CHAPTER 1
INTRODUCTION

Every organization needs a vision to guide its direction. Water Plan 2020 is the latest update of the County of Kauai Department of Water's (DOW's) long-range plan. It is our vision for the next 20 years, a roadmap for the future as we enter the new millennium. The project to update the plan began in mid-1999, and was completed in early 2001. It is a comprehensive plan that covers all of the water systems of the Department of Water, County of Kauai, from Haena to Kekaha.

Serving as inspiration and guiding us in the update of the plan is the Department's mission statement:

"Together, we provide safe, affordable, and sufficient drinking water through wise management of our resources and with excellent customer service for the people of Kauai."

For the first time, the plan addresses the difficult issue of deteriorating and aging water system infrastructure (i.e., the pipes, water tanks, wells, etc.). It also examines the financial needs of our water systems over the next 20 years. As a result, Water Plan 2020 provides a roadmap to operating our water systems in a sustainable fashion that ensures the reliability of our precious water systems for our community into the future. Sustainable operation of the water systems is especially important because the Department operates as an enterprise, relying solely upon the fees it charges for water.

PURPOSE

The purpose of the Water Plan 2020 project was to develop a long-range plan to guide the DOW for future operations and to identify the needed improvements and facilities required to continue to provide safe, affordable, and reliable water service to our community in a sustainable and financially secure manner. The DOW faces a similar challenge that many utilities across the nation are encountering… aging, deteriorating infrastructure. Years of growth and expansion of our water systems now yield to the challenge of maintaining service at the level citizens of Kauai have come to expect.

The goals of Water Plan 2020 include:

- Ensuring a reliable future water supply.
- Caring for our deteriorating and aging water systems.
- Ensuring water quality by meeting changing state and federal drinking water regulations.
- Increasing our customer service.
- Operating our water systems in a sustainable and financially secure manner.

To accomplish these goals, Water Plan 2020 included the development of:

- A Capital Improvements Program (CIP) that addresses existing capacity deficiencies in our water system and how to meet future needs for water by our community.
- A Capital Rehabilitation (CRP) and Capital Replacement Program (CRPL) to repair or replace deteriorating and aging infrastructure.
- A Financial Plan that examines our financial condition over the next 20 years.
- A Water Rate evaluation that develops the rates and charges needed to support the implementation of the first five years of the 20-year plan.

The Board of Water Supply and the DOW have agreed to meet the challenge of improving and maintaining the existing water system infrastructure. Water Plan 2020 is a product of this initiative. Once the plan is completed, it will be submitted to the Board of Water Supply for adoption. Water Plan 2020 will then serve as the Department's official long-range plan.

RELATED PLANS

Water Plan 2020 is a culmination of planning efforts spread over the last 25 years. Past planning work has been incorporated into Water Plan 2020 as appropriate to make the best use of materials and work previously completed. These plans and their status or current application to the DOW are summarized in Table 1.1.

Table 1.1
Water Plan 2020 Related Plans

Plan	Status/Current Application
Water System Standards, State of Hawaii, 1985	Basis of the DOW water standards, except as modified herein.
Water System Plan, R.M. Towill, 1999	Partial water plan elements, primarily consisting of water system maps. These water system maps were used to build the water system model used for analysis of the distribution system.
A General Plan for Domestic Water/Island of Kauai, Division of Water and Land Development, Department of Land and Natural Resources, State of Hawaii, 1972	Previous water system plan. This document was used to develop the history of DOW, existing facilities (pre 1972), and original standards of design for many areas of the water system.
Kauai General Plan Update, County of Kauai, 2000	Draft population and land use planning document. This work served as the source for population and zoning projections used in Water Plan 2020.

ACKNOWLEDGEMENTS

This plan was prepared jointly by the DOW staff and a consulting team consisting of CH2M Hill, R. W. Beck, Kodani and Associates, Plan Pacific, and MacDougal and Associates. We wish to also acknowledge the Board of Water Supply, without whose leadership this project would not have been possible.

Carol Suzawa	Chairperson
Thomas Tokioka	Vice Chair
Takato Sokei	Secretary
Edwin Nakano	Member
Cesar Portugal	Member
Dee Crowell	Member
Steven Kyono	Member
Ernest Y.W. Lau	Manager and Chief Engineer
Edward Tschupp	Deputy Manager-Engineer

The Water Plan 2020 project manager was Gregg Fujikawa, who coordinated Department efforts and kept this project moving forward. In addition, the Operations Division of the DOW provided valuable input based on their field experience and knowledge of issues in the various water systems. The other DOW divisions, Water Resources and Planning, Special Projects, Engineering Design and Construction, and Fiscal also provided valuable input and guidance. The DOW administrative staff provided important public relations, clerical and computer technology support. The Water Plan 2020 project was truly a team effort of the Board of Water Supply, the DOW staff, and the consultant team.

CHAPTER 2
DEPARTMENT OF WATER ORGANIZATION

OWNERSHIP AND MANAGEMENT

The Department of Water (the DOW) of the County of Kauai is a semi-autonomous agency consisting of a Board of Water Supply, Manager and Chief Engineer, and support staff. The Board of Water Supply is responsible for the management, control, and operation of the County of Kauai's water system. The Board of Water Supply consists of seven members, four appointed by the Mayor with the approval of the County Council and three exofficio members; the State District Engineer of the Department of Transportation, the County Engineer, and the County Planning Director. The Board of Water Supply appoints the Manager and Chief Engineer to be the head of the the DOW.

The DOW operates based on fees charged for water. This means that the DOW is financially self-sufficient and receives no support from the County or the General Fund. Consequently, the DOW is responsible for setting the budget, developing a financial plan, and establishing water rates. The Board of Water Supply may also issue revenue bonds, establish rates and charges, and amend, or make changes to rules and regulations relating to the management, control, operation, and preservation of the water facility.

DEPARTMENT ORGANIZATION

The six divisions that comprise the DOW are under the administration of the Manager and Chief Engineer. The DOW is divided into two major functional areas: utility support services and core water services. The utility support services add value and support to the core business and include five divisions; Administration, Engineering Design and Construction, Water Resources and Planning, Special Projects and Fiscal. Core water services are provided primarily through the Operations Division. Figure 2.1 is an organizational chart of the Department of Water. Following Figure 1, Table 2.1 describes DOW Utility Support Services.

Figure 2.1
DOW Organizational Chart

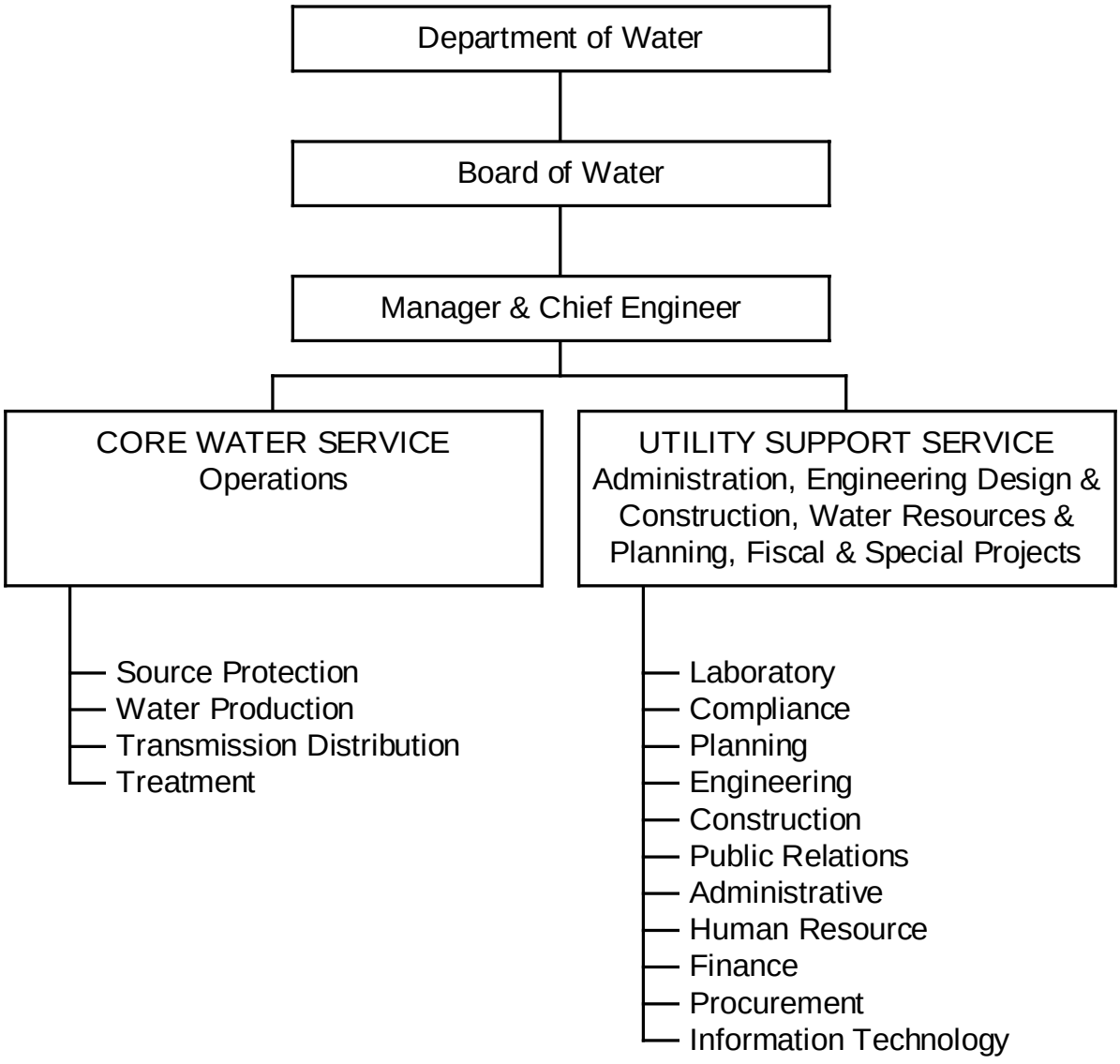


Table 2.1
DOW Utility Support Sevices

Division	Support Services
Administration	Management of The Department and support for Board of Water Supply. Communication between the Department, other agencies and the public Personnel management Clerical support Information Systems Procurement Legal
Engineering Design and Construction	Design, construction, inspection of water projects Review and inspection of private water system improvements Administers CIP and CRP programs
Special Projects	Engineering for selected water facilities improvements Water Quality testing and compliance Microbiological and chemical testing per Safe Drinking Water Act Maintenance of Water System Standards
Water Resources and Planning	Long range planning and research – Water Plan 2020 Review and planning of water systems of proposed developments Maintain engineering records and maps Hydraulic modeling Public education and water conservation Cross connection and backflow control programs
Fiscal	Cash management Cost accounting Payroll Accounts payable Utility plant accounting Consumer billing and accounting Meter reading

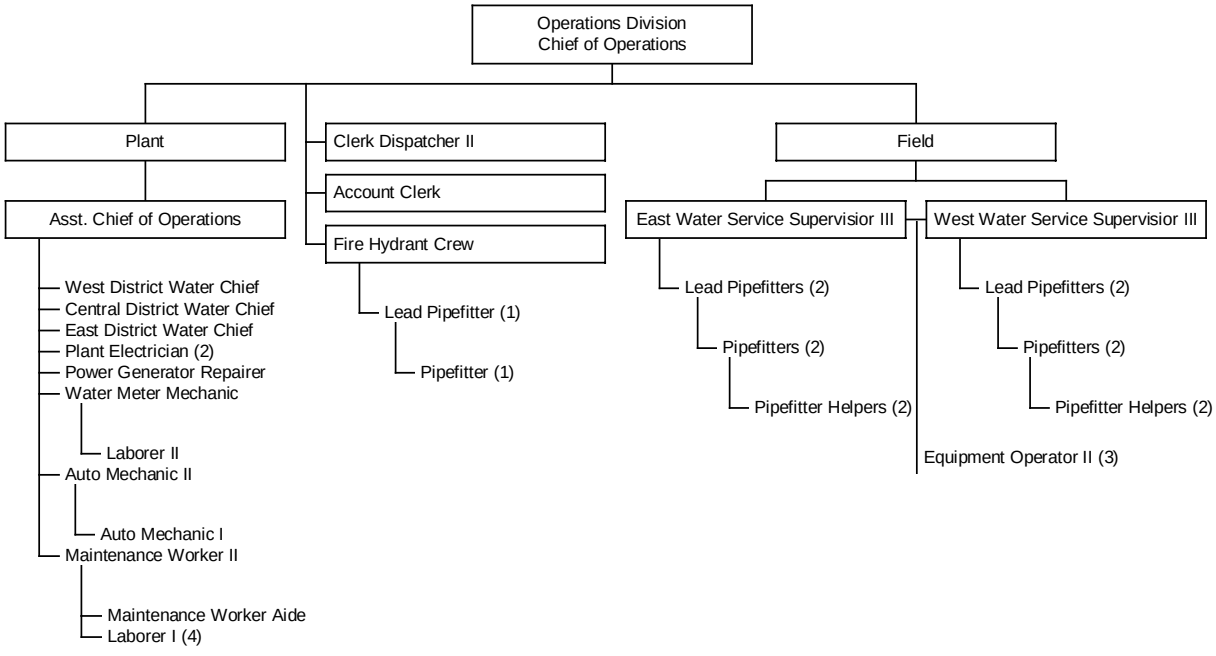
WATER SYSTEM OPERATION AND MAINTENANCE PROGRAM

The purpose of an operation and maintenance division is to assure satisfactory management of the water system operation, in accordance with Hawaii State Department of Health Regulations. This section documents and evaluates the management and personnel structure, and describes routine operation and maintenance activities.
Much of the operation and maintenance of the DOW water systems has historically been scheduled and performed on an as-needed basis. Staff responds to requests for meters, distribution system breaks, water quality monitoring, and more. The DOW is working to create a more planned and automated operation and maintenance system in the future. The DOW systems are also changing with increased source treatment. This change, combined with changes in the regulations, will require modifications and enhancements to the existing operations.

OPERATIONS DIVISION MANAGEMENT AND PERSONNEL

The Operations Division of the DOW is responsible for the scheduled and unscheduled operation and maintenance activities within the DOW. The Chief of Operations directly manages the Operations Division. The Division is divided into two sections: field and plant operations. The Chief's direct staff includes the assistant chief of operations, two water service supervisors, the fire hydrant crew, an account clerk and a clerk dispatcher II.
Figure 2.2 is an organizational chart of the Operations Division of the Department of Water.

Figure 2.2
Operations Division Organization Chart



Note: Numbers in parenthesis indicate the number of employees in these position

PLANT OPERATIONS

Under the Chief of Operations, an Assistant Chief of Operations is responsible for the water plant. This includes operations of all wells, tunnels, booster pumping stations, storage tanks, treatment facilities, and control valves (pressure reducing valves), water meters, equipment and generators. The County's water systems are organized into three districts: the west, central, and east districts, as listed in Table 2.2. The district water chiefs attend to the wells, reservoirs, and booster pump stations located within their respective districts.

Table 2.2
Plant Operation Districts

District	Water Systems
West District	Waimea-Kekaha Hanapepe-Eleele Kalaheo Lawai-Omao
Central District	Koloa-Poipu Puhi-Lihue-Hanamaulu
East District	Wailua-Kapaa Anaholoa Moloaa Kilauea-Waipake-Kalihiwai Anini Hanalei Wainiha-Haena

FIELD OPERATIONS

The field operations section is primarily responsible for distribution system activities including installation and repair of mains, service laterals, valves, and water meters, fire hydrant maintenance, and flushing. The Chief of Operations manages two water service supervisors who oversee water distribution services in their respective regions: the east and west as shown in Table 2.3, which do not correspond to the plant-side districts. This includes transmission, distribution systems, including water service connections, and valves. Each water service supervisor oversees two field crews, comprised of pipe fitters and equipment operators.

Table 2.3
Field Operation Districts

District	Water Systems
West Water Service District	Waimea-Kekaha Hanapepe-Eleele Kalaheo Lawai-Omao Koloa-Poipu
East Water Service District	Puhi-Lihue-Hanamaulu Wailua-Kapaa Anaholoa Moloaa Kilauea-Waipake-Kalihiwai Anini Hanalei Wainiha-Haena

OPERATOR CERTIFICATION REQUIREMENTS

Operation and management of public water systems is governed by the Hawaii Administrative Rules, Title 11, Department of Health, Chapter 25, and Rules Pertaining to Certification of Public Water System Operators. The rules were adopted in January 2001. These rules require certification as follows:

1. All public water systems covered by this chapter shall be under the responsible charge of an operator(s) holding a valid certification equal, to or greater than the classification of the water treatment plant or distribution system.

2. All operating personnel making process control/system integrity decisions about water quality or quantity that affect public health shall be certified.

3. A designated certified operator shall be available for each operating shift.

TREATMENT PLANT OPERATORS

Most of the DOW's current water treatment plants (WTP) are classified as Class 1 WTPs, which includes facilities employing chemical addition, such as for pH control. This means that the district water chiefs must be certified as Grade 1 WTP operators. This certification level requires a high school diploma or equivalent, one year of work experience or certification with the State as a Grade 1 or 2 wastewater treatment plant operator, passing the appropriate examination, and 1.5 continuing education units for each 3-year certification period.

Treatment additions in the DOW's future will require increased certification levels. Specifically, granular activated carbon filtration, air stripping, and membrane filtration are all classified as Class 2 WTPs. The DOW has recently installed activated carbon filtration at the Wailua Homestead Wells A and B and is considering air stripping and membrane filtration for other well facilities depending on future regulations. The Grade 2 WTP operator certification requires a high school diploma or equivalent, one year of work experience as an operator with Hawaii WTP Grade 1 certification or two years work experience or certification

in the State as a Grade 3 or 4 wastewater treatment plant operator, passing the appropriate examination, and 1.5 continuing education units for each 3-year certification period.

DISTRIBUTION SYSTEM OPERATORS

Certification requirements for distribution system operators are established based on the population served by the public water system. The DOW is classified as a public water system. Even though it operates several small to medium sized systems, the population served is the total of all systems owned and operated by the DOW. The current population served by the DOW is approximately 55,000. Systems serving more than 50,000 persons are classified as Class 4 distribution systems. The Grade 4 DS operator certification requires a high school diploma or equivalent, one year of work experience as an operator with Hawaii DSO Grade 3 certification or four years work experience or a combination of advanced degrees and work experience, passing the appropriate examination, and 3 continuing education units for each 3-year certification period.

ROUTINE OPERATIONS AND MAINTENANCE

Operation and maintenance tasks of the water system comprise routine operations and preventative measures. A summary of the routine system operations and prevention activities are presented in this section and summarized in Table 2.4

Table 2.4
Routine Operation and Maintenance

Tasks	Current Activities	Current Frequency	Recommended Activities	Recommended Frequency
Water Distribution System				
Water Main Maintenance	Repair leaks, maintain pressure and flow	As required	Develop program to for annual inspections and testing	As needed
Customer Inquiry/Complaint Response	Repair leaks	As required	Collect GPS data on location of break for entry to GIS system for improved tracking and identification of problem areas.	On–going
New Service Installation	Install new services for newly developed properties	As required	Collect GPS data on location of service for entry to GIS system.	On-going
Hydrant Maintenance	Repair leaks and repaint	As required	Operate and flush; check drain rate; lubricate as necessary; measure pressure. Replace older hydrants as needed.	3 year program
Hot-tap Water Mains	Hot tap as required for main extensions, branching, service laterals	As required	Collect GPS data on location of tap for entry to GIS system.	On–going

Tasks	Current Activities	Current Frequency	Recommended Activities	Recommended Frequency
Locate Lines	No-cost service to developers. Use available resources to identify water line locations.	As required	Collect GPS data on location of line for entry to GIS system and to update as-builts.	On–going
Valve Maintenance	Repair valves as problems arise.	As required	Operate full open/closed; uncover where buried; clean out valve boxes; repair as necessary.	Annually
Meter Replacement/ Testing	Test meters and replace as required by customer complaints	>2 inch, test and calibrate annually; replace as needed. <2-inch, test and replace every 20-years	Collect GPS data on location of meter for entry to GIS system.	On–going
Leak Detection	As needed with minimal equipment	As needed	Purchase leak detection equipment or use consultant services	On–going
Sources – Wells				
General Site and Building Maintenance	General site clean up and maintenance; check facility for security.	Per Preventive Maintenance schedule	None	N/A
Pump Motor Maintenance	Grease motor bearings; replenish lubrication to pumps that have oil reservoirs; Visually inspect for pump vibration. Pump maintenance determined by use (pumps are on running time meters).	Per Preventive Maintenance schedule	Log and record motor amperage draws; check packing; log gallons of water delivered; log pump motor hours; check motor noise, temperature and vibration.	Monthly
Chemical System Maintenance	Check chlorine remaining in 150 lb. cylinders; replace cylinders (every 3 months average); check chlorine residual (0.2 mg/L) and adjust dose if necessary; pH system maintenance at one well.	Weekly	Calibrate chlorine ejectors and pH meters. Evaluate use of hypochlorite at high-risk sites. Install new scales. Tie scale output and chlorine residual into SCADA system.	Monthly
Service Control Valves	Check and repair valves.	As required	Inspect and exercise valves. Replace as needed.	Annually
Alternate Sources at Multiple Source Sites	Alternate sources based on use.	As required	Monitor hydrology and equipment run time. Report data through SCADA.	On-going
Electrical and Monitoring System Maintenance	Replace circular charts. Check motor control center, electrical power, and switchgear.	As required	None	N/A
Telemetry Maintenance	Replace or repair SCADA, flow meters, and alarm systems.	As needed.	Check flow meter accuracy against other available data. Calibrate meters.	Weekly, Annually

Tasks	Current Activities	Current Frequency	Recommended Activities	Recommended Frequency
Booster Pump Stations				
General Pump Station Site and Building Maintenance	General site clean-up and maintenance; check facility for security	Weekly	None	N/A
Pump and Motor Maintenance	Grease motor bearings; replenish lubrication to pumps that have oil reservoirs; Visually inspect for pump vibration. Pump maintenance determined by use (pumps are on running time meters).	Twice weekly	Log and record motor amperage draws; check packing; log pump motor hours; check motor noise, temperature, discharge pressure, and vibration.	Monthly
Service Control Valves	Check and repair valves.	As required	Inspect and exercise valves. Replace as needed.	Annually
Electrical and Monitoring System Maintenance	Replace circular charts. Check motor control center, electrical power, and switchgear.	As required	None	N/A

ASSET MANAGEMENT

The Chief of Operations handles the administration, scheduling, and general management of maintenance. The DOW documents labor, materials, equipment, maintenance scheduling, and repair history. The DOW maintains water system repair log records indefinitely.

The DOW has implemented a computerized Preventative Maintenance Management Program using the software Mpet by Summit Systems. This program will tag and identify all equipment and track equipment specifications, usage, and age. The district water chiefs will use hand held recorders to enter information from the equipment during their site visits, and then download this information to a centralized computer. Based on this information, the system will generate work orders. The DOW expects that this system will establish and then regulate a preventative maintenance program for their wells, reservoirs, booster pump stations, vehicles and equipment.

This system will also be used to track distribution system equipment and maintenance, including meter installation/replacement and calibration, main repair or replacement, hydrant flushing, and valve exercising. These operation and maintenance activities will be mapped through the GIS system, coordinated with the billing process (for new meters), and itemized to inventory for ordering of new materials and supplies.

SCADA MAINTENANCE AND MANAGEMENT

The DOW will be implementing system wide Supervisory Control and Data Acquisition (SCADA) programs, that will result in increased planning and automation of the water system operation and maintenance.

The existing SCADA system incorporates alarm dialers to contact the DOW either directly or through the fire departments so we can dispatch crews when tank water levels, and system pressures are inadequate or pumps fail to operate. The new system will be designed to allow for not only notification of alarm conditions but also complete supervisory and operational control from the main operations base. The new SCADA system will use radio frequency control to replace the existing phone-based system. The design of the new SCADA system is scheduled to be complete in 2001.

The implementation program has not yet been determined, but may involve phased implementation at select water systems over a 3 to 5 year period. One phasing approach would involve installation of equipment in the water systems closest to the operations base in Lihue to give the operators time to get familiar with the new systems at a nearby location. The other alternative would involve equipment installation at the most remote locations to reduce the need for travel to the outer areas of the DOW system. The implementation alternative will be further reviewed upon completion of the SCADA system design.