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Proposal for the Purissima Hills Water District

EchoShore[®]-DX Leak Monitoring

Prepared for: Patrick Walter

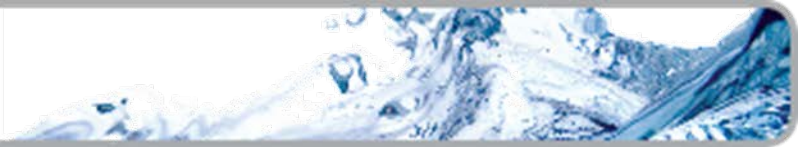
Prepared by: Charlie Fricke

Echologics, LLC

Proposal Number: 42219002

Date: January 11, 2019





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Proposal Number # 42219002

Purissima Hills Water District
Attention: Patrick Walter
26375 Fremont Rd.
Los Altos Hills, CA 94022

Re: EchoShore®-DX Permanent Leak Monitoring Service

Dear Patrick,

Echologics is submitting this proposal for a leak monitoring system to serve as a pilot for a yet-to-be determined area in Purissima Hills Water District. The designated deployment of this technology will monitor for leaks on distribution mains and enable the District to determine the benefits of monitoring as well as how to further deploy the technology in other areas of their water distribution system.

EchoShore®-DX is designed to improve service by detecting emerging leaks and preventing damage from catastrophic leaks on surrounding infrastructure. To support easy reliable service, each EchoShore-DX leak monitoring system includes the following features:

1. Leak sensors integrated into a fire hydrant cap that is custom manufactured to match the pumper caps of the Los Altos Hills County Fire District's hydrants, with zero impacts to customers, fire services, and water operations staff.
2. Each leak monitoring sensor is connected to the water distribution system **above ground** in a fire hydrant cap. Fire hydrants are a reliable acoustic connection to the water network avoiding the deposits and harsh conditions in valve boxes that degrade performance and accelerate wear out.
3. The patented sensor and signal processing system enables early detection of leaks and quick intervention. Rapid response results in savings from reduced water loss as leaks will be found earlier and further reducing the risk of damage to surrounding infrastructure.
4. Leaks are automatically identified every day. The acoustic sensitivity of the system, combined with advanced signal processing algorithms, minimizes false positive leak warnings.
5. The system data analysis and reporting software is entirely web-based for easy access and improved customer support.
6. Leak nodes feature field replaceable batteries, reducing the overall life cycle system cost.

We look forward to your feedback on the proposed deployment of EchoShore®-DX in the Purissima Hills Water District water system.

Yours truly,

Charlie Fricke
Echologics Regional Manager
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(702)-280-0789

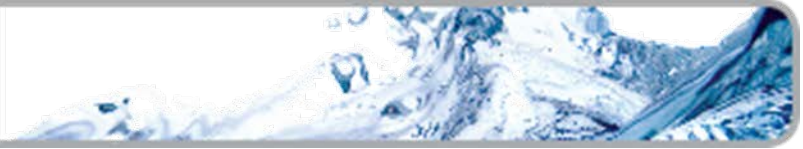
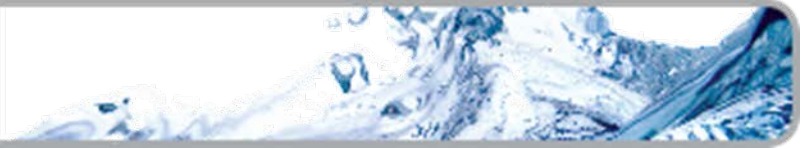


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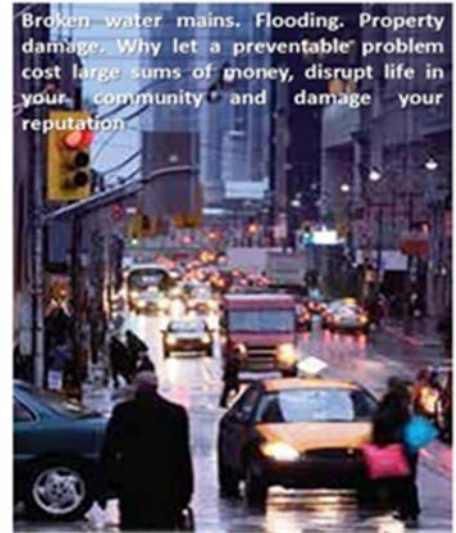


1. Project Understanding – Business Case

Purissima Hills Water District wishes to deploy a leak monitoring system on a pilot basis to determine its capability to pinpoint leaks as they first form thereby saving water and reducing the threat of catastrophic water main breaks.

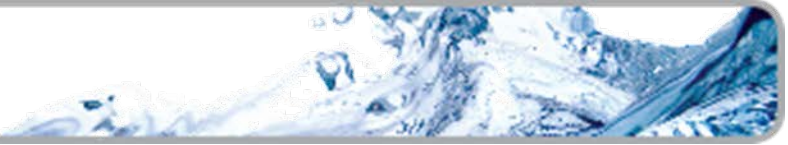
Echologics understands that the District needs to minimize water loss, including minimizing costs associated with lost water, labor costs for water main repairs and customer service disruptions. Customer service disruptions undermine public confidence and can cause significant retail and business losses within the community. Leaks happen anytime, anyplace with unpredictable frequencies, thus requiring constant monitoring.

EchoShore®-DX incorporates the latest generation of acoustic sensors capable of identifying extremely faint acoustical noises emitted by leaks before they become detectable by conventional methods. Echologics integrated leak monitoring sensors directly into a standard fire hydrant cap. Rapid detection capability enables utilities to prioritize repairs based on actual need and the most effective allocation of repair crews.



ECHOSHORE®-DX PLATFORM - SYSTEM BENEFITS

- ✓ Identify leaks early
- ✓ Monitor leak progression
- ✓ Prioritize field crew schedules
- ✓ Significantly reduce pipe repair costs
- ✓ Achieve non-revenue water loss targets
- ✓ Minimize service disruptions



2. Echologics Company Background

For more than 150 years, the companies that make up Mueller Water Products have provided products and services to deliver safe, clean drinking water in the United States. Echologics, a division of Mueller, is exclusively focused on providing leak detection and condition assessment solutions to the water industry. Founded in 2004, Echologics' mission is to provide the water industry with pipeline investigation tools that work from outside the pipe. Through the design of superior equipment and supported by an entrepreneurial, innovative company culture, Echologics has evolved into a full asset management solution provider. Echologics provides proprietary leak detection, condition assessment and non-revenue water management products and services throughout North America and around the world.

Maintaining and upgrading America's water pipelines is a pressing infrastructure challenge for the next two decades. There are 1.2 million miles of water pipelines in United States. The AWWA estimates a 1 trillion dollar investment in water pipes is required over the next 25 years. New, efficient solutions are needed to leverage limited replacement and rehabilitation budgets and manage infrastructure as it ages. Echologics' acoustic leak monitoring assessment is an innovative tool to help utilities identify water leaks as they start and prevent damage to nearby infrastructure. In the United States, Echologics has installed fixed leak monitoring networks in water systems located in Washington Suburban Sanitary Commission, New Jersey American Water, San Jose and many others.

The EchoShore-DX system is Echologics latest innovation that pairs best in class leak detection technology with integrated communications and Mueller's reliable hydrant manufacturing expertise. EchoShore-DX distribution pipe leak monitoring system identifies leaks daily with no changes needed to existing infrastructure or operating procedures. Cost effectively identifying leaks as they form can improve the efficiency of repair crew deployment, reduce damage to other infrastructure caused by pipe breaks, and improve customer service.

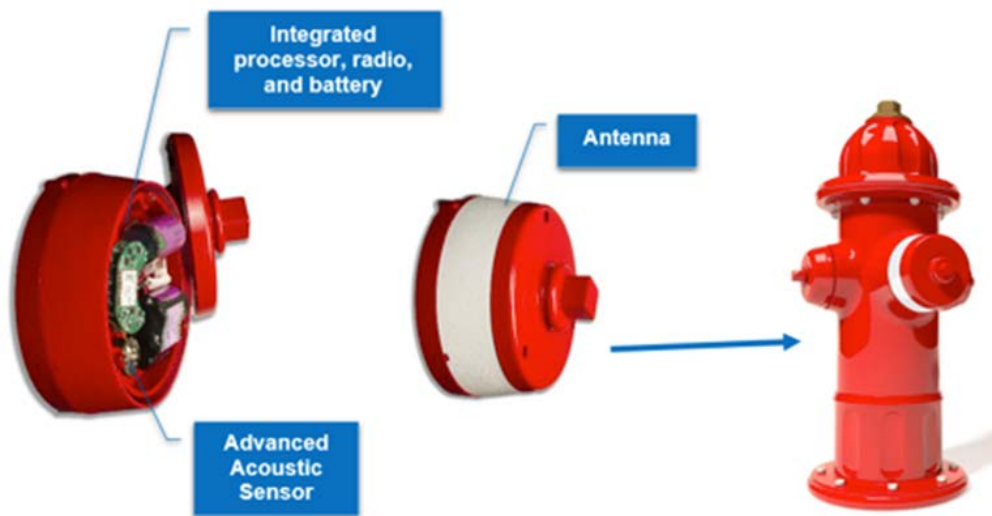
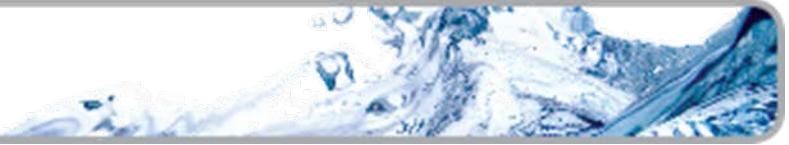


Figure 1 EchoShore-DX Sensor Integrated Into a Custom-Made Fire Hydrant Pumper Nozzle Cap – Each hydrant cap leak monitoring sensor is referred to as a “node”



3. Project Methodology – EchoShore®-DX Leak Monitoring

The EchoShore®-DX automated leak monitoring system integrates acoustic-based leak detection technology from Echologics with integrated communications over an AMI network or the cellular communication network. Both communications solutions are equally effective. This proposal is for a leak monitoring system that uses the cellular network for communication. EchoShore-DX patented, proprietary design is the only above ground, fully autonomous water distribution leak monitoring system currently available on the market.

3.1 EchoShore-DX Leak Detection System

The EchoShore-DX leak monitoring system consists of a network of leak detection sensors referred to as nodes. A node incorporates a cellular communications radio, GPS locator, antenna, acoustic sensor, on-board processor, and a battery power source. Each node is housed in a custom manufactured cast-iron fire hydrant pumper nozzle cap.

EchoShore-DX nodes can be installed on any site by replacing existing fire hydrant pumper nozzle caps with nodes. EchoShore-DX nodes are installed on fire hydrants throughout the service territory at distances required to meet effective coverage. Nodes are typically spaced at an average of 500-900 foot intervals and can detect leaks over a distance of up to 1,100 feet. The EchoShore-DX system scans the monitored area for the presence of leaks daily. EchoShore-DX nodes record acoustic data from the pipelines before generating and wirelessly transmitting recorded sound files over the cellular or radio network to the head-end host software system, which is a cloud-based internet solution.

Leak monitoring system operators can view the locations of leaks and review historic data to determine if immediate repairs need to be made. Detected leaks are easily viewed by water operators through the web user interface. Figure 2 shows an example of the web user interface.

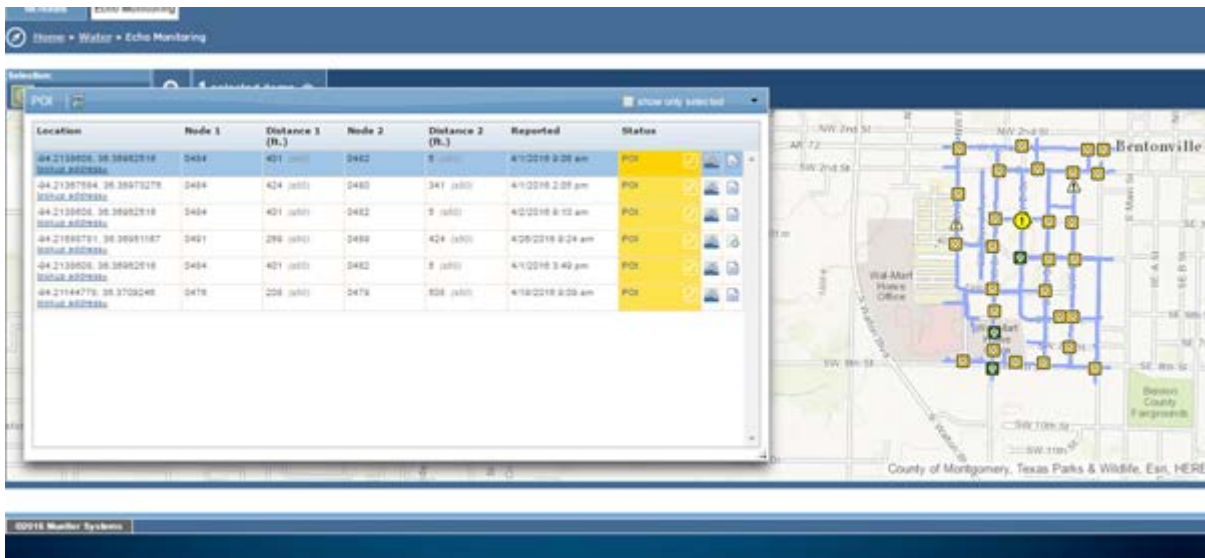
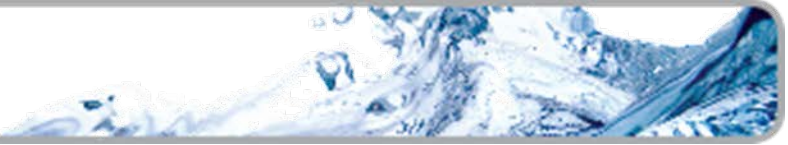
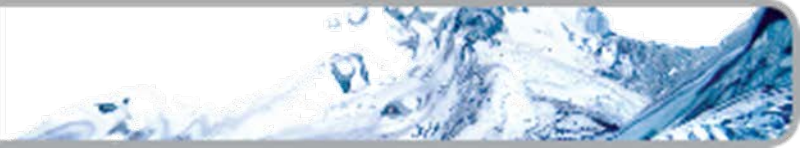


Figure 2 User Interface: Graphical and visual display of system status on the web user interface



4. EchoShore®- DX Leak Monitoring System Design

Echologics is yet to receive the GIS files that would constitute the scope of the proposed pilot. Once Purissima Hills Water District determines the designated distribution mains to be monitored and provides the respective GIS files, a leak monitoring sensor network map will then be provided. This proposal will be issued with a revision number and updated map to show the placement of the EchoShore-DX nodes.



5. Typical Project Workflow & Leak Detection Monitoring Services

5.1 Typical System Design and Installation Project Workflow

EchoShore®-DX is a distribution pipe leak monitoring system. Part of Echologics success with the EchoShore® platform is collaborating with the operators who manage each unique water distribution network. Informed partners who adopt the EchoShore® system and tailor it for their own operating context are Echologics true success stories. Where possible, the project workflow includes opportunities to share system information & best practices.

Echologics will take the following steps to design and deploy Purissima Hills Water District's EchoShore®-DX system:

1. Project Planning

Purissima Hills Water District provides the location, diameter, hydrant location and material of pipe network. Echologics will design a leak monitoring sensor network that optimizes the network coverage with the minimum sensors. This step has been substantially completed for this project.

2. Site Inspection

An Echologics Field Specialist will visit the Purissima Hills Water District to ensure that the site conforms with the initial system design. Acoustic testing may be completed on site to verify the design parameters. Final steps needed to tailor the system to the local environment will be taken. Further, the site visit may verify the number and type of each custom fire hydrant pumper cap to be produced.

3. Custom Hardware Creation

On receipt of purchase order Echologics will work with System Design and Installation Project Workflow to manufacture custom caps for each hydrants type and color that is in the project area. A typical hardware design and production timeline is shown in Figure below.

4. Hardware Installation and Commissioning

Echologics Field Specialists will return to install the EchoShore®-DX nodes and complete system commissioning tests.

5. Solution Training

Echologics Field Specialists will provide detailed training to Purissima Hills staff on the use and interpretation of results on the web-based user interface.

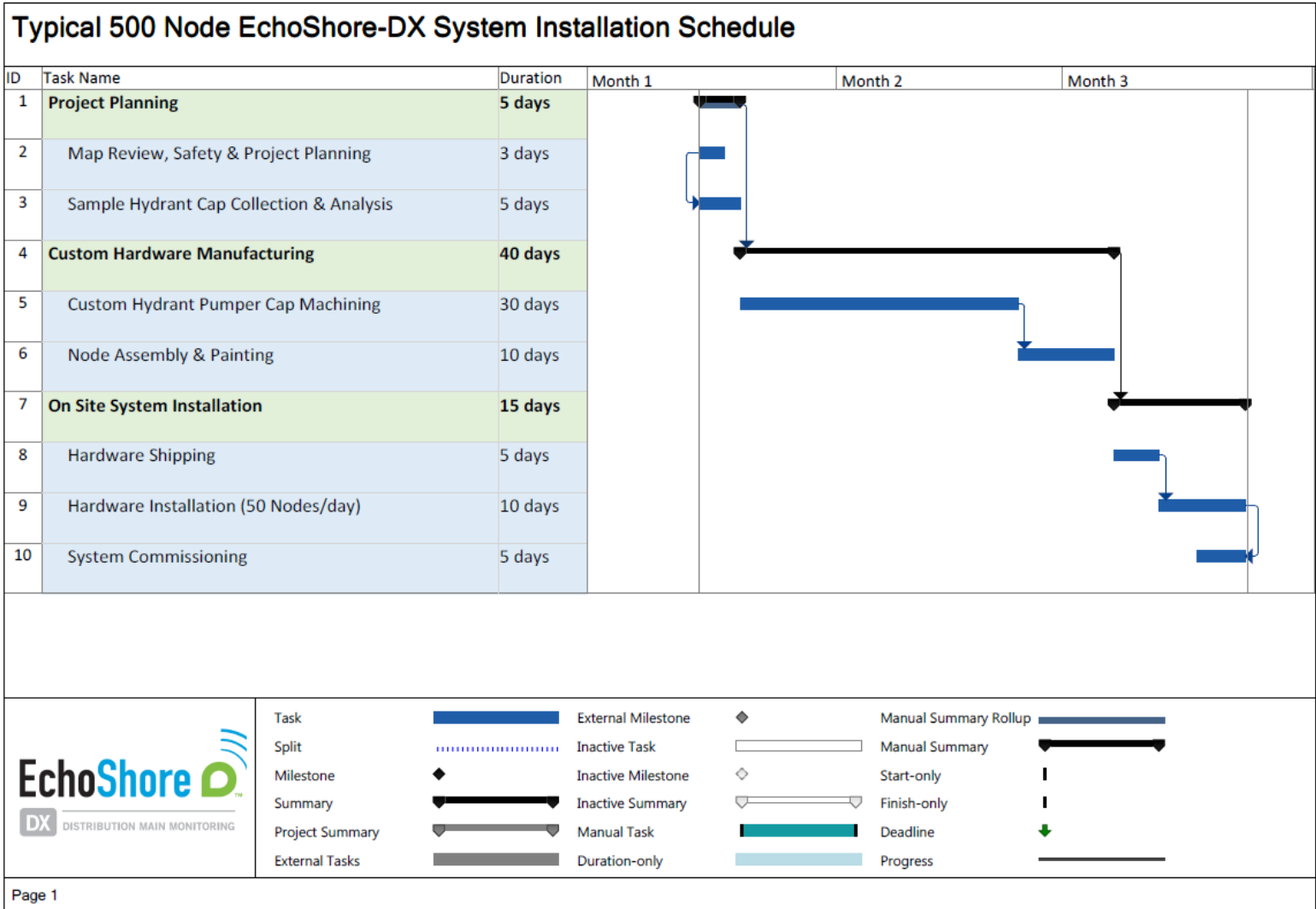
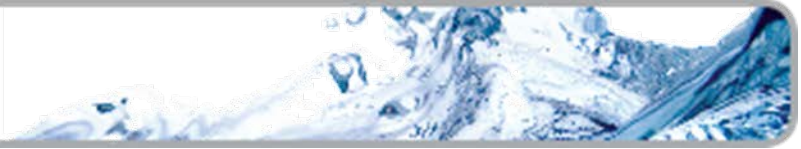


Figure 3: Typical EchoShore-DX Installation & Commissioning Timeline



5.2 Echologics Responsibilities

1. Identify appropriate locations for all EchoShore®-DX hardware using guidance from Purissima Hills Water District. Final locations will be approved by the District.
2. Analyze sample hydrant pumper cap & design custom matching hardware.
3. Manufacture & Install leak custom designed monitoring nodes.
4. Set up network communication between the EchoShore®-DX nodes and the head end system integrated with the web user interface.
5. Set up a customized website for the District to monitor for leaks and anomalies on their water network.
6. Make available one Echologics project manager to conduct product hardware, software and service tool training for the District
7. Conduct 1 day of system training to familiarize the District's operations staff with the leak monitoring operations software interface and system management.

5.3 Purissima Hills Water District Responsibilities

1. Approve and advise installation locations for EchoShore®-DX network hardware.
2. If needed, provide traffic control during installation of network hardware.
3. Approve locations selected by Echologics for EchoShore®-DX nodes and repair hydrants to a working condition if needed.
4. Flow hydrants to support commissioning and testing of the EchoShore®-DX system.
5. Identify one person as a primary user to provide a single channel of communication between Purissima Water District and Echologics.
6. Operate the leak monitoring site when it is live and take appropriate action when leaks are identified.

5.4 Leak Monitoring Options

Echologics offers a core monitoring service and an enhanced service for clients actively pursuing non-revenue water excellence.

Basic License

The Network Operations Center (NOC) constantly monitors and supports the health of Echologics hosted solutions. Basic license includes services provided by the Network Operations Center (NOC) data transfer over the cellular network and core elements of network maintenance for the leak detection web interface including software upgrades and firmware upgrades for the field deployed hardware

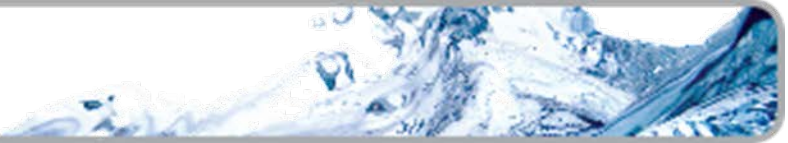
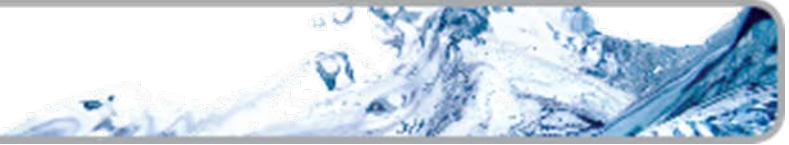


Figure 4: Wall panel of the NOC in Middleboro, Massachusetts

Managed License

The Managed License is an upgraded and enhanced service that includes access to remote support from Echologics leak detection specialists through the Leak Operations Center. This support service can be used for troubleshooting, knowledge sharing, and best practices for use of the EchoShore-DX system and general leak detection approaches that have proven successful in the field. Connecting front line operators with leak detection experts who have conducted hundreds of leak investigations in the field and now manage systems of thousands of leak monitoring sensors daily is a powerful combination that drives system success.

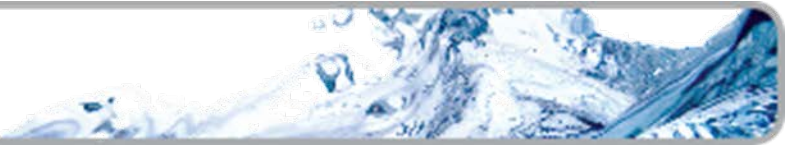
The managed licence option includes all of the support items identified in the basic licence option.



6. Scope of Work and Supply

The following is the proposed scope of supply for the Purissima Hills Water District EchoShore-DX leak monitoring system

| Item | Description | Quantity |
|---|--|----------------------------------|
| Leak Monitoring Nodes | Includes data logger, cellular communication module, leak sensor. Incorporated into a custom pumper nozzle cap for installation on standard fire hydrants. Installation & commissioning included. | 30 |
| Head-End System & Application Software | Cloud-based & Licensed | 1 |
| Project Management | System installation, commissioning, and start-up | Lot |
| Project Training | 1 Day of Leak Monitoring System Training with Echologics Project Manager | 1 |
| Leak Monitoring Licence | Managed] Leak Monitoring Service | 30 endpoints annual recurring |



7. Investment Information

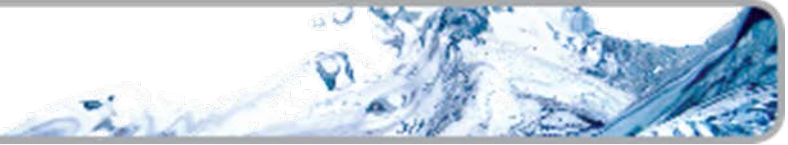
Table 1 outlines the investment information for the proposed EchoShore®-DX leak monitoring system, using a cellular based communications network. Purissima Hills Water District selected the *Managed Leak Monitoring Service*. EchoShore-DX has a 10-year design life with a 5 year field replaceable battery.

Table 1: EchoShore-DX Leak Monitoring System with Cellular Communications

| Purissima Hills Water District EchoShore-DX Leak Monitoring System | | | | | |
|--|------------|------------|-------------------|----------|--------------------|
| Equipment Fees | | | | | |
| Item Description | List Price | Sale Price | Unit | Quantity | Extended Rate |
| Installed EchoShore-DX Node | \$1,117.00 | \$1,117.00 | Per node | 30 | \$33,510.00 |
| Equipment Total | | | | | \$33,510.00 |
| Monitoring Fees | | | | | |
| Item Description | List Price | Sale Price | Unit | Quantity | Extended Rate |
| Managed Leak Monitoring Service | \$100.00 | | Per node per year | 30 | \$3,000.00 |
| Monitoring Total | | | | | \$3,000.00 |
| Total Project Fee First Year | | | | | \$36,510.00 |
| Battery Replacement | | \$58.00 | Per node | 30 | |

The pricing is in United States Dollars and valid for thirty days. Prices do not include any applicable taxes. Product prices are FOB Echologics. The prices listed include onsite system installation. Replacement battery prices quoted are FOB Echologics and do not include installation. Should any civil works or traffic control be required for installation, this would be the responsibility of Purissima Hills Water District.

In case of design modifications please refer to unit pricing in Exhibit B.



8. Future Development

There is currently a drive towards connected devices around the globe. A network of uniquely identifiable devices that communicate have formed the basis of what is known as the Internet of Things (IoT). Driven by increasing connectivity, commoditized sensor technologies, improved analytical tools and cloud – based platforms, IoT is changing global businesses and governments.

Below are common challenges utilities face that can be addressed with data-driven solutions:

- Aging Infrastructure

Traditionally, utilities replaced parts of their water mains or distribution networks without having access to information about the condition of the pipes. In many cases, entire lengths of pipe were in good condition, with only parts of them needing immediate replacement. Gathering actionable data about the water network enables utilities to decide on rehabilitation schedules and the methods used, with focus on intelligent capital and operational expense planning and controls.

- Aging/Retiring Workforce

With the average age of water utility operators currently standing at 55, water utilities face the retirement of a large portion of their workforce in the next 10 to 15 years. Along with the loss of skilled personnel will come the loss of system knowledge accumulated over their careers. IoT technologies will play a critical role in helping to avert this, through the capture, centralization and sharing of data that secure collective utility expertise for future generations of water network operators.

- Non-Revenue Water Management & Leak Monitoring

Utilities face pressure to reduce water losses from both an environmental and financial standpoint. Robust, advanced leak detectors and algorithms enable utilities to differentiate between abnormal consumption (e.g., a running tap or a home pipe break) and leak events in the network. This capability can help prioritize repair needs based on the severity and location of the leak.