RE: AMERICA'S WATER INFRASTRUCTURE ACT WATER SYSTEM RISK AND RESILIENCY ASSESSMENT AND EMERGENCY RESPONSE PLAN SCOPE OF WORK

PROJECT UNDERSTANDING

The City of Camas is undertaking a water system risk and resilience assessment (RRA) and Emergency Response Plan Update (ERP) of its physical operational assets and cyber networks in compliance with the America's Water Infrastructure Act (AWIA). The assessment is designed to determine the water system's vulnerabilities to malevolent acts, natural hazard, and proximity and dependency risks.

The objective is the development of an RRA that meets all AWIA requirements and provides the City of Camas with the documentation to develop the required emergency response plan internally. Tetra Tech proposes to perform the RRA in conformance with the methodology presented in Risk Analysis and Management for Critical Asset Management Protection (RAMCAP); Standard for Risk and Resilience Management of Water and Wastewater Systems (ANSI/AWWA, 2010) as described in the AWWA J100 standard (Figure 1).

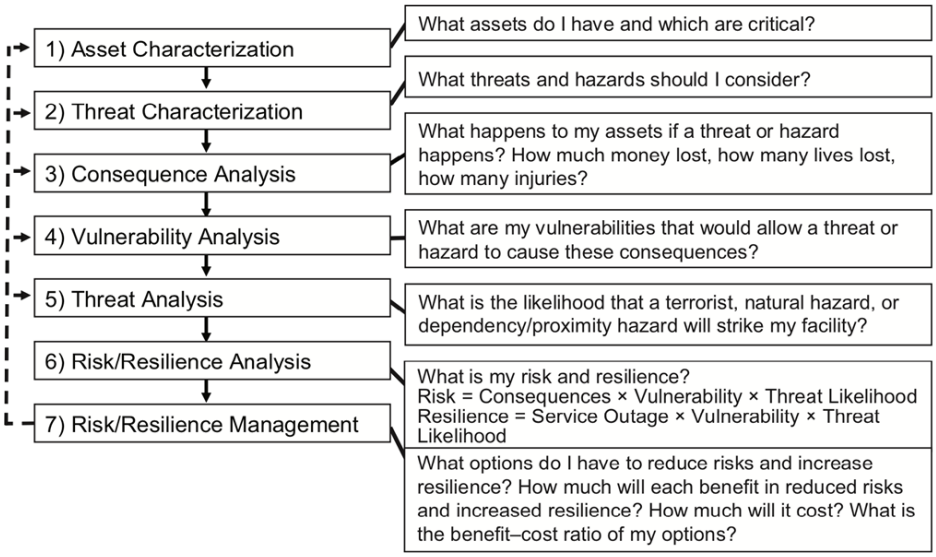

Figure 1. AWWA J100 Standard for Risk and Resilience Management of Water and Wastewater Systems

Tetra Tech will conduct the RRA for water system mission critical cyber and physical assets including its administrative and operations facilities. AWIA requirements emphasize cybersecurity threats in light of the increasing occurrences of system intrusions, data base hacks, and ransomware attacks. The RRA will consider the systems cyber assets – computers, networks, data and communications systems, and billing systems – critical to the safe production of drinking water and business operations. These consist of both information technology (IT) and operational technology (OT) systems, including:

Tetra Tech
15350 SW Sequoia Parkway, Suite 220, Portland, OR 97224
Tel 503.684.9097 Fax 503.598.0583 tetratech.com

- Industrial control systems (ICS)
- Supervisory control and data acquisition (SCADA) systems.
- Supporting network and computer infrastructure
- Business applications supporting utility operations

The cyber-asset assessment will closely mirror the physical RAMCAP assessment tasks but involve a different City of Camas team with knowledge of computerized systems from both IT and SCADA perspectives. This assessment will evaluate the risks to critical systems and the City of Camas's ability to quickly and effectively recover from disruptions of these systems.

SCOPE OF SERVICES

Task 1 Project Administration

Tetra Tech will provide a Project Administration Plan to direct, coordinate, and monitor the activities of the project with respect to budget, schedule, and contractual obligations.

Tetra Tech will be responsible for management of all Tetra Tech team activities, including any subconsultants. Tetra Tech will manage and coordinate all components of the Project and take a proactive role in keeping all tasks on schedule and budget and ensure timely completion of the Project.

Tetra Tech will provide full coordination with City of Camas staff and be responsive to any communications. Tetra Tech will be in contact with the City frequently enough to ensure a timely City review of deliverables. Tetra Tech will work with all stakeholders in a responsible manner and as directed by the City of Camas's Project Manager.

Tetra Tech will prepare all project-related agendas and meeting minutes. Agendas and the supporting information will be distributed via emails to the City of Camas's Project Manager at least one business day prior to any meetings, except draft reports, which shall be submitted at least three business days ahead of the meetings. Meeting minutes shall be distributed to all attendees and any other identified parties within five business days of the meeting date. Tetra Tech will submit a summary report of work completed by sub-tasks with each invoice.

Tetra Tech will conduct internal quality assurance and quality control meetings and follow-up with technical experts as necessary throughout the course of the project. The duration of this project will not exceed December 31, 2021.

Task 2 Kickoff Meeting and Data Review

Tetra Tech will conduct a project planning meeting with the Project Manager from the City of Camas. The objectives of this meeting will be to confirm the project timeline, confirm agencies participating in the project, and coordinate compilation of the necessary documents to conduct the plan reviews. The critical path item in developing a plan of this nature is data collection. We will address this need immediately. Using the AWIA requirements as a minimum baseline, we will develop a data needs list, data needs submission log, and draft data collection plan. The data collection schedule will be finalized at the kickoff meeting.

During the meeting, Tetra Tech will confirm the overall project, scope, project plan, and schedule.

Assumptions: The kickoff meeting will be conducted by Microsoft Teams conference call.

Task 3 Data Collection and Review

Data gathering, through existing documentation and field assessment will address the following elements:

- Malevolent acts (physical and cyber intrusion by internal/external perpetrators) and natural hazards (for the City of Camas, it is assumed that the list of natural hazards can be limited to earthquakes, fires, floods and storm events)
- System resilience
- Monitoring practices
- Financial network infrastructure
- Operation and maintenance
- Network diagrams addressing schemes and system descriptions
- Drawings showing the relationship of each system to the treatment process (i.e., process flow diagrams, record drawings and O&M manuals).
- City of Camas records of previous malevolent acts, natural events, service outages due to utility or external factors

The focus of data collection will be identifying the status of existing systems and analyzing existing systems and deficits per the EPA guidelines and City of Camas's objectives.

Additional technical documentation that may be requested if available includes:

- Latest version of all security policies and procedures
- Any contract/asset access service agreements
- Security documentation such as post orders, recent calls for service, and security organization chart.
- Electronic engineering files of the administration and operations building utilities, communications and security systems
- Available O&M manuals
- Most recent emergency management plan

This assessment will include the following system elements:

• Source of supply • Transmission pipelines • Pump stations • Storage reservoirs \ • Critical PRVs	• Security systems and practices • Operations center • Maintenance yard • IT and OT cyber networks

Task 4 Asset and Threat Characterization and Consequence Analysis – Workshop #1

Asset-Threat Pair Determination

Tetra Tech will prepare for, and facilitate, Workshop #1 with the City of Camas to introduce the RAMCAP assessment approach and develop the physical and cyber asset characterization. The workshop will be attended by Tetra Tech's project manager, project engineer, cybersecurity specialist, and physical security specialist.

Tetra Tech will review the major cyber assets associated with each facility and their criticality to the City of Camas's mission. Tetra Tech will facilitate a discussion with City staff to define their mission, followed by a discussion of how each facility is critical to this mission.

A threat characterization will be conducted, to assess malevolent acts and natural hazards, including threats that can impact off-site assets controlled by others (e.g., utilities and chemical suppliers). The workshop will identify reasonable, worst-case threats using the RAMCAP table of potential hazards and threat scenarios. These are based on leading physical and cybersecurity guidance identified as AWIA consensus standards for water utilities, including the following:

- AWWA J100 Standard
- AWWA Cyber Security Guidance & Tool
- National Institute of Standards and Technology Cybersecurity Framework
- ISA/IEC-62443 (Formerly ISA-99) Industrial Automation and Control Systems Security
- National Institute of Standards and Technology SP800-82 Rev. 1 Guide to Industrial Control Systems Security

Tetra Tech will prepare for, and facilitate, the threat characterization process at the workshop. This part of the workshop will identify threats and narrow the focus of threats that represent real, physically possible threats to critical assets identified during the asset characterization.

Tetra Tech will prepare an Asset Classification and Threat Characterization Technical Memorandum summarizing the key assets and associated criticality identified during the workshops.

Field Investigations

Tetra Tech will conduct field-data collection regarding water assets identified as critical and conduct interviews with key staff.

In conjunction with fieldwork, Tetra Tech's cybersecurity lead, will spend time with the City of Camas's IT and SCADA staff reviewing the networks. Tetra Tech will request information from the City to identify the key components of the network and cyber infrastructure. This will allow Tetra Tech to become familiar with the critical automated systems prior to the onset of project work.

Tetra Tech's field investigations will determine the ability of current protection systems to withstand each identified threat. Each site will be classified based on the criticality of its cyber assets as defined in the RAMCAP methodology. Tetra Tech will begin with threat analysis assumptions identified during the asset/threat characterization workshop to estimate the likelihood of a malevolent act or natural hazard based on relative alternative targets and historical records, respectively.

Consequence Analysis

Tetra Tech will reconvene with City of Camas staff to identify the types of consequences to be evaluated and quantify those consequences. This information will be used in the PARRE Software Tool to assign scores to calculate consequence of loss for each asset-threat pair. We will confirm or revise the consequence analysis to rank asset-threat pairs according to the magnitude of resulting consequences, using a consequence scale provided in the RAMCAP methodology. Consequences will be estimated, at a minimum, in terms of loss of life and serious injury; financial losses; duration and severity of service denial; and economic losses to the utility. This analysis will be used as the basis for the vulnerability and threat analysis workshop to follow.

Deliverable: Facilitated Workshop #1

Assumptions

- This assessment will be conducted in a manner and develop results to meet the needs of the AWIA RRA requirements.
- The RRA will fully evaluate a maximum of twenty (20) water system Asset-Threat pairs.
- The workshop and field analysis will be conducted by MS Teams video conference

Task 5 Vulnerability and Threat Analysis – Workshop #2

Based on the findings of Workshop #1, Tetra Tech will use the consequence analysis to identify a natural breakpoint in the quantification of consequence to identify approximately the top twenty critical assets in the water system. This approach, as recommended by the J100 guidance is simply to ascertain a manageable number of assets to be addressed.

With a focused list of assets Tetra Tech will prepare a vulnerability analysis to identify, within the security framework, the vulnerabilities to threats and/or hazards that could potentially occur.

Tetra Tech will then conduct a threat analysis using data from City records, law enforcement, and Emergency Planning and Community Right to Know Act (EPRCA Tier II) databases to identify the likelihood of that a natural hazard, dependency or proximity hazard or malevolent threat would take place at their facility.

Tetra Tech will facilitate Workshop #2 with City staff to review and revise the vulnerability and threat likelihood analysis.

Deliverables: Facilitated Workshop #2

Assumptions

- The workshop will be conducted by MS Teams video conference

Task 6 Risk and Resilience Analysis

Tetra Tech will assess the risk and resilience to the previously identified Asset-Threat pairs according to the malevolent acts and natural events (including earthquakes) as outlined by the AWWA J100 methodology. Tetra Tech will compile all information and scores gathered in the preceding tasks to calculate risk and resilience for each asset-threat pair. Risk is calculated as the product of the Consequence (expressed as a scored value), Vulnerability (expressed as a probability), and Threat Likelihood (expressed as a probability):

RISK = Consequence x Vulnerability x Threat Likelihood

Resilience will be calculated as the product of the Service Outage (expressed as a scored value in terms of duration and severity), Vulnerability, and Threat Likelihood.

RESILIENCE = Duration x Severity x Vulnerability x Threat Likelihood

Tetra Tech will prepare a risk and resilience analysis technical memorandum compiling the results of the analysis. We will then facilitate a conference call to discuss the results to ensure that all City participants agree with the outcome and determine which risks warrant mitigation. The call will define what level of risk and

resilience is acceptable. For asset-threat pairs with an unacceptable level of risk and resilience, the following process will be pursued:

- Define mitigation and resilience options as countermeasures to the threats.
- Estimate the capital and operating costs for each option.
- Identify options that apply to multiple asset-threat pairs.
- Calculate the net benefits and benefit-cost ratio to estimate total value and risk-reduction efficiency of each option.
- Determine the resources needed to operate the selected options.
- Identify mitigation options for the selected asset-threat pairs.

Task 7 Risk and Resilience Management - Workshop #3

Following the calculation of risk and resilience, Tetra Tech will facilitate Workshop #3. The Risk and Resilience Management workshop will evaluate and select what, if any, actions are needed to enhance all-hazards security or resilience are needed. If actions are needed then selecting the portfolio of actions to be taken including improving security, improving consequence mitigation, developing redundancy, entering into mutual aid agreements, developing emergency response plans, reducing or eliminating dependency/proximity threats, etc.

These decisions will be subjective and dependent upon City staff participants. Therefore, the recording or the reasoning process and justification for each decision will be important for future groups when the RRA is updated.

Tetra Tech will prepare recommended risk and resilience management options for the City of Camas's consideration and submit the recommendations one week in advance of the workshop. Tetra Tech will develop the necessary spreadsheets and analytical tools for evaluating and selecting the recommendations.

Deliverable: Facilitated Workshop #3

Assumptions

- The workshop and field analysis will be conducted by MS Teams video conference

Task 8 Draft Final and Final RRA

Following completion of the workshops, Tetra Tech will prepare a Draft Final RRA compiling and summarizing the process, results, recommendations, decisions, and action items that will provide the City with Risk and Resilience Action Plan for review. Following review, Tetra Tech will conduct a meeting with the City project manager to review comments and revisions. Tetra Tech will prepare a Final RRA Action Plan for the City of Camas's records. Tetra Tech will also prepare the required RRA document and post it to the project secure Sharepoint site for downloading. Tetra Tech will provide the link to the online certification letter for the City's completion and submission.

Deliverables:

- Draft Final RRA
- Final RRA

Assumptions:

- The City of Camas will provide a single set of reviewed and resolved comments on the Draft Final RRA.
- Following project completion all project files will be deleted from Tetra Tech serves and the Sharepoint site deleted for security purposes.

Task 9 Emergency Response Plan (ERP) Initiation

Concurrent with the submission of the final RRA, Tetra Tech will initiate the process of developing the ERP. Tetra Tech will conduct a 2-hour on-site ERP project kickoff meeting with the City's project manager and key personnel. The Tetra Tech project manager will facilitate the meeting. Tetra Tech will provide printed meeting materials for up to 10 participants.

Tetra Tech will conduct the on-site ERP kickoff meeting with key stakeholders pre-selected and notified by the City, who will serve as members of a Working Group. The objectives of this meeting will be to initiate their involvement in the ERP development, finalize the project timeline, and discuss the communication plan. Meeting objectives will also include obtaining commitment and buy-in to the planning process, as well as setting expectations and confirming responsibilities of the Working Group members. In addition, Tetra Tech will identify and discuss the planning requirements for this project and review applicable local, state, and federal guidelines.

Deliverable: Facilitated ERP kick-off.

Task 10 Plan Review, Gap Analysis, and ERP Outline

Tetra Tech will conduct a comprehensive review of the existing emergency response documentation and guidance and determine their suitability for meeting requirements for AWIA compliance. A gap analysis will assist Tetra Tech in guiding a discussion with the City regarding the update's overall vision and end state.

After discussing the gap analysis and reviewing revisions needed to meet the AWIA compliance, Tetra Tech will develop an ERP outline that is consistent with both the City's vision and AWIA requirements.

Tetra Tech will submit a data request for ERP documents to the City's project manager and assess those provided. Tetra Tech will then develop a gap analysis summary that highlights current capabilities and areas for further development.

Task 11 Stakeholder Workshop

A collaborative plan revision process that combines iterative draft plan development with Working Group participation is the key to building ownership in the plan. Through a series of targeted interviews and meetings, Tetra Tech will gather the data needed to begin the planning process. Tetra Tech will facilitate the stakeholder engagement process and provide advice and guidance based on best practices, as appropriate.

During this task, Tetra Tech will conduct an on-site planning meeting and up to four stakeholder interviews with departments that have critical ERP responsibilities. The meeting and interviews are designed to gather the necessary information to revise the plan as well as discuss key planning assumptions and the outline and format of the updated ERP. Tetra Tech will provide printed meeting materials for each interview.

After the stakeholder outreach, Tetra Tech will develop recommendations detailing the findings and proposed comprehensive plan outline and scope of content. The recommendations will be used as a tool to guide updates for the ERP as required by AWIA.

Deliverable: Facilitated ERP workshop

Task 12 Preliminary, Draft Final, and Final ERP Development and Review

Tetra Tech will develop a preliminary draft ERP and submit it to the City one week prior to a document-review workshop with the City's ERP Working Group. The workshop objective is for stakeholders to provide review, input, and direction and for the Tetra Tech team to gather feedback and guidance on missing information. Tetra Tech will provide printed meeting materials for up to 10 participants. The workshop will be scheduled for two hours.

Following the workshop, Tetra Tech will prepare a draft final ERP for City review. The City will provide a final review of the ERP. Tetra Tech will conduct a conference call with the City project manager to review comments and revisions. Following the conference, call Tetra Tech will prepare a final ERP for the City's records. Tetra Tech will also prepare the required ERP compliance letter for the City's submission to the EPA.

Deliverables:

- Preliminary draft ERP via Sharepoint site
- Final ERP via Sharepoint site

Assumptions:

The City will provide a single set of reviewed and resolved comments.