Engineering Overview and Analysis of the Herron Island Water System

System Description

The Herron Island Water System serves the properties of Herron Island west of Key Peninsula in Pierce County, Washington. The service area includes all 521 tax parcels and 3 tracts on the island with 405 assessable units.

The properties are broken down into the following categories:

62 full time residences
211 vacation residences
144 recreational properties
12 community properties
95 vacant/double/unbuildable lots

The water system facilities are comprised of two wells, a newer 91,000 gallon reservoir, booster station, and distribution system comprised of 4-inch AC (asbestos cement) and 2-inch PVC pipe. The wells, reservoir, and booster station all appear to be in very good condition with some components requiring minor operation and maintenance attention. The exact condition of the distribution system is unknown.

There are several "housekeeping" items that should be addressed in the pumphouses and around the wellsite such as: cleaning, sweeping, and generally getting the site a little more organized. All potential contaminants within the 100-foot Sanitary Control Area (fuel tanks, etc) should be removed or have secondary containment 150% of the potential volume.

Operations and Management

The system is managed by Scott Schulz under certified operator, Michael Davis. He has overseen the daily operations, assisted in system planning and upgrades, and overseen repairs as well as implemented several system improvements over the years. As long as Mr. Schulz is willing to serve as the system's operator and work together with the board and other personnel, we see no reason to recommend any change in water system management. However, we do recommend that Mr. Schulz provides adequate training and/or provides the system with extensive notes or a report about the system.

Unfortunately, we have seen too many communities that lose all knowledge of their water system after an operator moves away, has health problems, or otherwise is unable to share their invaluable knowledge of the system. Most communities greatly under value the knowledge and services provided by their operator. We do not know the specifics involved with your operator, but encourage you to regularly show him your appreciation for being the guardian of one of your most important resources.

If, in the future, when Mr. Schulz retires or moves, we recommend that the community investigates hiring a certified operator from within the community, or carrying a contract

with a Satellite Management Agency. Each has its own advantages, which can be explored at that point in time.

Leakage

As all other parameters of the water system appear to be in good condition with no need for immediate attention, the rest of this report will focus on the distribution system. In our experience, a system such as yours should have an Average Daily Demand (ADD) of about 200 gpd per connection.

In the draft Water System Plan (WSP) prepared by Montgomery Water Group average daily water use for the entire system was 30,000 gallons per day (gpd). If this is divided by the number of full-time residences, plus vacation home and recreation usage averaging 25 days per year, we find that Average Daily Demand (ADD) is 348 gpd. If all residences were treated as full-use homes, ADD would be 109 gpd.

The peak month listed in the draft WSP reports a water use of 81,000 gpd. Assuming half of the homes are occupied, plus 15 home's worth of recreational lots (Equivalent Residential Units), this gives us an ADD of 540 gpd, which is right in the range of what one would expect for your system, and perhaps even be a bit low.

The question remains: What does the above analysis tell us? As previously stated, one would expect an ADD for your system of about 200 gpd. If we make assumptions based upon the amount of usage by vacation properties, and what water use "should" be we can estimate leakage. While all these assumptions result in a lesser degree of accuracy, we can determine with a relatively high degree of confidence that it appears as though your system may have some leakage, between 0 and 9 gpm, which is very manageable.

We regularly work with Glen Doyle of Leak Finders West who only charges systems $65 per hour and only charges the system if he finds leaks.

As we analyze the history of your system's usage, it appears relatively stable over a five year period. This stability indicates that your distribution system is generally in good condition. A poor distribution system tends to have large variations in water usage as leaks become worse, then catastrophic, get repaired and then the cycle starts over with other small leaks, worsening. Since your system has had stable usage, it would appear that any leaks that you do have are either small, stable leaks that can be found and then repaired, or that the leaks are on private homes or recreational lots.

Systems with a large number of recreational lots and a flat rate often have leaks that are beyond the shut-off because plumbing for recreational lots is sometimes temporary in nature and tends to deteriorate and leak over time.

The system also has a history of passing the coliform bacteria tests. This is also an indication that the distribution system is in good condition. Assuming that your coliform samples are being collected throughout the distribution system at representative sites, the

lack of failed samples is an indication that the distribution system is in good condition. Leaks in the distribution system often result in failed coliform tests.

Distribution System Characteristics

Even though the data indicates that your distribution system is in good condition, it is an aging system and needs at least some degree of upgrades. Properly installed pipe (both Cement Asbestos (CA) and PVC) in the right conditions will last over 100 years. CA pipe will become soft and begin having problems after about 40 years in poorly drained, acidic soils.

The Municipal Water Law has been put into affect and requires that you install service meters on all active connections by January 22, 2017. Your system also could use additional blow-offs and isolation valves, although these items should be viewed as more of a luxury than an immediate need as long as current reliability and water quality are acceptable. Nevertheless, regardless of the direction the community chooses to take, service meters will need to be installed. The cost range for meter installations for all 422 active connections is $340,000 to $170,000 depending on who completes the installation and whether the installation is completed as part of a distribution system replacement, or as a separate service meter installation project.

Fireflow

The water system is also currently incapable of providing fireflow. The decision as to if, to where, and how fireflow is provided should be addressed in any future plans. Your current reservoir has adequate capacity for fireflow; however, your distribution system will not support the flow needed to supply a fire truck. Insurance costs, response times, and capital investment costs should all be considered when evaluating fireflow.

We have completed a very brief analysis. It appears as though it would be most advantageous to replace the existing mains with mains capable of supporting fireflow when the community decides that it is time to replace the mains or any section thereof. The difference in capital investment between replacing the existing lines that would be needed to support domestic use only and the lines that could support fireflow are likely offset by savings in insurance premiums and the need for individual home sprinkler systems on new construction. The final decision for this point will primarily be a reflection of the values and needs of the community. The following is a list of advantages and disadvantages associated with providing fireflow:

Table 1: Fireflow Parameters for Herron Island

Advantages	Disadvantages
Likely Insurance Savings	~50% greater capital investment
Reduced # sprinkler systems in new construction/remodels	Will likely never be needed unless a volunteer program is in place
Good response time if volunteer program ever becomes active	Greater on-going repair costs
If installed in stable soils, may last longer	Installation more complicated, poor work can cause pre-mature failure
Headlosses do not need to be taken into account for regular use	

Analysis of Alternatives and Options

The water system has two primary options before them: retain ownership and control of the water system or turn over ownership and control of the water system to another entity (PenLight). The following is a list of Advantages and Disadvantages associated with giving the system to Pen Light

Table 2: Advantages and Disadvantages of Giving Over Ownership

Advantages	Disadvantages
Less Hassle	Increased Costs
Able to Obtain Internal Loans/Funding	No Control Over Rates
Non-emotional, third party decision makers	Lose Control of the Water System (water quality, chlorination, desired upgrades)
Often provides more stability and continuity	Cannot hold operators and contractors directly responsible
	May involve loss of real property that could otherwise have dual uses (combined park and wellsite, for example)
	Loose control over policies (how to handle late payments, charges to community owned properties, connection fees, shut-off policies)
	Community looses desire to act in the best interest of “their” water system
	Loose flexibility and ability to change based on community wants and needs
	Turning over ownership is a one-way transaction with no chance of going back

As you can see, there are more disadvantages than advantages. However, many communities decide that the number one advantage of relieving themselves of all the hassle associated with operating a community water system is worth the greater expense and loss of control. We cannot provide the community with a solid recommendation as

to whether it is better to retain or turn over ownership of the system. This decision must be made on the basis of community values and needs.

We have heard many arguments for and against various communities turning over ownership of their water systems. Many half truths and misunderstandings are almost always presented. We can state with a high degree of confidence that in the end the debate should be decided on whether the reduction in hassle is worth the extra cost and loss of control.

We can speak to this without bias because we currently do PenLight's engineering, so we will most likely do any design work needed for your system either way. In fact, if you give the system to PenLight we will likely charge more for the engineering services because PenLight has a higher level of bureaucracy and requires more effort on our part.

PenLight Ownership

If ownership is given to PenLight, there are not many sub-options. PenLight will have the system designed and built to their standards and then charge you a rate to get the necessary return on their investment.

PenLight may consider purchasing the water system from you after you have overseen the upgrades yourself. You could certainly complete the installation for less money than PenLight. However, PenLight may not be interested in this arrangement and the main reason for turning yourself over to PenLight is to avoid hassles.

HMC Ownership

There are several options available if HMC retains ownership:

1. Levy and assessment or obtain a loan and replace the entire distribution system capable of fireflow and install all service meters at once (~$1.5M, or ~$3,700 per assessable unit).
2. Levy and assessment or obtain a loan and replace the entire distribution system without capability for fireflow and install all service meters at once (~$1.0M, or ~$2,500 per assessable unit).
3. Levy an assessment to install service meters to every active connection ($324,000, or $800 per connection (may be as low as $650 per connection)
4. Save money in a reserve account to complete the service meter installation program.
5. Replace the distribution system as funds become available. Install the balance of service meters before 2017.

Your distribution system appears to be in adequate condition. Your system is not in a "state of emergency" where there is great urgency to replace the distribution system immediately. The primary advantage to replacing the entire system within the next nine years is that there will be a savings in service meter installation because it is less expensive to replace the service meters as part of a distribution system replacement project while the facilities are all excavated anyway than to find each connection point, dig it up, and install a meter with the associated equipment. This savings is

approximately between $101,000 and $162,000, or about 10% of the cost of replacing the entire distribution system. While this is a significant savings, the cost of borrowed money either privately, or through PenLight, would quickly surpass any reduction in cost because the service meters were installed in conjunction with a line replacement.

Therefore, if financial considerations are the primary factor in choosing the method of moving forward, the only logical way to replace the entire distribution system in the short term is to fund it out of system reserves and/or a special assessment. Any other option would be to spend more than you would save.

Since there is no pressing reason to replace the entire distribution system, it appears most prudent to replace it as funds are available. For example, the distribution system could be replaced over a twelve year period of time in three different phases.

This replacement program should be part of an agreed upon plan and criteria. The following criteria should be evaluated:

1. Condition of Existing Pipe
2. Number and Nature of Leaks
3. Necessity or Desire for Fireflow
4. Other Work to be Completed (is the road to be torn up anyway?)
5. Ability to Pay for the Upgrades

For example, even if the distribution system is in perfect condition, the community may desire to go forward with a replacement program based solely upon the desire for fireflow.

Similarly, the community may choose to install all of the service meters to gather information first and then discover that they have significant leakage, especially in the AC pipe. Therefore, the community may choose to replace all of the AC pipe in a relatively short period of time and then slowly replace the other lines later.

Obviously, any combination of these options could be employed.

Grants and Loans

Systems nearly always inquire regarding grants and loans. Because your system is generally in good condition, and because you are not in a “low-income community”, your chances of receiving a grant are virtually impossible.

You may be able to qualify for a low interest loan through the State Revolving Fund or USDA Rural Development Program; however, these funds are also prioritized based upon need. In addition, they are generally not being granted for distribution system projects because their intent is to help systems address public health issues and not help system just comply with regulations.

Even if you did qualify for governmental funding, we would recommend that you fund your projects privately. The programs all come with strings attached (extra studies,

prevailing wage requirements, public notification, etc) all of these have additional costs. It is not unusual to end up increasing the project cost by more than 50%. Since much of this extra work needs to be completed or coordinated by the engineer, we need to charge at least twice what we normally would. These programs are vital however, for communities that have no other options.

Other Needs

It appears as though your system has more connections than are approved by the Washington State Department of Health. This is not at all unusual as recreational sites or cabins are often forgotten, or recreational properties slowly become full residences over time.

You appear to have more than enough capacity to serve all the lots on the island. In order to obtain approval for additional connections, you would most likely need a capacity analysis and a Small Water System Management Program (SWSMP). You can complete the SWSMP yourself, or we can complete it for $3,000. A formal capacity analysis and project report for the purpose of gaining additional connections would cost approximately $8,000. If we were to complete both a distribution system design report and a capacity analysis, there would be an overlap of about $3,000 worth of work between the two projects.

Summary

Herron Island is served by an aging system that appears to be generally in good condition. The system's immediate needs are to complete a little housekeeping in and around the pumphouses and develop a plan to install service meters (state requirement). Replacement of the distribution system may also be part of that plan.

The community is deciding whether or not to turn themselves over to PenLight or another large utility. This should be done only if members of the community are unable or unwilling to do the work associated with running a small water system.

There is no immediate reason or need to replace the distribution system. The replacement can be phased over time, wait until information provided by the service meters provides additional direction, or put off until it is necessary. If the decision to replace the distribution system is put off, a capital improvements fund needs to be created with money placed into that fund every year so money is available when needed.

The important steps to take at this point are:

1. Choose the Ownership Route
2. Identify criteria to be used to make the distribution system replacement decisions (decide on fireflow, determine condition of pipes, choose how it will be funded, etc)
3. Choose a realistic service meter and/or distribution system replacement timeline
4. Have bid docs prepared for service meter installation or the engineering/bid docs prepared for the distribution system replacement.

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