Reserve Study for Major Maintenance, Repairs, and Replacement for Aspen Shores HOA Septic System

Prepared September, 2019

Per RCW 64.38.065 a reserve study is supplemental to the association's operating and maintenance budget. In preparing a reserve study, the association shall estimate the anticipated major maintenance, repair, and replacement costs, whose infrequent and significant nature make them impractical to be included in an annual budget.

A reserve study must include:
(a) A **reserve component list**, including any reserve component that would cost more than one percent of the annual budget of the association, not including the reserve account, for major maintenance, repair, or replacement. If one of these reserve components is not included in the reserve study, the study should provide commentary explaining the basis for its exclusion. The study must also include quantities and estimates for the useful life of each reserve component, remaining useful life of each reserve component, and current major maintenance, repair, or replacement cost for each reserve component.

A separate, detailed spreadsheet has been prepared. It includes the components, estimate replacement costs, year of installation, and expected life. Components from transport pipes that run under Quincy to the laterals in the drainfields in the cherry orchard are listed. Approximately 130 different components are listed.

(b) The date of the study, and a statement that the study meets the requirements of this section;

September, 2019

(c) The following level of reserve study performed:

(i) Level I: Full reserve study funding analysis and plan;
~~(ii) Level II: Update with visual site inspection; or~~
~~(iii) Level III: Update with no visual site inspection;~~

(d) The association's reserve account balance; $99,519.05

(e) The percentage of the fully funded balance that the reserve account is funded; 23% ($99,519 / $423,938)

(f) Special assessments already implemented or planned; None at this time

(g) Interest and inflation assumptions; 2.17% annual interest on reserve account less 30% income tax; annual US inflation rate is 1.8% for 12 months ended July 2019

(h) Current reserve account contribution rates for a full funding plan and baseline funding plan; 43 properties each contribute $225 annually to the reserve account for a total of $9,675.

(i) A recommended reserve account contribution rate, a contribution rate for a full funding plan to achieve one hundred percent fully funded reserves by the end of the thirty-year study period, a baseline funding plan to maintain the reserve balance above zero throughout the thirty-year study period without special assessments, and a contribution rate recommended by the reserve study professional;

Maintain current $225 per property annual contribution and work toward achieving a baseline reserve level of $105,115 to replace:

- 1 drain field - $64,086
- 6 pumps - $17,850
- 2 control panels - $2,974
- 3 two-way distribution valves - $2,493
- 6 three-way distribution valves - $5,124
- 2 dosing tanks - $12,558

(j) A projected reserve account balance for thirty years and a funding plan to pay for projected costs from that reserve account balance without reliance on future unplanned special assessments;

Annually update minimum reserve level based on current replacement costs for those items. In the event of a catastrophic failure, e.g., drain field failure, a special assessment may be required to replenish the reserve fund.

(k) A statement on whether the reserve study was prepared with the assistance of a reserve study professional.

Not prepared with the assistance of a reserve study professional.

(3) A reserve study must also include the following disclosure: "This reserve study should be reviewed carefully. It may not include all common and limited common element components that will require major maintenance, repair, or replacement in future years, and may not include regular contributions to a reserve account for the cost

of such maintenance, repair, or replacement. The failure to include a component in a reserve study, or to provide contributions to a reserve account for a component, may, under some circumstances, require you to pay on demand as a special assessment your share of common expenses for the cost of major maintenance, repair, or replacement of a reserve component."

Maintenance, Repair and Replacement Strategy

1. Maintain the system in good working order with annual inspection, testing, and pumping, if required, of dosing tanks, and drain field components.
2. Monthly dosing tanks and drain fields check and recording of usage metrics - pump cycles and pump minutes.
3. Repair or replace malfunctioning dosing tank and drain field components with equal or better (in the case of technology improvements) components.
4. Annual inspection, testing and pumping, if required, of homeowner septic tanks and components.
5. Homeowner repair or replacement of any malfunctioning components in their septic system cited in the annual inspection.
6. Maintain a reserve balance to cover the repair or replacement of critical components, with an annual review and modification of reserve balance based on previous year's expenses.

Notes and Assumptions

1. Predicting actual life would require detailed historical failure rates from hundreds of failures of individual components in similar operating environments. Whenever possible information from manufacturers or service providers was used to estimate expected life. Most component lifetime estimates are educated guesses.
2. Other than unpredictable failure of float switches, component failures have typically been associated with poor installation, e.g., freezing of distribution valves in drainage field (remedied by installing heating source and insulation in the valve boxes); leak in PVC transport pipes due to failed glue joints; failure to cap-off transport pipe; underpowered pumps in dosing tanks (replaced with 1.5 HP pumps).
3. See Septic Reserve Study Spreadsheet for estimated current and replacement costs and explanatory notes,

Major Components - Quantity - Estimated Life Expectancy

1. Dosing Tank Pumps - 12 - 20+ years
2. Electrical conduit, junctions, splice boxes for pumps and floats - 12 - 30+ years
3. Drain Field Distribution Valves - 18 - 15+ Years
4. Control Panels - 6 - 20+years
5. Alarm System - 1 - 20+ years
6. Drain Fields - 6 - 25+ years
7. Pump Vault, Filter & Piping - 6 - 30+ years
8. Concrete Dosing tanks - 6 - 40+ years
9. PVC Transport Pipes from ASHOA to dosing tanks - 6 - 50+ years

Dosing Tank Pumps

Dosing tank pumps are utilized only a fraction of their rated use - 1 to 2 cycles per day compared to a rating of 100 cycles per day. Therefore, pumps may last significantly longer than the 20 years stated by manufacturer. It's also possible that a pump may fail due to deteriorating seals as a result of being immersed in effluent for many years. Each dosing tank has 2 pumps that alternate pumping. In the event of a failure, the other pump assumes responsibilities.

Recommendation: Budget to cover replacement of up to 6 pumps at any one time.

Electrical conduit, junction boxes, splice boxes

These were inspected in late 2018 by Beckstead Electric and determined to be in good shape (despite the ugly appearance of their exteriors) and use components (explosion-proof) that exceed current code regulations. Splice boxes for float switches tend to accumulate humidity and water as a result of location. Water can interfere with proper function of float switches.

Recommendation: Budget to replace float switch splice boxes located in the riser with external splice boxes to eliminate humidity and water problems by 2024.

Drain Field Distribution Valves

Each drain field has one 2-way distribution valve and two 3-way distribution valves. To date only 2 valves have failed - one from freezing temperatures, the other due to a worn-out internal indexing mechanism).

Recommendation: Budget to replace three 2-way valves and six 3-way valves at any one time.

Control Panels
The controller is a critical component, so any failure needs to be corrected as soon as possible. Individual components—motor starter contactors, circuit breakers, duplex alternators, intrinsically safe control relays, alarm, counters—can be replaced as needed.
Recommendation: Replace components if possible. Budget for replacement when panels become technically obsolete.

Drain Fields
These are the most critical part of the septic system. Failure of a drain field would be the single most expensive cost. Soil studies done prior to establishing the drain fields showed the soil to be well-suited to percolation and handing quotidian drainage needs.

There are several factors that indicate long-term reliability of drain fields:

- Drain fields are designed to handle 3,240 gallons per day. On a typical day only a fraction of the amount—several hundred gallons—is distributed to each field.
- Sequence of homes built from 2004 to present. See table below. As of September 2019 five lots have not been built on.
- Homeowners are often traveling, vacationing, or living elsewhere during the year, thereby reducing the annual volume of effluent pumped to a field.
- Quality of effluent being pumped into the fields: significant settling and digestion of solids takes place in homeowners' septic tanks, reducing the amount of solids pumped to the drain fields.

If a drain field should fail it would not be an instantaneous event; there would be warning signs regarding saturation (swampy areas of the field). In that case temporary piping could be installed to direct effluent into one of the lesser-used dosing tanks and fields. ASHOA has rights to use any of 12 currently unused rows in the cherry orchard (north of the current drain field rows) to establish new drain fields.

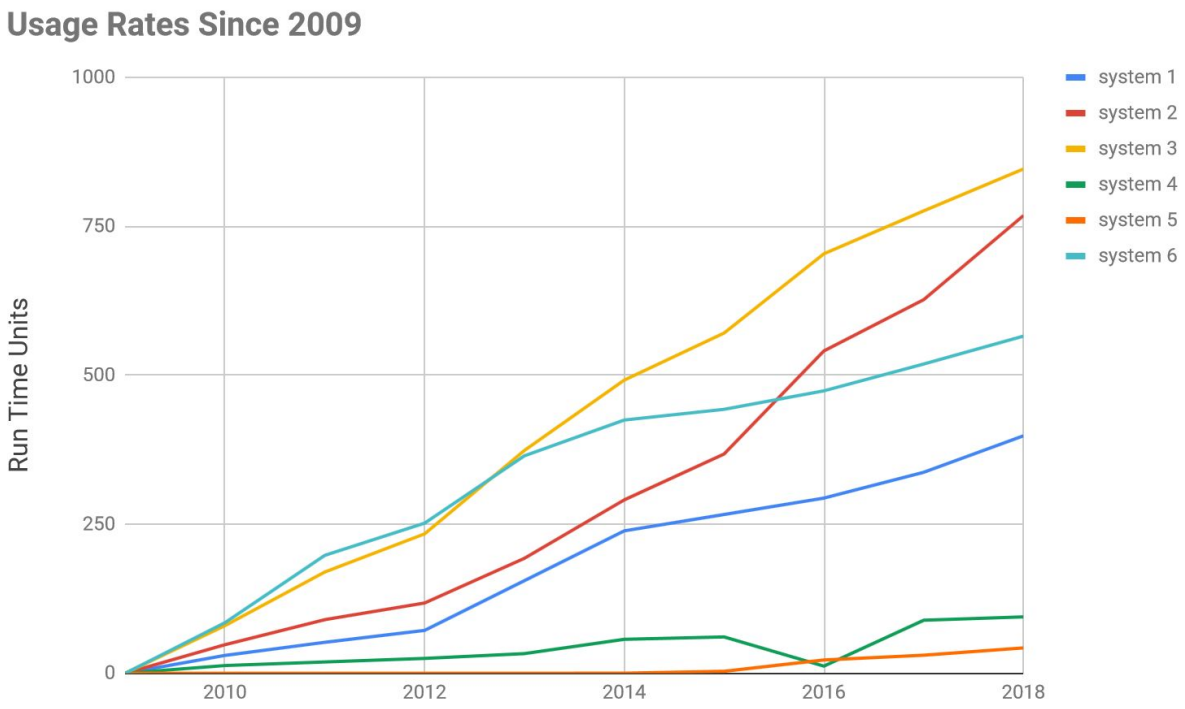
It's likely that a design (per current regulations) would need to be drawn up by a certified engineering or septic design firm. Permits would need to be obtained. A contractor would be hired to do the installation which would require removal of dirt in two rows of the orchard, installation of fabric, gravel, piping, distribution valves, valve boxes, test ports, and extension of transport piping from the failed drainfield to the new drain field.

Installation would need to be coordinated with the orchard owner so as not to interfere with cherry harvest or orchard work.

Based on minutes of pump time which equates to volume of effluent pumped, ranking of drain field usage since September 2009:

Field	Cumulative Units of Pump Time	Properties
3	846	2800, 2810, 2820, 2840, **2850** Akamai; 2830, 2840, 2850 Blue Heron
2	768	2858, 2864, 2870, 2878, 2888, 2896, 2912, 2938, 2952 Blue Heron
6	565	2801, 2825, 2835, 2845, 2855 Aspen Shores; 2870, 2890 Akamai
1	398	1 South Anchor Lane; **2790**, 2800 Mikayla; 2702, 2705, 2710 Gracie Lane
4	94	2820, 2830, 2840, **2860**, 2870, **2880**, 2890 Mikayla
5	42	2966, 2980, **2988**, 2990, 2992, 2994 Blue Heron

GREY NUMBER in above table indicates property does not have a house built on it as of September 2019.



Lots Connected to Systems

	System 1	System 2	System 3	System 4	System 5	System 6
2003			1			1
2004	4	1	3			4
2005		3	3	1		2
2006	1	2				
2007				2		
2014		2				
2015		1			1	
2016				2	1	
2019					2	
total	5	9	7	5	4	7

Recommendation: Budget for replacement of the first field that fails. Based on that failure data, estimate probability and time of failure for other fields and make changes in annual assessment accordingly.

Concrete Dosing Tanks
Installed in 2004, they have an expected 40 year life.Construction quality (or rather lack of) and poor installation could potentially lead to leakage.
Recommendation: Budget for replacement in 2044

PVC Transport Pipes from ASHOA to Dosing tanks
Failure of a glue joint resulted in leakage in 2016. ASHOA community effort replaced the pipe (and installed an extra pipe in the event of a future failure). PVC pipe is rated for 50+ years; failed glue joints are the risk. There are dozens of glue joints in the 6 lines (made from 20' pipe lengths) that run under Quincy Avenue. We've received a 2018 bid from Pipkin Construction for replacement of these pipes with 2" fused HDPE - $85,500 + tax + fees. We've also received a 2019 bid from KRCI for replacement of these pipes with 2" fused HDPE - $71,850 + tax + fees
Recommendation: If bids are competitive and homeowners are willing to make the investment, consider replacement. In the meantime, in the event of another failure utilize the extra pipe that was put in place in 2016. Also consider robotic pipe inspection to ascertain the condition of pipes before making a decision.

Pump Vault, Filter & Piping
Units are inspected and filters are cleaned annually. Dosing tanks are pumped (every few years) when bottom sludge depth exceeds recommended limits. Effluent entering dosing tank is surprisingly clean as a result of settling that takes place in homeowners' septic tanks.
Recommendation: Replace as needed.

Alarm System
Battery needs to be replaced about every 5 years. Evaluate cost of replacing landline phone with wireless phone connection.
Recommendation: Replace components as needed. Replace alarm system when entire panel becomes obsolete.

Valve/Inspection Port Boxes
There are 48 valve boxes located near the dosing tanks and throughout the drainage fields. They are made of resin and potentially can last several decades. They are more likely to be damaged by tractors and other orchard equipment.
Recommendation: Replace as needed.

Float Switches: replace as needed.
Float Switch Splice Boxes: replace with external boxes by 2024.

Pump Electric Junction Boxes: replace by 2034.
Pump and Float Switch Electric Conduit and Connectors: replace as needed.
Heat strips in valve boxes in drain fields: replace as needed.

Annual Maintenance and Repair Budget
Analysis of maintenance and repair records from 2008 through 2018 indicates an average expense of $2,035 per year.

Annual Operations Budget
Electric utilities, phone line to the monitoring service, and alarm monitoring is $1,293 per year.

Recommendation: Maintain the annual OM&R budget of $2,035. Keep this budget item separate from the reserve and operations accounts. Make an annual adjustment based on the most recent year's OM&R expenses.

Reserve Budget Recommendation
Achieve a minimum reserve level of $105,115 to replace:

- 1 drain field - $64,086
- 6 pumps - $17,850
- 2 control panels - $2,974
- 3 two-way distribution valves - $2,493
- 6 three-way distribution valves - $5,124
- 2 dosing tanks - $12,558

Annually update minimum reserve level based on current replacement costs for those items. In the event of a catastrophic failure, e.g., drain field failure, a special assessment may be required to replenish the reserve fund.