City of Spokane

City of Spokane

Link – Utilities Strategy

Technical Memorandum

December 2020

Table of contents

Table index

Figure index

Appendices

Acronyms

APPA	Adaptive Pathways Planning Approach
ASCE	American Society of Civil Engineers
AWWA	American Water Works Association
CBO	Congress of the United States, Congressional Budget Office
CE	Communications and Engagement
CIP	Capital Improvement Plan
DOH	Washington State Department of Health
ERU	Equivalent Residential Unit
GAO	United States General Accounting Office
GFC	General Facilities Charge
GHG	Greenhouse gases
gpcd	gallon per capita per day
ICM	Integrated Capital Management
IWAC	Idaho Washington Aquifer Collaborative
IWM	Integrated Water management
LOS	Level of Service
MODA	Multi-Objective Decision Analysis
SAJB	Spokane Aquifer Joint Board
SMC	Spokane Municipal Code
Spokane	City of Spokane
Strategy	Link – Utilities Strategy
TAC	Technical Advisory Committee
TBD	to be determined
TM	Technical Memorandum
US	United States
USEPA	US Environmental Protection Agency

1. Introduction

This technical memorandum (TM) outlines the development of the City of Spokane's (Spokane) Link – Utilities Strategy (Strategy) for the 20-year Capital Facilities Plan. Specifically, this TM focused on developing a framework for prioritizing actions for the Spokane Water System. The purpose of this TM is to provide a short summary outlining Phase 1 of the Strategy, which included framing of the Strategy development process, a communications and engagement plan, and next steps in the Strategy development process.

1.1 Background

As infrastructure across the United States deteriorates and utilities are unable to keep pace with required maintenance and improvements through current user charges, the need increases for a process to make decisions about infrastructure rehabilitation and replacement based on maximizing levels of service while minimizing risk. In its report entitled (GAO-02-764) *Water Utility Financing and Planning*, the United States General Accounting Office (GAO) found that only 85 percent of water utilities covered operation and maintenance costs from user charges and that 29 percent of utilities deferred facility maintenance due to insufficient funding. Compounding the funding deficiency that some utilities are facing is the need for large expenditures to replace aging infrastructure (i.e., what the American Water Works Association [AWWA] has dubbed the "Dawn of the Replacement Era"), as well as funding needed to satisfy new regulatory standards. The AWWA estimates that the cost of restoring underground pipes will total at least $1 trillion over the next 25 years, without including the cost of constructing new infrastructure or repairing treatment plants (AWWA, 2012). Maintaining service while managing infrastructure needs so the cost of infrastructure replacement does not cripple existing or future generations is a key challenge for utilities (AWWA, 2001). Deferring replacement expenditures can lead to "lowering standards of service, excessive maintenance expenditures, or both" (Congressional Budget Office; CBO 2002). These competing needs for funding will result in challenges as utilities try to maintain the level of service (LOS) while keeping drinking water affordable for customers.

Spokane faces these same challenges as it seeks ways to meet expected LOS while maintaining affordability of water services. For this reason, developing a Strategy for balancing the needs at existing facilities and planning for future needs (due to growth and regulations) is important. The Strategy must prioritize water system investments for the 20-year Capital Facilities Plan and provide a framework that is compatible for implementation across Spokane's water utilities (e.g., water, wastewater, stormwater, and integrated water management).

1.2 Approach

The Strategy is based in advanced asset management and integrated water management strategies to provide a rigorous and defensible decision-making process, which enables the balancing of the costs of infrastructure assets with acceptable levels of risk, while continuously delivering established LOS. The Strategy also assists in managing risk as well as providing public confidence, internal utility coordination, communication, and information and knowledge transfer/retention.

Developing a long-term capital facilities plan is a complicated process that requires balancing existing and future planning needs, anticipating growth and regulatory changes, as well as meeting community expectations. To achieve this intent and meet Spokane's long-term goals requires a focus on creating resiliency within the water system to address existing and future development, aging infrastructure, and addressing foreseen and unforeseen risks. Business

case evaluations are needed to enable the identification of the best solutions or actions for a given need or problem. Different solutions or actions can be analysed and prioritized using an Adaptive Pathways Planning Approach (APPA). APPA provides decision-makers with different potential pathways enabling them to understand how different decisions work together or preclude other decisions in the future. This improves the prioritization of actions by placing them within a larger context. Finally, a successful Strategy requires the support of partners, key stakeholders and the public. Engaging with stakeholders is therefore important as it offers those who will affect or be affected by the outcomes a voice, which can help reduce risks, as well as improve governance and stakeholder relationships. Also, internal agency engagement facilitates organizational alignment and inter-departmental support by providing clarity as to long-term objectives and vision. For this reason, the Strategy must include a Communications and Engagement (CE) Plan.

For Phase 1, which is summarized in this TM, the Strategy focuses on developing LOS standards, a multi-objective decision analysis (MODA) framework, and framing the components on a communications and engagement plan. The MODA framework developed as part of the Strategy is based on the Spokane's long-term goals of balancing sustainability, social responsibility, and affordability (illustrated in Figure 1), as articulated in the 2020 Water Conservation Master Plan.

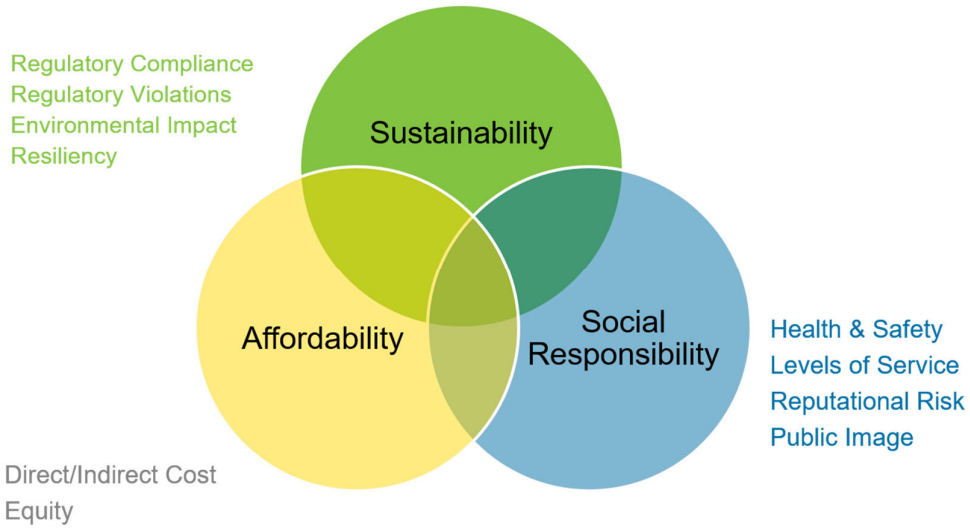

Figure 1. Spokane's Triple Bottom Line

Source: [Adapted] City of Spokane Water Conservation Master Plan, 2020

The objectives of the MODA framework is to:

- Define the context and goals for evaluation based on Spokane's values and mission
- Identify the importance factor for each criteria, allowing evaluation of a range of criteria
- Maximize return on investment by identifying actions that provide the greatest value to priority goals
- Build credibility by providing objective, transparent documentation
- Manage change by responding to changing external conditions and needs over time
- Provide a feedback loop, which can guide future system planning and allow for a living process that can be adapted over time

1.3 Phase 1 Strategy Development

Phase 1 of the Strategy development comprised three core tasks:

1. Understand the business risk exposure of the water system, including risk tolerance objectives as well as how the Spokane's water charges compare with other cities.

The first step in the process was to develop organizational understanding of business risk exposure of the water system through Group 1 interviews. This included identifying the desired Level of Service, acceptable level of risk, and other relevant assessment criteria. An overview of the Group 1 and 2 interviews are provided in Sections 2 and 3 of this TM. Section 4 of the TM provides a comparison of water rates with western cities of similar size as well as example of different rate structures used by water agencies to recover the full cost to deliver water.

2. Develop Goals and Decision Criteria for the MODA Analysis Matrix

A draft MODA analysis matrix was developed to frame the decision criteria and define desired level of service for the system, which included draft sample evaluation criteria. This process included information drawn from Group 1 and Group 2 interviews, as well as a detailed comparison with Spokane's Comprehensive Plan and other municipal decision-matrices. Section 6 of this TM provides a draft MODA sample analysis matrix.

A draft sample matrix framework was developed as a basis of discussion. It is important to note that the draft MODA presents sample criteria, which will be revised and updated during workshop discussions with key stakeholders in Phase 2 (see Section 6, Communication and Engagement Plan). Once these decision criteria have been finalized the next step will be to develop the measurement scales (weighting) based on desired LOS, acceptable level of risk, and other relevant criteria. The framework will be tested through a formal review of projects/actions to ensure criteria compatibility using the APPA. The APPA will be used to develop future scenarios in order evaluate project and actions that can be prioritized using the MODA framework.

3. Identify internal and external stakeholders as part of the communications and engagement plan framing.

Internal stakeholders included the Technical Advisory Committee (TAC) Team members who were to be interviewed as part of the business risk and risk tolerance research. The purpose of the TAC team was to identify acceptable level of risk, level of service, risk based, and other decision criteria definitions, importance factors (weighting), and assist with alternative scoring. These interviews were conducted in two groups: Group 1 comprised Spokane senior staff, and Group 2 comprised Spokane administrators and Council members. Preliminary mapping of external stakeholders was also conducted, which informed the draft Communication and Engagement Plan framework (see Section 6 of this TM).

Section 7 of the TM provides an explanation of next steps for developing and implementing the MODA framework and Strategy.

1.4 Key Definitions

There are a number of terms that are important to understand in this TM and for convenience their definitions are provided below:

Adaptive Pathways Planning Approach is a methodology developed by GHD for use in Australia for the City of Melbourne and other large urban areas as a way to understand decision making impacts over time. "Pathways" are defined as "bundled combinations of actions, strategic investments, policies, programs, partnerships, collaboration and decision frameworks that work in concert to achieve objectives and milestone performance targets through time". The

term “adaptive pathways” is used because this incorporates key elements such as a broad consideration of future uncertainty, the exploration of flexibility so that the chosen pathway can change in response to an uncertain future to both manage risks and take opportunities, the use of decisions points and triggers, and the use of pathway maps to visualize both strategic and investment level pathways. The adaptive pathway planning framework can be used to develop a range of exploratory pathways to achieve objectives and milestone performance targets through time. These “adaptive pathways” (or strategic pathways) will be developed collaboratively through a multi-stakeholder structured decision process, and will form the basis for charting the 20-year Capital Facilities Plan.

Asset management is defined as *“an integrated set of processes to minimize the life-cycle costs of infrastructure assets, at an acceptable level of risk, while continuously delivering established levels of service”* (AMWA, 2007). At its core, asset management is fundamentally a collection of efforts aimed at optimizing the value derived from assets. The way value is defined is the central component of how success is measured in delivering services at specified costs and at acceptable levels of risk.

Levels of Service is a measurable goal for delivery required to satisfy user needs, provide for a safe work environment for employees and the public, and address stakeholder needs. Level of service provides a utility with an established metric to judge progress, and are important when an organization wants to measure the performance of its assets and asset management program (AWWA, 2018), and evaluate customer service. Aligning performance requirements with strategic direction across the organization is the fundamental value of level of LOS, from both customer and internal requirement perspectives.

Multi-Objective Decision Analysis (MODA) is a process for making decisions when there are very complex issues involving multiple criteria and multiple parties who may be deeply affected from the outcomes of the decisions. This approach provides a rigorous and defensible decision-making process that result in better-managed risk as well as improved public confidence, internal utility coordination, communication, and information and knowledge transfer/retention.

Risk Assessment requires understanding the different components of the a system, their strengths and weaknesses as well as the existing and potential threats to the system so that informed decisions can be made (Dunn et al., 2014). Risk Assessment is a key component of a successful asset management program because it is the balancing point between minimizing cost and maintaining level of service. For example, a decision to keep costs low at any price results in impacts to the level of service from failing infrastructure, and a decision to provide an increased level of service with no regard to cost can result in inappropriate spending of funds. Therefore, it is important to understand the risk associated with balancing service and cost. The United States GAO highlighted the impacts of not maintaining this balance:

> *“…despite their needs, utilities may have to postpone capital improvements because revenues are not sufficient to finance the costs or more immediate needs divert resources away from planned improvements. However, deferring major or minor capital improvements can ultimately result in higher costs to the utilities” (GAO, 2002)*

2. Group 1 Interview Summary

2.1 Overview

Understanding the business risk exposure of Spokane's water system, including risk tolerance was crucial to the development of the MODA framework. In order to develop the MODA framework criteria, Spokane staff were interviewed to gain a deeper understanding of key areas of concern, risk tolerance, level of service objectives and definitions and utility goals. For the Group 1 interviews, staff with knowledge and experience from across the utility were selected who could provide different perspectives relating to the provision of water services (see Table 1). These staff were asked a number of questions during an hour long interview based on their area of expertise.

Table 1. Group 1 Interviewees

Interviewees	Question Theme	Date
Dan Kegley	Overview	May 21, 2020
Kristen Zimmer and Marlene Feist	Communication	July 14, 2020
John Sawyers and Beryl Fredrickson	Development Services	July 14, 2020
Loren Searl and Colin Naake	Emergency Management	July 21, 2020
Jim Sakamoto and Raylene Gennett	Overview	July 22, 2020
Steve Burns and Jeanne Finger	LOS	July 28, 2020
Katherine Miller and Marcia Davis	Integrated Capital Management (ICM)	August 7, 2020

The interview questions addressed the Spokane's long-term goals of balancing sustainability, social responsibility, and affordability. These interview questions were designed to collect information to initiate a conversation regarding the following issues related to:

- What LOS standards Spokane should use for its water system
- Ways in which these standards can be used to evaluate and prioritize capital improvement actions
- Possible differences in levels of importance between the standards
- The most significant risks facing Spokane's water system
- Spokane's business risk tolerance for its water system

Appendix A provides the full question list as well as a matrix summarizing which specific questions were answered during each interview.

2.2 Key Findings

A number of key issues were raised during the Group 1 interviews of staff, which are organised under the five major topic headings identified below.

2.2.1 Institutional

Key findings related to institutional issues include:

- Spokane's Water Department and its staff operate in silos.
- Spokane Water Department succession planning and capturing of institutional knowledge is needed.
- System condition and assessment information needs to be compiled to increase understanding and to form a basis for decision making.
- A business case for increasing water rates needs to be developed based upon detailed granular data for water use, system capacity, system condition, and projected future needs.

2.2.2 Operational / Infrastructure

Key findings related to operational and infrastructure issues include:

- There are a number of system deficiencies within the water system including:
  - Choke points and a lack of redundancy in mains (see Table 2)
  - Numerous pumps are out of service
  - Insufficient back-up power at facilities
  - Aging wells
  - Insufficient water storage to maintain pressure and fire flow in some pressure zones
- Development in outer edges of system is testing system capacity.
- Reliance of neighboring systems on capacity [intertie agreements] may impact long-term development opportunities.

2.2.3 Growth and Development

Key findings related to growth and development include:

- Cost of development is inequitable, with the "last one in" bearing the cost regardless of development size.
- Development is impacting system capacity over time, as the full buildout impacts to system are not always considered during development approval.
- Available system capacity is decreasing over time as water use projections set for development are exceeded because standards agreed upon by the developer erode over time.

Table 2. List of Choke Points in Water System

Area	Description
Northwest and Southwest	Issues associated with meeting demands in future due to development.
Eagle Ridge	High consumption in this area is taxing the system. Eagle Ridge is a located on outer edge of system and is not easy to resupply. Eagle Ridge has undersized mains (pinch point) and undersized tanks (storage).
West Plains PDA	System capacity limitations are making development in this area difficult. There are a number of large commercial users connected to the system with limited main capacity. The City needs to upsize the transmission main that crosses an interstate requiring bore under Interstate, which is costly. There are a number of systems that rely on the capacity from this portion of the system so additional interties are needed. System reliability needs to be improved to meet needs of other water systems that have an intertie with the Spokane's system and rely on the Spokane's capacity.
Downtown	Failing leadite pipe joints in downtown core (100+ years old).
Airway Heights (West of Spokane):	Neighboring Airway Heights has ongoing PFOS/PFAS contamination.
Fairchild Air Force Base	Intertie agreement to supply water to Air Base could limit development in future due to system capacity constraints.
Five Mile Prairie	Five Mile Prairie has fire flow issues. A proposal to connect the Kempe and Woodridge Reservoirs (tanks) to address this issue was not approved by Council due to concerns about growth in the Five Mile Prairie area.
Up River	Up River site facilities are past their useful life and require complete overhaul.
Indian Trail	Indian Trail has pressure issues and relies on water being supplied through other zones, and are pumping capacity concerns for this area.
Well Electric	Spokane generates power at this site but still requires back-up power for emergency. Well Electric and Park Water have 8-10 large motor pumps that are on the list for replacement, including one pump that has been out of service for 25 years.
Intertie agreements (and end dates)	Current intertie agreements include Airway Heights, Medical Lake, Fairchild Air Base, Spokane Water District #3, and Bel Verde areas. Only Airway Heights and Medical Lake have end dates. These interties are stretching system capacity and could limit development within Spokane in the future.

2.2.4 Adequate and Sustainable Funding

Key findings related to adequate and sustainable funding include:

- General Facilities Charges (GFCs) do not recover full cost of system upgrades and are too low to ensure system sustainability.
- The waiving of GFCs, particularly in areas on the edge of the water system, tax system capabilities resulting in overall system performance degradation.
- Spokane's current billing structure results in the Water Department being the last utility paid and the first utility responsibility for cutting off delinquent customers.
- There is a zonal inequity in water pumping cost, with customers in the lower pressure zones bearing an unequal share of the water use cost of customers in the high pressure zones.
- The existing tiered rate structure does not incentivize water conservation.

2.2.5 Business Risk

Key findings related to business risk include:

- There is a lack of comprehensive system deficiency assessment and understanding of system risks across the Water Department.
- A determination is needed on how to balance community development, system capability, affordability, level of service, and public health and safety in setting water system priorities.
- Degradation in system capacity threatens the continued ability of Water Department staff to rapidly respond to emergencies.
- There is a financial risk to the system and Spokane of future development being limited if the Department of Health changes its interpretation of the fire flow requirements.
- Groundwater adjudication and riverine / habitat flow requirements pose a long-term risk to the Spokane's water right portfolio.
- Stakeholders (customers, council, neighbouring systems) undervalue the cost of water and underestimate system condition and operability.
- There is a perception that water is or should be free (i.e., some equate the cost of dipping a bucket into the river to be equal to providing clean, safe, clean drinking water conveyed to your home).
- The discourse around water use and conservation is polarized.
- There are no enforceable requirements for water conservation or SpokaneScape.

2.3 Group 1 Interview Summary

Spokane's Water Department staff excels at, and takes pride in, reacting to keep the water system operational and addressing emergencies. This task is challenging because the system was built with different design standards and operational parameters than exist today. Parts of the system have degraded over time due to aging and deferred maintenance, and system components have been operating with short-term patches and fixes. These system deficiencies coupled with development, especially on the outer edges of the system, and existing intertie agreements, are pushing system capacity to its limits.

The water system is at a cross roads as historic underinvestment in the system has result in a run to failure mode and significant investment is needed to maintain the existing expected level of service. Development, especially on the outer edges of the system, coupled with existing

intertie agreements, and system deficiencies are pushing system capacity beyond its capabilities. In the absence of a long-range plan and investment, the water system may experience a significant failure.

There is a need to transition from a reactive to a proactive, anticipatory approach to capital and operations, repair, rehabilitation, and replacement planning and investment. A long-term plan could help resolve system deficiencies, support water conservation and address development impacts. A determination is needed on how to balance community development, system capability, affordability, level of service, and public health and safety in setting water system priorities.

A summary of actions resulting from the Group 1 interviews included:

- Full daylighting of concerns related to risk of running system 24/7 does not occur because water operators are driven to maintain continuity of service.
- Operation staff should be involved in development approvals so that the long-term impacts of decisions are based on real-time operational concerns.
- There is a need for formal policy direction. Water Department staff are looking for long-term planning to help resolving system deficiencies, supporting water conservation, and addressing development impacts to the system.
- Information sessions and tours/site visits for public and Council members are highly recommend.
- Urban design guidelines should address the critical role of water in achieving sustainability, affordability and social responsibility goals.
- Water system planning should be fully integrated in urban planning and design.
- The GFCs system needs to be re-evaluated and potentially replaced.
- There is no agreement between staff on best solution to address peak summer demand or a future operational approach (pumping, storage, supply, redundancy in mains, LOS changes).
- Formal collaborative governance structures with clearly defined roles and responsibilities are mandated and embedded in practice would be beneficial.

3. Group 2 Interview Summary

3.1 Overview

The second group of interviews (Group 2) discussed business risk with senior officials, including Spokane's Administrators and senior advisors, as well as the Mayor and Council members. There were five questions posed as part of the Group 2 interviews:

1. In your opinion, do current water rates reflect the actual costs to supply water?
2. When you are making water-related decisions, which of the following factors are most important to you? Please order by level of importance: level of service, impact to system, cost, public health and safety, or reputational risk.
3. In your opinion, what are the biggest issues impacting the City of Spokane's water system?
4. Do you feel the water system has adequate capacity to meet existing and future demands?

5. What drives your decision-making when considering water system capital improvements versus approval of development proposals?

Table 3 provides a list of the Group 2 interviewees along with the date the interview occurred.

Table 3. Group 2 interviewees

Interviewees	Date
Scott Simmons and Marlene Fiest	September 1, 2020
Catherine Olsen and Logan Callen	September 1, 2020
Mayor Woodward and City Administrator Crago	September 23, 2020
Council President Breean Beggs and Council Person Michael Cathcart	September 30, 2020

3.2 Key Findings

The key findings from Group 2 interviews of Administration and Council members included:

- There was broad consensus that current rates do not reflect actual costs to deliver water.
- The order of key factors that are top of mind when making in water-related decision-making vary. Affordability and cost are a primary concern, followed by public health and safety, reputational risk and level of service.
- The most significant issue facing Spokane is how to balance budget constraints with capital management needs, particularly capital needs resulting from deferred maintenance.
- Fees (such as GFCs) need to be consistent and predictable.
- Addressing summer outdoor water use patterns is important, particularly attitudes and behaviors around lawn watering.

Four high-priority issues were identified during the Group 2 interviews:

1. Accelerate smart water meter (particularly in high consumption areas such as Hamblen Park). Understanding water use in real-time is important and beneficial to ratepayers.
2. Increase education to improve water conservation, particularly reductions in outdoor watering (such as changing lawn watering practices and increased implementation of SpokaneScape). There is an urgent need to educate Spokane citizens' on the responsibility and the true system cost of meeting "on-demand" water delivery (particularly during the summer peak demand months).
3. Full cost recovery pricing should be pursued, and subsidizing the cost to supply water to those in higher pressure zones curtailed.
4. There is a need for greater alignment between development planning and water system capacity. There was recognition that Spokane is at a crossroads. Long-term resiliency necessitates finding ways to reduce the "building more" at the outer edges of the system (where zonal pumping costs are highest), and instead find ways to grow within our existing pumping capacity. For example, incentivizing or simplifying infill development in Zone 10. A key point is not to punish development at the outer edges of the system, but Spokane should not be subsidizing this development by covering the cost of system upgrades required to meet water demands.

4. Cost of Water and Rate Comparison

To address concerns over Spokane's Water Department not recovering the true cost of water of supplying water, a comparison of water rates with western cities of similar size was performed. In addition, research into examples of different rate structures used by water agencies to recover the full cost to deliver water was completed.

A cursory review of rate structures and water rates of western cities with populations of approximately 220,000 was performed. This analysis reaffirmed that Spokane's water rates are consistently below water charges in other jurisdictions in the United States (US) and internationally as illustrated in Figures 2 and 3. Figure 2 shows that water consumption is higher in the US while the price for water is lower. This figure demonstrates that higher prices for water can result in different actions being undertaken to reduce water usage.

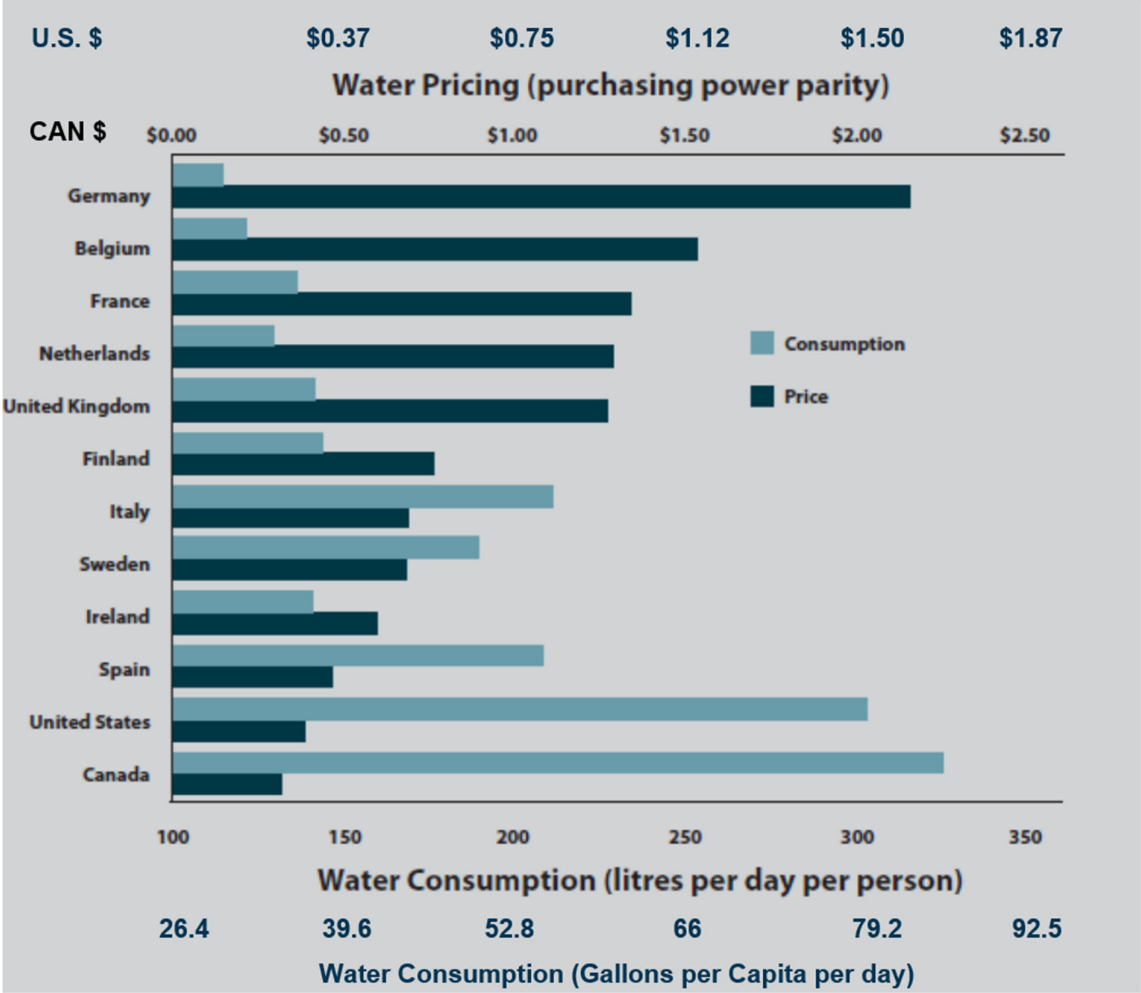

Figure 2. International Comparison of Municipal Water Prices and Consumption

Source: Council of Canadian Academies, 2009.

Figure 3 shows that water use in Spokane is higher than cities of similar size while water consumption levels are higher. This demonstrates that higher prices for water consumption can drive down water rates.

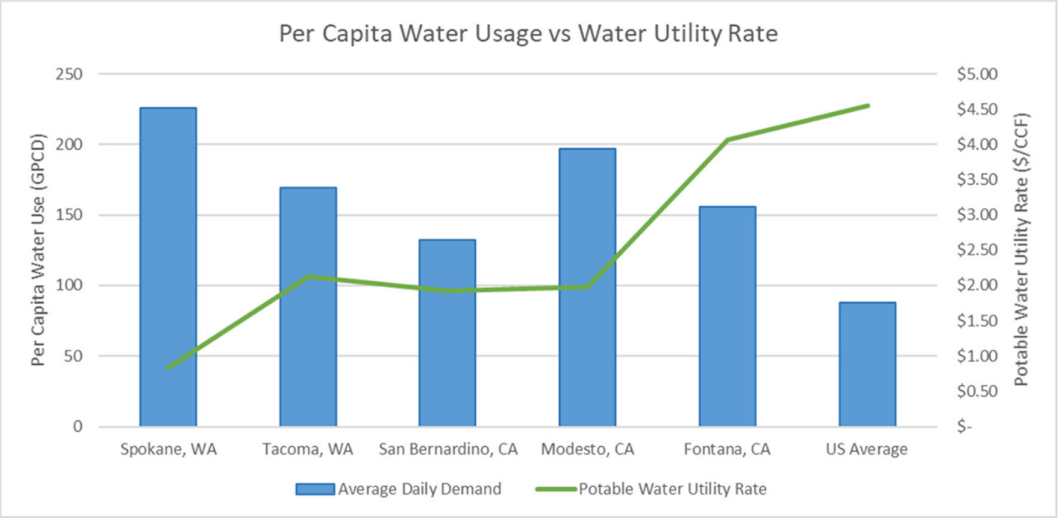

Figure 3. Comparison of Consumption Versus Rates For Cities with Populations of Approximately 220,000

Table 4 provides a summary of different types of rate structures that are used in the western US. In general, tiered seasonal rate structures were the most commonly used rates to encourage outdoor water conservation.

Table 4. Sample Rate Types

Type	Description	Comment	City/Agency Example
Components of a Two Part Rate			
Fixed Charge	The portion of the bill that does not vary by volume of water consumed (though it may increase with increase in meter size)	Provides increased revenue stability; some local governments use parcel taxes in a way similar to fixed charges	Modesto, CA Salem, OR
Variable Charge	The portion of the bill that increases with the amount of water consumed	The most effective rate structure for reducing demand; requires full metering	San Antonio, TX
Variable Charge Formats			
Uniform Rate Constant Unit Charge	Single Block Rate Price per unit is constant as consumption increases	Targets all users equally; simple to calculate bill	Guelph, Ontario Fontana, CA
Inclining Block Rates	increases in steps as consumption increases	Targets high volume users; requires more complex calculating for billing	Seattle, CA San Antonio, TX
Declining Block Rates	Price decreases in steps as consumption increases	Charges low volume users the highest rate; typically used where utilities want to provide large industry with a lower cost of service	

Table 4. Sample Rate Types

Type	Description	Comment	City/Agency Example
Excess Use Rate	Price is significantly higher for any consumption above an established threshold	Can be used to target high consumption during peak periods; more effective with frequent (e.g., bi-monthly) meter reading	
Seasonal Surcharges	Price is higher during peak periods (i.e., summer)	Targets seasonal peak demand; tied to the higher marginal costs of water experienced during peak periods	Seattle, CA Marin MWD Tacoma, WA
Distance Rates	Spatial Rates Zonal Rates	Users pay for the actual cost of supplying water to their connection Discourages difficult-to-serve, spatially diffused connections	San Bernardino, CA
Scarcity Rates	Price per unit increases as available water supply decreases (e.g., during drought)	Sends strong price signal during periods of low water availability; an alternative to outdoor watering restrictions	
Recovery Charges	Set price per unit	Recovers cost related to specific activity (e.g., cost to purchase water to replenish groundwater aquifer)	San Bernardino, CA
Budget Based Rates	Rate based on formula that spreads true cost of water across users based on water budget.	Ensures true cost of water is captured.	Irvine Ranch Water District
Lifeline Block	A first block of water is provided at low or no cost beyond the fixed charge in order to ensure everyone has a minimum amount of water to meet basic water needs	Used to address equity issues and ensure that all consumers' basic water needs are met	
Uniform Rate Constant Unit Charge	Single Block Rate Price per unit is constant as consumption increases	Targets all users equally; simple to calculate bill	Guelph, Ontario Fontana, CA

Figure 4 shows the gallon per capita per day (gpcd) for maximum day demand of equivalent residential units for Spokane's water system pressure zones. In general, the pressure zones with the highest per capita use are:

- Woodridge (19)
- Shawnee (13)
- Midbank (11)
- Kempe (9)
- Top + Hatch Road (16)
- Southview (15)
- Glennaire (5)
- High (6)
- Eagle Ridge (2)

These systems are located at the north central and southern edges of the systems making it more costly and challenging to provide water. For example, the Woodridge, Shawnee, Midbank, and Kempe zones in the north-central portion of the system are at a higher elevation requiring additional energy usage to supply water to these zones.

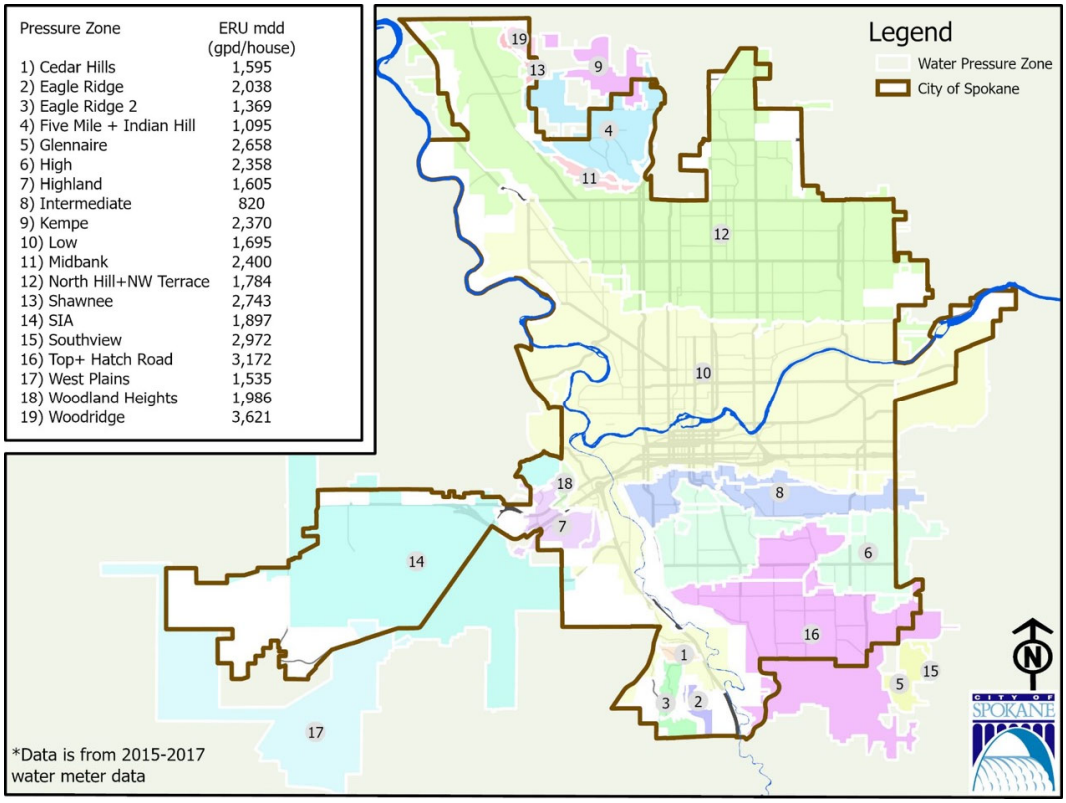

Figure 4. Comparison of Water Consumption Rates within City of Spokane

There was significant discussion around current water rates in both Group 1 and Group 2 interviews, and agreement that current rates do not reflect the cost to deliver water services. A change in water rate structure is essential in order to address long-term capital needs and encourage water conservation. However, there was no consensus whether tiered rates (including seasonal charges) and/or pressure zone charges were preferred options.

The need to develop a strong, well-vetted business case that is socialized within the community in order to gain understanding and support also was discussed. Spokane needs time to develop this information so it can be prepared for the next rate re-structuring cycle in three years. This will enable the time to develop the business case backed by data/facts so Spokane can have a meaningful discussion with its customers (make sure people are well informed) about the true needs of the system and the cost of water.

5. MODA Framework Development

A decision framework is needed to review potential project and actions to repair, rehabilitate, replace, and construct new facilities as part of the Strategy. A MODA framework was used to develop a sample (draft) matrix for use in formulating the Strategy. The MODA framework development process consists of:

- Formulating the evaluation criteria, definitions, and scoring scale, for the high-level criteria and sub-criteria. The scoring scale typically ranges from 0 to 10.
- Reviewing of criteria to compare with other municipalities and informational sources.
- Assigning importance factors for the high-level criteria and sub-criteria. This is accomplished by comparing the different criteria against each other and determining if one is more important or if the criteria are of equal importance.
- MODA Framework Finalization and Testing

5.1 Formulating Draft MODA Sample Evaluation Criteria

Draft MODA sample evaluation criteria were developed for Spokane using the information from the Group 1 and 2 interviews along with research into water rates and other municipalities' evaluation criteria. Three MODA high-level sample criteria categories were identified (Sustainability, Social Responsibility and Affordability) based upon the long-term goals identified in the City of Spokane Water Conservation Master Plan, 2020. Next subcategories were identified under each high-level criteria category based upon the interviews and research. The sub-criteria were grouped under the high-level criteria categories deemed to be the best fit; however, some sub-criteria could have fit under multiple high-level criteria categories. Table 5 lists the draft high-level sample criteria categories, and associated sub-criteria for Spokane's draft MODA.

Once the sample criteria were identified, then the scoring scale was set at 0 to 10 and qualitative and quantitative definitions were developed for each sub-criteria. Tables 6 through 8 provide the detailed sample criteria developed during Phase 1.

Table 5. Spokane's Draft MODA Sample Criteria Categories

Sustainability	Social responsibility	Affordability
Regulatory	Health & Safety	Cost Sharing
Water Stewardship	Levels of Service	Equity
Resiliency	Reputational Risk	Long-term Costs
Staff, Planning and Tools	Public Image	

Table 6. Draft MODA Sample Criteria – Sustainability

Criteria	Minimum expectation = 1	3	5	7	Best Practice = 10	Importance Factor (Weighting)
Legislated requirements: Water quality	Violation of standards resulting enforcement action.	Technical violation of standards. Possible notice of violation, and enforcement action.	Meeting standards but not guidelines.	Standards and guidelines are being met. No State or local permit or code violations.	Exceeding standards and guidelines.	TBD
Legislated requirements: Fire flow and storage requirement	Loss of service to any "critical customer" (e.g., hospital, food manufacturing) and/or affects fire flow to ≥1000 connections.	Impacts system services and/or fire protection to ≥250 but <1000 connections.	Impacts system services and/or fire protection to ≥100 but <250 services connections.	Impacts system services and/or fire protection to <100 connections.	All connections have fire protection and no impacts to system services.	TBD
Legislated requirements: Pressure	Pressure <20psi at meters. (Not meeting DOH guideline).	Pressure <30 psi but ≥ 20 psi at meters. (Not meeting DOH guideline).	Pressure <45 psi but ≥30 psi at meters. (Meeting Washington State Department of Health (DOH) guideline, but not meeting Spokane's standard).	Pressure at 45 psi at meters (meeting Spokane's standard).	Pressure >45 psi at meters. (Exceeding Spokane's standard).	TBD
Emerging issues/ policy and regulation	Does not consider or understand emerging issues / policy / regulation that may create business risk.	Anticipates emerging issues / policy / regulation but business risk has not been evaluated.	Business risk from emerging issues / policy / regulation has been anticipated and evaluated.	Addresses emerging issues / policy / regulation that may create business risk anticipated and steps underway to minimize business risk.	Proactively preparing for emerging issues / policy / regulation.	TBD
Water stewardship: Source Water Protection [quality]	Has long-term risk of contaminant and/or supply of aquifer/riverine.	Has short-term risk of contaminant and/or supply of aquifer/riverine.	Maintains aquifer/river quality; no degradation.	Improves aquifer/river quality in the short-term.	Protects and improves the aquifer and river over the long-term.	TBD

Table 6. Draft MODA Sample Criteria – Sustainability

Criteria	Minimum expectation = 1	3	5	7	Best Practice = 10	Importance Factor (Weighting)
Water stewardship: Sustainable Water Supply (incl. water conservation) [quantity]	Unsustainable consumption levels (with adverse impacts to aquifer/rivers). Focus is only on local needs.	Unsustainable consumption levels (with adverse impacts to aquifer/rivers). Focus is only on local needs.	Consumption levels short-term impacts. Focus is only on local needs.	Planning for future demand with reduced water usage (improved customer understanding and adoption of conservation practices). Focus is on regional needs.	Regional planning capabilities for future demand. Widespread water conservation.	TBD
Transmission system resiliency	Choke points and/or isolated area in the system. More than 75% unplanned maintenance.	Choke points and/or isolated area in the system. 75-50% unplanned maintenance.	Choke points and/or isolated in the system. 50% unplanned maintenance.	Improves system performance. Limited choke points with no isolated areas in the system. 25-50% unplanned maintenance.	Improves system resiliency and optimizes system performance. Fully integrated (and looped) system. Less than 25% unplanned maintenance.	TBD
Facility Resiliency	System components need repair with more than 75% unplanned maintenance.	75-50% unplanned maintenance.	50% unplanned maintenance.	25-50% unplanned maintenance. All critical systems will have redundant components.	Improves system resiliency. Less than 25% unplanned maintenance.	TBD
Power Supply Resiliency	Relying on existing power (no emergency back-up).	25% of system has emergency power back-up.	50% of system has emergency power back-up.	75% of system has emergency power back-up.	Improves system reliability Back up power generation.	TBD

Table 6. Draft MODA Sample Criteria – Sustainability

Criteria	Minimum expectation = 1	3	5	7	Best Practice = 10	Importance Factor (Weighting)
Staff Capacity and Capability	Requires more staff with specialized experience.	Requires additional staff.	There are sufficient number of qualified and adequately trained staff with no back-up support.	There are sufficient number of qualified and adequately trained staff with additional back-up support.	Staff are cross trained.	TBD
Data, Tools and record keeping	No written / online protocols and/or record keeping systems in place to capture important institutional knowledge or data. Water use reporting is unreliable.	Written/online, but outdated and/or location is unknown. Water use reporting is periodic.	Written/online, but not incomplete and/or not up-to-date. Water use data is accessible and reliable.	Complete, written/ online, up-to-date, but not easily accessible. Water use data is accessible and reliable with portions of the system with real-time reporting.	Improved understanding of the system (inform decision-making). Complete, up-to-date, written/ online, and easily accessible. Water use data is real-time and accessible.	TBD
Emergency Planning	Emergency planning is not incorporated and/or negatively impacts emergency response capabilities.	Emergency response procedures (practice plans and procedures) are in place.	Supports business continuity to ensure that emergency operations and critical services continue (e.g., despite loss of power, facilities, IT infrastructure and/or communications systems, and staff resources).	Improves resiliency (e.g., adequate back-up power, alternative water supplies / interconnections etc.).	Supports a robust emergency management program (including adequate insurance and emergency funds).	TBD

Table 7. Draft MODA Sample Criteria – Social Responsibility

Criteria	Minimum expectation = 1	3	5	7	Best Practice = 10	Importance Factor (Weighting)
Health, safety and security (public and employees)	Loss of life or widespread outbreak of illnesses; security compromised in both delay and detection.	Lost-time injury or medical attention required. Security compromised by either delay or detection.		No lost-time injuries or medical attention required. Assets remain secure.	No injuries or adverse health effects; Assets remain secure.	TBD
City standard: Level of Service (LOS)	Negatively impacts LOS and/or Increases water consumption.	Has limited impacts LOS and/or Increases water consumption.	Maintains LOS.	Improves LOS but does not change water consumption.	Improve LOS (whole system) and reduces water consumption.	TBD
Development	Supports development in areas of Spokane that impact water system performance.		Maintains existing system performance.		Improves system performance.	TBD
Reputational risk	Long-term impact. Area-wide disruption. Widespread adverse media coverage.	Substantial but short-term disruption. Adverse media coverage due to public impact. Substantial increase in number of taste and odor complaints.		Minor disruption (e.g., traffic, dust, noise). No adverse media coverage. Limited increase in taste and odor complaints.	No social or economic impact on the community. No reactive media coverage (any media coverage is a result of proactive announcements by Utility). No increase in taste or odor complaints.	TBD

Table 7. Draft MODA Sample Criteria – Social Responsibility

Criteria	Minimum expectation = 1	3	5	7	Best Practice = 10	Importance Factor (Weighting)
Internal communication and coordination	Siloed internal departments with no communication or coordination between engineering, operations, land-use planning, parks and recreation, finance, information technology, emergency management and communications.	Siloed internal departments with some communication between engineering, operations, land-use planning, parks and recreation, finance, information technology, emergency management and communications.	Facilitates some internal departmental communication and coordination between engineering, operations, land-use planning, parks and recreation, finance, information technology, emergency management and communications.	Facilitates internal departmental communication and coordination between engineering, operations, land-use planning, parks and recreation, finance, information technology, emergency management and communications.	Adds internal departmental communication and coordination between engineering, operations, land-use planning, parks and recreation, finance, information technology, emergency management and communications.	TBD
Stakeholder Engagement	Stakeholders are not identified and there is no interaction.	Stakeholders are identified and there is limited interaction.	The stakeholders are well understood (e.g., demographics, languages and ability to access information, length of residency, vulnerable groups and age. Interaction is informational only.	The effectiveness of the different modes of communication has been evaluated (and associated changes in behavior understood).	An effective communication approach is activated with two-way engagement resulting in behavioral changes and/or support.	TBD

Table 7. Draft MODA Sample Criteria – Social Responsibility

Criteria	Minimum expectation = 1	3	5	7	Best Practice = 10	Importance Factor (Weighting)
Community/ customer water literacy	Generally little or no understanding or interest in the water cycle, planning and management of water systems, and/or the provision of services. Water is not valued or recognized as contributing to sense of place.	Facilitates limited interest and/or understanding of the water sector.	Facilitates some interest and/or understanding of the water sector, sufficient to know what they are paying for and where key responsibilities sit organizationally.	Facilitates an involvement in and thorough understanding of the water system services and costs. A range of stakeholders (including less-represented communities and cultures) are involved.	Adds to a strong connection between community and water-related assets, provides a sense of place, and improves liveability. People value water and know what they are paying for.	TBD
Community Resilience	Provides no additional community resilience or climate change protection.	Provides limited additional community resilience or climate change protection.	Provides some additional community resilience or climate change protection.	Provides significant community resilience or climate change protection.	Community resiliency in the face of a changing climate is a key component.	TBD
Social Amenity (sense of place)	Does not foster pride and connectedness of people with water in the landscape.		Fosters pride and connectedness of people with water in the landscape.		Provide access to water-related landscape features, and fosters water stewardship.	TBD

Table 8. Draft MODA Sample Criteria – Affordability

Criteria	Minimum expectation = 1	3	5	7	Best Practice = 10	Importance Factor (Weighting)
Equitable distribution of costs	Inequitable distribution of water system costs in relation to water usage and cost to serve.		Equitable distribution of costs in relation to water usage and cost to serve.		Equitable sharing / distribution of costs across the system.	TBD
Pressure Zone	Customers in the lower pressure zones bearing an unequal share of the water use cost of customers in the high pressure zones.				Customers in the higher pressure zones bearing a representative share of the water use costs.	TBD
Water Usage	Low water users bearing an unequal share of the water cost.				High Water users bear cost of additional usage.	TBD
Access	Could result in 50% or greater reduction in availability of clean, safe and affordable water for customers across system.		Could result in 25% or greater reduction in availability of clean, safe and affordable water for customers across system.		No impact to availability of clean, safe, and affordable water for customers across system.	TBD
Development	Inequitable distribution of water system development costs. Burden of cost is placed on existing customers.		Inequitable distribution of development cost. Last one in pays.		Future growth needs is factored into development planning and cost.	TBD

Table 8. Draft MODA Sample Criteria – Affordability

Criteria	Minimum expectation = 1	3	5	7	Best Practice = 10	Importance Factor (Weighting)
Economic diversification	Negatively impacts water services cost or availability causing economic and development impacts.		Has no impact on water services cost or availability and no impacts to economy and development.		Maximizes beneficial outcomes of water-related services for economy or development.	TBD
Cost of Performance Improvement	Limited system performance improvements with higher costs.		Some system performance improvements and costs increase.		Significant system performance improvement at reasonable cost (pay now rather than defer to future).	TBD
Multiple Benefits (IWM)	Multi-benefit projects are not considered. There is multi-functional infrastructure.	Multi-benefit projects / multi-functional infrastructure are considered.	Multi-benefit projects / multi-functional infrastructure are pilot tested.	Multi-benefit projects are widespread.	Maximize the community and economic benefits of water infrastructure investment. Considers the full water cycle / Use of multi-functional infrastructure is embedded.	TBD
O&M budget	There are increased O&M costs without addressing critical infrastructure repair and or replacement needs.		O&M budget sufficient to address critical infrastructure repair and or replacement needs.		Works within existing O&M budget has enough capacity address to address infrastructure repair and or replacement needs over the long-term.	TBD

5.2 Draft MODA Sample Criteria Review

Once the draft MODA sample criteria were developed, they were reviewed and compared against other municipalities Integrated Water management (IWM) decision-making frameworks and Spokane's Comprehensive Plan. This step was important to identifying gaps and overlaps in the sample criteria. The overlap between the Spokane Comprehensive Plan's vision, goals, and policies and the draft MODA Sample Criteria is illustrated in Figure 5.

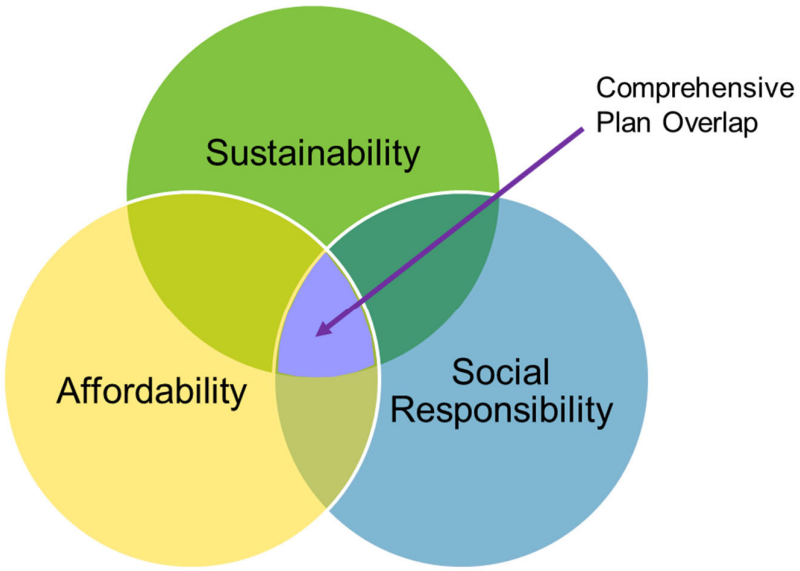

Figure 5. Relationship of Comprehensive Plan to Draft MODA Sample Framework

This review identified revisions in each of the three draft sample categories, including:

- Improve level of specificity of criteria
- Broader criteria with numerous components in definitions and increase granularity
- Implied aspects (e.g., flooding in climate resilience) should be made explicit
- Address key gaps in criteria (e.g., missing habitat, connectivity, and integrated planning)
- Reduce and refine number of draft sample criteria in **Sustainability**, such as
    - Conflate three resiliency indicators into "Utility System Resiliency" and expand the definition to include improving systems resilience and improving customer outcomes
    - Conflate two Water Stewardship criteria and expand to reflect water quality treatment potential / water resource conservation potential
    - Revise Power Supply [Energy] Resilience heading, and expand definition to include energy efficiencies and reduce greenhouse gas (GHG) emissions
    - Expand Staff and Data Tools criteria to include link to sharing data with others to support economic activities (beyond water sector)
    - Revise Social Amenity to include "neighborhood" scale to definition and include cultural needs
    - Expand Emergency Planning criteria to include integrated / coordinated planning

- Updates to draft **Social Responsibility** sample criteria include:
    - Update Health, Safety and Security (Public and Employees) criteria to include protection of facilities (and avoided cost of disasters)
    - Revise Development and add planning and growth to heading and integrated (city-wide) approach to definition
    - Revise Community Resilience scope to include climate, economic and social resilience, and add livability into definitions (note: flood hazard implied).
    - Revise Social Amenity to include connectivity. Could add "increase community [place] connectivity" and other related criteria such as blue/green corridors, transport and habitat connectivity.
- Specific updates to **Affordability** criteria include:
    - Update IWM criteria to ensure "multiple objectives" are considered. References to storm water and green infrastructure should also be included.
    - Access – Add equitable access to services into definition
    - Avoided costs of disasters/infrastructure is missing. Could add new criteria to Affordability (or include this under Health and Safety)
    - Add equitable access to services into Access definition
    - Add capital and O&M to the Equitable Distribution of Costs definition

Figure 6 shows a number of sub-criteria under the draft Sustainability sample criteria that could be consolidated (indicated by red circles). For example, the two water stewardship criteria could be consolidated into a single criteria and the three system resiliency sub-criteria could be consolidated into a single sub-criteria.

Some of the proposed revisions have been incorporated in the updated draft MODA Sample Criteria shown in red text in Tables 9 through 11. In Phase 2, the draft sample criteria will be revised and finalised, and the Importance Factor (Weighting) will be identified.

Sustainability	Social Responsibility	Affordability
Legislated requirements: Water quality	Health, safety and security (public and employees)	Equitable distribution of costs
Legislated requirements: Fire flow and storage requirement	City standard: Level of Service (LOS)	Pressure Zone
Legislated requirements: Pressure	Development	Water Usage
Emerging issues/ policy and regulation	Reputational risk	Access
Water stewardship: Source Water Protection [quality]	Internal communication and coordination	Development
Water stewardship: Sustainable Water Supply (incl. water conservation) [quantity]	Stakeholder Engagement	Economic diversification
Legislated requirements: Water quality	Community/ customer water literacy	Cost of Performance Improvement
Transmission system resiliency	Community Resilience	Multiple Benefits (IWM)
Facility Resiliency	Social Amenity (sense of place)	O&M budget
Power Supply Resiliency		
Staff Capacity and Capability		
Data, Tools and record keeping		
Emergency Planning		

Figure 6. Examples of Recommended Revisions to Draft MODA Sample Framework Criteria

Note: Red circles indicate draft sample criteria that could be consolidated.

Table 9. Revised Draft MODA Sample Criteria – Sustainability

Criteria	Minimum expectation = 1	3	5	7	Best Practice = 10	Importance Factor (Weighting)
Legislated requirements: Water quality	Violation of standards resulting enforcement action.	Technical violation of standards. Possible notice of violation, and enforcement action.	Meeting standards but not guidelines.	Standards and guidelines are being met. No State or local permit or code violations.	Exceeding standards and guidelines.	TBD
Legislated requirements: Fire flow and storage requirement	Loss of service to any "critical customer" (e.g., hospital, food manufacturing) and/or affects fire flow to ≥1000 connections.	Impacts system services and/or fire protection to ≥250 but <1000 connections.	Impacts system services and/or fire protection to ≥100 but <250 services connections.	Impacts system services and/or fire protection to <100 connections.	All connections have fire protection and no impacts to system services.	TBD
Legislated requirements: Pressure	Pressure <20psi at meters. (Not meeting DOH guideline).	Pressure <30 psi but ≥ 20 psi at meters. (Not meeting DOH guideline).	Pressure <45 psi but ≥30 psi at meters. (Meeting Washington State Department of Health (DOH) guideline, but not meeting Spokane's standard).	Pressure at 45 psi at meters (meeting Spokane's standard).	Pressure >45 psi at meters. (Exceeding Spokane's standard).	TBD
Emerging issues/ policy and regulation	Does not consider or understand emerging issues / policy / regulation that may create business risk.	Anticipates emerging issues / policy / regulation but business risk has not been evaluated.	Business risk from emerging issues / policy / regulation has been anticipated and evaluated.	Addresses emerging issues / policy / regulation that may create business risk anticipated and steps underway to minimize business risk.	Proactively preparing for emerging issues / policy / regulation.	TBD

Table 9. Revised Draft MODA Sample Criteria – Sustainability

Criteria	Minimum expectation = 1	3	5	7	Best Practice = 10	Importance Factor (Weighting)
Water Stewardship: Source Water Protection and Sustainable Water Supply (incl. water conservation) [quality and quantity]	Has long-term risk of contaminant and/or supply of aquifer/riverine. Unsustainable consumption levels (with adverse impacts to aquifer/rivers). Focus is only on local needs.	Has short-term risk of contaminant and/or supply of aquifer/riverine. Unsustainable consumption levels (with adverse impacts to aquifer/rivers). Focus is only on local needs.	Maintains aquifer/river quality; no degradation. Consumption levels short-term impacts. Focus is only on local needs.	Improves aquifer/river quality in the short-term. Planning for future demand with reduced water usage (improved customer understanding and adoption of conservation practices). Focus is on regional needs.	Protects and improves the aquifer and river over the long-term. Regional planning capabilities for future demand. Widespread water conservation.	TBD
Utility System Resiliency	Choke points and/or isolated area in the system exist. More than 75% unplanned maintenance. System components need repair with more than 75% unplanned maintenance.	Choke points and/or isolated area in the system exist. 75-50% unplanned maintenance. System components need repair with 75-50% unplanned maintenance.	Choke points and/or isolated in the system exist. 50% unplanned maintenance. System components need repair with 50% unplanned maintenance.	Improves system performance and limited choke points with no isolated areas in the system. 25-50% unplanned maintenance. System components need repair with 25-50% unplanned maintenance. All critical systems will have redundant components.	Improves system resiliency and optimizes system performance. Fully integrated (and looped) system. Less than 25% unplanned maintenance. Improves system resiliency. System components need repair with less than 25% unplanned maintenance. Improves system reliability	TBD

Table 9. Revised Draft MODA Sample Criteria – Sustainability

Criteria	Minimum expectation = 1	3	5	7	Best Practice = 10	Importance Factor (Weighting)
Power Supply [Energy] Resilience	Relying on existing power (no emergency back-up). Energy efficiencies occur in less than 20% of system. Reductions in GHG emissions by less than 20%.	25% of system has emergency power back-up. Energy efficiencies occur in more than 20% of system. Reductions in GHG emissions by more than 20%.	50% of system has emergency power back-up. Energy efficiencies occur in more than 30% of system. Reductions in GHG emissions by more than 30%.	75% of system has emergency power back-up. Energy efficiencies occur in more than 40% of system. Reductions in GHG emissions by more than 40%.	Back-up power exists at all facilities. Energy efficiencies occur in more than 50% of system. Reductions in GHG emissions by more than 50%.	TBD
Staff Capacity and Capability	Requires more staff with specialized experience. Data generated is used only by water staff.	Requires additional staff. Less than 10% of data generated is used only by water staff.	There are sufficient number of qualified and adequately trained staff with no back-up support. Data generated is shared across water and development related departments.	There are sufficient number of qualified and adequately trained staff with additional back-up support. Data generated shared with some city departments.	Staff are cross trained. Data generated is shared across city departments.	TBD
Data, Tools and record keeping	No written / online protocols and/or record keeping systems in place to capture important institutional knowledge or data. Water use reporting is unreliable.	Written/online, but outdated and/or location is unknown. Water use reporting is periodic.	Written/online, but not incomplete and/or not up-to-date. Water use data is accessible and reliable.	Complete, written/ online, up-to-date, but not easily accessible. Water use data is accessible and reliable with portions of the system with real-time reporting.	Improved understanding of the system (inform decision-making). Complete, up-to-date, written/ online, and easily accessible. Water use data is real-time and accessible.	TBD

Table 9. Revised Draft MODA Sample Criteria – Sustainability

Criteria	Minimum expectation = 1	3	5	7	Best Practice = 10	Importance Factor (Weighting)
Emergency Planning	Emergency planning is not incorporated and/or negatively impacts emergency response capabilities. Coordinated and integrated emergency management planning does not occurs.	Emergency response procedures (practice plans and procedures) are in place. Minimal coordinated and integrated emergency management planning occurs.	Supports business continuity to ensure that emergency operations and critical services continue (e.g., despite loss of power, facilities, IT infrastructure and/or communications systems, and staff resources). Some coordination and integrated emergency management planning occurs.	Improves resiliency (e.g., adequate back-up power, alternative water supplies / interconnections etc.). Significant coordination and integrated emergency management planning occurs.	Supports a robust emergency management program (including adequate insurance and emergency funds). Coordinated and integrated emergency management planning occurs across Spokane's departments.	TBD

Table 10. Revised Draft MODA Sample Criteria – Social Responsibility

Criteria	Minimum expectation = 1	3	5	7	Best Practice = 10	Importance Factor (Weighting)
Health, safety and security (public and employees)	Loss of life or widespread outbreak of illnesses; security compromised in both delay and detection. Facilities are not protected from potential disasters and their costs.	Lost-time injury or medical attention required. Security compromised by either delay or detection. Minimal facilities are not protected from potential disasters and their costs.		No lost-time injuries or medical attention required. Some Assets remain secure and protected from disasters and their costs.	No injuries or adverse health effects; Assets remain secure and protected from disasters and their costs.	TBD
City standard: Level of Service (LOS)	Negatively impacts LOS and/or Increases water consumption.	Has limited impacts LOS and/or Increases water consumption.	Maintains LOS.	Improves LOS but does not change water consumption.	Improve LOS (whole system) and reduces water consumption.	TBD
Development Planning and Growth	Supports development in areas of the city that impact water system performance. Development and the provision of services are unplanned or not part of City-wide planning.		Maintains existing system performance.	Higher density development is directed to designated centres and corridors in lower pressure zones. Planning is mostly integrated and considers city-wide planning.	Development is approached from a coordinated, integrated, city-wide perspective. It proactively reinforces Spokane's downtown urban centre and improves system performance.	TBD

Table 10. Revised Draft MODA Sample Criteria – Social Responsibility

Criteria	Minimum expectation = 1	3	5	7	Best Practice = 10	Importance Factor (Weighting)
Reputational risk	Long-term impact. Area-wide disruption. Widespread adverse media coverage.	Substantial but short-term disruption. Adverse media coverage due to public impact. Substantial increase in number of taste and odor complaints.		Minor disruption (e.g., traffic, dust, noise). No adverse media coverage. Limited increase in taste and odor complaints.	No social or economic impact on the community. No reactive media coverage (any media coverage is a result of proactive announcements by Utility). No increase in taste or odor complaints.	TBD
Internal communication and coordination	Siloed internal departments with no communication or coordination between engineering, operations, land-use planning, parks and recreation, finance, information technology, emergency management and communications.	Siloed internal departments with some communication between engineering, operations, land-use planning, parks and recreation, finance, information technology, emergency management and communications.	Facilitates some internal departmental communication and coordination between engineering, operations, land-use planning, parks and recreation, finance, information technology, emergency management and communications.	Facilitates internal departmental communication and coordination between engineering, operations, land-use planning, parks and recreation, finance, information technology, emergency management and communications.	Adds internal departmental communication and coordination between engineering, operations, land-use planning, parks and recreation, finance, information technology, emergency management and communications.	TBD
Stakeholder Engagement	Stakeholders are not identified and there is no interaction.	Stakeholders are identified and there is limited interaction.	The stakeholders are well understood (e.g., demographics, languages and ability to access information, length of residency, vulnerable groups and	The effectiveness of the different modes of communication has been evaluated (and associated changes in behavior understood).	An effective communication approach is activated with two-way engagement resulting in	TBD

Table 10. Revised Draft MODA Sample Criteria – Social Responsibility

Criteria	Minimum expectation = 1	3	5	7	Best Practice = 10	Importance Factor (Weighting)
			age. Interaction is informational only.		behavioral changes and/or support.	
Community/ customer water literacy	Generally little or no understanding or interest in the water cycle, planning and management of water systems, and/or the provision of services. Water is not valued or recognized as contributing to sense of place.	Facilitates limited interest and/or understanding of the water sector.	Facilitates some interest and/or understanding of the water sector, sufficient to know what they are paying for and where key responsibilities sit organizationally.	Facilitates an involvement in and thorough understanding of the water system services and costs. A range of stakeholders (including less-represented communities and cultures) are involved.	Adds to a strong connection between community and water-related assets, provides a sense of place, and improves liveability. People value water and know what they are paying for.	TBD
Community Resilience	Provides no additional community resilience, climate change protection, economic and social resilience, or improvement in terms of liveability.	Provides limited additional community resilience, climate change protection, economic and social resilience, or improvement in terms of liveability.	Provides some additional community resilience, climate change protection, economic and social resilience, or improvement in terms of liveability.	Provides significant community resilience, climate change protection, economic and social resilience, or improvement in terms of liveability.	Community resiliency in the face of a changing climate is a key component. Economic and social resilience, and liveability is improved.	TBD
Social Amenity (sense of place)	Does not foster pride and connectedness of people with water in the landscape or increase cultural and neigborhood connectivity.		Fosters pride and connectedness of people with water in the landscape or cultural and neigborhood connectivity.		Provide access to water-related landscape features, and fosters water stewardship and neighbourhood or cultural connectivity.	TBD

Table 11. Revised Draft MODA Sample Criteria – Affordability

Criteria	Minimum expectation = 1	3	5	7	Best Practice = 10	Importance Factor (Weighting)
Equitable distribution of costs	Inequitable distribution of water system costs in relation to water usage and cost to serve (including capital and O&M costs).		Equitable distribution of costs in relation to water usage and cost to serve (including capital and O&M costs).		Equitable sharing / distribution of costs across the system (including capital and O&M costs).	TBD
Pressure Zone	Customers in the lower pressure zones bearing an unequal share of the water use cost of customers in the high pressure zones.				Customers in the higher pressure zones bearing a representative share of the water use costs.	TBD
Water Usage	Low water users bearing an unequal share of the water cost.				High Water users bear cost of additional usage.	TBD
Access	Could result in 50% or greater reduction in availability or equity access to clean, safe and affordable water or other services for customers across system.		Could result in 25% or greater reduction in availability or equity access to clean, safe and affordable water or other services for customers across system.		No impact to availability or equity access to clean, safe, and affordable water or other services for customers across system.	TBD

Table 11. Revised Draft MODA Sample Criteria – Affordability

Criteria	Minimum expectation = 1	3	5	7	Best Practice = 10	Importance Factor (Weighting)
Development	Inequitable distribution of water system development costs. Burden of cost is placed on existing customers.		Inequitable distribution of development cost. Last one in pays.		Future growth needs is factored into development planning and cost.	TBD
Economic diversification	Negatively impacts water services cost or availability causing economic and development impacts.		Has no impact on water services cost or availability and no impacts to economy and development.		Maximizes beneficial outcomes of water-related services for economy or development.	TBD
Cost of Performance Improvement (cost effective utilities)	Limited system performance and/or service improvements with higher costs		Some system performance and/or service improvements and costs increase.		Significant system performance and/or service improvements at reasonable cost (pay now rather than defer to future)	TBD
Multiple Objectives / Benefits (IWM)	Multi-objective/ benefit projects are not considered. There is no multi-functional infrastructure.	Multi-objective/ benefit projects / multi-functional infrastructure are considered.	Multi-objective/ benefit projects / multi-functional infrastructure are pilot tested.	Multi-objective/ benefit projects are widespread.	Maximize the community and economic benefits of water infrastructure investment. Considers the full water cycle / Use of multi-functional infrastructure is embedded.	TBD

Table 11. Revised Draft MODA Sample Criteria – Affordability

Criteria	Minimum expectation = 1	3	5	7	Best Practice = 10	Importance Factor (Weighting)
O&M budget	There are increased O&M costs without addressing critical infrastructure repair and or replacement needs.		O&M budget sufficient to address critical infrastructure repair and or replacement needs.		Works within existing O&M budget has enough capacity address to address infrastructure repair and or replacement needs over the long-term.	TBD

5.3 Criteria Finalization and Testing

5.3.1 Criteria Finalization

The next step in development of the criteria is to hold a series of internal workshops with the TAC team to review, revise, and finalize the draft MODA criteria. During the workshops the criteria, sub-criteria and details will be discussed and reviewed (to identify gaps and overlaps), and the definitions will be refined and finalised. Then the importance factors will be determined using the Delphi method.

The Delphi Method was developed by the RAND Corporation in the 1950s as a tool for reaching a group consensus based on expert feedback. The Delphi Method has three key characteristics:

- Structure of information flow
- Regular feedback
- Anonymity of the participants

The sample MODA criteria matrix will be used as a starting point for a facilitated discussion driving the TAC team to reach consensus on the final MODA criteria matrix. The facilitated discussion will be designed to keep the TAC members focused, build consensus, and ensure that all members remain engaged in making autonomous recommendations.

Once the criteria are set then the importance factors will be determined for each high-level and sub-criterion through a facilitated discussion. First the high-level criteria will be compared to determine the relative importance of each criteria compared to each other. Then the sub-criteria under each high-level criteria will be compared against the other sub-criteria. Sub-criteria scores may need to be normalized if there are different numbers of sub-criteria under each of the high-level criteria.

Once the TAC team has finalized and endorsed the MODA criteria (through workshops), a separate workshop will be held with key influencers and interested stakeholders to review and gain endorsement for the criteria. Any significant changes to the criteria will require renewed endorsement by the TAC team. After the MODA Framework matrix are finalized, they will be presented to the Spokane administration and Council for review and approval.

5.3.2 Criteria Testing

The next step is to perform an exercise to test the applicability of the criteria using projects, actions, and scenarios. This will be undertaken as part of the APPA. APPA steps 1 through 3, as well as portions of Step 9 have already been undertaken as part of Phase 1 of this project. Phase 2 will build upon this information to:

- Develop and assess project/actions/scenarios for comparison which are focused on affordable, sustainable, socially responsible, or balanced pathways
- Evaluate trade-offs/pathways
- Obtain stakeholder input on pathways through meetings and workshops with internal Spokane stakeholders including senior management, TAC team, City Council as well as from external sources such as community meetings, community surveys and cost sensitivities assessment
- Revise Framework based on stakeholder outreach and pathway testing
- Test the pathways on a small part of the water system to demonstrate the different outcomes. The Eagle Ridge Pressure Zone could be used as the test area.
- Assess futures and develop the Strategy for the 20-Year Capital Facilities Plan

5.3.2.1 Adaptive Pathways Planning Approach

The APPA is a 12-step process that can be used to develop and explore a range of pathways over time to aid decision-makers in evaluating alternatives. The advantage of the APPA is that it enables evaluation of shocks (such as fire, flood, climate change, system outages, etc.) in the decision-making process. Figure 7 shows the **12- Step APPA process**, which is described below:

1. **Define Problem, Aims, Objectives, Requirements** – This step will establish the problem being addressed and the vision, objectives, constraints in the current and future situation, decision context, and the general requirements to meet Spokane's goals. This step will rely on data and information obtained from the Group 1 and 2 interviews and the MODA criteria.

Figure 7. 12-Step Adaptive Pathways Planning Approach

2. **Define Your Adaptive Pathways Planning Approach -** This step will define the specific details of the use of an APPA, which includes focusing on the elements such as confirming the planning or decision making context; defining "what matters"; developing alternative(s) or pathways; estimating consequences; deliberating about trade-off and preferences; and monitoring and learning. This step will build upon existing information from the Group 1 and 2 interviews and research and use the TAC team to help define alternatives, shocks or risks, and other key factors that help frame the APPA.

   a. **Confirming the planning or decision making context** - This includes:
      - Determining what the decision is, who is involved and how, what is in and out of scope, and how should the process be structured.
      - Defining consistent terminology for use, to ensure the use of terms such as pathways, scenarios, risks, triggers, decision points, are understood and used consistently by the TAC and stakeholders. It also will be important to distinguish differences between approaches (e.g., adaptive pathways versus adaptive management).
      - Integrating and defining how the APPA will be used.

b. **Defining "What Matters**" - This includes:
   - Defining the values to be protected or enhanced as well as what are the objectives and the specific measures or evaluation criteria that will be used to identify and compare alternatives.
   - Defining the type of pathways used in the project (e.g. high level strategic pathways for the entire system underpinned by multiple detailed infrastructure and action investment sequencing pathways).
   - Considering and defining the time horizon as well as the level of analysis/ exploration required to understand the system, thresholds, decision points and options within the time horizons. This will be at least the year 2050, but we recommended considering at least the impacts of climate change through to 2070 or 2100 to more fully understand the potential implications of climate change.

c. **Developing alternative(s)or pathways –** This includes:
   - Identifying what are the alternative actions (e.g., pathways) or strategies that could be taken to address the objectives (i.e., logical bundled combinations of investments, policies, programs, and other actions / decisions).
   - Optimizing alignment with relevant parallel processes.
   - Determining the style of pathway maps that are most effective (e.g., a high level route map, underpinned by detailed infrastructure and action sequencing investment plans).

d. **Estimating Consequences** - This includes:
   - Determining if the alternatives are expected to meet or address the objectives.
   - Determining what are the key uncertainties and risks?
   - Understanding the best way to engage different audience from engagement through development of the Strategy as well as communication and monitoring in implementation of the Strategy.

e. **Deliberating about trade-off and preferences** - This includes:
   - Exploring what are the key trade-offs, and which alternatives deliver the best balance across multiple objectives.
   - Exploring how uncertainties will be defined and used in analytical activities (e.g. combining scenarios and shocks, articulating transient (time based) scenarios, exploration of new uncertainties, etc.).
   - Determining how to manage uncertainty? This is not just about the future, but also uncertainty about current knowledge, data and models.

f. **Monitoring and learning** – This includes understanding how the decision can be implemented in a way that promotes learning over time and provides opportunities to revise management actions based on what is learned.

3. **Understand Functioning of Current System** – This step will develop knowledge of the context and functioning of the existing water system. To ensure that all aspects of system functioning are understood, amongst other things, we will be posing the following questions:

- What are the environmental, physical and social factors affecting the current system?
- What factors affect the performance of the system?
- What are the interfaces with other systems?
- What are the most critical issues, risks and opportunities?
- What decisions that affect vulnerability do you have, or not have, control over?
- What are the key decision points and processes within the system? Are these mapped?

This is a necessary step towards understanding the factors that will influence the system in future, and the types of options required to respond. Existing information and the Group 1 and 2 interviews will be used as a starting point in this discussion.

4. **Define Scenarios and Drivers of Change and Uncertainty** – This step will explore future scenarios or 'futures' to understand the impact of drivers of change and uncertainty on the system. This typically involves development of exploratory scenarios, generated through use of both scientific and creative/collaborative processes. Future scenarios should encapsulate a wide range of uncertainty, including where relevant changes to societal, technological, environmental, economic and political (STEEP) factors. These should focus on the areas of uncertainty and change that impacts the system and any key decisions areas.

   For the purpose of developing pathways through time that can adapt to a wide range of future uncertainty, scenarios should be:

   - Exploratory - Problem focused and used to explore "what could happen in the future?"
   - High impact - Consider 'plausible high impact' futures that test the bounds of current thinking
   - Risk and opportunity - Used to explore not just risks, but also opportunities
   - Transient - Expressed over time
   - Resilient - Include both trends and shocks

   This will involve workshops to collaboratively identify and thematically explore the drivers, understanding perspectives on their impact and uncertainty, and then prioritize key drivers for use in pathways development and assessment.

5. **Understand Functioning of System Under Future Scenarios** – This step will focus on understanding the functioning of the water system under future scenarios to establish the gaps or challenges that must be addressed. This will include identification of how and why the system performs and is vulnerable under the different scenarios, including the highest impact scenarios, and identification of the relevant thresholds (or tipping points and turning points). For example, what things "fail" (to meet objectives) and when? What are the localized and systemic implications of each failure? What is not affected?

6. **Identify Actions** – This step will explore what "actions" (the measures, response, interventions or options) could be used to meet Spokane's goals and objectives, adapt the system over time, address identified risks and thresholds, and respond to future uncertainty. These are the component parts, the building blocks, of the pathways. This step also considers different types of actions as part of the effort to develop pathways.

7. **Assess Actions** – This step will analyze and assess the performance of individual actions and provide short-term recommendations. This is an important step in providing short-term recommendations that are made with an initial understanding of how they might contribute to longer term pathways. This will include analysis of performance of options under different scenarios to understand how actions meet or do not meet core performance requirements and broader project objectives, a preliminary assessment of costs, risks and impacts, and a high level MCA. This also will include developing information about lead times for options, thresholds, and interrelationships and trade-offs between options, to inform the development of pathways. The assessment of actions, decisions about the MCA, and preliminary assessment of risks will be developed in collaboration with the TAC. This would also include assessment of bookend and thematic portfolios of actions, but without the full complexity of the sequencing and flexibility/decision points under different scenarios that will be considered comprehensively in the pathways development.

8. **Develop Pathways** – This step will develop pathways, which involves assembling and sequencing the range of actions and options into holistic 'pathways' that meet project objectives and address identified risks under different scenarios throughout the project planning horizon. The purpose of using a pathways approach to strategic planning is that it is a pragmatic approach that allows for uncertainty and change. The TAC team will be used to develop pathways that include:

    - Combinations of actions, strategic investments, policies, programs, partnerships and collaborations, sequenced through time to at least the year 2050.
    - Identification of the key decision (or trigger) points at which an option may need to change.
    - Ability to change between options – ensuring "flexibility" so that decision makers have the ability to respond as the future unfolds and change pathways at key decision points, not just to manage risk (e.g., a threshold or limit being reached, or a shock occurring) but also potentially to take opportunities (e.g., adaptation to new infrastructure in other sectors, or land development).
    - Consideration of "robustness", meaning that there are pathways available, or open, under a range of plausible futures.
    - Allowance for changes to the timing of actions as the focus is decision based planning rather than time based planning, meaning that under different scenarios the uncertainty in timing of actions is understood.
    - Maps to visualize strategic, investment and implementation level pathways. The pathway maps provide a simple way to show how options can be implemented through time, in the context of uncertainty. This is a key feature of the APPA, and will assist in both the conceptual development and communication of the pathways. Pathway maps can be very high level, or detailed, depending on the context of the approach.

9. **Evaluate the Pathways** - The focus of Step 9 is to assess each pathway against the performance criteria. This will include a financial and economic assessment, as well as a broader non-cost assessment using the MODA framework developed in Phase 1. For each pathway the following will be identified: (i) associated costs, (ii) impacts to rates, (iii) water quality impacts, (iv) risks, and (v) benefits. Where possible, benefits will quantified and even monetized.

10. **Recommend Preferred Pathway(s)** – This step will involve a collective decision making process to identify a preferred pathway. Drawing on the development and evaluation of pathways in previous steps to provide a collective understanding of the impacts, costs and benefits of different pathways available, the TAC will be guided through a trade-offs analysis to identify a preferred pathway.

11. **Develop the Adaptive Plan** – This step will develop an integrated approach to implement the preferred pathway, which will be summarized in a Final Living or Adaptive Plan. The final implementable plan will include: vision; detailed implementation and financial approaches; actions with timeline and milestones; recommended changes to, or new, policy and regulations; establish key performance indicators and targets to guide long-term delivery of water services; triggers and milestones to adapt to changing parameters.

12. **Implement, Monitor, Review, Learn** - The final step will be to implement the adaptive plan. Implementation is, as with all strategies and plans, the most important phase of a successful plan. For APPA, this includes the establishment of the monitoring framework or program to enable adaptive decision making, and review and update at regular intervals.

The Table 12 captures what data from Phase 1 of the project, which can be used to inform the Adaptive Pathways Planning process in Phase 2.

Table 12. Linking data from Phase 1 to Adaptive Pathways Planning Process

Adaptive Pathways Planning Step Number	Description	Data Sources
1	Define Problem, Aims, Objectives, Requirements	Builds upon Phase 1 Interviews and MODA discussions in Phase 2
2	Define Your Adaptive Pathways Planning Approach	Phase 1 Interviews Phase 2 and CE Plan
3	Understand Functioning of Current System	City of Spokane Water System Plan, Capital Improvement Plan (CIP) projects, Phase 1 Interviews Phase 2
4	Define Scenarios and Drivers of Change and Uncertainty	Phase 1 Interviews Phase 2
5	Understand Functioning of System Under Future Scenarios	Phase 2
6	Identify Actions	CIP projects and Phase 2
7	Assess Actions	MODA Framework
8	Develop Pathways	Phase 2
9	Evaluate the Pathways	Phase 2
10	Recommend Preferred Pathway(s)	Phase 2
11	Develop the Adaptive Plan	Phase 2
12	Implement, Monitor, Review, Learn	Phase 2 & Ongoing

6. Communication and Engagement Plan

There are many stakeholders with a vested interest in the issues and impacts of water services in Spokane and surrounding areas. Stakeholder interests span recreational activities, development, economic growth, environmental and ecosystem health, public health, equity, affordability, climate resilience, and Tribal/First Nations reconciliation. It is important to identify who are the key stakeholders; understand the relationship (and influence) they have with Spokane and one another, and the champions that are committed to supporting sustainable water management. Table 13 show a preliminary list of stakeholders for the Strategy.

Providing opportunities to effectively engage with the different stakeholders throughout the Strategy and Spokane's 20-Year Capital Facilities Plan development process is critical to its acceptance and ultimately its success. It is important to align the communication and engagement (CE) goals and objectives with the overarching Spokane Comprehensive Plan goals. These goals and objectives will be guidelines for designing a measurable CE Plan.

A list and description of CE goals, objectives, strategies, activities and performance measures will be included in the CE Plan. The CE Plan should capture the CE goals, objectives, approach, strategies, activities and performance measures of the project's engagement program and serve to guide engagement and build awareness of and support for the Spokane's Strategy, 20-Year Capital Facilities Plan, and potentially any associated rate changes. The CE Plan will include:

- A stakeholder scan and an identification of the potential impacts of the proposal.
- An overview of engagement activities.
- An overview of key messaging and objectives of the plan.

This information will be summarized in an easily useable table as shown in Table 13. It is important to work with Spokane to confirm a vision for success, key project priorities, and engagement requirements. A strong communication foundation should include project description, key messages and supporting facts that can be used to develop a public communications, which could include posters, web page content, social media content, and other supporting engagement materials, both online and in the community.

CE also will play an important role in working with stakeholders to build understanding, gain acceptance, and support the process, information, and decisions from the APPA.

Table 13 – Sample Communication and Engagement Plan Framework Summary

Specialized Audience	Champion	Topics of Interest	Desired Outcomes	Strategies / Actions	Messages	Timeframe
City of Spokane - Internal						
Utility Director, Water Director Water						
ICM, Developer Services, Parks, and Fire Department (Managers, planners and implementers of related projects and programs)						
Mayor, City Council Members, Utility Director						
Regulators						
Department of Health, US Environmental Protection Agency (USEPA)						
Washington State Department of Ecology						
Tribal/First Nations						
Spokane Tribe of Indians						
Regional Water Agencies - External						
Regional Aquifer Groups Spokane Aquifer Joint Board (SAJB) and Idaho Washington Aquifer Collaborative (IWAC)						
Agencies with Intertie Agreements City of Airway Heights, Spokane County WD #3, Whitworth WD #2, Fairchild Air Force Base, Velview WD, North Spokane ID #8						

Table 13 – Sample Communication and Engagement Plan Framework Summary

Specialized Audience	Champion	Topics of Interest	Desired Outcomes	Strategies / Actions	Messages	Timeframe
Stakeholders - External						
Environmental *Riverkeepers, Centre for Justice, The Lands Council, Spokane River Forum*						
Recreational *Rafting and Fishing*						
Community Organizations/ Neighborhood Councils *Community Assembly, Homeowners Associations*						
Business - External						
Developers *(List of key Developers), Green Building Council*						
Landscape Architects and Contractors						
Master Gardeners						
Representative Organizations *Greater Spokane Inc., Downtown Spokane Partners*						

Table 13 – Sample Communication and Engagement Plan Framework Summary

Specialized Audience	Champion	Topics of Interest	Desired Outcomes	Strategies / Actions	Messages	Timeframe
Technical Associations						
AWWA, American Society of Civil Engineers (ASCE)						
Media						
Local, Regional, Trade, Environmental, Economic, Social Media			***News***: Balanced, accurate and timely coverage of the issues.			
			Editorial: Support for the approach and recommendations.			

7. Summary and Next Steps

This TM summarizes the key products from Phase 1 of framework for advancing the Spokane Strategy for the 20 –Year Capital Facilities Plan. Phase 2 of the Strategy will include the following steps:

1. **Develop CE Plan -** Develop a CE plan that outlines audiences (internal and external), stakeholders, and outreach messages, timing, and methods. Establish Public Engagement Principles and Participation Plan goals to guide the development, implementation and monitoring of the plan to meet relevant requirements and ensure a responsive plan. Work with Spokane to identify both internal and external audiences that are key to gaining support for the Strategy development, APPA process, 20-Year Capital Facilities Plan, and rate case. Lead Stakeholder Mapping exercise to identify what internal/external stakeholders have interest and/or influence on project outcomes and group stakeholders into categories to develop stakeholder-specific engagement/management strategies. Once audiences are identified, a public participation plan will be developed outlining who, when, how, and what types of engagement strategies will occur and what is the desired outcome of each engagement. Develop Engagement Strategies that identify/leverage existing communication channels and propose communication/consultation methods to target larger stakeholder audiences. The plan will include a schedule to implement stakeholder engagement strategies and initial messaging for specific audiences (internal and external at different expertise and engagement levels) to encourage participation in the engagement process. It will include quarterly or key milestone briefing meetings with Executive Team (Admin and Council) as part of the Strategy development. These meetings will be focused on building understanding of system issues, the Strategy process, and to gain endorsement at key milestones. The CE Plan development is scheduled to being in early 2021, with a CE Plan being completed by March 2021.
2. **MODA Framework criteria review and evaluation** – A series of workshops will be held with the TAC, Spokane staff, key interested external stakeholders, Spokane Administration, and City Council to review the sample MODA Criteria. This effort will be initiated through workshop(s) with the TAC team where: the overarching MODA process will be explained and the draft criteria in the MODA matrix will be reviewed and evaluated. During the workshops the criteria will be discussed, definitions will be refined, then the importance factors will be determined using the Delphi method.

   The draft MODA sample criteria matrix will be used as a starting point for a facilitated discussion driving the TAC team to reach consensus on the final MODA criteria matrix. Once the criteria are set then the importance factors will be determined for each high-level and sub-criterion through a facilitated discussion. A draft final MODA framework will be developed from the TAC team input for use in separate workshop(s) with key influencers and interested stakeholders to review and gain endorsement for the criteria. Any significant changes to the criteria will require renewed endorsement by the TAC team. After the MODA Framework matrix is finalized, then it will be presented to the Spokane administration and Council for review and approval.

   The MODA Framework process will be summarized in a TM. The timeline for this effort is expected to begin in early 2021 and be finalized by Quarter 3 of 2021.

3. **Test Framework, Refine Pathways, and Select recommended pathway for Link - Utilities for Water** - Formal review of projects/actions to ensure criteria compatibility using the APPA – The 12-Step APPA process will be used to:

    - Develop and assess project/actions/scenarios for comparison which are focused on affordable, sustainable, socially responsible, or balanced pathways
    - Evaluate trade-offs/pathways
    - Obtain stakeholder input on pathways through meetings and workshops with internal Spokane stakeholders including senior management, TAC team, City Council as well as from external sources such as community meetings, community surveys and cost sensitivities assessment
    - Revise Framework based on stakeholder outreach and pathway testing
    - Test the pathways on a small part of the water system to demonstrate the different outcomes. The Eagle Ridge pressure Zone could be used as the test area.
    - Assess futures and develop the Strategy for the 20-Year Capital Facilities Plan

    Work has already been done on Steps 1 through 3 (Define Problem, Aims, Objectives, Requirements; Define Your Adaptive Pathways Planning Approach; Understand Functioning of Current System) of the APPA, but additional information will need to be collected and collated to form the basis of discussion to define scenarios and drivers of change and uncertainty (Step 4 of APPA) and understand the functioning of the system under future scenarios (Step 5 of APPA). Once the baseline for the pathways is established in Steps 1 through 5, potential actions will be identified and evaluated (Steps 6 and 7 of APPA) so pathways can be developed and evaluated (Steps 8 and 9 of APPA). Step 9 will rely on using the MODA Framework criteria matrix during the evaluation. Finally a recommended preferred pathway will be identified (Step 10 of APPA) and a flexible “Living” (vs Static) Plan for the 20-Year Capital Facilities Plan will be developed (Steps 11 and 12).

    Developing a living plan will provide the Spokane with a plan that is adaptable and can be revisited as shocks, community, or infrastructure needs change. A key component of a living plan is establishing the monitoring framework to enable adaptive decision making, and review and update at regular intervals. The APPA process will be carried out by using the TAC team, Spokane Administration (senior management), and potentially key influencers and interested stakeholders to assist with formulation, refinement, and selection of pathways (including a recommended pathway) through a series of facilitated workshops. The pathways will be developed and refined using a three step process:

    - Part 1: Spokane Administration
    - Part 2: Council and TAC
    - Public outreach and education

    Once pathways are established they will be tested by reviewing assessing results based on looking at a small part of the water system (e.g., Eagle Ridge pressure zone). The results of this effort will be shared with key stakeholders including City Council and external stakeholders to gain support, approval and endorsement.

    The results from this effort will be summarized in a Strategy for the 20-Year Capital Facilities Plan. The timeline for this effort is expected to begin in Quarter 3 of 2021 and be finalized by Quarter 3 of 2022.

4. **Incorporate information from public outreach and pathways into Rate Setting Study**

5. **Provide recommendations for updates to Spokane Municipal Code (SMC) and design standards from recommended pathway** - Upon completion of the Strategy for the 20-Year Capital Facilities Plan, SMC and design standards will be reviewed to evaluate what, if any changes are needed to facilitate successful implementation of the Strategy. Recommendations will be reviewed with Spokane administration and assistance will be provided to support any information or documentation needed to share these changes with the City Council. The timeline for this effort is expected to begin in Quarter 2 of 2022 and be finalized by Quarter 3of 2022.
6. **Public education and outreach on recommended pathway** - This effort also will include working with the Strategy and APPA development team to socialize and gain consensus by developing and assisting with facilitation of a TAC and potentially external stakeholder, administration, and council workshops. A TAC group that represents all segments of Spokane including planning, engineering, operations, maintenance, regulatory, and community engagement will be established. The TAC Team could include technical or community experts. Technical expert members of the TAC team would be selected with input and subject to approval from the Spokane. The TAC will work to hold workshops to review and finalize the draft MODA matrix, work through the APPA process (including identifying pathways, shocks, and a recommended pathway), and make recommendations for the 20-Year Capital Facilities Plan. A kick-off meeting will be held with the TAC to establish communication guidelines, TAC purpose, and TAC responsibilities. A Draft MODA TAC Team charter will be developed as part of this process to gain commitment and endorsement for process and direction. In addition to the TAC team, CE workshops will be held with external stakeholder to gain input and seek endorsement of the process; MODA, pathways, and recommended 20-Year Capital Facilities Plan. This information will also need to be shared with key stakeholders through a series of meeting or workshops to building understanding and support of the process and outcomes.

   A final CE report will be prepared that includes a summary of the findings from the CE activities. CE activities will continue in support of stakeholder engagement activities throughout the Strategy timeline, which is scheduled to be completed in Quarter 4 of 2022). Activities supporting the rate case could continue into Q1 of 2023.

Figure 8 provides an overview of the proposed schedule for Phase 2. In addition, other work not shown in this schedule that could be initiated by 2022 include the following activities:

- Rate Setting Study, start Q2 2022 completed by Q2 2023
- 100-Year Water Resource Planning for Water Rights and Supply
- MODA update for wastewater management
- Updates to SMC and Design Standards for wastewater management
- Additional community outreach & public education

Activity	Participants	Objective	Draft Schedule 2021	2022	2023
Phase 2 Core Tasks					
Develop CE Plan	City PM; Project Team: Engagement Specialist	Review Outline; Stakeholder Identification; Virtual Engagement Strategies; Develop Plan	♦ ♦		
Finalize MODA Framework	Project Team	Final Framework; Internal and external stakeholder review (workshops)	♦		
Refine Pathways; Test Framework; Implement Adaptive Pathways Planning Framework	City PM; Project Team	Devlopment of Potential Pathways for development of Strategy; Identification of Recommended Pathway endorsed by stakeholders and City Council		♦ ♦ ♦	
Spokane Municipal Code (SMC) and design standards Update	City; Consultant	Provide recommendations for updates to Spokane Municipal Code (SMC) and design standards, etc. from recommended pathway			♦
Rate Setting Study	City; Consultant	Develop information to support updated rate discussion by City Council			
Public Outreach for Pathways and Rate Case	City PM; Project Team: Engagement Specialist	Provide information to stakeholders to gain endorsement for Pathwys and Rate Case			
Phase 2 Project Management					
Project Status Updates	Project Team	Monthly Project Status/Reporting			
Legend: ♦	Deliverable				

Figure 8. Proposed Draft Strategy Phase 2 Schedule

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Appendices

Appendix A – Group 1 Interview Questions and Matrix

City of Spokane 20-Year Capital Facilities Plan Multi-Objective Decision Analysis

Introduction

Level of service (LOS) is an agreed upon performance target based upon quality, quantity, reliability, and environmental standards as well as short- and long-term goals (Source: *USEPA Asset Management: A Best Practices Guide*, 2008). Adopting written LOS standards for each utility service and providing capital improvements to achieve and maintain these standards for existing and future development is a policy under the *Shaping Spokane Comprehensive Plan for the City of Spokane* (2017*)*.

The City is currently developing LOS standards as well as a methodology to assess and prioritize capital needs through an information gathering process. This process focuses on developing the LOS standards and a multi-objective decision analysis (MODA) framework based on the City's long-term goals of balancing sustainability, social responsibility, and affordability (Figure 1: Triple Bottom Line; *City of Spokane Water Conservation Master Plan, 2020*).

Achieving these goals requires an understanding of how cities progress through different stages of urban water management in pursuit of more sustainable, resilient, and equitable futures (illustrated in Figure 2). The transitions framework (Fig. 2) aligns with the goals within the *City's One Spokane Strategic Plan (2019)* of innovative, sustainable, and resilient infrastructure and systems. To achieve this intent and meet the long-term goals of the City requires a focus on creating resiliency within the water system to address existing and future development, aging infrastructure, and addressing foreseen and unforeseen risks.

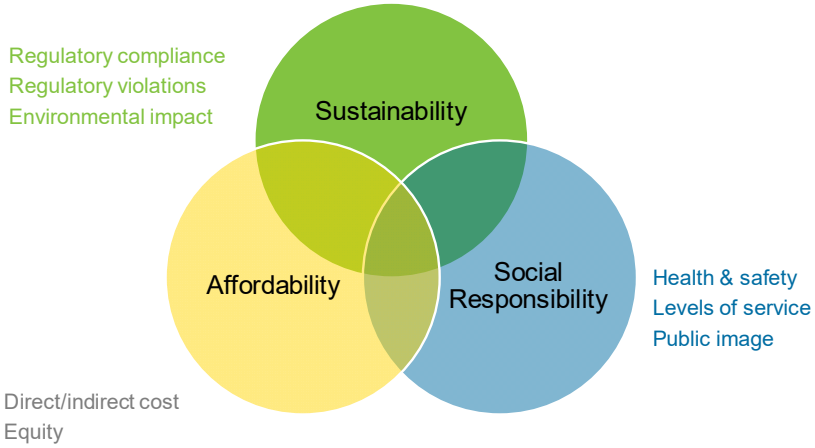

Figure A1. City of Spokane's Long-term Goals
(Triple Bottom Line)

Risk is a function of the consequence and likelihood (probability) of failure. Business risk is an organization's exposure to internal or external factor(s) that will lead it to failure from a social, financial, or reputational standpoint. It is important to note that risk, LOS, and costs are interrelated. The MODA framework focuses on an analysis of acceptable risks and is being conducted in parallel to a top-down analysis of available funding to ensure that these interrelationships support decision-making. The MODA analysis supports improved decision-making by providing a full picture of business risk enabling the multifaceted goals of the City to be considered.

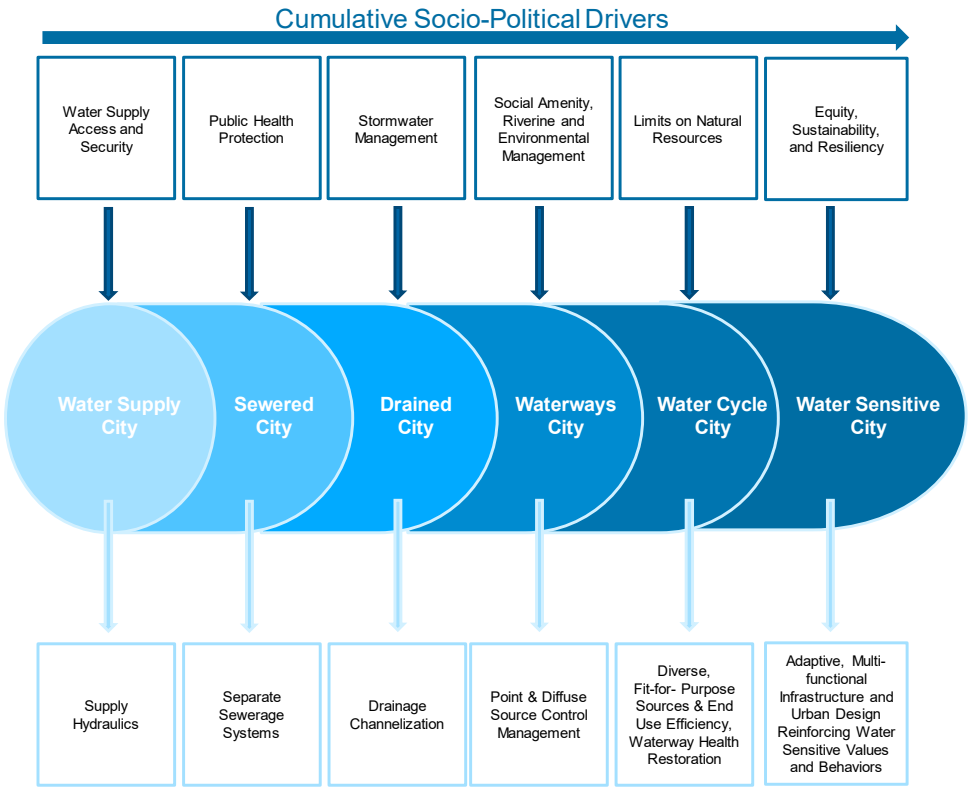

Figure A2: Framework for Transitions of City States

Source: [Adapted] Brown et al., 2009

Resiliency is evaluated by considering the following elements:

- **Robustness:** the inherent **strength or resistance** in a system to withstand external changes and demands without degradation or loss of the expected LOS
- **Redundancy:** system properties that allow **alternate options**, choices, and substitutions to be used to attempt to provide the expected LOS while the system is under stress
- **Resourcefulness:** the **capacity** within the system to mobilize needed resources and services in response to significant stress events or long-term external changes
- **Rapidity:** the **speed** with which a system can **return** to the expected level of service after a significant disruption occurs (Source: O'Rourke, T. D. 2007. "Critical Infrastructure, Interdependencies, and Resilience." *The Bridge Linking Engineering and Society*. pp. 22-29. Spring.)

These interview questions are designed to collect information to initiate a conversation regarding the following issues related to developing a MODA framework:

- LOS standards the City should use for its water system
- Ways in which these standards can be used to evaluate and prioritize capital improvement actions
- Possible differences in levels of importance between the standards
- The most significant risks facing the City's system
- The City's business risk tolerance for its water system

Interview Questions

Below are a number of questions developed to gathering information in support of development of the MODA criteria. Please answer as many questions as possible. However, if a question is beyond your purview or you do not feel comfortable answering it, please let the interviewer know, and we can move on to the next question.

Sustainability

1. **What is/are the most important aspect(s) of the system that needs consideration (e.g., risk, LOS, and reputation)?**
   Things to consider:
   a. What is your biggest concern about the system?
   b. What keeps you up at night?
2. What are current capital and O&M procedures for maintaining, rehabilitating, and replacing assets?
3. **How are you planning for adequate capacity and capabilities to meet existing and future variability?**
   Things to consider:
   a. Is there a sufficient number of qualified and adequately trained operators/staff?
   b. Are adequate record keeping systems in place to capture important institutional knowledge?
   c. Are existing software and tools (e.g., SCADA, Infowater, Citiworks, Fracta, and Utilis) able to improve system operation?
   d. Are succession planning and retention strategies implemented?
4. What major system constraints influence LOS and future development?
5. What are the challenges in communicating a business case for conservation?
   Things to consider:
   a. How do you currently incentivize reductions in outdoor seasonal water use?
   b. What programs are in place to improve water literacy?
   c. Is there adequate understanding of watershed stewardship, including the link between water conservation and the riverine environment?
6. What would a regional approach to watershed stewardship resemble?

Social Responsibility

1. Are water system operations currently meeting compliance requirements (legislative, policy, and regulatory)?
2. What processes are in place for identifying and managing risk?
   Things to consider:
   a. What does business risk mean to you?
   b. What is the most concerning risk in the system?
   c. Are current City operations adequately addressing business risk?
3. **What emerging issues that impact business risk need to be addressed? Are social, environmental, and economic impacts considered when evaluating system-wide impacts and benefits?**
   Things to consider:
   a. Do you have adequate information to make evidence-based decisions?
4. Do overarching principles and water management objectives consider the complete water cycle (Figure 3)?
5. Are stakeholder engagement practices and communications effective?
   Things to consider:
   a. Are external stakeholders consulted (including environmental groups, NGOs, state and federal agencies, neighboring local governments, neighboring tribal interests, industry and agriculture, and the public)?
   b. Is there internal departmental cooperation between engineering, operations, land-use planning, parks and recreation, finance, information technology, emergency management and communications?
   c. What communication hurdles exist and how can they be addressed?

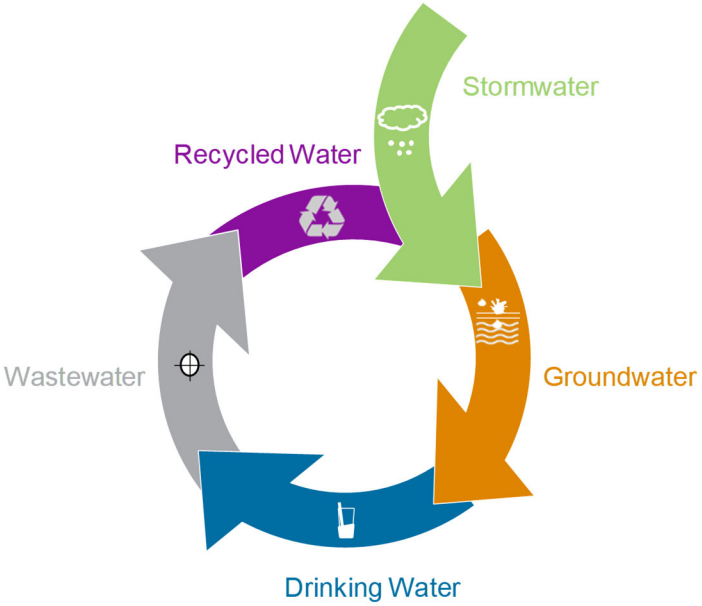

Figure A3. Complete Water Cycle
Source: City of Los Angeles One Water Plan, 2018

6. Is a resilient emergency management program in place (including risk assessment and management; preparedness activities; coordinated response, and recovery; and reconstruction)?
7. Does a robust [public] communication plan exist?
   Things to consider:
   a. Is the audience understood? (e.g., community demographics, languages and ability to access information, length of residency, vulnerable groups and age)
   b. Has the effectiveness of the different modes of communication been evaluated? (e.g., associated changes in behavior)
   c. Has the value of awareness and education campaigns been demonstrated? (e.g., has stakeholder water literacy increased?)
   d. What do you view as the most effective way to have a community conversation regarding the impacts of summer usage on overall system costs?

Affordability

1. What are the most common service complaints from customers (e.g., taste, quality, color, odor, pressure, service interruptions [planned and unplanned], and call response times)?
2. **What are the most important trade-offs between risk and LOS?**
   Things to consider:
   a. Can water conservation alone meet summer peak demand?
   b. Are infrastructure improvements required to maintain LOS and meet summer peak demands?
   c. What are (1) acceptable trade-offs in LOS; and (2) acceptable or necessary trade-offs in LOS to meet summer peak demand and/or fire flow?
   d. What are (1) acceptable trade-offs in cost versus risk; and (2) acceptable or necessary trade-offs in cost versus risk to meet summer peak demand and or fire flow?
   e. What other types of improvements could justify increased rates to gain customer support?
3. Are the full costs of water supply recovered?
   Things to consider:
   a. Do water rates reflect all the costs associated with the provision of drinking water services (e.g., operations, maintenance, administration, system depreciation [debt servicing, etc.], capital works* and decommissioning, regulatory compliance, conservation, environmental management and source protection costs)?
   b. Do you use a comprehensive pricing program or flat-rate pricing?
   c. Do customer expectations match the true cost and value of water?
   d. What does affordability mean to you and how does its definition vary across stakeholders?
4. How are payee benefits and cost responsibilities for system improvements currently determined?
   Things to consider:
   a. Are the impacts to overall system needs and costs evaluated for new development or zoning changes?
   b. Is equity of cost distribution a consideration?
   c. What criteria are important to consider for equitable distribution of costs?
   d. How should current cost distribution guidelines change?
5. What components of equity are important to consider when evaluating improvement actions (social, environmental, financial, etc.)?

For Reference: Table A1. Comparison of DOH and City Guidelines

Parameter	DOH Guidelines	City Standards [Sample]
Transmission System	• Pipe Size: >6-inches (required for pipes that provide FF) • Transmission Mains: >5 psi at ground surface above pipe for max design flow • Pipe Max Velocity: 8 fps under PHD (Recommended) • System Pressure: <80 psi	• Pipe Velocities: 3-5 fps (Peak 7.5 fps; Max 15 fps) • System Pressure: >45 psi
Flow	• MDD (based on metered read monthly; ERUMDD = 350 gal/day/connection) • PHD while maintaining >30 psi in system or require ES; >20 psi for MDD & FF • Fire flow minimum value calculated by fire marshal • DSL: <10%	• 350 GPD per ERU • ADD: 62 mgd; MDD: 185 mgd; Peaking Factor: 1.7 • Fire Flow: 1,000 - 1,750 gpm for 2-hours • Distribution System Loss (“DSL”): <10%
Pumps	• PHD when largest capacity booster pump is out of service • >20 psi at MDD + FF	• Booster Pump: 2 X MDD for each pressure zone
Groundwater Source Reliability	• 1-in 50-Year interval interruption (restriction) • MDD calculations based on 20-hour max pumping (recommendation) • OS, SB, & FSS to maintain reliable water service for normal/abnormal demands • SB = MDD for zone (recommended) • FSS = >20 psi at all points in system under MDD • Applicable water quality standards for acute and chronic contaminants • Factor of safety is applied to well pumping test safe yield determination	• Standby Storage (SS): 200 gal/ERU • Required Storage: FSS or SS + ES • Quality: 0.2 ppm chlorine residual
Power Supply Reliability	• Frequency: Avg <3 outages/year over last 3 years, <6 outages/year; outage = power loss for 30 minutes or more. • Duration: Avg <4-hour outage over last 3 years, & <1 outage >8-hours over last 3 years • Source of supply pump stations have power connections to 2 independent primary public power sources; have in-place auxiliary power available (auto transfer capable), and/or maintain adequate gravity standby storage	

Table A2. Interviewee Question Matrix

Question		Overview		Level of Service	Communications	Emergency Management	Developer Services	ICM
#	Text	Dan Kegley	Raylene Gennett / Jim Sakamoto	Steve Burn / Jeanne Finger	Kristen Zimmer / Marlene Fiest	Loren Searl / Colin Naake	John Sawyers / Beryl Fredrickson	Katherine Miller / Marcia Davis
	Sustainability							
1	What is/are the most important aspect(s) of the system that needs consideration (e.g., risk, LOS, and reputation)?	•	•	•	•	•	•	•
2	What are current capital and O&M procedures for maintaining, rehabilitating, and replacing assets?	•	•	•			•	•
3	How are you planning for adequate capacity and capabilities to meet existing and future variability?	•	•	•	•	•	•	•
4	What major system constraints influence LOS and future development?	•	•	•			•	•
5	What are the challenges in communicating a business case for conservation?	•		•	•		•	•
6	What would a regional approach to watershed stewardship resemble?	•			•	•	•	•

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	Social Responsibility							
1	Are water system operations currently meeting compliance requirements (legislative, policy, and regulatory)?	•	•	•				•
2	What processes are in place for identifying and managing risk?	•	•			•	•	•
3	What emerging issues that impact business risk need to be addressed?	•	•	•	•	•	•	•
4	Do overarching principles and water management objectives consider the complete water cycle?	•		•			•	•
5	Are stakeholder engagement practices and communications effective?	•			•			•
6	Is a resilient emergency management program in place (including risk assessment and management; preparedness activities; coordinated response, and recovery; and reconstruction)?	•	•	•		•		•
7	Does a robust [public] communication plan exist?	•			•			•

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	Affordability							
1	What are the most common service complaints from customers (e.g., taste, quality, color, odor, pressure, service interruptions [planned and unplanned], and call response times)?	•	•	•	•			•
2	What are the most important trade-offs between risk and LOS?	•	•	•	•	•	•	•
3	Are the full costs of water supply recovered?	•	•	•	•		•	•
4	How are payee benefits and cost responsibilities for system improvements currently determined?	•	•	•	•		•	•
5	What components of equity are important to consider when evaluating improvement actions (social, environmental, financial, etc.)?	•	•		•			•

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