

Kalamazoo Water System Capacity Study

Section D—Gap Analysis

Project No. 201542
April 27, 2022



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Introduction

The City of Kalamazoo (City) Water System has the largest groundwater-based drinking water system in the state of Michigan. The system is very complex, consisting of 96 available supply wells, 16 well pump stations, 20 booster/bleeder stations, and 11 pressure districts. The City manages water quality and demands between the pressure districts using the supply wells, the pump stations (some of which provide treatment), and booster/bleeder stations. The water system has developed over several decades and has some assets that are aged. This warrants intense operational activity, life-cycle delivery, managerial oversight, technical competency, and capital investment. These demands may exacerbate the “gap” between the current capacity and what will be necessary to meet system and regulatory requirements.

On December 21, 2020, City Council approved the Administrative Consent Order (ACO), dated December 3, 2020, between the City and the Michigan Department of Environment, Great Lakes, and Energy (EGLE). The ACO requires the City to submit a Capacity Study for EGLE approval by March 31, 2022. The City requested, and EGLE approved, an extension to submit the study no later than April 30, 2022. The City requested assistance from Fishbeck and Applied Asset Management to complete this Capacity Study.

An outline of the Capacity Study report was submitted to EGLE and approved. Based on this outline, the report is divided into four main sections: Technical Capacity, Financial Capacity, Managerial Capacity, and Gap Analysis and Implementation Plan.

For the Technical Capacity section, existing studies and other documents related to the technical capacity of the water system were reviewed for gaps and deficiencies. The reviewed documents are available upon request.

The Financial Capacity section consists of documentation that demonstrates the City’s financial capacity. It includes relevant documents such as the annual budget plan for 5 years, Capital Improvements Plan, water rates and fee structure, and Water Resources Division performance-based budgeting programs.

The Managerial Capacity section contains information identifying the organizational structure and required funding to operate and manage the water system in compliance with Safe Drinking Water Act (PA399) permit requirements. In addition to reviewing existing documentation, interviews were conducted with various City staff and the City’s water rate consultant to evaluate gaps and deficiencies.

The Gap Analysis and Implementation Plan section includes the deficiencies identified from a review of the first three sections.

Gap Analysis

Section D



Technical Capacity Gap Analysis

Section D1

Information Reviewed

The technical capacity review information included the following:

1. City of Kalamazoo Water System Reliability Study and General Plan dated December 2017 (draft) and InfoWater-based hydraulic model.
2. Water Resources Division Asset Management Plan (WAMP) submitted to EGLE dated 2017.
3. Environmental System Research Institute (ESRI) based Geographic Information System (GIS) of the City distribution system.
4. Water Pumping and Distribution Emergency Response Plan.
5. City's Standard Operating Procedures related to areas of coverage: This document was read to understand the intent. The content related to the specific procedures was not reviewed. It is assumed that EGLE will provide any content related reviews.
6. Job descriptions.

To provide a better understanding of the gaps identified, *italicized* text indicates direct excerpts from the existing referenced sources.

Water System Reliability Study and InfoWater

1. The Reliability Study indicates the estimated water loss in the system averaged 18% over the past two years. The known sources of water loss should be tracked and estimated to prevent lost revenue as a measurable item.
2. The wellhead protection program was last approved in 2011. The program needs to be updated.
3. Demand projections should be updated as part of the updated study effort. We recommend climate change be considered in addition to typical factors of historical use trends, population growth, unaccounted water, etc. Consideration of climate change may be limited to available data but can be mentioned as a component to track.
4. Water Loss – We recommend including updates on the water meter testing and replacement program within the Reliability Study.
5. “Water System Deficiencies document” is referenced in several places in the report. We recommend referencing this information as the appendix and deleting the word "document."
6. The Level of Service (LOS) is not consistent between the WAMP and the Reliability Study. We recommend the LOS for the system be redefined with well-defined statements and linked to the Strategic Asset Management Plan (SAMP) and Imagine Kalamazoo 2025 (IK2025).
7. The Annual Water Quality Report within the Reliability Study needs to be updated using current samples.
8. The condition of the water main should be observed and documented by the City staff repairing the main break. We recommend this information be tracked with required field data in Lucity Asset Management or ESRI GIS Software. The results of the evaluations should be included in subsequent Reliability Study and WAMP updates as an additional way to prioritize pipeline replacement projects.
9. The Reliability Study recommends structural repairs at Stations 2, 4, 5, 9, 12, 14, 17, 18, 22, 23, 24, and 26. This information needs to be updated if the repairs have been completed.

10. *General maintenance of equipment and facilities enhances overall system reliability. All water system assets in the Kalamazoo water distribution system are included in Lucity Asset Management Software, which is also used for work orders and system maintenance.*
 - a. We recommend reviewing this and determining what staffing and managerial capacity exists for an adequate Preventative Maintenance Program consistent with the Operation and Maintenance (O&M) resourcing strategies and the rate forecasting model.
11. *Recommendations have been separated into projects and general improvements based on the above criteria and demand projections. Recommendations developed herein are intended to improve the overall supply and increase available fire flows to customers. These projects should be completed in conjunction with road projects, when possible, over the next 30 years. Twenty-three of the recommended projects (Projects 1, 3-4, 8-24, 29-30, and 35) are also included in the Water System Deficiencies document in Appendix C.*
 - a. We recommend further explanation of the methodology used to prioritize projects be included so that it can be considered or further developed in subsequent Reliability Study updates.
12. Recommended Projects (Projects 1 through 39) – Review the projects listed and update with completed projects and any additional projects.
13. Identified Water System Deficiencies – We recommend the 2022 update not be recreated, but instead updated based on construction progress, system risk reduction, O&M strategy development as a result of this Capacity Study, and population growth verification.
14. Recommendations for the InfoWater-based hydraulic model:
 - a. The latest update to the hydraulic model (InfoWater platform) was performed in 2017. The model should be updated with any new assets (i.e., water main, pumps, and pressure reducing valves) and for assets removed from the system.
 - b. Current and projected demands should be updated within the model.
 - c. The model should be checked and recalibrated as required by performing hydrant flow tests throughout the system, including in areas affected by completed improvements.
 - d. Fishbeck performed a detailed review of all system components and compiled the information at the end of this section. The model should be updated accordingly to reflect current system operation. This includes deleting any assets that have been abandoned or removed, closing any pumps or valves that are currently out of service, updating pump curves, adjusting valve settings, and calibrating the model.

Water Asset Management Plan

1. We recommend revising the mission statement to be inclusive of the IK2025 requirements of Water Conservation, Safe/Clean Reliable Water, Good Governance, and Environmental Responsibility. The SAMP bridges the AMP and IK2025.
2. *Asset management is an evaluation of needed actions after considering the condition of an asset, the consequences of an asset failure, and the action alternatives available. The solution that provides lowest life cycle cost at the desired level of service is implemented.*
 - a. Asset Management is an organization's coordinated activity to realize value from its assets. Asset Management is about value and stakeholders. We recommend correcting this paragraph for clarification and consistency.
3. Develop Asset Management Plans that provide sensible purpose to water business and strategic outcomes.

4. A water policy needs to be developed to value commitment and guide decisions by staff, organizational recognition, and support for Asset Management Leadership. The current WAMP attempts to obligate the Water Resource Division (WRD) with statements having no formal policy document or commitment.
5. The current WAMP only consists of the water distribution components and does not include other primary and relevant secondary water components. We recommend expanding the collection of these components for inclusion in the WAMP. This may already be defined in the City's GIS system; however, we recommend the hierarchy and registry of primary and relevant secondary water asset components be listed in the WAMP.
6. It is recommended to develop a complete water asset hierarchy and registry and use it as a checklist against new, reconstructed, modified, acquired, deactivated, decommissioned, demolished, or removed water assets. This will help assure registry maturity and accuracy for each WAMP update to EGLE. A financial component pertaining to the asset, such as replacement cost, also needs to be included.
7. Include the asset condition assessments on each primary and relevant secondary component within the WAMP. Also include the asset Probability of Failure (POF) and Consequence of Failure (COF) scores and perform risk assessments.
8. The WAMP does not include LOS performance statements. Development of LOS is typically a process and involves stakeholder engagement. Develop and include LOS performance statements consistent with the Strategy and Performance Framework previously developed in the 2020 SAMP.
9. Integrate criticality maps with LOS performance statements and transparency to demonstrate risk reduction for every unit of capital investment and update criticality maps based on recent capital reconstruction.
10. We recommend an Asset Risk Assessment be completed to determine a Water Risk Profile that illustrates the greatest risk facing the water asset system and its primary components. Criticality maps are not Risk Profiles and they are only one dimensional based on fire flows and pressure.
11. *For the distribution system water mains, all data for the COF factors will be maintained in the GIS database.*
 - a. It is recommended to check the water main data for any updates that have been completed within the distribution system, then adjust the scores.
12. The WAMP should contain a 20-year forecast that is similar to the Reliability Study. Municipal Planners typically have a 20-year population growth projection. The 5-year CIPs are mandated by state agencies for budget requirements. Years 10 to 20 or more enable clarity in alignment with long-term organizational and infrastructure strategic objectives.
13. The WAMP indicates there is a comprehensive CIP to maintain the projects. We recommend reviewing and updating this document and including it in the WAMP.
14. There is a gap in funding alignment, or identification of funding opportunities.
15. We recommend making water system asset decisions that lead with risk, LOS performance, regulatory, and IK2025/SAMP long-term strategic goals in addition to long-term lifecycle cost.
16. The absence of asset optimization between O&M and CIP strategies in the WAMP creates a gap. These strategies must consider investment scenarios that optimize water rates (cost), water asset performance (LOS and Key Performance Indicators), and water asset risk (risk profiles) in the context of operations, preventive maintenance, capital maintenance, energy conservation, and capital investment.
17. *We will establish a Partnering Board with our utility partners to facilitate communications regarding Operation and Maintenance demands, Capital Improvement Plans, and Rate impacts.*
 - a. Provide a summary on the established committee within the WAMP.

18. *A Capital Improvement Plan (CIP) for our water system is found in our most recent Water Reliability Study (WRS).*
 - a. The two project improvement lists do not correlate with each plan. The CIP should be born as a strategy from the AMP. The Reliability Study is considered a "Demand Analysis."
19. CIP Water Distribution System Maps (1 through 8) – updates to these maps should be made based on the improvements that have occurred.
20. *We will implement a water efficiency program to track the actual lost water.*
 - a. Include information regarding the water efficiency program within the WAMP.
21. *Assets within our treatment system will be tracked using Computerized Operations Maintenance and Management tools. We will utilize the Proteus CMMS software as well as customized spreadsheets.*
 - a. Include information on the CMMS software being used.
22. *Certain portions of our system need routine/on-going service to continue functioning. Our system Operations and Maintenance (O&M) demands are relatively stable and we will manage the system to maintain that stability. We will utilize Computerized Operations Maintenance and Management tools to maintain asset inventories and schedule regular O&M activities.*
 - a. There is a heavy reliance on a CMMS that has not been implemented. We recommend value stream mapping of all water activities to remove inefficiencies and establish key performance metrics that support the AMP and vertical 'line of sight' concept.
23. We recommend including information on the identification and replacement of lead/galvanized water service lines within the WAMP.
24. *We will fully rehabilitate or replace pipes, hydrants, production wells, and elevated storage tanks when doing so would provide the lowest life cycle cost. Such projects are identified in our Capital Improvement Plan.*
 - a. This is a cautious statement because the lowest life-cycle cost cannot drive the sound judgment for consistency in spare parts and pumps. Inconsistency costs the City in storage space, increased crews, expanding knowledgebase for multiple parts, and wasted parts that are never used.

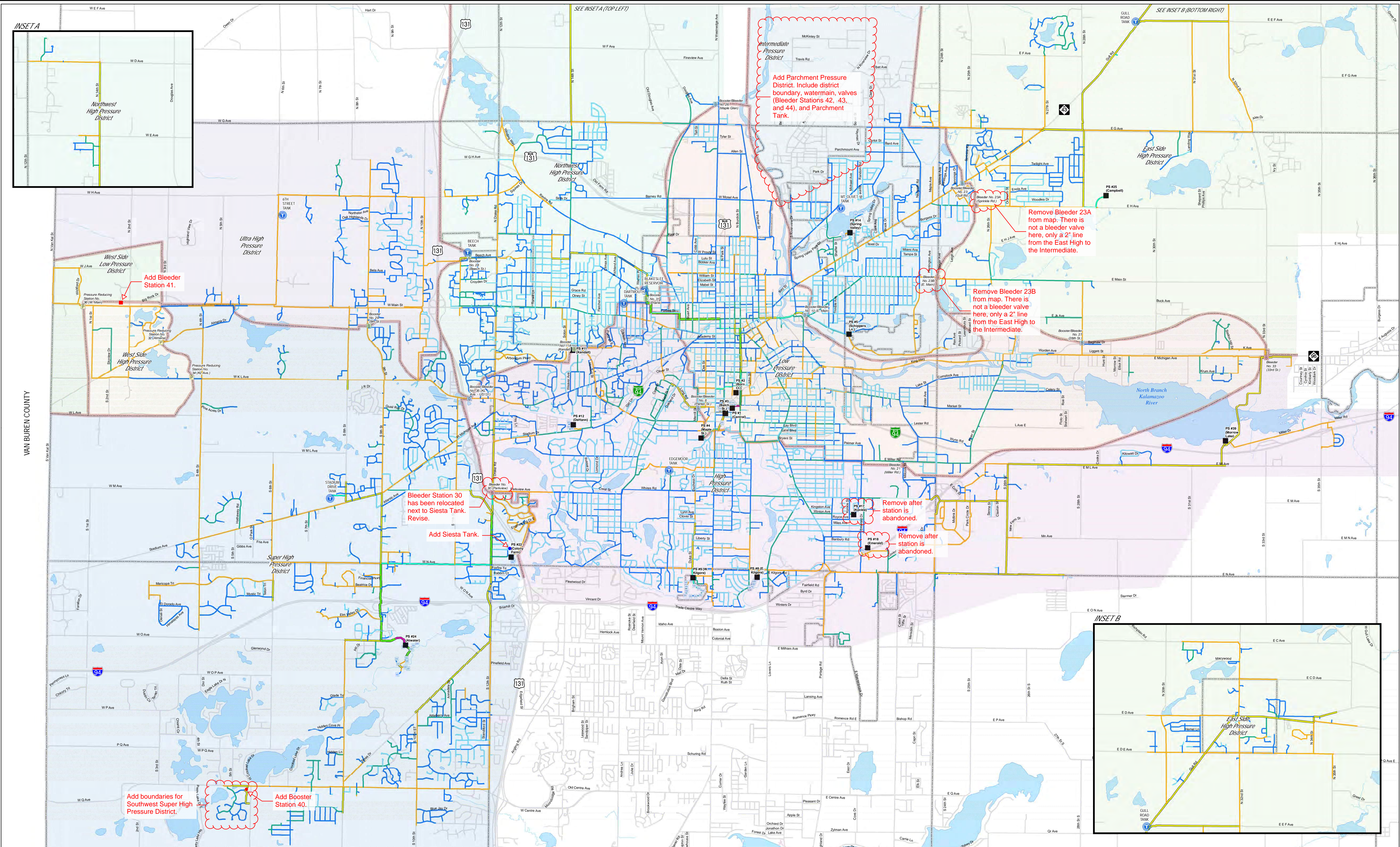
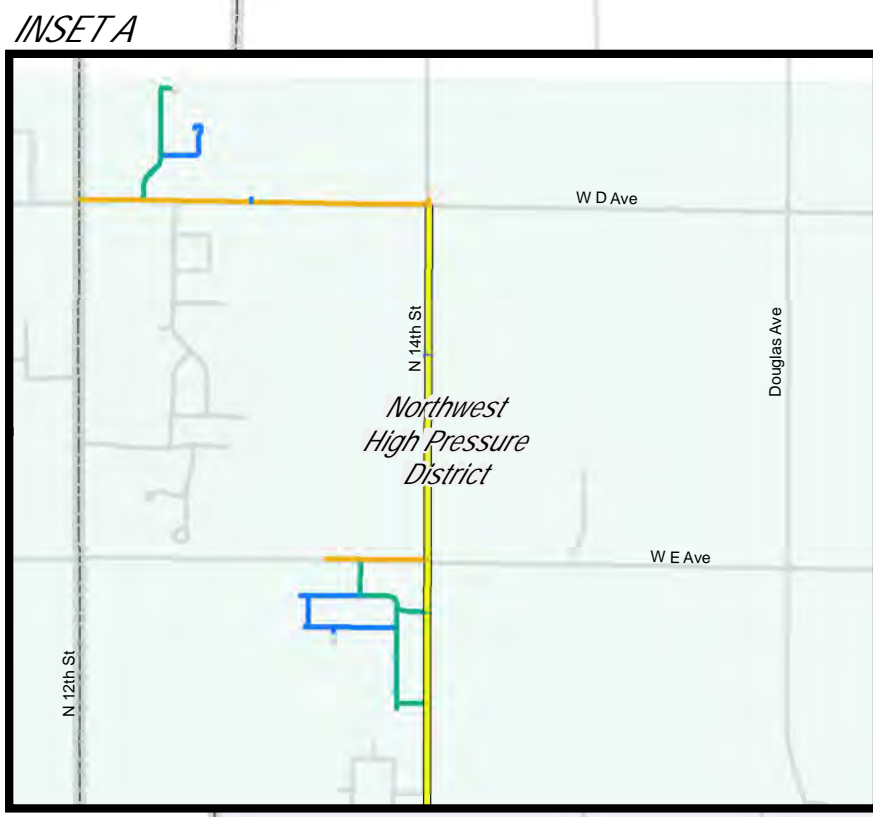
Geographic Information System

1. It appears the City's GIS has not been updated since 2019. Any new assets/system components should be added (i.e., water main, pumps, pressure reducing valves, and pressure districts).
2. Any assets that have been abandoned or removed should be deleted from GIS.
3. A detailed review of each GIS layer should be performed to verify the accuracy of the attribute information.
4. Only a portion of the system isolation valves and blow-off valves have been input into GIS. All valves should be added to these GIS layers.
5. Fishbeck performed a detailed review of each GIS layer and compiled the information into a technical memo for the City included at the end of this section. GIS should be updated accordingly to reflect the current system. This includes adding system components, deleting any assets that have been abandoned or removed, and updating layer attributes with current information.

Water Pumping and Distribution Emergency Response Plan

1. The Emergency Response Plan (ERP) follows the National Incident Management System (NIMS) using the Incident Command Structure (ICS). It appears thorough in theoretical context but lacks the completeness in applicable scenario content. Therefore, it is recommended to engage staff to develop specific scenarios applicable to the City's water system within each of the four generalized categories identified within the current ERP. We encourage inclusive engagement of senior employees at the field activity level that may have valuable institutional knowledge or prior emergency situational experience.
2. The City experiences 80 to 100 water main breaks per year. An aged, materially compromised, and complex system warrants fully vetted and optimized main break repair scenarios within an ERP. This example is simply for water main breaks; yet may be more detrimental and have geographically far-reaching consequences under different emergency scenarios.
3. We recommend the WRD solidify its ERP managerial capacity by collectively developing different scenarios based on their institutional knowledge. There are many scenarios to consider, but it will be important to be prepared for present and future tactical threats to the water system.
4. Incidents may cause widespread system effects resulting in considerable WRD resources being consumed. Managing such incidents may expose business continuity challenges during a prolonged emergency response. We recommend WRD and Public Services employ a risk-based scenario selection process for those events that may significantly impact the water system. Focus on potential incidents that pose the greatest likelihood and consequential impact to long-term objectives, water service business continuity, and water customers.
5. The City's system is complex and aged; therefore, succession planning and employee retention are paramount in building valuable institutional knowledge and trust for emergency planning and incident response. This is another reason to develop emergency scenarios with an appropriate balance of resources for emergency preparedness and response.
6. The City water system is multi-jurisdictional spanning the county, several cities, townships, and villages. Some water main assets are within the Michigan Department of Transportation jurisdiction. During an emergency incident, it is paramount that daily management systems are well coordinated between multiple jurisdictions within a National Incident Management System. The organization in general and WRD are recommended to develop and attain maturation in a documented Asset Management System (AMS) aligned with any type of emergency management system.
7. Strategize, plan, and align resources (internal and external) for each scenario according to the Incident Command System.
8. We understand a Utility Policy Committee exists as a collective platform for general collaboration and consensus-building opportunities on capital investments and water asset policies throughout the customer community region. Leveraging this platform in the context of the EAP will be beneficial to both the WRD and customer communities. Customer communities may likely want to understand their role during an emergency event that impacts their community.
9. We recommend Public Services and the WRD expand the span of control to include peer departments like Risk Management, City Manager Office, Communications Director, IT, Purchasing, City Attorney, Environmental Program Services (Laboratory), Wastewater, and Public Works. Tapping the resources and strengths from these departments may assist the WRD in any strategic approach and tactical deployment during the event at hand.

10. Operating under an emergency incident requires vast understanding of the water system with readily available specific asset information. Based on our interviews and assessments, asset data and information appear to need greater maturity, accessibility, and transparency to better inform decision-makers within an ICS. The City's CMMS, Lucity, contains significant gaps in these areas.
11. Communicate and create a clear vertical 'line of sight' in the Water EAP from the manager level to the field supervisors and crews. Everyone has a role and should read the Water EAP. All must have an opportunity to inquire or gain greater clarity in a structured forum for WRD staff.
12. Conduct regular and frequent meetings to bring awareness to EAP best practices and incorporate the Water EAP in the WRD new employee orientation program.
13. Enable all staff to attain appropriate levels of emergency action or incident response training consistent with the Kalamazoo County Emergency Operations Manager.
14. Conduct annual emergency incident response training and implement documented continuous improvement. Develop and hold accountable functional unit managers and respective supervisors to develop succession plans with career paths and professional development for all staff. Perform cross training of staff to increase institutional knowledgebase.
15. Perform documentation training on templates used by state and federal agencies. We recommend the WRD Manager and Public Services Support Services Division, along with City Hall Fiscal Office become familiar with frequently used documentation by state and federal agencies. This avoids inaccuracies in documentation while attempting to recreate unrecorded time and remember incident details or damages after the fact.
16. Decentralize and make accessible Lucity to increase accessibility, maturation, and use through WRD Subject Matter Experts. Assure accurate and complete water asset data and information during any emergency within the Lucity platform. Strategize and integrate the CMMS/Lucity with the Water ERP.
17. Establish and communicate rules for CMMS/Lucity engagement to internal and external resources for access to appropriate water asset information, uploading of resources consumed during a municipal incident response, and alignment of field data collection consistent with state and federal templates.
18. Develop, document, and practice an AMS that standardizes water operations and helps establish a baseline for continuous improvement in business continuity during an emergency event.
19. Integrate the AMS with the NIMS and other internal and external stakeholder management systems for an emergency event.



Intermediate Pressure District. Add Parchment Pressure District. Include district boundary, watermain, valves (Bleeder Stations 42, 43, and 44), and Parchment Tank.

Remove Bleeder 23A from map. There is not a bleeder valve here, only a 2" line from the East High to the Intermediate.

Remove Bleeder 23B from map. There is not a bleeder valve here, only a 2" line from the East High to the Intermediate.

Bleeder Station 30 has been relocated next to Siesta Tank. Revise.

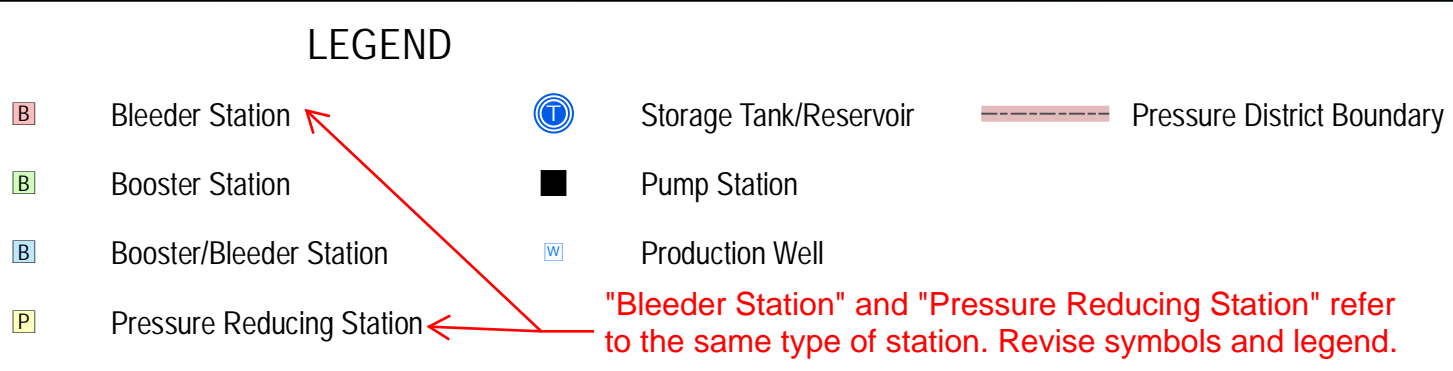
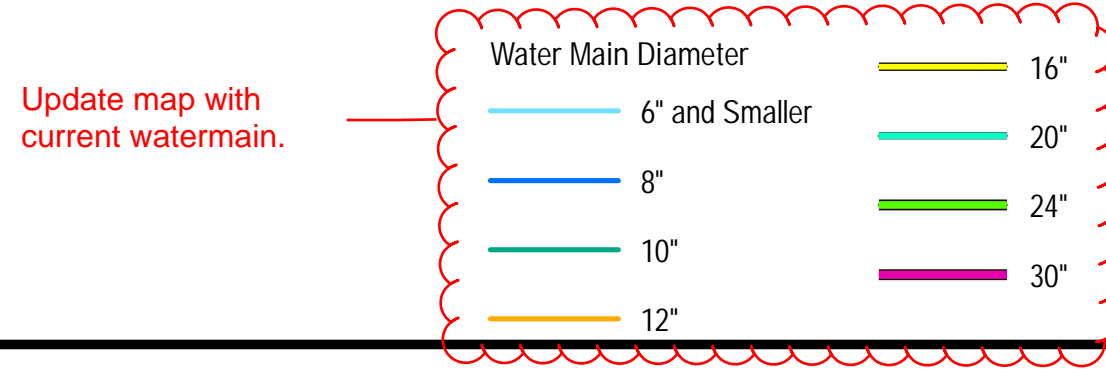
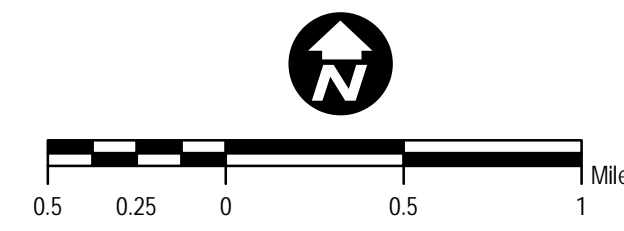
Add Siesta Tank.

Remove after station is abandoned.

Remove after station is abandoned.

Add boundaries for Southwest Super High Pressure District.

Add Booster Station 40.



Financial Capacity Gap Analysis

Section D2

Financial Capacity Gap Analysis

The financial information was provided by the City and compiled for inclusion in the Financial Capacity Analysis. However, a financial analysis was not included as a part of this study. A meeting was conducted with the City's financial consultant to review the rate structure and financing for identified capital improvements projects and ongoing operations and maintenance. The gaps identified have been discussed with the City.

Information Compiled

1. Annual Budget Plan for 5 years
2. Capital Improvements Plan for 5 years
3. Water System Rates and Fee Structure
4. Water Resources Division Performance Based Budgeting (PBB)

Managerial Capacity Gap Analysis

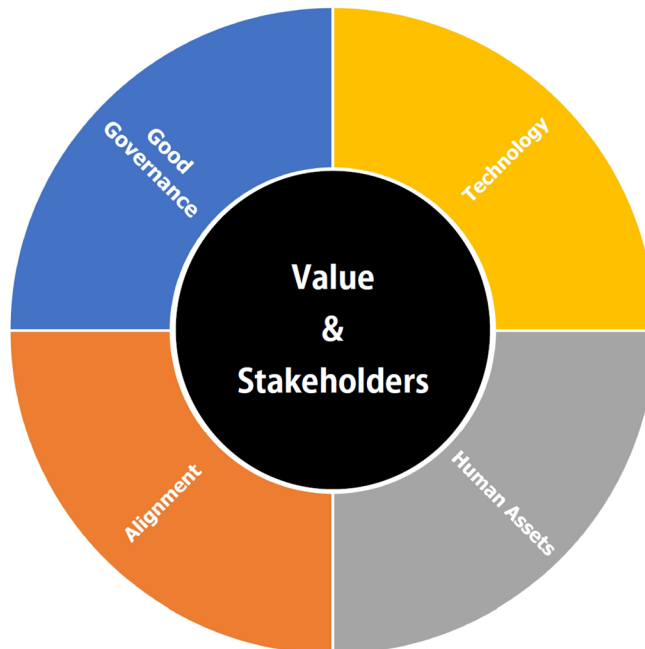
Section D3

Managerial Capacity Gap Analysis

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The U.S. Environmental Protection Agency (USEPA) defines Managerial Capacity as the ability of a water system to conduct its affairs in a manner enabling the system to achieve and maintain compliance with the Safe Drinking Water Act (PA399) requirements. Managerial capacity refers to the system’s institutional and administrative capabilities. The Michigan Department of Environment, Great Lakes, and Energy (EGLE) uses PA399 as the benchmark for managerial capacity within water municipalities. Therefore, we recommend the City of Kalamazoo (City) Water Resources Division (WRD) employ the following framework and accompanying implementation plan to strengthen their Managerial Capacity in the context of PA399.

Figure 1 – Recommended Managerial Capacity Framework



Managerial Capacity gaps exist within the WRD in the context of Good Governance, Technology, Human Assets, and Alignment. This study recommends a focus on these elements to realize value for its stakeholders through water asset infrastructure. Good Governance is a key theme from the City's Imagine Kalamazoo 2025 Community Master Plan (IK2025).

Good Governance, Human Assets, Technology, and Alignment are systematic managerial capacity gaps that this study recommends improvements:

1. Good Governance – Optimize programs and processes that consume significant resources to reduce overall cost and time within activities. Time made available enables personnel to be redeployed onto activities that were previously understaffed.
 - a. Optimize processes, programs and workflows using best practices such as Lean Management techniques.
 - b. Display information for the appropriate stakeholders by developing dashboards for greater coordination, accountability, and performance monitoring in the areas of:
 - Water asset system health and performance.
 - Water asset system risk profile.
 - Water asset system business objectives.
 - WRD human asset development.
 - c. Use Asset Management as the core practice for the WRD. Asset Management is stated multiple times in IK2025 as a best management tool for achieving the community long-term objectives.
2. Technology – Increase technology capability for Lifecycle Maintenance Delivery and create greater accessibility to employees through the City's Computerized Maintenance and Management System (CMMS), Lucity, Geographic Information System (GIS), and BS&A applications, respectively.
 - a. Develop a program management plan to implement Lucity and assign its responsibility accordingly.
 - b. Grow internal subject matter experts and expand knowledgebase on Lucity functionality, and configuration ability, and program development.
 - c. Improve accuracy and completeness of the information conveyed to decision makers.
3. Human Assets – Invest in developing managerial skillsets among individuals new to overseeing direct reports, functional units, and managing water assets by growing:
 - a. Interpersonal skillsets for managers and supervisors.
 - b. Leadership through external coaching.
 - c. Institutional knowledge in critical functional units.
 - d. Healthy and productive team environments within functional units.
 - e. Well-coordinated divisional activities across all functional units.
4. Alignment – Continuously align WRD activities, process, and programs with Public Services Department priorities of Customer Service, Water Quality, and Water Reliability and long-term strategic objectives.
 - a. Develop a Water Asset Management Policy or Guidance Document based on the following key City and Department of Public Services documents:
 - IK2025.
 - Water Strategic Asset Management Plan.
 - Water Asset Management Plan.
 - Emergency Action Plan.
 - b. Improve the vertical 'Line of Sight' and alignment between various levels of field activity, water management and senior leadership.
 - Over-communicate the Public Services Department and WRD water priorities.
 - Practice continued alignment of purpose, processes, and people.
 - Assign an internal sponsor to the Water Asset Management Plan, leverage it to bring division alignment, practice continuous improvement, and deliver value by coordinating divisional activities.

- c. Incorporate a healthy balance with the six themes of the Institute of Asset Management Concept Model (Figure 5) into the daily managerial practice:
 - Strategy & Planning
 - Decision-Making
 - Lifecycle Delivery
 - Asset Information
 - Risk & Review
 - Organization & People
- d. Review regularly and improve alignment between daily activity and job descriptions.
 - Realistically and consistently record labor on activities, programs, processes, and projects to annually review time allocation for monitoring adequate levels of managerial and staffing capacity necessary to serve the needs of the business and sustainably comply with PA399.
 - Incorporate and practice reviewing present and future activity time allocations during annual employee performance evaluations.
 - Eliminate gaps to assure job descriptions and activities are aligned with water priorities, and that both work in unison to achieve long-term strategic objectives efficiently and effectively.

An Implementation Plan accompanies the Managerial Capacity Framework in Section D4. We strongly recommend assembling and documenting a Water Asset Management System (AMS) consistent with ISO55000/1/2 to incorporate the outputs of the Implementation Plan. The purpose for a documented AMS is to use as the WRD mode of business operations. It may be used in succession planning events, emergency action planning, strategic plan updates, orientation materials for future employees, and in other artifacts requiring alignment to the AMS. The AMS may be developed in a manner that supports the “Kalamazoo Way” of business operations to deliver PA399 compliance.

The four elements of the Managerial Capacity Framework are common issues within the WRD and have a direct impact on internal resourcing levels. Water Resources currently budgets 61 full-time equivalent (FTE) employees, not including FTEs from contributing departments. We recommend an FTE of 73 with the inclusion of a Water Operations Supervisor and Water Maintenance Supervisor and 7 additional Operator/Maintainer/Well Maintenance personnel in the Water Supply Operations and Maintenance functional unit, a Water Assistant City Engineer overseeing capital project delivery and asset lifecycle value realization, and both a Draftsperson and a GIS Operator in the Asset & Records functional unit. These functional units exhibit managerial capacity gaps in delivering the needs of their respective groups for which these recommended staffing adjustments may help address.

This managerial capacity study did not address recommendations to field crews within the Water Distribution functional unit, Engineering Technicians for utility locations within the Asset & Records functional unit or the Construction Inspectors within the Water Engineering functional unit. Staffing levels for positions at this level vary based on fluctuating demands and the ability to balance necessary internal and external resources. We recommend utilizing the tools and recommendations from this study in determining future staffing at those activity levels to continuously adapt to demands for PA399 sustainability.

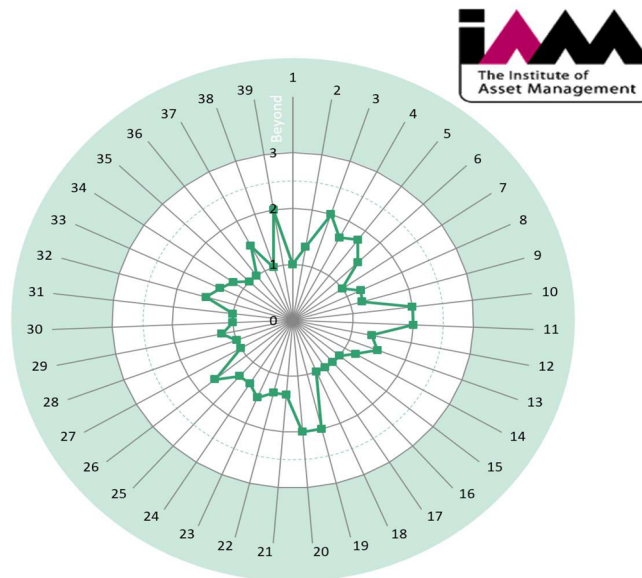
Asset Management is defined as an organization’s *coordinated activity* to realize value from its assets. At the time of this assessment, this study indicated the coordination of activities and processes within and across functional units as work in progress. From a business perspective, WRD delivers water as a product to its customers, and therefore, we recommend it adopt a practice of Lean Thinking to remove inefficiencies that impede “pulling water” as a product through its activities, programs, and processes with the least amount of resistance. Lean evaluation techniques were used on the Water Main Break Repair Activity optimization conducted in early 2021; hence we recommend it be used for field programs like a valve exercising program, water operational processes, the water capital project delivery process, and other resource intensive workflows to improve the WRD

coordinated activity. Water activities considered for optimization should be prioritized by the greatest impact in achieving business operational excellence and Good Governance.

This study indicated a managerial capacity gap with investing in WRD human asset performance and accountability for program and process efficiency and effectiveness. Positive accountability is rewarding those that use best management practices and are able to employ innovative ideas and a culture of continuous improvement on their activities to produce outcomes that serve water system priorities and long-term strategic objectives. For this reason, there is an opportunity to develop managerial and interpersonal skillsets amongst managers and supervisors that enables attention to results, positive accountability, commitment, healthy discussions of opposing viewpoints, building employee trust, and productive teams. The study recommends an approach of combining the practices of Asset Management, Lean Thinking and Human Asset Development to aid in achieving these managerial objectives.

This study performed an Asset Management Gap Analysis and developed an ensuing ‘Roadmap’ for improving the WRD competency in several key areas. The Institute of Asset Management maturity assessment score for the WRD is 1.36. The assessment lower and upper limits span from “0” (innocent), aware, developing, and “3” (competent). This score indicates early stages of the WRD Asset Management journey. The ‘roadmap’, following the Managerial Capacity Future State provides a 1, 3, and 5+ year recommendations for increasing Asset Management competency within the WRD.

Figure 2 – Current State Asset Management Maturity Assessment Score



The gap analysis also highlights a managerial gap associated with Lifecycle Maintenance Delivery in the Water Operations & Maintenance (O&M) functional unit. In the context of PA399, this functional unit is also performance-challenged with significant gaps in levels of institutional knowledge between apprentices and senior Operators/Maintainers. The unit is highly reactive with known managerial and asset management competency gaps. To address this, the WRD is implementing structural changes to within the Water Supply functional unit by dedicating the Water Superintendent as the principal sponsor and creating distinct Operations Supervisor and Maintenance Supervisor positions. The Water Superintendent/Water Assistant City Engineer position will be split to facilitate this approach. The Water Assistant City Engineer position will be relocated to oversee the Water Engineering functional unit. We believe this arrangement has the potential to strengthen the Water O&M functional unit and its purpose to the division and water customers. Critical to its success will be executing the

applicable items in the Implementation Plan in Section D4 and the Asset Management ‘Roadmap’ located following this Managerial Capacity future state section.

This study conducted an USEPA Managerial Capacity Assessment covering 13 indicators over key areas of Ownership Accountability, Staffing & Organization, and Effective External Linkages. The WRD scored primarily a “moderate to strong” managerial capacity. The USEPA assessment is considered high level and did not examine at a deeper managerial level, yet there are USEPA indicators that reflect opportunities to increase managerial capacity.

This study indicates a managerial capacity gap and organizational challenge related to delays in filling vacancies. The process itself is not considered a part of the project scope; however, both the WRD and Public Services Department acknowledge their role and ownership in the process. They are committed to its overall improvement from beginning to end.

The WRD may consider this Managerial Capacity Study as a transformation plan for implementation. The framework illustrated above are interdependent of each other including their subsequent recommendations. In consideration of the above, Applied Asset Management is currently assisting with the WRD on improvements to business operations and Lucity implementation at the activity level.

Information Reviewed

1. 2020 Water Strategic Asset Management Plan
2. 2017 Water Asset Management Plan
3. 2017 Water Reliability Study
4. WRD job descriptions
5. Municipal Worker Program
6. Water policies and standard operating procedures
7. Utility Policy Committee Agreement
8. 2017 Financial Rate Study
9. 25-year Capital Improvement Plan project projections

Summary of Gaps and Recommendations

This section discusses the future state of managerial capacity for the WRD and individual functional units responsible for managing activities to comply with PA399. Please reference Section C14 for comparisons to the current state. This gap analysis identified some unique gaps and recommendations identified for specific functional units, as well as deficiencies common to all.

Water Resources Division

Our recommendation of the future state FTE Managerial Capacity is illustrated in Figure 3, which also includes the City’s proposed staffing additions for fiscal year 2022, including:

1. Separating the Water Superintendent/Assistant City Engineer position into two and assigning the former to oversee the Water Supply O&M functional unit while the latter to manage the Water Engineering functional unit.
2. Water Supply Maintenance Supervisor.
3. Water Supply Operations Supervisor.
4. Asset & Records Draftsperson specifically to address the backlog in as-built record drawings.
5. Safety Officer under the Public Services Department and available to the WRD.
6. Training Officer under the Public Services Department and available to the WRD.

This study closely worked with the city to leverage the fiscal year budget cycle (Jan 1, 2022 – Dec 1, 2022) in closing gaps related to managerial/supervisory staffing levels. Beyond the next fiscal budget, this managerial capacity study recommends an additional:

1. Water Assistant City Engineer to oversee and manage the Water Engineering Functional Unit including capital project delivery process, site plan reviews, Lead Service Line Replacement Program, Capital Improvement Planning, unique projects to the WRD, technical support, and asset management assistance to other WRD functional units.
2. Addition of up to seven operators, maintainers, and well maintenance personnel within the Water Supply functional unit. This functional unit is under-staff based on demands and increased vertical assets to manager operations and maintenance related activities.
3. GIS Operator for the Asset & Records functional unit. An A3 business case model to increase the managerial capacity of the Asset & Records functional unit is included in Figure 12. The municipal immediate future is the GIS platform associated with its assets; hence it is prudent for the WRD to focus its near-term hires with qualifications primarily in this area and to shed lower-level duties to those most appropriate in the functional unit. The calendar year 2022 fiscal budget proposes a Draftsperson position to address short-term needs of the as-built records backlog while the future state recommends a GIS Operator due to the critical need for water asset data and information used between the City's Lucity, GIS, ESRI, BS&A (water billing), and other technological platforms.
4. Additional Environmental Programs Services (EPS) Specialists or other applicable positions are recommended for short and long-term sustainability of this functional unit. However, exact staffing capacity levels are not indicated at this time until further evaluation is performed based on the recommendations in the Implementation Plan in Section D4, which include developing resourcing strategies and monitoring against resource management, along with operational efficiencies and leveraging technology. The regulatory landscape and compliance reporting may also dictate the staffing necessary to support future demands.
5. Field Supervisors and Field Crew staffing levels are up to the decision of the WRD Manager and Water Distribution Manager based on balancing internal and external resources necessary to fulfill programmatic obligations for PA399 compliance. The WRD Manager has the budgetary authority to recommend increases in field supervisors and field crews based on regulatory demands, for example, the pace of lead service line replacement.
6. Safety and Training Officer positions have been recently filled as direct reports to the Public Services Department. It will be important for the WRD to leverage their roles with safety, training, and professional development of water personnel.
7. Administrative Specialist position is currently on the most recent WRD organizational chart and may be filled at any time to relieve some of the administrative tasks assumed by various WRD managers and supervisors.

Other FTE increases in staffing levels may indirectly improve the capacity of positions managing water infrastructure activities and may be necessary based on justifying the science with implementing the recommended tools and use of other industry best practices as noted in this study.

The USEPA direction and sustainable compliance with PA399 (or future amendments) desires municipalities to adopt the practice of Asset Management for municipal drinking water systems. This will require the WRD Manager and direct reports re-focus their mode of operations in defining and documenting an AMS consistent with ISO55000/1/2 for the division. The USEPA's direction punctuates the importance of practicing Asset Management with a defined management system as opposed to defaulting into simply managing assets by a tactical and "reactive" mode of operations. (Please refer to "Managing Assets" versus Asset Management in Section C14). It is also recommended that WRD managers and supervisors acquire and grow managerial and interpersonal skillsets when "managing" people and activities. This managerial capacity study emphasizes the Asset Management competency subject area of "Organization and People" and Asset Leadership for reasons

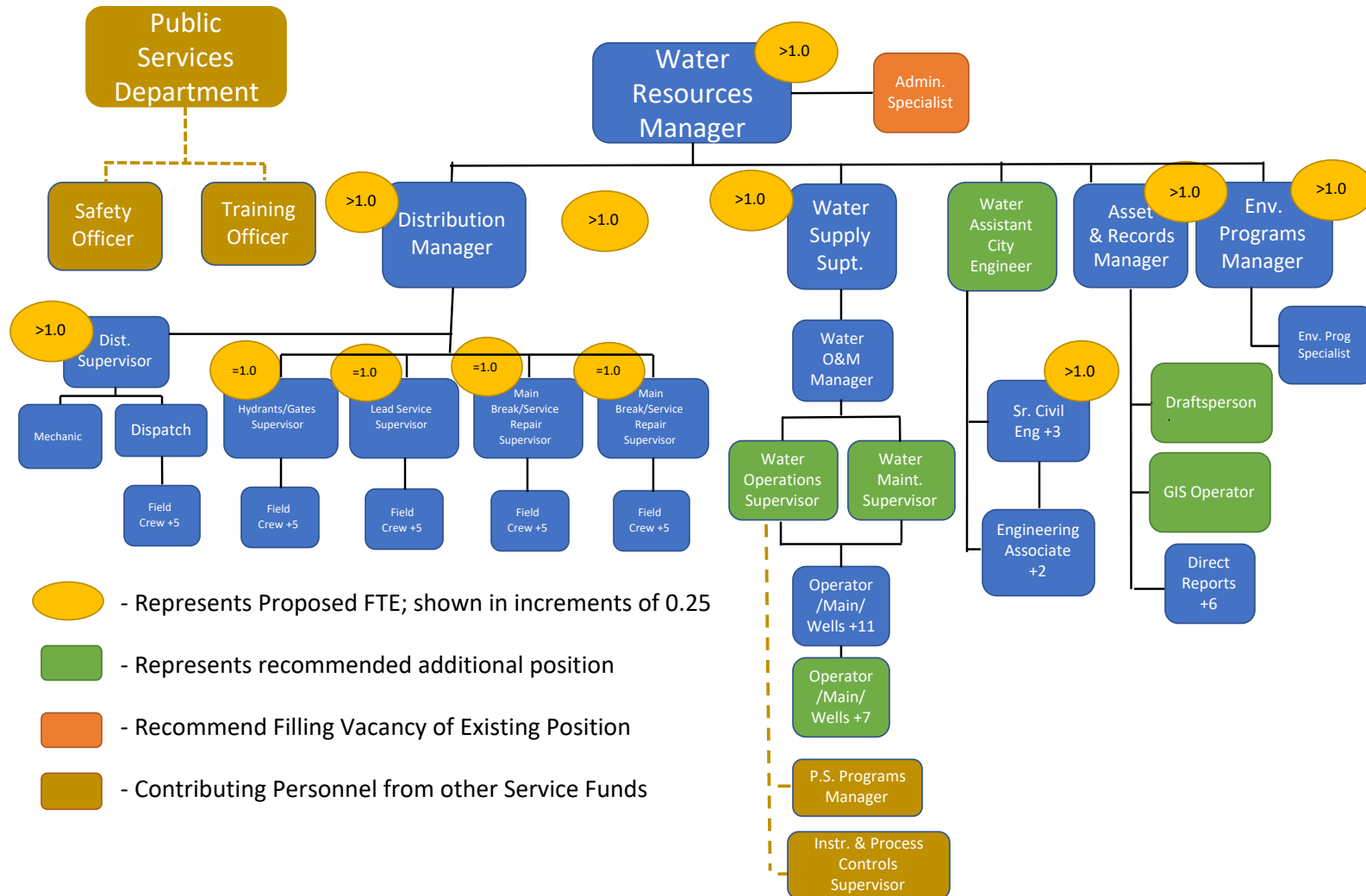
stated throughout this recommendation section (Please see the Asset Management Maturity Gap Analysis and 'Roadmap' following this Managerial Capacity Future State section). Much of the AM maturity assessment and roadmap focuses on improving the competency level of WRD managers and supervisors with respect to the practice of Asset Management. Therefore, improving Organization and People competency in Asset Management and managerial skillsets is recommended as core to the WRD managerial and supervisory positions.

Our assessment indicated an importance for WRD managers, superintendent, and supervisory positions to transform their mode of operations to exhibit leadership and managerial capacities that effectively support and manage their staff implementing programmatic activities. Although variations may apply based on numerous factors within WRD and the organization, an opinion on the range of time spent on leadership and managerial roles include:

1. WRD Manager may spend 5-15% for leadership and the remainder in a managerial role.
2. WRD direct reports may anticipate between 5-10% leadership and between 70-80% managerial and up to 10% hands-on doing actual activity work.
3. Water O&M Supervisors and Water Distribution Supervisor may anticipate up to 5% in a leadership role, between 70-80% managerial capacity, and up to 20%-25% hands-on. All remaining Supervisors may anticipate 60%-90% managerial and 10-40% hands-on based on field program and staffing demands.

These ranges are not exact and are fluid based on the needs of the business and regulatory demands. A healthy balance is also necessary to enable managers, superintendent, and supervisors to practice performing various degrees of the 6 themes of the Asset Management conceptual model (Figure 5). For example, all managerial positions should be spending time planning, strategizing, and assessing risks within their functional unit. This time spent is considered both leadership and managerial traits as heads of functional units. The point is that managerial capacity is a balance between leadership, managerial, and hands-on activity roles within any level of the WRD organizational chart.

Figure 3 – Recommended Managerial Capacity



- - Represents Proposed FTE; shown in increments of 0.25
- - Represents recommended additional position
- - Recommend Filling Vacancy of Existing Position
- - Contributing Personnel from other Service Funds

Please note that recommendations for managerial or personnel staffing levels are not final. They must be made in the context of human asset development, leveraging technology, optimizing processes and programs, and assuring alignment to purpose. Working on these four areas will greatly assist in attaining healthier FTE values, staffing levels, and managerial capacity in future fiscal years during increased demands or levels of service.

We believe the future state organizational structure contains strong managerial capacity that may serve as its business model. Sustainability of this model will be the responsibility of the WRD Manager and Public Services leadership by employing a practice of continuous improvement, robust succession planning, and a cultural transformation to the practice of Asset Management.

The following contains an overview of the managerial capacity gaps for each functional unit as interpreted from PA399. The Implementation Plan in Section D4 includes our recommendation for EGLE approval. We provide an in-depth examination and recommendations because sustaining transformative momentum begins with a firm understanding of barriers impeding value to water customers. Knowing the barriers that impede stakeholder value enables a laser-focused transformation based on managerial capacity, operational, and cultural improvement recommendations.

Water Supply Operations & Maintenance Functional Unit

We understand EGLE considers the Water O&M Supervisor position responsible for this functional unit as the Water Supply “Operator-in-Charge”. The chain of command from this functional unit to the Public Services Department leadership contains several individuals that have the state required S-1, D-1 licenses to oversee water supply.

This study strongly recommends the functional unit adopt a Lifecycle Maintenance Delivery mode of operations. This includes embracing preventive maintenance with the City’s CMMS, Lucity, for lifecycle value realization of water supply asset system and components. Since the functional unit is very operational and maintenance resource intensive, managing resources wisely within O&M budgets is important. Configuring major components or capital replacement of micro-systems within the greater water asset context is necessary to assure that system lifecycle value is maximized. Reliability Engineering assures lifecycle preventive maintenance best practices per O&M manuals and intended design specifications are implemented to realize asset component value over a defined period. These examples represent critical-thinking subjects necessary for the Water Superintendent, Water Operations Supervisor and Water Maintenance Supervisor positions in short-term and long-term progression towards the practice of Asset Management. These critical subjects are also outlined in the Asset Management Gap Analysis and ‘Roadmap’ tailored for WRD in this report.

This study recommends the Water O&M Supervisor incorporate best management practices that are applicable in the field of Asset Management, including:

1. Integrating the Water Asset Management Plan into water operational and maintenance strategies, including reducing unacceptable levels of asset risk within water supply while working toward desired levels of service performance indicators for major components. This study recommends completing the gaps identified in the WAMP that will support O&M strategies.
2. Conducting regular succession planning and staffing capacity evaluations to sustain and pivot Water Supply Operations, Maintenance, and Well Maintenance with water system demands, regulatory advancements and PA399. This study recommends monitoring time spent on water supply activities and performing an annual review to compare against individual employee job descriptions and succession plan.
3. Regular coordination between Water Supply Operations and Maintenance, Well Maintenance, Environmental Program Services (Laboratory) and the Well Protection Program. Collectively, these primary elements comprise the Water Supply System that serve the stations and subsequent water asset infrastructure for public drinking water. This study recommends this be a regular agenda item on monthly WRD Manager-Direct Report meetings.

4. Forecasting preventive maintenance interventions and costs that support the WAMP O&M strategies and lifecycle maintenance delivery critical thinking. This study recommends using asset operation and maintenance manuals, staff's institutional knowledge, and historical context to develop a preventive maintenance intervention schedule. This study encourages that Lucity be explored for potential utilization in conducting lifecycle analyses.
5. Proactive resource planning and management with integrated work orders associated with the city's CMMS, Lucity. This study recommends that Lucity works orders precipitate from a proposed preventive and corrective maintenance intervention schedule. Additionally, regular condition assessments on primary components may also supplement or adjust preventive maintenance intervention schedule. This effort is best performed in the context of the WAMP, hence an inventory and condition assessment of primary or relevant water supply components is a prerequisite for developing intervention schedules.
6. Practicing Lifecycle Value Realization. This study recommends quantifying the costs within each lifecycle phase (See Figure 4 in Section C14) of the water supply asset system/components and examining the CapEx, OpEx, and TotEx for improved decision-making opportunities with Capital Improvement, Capital Maintenance, Preventive Maintenance, and daily work plans.
7. Reliability, Configuration Management and Systems thinking that involves highly dependent components to function harmoniously from scheduled preventive maintenance regimes that assist in achieving optimum performance for defined lifecycle durations. This study recommends that water supply systems and relevant components have assurances to achieve at least their intended design service life at the lowest possible TotEx with adjustments being made based on preventive maintenance intervention schedules. Components and systems should be designed and configured as systems such that neither new component nor up/downstream components negatively impact each other.
8. Process evaluation and analysis to increase efficiency and effectiveness of water supply activities, programs, and processes, including establishing key performance metrics for monitoring and continuous improvement.
9. Creation and implementation of a succession plan, including individual professional development plans, licensing, role clarity, Lucity implementation, specific training and cross-training between water operations and maintenance activities, human asset development, time advancement of personnel, and a schedule with milestones to assure progress in the transfer of institutional knowledge to the next generation of employees including closing any gaps in competencies for current and future regulatory landscapes.
10. Human Asset development to promote teamwork and a highly productive water operations team that fosters trust.
11. Conducting annual performance evaluations for all positions in the functional unit.

There is additional Asset Management explanation on the above terminology in the Asset Management Gap Analysis and 'Roadmap' following this Managerial Capacity Future State section. Based on the WRD's intentions and modifications to the Water Supply O&M functional unit structure, we believe it has a solid opportunity to advance operations to a higher performance level.

This study also recommends staffing capacity adjustments of 7.0 FTEs to Operators, Maintainers, and Well Maintainers as indicated in Figure 4. Based on our assessment and input from water supply staff, Table 1 shows the water supply activities with an opinion of staffing levels to support Asset Management and a lifecycle delivery approach within the functional unit. The additional FTEs are supported by the following assumptions:

1. This functional unit is currently undergoing an attrition event with the Water O&M Supervisor and one Maintainer III positions that will occur over the next 12 months.
2. A new organizational structure is being implemented with the separation of the Water Superintendent/Assistant City Engineer position and the creation of separate Water Operations and Water Maintenance Supervisor positions. This study recommends the Operations and Maintenance Supervisors be responsible for the optimal performance of their respective lifecycle phases, while the Water Superintendent

be responsible for the complete lifecycle delivery and Asset Management Plan for the water supply system and components. There are several other duties that will comprise these positions, but the entire Lifecycle Delivery theme of the Asset Management concept model is paramount for this functional unit. Please refer to Figure 4 in Section C14 for the Asset Lifecycle Phases and the Asset Management Gap Analysis and ‘Roadmap’ following this section for further content on terminology.

3. Ability to cross train staff is predicated on having adequate staffing levels. Staff indicates that learning maintenance protocols occurs over a several month period of practice and experience in the maintenance environment as opposed to periodic training. Hence, adequate staffing levels are necessary to cover the trainee’s position while undertaking training.
4. Well Maintenance staffing levels are based on key activities of well rehabilitation, pump repairs, weekly operational inspections, and field inspection of well rehabilitation contractors. It is paramount the City maintain a level of institutional ownership in this area.
5. Cultural transformation with mode of operations, acquiring Asset Management competencies, optimizing activities, and implementing Lucity will require staffing levels at the opinion provided. In conjunction with demands and the pace of change in the water industry, this study indicates that maintaining the status quo with the current staffing levels is not an option.

Table 1 – Water Supply Operations & Maintenance Functional Unit Future State Staffing Capacity

Activity	Description	Operator	Maintainer
Lifecycle Maintenance Delivery	Preventive Maintenance, development & scheduling interventions, using Lucity, support Maint. Supv.		0.33 FTE Maint. III
Managing Preventive Maintenance – Vendor Assistance	Vendor project controls, contract adherence		
Vendor Supply Chain Management	Vendor contract health & performance by Main. Supervisor		
Project Design Input	Attend design mtgs for new facilities	0.5 FTE Ops III	0.33 FTE Maint. III
Water New Assets Commissioning	Commissioning of new asset components both for operations, SCADA, and maintenance.		
Water Supply Operations	Office Controls, SCADA	1.0 FTE Ops III 1.0 FTE Ops II	
Water Quality Sampling & Recording		0.5 FTE Ops I or II 0.5 FTE Ops I or II	
Customer Complaints	Water Quality, Hydrant Flushing, others	0.5 FTE Ops I or II	0.5 FTE Maint. I or II
Operational Check-Ups	2 Route Operators; 2-day per week duty	0.5 FTE Ops I or II 0.5 FTE Ops I or II	
Planned Work	Performing PM work as scheduled in Lucity	0.5 FTE Ops III 0.5 FTE Ops I or II	2.0 FTE Maint. III 2.0 FTE Maint. I or II

Table 1 – Water Supply Operations & Maintenance Functional Unit Future State Staffing Capacity

Activity	Description	Operator	Maintainer
Unplanned Work Troubleshooting	Well pumps and booster pumps	0.5 FTE Ops I or II 0.5 FTE Ops I or II	1.0 FTE Maint. I or II
General Maintenance	General facility maintenance and station/well pump access, other related duties	1.0 FTE Ops I or II	0.5 FTE Maint. I
Record Documentation	SOPs, O&M Manuals, PM intervention schedules, pictures; accurate and complete field work orders, uploading field data & information.		0.33 FTE Maint. III 0.5 FTE Maint I or II
Well Maintenance & Vendor Management	Assist with Well & Pump Rehabilitation, Managing vendor work		2.0 FTE Well Maint. II 1.0 FTE Well Maint. I
Totals Staffing Levels Projected – Ops & Maintenance		8.0 FTE (2) Ops III (1) Ops II (5) Ops I or II	7.0 FTE (3) Maint. III (4) Maint. I or II
Total Staffing Levels Projected – Wells & Well Pumps			3.0 FTE
Current Staffing Levels (incl. Well Maint.)		5.0 FTE	6.0 FTE
Additional FTE Requested		3.0 FTE	4.0 FTE

Water Engineering Functional Unit

At the time of this assessment, the WRD has separated the Water Superintendent position and is seeking candidate to fill the Water Assistant City Engineer position whose responsibility will be to manage and oversee the Water Engineering functional Unit. Our assessment supports the WRD decision. Primary responsibilities of this position will encompass managing the water capital projects portfolio, leading the capital project delivery, site plan, and Contribution-in-Aid processes, program manager for the Lead Service Line Replacement project, and coordinating engineering support for water operations and distribution. A well-rounded engineering manager with experience may also lead major, complex project initiatives for the Public Services Director and help manage unique environmental liability projects under the EPS Manager. Other critical recommendations include, but are not limited to:

1. Project Management training specifically geared for municipal public agencies for acquiring methods for employing project controls to deliver capital projects efficiently and effectively. This also includes development of a project management manual as the standard operating procedure encompassing all processes from project initiation to closeout.
2. Accuracy and completeness of the 25-year capital improvement plan that is supported by the science and strategies of the Water Asset Management Plan.
3. Optimize using Lean techniques the capital project delivery, site plan review, and contribution-in-aid processes.

4. Best management practices with electronic scheduling tools that assist with staff-utilization and capacities necessary to deliver projects trending with an ambitious WRD capital investment program. A healthier and realistic balance of internal and external resource assignments is needed, if not possible, then adjustments and other strategies may be required. Applied Asset Management is currently assisting the City with mapping its CIP Decision-Making process and workload forecasting of project assignments to help address this situation.

It is worth noting that electronic scheduling tools aid forecasting staffing needs and understanding staff-utilization levels. The result enables a manager to “right-size” internal and external resources based on ebbs and flows of the economy and project demands, particularly with construction inspectors. Based on the newly created Water Assistant City Engineer position, this study recommends maintaining the current three Senior Civil Engineer positions. If one of them is promoted to the Water Assistant City Engineer position, then an entry level Civil Engineer position may enable the WRD to mentor and train as part of its succession plan.

This study also recommends the Water Assistant City Engineer and functional unit provide technical and Asset Management support for all functional units. Water Distribution and Water Supply will benefit from Water Engineering expertise by integrating engineering principles and concepts with hands-on practical, institutional knowledge from field activities. Additionally, attaining Asset Management proficiency will greatly benefit application of Asset Management concepts and terminology to other functional units. Ultimately, this may improve overall water asset system reliability, efficiency, and effectiveness.

Water Distribution Functional Unit

Our assessment informs that the Water Distribution Functional Unit is labor and resource intensive. This section recommends increasing managerial capacity associated with managerial skillsets and Asset Management best practices that are critical to the sustainability of the water distribution system and institutional knowledge amongst field personnel. Due to the age, complexity, and the geographical footprint of system, we recommend the Water Distribution Manager and Supervisor identify, balance, and monitor annual time spent on managerial duties necessary for their respective positions. Periodic review of their time allocation with the WRD Manager is paramount for efficiency and effectiveness at their positions within this functional unit. We recommend this functional unit adopt the following managerial capacity practices to close the current gap:

1. Developing resourcing strategies which consistently align and coordinate water distribution activities with the Water Asset Management Plan, WRD’s Strategic Asset Management Plan, and the City’s IK2025.
2. Learning and practicing Resource Management and the electronic scheduling tools that aid in this effort. It will be paramount for the Water Distribution Manager to assure internal and external resources are adequately balanced for delivering necessary services.
3. Re-evaluating the daily task associated with the Water Distribution Supervisor and assigning the position as the Lean Sponsor with the intent to conduct continuous improvement and measure key performance indicators of all field programs within the Water Distribution functional unit. Training will be necessary to develop proficiency in Lean Thinking.
4. Assessing Water Distribution asset risks with close coordination with the WRD Manager to mitigate those risks by adjusting multiple WAMP strategies.
5. Implementing the Municipal Worker Program to grow institutional knowledge from within and retain employees for long-term career ambitions.
6. Providing training horizontally across all field services to grow employees for advancement, advocate for their licenses and certifications, and engage them in evaluating process improvements. Holistically addressing the individual may reduce employee retention issues within field crews.
7. Advocating for and continue participating in Lucity implementation as workflows are optimized from process evaluation and analysis.

8. Maximizing planned activities and relentlessly reducing the occurrences of unplanned activities that cause disruptions to the unit's business continuity. Planned activities are considered core programs of which identified and specified crews should refrain from being pulled to do unplanned incident responses. This will influence workload forecasting of field crews.
9. Performing Root Cause Analyses on unplanned incidents to better understand their reasons and determine mitigation measures. For example, tightening language in construction contracts on contractor hits related to service lines or mains, and better access to maps for improved accuracy of existing underground infrastructure locations.
10. Recommending/considering site restorations for all water field excavations be performed by a trained and specified water crew, or other best practice strategy.
11. Using Resource Management to formulate better Resourcing Strategies and an appropriate annual fiscal budget while employing a documented continuous improvement approach. This will also require understanding hours and resources consumed for each of the programs though Lucity.
12. Developing a 'box score' to monitor business objectives, like the Percentage of Planned vs. Unplanned Incident Responses, cost of Planned vs Unplanned Incident Response, etc.

Asset & Records Manager

Figure 4 shows the future state recommendation for improving the managerial capacity of the Asset & Records Manager along with the functional unit. The intent of the recommendation scenarios is to address these gaps:

1. Remove as many distractions as possible from the functional unit manager to allow better focus on managerial and strategic objectives for water asset data, information, and records management.
2. Expand the GIS mapping for the water infrastructure system.
3. Develop widespread Lucity capability and program management of Lucity implementation within WRD.
4. Develop and regularly refresh common stakeholder dashboards for performance measurement based on the GIS and Lucity data.

To actively pursue these crucial objectives, the Asset & Records Manager must re-allocate lower-level tasks to direct reports that are currently being performed in the position. Regarding utility locations, the Engineering Tech II Position may be empowered to be the lead role for all utility location activities. This may require a review of the job description and any subsequent adjustments.

The future sustainability of municipal operations in an evolving regulatory landscape is through the maturity of its asset data and electronic records. Therefore, we recommend a strategy that embraces GIS and CMMS technologies; and provides staffing levels to maintain asset data and records that supports well-informed decision-making. Future staff hires may want to focus on qualifications and career growth in the areas of GIS and CMMS. A succession planning event should address this opportunity.

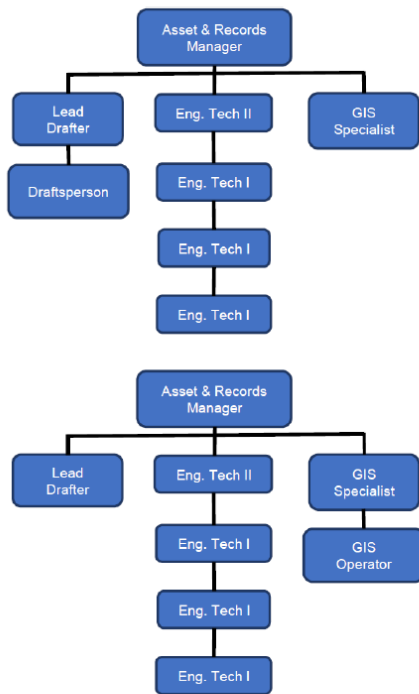
We also recommend coordinating common dashboards for groups of stakeholders. This will reduce the duplication of informational displays to stakeholders and minimize the impulse requests to produce such artifacts. Quarterly water asset performance updates in the form of a visual dashboard may be developed and used to inform multiple stakeholders such as the City Manager's Office, elected officials, and the Utility Policy Committee. Similarly, internal WRD managers and supervisors would benefit from understanding the performance of their activities and the water asset systems or components they affect.

Asset & Records Manager leadership will be crucial to success of the CMMS, Lucity. The job description assigns this responsibility to this position; however, it is recommended the manager assume a greater leadership role in this area in the form of program manager in Lucity implementation. Water asset data completeness and integrity supports Water Asset Management Planning and must not be underestimated.

Figure 12 contains the full A3 model for the Asset & Records Managerial capacity current state, gap analysis, future state recommendations and implementation.

Figure 4 – Future State Asset & Records Functional Unit Model

Future State Countermeasure:



Scenario #1: Draftsperson Addition

Pros:

1. Additional help for as-builts.
2. Additional help with AutoCAD work related to water base maps.
3. May split on-call duties of Lead Draftsperson serving utility locations.
4. May respond to inquiries with water service locations.
5. Assist with Boil Water Advisory map creation.

Cons:

Does not align with core business objectives or pivoting for future needs of the business.

1. As-builts does not have a strategic approach to reduce backlog.
2. Backlog is temporary, resolve with temporary external resources.
3. GIS is dominating the municipal landscape for managing asset data as opposed to AutoCAD technology.
4. Job duties and essential requirements are heavily based on AutoCAD use and Public Works design.
5. There is little emphasis on the future for the unit including the PA399 requirements for a fast-changing industry landscape.

Scenario #2: GIS Operator Addition

Pros:

Aligns with core business objectives. Relieves GIS Specialist from data handling while expanding platform capabilities by performing:

1. Asset data uploads into GIS from new condition appraisals, lead service line replacements, new capital construction, as well as for other linear assets.
2. Asset data maintenance for transparent dashboard to stakeholders.
3. Creating and sustaining 'box scores' for water asset component performance for distribution and operation daily decision-making.
4. Develop risk profiles from asset data.
5. Assist with GIS Mapping of asset data collected from field activities.
6. Assists with GIS Specialist expand platform & coordinate workflows.
7. Assist with improving coordination of asset data between GIS & Lucity.

Recommended Strategy:



It is recommended to grow managerial capacity with a focus on the core business objectives grounded in data sustainability and information for stakeholders using a GIS platform. The Municipal industry is utilizing GIS as its data repository function. The EPA is urging utilities to practice asset management and manage data & information as it relates to PA399. GIS has growing compatability with several industry leading CMMS solutions like Lucity, to well-inform stakeholders in their infrastructure decisions. It also supports workflows that are common place with municipal good governance.

This A3 also recommends a transition to quarterly dashboards that serve multiple stakeholders, which was evident in the time management analysis.



serve

By the Numbers:



Draftsperson - short-term value added benefit, only solves as-built backlog
 GIS Operator - long-term strategic value added benefit.
 Approximate Total Compensation Package ~ \$100,000, assumes \$25/hr with benefits
 Lifecycle – Draftsperson 5 yrs; GIS Operator >5 yrs., plus a sustainable career path in a technological field that is exponentially growing. AutoCAD duplicates work by double handling.



Implementation Schedule:

- ✓ Groom Eng Tech II into Utility Locator Lead – position substitution & fill by position by April 2022.
 - Empower Utility Locator to lead and manage program.
- ✓ Add GIS Operator in 2022 budget: fill position by Summer 2022.
- ✓ Collect data & create Water Service Line layer in GIS – during 2022 winter; reduce backlog.
- ✓ Create GIS layer for water service requests
- ✓ Train 311 to search GIS records for active or inactive water service requests
- ✓ Write 311 scripts and assign Lead Draftsperson to assist with Utility Locations
- ✓ Interview stakeholders for multi-purpose, transparent Water Dashboard, 2022 and ACO recommendation.
- ✓ Leverage Lucity & GIS to create functional unit infrastructure 'scorecards' for operations and distribution performance.

Environmental Programs Services Manager – Water

Future state recommendations on time percentages per activity or per month were not developed for this position due to many activities being executed over multiple years. However, the depth and breadth of the EPS service package is extensive. We strongly recommend using the Lean A3 tool to develop the business model that will balance internal resources such that commitment requests are upheld (as shown in Figure 4). We understand from the WRD that historical context of this service package may be incorporated into the A3 model for staffing capacity justification.

The depth and breadth of this service package is challenging to manage; however, we believe the current EPS Manager contains strong managerial competency to assume this responsibility. There appears moderate to strong managerial capacity for this position to deliver the service package, and therefore we recommend these items:

1. Use the Lean A3 tool to develop a sustainable service package business model that clearly understands the required staffing capacity for short- and long-term scenarios. This study recommends using best practices in continuous improvement with appropriate key performance indicators to measure service package efficiency and effectiveness. There are many “moving parts and pieces” to this service package with a devotion to permits. A Lean A3 model will assist in creating a delivery plan to adequately resource the demands of the service package.
2. Develop Resourcing Strategies & Resource Management techniques to better balance internal and external resourcing needs to deliver the service package. Numerous reasons including the proposed federal infrastructure bill will likely strain internal and external resources. The effect may increase FTE values to unsustainable levels. Remaining ‘ahead of the curve’ will be crucial in maintaining moderate to strong managerial capacity.
3. Continue Asset Management Planning efforts related to stormwater and active participation in the development of the Well and Well Pump Asset Management Plan as currently under development by Applied Asset Management.
4. Continue participation in capital and lifecycle maintenance delivery decision-making processes and business needs related to the service package as dictated by USEPA, EGLE permit requirements and on-going obligations for liability sites.
5. Practice Time Management skills enabling review actual labor spent to strategically allocate available time devoted to activities. With the potential funding availability through the proposed federal infrastructure bill, competitive grant writing may be a larger focus of the EPS Manager’s time over the next couple of years. Leveraging external resources may be necessary, but institutional knowledge will be valuable for aligning organizational objectives with infrastructure bill terminology to position the City for maximum funding opportunity.
6. Participate with the WRD Manager and Public Services Deputy Director in developing a strategic in-person public feedback loop to provide validation or adjustments to the education and outreach program. Please also refer to the USEPA assessment on this similar indicator.

Asset Management Maturity Assessment Gap Analysis and Competency ‘Roadmap’

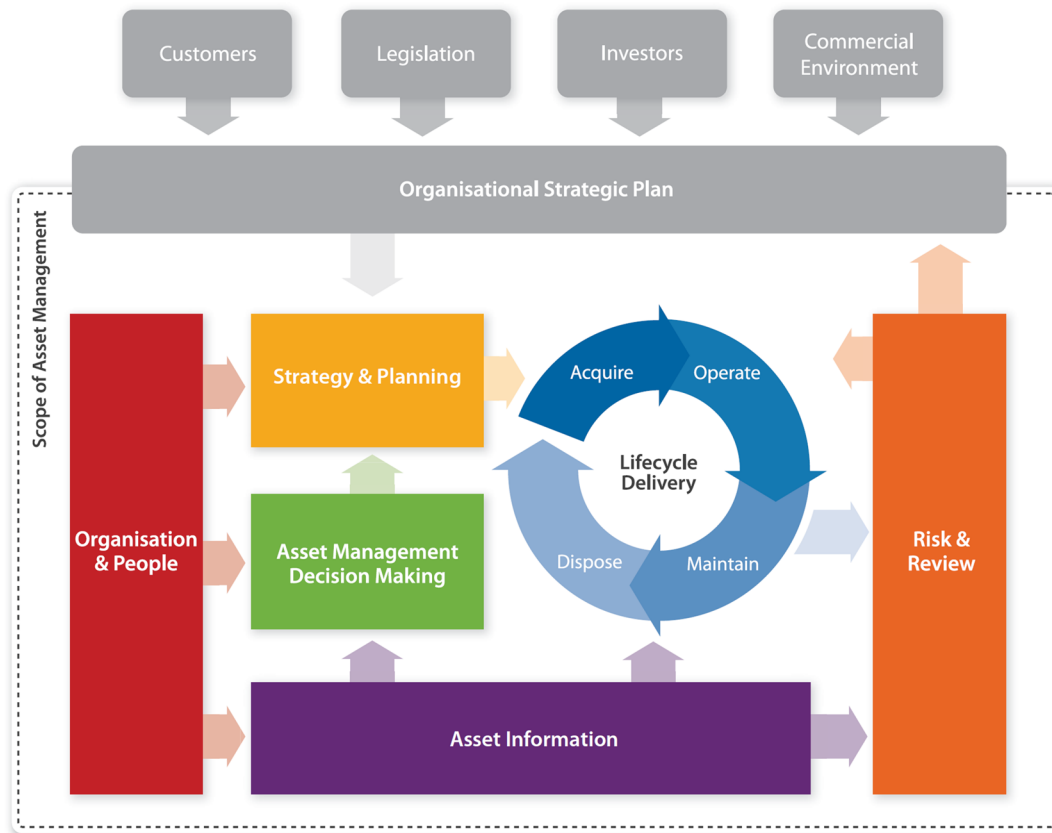
Future State Recommendation

Applied Asset Management assisted the WRD in developing a ‘roadmap’ for increasing competency and advancing its journey Asset Management Maturity. The topics stated in this section are inclusive of the time management recommendations in determining managerial capacity.

Applied Asset Management administered the Institute of Asset Management Asset Management Maturity Assessment tool to the WRD managers, superintendent, supervisors, and water engineers. The tool assesses the current state of institutional knowledge for managing assets against the ISO55000 elements of practicing Asset Management.

The future state scores show 1-year, 3-year, and greater than 5-year projections of where Water Resources believes it may achieve certain competency levels in the 39 subjects that support the Institute of Asset Management concept model for Asset Management.

Figure 5 – Institute of Asset Management Conceptual Model for Asset Management



WRD has clearly stated that its primary intent within the 1-year competency goal is appropriately sizing its staff and stabilizing technical and regulatory areas of drinking water as it applies to its public water infrastructure. With becoming the water supply source for the City of Parchment in 2019, lead service line replacements, and forever chemicals within the regulatory landscape, the WRD believes transforming itself through this ACO process is paramount for PA399 sustainability. Additionally, the WRD Manager wants to allocate quality time to assist managers and supervisors of each functional unit to acquire the resources to adequately perform their duties.

Strategy & Planning

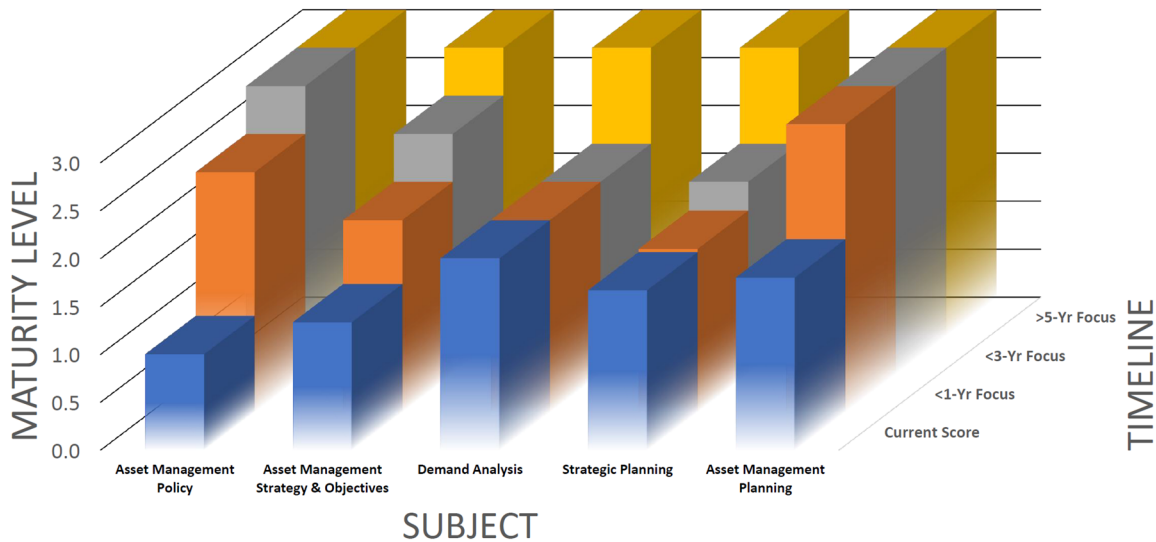
Strategy & Planning is dependent on the level of management. The Division manager will practice the most strategy and planning duties with less percentage of time for each managerial or supervisory level removed from the Water Resources Manager.

Within 1- year:

- Complete and execute a Water Asset Management Policy.
- Revise Water Asset Management Plan document per the ACO recommendation and align it with the Water Strategic Asset Management Plan completed in 2020 and IK2025.
- Align Water Reliability Study with WAMP and SAMP documents.
- Begin and sustain a regular practice of strategic thinking.

We also recommend that the Water Superintendent position be the sponsor and executor of the WAMP. This will assure better alignment and coordination of activities across multiple functional units within the division to long-term objectives.

Figure 6 – Strategy & Planning Theme Roadmap



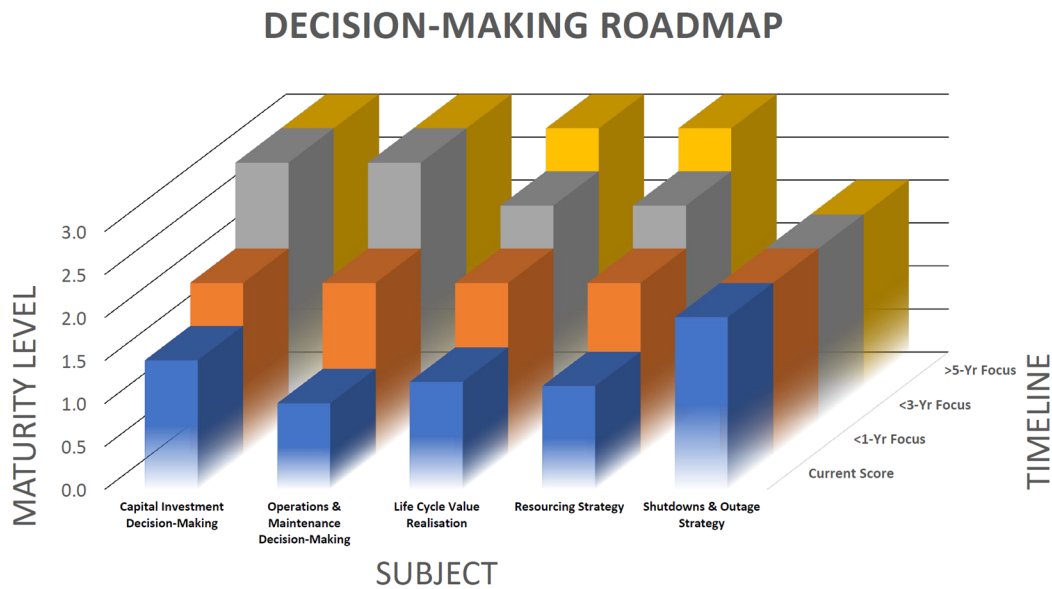
Asset Management Decision-Making

Within 1-year:

- Leverage technology to begin developing Resourcing Strategies consistent with its Water Asset Management Plan.
- Use Resourcing Strategies and Resource Management to better inform Operations and Maintenance Decision Making during the next fiscal budget cycle.
- Increase accuracy and completeness of the 25-year water capital improvement plan based on the science and strategies within the WAMP.
- Implement the Capital Investment Decision Making process as recommended in the ACO. Begin practicing and making annual improvements to this process at the turn of each fiscal budget cycle.
- Develop within Lucy the ability to realize quantifiable value during the lifecycle phases of assets.

Both water distribution and operations are resource intensive, and therefore, shifting to a mode of managing resources consumed against a resourcing strategy may help reduce highly reactive corrective actions.

Figure 7 – Decision-Making Theme Roadmap



Lifecycle Delivery

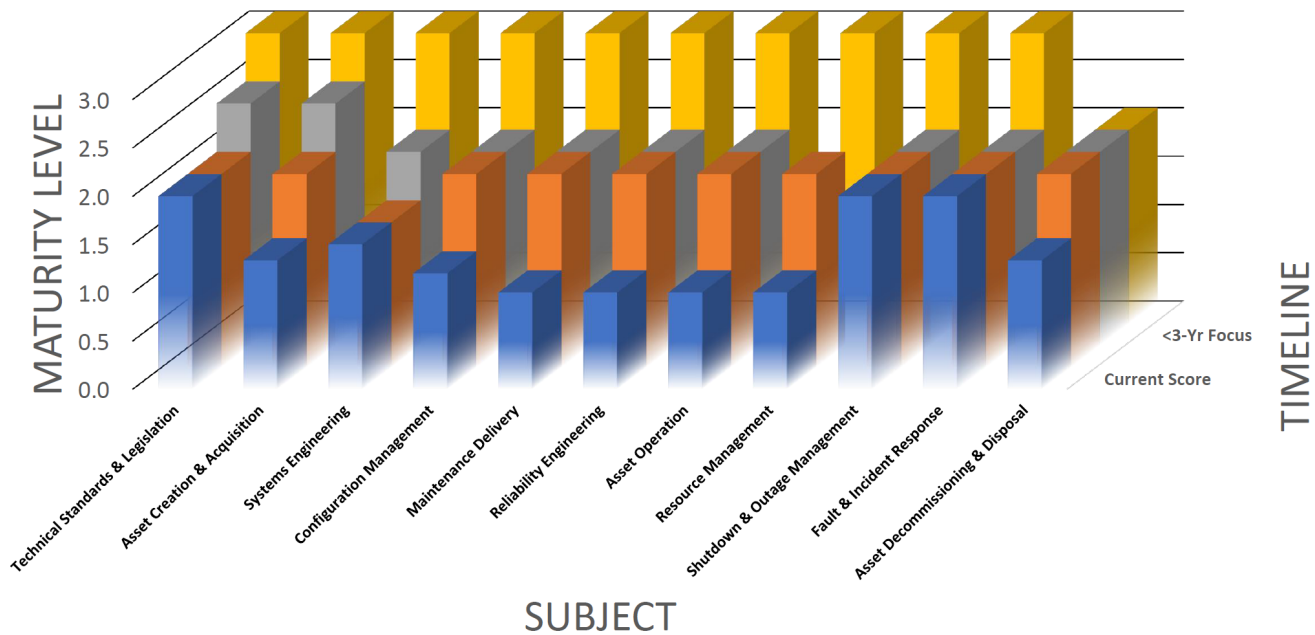
This study indicates core competencies in Lifecycle Delivery that are critical to the Water Supply O&M functional unit. These core competencies are well within the Water Operations and Water Maintenance Supervisor job description. They are simply best practices in processes and management techniques enabling the Water Operation Supervisor and Water Maintenance Supervisor to remain proactive, build reliability, and create lifecycle value within primary and other relevant components within the water supply system. With a complex and antiquated water asset system spread throughout a 580 square mile area of Kalamazoo County, it is imperative that this functional unit transition from their current reactive mode of operations to these proactive and preventive core competencies. Simple benefits include:

- Reduction in the Total Cost of Ownership (TCO) of the water asset system.
- Routine practice in preventive maintenance regimes rather than reactive.
- Sustains reliable water operations in accordance with PA399.
- Assurances that the intended design of any system component is achieving its maximum performance over its lifecycle. Maximizing value is important to the system and water customer.

Hence, we recommend the immediate training for the Water Superintendent, Water Operations Supervisor and Water Maintenance Supervisor in the following core competencies beginning in year 1:

- Systems Engineering
- Configuration Management
- Maintenance Delivery
- Reliability Engineering
- Asset Operations
- Resource Management

Figure 8 – Lifecycle Delivery Theme Roadmap



With regards to new pump station design, we recommend WRD engineers take a wider view of their existing systems and assure design consultants are configuring upstream and downstream primary asset components and systems to each new design. Terminology of the subjects in Figure 9 are highlighted in the following statements. The benefit of using a *Systems Engineering* approach with proper *Configuration Management* minimizes the risk of adding unnecessary operational and maintenance strain to an existing antiquated system. *Reliability Engineering* are the processes that enable primary asset components to operate at or near original manufacturer design intent over their service life and within a defined environment; thus, maximizing value over their lifecycle. Wellhead and booster pumps are great examples of this core competency. We recommend preventive and predictive maintenance intervention measures be determined using Operations and Maintenance Manuals delivered to the WRD at the completion of a project. Alternatively, water engineering may include this form of delivery in their Professional Service Agreements with consulting engineering firms. Uploading O&M manuals to Lucity at project’s completion would enable preventive maintenance forecasting and scheduling over an asset component’s lifecycle in the form of work orders through a standardized workflow process.

Maintenance Delivery is the management practice of preventive maintenance and correction action methodologies for a collective set of assets, thus, encompassing the other mentioned competencies. Water Operations currently logs issues into its CMMS, Lucity, on a daily or weekly basis as problems arise; and assigns corrective work order assignments to Operators/Maintainers on a weekly basis. This mode of operation is highly reactive; and therefore, this study recommends a transition to preventive maintenance. This may be done by first assessing the physical and dynamic performance conditions on primary asset components, and second, developing strategies forecasted in Lucity that issues work orders for assignments in advance of problems. Facilities may have their mechanical, electrical, plumbing, structural, architectural, and building envelope assessments developed to accompany these strategies. Additionally, strategies may forecast preventive and predictive maintenance costs over a component’s lifecycle resulting in optimal return-on-investment decisions that assure the lowest possible operational, energy, maintenance, capital, and disposal costs.

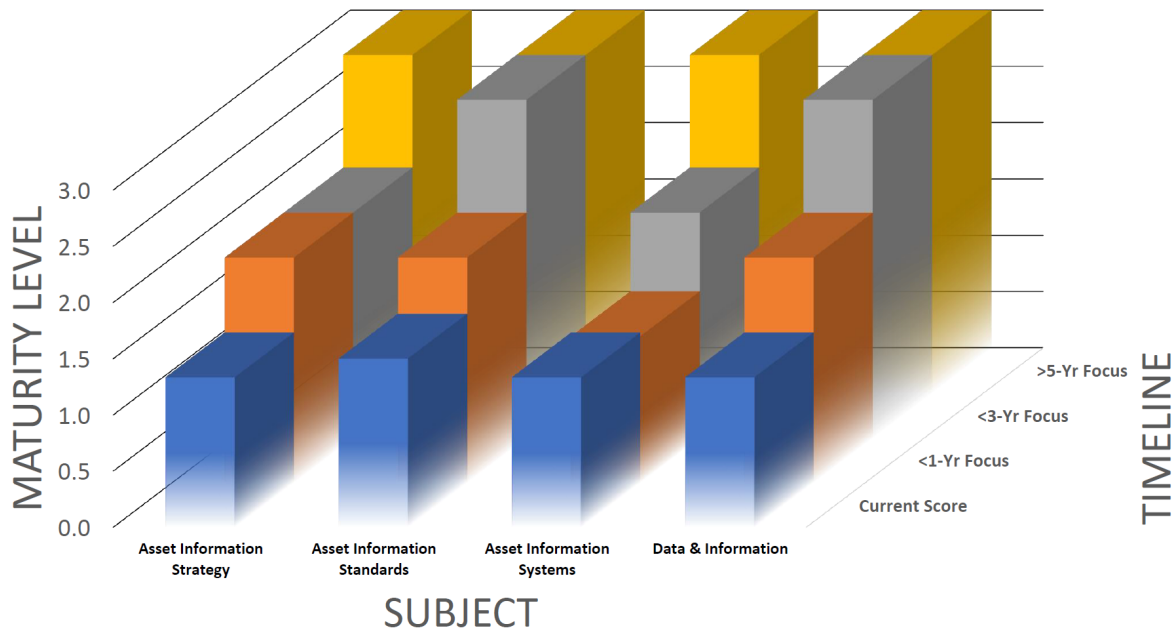
Water Asset Operations are the processes used to operate the water asset system to achieve business objectives for the WRD. Business objectives cannot be realized while operating in a reactive mode with a lack of long-term strategic direction for Water Operations and Maintenance personnel. We recommend the Water Operations functional unit assist the Water Superintendent in developing the operational business objectives and use the core competencies to achieve them. The benefit is clear direction, constant pursuit of long-term objectives, and a relentless effort to reduce the TCO, hence, improving water affordability.

Asset Creation & Acquisition is capital project delivery and capital maintenance for the water system, including new tanks, easements, or additional right-of-way, watermain replacement, facility, and major component repair. Water engineers do not currently use best practice project controls for water capital delivery. This study recommends water engineers seek project management training for municipal agencies for this practice may annually reduce its project costs up to 20%. Industry states that 20% of the TCO may be assumed during Asset Creation & Acquisition of infrastructure.

Asset Information

The WRD wants to collect good data in a timely fashion such that it may interpret the data into meaningful information for decision makers and to assess the water system health and performance at any given time. Hence, the WRD has decided on a 1–3-year timetable for achieving this goal for it must also coordinate and configure various new software, hardware, SCADA and PLC systems in projects culminating within this time period. This study supports the WRD intention and decision for it appears realistic.

Figure 9 – Asset Information Theme Roadmap



This study recommends an Asset Data & Information Policy and Strategic Objectives be developed within 1-3 years. We understand there are many Lucity workflows advancing at different rates and journeys within the WRD. As a result, this study recommends a governance model with rules of engagement be established to protect the integrity and ever-expanding nature of its water asset data. In a sophisticated, fast-changing industry, asset data and records sustainability are dictated by having well-established policies, processes, and management techniques. Data is an asset, and it has much value.

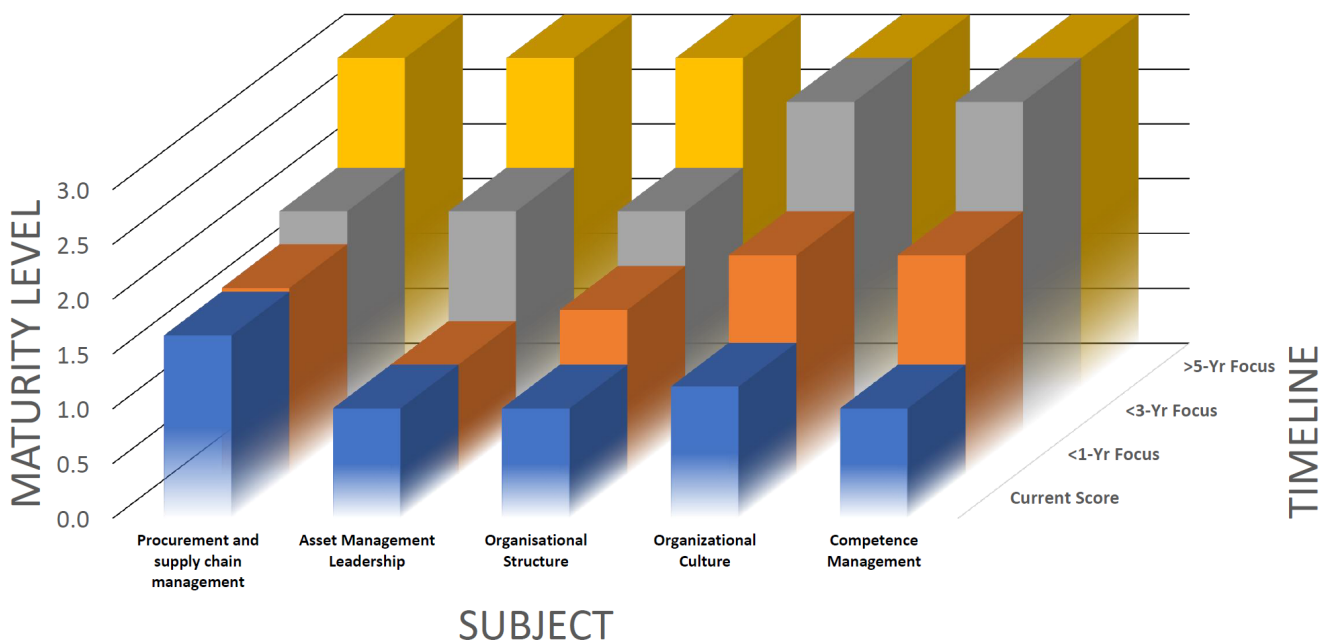
This study recommends that water asset data be reviewed and assessed for integrity and with a maturity index assigned to it. An Asset Information Strategy is recommended to document and implement a realistic schedule to increase water asset data maturity and develop and sustain a consistent water asset data hierarchy structure. Both are required to develop trusted informational displays for stakeholder decision-making.

Additionally, we recommend the Asset & Records functional unit develop internal and external dashboard for messaging the health and performance of the water asset system. Refreshing a dashboard on a quarterly basis is efficient and optimal in aiding managers and supervisors for pivoting operations from activity outcomes.

Achieving an Asset Information System and Asset Information Standards will come in due time, greater than 5-years, as this functional unit evolves and develops a new identity within Public Services Department.

Organization & People

Figure 10 – Organization & People Theme Roadmap



This subject involves developing and sustaining human interpersonal skillsets within managerial capacity, including leadership. The past decade of attrition has exposed gaps in managerial skillsets. Lengthy periods of unfilled vacancies jeopardized duties within positions and caused over-utilization for acting positions. Most of the senior management within the WRD are new people to their positions with a variety of experience. They must learn how to work together for business outcomes and long-term objectives. This new management team wants to first understand the end goal in both technical and regulatory aspects, for these targets seem to constantly move. The WRD management believes the ACO will help define and clarify that end goal. With that in mind, the following is recommended:

1-year:

- Organization Structure – develop and document a division-wide Succession Plan and communicate to direct reports.
 - Define the process for transferring institutional knowledge.
 - Coordinate with divisional competency needs.
 - Learn and “Lean” the process for filling position vacancies.

- Organizational Culture – provide staff with management training opportunities and develop human interpersonal skillsets to accompany their managerial capacity development. This includes duties, but not limited to:
 - Upholding accountability
 - Coaching and mentoring direct reports
 - Performing good annual employee evaluations
 - Rewarding for ‘good behavior’, especially with aligning activities to long-term objectives.
 - Managing change
 - Dealing with poor performance
- Competence Management – coach and mentor direct reports in developing professional development plans. Competency is an asset and must be quantified with a line-item cost in the water system fund fiscal budget. Duties include:
 - Training on equipment, appliances, and processes.
 - Training on laboratory processes and standard operating procedures.
 - Project Management training for water engineers.
 - Human Resources training.
 - Time Management.
 - Lean Management for process optimization.
 - License and Certification opportunities and encouragement.
 - Asset Management training and subject matter expertise in certain core competencies specific to one’s functional unit or job description.
 - Attending and actively participating in memberships like that expands one’s context in best practices. Many managers, engineers and supervisors already attend conferences with the American Water Works Association, but Asset Management knowledge is more available within leading industry practices like the Institute of Asset Management, Global Forum on Maintenance and Asset Management, and the International Infrastructure Management Manual.
 - Building relationships and attending EGLE and USEPA agency sponsored regulatory and technical advancements within the water industry.

3 & 5-years

- Asset Management Leadership – practice the theory of good management, continue to grow Organizational Structure, Culture, and Competency to a sustainable level.
 - Be advocates and communicate Water Asset Management to organizational senior leadership, elected officials, and internal and external stakeholders.
- Procurement & Supply Chain Management – aligning strategies with the appropriate procurement tools by developing the following categories:
 - Daily operational plans
 - Preventive maintenance
 - Capital Maintenance
 - Capital Improvement

The WRD management team will be responsible for building a diverse, inclusive, and sustainable supply chain program for delivering the resources and activities within its service package. The pending infrastructure bill in Congress and current labor shortage may influence internal and external resources for operations, maintenance, and capital investment delivery. Spending annual managerial effort in supply chain management is paramount for delivering reliable water service.

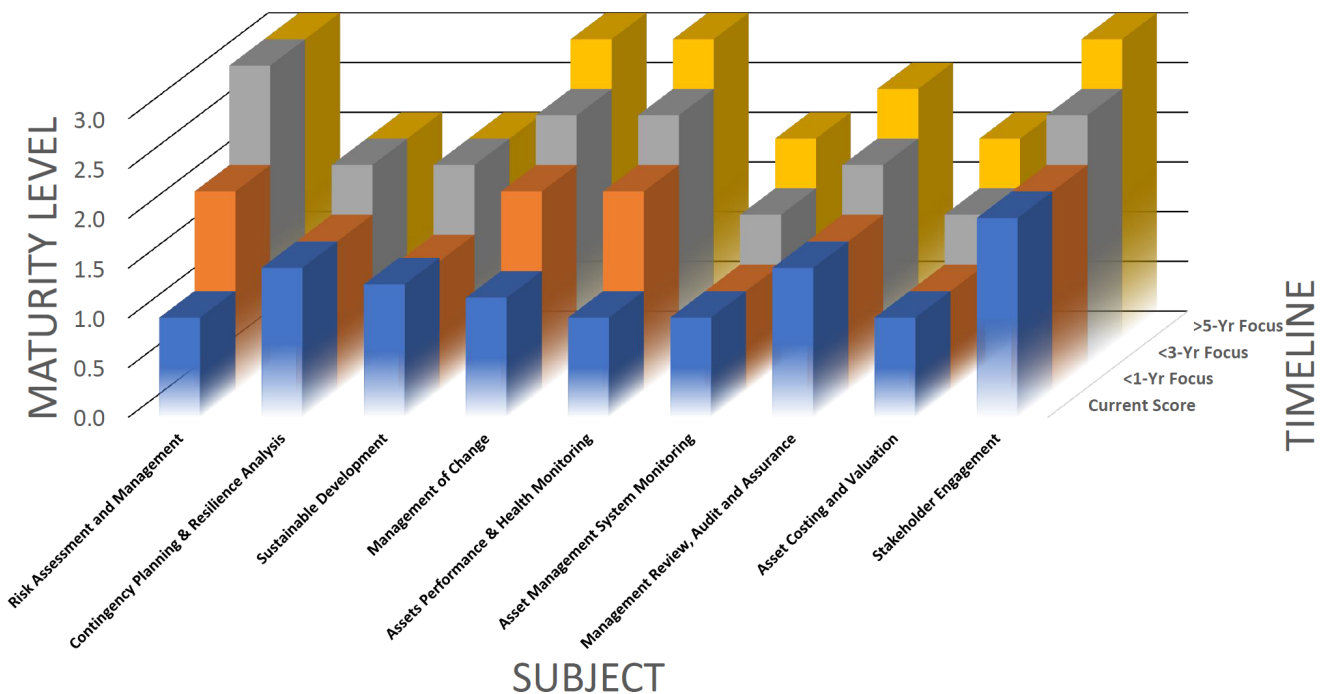
Risk & Review

Maintaining resiliency and striving toward continuous improvement is the objective under Risk & Review. This also involves how well the WRD will manage change in the face of an EGLE approved ACO and pivot operations based on risk and asset performance. Our recommendation is as follows:

1-year:

- Managing Change – this will be key to the success of the ACO. We recommend completing many of the first year Asset Management ‘roadmap’ items and incorporating them into a Change Management document that is regularly communicated to the entire division staff.

Figure 11 – Risk & Review Themes Roadmap



3-years:

- Risk Assessment and Management – this will take effort, but it will add tremendous value. Averting risk builds financial resiliency. Risk goes well beyond the criticality maps for capital water main replacement for it must also include but not be limited to:
 - All distribution primary components.
 - All transmission line primary components.
 - Elevated and below grade tanks.
 - Station pumps.
 - Wells and well pumps.
 - Well field land management.
 - Station building envelopes.
 - Station mechanical, electrical, plumbing, structural and architectural components.
 - WAMP, SAMP, & IK2025 Long-term objectives and strategies

- Water Asset Data & Information
- Water Resources Succession Plan
- Water Resources Emergency Action Plan
- Asset Health and Performance Management – Water Resources desires to develop capabilities with dashboards that provide managers and supervisors the ability to monitor the health and performance of water asset components they oversee. This study recommends developing internal dashboards in conjunction with the Asset & Records functional unit and refreshed quarterly to managers and supervisors.

>5-years:

- Contingency Planning & Resiliency Analysis – Water Resources currently has an Emergency Action Plan, and its manager attends monthly meetings with the county and surrounding jurisdictions for coordination efforts. Please refer to the section of this report on Emergency Action Plan Assessment for recommendations.
- Sustainable Development – for now, it is aligning Water Resources activity outcomes with social, economic, and environmental objectives in the SAMP and IK2025. Other detailed applications include the 6 Capitals and the United Nations Sustainability Development Goals. Climate Change is a common thread in Sustainable Development that may impact the water asset system.
- AMS Monitoring – this action can be applied to the ACO and monthly progress reporting to EGLE, but development and documentation for a formal management system is recommended in accordance with ISO55000/1/2.
- Management Review, Audit, and Assurance – processes for measuring the effectiveness of the WRD asset management activities, this ACO and the AMS. Lean optimization, like the Water Main Break Repair activity, is one method of reviewing such processes. Lean Accounting establishes monetary performance metrics at the activity level that may be monitored. We understand establishing the accounting practices for monitoring resources at the activity level is one of the goals with Lucy. Practicing continuous improvement tactics aids in auditing and assurances. This will all come in due time with the appropriate training.
- Asset Costing & Valuation – subject matter experts will need to be trained in Lucy to enter costs and condition assessments for determining the ‘book value’ of the water asset system. Water Resources has begun a similar approach by recording the monetary value of the system after each water main replacement project.
- Stakeholder Engagement – municipal agencies perform this task by their very nature with engaging the public through a variety of methods. From a managerial capacity standpoint, many of the 1–3-year Asset Management competencies will be helpful to Water Resources when engaging its stakeholders.

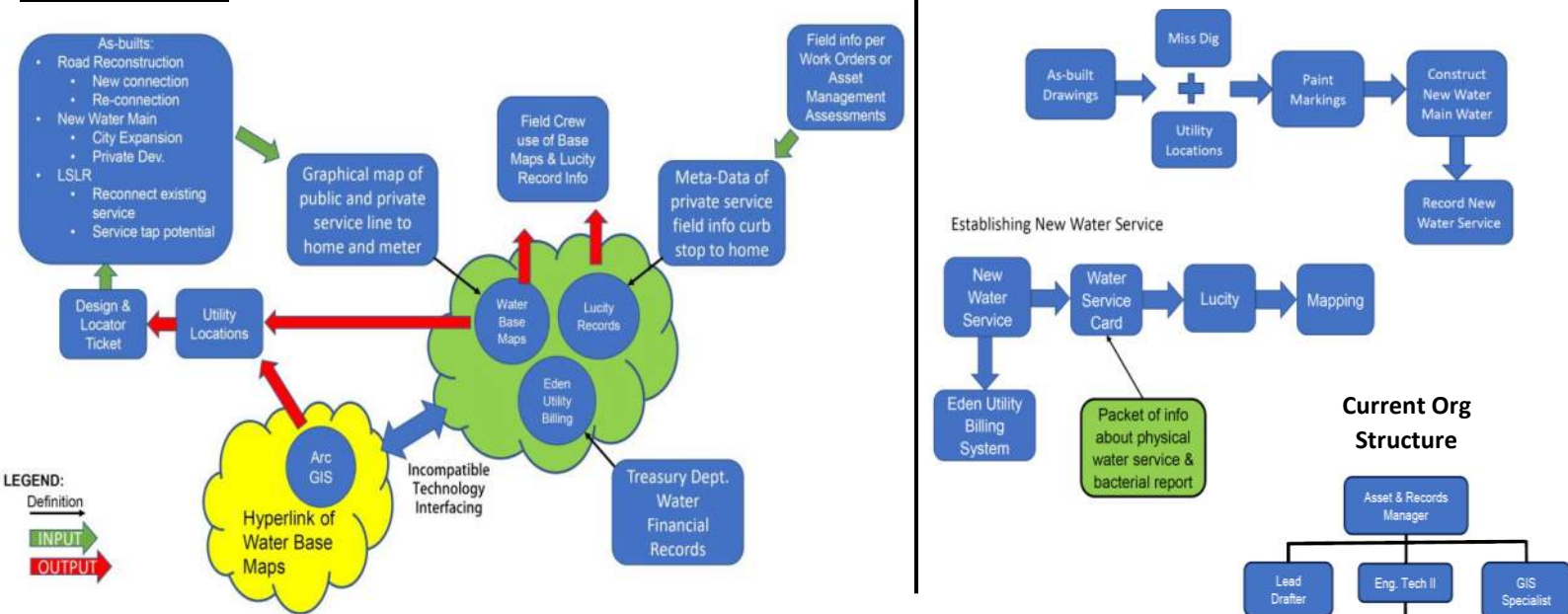
In addition to recommendations that support closing the above-mentioned managerial capacity gaps, this study recommends the WRD develop an AMS as the management best practice for the water system asset. ISO55000/1/2 is a leading international standard that defines the requirements for an AMS. An AMS may be viewed as a cornerstone for maintaining trust within the Utility Policy Committee, City Commission, various stakeholders, and bond investors. Even more importantly, an AMS enables Public Services and WRD management to improve their ability to optimize water system rates (cost), water asset risks, and water asset system performance. This study provides similar comments in the Water Asset Management Plan document review and recommendations. Optimizing these elements of an AMS enables flexibility during fluctuations in environments like the economy, climate change or regulatory that may heavily influence water decisions. An AMS will assist the WRD in transforming from reactively ‘managing water assets’ to practicing Asset Management on the water asset system while working toward achieving long-term strategic objectives.

Figure 12

Problem Statement: Define Managerial Capacity required to sustain Asset & Records to Stakeholders

Background: The Asset & Records function unit comprises of (1) Manager, (1) Lead Draftsperson, (1) GIS Specialist, and (4) Engineering Tech I's. The Manager job description was re-written to transform predecessors. Internal & external stakeholders are served with multiple requests & reports.

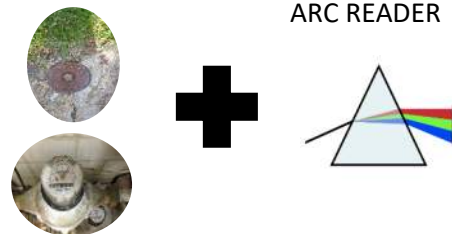
Current State:



Water Base Maps Explained

50,000' View – Geospatial location map of WMs (size), Hydrants (ID#s), Valves & Streets(ref)

10,000' View – Detailed as-built of the water system: transmission & distribution lines, gate valves, hydrants, service valves, service lines, & meters



Graphical Information



Graphical Information System - Geospatial location of linear infrastructure

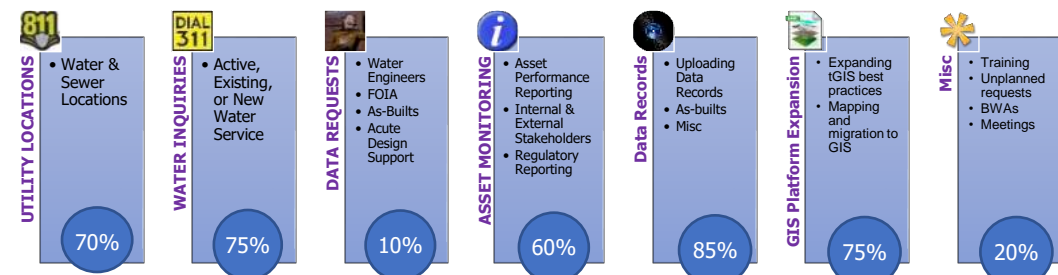
Lots of Data: Better functionality with Lucy, BS&A: for multiple Infrastructure Types

Metadata – Repository for Field Info like New Copper Service Lines or Water Main

Lucy is the City's Computer Maintenance & Management System (CMMS) – Taps



Analysis:



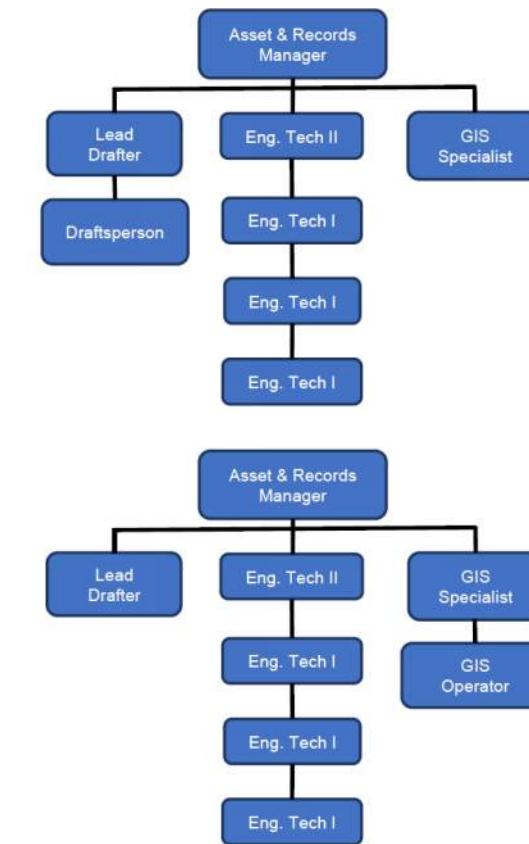
Core Business Objectives

- Maintain & sustain data quality.
- Provide accurate information to stakeholders for well-informed decision-making and safe operations.

FTE based on Activity = 3.95
Current FTE based on Manager, GIS & Draftsperson Positions = 3.0

1. The unit is data & stakeholder intensive while pivoting to GIS & Lucy best practices.
2. Too many stakeholders are requesting similar information on multiple occasions, which detracts focus from core business objectives, value, and the customer.
3. Water service inquiries is an unnecessary burden for the manager.
4. Utility Location services create value but consume too much time of the entire unit.
5. FTE evaluation supports an additional employee aligned for future GIS needs of the business.
6. A GIS platform is the industry best practice for municipal asset management, which must be the future state emphasis to deliver the business core objective.

Future State Countermeasure:



Recommended Strategy:



serve

By the Numbers:

Draftsperson - short-term value added benefit, only solves as-built backlog
GIS Operator - long-term strategic value added benefit.
Approximate Total Compensation Package ~ \$100,000, assumes \$25/hr with benefits
Lifecycle – Draftsperson 5 yrs; GIS Operator >5 yrs., plus a sustainable career path in a technological field that is exponentially growing. AutoCAD duplicates work by double handling.



Implementation Schedule:

- ✓ Groom Eng Tech II into Utility Locator Lead – position substitution & fill by position by April 2022.
 - Empower Utility Locator to lead and manage program.
- ✓ Add GIS Operator in 2022 budget: fill position by Summer 2022.
- ✓ Collect data & create Water Service Line layer in GIS – during 2022 winter; reduce backlog.
- ✓ Create GIS layer for water service requests
- ✓ Train 311 to search GIS records for active or inactive water service requests
- ✓ Write 311 scripts and assign Lead Draftsperson to assist with Utility Locations
- ✓ Interview stakeholders for multi-purpose, transparent Water Dashboard, 2022 and ACO recommendation.
- ✓ Leverage Lucy & GIS to create functional unit infrastructure 'scorecards' for operations and distribution performance.

Scenario #1: Draftsperson Addition

Pros:

1. Additional help for as-builts.
2. Additional help with AutoCAD work related to water base maps.
3. May split on-call duties of Lead Draftsperson serving utility locations.
4. May respond to inquiries with water service locations.
5. Assist with Boil Water Advisory map creation.

Cons: Does not align with core business objectives or pivoting for future needs of the business.

1. As-builts does not have a strategic approach to reduce backlog.
2. Backlog is temporary, resolve with temporary external resources.
3. GIS is dominating the municipal landscape for managing asset data as opposed to AutoCAD technology.
4. Job duties and essential requirements are heavily based on AutoCAD use and Public Works design.
5. There is little emphasis on the future for the unit including the PA399 requirements for a fast-changing industry landscape.

Scenario #2: GIS Operator Addition

Pros: Aligns with core business objectives. Relieves GIS Specialist from data handling while expanding platform capabilities by performing:

1. Asset data uploads into GIS from new condition appraisals, lead service line replacements, new capital construction, as well as for other linear assets.
2. Asset data maintenance for transparent dashboard to stakeholders.
3. Creating and sustaining 'box scores' for water asset component performance for distribution and operation daily decision-making.
4. Develop risk profiles from asset data.
5. Assist with GIS Mapping of asset data collected from field activities.
6. Assists with GIS Specialist expand platform & coordinate workflows.
7. Assist with improving coordination of asset data between GIS & Lucy.



Implementation Plan

Section D4

Implementation Plan

The Fishbeck and Applied Asset Management Consultants team have prepared an Implementation Plan with recommendations on reducing the capacity and competency gaps that exist within the technical, financial, and managerial sections.

A schedule for implementation of the necessary activities is included within this section. The below represents minimum recommendations and must be correlated with the gaps and recommendations in this entire Capacity Study.

Implementation Plan Schedule

Item		Schedule
Technical		
Update Water Asset Management Plan		
Update Water Reliability Study		
Update General Plan		
Update Water System Model		
Update Geographic Information System		
Develop Valve Exercising SOP		
Develop Hydrant Flushing SOP		
Update Well Head Protection Plan		
Complete Water Loss Study		
Financial		
Update Rate Study		
Update Capital Improvements Plan		
Managerial		
Training Support for Operators		
Safety Policy Updates		
Develop Safety Committee		
Update Water System Rules, Regulations and Policies		
Develop Customer Complaint Response Procedures		
Implement the Asset Management 'Roadmap' in Section D3		
Human Assets – Capacity	Complete field, operator & maintainer training plans with advancement milestones and clear training sequences	
	Integrate knowledge transfer with succession planning event; require senior staff to transfer institutional knowledge through structured sessions.	
	Complete all Professional Development plans for employees, including milestones.	
	Conduct a succession planning event encompassing human development & Asset Management competency, and coordination of notable planning documents; include Public Services Training Officer.	

Implementation Plan Schedule

Item		Schedule
Human Assets – Managers & Supervisors	Conduct a series of sessions and individual coaching in growing interpersonal skillsets, providing employee feedback (having difficult conversations), employee supervision, and positive annual employee evaluations.	
	Conduct Executive Coaching for mentoring “manager” activity once per month.	
	Require Direct Reports to shadow staff up to 6 months within their respective functional units and document resource and proficiency recommendations for activity success in the context with this Managerial Capacity study attainment. Report discovery and recommendations to immediate Manager or Supervisor.	
	Create Performance Metrics for activities “championed” by direct reports – identify process and content. Develop resources and schedules for support and continuous improvement.	
Human Assets – Accountability	Train and mentor managers on how to conduct valuable formal and informal annual performance evaluations. Understand behavioral and technical elements, and Performance Improvement Planning.	
	Use and complete RACI (Responsible, Accountable, Consulted, Informed) diagram for each activity for accountability assignments.	
Technology – Accessibility	Provide electronic field notebooks to technology leads in each field crew and water operators/maintainers.	
	Provide and ensure easy access to GIS maps for field operations and maintenance activities.	
	Provide and ensure easy access to Lucity for field operations and maintenance activities. Resolve web-based versus server-based solution issue. Decide most appropriate and enforce accessibility.	
Technology – Lucity	Identify, plan, schedule, and begin implementing preventive maintenance interventions (Lifecycle Delivery) and actions via work orders in Lucity.	
	Identify critical water asset microsystems and components and forecast lifecycle costs over a defined period.	
	Learn and adopt a ‘value’ realization approach to lifecycle delivery and capital replacement.	

Implementation Plan Schedule

Item		Schedule
Technology – Program Implementation	Develop and implement a Program Delivery Plan for migrating both field and administrative workflows into Lucity to appropriate resources, assignments, and schedule. Assign a “Sponsor” and “Champion” to execute the Delivery Plan. Use Project Management best practices to develop the Delivery Plan.	
Technology – Connectivity	IT and Field Supervisors coordinate to resolve connectivity issues in the field between hotspot and software technologies. IT investigate multiple carrier options for water system-wide signal to access water maps and metadata.	
Technology – Subject Matter Experts	Select and obtain training within each functional unit. Grow SMEs and expand knowledge base within division.	
Good Governance – Transparency	Develop inward and outward facing transparent dashboard representing water asset system health and performance.	
	Develop quarterly performance dashboards for programs and asset components to monitor performance, pivot operations, and aid in decision-making for managers and supervisors.	
	Develop Level of Service statements for the water asset system and groups of major components.	
Good Governance – Business Operations	Develop business operations ‘box scores’ and key performance indicators for managers and supervisors to measure progress in human development and activity performance.	
	Prioritize and perform LEAN Thinking techniques to optimize WRD and contributing department activities and processes. Where appropriate, integrate with Lucity Program Delivery Plan and develop innovative LEAN Accounting metrics for monitoring resource consumption in operations and maintenance activities. Capital Project and Water Asset Creation processes are recommended for optimization and may be considered as future candidates for a Project Information Management technological platform.	

Implementation Plan Schedule

Item		Schedule
	Reform recording of employee time accrued against activities to enable annual evaluation and adjustment to resources, job descriptions, capacity, or other business needs.	
	Obtain Project Management for Municipal Agencies training, develop project control measures, and create a water project management manual for water capital project delivery; monitor water capital portfolio performance.	
	Finalize and implement the Capital Investment Decision-Making process including regular meetings during the year within WRD and among WRD asset partners.	
	Develop the O&M Decision-Making process including regular meetings during the year within WRD to monitor resource consumption. Use Resourcing Strategies and Resource Management as supporting science for the process.	
	Develop Resourcing Strategies to support delivery of WAMP and CIP strategies; develop annual workload forecast assignments and manage resource consumption against annual approved resourcing strategies. Practice Resource Management to track time accrued on activities and compare with Resourcing Strategies. Using Microsoft Project is a beginning foundation.	
	Develop a water asset data and information strategy for its sustainability. Review water asset inventory and assign a maturity index, develop a target, schedule, and assign resources to increase water asset data maturity.	
	Develop and implement Lean A3 business model for the Environmental Services Program service package for strategic direction and staffing capacity.	
Good Governance – Business Objectives	Develop and monitor appropriate risk profiles for the water asset system, microsystems, primary components, and major secondary components.	
	Develop a Change Management Plan that incorporates the appropriate risk profile to mitigate barriers impeding transformation progress against the ACO recommendations.	
	Centralize, identify, and monitor core WRD business objectives for WRD Manager and Direct Reports.	

Implementation Plan Schedule

Item	Schedule
<p>Good Governance – Emergency Action Plan</p> <p>Fully develop the Water Emergency Action Plan with ACO recommendations; practice annually, ensure resources are available, integrate with Succession Planning event.</p>	
<p>Alignment – Asset Management</p>	<p>Create and implement a consensus-based Water Asset Management Guidance Document (a.k.a. Water Asset Management Policy) to align and steer WRD activity and planning events.</p>
	<p>Update Strategic Asset Management Plan consistent with a proposed Water AM Guidance document.</p>
	<p>Update the WAMP for a 2022 state regulatory submittal consistent with Water AM Guidance document, IK2025!, SAMP, Financial Water Rate Study, and updated Reliability Study, and ACO Recommendations. Coordinate the consistency and dependency between these documents and others as appropriate.</p>
	<p>Develop and actively participate in an ongoing, tailored training program to grow Asset Management competency in accordance with the AM ‘Roadmap’. Join the Institute of Asset Management to leverage leading best international practices, conferences, discussion boards, and technical documents.</p>
	<p>Reassess Asset Management Maturity every 2-3 years against the benchmark in this Capacity Study. Adjust resources and training as required in comparison to the Asset Management ‘Roadmap’ in Section D3</p>
	<p>Create, assemble, and document the Water Asset Management System from ACO recommendations, activity optimization, clearly identified roles and responsibilities, programmatic resources, and SOPs. Adopt the AMS as the business management system for managing the water asset system.</p>