrics and procedures described above. Specific reports are needed for manual read exceptions, multiple exceptions per account, and “as is” and estimated/corrected releases. Billing Specialists also indicated that work order status is difficult to be identified when processing exceptions (e.g., work order is completed for specific exception). In lieu of a software revision, a specific report with open/updated status could address this issue. New CPAK reports should also be used by field services supervisors and staff as appropriate.

Key Issue 7.2: Errors from Manual Meter Reading Processes

A significant number of exceptions are generated from manual reading of meter data (76% of all exceptions estimated or corrected resulted from manually read meters). There are 10,113 older meters that require manual readings and other cases where touch reading does not register and manual reading on the device keypad is required. Because of the variety of meter types installed, different meter digit registers have 4,5,6,7 digits in addition to 0,1,2 decimals (a meter register is recorded on a handheld keypad only to left of decimal). Erroneous manual readings have been frequent adding or omitting digits from the register. Also, as discussed earlier in the Meter Reading section, there is limited data quality review and reporting prior to upload of data from AutoRead system. Thus, errors are not fixed at the source and tend to re-occur in subsequent billing cycles. The County lacks standard procedures for Billing Specialists to release bills “as is”, through estimation, or to provide guidance on the number of estimates per account, which would help mitigate the high volume of exceptions generated through older, manual meters.

Recommendation 7.2

- The County should prepare standard procedures for releasing bills “as is” and estimating and calculating revised bills. While general billing procedures exist, the focus of this recommendation is processing of billing exceptions. The review and release of exceptions ‘as is’ is the most straightforward step in the exception process and these make up most of the exceptions released. However, the use of standard criteria and conditions for release of these bills is not well documented and is needed to help in the release of bills that may be erroneously high. Standard procedures for making estimate and correction calculations also need to be better documented under a range of scenarios with inconsistent, inaccurate or missing data and meter changeovers/rollovers. Updated and accepted procedures are necessary to support staff training. Responsibilities of supervisors, analysts and Billing Specialists, important for accountability, are discussed as a separate recommendation.

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

- The County should develop easy to use automated tools to facilitate estimation and calculations. Billing Specialists typically use manual calculations as well as personal judgment in determining the basis for calculations. The tools may be updated versions of some of the existing Microsoft Excel tools with more detailed scenarios and examples. The Billing Specialists indicated that CPAK's auto-estimate tool is not reliable or accurate because of data issues and, therefore, is not being used.
- The County should leverage workflow capabilities currently existing in CPAK to limit the number of estimations that can be done on a singular account successively. Enabling this feature will help standardize the process for working billing exceptions, forcing Billing Specialists to follow procedure and investigate bills. In addition, such a feature will help reduce the number of exceptions that occur once an actual reading is obtained for an account, limiting the number of "catch up" exceptions as previously discussed.

Key Issue 7.3: Limited Controls in Bill Estimation/Correction Procedures

The County has limited documentation of methods and steps for estimating, correcting or releasing bills and is not fully utilizing the automated estimation/correction controls available in CPAK. Based on interviews with Billing Specialists and demonstrations of actual bill corrections, judgment of multiple conditions and several manual calculations are generally used to resolve a bill exception. There is flexibility on the part of the Billing Specialist on procedures and methods used to estimate or calculate the revised usage based on various conditions identified. Billing Specialists also use individual judgment to release an exception 'as is' if it appears reasonable within the read history. Though a Microsoft Excel workbook for exception calculation is available, there is limited use of the workbook among Billing Specialists.

Further, the CPAK software does contain a feature that limits the number of estimations a singular account can have in a row. However, the County elected to "turn off" this feature in CPAK and as a result, Billing Specialists are able to estimate a bill cycle after cycle indefinitely. By not reactivating this available workflow within CPAK, the County is not fully leveraging the technology tools at its disposal and enabling a process that supports bill estimation rather than bill investigation.

Estimates, including the recent batch automated estimate, has been used to help reduce the backlog in pending exceptions. If an estimate is much lower than the actual usage (that may be unknown), then a subsequent correct reading can result in a high 'catch up' bill that will also generate an exception. Many accounts have multiple exceptions that cannot be released until a prior cycle exception is processed and billed.

Recommendation 7.3

- The County should develop quality control objectives for critical billing data inputs. UCO and Billing must take the lead in clearly defining quality control objectives for DWM meter reading, field services and new services/connections and work with DWM and IT to ensure continuous progress is made with data quality and integrity. The quality control objectives should be measurable, achievable and readily available for routine management reporting.
- The County should prioritize replacement of remaining manually read meter with meters outfitted with AMR/AMI technology to improve meter reading accuracy and efficiency. The County still maintains over 10,100 manually read meters that have not yet been replaced. The County has changed out over 68,000 meters over the past 5 years without addressing the manually read meters. The change out program has been temporarily suspended pending meter type decisions, however, DWM continues to conduct meter repairs and replacements, when necessary, as well as FlexNet MXU installations (more discussion provided in Section 7-Field Services).

Key Issue 7.4: Insufficient Processing of Routine Exception Process

The staff available to support the manual and extended procedures for completing the exception process are not able to sufficiently keep pace with the number of exceptions that are occurring and requiring review. The Billing Unit has 14 staff including a Supervisor, three Billing Analysts and 10

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

Billing Specialists. To efficiently and effectively 'work' billing exceptions with a range of unique conditions and data, a relatively high level of skill, training and experience is required. There has been high staff turnover in Billing Specialists with all 10 employees starting 2014 and after. There are 6 temporary employees out of 10 Billing Specialists. Staff turnover and training needs are key factors effecting exception process performance. The number of estimates/corrections released averages 15/day per Billing Specialist and the pending queues average 625 each. The time to release exceptions (with correction) has increased beginning in 2016 to average of 37 days after meter reading (average for 2012-2015 is 16 days). The learning curve for a Billing Specialist is steep with a wide variety of techniques, calculations, and CPAK features to achieve.

In addition, Significant UCO resources and work efforts are currently committed to the Triage Billing team with a Manager and 5 filled position (and 15 vacant positions) and Issue Resolution/Assurance Unit with six positions (one vacant). These teams are supporting the New Day project and Held Bill and dispute resolutions. The resource commitment and work being generated in UCO and DWM field services by these groups compete with that of the Billing Unit. As a result, there is fragmentation of operations and oversight of these units, especially within DWM, is affecting data integrity. Maintaining current billing work flows across multiple units through exception processing is critical to maintaining backlogs at acceptable levels.

Recommendation 7.4

- As part of developing new/revised standard procedures, the roles and responsibilities of key billing positions (Billing Supervisors, Analysts and Specialists) should be defined to provide delineation of tasks and accountability. The roles/responsibilities should include performance objectives as well as working relationships relative to other organizational units within UCO and DWM.
- The County should conduct needs assessment of current and projected workloads across UCO roles to identify gaps in staff skillsets and capacity. This assessment could include a 'job activity survey' to identify how existing employees allocate their time and opportunities for improvements.
- The County should provide means for contract employees to be hired as County employees and seek to fill vacancies with County employees. There are an estimated 26 contract employees within UCO. The County is making significant investments in training and on-the-job education of contract employees with typically high turnover.
- The County should prepare updated training programs, specifically training for Billing Specialists and Analysts should include actual case scenarios for the variety of conditions and exceptions encountered. With new employees and detailed work activities and systems, training is a critical on-going role within UCO (currently supported by a Manager and two Trainers). Training and re-training is needed as new processes, metrics and responsibilities are rolled out.
- The County should cross train and rotate Billing Specialists and Analysts. As employees are trained and retrained, the County should enable Billing Specialists and Analysts to rotate to other units and work with teams across organizational lines. Creating more flexible cross functional and team-oriented organization will help fill staffing gaps and support priority needs and projects.
- The County should consolidate and strengthen management and controls between UCO and DWM billing functions. Initial consideration should be given to assigning Billing 'coordinators' in UCO and DWM to oversee key teams in each department as well as interactions between UCO and DWM units and locations. The coordinators should have strong management analysis and technology skills with Director report authority. Fragmentation of operations and oversight of these units, especially within DWM, is affecting data integrity. Consideration should also be given to dividing Technical Services into two separate sections: 1) Meter reading and field services and 2) Construction and inspection. Stronger management with implementation of quality control objectives and policies/procedures as discussed previously is recommended for UCO and DWM to work effectively together.
- The County should review and update communication protocols. A communication plan is recommended to define and encourage the exchange of information within DWM field services units and UCO as well as between the units. The plan should define the communication channels

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for proposing and developing new policies, procedures, performance measures, and reporting. The plan should also define how any changes in policies and procedures should be approved and well communicated to promote understanding and practice.

Key Issue 7.5: Complexity from Use of Multiple and Aging Information Systems

The CPAK system is limited in its capabilities for DeKalb County's size and complexity. The County is currently in the procurement process for a new customer information system (CIS) for customer services, billing, collections and payments to better meet its water billing requirements. The new system is envisioned to bring a host of enhancements with robust features, business processes, reporting, user experience, security and integration with other systems.

The following technology issues were identified as affecting consumption accuracy, billing work processes, and user efficiency and effectiveness.

- **Integration.** The current deployments of Cityworks and Oracle WAM requires manual data entry of work order data in CPAK as well as these source systems. These systems provide important meter identification and meter reads for meter installations and new connections. The County also uses batch file transfers for meter inventory data (from Kendall) and daily uploads of meter reading data which is then processed by CPAK including any errors or inconsistencies. Staff indicated that the Kendall transfers are not consistent and data for new meters is often not in the CPAK inventory.
- **System Complexity and Work Flow.** Since its installation in 2003, the CPAK system has been updated with features as the needs of DeKalb County have required and has a full range of functionality and features for a utility customer information system (CIS). The system is viewed by several experienced users as complex and difficult to intuitively accomplish billing tasks. There is a large number of codes and configurations for exceptions, audit and work orders that have accumulated over the 13 years making it more complicated to manage work flows and less useful for reporting. Mastering the system features in combination with business logic for exceptions and estimates requires significant user training and experience.
- **Reporting.** There are several 'custom' reports that are available for Billing Supervisor and Specialists, however, they do not appear to be used routinely or meet the specific needs of daily work processing. The existing reports provide exception counts by type, route, and Billing specialist and includes a listing of meter readings changed by Billing Specialists. However, standard performance-oriented reports are not evident for tracking exceptions pending, released 'as is' or released as processed by Billing Specialist or prioritizing work using business requirements or logic.
- **Reliance on Vendor.** CPAK Technology Solutions is heavily relied upon for overall system support and operations as well as data integration, configurations and user training. CPAK is a small company having DeKalb County as its primary billing system client.

Recommendation 7.5

- The County should evaluate alternative interface designs for AutoRead, CityWorks, and warehouse and inventory systems to enable effective data exchange. The critical interface requirement at this stage is the interfacing of CityWorks and other manual data entry paths to CPAK. As the County begins to implement a new CIS, the interface requirements for all source data systems should be evaluated to develop a 'modern' interface environment that provides accurate, reliable and up-to-date information for billing purposes. Interface architecture and design should be conducted in coordination with the vendor/implementer of the new CIS system but should be independently conceived and not driven by the vendor's system requirements and/or protocols. The current interfaces for meter and meter read data consist of batch file transfers (e.g., daily). Real-time interfaces via web or scripting services would allow more timely data access to identify errors and enable action to be taken more quickly than batch data. A holistic design of the CIS interfaces would also enable a wide range of options for using CityWorks, Sensus and Oracle systems to

DeKalb County Water Metering and Billing Audit Report
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accomplish work order driven tasks and capture field data using automation (vs. manual entry) such as meter ID scanning and Touchread and Flexnet technologies.

- The County should develop a quality assurance and quality control (QA/QC) program for the Sensus AutoRead system. This recommendation is presented and discussed in more detail within the Meter Reading section. Limited QA/QC of meter reading data is a key data integrity issue needed to filter and service exceptions prior to CPAK import. This program should be developed with the 'status quo' technology including performance objectives, procedures and reporting as discussed previously. As new systems and interfaces are developed this QA/QC program should be updated accordingly.
- The County should streamline CPAK codes and configurations for work flows to reduce opportunity for error and increase usefulness of available reports. Within the CPAK system, there are 100 audit codes, 77 exception codes and 88 work order codes – the majority are not used routinely, some are inactive and some are duplicated. Audit and exception codes can be configured to trigger work flow tasks such as a work order or bill review/release. Codes are also important for management and operational reporting. Over time, codes are created on ad hoc basis and not routinely managed or maintained. A review of these codes and how they are configured within CPAK for workflow tasks is needed especially prior to migration to a new CIS system.
- The County should review and revise CPAK user permissions to limit access to a needed basis, thus enhancing data security. CPAK has a growing number of users each assigned to a user or permissions group to access selected features. There are 792 user accounts assigned to CPAK and of these, 435 are relatively active users and 52 accounts are assigned to full privileges including security. Several interviewees indicated concern about who had permission to what features. One identified a case where a configuration change was made that erroneously affected meter usage multipliers. UCO should conduct a review of all CPAK users, inactivate users that do not exist or should not be assigned and confirm or revise user permission assignments. The CPAK IT administrator should take responsibility for overseeing and managing users and their privilege assignments.

8. Field Services



Water metering and billing processes are supported by field operations that help ensure functioning assets are deployed, equipment is operating properly, and that metering and billing work orders and necessary follow-up tasks are completed. Field operations/services are performed by the DWM Field Services Unit. Field Services and Meter Reading functions are organized into six units reporting to a Superintendent within DWM's Construction and Maintenance Division. The following units provide operational support for the County's water metering and billing operation:

- Field Services 1
- Field Services 2
- Planning and Inspection
- Construction
- Meter Reading
- Engineering & GIS

Field Services' primary workload driver are work orders (WO) generated by the Customer Services and Billing functions, and requests resulting from the New Day program. Meter Reading and GIS serve in support roles as the Field Service groups perform daily work orders.

This section presents the following topics for DWM Field Services and its role supporting meter reading, meter services and billing:

- Operational Processes
- Work Order Processing and Associated Technology
- Field Validation Surveys

Operational Processes

Field Services supervisors and staff are responding to shifting priorities and increased workload from the County's billing issues and related initiatives and policy changes of UCO. Policy decisions that serve as examples of shifting priorities include requiring field verifications of meter data and placing moratoriums on enforcing policies in the field (i.e. suspending disconnections). Field Services has been affected by changes in management, staffing, policies/procedures, and technology as they continue to manage the requirements associated with routine work in addition to addressing field issues causing meter reading and billing errors. Policy changes and the associated impact on Field Service workloads limits DWM's leadership's ability to focus on the supervision of daily routine tasks as well as manage day-to-day personnel needs within Field Services.

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

There are several contractors that support the County's Field Services function and require management oversight by DWM. DWM contractors include:

- Kendall Supply: meter orders and related services
- MM&E/Other Contractors: meter and MXU installations
- CH2MHill: Cityworks software
- Sensus: Handhelds, AMI/FlexNet, AutoRead software
- AdaptoSolve: CPAK contractor

Management control over the various Field Services units is fragmented and limited in its ability to effectively coordinate the range of internal operations and numerous outside entities. Supervisors assign routine tasks to Field Services personnel but lack management analysis and technical skills needed to manage work priorities, flows, and data. Field Services employees indicated that staffing issues and changes in priorities from the County's billing issues affect service levels. Over the past two years, staff available to support worker orders generated in CPAK declined from 30 to 25 FTEs which includes multiple temporary employees, placing additional pressures on the current organizational structure. In addition, UCO directives and billing requirements drive a large portion of Field Services work. Coordination and cooperation between Field Services and UCO is critical for overall operations.

The list below includes multiple field service activities currently influencing the recording and delivery of meter data necessary for accurate and efficient billing:

- Routine meter reading, work orders and exceptions
- Special meter services (large meters, testing, service retrofits)
- New Day/dispute resolution verifications and re-reads
- Meter change outs
- AMI/FlexNet/MXU installations
- Meter warehouse/inventory

Work Order Processing and Associated Technology

Field Services activities are driven and managed primarily by work orders assigned to various Field Services units. Work orders are initiated through multiple sources including customer service, meter reading, bill exception processing, dispute processing and held bill verification work. Field Services also conducts and/or oversees meter changeouts, new service/meter installations, meter/service repairs and Flexnet/MXU installations which are also tracked via work orders.

There are two work order systems used by the County – CPAK and Cityworks. A third work order system, the County's Oracle WAM system, was historically used for Field Services and contractor meter work and was phased out in December 2016 and replaced with Cityworks.

CPAK and Cityworks work orders are generated for the following reasons:

- CPAK generated work orders are used for routine services directly supporting billing and resolution of billing exceptions (e.g., No Reading, High/Low Reading)
- Cityworks generated work orders are used for new service installations and meter change outs
- Cityworks generated work orders are also used for meter installations, service retrofits and repairs often in conjunction with CPAK work orders

In all cases, meter specifications and meter reading data is uploaded in CPAK to provide data for customer billing. The following subsections further describe Field Services work order processes for both CPAK and the Cityworks systems.

CPAK Work Orders

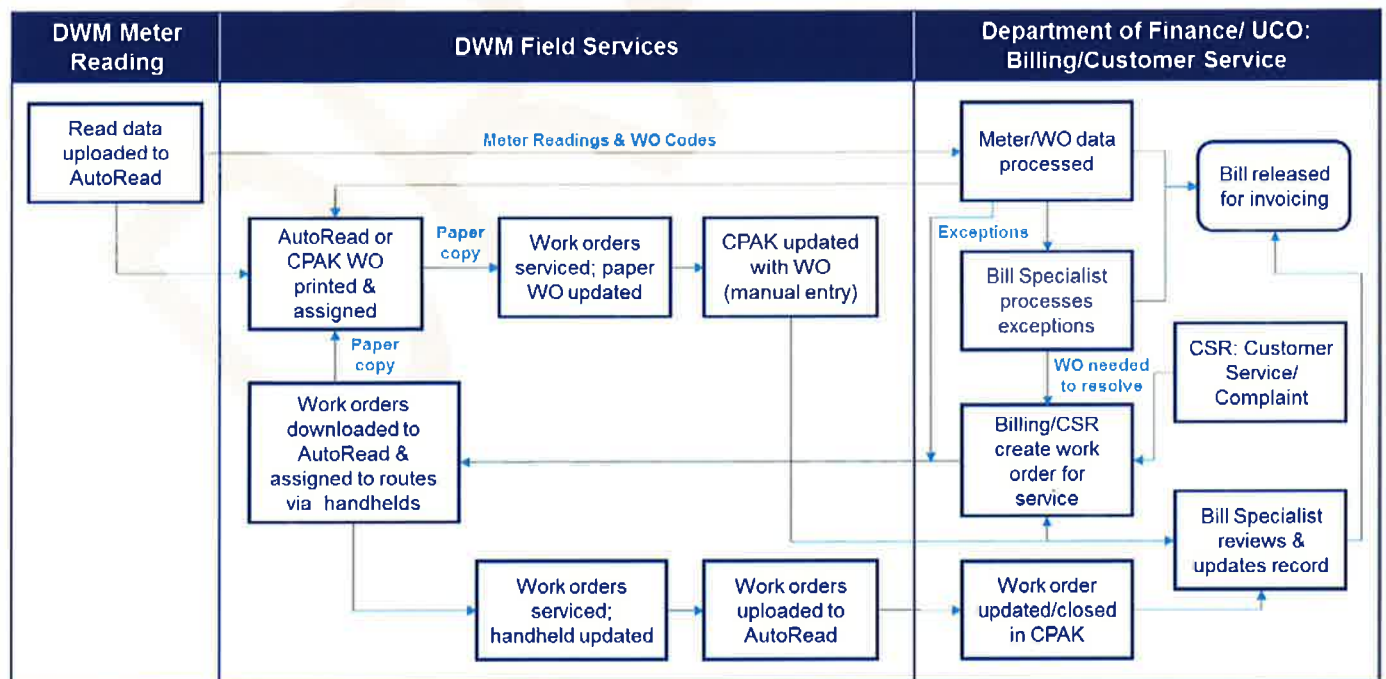
CPAK work orders are integrated with CPAK's billing function and with the Sensus AutoRead system.

The work flow for routine CPAK generated work orders is shown in Exhibit 8.1. Key steps in the process are as follows:

- Meter read data is uploaded to CPAK which filters out meter reading and billing exceptions.
- Work orders are generated through CPAK based on:
 - Billing exceptions, such as High/Low, are assigned to the Billing Unit and Billing Specialists to review and process. If Billing Specialists cannot correct or estimate the reading, they will create a work order.
 - Varying business conditions or exceptions (CPAK auto-generates work orders such as Re-Read or Cut Off Non-Payment).
 - Customer Service Representatives (CSR) create work orders for services such as Final Bill or Turn On Service.
 - Work orders may also be created within Field Services based on various meter reading exception reports (e.g. register malfunction, negative readings) generated from AutoRead
- Work orders are downloaded via AutoRead system and assigned to routes or crews via handheld and, in some cases, paper copies.
- Work orders are assigned to Dispatch (e.g. Turn On) or construction crews (e.g. Repair Leaks, Replace Service).

Work order completion is confirmed via handheld devices and are uploaded to CPAK. Work orders completed from paper copies are manually input in CPAK by the Field Services Accounting Technician.

Exhibit 8.1
 Routine Work Order (WO) Processing Using CPAK

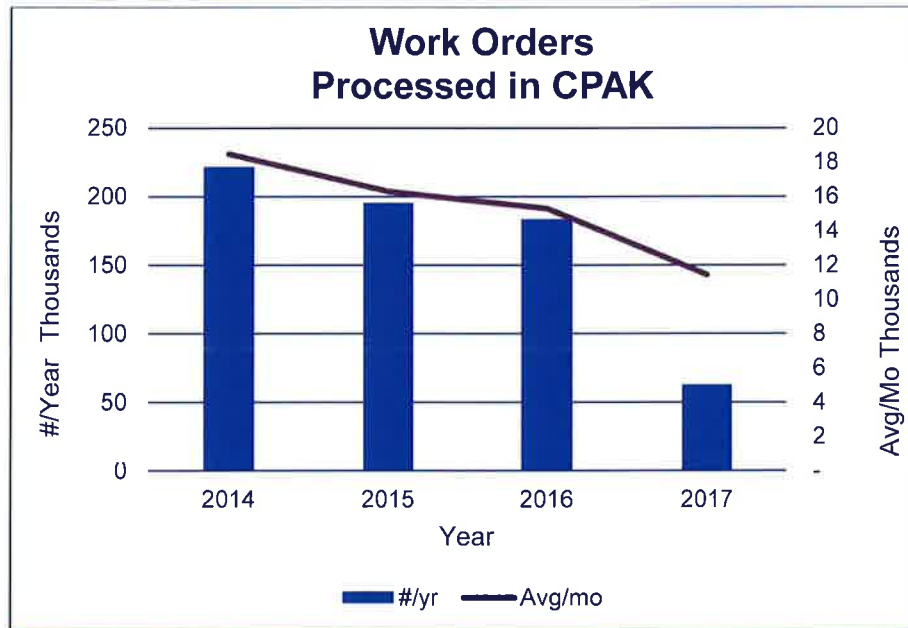


Work orders are assigned to Field Services staff and prioritized based on code types. There are 85 different work order codes that are assigned to Field Services staff to process based on their assigned work activities. These codes and assignments can be revised to redirect work tasks and address priorities (e.g., a new code was created to address field verification work related to Held Bills).

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

As shown in Exhibit 8.2 below, the number of work orders created from CPAK declined from 221,000 in 2014 to 183,000 in 2016 and further in 2017 (based on average/month). This reduction primarily results from the September 2016 policy to temporarily suspend residential water disconnections for non-payment (e.g. work orders for Turn On/Turn Off for Non-Payment discussed later in this section).

Exhibit 8.2

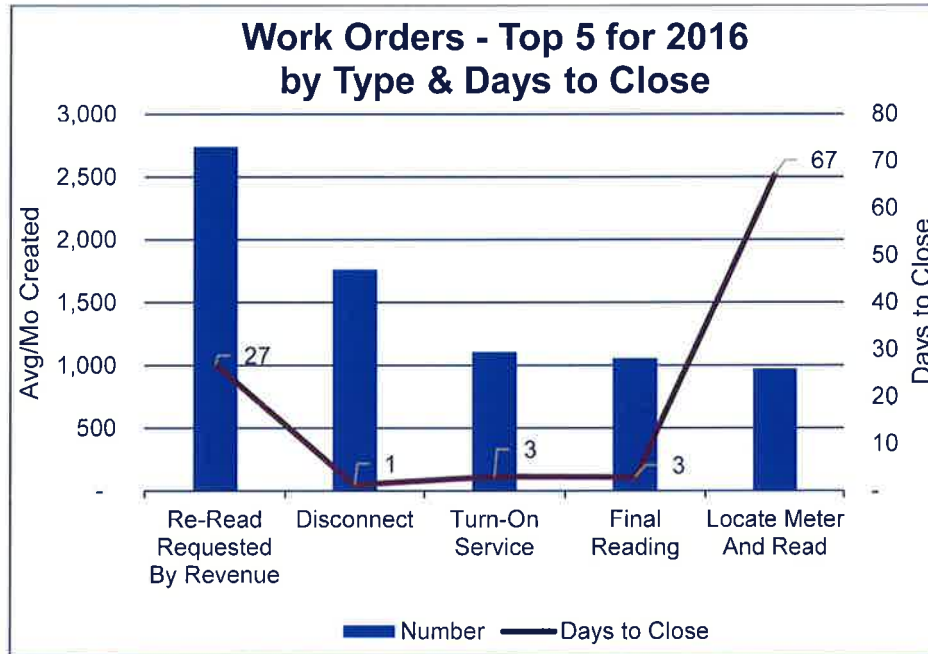


CPAK Work Order Timeline

Work orders generated by billing exceptions should be completed in three days to meet the billing cycle schedule. Data analysis was conducted on CPAK work orders in 2016 and 2017 by type and turnaround time. Exhibit 8.3 provides the top five work order types processed in 2016 and the average days from creation to close. As cited earlier, there were 183,000 work orders generated in 2016 (15,300/month average). Meter re-reads were the most common work order type with 37,500 total and 3,100/month average.

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

Exhibit 8.3



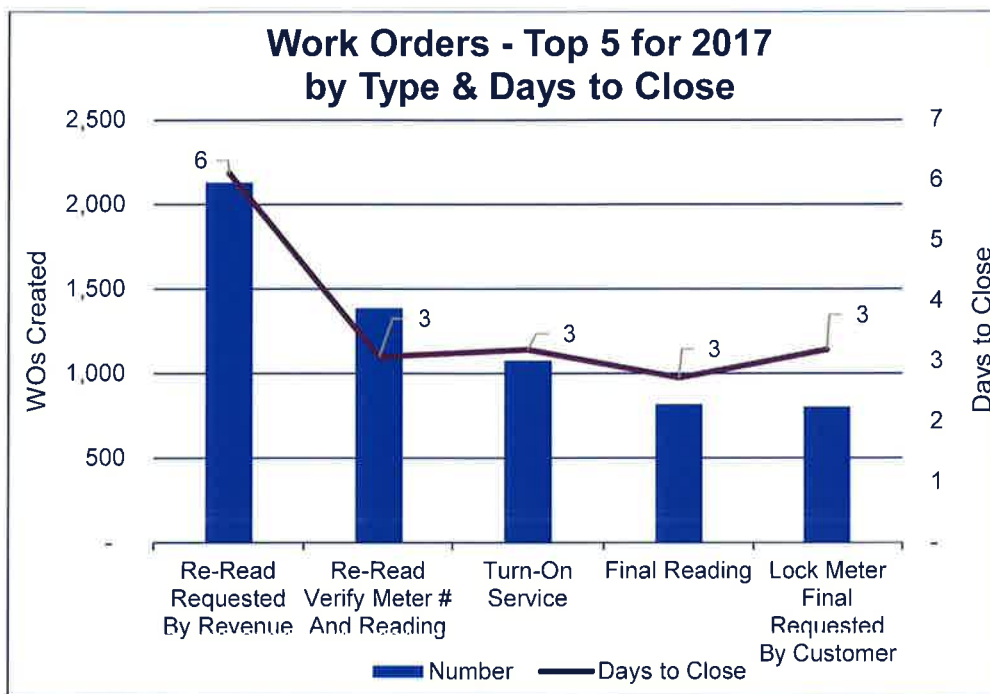
As the graphic above indicates, work orders completed for “Re-Read” and “Locate Meter/Read” showed high close times in 2016 (27 and 67 days respectively). A large portion these were not processed or closed on a timely basis and then closed as a batch in August 2016. Of the 17,700 work orders closed during August 2016, 8,300 were open 30 days or more. These work orders were either processed and not closed or not processed at all, and then closed as a batch. The batch close out of work orders was performed in connection to an auto-estimate batch conducted in August 2016 (10,100 bills) and contributed to the backlog in billing exceptions that precipitated the batch auto-estimate.

The most frequently requested work orders processed as of June 2017 (shown in Exhibit 8.4) indicate a shift in priority toward obtaining meter reading and verifications to address identified billing and meter reading issues. With the New Day program and Held Bill policy, more work orders are being created to verify meter identification and readings. Additionally, in 2017, the County instituted a policy and is not disconnecting residential water service for non-payment. In 2016, the County had 37,000 work orders for disconnections that have not yet been worked/addressed in 2017.

The response times in 2017 also reflect higher priorities in completing work orders within the three-day target for meeting the billing schedule. The Re-Read Revenue work orders (at six days on average to close) are processed separately from those of routine billing exceptions.

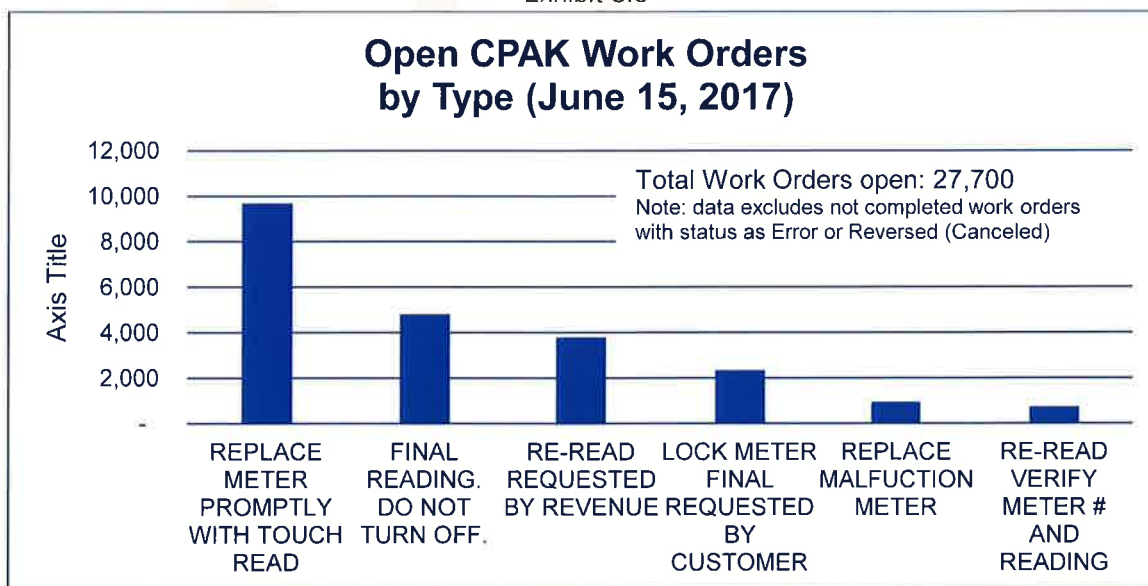
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Exhibit 8.4



Open work orders as of June 15, 2017 further underscores Field Service's focus on addressing billing inaccuracies. The chart below in Exhibit 8.5 provides the number of open work orders for most frequent types (not including Disconnect service). There are 27,700 open work orders for 26,500 customer locations. Approximately 2,200 of the open work orders are duplicated (representing 990 customer locations) as new work orders are often created for the same customer and service. This backlog and duplication of work orders represents a significant workload not reflected in the response times shown earlier for 2017.

Exhibit 8.5



Cityworks Work Order Process

In spring 2016, DWM elected to use Cityworks for its primary asset and maintenance system to enhance the work order process to include GIS mapping and mobile computing. Cityworks was initially

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

deployed in December 2016 for the wastewater collection system, with water distribution and metering currently under deployment. Cityworks was first used in creating work orders for new service installations conducted primarily by an outside contractor. Beginning in May 2017, meter changeouts and other work orders initiated through dispatch began using Cityworks. Meter installation/new service installation and meter change out work orders initiated through Cityworks are further described below.

Meter Installation - Contractor

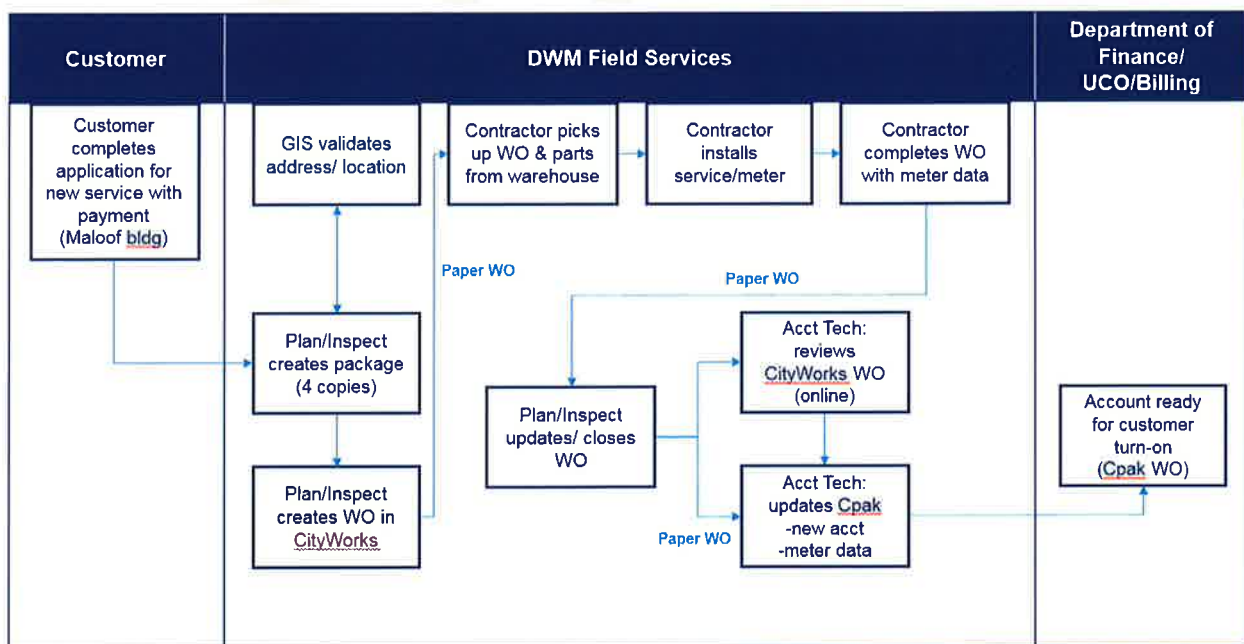
Exhibit 8.6 provides an overview of the work process for new service/meter installations conducted by a contractor. The process is paper-driven with data entered into both Cityworks and CPAK. As shown below, the application and work order information has a multi-step path as follows:

- Application and payment is taken at the County Administration Building (Maloof Building)
- The Meter Application and Installation unit assembles installation package and enters into Cityworks at Memorial Drive offices
- The contractor picks up work orders at Meter Application and Installation and receives meters from the warehouse
- The contractor completes the meter installation
- The Meter Application and Installation closes out work order in Cityworks and forwards to DWM at Roadhaven
- The Accounting Technician at Roadhaven receives paperwork to update CPAK with meter and read data

A meter label containing key data such as serial number and register configuration (and bar codes) is affixed to each paper work order. The Oracle WAM system was previously used to generate work orders and a similar paper-based process was used to document work completed and associated meter data.

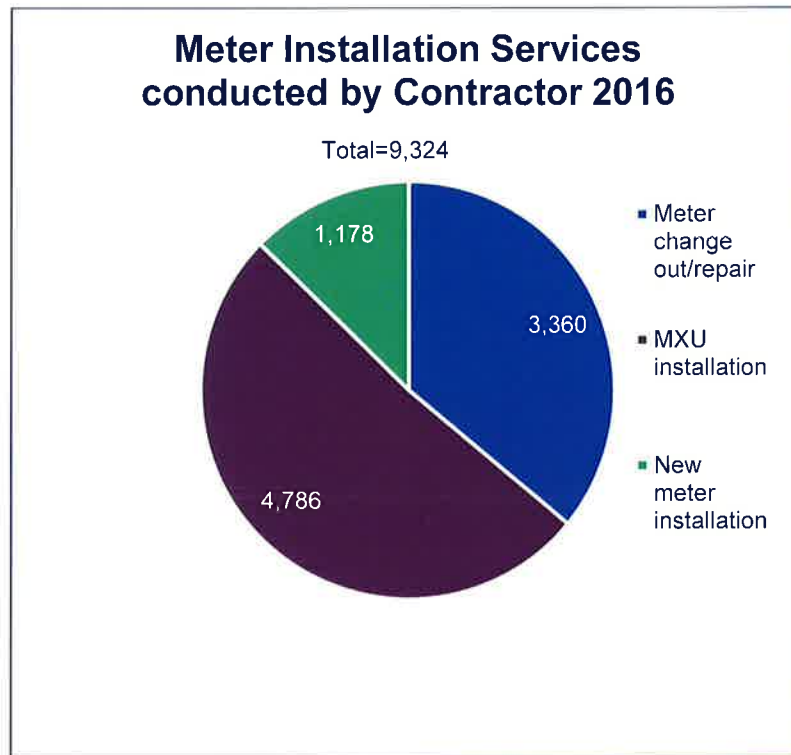
Exhibit 8.6

Work Order (WO) Process – Meter Installations/Change Outs with Contractor Using Cityworks



Although the change out program iPERL was suspended in October 2016, contractors continue to conduct meter repairs and replacements, as well as FlexNet MXU installations. Exhibit 8.7 provides a summary of the total meter and MXUs installed in 2016.

Exhibit 8.7



Interviews with Meter Application and Installation, and Field Services staff indicated that the meter installation process can be slow, paperwork can be lost/misplaced by the contractor, and data on work orders is often recorded improperly. For example, meters must be entered accurately in CPAK's inventory with correct register type, digits and multiplier to assign to the correct location and account. Kendall Supply prepares a data file of individual meters with specifications to update the meter inventory. For meters installed not in the CPAK inventory, data often needs to be manually retrieved from Kendall Supply and properly entered and configured in CPAK by another user (Supervisor) separate from the Accounting Technician who is entering data from work orders.

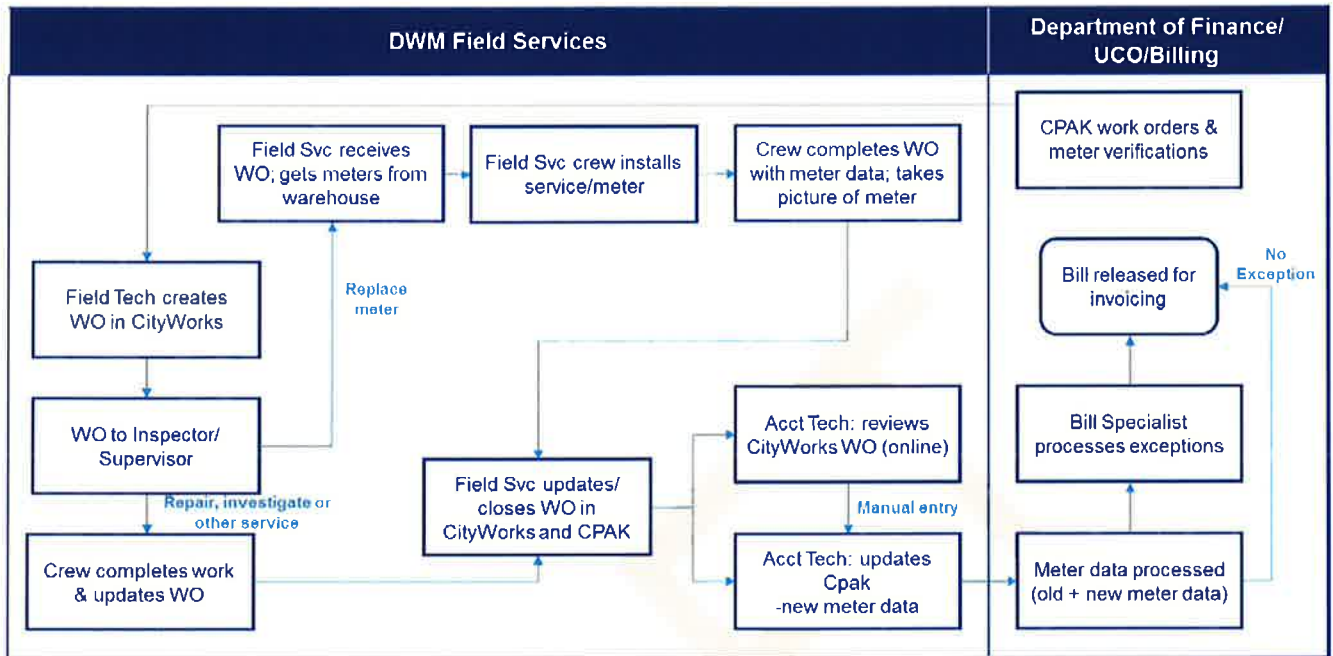
Meter Replacement & Other Services

Field Services also conducts meter replacement, verifications and other meter services that are tracked through Cityworks. The work order process shown in Exhibit 8.8 depicts the Field Services unit using Cityworks and its mobile tablet application to complete non-installation work orders in the field. Work orders not related to meter installation are generated and entered either based on CPAK billing work orders or meter verifications/investigations (submitted via spreadsheet). Both work order systems are being used with CPAK as the primary system for initiating work orders and Cityworks as the primary system for conducting work in the field. This dual process is in its early stages of development and use and should be streamlined and integrated as Cityworks is further deployed and the new customer information system is procured and implemented.

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

Exhibit 8.8

Work Order (WO) Process – Replace/Verify Meter Using Cityworks with CPAK



As the above process map summarizes, the user retrieves the Cityworks work order from an unprocessed queue, then enters the meter data in CPAK. The user enters meter identification and read data manually using the tablet keypad and work orders are updated in both CPAK and Cityworks. Cityworks allows for the upload of this information but that feature is not used consistently by the County. The Accounting Technician processes work orders directly from Cityworks as well as from paper work orders at this time. Quality control over meter data is limited due to multiple systems, manual data entry points, and a lack of system integration.

Further, work orders may contain errors in either meter identification or meter readings – KPMG observed both errors during the demonstration of work order processing. For example, during the KPMG observation, the register number was recorded instead of the serial number or the meter (meter identification labels include a unique meter serial number (CPAK meter code) and register number).

Field Validation Surveys

As discussed earlier, Field Services is also supporting the New Day Program/Triage Unit with dispute resolutions by responding to re-reads and meter verification work orders generated through CPAK. A field validation survey was initiated in early 2016 to physically view and document key data for meters related to held and disputed bills. A form was created containing CPAK information relative to each location/meter to be surveyed (see Exhibit 8.9). Field Services deploys staff to conduct the site verifications including photographs of the meter. As discussed earlier, UCO is currently initiating new work orders in Cityworks for field services to conduct verifications. Field Services indicated that availability of personnel to conduct data entry work into CPAK for field validation surveys was an issue due to competing workloads with other daily routine tasks and needs.

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

Exhibit 8.9

Field Validation Survey			2/20/2017
Read By:	3.12	Date:	3-1-17
Hand Held Device #			
Route	3713	Sequence	39900
Customer Name	CPAK		
Customer Address	Field Survey Results		
Latitude / Longitude	Lat: 33.24725 Long: -84.23172		
Customer Number	10362795		
Meter Number	10362795		
MXU ID	N/A		
Touch Read ID	10362795		
Read Type	Touch Manual / Fax		
Size	3/4		
Manufacturer	Sensus		
Model	Sensus Meter - Touch Read		
Serial Number	010362795		
Survey Reading	889.8		
Meter Multiplier	100		
Number of Digits	4		
Units: Gallons/Hundred/Thousand	GALLS Gallons/Hundred/Thousand / Unknown		
Irrigation Meter	Yes / ☒ No / Unknown		
Customer Type	WTR Residential / Apts / Commercial / No Sure		
Vacant Building or Property	Yes / ☒ No / Maybe		
Meter Directions			
Byte Entry/Unit			

Key Issues and Recommendations

This section presents key issues and recommendations related to Field Services processes, staffing and technology.

Key Issue 8.1: Limited Management Capacity

Management control over the various Field Services units appears fragmented and is limited regarding directing and coordinating the range of internal resources and outside vendors. Field Services faces challenges from new priorities, processes and technologies resulting in a large volume of work orders and data. These new priorities were preceded by the re-organization and staffing changes (e.g., retirements, hiring) discussed in the previous sections.

UCO directives and needs drive much of Field Services work, and coordination and cooperation is critical for overall operations. Supervisory accountability is not effectively delineated from the top level down. Supervisors appear to adequately delegate routine daily tasks to Field Services personnel but lack management analysis and technical skills needed to manage work priorities, flows and data. A lack of management analysis and management of work priorities, affects the efficiency of staff and results in a perceived lack of adequate staffing levels.

Recommendation 8.1

- The County should create a new supervisory unit with increased input into overall Department strategy and improvement efforts. The supervisory unit should include meter reading and 2 Field Services units that respond to routine UCO needs and CPAK work orders. This unit should be augmented with staffing capabilities including data analysis and software application skills. Dedicated resources for quality control across various Field Services units is critical component of this organizational unit. This unit should have responsibility for all meter reading and field service data that interfaces or entered into CPAK or future billing systems including work orders from Cityworks and CPAK. The new supervisory unit would be given primary responsibility to manage/coordinate directives from UCO and support other DWM entities in making associated changes.
- The County should revise and develop new management and operational reports. As data quality objectives and priorities are established, new reports should be developed to provide management summaries and details of work accomplishments, outstanding work orders and exceptions. These reports from both CPAK and Cityworks should include common and consistent measures needed for routine and non-routine billing needs.

Key Issue 8.2: Work Processes

Manual processes compounded by data quality issues and limited long range planning have impacted the effectiveness of DWM's Field Services unit. In addition to the changes precipitated by billing issues, several factors are contributing to or causing operational and data integrity issues within the CPAK work order, meter installation, and meter change out processes. Three different software systems are used with many different work order types and workflows to manage and various and disparate entities within UCO and DWM, as well as, vendors are involved with meter activities and data.

Data quality issues will continue to occur with limited quality control and system integration. Further analysis of specific processes are summarized below:

Meter change out program. Over 68,000 meters were changed out over the past 5 years (mostly by contractors). A review of the change out program plans and routine status reports indicated a focus on planning and managing work and various technical aspects of the program but little emphasis was placed on responsibilities and procedures for data outputs required for CPAK. The paper based nature of the process has further emphasized the issue. Quality control issues have also resulted from poor meter inventory data and well as work order outputs.

Manual and paper-driven processes. The work processes using Cityworks and WAM involve paper work orders in key steps where data is compiled and documented. Meter identification and read data is captured within the work orders which are subsequently entered in CPAK. The key problems resulting from the paper process include:

- Errors in either meter identification or meter readings
- Lost or misplaced paperwork
- Inefficiencies created by physically assigning and routing work orders (e.g., prioritize/sequence workflows) as well as the documentation, double data entry and re-working of work order data.

The various Field Service units including Planning/Inspection and Construction also interact with UCO groups, Engineering and GIS as well as a number of contractors and vendors. The lack of effective coordination and communication among groups have been attributed to a variety of operational issues affecting Field Services' day-to-day work.

Recommendation 8.2

- The County should revise business processes to optimize capabilities and use of Cityworks to support billing and meter activities. As Cityworks is implemented as an asset management, maintenance and work order system for DWM's overall operations, specific workflows should be developed for related work processes. These workflows would seek to streamline the current parallel use of Cityworks and CPAK for work orders and include staff and contractor responsibilities as well as data quality control objectives and procedures for data documentation. A key part of this effort involves the review and revision of CPAK and Cityworks codes, assignments and workflow steps/sequences to provide consistency between systems and prevent overlap inefficiencies. As cited earlier, there are 85 different work order codes used in CPAK that can be configured for processing assignments. These codes and assignments should be revised to redirect work tasks and address priorities as needed. As Cityworks is further deployed, its work order types and assignments should be assessed and updated to support a streamlined the application of the system.

Key Issue 8.3: Reduced Data Quality

Data quality is reduced by ineffective and inconsistent processes for data input. Cityworks operates as a standalone system, runs parallel to CPAK and requires work order and meter data to be entered and closed in both systems. Cityworks workflow uses manual and paper based work orders to obtain meter data which is then entered in CPAK. As a result, data entry is conducted on both Cityworks and CPAK. While CPAK work orders are integral part of the CPAK system, there are quality control

DeKalb County Water Metering and Billing Audit Report
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concerns with meter and consumption data transmitted to/from the handhelds (via the AutoRead batch interfaces) as well as data entry of manual work orders. Additionally, for meters installed not in the CPAK inventory, data often needs to be tracked down from Kendall Supply and entered and configured in CPAK.

Recommendation 8.3

- The County should establish quality control objectives and data requirements for Field Services processes based on customer and billing needs. UCO should set clear expectations for Field Services data quality, consistency and accuracy. UCO should also define detailed specifications for meter identification, reading, configurations and schedules for data inputs. These specifications would serve as standards with definitions and guidelines to be used by all systems and work processes providing meter related data to the billing system. Routine QA/QC training programs for field staff specifically focusing on all meter related data inputs should be used to help enforce new requirements. Job descriptions and staff performance evaluations should subsequently be revised and include QA/QC performance objectives. QA/QC training and performance objectives should cover use of CPAK, Cityworks and AutoRead applications.

9. Looking Forward

Based on fieldwork, observations and recommendations, we have identified complex challenges with DeKalb County's water metering and billing operations. KPMG has identified numerous observations and recommendations in this report for rectifying historic and current meter reading and billing issues. There is no single issue that created the problem and no single recommendation that will solve the problem. The County should review, consider, and implement numerous recommendations contained in this report and other potential recommendations identified from the New Day Project to begin to correct the meter reading and billing issues. As the County's path to success is dependent on successfully implementing a multitude of recommendations spanning operations, organization structure, technology, personnel, vendor management, and communication; the County must have a formal and transparent method to effectively implement recommendations and positive change that is sustainable, meaningful, and impactful. This section of the report outlines key next steps in establishing a formal transformation program aimed at implementing numerous recommendations to rectify historical and current water meter reading and billing issues. Any such program should have formal methods for promoting accountability and transparency. Periodic status reports including progress to-date and key performance measures should be published and presented to governing bodies and the public.

The County should create a detailed roadmap for future success including recommendations contained in this report and other potential recommendations identified in the New Day Project. The roadmap should be implemented using the following implementation tools:

- **Establishing a clear, formal governance framework** – the County should establish a clear, formal governance framework for managing the change program. A formal governance structure refers the process by which decisions are made and managed and will set the means by which change is made and sustained. As part of the governance structure, the County should develop a Project Management Office (PMO) comprised of various levels of County stakeholders and external resources, as needed, to focus on overseeing the change program.
- **Developing detailed plans for implementing recommendations** – the County should assign a single mid-level manager or staff person to be responsible for implementation of each recommendation, the initiative "owner." The initiative owner should develop detailed action plans for implementing each recommendation, including measures of success, dependencies, risks, and key action steps. The first step in any action plan is for the initiative owner to identify a core team of support resources to contribute to development of the action plan and overall implementation of the recommendation.
- **Monitoring ongoing progress** – through the established governance structure and PMO, the County should monitor ongoing progress of implementation efforts until success can be adequately measured and determined. Upon completion of recommendations, the County should evolve the PMO into a permanent function that identifies and supports continuous improvement for water metering and billing activities.

Governance Framework

The County should establish a formal governance structure to govern, guide, and direct the implementation of recommendations contained in this report. The purpose of a formal governance structure is to enable:

- Mechanisms and processes to solicit ongoing feedback on implementation activities from County stakeholders

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

- Open and transparent communication regarding upcoming changes and initiatives
- Ongoing monitoring of implementation to help ensure success and buy-in from affected business units, employees, and stakeholders

The governance structure increases accountability, provides a structured process for issue resolution, and contributes to successful and timely transformation. The governance structure should include:

- Structured, methodical framework of activities for achieving transformation
- Identified stakeholders for input and decision making
- Defined roles and responsibilities of all key stakeholders
- Communication timelines
- Change management activities
- Methods for quantitatively and qualitatively measuring success

Governance Roles

The governance framework should consist of three, integrated tiers of governance responsibilities for providing collaborative direction for implementing the recommendations. The three tiers include Strategic, Program, and Operational levels of input to the overall initiative. The following exhibit details the roles and responsibilities of each tier.

Exhibit 9.1

Governance Tier	Role	
Strategic		Oversees alignment of the overall initiative with County goals and objectives. Defines future vision and definition of success. Members of this tier would include County leadership responsible for driving overall County strategy.
Program		Manages implementation of the initiatives within the Organizational and Operational Enhancement Initiative. Members of this tier would include County Department leaders who are impacted by the changes and have authority to contribute to the defined decision-making process. This tier forms the key members of a Project Management Office.
Operational		Implements and executes individual transformation initiatives. Members of this tier would include the single individuals at the mid-level management or staff level identified to lead implementation of each recommendation.

Each governance tier contributes to the overall success of the change program. Each governance tier is responsible for key governance activities, but to varying levels of detail. For example, the strategic tier is responsible to ensure the change program for water metering and billing contributes to the strategic direction of the County as a whole. The program tier is responsible for the success of the overall change program for water metering and billing. Finally, the operational tier is responsible for success of the implementation of individual recommendations.

The following list identifies the key governance activities to be carried out.

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

- **Scope Management** - Planning, monitoring, and controlling parameters and activities during the project
- **Schedule Management** - Planning, coordinating, and monitoring to achieve timely and proper completion of initiatives and resources during the project
- **Quality Management** - Establishing standardized program and project management tools, templates, and measurements during the project. Quality management also includes the ongoing process of measuring performance against the established criteria
- **Resource Management** - Planning, managing, and controlling human, physical, and technological resources during the project
- **Communication Management** - Planning and distributing information to internal and external stakeholders during the project
- **Issue/Risk Management** - Identifying, analyzing, mitigating and monitoring risks during the project

With leadership from the strategic tier, and day-to-day support from the operational tier, it is the program tier which will be central to driving the change program forward and will comprise the primary members of the PMO. As such, the following list provides additional detail of the functions typically performed by the PMO to support governance activities:

- Confirms alignment and creates transparency for DWM and UCO leadership
- Selection of key staff for each initiative and on-boarding any new staff into the PMO
- Provides direction and support to the operational team responsible for implementation
- Reviews and finalizes detailed project plans for each initiative, as developed by initiative owners
- Ensures the successful completion of each initiative detailed in the transformation plan
- Develops and executes a communications and change management strategy for the transformation initiatives
- Establishes Department level work groups for the purpose of reviewing, analyzing and recommending changes to DeKalb County's water metering and billing operations that may be required

Communication Plan

The PMO should also establish a formal Communication Plan to ensure consistent and clear communication regarding the goals, objectives, issues, and progress to date for implementation of recommendations. The Communication Plan should include the following items:

- **Status Meetings** – Regular meetings involving strategic, program, and operational level stakeholders to discuss current progress, initiatives, risks, and next steps
- **Status Reports** – Bi-weekly status reports documenting progress to-date of implementation activities and project management tasks
- **Action Plans** – Detailed plan of activities by recommendations that is used by teams to document a detailed plan of activities, measures of success, and issues as they arise and identify mitigating strategies to resolve issues before they impact project initiatives
- **Risk Register** – Tool used by the PMO to identify and document risks, risk impact, and risk resolution as they arise throughout the project lifecycle
- **Other Communications** – Identification of other key stakeholders (including the Board of County Commissioners, Audit Committee, and the public) and the frequency and purpose of key communications to these stakeholder audiences

Exhibit 9.2 describes the recommended frequency of each key communication item of the PMO and the impacted governance functions.

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

Exhibit 9.2

Communication	Frequency	Impacted Governance Functions
Status Meetings	Weekly/ As Needed	Strategic, Program, Operational
Status Reports	Bi-Weekly/ As Needed	Strategic, Program, Operational
Action Plans	Updated Weekly	Program, Operational
Risk Register	Updated Weekly	Program, Operational
Other Communication	As Needed/ Defined	Strategic, Program, Operational

Other Governance Considerations

Exhibit 9.3 provides a sample list of questions for the County to consider as it develops a governance framework and sets the foundation for creating a program to transform water metering and billing functions.

Exhibit 9.3

Area	Key Question(s)
Scope Management	— Are the overall objectives understood? — How will the overall objectives be regularly communicated throughout the change program? — Is there a clear process to get decisions made? — Is there a process for expedited decision making? — Who has authority to make a decision? — Who is responsible for providing input to a decision?
Schedule Management	— Are deadlines understood? — What dependencies do these deadlines require? — Have dependencies been broadly communicated? Are they well understood?
Quality Management	— What does success look like for us? — How will we measure success? — How and when will we get feedback from various stakeholder groups throughout the program? — What action will we take if goals are not met?
Resource Management	— Is the budget for completing changes clearly understood? — What steps is the County taking to assure that the budget is managed for each change effort? — Who are our key stakeholders? — Are committee roles and responsibilities clearly understood? — How will roles and responsibilities change to enable key resources to focus time and effort on the change program? — How will workloads be effectively transitioned? What guidance is the County going to provide? — Who will be the most impacted by the changes? How will we support them?
Communication Management	— How often do various stakeholder groups need to meet? — What is the reporting structure, format, and cadence? — Are existing committees and communications channels being used? — How often do various stakeholder groups need to be communicated to? — What will be communicated to who, when? — How will the County communicate to the communities? — How will the County communicate to vendors? — How will the County communicate with the Press?

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

Area	Key Question(s)
	— How will reporting (i.e. internal reporting, regulatory reporting, etc.) be impacted?
Issue/ Risk Management	— How do risks and issues get escalated? — How are likelihood and impact assessed to prioritize risks? — How are risks and issues assigned for mitigation efforts?

Detailed Project Planning

Upon establishing a governance structure, the PMO should assign individuals responsible for implementation of each initiative. These initiative owners should then draft a detailed action plan for implementing the initiative that can be reviewed and finalized by the PMO. Exhibit 9.4 provides a sample template that can be leveraged by each initiative owner to develop an action plan. The template includes not only action steps and due dates, but also internal/external resources needed, dependencies, estimated ROI, and risks to be managed during implementation.

Exhibit 9.4

Prioritization #	[Numbered Priority Among All Initiatives]	Overall Timing	[Estimated Number of Months from Start to Completion]
Initiative Title	[Title of Initiative / Recommendation]		
Initiative Owner	[Name and Title of the Single Person Responsible for Completion of this Initiative]		
Initiative Detail	[Detail Text of the Recommendation to be Implemented]		
Detail Action Plan			
Action Step	Due Date	Internal/External Resources	
1. Identify and confirm team of key resources needed to support initiative.	[Due Date]	[Name of Initiative Owner]	
2. [Action Step 2]....	[Due Date]	[List of Resources Who Must Provide Input and the Estimated Time or Cost of the Resources]	
3. [Action Step 3]....	[Due Date]	[List of Resources Who Must Provide Input and the Estimated Time or Cost of the Resources]	
Estimated ROI/Benefit	[Estimated Result Once Implemented, KPI, or Other Measure to Determine Successful Completion of Initiative]		
Dependencies	[List of Key Dependencies for Completion (i.e. Input from Multiple Departments, Board Approval, Technology Implementation, etc.)]		
Risks	[List of Key Risks/Barriers to Completion and Strategies to Mitigate Each Risk]		

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

Exhibit 9.5 provides a sample list of questions for initiative owners to consider as they develop action plans.

Exhibit 9.5

Topic	Key Question(s)
Decisions	— What are the key decision needed to implement this recommendation? — Is there a clear process to get decisions made?
Risks	— What is the likelihood and potential impact of key risks? - Do we have clear plans to mitigate each risk? Who is responsible for mitigation?
Timeline	— Are deadlines understood? — What dependencies do these deadlines require? - Have dependencies been broadly communicated? Are they well understood?
Communication	— How often do various stakeholder groups need to be communicated to? — What will be communicated to who, when? — How will we get feedback from key stakeholders throughout the implementation? — Who do we need to get feedback from throughout the implementation? — How will we communicate the changes?
Contract Requirements	— Are there implications with new or existing contracts? — Do we fully understand the impacts?
Roles and Responsibilities	— Who are our key stakeholders? — How will roles and responsibilities change to enable key resources to focus time and effort on the change program? - How will workloads be effectively transitioned? — Who will be the most impacted by our changes? How will we support them?
Training	— What training is in place to assist with the expected changes? - What training needs to be prioritized and developed to ensure employee understand changes and put them into practice?
Technology	— Will technology processes still be executable given the changes? - What new and pending technology needs to be considered? — How can we better use technology to reduce manual effort and risk of errors?
Budget	— What is our budget for implementing the recommendation? — Do we need to make adjustments in order to meet budget expectations?
Policy and Procedures	— What current process steps can we eliminate? — What current process steps do we need to change? — Are there any current process steps we can automate with technology? — Have segregation of duty issues been considered? — Will County policy need to be changed in order to complete the implementation?
Governance / accountability	— What departments or other stakeholders are involved? — How will we ensure accountability and appropriate action by all stakeholders?
Reporting	— How will reporting (i.e. internal reporting, regulatory reporting, etc.) be impacted?
Facilities / Assets	— Is there any impact to physical assets? — Will assets be inventoried? — What protections are in place against theft? Vandalism?

Timeline

The PMO should develop a methodical and clear timeline for the overall implementation program. This high level framework will allow track overall progress of implementing the recommendations. The timing and order of implementation of each recommendations should be based on the following criteria:

- Initiative priority
- Initiative output or benefit
- Initiative dependency and relationship to other initiatives

Implementation of some recommendations may occur concurrently. Implementation of other recommendations will likely need to begin upon completion of other recommendations due to dependencies such as prerequisite activities and availability of County resources.

Monitoring Ongoing Progress

Creating meaningful change among the County's water metering and billing process with require time and focus by the County. Establishing a governance framework and developing detailed action plan for implementing each recommendation will provide a strong foundation for effectively managing the ongoing activities by the County to improve water metering and billing challenges. Sustaining this effort will ensure the County is holding itself accountable to achieving the water metering and billing services that not only meet, but also exceed, the expectations of its citizens.

Appendix 1: Glossary

The following list identifies the terms and acronyms referred to in the Water Metering and Billing Audit Report.

AMI: Advanced Metering Infrastructure (AMI) remotely transmits meter data to the County using radio towers and communication networks (often referred to as 'fixed base' system). The meters can transmit data to the County using a transceiver (see MXU) that communicates with radio towers or meters can transmit data to County vehicles equipped to receive meter transmission when driving near the location of the AMI meters. Meter data is stored and downloaded from a cloud based system to the CPAK billing system (see CPAK).

AMR: Automated Meter Reading (AMR) is a meter reading system that includes using a Handheld device and TouchRead gun (see Handheld and TouchRead gun) to receive meter data using TouchRead technology without requiring Meter Readers to open customer meter boxes. Meter data is transmitted from the meter transceiver to the handheld and then downloaded to the Sensus AutoRead system (see AutoRead) and then uploaded as batch files to the CPAK billing system.

Audit Code: a code used by the Billing Specialist or auditor to respond to the exception code and to release the bill to invoice (if code allows to bill). Audit code can also initiate and close a work order.

AutoRead: software package from Sensus (brand of Xylem Inc.) that processes data from and to handheld devices, provides summary management reports and enables data uploads and downloads with the County's CPAK billing system.

Auto Reading (B read): meter reading is based on automated TouchRead or Flexnet transmitted reading.

Batch File Transfer: data is transferred in batch file (usually Text or ASCII file) from one system to another to be processed. AutoRead data is uploaded daily using a batch file system to CPAK.

CPAK: the County's customer service and billing system acquired and supported by AdaptToSolve Inc.

DWM: DeKalb County's Department of Watershed Management, the operational function responsible for water metering and field services.

Exception Code (CPAK): an alpha code with description assigned by the CPAK system (based on its internal control logic) to define why a bill did not release to invoice. Any exception with an 'Allow to Bill' status = 'No' is assigned to Billing Specialists for review.

Exception Code (Meter Reading/AutoRead): a numeric code entered by Meter Readers to indicate a reason that the meter cannot be read (e.g., Meter Not Found) or to initiate a work order to resolve a meter issue.

Exception Queue: list of customers (i.e., locations) with exception codes not allowed to bill and assigned to Billing Specialists within CPAK's Audit Readings screen. The list can be sorted by read date, route, location and other provided data elements.

FlexNet: the communication network installed and managed by Sensus/Xylem Inc. that receives and transmits data for the AMI system.

Handheld Device: portable electronic device that stores data from meter readings entered either manually from keypad or electronically from the TouchRead device.

High/Low (HL): an exception code that indicates whether a meter reading is high (300% higher than previous reading) or low (0 or negative reading) imported from AutoRead system.

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

Import reading vs. meter reading: the meter reading record in CPAK includes three distinct fields for comparing meter readings: the 'import reading' represents the meter register reading recorded in the field and imported to CPAK; the 'meter reading' represents the reading to be billed (if released to invoice) and may be estimated, corrected or revised by a Billing Specialist; the 'previous reading' is the last reading used in billing (last meter reading) and is used to calculate the usage or consumption in gallons.

Manual Reading (M read): meter reading is manually entered in handheld device using keypad.

MXU: Meter Transceiver Units installed within a meter box that provides two-way communication with the AMI radio towers, drive by receivers and TouchRead devices.

Multiplier: the meter register for the County represents either 1 or 100 gallons when read. The consumption or usage is calculated using the multiplier (current reading minus previous reading).

Rate Code: designates the type and size of meter installed at a customer location (e.g., W3/4 is water meter with 3/4" diameter connection; I3/4 is irrigation meter with 3/4" connection).

Reading Table: screen within CPAK billing system (see CPAK) for an individual customer account that shows history of meter readings with usage, billed (or not), estimate (yes/no), exception codes, audit code, and assigned user (i.e. Billing Specialist).

Rollover: indicates if a meter register has reached the maximum digits provided by the meter dial resulting in the meter returning to an odometer reading of 0. The meter will continue record water consumption.

Sensus: utility industry manufacturer that sells a range of utility meters, electronics and related solutions such as Handheld devices, software and communication networks. Sensus is a part of Xylem Inc.

TouchRead Gun: meter reading device that electronically receives data from a 'TouchRead' enabled meter and transmits data to a Handheld device (see Handheld). TouchRead guns may also serve as standalone reading device.

UCO: The Utility Customer Operations, the operational function responsible for water billing within DeKalb County's Finance Department.

Vendor Portal: the software designed for UCO (see UCO) users to view and approve customer water bills prior to mailing by the printing/mailing vendor.

Appendix 2: Summary of Issues and Recommendations

The table below provides a summary of issues and recommendations discussed in Sections 4 through 8.

Administration Key Issues and Recommendations
Key Issue 4.1: Lack of a Common Leadership Structure Water metering and billing governance, management, organizational reporting, and operations are bifurcated between two departments -- the Department of Watershed Management and the Finance Department's Utility Customer Operations Division. The two functions reside in differing departments reporting to differing department directors. Organizational and operational silos reduce the efficiency and effectiveness of water metering and billing. Recommendation 4.1 The County should merge the two bifurcated water metering and billing functions into a single organizational unit governed by a single department director that can oversee and manage end-to-end water metering and billing processes for the County. Key operational processes and procedures within DWM and UCO are interrelated and dependent upon one another due to the nature of the services performed by each department/division. Having a bifurcated organizational structure between two departments performing functions supporting a common service delivery goal creates strained communication, inconsistent execution of daily processes and procedures, and limited accountability for personnel performing tasks that cross departmental and divisional lines. Having a single point of governance over end-to-end water metering and billing processes, will allow for holistic management of customer service delivery, increased visibility into and control over internal/external reporting, and process standardization and consistency. The County should consolidate the water metering and billing function under the DWM and create a new organizational structure through the addition of a fourth division within DWM focused on water billing and customer service. The director of the newly created water billing and customer service unit should report directly to the DWM director to help elevate the importance of water billing and customer service and help ensure strategic focus on related processes. Key Issue 4.2: Reliance on Temporary Employees and Internal Promotion The County often relies on temporary staff to support key processes and does not proactively recruit externally to identify and acquire talent for vacancies. In addition, temporary employees are, at times, employed in managerial positions. Temporary employees in managerial positions receive no formal managerial training from the County. Further, many management positions within DWM and UCO are the result of internal promotions of personnel that were previously employed in a field or line service capacity. Executing the necessary tasks of a managerial position requires a different skill set than those needed to perform service delivery tasks. Recommendation 4.2 The County should implement a program to promote high performing temporary staff to full-time positions. By creating a formal career path program, DWM and UCO will encourage staff to perform at high levels and produce quality work products in an effort to receive a fulltime job opportunities at the DWM and UCO that offers security and a career path. The County should also develop an annual recruiting plan inclusive of forecasted activities and priorities to limit the need for temporary staffing solutions for full-time vacancies. The plan should ensure recruiting is timely implemented and allows DWM and UCO to be more competitive and proactive, avoiding the need to rely on temporary employees. DWM and UCO should define the skills and character traits needed to improve staff retention levels and improve employee morale. Defined skill needs and gaps will allow DWM and

UCO to tailor job postings and recruitment strategies to fill high need and high impact positions within the Department. Finally the County should perform a formal skills gap assessment to determine areas of greatest deficit as well as to assess the future workforce needs against current staff availability and competencies, particularly related to management level positions. The County should also prepare formal training material and conduct formal training sessions with personnel in order to educate towards organization goals, objectives, roles, responsibilities and relationships with other Departments. The County should prioritize management training.

Key Issue 4.3: Insufficient Knowledge Retention

When DWM loses critical members of their workforce, temporary employees may provide part-time assistance in relieving workload volume from the organization's fulltime employees. Temporary employees have the same workload as full-time staff, however they lack the security and benefits associated with a full-time position. Temporary employees also often lack the institutional knowledge necessary to analyze billing exceptions, circumstances, and potential resolutions.

Recommendation 4.3

DWM and UCO should prioritize filling vacancies with personnel who possess the necessary skill sets and ensure incoming staff are receiving adequate knowledge of daily roles and responsibilities. DWM and UCO should implement formal succession planning to facilitate effective knowledge transfer from staff leaving the organization to existing or new staff. Additionally, as mentioned throughout the report, the County should formally document policies and procedures throughout its water metering and billing functions to facilitate knowledge transfer.

Account Set Up Key Issues and Recommendations

Key Issue 5.1: Inefficiencies and Risks of Paper-based and Manual Processes

The process for new construction meter set-up is paper-based and manual from the initial intake process through the return of hardcopy work orders and customer forms, such as the Application for Water Meter Installation, increasing risk for human error and process inconsistency.

The opportunity for human error begins at the outset of the process when the County relies on members of the public to complete information regarding their new meter set up. As discussed, the County then routes four separate copies of the Application for Water Meter Installation to stakeholders around the County and then to outside contractors. Routing the documents in hardcopy form takes extended time and leaves the County staff with limited insight into the status of the documents as they wait for inter-office mail to be delivered or for contractors to return work orders and other forms. Additionally, work orders and Application for Water Meter Installation forms have been lost by contractors and County staff, causing delays and additional work for those staff members responsible for fulfilling the new water meter set-up requests.

In addition to the inefficiencies and increased risk of the paper-based processes, much of the information populated for new construction meter set up in either handwritten or manually input into information systems without opportunities for quality assurance and accuracy review. Handwritten notes often cause issues in interpreting the intention of the information provider – resulting in information later being incorrectly inputted into the County's information systems.

The manual entry of important customer information and meter data offers the opportunity for human error to affect the accuracy of water bills because the accuracy of water bills is inextricably linked to the meter number being correctly connected to customer accounts in CPAK. The jobs and responsibilities of Meter Readers and the Billing Unit are impacted by the accuracy of customer account information in CPAK. If meter numbers are not connected with the correct address, then the subsequent meter readings and billings for that meter number will not reflect with the usage on the customer's account who is being billed.

Recommendation 5.1

- The County should make initial application and intake steps electronic so that information can be routed electronically rather than via paper-based form. Enabling technology can decrease the paper-based processes utilized by the County and third party contractors, decrease the risk that important paperwork will be lost and delay the new customer set up process, and remove data entry process steps. If the County continues to maintain paper-based processes, they should, at minimum, enable technology to distribute the paper forms around the County rather than using inter-office mail. Inter-office mail adds multiple days to the overall set up process whereas

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

scanning and sending key documents or enabling shared drive capabilities allows key staff to receive documents instantaneously and at the same time as other key stakeholders. Additionally, leveraging technology to route important application paperwork provides the County and its contractors an electronic trail of where the documents are located and the status of the documents.

- The County should provide Contractors copies of meter applications and work orders in electronic format, avoiding the need for contractors to travel to multiple locations around the County before starting performance. Electronic work orders decrease processing time, improve security of work order documentation, and provide greater transparency into the location and status of work orders. Electronic work orders also mitigate the opportunity that the contractor will lose the application and work order paperwork the County requires to be returned before the new customer set up process can continue. As the County begins developing RFP requirements for the upcoming new construction meter installation services contract, the County should require that respondents have the capabilities to receive work orders electronically and have a process for electronically routing the work orders to their individual employees. Additionally, the County's procurement function should prioritize the electronic capability requirement during the response evaluation.
- The County should no longer accept handwritten notes and information from contractors in the field because manual entry has the potential to lead to inaccuracies when updating customer meter information into the County's billing software.

Key Issue 5.2: Limited Customer Service Focus

The process for new construction meter set-up is not focused on the customer experience. Generally, the County is dictating the form in which it wants to receive key information from the new construction meter applicant without first considering the applicant's preferred method for communicating the information or providing multiple options to meet the preferences of a diverse set of stakeholders. Further, once the County obtains the initial information from the applicant, there is no additional touchpoints with the applicant to provide status of the meter installation. The applicant must proactively contact the County for an update regarding the timeframe for receiving water service, which is common as the County is averaging nine to ten weeks to complete the process as compared to an established goal of providing service in four to six weeks.

Recommendation 5.2

- The County should offer the Application for Water Meter Installation forms online so that the information may be submitted online or completed ahead of the applicant visiting the Maloof Center for submission – doing so allows the customer to do any research necessary to complete the information requested accurately and also decreases the amount of time that the public needs to spend in person trying to receive new water meter service. Electronic entry of key customer data makes the process easier for applicants and decreases the opportunity for key information to be incorrectly populated and transposed by County staff.
- The County should offer customers a more readily-available status of meter applications and installations. The County should consider a self-service website for applicants that does not require the applicant contacting the County directly for an update on the standing of their Application for Water Meter Installation. Developing a comprehensive knowledge base in conjunction with an online self-service website would improve customer satisfaction and reduces time and effort required by County staff.
- The County should provide a comprehensive knowledge base for UCO Customer Service Representatives to access to answer questions related to new construction meter set up status and other frequent customer inquiries to increase the rate of first call resolution.
- The County should consider co-locating some Meter Application and Installation personnel to help expedite the process of sharing application information through the County. Co-locating key stakeholders may help expedite the intake, routing and data entry process by providing a "one

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

stop shop” for stakeholders to address questions, interact with customers and better direct the efforts of outside contractors.

Key Issue 5.3: Lack of Optimization of Information Systems

The County uses multiple technology systems which are not fully optimized to support the account set up process. Additionally, County processes are not fully stabilized due to recent and upcoming transitions of multiple technology systems. The County recently implemented Cityworks in December of 2016, with the technology currently being rolled out to additional DWM staff over the last 2 months. The County is also in the process of procuring a new billing system to replace CPAK. The implementation of Cityworks offers the County additional capabilities to improve and enhance the process in which new construction meters are deployed. The County is continuing to provide outside contractors with hardcopy work orders that drive the services provided. As discussed, maintaining the paper process does not allow the contractor the ability to upload pictures of newly installed meters that members of the DWM’s Field Services are beginning to do, albeit inconsistently. In addition, key members of the new construction meter set up process do not have access to both CPAK and Cityworks, making it difficult to address applicant questions when received and assist with the set up process as needed. As mentioned above, the County is in the process of replacing the CPAK billing system which will require DWM staff to alter the current business processes to align with the capabilities of the new billing system. Current CPAK technology and capabilities do not offer interface capabilities with the County’s other systems that support the new construction water meter set up – namely Cityworks and WAM.

Recommendation 5.3

- The County should consider providing access to key portions of the County’s billing system to Meter Application and Installation personnel. Access to customer notes can enhance the ability of personnel to answer questions without needing to contact other DWM or UCO staff when trying to address questions or clarify account set up issues.
- The County is currently evaluating RFP responses for a new billing system (CIS) to replace CPAK. The County should establish processes to integrate related data components in the current billing system and work order system into the selected billing system. Billing and work order system integration is key to managing new meter set up workflow and can add efficiency to the process by eliminating the need to operate in multiple systems (CPAK and Cityworks) that do not interface. Integration also offers the ability to reduce risk of billing errors and inaccuracies by reducing conflicting data in the various systems.
- The County should require photos be taken of meter installations and then uploaded to Cityworks to ensure that the County has a comprehensive database of meter pictures, regardless of which party is installing meters.

Key Issue 5.4: Overreliance on Third Party Contractor

The County relies on the meter installation contractor to perform meter installations as part of the new construction meter set up process. The County has high level insight to the volume of installations the contractor is performing but is not leveraging data or other KPIs to provide more strategic oversight and management of the contractor’s performance and the quality of the meter installation. The County has one supervisor who oversees the management of the new construction meter installation contract. The contractor manages the performance of its employees and interacts with DWM management regularly during the process of obtaining new work orders. Generally, the County believes there is opportunity for the vendor to improve performance by hiring additional employees and providing stricter oversight of the current employees. County employees reported having issues in holding the new construction meter installation contractor accountable for performance and it was reported by the County that the contractor continues to have issues in returning important paperwork, causing delays in the overall customer set up process.

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

Recommendation 5.4

- The County should develop robust vendor management protocols within their contract terms and conditions and contract management processes to ensure that contractors are evaluated on the volume of successful meter installations and the quality of services performed.
- For example, the County should have insight into how frequently they need to send out DWM Field Services staff to address issues or mistakes generated by the contractor. Metrics should be developed and used to ensure that the contractor or contractors are incentivized to address water metering and billing issues, not creating additional issues that lead to billing inaccuracies. Billing inaccuracies can stem from improper meter set up, configuration and misidentification of meter numbers – all of which can take place during the new construction meter set up process.
- The County should establish a stronger end-to-end contract management function in DWM to manage all aspects of third party vendors, specifically the contractors who are installing or replacing new meters. DWM should work more closely with the County Purchasing and Contracting Department to establish comprehensive vendor standards and performance measurements. The County will benefit from enhanced vendor accountability and the critical role the contractors play in the overall success of the water metering and billing function requires full-time oversight and commitment of at least one individual.
- The County should conduct a feasibility study to determine and measure the pros and cons of outsourcing new construction meter installations as opposed to performing the installations internally with County personnel.

Key Issue 5.5: Limited Staffing Capacity

The County relies on the contributions of a small number of staff members to fulfill the new construction meter set up responsibilities. Generally, the staff members performing key functions operate individually and not in collaboration with other staff members or with oversight provided by their function managers. Additionally, there is no formal succession planning or desktop procedures and job aids that would facilitate the transition of institutional knowledge during turnover.

Recommendation 5.5

- The County should develop formal desktop procedures, knowledge base content and succession planning to help ensure that the skill and experience of tenured staff members is maintained within the Department.
- The County should cross-train key members of the new construction meter set up process to better understand the technology and the end-to-end process to foster a redundancy in human resource capabilities should staff members be out of the office. Cross-training will help ensure that the new construction meter set up does not stop should someone be out of the office.

Meter Reading Key Issues and Recommendations

Key Issue 6.1: Aging Meters

Approximately 33% of residential meters are over 15 years old and nearly past their useful life. The County does not currently have a clear replacement plan. The County began in 1993 with the installation of the TouchRead meters in order to decrease the opportunity for human error during meter reading. The implementation of TouchRead increased billing accuracy and reduced meter reading expenses, however many of these meters are still in the ground today and have been in place past their useful life. Meters that have been in the ground for more than 20 years run the risk of delivering faulty or incorrect water usage data, and inaccurate bills.

Recommendation 6.1

The County should replace manually read and other older meters based on their age (more than 30% of meters in the ground are 2001 or older). DeKalb County should prioritize replacing older manually read meters in addition to routine meter changeouts for meter failure. Planning and management of the overall meter changeout program should integrate replacement of older manual meters and ensure accurate meter data is recorded and provided in electronic form for CPAK updates.

Key Issue 6.2: Lack of Route Optimization

DWM has not recently reviewed and appropriately redistributed the number of meters assigned per routes, creating inconsistent meter reading workloads. Over the past 3 years, approximately 3,000 new metered accounts have been added to the system and assigned to routes based on proximity. This 'ad hoc' growth in meters per route does not consider specific workloads per route or a balancing of meters and types read by route and group. This results in routes that contain zero to ten meters and some that contain over 5,000 meters.

Recommendation 6.2

The County should review and appropriately redistribute the number of meters assigned per routes to ensure routes are being read in the most efficient and effective manner. DWM can benefit from performing an assessment of the distribution of meters by group/route considering factors such as the type of meters, route characteristics, read times, and travel distances. Each Group should contain roughly the same amount of meters. In addition to group optimization, the route should be revamped to ensure equal distribution. An unequal distribution can create an unequal workload for Meter Readers.

Key Issue 6.3: Minimal Use of AutoRead System Reports

DWM does not leverage the existing AutoRead reports to proactively mitigate mistakes on the front end. In the past, DWM had an employee in charge of looking through AutoRead reports to identify and help resolve issues and Billing Specialists performed their own analysis. However, the DWM employee working through AutoRead reports was moved to a different part of the organization as DWM determined Billing Specialists were able perform their own analysis, though this occurs on a limited basis.

Recommendation 6.3

The County should leverage existing AutoRead System Reports to control errors and omissions prior to CPAK upload. The County is not currently leveraging existing reports for individual routes. Outside of the Master Route Report, there is little utilization of AutoRead exception reports, such as Non-Read Exception Report, Route Exception Report or Register Malfunction Report, to actively identify meter reading issues before they develop into billing issues. DWM should leverage a full-time employee to help analyze these AutoRead reports and proactively resolve potential billing issues.

Key Issue 6.4: AMI/AMR Technology Capability

DWM has the ability to read meters from a group of single antennas across the County, eliminating the need for physical meter reading. However, the County has not fully deployed AMI/AMR technology. From 2012 to 2016 over 30,000 FlexNet meters were installed. Additionally, the County decided to move forward with converting to 1 gallon for billing (instead of 100 gallon) for all FlexNet routes. This applied to the current installed FlexNet, new FlexNet installation and retrofit (MXU installation) routes. The infrastructure for FlexNet fixed based system has the ability to provide coverage for over 98% of the County, however that coverage has not yet been achieved.

Recommendation 6.4

The County should expand AMI/AMR technology capability system-wide to eliminate time-intensive manual processes, reduce meter reading errors, and identify leaks timely. With an AMI system, the distribution network can be continuously monitored by hourly interval reads. Recent advancements in meter data management have allowed a water utility to find evidence of leaks before they hit the surface. With and automated meters, the County will have the opportunity to detect problems earlier and thus intervene to help customers only pay for what they actually use while at the same time reducing the need for physical meter reading.

Key Issue 6.5: Frequent Malfunction with Handheld Technology

DWM staff noted malfunction or other issues with handheld technology as their biggest challenge on a daily basis. DWM noted issues with devices holding a power charge, limited storage capacity and GPS capabilities. With such a high reliance on technology, it is imperative for DWM to have devices and systems that are functioning to the highest level and ensuring consistency in their work.

Recommendation 6.5

The County should ensure equipment is in serviceable condition before being deployed to the field and develop a program with parameters regarding replacing equipment that is nearing the end of its useful life. DWM should upgrade/replace outdated equipment to help eliminate errors caused by non-functioning technology. The meter reading function relies heavily on technology to perform job responsibilities on a daily basis and current technology has led to inefficiencies in the Meter Reading and Field Services daily job responsibilities.

Key Issue 6.6: Inconsistent Ability to Effectively Read Meters

UCO and DWM staff are not routinely trained on performing manual reads and there is no staff accountability associated with an incorrect reading. As discussed, Manual and TouchRead meters look different in the field, use different combinations of digits, and also leverage several different multipliers. Meter Readers may have a difficult time identifying the number of digits to read on a meter in the field and will enter the incorrect consumption, leading to a high/low exception in CPAK.

Recommendation 6.6

The County should develop and provide Meter Readers with a quick reference card for manual meter reads. A large number of manual readings still occur from older manual meters and TouchRead meters that do not transmit. Developing quick reference cards for all meter types in the field will help ensure Meter Readers have a "single source of truth" regarding the varying types of meters and the number of digits to be read. DWM should also ensure Meter Readers are consistently following policies and procedures and leverage existing technology to supplement decisions in the field. Accurate meter reading processes can help ensure accurate customer bills and consistency throughout the billing lifecycle.

Billing Key Issues and Recommendations**Key Issue 7.1: High Volume of Exceptions**

A high number of meter read exceptions result from a combination of factors: inaccurate data from meter reading, field services, and contractor installments; estimates and other methods to correct or normalize meter reads in previous cycles; and staff turnover and experience. The number of High/Low exceptions increased in 2016 by over 40% from 2015. High numbers of exceptions result in increased workloads for Billing Specialists and delayed resolution times for customers. As discussed, key factors influencing the recent increases include:

- The High/Low threshold being reduced from 500% of the previous reading to 300% in mid-2015.
- The Held Bill policy that covers statements from September to December 2016.
- An auto-estimated batch of over 10,000 accounts conducted in August 2016.

In addition, staff turnover over the past three years contributed to the ability of UCO to effectively process exceptions apparently resulting in 68% in 2015 and 65% in 2016 of exceptions released "as is" compared to 55% in 2013 and 48% in 2014.

The backlog of pending "routine" exceptions to be processed by Billing Specialists is almost 7,000 with an average of 625 each for the 10 Billing Specialists. Held bills which are being processed separately by the Triage team accounting for 97,000 exceptions pending (for 30,500 accounts).

Recommendation 7.1

- The County should develop realistic performance indicators that reflect work outstanding/completed. Billing Specialists process exceptions that are released "as is" or after estimated/corrected work. Exceptions released after estimated/corrected work take significantly longer than exceptions released "as is". As such, performance metrics are needed for both exception types to assess staffing needs relative to current workload and exception backlogs. Examples of metrics include number in queue, days in queue, released per day and work orders outstanding.
- The County should improve the detail and flexibility of exception reporting to meet the needs of multiple purposes and users, specifically for Billing Specialists. Many of the existing reports are oriented by route group which are useful for investigators, Meter Readers or field staff. However, performance reporting related to exception processing by Billing Specialists is needed

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

in conjunction with the metrics and procedures described above. Specific reports are needed for manual read exceptions, multiple exceptions per account, and "as is" and estimated/corrected releases. Billing Specialists also indicated that work order status is difficult to be identified when processing exceptions (e.g., work order is completed for specific exception). In lieu of a software revision, a specific report with open/updated status could address this issue. New CPAK reports should also be used by field services supervisors and staff as appropriate.

Key Issue 7.2: Errors from Manual Meter Reading Processes

A significant number of exceptions are generated from manual reading of meter data (76% of all exceptions estimated or corrected resulted from manually read meters). There are 10,113 older meters that require manual readings and other cases where touch reading does not register and manual reading on the device keypad is required. Because of the variety of meter types installed, different meter digit registers have 4,5,6,7 digits in addition to 0,1,2 decimals (a meter register is recorded on a handheld keypad only to left of decimal). Erroneous manual readings have been frequent adding or omitting digits from the register. Also, as discussed earlier in the Meter Reading section, there is limited data quality review and reporting prior to upload of data from AutoRead system. Thus, errors are not fixed at the source and tend to re-occur in subsequent billing cycles. The County lacks standard procedures for Billing Specialists to release bills "as is", through estimation, or to provide guidance on the number of estimates per account, which would help mitigate the high volume of exceptions generated through older, manual meters.

Recommendation 7.2

- The County should prepare standard procedures for releasing bills "as is" and estimating and calculating revised bills. While general billing procedures exist, the focus of this recommendation is processing of billing exceptions. The review and release of exceptions 'as is' is the most straightforward step in the exception process and these make up most of the exceptions released. However, the use of standard criteria and conditions for release of these bills is not well documented and is needed to help in the release of bills that may be erroneously high. Standard procedures for making estimate and correction calculations also need to be better documented under a range of scenarios with inconsistent, inaccurate or missing data and meter changeovers/rollovers. Updated and accepted procedures are necessary to support staff training. Responsibilities of supervisors, analysts and Billing Specialists, important for accountability, are discussed as a separate recommendation.
- The County should develop easy to use automated tools to facilitate estimation and calculations. Billing Specialists typically use manual calculations as well as personal judgment in determining the basis for calculations. The tools may be updated versions of some of the existing Microsoft Excel tools with more detailed scenarios and examples. The Billing Specialists indicated that CPAK's auto-estimate tool is not reliable or accurate because of data issues and, therefore, is not being used.
- The County should leverage workflow capabilities currently existing in CPAK to limit the number of estimations that can be done on a singular account successively. Enabling this feature will help standardize the process for working billing exceptions, forcing Billing Specialists to follow procedure and investigate bills. In addition, such a feature will help reduce the number of exceptions that occur once an actual reading is obtained for an account, limiting the number of "catch up" exceptions as previously discussed.

Key Issue 7.3: Limited Controls in Bill Estimation/Correction Procedures

The County has limited documentation of methods and steps for estimating, correcting or releasing bills and is not fully utilizing the automated estimation/correction controls available in CPAK. Based on interviews with Billing Specialists and demonstrations of actual bill corrections, judgment of multiple conditions and several manual calculations are generally used to resolve a bill exception. There is flexibility on the part of the Billing Specialist on procedures and methods used to estimate or calculate the revised usage based on various conditions identified. Billing Specialists also use individual judgment to release an exception 'as is' if it appears reasonable within the read history.

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

Though a Microsoft Excel workbook for exception calculation is available, there is limited use of the workbook among Billing Specialists.

Further, the CPAK software does contain a feature that limits the number of estimations a singular account can have in a row. However, the County elected to “turn off” this feature in CPAK and as a result, Billing Specialists are able to estimate a bill cycle after cycle indefinitely. By not reactivating this available workflow within CPAK, the County is not fully leveraging the technology tools at its disposal and enabling a process that supports bill estimation rather than bill investigation.

Estimates, including the recent batch automated estimate, has been used to help reduce the backlog in pending exceptions. If an estimate is much lower than the actual usage (that may be unknown), then a subsequent correct reading can result in a high ‘catch up’ bill that will also generate an exception. Many accounts have multiple exceptions that cannot be released until a prior cycle exception is processed and billed.

Recommendation 7.3

- The County should develop quality control objectives for critical billing data inputs. UCO and Billing must take the lead in clearly defining quality control objectives for DWM meter reading, field services and new services/connections and work with DWM and IT to ensure continuous progress is made with data quality and integrity. The quality control objectives should be measurable, achievable and readily available for routine management reporting.
- The County should prioritize replacement of remaining manually read meter with meters outfitted with AMR/AMI technology to improve meter reading accuracy and efficiency. The County still maintains over 10,100 manually read meters that have not yet been replaced. The County has changed out over 68,000 meters over the past 5 years without addressing the manually read meters. The change out program has been temporarily suspended pending meter type decisions, however, DWM continues to conduct meter repairs and replacements, when necessary, as well as FlexNet MXU installations (more discussion provided in Section 7-Field Services).

Key Issue 7.4: Insufficient Processing of Routine Exception Process

The staff available to support the manual and extended procedures for completing the exception process are not able to sufficiently keep pace with the number of exceptions that are occurring and requiring review. The Billing Unit has 14 staff including a Supervisor, three Billing Analysts and 10 Billing Specialists. To efficiently and effectively ‘work’ billing exceptions with a range of unique conditions and data, a relatively high level of skill, training and experience is required. There has been high staff turnover in Billing Specialists with all 10 employees starting 2014 and after. There are 6 temporary employees out of 10 Billing Specialists. Staff turnover and training needs are key factors effecting exception process performance. The number of estimates/corrections released averages 15/day per Billing Specialist and the pending queues average 625 each. The time to release exceptions (with correction) has increased beginning in 2016 to average of 37 days after meter reading (average for 2012-2015 is 16 days). The learning curve for a Billing Specialist is steep with a wide variety of techniques, calculations, and CPAK features to achieve.

In addition, Significant UCO resources and work efforts are currently committed to the Triage Billing team with a Manager and 5 filled position (and 15 vacant positions) and Issue Resolution/Assurance Unit with six positions (one vacant). These teams are supporting the New Day project and Held Bill and dispute resolutions. The resource commitment and work being generated in UCO and DWM field services by these groups compete with that of the Billing Unit. As a result, there is fragmentation of operations and oversight of these units, especially within DWM, is affecting data integrity. Maintaining current billing work flows across multiple units through exception processing is critical to maintaining backlogs at acceptable levels.

Recommendation 7.4

- As part of developing new/revised standard procedures, the roles and responsibilities of key billing positions (Billing Supervisors, Analysts and Specialists) should be defined to provide delineation of tasks and accountability. The roles/responsibilities should include performance

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

objectives as well as working relationships relative to other organizational units within UCO and DWM.

- The County should conduct needs assessment of current and projected workloads across UCO roles to identify gaps in staff skillsets and capacity. This assessment could include a 'job activity survey' to identify how existing employees allocate their time and opportunities for improvements.
- The County should provide means for contract employees to be hired as County employees and seek to fill vacancies with County employees. There are an estimated 26 contract employees within UCO. The County is making significant investments in training and on-the-job education of contract employees with typically high turnover.
- The County should prepare updated training programs, specifically training for Billing Specialists and Analysts should include actual case scenarios for the variety of conditions and exceptions encountered. With new employees and detailed work activities and systems, training is a critical on-going role within UCO (currently supported by a Manager and two Trainers). Training and re-training is needed as new processes, metrics and responsibilities are rolled out.
- The County should cross train and rotate Billing Specialists and Analysts. As employees are trained and retrained, the County should enable Billing Specialists and Analysts to rotate to other units and work with teams across organizational lines. Creating more flexible cross functional and team-oriented organization will help fill staffing gaps and support priority needs and projects.
- The County should consolidate and strengthen management and controls between UCO and DWM billing functions. Initial consideration should be given to assigning Billing 'coordinators' in UCO and DWM to oversee key teams in each department as well as interactions between UCO and DWM units and locations. The coordinators should have strong management analysis and technology skills with Director report authority. Fragmentation of operations and oversight of these units, especially within DWM, is affecting data integrity. Consideration should also be given to dividing Technical Services into two separate sections: 1) Meter reading and field services and 2) Construction and inspection. Stronger management with implementation of quality control objectives and policies/procedures as discussed previously is recommended for UCO and DWM to work effectively together.
- The County should review and update communication protocols. A communication plan is recommended to define and encourage the exchange of information within DWM field services units and UCO as well as between the units. The plan should define the communication channels for proposing and developing new policies, procedures, performance measures, and reporting. The plan should also define how any changes in policies and procedures should be approved and well communicated to promote understanding and practice.

Key Issue 7.5: Complexity from Use of Multiple and Aging Information Systems

The CPAK system is limited in its capabilities for DeKalb County's size and complexity. The County is currently in the procurement process for a new customer information system (CIS) for customer services, billing, collections and payments to better meet its water billing requirements. The new system is envisioned to bring a host of enhancements with robust features, business processes, reporting, user experience, security and integration with other systems.

The following technology issues were identified as affecting consumption accuracy, billing work processes, and user efficiency and effectiveness.

- Integration. The current deployments of Cityworks and Oracle WAM requires manual data entry of work order data in CPAK as well as these source systems. These systems provide important meter identification and meter reads for meter installations and new connections. The County also uses batch file transfers for meter inventory data (from Kendall) and daily uploads of meter reading data which is then processed by CPAK including any errors or inconsistencies. Staff indicated that the Kendall transfers are not consistent and data for new meters is often not in the CPAK inventory.
- System Complexity and Work Flow. Since it's installation in 2003, the CPAK system has been updated with features as the needs of DeKalb County have required and has a full range of

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

functionality and features for a utility customer information system (CIS). The system is viewed by several experienced users as complex and difficult to intuitively accomplish billing tasks. There is a large number of codes and configurations for exceptions, audit and work orders that have accumulated over the 13 years making it more complicated to manage work flows and less useful for reporting. Mastering the system features in combination with business logic for exceptions and estimates requires significant user training and experience.

- Reporting. There are several 'custom' reports that are available for Billing Supervisor and Specialists, however, they do not appear to be used routinely or meet the specific needs of daily work processing. The existing reports provide exception counts by type, route, and Billing specialist and includes a listing of meter readings changed by Billing Specialists. However, standard performance-oriented reports are not evident for tracking exceptions pending, released 'as is' or released as processed by Billing Specialist or prioritizing work using business requirements or logic.
- Reliance on Vendor. CPAK Technology Solutions is heavily relied upon for overall system support and operations as well as data integration, configurations and user training. CPAK is a small company having DeKalb County as its primary billing system client.

Recommendation 7.5

- The County should evaluate alternative interface designs for AutoRead, CityWorks, and warehouse and inventory systems to enable effective data exchange. The critical interface requirement at this stage is the interfacing of CityWorks and other manual data entry paths to CPAK. As the County begins to implement a new CIS, the interface requirements for all source data systems should be evaluated to develop a 'modern' interface environment that provides accurate, reliable and up-to-date information for billing purposes. Interface architecture and design should be conducted in coordination with the vendor/implementer of the new CIS system but should be independently conceived and not driven by the vendor's system requirements and/or protocols. The current interfaces for meter and meter read data consist of batch file transfers (e.g., daily). Real-time interfaces via web or scripting services would allow more timely data access to identify errors and enable action to be taken more quickly than batch data. A holistic design of the CIS interfaces would also enable a wide range of options for using CityWorks, Sensus and Oracle systems to accomplish work order driven tasks and capture field data using automation (vs. manual entry) such as meter ID scanning and Touchread and Flexnet technologies.
- The County should develop a quality assurance and quality control (QA/QC) program for the Sensus AutoRead system. This recommendation is presented and discussed in more detail within the Meter Reading section. Limited QA/QC of meter reading data is a key data integrity issue needed to filter and service exceptions prior to CPAK import. This program should be developed with the 'status quo' technology including performance objectives, procedures and reporting as discussed previously. As new systems and interfaces are developed this QA/QC program should be updated accordingly.
- The County should streamline CPAK codes and configurations for work flows to reduce opportunity for error and increase usefulness of available reports. Within the CPAK system, there are 100 audit codes, 77 exception codes and 88 work order codes – the majority are not used routinely, some are inactive and some are duplicated. Audit and exception codes can be configured to trigger work flow tasks such as a work order or bill review/release. Codes are also important for management and operational reporting. Over time, codes are created on ad hoc basis and not routinely managed or maintained. A review of these codes and how they are configured within CPAK for workflow tasks is needed especially prior to migration to a new CIS system.
- The County should review and revise CPAK user permissions to limit access to a needed basis, thus enhancing data security. CPAK has a growing number of users each assigned to a user or permissions group to access selected features. There are 792 user accounts assigned to CPAK and of these, 435 are relatively active users and 52 accounts are assigned to full privileges including security. Several interviewees indicated concern about who had permission to what

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

features. One identified a case where a configuration change was made that erroneously affected meter usage multipliers. UCO should conduct a review of all CPAK users, inactivate users that do not exist or should not be assigned and confirm or revise user permission assignments. The CPAK IT administrator should take responsibility for overseeing and managing users and their privilege assignments.

Field Services Key Issues and Recommendations

Key Issue 8.1: Limited Management Capacity

Management control over the various Field Services units appears fragmented and is limited regarding directing and coordinating the range of internal resources and outside vendors. Field Services faces challenges from new priorities, processes and technologies resulting in a large volume of work orders and data. These new priorities were preceded by the re-organization and staffing changes (e.g., retirements, hiring) discussed in the previous sections. UCO directives and needs drive much of Field Services work, and coordination and cooperation is critical for overall operations. Supervisory accountability is not effectively delineated from the top level down. Supervisors appear to adequately delegate routine daily tasks to Field Services personnel but lack management analysis and technical skills needed to manage work priorities, flows and data. A lack of management analysis and management of work priorities, affects the efficiency of staff and results in a perceived lack of adequate staffing levels.

Recommendation 8.1

- The County should create a new supervisory unit with increased input into overall Department strategy and improvement efforts. The supervisory unit should include meter reading and 2 Field Services units that respond to routine UCO needs and CPAK work orders. This unit should be augmented with staffing capabilities including data analysis and software application skills. Dedicated resources for quality control across various Field Services units is critical component of this organizational unit. This unit should have responsibility for all meter reading and field service data that interfaces or entered into CPAK or future billing systems including work orders from Cityworks and CPAK. The new supervisory unit would be given primary responsibility to manage/coordinate directives from UCO and support other DWM entities in making associated changes.
- The County should revise and develop new management and operational reports. As data quality objectives and priorities are established, new reports should be developed to provide management summaries and details of work accomplishments, outstanding work orders and exceptions. These reports from both CPAK and Cityworks should include common and consistent measures needed for routine and non-routine billing needs.

Key Issue 8.2: Work Processes

Manual processes compounded by data quality issues and limited long range planning have impacted the effectiveness of DWM's Field Services unit. In addition to the changes precipitated by billing issues, several factors are contributing to or causing operational and data integrity issues within the CPAK work order, meter installation, and meter change out processes. Three different software systems are used with many different work order types and workflows to manage and various and disparate entities within UCO and DWM, as well as, vendors are involved with meter activities and data. Data quality issues will continue to occur with limited quality control and system integration. Further analysis of specific processes are summarized below:

Meter change out program. Over 68,000 meters were changed out over the past 5 years (mostly by contractors). A review of the change out program plans and routine status reports indicated a focus on planning and managing work and various technical aspects of the program but little emphasis was placed on responsibilities and procedures for data outputs required for CPAK. The paper based nature of the process has further emphasized the issue. Quality control issues have also resulted from poor meter inventory data and well as work order outputs.

Manual and paper-driven processes. The work processes using Cityworks and WAM involve paper work orders in key steps where data is compiled and documented. Meter identification and read

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

data is captured within the work orders which are subsequently entered in CPAK. The key problems resulting from the paper process include:

- Errors in either meter identification or meter readings
- Lost or misplaced paperwork
- Inefficiencies created by physically assigning and routing work orders (e.g., prioritize/sequence workflows) as well as the documentation, double data entry and re-working of work order data.

The various Field Service units including Planning/Inspection and Construction also interact with UCO groups, Engineering and GIS as well as a number of contractors and vendors. The lack of effective coordination and communication among groups have been attributed to a variety of operational issues affecting Field Services' day-to-day work.

Recommendation 8.2

- The County should revise business processes to optimize capabilities and use of Cityworks to support billing and meter activities. As Cityworks is implemented as an asset management, maintenance and work order system for DWM's overall operations, specific workflows should be developed for related work processes. These workflows would seek to streamline the current parallel use of Cityworks and CPAK for work orders and include staff and contractor responsibilities as well as data quality control objectives and procedures for data documentation. A key part of this effort involves the review and revision of CPAK and Cityworks codes, assignments and workflow steps/sequences to provide consistency between systems and prevent overlap inefficiencies. As cited earlier, there are 85 different work order codes used in CPAK that can be configured for processing assignments. These codes and assignments should be revised to redirect work tasks and address priorities as needed. As Cityworks is further deployed, its work order types and assignments should be assessed and updated to support a streamlined the application of the system.

Key Issue 8.3: Reduced Data Quality

Data quality is reduced by ineffective and inconsistent processes for data input. Cityworks operates as a standalone system, runs parallel to CPAK and requires work order and meter data to be entered and closed in both systems. Cityworks workflow uses manual and paper based work orders to obtain meter data which is then entered in CPAK. As a result, data entry is conducted on both Cityworks and CPAK. While CPAK work orders are integral part of the CPAK system, there are quality control concerns with meter and consumption data transmitted to/from the handhelds (via the AutoRead batch interfaces) as well as data entry of manual work orders. Additionally, for meters installed not in the CPAK inventory, data often needs to be tracked down from Kendall Supply and entered and configured in CPAK.

Recommendation 8.3

- The County should establish quality control objectives and data requirements for Field Services processes based on customer and billing needs. UCO should set clear expectations for Field Services data quality, consistency and accuracy. UCO should also define detailed specifications for meter identification, reading, configurations and schedules for data inputs. These specifications would serve as standards with definitions and guidelines to be used by all systems and work processes providing meter related data to the billing system. Routine QA/QC training programs for field staff specifically focusing on all meter related data inputs should be used to help enforce new requirements. Job descriptions and staff performance evaluations should subsequently be revised and include QA/QC performance objectives. QA/QC training and performance objectives should cover use of CPAK, Cityworks and AutoRead applications.

DeKalb County Water Metering and Billing Audit Report
Draft for Discussion Only

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