NAPA SANITATION DISTRICT

WESTIN TECHNOLOGY SOLUTIONS - TASK ORDER No. 02
SCADA MASTER PLAN
(CIP 19718)

Date: _____

Issued under Professional Services Agreement dated _____.

To: Westin Technology Solutions

Project Description:

SCADA Master Plan - Professional Design Services.

Description of Scope of Services to be performed by Consultant under this Task Order:

See Exhibit 'A' – Detailed Project Scope

Description of Services to be Provided by District:	See Exhibit 'A' – Detailed Project Scope
Deliverables:	See Exhibit 'A' –Detailed Project Scope
Consultant Project Manager:	Dean Ford, PE
Consultant Quality Control Manager:	Danielle O'Dell
Schedule to Perform Services:	September 2018 through July 2019
Time & Materials Not-to-Exceed Cost Limit:	$172,239 See Exhibit 'B' – Project Cost

APPROVALS:

WESTIN TECHNOLOGY SOLUTIONS

By: _____ _____
Authorized Representative Date

NAPA SANITATION DISTRICT

By: _____ _____
Purchasing Agent Date

NSD Account No.: CIP 19718

EXHIBIT A: DETAILED PROJECT SCOPE

This Scope of Work for the development of a SCADA Master Plan for NapaSan is based upon the District's RFP, the Pre-Bid meeting discussions, and Westin's best practice SCADA Master Plan development process. Westin has developed a structured methodology for SCADA Master Planning, which we have refined over literally hundreds of assessment and planning engagements with water utilities. Our methodology has three distinct phases:

- **Assessment Phase**: SCADA current state and requirements analysis. To note: Westin will complete the Assessment Phase with assistance from NapaSan staff as required.
- **Planning Phase**: SCADA desired state and the SCADA upgrade program definition
- **Endorsement Phase**: Includes executive and board presentations and publishing the final approved master plan

The content and format of the Master Plan and other project documentation will be reviewed at the Project Kickoff meeting. Westin will incorporate any pre- existing work NapaSan's has already completed regarding documentation, System Assessments and Hardware Inventory. Onsite assessment data gathering will be conducted directly after the Kick-off meeting to minimize travel expenses.

The following is the proposed outline for the final SCADA Master Plan report:

- Executive Summary
- Master Plan Development Approach
- Current State Analysis Overview
- Desired State Analysis Overview
- Master Plan Program

The Master Plan development will be divided into the following project tasks for scope of work and project estimate:

- Phase 100 Project Management
- Phase 200 Cybersecurity Assessment
- Phase 300 SCADA Hardware Assessment
- Phase 400 SCADA Network Assessment
- Phase 500 SCADA Operations Assessment
- Phase 600 SCADA Controls Assessment
- Phase 700 Master Plan Program Project Identification
- Phase 800 Master Plan Document Development
- Phase 900 Master Plan Project Schedule & Estimate
- Phase 1000 Master Plan Presentations

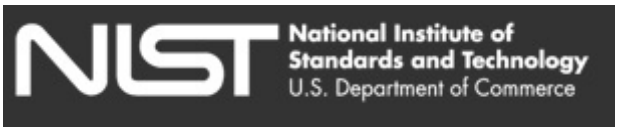
Phase 100: Project Management

This phase of the project covers overall project management including periodic status meetings/reports, primary interface between Westin and NapaSan, and management of deliverables. This phase also includes a Project Kick-off meeting designed to ensure that management and key stakeholders fully understand the scope of work, outcome and value of the SCADA Master Plan. Westin will introduce the assessment methodology and overall industry best practices and forward-looking philosophies. Emphasis will be put on an understanding by Westin of client's overall operating methods and long-term business goals.

Phase 200: Cyber Security Assessment

The objective of this assessment is to determine the current and desired states. It will identify potential gaps in the security infrastructure built around the SCADA System. This assessment will focus on how the current cybersecurity programs and activities compare against the NIST Framework Core to assess alignment with the five high-level functions: Identify, Protect, Detect, Respond, and Recover. It will also evaluate how the SCADA system remote access for operations is achieved and what means are deployed to mitigate any cybersecurity threat.

Cyber Security/NIST Framework: The National Institute of Standards and Framework's (NIST), Cybersecurity Framework (CSF) is recognized by many as a resource to help improve the security operations and governance for public and private organizations. This voluntary Framework consists of standards, guidelines, and best practices to manage cybersecurity-related risk.



The NIST CSF is a guideline for transforming the organizational security posture and risk management from a reactive to a proactive approach. In addition to helping manage and reduce risks, the Framework is designed to foster risk and cybersecurity management communications amongst both internal and external organizational stakeholders. However, it should be noted that this a generic tool and is only a way to support an organization through the process. Westin will bring a much more robust and specific action plan to NapaSan to ensure it understands and appropriately mitigates the risks.

The NIST CSF is organized into five core Functions also known as the Framework Core. These 5 Core Functions provide a strategic view of the lifecycle of an organization's cybersecurity risk management and should be treated as a key reference point.

- **Identify:** Investigate and plan the organizational understanding of cybersecurity to the facility, that shall manage risk to systems, assets, data, and capabilities. To comply with this, Westin will investigate the current system to gain insights into your digital and physical assets and their interconnections, defined roles and responsibilities, understand your current risks and exposure and put policies and procedures into place to manage those risks.
- **Protect:** Westin shall create and implement the appropriate safeguards to limit or contain the impact of a potential cybersecurity event. These safeguards shall control access to digital and physical assets, put processes into place to secure data, maintain baselines of network configuration and operations to repair system components in a timely manner, provide awareness education and training to personal, and deploy protective technology to ensure cyber resilience.
- **Detect:** Design and implement the appropriate measures to quickly identify and handle the occurrence of a security event. The continuous monitoring that detect anomalous activity and other threats to operational continuity is required to comply with this Function. Westin shall supply a system that shall have visibility into the networks to anticipate a cyber incident and have all information at hand to respond to one. Continuous monitoring is a very effective ways to analyze and prevent cyber incidents in ICS networks.
- **Respond:** Design and implement a procedure to follow when facing a detected security event. To comply, Westin shall craft a response plan, and designate a communication path among the appropriate parties. The plan shall include procedures on collecting and analyzing information about the event, perform all required activities to eradicate the incident and incorporate lessons learned into revised response strategies.
- **Recover:** Create and implement a procedure to restore any capabilities or services that were impaired due to a cybersecurity event. Westin shall create the procedure for a recovery plan. This procedure shall be able to coordinate restoration activities with external parties and incorporate lessons learned into the recovery strategy. In this procedure, defining a prioritized list of action points which can be used to undertake recovery activity is critical for a timely recovery.

Remote Access Security: By using Wonderware (now Aveva) InTouch Access Anywhere, users are enabled to remotely access a running InTouch application from a desktop computer or a mobile device through an HTML5 enabled browser. It allows a user to login from the field, or after hours from a remote location. This functionality is used in many industries worldwide, including manufacturing, energy, and water and wastewater management. However, it can be installed in multiple different configurations. Dependent on when it was installed, it may have been installed with the best practices of that time, which may not be adequate for today's cyber environment. Westin would evaluate the current configuration and use of this functionality and compare it against the current standards and best practices to determine the most secure environment against cyber attaches.

Phase 300: SCADA Hardware Assessment

The objective of this assessment is to determine the current and desired states. It will identify possible improvements in the SCADA HMI hardware infrastructure.

Server Hardware: Westin will complete a full evaluation of the hardware and software for the HMI servers, workstations, and the hardware architecture. Westin will create an assessment document of the current equipment with site visits and data provided by the NapaSan. During the process the following will be documented:

- Server/Workstation type and manufacturer
- Server/Workstation Model Number
- Server/Workstation Processor speed
- Server/Workstation Ram
- Server/Workstation Hard Disk Size and remaining space
- Server/Workstation Network adapters/speed
- Server/Workstation Power Requirements (For UPS Sizing)
- Server/Workstation Monitor Size/model number
- Server/Workstation Current Operating System
- Server/Workstation Anti-Virus Definition date
- Server/Workstation Software/Applications with version dates

Following the collection of this data, a review will be performed on all hardware and software to determine the Product Life Cycle status, to identify equipment that should be considered for replacement in a preventive maintenance program.

Disaster Recovery and Business Continuity (Server redundancy and Back-up capability): As water and wastewater systems are part of the critical infrastructure, maintaining operations through planned and unplanned disruptions is critical. This task will analyze how prepared the client is to respond to disruptions and where it can improve. This topic is covered in the existing SCADA Master Plan scope of work under sections 3.1.1 Executive Management, & 4.2.1 Executive Management Disaster Recovery Plan, but may require updates to include strategy changes over the last 8 years. Westin will collaborate with NapaSan to identify critical control points throughout the system. Each critical control point will be measured and ranked for resiliency, redundancy, and alternative control mechanisms.

Westin will conduct a preliminary failure mode analysis workshop with NapaSan and identify areas where automation may be able to adapt the process to accommodate a failure scenario. In areas that cannot be addressed by automation, Westin will recommend work around plans for likely scenarios, especially where weak points have been identified in the system.

Westin will also conduct an operations planning workshop to identify minimum levels of service requirements. Major system components will be evaluated and prioritized such that minimum service levels can be maintained. The workshop will also cover the following:

- Analyze the business impact of system failure and determine recovery time frames and system availability objectives.
- Document Recovery Team objectives and responsibilities.
- Develop and document recovery strategies.
- Develop and document prevention and mitigation strategies.

Westin will also request copies of any existing disaster recovery plans, emergency operation plans, or business continuity plans. Westin is acutely aware of the sensitivity of these documents and will store the documents on our secure servers with access restricted to only those conducting the security analysis. Westin will perform a preliminary review the system in the following areas:

- Analyze SCADA system redundancy
- Review software application program back-up practices:
- Review current back-up policies and procedures
- Review change management procedures
- Review of software systems and storage / retrieval location

This analysis will identify possible gaps in the existing Disaster Recovery procedures and documentation.

Uninterruptible Power Supply (UPS): Westin will complete a full evaluation of the UPS hardware for the SCADA system infrastructure. Westin will create an assessment document of the current equipment with site visits and data provided by the NapaSan. During the process the following will be documented:

- UPS type and manufacturer
- UPS Model Number
- UPS Source Power – Location, voltage, and amperage
- UPS Battery type, condition, and age
- Analyze backup power strategies:
- Assess UPS installations, capacity, analysis of protected equipment
- Assess UPS sizing & technology
- Assess UPS length of time to keep systems active
- Assess which equipment needs to be active
- Assess system Testing Procedures

Following the collection of this and other assessment data, the condition and loading of the UPS system will be evaluated to determine the Product Life Cycle status and recommendations to improve the reliability (up-time) of the SCADA system, if required.

Phase 400: SCADA Network Assessment

The existing Master Plan references network architecture and configuration. It is assumed the Plant has an Ethernet SCADA network between buildings and process areas. This network uses fiber optic cable in a ring topography. The SCADA Ethernet network is separate from the business network. It is also assumed the two SCADA Master servers have dual Network Interface Cards (NIC)—one for the business network and one for the SCADA network. The business network has set "trust" levels for certain computers that allow access to SCADA and data servers. The IP addresses are a private addressing scheme and are not published. The Ethernet network is segmented into three domains, SCADA, Business, and the County's network. Remote access is achieved through a Virtual Private Network (VPN) access point that allows access to the business network and the SCADA Web Server. The Web Server allows the Operators to launch a session and perform all SCADA-related functions remotely.

The objective of this assessment is to identify possible improvements in the SCADA Network infrastructure. Identify equipment, policies and procedures that can aid in making the system more resilient, easier to maintain, and to troubleshoot when problems occur.

Network Monitoring: Westin will complete an evaluation to determine what data is available to the SCADA system or a Network Management software to monitor the status of the network and aid in the identification of network issues.

Fiber Ring Performance: Westin will complete a full evaluation of the plant's fiber ring. Westin will create an assessment document of the current equipment with site visits and data provided by the District. During the process the following will be documented:

- Network configuration, resiliency, and segmentation
- System throughput on the network

Network Switches: Westin will complete a full evaluation of the SCADA network hardware. Westin will create an assessment document of the current equipment with site visits and data provided by the District. During the process the following will be documented:

- Network Switch type and manufacturer
- Network Switch Model Number
- Network Switch Number of ports – used and spare, (Copper and Fiber)
- Network Switch Speed of switch
- Network Switch Power Requirements (For UPS Sizing)
- Number of SCADA Networks

Phase 500: SCADA Operations Assessment

The objective of this assessment is to identify potential gaps in the security structure built around the SCADA System.

Control Room Assessment/Philosophy/Location/Layout: ISO 11064 – The International Standard for Ergonomic Design of Control Centers will be used as guidance for a control room assessment to determine the current state and provide recommendations for a new control room design.

- Review and verify all existing current control room layout drawings, including audit of AV and IT components. Survey and collect feedback from control room primary (Operations) and secondary users (Supervisors, Engineers/IT & Managers) to identify strengths and weaknesses of existing control room philosophy/location/layout. Identify safety or security concerns, operational and control recommendations, and ergonomic recommendations. Determine if any design/layout or location constraints exist.
- Evaluate current and future operational requirements. Perform task and functional link analysis based upon survey results and feedback provided. Review findings with client and propose functional layouts. Prepare Operational Specification based upon client-determined functional layout.
- Use current best practices and User feedback to create conceptual design alternative control room layouts.
- Develop a high-level control room design specification based upon the client-determined control room layout, incorporating ergonomic design requirements and architectural design specification which will provide the project definition for a newly designed and installed control room.

HMI Software/Software Updates (Wonderware): Working with the documented data from Phase 300, determine the current state of the HMI software version installed. Determine the gap between the installed version and the currently released version. Develop a plan to upgrade the HMI software to the most reasonable version and a maintenance plan to keep it up to date.

Remote SCADA (SCADA Network and Mobile Devices): Westin will do an assessment of the existing hardware and software used to gain remote access to the SCADA system by Operations or Engineering, when the control room is not manned. Document the Product Life Cycle status of this hardware and software. Evaluate the existing hardware, software, and process used for remote access against current best practices and standards to determine recommendations to meet operation requirements and /or mitigate cybersecurity risks.

Operator Interface Terminal (OIT): Westin shall complete a full evaluation of the existing OITs in use. Identify lifecycle status and remaining service life of the existing OIT hardware. Westin will perform site surveys at the plant, operations and control centers, and several representative remote sites to gain a better understanding of the current conditions, use and installation of the OITs, and the unique challenges faced by Operations.

- Compiled field notes and digital photos from each location will be collated and loaded to the project website. Gathered information will include, from each site: general operation philosophy; unique operational and maintenance challenges; the type and condition of installed OIT infrastructure and quality of documentation.
- Westin will make an assessment document of the current and spare equipment based on site visits and data provided by NapaSan.

Phase 600: SCADA Controls Assessment

The objective of this assessment is to identify potential gaps in the functionality and useful life of radio and PLC components in the SCADA System.

Radio System: Westin shall complete a full evaluation of the hardware and software for the radio communications system. Westin will make an assessment document of the current equipment with site visits and data provided by The District. This review shall include the following:

- Radio type and manufacturer
- Radio Model number
- Year installed (if available)
- Radio Life cycle status and remaining service life
- Radio Operating deficiencies
- Review Path Studies (this scope does NOT include performing a new Radio Path Study)
- Analyze and field verify extrapolated radio survey data
- Evaluate alternative technologies to achieve the same functionality, with increased reliability and supportability

PLC Hardware: Westin will complete a full evaluation of the hardware and software for the PLC hardware. Westin will make an assessment document of the current equipment with site visits and data provided by NapaSan. This will NOT include point to point wiring. It is understood that Siemens is NapaSan's PLC preference. This review shall include the following:

- PLC type and manufacturer
- PLC Model number
- PLC Power Supply Hardware version, Firmware, and Date of Manufacture (if possible), Power Requirements (For UPS Sizing)
- PLC Processor Hardware version, Firmware, and Date of Manufacture (if possible)
- PLC Digital and Analog I/O card type Hardware version, Firmware, and Date of Manufacture (if possible) for each module.
- PLC Rack Hardware version, Firmware (if any), and Date of Manufacture (if possible)
- PLC Digital and Analog I/O card spare point count for each module.
- Programming software and current version used
- PLC Year installed (if available)
- PLC Life cycle status and remaining service life
- PLC Operating deficiencies
- PLC Network interface types, recording all available and uses interfaces.
- PLC Cabinet external 24 VDC power supply manufacture, condition, and life cycle status with remaining service life.
- PLC Cabinet material, and condition.
- External Power Supply Model Number, Type and Voltage of supply, if available, date installed, Power Requirements

Westin shall initiate and lead workshops with NapaSan Engineering and Operations staff to discuss current and future PLC operational and maintenance issues. All issues and requests (wish list) items shall be documented and addressed as future PLC upgrades.

Phase 700: Master Plan Project Identification

The objective of this phase is to identify potential projects that will address the identified gaps in the SCADA System. This listing of projects will be reviewed with NapaSan, to determine priority and feasibility of funding before continuing with the Master Plan program development.

Phase 800: Master Plan Document Development

The objective of this phase is to consolidate and summarize the data, analysis, and recommendations from the previous phases to develop the Master Plan document. A preliminary version will be drafted for review with NapaSan. This version will NOT contain a schedule or estimate.

A Draft Master Plan version will be developed from the Preliminary version and the addition of the finalized Master Plan Program project list, with schedule and estimates. This version will be submitted prior to the Executive Team presentation and used as the basis for that presentation.

After the Executive Team presentation, the Master Plan will be edited to include any comments or direction from the Executive team to create the Final Master Plan version to be submitted to the Board.

Phase 900: Master Plan Project Schedule and Estimate

After the Preliminary Master Plan version is reviewed and NapaSan and Westin concur its content and format, then the Master Plan Program schedule and estimate will be developed. This is done at this point to avoid estimating projects that may or may not be included in the Final Master Plan version.

The Final Master Plan Program Report will describe annual cash flow and resource requirements, recommended implementation and maintenance plans, individual project scope statements (description, need, scope, budget, duration, and dependencies), and strategies and phasing for achieving NapaSan's Operations and SCADA goals. Westin will work with the NapaSan to meet the expected program schedule as set forth in the Vision and Desired State process.

Phase 1000: Master Plan Presentations

It is intended to conduct two (2) Master Plan presentations. The first is the presentation of the Draft Master Plan to the Executive Team. The second presentation will be of the Final Master Plan to the Board.

Deliverables

The culmination of the data collection and analysis will result in multiple Assessment Reports and versions of the Master Plan. The following is a listing of these documents:

- Project Kick-Off Meeting
- SCADA Current State Report
- SCADA System Desired State Report
- Workshop – Proposed Project List Review
- Preliminary Master Plan – minus schedule and estimate
- Workshop - Master Plan Review (qty 2)
- Draft Master Plan – including schedule and estimate

- Executive team Master Plan presentation
- Board Master Plan presentation
- Final Master Plan

Project Challenges

We provide a unique perspective on the planning process as we also implement the designs and systems we develop. Understanding all facets of the program lifecycle makes our plans highly realistic and implementable. A few potential challenges based on experience:

1. **Time is the largest risk to the success of these projects**.

NapaSan's primary mission is to collect, treat, beneficially reuse, and dispose of wastewater in an effective and economical manner that respects the environment, maintains the public's health and meets or exceeds all local, state and Federal regulations. The planning process cannot negatively impact this mission.

We will look to always optimize the time requirements of NapaSan resources. Westin's proven approach brings solutions to the table versus endless discussions and alternatives analysis. Through the 100's of Master Plans that have been developed by Westin, we have shared with clients that the fundamental answers many times end at the same conclusion. The technology vendors are heading in the direction of the market and working against those trends is often counter-productive and costly. As such, we can expedite the bulk of this process and move to a validation of the solution versus the development of fundamental decisions.

The time that elapses from planning to implementation allows designs to become stale while technology continues to advance. Our assessments identify quick hits our clients can begin to implement immediately. Technology advances are moving faster than ever. It is important to get from plan to commissioning as quickly as possible.

2. **Lack of detailed SCADA Documentation, Policies and Standards can be a challenge ahead of an Automation upgrade.**

Automation is a tool that should be used to drive out costs from the operation, increase reliability and improve decision making. Westin brings a unique perspective to the water and wastewater industries from its peers in industrial applications. Westin looks at more than just the technology. We look at the proven application of the technology and how the business can improve with the appropriate application of automation. Reviewing the organization and its policies, standards, procedures, and staffing related to the implementation, maintenance and usage of automation is as important as the effective application of the systems being deployed.

- Westin identifies opportunities to use Automation to deliver a clear return on the investment.
- Westin analyzes the organizational structure and recommends changes to keep the total cost of automation minimized.
- Our team has deep knowledge and experience with many vendor platforms which will deliver a "best-fit" solution to NapaSan.

EXHIBIT B: PROJECT COST
Westin Technology Solutions
SCADA Master Plan

Phase #	Phase Name	Hours Subtotal by Phase	ODCs Subtotal	Subs Subtotal w/MU	Phase Subtotal	Phase Cont-ingency	Phase Total
100	Project Management	110	$ 12,650.00	$ -	$ 28,430.00	$ -	$ 28,430.00
200	Cybersecurity Assessment (1 & 2)	48	$ -	$ -	$ 9,360.00	$ -	$ 9,360.00
300	SCADA Hardware Assessment (3, 4, & 5)	52	$ -	$ -	$ 10,140.00	$ -	$ 10,140.00
400	SCADA Network Assessment (6, 7, & 8)	32	$ -	$ -	$ 6,240.00	$ -	$ 6,240.00
500	SCADA Operations Assessment (9, 12, 13, & 14)	108	$ 1,166.00	$ -	$ 22,226.00	$ -	$ 22,226.00
600	SCADA Controls Assessment (10 & 11)	76	$ -	$ -	$ 14,820.00	$ -	$ 14,820.00
700	Master Plan Project Identification	56	$ 1,507.00	$ -	$ 12,427.00	$ -	$ 12,427.00
800	Master Plan Document Development	145	$ 6,710.00	$ -	$ 34,685.00	$ -	$ 34,685.00
900	Master Plan Project Schedule & Estimate	44	$ -	$ -	$ 6,965.00	$ -	$ 6,965.00
1000	Master Plan Presentations	100	$ 9,746.00	$ -	$ 26,946.00	$ -	$ 26,946.00
	Totals	**771**	**$ 31,779.00**	**$ -**	**$ 172,239.00**	**$ -**	**$ 172,239.00**