Diversion" would be the diversion to be used for drawing water from the lake. Ecology estimates that to hire a consultant to process this water right application would cost up to $25,000 and may take as long two years.

As part of the approved Water Rights Application "Report of Examination", a schedule of development would be established including the process by which each existing water right would be transitioned to the new water right. For example, a property would continue to use their existing water right until water service from the new organization was connected to their property. At the point when a new water service is turned on and the existing diversion or withdrawal is decommissioned, an inspection would be done most likely by Ecology following which the transition of the water right associated with that property would be complete. A record of development would be maintained during process until the transition of all individual rights is complete. Once the transition of all water rights is complete and the development is complete a final water right certificate would be issued.

Ecology has indicated that each existing individual water right or permit quantity would be put into permanent trust in exchange for the offsetting quantity to be issued as part of the new consolidated water right application. It is unclear at this point how the priority dates of existing individual rights will be impacted during the transition and this will need to be addressed, especially for those rights that were not issued as part of the 1992 agreement.

Calmor Cove Water Rights

The Calmor Cove water right would likely remain unchanged and simply be included in the portfolio of water rights used by the new consolidated water system. It may be appropriate at some point to change the Calmor Cove water right "Place of Use" to include the new water system service area. (See Map 9: Calmor Cove Service Area)

Samish Water District Water Rights

Although Lake Samish Water District is not considering development of a public water system at this time, it should be noted that on April 14, 1992 Samish Water District submitted to the Department of Ecology an Application for Permit to construct a well field of 2 or more wells approximately 300 feet deep in the vicinity of Cain Lake. The water was to be conveyed via 8" pipeline to a reservoir at the summit of Palmer Lake Gap and then into the Lake Samish District Service Area by a network of 8" – 12" pipes. The Application for Permit does not appear to have been processed. A copy of the Application is found in the Appendix as Exhibit 14.

Water Treatment

In order to use Lake Samish as a source of public water supply, it must be treated to meet the water quality standards set under the Safe Drinking Water act. The minimum treatment acceptable by DOH for surface water sources is 4 log removal and the treatment necessary to meet these criteria may include coagulation, sedimentation, filtration, disinfection, or combinations of these methods. Treatment is required to meet the provisions of WAC 246-290-250 Part 6. From the viewpoint of water quality, Lake Samish is a viable source of supply with proper treatment.

The general requirements for operation of a Group A Public Water Supply are set forth in WAC 246-290. Part 6 of WAC 246-290 establishes treatment requirements for water systems using surface water or ground water under the influence of surface water (GWI). Part 6 treatment technique requirements are established in lieu of maximum contaminant levels (MCLs) for: Giardia Lamblia; Viruses; Heterotrophic plate county bacteria; Legionella; Cryptosporidium; and Turbidity

Calmor Cove Water System Facilities

Calmor Cove's existing water distribution system provides water primarily to mobile homes located on the southwest shore of Lake Samish. The service area includes a build out of 52 Equivalent Residential Units (ERU's) comprised of a mobile home park with a mix of 24 full time residents and 25 part time residents, one unused site plus, and two existing homes immediately adjacent to Calmor Cove that in the past have been connected to the system. The area served by Calmor Cove is shown in Map 9.

Calmor Cove currently does not have a formal approval and operates with a "Blue" permit, meaning that there is no immediate health risk but the system does not meet all DOH (Washington State Department of Health) requirements for a Group A water system. In order to obtain a "Green" permit, the system capacity must be analyzed and a water system plan approved.

A detailed Water System Analysis was completed on June 20, 2011 for Calmor Cove and is included in the Appendix as Exhibit 10. The Water System Analysis established a Maximum Day Demand (MDD) of 250 gallons per day and an Average Daily Demand (ADD) of 125 gallons per day per ERU (Equivalent Residential Unit) based on historical data including adjustment for high flow events attributable to system malfunctions plus an approximate 20% safety factor. It should be noted that the Calmor Cove ADD and MDD are significantly lower that than that determined by Skagit PUD for the Alger Water System (ADD 164/MDD 328). This is most likely due to the small dwelling and lot size in the Calmor Cove community.

The existing water system is supplied by surface water from Lake Samish that is pumped through a submersible pump located approximately 500 feet off shore and north of the service area. A low "level" condition in the storage tank starts the supply pump and water is pumped through a pipe to the package filter plan at a rate of 15 gpm. The lake water is filtered, disinfected and then pumped into a 4,200 gallon contact chamber. From the contact chamber, water gravitates into a 1,100 gallon storage tank. A duplex booster system with bladder tanks is activated by low distribution pressure. The distribution system consists of 2 inch PVC and non-looped with limited valving providing the ability to isolate sections as required. A map of the distribution system is shown in Map 10.

Calmor Cove's existing Key Tech conventional surface water treatment package utilizes Alum as the coagulant for flocculation, tube settlers, filtration, and ultimately disinfection to meet water quality standards. The existing plant was designed to treat 20 gpm of raw water which is consistent with Calmor Cove water rights of 19.74 gpm. The plant is currently operated at 15 gallons per minute for 20 hours per day, the plant can provide for the following number of ERU's:

15 gpm x 1200 minutes per day / 250 gpd/ERU = 72 ERU's

Calmor Cove Water Treatment/Sanitary Surveys

Sanitary Surveys by DOH on August 24, 2007 and January 7, 2011 indicated that the existing treatment plant is near the end of its life expectancy and further identified numerous operational challenges and deficiencies that need to be addressed. There were also signs of deteriorations in the walls of the plan due to corrosion that may eventually result in wall. For these reasons, replacement of the existing filter plant is a priority for continued safe operation of the water system. A copy of the Calmor Cove Sanitary Surveys are included in the Appendix as Exhibit 11a, 11b.

A "bag filtration" system was considered as an alternative to the existing package plant. Camp Lutherwood, located at the northwest end of the Lake Samish, is currently using a bag filtration system for treatment of lake water used by the camp. A local supplier proposed a similar system, however, due to concern regarding raw water quality variations between the two locations a brief pilot plan study was performed. Normally pilot studies for surface water sources are performed for one year to assure that all seasonal variations are experienced by the pilot plant. However, in an effort to expedite determining

preliminary feasibility of the system, it was decided to pilot the system in the early fall season when the lake historically experiences its worst water quality. Due to almost immediate fouling of the pilot filter system although no formal data was provided, the supplier immediately withdrew the proposed system as an alternative for water filtration for Calmor Cove. The results are consistent with the much poorer water summer water quality at the south end of Lake Samish.

The June 20, 2011 Water System Analysis by Wilson Engineering recommended replacement of the plant with a Key-Tech ACF (Adsorption Clarifier/Filtration) filter. Chemical injection followed by static mixing, then followed by coarse media roughing filter for floc development and removal, and followed by multimedia polishing filter. The course media roughing filter provides better clarification when subjected to multiple starts when compare to the existing filter tub settlers. An additional advantage of the ACF filter is a small foot print, making it a good candidate for replacement in the tight quarters of the existing building.

On September 8, 2011 DOH provided comments regarding the June 20, 2011 Water System Analysis and related Treatment Plan Options. A copy of the September 8, 2011 letter is included in the Appendix as Exhibit 12. Most significant is comment #9 that asks for further consideration for alternate systems of slow sand filtration and membrane filtration in addition to the current rapid sand filtration. Comment #9b notes that "two treatment trains must be provided", comment #9d requires "pilot testing", and comment #9e suggests "moving the WTP" all of which will likely result in significant increases over that reflected in the 2011 Water System Analysis.

As part of this study Wilson Engineer was asked to review the September 8, 2011 comments provided by DOH regarding the 2011 Water System Analysis and update the preliminary costs estimates accordingly. After further review by Wilson Engineering it was concluded that slow sand filtration and membrane filtration were not the most feasible options given the existing treatments plants' long history of successful filtration.

The "two treatment train" and "moving the Water Treatment Plant" while desirable, are expected to at least double the construction and other associated costs reflected in the original estimate. If Calmor Cove continues to serve the same existing demand, it proposes to simply replace their existing treatment package plant in the same location, with an updated version of the same package plant from the same manufacture. Moving the treatment plan is not necessary or feasible for Calmor Cove existing demand.

The "two treatment train" design required to meet current design standards is desirable and should be included as part of the updated treatment plant design for long term implementation. However, the cost of the additional treatment train is not feasible for Calmor Cove in the short term, and given the priority to replace the existing treatment package plant as soon as possible, a phased approach to implementation of a long term treatment plan including a "two treatment train" is the most feasible approach.

The yearlong "pilot testing" requirement could add $20,000 to engineering and testing plus the cost of renting the equipment. Given the historical success of the current rapid sand filtration package plant, it is anticipated that pilot testing of an updated package plant of the same kind and manufacture can be minimized thereby significantly reducing the financial costs of the pilot test and still meeting DOH requirements.

Calmor Cove's existing water treatment plant, storage, distribution system and water rights are not adequate to provide for any expansion beyond their current service area and connections. Therefore any plans for a larger community system will require constructing a larger treatment facility, storage, and booster system in another location.

Expanded Treatment Facilities

Based on the proposed service area and associated demand, Wilson Engineering was asked to provide scaled alternatives for a package treatment plant that meets current Water System and Water Treatment design standards including "two train treatment".

Research indicates that an upgraded version of the existing Key-Tech ACF (Adsorption Clarifier/Filtration) filter package plant is the best option and it is available at rates of flow for 20 gpm and 50 gpm. With a "two train treatment" design it is possible to operate a single treatment package plant 24 hours per day to meet Maximum Day Demand while allowing redundancy for filter backwash and maintenance.

Operating the Key-Tech ACF treatment plant with at design capacity of 20 and 50 gpm for 24 hours per day the plant can provide for the following number of ERU's based on the Calmor Cove MDD of 250 gpd/ERU. The cost of each treatment package only is shown below for comparison.

20 gpm x 1440 minutes per day / 250 gpd/ERU = 113 ERU's ($234,000)
50 gpm x 1440 minutes per day / 250 gpd/ERU = 288 ERU's ($264,000)

Operating the same plant with a capacity of 20 and 50 gpm for 24 hours per day can provide the following number of ERU's based on the more conservative Alger Water System MDD of 328 gpd/ERU:

20 gpm x 1440 minutes per day / 328 gpd/ERU = 87 ERU's ($234,000)
50 gpm x 1440 minutes per day / 328 gpd/ERU = 219 ERU's ($264,000)

In the analysis above the 20 gpm package plant is capable of serving 38 – 64 additional ERU's based on the corresponding Alger and Calmor Cove MDD. Unfortunately, the due to limitations of the existing Calmor Cove location, it is not possible to make the other improvements necessary to serve additional connections including additional storage and booster capacity, regardless of available water rights.

Due to the limitations of the existing Calmor Cove site, another location will be required for the new treatment facility that will serve the proposed service area. In any location the 20 gpm treatment package is not adequate to serve the demand of the proposed service area. Therefore the 50 gpm Key-Tech ACF treatment plant is recommended in a new location to serve a minimum of 219 ERU's.

It has been suggested that Calmor Cove could simply replace its existing package plant with an updated 20 gpm package plant (same size as existing), and then later add a second one of the same size, together with the existing one, both in a new location if and when a larger community system develops. However, as you can see above from the analysis above, it is dramatically more cost efficient to update to the larger package plant right away if the goal is a treatment plant large enough to serve the proposed south Lake Samish Community service area. It is not cost effective to consider installing two 20 gpm "two treatment train" package plants (2 x $234,000 = $464,000) compared to one 50 gpm package plant ($264,000).

As part of this feasibility study Wilson Engineering was asked to provide a cost estimate for water system facility capable of service 200 ERU's in a new location including: 50 gpm "two train treatment" package plant, storage, booster, building, and other as necessary. This did not include distribution improvement necessary to serve a South Lake Samish Water System which will be discussed later.

The Preliminary Water System Facility Estimate to replace the existing Calmor Cove 20 gpm "two train" Treatment Package plus additional storage required to meet current design standards is $458,505. The detailed planning estimate is also included in the Appendix as Exhibit 17.

CALMOR COVE CLUB
REPLACE WATER TREATMENT PLANT & ADD STORAGE
April 10, 2014
PROJECT NO. 2014-041

Line	Description	Approx. Quantity	Unit	Unit Price	Amount
1	Mobilization (5% Maximum)	1	L.S.	$16,053	$16,053
2	Minimum Dual WTP (20-gpm, 3' X 5')	1	L.S.	234,000	234,000
3	WTP Installation	1	L.S.	36,000	36,000
4	Building Modifications	1	L.S.	20,000	20,000
5	Storage Tank (Plastic), Slab, & Piping	1	L.S.	15,000	15,000
6				SUB-TOTAL	$321,053
7				8.5% SALES TAX	27,289
8	*DESIGN ENGINEERING & ADMINISTRATION (15% OF CONSTRUCTION)				48,158
9				TOPOGRAPHICAL SURVEY	2,200
10				SUB-TOTAL	398,700
11				15% CONTINGENCIES	59,805
12				**TOTAL****	**$458,505**

*Reflects no pilot study, budget $20,000 + pilot plant rental if piloting is required.
**Reflects private funding and minimal environmental study.

The Preliminary Water System Facility Estimate to replace the existing Calmor Cove 20 gpm Treatment Package with a new 50 gpm Treatment Package in a new location including a new building, storage, and booster system is $860,994. The planning estimate is also included in the Appendix as Exhibit 18.

SHALLOW SHORES
TREATMENT, STORAGE, BOOSTER PRELIMINARY COST ESTIMATE
April 7, 2014
PROJECT NO. 2014-040

Line	Description	Approx. Quantity	Unit	Unit Price	Amount
1	Mobilization (5% Maximum)	1	L.S.	$26,189	$26,189
2	Dual WTP (50-gpm)	1	L.S.	265,000	265,000
3	WTP Installation	1	L.S.	41,000	41,000
4	Building & Electrical Service	1	L.S.	60,000	60,000
5	Duplex Booster Pumps	1	L.S.	31,200	31,200
6	Bladder Tanks	4	EA.	1,000	4,000
7	Storage Tank (75,000-gallon concrete)	1	L.S.	68,000	68,000
8	Site Preparation	1	L.S.	10,000	10,000
9	Landscaping & TESCP	1	L.S.	4,000	4,000
10	Fencing (0.25-ac site)	420	L.F.	20	8,400
11	Yard Piping & Valving Service Bore & Jack (1	1	L.S.	6,000	6,000
12				SUB-TOTAL	$523,789
13				8.5% SALES TAX	44,522
14				DESIGN ENGINEERING & ADMINISTRATION (10% OF CONSTRUCTION)	52,379
15				INSPECTION (4.5% OF CONSTRUCTION)	23,571
16				TOPOGRAPHICAL SURVEY	3,500
17				PREPARE WATER SYSTEM PLAN	20,000
18				PREPARE ENVIRONMENTAL REPORT	7,500
19				GEOTECHNICAL RESERVOIR SITE REVIEW	5,000
20				ENDANGERED SPECIES & ARCHAEOLOGICAL STUDY	10,000
21				ADMINISTRATIVE & LEGAL, 5%	26,189
22				SUB-TOTAL	716,451
23				15% CONTINGENCIES	107,468
24				SUB-TOTAL	823,918
25				LOAN FEE + INTERIM INTEREST	37,076
26				**TOTAL**	**$860,994**

NOTES - 1) no land cost 2) reflects additional services associated with federal funding
Reflects no pilot study, budget $20,000 + pilot plant rental if piloting is required.
Reflects 160 ERU's or 112 ERU's at 400 gpd/ea + 48 @ Calmor at 250 gpd/ea or total MDD of 56,800 gpd (47.3 gpm at 20 hr day)