



Rancho Murieta Community Services District Technology Master Plan

April 20, 2005

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1 Executive Summary

Rancho Murieta Community Services District (CSD) plans to use information technology (IT) to become a state of the art facility and provide state of the art customer service to the Rancho Murieta community.

In 2004, the District published a Strategic Plan. In accordance with that Strategic plan, this document, the Information Technology Master Plan, was initiated. The Master Plan sets forth an IT Vision and five IT strategic objectives described in the Strategic Direction section. The objectives are supported by an aggressive plan to upgrade the IT infrastructure and implement new software applications including a new Computerized Maintenance Management System, a Graphical Information System, new security functionality, a centrally monitored SCADA/Control system, and software to support a call center for customer service. The Master Plan describes the current and future environments, discusses bridging the gap between the two, and identifies solutions to be implemented over five years.

The major solutions presented below, have been prioritized based upon anticipated impact and upon interdependencies among them:

- Computerized Maintenance Management System (CMMS)
- Wireless network to make data available in the field
- SCADA
- Graphical Information System (GIS)
- Automated incident tracking in ABDI, the resident security package
- Install Sensus “Fixed Base” wireless meter reading technology for new development and retrofit the existing VehicleRead program (if cost effective)

The following additional projects are recommended, but are not included in the implementation schedule and budget because they have relatively low cost and can be implemented at any time without significant impact to the other projects:

- Automated Service Order / Customer Service application
- Web-based Bill-Pay capability

- Enhanced database management and reporting
- Employee Intranet

Because of interdependencies and other contingencies, the five year schedule is projected to be:

Fiscal Year	Project Tasks
2005/6	Begin development of CMMS RFP Evaluate and select Wireless vendors Initiate GIS project to obtain first layer Implement Automated ABDI Incident Tracking Evaluate Fixed Base meter reading for new development
2006/7	Implement CMMS, possibly with GIS integration Develop GIS capability with hardware/software/analyst Wireless Network Site Survey Implement Chosen Wireless Solution Rollout field access to CSD data (mobile computing) Implement centrally monitored SCADA for Water Plant Implement Fixed Base system for new development
2007/8	Create additional GIS layers Design CSD-wide SCADA/Control System and central monitoring site
2008/9	Begin Implementation of CSD-Wide SCADA and control center
2009/10	Evaluate feasibility for additional wireless opportunities Evaluate retrofitting existing meters to Fixed Base

Approximate costs for these projects are projected as follows. These costs are estimates determined by talking with vendors and other communities that have implemented similar technologies. With changing technology and economic conditions, vendors, technologies and prices are subject to significant change. It is advisable that the District consult vendors to reevaluate pricing as you prepare your annual budgets. Well defined requirements, selection of experienced vendors and the timing of purchases can provide cost savings.



Technology Project	FY 2005-06	FY 2006-07	FY 2007-08	FY 2008-09	FY 2009-10	Total
Wireless Network	45,000	240,000				285,000
ABDI Enhancements	5,000	55,000				60,000
CMMS	10,000	155,000	40,000			205,000
AutoCAD & GIS	20,000	45,000	80,000			145,000
SCADA		*	*	300,000	300,000	600,000
Sensus Fixed Base	5,000		225,000		550,000	780,000
Totals	85,000	495,000	345,000	300,000	850,000	2,075,000

* Initial SCADA upgrades have been designed and budgeted in conjunction with the Membrane project. The budget for phase 2 is shown above in years 2008/9 and 2009/10.

Note that this technology investment will require an investment in support personnel. Tracking this volume of IT work will exceed the Director of Administration's available time dedicated to IT. Technical staff will be needed to support applications and technical infrastructure. A project manager will also be needed to manage the large number of IT projects. This means the addition of two to four people either as permanent employees or as temporary consultants.

The technology provided by these projects will enable the CSD to provide a higher level of service in a growing community, without significant expansions in staff and district budgets. Existing staff will be more efficient and effective at securing the community, maintaining CSD assets, and responding to community needs. While this Technology Plan is aggressive, it is also achievable and will provide significant benefits to the District and the community.

2 Strategic Direction

2.1 Supporting the CSD Strategic Plan

The Community

In August of 2004, the District published a Strategic Plan, which set forward the following Strategic Objectives:

1. **Provide Needed Community Services**
2. **Optimize the Level of Services**
3. **Employ a Quality Workforce**
4. **Maintain Good Relationships**
5. **Handle Finances Effectively**

This document, a Technology Master Plan, was initiated as a result of Action Item 2.4.1 in support of the District's goal to "Optimize Use of Technology for Operations and Communications". By optimizing the use of technology, all five Strategic Objectives are supported. For example:

- Technology can be used to enhance current services, such as allowing security patrols to spend more time out in the community and less time in the office. It can also be used to provide new services such as online utility payments or service requests by residents.
- Technology can provide tools in Utility Management, Maintenance, Security and Purchasing to improve the efficiency and effectiveness of District employees.
- Technology can be used provide a more appealing work environment for employees and technology itself may help to attract and retain highly quality employees.
- Internet technologies offer numerous ways to improve communication and simplify interaction with residents, developers, employees and other agencies.
- Technology is now, and will continue to be, a key element in administering the District's budget and finances.

2.2 Information Technology Vision

Current and appropriate technology will be used to provide the best customer service possible. A single point of access will be provided to Customers so that service is seamless and there are no apparent boundaries among District service providers. The District will be available to employees, residents, Board of Directors, and external agencies twenty-four hours a day, seven days a week. This includes the availability of services, communication, and applications and data necessary to support District work processes. For employees, information will be available at the point of use¹, whether that be a traditional, or a non-traditional, workplace. This vision stands on three core values:

- Provide the best customer service possible
- Maintain stable rates to customers
- Seek continuous improvement in productivity and the quality of service.

2.3 Technology Strategic Goals

The following Information Technology Strategic Goals provide direction and guidance for the District in the pursuit of its vision:

1. Minimize paper processes and files by replacing them with automated processes and electronic storage.
 - Deploy current and appropriate technology and software applications.
 - Where applicable, exercise a preference for web-based applications to simplify maintenance and improve access.
2. Maximize employee productivity through information technology
 - Use technology to leverage the productivity of existing staff so that growing demand is met through technology, minimizing staff growth.
 - Where practical, provide employees with the information and tools at the point of use¹.
3. Enhance customer service by improving District accessibility.

¹ “Point of use” might be in the office, a vehicle, the Plant, the warehouse, at a residence, or in an employee’s home.

- Allow residents, developers and interested parties to contact the District by phone, email or internet request and have all requests tracked and responded to appropriately.
 - Exploit internet technology to enhance customer service for residents, developers and other external entities.
 - Use intranet and internet technology to improve communication among residents, staff, the Board, and external agencies.
4. Increase effectiveness by exercising proper management of District data.
- Data will be kept in standard databases so that it can be shared by multiple applications and will support District report writing requirements.
 - Data will be stored in only one place, eliminating redundant data and redundant data entry.
5. Provide a secure IT environment where private data is protected from unauthorized access or manipulation.

3 Current Environment

3.1 Overview

The Community Services District (CSD) favors the use of technology and has, thus far, implemented technology effectively. Growth of Rancho Murieta, and advances in technology have made it apparent to Management that a need exists to pursue technology in a more aggressive and more organized fashion. Interviews with CSD staff reinforced this need, by highlighting many opportunities to improve and enhance services without significantly increasing staff.

Though technology effectively supports most financial and administrative functions, there are numerous opportunities to improve support in other areas. These opportunities generally fall into three categories:

Replacing Paper-Based Data with Electronic Data

- Work requests for maintenance or other services are hand written on paper forms. Staff cannot access the Qquest maintenance management system over the network to enter requests or do inquiries about equipment or work orders. The current system is stand alone, on a single PC. This is inefficient for both Maintenance staff and those requesting work. Maintenance staff must go to the warehouse or the administration building to determine what work needs to be done or to find information on what work has been done. Therefore, travel time between the field and offices cuts into maintenance time.
- Currently the drawings used to support facility and community maintenance and construction projects are paper-based, as-built drawings, created as part of the original construction project. The CSD does not have electronic drawings or the AutoCAD software to support them. This makes it difficult to modify drawings to reflect changes that occur in the community. Access to electronic drawings and/or a Graphical Information System (GIS) based system would provide much better support for maintenance and construction activities.
- Monthly operational reports for water and sewer plants, as well as monitoring and sampling results are hand-written based on daily, weekly, or monthly inputs. This data is manually consolidated into monthly regulatory reports. Database technology could be applied to this to better support monitoring and reporting.

Improving Efficiency through Faster and Easier Access to Data

- The Rancho Murieta community expects a secure community with highly visible security patrol personnel. Patrol officers do not have adequate access to security information in the field and lose valuable patrol time completing forms and researching incident files in the Gate or District offices. Incident forms are paper-based. In their vehicles, patrol officers have limited access to resident information and no access to prior incidents. Patrol officers would be more efficient, effective, and safe, and would provide a more visible presence on community streets if they had information available to them in the field and could complete administrative tasks in their vehicles.
- Currently the District has SCADA devices that send monitoring information to a locally placed TESCO panel. Alarms are sent out through a paging system. There is no process control system in place. Efficiency and effectiveness could be improved through SCADA/Process Control systems that can be monitored remotely.
- The CSD has an internet site to provide basic District information and communication with residents and the board. However, they don't currently offer an Intranet to distribute private or restricted information to employees and Board members.

Enhancing Current Technology

- Meter reading is accomplished through radio technology employed in a vehicle. Some meters are read before the truck leaves the CSD parking lot but an employee must drive to different areas around the community to get all meters read. Some meter reads fail but are not identified until the vehicle returns to the office and the reads are uploaded to a database. An employee must return to the field to manually read those meters. This process takes two to four hours per month.

3.2 Physical environment

The physical environment for Information Technology in the District consists of the following elements:

- Network Infrastructure
 - District Office Local Area Network
 - Fiber links to two existing security gates
 - Wireless connection from Utility Plant/Warehouse to District Office

- Internet connection through SBC (DSL)
- SonicWall Firewall between District Office LAN and Wireless Connection
- Hardware
 - 2 Dell PowerEdge 2600 File Servers (Admin, Security/South Gate)
 - PC Workstations
 - 12 Dell Optiplex GX260T (Admin, Utility Staff)
 - 3 Additional PCs (Spare Admin Office, South Gate, Patrol Office)
 - Laptop Computers
 - 7 Dell Inspiron 8600 (Management, Admin)
 - 5 Dell Inspiron 1100 (Board of Directors)
 - 2 Dell Latitude C840 (Security: DMV at South Gate, Patrol vehicle)

3.3 Applications & Data

The following table shows the software applications currently in use by the District.

Application	Function	Data base	Platform	Used by	Meets future needs	Future Plans
Office XP (Standard)	Office Automation: Web Browser Email Word Processing Spreadsheets Presentations		Client Server	All employees with PC access that don't need MS Access	90%	Upgrade as required
Office XP (Professional)	Office Automation: Web Browser Email Word Processing Spreadsheets Presentations Database		Client Server	Greg Patrol Judy Debby Steve	90%	Upgrade, as required
Great Plains	General Ledger Accts. Payable Fixed Assets Payroll Human Resources	SQL Server	Client Server	Greg Debby Jenny	90%	Upgrade, as required.
Utility Star Platinum	Utility Billing Accts. Receivable	SQL Server	Client Server	Greg Debby Jenny Judy	75%	Upgrade, as required. Needs to be able to interface with new fixed base Sensus meter reading system. Add functionality to receive bill payments over the internet.
VehicleRead	Automatic reading of water meters from vehicle	Unknown	Stand Alone	Mac	85%	Upgrade or replace, as required by new fixed base Sensus meter reading system.
AutoRead	Processes automatic meter read data into Utility Star	Unknown	Stand Alone	Debby	85%	Upgrade or replace, as required by new fixed base Sensus meter reading system.
SAS2000 (ABDI)	Gated Community Resident Information and Security	SQL Server	Client Server	Security, Chief	90% Nothing else avail.	Upgrade, as required. Enhance Incident Reporting module and ensure compatibility with mobile devices for patrol officers.
Timesheet Professional	Project based timekeeping	Access	Browser based - On local network	Jenny Greg Soon to be CSD wide	75%	Upgrade, as required. Replace with Great Plains bolt-on application or Interface with Electronic Work Order app (possibly through CMMS)
Qquest	Equipment Maintenance	Access	PC Stand alone	Wes White	20%	Replace CMMS system, including wireless dispatching, access to e-drawings/GIS.
Aestiva	Purchasing	Unknown	Browser app-local network	CSD wide	100%	Upgrade and modify as required
Scancheck	Vehicle entry/exit tracking with barcodes	Access	Client Server with PC Backup	Security	80%	Upgrade, as required
Vehicle License Query	Verify vehicle owner by License		Browser app-Teale Data Center	Security Chief	90%	Upgrade as they become available from DMV
MS FrontPage	Website		Standalone	Greg	90%	Upgrade as required



The following table describes who uses the applications on what type of devices:

Employee	Title/Dept	Applications	Devices	Location
Ed Crouse	General Manager	MS Office (Std) Aestiva Purchasing	Laptop	Office Home
Greg Hall	Director of Administration	MS Office (Pro) Great Plains Utility Star ABDI Timesheet Professional Aestiva Purchasing MS FrontPage	Laptop	Office Home
Joe Majarucon	Director of Field Operations	MS Office (Std) Aestiva Purchasing	Laptop	Office Home
Greg Remson	Chief of Security	MS Office (Std) ABDI Aestiva Purchasing	Laptop	Office Home
Debby Bradberry	Accounting Supervisor	MS Office (Pro) Great Plains Utility Star Aestiva Purchasing AutoRead	Desktop	Office
Judy Goyen	Office Assistant II	MS Office (Pro) Utility Star Aestiva Purchasing	Desktop	Office
Jenny Griffin	Accounting Assistant II	MS Office (Std) Great Plains Utility Star Aestiva Purchasing	Desktop	Office
Suzanne Lindenfeld	Administrative Assistant	MS Office (Std) Omniscan Aestiva Purchasing	Laptop	Office Home
Multiple Employees	Plant Operator	MS Office (Std) Aestiva Purchasing Qquest	Desktop	Office
Multiple Employees	Utility Worker	MS Office (Std) Aestiva Purchasing Qquest	Desktop	Office
Wes White	Equipment Mechanic	MS Office (Std) Aestiva Purchasing Qquest	Desktop	Office
Rob McLeod (Mac)	Field Supervisor	MS Office (Std) Aestiva Purchasing Vehicle Read	Laptop	Office
Steve Twitchell	Treatment Plant Supervisor	MS Office (Pro) Aestiva Purchasing	Laptop	Office

3.4 Information Technology Support Structure

The IT environment is supported by of the following elements:

Technology Master Plan

This document provides a technology master plan for the District. It replaces the District Management Information Systems plan created in 1997 and updated periodically thereafter.

IT Organization

The District's Information Technology operations are managed by the Director of Administration, Greg Hall. He spends about 25% of his time managing technology, and the remaining 75% on budget, finance, administrative, and supervisory duties. In his Information Technology role, Greg selects and implements hardware and software, trains users, controls access, and manages security. He created and maintains the CSD internet site and has written departmental applications using MS Access and Excel. Greg also interfaces with vendors and contracts out installation, training, and custom modifications, as required.

For networking design, installation and support, Greg calls on the Murieta Group, a Rancho Murieta based networking vendor that the District and the RMA have worked with for several years. The Murieta Group is under contract to advise the District on network and data security. They can also provide web and application development services, as needed. As demand grows, Greg increasingly turns to the Murieta Group to complete maintenance and development work that he might have done himself in the past.

Policies & Procedures

The District has an Internet, E-mail, and Electronic Communication Ethics, Usage and Security Policy which each employee receives and signs. It does not currently address how private information, such as Human Resources (HR) or private resident information should be handled. The District does not have a designated Data Security Officer nor documented policies and procedures for handling network and data security, as required by legal requirements such as the Health Information Portability and Accountability Act (HIPAA).

Contracts & Support Agreements

The District has standardized on the use of Dell PCs and currently runs all workstations under Windows XP. Operating System upgrades are accomplished by replacing aging PCs with new ones running the desired Operating System. Employees are responsible for upgrading their individual PCs by responding to system prompts from Microsoft advising them to install Windows upgrades. Greg



Hall installs server upgrades. All workstations also have Microsoft Office, either the Professional (including Access) or Standard Edition, depending upon need. Some have internet access and Microsoft's browser, Internet Explorer, is an enforced standard.

The District runs a variety of software applications on their network. However, each application runs independently; they do not currently share data. Each application was selected with a department wide focus on its functionality. Most are supported and upgraded by the software vendor. Rancho Murieta maintains good relationships with its application vendors. In some cases, they are Beta testers and receive additional benefits from this preferred status.

The District sees advantages in browser-based, web-deployed applications. The applications are accessible from anywhere and easier to modify and maintain since upgrades need not be completed on each client PC. The Purchase Order application from Aestiva was their first experience with a web-based application and it is very successful and widely appreciated. They hope to use this as a standard as opportunities to select new applications or upgrade older ones occur. However, they recognize that alternatives may be selected based on District needs.

4 Future Environment

4.1 Overview

Over the next decade, the number of homes and businesses served by the Rancho Murieta Community Services District (CSD) is expected to nearly double. The increased demand for services will require physical expansion of District facilities as well as increased demands on the District staff. To manage this growth, the District intends to employ technology to improve the effectiveness and productivity of employees and minimize increases in District staff. Technology is also being reviewed for opportunities to enhance services and improve residents' overall satisfaction.

To accomplish these goals, more information must be available electronically and it must be accessible to the people who need it in the location where it is required. In the future, this will be accomplished through the use of a wireless network infrastructure, internet technology, and new or improved software applications.

Once the infrastructure and software is in place, staff will have the ability to improve efficiency, provide additional services to a growing number of residents, and be more proactive and effective:

- Maintenance staff will access work requests and maintenance data in the field. Other CSD staff will create work orders from their desk or the field.
- Security officers will access resident data from the field. Security Incident Reports will be electronic and can be updated in vehicles, thereby increasing the time that existing Patrol Officers are in the field and are visible.
- Important tools for maintenance and construction work will be moved to electronic media. Electronic drawings will accurately depict locations and equipment and processes will be in place to keep them current.
- Water meters will be read centrally providing accurate and current data to support usage reporting and billing. The CSD can notify residents of abnormal usage patterns as they occur, not just at billing periods. Reading meters will require fewer trips between resident meters and administrative offices.
- Access to the internet/intranet for staff will be improved and these technologies will be a source for much of the communication among staff, residents, the Board, and the public.

- The internet and intranet will be used to provide CSD services, such as electronic payments and benefits management to residents and employees.
- Operating CSD facilities will increasingly become computer based, allowing for remote monitoring and, perhaps, control. Staff will be able to provide some forms of emergency support from their homes. This might include diagnosing and responding to system alarms.

4.2 Bridging the Gap

Achieving this level of technological sophistication requires several significant projects:

- Implement hardware and network infrastructure technology.
- Implement current and appropriate software applications.
- Create an organizational structure to better support technology.

Physical Environment

The chief infrastructure project will be to implement a wireless network that makes data available in the field and in District vehicles. It includes towers and equipment to support the reading of meters and the wireless cloud, as well as vehicle based access devices, such as laptops. These devices will be acquired in accordance with the requirements of software applications that are selected with the intention of deploying information in the field.

Applications and Data

Several significant software solutions will need to be implemented. These include a new Maintenance Management System and an associated solution supporting electronic documents with AutoCAD, GIS, and perhaps Global Positioning System (GPS) capabilities. In addition, the current security application will need to be enhanced to improve Incident Tracking capabilities.

The new SCADA system is also planned to be implemented in conjunction with the Water Treatment Plant Membrane upgrade project scheduled for 2006. This SCADA system should be designed to support eventual use for the entire facility and to provide centralized, remote monitoring.

The District also desires a “Call Center” application to track all calls for service from residents, developers or regulatory agencies. These calls would be tracked, handled, and closed when complete, leaving a history of work requested and completed. This application would also offer the multiple ways to request service including phone calls, mail, e-mail, internet request, and so forth.

A CSD Intranet should be developed to provide secure services to employees and/or residents and developers.

There is also a need for a database to support plant operations and regulatory requirements. This database might combine SCADA/Control system, laboratory, or

other source data to provide District reporting for many needs, including regulatory and operational.

The District should seek to select or convert applications to a common database such as Microsoft's SQL Server. This would allow the applications to share a common server, as well as sharing data across applications.

Information Technology Support Structure

The District's growing reliance on Technology will require skilled staff to plan for, implement, and manage the applications, data, and infrastructure. The skills required will include the following:

- Project Management

- Network and router support

- Server configuration and support

- Desktop and Mobile Device support

- Security Configuration and Monitoring

- Analyst – interface between users and vendors

- Application Training and Support

- SQL Server Database Administration

- Database Developer or Report Writer to manage data and create reports and reporting applications.

- Wireless Support

- Telecommunications Support (optional)

Some of these tasks may be handled by consultants/vendors, but the District will eventually want to have employees fill some of these roles to reduce costs and provide the security of institutional knowledge.

The District should evaluate the regulations (such as HIPAA) that may apply to District data and have an independent security consultant conduct a security assessment. The consultant can help the District develop clearer policies and procedures regarding Security and Privacy and identify a Data Security Officer outside of IT to oversee the data security program.

The District should also consider implementing a trouble ticket or helpdesk application to track hardware and software issues which can be used to schedule maintenance, upgrades or replacement.

A Change Control System should also be implemented to track who changed what, (software or hardware) on what day, and for what reason. A simple tracking system can save hours when something goes unexpectedly wrong.

5 Analysis

5.1 Secure Wireless Data Communications throughout the Rancho Murieta Community

About

This wireless network infrastructure would support remote access to all District applications, including email and instant messaging for employees working in the field.

Preliminary Requirements

- Accessible throughout the Rancho Murieta Community
 - Ideally, there would be no dead spots or system downtime and access from the more remote Water Plant must be accommodated.
 - The District seeks a balanced cost-effective solution that will offer the best quality coverage in their area.
- Secure from unauthorized access with the ability to encrypt private data.
- Able to support data from the following applications:
 - Secure email and/or instant messaging
 - Work order tracking from the Computerized Maintenance Management System (CMMS)
 - GIS applications to view District maps that are sized for this type of use
 - Drawings of parts and equipment
 - Web access for utility workers to research parts and vendors
 - SCADA system (on dedicated bandwidth)
 - Shared access to office documents including procedures, incidents, etc.
 - Electronic timesheets
 - Access to online purchase order application
 - Remote access to Applications By Design, Incorporated (ABDI, resident tracking system)
 - Images from remote security cameras
 - Automated water meter readings from the Sensus fixed base system

- The wireless cloud could also carry voice traffic between the District office, the plant, the security gates, and the mobile utility and security workers
- Cost appropriate for anticipated benefit

Analysis

Increasingly communities and cities are adopting wireless technology to make public safety and other data readily available to workers. As the technology improves they are providing secure networks to support both resident and employee needs.

The city of Las Vegas deployed a downtown wireless network over a five square mile area. This is a test to support the Traffic engineering Department and police and fire departments. They will access databases, move large data files, monitor intersections and maintain communications with employees in remote locations. This network supports up to 2 megabits per second (Mbps). They used a wireless integrator to install it and paid \$25,000 for the project, including hardware. They partnered with an ISP that put up the bulk of the project cost of \$200,000-250,000. The ISP intends to sell services over the network.

The city of Indianola, Iowa supports its five police patrol cars with a citywide wireless network. They can now get mug shots, database information and images from security cameras on laptops in squad cars.

Wireless networks are implemented using access point devices. These are rugged devices that handle communication and encryption over a defined physical area. The area to be covered is divided into a grid and one device is placed in the center of each sub-area. This approach is extremely flexible. Access points are typically mounted on light or utility poles or on rooftops at about forty feet above the ground. They can also be mounted in vehicles and temporary access points can be installed for temporary use, for example in a park to support a short term event. The technology also allows for phased implementation.

Cisco Systems is a vendor that provides wireless network technology with various levels of access point/bridge devices. The high end device is the Cisco Aironet 1300 series. These provide 54 Mbps within a 350 foot square area. To get 54 Mbps, the area to be covered is divided into a grid of 350 x 350 foot squares and a device is installed in the middle of each. The data rate falls with distance from the device so that a grid with 1,450 foot square areas has a data rate of 11 Mbps. The 2 Mbps implemented for Las Vegas is typical. Therefore, one lays out a grid based upon data rate requirements to determine the number of access points required. Aironet 1300 series are \$1,299 each. A mounting device is required for each at \$200. Antenna and other technology are available to extend the range of the access points.

Additional technology is required to avoid having to hardwire the access points to the Ethernet network. A popular implementation is mesh technology. Firetide is an industry leader providing in this. They are currently releasing their latest model, the 25 Mbps, Hotpoint 3000. One of these must be installed to each access point to provide communication with surrounding access points. The outdoor model sells for \$1,995 and the indoor for \$895. These devices require access to an electrical source; the vendor is developing solar power capability but this is not yet available.

To initiate a wireless implementation as described, a wireless integrator or vendor should be hired to conduct a site survey. In a survey, a grid will be defined and physically tested by placing an access device at each planned location. Dead spots are identified and corrected.

Additional cost savings may be achieved by adding voice (phone) capabilities over the network. This can be done but is secondary to the need for wireless support to critical CSD applications.

Another possibility is to use the wireless network to provide broadband to enable residents to access email and the internet inexpensively. This is not the highest priority for the CSD but some communities are successfully doing so at economical rates for residents. The city of Granbury Texas is implementing a 9 square mile network and is partnering with an Internet Service Provider to share the costs. The ISP will charge customers for the service. As you consider whether to provide broadband access to residents, you need to consider potential legislation limiting this service. At the time of this report, there is not legislation pending in the state of California, but some states have passed laws limiting the ability of public organizations to compete with ISPs by providing public access. A decision to provide residential service also requires a significantly higher investment in customer support. We do not recommend that the District take on this responsibility without partnering with another skilled and experienced organization that will provide residents with this support.

Conclusions/Recommendations

Based on expected growth, we recommend that the District plan for a wireless network and mobile devices to serve their internal employee needs. We recommend a “mesh” type network that allows all access points to communicate wirelessly with each other and with the central office network. This type of configuration allows for flexible deployment, ease of maintenance, and uncomplicated growth. It also allows for a temporary expansion of the network to a park or golf course for special events.

We recommend that a site survey be conducted in 2005. This survey should review the bandwidth required to support all CSD applications (including video surveillance

cameras requested by CSD Security). It will also review security requirements of the different types of data to be transmitted. Finally, the review will examine the topography and potential access point locations to determine the components required to provide adequate coverage on Rancho Murieta roads as well as at water towers and pumping stations. The result will be a network design, a preliminary implementation plan and a list of qualified vendors for hardware and implementation.

Windows based notebook or tablet PCs are preferred for mobile devices because they are likely to conform to wireless standards (IEEE 802.11) and their large screens can handle most applications without customization. They should be of the type that are protected against damage in the field caused by moisture, spills, and dust. The Panasonic Toughbook meets this requirement and sells for about \$3,600.

Hardware vendors should be selected based on their market share and stability, to minimize the possibility of being left with unsupported equipment. Integration vendors should be selected based on their experience implementing similar systems and their past experience with hardware vendors. References need to be checked.

Estimated Costs

Site Survey	\$25,000
Hardware Access Points (20-30) Mesh Network Servers	\$60,000 \$10,000 \$30,000
Mobile Devices (10 x \$3,600)	Included in cost of deploying specific applications
Other Integration & Deployment costs	\$100,000
Acquisition and Startup Costs	\$60,000
Estimated Total	\$285,000

Sources: Costs based on from Las Vegas and Granbury, TX experience and discussions with Cisco and Firetide.

Estimated Annual Operations & Maintenance Costs	\$95,000 / year
Assumptions:	
▪ Hardware support & replacement (3 year replacement)	
▪ Vendor network support	
▪ Internal network & hardware support	

5.2 Computerized Maintenance Management System (CMMS)

About

The existing Computerized Maintenance Management System (CMMS) has only limited capability and should be replaced with one that supports a web-based work order system that can be accessed at work sites throughout CSD facilities and the community. The system should support corrective, preventative, and emergency maintenance. It should support work order based time tracking. It should also support, or be compatible with, an application for managing electronic drawings. GIS technology with drill down capabilities would be a desirable basis for drawings and GPS technology for accurate location management is also desirable. These technologies must be understood in terms their relationship to the CMMS.

Preliminary Requirements

- The application should:
 - Offer a browser based user interface
 - Provide availability of CMMS data in the field on a laptop or other device over a wireless network
 - Support the creation of work requests over the internet by community residents
 - Prepare, issue, track, and close predictive, preventative, reactive, and emergency maintenance work orders
 - Provide a work order approval process
 - Support job plans and safety plans
 - Track materials used and time against work orders. Ideally, work order time tracking should be exportable to the Great Plains HR and financial system
 - Track and manage asset warranties and repairs
 - Maintain historical records and data
 - Track maintenance costs and allocate cost to appropriate asset
 - Provide for the reporting of maintenance activities and costs

- The vendor should:
 - Have implementations where their products are integrated with GIS, either directly or through a third party
 - Present a referenced track record of providing products and support to smaller municipal organizations like the Rancho Murieta CSD
- Appropriate cost for the anticipated benefit.

Analysis

Qquest, the District's current Computerized Maintenance Management System (CMMS) is outdated and does not meet CSD requirements. A new CMMS system offers the greatest opportunity for improving reliability and customer satisfaction with the water treatment, sewer, and wastewater drainage systems. A robust CMMS system offers many benefits:

- Equipment maintenance is performed according to preventative maintenance schedules so there are fewer breakdowns and less downtime
- More maintenance work is planned and scheduled
- Resources are more effectively applied to maintenance activities
- The CMMS becomes a repository for maintenance information so that less time is lost by maintenance staff looking for maintenance information
- Service history is recorded for equipment so analysis can be done to make informed maintenance and replacement decisions
- If integrated with a Geographic Information Systems (GIS), maps and engineering drawings can identify where assets (including equipment, pipes, drains, conduit, etc.) are located in relation to street centerlines and tax parcel information. A more comprehensive implementation would support the ability to click on a GIS layer and drill down to more information about equipment, residents, and so forth
- With the proposed wireless network and mobile devices, utility workers will have access to work orders, maintenance history, maps and drawings, purchase orders, and online vendor information in the field.

There are quite a few CMMS vendors and the CSD should evaluate them through a bidding process. Vendor demos are one way to educate staff regarding CMMS capability to assist in the defining of requirements for an RFP. Consultants can assist in the development of the Request for Proposal (RFP), if needed.



The CMMS product believed to have the largest market share in the United States is MRO's Maximo. They have just announced the release of Maximo Enterprise Suite, formerly referred to as version 6.0. This is a robust web based version that meets most Rancho Murieta requirements plus workflow, purchasing, stores and inventory, and asset management. They will soon provide the capability to allow residents to create work orders online. Maximo sells Mobile Suite, a product that makes CMMS data available on a PDA in the field. Data is uploaded/downloaded at the beginning/end of the day. This product is not necessary if a wireless network is available. Maximo can be integrated to GIS using third party tools from a company called ActiveG. See the Geographic Information System (GIS) & Electronic Drawings section in this document for additional information about ActiveG.

Maximo sells their products by seat licenses. The price varies according to the type of user. Non-negotiated prices for a facility like CSD might be:

License type	Price	Quantity	Extended
Primary registered user (full functionality, utility worker)	\$2,850	10	\$28,500
Secondary registered user (occasional user, CSD employees)	\$1,425	20	\$28,500
Work requestor user (community residents)	\$10	2500	\$25,000
Total			\$82,000

Annual customer support Plan includes 24 hour phone/web support and is calculated at 20% of purchase price. These numbers do not include implementation costs or ActiveG GIS integration.

A less expensive CMMS product is MaintainEX. They claim the highest market share in Australia at about 80%. They have a sales office in El Dorado Hills. MaintainEX offers their product with concurrent licenses. It is web based and currently provides the capability to have residents do work requests online. The costs are listed in the table below:

License type	Price	Quantity	Extended
Concurrent Licenses	Varies	10	\$19,490
Additional Users (if required)	\$1,000	20	\$20,000
Web Based Job Request System for Residents (per server)	\$2,490	1	\$2,490
Total			\$41,980

Whichever vendor is selected, implementation is important. All existing equipment must be entered into the system correctly. Hierarchies of equipment will need to be correctly defined if there is a need to report on the cost of maintenance for some asset. Location schemas need to be defined and systems to be tracked in CMMS need

to be identified. It is most important to understand maintenance and operations work processes in the context of a CMMS so that the implementation will support them.

Conclusions / Recommendations

Appendix C contains contact and website information about CMMS vendors. CSD should educate themselves about CMMS capability and options to help with the development of requirements and an RFP. Once the wireless infrastructure is in place, the CMMS presents one of the areas of greatest benefit for the CSD.

Estimated Costs

CMMS Application (10 licenses)	\$42,000 - \$82,000
Server (if required)	\$8,000
Installation & Training (10 days onsite)	\$15,000
Mobile Devices (10 laptops)	\$36,000
Vehicle Mounts (10 mounts)	\$5,000
Acquisition and Startup Costs	\$60,000
Estimated Total	\$206,000

Sources: Costs based on discussions with vendors, MRO Maximo and Maintain EX and experience with Sacramento County installation of Maximo.

Estimated Annual Operations & Maintenance Costs	\$66,000 / year
Assumptions:	
<ul style="list-style-type: none"> ▪ “Super user” to maintain data (.5 full-time equivalent) 	
<ul style="list-style-type: none"> ▪ Licensing 	
<ul style="list-style-type: none"> ▪ Hardware support & replacement (3 year replacement) 	
<ul style="list-style-type: none"> ▪ Internal hardware & network support (.10 full time equivalent) 	

5.3 Geographic Information Systems (GIS) and Electronic Drawings

About

Geographic Information Systems (GIS) and Electronic Drawings can save time otherwise spent looking for and transporting drawings to a worksite. Digital formats also greatly increase the likelihood that drawings are kept up to date.

Preliminary Requirements

- Compatibility with the District's work processes and CMMS
- Depending on the solution desired, this project can be time-consuming to implement and maintain. To ensure long-term success, the District needs to consider the effort required to create and maintain a drawings library or application with current, accurate information. Sacramento County could provide to the District some of the newer subdivisions' electronic parcel maps.
- Acceptable cost for anticipated benefit

Analysis

The ideal Drawing Management solution would be a GIS system with drill down capabilities that includes Global Positioning System (GPS) technology to manage locations. Drill down capability means to click on a GIS layer and get database information related to that point. One could click on equipment and get setpoint or warranty data. One could click on a parcel map and get resident information. All of this is very possible. However, it must all be built and would need to be approached as a phased implementation.

A starting point for CSD would be to acquire base maps to be implemented as the first GIS layer. Sacramento County can offer base maps containing street centerlines, tax parcel information for the minimal cost of \$250. District drawings with water, sewer, and drainage data can then be overlaid on the base. Contact information is in Appendix C for SACOG's GIS Consortium and Sacramento County GIS.

Adding additional layers will require a GIS analyst working with CSD historical as-built drawings that have been digitized. This person could be an employee or long term consultant. This work requires a powerful workstation running AutoCAD or similar software (approximate cost for hardware and software is approximately \$9,000).

The most widely used GIS tools are ESRI products. We recommend the use of these tools for maximum compatibility. ArcView can be purchased for about \$3,500. A GIS server may also be required.

Integrating GIS with the CMMS system creates a highly effective tool to support primarily operations and maintenance, but also, administrative, security, and customer service needs. There are six different CMMS vendors who have integration with ESRI GIS software. MRO Maximo, is linked to GIS by three different third party vendors, including ActiveG discussed in the CMMS section of this document. Appendix C has a chart listing CMMS vendors with GIS integration.

ActiveG provides the capability to imbed small, 300 to 400 pixel, maps into the Maximo webpage. Field staff could access maps to support maintenance activities on a laptop in the field. ActiveG recommends that this integration be done as part of a Maximo implementation. It is not necessary to have all GIS layers in place, only one, the parcel layer, perhaps. ActiveG would charge according the number of Maximo seat licenses. A price of \$50 to \$100 per seat has been suggested.

Not all drawings can be accessed over the wireless network; some drawings are too large. For these drawings, it is better to copy them to a DVD that can be carried into the field and read on a laptop. In fact, this process can be seen as a lower cost alternative to GIS and to integrating with the CMMS. It is not as effective, but only requires digitizing drawings and a DVD reader for the worker.

Conclusions / Recommendations

Select a CMMS system with the ability to access GIS maps. Implement GIS/Drawings management in conjunction with your CMMS project. Work with Sacramento County GIS, SMUD, and SACOG to identify base GIS maps for Rancho Murieta.

Estimated Costs

AutoCAD & Workstation	\$9,000
GIS Server and ArcView GIS license	\$7,600
Acquisition of Base maps from Sacramento	\$250
Consulting to create GIS environment, digitize 1000 existing drawings, load base maps and overlays	\$50,000 - \$80,000
Build interface to CMMS	\$10,000
Acquisition and Startup Costs (Project Mgmt. and User Training on AutoCAD & ArcView)	\$40,000
Estimated Total	\$145,000

Sources: Costs based on discussions with Sacramento County and Sacramento City GIS departments, as well as estimates by vendor, ValueCAD, who has worked with several Northern California municipalities and ActiveG.

The GIS system also requires a GIS Analyst to modify drawings and maintain the system. This can be handled part time by a District employee familiar with AutoCAD, database management, and application development.

Estimated Annual Operations & Maintenance Costs	\$25,000 / year
Assumptions:	
▪ Licensing (AutoCAD & ESRI)	
▪ Internal entering new drawings and modifying existing ones	
▪ Vendor support	

5.4 Upgrade to Sensus Centralized Remote Water Meter Reading Technology

About

The District currently uses the Vehicle Read application from Sensus to read water meters as a transmitter equipped vehicle drives through the community. Meter reads are uploaded to the billing system once the vehicle returns to the administrative offices. However, the meter reader must return to the field to manually read meters that did not read successfully. Typically, about twenty meters fail to read.

Newer “fixed base” technology from Sensus can read meters from permanent devices located on towers. The District would like to upgrade to this technology in the near future. The vendor provides a propagation study to determine the locations of towers and repeaters to provide coverage to all water users in the Rancho Murieta area.

Requirements

- Vendor will engineer the site to determine the locations for towers and repeaters to provide optimal coverage
- The physical implementation, specifically, the addition of towers to the community, must be acceptable to the RMA
- The physical design must be consistent with an implementation of a wireless network covering Rancho Murieta
- The solution must provide continuous or ad hoc meter reading to support water usage reporting so that the CSD can identify and resolve problems
- The solution must resolve the need for meter reading personnel to repeatedly go into the field to get one successful read
- Reliability of the technology must be proven
- Developer fees must be able to cover the cost of implementation for new development
- Existing residents will need to pay (in some form) for the retrofitting of the current meters
- The benefit for this technology must exceed the cost

Analysis

Automated meter reading continues to be improved by technology. The District currently employs VehicleRead; a vehicle mounted transmitter that “pings” Sensor meters and receives back meter usage data. This process only takes about 2 hours each month. When the drive through is complete, the data is transferred by floppy to AutoLoad which identifies any unsuccessful reads. Utility workers go back out to those meters and reread them with a wand. Those that still don’t read are scheduled for replacement. AutoLoad transfers the usage data to the Utility Star application for customer billing.

The latest technology offered by Sensus allows for transmitters to be placed on “fixed base” towers that automatically read the meters and report the data back to the AutoRead application. This eliminates the need for an employee to drive around the community. It also allows for more frequent meter reading, even on selected meters such as when a resident moves or when excessive watering is suspected.

The estimated costs provided by Sensus are approximately \$150,000 for the base station tower site and an additional \$50,000 for each repeater site. It also costs \$135 per meter to upgrade to the new technology (with a 20 year battery and warranty). Rancho Murieta would only require one main tower and perhaps three repeaters. Sensus can provide a Propagation Study for \$300 to determine how much equipment would actually be required.

The transmitters have a range of 3-5 miles depending on the terrain and obstacles. Sensus recommend that they be placed at a height of 100-300 feet.

Based on conversations with Sensus, the fixed based operates on its own frequency and hardware, independent of the wireless network. The only savings from implementing both would be from possible sharing of towers.

The fixed based system has been implemented in Joliet, Illinois and other locations with basement mounted systems. The results have been very positive. However, the underground transmitters used by Rancho Murieta will not be offered for fixed base until June or July of this year. Another difficulty would be that the MXUs that transmit meter data are not currently compatible with both Vehicle Read and Fixed Base. So, both systems would need to be supported until all existing meters were retrofitted with the new meter. On a positive note, Ford Hoover of Sensus said that their company would be willing to provide discounts in exchange for Rancho Murieta functioning as a reference site for the Fixed Base technology. He could not be specific, but thought there would be more answers in late summer when they begin production on the Fixed Base MXUs for the western U.S.

Conclusions / Recommendations

With current pricing from Sensus, we cannot recommend the “Fixed Base” meter reading based on employee cost savings. However, water savings gleaned from more frequent meter reading and analyzing usage may provide a stronger justification. Since the fixed based technology is a very new offering for Sensus with only one solid reference, we expect implementation prices to drop as the company gains experience with the early adopters. We suggest the District consider implementing the Fixed Base technology for new development and consider retrofitting older meters if/when it becomes cost effective.

We recommend that any Sensus requirements related to the wireless network are identified for the wireless site survey so that they are not overlooked. However, we find the current Vehicle Read program to be an efficient process for Rancho Murieta and would rate this technology upgrade as a low priority.

Estimated Costs

Propagation Study (credited to purchase price)	\$300
Base Station and Data Operations Center (includes server and Data Manager app.)	\$150,000
Repeater Site (estimated at 3)	\$150,000
Upgrade existing AMR Transmitter units (2,500 x \$135)	\$337,500
Labor to replace units (estimated at 2,500 units x \$25 per unit)	\$62,500
Acquisition and Startup Costs (Project Management & Training)	\$75,000
Estimated Total	\$775,300

Sources: Costs based on discussions with Sensus representatives and local distributor, Golden State Flow Measurement

Estimated Annual Operations & Maintenance Costs	\$30,000 / year
Assumptions:	
▪ Replace AMRs (20 year life)	
▪ Vendor Support	

5.5 SCADA

About

The Rancho Murieta CSD has identified a need to implement a facility wide SCADA system to monitor and provide remote control capabilities for the water treatment and wastewater plants, ponds, tanks, pumps, and pipes. CSD has project approval to upgrade water treatment facilities to membrane technology in 2006. A SCADA system with centralized monitoring will be implemented as part of this project for the physical area being upgraded, the Water Plant. The SCADA system implemented for the Water Plant must be compatible with the intended extension of this system to support the entire facility in the future.

Currently centralized monitoring is not possible. Data is communicated to a panel. Operators walk routes to check the panels. Alarms are autodialed to staff. Controllers are now being upgraded to support centralized monitoring. There are fifteen controllers; ten need to be upgraded. These will be completed in advance to accommodate communication to a central monitoring site.

There has been a temporary delay in the Water Plant upgrade and it has not gone out to bid yet.

Requirements

- Centralized monitoring of facilities (The Control Center will initially be at the Water Plant, but eventually the current Administration building is to be used for Operations staff and the control center will be located there.)
- Internet access for alarm response is desirable.
- SCADA data should be copied to remote data servers outside the SCADA firewall for access from outside the SCADA network. This would support monitoring, diagnosis or control from an employee's home yet still isolate the SCADA system from the internet.
- The SCADA system must be protected from other IT users and applications by firewalls.
- SCADA data would travel over the wireless network but would require dedicated bandwidth through network configuration or by using separate frequencies.
- Historical SCADA data must be available to support regulatory and operational reporting requirements.
- Appropriate cost for anticipated benefits.

Analysis

Rancho Murieta's planned Water Treatment Upgrade project includes a design for enhanced SCADA capabilities. The cost of the plant upgrade and the associated SCADA upgrades has already been estimated and budgeted by the District. At some point in the future, the District intends to move its offices to the retail center and house the Utility Monitoring and Control Center in that office. This would be an appropriate time to install SCADA equipment for the remaining sewer and wastewater systems. HDR Engineering has estimated the cost of this second phase at \$400,000 – 500,000.

To a large degree the SCADA implementation can proceed separately from other work recommended in this document. The chief area of concern is meeting SCADA needs in terms of communication over the network while maintaining protection and reliability of SCADA. SCADA requirements need to be addressed in design of the wireless network. CSD's desire to have access to SCADA information from an employee's home needs to be addressed as part of the facility wide SCADA design.

Conclusions / Recommendations

Future SCADA communication requirements to implement a CSD-wide SCADA system with a centralized Control Center need to be understood when the site survey is conducted to design the Rancho Murieta wireless network.

Designers and implementers of the Water Plant SCADA must confirm that future plans for a facility wide SCADA are understood .

CSD's requirement for access to SCADA data from an employee's home needs to be included in the design for the expansion of a remotely monitored SCADA for all facilities.

The CSD needs to plan for technical support of the SCADA/Control system.

Estimated Costs

Phase 2 SCADA implementation	\$400,000– 500,000
Acquisition and Startup Costs	\$100,000
Estimated Total	\$600,000

Sources: Information based on discussions with HDR Engineering and TESCO, which provides utility control panels.

Estimated Annual Operations & Maintenance Costs	\$30,000 / year
Assumptions:	
▪ Licensing	
▪ Vendor support and programming	

5.6 Enhance Application Support for Physical Security of the Rancho Murieta Community

About

CSD uses the ABDI security application to support the security requirements of the District. It is primarily an application for Gated Communities with resident information. It uses a third party application, ScanCheck, which reads bar codes on vehicles at the gate and displays the license plate on the guards screen.

Security incident reporting is currently a paper process. Upon receiving a call, the Gate Officer completes an incident form. He reads the information to the Patrol Officer and might look up ABDI data to forward to the officer. The Patrol Officer completes the incident report upon returning to the office at the end of the shift. Queries into incidents are accomplished by having an officer go through physical files of incidents. With paper-based files, it is impossible to query or summarize incident data such as how many animal complaints were made near a certain intersection.

The District plans to enhance the Incident Tracking capabilities in ABDI and to make this application available to the Security Patrol officers in their vehicles via the Wireless Network. This use of technology will increase the Patrol Officer's time in the field and improve their access to relevant security information.

Requirements

- Ability to track incident information for District and state reporting purposes.
- Support vehicle access through wireless network.
- Provide the ability to run queries and reports on Incident Tracking data.
- Acceptable cost for anticipated benefit.

Analysis

Wireless access by Patrol Officers will keep officers in the field and provide them with the information they need to do their job while lessening the need for assistance from the security gate personnel. ABDI can support wireless connectivity with a cell modem and using a Remote Desktop or Citrix application. However, when configured on a wireless network (as proposed in 5.1), remote devices can access the application just as if they were another wired workstation.

Greg Hall is working with ABDI to design an enhancement to the application that will provide Incident Tracking. This will allow Security Officers to write and store incident reports to the ABDI database instead of in paper files.

The application currently runs on Microsoft SQL Server (MSDE version). If it is upgraded to SQL Server 2000, the District would have access to Microsoft SQL Reporting Services, report writing tool at no additional cost. With training or consulting, reports could be developed to report incidents to the state and federal governments.

Conclusions / Recommendations

Continue to work with ABDI to develop Incident Tracking module to collect all required information.

Upgrade database to Microsoft SQL Server 2000. Migrate ABDI to the server database. Install Microsoft Reporting Services.

Implement wireless network and procure mobile devices and vehicle mounts.

Estimated Project Costs

Incident Tracking Enhancement	\$5,000
Upgrade to Microsoft SQL Server 2000 (\$6,000 per server)	\$6,000
ABDI Licenses (5 addl.)	\$12,500
Mobile Devices (5 laptops)	\$18,000
Vehicle Mounts (3)	\$1,500
Acquisition and Startup Costs	\$15,000
Estimated Total	\$58,000

Sources: Costs based on discussions with ABDI Sr. Network Engineer and information provided by Greg Hall based on previous discussions with ABDI.

Estimated Annual Operations & Maintenance Costs	\$18,000 / year
Assumptions:	
▪ ABDI Licensing	
▪ Internal hardware support (.10 full time equivalent Technician)	
▪ Vendor hardware support & replacement (3 year)	
▪ Internal training of security officers	

5.7 Additional Technology Projects

5.7.1 Centralized Call Center to support customer service

The District desires a single point of entry for all customer service requests from anyone who requires service, including residents, developers, regulators, or internal staff.

Though the request might be expressed over the internet, intranet, email, or telephone, they would all be initially handled by one process. Typically these requests would be forwarded to:

- The CMMS system as a request for maintenance response
- The ABDI system for a request for security response
- An IT Trouble Ticket system for a request for technical response (internal)
- A request for administrative response.

These service requests should be tracked and email notifications and reporting must be supported. The process for twenty-four hours a day, seven days a week, handling of these requests must be defined. Who and where are most effective at handling calls? How will the requests be translated into maintenance work orders, security incident reports, or administrative inquiries or requests? How will they be tracked and reported to CSD management and service requestors? How will residents know how to make a request?

Once this process is clearly defined, decisions can be made about software to support it. Then software can be selected to support it.

Currently many of these requests are handled by the paper-based Service Order process. Maintenance requests are entered into Qquest by a member of the maintenance staff. Security requests are hand written on paper forms by Gate Officers.

Analysis

There are many applications available for tracking customer requests. Most of them are specialized by function. For example, a maintenance request can be handled through the CMMS application, a security request through ABDI, and an IT request through a Helpdesk application. There are also Customer Relationship Management (CRM) applications that focus on gathering information and understanding each

customer. Other Case Management applications are available to track issues through resolution.

While the District can implement separate applications for each function, this is often unnecessary and leads to unnecessary expense and support. We recommend that the District define all their customer (internal & external) requests in a single process and select the one or two applications that can best meet the District's customer service goals. For example, the CMMS may handle all utility maintenance and technology work orders, while ABDI may handle all security and administrative requests. If a customer service application is determined to be necessary, we recommend the District use one of the smaller and less expensive systems such as Intuit's Track IT! or HEAT. Remedy also offers a variety of products for all sizes of organizations and all levels of complexity. Depending on the functionality and number of users, the cost can range from \$199 for a single user Track IT! to over \$100,000 for a comprehensive Remedy implementation.

Whichever application the District selects should handle service requests by phone, by email or by web application. A good example of an online service request can be found on the City of Buffalo, MN website:

<http://com2.govtsystems.com/rpbf/public/>.

Sources: Costs based on discussions with Sacramento County Public Works Department which uses Intuit's Track IT! application.

5.7.2 Automated Regulatory Reporting

The District would like a centralized database of monitoring and operational performance data collected from various sources. Sources would include data derived from SCADA, data from laboratories, data collected by Operations staff on daily routes, weather data or other sources. This would be a data warehouse used to create regulatory reports, to diagnose problems, trending or other ad hoc reporting.

This District also would benefit from software that tracked reporting requirements for regulatory compliance and permits. This would be calendaring software that would send emails to notify responsible staff about due dates for reporting.

Analysis

We did not find any commercially available applications that would automate these needs. However, we know that Sacramento County is working on a customized application and suspect that many regulated entities have similar needs.

We recommend that the District talk with regulators or fellow members of industry organizations to find out how others have met this need. If no existing application is

available, we recommend bringing in a programmer/analyst to help the district define their requirements and design a database that meets those needs. We recommend using Microsoft SQL Server since this will be the database that most District applications will be using, so it will be easy to transfer data, as necessary.

The costs of this project will vary significantly based on the actual requirements and tools used. The greatest cost will be for a software developer to design the database and customize reports. If there is no existing application to customize, a typical new development project may cost from \$30,000-100,000. Ongoing costs of approximately \$20,000 per year would primarily pay the developer to customize the database and reports to conform to new regulations and user needs.

5.7.3 Enhanced Resident Communication through email and internet

Residents want to be able to interact with District personnel and receive services through email and the internet. The District has plans to implement the ability to pay bills online as well as view customer bill history, and hopes to add other services such as reporting water quality issues, notifying security of guests, reporting water leaks, sending electronic newsletters, and so forth.

Analysis

There are numerous services that can be offered to residents through the internet. The key is developing a web site or portal that is easy to use and offers easy to find services that people are looking for. We recommend that you work with an experienced web designer to who can help you define the type of people you are targeting and offer services that meet your needs.

RanchoMurietaCSD.com is a good starting point. Its content changes frequently and is usually up to date. However, it offers limited services. The most successful web services are those which are currently provided only during office hours in person, by phone or by mail. A few examples include:

1. Viewing your bill with an option to pay (by credit card).
2. Viewing tax bills and payment history.
3. Registering a complaint about water quality.
4. Registering a complaint about barking dogs.
5. Filling out a form to request a vehicle bar code.
6. Canceling, transferring or requesting utility service.

Some of these services may be provided by existing applications such as Utility Star Platinum (bill pay), CMMS (water quality), or ABDI (barking dogs) and just need to be linked to the application. Others will require developing web applications and storing information on a local database. Web applications must also be designed with security that protects the data from unauthorized viewing and prevents access to the underlying database.

If enhancing web services is a high priority for the district, a consultant should be brought in to design a comprehensive portal with as many services as possible. However, if this is not a critical need, the services can be added over time as the needs are identified through periodic reviews.

5.7.4 Enhanced Employee Communication and Self-service Applications through secure employee intranet.

The District would like to provide a secure intranet where employees can review policies and manuals or access benefits information.

Analysis

As in #3 above, employees also want access to services after hours and through the web. However, the information on an employee web site are usually not intended for public viewing. Limited access web sites are known as Intranets and are usually password protected. Some of the services that employees can appreciate are:

1. Employee Handbook
2. HR Forms including W-4, request for time off, etc.
3. Policies and procedures
4. Benefits information with links to insurers and benefit providers
5. View paychecks, pay history and accrued Paid Time Off (PTO)
6. Employee or resident phone lists
7. Links to 401K investment options

Some of these services may be made available by links to benefit providers. Others will require developing web applications and storing information on a local database. Security is even more important when dealing with sensitive employee information.

6 Recommendations

Based on the District's requirements, we have reviewed applicable technology and spoken with vendors, customers and other municipalities. We recommend that the District consider the following technologies in priority order:

1. CMMS
 - a. Vendor demos
 - b. Define requirements and develop RFP
 - c. Select and implement product
 - d. Interface with GIS
 - e. Enter assets
 - f. Develop Job Plans and Preventative Maintenance schedules
 - g. Wireless rollout to Utility workers/vehicles
2. Wireless Network
 - a. Site Survey
 - b. Installation of Access Points and Canopy or Mesh Network
3. SCADA
 - a. Upgrade current SCADA equipment with Membrane project
 - b. Use to wireless network to carry operational data
 - c. Build Central Monitoring and Control Center
4. Geographic Information Systems (GIS) and Electronic Drawings
 - a. Implement AutoCAD to work with layers and overlays
 - b. Implement GIS application and GIS tools
 - c. Secure base drawings
 - d. Digitize existing drawings and overlay on GIS base map

- e. Interface to CMMS
- 5. ABDI
 - a. Incident Tracking enhancement
 - b. Wireless rollout of ABDI query and Incident Tracking to Patrol officers/vehicles
- 6. Sensus Fixed Base Meter Reading
 - a. Install Base Station and Repeaters
 - b. Roll out upgrades of AMR Transmitters on existing meters

The following additional projects are recommended, but are not included in the implementation schedule and budget because they have relatively lower costs and can be implemented at any time without significant impact to the other projects:

- 1. Customer Management System
 - a. Define a 24/7 customer service process
 - b. Implement a phone based process
 - c. Implement Email and Internet requests
 - d. Build Interfaces (if required) with CMMS, ABDI, Technical Helpdesk, etc.
- 2. Internet & Intranet Portals
 - a. Add bill-pay and customer service request functionality to ranchomurieta.com website through other applications
 - b. Create a password protected employee intranet to provide information about benefits, policies, employee handbook, forms, and access to benefit providers
- 3. Regulatory Reporting Database
 - a. Gather requirements and build Access or SQL Server database to collect and report required data to regulators

In addition to investing in technologies, the District also needs to invest in the organizational infrastructure to manage and secure those technologies. The following are our recommendations:

1. Hire staff to support Information Systems
 - a. Acquire a temporary or permanent IT Project Manager to support these initiatives
 - b. Network Support Engineer with Security experience
 - c. Programmer/Analyst with SQL Server and web front end experience (GIS knowledge preferred)
2. Strengthen data security policy and processes and appoint a Data Security Officer
3. Integrate security calls with an overall Customer Service Call Center process

7 Implementation Plan

7.1 Projected Costs

This section estimates the cost of each technology project recommended in the Implementation Plan. These costs are broken down into each budget year for planning purposes. The costs are estimated based on today's prices but are subject to change. All costs should be verified by vendor bids or RFP before committing funds.

	FY	FY	FY	FY	FY	
Technology Project	2005-06	2006-07	2007-08	2008-09	2009-10	Total
Wireless Network	45,000	240,000				285,000
ABDI Enhancements	5,000	55,000				60,000
CMMS	10,000	155,000	40,000			205,000
AutoCAD & GIS	20,000	45,000	80,000			145,000
SCADA		*	*	300,000	300,000	600,000
Sensus Fixed Base	5,000		225,000		550,000	780,000
Totals	85,000	495,000	345,000	300,000	850,000	2,075,000

* *Initial SCADA upgrades have been designed and budgeted in conjunction with the Membrane project. The budget for phase 2 is shown above in years 2008/9 and 2009/10.*

The following section estimates the annual cost for operations and maintenance of each technology project. This estimate includes licensing fees, maintenance fees, hardware replacement costs, vendor support and additional staff time required to support each technology on an ongoing basis.

Technology Project	Estimated Annual O&M Costs
Wireless Network	\$95,000
ABDI Enhancements	\$15,000
CMMS	\$66,000
AutoCAD & GIS	\$25,000
SCADA	\$30,000
Sensus Fixed Base	\$30,000
Totals	\$261,000

Appendix A: Employee Interviews

Employee	Position	Date(s)	Location(s)
John Merchant	Board Member	10/20/04	District Office
Ed Crouse	General Manager	11/12/04 12/28/04	District Office Phone
Greg Hall	Director of Admin	10/20/04 10/29/04	District Office
Joe Majarucon	Director of Field Operations	11/12/04	District Office
Jim Noller	Chief of Security (retired)	10/20/04	District Office
Greg Remson	Chief of Security (new)	10/29/04	District Office
Debby Bradberry	Accounting Supervisor	10/20/04	District Office
Judy Goyen	Office Asst. II	10/20/04	District Office
Jenny Griffin	Acct. Asst. II	10/29/04	District Office
Jeremy Hawk Jim Bieg	Gate Officer Patrol Officer	10/29/04	District Office
Rob McLeod	Utility Supervisor	10/29/04	District Office
Sean Montgomery	Plant Operator	10/29/04	District Office
Johnny Allen	Utility Technician		
Wes White	Equipment Mechanic	10/29/04	District Office

Appendix B: Additional Contacts

Technology	Name	Position	Location(s)
CMMS	Lee Gurley	Maximo	832-225-9194
CMMS	David Grenia	Maintain EX	916-941-7677
Customer Request	Richard Yee	Sacramento County Public Works	916-875-7141 yeer@saccounty.net
GIS	Anil Ranadive	ValueCAD	510-654-3263
GIS	Maria MacGunigal	Sacramento City GIS	
GIS	Joe Concannon	SACOG GIS Consortium	916-340-6234
GIS	Roger Exline	Sacramento County GIS	916-875-6354
Security	Dan Russo	Sr. Network Engineer ABDI	866-451-2234
SCADA	Ron Montoya Chad Webb	Tesco	
SCADA	Rich Stratton	HDR Engineering	916-817-4819
Sensus	Ford Hoover Ardell Dobsen Jim Henry	Sensus (Fixed Base Meter Reading) Golden State Flow Measurement	415-860-8435 602-321-2158 916-716-2776
Wireless	Andrew Lohmann Joan Bivens Matt Recore	Cisco	916-861-2021 lohmann@cisco.com 916-861-2007 916-813-3798
Wireless	Ryan Bill	The Murieta Group	
Wireless	Russ Carleton	LiveNetworking	
Wireless	Fred Sutherland	TESSCO	



Wireless	Leslie Green Frederick Harris	Firetide (Wireless)	408-355-7216 lgreen@firetide.com www.firetide.com
Wireless	Chris Shinnick	City of Buffalo, MN	763-682-1181 chris.shinnick@ci.buffalo.mn.us
Wireless	Tony Tull	City of Granbury, TX	817-573-9692
Wireless	Mike Timmons	President Frontier Broadband (TX ISP)	817-219-4105

Appendix C: Other Reference Information

Computerized Maintenance Management System

Vendors

Maximo

Maintain EX

CMMS Vendors Integrated with ESRI GIS Software

Software Vendor	CMMS	Internet Site
Azteca Systems, Inc.	Cityworks	www.azteca.com
GBA Master Series, Inc.	GBA Master Series	www.gbamasterseries.com
Hansen Information Technologies	Hansen's Citizen Relationship Software	www.hansen.com
Indus International	EMPAC	www.indus.com
RJN Group, Inc.	CASSView	www.rjn.com
The Synergen Series	CMMS	www.synergen.com

CMMS Links Developed by Third Parties

CMMS Vendor	Linking Software Vendor	Software Name	Internet Site
MRO Software		MAXIMO	www.mro.com
	ActiveG, LLC	MAXIMO MapEngine	www.active.com
	GeoNorth, LLC		www.geonorth.com
		Inform---Network for Management Systems, Limited	www.informgis.com

GIS

Sacramento County

ValueCAD

ActiveG

http://www.govtech.net/magazine/channel_story.php?channel=7&id=93227

Sensus Technology

http://www.sensus.com/product_01e_6.shtml

SCADA

HDR

Tesco

Wireless

Case studies

<http://www.muniwireless.com/>---A great source of information for wireless municipalities is. It offers news about municipalities implementing or planning for wireless as well as additional information about technologies, legislation and integration consultants.

<http://www.muniwireless.com/archives/000534.html> (Las Vegas, NV)

<http://www.muniwireless.com/archives/000474.html> (Granbury, TX)

<http://www.muniwireless.com/cgi-bin/mt-search.cgi?IncludeBlogs=1&search=indianola> (Indianola, IA)

http://www.ci.fullerton.ca.us/admin_serv/twg/wirelessrfp.html (Fullerton, CA)

<http://www.wirelessphiladelphia.net/> (Philadelphia, PA)

<http://www.bwig.net/> (Buffalo, MN)

<http://www.austinwirelesscity.org> (Austin, TX)

<http://www.culver-city.ca.us> (Culver City, CA)

Legislation to limit Municipal Wireless

http://www.govtech.net/magazine/channel_story.php?channel=7.0&id=93169

<http://www.thenmrc.org/archive/wifireport2305.pdf>

Internet Service Providers (ISP) that provide wireless services to communities

<http://www.pp-inet.net> (Illinois and Iowa)

<http://www.racom.com> (police and sheriff forces in Iowa)

Wireless Equipment Vendors

Firetide

Cisco

Tropos

Motorola Canopy