Puget Sound Septic Financing Assessment

Property Owner Loan Program Needs Assessment

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Washington State Department of Health

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Tables and Figures

1. Executive Summary

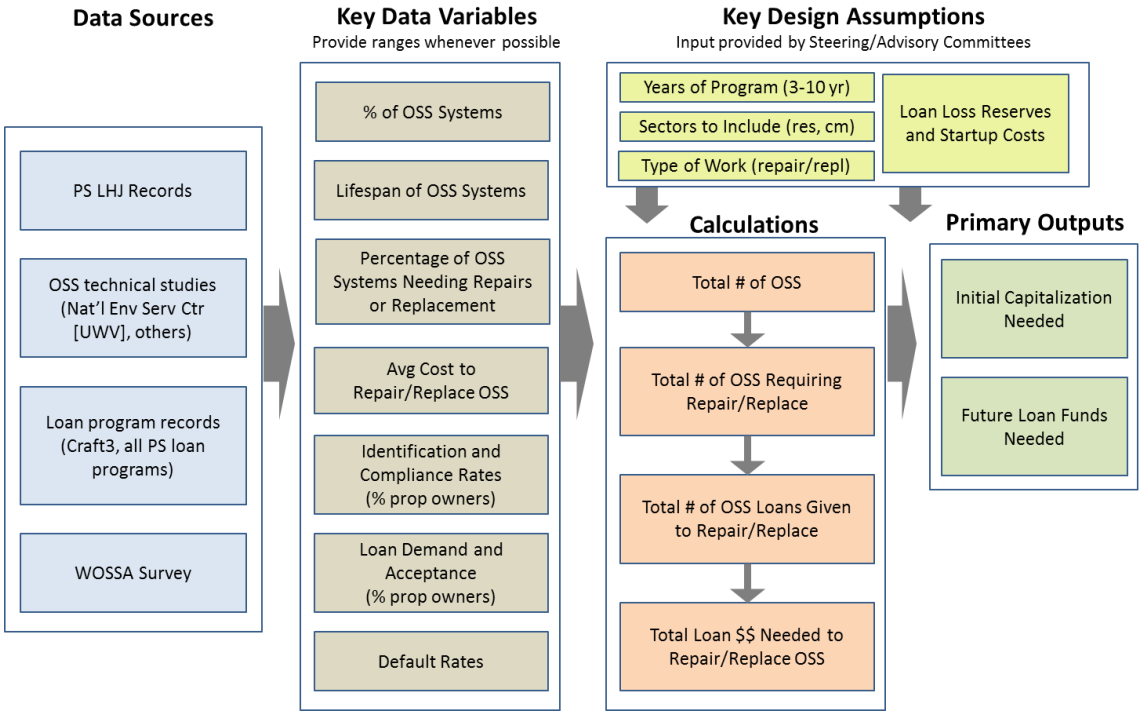
The *Property Owner Loan Program Needs Assessment* presents the amount of funding needed to capitalize and sustain a regional loan program to repair and replace septic systems. This document is one of three technical analyses regarding funding for septic management in the Puget Sound region. A separate needs assessment estimates the amount of funding needed to implement local septic management programs. The third technical document evaluates potential sources and mechanisms to fund the two programs.

Overview

The Washington State Department of Health is leading a priority project of the Puget Sound Action Agenda to assess the viability of establishing a unified, self-sustaining septic loan program in the Puget Sound region. Such a program would help property owners repair and replace failed or malfunctioning on-site sewage systems (OSS) and better protect public health and water quality for shellfish harvesting and other important uses. This needs assessment estimates the amount of funding needed to provide a property owner loan program.

Figure 1 depicts the conceptual framework of the needs assessment analysis. It shows how a few central data sources informed key data variables in an Excel-based model, which when coupled with design assumptions, calculates the primary outputs of loan program capitalization need. Characterizing the OSS market has historically been uncertain and, thus, making the right assumptions was not straightforward. To address this, the project team presented low and high ranges for variables and also selected “most likely” values based on the soundness of data sources and the judgment of the Steering Committee. Figure 1 depicts the model’s variables in diagrammatic format. More detail about the analytical methodology is available in the body of this report.

Figure 1. Conceptual Framework of OSS Loan Program Modeling



The values of model variables reflect two separate loan design scenarios based on potential policy choices: **(1) "Conservative" Scenario** – This program has stricter loan criteria to minimize risk and funding, resulting in an assumed loan acceptance rate of 75% and a default rate of 8% (the bottom two boxes under Key Data Variables in Figure 1). **(2) "Inclusive" Scenario** – This program scenario has less strict loan criteria to maximize environmental benefits, resulting in an assumed loan acceptance rate of 95% and default rate of 10%. There are a variety of other "scenarios" that can be portrayed; however these two were selected because they represent key likely conceptual pathways that a future loan program will take.

The key results of the needs assessment are summarized in the following three tables below:

Table 1 – Assumed annual number of OSS loans granted (county and regional total)
Table 2 – OSS loan program funding need (ranged first-year and ten-year totals)
Table 3 – Most likely OSS loan program funding need (for each year)

Table 1 shows the projected number of annual OSS loans by county, in both the conservative and inclusive scenarios described above. Note the wide range of potential loans in the low and high cases—this is due to substantial uncertainty embodied in multiple variables. The "most likely" estimates represent the best judgment of the project team and are the basis of the team's funding recommendations.

Table 1. Projected Annual Number of Loans Issued (low, high, and most likely)

	Conservative Scenario			Inclusive Scenario		
County	**Low**	**High**	**Most Likely**	**Low**	**High**	**Most Likely**
Clallam	1	134	16	3	171	20
Island	4	228	27	5	289	36
Jefferson	1	94	12	1	120	14
King	18	1,065	128	22	1,350	163
Kitsap	6	367	43	7	465	55
Mason	3	176	21	4	221	26
Pierce	11	738	90	15	934	113
San Juan	0	60	7	0	75	9
Skagit	1	94	11	1	120	14
Snohomish	9	526	64	10	665	79
Thurston	8	473	57	9	597	72
Whatcom	3	189	22	4	240	28
Regional Total	**65**	**4,144**	**498**	**81**	**5,247**	**629**

Table 2 shows the funding needed for a regional OSS loan program, displaying the 10-year capital need for the revolving fund, the first-year capital need, the average annual capital needed, and the average loan amount per project. Again, we present results from both the conservative and inclusive loan program designs.

Table 2. Ranged OSS Loan Program Funding Needed

Output Level	10-Year Revolving Fund Total	First-Year Capital Needs Totals	Average Annual Capital Needs Across 10-Years	Average Loan Amount per Project
Conservative Program Scenario				
Low Estimate	$1,481,000	$163,000	$148,000	$5,000
High Estimate	$242,769,000	$26,771,000	$24,277,000	$12,000
Most Likely Estimate	$22,266,000	$2,455,000	$2,227,000	$9,000
Inclusive Program Scenario				
Low Estimate	$1,896,000	$204,000	$190,000	$5,000
High Estimate	$319,935,000	$34,500,000	$31,994,000	$12,000
Most Likely Estimate	$29,163,000	$3,145,000	$2,916,000	$9,000

Funding for a loan program is not expected to be consistent across all ten years, because of repayments made into the revolving fund. Funding includes loan program fees and loan loss reserve, which the loan

program must also capitalize. Table 3 displays the amount of loan funding needed in each of the ten program years ("most likely" levels). The needs assessment assumes initial capitalization and program startup in 2015. While capitalization in 2015 is not certain, the model is not highly sensitive to the timing; the capitalization needed would not change greatly.

Table 3. Most likely OSS loan program funding need (each year)

Year	Funding Needed in Each Year - *Conservative Loan Program Scenario* (no PV)	Funding Needed in Each Year – *Inclusive Loan Program Scenario* (no PV)
2015	$2,455,000	$3,145,000
2016	$2,768,000	$3,571,000
2017	$3,751,000	$4,837,000
2018	$3,258,000	$4,219,000
2019	$2,780,000	$3,620,000
2020	$2,317,000	$3,039,000
2021	$1,869,000	$2,478,000
2022	$1,436,000	$1,936,000
2023	$1,018,000	$1,412,000
2024	$615,000	$907,000
10-YEAR TOTAL	**$22,266,000**	**$29,163,000**
Remaining Need: 2025-2029	**$(2,440,000)**	**$(2,374,000)**
15-YEAR TOTAL	**$19,826,000**	**$26,789,000**

Findings

Based on project team assumptions and best estimates for the modeled variables, we estimate between $22-29 million is needed to capitalize a property owner loan program within ten years. The revolving fund is projected to become self-sustaining in year 11.

The estimate of $22 million corresponds with a conservative loan program scenario (restrictive lending criteria) and the estimate of $29 million corresponds with an inclusive loan program scenario (flexible lending criteria). These estimates represent $17 million and $23 million respectively in present value terms[1].

[1] Present value (PV) describes a future amount of money that is represented in today's dollars, often for comparative purposes. A "discount rate" establishes how much future amounts are reduced. For equivalent amounts, years far into the future have less present value than years in the near future.

2. Introduction

The Washington Department of Health is leading a priority project of the Puget Sound Action Agenda to better protect public health and water quality for shellfish harvesting and other important uses. The project addresses sustainable funding for the repair and replacement of failed or malfunctioning on-site sewage systems (OSS) and for local health jurisdiction (LHJ) septic management programs. DOH contracted with a consulting team led by Sound Resolutions with support from Cascadia Consulting, BERK Consulting, Foster Pepper, and independent consultant Terry Hull, to conduct the project's technical analyses and to facilitate policy recommendations and direction from the project's Advisory Committee.

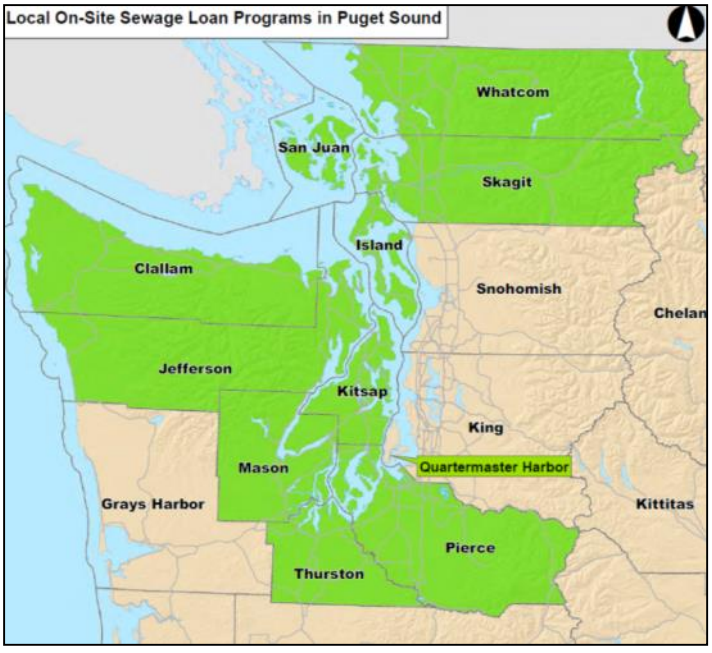
The *Property Owner Loan Program Needs Assessment* presents findings on the estimated ten-year capitalization needs of a unified, regional low-interest loan program. This document is one of three technical analyses regarding funding for septic management in the Puget Sound region. A separate needs assessment estimates the amount of funding needed to carry out the local septic management programs in the Puget Sound region. The third technical document evaluates potential sources and mechanisms to fund the two programs.

Washington law requires local health jurisdictions across the state to adopt management programs to encourage and help residents properly operate and maintain their on-site sewage systems (OSS), commonly called "septic systems." Proper operation and maintenance (O&M) helps ensure the systems stay in good condition, effectively treat sewage, and protect public health and water quality. State law places added requirements on the twelve Puget Sound counties in carrying out these management programs because of the region's sensitive water resources and large number of septic systems.

The region's local management programs are all uniquely designed and have been implemented to varying degrees. The programs share many common elements, including low-interest loan assistance to help system owners fix or replace failed or malfunctioning systems. The region's septic loan programs cover all or portions of eleven Puget Sound counties (see Figure 2).

This Needs Assessment estimates the financial need for a prospective Puget Sound region loan program, focusing on funding needs over a ten-year program period. To that end, we will clearly describe the research and analysis process, which included the development of a companion Excel-based Needs Assessment Analysis Model. The final result is a ranged loan program capitalization estimate for the program period, starting in 2015.

Figure 1. Map of Puget Sound Counties with Current OSS Loan Programs



3. Methodology

During early phases of the project, the project team was careful to spend time mapping data needs and identifying known data sources that would be involved with the assessment of OSS loan needs in the Puget Sound region. This framework helped make the research plan more straightforward and allowed the team to get started quickly. Research activity fell into three main areas: (1) interviews with state staff and local health jurisdiction (LHJ) loan officials, (2) surveys of OSS industry professionals, and (3) a literature review.

Interviews

In November 2013, the project team communicated with a number of individuals who are familiar with the OSS market, existing OSS loan programs, and other data that informs regional loan needs. Washington State staff interviewees included Lynn Schneider at the Department of Health and Melanie Tyler at the Department of Ecology (Ecology), both of whom are familiar with OSS O&M programs and property owner loans programs. The team also arranged meetings with the following LHJ staff, all of whom added context and details about their OSS loan activities:

- Kathleen Parvin, Island County
- Terri Jenkins-McLean, King County
- Eric Evans, Kitsap County
- Mark Tompkins, San Juan County
- Alison Mohns, Skagit County
- Sean Edwards, Snohomish County
- Debra Baker and Sue Davis, Thurston County
- Kyle Dodd, Whatcom County
- Desiree Sideroff, Craft3 (a non-profit community development financial institution that manages the loan programs for Kitsap, Clallam, Jefferson, Mason, and King Counties)

Industry Survey

The project team worked collaboratively with John Thomas at the Washington On-Site Sewage Association (WOSSA) to develop an online survey of their membership (on *SurveyMonkey*), with the intent of gaining insights into OSS lifespans, costs, repair and replacement needs, compliance rates, loan demand, and other factors from professionals in the field. WOSSA helped disseminate the survey to approximately 350 individuals and we obtained 38 respondents for about an 11% response rate.[2] Respondents included designers, installers, operations & maintenance professionals, and inspectors. The project team then screened the data to remove anomalies and prepared it for input into the main loan assessment model.

[2] Different "n" values are presented throughout this report since a different number of respondents answered each question.

Literature Review

The team reviewed a number of seminal and more recent reports and data sources relating to OSS system characteristics and market behaviors. Some of the key sources include:

- Washington State Department of Health 2011-2013 Biennium LHJ Implementation Report
- Washington State Department of Health, CWNS OSS data (2012)
- National Environmental Services Center (NESC) at the University of West Virginia (2009), http://www.nesc.wvu.edu/septic_idb/washington.htm.
- Update of the Advanced On-Site Wastewater Treatment and Management Market Study: State Reports, A. Macrellis and B. Douglas, Stone Environmental, Inc. (2009)
- Estimating On-site Sewage System Failure Rates for the Puget Sound Region, T. Hull (2013)
- U.S. Census (2010)
- Voluntary National Guidelines for Management of Onsite and Clustered (Decentralized)
- Wastewater Treatment Systems (2003), http://water.epa.gov/scitech/wastetech/upload/septic_guidelines.pdf
- Failing Systems (2003), http://www.doh.wa.gov/Portals/1/Documents/Pubs/337-098.pdf
- City of Olympia Wastewater Utility, Wastewater Management Plan Chapter 7 – Onsite Sewage Systems (2007), http://olympiawa.gov/documents/WastewaterManagementPlan_2007/WWMP_CH7_0907.pdf
- O & M, The Good, The Bad and The Ugly (2003), http://www.doh.wa.gov/Portals/1/Documents/Pubs/337-Deeter.pdf

4. Data and Analysis

In this section, we describe the structure of the analysis and focus more in more detail on data sources (presenting multiple possible data points) and modeling assumptions (selecting certain data points for use in the analysis). The project team created a logic flow of the analysis, shown in Figure 3, to help the reader understand the general process.

During the project's scoping phase, the project team had the opportunity to make some preliminary decisions about the design of a prospective program. They are:

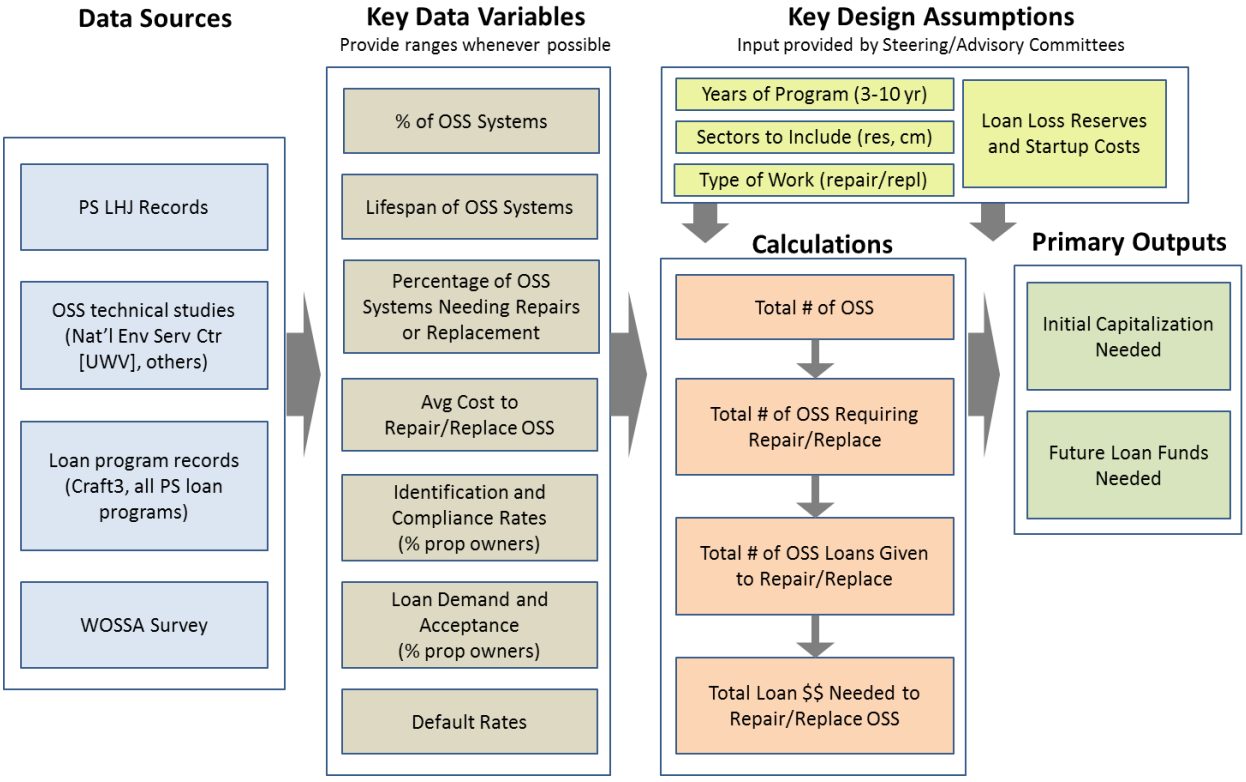
- Loans will be available for work on existing OSS only
- Eligible work includes repairs, replacement, and sewer connections for individual systems (*not* large-scale sewer extensions)
- Eligible OSS have a maximum size of 3,500 gal/day
- Loans will be available in all areas of all Puget Sound counties (Clallam, Island, Jefferson, King, Kitsap, Mason, Pierce, San Juan, Skagit, Snohomish, Thurston, and Whatcom)
- There will be no loan amount maximums
- We are not including grants as part of the regional loan program analysis[3]

These decisions were used to guide the development of the financial model and do not serve as final policy decisions. However, final policy decisions that differ significantly from the model's assumptions may affect the amount of money needed to capitalize a sustainable regional loan program. The final policy decisions of the Advisory Committee can be found in the final *Overview and Recommendations*.

At the time of the modeling, some key design/eligibility decisions that remained open included the type of property owner (residential and/or non-residential), minimum loan amount, ancillary project costs (e.g., design and engineering and site restoration), geographic focus (e.g., systems located in sensitive areas), and financial need and credit risk of the property owner.

[3] In addition to their property owner loan programs, some of the Puget Sound counties (Thurston, Skagit, Island, and Pierce) currently give small grants in select cases of financial need.

Figure 3. Logic Flow of Analysis in Companion Model



Role of Judgment in the Analysis

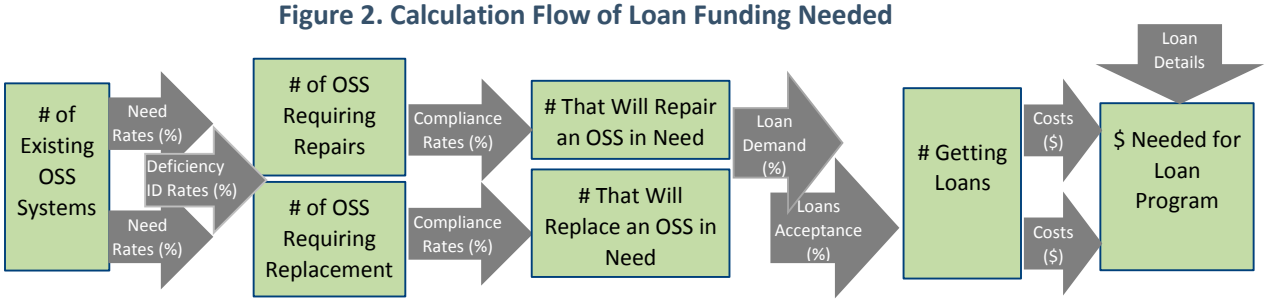
As the next subsection shows, a number of different data sources were used to develop assumptions for the key variables used in the analysis of OSS loan capitalization needs, and some sources seem to conflict. In cases where there are disparate data points, the project team was required to make assumptions that required judgment. In all cases, we present both the available source data and the assumptions made to be transparent about why variables are selected. Given the uncertainty, we express most estimates in rough terms, for example using whole numbers for percentages or dollar values rounded to the thousands' place. To address uncertainly even further, we present low, high, and "most likely" estimate of averages for most variables. The model assumptions and methodologies were initially vetted by the project team in a collaborative meeting on December 19, 2013, and by the project's Advisory Committee in a more formal meeting on January 9, 2014. The primary goal of these meetings was to reach agreement on the "most likely" estimates used in the modeling.

Data Sources and Assumptions

This section discusses the extensive set of data sources that the project team examined and presents the assumptions that were made throughout the modeling process. It is important to reiterate that due to limited information for some variables and disagreement between sources for others, judgment was required throughout.

In carrying out the analysis, the project team first applied a preliminary set of eligibility criteria that determined a few high-level assumptions (see page 4). We then applied assessment methodology on a region-wide basis to estimate total septic loan capitalization needs for the Puget Sound region. The low and high levels for the variables provide more transparency to the ranges of key outputs. These variables are assumed to be different potential levels of *averages*, not absolute ranges (in other words, a "high" cost value is *not* the highest possible OSS system cost). The "most likely" scenario reflects the team's judgment about the most plausible values based mainly on the agreement and legitimacy of the data sources. Figure 4 depicts the calculation flow of the companion model. Below, we present short definitions of the key variables to help the reader more clearly understand each step. We will discuss each of these variables in more depth throughout the rest of this section.

Figure 2. Calculation Flow of Loan Funding Needed



- **Number of Existing OSS** – assumed total number of OSS in each Puget Sound County
- **Rate of OSS Needing Repairs or Replacement** – assumed percentage of OSS (gravity and non-gravity) that require (1) major repairs or (2) complete replacement to bring them into full working order
- **Deficiency Identification Rate** – assumed percentage of OSS needing major repairs or replacement that has been identified through noticeable symptoms or inspections
- **Compliance Rates** – assumed percentage of property owners (residential and non-residential) that actually undertake the needed work represented by the previous variable; this assumes the presence of a loan program, which is thought to have a positive impact on this rate
- **Cost of Repair and Replacement** – assumed costs to perform the major repair or complete replacement work on OSS (gravity and non-gravity)
- **Loan Demand** – assumed percentage of property owners (residential and non-residential) that wish to get a public OSS loan
- **Loan Acceptance Rate** – assumed percentage of public OSS loan requests that are accepted
- **Loan Details** – a set of assumed variables such as discount rate, average loan term, average loan interest rate, default rate, loan loss reserve, and administrative fees that affect the capitalization need

Number of Existing Systems

To estimate the number of OSS in each county, the project team heavily based its analysis on direct input from LHJ staff via provided worksheets, each of which provided varying degrees of specificity for the input: "number OSS estimated total (known and assumed or anticipated unknown)." All counties, with the exception of Mason and Skagit Counties, reported more assumed OSS than the number of

"known" systems in their databases. The "estimated total" figures were approximated in different ways—sometimes using rough percentages and sometimes deriving the figure based on the number of buildings located off sewer lines (as a rudimentary method to presume the existence of septic systems). The project team then rounded the estimated totals to the nearest thousand to reflect the roughness of the estimates (see Table 4).

As points of comparison, the team compared the LHJ estimates with data from county databases, the Department of Health report on December 4, 2013, and the National Environmental Services Center (NESC) at the University of West Virginia (2009, http://www.nesc.wvu.edu/septic_idb/washington.htm). The latter source required some adjustment when it was apparent that the population, housing unit, and septic unit assumptions in the NESC study were consistently low across the board (likely because they were a bit outdated).[4] The county database, Department of Health, and NESC numbers were almost always lower than the assumed number estimate by LHJ staff.

Table 4. Data Sources for Number of Septic Systems in Puget Sound Counties

Counties	Assumed Number of OSS (reported by LHJ staff)	Rounded to Thousand (used in analysis)	County Databases *(for reference)*	Department of Health Estimates, 12/4/13 *(for reference)*	NESC Study Adjusted for Census Population *(for reference)*
Clallam	20,007	20,000	18,002	20,000	16,562
Island	34,117	34,000	28,414	25,000	23,134
Jefferson	13,500	14,000	11,422[a]	15,000	10,070
King	157,500[b]	158,000	47,913[c]	130,000	108,213
Kitsap	54,000	54,000	23,507[d]	50,000	50,990
Mason	25,735	26,000	25,735	25,000	28,148
Pierce	110,028	110,000	58,888	80,000	98,471
San Juan	8,600	9,000	8,269	8,500	7,019
Skagit	13,500[e]	14,000	13,500[e]	20,000	21,376
Snohomish	78,000	78,000	54,000	60,000	88,696
Thurston	70,000	70,000	39,083	39,083	59,639
Whatcom	27,564	28,000	25,775	30,000	30,621
Total	612,551	613,000	354,508	502,583	542,939

a. Jefferson County quoted a range of 10,647-12,196; we took the midpoint
b. King County quoted a range of 115,000-200,000; we took the midpoint

[4] The team attempted to reconcile this by adjusting the number of housing units and septic units using 2010 U.S. Census data. The housing and septic totals in the NESC study were scaled up by the same ratio its population would need to increase to equal the 2010 U.S. Census figures. For example, the NESC noted that Clallam County had a population of 56,464, but the Census shows a population 26.5% larger at 71,404. Thus, the team used that ratio to inflate the assumed housing units (25,225 to 31,899) and septic units (13,097 to 16,562. This yielded values that were much more in line with the Department of Health's 2011-2013 Biennium LHJ Implementation Reporting figures.

c. King County's OSS system data is known to be markedly incomplete
d. Kitsap said that this number represents OSS that have been proofed, verified, and updated electronically in the database from hardcopy files.
e. Skagit County quoted a range of 13,000-14,000; we took the midpoint

Many LHJ staff also provided an estimate of the assumed split of OSS by type of property owners (residential and non-residential) and/or the type of systems (gravity and non-gravity). Table 5 shows the data provided to the project team by LHJ staff and through the Department of Health records (LHJ data superseded Department of Health data if both were available). Where there are blanks, we used the weighted average percentages in the analysis. These property owner splits are roughly confirmed by U.S. Census data for each county, by looking at the percentages of total number of housing units and number of employer establishments. Where there are differences of more than a few percentage points, the reason is likely due to the fact that non-residential properties, compared to residential properties, are more commonly located in areas with sewer systems.

Table 5. Percentage of OSS by Property Type and System Type (County records)

Counties	Percentage of OSS at Residential Properties	Percentage of OSS at Non-Residential Properties	Percentage of OSS that are Gravity Systems	Percentage of OSS that are Non-Gravity Systems
Clallam	96.7%	3.3%	67.7%	32.3%
Island	96.0%	4.0%	96.0%*	4.0%*
Jefferson	98.4%	1.6%	80.7%	19.3%
King			94.2%	5.8%
Kitsap	98.8%	1.2%	85.2%	14.8%
Mason	99.0%*	1.0%*	69.8%	30.2%
Pierce	95.9%	4.1%	56.6%	43.4%
San Juan	97.0%*	3.0%*	43.9%	56.1%
Skagit				
Snohomish			71.3%	28.7%
Thurston				
Whatcom			68.1%	31.9%
Weighted Average	97.1%	2.9%	79.3%	20.7%

*Provided by the Department of Health, 2013

This results in a valuable estimate of OSS in the twelve Puget Sound counties, segmenting by customer type and system type, as shown in Table 6. Note that the estimated number of OSS in the region is about 615,000.

Table 6. Assumed Number of OSS in Puget Sound Region

	Residential		Non-Residential		
County	**Repair**	**Replacement**	**Repair**	**Replacement**	**TOTAL**
Clallam	13,085	6,249	451	215	20,000
Island	31,322	1,305	1,318	55	34,000
Jefferson	11,113	2,657	186	44	14,000
King	144,446	8,939	4,346	269	158,000
Kitsap	45,443	7,903	557	97	54,000
Mason	17,619	7,622	530	229	26,000
Pierce	59,776	45,747	2,536	1,941	110,000
San Juan	3,836	4,894	119	151	9,000
Skagit	10,772	2,820	324	85	14,000
Snohomish	53,980	21,742	1,624	654	78,000
Thurston	53,858	14,098	1,621	424	70,000
Whatcom	18,522	8,660	557	261	28,000
Total	**463,769**	**132,636**	**14,169**	**4,426**	**615,000**

Percentage of OSS Requiring Repairs or Replacement

The next variable is the percentage of OSS that require major repairs or replacement. In Washington State, a "failure" of an on-site sewage system is officially defined in WAC 246-272A-0010 as "a condition of an on-site sewage system or component that threatens the public health by inadequately treating sewage or by creating a potential for direct or indirect contact between sewage and the public." Examples of failure include:

1. Sewage on the surface of the ground;
2. Sewage backing up into a structure caused by slow soil absorption of septic tank effluent;
3. Sewage leaking from a sewage tank or collection system;
4. Cesspools or seepage pits where evidence of ground water or surface water quality degradation exists;
5. Inadequately treated effluent contaminating ground water or surface water; or
6. Noncompliance with standards stipulated on the permit."

The project team decided not to use the term "failure rate" in its analysis since it does not distinguish system needs and the literature uses the term inconsistently. We choose to be more specific by characterizing system deficiencies as either the "percentage of OSS needing major repairs" or the "percentage of OSS needing complete replacement." Separating the technical need into two categories helps assign more defined population assumptions and associate these segments with other variables such as "compliance rates" and costs. It is worth pointing out that different studies still define things differently and it is not always completely clear how the percentages are being applied.

Major repairs most often involve one of the following: the addition or replacement of system plumbing ("flow line alteration"), a treatment component (septic tank, aeration unit, filter device), rework of a treatment unit (replace filter media, Glendon biofilter media, etc.), or replacement of a dissipation device (drainfield, mound). We do not consider minor repairs (e.g., replacing a broken septic tank baffle or minor grading over the drainfield) in the model, since the lower costs of these repairs lead to minimal loan demand.

Complete replacement involves the full change-out of an OSS system. We assume that 100% of non-gravity systems will be replaced with new non-gravity systems, however, we assume that gravity systems will be replaced with gravity systems 50% of the time and non-gravity systems 50% of the time (due to new regulations and property logistics). We are also including sewer connections for individual existing properties (not sewer line extensions) in this category because the magnitude and costs of such projects are similar to those of complete OSS replacements.

It is important to note that OSS repair/replacement needs have historically been difficult variables to estimate for OSS program planners. There are countless factors that determine the chance of OSS system deficiencies, including the age of systems, soil condition, design and installation of systems, maintenance frequency, and usage rates.[5] These factors vary widely within the Puget Sound region, as in most places. Additionally, data sources seem to disagree on what repair need rates, replacement need rates, and general deficiency rates are most valid. Therefore, the project team paid special attention to these variables and collected a number of pieces of data, shown in Table 7, Table 8, and Table 9. Originally, the intent was to present assumptions separately by gravity and non-gravity systems, but the project team found little data to support a significant distinction between the repair/replace rates of these two system types, so the rates are merged.

Table 7 and Table 8 focus on the rate of repair and replacement needs, respectively.

Table 7. Data Sources for Percentage of OSS Needing *Major Repair*

Data Sources	Estimates for All OSS		
	Low	Mid	High
2012 Clean Water Needs Survey	0.2%	2.5%	6.7%
Dept. of Health staff estimate	1.0%		2.0%
WOSSA survey (2013, n=36)		28.6%	
NESC Study (UWV) and Stone Environ. Inc. Report		33.0%	
Thurston County, Dept. of Health (2013)		15.8%	
Thurston County (Henderson) Records, 2007-2011		1.4%	

[5] Usage rates depend on multiple factors, such as the number and profile of residents in a household. It is also influenced by seasonal versus full-time home/building occupation.

Table 8. Data Sources for Percentage of OSS Needing Complete *Replacement*

Data Sources	Estimates for All OSS		
	Low	Mid	High
2012 Clean Water Needs Survey	0.3%	0.4%	0.5%
WOSSA survey (2013, n=36)	11.7%		11.8%
NESC Study (UWV) and Stone Environ. Inc. Report	3.0%		5.0%
Department of Health (1997-1999)	0.3%		0.5%
Thurston County (Henderson) Records, 2007-2011		0.48%	
Annual replacement rate - based on life from WOSSA survey	3.23%		3.68%
Annual replacement rate - based on life from Dept. of Health staff	1.3%	3.33%	20.0%
"Combined Approach," T. Hull (2013)	1.2%		2.4%

The percentages in the last three rows of Table 8 make the assumption that in each year a certain percentage of OSS will need to be replaced; that percentage is a function of expected life. The simple calculation is: 1 / Expected Life in Years. For example, if a unit is expected to last for 30 years, then 3.33% of the units should theoretically fail in any one year. The project team's "combined approach" (T. Hull) blended this calculation with rates from select works of industry literature. Interestingly, OSS system lifespan itself is quite variable since it is heavily dependent on design, operation, and maintenance of systems. Lynn Schneider at the Department of Health said it well: "A poorly designed, installed, and/or operated system may work for a few days or months before issues arise. A properly designed, installed, operated, and maintained system may last as many as 50-75 years. The degree of variation in site conditions, design, operation, and maintenance, together with limited on-site sewage system documentation, makes it difficult to document average lifespans."

Table 9 presents data sources that refer more generally to system deficiencies and does not distinguish between repair and replacement. These data points—often gained from site-specific, time-bound field studies—are included for reference only, since these general rates are different from required repairs and replacements in the two tables above.

Table 9. Data Sources for General Deficiency Rate of OSS

Data Sources	Estimates for All OSS		
	Low	Mid	High
U.S. Census of Housing (1995)	10.0%		20.0%
Northeast Ohio Areawide Coord. Agency (2001)	12.5%		19.7%
EPA Onsite Wastewater Treat. Sys. Manual (2002)		33.0%	
Puget Sound Water Quality Authority (1994)	10.0%		60.0%
Island County, Dept. of Health (2013)	10.0%		15.0%
San Juan County, Dept. of Health (2013)	3.0%		5.0%
Mason County (1997) - Totten and Lower Hood *	8.5%		13.7%
Thurston field study (2000)*		13.0%	

*From special shoreline surveys; sample is not believed to be wholly indicative of overall annual deficiency rates

Even cursory glances at Table 7, Table 8, and Table 9 show a wide range of deficiency estimates for OSS, presenting the project team with perhaps its biggest challenge in selecting proper modeling values. Table 10 contains the project team's preliminary judgment about the low and high, and the project team's determination of "most likely" estimates to use in the region-wide modeling. These are informed by the data within the tables above and based on a subjective assessment of the quality and time period of the data sources. It is difficult to assign a more advanced methodology for selecting these values (such as weighting or prioritizing) given the wide distribution of disparate data. In estimating the "most likely" annual rate of system replacement and major repair, the project team relied on empirical evidence and professional judgment regarding the average lifespan of modern systems and the relative frequency of major repairs.

Table 10. Judgment of Project Team for Annual Rates of Repair and Replacement Need

Type of Work Needed	To Be Used In Modeling		
	Low	High	Most Likely
Percentage of OSS Needing Major Repair	1.0%	8.0%	3.5%
Percentage of OSS Needing Complete Replacement	0.5%	5.0%	2.5%

As a final point about the variables above, it is not hard to contend that the rates of repair and replacement need could decline over the course of a 10-year loan program, coupled with twelve active LHJ O&M programs, since a higher percentage of units should transition to working order each year. Also, new materials (e.g., PVC vs. concrete) are expected to last longer, which will likely impact the average system life across the region. Similar temporal assumptions can be made about other variables in the analysis; however, the only such time-based adjustment we make in the modeling is to reduce the number of participants by 50% in year-one and 25% in year-two to account for program ramp-up.

Deficiency Identification Rates

If a property owner is not aware that their OSS system is in need of repair or replacement, there is little chance that action will be taken. Some OSS deficiencies result in symptoms that a property owner can clearly detect, but even if these indicators are not evident, an inspection can find the problem. While inspections typically occur periodically through county O&M permitting or programs or at the time of a home sale, it is difficult to assign an exact rate to the frequency of inspections. The project team estimated a 20% rate of deficiency identification, based on LHJ experiences with active monitoring and home sales. This does not imply that action will be taken by property owners in each identified case. That is addressed in the next variable.

Compliance Rates

The next key variable is the rate of compliance, which refers to the percentage of property owners that take action to repair or replace known systems in need (established by the previous variable). These two rates assume a loan program is in place, which, as previously mentioned, contributes to property owners being less resistant to OSS inspections and more open to exploring solutions, even though they may ultimately pursue alternative forms of funding. Still, there are a number of property owners that decide not to undertake required work for a variety of reasons, often due to financial factors and sometimes due to neglect.

The project team originally assumed that residential and non-residential property owners would have different rates of compliance; however, there were no data available to support this presupposition. There was also a lack of evidence that compliance rates between needed repairs and needed replacements were significantly different. Thus, in an effort to simplify assumptions wherever possible, the assumed percentages for residential and non-residential properties and repairs and replacements are combined in Table 11.

Table 11. Data Sources for Compliance Rates for All OSS

Data Sources	Estimates for All OSS and Property Owners		
	Low	Mid	High
WOSSA survey average (2013, n=36)	54.0%	68.0%	83.0%
2011-2013 Biennium LHJ Implem. Rept.		88.6%	
Island County, Dept of Health	50.0%		100.0%
Whatcom County, Dept of Health		88.6%	

Based on the data sources above, the project team selected the following compliance-rate values to use in its modeling of regional loan needs, as shown in Table 12. The “most likely” estimates are on the high-end, since the assumption is that when property owners have identified a deficiency, they are fairly likely to do the work. Sometimes they may push out repair/replacement for a few years, which is reflected in the selected 80% rate, but often repair/replacement occurs in the year the deficiency is identified.

Table 12. Judgment of Project Team for Compliance Rates

Type of Work Needed	To Be Used In Modeling		
	Low	High	Most Likely
Percentage of Property Owners that Take Action on Identified OSS System in Need	50%	90%	90%

It is important to again note that not all OSS will be replaced with the same type of system. Some counties report that a significant portion of existing gravity systems are replaced with non-gravity systems (1) to comply with current regulatory requirements or (2) when pressure/pumping is needed for new systems that are placed in different locations/elevations. Thus, we made a basic modeling assumption that gravity systems are replaced 50% of the time with non-gravity systems. There is no similar assumption for repairs.

Cost of Repair and Replacement

Another key factor relevant to a needs assessment of loan funding is the cost of projects. We segment this variable into four groups: gravity system repair, non-gravity system repair, gravity system replacement, and non-gravity system replacement. The project team discovered few sources that estimate costs, putting more weight on data from the existing sources: the Washington Clean Water Needs Survey, a survey of WOSSA members conducted for this project, and NESC/Stone Environment reports (only for replacement; values were adjusted upwards by 3% inflation from 2008). Table 13 shows repair costs for gravity and non-gravity systems and Table 14 shows replacement costs for gravity and non-gravity systems. Since we include sewer connections in the replacement category, it is worth mentioning that such work carries a high cost similar to the replacement cost of non-gravity systems. Note that "n" values (e.g., n=32) designate the number of survey participants that responded to a particular question.

Table 13. Data Sources for Cost to Repair Gravity and Non-Gravity Systems

Data Sources	Estimates for All OSS		
Repair Costs - Gravity Systems	**Low**	**Mid**	**High**
Washington Clean Water Needs Survey (2012)		$2,740	
WOSSA survey (2013, n=32)	$2,972	$4,400	$6,678
Repair Costs - Non-Gravity Systems	**Low**	**Mid**	**High**
Washington Clean Water Needs Survey (2012)		$3,748	
WOSSA survey (2013, n=32)	$4,167	$6,835	$12,779

Table 14. Data Sources for Cost to Replace Gravity and Non-Gravity Systems

Data Sources	Estimates for All OSS		
Replacement Costs - Gravity Systems	**Low**	**Mid**	**High**
Washington Clean Water Needs Survey (2012)		$6,089	
WOSSA survey (2013, n=32)	$6,144	$8,194	$11,047
NESC and Stone reports (adjusted with 3% inflation)	$2,149	$3,582	$5,373
Craft3 Data (3 PS counties; 2007-2008)[6]	$12,715	$16,705	$20,696
Craft3 Data (4 PS counties; 2011-2013) - all loans, no fees		$19,621	
Replacement Costs - Non-Gravity Systems	**Low**	**Mid**	**High**
Washington Clean Water Needs Survey (2012)		$10,067	
WOSSA survey (2013, n=32)	$9,641	$14,258	$23,422
NESC and Stone reports (adjusted with 3% inflation)	$9,552		$19,105
Craft3 Data (3 PS counties; 2007-2008)[3]	$19,485	$25,125	$30,765
Craft3 Data (4 PS counties; 2011-2013) - all loans, no fees		$19,621	

As with the previous variable, the project team identified the "most likely" level values for costs in each category. Note that the dollar values in Table 15 are rounded to the thousands level to reflect the rough nature of the estimate (vs. artificially portraying precision in light of unknowns). It is important to remember that low and high levels here and throughout the analysis refer to assumed "averages," not the absolute range of project costs—that range is known to be far wider.

Table 15. Judgment of Project Team for Repair and Replacement Costs

Type of Work Needed	To Be Used In Modeling		
	Low	**High**	**Most Likely**
Cost to Repair Gravity System	$3,000	$7,000	$5,000
Cost to Repair Non-Gravity System	$4,000	$12,000	$12,000
Cost to Replace Gravity System	$4,000	$10,000	$7,000
Cost to Replace Non-Gravity System	$9,000	$20,000	$20,000

Loan Demand

Unlike compliance rates, the data show that demand for loans is assumed to be dependent on the type of property owner (residential or non-residential) and the type of work performed on a deficient OSS system (repair or replacement). Much of the data that informs this variable comes from the survey that the project team fielded to members of WOSSA. We assume the average of their perspectives provides usable data. The survey question asked, "What percentage of property owners needing OSS work would

[6] The low estimate was calculated by taking the average of the dataset minus 0.5 times the standard deviation and the high estimate was calculated by taking the average of the dataset plus 0.5 times the standard deviation.

seek alternative funding (e.g., loans)?" and thus left room for multiple financing methods outside a potential public loan program. Conversations with county and other loan professionals helped us estimate that less than a majority of those seeking alternative financing would pursue public loans (vs. bank loans). With that context, the WOSSA survey results are somewhat corroborated by input from two county loan officials. See Table 16 and Table 17 for details.

Table 16. Data Sources for Loan Demand - Residential

Data Sources	Estimates		
Residential Loan Demand - General	**Low**	**Mid**	**High**
San Juan County, Dept. of Health		16.7%	
Skagit County, Dept. of Health	25.0%		50.0%
Residential Loan Demand - Repair	**Low**	**Mid**	**High**
WOSSA survey average (2013, n=35)*	18.7%	34.0%	49.3%
Residential Loan Demand - Replacement	**Low**	**Mid**	**High**
WOSSA survey average (2013, n=35)*	33.1%	48.2%	63.4%
Craft 3 estimate		20.0%	

Table 17. Data Sources for Loan Demand - Non-Residential

Data Sources	Estimates		
Non-residential Loan Demand - Repair	**Low**	**Mid**	**High**
WOSSA survey average (2013, n=35)*	11.5%	27.4%	43.3%
Non-residential Loan Demand - Replacement	**Low**	**Mid**	**High**
WOSSA survey average (2013, n=35)*	23.5%	41.1%	58.6%

* Half of these percentages are expected to seek prospective public loans versus other forms of financing.

Table 18 presents the project team's determination of the loan demand values to use in the analysis, based on the available data. The "most likely" estimate was set at 10% across the board for simplicity, which is on the low end of the reference range in recognition of the fact that current county programs have experienced lower loan demand than originally anticipated. Future program design decisions, such as marketing and ease of loan applications, should have an impact on this variable. Currently, the modeling makes a very basic assumption that the first two program years will experience lower demand (50% less in year-one and 25% less in year-two). With more awareness and enforcement, a loan program would experience heightened demand in future years.

Table 18. Judgment of Project Team for Loan Demand

Type of Work Needed	To Be Used In Modeling		
	Low	High	Most Likely
Residential Loan Demand - Repair	10%	35%	10%
Residential Loan Demand - Replace	10%	45%	10%
Non-residential Loan Demand - Repair	5%	20%	10%
Non-residential Loan Demand - Replace	10%	30%	10%

Loan Program Design Variables

In addition to the variables discussed previously that combine to characterize the expected capital demands of the market, there are seven variables more closely related to loan program design. For each, we explain which values were selected by the project team to drive the baseline modeling results that are included in this report. Note, that except for default rate, each has only one value (vs. ranged estimates).

Loan Acceptance Rate

Demand for loans does not ensure that the public lending body will approve an application and disburse funds. The rate at which loan requests are granted is a function of many factors, especially the stringency of the loan criteria (e.g., required credit scores or debt-to-income ratios). A more inclusive program that reflects the principal purpose of keeping Puget Sound waters clean (e.g., one that would include low-income households), will experience a higher loan acceptance rate, but will likely see impacts to other variables such as default rate (below). A more accurate estimate of expected acceptance rate would require a deeper analysis of the Puget Sound population's income levels, extent of deferred taxes, bankruptcies, asset payments, and other indicators.

For this analysis, the project team elected to consider two levels of loan program inclusion as a basis for its estimates: (1) *Conservative Scenario* – This loan program scenario has an assumed acceptance rate of 75%, where 25% of applicants are estimated to fall short of the loan criteria. This approximates the 72% historical acceptance rate from Craft3's Puget Sound OSS loan program (2010-2013). (2) *Inclusive Scenario* – This program scenario has an assumed acceptance rate of 95%, where loan criteria would be loosened to accept almost every applicant. We will refer to these two scenarios again in the discussion of default rate below (but not in the discussion of interest rates or other variables, as all other variables are assumed to be equivalent for both design scenarios).

An argument can be made to effectively split the loan fund into two or more distinct segments (e.g., one for the standard credit, middle-income property owners and one for poor credit, low-income property owners). However, it is easier to conceive of and model a single program with a couple design scenarios that affect the program as a whole.

To characterize potential borrowers in a bit more detail, we offer three basic profiles to distinguish which property owners may be eligible and ineligible for the loan scenarios described above. It is

important to note, however, that underwriting at many institutions is handled on a case-by-case basis, so these depictions are not completely rigid:

- **Likely Eligible in *Conservative Scenario*** – Property owners who have good credit scores, good equity status on their property, and/or decent stable incomes. These individual can probably also obtain financing from traditional financial institutions (e.g., banks, credit unions).
- **Likely Eligible in *Inclusive Scenario*, but Likely Ineligible in *Conservative Scenario*** – Property owners with credit challenges such as low credit scores, past credit score issues, low equity on their properties, or minimal or fixed income. These individuals can typically only be financed through non-traditional finance organizations (e.g., CDFI, some county loan programs).
- **Likely Ineligible in Both *Inclusive* and *Conservative Scenarios*** – Property owners who are in the process of bankruptcy or foreclosure; have significant unpaid property taxes; have no verifiable income; are saddled with multiple credit challenges (e.g., low credit scores based on high debt, no income, and/or no equity). These individuals present often unsurmountable lending hurdles, perhaps even in the most inclusive loan programs.

Discount Rate

This variable helps calculate present value (PV) of money over time, which is a particularly important consideration when modeling a 10-year program. It is set at 4.8255%, which the Washington Office of Financial Management estimates as the state's borrowing rate in 2015.[7]

Average Loan Term

This variable is a key input to the calculation of loan repayments. It is set at 15 years, based on Craft3's historical OSS loan program term.[8]

Average Loan Interest Rate

This variable is a key input to the calculation of loan repayments. It is set at 4% per year, based on a rough average of the existing county and Craft3 loan programs (2-6%). We are currently not assuming that the public program will offer multiple interest rates based on factors such as the financial merits of property owners. It is assumed that program income from this interest rate will cover some of the costs associated with administering the loan program; other fees are incurred based on the "Administrative Fees" assumption below.

Default Rate

This variable defines the percentage of borrowers that do not pay back loans. This variable is also based on the inclusivity design options introduced above under the "Loan Acceptance Rate" heading: (1) **Conservative Scenario** – The default rate in this scenario is set at 8% per year, based on data from the existing Puget Sound county loan programs (0-6%) and rough estimates from Craft3 (12%). (2) **Inclusive Scenario** – This scenario assigns a 10% default rate, which was subjectively determined by the project team to estimate increased non-payments as a result of accepting more property owners who are less

[7] Based on the Global Insight Bond Buyer Index. The rate is projected to increase in 2016 to 5.01545%, in 2017 to 5.5242%, and beyond that to 5.8189%.

[8] Craft3 is moving to a 10-year term and certain county officials have experienced closer to a 20 year average, keeping the selected variable level appropriate.

financially sound. It still falls in the range of current program default rates, albeit on the higher end. This assumes that the default rate for the "extra" 20% (95% minus 75%) of property owners obtaining loans will be about 17.5%.

Loan Loss Reserve

In many loan programs, extra funds are held in a loan loss reserve (LLR) to compensate for loan defaults and, thus, are a key input to the calculation of loan capitalization requirements. For example, an LLR is required for the current LHJ OSS loan programs, which must maintain it to pay back loans, and for Craft3 or a credit union, which carries it to meet consumer-lending rules. According to industry loan experts, however, an LLR is not mandated by regulations in a publicly capitalized loan fund and defaults could alternatively be accounted for by an annually recapitalized public loan fund. But there is value to including an LLR in the planning, as it ensures the fund is anticipating and preparing for future non-repayments in advance. In the model, we assume the LLR equals the assumed default rate since the latter is approximated to be the rate of loan losses—in our analysis, this is either 8% or 10%, depending on the inclusivity assumption selected.

Administrative Fees

This assumption defines the fees associated with getting loans, taken as a percentage of loan amounts. These fees are assumed to be outside the money collected through interest rates and do not include design and setup costs related to the loan program. According to Craft3, this one-time fee is estimated to be 2% of the full loan amount.

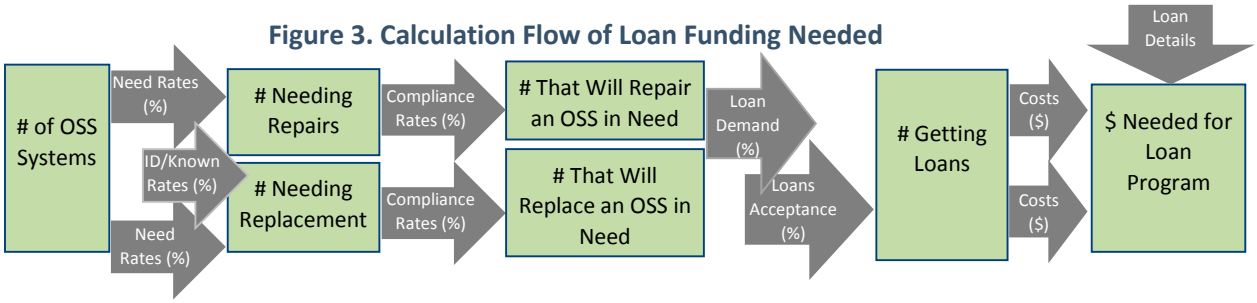
5. Analysis Process

Now we briefly discuss how the data decisions made in the previous section are utilized within our Needs Assessment Analysis Model by giving an overview of the model's basic calculation progression and how that impacts determination of capital needs (with revolving loan fund considerations).

Calculation Flow

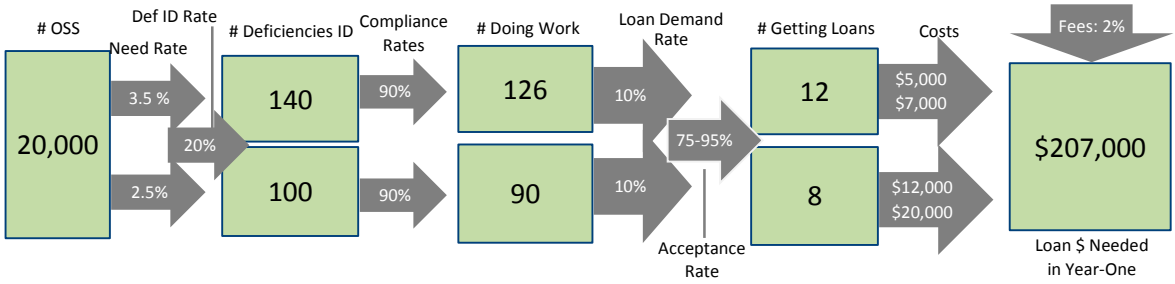
This subsection explains how calculations are performed with the companion quantitative model. The basic calculation flow within the model is depicted again in Figure 5 (same as Figure 4 presented earlier). One can see how each of the data inputs described in the previous section conceptually fits into the process. The figure divides repairs and replacements into two logical "tracks," and the model further segments residential and non-residential property owners and gravity and non-gravity systems where appropriate.

Figure 3. Calculation Flow of Loan Funding Needed



As an example of this calculation flow, we populate the diagram in Figure 6 with assumed numbers for Clallam County, using annual "most likely" values across the board for a "conservative" loan program design scenario.

Figure 4. Sample Calculation of Annual Loan Funding Needed for Clallam County (using "most likely" estimates)



Calculation of Capitalization Need

The model assumes that the program is capitalized annually, although in reality this may be done a variety of ways and from a variety of sources, including multi-year funding cycles (e.g., every three years) depending on funding sources and other considerations. The results of the model do not vary greatly with either approach.

The model also assumes that a potential public loan fund will be “revolving,” that is, the main loan fund is replenished as borrowers pay back their loans, creating an opportunity for further loans to be issued in the future. This type of funding steadily reduces the need for outside funding to capitalize the loan program each year. After ten years, the needed outside funding is less than half of what it is in year-one (given our base assumptions). The matrix in Appendix 1 shows how the annual loan need (including fees and loan loss reserves), minus the loan payment receipts, creates a balance of what is required to be input into the loan fund. This matrix shows low, high, and “most likely” levels of funding, both nominally across ten years and factoring present value (PV; in 2015 dollars), of this stream of funding over that time period.

6. Results of Analysis and Recommendations

This section presents the results of the team's analysis and modeling efforts, imparting observations that emerged from the research process, presenting the bottom-line outputs of the modeling work.

Qualitative Observations

During the research process, the project team identified a few observations related to OSS loan program planning:

1. The OSS industry in general has little available hard data about system need and market demand for loans. The data that do exist often conflict, potentially due to unclear assumptions, imprecise research parameters, or other poor methodologies. Thus, judgment of industry experts is critical to making determinations about OSS owner needs and loan program funding levels.
2. There is no variable that stands out as significantly more or less "sensitive" than the others. This is because the calculation flow in the OSS model is sequential, so percentage changes at any one step carry through with similar weights to the final capitalization estimates. That said, we expect that program experience would provide insights into certain variables over time (e.g., the number of property owners requesting public OSS loans). Additionally, we expect LHJ program or loan program actions to affect the values of certain variables (e.g., deficiency identification rates).
3. Even though many property owners decide to finance projects through means other than county-sponsored loan programs (e.g., home equity lines of credit and personal loans), the presence of public loan programs seems to make property owners less resistant to OSS inspections and help them feel more comfortable exploring the options available to them. Programmatically, this means that the mere existence of a loan program is perhaps even more important than any capitalization level that is ultimately established.
4. Staff at some of the smaller, more isolated counties expressed concern that a future regional program could be more difficult for their residents and businesses to access, both due to geography and constituents' preferences to deal with local financing institutions. If established, a regional loan program can take these needs and concerns into account. This sentiment was balanced by statements from other small county officials who noted that since they lacked the internal resources to effectively manage their own loan programs, a regional loan program would be well received.
5. The region's septic management programs are still relatively new and, as coverage, service, and contact with the region's population expand, it is expected that work on septic systems and demand for low-interest loans will increase. It is also anticipated that over time the percentage of systems in disrepair will decrease.

Quantitative Modeling Results

We present modeling results using the "most likely" inputs, as determined by the project team, segmented into the two loan inclusivity scenarios discussed earlier in this document: (1) Conservative Scenario (75% acceptance, 8% default) and (2) Inclusive Scenario (95% acceptance, 10% default). These design options are highlighted because they represent two distinct policy options.

The model calculates a few key outputs, namely the assumed number of systems that get loans for repair and replacement each year and the loan capitalization requirement in year-one and over ten years in a revolving fund. Table 19 (Conservative) and Table 20 (Inclusive) present the "most likely" number of public OSS loans expected to be given in county, by property owner type (residential and non-residential) and type of work (repair and replacement).

Table 19. Assumed Annual Number of OSS System Loans for Repair and Replacement by County – *Conservative Loan Program Scenario*

	Residential		Non-Residential		
County	**Repair**	**Replacement**	**Repair**	**Replacement**	**TOTAL**
Clallam	9	7	0	0	16
Island	15	11	1	0	27
Jefferson	7	5	0	0	12
King	72	52	2	2	128
Kitsap	25	18	0	0	43
Mason	12	9	0	0	21
Pierce	50	36	2	2	90
San Juan	4	3	0	0	7
Skagit	6	5	0	0	11
Snohomish	36	26	1	1	64
Thurston	32	23	1	1	57
Whatcom	13	9	0	0	22
Total	**281**	**204**	**7**	**6**	**498**

Table 20. Assumed Annual Number of OSS System Loans for Repair and Replacement by County – *Inclusive Loan Program Scenario*

	Residential		Non-Residential		
County	**Repair**	**Replacement**	**Repair**	**Replacement**	**TOTAL**
Clallam	12	8	0	0	20
Island	20	14	1	1	36
Jefferson	8	6	0	0	14
King	92	66	3	2	163
Kitsap	32	23	0	0	55
Mason	15	11	0	0	26
Pierce	63	45	3	2	113
San Juan	5	4	0	0	9
Skagit	8	6	0	0	14
Snohomish	45	32	1	1	79
Thurston	41	29	1	1	72
Whatcom	16	12	0	0	28
Total	**357**	**256**	**9**	**7**	**629**

Using the data input judgments and calculations described earlier in this report, the project team has determined that there is a wide range of potential OSS loan funding needs for the Puget Sound region over the next ten years, as presented in

Table 21 and Table 22. The large span from low to high estimates results from the wide variability of assumptions and the fact that the "high" variables compound separately from "low" variables. In other words, when several high numbers multiply with one another this creates an exponential situation that differs appreciably from when several low values multiply with one another. In general, models can avoid this compounding when certain variable selections eliminate options for other inputs; however, the independent nature of the variables in our model makes this impractical here.

The wide range between high and low outputs notwithstanding, the model also offers a "most likely" output, which uses the project team's best estimates for each variable in its calculations. The numbers in bold in Table 21 and Table 22 are the best estimates of regional loan program funding need over ten years. The total capitalization figures are presented alongside first-year capital needs, average annual capital needs, and average loan amount. Present value (PV) analysis is not presented in these tables, but the project team did conduct this analysis, which is mentioned later.

Table 21. Regional OSS Funding Needed – *Conservative Loan Program Scenario*

Output Level	10-Year Revolving Fund Total (no PV)	First-Year Capital Needs Totals	Average Annual Capital Needs Across 10-Years	Average Loan Amount per Project
Low Estimate	$1,481,000	$163,000	$148,000	$5,000
High Estimate	$242,769,000	$26,771,000	$24,277,000	$12,000
Most Likely Estimate	$22,266,000	$2,455,000	$2,227,000	$9,000

Table 22. Regional OSS Funding Needed – *Inclusive Loan Program Scenario*

Output Level	10-Year Revolving Fund Total (no PV)	First-Year Capital Needs Totals	Average Annual Capital Needs Across 10-Years	Average Loan Amount per Project
Low Estimate	$1,896,000	$204,000	$190,000	$5,000
High Estimate	$319,935,000	$34,500,000	$31,994,000	$12,000
Most Likely Estimate	$29,163,000	$3,145,000	$2,916,400	$9,000

Outside funding required to capitalize a revolving OSS loan program is not expected to be consistent across all ten years, because loan repayments are assumed to recapitalize the fund only after repayment receipts are taken into account. Table 23 displays the amount of loan funding needed over the ten-year program period (summarizing what is represented in Appendix 1). Again, the model assumes program startup in 2015; however, if this occurs in a later year, the analysis does not change significantly.

Table 23. Loan Funding Needed In Each Year of Program Period, Using "Most Likely" Outputs

Year	Funding Needed in Each Year - Conservative Loan Program Scenario (no PV)	Funding Needed in Each Year – Inclusive Loan Program Scenario (no PV)
2015	$2,455,000	$3,145,000
2016	$2,768,000	$3,571,000
2017	$3,751,000	$4,837,000
2018	$3,258,000	$4,219,000
2019	$2,780,000	$3,620,000
2020	$2,317,000	$3,039,000
2021	$1,869,000	$2,478,000
2022	$1,436,000	$1,936,000
2023	$1,018,000	$1,412,000
2024	$615,000	$907,000
10-YEAR TOTAL	**$22,266,000**	**$29,163,000**
Remaining Need: 2025-2029	$(2,440,000)	$(2,374,000)
15-YEAR TOTAL	**$19,826,000**	**$26,789,000**

Again, the loan program can be funded each year or in groups of two to three years for consistency and possibly to reduce political and administrative burdens.

Findings

After ten years at "most likely" levels, the program is expected to be capitalized with about $22-29 million. The revolving fund is projected to become self-sustaining in year 11. With the aim of creating a truly sustainable loan program, the recommended funding level is $22 million if a conservative loan program scenario is selected or $29 million if an inclusive loan program scenario is adopted (which represent $17 million and $23 million, respectively, in present value terms). Actual capitalization needs and loan demand will become evident over time as the regional loan program is established and implemented.

Appendix 1: Calculation of Loan Funding with Considerations of Revolving Fund

Output for "Conservative" Loan Scenario

The tables below show how loan repayments lessen the need for loan program funding in future years. See the bottom table for how loan funding declines over time.

Calculation of Loan Funding with Consideration of Revolving Fund

Scenario:	Most Likely Estimate															
Loan Dispersements & LLR	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**
Most Likely Estimate	$2,455,358	$3,683,037	$4,910,717	$4,910,717	$4,910,717	$4,910,717	$4,910,717	$4,910,717	$4,910,717	$4,910,717	$4,910,717	$4,910,717	$4,910,717	$4,910,717	$4,910,717
Repayment	$2,258,930	$3,388,394	$4,517,859	$4,517,859	$4,517,859	$4,517,859	$4,517,859	$4,517,859	$4,517,859	$4,517,859	$4,517,859	$4,517,859	$4,517,859	$4,517,859	$4,517,859
	* 50% less for ramp-up	*75% less for ramp-up													
Fraction of Principal Remaining	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Loan Repayment Receipts	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**
2015 Principal	$150,595	$150,595	$150,595	$150,595	$150,595	$150,595	$150,595	$150,595	$150,595	$150,595	$150,595	$150,595	$150,595	$150,595	$150,595
LOANS Interest	$112,946	$105,417	$97,887	$90,357	$82,827	$75,298	$67,768	$60,238	$52,708	$45,179	$37,649	$30,119	$22,589	$15,060	$7,530
Total	**$263,542**	**$256,012**	**$248,482**	**$240,952**	**$233,423**	**$225,893**	**$218,363**	**$210,833**	**$203,304**	**$195,774**	**$188,244**	**$180,714**	**$173,185**	**$165,655**	**$158,125**
2016 Principal		$225,893	$225,893	$225,893	$225,893	$225,893	$225,893	$225,893	$225,893	$225,893	$225,893	$225,893	$225,893	$225,893	$225,893
LOANS Interest		$169,420	$158,125	$146,830	$135,536	$124,241	$112,946	$101,652	$90,357	$79,063	$67,768	$56,473	$45,179	$33,884	$22,589
Total		**$395,313**	**$384,018**	**$372,723**	**$361,429**	**$350,134**	**$338,839**	**$327,545**	**$316,250**	**$304,956**	**$293,661**	**$282,366**	**$271,072**	**$259,777**	**$248,482**
2017 Principal			$301,191	$301,191	$301,191	$301,191	$301,191	$301,191	$301,191	$301,191	$301,191	$301,191	$301,191	$301,191	$301,191
LOANS Interest			$225,893	$210,833	$195,774	$180,714	$165,655	$150,595	$135,536	$120,476	$105,417	$90,357	$75,298	$60,238	$45,179
Total			**$527,084**	**$512,024**	**$496,965**	**$481,905**	**$466,845**	**$451,786**	**$436,726**	**$421,667**	**$406,607**	**$391,548**	**$376,488**	**$361,429**	**$346,369**
2018 Principal				$301,191	$301,191	$301,191	$301,191	$301,191	$301,191	$301,191	$301,191	$301,191	$301,191	$301,191	$301,191
LOANS Interest				$225,893	$210,833	$195,774	$180,714	$165,655	$150,595	$135,536	$120,476	$105,417	$90,357	$75,298	$60,238
Total				**$527,084**	**$512,024**	**$496,965**	**$481,905**	**$466,845**	**$451,786**	**$436,726**	**$421,667**	**$406,607**	**$391,548**	**$376,488**	**$361,429**
2019 Principal					$301,191	$301,191	$301,191	$301,191	$301,191	$301,191	$301,191	$301,191	$301,191	$301,191	$301,191
LOANS Interest					$225,893	$210,833	$195,774	$180,714	$165,655	$150,595	$135,536	$120,476	$105,417	$90,357	$75,298
Total					**$527,084**	**$512,024**	**$496,965**	**$481,905**	**$466,845**	**$451,786**	**$436,726**	**$421,667**	**$406,607**	**$391,548**	**$376,488**
2020 Principal						$301,191	$301,191	$301,191	$301,191	$301,191	$301,191	$301,191	$301,191	$301,191	$301,191
LOANS Interest						$225,893	$210,833	$195,774	$180,714	$165,655	$150,595	$135,536	$120,476	$105,417	$90,357
Total						**$527,084**	**$512,024**	**$496,965**	**$481,905**	**$466,845**	**$451,786**	**$436,726**	**$421,667**	**$406,607**	**$391,548**
2021 Principal							$301,191	$301,191	$301,191	$301,191	$301,191	$301,191	$301,191	$301,191	$301,191
LOANS Interest							$225,893	$210,833	$195,774	$180,714	$165,655	$150,595	$135,536	$120,476	$105,417
Total							**$527,084**	**$512,024**	**$496,965**	**$481,905**	**$466,845**	**$451,786**	**$436,726**	**$421,667**	**$406,607**
2022 Principal								$301,191	$301,191	$301,191	$301,191	$301,191	$301,191	$301,191	$301,191
LOANS Interest								$225,893	$210,833	$195,774	$180,714	$165,655	$150,595	$135,536	$120,476
Total								**$527,084**	**$512,024**	**$496,965**	**$481,905**	**$466,845**	**$451,786**	**$436,726**	**$421,667**
2023 Principal									$301,191	$301,191	$301,191	$301,191	$301,191	$301,191	$301,191
LOANS Interest									$225,893	$210,833	$195,774	$180,714	$165,655	$150,595	$135,536
Total									**$527,084**	**$512,024**	**$496,965**	**$481,905**	**$466,845**	**$451,786**	**$436,726**
2024 Principal										$301,191	$301,191	$301,191	$301,191	$301,191	$301,191
LOANS Interest										$225,893	$210,833	$195,774	$180,714	$165,655	$150,595
Total										**$527,084**	**$512,024**	**$496,965**	**$481,905**	**$466,845**	**$451,786**
2025 Principal											$301,191	$301,191	$301,191	$301,191	$301,191
LOANS Interest											$225,893	$210,833	$195,774	$180,714	$165,655
Total											**$527,084**	**$512,024**	**$496,965**	**$481,905**	**$466,845**
2026 Principal												$301,191	$301,191	$301,191	$301,191
LOANS Interest												$225,893	$210,833	$195,774	$180,714
Total												**$527,084**	**$512,024**	**$496,965**	**$481,905**
2027 Principal													$301,191	$301,191	$301,191
LOANS Interest													$225,893	$210,833	$195,774
Total													**$527,084**	**$512,024**	**$496,965**
2028 Principal														$301,191	$301,191
LOANS Interest														$225,893	$210,833
Total														**$527,084**	**$512,024**
2029 Principal															$301,191
LOANS Interest															$225,893
Total															**$527,084**

Balance (Funding Needed)	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**
Need	$2,455,358	$3,683,037	$4,910,717	$4,910,717	$4,910,717	$4,910,717	$4,910,717	$4,910,717	$4,910,717	$4,910,717	$4,910,717	$4,910,717	$4,910,717	$4,910,717	$4,910,717
Repayment		$914,866.51	$1,159,584	$1,652,784	$2,130,924	$2,594,004	$3,042,025	$3,474,987	$3,892,889	$4,295,731	$4,683,514	$5,056,238	$5,413,901	$5,756,506	$6,084,051
Balance	$2,455,358	$2,768,171	$3,751,133	$3,257,933	$2,779,793	$2,316,712	$1,868,691	$1,435,730	$1,017,828	$614,985	$227,202	-$145,521	-$503,185	-$845,789	-$1,173,334

Appendix 2: Summary of Puget Sound and National OSS Loan Programs

The project team reviewed details for OSS loan programs in the Puget Sound and a select group outside the region.

Puget Sound OSS Loan Programs

Eleven of the twelve Puget Sound counties have OSS loan programs, six of which are administered by non-profit lender Craft3 (formerly Shorebank Enterprise Cascadia). The following summaries provide descriptions of each for the reference of program planners.

Craft3 Clean Water Loans

Clallam, Jefferson, King (Vashon MRA), Kitsap, Mason, Pierce (mid 2014), and Pacific (select areas) Counties

Craft3, a nonprofit Community Development Financial Institution, has partnered with local health jurisdictions, the State of Washington Legislature, and philanthropic organizations to establish and manage a Clean Water Revolving Loan fund for septic repairs/replacements at residential and small commercial properties located in Clallam, Jefferson, Kitsap, Mason, and Pierce (launching in 2014) Counties, as well as select areas in King County (currently limited to Marine Recovery Area on Vashon-Maury Island, but may be expanded in 2014). Craft3's loans are also available in select areas of Pacific County, which is not considered a part of the Puget Sound study area. Loan proceeds may fund the full costs of the design, permitting, repair, and/or replacement of on-site septic systems that are (1) failing (per WAC guidelines), (2) ordered to be fixed by the health departments, or (3) older than 25 years. Each loan also contains a reserve of up to $1,750 to cover the ongoing O&M costs, inspections, and minor repairs (no interest is charged until funds are disbursed). In certain areas, upon approval by the local health jurisdiction, funds may also be used to connect the property to a municipal sewer line.

Loan amounts typically range from $5,000 to $50,000, but other amounts may be considered on a case-by-case basis. Craft3 serves borrowers of all income levels, including low-income households and provides a rate/term structure that offers fully or partially-deferred payments and reduced interest rates for lower income borrowers. Their 'risk layering' approach to loan approval is designed to allow as many applicants as possible obtain financing to keep their homes. Applicants' credit history, income, and home value are evaluated in part of the credit decision process. Loans are secured with a lien on the property primarily via UCC-1a (historically, Deed of Trust) filed with the county.

Interest rates and repayment terms are determined by the applicant's annual household income. Approved residential applicants with annual household incomes up to $35,000 are eligible for an interest rate of 1.99% with no monthly payments, payable over a 10-year term with a renewal option. Households making between $35,001 and $55,000 receive an interest rate of 3.99% with a term of 10 years, with the option to renew, and require monthly payments on the interest. Applicants with an annual household income greater than $55,001 receive a 4.99% interest on their loan with a payback term of up to 15 years and are required to pay monthly payments on principal and interest. Commercial rates and terms are determined on a case-by-case basis depending on the project. Typical Clean Water commercial project rates range from 4.99% to 7.99% with monthly P&I payments and 5-7 year terms. Loan fees cover relevant third party fees plus Craft3's cost for loan document production, underwriting

and servicing. Associated fees include a $150 Craft3 Loan fee, a $350 Document fee, and estimated $200 in third party fees (e.g. credit/title reports, etc.). Craft3 allows for portions of loans to be dispersed over multiple phases of the project to ensure sufficient working capital for the contractor. Projects typically get an upfront disbursement upon Craft3's receipt of signed loan documents. The final disbursement occurs after the project is complete and approved by the county and borrower. More details are included in the table below.

Through this program, Craft3 has deployed over $9 million through over 400 clean water loans since 2003. At least $2 million has been revolved and relent since the program started. Craft3 has obtained its revolving loan capital from a combination of public and private sources including the centennial clean water fund, and local philanthropic organizations. To date, they have not utilized dollars from the state revolving loan fund.

Annual Household Income	Interest Rate	Repayment Terms	Example
Up to $35,000	1.99% (2.08% APR)	No monthly payments required**	Example loan amount of $15,000*, no monthly payments for 179 months, then 1 balloon payment of $20,449 due in the 180th month.
$35,001 - $55,000	3.99% (4.42% APR)	Monthly interest-only payments.**	Example loan amount of $15,000*, 179 months interest payments of $53.29, then 1 balloon payment of $15,777 due in the 180th month.
Over $55,000 & non-owner occupied	4.99% (5.72% APR)	Monthly principal and interest payments for term up to 15 years.	Example loan amount of $15,000*, $124.31 per month, 15 year term (180 months).

Commercial loan rates determined on a case-by-case basis

APR, Annual Percentage Rate
*Loan availability, terms, and conditions current as of 7/1/2013, and are subject to change. Residential property examples include financing of standard third party and lender loan fees totaling approximately $725. Not all applicants will qualify. Equal Housing Lender. Craft3 NMLS ID#390159.
** Principal balance and interest (if applicable) due on sale, transfer, refinance, or maturity. If, after 15 years, homeowner has not sold, refinanced, or otherwise transferred ownership of the property, is in compliance with the loan agreement, and meets relevant lending/program criteria, the 15-year loan period may be extended, at the lender's sole discretion, for up to an additional five years

Island County

On-Site Sewage System Financial Assistance Program

The "On-Site Sewage System Financial Assistance Program" provides financial assistance for the repair and replacement of failed on-site sewage systems in Island County, Washington. The program is funded by the Washington State Water Pollution Control Revolving Fund (SRF), a low-interest loan fund and grants from the Washington State Centennial Clean Water Fund. The funding is administered by the Washington State Department of Ecology to counties for water quality infrastructure and nonpoint

source pollution projects such as the repair and replacement of failing on-site sewage (septic) systems, and the connection of properties to sewer systems when feasible. The program must begin to pay back the state SRF funds one year after the end of the funding cycle (two to four years), and completes repayment over a five-year period.

Funds are available to any Island County property owner with a failing on-site sewage system that is verified by Island County Public Health. Funds can be used for on-site sewage system repair and replacement, as well as connection to a municipal sewer system, but cannot be used as part of a home remodel. Existing on-site sewage systems must be abandoned after connecting to a municipal sewer system. Wastewater flows cannot exceed 3,500 gallons per day. Property owners must obtain an approved on-site sewage system repair permit designed by a Washington State licensed On-Site Sewage System Designer and construction bids from an Island County licensed On-Site Sewage System Installer before funding applications can be reviewed and processed.

Island County evaluates the applicant's credit. The evaluation includes income verification, loan to value and debt to income ratios, credit scores and stability rating. A total credit evaluation grade of C or better is needed for loan approval. Applicants unable to qualify for a full loan are considered for combination loan and grant funding or full grant funding.

Interest rates for loans are determined by the applicant's income level as a percentage of current Island County median household income (MHI). Individuals earning less than 50%, between 50% and 80%, and greater than 80% of MHI, qualify for 1.5%, 2.7%, and 4% interest rates, respectively. The loan term is five years and the maximum borrowing amount for a single project is $50,000, although to date no one has borrowed more than $35,000. The loan can be used for residential and commercial sites but so far has only been utilized residentially.

Loans are secured by a Promissory Note and Deed of Trust. The loan balance must be repaid in full if a borrower sells or transfers the property. Loan fees consist of $200 Deed of Trust recording and reconveyance fees, $100 bank contract set-up fee, $420 bank contract collection fee, $235 Island County loan administration fee; a total of $955. This does not include upfront fees of $105 for Title Insurance and Credit Report ($18 per person). It is not recommended that loans below $5,000 be pursued through the program. Any grant funding must be paid back if the property is sold or transferred within three years of assistance. On-site sewage system repairs of less than $2,000 are eligible for streamlined grant funding upon income verification and receipt of a sewage system evaluation from a licensed Island County Maintenance Service Provider and a repair bid. Operation and maintenance costs such as tank pumping and riser installation are not eligible for the streamlined grant funding.

Pierce County

Pierce County Septic Repair Grant and Loan Project

The "Pierce County Septic Repair Grant and Loan Program" provides grant funding and low-interest loans for on-site septic repair and replacement or sewer line connection for properties in unincorporated areas of Pierce County. It is funded by the Department of Ecology, structured as a state revolving fund and Centennial Grant. The Centennial Grant is a Washington State funded grant program

that distributes grants to local governments and tribes in Washington State for water quality infrastructure improvements and nonpoint source pollution prevention projects.

Loan amounts between about $5,000 and $50,000 are given and must be paid back over 15 years. Loans are secured by a lien on the property. Sites must have surfacing sewage that is adversely impacting water quality. Loan terms and grant eligibility takes into consideration the applicant's income and assets and the expected water quality benefit.

San Juan County

On-Site Repair Financial Assistance Program

The "On-Site Repair Financial Assistance Program" is a San Juan County loan program that offers multiple loans to property owners. It is funded by a $300,000 low-interest loan from the Department of Ecology's Water Pollution Revolving fund, only half of which the county is required to pay back. Over 20 years, the program has loaned about $1.5 million for the assistance of 118 on-site septic repair and replacement projects.

The program offers an OSS loan to homeowners countywide that have small (up to 3,500 gallons per day) systems failures. System failures can include, but are not limited to, surfacing, backups into buildings, leaking tanks, and discharging into water. Some community and commercial systems are also eligible for the program. San Juan County Health & Community Services must verify the repair of the failing system and approve the project design. The loan is secured by a promissory note and deed of trust, which is handled by the auditor who conducts a financial review (including a loan-to-debt ratio analysis) of the applicant prior to loan approval. The interest rate for all program loans is 4%, which helps cover the 1.3% Department of Ecology interest rate collected from the program (50% of their current loan from Ecology is "forgivable"). Payback terms are from one to five years. There is no maximum or minimum borrowing amount; to date the loans have ranged from $1,800 to $77,000, averaging $15,000 to $18,000 per loan.

Skagit County

OSS Loan Program

To fund its OSS loan program, Skagit County utilizes the state revolving fund (where 50% of the principal is forgivable). In Skagit County, the loan is available countywide for commercial and residential sites. The loan is secured by a deed of trust and in certain circumstances the Treasurer's special tax assessment is levied by county resolution. Commercial loans can be offered up to $75,000. Loans are offered at an interest rate between 0% and 5%—qualifying HUD applicants are offered an interest rate between 0% and 2.5% and other applicants are offered 3% to 5%, depending on the payback period (5, 10, 15 or 20 years) and other factors.

Restructuring payments and interest rates for loans can happen in circumstances of financial hardship, but must be reviewed and approved by committee review with the Treasurer's Office (who reviews and prepares the original loan paperwork), County Administration, and the Budget and Finance Offices. Applicants must have a failing septic system and a good line of credit to qualify for the loan. In recent

years as a result of the collapse of the real estate market, more applicants have poor credit and are being turned down. Such applicants often find alternative sources of funding to conduct septic repairs.

Snohomish County

Stillaguamish River Clean Water District Discretionary Fund Grant Program

While Snohomish is the only county in the twelve-county Puget Sound region that does not have an on-site septic system repair loan program, it is applying for Centennial Grant funds for $500,000 to create a combined grant and low-interest loan pilot program that would start in 2015 for Snohomish County residential projects.

Currently, Snohomish County only offers on-site septic repair grants to fee-for-service ratepayers within the Stillaguamish River Clean Water District (CWD). The CWD covers the Snohomish County portion of the Stillaguamish River basin except for the Stillaguamish River Flood Control District (i.e., the lower floodplain area west of Silvana) and the cities of Stanwood, Arlington, and Granite Falls. The purpose of the CWD includes restoring "… water quality in saltwater tidelands to allow the upgrading of conditionally approved, restricted, and prohibited shellfish beds" (Snohomish County Code Title 25A). Historically, the Stillaguamish River has had water quality problems: the South Skagit Bay and Port Susan Commercial Shellfish Growing Areas were closed in 1987 due to fecal coliform pollution from the Stillaguamish River and adjacent marine shorelines. Partly in response to these shellfish closures, Snohomish County created the CWD in 1993 and established the Discretionary Fund Grant Program to help landowners pay for small-scale projects designed to improve water quality on private and public lands within the CWD.

The Discretionary Fund Grant Program is managed by the Snohomish County Department of Public Works Surface Water Management Division, and is designed for small scale water quality restoration projects that can be completed quickly. Indirect costs associated with a project, like planning, design, coordination and capital-project mitigation cannot be covered by the Discretionary Fund. Projects supported by the Discretionary Fund must provide shellfish protection benefits in the Port Susan or South Skagit Bay areas through water quality improvements within the CWD. On-site septic repairs have been eligible for Discretionary Fund grants since late 2011.

Applicants interested in an on-site septic repair/replacement project can apply for a Discretionary Fund grant that can cover up to 50% of the eligible project costs with a maximum grant award of $10,000 per project. Eligible costs include installation and repair of septic systems components approved by the Snohomish Health District (an independent organization not run by Snohomish County). Discretionary Fund grant awards require a recommendation by the CWD Advisory Board and final approval by the Snohomish County Department of Public Works. Properties that have previously received a Discretionary Fund grant for on-site septic repair work are not eligible for additional funding. Since late 2011, the Discretionary Fund has supported 23 projects, 18 of which were on-site septic repairs.

Until recently the annual CWD fee revenue dedicated to the Discretionary Fund was about $66,000 per year, but in 2013 it was reduced by about 47% along with all other CWD revenues collected under the authority of RCW 90.72 (shellfish protection districts). This reduction was made by Snohomish County in compliance with a provision of RCW 90.72 that exempts NPDES wastewater permit holders from paying

shellfish protection fees. Snohomish County is currently evaluating its surface water management fee-for-service rate structure, services, and service areas, which includes the CWD, with the goal of implementing any changes in 2015.

Thurston County

Septic System Repair Financial Assistance Program

Thurston County offers low-interest loans and grants for on-site septic repair and replacement projects. The loans are funded through the Department of Ecology's revolving loan fund. They are available from the County and are offered to all single owner residences in the county. Applicants undergo an eligibility review performed by the County Environmental Health Division including tax history, credit report and title search of subject property prior to loan approval. Loans are secured through a promissory note and deed of trust. The program can offer loans of as little as $2,000, and there is no maximum borrowing amount. Interest rates range between 2% and 3.5%, but if loan payments at 3.5% equal or exceed 1% of the applicant's gross annual income, the interest rate is adjusted to 2%. The interest rate can be waived in extreme hardship circumstances. Loans are repaid over 20 years or less. Loan funds can be used for the repair or replacement of a failing on-site septic system for residences; it cannot be used for remodeling, expansion, or connecting additional living units to the system. However, loans can be used to connect a home to the public sewage system if it is deemed a better option than replacing the on-site septic system. Houses for sale are not eligible for work under the program.

Replacement and small repair grants, which do not need to be repaid, are available only to homeowners with limited incomes. Grant fund projects are subject to state prevailing wage and historical site requirements. Replacement grants require a county permit for the project, can only cover a portion (between 1/3 and 1/2) of the total cost of work, and cover at least $2,000. Small repair grants do not require a permit from the county and can cover up to $800 in small repairs. To qualify, the owner's annual income must be no more than 80% of the median income, or they must be enrolled in a senior or disabled tax exemption by the Thurston County Treasurer.

Whatcom County

On-Site Sewage Loan Program

The *On-Site Sewage Loan Program* provides financial assistance for Whatcom County residents in their on-site septic repairs. The program was originally set up as a state revolving fund through a state revolving fund, financed by the Department of Ecology but in 2008 it switched to providing grant money instead of a SRF loan. The $500,000 given by the Department of Ecology is used as the loan loss reserve. It is funded by a private/public partnership with Industrial Credit Union and Community Assistance Organization with the goal of a revolving structure.

There are two loan options: a "Reduced Interest" loan through the credit union and a "Deferred Payment loan funded by the County and managed by the Community Assistance Organization. Both loans are available countywide. *Reduced* Interest loans typically have an interest rate of about 6.25% and are secured by deeds of trust. Seven of such loans have been issued to date, all consisting of complete system replacements, with interest rates between 5.75% and 6.5%.

The *Deferred Option* has an interest rate of 1% without monthly installments. This loan is secured by a deed of trust on the property, and is payable in full with interest at the time of sale, transfer or rental of the property. The maximum amount for the Deferred Option loan is $18,000 unless reviewed and approved by the Loan Review Board. Deferred loan applicants must be denied a *Reduced Interest* loan and have an income no greater than 80% the Whatcom County median household income to qualify.

The loans can be used for on-site septic repairs, connecting properties to sewer mains, associated design and permit fees and other costs associated with on-site septic permit issuance. The work must be done by a Licensed OSS installer, but property owners living on-site can request en exemption from certification requirements. Whatcom County Health Department must confirm the failure prior to eligibility. All residents in Whatcom County may apply for the loans, but applicants must have a credit score less than 639, a debt-to-income ratio greater than 50%, and/or a loan-to-value ratio greater than 80% in order to qualify. Financial qualifications are taken into consideration when assessing the loan loss reserve. There is no maximum loan amount for this loan and the payback terms have ranged between 117 and 240 months. The Credit Union will set the interest rate at 26-week T-bill rate rounded to the nearest 25 basis points.

National OSS Loan Programs

Delaware

The Delaware Department of Natural Resources offers financial assistance for septic repair and replacement through the Septic Rehabilitation Loan Program (SRLP) and the Septic System Extended Fund Option Program (SEFO). The SRLP offers low interest loans to pay for the cost of replacing failing on-site septic systems, while the SEFO offers no-interest loans for eligible low-income homeowners. Both programs are managed by Delaware's Financial Assistance Branch (FAB) and First State Community Action Agency (FSCAA) with technical support from Ground Water Discharge Branch, and are financed through the Clean Water State Revolving Fund. Loans are available to property owners with on-site wastewater disposal systems that are out of Delaware Code regulatory compliance. Loans can cover site evaluation, septic system design, permits, construction costs, and closing and recording charges. Interest rates—ranging from 3% or 6% for SRLP loans, and 0% for SEFO loans—depend on the site's location and applicant's income level. Applicants may be considered for a SEFO loan only after denied a SRLP loan. Loans can be made out for amounts between $1,000 and $35,000 for individual systems and a maximum of $250,000 for community systems. Loans are secured by a lien on the property. SRLP loan payments occur monthly over as long as a 20 year period with no penalty for prepayment. SEFO loans have no monthly payment requirements and are due and payable upon property transfer. There is a modest application fee ($8 to $10) to cover a credit history report.

Iowa

Iowa's On-site Wastewater Assistance Program (OSWAP) provides low-interest loans for rural homeowners for failing septic system repairs and replacements. The loans are funded by the Clean Water State Revolving Fund, which is administered by the Department of Natural Resources and the Iowa Finance Authority. Eligible applicants must own a home in a participating county that has a septic system not connected to a public swage line. Projects must include a septic system tank and a secondary treatment system, per Iowa law. Applicants must first obtain a septic construction permit from the

county sanitarian prior to applying for an OSWAP loan. Only after the loan is approved should applicants hire a licensed septic contractor to complete the project. OSWAP offers loans as low as $2,000 with a 3% interest rate and terms up to 10 years. Funds can cover all actual costs of the project.

Maryland

The state of Maryland has multiple financing sources for water quality point source and non-point source pollution control projects—including septic system upgrade projects—through the Maryland Water Quality Financing Administration (WQFA) and Bay Restoration Fund (BRF). Their mission is to provide low interest rate loans through the Water Quality Revolving Loan Fund (WQRLF) programs and the State Bay Restoration Fund. The WQFA was established in 1988 by the Maryland General Assembly to encourage capital investment for wastewater and drinking water projects pursuant to the Federal Clean Water Act of 1987. Established in 2004 the BRF raises funds by collecting $30 fees per equivalent dwelling units of all homes and businesses connected to wastewater treatment plants and on-site septic systems. 60% of the BRF septic fees are allocated to the Maryland Department of Environment (MDE) and the remaining 40% to the Maryland Department of Agriculture for their Cover Crop Program.

The WQRLF provides low interest loans for wastewater water quality nonpoint source projects, including sewerage collection and conveyance system repair and replacement. The standard rate (excluding administrative fees) for these loans is 2.1%, although if the applicant is classified as a “disadvantaged community” by the WQFA the rate drops to 1%. Other subsidies such as loan forgiveness and grant funds may be available to disadvantaged communities as well. Loans can be paid back over up to a 20 year period. The administrative fee associated with the loan—collected annually—is 5% of the aggregate debt service divided by the number of fee payments over the loan term.

The BRF was created in efforts to address the decline in water quality from over enrichment of nutrients such as phosphorus and nitrogen. The funds are used to upgrade wastewater treatment plants with enhanced nutrient removal technology to achieve acceptable levels of water quality. In 2012, it was voted to double the BRF fee for on-site septic disposal systems to $5 per month per household or equivalent dwelling unit. Due to funding constraints and high demand, MDE must allocate funding based on Bay Restoration Fund priorities; the Fund prioritizes upgrades to failing on-site disposal system (OSDS) or holding tanks within or outside of Critical Areas (1,000 feet or less to tidal waters), non-failing OSDS in Critical Areas including new best available technology (BAT) installation, and lastly, non-failing OSDS outside Critical Areas. MDE considers a failure to be when the continued operation of the OSDS presents an imminent threat to public health, including either the possibility of human contact with sewage through a system that directly discharges to the ground surface, surface water or backs up into a building, or the system has been identified as contaminating a specific water supply. Effective January 1, 2013, all OSDS repairs and installations must utilize BAT within critical areas. BAT practices are reviewed by the Best Available Technology Review Committee, consisting of members of MDE. BAT Grant assistance is based on household income; household incomes less than $300,000 are eligible for 100% of BAT costs covered by grant funds, while household incomes any larger than the aforementioned are eligible for grant funds to cover 50% of BAT costs. On the commercial side, non-profit enterprises can have all BAT costs covered by grant funds, while for-profit businesses can use grant funds to pay for 50% of BAT costs.

Michigan

The Michigan Water Pollution Control Revolving Fund (SRF) provides low-interest loans at 2.5% for municipalities to finance the construction of water pollution control facilities. For municipalities that cannot qualify for the SRF loan, the Strategic Water Quality Initiatives Fund Loan Program (SWQIF) provides funding to municipalities for projects to replace or upgrade failing on-site septic systems on private properties that are adversely impacting human health and the environment (projects on public properties can get funds from the SRF under a different program). The SWQIF loan rate is also 2.5% for qualified municipalities that do not qualify for SRF assistance. The discount rate for both SRF and SWQIF loans is 4.375%. Municipalities interested in using SQUIF loan funding for on-site septic projects must provide advanced notice and requests comments from the local health department.

New Mexico

New Mexico's Rural Infrastructure Revolving Loan Program (RIP) provides loans to local authorities for the repair, replacement and construction of water supply and wastewater projects. Created in 1988, the RIP originally helped local authorities finance water supply projects, but in 2001 it was amended to include wastewater projects as well. Local authorities can apply for loans as high as $2,000,000 with an interest rate of 3% and repayment up to 20 years. Funds can be used for non-point source projects, such as on-site septic repair and replacement. Funds can be made available within four to six weeks. There currently is no grant funding available.

New York

New York's Water and Environmental Loan and Grant program provides funding to public bodies—such as municipalities, special purpose districts and authorities, and federally acknowledged Native American tribes—for construction and improvement of water and wastewater systems in rural communities. The USDA Rural Development office must determine that no other lines of funding are available at a reasonable rate and terms for applicants before they are made eligible. Funds can be used for the purchase of equipment, construction, expansion, and improvement of solid waste disposal facilities, like on-site septic systems, as well as covering costs and fees related to the project. Grant funds are limited to communities whose median household incomes (MHI) are equal to or below the statewide non-metropolitan MHI, and may be further limited based on availability. Loan interest rates are fixed, based on the MHI of the service area, with repayment terms up to, but not exceeding, 38 years. Loans are secured by general obligation bonds.

Ohio

The Ohio EPA Water Pollution Control Loan Fund (WPCLF) is a revolving fund designed to operate in perpetuity to provide low interest rate loans and other forms of assistance for water resource protection and improvement projects. In addition, specialized services are provided for small and hardship communities. The WPCFL can offer below-market rate loans for the planning and construction of waste water treatment and collection facilities, water supply and distribution facilities, storm water management facilities within the state of Ohio. In 2013 projects across 35 counties received funding, with funding ranging from $34,000 to $56,000 per county. Homeowners with income levels at or below the poverty line are eligible to receive 100% funding for their OSS project costs, while homeowners at 200% the poverty line are eligible for 85% of their project to be funded through the WPCLF. Interest

rates will be determined for communities based on the term of the loan, population of the service area and the economic status of the applicant. There are six types of interest rates this program year (2014): standard, index, small community, hardship, negotiated linked deposit, and 30-Year Long Term. There are discounts offered for the standard, small community, and hardship interest rates, but the total interest rate established for the construction loan is not to drop below 0.2%. Loan recipients will be required to repay the loan over a period of years on a semi-annual basis starting on a specific mutually agreed-upon date.

Pennsylvania

The Pennsylvania Infrastructure Investment Authority (PENNVEST) offers 20-year, and some 30-year, loans to municipalities or authorities and some private entities, with below-market interest rates. With limited exceptions, all citizens of Pennsylvania are eligible for PENNVEST's On-Lot Sewage Disposal loan, which can be used for rehabilitation, improvement, repair or replacement of an existing system located on a single family, owner-occupied property which the primary resident is the owner, and construction costs and permitting and loan fees. PENNVEST offers limited grants for financially distressed communities. It is established as a revolving loan fund, funded by nearly $2 billion from the state general fund appropriations, state general obligation bond sales, PENNVEST revenue bond sales, and federal grants for drinking water and wastewater projects as well as nonpoint source projects such as on-site septic systems.

PENNVEST's On-Lot Sewage Disposal Loan program offers loans up to $25,000 at an interest rate of 1% to 4% depending on the user rates within the community, plus a servicing fee of 0.75% per year. Loans are secured through financial ability to repay the loan, which must be demonstrated through a credit worthiness check. An application fee of $65 is collected upon submission. Applicants must not have a family income that exceeds 150% of the statewide MHI. The project can be located in any area within the state that does not have an existing community wastewater collection treatment system or and will not have one constructed within the next five years. Loans are secured through a mortgage on the borrower's home. Loans are secured by a lien on the property. The longest term for a loan is 20 years and repayment starts within 60 days of the closing date. The entirety of the loan must be repaid if the property is sold or transferred. The borrower is expected to keep the upgraded or new system in good condition and maintain it regularly, including regular pump-outs. The pumping frequency schedule and other reporting requirements are included with the loan agreement.

Rhode Island

Rhode Island has multiple on-site septic financing programs available to its residents. The Clean Water Finance Agency runs the Community Septic System Loan Program (CSSLP) provides homeowners in communities without centralized wastewater treatment facilities loans for the repair or replacement of substandard, failed or failing septic systems within areas identified in the participating towns. The program is funded by the Clean Water State Revolving Fund, which was created with federal funding. Communities can access these funds after completing an Onsite Wastewater management Plan, securing approval of the Plan from DEM and completing an application process with the Rhode Island Clean Water Finance Agency. The Community can make loans to individual homeowners for septic system repairs or replacements. The borrowing cost for the homeowner is 2% for a term up to 10 years, on loans of no more than $25,000.

The Rhode Island Housing provides financial assistance for repairing and improving existing homes, including septic system repair or replacement. The maximum home repair loan is $25,000, and the household income cannot exceed $77,300 for households of one or two persons, or $88,950 for households of three or more persons. The loans are 20-year fixed rate low-interest loans and do not have any points, application fees or other charges. Only owner-occupied one to four person properties are eligible for loans. At least half of tenants living in homes with more than one unit must earn no more than 80% of median family income for their community and household size. Rates are fixed over 20 years and there are no application fees or other charges.

Washington – Northeast Tri-Counties

The Northeast Tri County Health District (NETCHD) has established a program to provide financial assistance to homeowners for repairs to or replacement of failing on-site septic systems for Ferry, Pend Oreille, and Stevens Counties. It is funded from statewide Centennial Grant and SRF loans. The program's low interest loans can cover 100% of the costs during the design and installation phases of the project. Loan payment options are flexible and can be paid back over long terms.

West Virginia

West Virginia Housing Fund's On-site Systems Loan Program provides financial assistance to eligible households for on-site septic system repair and replacement, or to connect property to a public sewage line. It is funded by the Clean Water State Revolving Fund program. The On-Site System Loans Program is available to owner-occupied homeowners or long-term lessees that have failing septic systems that have direct sewage discharge to ditches, streams, and other bodies of water. Loans amounts cannot exceed $10,000, and repayment must be made over a maximum of 10 years.

Appendix 3: Partial Screen Shot of Needs Assessment Model

OSS Property Owner Loan Program - Needs Assessment Model

Key Loan Program Decisions

Years of Program (2014-)	10	Discount Rate (for PV)	4.8255%	Default Rate	8.0%	Program OSS Loan	
Sector	Both Res and Comm	Avg Loan Term (yrs)	15	Loan Loss Reserve	8.0%	Conservative Scenario	pull down
Loan Purpose	Repair and Replace	Avg Loan Interest Rate	5.0%	Administrative Fees	2.0%	75%	

Cell Color Key

	= key design decisions
	= driven by cells on the 'Data Sc
	= key outputs
Blue Text	= most likely variables and calc

OSS Type	% Needing Major Repairs/Yr	% Needing Complete Replace /Yr	Average Cost to Repair	Average Cost to Replace
Gravity - low	1.0%	0.5%	$3,000	$4,000
Gravity - mid	3.5%	2.5%	$5,000	$7,000
Gravity - high	8.0%	5.0%	$7,000	$12,000
Most likely	3.5%	2.5%	$5,000	$12,000
Non-Gravity - low	1.0%	0.5%	$4,000	$9,000
Non-Gravity - mid	3.5%	2.5%	$7,000	$13,000
Non-Gravity - high	8.0%	5.0%	$10,000	$20,000
Most likely	3.5%	2.5%	$7,000	$20,000

Owner Type	Deficiency Identification Rates	Compliance Rate (% that get Repairs done)	Replacement Compliance Rate (% that	Loan Demand for Repair (% of compliant)	Loan Demand for Replace (%
Res property owners - low		50%	50%	10%	10%
Res property owners - mid	20.0%	70%	70%	20%	25%
Res property owners - high		90%	90%	35%	45%
Most likely	20.0%	90%	90%	10%	10%
Non-Res property owners - low		50%	50%	6%	10%
Non-Res property owners - mid	20.0%	70%	70%	10%	20%
Non-Res property owners - high		90%	90%	20%	30%
Most likely	20.0%	90%	90%	10%	10%

County Variables and Calculations

Counties	# of OSS Systems	# Needing Major Repairs/Yr	# Needing Complete Replacement /Yr	# That Identify Deficiencies Needing Major	# That Identify Deficiencies Needing Complete	# That Will Get Repairs Done on an OSS in Need/Yr	# That Will Replace an OSS in Need/Yr	# Demand for Loans to Repair/Yr	# Demand for Loans to Replace/Yr	Loans Granted for Repair/Yr	Loans Granted for Replace/Yr	Loan $ Granted to Repair/Yr	Loan $ Granted to Replace/Yr
CLALLAM													
Residential													
Gravity													
Low		131	33	26	7	13	3	1	0	1	0	$3,000	$0
Mid	13,085	458	164	92	33	64	23	13	6	10	4	$50,000	$28,000
High		1,047	327	209	65	188	59	66	26	49	20	$343,000	$240,000
Non-Gravity													
Low		62	64	12	13	6	6	1	1	0	0	$0	$0
Mid	6,249	219	320	44	64	31	45	6	11	5	8	$35,000	$104,000
High		500	640	100	128	90	115	31	52	24	39	$240,000	$780,000
TOTAL RES (Most Likely	19,334	677	483	135	97	122	87	12	9	9	7	$50,817	$102,099
Non-Residential (Comm, Institutional, Go													
Gravity													
Low		5	1	1	0	0	0	0	0	0	0	$0	$0
Mid	451	16	6	3	1	2	1	0	0	0	0	$0	$0
High		36	11	7	2	6	2	1	1	1	0	$7,000	$0
Non-Gravity													
Low		2	2	0	0	0	0	0	0	0	0	$0	$0
Mid	215	8	11	2	2	1	2	0	0	0	0	$0	$0
High		17	22	3	4	3	4	1	1	0	1	$0	$20,000
TOTAL NON-RES (Most	666	23	17	5	3	4	3	0	0	0	0	$0	$0
TOTAL CLALLAM (Most L	20,000	700	500	140	100	126	90	13	9	9	7	$50,817	$102,099

more in model

Appendix 4: References

Interviews

- Lynn Schneider, Washington State Department of Health
- Melanie Tyler, Department of Ecology
- Kathleen Parvin, Island County
- Terri Jenkins-McLean, King County
- Eric Evans, Kitsap County (and Online RME[9])
- Mark Tompkins, San Juan County
- Alison Mohns, Skagit County
- Sean Edwards, Snohomish County
- Debra Baker and Sue Davis, Thurston County
- Kyle Dodd, Whatcom County
- Desiree Sideroff, Craft3
- John Thomas, Washington On-Site Sewage Association (WOSSA)

Survey

- 38 respondents from WOSSA (11% response rate)

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[9] Online RME is an online system for OSS regulators and professionals to manage onsite wastewater systems. More at http://www.onlinerme.com/OnlineRMEMarketing/onlinerme.htm.

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