TO: BOARD OF DIRECTORS

FROM: BRUCE BUEL BBB

DATE: FEBRUARY 4, 2009

AGENDA ITEM
E-3
FEBRUARY 11, 2009

PREVIEW FUTURE SCADA SYSTEM CAPABILITIES

ITEM

Preview and discuss future Supervisory Control and Data Acquisition (SCADA) System capabilities [PROVIDE POLICY GUIDANCE].

BACKGROUND

The District utilizes an IPAAC (trade name) SCADA system to remotely monitor the operation of the District's water supply wells, sanitary sewer lift stations and wastewater treatment plants. The system utilizes a web based human machine interface (HMI) that lists Inputs/Outputs in a table format only, not graphical, provides limited control capability, and has limited ability for historical data storage and retrieval. Changes to the system typically require custom programming that must be outsourced.

District staff developed a written description that outlines the SCADA system functionality that staff would like to have in an upgraded SCADA system including HMI graphics capability, control capability, increased historical data logging, improved alarm notification, improved report capability, and standardized parameters to monitor at each District facility. Furthermore, staff's goal is to reuse all existing field installed hardware and upgrade the hardware as necessary to provide the desired functionality.

The District contracted with Cannon to prepare a Process Overview system design, based on the SCADA system functionality description prepared by staff, that determined the improvements necessary to modify existing field installed hardware, preliminary HMI screen design, historical data server configuration, and software and hardware required for the operations office. The draft report is attached.

Cannon recommends that the District's SCADA system architecture should be based on integrating Rockwell FactoryTalk™ SCADA software, or equal, and related hardware with the District's existing field installed hardware. While some minor modifications of the existing field installed hardware will be necessary, the majority of the cost will be in the software, hardware, and configuration of the system for the operations office. The estimated total cost of the upgrade as recommended is $183,000.

FISCAL IMPACT

If the District Board supports upgrading the existing SCADA system, staff will request funding for the project through the FY 09-10 Budget process.

RECOMMENDATION

Staff requests your Honorable Board review the draft SCADA System Upgrade Report and provide staff with comments.

ATTACHMENTS

- Draft SCADA System Upgrade Report prepared by Cannon dated January 2009

NCSD SCADA System Upgrade

Nipomo Community Services District
148 S. Wilson St.
Nipomo, CA 93444

080840

January 2009

Prepared By:

CANNON

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1.0 Introduction

The Nipomo Community Services District (NCSD) proposes to upgrade its existing SCADA system for its water and wastewater networks from the IPAAC system to a Rockwell RS View, or equivalent, system architecture. NCSD expressed what they would like to accomplish in the upgrade in "Desired NCSD SCADA Functionality" (see Exhibit 1).

1.1 Purpose and Scope

Upgrading the SCADA system will provide NCSD with detailed HMI graphics capability, write (control) capability, increased historical data logging ability, and improved alarm notification capability on a software platform that is supported by a vendor with a strong legacy in the SCADA software business.

1.2 Project Location and Description

The SCADA system base station will be hosted in the NCSD Southland office and communicate with 21 or more sites (or Remote Terminal Unit, RTU) with an existing MDS radio network communicating with Ethernet protocol.

1.3 Existing Conditions

The existing SCADA system is built on the IPAAC (trade name) system architecture. The IPAAC SCADA system was developed for smaller users using cell phone communication. Due to the cost of communication, the IPAAC system was designed to minimize communication airtime. This was accomplished by poling status data on an hour time interval (adjustable) and on change of status. The historical data stored in OPC servers was not extensive due to the long poling interval, so the actual OPC servers used are not sufficient for an increase in historical data storage anticipated with the system upgrade. The HMI capability with the IPAAC system is limited to a web page that lists Inputs/Outputs in table format only. Graphical interface is not possible with the IPAAC system.

1.4 Strategy

The SCADA system upgrade will be done in phases in order to keep existing SCADA capabilities in place until the SCADA upgrade is tested and ready for implementation. The first phase is the Process Overview system design, which consists of this report. The Process Overview system design will include the software and hardware required for the upgrade, HMI screen types and number of screens, and the total number of tags required.

The second phase will consist of installing the new SCADA hardware and software and setting up communication paths to the existing radio network and data network(s).

The third phase will be to convert one site from the IPAAC system to the new SCADA system to determine if there are any limitations to the conversion.

The fourth phase will be to set up a conversion plan and systematically convert the remaining sites from the IPAAC system to the upgraded SCADA system.

The final phase of the system upgrade includes completion of the instruction and operations manual, providing onsite training to NCSD personnel, and to provide extended technical support on a 24/7 basis as needed.

1.5 Method of Analysis

The upgrade of the SCADA system is based on the NCSD requirements outlined in "Desired NCSD SCADA Functionality" (see Exhibit 1) and on discussions with NCSD personnel. The software licensing is generally based on the number of displays (screens) and number of tags required. Analysis of the number of screens and tags for present and future use is essential in designing the software upgrade architecture.

1.6 Background and Assumptions

It is assumed that the initial tag list of the SCADA system upgrade will match the existing IPAAC system, and the additional tags outlined in Appendix B. Future expansion requirements will be considered when selecting the license level for the upgrade.

1.7 Constraints

The SCADA system upgrade does not include radio communication issues from existing or proposed sites to an access point. Any radio communication issues presently existing will still be an issue with the SCADA system upgrade.

Remote access of a "client" to the SCADA system workstation will be with VPN protocol. Any NCSD intranet security architecture that prevents VPN communication is not addressed as part of the SCADA system upgrade.

2.0 Preliminary HMI Screen Design

The term "Screen" is a configurable display, or window on a computer terminal, with a unique identifier. The preliminary design of the SCADA HMI screens involves identifying what type of graphics are desired, what the order of screen selection is, and the total number of screens required. The proposed SCADA Screens Logic Diagram is shown in Exhibit 2. Based on the number of sites listed in "Desired NCSD SCADA Functionality", 69 screens would be developed using the logic in Exhibit 2.

One aspect of SCADA system software pricing is how many screens that can be created. The more screens the software will allow, the more expensive the software. Creating screens with extensive data in order to reduce the total number of screens may make the actual use of the screens by the operators difficult and cumbersome. Therefore, care should be used in determining the anticipated number of screens required, plus additional screens for future system expansion, so the SCADA software screen capability is not undersized.

The screen format should be intuitive. Typical screens from previous Cannon projects are shown in Appendix A for informational purposes. Scrolling through screens should follow a logical process, where "Links" from Process Overview screens go to more detailed screens, and the visa versa. The "Link" button is a special virtual button on the screen that, when pressed by the mouse cursor, a new screen appears.

2.1 Process Overview Screen

The purpose of a Process Overview screen is to show a quick overview of the status of the processes without getting into too much detail. The operator should be able to get a quick overview by glancing at a Process Overview screen and then click on a link button or other virtual graphic symbol to open up a screen showing an individual site or process in greater detail. In general, the Process Overview screen is usually the screen left up on the computer monitor with the screens for individual areas open on an as-needed basis.

2.2 Alarm Screen

The Alarm screen shows detailed information on any tag in the alarm state and can keep a history of recent alarms even if after they are cleared. The operator is able to acknowledge the alarm on the Alarm screen, which will stop the alarm from flashing and stop the notification process by the alarm annunciation software. If, after a predetermined time, the alarm tag does not reset, the Alarm screen or Alarm button will start to flash again and the alarm annunciation software will again start the progressive notification process

On every other screen, there is a virtual "Alarm" button. When any alarm tag is in the "Alarm" state, the virtual alarm button flashes until the alarm is acknowledged. Upon pressing the virtual "Alarm" button, the Alarm screen immediately pops up. The Alarm button on each screen will stay illuminated (Red), but not flashing, until the alarm tag resets to a normal state. . When no tags are in the alarm state, the "Alarm" button on all screens is a solid Blue (or Link color).

2.3 Map Screen

A Map screen can be created that is similar in function as the Process Overview screen, but shows the status of the process in a map format. By looking at the Map Screen, status (such as pressure or flow rate) can be easily related to a location. Generally, less detail is shown in the Map screen than the Process Overview screen in order to keep the screen legible.

2.4 Detailed Site Screen

The Detailed Site screen shows the most detail for an individual site. The operator, by clicking on the link to the Detailed Site screen, can quickly assess the status of the tags at an individual site in a graphical format (see Detailed Site screen examples for a Lift Station and a Well site in the appendix).

2.5 Trending Screen

A Trending screen is associated to each Detailed Site screen. From the Trending screen, a graphical representation of the processes tagged to the Detailed Site screen can be created. Historical data is stored in the SCADA software for limited graph creation that is usually sufficient for operators to troubleshoot processes. For more extensive graphing of trends, the "Historian" data server is required.

3.0 Software and Hardware Configuration

The SCADA software shall be from a well-established vendor with a track record in providing SCADA software and after sales support for municipal water and wastewater SCADA systems. The software shall be "Off the Shelf" and not custom configured from the vendor and be sufficiently familiar to independent SCADA integrators so that NCSD can reasonably expect cost effective initial integration and support after commissioning. There are several SCADA software vendors that would meet this requirement, including Rockwell FactoryTalk View ™, Wonderware ™, and Lookout ™. The design presented in this report is based on Rockwell's FactoryTalk View ™, hereon called FactoryTalk.

There are several common components to any SCADA software package:

1. The HMI Server
2. The Data Server
3. The HMI Client
4. Alarm Annunciation
5. The "Historian" Server (see Section 4)

The details of these components are discussed below.

To host the SCADA software, certain minimum hardware is required. The HMI, Data, and Alarm Annunciation software can be hosted in a single machine. The "Historian" server must be hosted in a separate machine.

3.1 HMI Server

The HMI server contains all the graphics and logic to enable the operator to have a clear understanding of the state of the process being monitored. The "Screen" is an important part of the design of a well functioning HMI server, and is defined as the display the operator sees on his computer monitor. FactoryTalk is licensed by the number of displays (screens) allowed (25, 100, 250, unlimited). Based on the Preliminary HMI Screen Design, at a minimum the 100 display license should be purchased.

The minimum required HMI server is the FactoryTalk View Site Edition Server 100 Display, Catalog Number 9701-VWSS100LENE, or equal.

3.2 Data Server

The FactoryTalk package comes with a Data server capable of communicating with up to 20 Rockwell product PLC's. However, the IPAAC system presently in use at NCSD uses a DirectLogic 06 from Automation Direct as the main PLC. In order for FactoryTalk to communicate with the DirectLogic 06, a KepWare ™ server is required. One benefit of the KepWare ™ server is the ability to host 250 or more PLC's, which benefits NCSD since it presently has 22 PLC's at different sites and plans to add more. Therefore, the added cost of the KepWare ™ server is offset by not having to purchase another Rockwell Data server license.

The required server from Kepware is the AutomationDirect ECOM OPC Server, product # OPC-ATDRT-NA00, or equal.

3.3 HMI Client

The HMI Client is licensed software that allows the operator to view and interact with the display screens. FactoryTalk has two levels of clients:

a) FactoryTalk View Site Edition Client is the full version of Client that allows the operator to see the display screens and to change set points in the HMI server (Catalog Number 9701-VWSCWAENE).

b) FactoryTalk View Site Edition View Client allows the operator to view the display screens only and not make changes to set points (Catalog Number 9701-VWSCrAENE).

For a Client to remotely connect to the HMI server through a public network, a "virtual private network" (VPN) will be required.

3.4 Alarm Annunciation

An important function of a SCADA system is to notify operations and supervisory personnel when an alarm condition exists. FactoryTalk has a tag file system that includes alarm tags. The alarm tags are tied to the alarm display screen in the HMI server so that the operator can view the details of the alarm and acknowledge the alarm. When it is not possible for the operator to monitor the HMI display screen, an alarm notification and acknowledgement method that uses telephone, email, and/or a pager is needed. The alarm notification method must be able to continue notification up the chain of command at predetermined time increments until the alarm is acknowledged.

Rockwell FactoryTalk recommends a separate vendor, Specter Win-911 software as its preferred alarm notification software. The Win-911 package can communicate seamlessly with FactoryTalk alarm tags when the WIN-911FactoryTalk A&E Client add-on is included. The hardware bundled system from Specter that includes Telephony (voice message over the telephone) is Product Number WIN-911/TEP-BT. The add-on to communicate with Rockwell's FactoryTalk from Specter is Product Number WIN-911/FT.

4.0 Historical Data Server

Limited data can be stored on the SCADA data server or on PLCs at remote sites. This data can be useful for operators diagnosing problems that occurred recently. An SQL database on a hard drive storage media is needed for long term, or "Historical", data storage. Furthermore, it should be easy to create reports using the historical data as outlined on pages 6 to 8 in "Desired NCSD SCADA Functionality" in Exhibit 1. To meet these requirements, Rockwell FactoryTalk Transaction Manager software is needed for acquiring data from the SCADA system and storing the data in an SQL data base. At present, an SQL data server is required to be hosted in a separate machine from the one that hosts the FactoryTalk View software.

4.1 Historical Data Server Software

FactoryTalk Transaction Manager is licensed based on the number of tags it reads on FactoryTalk View. The lower tag limits are 150, 300, and 1,500. At a minimum, a 300 tag limit would be needed (approx. 10 tags per site). It may be desirable to start with the 1,500 tag limit to meet future system expansion, including additional tags created at existing sites and new sites added to the SCADA system.

FactoryTalk Transaction Manager comes in a Professional version, which includes a license for Microsoft SQL Server 2005, and a Standard version which does not include Microsoft SQL Server 2005. For customers who already own Microsoft SQL Server 2005 or a similar version, the Standard version would apply. Otherwise, either the Professional version would be needed or the customer would have to purchase an SQL server separately.

FactoryTalk Transaction Manager Professional Version with 1,500 Tag Limit, Catalog No. 9356-PRO2300, includes Microsoft SQL Server 2005 Standard Edition. FactoryTalk Transaction Manager Standard Version with 1,500 Tag Limit, Catalog No. 9356-STD2300, does not include Microsoft SQL Server 2005.

For report preparation, Crystal Reports 2008 [tm] software can develop templates to create the desired reports.

Another option that may have application for NCSD is the FactoryTalk Historian software package, hereon called Historian, that provides the functionality of FactoryTalk Transaction Manager and SQL Server combination as well as Crystal Reports reporting software. The FactoryTalk Historian Site Edition-500 live data tags version, Catalog 00 No. 9518-HSERA500 and includes its own proprietary SQL equivalent server. Historian has its own report preparation software that would need to be explored as to whether the report formats meet the needs of NCSD.

4.2 Historical Data Server Hardware

A separate machine is required to host the SQL server and store the historical data. An HP ProLiant DL385 G5, or equivalent, with useable 543 GB of RAD5 storage was selected in order to provide sufficient data storage capacity at a reasonable cost.

5.0 IPAAC Field Equipment Modification Requirements

The present IPAAC system uses two PLCs in the Communication Panel (Comm Panel or Remote Terminal Unit, RTU); a DirectLogic 06 (DO-06DR-D) and a DirectLogic 05 (DO-05DR-D). The DirecLogic 06 has Inputs/Outputs (I/O) directly related to the site equipment whereas the DirectLogic 05 is used for IPAAC functions only. The DirectLogic 05 will not be needed with the new SCADA upgrade.

A SitePAAC Communications Interface, CIU-600, is presently used as the link between the DirectLogic PLCs and the MDS i900 radio. With the new SCADA upgrade, the CIU-600 will be replaced with a new Ethernet card, Automation Direct Item Code HO-ECOM100.

Field configuration of the Comm Panels will involve removing the DirectLogic 05 and SitePAAC Communications Interface, installing the HO-ECOM100 Ethernet card, and create and install Cat 5 cable from the Ethernet card to the MDS i900 radio. A radio test will be done after each configuration to assure all tags required are communicating with the access point.

6.0 Conclusions and Estimate of Probable Costs

NCSD presently monitors the performance of the water and wastewater systems using an IPAAC SCADA software that does not have the capability to develop graphic screens, control the system remotely, or store sufficient historical data. NCSD desires to upgrade their SCADA software to meet their increasingly demanding SCADA needs while still using as much of the existing system as possible.

An analysis of the existing system shows the Comm Panels (RTU's) at the 22 present sites are compatible with a SCADA system upgrade with minor modifications. The major investment would be for the software and hardware required for the SCADA upgrade and for designing and configuring the screens (displays) for each site.

To maintain operations, the SCADA upgrade should be done systematically. The existing IPAAC system shall remain in place until all software and hardware is in place and tested. Then each remote site shall be reconfigured to communicate with the upgraded software one site at a time so that minimal supervisory control and data acquisition system downtime occurs.

The estimated probable costs, based on the configuration outlined in this report, is:

Software Upgrade	$30,000.00
Hardware Required for Upgrade	$16,000.00
Integration and Programming	$101,000.00
Administration and Contingency	$36,000.00
Total Cost	$183,000.00

7.0 Exhibits

The following exhibits are included:

- Exhibit 1: Desired NCSD SCADA Functionality, dated 8/26/2008
- Exhibit 2: SCADA Screens Logic Diagram
- Exhibit 3: SCADA Hardware Requirements
- Exhibit 4: SCADA Software List
- Exhibit 5: Details of Estimated Probable Cost

Exhibit 1: Desired NCSD SCADA Functionality, dated 8/26/2008

Desired NCSD SCADA Functionality

The District desires to upgrade the software for the IPAAC SCADA System. The goal, if possible, would be to reuse all existing field installed hardware and the existing servers, and upgrade the hardware as necessary to provide the desired functionality.

The basic features to be included within the SCADA system include operator screens which provide an overall graphical view of the entire water system and sewer system, as well as informational screens which provide real-time data on well flow rates, reservoir levels, water system pressures, lift station levels, and WWTF flow rates. Additional screens will be provided to implement pump on/off controls, level controls, and reporting functions as required.

The SCADA system oversees the following water and sewer system components:

1. 9 water wells and 1 transfer pump
2. 6 water reservoirs
3. 14 lift stations
4. 2 wastewater treatment facilities

Training: Onsite training will be provided after system startup. A complete instruction and operations manual will be provided upon project completion.

Extended Support Service: 24/7 technical support and on-going software upgrades.

For the nine (9) producing wells and one (1) transfer pump, the following features are to be provided within the SCADA interface:

CONTROLS:

- Status of HAND/OFF/AUTO selector switch (manual selection made at pump motor starter panel)
- Pump START/STOP SET-POINT CONTROL.
- Controlling reservoir selector for level control/pump start/stop operation.
- Pump on/off control to maintain reservoir level (level control, primary form of control).
- Time-of-use override to selectively shut pumps off for energy management during peak period hours.
- Time-of-use override periods are to be operator configurable for both day-of-week and time-of-day.

REPORTING:

- For each pump, instantaneous flow rate and rate totaling daily, weekly, and monthly. Default time interval for reporting will be established as midnight to midnight.
- Pump run time, accumulated daily, weekly, and monthly. Default time interval for reporting will be established as midnight to midnight.
- Well water surface level.

ALARMING:

- An alarm will be generated for each pump upon power failure.
- An alarm will be generated for each pump upon communications failure.
- An alarm will be generated for each pump upon failure to start.

For the Six (6) Reservoirs, the following features are to be provided within the SCADA interface:

CONTROLS:

- Level set-point control from the SCADA interface. Provided for each individually, in the form of pump on/off control to maintain reservoir level.

REPORTING:

- For each reservoir, instantaneous level indication will be provided as well as historical trending of the level.
- Level information will be accumulated daily, weekly, and monthly. Default time interval for reporting will be established as midnight to midnight.
- Change in water in storage accumulated daily, weekly, and monthly. Default time interval for reporting will be established as midnight to midnight.

ALARMING:

- An alarm will be generated for each reservoir upon communications failure.
- An alarm will be generated for each reservoir low liquid level.
- An alarm will be generated for each reservoir upon high liquid level.
- An alarm will be generated for each reservoir upon rapid level change.

For the fourteen (14) Lift Stations, the following features are to be provided within the SCADA interface:

CONTROLS:

- Status of HAND/OFF/AUTO selector switch (manual selection made at pump motor starter panel)
- Pump START/STOP set-point control from the SCADA interface.
- Pump on/off control to maintain reservoir level (level control, primary form of control).
- Time-of-use override to selectively shut pumps off for energy management during peak period hours.
- Time-of-use override periods are to be operator configurable for both day-of-week and time-of-day.

REPORTING:

- For each lift station, instantaneous level indication will be provided as well as historical trending of the level.
- Pump run time, accumulated daily, weekly, and monthly. Default time interval for reporting will be established as midnight to midnight.

ALARMING:

- An alarm will be generated for each pump upon power failure.
- An alarm will be generated for each pump upon communications failure.
- An alarm will be generated for each pump upon failure to start.
- An alarm will be generated for each pump upon seal failure (water in motor).
- An alarm will be generated for each lift station upon low liquid level. Alarm level is determined by the installed location of the level switch and pressure transducer level.
- An alarm will be generated for each lift station upon high liquid level. Alarm level is determined by the installed location of the level switch and pressure transducer level.

For the two (2) wastewater treatment facilities, the following features are to be provided within the SCADA interface:

CONTROLS:

- Status on/off of the grinders & aerators.

REPORTS:

- Each flow meter, instantaneous flow rate & flow total for each day, month, & year.
- Grinders & aerators run time, daily, weekly, monthly & yearly.

ALARMS:

- An alarm will be generated for each grinder and aerator upon power failure.
- An alarm will be generated for each grinder and aerator upon communications failure.
- An alarm will be generated for each grinder and aerator upon failure to run.

With respect to the summary reporting component of the system, on-screen and printed reports are to be provided on the following:

DAILY:

- Daily well runtime information - Well pump operating hours/day, total for the day for each pump.
- Hourly runtime information - Well pump operating time/hour, for each hour of the day for each pump.
- Daily well water pumped – Water pumped in gallons per day, total for the day for each pump.
- Hourly water pumped – Water pumped in gallons per hour, total for each hour of the day for each pump.
- Reservoir level trend plots - Level vs. time for a 24 hour period.
- Reservoir change in storage volume – Hourly and daily.
- Total daily water system demand – Total water demand/day in gallons and acre-feet based on daily water pumped plus daily change in storage volume.
- Total hourly water system demand – Total water demand /hour in gallons and acre-feet, for each hour of the day, based on total hourly water pumped plus hourly change in storage volume.
- Lift Station level trend plot - Level vs. time for a 24 hour period.
- System pressure trend plot - Pressure vs. vs. time for a 24 hour period.
- Daily runtime information - Lift station pump operating hours/day, total for the day for each pump.
- Hourly runtime information - Lift station pump operating time/hour, for each hour of the day for each pump.
- Alarm summary - Report of all alarm events.

WEEKLY:

- Weekly runtime information - Well pump operating hours/week, total for the week for each pump.
- Weekly water pumped – Well water pumped gallons and acre-feet per week for each pump.
- Weekly water system demand – Well water pumped plus change in volume in storage in gallons and acre-feet per week.
- Reservoir level trend plot - Level vs. time for a 7 day period.
- Lift station level trend plot - Level vs. time for a 7 day period.
- System pressure trend plot - Pressure vs. time for a 7 day period.
- Weekly runtime information - Lift station pump operating hours/week, total for the week for each pump.
- Alarm summary - Report of all alarm events.

MONTHLY:

- Monthly runtime information - Well pump operating hours/calendar month, total for the month for each pump.
- Monthly water pumped – Well water pumped gallons and acre-feet per month for each pump.
- Monthly water system demand – Well water pumped plus change in volume in storage in gallons and acre-feet per month.
- Monthly water system demand – Well water pumped plus change in volume in storage in gallons and acre-feet per month.
- Reservoir level trend plot - Level vs. time for a one month period.
- Lift station level trend plot - Level vs. time for a one month period.
- System pressure trend plot - Pressure vs. time for a one month period.
- Monthly runtime information - Lift station pump operating hours/month, total for the month for each pump.

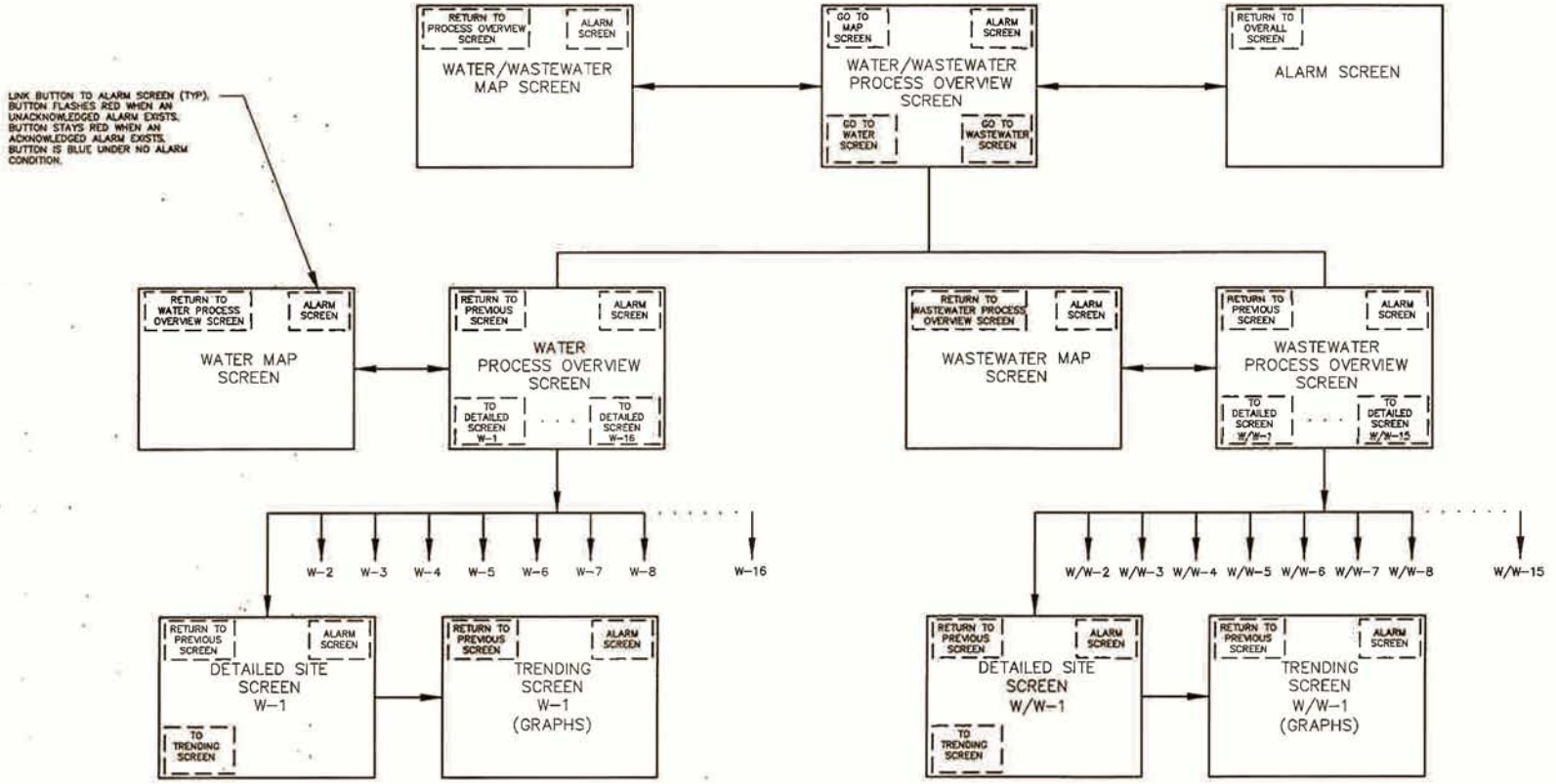
- Alarm summary - Report of all alarm events

ANNUALLY (12 Month Period):

- Annual runtime information - Wells and lift station hours/year.
- Annual water well production - Well production for each well in million gallons and acre-feet/year.
- Alarm summary - Report of all alarm events

Exhibit 2: SCADA Screens Logic Diagram

SCADA SCREENS LOGIC DIAGRAM



REV. NO	DATE	REVISED	DESTROY ALL PRINTS BEARING EARLIER DATE	REV. BY	CKD. BY	APRD BY

Cannon ASSOCIATES

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www.CannonAssociates.us

DRAWN BY GDW
CHECKED BY
TRACED BY
TRAC'G. CKD.
APP'D
APP'D
SCALE N/A

SCADA SCREEN LAYOUT

NIPOMO, CALIFORNIA

DRAWING NUMBER:
REVISION
SHEET 1 / 1
MASTER FILE:
DATE: 12-1-08

Exhibit 3: SCADA Hardware Requirements

SCADA Hardware Specifications

2/3/2009

Number	Item Description
	Workstation
1	**HP xw4550 or equivalent** Windows Vista w/ Windows XP Pro Downgrade AMD Opteron 1356 Quad-Core CPU Nvidia Quadro FX370 PCIe Graphics Card 4GB DDR2-667 ECC Ram 2x 80GB SATA 3Gb/s HDD Configured for RAID 1 Standard SATA DVD-ROM Optical Drive Mouse Keyboard 20" LCD monitor (HP LP2065)
	Server
2	**HP ProLiant DL385 G5 or equivalent** Windows Server 2003 R2 2x AMD Opteron Quad-Core Processor Model 2352 8GB PC2-5300 RAM 6x HP 146GB 2.5" SAS 10,000 rpm Hard Drive Configured for Raid 5 + Online Spare Redundant 1000 watt Hot Plug Power supply
	SQL Server 2008, if needed
	Notebook
3	**HP Compaq 6830s or equivalent** Windows XP Pro Intel Core 2 Duo Processor P8600 3 GB DDR2 RAM 160 GB SATA HD
	FactoryTalk View Client Computer Specifications
4	**FactoryTalk View Client may be installed on an existing computer that meets the following requirements:** Windows XP Pro AMD or Intel 2-3 Ghz CPU 2 or more GB of RAM 5 Gigs of available HD Space 19" Inch monitor (Capable of 1280X1024 resolution)
	UPS Recomendations
5	2200VA RACK Mount UPS for the Server
6	1500VA UPS for Workstation

Exhibit 4: SCADA Software List

NCSD SCADA Upgrade Software Materials List

Vendor	Catalog Number	Product Name	Unit	Amount
Rockwell	9701-VWSS100LENE	FactoryTalk View Site Edition Server 100 Display	EA.	1
Rockwell	9701-VWSCWAENA	FactoryTalk View Site Edition Client	EA.	4
Rockwell	9701-VWSCRAENE	FactoryTalk View Site Edition View Client	EA.	4
Rockwell	9518-HSERA500	FactoryTalk Historian Site Edition - 500 Live Data Tags	EA.	1
Kepware Technologies	OPC-ATDRT-Naoo	AutomationDirect ECOM OPC Server	EA.	1
Specter	WIN-911/TEP-BT	WIN-911-Bundle	EA.	1
Specter	WIn-911/FT	WIN-911 FactoryTalk A&E Bundle	EA.	1

Exhibit 5: Details of Estimated Probable Cost

Estimate of Probable Costs
NCSD SDADA Upgrade
080840

	Details of Estimated Probable Cost				
	SOFTWARE				
9701-VWSS100LENE	FactoryTalk View Site Edition Server 100 Display	EA.	$ 5,930.00	1	$ 5,930.00
9701-VWSCWAENA	FactoryTalk View Site Edition Client	EA.	$ 2,270.00	4	$ 9,080.00
9701-VWSCRAENE	FactoryTalk View Site Edition View Client	EA.	$ 980.00	4	$ 3,920.00
9518-HSERA500	FactoryTalk Historian Site Edition-500 Live Data Tags	EA.	$ 7,018.00	1	$ 7,018.00
OPC-ATDRT-NA00	AutomationDirect ECOM OPC Server	EA.	$ 795.00	1	$ 795.00
WIN-911/TEP-BT	WIN-911 Bundle	EA.	$ 2,495.00	1	$ 2,495.00
WIN-911/FT	WIN-911 FactoryTalk A&E Bundle	EA.	$ 495.00	1	$ 495.00
				Sub Total	$ 29,733.00
	HARDWARE				
	Workstation	EA.	$ 1,700.00	1	$ 1,700.00
	Client Computer	EA.	$ 1,500.00	3	$ 4,500.00
	Historian Data Server	EA.	$ 6,200.00	1	$ 6,200.00
	Laptop	EA.	$ 1,500.00	1	$ 1,500.00
	UPS 2200VA	EA.	$ 1,000.00	1	$ 1,000.00
	UPS 1500VA	EA.	$ 500.00	1	$ 500.00
				Sub Total	$ 15,400.00
	INTEGRATION AND PROGRAMMING				
	INTEGRATION				
	Computer Hardware & Software Setup	Hrs	$90	80	$ 7,200.00
	RTU Reconfiguration based on 4 hrs/site x $170/hr (2 man crew)	Site	$ 680.00	21	$ 14,280.00
				Sub Total	$ 21,480.00
	PROGRAMMING				
	Overall	EA.	$ 3,000.00	2	$ 6,000.00
	Alarm	EA.	$ 4,000.00	1	$ 4,000.00
	Water Overall	EA.	$ 2,000.00	2	$ 4,000.00
	Detailed Water	EA.	$ 1,000.00	16	$ 16,000.00
	Water Trending	EA.	$ 1,000.00	16	$ 16,000.00
	Wastewater Overall	EA.	$ 2,000.00	2	$ 4,000.00
	Detailed Wastewater	EA.	$ 1,000.00	15	$ 15,000.00
	Wastewater Trending	EA.	$ 1,000.00	15	$ 15,000.00
				Sub Total	$ 80,000.00
	TOTAL PROJECT COST				
	Software				$ 29,733.00
	Hardware				$ 15,400.00
	Integration and Programming				$ 101,480.00
	Contingency & Admin.				$ 36,653.25
				TOTAL	$ 183,266.25

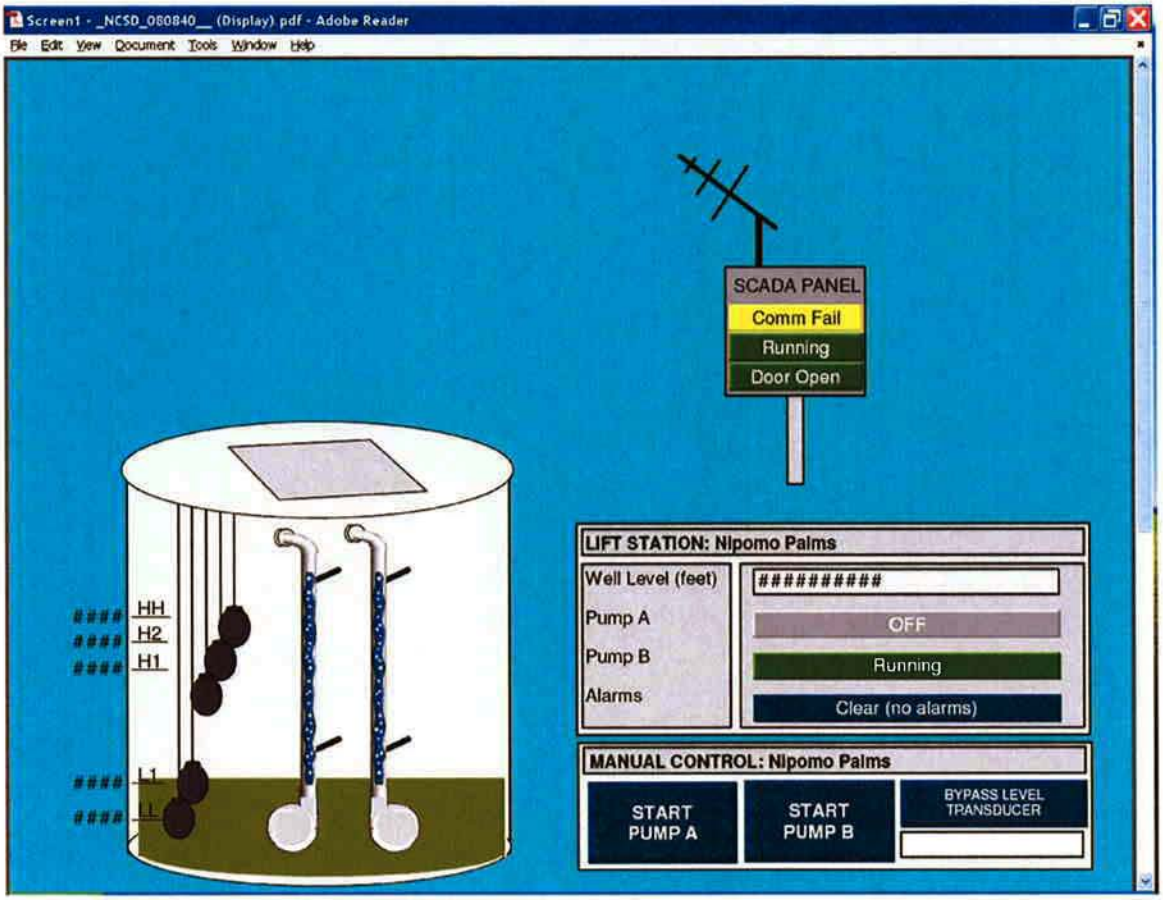
8.0 Technical Appendices

The following technical appendices are included:

- Appendix A: Typical Screens
- Appendix B: Tag List

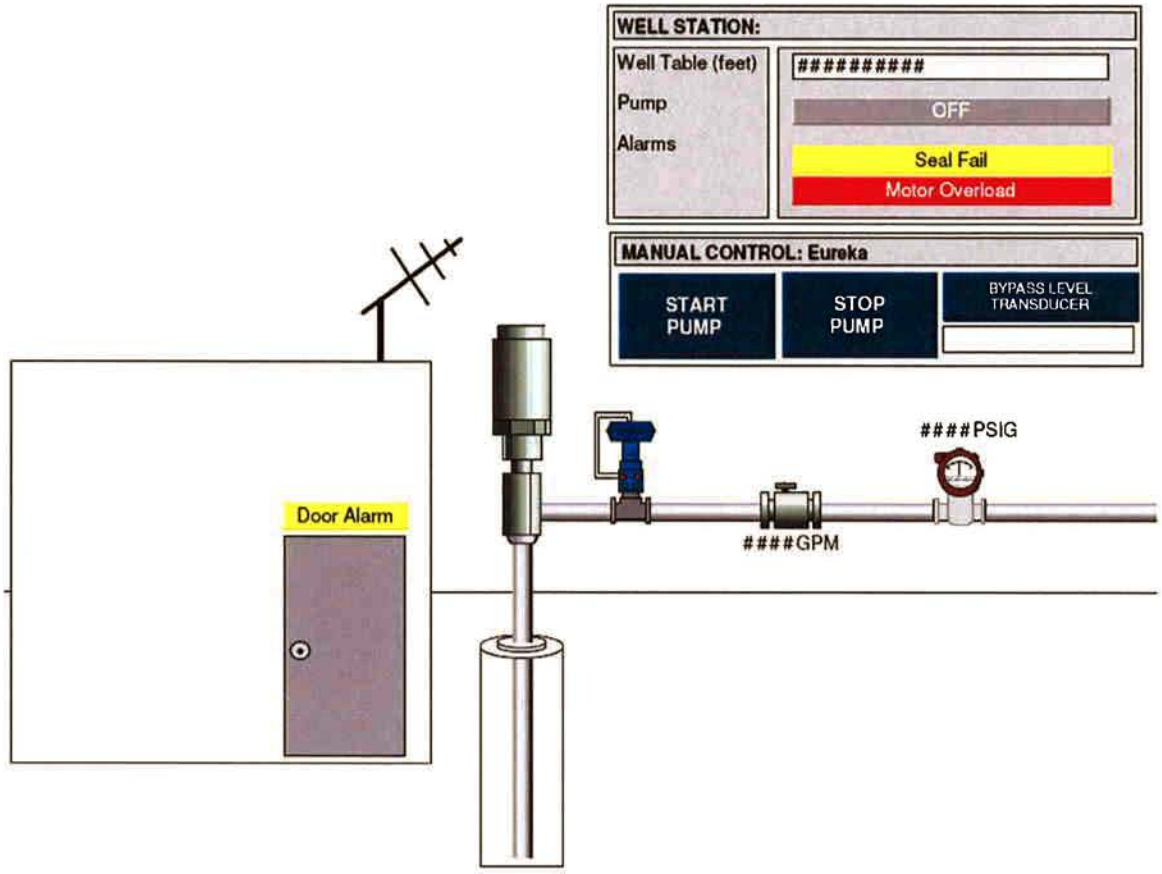
Appendix A:

Typical Screens



Wet Well Detailed Screen Example

This is an example of a Wet Well screen that could be applicable to NCSD.



Well Detailed Screen Example

This is an example of a Well screen that could be applicable to NCSD.

Appendix B:

Tag List

The following pages are the existing tags in the IPAAC system that would be used in the SCADA system upgrade. The other existing tags (not shown in the following pages) are for IPAAC internal use and not needed in a system upgrade.

NOTE: THIS LIST IS AVAILABLE FOR BOARD REVIEW AT THE DISTRICT OFFICE.