Hoodsport-Skokomish Wastewater Project Definitions

March 2007

Using grant funds made available by the Puget Sound Action Team and the Hood Canal Coordinating Council through the Interagency Commission, this planning document was prepared on behalf of the Skokomish Indian Tribe, Mason County Public Utility District Number One and Mason County by the following individuals and firms:

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1.0 Introduction and Summary

This report, prepared under the collective supervision of the Skokomish Indian Tribe, Mason County and Mason County PUD #1, defines three wastewater management projects. The projects serve each of three planning areas established in the Memorandum of Understanding (see **Appendix 1.1**) approved by the Tribe, the County, and PUD #1 in August, 2006: the Hoodsport Rural Activity Center, the residential zone known in this report as the Potlatch "Bubble," and the most densely developed commercial and residential areas on the Skokomish Reservation (called "Core Reservation").

1.1 Introduction

A grant from the Puget Sound Action Team and the Hood Canal Coordinating Council made this effort financially possible. An array of consultants was chosen by staff representatives of the Tribe, the County and PUD #1 (the "TriParty Staff") using a roster of consultant-submitted statements of qualifications. The following table names the contributors and their areas of responsibility.

Responsible Organization	Hoodsport RAC	Potlatch "Bubble"	Core Reservation	Program
Sewer System Engineering Cascade Design, Inc.		•	•	
Sewer System Engineering Gray and Osborne, Inc.	•			
On-site System Engineering CH2M Hill, Inc.	•			
Environment and Permitting ESA Adolfson	•	•	•	
Geology and Hydrology HWA GeoSciences, Inc.	•	•	•	
Wetland Disposal Jones and Stokes			•	
Cultural Resources Wessen and Associates	•	•	•	
Sponsoring Entity Mason County PUD #1	○			•
Sponsoring Entity Skokomish Indian Tribe		•	•	•
Sponsoring Entity Mason County	•			•
Program & Project Mngmnt. • Art O'Neal & Associates • Linda Hoffman Consulting • Mike Sharar Consulting	•	•	•	•

Mason County had lead responsibility for the Hoodsport Planning Area and overall fiscal administration. The Skokomish Tribe had lead responsibility for the Potlatch and Core Reservation Planning Areas. The lead agencies and the TriParty Staff guided the consultants' work and the work of staff from the Skokomish Tribe and Mason County.

There are several wastewater management studies that cover all or parts of the Hoodsport-Skokomish Region. These are sited as references in this report and provide substantial planning detail for the future design activities initiated by the Project Descriptions in this report. The following table names these studies, the date of their publication, and whether they are available in the print or CD versions of this report.

Title	***Date***	***Availability*** Print Vers.	CD Vers.
Skokomish Indian Tribe Wastewater Master Plan *(see Appendix 1.3 CD only)*	**1998**		●
Finch Creek Wastewater Feasibility Study *(see Appendix 1.4 CD only)*	**2000**		●
Skokomish Indian Tribe Non-point Assessment Report and Preliminary Management Plan *(see Appendix 1.2)*	**2006**	●	●
Hoodsport-Skokomish Wastewater Management Alternatives Analysis *(see Appendix 1.5 CD only)*	**2006**		●

It is important to recognize that while this report focuses on descriptions of wastewater management projects, wastewater is only part of the Hood Canal water quality situation. Non-point source activities along freshwater streams tributary to the Canal and storm water management in developed areas also present significant opportunities for water quality improvement. The Skokomish Tribe is engaged with a Non-Point Source Management Plan, Mason County is preparing a storm water management plan and there are Water Resource Inventory Area efforts that, if considered as part of wastewater project design and implementation, can result in very significant water quality improvement.

The Puget Sound Action Team provided federal funds for the recently-completed, Mason County managed Hoodsport-Skokomish Wastewater Management Alternatives Analysis, a review of wastewater management options for the western shore of Hood Canal from Hoodsport south through the Skokomish Tribal Reservation. The Action Team also facilitated the review, comment and participation of several state agencies to assure a coordinated State of Washington involvement and response in the preparation of this useful document.

The Alternatives Analysis assembles data and examines ways to improve Hood Canal water quality which suffers from low dissolved oxygen and fecal contamination. One of the major sources of these problems is widely presumed to be residential and commercial wastewater along and near the shoreline. The current management technique is conventional septic systems that do not treat for nitrogen. Too much nitrogen in Hood Canal results in low dissolved oxygen. Conventional septic systems without adequate soil and geology that blocks the transport of contaminates to the Canal also result in fecal contamination.

During the summer of 2006 as the Hoodsport-Skokomish Wastewater Alternatives Analysis was being finished, Mason County, the Skokomish Tribe and Mason County PUD #1 joined in approving a Memorandum of Understanding (MOU). A reproduction of the Memorandum is found in **Appendix 1.1**.

The MOU is founded on a conclusion that a single wastewater treatment plant will not be the selected alternative for the Hoodsport-Skokomish region. While a single central treatment plant may be possible, and would certainly be reliable and very environmentally effective, it is also very costly and is difficult or impossible to coordinate with growth management laws and regulations. The MOU sets a path for wastewater management that takes a different, more localized approach. Initially, a number of localized solutions involving both very small treatment plant systems and innovative on-site septic and clustered septic systems may prove more workable.

The MOU coordinates wastewater planning activities and assigned planning responsibilities for the planning areas. Washington State Parks, the Puget Sound Action Team, EPA, the Washington State Department of Ecology, Washington State Department of Community, Trade and Economic Development and other agencies are also participating. The first step, is this report's description of three wastewater management projects for each of the three principal population centers identified in the Hoodsport – Skokomish Wastewater Management Alternatives Analysis.

In describing projects for each Planning Area, the Tribe, the PUD and the County are using the Alternatives Analysis and taking into account the complexities of growth management regulations, the concerns and opportunities arising from private and tribal land ownership, and the need to both manage costs and provide long-term solutions. The parties are committed to leaving open the possibility for areas to be interconnected at some future time. Similar design and equipment standards should be employed in all the service areas.

Finding federal, state and private funding support is another important objective of the MOU. All three entities agree their funding efforts are enhanced if there is a coordinated, multi-jurisdictional, non-competitive regional approach that restores and protects water quality. Section 8 of this report discusses funding and the TriParty commitment to pursue assistance jointly and bring equal effort and priority to the completion of each of the wastewater management projects.

Sections 2 through 5 assemble planning data for each of the planning areas and propose a project description. Because both Potlatch and the Core Reservation areas within the Skokomish Reservation, Sections 3, 4 and 5 need to be considered jointly even though separate projects are proposed for Potlatch (Section 3) and the Core Reservation (Section 4).

It is critical that this report be considered a planning document. Its purpose is to set general directions that must be refined and validated in a thorough design process. Accordingly, maps included are not precise with regard to exact boundaries of service areas and cost estimates are general with appropriate planning-level contingencies. A homeowner near the boundary of a proposed service area represented in this report cannot be certain whether their property is included or excluded. Similarly, it is inappropriate to make monthly rate determinations based on this report. While it is entirely clear substantial financial assistance beyond that which is already anticipated will be essential, feasibility will remain an open question at least through completion of Facilities Plans (the next step before Design, Construction and Commissioning).

Public input has played a substantial role in shaping the project descriptions. In the Hoodsport RAC, with the assistance and involvement of Mason County PUD #1, there have been three public meetings during the 3+ months this report has been under preparation. The Skokomish elected Tribal Council and the General Council have been kept closely informed and a special committee of the Tribal Council has provided considerable direction. Mason County's Board of Commissioners and the County's Community Development and Utilities Director have been instrumental in moving the collective, TriParty program forward.

Congressman Norm Dicks, his staff, the federal Environmental Protection Agency and several Washington State agencies, especially the Puget Sound Action Team, the Department of Ecology, the Department of Health, State Parks and Community, Trade and Economic Development have been prompt, thorough and energetic in providing essential assistance.

There is communication, collaborative commitment and action underway at all levels, and the goal of a better Hood Canal is widely embraced.

1.2 Summary

Each of the three Planning Areas, Hoodsport RAC, Potlatch "Bubble" and Core Reservation, is not well suited to conventional septic tank wastewater management. They all have comparatively shallow soil columns above soils highly likely to transport septage to the nearest water body that either flows to or is Hood Canal. Although none of the areas is a city or town, they all have one or more fairly dense population centers.

The combination of transmissive soils and greater than traditional rural densitites makes each Planning Area a Hood Canal pollution source. The pollution includes not only bacterial contimation as indicated by higher-than-acceptable levels of fecal coliform, but also the nutrient nitrogen which cannot be effectively treated by septic systems with limited soil columns.

Another shared characteristic is a limited amount of flat, dry land. Comparatively steep slopes flatten into deltas or wetlands that border Hood Canal. There is limited dry area with soil columns offering much treatment opportunity before reaching ground water or impervious soils.

In areas outside the Skokomish Indian Tribe Reservation, Washington State's Growth Management Act applies. Sewer systems with central treatment plants are generally view as urban-style services not suitable in rural conditions. Providing sewer capacity beyond what is needed to serve existing development is inconsistent with the aims of the Growth Management Act.

All of these factors, together with the region's modest to moderate income status, serve to focus wastewater management options. A single plant system to serve all the area from Hoodsport south through the Skokomish Reservation is expensive and not easily permitted under growth management regulations. Continued reliance on traditional septic systems, even though they may be well maintained, does not address the pollution issues.

The TriParty group decided to address each Planning Area individually and find the best combination of approaches in each area while striving to use common technology among the three and work to design and construct so as to allow convenient interconnection of the systems in the future if conditions warrant.

It appears treating wastewater to Class A reclaimed water standards offer the more and best potentials for managing treated wastewater. Class A water can be infiltrated into the ground in areas with proper soil without endangering water supplies. It can be used to irrigate trees or other flora as seasonal conditions require or permit. It can also serve a variety of commercial/industrial water uses where the water cools processes or washes non-food items.

Creating Class A reclaimed water is possible using either a sequencing batch reactor (SBR) with filtration or a membrane bioreactor (MBR). MBR has certain advantages in that it provides a positive physical barrier to many pollutants and it has a comparatively small footprint. While the design phase is when technology decisions are made, MBR is the consensus technology choice for all three Planning Areas.

All three Planning Areas are unsuited for gravity sewers. The current choice for wastewater collection is either septic tank effluent pumping (STEP) or grinder pumps feeding pressurized sewer lines. Some areas are experience difficulties with STEP systems, and Mason County has considerable experience with grinder pumps. The final decision is another question to be answered during design.

Marine discharge of treated water is not seriously considered in the Hoodsport-Skokomish area. Rapid infiltration, irrigation and commercial use of Class A reclaimed water are the favored methods for handling highly treated water. There appear to be areas suitable for rapid infiltration in both Core Reservation and Potlatch. Earlier study suggests a similar opportunity, using pressurize drip discharge, exists in Hoodsport. All areas have irrigation reuse options depending on how far from the treatment site the treated water is pumped. There may also be commercial water reuse options. A decision concerning effluent fate is the most pressing issue in Hoodsport and continues to be an issue in the other two planning areas. This is a high priority matter during preparation of Facilities Plans.

This report indicates that advanced septic systems that require periodic profession inspection and operation have a role in managing Hoodsport's wastewater. For the area characterized as having "moderate risk" for transmission of pollutants to Hood Canal from conventional septic tank effluent that has not had sufficient soil treatment, advanced systems serving 7-residence clusters are proposed. These systems would be operated by a utility, not by home owners, and they would be located on public property. They are proposed to use pressurized drip systems to manage treated water. This well-treated water will receive some additional treatment in the soil column and significantly reduce the risk of pollutants being transported to Hood Canal at a cost lower than the cost of the sewer system and central treatment plant.

The cost of the wastewater management projects defined for each of the three areas is high. With development density lower than most sewered urban areas, the cost of the systems is shared by comparatively few connections. The following table shows the estimated cost to complete each of the defined projects.

Planning Area	***Total Cost to Complete***
Hoodsport RAC	$9,946,702
Potlatch "Bubble"	$3,433,430
Core Reservation	$6,465,030
Total	$19,845,162

This total is a planning level estimate and will undoubtedly change as the projects are subject to more investigation and engineering. Nonetheless, compared with the $7,017,800 in grants remaining available for projects in the Hoodsport-Skokomish region, there is a sizable difference between needs and funding.

The funding problem is further complicated by operating costs currently estimated at more than $75 per month per connection. This leaves little capacity for debt and while maintaining sewer rates at suitable levels. Substantial grant funding will need to be pursued and found to assure the projects are affordable.

The TriParty group is committed to collectively funding the projects on a regional basis. This approach has met with success so far in as much as grant money was secured continue the planning effort and define projects.

The next step is to prepare a Facilities Plan for each of the projects. When these are approved by the Washington Department of Ecology, final design can begin.

NOTE:
As this report is issued, it appears grant funding will be available to complete the Facilities Plans provided the work can be accomplished in a very short time frame. Consequently, the table above does <u>not</u> include the cost of Facilities Plans.

Also at the time of publication, the Washington State Legislature and the Governor are considering funding in support of these projects. Congressman Norm Dicks and the United States Environmental Protection Agency are following and actively efforts in the Hoodsport-Skokomish region, and various Washington State departments have been very helpful with both advice and funding.

If funding is secured and all three projects are aggressively advanced, it appears possible the wastewater management efforts defined here could be in place by early 2010.

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2.0 Hoodsport RAC

2.1 Existing Information

In the Mason County Comprehensive Plan, the Hoodsport area is designated as a "Rural Activity Center" (RAC), which covers approximately 584 acres. The sources of information which characterize and describe the RAC are found primarily in the *Finch Creek Wastewater Feasibility Study* (Gray & Osborne, Inc., August 2000) and the *Hoodsport-Skokomish Wastewater Management Alternatives Analysis* (Gray & Osborne, Inc., October 2006). The Finch Creek Study focused on two potential sewer service areas: the Finch Creek corridor only and Finch Creek and the shoreline area of Hoodsport. The Alternatives Analysis covered the Hoodsport RAC, the Skokomish Indian Reservation, and the shoreline area in between these two jurisdictions.

Figures 2.01 through **2.04**, respectively, present the boundaries of the Hoodsport RAC, the two service area alternatives described in the Finch Creek Study, and a population density schematic found in the Alternatives Analysis. In general, this plan will focus on the Hoodsport RAC and Service Area 2. Service Area 1, the Finch Creek corridor, covers a very limited area.

Both the Finch Creek Study and the Alternatives Analysis were prepared to address water quality problems in Hood Canal which are due to nutrient and fecal coliform loading. In part due to inadequate on-site wastewater systems, the nutrient loading, particularly nitrogen, has resulted in low dissolved oxygen concentrations and has led to fish kills in Hood Canal. In addition, elevated fecal coliform levels in Finch Creek resulted in closure by the Washington State Department of Health of public access tidelands at the mouth of Finch Creek to shellfish harvesting. This closure remains in place today.

Several alternatives for collection systems and wastewater treatment have been developed in both the Finch Creek Study and the Alternatives Analysis to address nutrient and fecal coliform loading. The Finch Creek Study considered two service areas and developed design criteria, schematics, and costs for alternatives for both areas. The Alternatives Analysis prepared similar information for all of the Hoodsport RAC. The Alternatives Analysis also considered decentralized wastewater systems and management options to reduce the nutrient and fecal coliform loadings.

Figure 2.05 summarizes the cost-effective wastewater collection and treatment alternatives considered in both reports. **Figure 2.05** lists the approximate number of equivalent residential units (ERUs), a brief description of the alternative, and the estimated capital and annual operation and maintenance (O&M) costs. The Finch Creek Study was prepared in 2000, and for any use for 2007, these costs would need to be updated.

For each of the service area alternatives, the capital costs per ERU are very high and are not likely affordable without a significant amount of funding assistance. The least cost per ERU in **Figure 2.05** is $26,000 per ERU and the highest cost is $32,500 per ERU. For the Hoodsport RAC, the capital cost per ERU is

$27,400 based on an assumption that the target year would be 2015. Most conventional funding of wastewater treatment facilities is through loan programs. However, the debt service for the loans combined with annual O&M costs likely would result in unaffordable sewer rates.

The Alternatives Analysis considered decentralized on-site systems, such as recircu-lating sand filters and proprietary products for nitrogen removal. The cost of these individual on-site systems ranges from $15,000 (low) to $30,000 (high) with additional O&M costs. The expected installation costs for a recirculating sand filter is $15,000 to $20,000 with $400 to $600 for annual O&M. These costs are less than the capital and O&M costs per ERU for a centralized wastewater collection and treatment facility. However, due to small lot sizes, high groundwater table, and unsuitable soils, the on-site alternatives may not be suitable for all areas of the Hoodsport RAC. As a result, the Alternatives Analysis recommended a combination approach utilizing centralized and decentralized alternatives. The centralized treatment alternatives would focus on the core commercial area, Finch Creek, and possibly a few other selected areas. This area closely follows Service Area 2 as outlined in the Finch Creek Study. The decentralized alternatives would focus on the larger lots which are generally located in the upland areas of the RAC.

2.1.1 Population and Land Use

Population data for the total RAC area are based on a "windshield" survey of the number of housing units within the RAC multi-plied by 2.49 (the number of person per household in Mason County during the 2000 U.S. Census). The number of residential housing units counted was 258 and the total number of commercial businesses was 38 within the RAC. The total estimated population, including both permanent and seasonal residences, is 642. Based on PUD billing records, about 30 percent of County utility customers are seasonal. It is assumed that 30 percent of the Hoodsport RAC residences are also seasonal.

The Finch Creek Study identified two potential sewer service areas. Service Area 1 covers only the Finch Creek corridor and Service Area 2 covers Finch Creek and the commercial area. Both Service Area 1 and Service Area 2 are located within the RAC boundaries.

Based on hydrogeological information provided by HWA GeoSciences, a third area is also developed as an Expanded Service Area 2. The basis of this expanded area is the area identified as the highest risk for contaminant transport to Hood Canal coinciding with existing development. In general, the intent of this expanded area is to include the small lots and near-shore areas where the highest risk exists. This expanded area is shown on Exhibit V and includes Highway 101 south to Hill Creek, Cedar Lane, part of Old Mill Hill Road, the steepest portion of North Schoolhouse Road, and North Hill Road. Each of these areas is located within the boundaries of the Hoodsport RAC. The exact number of residential connections is not known, but the estimate arrived at through the "windshield" survey is shown below:

South along Highway 101 (including Cedar Lane)	16
Old Mill Road	24
North Schoolhouse Road	20
North Hill Road	13

North Harrison	10
	83

This expanded area would add approximately 83 residential connections to Service Area 2. Along North Schoolhouse Road, there is a total of 54 residences. However, only 20 of these residences are included in the Expanded Service Area 2 area.

Figure 2.07a summarizes the existing population for the RAC and the service area alternatives.

Land use within the Hoodsport RAC is primarily residential. There are a limited number of commercial businesses and public buildings. Each of these is listed in **Figure 2.07b** along with vacant/closed structures. Most of the businesses provide essential local services while a few serve tourists. Most all of these commercial units are located along or near U.S. Highway 101.

Under the County's land use policies for RACs, the standard residential density is one dwelling per 2.5 acres. However, lots platted prior to 1996 are not subject to this density requirement and may be able to develop at an average density of one dwelling unit per acre.

Figure 2.07c summarizes the existing lot size based on a survey of County records covering 200 lots. The average lot size was calculated to be 55,666 square feet, or 1.25 acres. In general, smaller lot sizes are located near shoreline areas or the central commercial area of the RAC. Larger parcels are located in upland areas as shown in **Figure 2.01**. Most of the small parcels within the RAC are included in Service Area 2 or the Expanded Service Area 2 as shown in **Figures 2.03** and **2.06**.

2.1.2 Flows and Loadings Estimates

Flows and loadings estimates were developed both in the Finch Creek Study and the Alternatives Analysis for their respective areas. As stated in both reports, unit flows and loadings had to be assumed due to the lack of residential and commercial water use. These assumptions, which would be pertinent to the Hoodsport RAC and Service Area 2, are summarized in **Figure 2.08** The Alternatives Analysis based its assumptions on per capita flow for water usage from other areas within Mason County. Based on data from the Belfair Water District, the daily average water use was about 60 gallons per capita per day (gpcd), and in Lakeland Village, the average use during low irrigation months is 69 gpcd.

The two reports utilize similar unit loading values, but significantly different unit flow values. The Finch Creek Study assumes a significant increase in seasonal tourist activity and accordingly, develops high commercial flows. In the Finch Creek Study, the estimated peak day commercial flow is 31,056 gpd. In the Alternatives Analysis, the estimated peak day commercial flow is only 13,934 gpd, about 45 percent. For the commercial flows, the Alternatives Analysis accounts for all of the restaurant seats and motel rooms, the primary units impacted by tourist activity. The other commercial businesses shown in Table 2-3 are unlikely to be significantly impacted by tourist activity. Of the two estimates, the one presented in the Alternatives Analysis is likely the more accurate one, although it should be reevaluated as better data become available.

Figure 2.09 presents both flow and loading estimates for existing conditions. This table presents these estimates both for the Hoodsport RAC, Service Area 2, and the Expanded Service Area 2 based on the unit flows presented in the Alternatives Analysis.

The flows and loading values presented in **Figure 2.09** indicate a wastewater strength concentration covering a range of 350 to 400 mg/L BOD_5. Historical values from the County's North Bay-Case Inlet facility suggest that this range is reasonable for planning purposes. Typically, the North Bay-Case Inlet facility has influent BOD_5 concentrations from 250 to 350 mg/L. In addition, where commercial flows include restaurants, higher BOD_5 concentrations can be expected.

2.1.3 Soils

*(The following is an excerpt from a complete report prepared by HWA GeoSciences for this effort. To fully understand the particulars of this report, its sources of information and any limitations concerning its use, please consult the full document included in this report as **Appendix 2.1**.)*

Soils in the Hoodsport RAC area consist of mainly Hoodsport series soils in the upland areas, with isolated pockets of Grove series soils in some drainages, and smaller areas of fine grained (e.g., Cloquallum and Tanwax) and alluvial (e.g., Juno) soils (Ness, 1960). **Figure 2.10** shows the mapped soil units in the Hoodsport RAC planning area.

Hoodsport soils (Hd, He, Hf) consist of well-drained, reddish soils on uplands, formed over granitic till that is highly stained by iron and contains considerable metamorphosed and basic igneous gravel and stone. The soil survey report lists Hd soils as having a "very limited" rating for septic tank absorption fields, due to slow water movement and shallow depth to saturated zone. He and Hf soils are also listed as having a "very limited" rating for septic tank **absorption** fields, due to slow water movement, shallow depth to saturated zone, and slope (Ness, 1960).

Grove series (Gh, Gk) soils consist of somewhat excessively drained, reddish-brown gravelly soils, that formed on large glacial outwash plains over Vashon glacial drift, modified considerably by inclusions of local basaltic rock and mixed material from the Olympic Mountain glaciers. The soil survey report lists Gh and Gk soils as having a "very limited" rating for septic tank absorption fields, due to "bottom layer seepage" (i.e., soils are too permeable) (Ness, 1960).

Cloquallum silt loam (Cc) is a moderately well drained, brown upland soil, developed over silty glacial-lacustrine (lake) sediments. The soil survey report lists Cc soils as having a "very limited" rating for septic tank absorption fields, due to slow water movement and shallow depth to saturated zone (Ness, 1960).

Tanwax peat (Tb) consists of brown peat formed in wet areas and bogs. The soil survey report lists Tb soils as having a "very limited" rating for septic tank absorption fields, due to shallow depth to saturated zone, subsidence, slow water movement, and ponding (Ness, 1960).

Juno Sandy Loam (Jb) consists of coarse textured, brown to reddish-brown alluvial soils, formed over glacial alluvium in small streams. The soil survey report lists Jb soils as having a "very limited" rating for septic tank absorption fields, due to flooding, bottom layer seepage, and filtering capacity (Ness, 1960).

Although the soil survey lists all soil types present in the RAC area as having "very limited" suitability for septic drainfields, HWA's opinion is that of the soils present, the Hd Hoodsport soils (5 to 15 percent slopes) have the best septic treatment potential and least off site septic contaminant transport risk. These soils are generally found on the till uplands, on relatively flat land. Steeper Hoodsport soils (He and Hf) have a higher potential to transport contaminants, due to increased slopes. Soils with the highest potential for septic contaminant transport include Grove and Juno soils, which are found in the drainages. The Grove soils pose an increased risk due to excessive permeability. Cloquallum and Tanwax soils have a low potential for transport, but also a low potential for treatment.

2.1.4 Geology

*(The following is an excerpt from a complete report prepared by HWA GeoSciences for this effort. To fully understand the particulars of this report, its sources of information and any limitations concerning its use, please consult the full document included in this report as **Appendix 2.1**.)*

Figure 2.11 shows the mapped geology in the Hoodsport RAC planning area. According to the Logan (2003) unconsolidated sediments mapped in the Hoodsport RAC planning area include the following:

Qgt - Till, late Wisconsinan (Pleistocene). Glacial till deposits generally consist of a compact unsorted mixture of clay, silt, sand, gravel, and boulders, deposited at the base of the Puget lobe of the Cordilleran ice sheet during the latest glaciation. Occasional sand and gravel lenses may be present. Till is commonly referred to as "hardpan" due to its cement-like texture. Till does not provide a favorable infiltration medium, but may be suitable for septic drainfields if sufficient depth of soils and weathered till are present. Till acts as an aquitard that inhibits the flow of ground water, perches water on top of it where overlain by recessional outwash, and also confines water below it in the advance outwash. In general, the permeability of till ranges from low in weathered surficial deposits to relatively impermeable in very dense non-weathered materials (Logan, 2003).

Qga - Advance outwash, late Wisconsinan (Pleistocene). Advance outwash consists mostly of glaciofluvial sand and gravel, with some and lacustrine clay, silt, and sand deposited during the advance of glaciers. Sandy units are commonly thick, well sorted, and fine grained, with interlayered coarser sand, gravel, cobbles and silt (Logan, 2003). Advance outwash is typically permeable, often water-bearing, and denser than recessional outwash, having been overridden by glacial ice. Advance outwash is commonly overlain by till.

Qgo - Proglacial and recessional outwash, late Wisconsinan (Pleistocene). Recessional outwash typically includes poorly to moderately sorted, rounded gravel and sand with localized coarser- and finer-grained constituents. Some fine sand, silt, and clay form local overbank sediments may also occur. Recessional outwash thickness varies and is not well known. It most commonly occupies outwash channels scoured into or through till (Logan, 2003). Recessional outwash was not glacially overridden, and is generally poorly consolidated to loose. Typically outwash deposits exhibit moderate to high permeabilities and infiltration rates depending on silt content.

Qapo - Alpine outwash, pre–late Wisconsinan (Pleistocene). Alpine outwash consists of stratified sand, gravel, and cobbles, may include peat, silt, and clay, and may be capped by weathered loess. Clasts are generally more rounded than those in till and lack facets and striations.

Qa - Alluvium (Holocene). Alluvium may consist of silt, sand, and gravel deposited in streams and alluvial fans, locally may contain Alpine drift, peat, or landslide deposits.

The soils and geologic maps reviewed are not entirely consistent with regard to correlation of mapped glacial deposits with mapped overlying soils. For example, most of the areas mapped as outwash on the geologic maps are mapped as Hoodsport series on the soils maps. The only areas mapped as Grove soils correspond with areas mapped as alluvium on the geologic maps.

Some differences in geologic mapping based on different references also occurs, which is not uncommon. Field verification of soils and geology is therefore recommended prior to design or siting of any facility. **Figure 2.12** shows the mapped geology per Carson (1976), which is similar to the Logan map. The main till/outwash boundary (Qgt to Qga on the Logan map) is interpreted similarly in both maps.

2.1.5 Environmental Issues and Permitting

2.1.5.1 <u>Environmental Issues</u>

The Mason County Comprehensive Plan (updated 2005) mapped a number of sensitive areas on a county-wide basis. Sensitive areas mapping within the study area has not been conducted as part of this project. The sensitive areas mapping, including geologic hazard areas, flood hazard areas, aquifer recharge areas, and surface water and wetlands has been reviewed as part of this project.

Within the Hoodsport study area, the major surface water bodies include Hood Canal, Finch Creek, Hill Creek, and a number of wetlands, particularly near the mouth of Finch Creek and adjacent to Hood Canal. Potential impacts to wetlands and/or water bodies are likely the environmental issue of greatest concern. A field reconnaissance should be conducted prior to siting any treatment or disposal facilities to determine the location and extent of streams and wetlands. Conducting this review early in the process would potentially allow for wetland avoidance by making siting adjustments. Similarly, wetland delineations should be conducted when pipeline routes are determined so that wetland impacts can be avoided, or minimized to the greatest extent possible.

Water quality in Hood Canal has long been a concern. In general, Hood Canal suffers from elevated levels of nutrients and bacteria, and low levels of dissolved oxygen. Finch Creek has also exceeded water quality criteria for fecal coliform bacteria (Gray and Osborne, 2000). Implementation of the wastewater management project is expected to help reduce bacterial and nutrient loading to nearby surface water bodies from suspected poorly-functioning septic systems.

Other issues include potential impacts to groundwater, storm water impacts associated with increased development, and construction impacts to local roads.

2.1.5.2 Permits

Appendix 2.2 provides a matrix summarizing the various permits that may be required for the Hoodsport Rural Activity Center, Potlatch, and Core Reservation Wastewater Management Planning Areas. Given the general siting information currently available for the projects, a full range of permits that may be required is included. The matrix describes the type of permit, the agency responsible for reviewing the permit, the permit triggger, timelines, agency responsible, and other relevant issues.

Some permit issues of particular note for this project are further described in **Appendix 2.2**. These include permits that could require several months or longer to process, have appeal processes, require potential substantial mitigation for impacts, and/or could be difficult to attain. Requirements for these permits should be identified early and incorporated into the facilities planning process.

Of the potential permits, the permits required from the Corps of Engineers and Department of Ecology would likely represent the longest lead times. Compliance with NEPA is required prior to approval of NEPA funding, which will require completion of all federal requirements, including the Endangered Species Act and Section 106.

2.1.6 Cultural Resources

In the fall of 2006, Mason County contracted with Wessen & Associates, Inc. to assist in planning for a wastewater management system in the Hoodsport "Rural Activity Center" (RAC). Wessen & Associates' role was to prepare an inventory of cultural resources in the Hoodsport RAC and advise in the planning effort so that disturbance to known and suspected cultural resources might be avoided to the fullest possible extent. This section presents the background, goals, methods, findings, and recommendations of that effort. *(**Appendix 2.3** is the complete report with one redaction as required by Washington State law.)*

2.1.6.1 Background

The Hoodsport RAC is located in northeastern Mason County. It includes the commercial 'core' of the community of Hoodsport and residential areas to the north, west, and south (see **Figure 2.13**). Its total area is approximately 1.5 square miles.

The Hoodsport RAC is located within the traditional territory of the Tuwaduq (Twana) People. In early historic times – and for a considerable period prior to them – the Tuwaduq People occupied all of the lands in the immediate vicinity of Hood Canal. Many of their traditional settlements were located along the Hood Canal shoreline, often at or near the mouths of rivers or creeks. They also fished, hunted, and otherwise used a considerable range of lands interior to Hood Canal. Representatives of the Tuwaduq signed the Point-No-Point Treaty in 1855 and subsequently relocated onto the Skokomish Indian Reservation, approximately 2 miles south of the Hoodsport RAC. Their descendants are now usually referred to as the Skokomish Indian Tribe.

There has been only very limited archaeological research within the traditional territory of the Tuwaduq People. Few efforts to locate archaeological sites have been conducted and those which have occurred have generally been limited in their geographic focus. Large scale systematic efforts to identify prehistoric archaeological resources have yet to occur here. Similarly, there have been relatively few detailed studies of particular archaeological sites anywhere along Hood Canal. We currently know that some traditional Tuwaduq settlements near the Hoodsport RAC have been occupied for at least 1,500 to 3,300 years. Other, as yet undated, archaeological sites in the area are probably much older.

2.1.6.2 Research Design

The goals of this effort are essentially those stated above in the introduction to this document: "to prepare an inventory of cultural resources in the Hoodsport RAC and advise in the planning effort so that disturbance to known and suspected cultural resources might be avoided to the fullest possible extent". The term 'cultural resources' as used here, refers to archaeological materials. Thus, this study has not addressed the possibility that there may be historic structures in the Hoodsport RAC. To our knowledge, there aren't any and, moreover, our current understanding of the proposed wastewater management actions suggests that historic structures - - if present - - are unlikely to be affected. The focus of this effort has been directed largely toward archaeological resources representing the Native American occupants of the area. It should be noted, however, that archaeological resources representing late 19th and early 20th Century Euro-American occupants of the area could also be present in the Hoodsport RAC.

The results of the inventory effort have been summarized in two maps of the Hoodsport RAC. The first map shows the locations of recorded archaeological sites and settlements known from ethnographic and/or historical sources that may have archaeological manifestations. It is important to note here that the locations of recorded archaeological sites are protected by state and federal laws, and thus this information cannot be released to the general public. In this same regard, the Skokomish Tribal Historic Preservation Office has requested that specific information about the locations of traditional Tuwaduq settlements also not be released to the general public. These requirements, and the paucity of archaeological survey data for the Hoodsport RAC, have led us to develop a second map. The second map identifies zones of archaeological potential within the Hoodsport RAC. These zones have been developed on the basis of the distributions of the above-noted locations and generalizations about the relatively sensitivity of different types of landforms in the study area. In brief, low gradient surfaces in the immediate vicinity of the Hood Canal shoreline and the flood plains of larger creeks are considered to have a relatively high potential for archaeological resources. The vicinities of smaller low gradient creek channels and so-called vista points (i.e., locations that offer sweeping views of the surrounding landscape) are considered to have a moderate potential for archaeological resources. Steep gradient surfaces and low gradient interior surfaces that are not located near creeks or lakes are considered to have a relatively low potential for archaeological resources. The map identifying zones of archaeological potential within the Hoodsport RAC may be released to the general public.

Finally, it is important to emphasize that the study reported here is not an archaeological survey of the Hoodsport RAC. While we have considerable familiarity with this area, no actual on-the-ground inspection for archaeological resources was conducted at this time. Rather, the effort was essentially a literature review and our products are based upon examination of documents on file with the Washington State Department of Archaeology and Historic Preservation, the Skokomish Tribal Historic Preservation Office, other materials in our possession, and archaeological site survey experience in nearby areas.

2.1.6.3 The Cultural Resource Maps

Our map of the locations of recorded archaeological sites and settlements known from ethnographic and/or historical sources that may have archaeological manifestations is presented in **Figure 2.14**. Note first that there are no recorded archaeological sites in the Hoodsport RAC. This condition is undoubtedly related to the fact that there has been almost no archaeological research conducted in the Hoodsport RAC. As such, the absence of recorded archaeological sites should not be seen as suggesting that archaeological resources are unlikely to be present. **Figure 2.14** does indicate that at least three traditional Tuwaduq settlements were located within the Hoodsport RAC. All three were located along the Hood Canal shoreline at the mouths of creeks. Relatively little information is available about any of these places, but at least one is clearly identified as a 'large winter village'. The other two settlements may have been somewhat smaller. Native American archaeological resources – potentially including artifacts, occupation refuse, and human remains – may be present at any of these locations. We have not specifically identified the early historic Hoodsport Town site in **Figure 2.14**, but it was located in what is essentially the commercial 'core' of the modern community of Hoodsport. Late 19th and early 20th Century Euro-American archaeological resources may be present anywhere in this area.

The information in **Figure 2.14**, and the generalizations about the relatively sensitivity of different types of landforms noted earlier, have been used to generate the archaeological sensitivity zones presented in **Figure 2.15**. Two important caveats need to be offered about this map. First, zones based upon landforms have been defined, as the landforms appear on USGS 7.5 minute topographic maps. These are valuable tools, but it is important to emphasize that there may be archaeologically sensitive features in the study area that are too small to be indicated on USGS 7.5 minute topographic maps. The zones shown in **Figure 2.15** are therefore generalizations about probable potential and should not be regard as guarantees that archaeologically sensitive areas are not present within zones here identified as having only a low potential. A second caveat concerns the low gradient surfaces in the immediate vicinity of the Hood Canal shoreline. This area has been indicated as having a relatively high potential for archaeological resources. This study has not documented whether historic filling has occurred along any portion of this shoreline. We raise this issue because we suspect that some locations – such as near the mouth of Finch Creek – may contain fill deposits, and fill deposits are a complicating consideration. At first glance, fill sediments can be expected to be culturally-sterile, and thus documented fill areas should have no potential to contain archaeological resources. The issue is actually more complicated for two reasons. First, experience elsewhere in western Washington has shown that low lying areas with archaeological resources were sometimes filled in order to raise their base level. Thus, potentially significant archaeological resources can be present underneath fill deposits. Second, there are documented cases of archaeological sediments having been used as fill materials in western Washington. This means that it is possible that archaeological materials – including human remains – could be encountered in fill deposits.

The map of zones of archaeological potential within the Hoodsport RAC indicates that high potential areas are limited to the low gradient surfaces in the immediate vicinity of the Hood Canal shoreline and the Finch Creek flood plain. These areas have the highest potential for both Native American and Euro-American archaeological resources. These are also among the most developed (i.e., disturbed) areas in the Hoodsport RAC. The history of historic disturbance may have damaged and/or destroyed archaeological resources in these areas. It would, however, be dangerous to simply assume this. In fact, there are many well documented cases of important archaeological resources having survived in badly disturbed, highly developed landscapes. (Witness the recent events at the graving dock site in Port Angeles.)

Areas thought to have a moderate potential for archaeological resources are also relatively limited within the Hoodsport RAC. They include the vicinities of two smaller low gradient creek channels to the south of Finch Creek and the areas along the tops of slopes that look out over Hood Canal and/or the lower Finch Creek canyon. Some of the latter areas have also experienced significant historic disturbance, and the above-noted caution also applies in these areas.

Finally, a significant amount of the Hoodsport RAC appears to have only a relatively low potential for archaeological resources. Areas thought to have only a relatively low potential include steep surfaces along the margin of Hood Canal and the lower Finch Creek canyon and low gradient interior surfaces in the western portion of the Hoodsport RAC. While we are confident that the latter areas have only a relatively low potential for archaeological resources, we should emphasize that there is a difference between ‘low potential’ and ‘no potential’.

It is possible that that archaeological resources could be encountered in areas we characterize as having a low potential.

2.1.6.4 Resource Management Considerations

The assessments of archaeological resource potential presented here are based upon very limited archaeological and ethnographic data and generalizations about the relative sensitivity of different types of landforms, as they appear on USGS 7.5 minute topographic maps. As already indicated, this study is not an archaeological survey of the Hoodsport RAC and should not be regarded as one. We therefore recommend that an archaeological survey of the areas to be impacted by the waste-water management system be conducted. Having said this, we think that project planners should be aware that – depending upon the system's design – it may prove to be difficult to investigate some portions of the Hoodsport RAC. In particular, we note that much of the high potential areas have been extensively developed and thus, built features such as paved road beds and structures may make effective archaeological inspection difficult. Some of this difficulty may be addressed by test boring portions of the study area, but even the feasibility of this approach is difficult to assess at this time.

As such, while an archaeological survey is an important next step, project planners should recognize that such an effort may not be sufficient to be certain that archaeological resources are not present anywhere in their project area. We therefore think that some degree of archaeological monitoring may be appropriate during the construction of the planned facilities. The specific scope and character of such a monitoring plan should be developed after the results of the archaeological survey are available.

2.2 Additional Information

2.2.1 Treatment Soils Can Provide

*(The following is an excerpt from a complete report prepared by HWA GeoSciences for this effort. To fully understand the particulars of this report, its sources of information and any limitations concerning its use, please consult the full document included in this report as **Appendix 2.1**.)*

HWA GeoSciences' scope of work for this report included using available soils and septic system information to assess which areas in the Hoodsport RAC currently served by conventional septic systems have the highest, moderate and least likely probability of causing Hood Canal contamination.

Criteria contributing to relative risk of transmitting septic contamination to Hood Canal include:

- Soils and geology (soil treatment capacity and permeability)
- Slopes
- Distance to surface water
- Depth to ground water

Several of the criteria are overlapping, for example slopes, distance to surface water, and permeable outwash soils all coincide with the coastal areas and east-west drainages in the planning area.

Soils and geology are described above. Soils with increased risk of contaminant transport and reduced treatment capacity include those that are excessively drained, such as Grove soils. These soil types would provide less treatment than slower draining soils due to less organic content and decreased residence times. Grove soils on steep slopes in and near drainages (e.g., Gk) have an added element of risk due to thinner soil profiles, and steeper hydraulic gradients. Distance to surface water relates directly to potential for septic contaminants to reach Hood Canal. For reference, Chapter 246-272A WAC, On-Site Sewage Systems specifies a setback of 100 feet for drainfields from surface water, and 30 feet from any downgradient site feature that may allow effluent to surface.

Based on these criteria, areas ranked by relative risk of transmitting septic contamination to Hood Canal include:

- Low risk – Upland areas underlain by glacial till and Hoodsport soils, not near surface water drainages.
- Moderate risk – Areas mapped as having outwash soils, but not in or near surface water drainages.
- High risk – Areas within or adjacent to surface water drainages, including the Hood Canal coastline. Most of the areas in and near drainages also contain permeable soils which are more likely to transmit water and contaminants with minimum treatment.

Figure 2.15 shows mapped geology (Logan, 2003) topography, and land parcels. **Figure 2.16** shows the major geologic contacts, topography, land parcels, and an aerial photograph, to provide some indication of land development status. **Figure 2.17** includes the three risk areas delineated in the Hoodsport RAC.

Wastewater treatment/disposal options for future development include:

- Conventional on site sewage treatment/disposal systems
- Enhanced on site sewage treatment/disposal systems (single residence or combined)
- Conveyance to a centralized waste water treatment facility (including a variety of treatment processes, effluent qualities, and effluent disposal options)

Delineation of areas for varying types or levels of treatment in the planning process may be made qualitatively, based on relative risks as outlined above, or semi-quantitatively, by establishing maximum pollutant (e.g., nitrogen) loading or downgradient concentrations, then performing analytical modeling to predict estimated concentrations for various scenarios, including effluent quality, development density, etc.

2.2.2 Population/Land Use and Predicted Flows and Loadings

Table 2-6 develops flows and loadings estimates for existing conditions within the RAC, Service Area 2, and the Expanded Service Area 2. Currently, the estimated populations within these respective areas are 642, 139, and 346.

Existing land use is predominantly residential, with a commercial corridor along U.S. Highway 101 and the shoreline. The smallest lot sizes and the highest density development are located within or near Service Area 2. The population density covers a range of two to six homes per acre (refer to **Figure 2.04**).

Future, or predicted, flows and loadings are dependent upon growth within the RAC and changes in land use. In the Alternatives Analysis, an annual growth rate of 3.5 percent was recommended by Mason County for the Hoodsport RAC. This rate was utilized to project population through the year 2025 and resulted in an estimated population of 1,277 for the RAC.

With an area of 584 acres, a 2025 population of 1,277 would result in a density of about 2.2 persons per acre. While approximately one-third of the RAC is characterized by steep slopes, the remaining two-thirds are characterized by a relatively flat plateau. Exhibit IV presents both existing topography and population density. As shown, the south and west areas of the RAC are characterized by low-density development.

The Finch Creek Study did not project population for Service Area 2. As shown in **Figure 2.07a**, the estimated current population is 139. As shown in **Figure 2.04**, it contains the highest density (two to six homes per acre), but is also confined by steep slopes on the uplands side of U.S. Highway 101 and Hood Canal along the shoreline. Without a conversion in land use (e.g., multifamily) and with the existing lot configuration, the high growth rate of 3.5 percent used in the Alternatives Analysis does not appear achievable for Service Area 2.

However, for the purpose of this plan, it is assumed that Service Area 2 and the Expanded Service Area 2 will be served by a central sewer system which will allow a 3.5 percent growth for commercial flows, but only a 1.5 percent growth in population. It is assumed that the higher population growth rates will occur elsewhere in the RAC. These assumptions and any others will need to be confirmed by the Mason County Department of Community Development.

Figure 2.18a summarizes the population projections both for the Hoodsport RAC and Service Area 2 through 2025.

Figure 2.18b presents future flow and loading estimates for the Hoodsport RAC, Service Area 2, and the Expanded Service Area 2. For the Hoodsport RAC, the estimates follow the work presented in the Alternatives Analysis. For the Service Area 2 alternatives, the estimates are based on the unit values in Table 2-4, a growth estimate of 3.5 percent for commercial flows, and a growth estimate of 1.5 percent for population.

2.2.3 Inventory of Applicable Technologies for Treatment Plant

Any applicable technologies suitable for all, or part of the Hoodsport RAC, will need to be capable of nutrient reduction. Since none of the disposal or reuse options is likely to include direct discharge to Hood Canal, the State's Groundwater Standards, 173-200 WAC, and the Water Reclamation and Reuse Standards, 90.46 RCW, are the most significant standards for any treated effluent from the Hoodsport RAC. Unlike most wastewater treatment facilities, which operate under an NPDES permit, any facility serving the Hoodsport RAC would be regulated by Ecology's State Waste Discharge Permit (SWD).

Based on a meeting with Ecology, the likely effluent limitations for BOD_5, TSS, dissolved oxygen, turbidity, total coliform, pH, and total nitrogen are shown in **Figure 2.19**.

The effluent limitations presented in **Figure 2.19** meet the requirements for

Class A reclaimed water to surface percolation ponds or spray irrigation. In addition to the effluent limitations shown in **Figure 2.19**, there would also be groundwater limitations summarized in **Figure 2.20**.

In the Water Reclamation and Reuse Standards, one of the listed commercial and industrial uses for reclaimed water is fish hatchery basins. Specifically, the standards state: "Reclaimed water used as a source for basins at fish hatcheries shall be at all times Class B reclaimed water or better." This reuse option was discussed in the Finch Creek Study since the Washington State Department of Fish and Wildlife operates a fish hatchery located at the mouth of Finch Creek. According to records in 1997 to 1998, the average daily water intake at the hatchery is about 10 mgd with a range of 6 mgd (low) to 16 mgd (high). Based on the flow estimates for Service Area 2 in Table 2-8, the peak day flow of 52,000 gpd would only amount to 5 percent of the average intake. For the Expanded Service Area 2, the peak day flow of 88,000 gpd amounts to 9 percent of the average intake. However, according to Ecology representatives at the Southwest Regional Office, this use of reclaimed water has not yet been implemented in the State of Washington. The expected effluent limitations presented in **Figure 2.19** may need to be modified for this use of reclaimed water. At a minimum, there likely would be a specific concentration for dissolved oxygen and the stricter turbidity standard associated with membrane systems. Other concerns, which are not currently addressed by the reuse standards, are micro-constituents such as pharmaceuticals.

Applicable technologies to meet the requirements in **Figure 2.19**, **Figure 2.20**, and the Water Reclamation and Reuse Standards are the membrane bioreactor (MBR) process with disinfection and the sequencing batch reactor (SBR) with filtration and disinfection. Both technologies have proven capability for nutrient removal and both require a relatively small "footprint," or site area. Both technologies are widely used for the level of flows and loadings presented in **Figure 2.18b**.

MBR facilities are in operation at the Tulalip Tribe, Stillaguamish, and the City of Duvall. Mason County operates SBR facilities at Hartstene Pointe and North Bay-Case Inlet. Among the MBR systems, there are several alternatives, including micro-filters manufactured by Zenon Corporation, and a flat plate design manufactured by Kubota. These MBR alternatives would need to be screened based on flows, capital, and annual O&M costs. There is less variability among SBR manufactured systems.

Between the two applicable technologies, MBR and SBR, the MBR systems have increasingly found greater use in western Washington. For small systems, the MBR systems produce a higher effluent quality and require less annual O&M. However, replacement of the membranes at approximately 10-year intervals is an added cost not found with the SBR systems. In addition to capital and annual O&M costs, both systems should be evaluated against non-cost factors such as the examples listed below:

- Proven reliability for nutrient and total coliform reduction;
- Highest effluent quality;

- Most expansion capability;
- Lowest maintenance requirements;
- Best aesthetics/visibility;
- Best noise and odor control;
- Least operational complexity; and
- Highest regulatory acceptance.

The quantities of flow associated with Service Area 2 (peak day of 52,000 gpd) and the Expanded Service Area 2 (peak day of 88,000 gpd) are well suited both to the MBR and SBR technologies. Which service area alternative that can be implemented will depend on several factors, including costs. The primary technical challenge is not with the treatment technologies, but with identifying a suitable reuse site capable of handling the flow quantities.

2.2.4..Inventory of Applicable Technologies for On-site Systems

(There are areas in Hoodsport where there is moderate risk of septic tank effluent reaching Hood Canal. Please see sections 2.1.3 and 2.1.4. Because of Hoodsport's Rural Activity Center status, growth from new development is limited. Advanced on-site systems hold promise for handling conventional septic tank pollution that may move to Hood Canal. CH2M Hill provided the following planning level review, presented here in its entirety.)

2.2.4.1 Non-Sewered Area Wastewater Management

The expanded sewer service area for the Hoodsport RAC encompasses the Finch Creek corridor and that area adjacent to Hood Canal. Upland from this expanded service area, the soils are marginal and have been determined not suitable for conventional septic tank systems. If you divide the Hoodsport RAC into two sections, the smaller western area, and the larger eastern area that extends farther north and south than the western area, the eastern section is the section where there will be a need to install more advanced on site systems outside of the designated sewer service area. *(**Figure 2.25** is a topographic aerial view of this general area with the Expanded Service Area identified.)*

Recent studies in New Zealand (*Nitrogen reduction trials of advanced on-site treatment systems*, Paul Scholes, Environmental Bay of Plenty Regional Council, July 2006) indicate that there are available on site systems that can meet reduced nitrogen requirements. In the study, the AdvanTex system by Orenco (Roseburg, Oregon) consistently met removal rates greater than 80% and a total N effluent concentration below 15 mg/l. While this is less that what can be accomplished with a centralized system, it will allow the soil to provide additional treatment to further reduce nitrogen.

The Orenco AdvanTex system is one of many available advance on-site systems available. Based on the New Zealand study, it appears to be the best among those systems tested. Other advanced systems are appearing in the marketplace. Huber has an on-site membrane system that shows great promise. This system is currently being pilot tested by the Karcher Creek Sewer District (Port Orchard, WA).

Regardless of the type of advance on site system, it is recommended that these systems be clustered to serve a number of homes. There are many reasons why these systems should be clustered. Here are a few of the top reasons for clustering the advance on site systems:

- Clustered systems would be owned and operated by a public agency that would maintain the integrity and water quality of the system
- Public agencies can obtain public funding where private systems are limited on funding options
- Advance on-site systems use biological treatment in an aerobic environment, clustering would help the biological system dampen the flow and load variations that are inherent with an individual on-site system.

The AdvanTex AX100 system will be used as an example for this planning level review. According to available literature, this system is capable of handling an average flow of 2,500 gallons per day (gpd) with a peak flow of 5,000 gpd. Using a peaking factor of 3.5, results in a design flow of just over 1,400 gpd. Based on the flow projections completed for the Hoodsport RAC, that would equate to a 7 equivalent residential units. (ERU) A cluster could be bigger by adding additional units (i.e. 2 units = 14 ERU, 3 units = 21 ERU).

It is possible to reuse existing septic tanks with these clustered systems. In discussions with representatives at Orenco, new septic tanks would not be required if the existing tanks are proven to meet certain leak test criteria. This would help offset the cost of the new systems. The other parts to these clustered systems would include the following:

- Septic Tank (existing or new, depending on leak test)
- Septic Tank Effluent Pump (STEP) system – a separate chamber with existing tanks, integral with new tanks – that would include a pump that would pump septic tank effluent from each residence in the cluster to the treatment unit.
- Treatment Unit – for this example we are assuming an Orenco AdvanTex AX-100.
- Recirculation Pump and holding tank – to keep re-circulating liquid through the treatment system
- Effluent system – diversion box that distributes treatment system effluent between the discharge and recirculation, pump (if necessary for pressurized discharge), and discharge piping (subsurface drip type distribution material can be used – Geoflow or similar product)

The capital costs for the 7 ERU cluster system, based on a full use of a single AdvanTex AX-100 system are detailed in **Figure 2.21**.

The costs developed in **Figure 2.21** are based on installed costs quoted by the manufacturer and similar installations. Costs assume that there would be multiple cluster systems being installed at the same time in the Hoodsport RAC. Costs also assume minimal restoration costs.

Based on the costs in **Figure 2.21**, the range of costs for this cluster system is from \$90,000 to \$139,000. This would equate to approximately \$13,000 to \$20,000 per ERU. Adding costs for easements and/or property purchase for the treatment system and discharge would add another \$7,000 to \$21,000 to the total cost of the system. This would increase the per ERU cost range to \$14,000 to \$23,000.

Operation and Maintenance (O&M) costs would be on the order of $3,000 to $4,000 per year (does not include septic tank pumping – homeowner's expense). This assumes that there are multiple clustered systems in the area and that the same O&M team that is running the centralized system for the Hoodsport RAC is also operating the advance on-site systems. If this is not the case, the O&M costs would be greater depending on location of the staff.

How will these systems be clustered in the non-sewered area of the Hoodsport RAC is beyond the scope of this planning level work. **Figure 2.22** is an example of how a cluster system might be configured. This example shows the STEP units that would be located at each property. The septic tank effluent would be pumped using a small diameter pipe to a centralized treatment unit. The treated effluent would then be discharged to a pressurized drip system located within the adjacent right of way.

Actual clustering will require further investigation, additional mapping, property investigation, title search, and survey.

2.2.4.2 Storm Water

While the focus has been on wastewater as the primary contributor to water quality issues in Hood Canal, storm water will need to be included in the overall program if the County and the agencies involved want to have a comprehensive effort to address water quality issues. Storm water management including treatment of runoff should be addressed. Other practices such as fertilization of lawns and gardens should be done using methods and applications that minimize the impact on Hood Canal.

2.3 Proposed Approach

2.3.1 Technologies for Hoodsport /Project Definition

Section 2.2.3 concludes by stating:

> *The primary technical challenge is not with the treatment technologies, but with identifying a suitable reuse site capable of handling the flow quantities.*

Both membrane bioreactor (MBR) and sequencing batch reactor (SBR) with filtration can reliably produce Class A reclaimed water. The greater question at this stage is what to do with the highly treated water.

For the purposes of estimating, MBR technology is presumed both because of its reliability and small footpring, and because it is a technology already supported by Mason County PUD #1 and accepted and used by Mason County in its North Bay utility and soon to be used in its Belfair utility.

During design, decisions concerning effluent will be made. These will be driven by land availability for infiltration, potential use of reclaimed water at the fish hatchery, and irrigation opportunities. With estimated peak daily flows at 88,000 gpd, water volumes are manageable. Class A reclaimed effluent allows the greatest flexibility for reuse or discharge and developing redundant capabilities through multiple fates. Pumping to deliver the Class A water to its fate location and purchase of land will be two significant cost factors. The cost estimate for Hoodsport assumes a lift station with 5,000 feet of force main and $250,000 to purchase land for the treatment plant and effluent fate.

Topography makes gravity sewers in Hoodsport impractical. Grinder pump technology is proposed since it is already used by Mason County wastewater utilities. Septic effluent pumping (STEP) technology could also be used. A selection will need to be made during design based on several factors previously listed including reliability, ease of maintenance, expected performance and cost.

Section 2.2.4 uses the AdvanTex system as an example while noting there are other on-site systems that can provide significant degrees of nitrogen reduction. The planning level estimates in this report suggest that such systems offer a cost advantage over central systems where soil conditions are adequate to make up the difference in nitrogen removal performance. This appears to be the case in Hoodsport. The extent of the use of advanced on-site cluster systems will need to be determined during design.

Hoodsport Project Definition

The recommended project for the Hoodsport RAC uses a grinder pump collection system to serve the Expanded Service Area2 (see **Figure 2.06**). The sewer collection system feeds a centrally located MBR treatment facility (see report's CD version **Appendix 1.4** "Finch Creek Wastewater Feasibility Study" for location possibilities) creating Class A reclaimed effluent.

During design final effluent fate must be determined. Among possible options are irrigation of forest land west of the Hoodsport RAC and infiltration of the highly treated water (see report's CD version **Appendix 1.4** "Finch Creek Wastewater Feasibility Study" for location possibilities). Another unexplored possibility is reuse of the highly treated water at the fish hatchery in Hoodsport.

Because of the risk of pollutant transport to Hood Canal, the use of advanced on-site cluster systems is proposed for an area west of the sewer service area along Hood Canal and below the plateau that occupies the western part of the Hoodsport RAC. Utility-owned and operated advanced on-site systems are envisioned with each system serving approximately 7 ERUs. Effluent would be discharged using a pressurized drip system in the public rights of way.

The current cost to complete the Hoodsport RAC project is estimated at $10.1 million in current dollars (please see Section 2.3.2 below for additional detail).

2.3.2 Planning Level Costs

As noted in Section 1, this report is using planning level estimates. A typical approach for developing planning level estimates is to first establish unit costs for parts of the conceptual project such as a cost per lineal foot of 6" sewer pipe or the installed cost of a grinder pump.

Some estimates at this level are "lump sum" based on experience. It is too costly at this stage to estimate quantities of rebar or volumes of concrete. Qualified and experience engineers are a good source for these estimates that, when summed, can provide a construction cost. The construction cost comes with a contingency factor. It is important to note that construction costs are currently very unstable. Rapidly rising prices for Portland cement and steel make construction cost estimating more difficult than normal.

Other cost elements, such as design, project administration and assistance during construction are typically derived as a percentage of the construction cost estimate. Hoodsport and the two other Planning Areas are comparatively small wastewater projects, so the percentages should arguably be larger for these costs since a certain portion of the work is fixed and not proportional to the size of the job. A "rule of thumb" at this planning level of estimating is to multiply the construction estimate by 1.5 to estimate the total project cost.

A Hoodsport RAC cost estimate is presented in **Figure 2.23a**. Gray and Osborne, Inc., developed unit cost and lump sum (LS) estimates for systems to serve Service Area 2 (from the "Finch Creek Wastewater Feasbility Study" done in 2000) and Expanded Service Area 2 that was developed in response to both public input and the predicted soil transport of pollutants to Hood Canal. This report focuses on the Expanded Service Area.

CH2M Hill provided estimates for the advanced cluster septic systems proposed to serve the "moderate transport risk" zone west of the Expanded Sewer Service Area (see **Figure 2.17**). The costs developed are for an advanced cluster system with pressurized drip effluent dispersal serving seven homes. The number of clusters to be installed will need to be addressed during design using additional soils information.

For the purposes of a planning level estimate, six cluster systems are assumed. This number was not provided by an engineer.

Firgure 2.23a notes engineer-provided numbers with an asterisk (*). The sources of these can be found by examining the detail sheets in **Figures 2.23b** and **2.23c**. Other numbers are either derived from an engineer's estimate (6 clusters X estimated cost per cluster) or are experienced based (design cost = 12% of estimated construction cost).

The **Figure 2.23a** "bottom line" of ~$10.1 million is 15% less than the "rule of thumb" ($7.685 million X 1.5 = $11.53 miilion) would suggest. The lower estimate is offered because a substantial amount of study already exists to guide work in the Hoodsport RAC. The risk of unknowns is lowered somewhat. Also, if all three Planning Areas are designed by one firm or joint venture as recommended in Section 7, it is reasonable to expect some design cost efficiencies. These efficiencies could also extend to construction if a uniform approach is used.

2.3.3 Action Plan/Schedule

In the late '90s wastewater management strategies for the area now designated as the Hoodsport Rural Activity Center were actively considered. Financing was and continues to be a major hurdle in the path of completing a plan and implementing it. Congressionally sponsored State and Tribal Assistance Grants and a State of Washington grant were "earmarked" for Hoodsport and the Hoodsport-Skokomish region. By 2005 there was more widespread recognition of the importance of Hood Canal as a significant public asset. Regulatory attention was more sharply focused on the Canal's bacterial and nutrient problems. Also, those interested in re-development, particularly in the Hoodsport commercial corridor, recognize wastewater management as an important element.

In 2007 at least two new factors are driving the need to better management of wastewater in the Hoodsport RAC. Congressional and state grants are going unused and there is substantial demand to reprogram the monies. Also, as a result of recent Puget Sound initiatives, there is greater state attention and there are more state resources available for water quality improvements. Consequently, the August, 2006, Memorandum of Understanding among the Skokomish Indian Tribe, Mason County PUD #1 and Mason County (see **Appendix 1.1**) is timely. Efforts to advance wastewater management in the MOU's three Planning Areas, including Hoodsport RAC, are securing assistance to do the vital planning efforts that must precede the design and construction work for which state and federal grants are earmarked. The activity has created a sense of both possibility and urgency to move forward. Along with the obvious need for environmental attention, there is a clear path of opportunity. It is time for action.

For the Hoodsport RAC wastewater management effort, schedule maintenance and project management are like housework: they are never finished. It is very rare that wastewater projects, regardless of how well planned, anticipate all challenges and opportunities. This dynamism has far-reaching impacts including the ability to precisely estimate performance dates, costs, and rate implications. This by no means suggests that schedule, budget and project management should not be carefully tended with the best talent available. It is to suggest that expectations must be managed along with the project, and that clear and frequent communication among owners and service providers is essential.

It appears possible to have a Hoodsport wastewater management effort in place and functioning by early 2010. This will require a high degree of aggressive attention and a fulsome measure of good fortune. In Section 5.5 a series of action steps is presented for the Potlatch and Core Reservation Planning Areas. Using those steps as a basis, a similar list of actions for the Hoodsport RAC is presented below. It is important to note that, although the steps are presented sequentially, there are opportunities to perform some actions concurrently and save time. For example, it is possible to complete design of the non-sewer advanced clustered on-site facilities independent of the sewer system. Also, collection and conveyance elements of the sewer system can be designed independent of the treatment facility once it is properly sited. **Figure 2.24** is a rough "example schedule" illustrating the ways some actions might overlap.

Action Steps

1. Prepare a Hoodsport Facilities Plan consistent with the Project Definition that is approvable by the Washington State Department of Ecology.
2. Prepare environmental documentation suitable for guiding elected officials approving the Facilities Plan and for funding that relies on the State Environmental Policy Act (SEPA), the State Environmental Review Process (SERP) for State Revolving Fund loans and National Environmental Policy Act (NEPA) documentation.

3. Carefully plan the Facilities Plan approval process to minimize delay and risk. Mason County approves wastewater Facilities Plans through the County's Comprehensive Plan amendment process. This occurs only once annually in December. Amendments to the Comprehensive Plan require environmental review and a public input process. Coordinating timely review by the Department of Ecology and initiating engineering design (see the next two steps) needs to be managed to avoid overall project delay and avoid design re-work as a result of Ecology review of the Facilities Plan.
4. Seek and secure Ecology approval of the Facilities Plan.
5. Select a design firm using Washington State procurement procedures and federal procurement procedures. This selection process can be conducted concurrently with preceding steps to minimize time loss.
6. With Environmental Protection Agency and Department of Ecology consultation, approve a scope of services, review points, schedule and contract with the selected design firm.
7. Initiate design and promptly prepare an Engineering Report for review and approval by the Washington Department of Ecology. Assure proper coordination with the Environmental Protection Agency and Ecology during the review steps of final design.
8. As design is initiated, determine the facility operator. Involve the operator in the design process and establish an operator training program to be conducted by the designer in a manner timely with plant completion. If the operator is a new organization or new to wastewater operations, operating costs may be incurred well in advance of revenues being generated by the new wastewater facilities. Currently only capital costs are anticipated during the design and construction process. It may be possible to capitalize operator costs during design and training.
9. As facilities are sited during final design, prepare site specific environmental documentation for siting options along with needed mitigation plans.
10. Assure during design that the potential for disturbing cultural resources is recognized and avoid or carefully plan for construction in these areas. Plans must include provision for construction observation by qualified personnel, methods for cost-effectively delaying construction (and continuing in other areas) in the event cultural resources are exposed, and appropriate agreed-upon arrangements are made for curation of resources if necessary. All cultural resource plans must be made with the concurrence of the Tribe and the involvement of the State Historic Preservation Officer as required by state law.
11. As soon as possible, acquire sites and start permitting activities for construction.
12. Determine how the County (or other utility owner) will supervise construction and assign responsibilities/authorities for accepting construction work. Hire or retain

necessary professional services or staff. Also assure plans are prepared for discovery of cultural resources and appropriate response plans are in place to assure sensitive and prompt handling consistent with State of Washington and Tribal requirements.

13. At the 80%-90% design stage, conduct a value engineering process managed by a qualified CVE specialist.
14. At or before the time of design approval but following preparation of plans, specifications and estimates, solicit construction bids in accordance with the construction plan. Bidding procedures must be consistent with federal and state requirements and any special requirements depending on fund sources.
15. With final approval of design, assure necessary permit applications are timely submitted and construction contracts are awarded.
16. Complete construction consistent with the construction plan.
17. Commission new facilities, initiate service, begin revenue stream.

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3.0 Potlatch "Bubble" Planning Information

3.1 Existing Information

3.1.1 Population and Flow Estimates

Wastewater service areas for the Reservation near Potlatch State Park are shown in **Figure 3.01**. The service areas were developed with direction from the Skokomish Indian Tribe (SIT) Wastewater Planning Committee, which included Tribal staff, Tribal Council members and consultants. The service areas were separated into 2 phases, Phase 1 and Ultimate Build Out. The separation of the 2 phases was prepared in response to Tribal direction, as a way to define an initial project that is economically feasible.

Existing land use types based on the Skokomish Indian Tribe's land use maps are shown in **Figure 3.02**. The Tribe is in the process of defining the land use types, therefore these maps are subject to change. However, they are sufficient for purposes of this study.

Existing population numbers were prepared by Tribal staff, using an updated residential population survey for the intended service areas. Parcel information and a household inventory (manually developed) were provided by the Tribe.

For planning purposes, the population density observed by the Tribe for their tribal-managed housing was assumed to be representative of housing density throughout the Reservation (4.16 per household). Thus, a final estimate of the total population of the Reservation was made based on 4.16 people per household.

Additional information from Washington State Parks and Recreation Commission (WSPRC), Mason County and Mason County PUD #1, was incorporated into the final population and flow estimates for the Reservation. In general, 2.5 people were assumed to live in each mobile home or recreational vehicle (RV) in the Minerva RV Park and serviced in Potlatch State Park.

Growth projections were developed in consultation with the Wastewater Planning Committee which included Tribal staff, Tribal Council members and consultants. The assumptions used as a foundation for the growth projections are included in **Appendix 3.1**. Population estimates were prepared for two planning horizons: five year (Phase 1) and 20 year (Ultimate). **Figures 3.03** and **3.04** show the Potlatch area population and flow projections for the Phase 1 and Ultimate planning timelines.

The plan for Potlatch State Park will be updated in the next five years, after adjacent Tribal lands are developed, and the wastewater project definition is adopted. Future projections for both the State Park and Minerva RV Park are based on full occupancy of existing facilities.

Tribal housing development (T3ba'das Ridge) near Potlatch State Park is in its initial construction phase, with occupancy planned for May 2008. The planned first phase of development of new homes is the basis for this report's Phase 1 growth projections. The Ultimate growth projection was based on full build-out of the planned Skokomish Tribal housing. Population projections for the new housing are based on 4.16 people per household, as noted earlier.

Growth in the service area north of Minerva RV Park is estimated to be at a rate of 1.5% per year, according to Tribal and Mason County planning estimates (see **Appendix 3.1**). Population per household was assumed to be the same as all Tribal households, or 4.16 people. Commercial growth was assumed to be based on both acreage (north of the powerhouse) and the number of new businesses (south of the powerhouse).

3.1.2 Hydrology

The Skokomish Indian Reservation is located in the lower Skokomish River basin (**Figure 3.05**). Several spring-fed seeps are associated with the lower basin and substantial riverine and estuarine wetlands are located on the Reservation.

The river empties into Annas Bay at the Great Bend of the Hood Canal. Shellfish are harvested in the Bay by Tribal, commercial, and recreational harvesters. Bed locations are in Potlatch State Park, and to the south of the Park, and near the town of Union, in the eastward end of the Bay. Shellfish beds near the mouth of the Skokomish River recently closed due to fecal contamination (Washington Department of Health News Release August 16, 2005). The DOE has determined that the water quality of the river directly influences water quality in the Bay, including shellfish beds.

The lower section of the river (the last 10 miles) is a low gradient floodplain that has extensive wetlands and spring fed seeps. Agricultural activities and residential developments are located on the floodplain. Management practices concerning the floodplain are regulated by the Skokomish Tribe on the Reservation. The Skokomish Indian Tribe has developed a non-point source assessment (see **Appendix 1.1**), and has begun to initiate programs to reduce non-point sources of fecal coliform.

Recent concerns regarding low dissolved oxygen in Hood Canal together with significant fish kills in 2002-2003 and a smaller event in 2004 have prompted major initiatives including enhanced monitoring of the Skokomish River (Preliminary Assessment and Corrective Action Plan (PACA), May, 6 2004). The Puget Sound Partnership (Office of the Governor News Release December, 19, 2005) is an initiative organized by Washington State Governor Christine Gregoire to protect water quality throughout Puget Sound including the Hood Canal.

The natural hydrologic regime in the Skokomish basin has been altered. Research shows that land use practices have caused filling of the lower river channel with aggregate to over five times background levels (Barreca, 1998). The frequency and intensity of flood events has increased, and the water table has risen causing septic system failures.

3.1.3 Geology

The best area for rapid infiltration is in Grove gravelly loam (Gk) soils, with glacial outwash sediments underneath, and no high ground water or surface water issues. Hoodsport soils on the soils maps, or Glacial Till on the geology maps, would not be suitable for rapid infiltration. See **Figure 3.06** for geology mapping, and **Figure 3.07** for soils mapping.

The area of mapped Grove soils in Service Area A is mapped as Glacial Till on geologic maps, with a small pocket of Outwash shown on one map. The geology report (in **Appendix 3.2**) indicates the Grove soils in Service Areas B through E are over Recessional Outwash, which is consistent, and more promising for rapid infiltration.

Areas along the highway are less steep, and therefore more favorable. Slope stability parameters include the slope geometry, soils (density, permeability, saturation, layering, etc.), amount, location and distance of added water, and other site specific variables.

*(Please see **Appendix 4.1** for more.)*

3.1.4 Environmental Issues and Permitting

As described in Section 2.1.5, the Mason County Comprehensive Plan (updated 2005) mapped a number of sensitive areas on a county-wide basis. Sensitive areas mapping within the study area has not been conducted as part of this project. The sensitive areas mapping, including geologic hazard areas, flood hazard areas, aquifer recharge areas, and surface water and wetlands has been reviewed as part of this project.

Within the Potlatch study area, the major surface water bodies include Hood Canal, numerous unnamed streams, and a number of wetlands. Potential impacts to wetlands and/or water bodies are likely the environmental issue of greatest concern. A field reconnaissance should be conducted prior to siting any treatment or disposal facilities to determine the location and extent of streams and wetlands. Conducting this review early in the process would potentially allow for wetland avoidance by making siting adjustments. Similarly, wetland delineations should be conducted when pipeline routes are determined so that wetland impacts can be avoided, or minimized to the greatest extent possible.

Water quality in Hood Canal has long been a concern. In general, Hood Canal suffers from elevated levels of nutrients and bacteria, and low levels of dissolved oxygen. Finch Creek has also exceeded water quality criteria for fecal coliform bacteria (Gray and Osborne, 2000). Implementation of the wastewater management project is expected to help reduce bacterial and nutrient loading to nearby surface water bodies from suspected poorly-functioning septic systems.

Other issues include potential impacts to groundwater, storm water impacts associated with increased development, and construction impacts to local roads.

Appendix 2.2 provides a matrix summarizing the various permits that may be required for the Hoodsport Rural Activity Center, Potlatch, and Core Reservation Wastewater Management Planning areas. Given the general siting information currently available for the projects, a full range of permits that may be required is included. The matrix describes the type of permit, the agency responsible for reviewing the permit, the permit triggger, timelines, agency responsible, and other relevant issues.

3.1.5 Cultural Resources

This report section was prepared by Dr. Gary C. Wessen, a recognized archaeologist. It has been slightly edited here to be consistent with report formatting. The complete report, minus one map redacted to be consistent with state law, is **Appendix 3.3**.

3.1.5.1 Background

The Potlatch & Skokomish Indian Reservation (P & SIR) Study Area is located in northeastern Mason County. It consists of four distinct parcels on and near the Skokomish Indian Reservation (see **Figure 3.08**). The northernmost parcel is almost a square mile that includes Potlatch State Park and adjacent areas to the north, south, and west. It includes almost 1 mile of Hood Canal shoreline and much of the slope rising to the upland glacial plain to the west. A second large parcel of slightly more than a square mile includes much of the Highway 101 and 106 corridors and adjacent residential areas on the Skokomish Indian Reservation. It is entirely on the flood plain of the Skokomish River delta. A third parcel is approximately 0.25 square mile along the northern bank of the Skokomish River. It is also on the flood plain. Finally, the fourth parcel is less than 0.25 square mile on the upland glacial plain in the western part of the reservation. There are significant areas of commercial and/or residential development in portions of the first three parcels. The last parcel is currently undeveloped timber land.

The P & SIR Study Area is located within the traditional territory of the Tuwaduq (Twana) People. In early historic times - - and for a considerable period prior to them - - the Tuwaduq People occupied all of the lands in the immediate vicinity of Hood Canal. Many of their traditional settlements were located along the Hood Canal shoreline, often at or near the mouths of rivers or creeks. They also fished, hunted, and otherwise used a considerable range of lands interior to Hood Canal. Representatives of the Tuwaduq signed the Point-No-Point Treaty in 1855 and subsequently relocated onto the Skokomish Indian Reservation. Their descendants are now usually referred to as the Skokomish Indian Tribe.

There has been only very limited archaeological research within the traditional territory of the Tuwaduq People. Few efforts to locate archaeological sites have been conducted and those which have occurred have generally been limited in their geographic focus. Large scale systematic efforts to identify prehistoric archaeological resources have yet to occur here. Similarly, there have been relatively few detailed studies of particular archaeological sites anywhere along Hood Canal. We currently know that some traditional Tuwaduq settlements in the P & SIR Study Area have been occupied for at least 1,500 to 3,300 years. Other, as yet undated, archaeological sites in the area are probably much older.

3.1.5.2 Research Design

The goal of this report section is "to prepare an inventory of cultural resources in the P & SIR Study Area and advise in the planning effort so that disturbance to known and suspected cultural resources might be avoided to the fullest possible extent". The term 'cultural resources' as used here, refers to archaeological materials. Thus, this study has not addressed the possibility that there may be historic structures in the P & SIR Study Area. To our knowledge, there are very few and, moreover, our current understanding of the proposed wastewater management actions suggests that historic structures are unlikely to be affected. The focus of this effort has been directed largely toward archaeological resources representing the Native American occupants of the area. It should be noted, however, that archaeological resources representing late 19th and early 20th Century Euro-American occupants of the area could also be present in the P & SIR Study Area.

The results of the inventory effort have been summarized in two maps of the P & SIR Study Area. The first map shows the locations of recorded archaeological sites and settlements known from ethnographic and/or historical sources that may have archaeological manifestations. It is important to note here that the locations of recorded archaeological sites are protected by state and federal laws, and thus this information cannot be released to the general public. In this same regard, the Skokomish Tribal Historic Preservation Office has requested that specific information about the locations of traditional Tuwaduq settlements also not be released to the general public. These requirements have led us to develop a second map. The second map identifies zones of archaeological potential within the P & SIR Study Area. These zones have been developed on the basis of the distributions of the above-noted locations and generalizations about the relatively sensitivity of different types of landforms in the study area. In brief, low gradient surfaces in the immediate vicinity of the Hood Canal shoreline, the Skokomish River and the larger creeks are considered to have a relatively high potential for archaeological resources. The flood plain of the Skokomish River, vicinities of smaller low gradient creek channels, and so-called vista points (i.e., locations that offer sweeping views of the surrounding landscape) are considered to have a moderate potential for archaeological resources. Steep gradient surfaces and low gradient upland surfaces that are not located near creeks or lakes are considered to have a relatively low potential for archaeological resources. The map identifying zones of archaeological potential within the P & SIR Study Area may be released to the general public.

Finally, it is important to emphasize that the study reported here is not an archaeological survey of the P & SIR Study Area. While we have considerable familiarity with this area, no actual on-the-ground inspection for archaeological resources was conducted at this time. Rather, the effort was essentially a literature review and our products are based upon examination of documents on file with the Washington State Department of Archaeology and Historic Preservation, the Skokomish Tribal Historic Preservation Office, other materials in our possession, and prior archaeological site survey experience in this area.

3.1.5.3 <u>The Cultural Resource Maps</u>

Our map of the locations of archaeological sites and settlements known from ethnographic and/or historical sources that may have archaeological manifestations is presented in **Figure 3.09**. Note first that there are six archaeological sites in the P & SIR Study Area and eight more are located near it. Further, it is important to emphasize that this inventory is based on only limited archaeological survey efforts. To a large extent, the distribution of the known sites reflects where survey coverage is. Thus, most of the surveys conducted to date have focused upon either the Hood Canal shoreline or the Skokomish River channel. Survey coverage in the interior of the flood plain of the Skokomish River and on the uplands to the west have been quite limited. **Figure 3.09** also indicates that at least 10 traditional Tuwaduq settlements were located within, or near, the P & SIR Study Area. Five were located along the Hood Canal shoreline and another five were along the Skokomish River channel. Relatively limited information is available about many of these places, but several have been identified as large winter villages. Other may have been somewhat smaller locations such as seasonal fish camps. Native American archaeological resources – potentially including artifacts, occupation refuse, and human remains – may be present at any of these locations. We have less information about 19th and early 20th Century Euro-American occupations in the area, but know that a timber-related community was present along the Hood Canal shoreline at Potlatch. (The Potlatch community was developed in the vicinity of an older Tuwaduq settlement.) We also know that there were several mid 19th Century Donation Land Claims on the Skokomish Indian Reservation, although most were abandoned shortly after the reservation was established. Thus, there is also potential 19th and early 20th Century Euro-American archaeological resources in the Potlatch area and elsewhere to the south.

The information in **Figure 3.09**, and the generalizations about the relatively sensitivity of different types of landforms noted earlier, have been used to generate the archaeological sensitivity zones presented in **Figure 3.10**. Two important caveats need to be offered about this map. First, zones based upon landforms have been defined, as the landforms appear on USGS 7.5 minute topographic maps. These are valuable tools, but it is important to emphasize that there may be archaeologically sensitive features in the study area that are too small to be indicated on USGS 7.5 minute topographic maps. The zones shown in **Figure 3.10** are therefore generalizations about probable potential and should not be regarded as guarantees that archaeologically sensitive areas are not present within zones here identified as having only a low potential. A second caveat concerns the low gradient surfaces in the immediate vicinity of the Hood Canal shoreline. This area has been indicated as having a relatively high potential for archaeological resources. This study has not documented the history of filling along this shoreline. We raise this issue because we know that some locations (e.g., near the Cushman No. 2 Powerhouse at Potlatch and in the day use area of Potlatch State Park) contain fill deposits, and fill deposits are a complicating consideration. At first glance, fill sediments can be expected to be culturally-sterile, and thus documented fill areas should have no potential to contain archaeological resources. The issue is actually more complicated for two reasons. First, experience elsewhere in western Washington has shown that low lying areas with archaeological resources were sometimes filled in order to raise their base level. Thus, potentially significant archaeological resources can be present underneath fill deposits. Second, there are documented cases of archaeological sediments having been used as fill materials in western Washington. This means that it is possible that archaeological materials – including human remains – could be encountered in fill deposits.

The map of zones of archaeological potential within the P & SIR Study Area indicates that high potential areas include the low gradient surfaces in the vicinity of the Hood Canal shoreline, the Skokomish River channel and the Skebob Creek channel. These areas have the highest potential for both Native American and Euro-American archaeological resources. These are also among the most developed (i.e., disturbed) areas in the P & SIR Study Area. The history of historic disturbance may have damaged and/or destroyed archaeological resources in these areas. It would, however, be dangerous to simply assume this. In fact, there are many well documented cases of important archaeological resources having survived in badly disturbed, highly developed landscapes. (Witness the recent events at the graving dock site in Port Angeles.)

Areas thought to have a moderate potential for archaeological resources include those portions of the flood plain of the Skokomish River delta that are not in the immediate vicinity of the Hood Canal shoreline, the Skokomish River channel, or other creek channels and areas along the tops of slopes that look out over Hood Canal and/or major creek canyons. Some of the latter areas have also experienced significant historic disturbance (e.g., the Highway 101 and 106 corridors) and the above-note caution also applies in these areas.

Finally, significant portions of the P & SIR Study Area appear to have only a relatively low potential for archaeological resources. Areas thought to have a relatively low potential include steep surfaces along the margin of Hood Canal and low gradient interior surfaces on the upland glacial plain in the western portion of the P & SIR Study Area. While we are confident that the latter areas have only a relatively low potential for archaeological resources, we should emphasize that there is a difference between 'low potential' and 'no potential'. It is possible that archaeological resources could be encountered in areas we characterize as having only a relatively low potential.

3.1.5.4 Resource Management Considerations

The assessments of archaeological resource potential presented here are based upon archaeological and ethnographic data and generalizations about the relative sensitivity of different types of landforms, as they appear on USGS 7.5 minute topographic maps. As already indicated, this study is not an archaeological survey of the P & SIR Study Area and should not be regarded as one. We therefore recommend that an archaeological survey of the areas to be impacted by the waste-water management system be conducted. Having said this, we think that project planners should be aware that – depending upon the system's design – it may prove to be difficult to investigate some portions of the P & SIR Study Area. In particular, we note that some of the high potential areas have been extensively developed and thus, built features such as paved road beds and structures may make effective archaeological inspection difficult. Some of this difficulty may be addressed by test boring portions of the study area, but even the feasibility of this approach is difficult to assess at this time.

As such, while an archaeological survey is an important next step, project planners should recognize that such an effort may not be sufficient to be certain that archaeological resources are not present anywhere in their project area. We therefore think that some degree of archaeological monitoring may be appropriate during the construction of the planned facilities. The specific scope and character of such a monitoring plan should be developed after the results of the archaeological survey are available.

3.2 Additional Information

3.2.1 Treatment Soils Can Provide

The Mason County Soil Survey (Ness, 1960) lists all soil types present in the planning area (except Made Land) as having “very limited” suitability for septic drain fields. Similarly, figures prepared by Latourell Associates show soil limitations for use of septic tanks over the entire Potlatch bubble planning area as either moderate or very severe (reproduced in HWA, 1994).

Soils with lower septic treatment capabilities include those that are excessively drained, such as Grove gravelly sandy loam, 5 to15 percent slopes (Gk), and soils formed on steep slopes, such as Hoodsport gravelly sandy loam, 30 to 45 percent slopes (Hf). These soil types would provide less treatment than slower draining soils due to higher permeability, resulting lower effluent residence times, and lower organic content.

HWA’s opinion is that of the three main soil types encountered (Hd, Hf and Gk), the Hd soils have the best septic treatment potential and least off site septic contaminant transport risk. Hf and Gk soils are both associated with surface water or drainages, and have a higher potential for off site septic contaminant transport, due to steep slopes and excessive permeability, respectively. Artificially placed or fill soils are also likely unsuitable.

Other planning criteria for enhanced treatment include distance to surface water, as it relates to potential for septic contaminant transport (e.g., BOD, nutrients, bacteria, etc.) to surface water bodies, particularly Hood Canal. Surface water for the purpose of this discussion includes creeks, intermittent drainages, tide flats, and Hood Canal. The planning area does not appear to contain isolated upland wetlands. **Figure 3.11** shows mapped wetlands and surface water features that are likely to convey septic drain field effluent rapidly and without much treatment to Hood Canal. Enhanced septic treatment (above conventional residential systems) may be considered for areas near surface water or drainages. For reference, Chapter 246-272A WAC, On-Site Sewage Systems specifies a setback of 100 feet for drain fields from surface water, and 30 feet from any down-gradient site feature that may allow effluent to surface.

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4.0 Core Reservation Planning Information

4.1 Existing Information

4.1.1 Population and Flow Estimates

Core Reservation area population and land use types were assessed in the same way as the Potlatch area (Section 3.1.1). An aerial map of the Core Reservation proposed wastewater service area can be found in the next section of this report, **Figure 5.09**.

Planning assumptions for the Core Reservation area reviewed by the Skokomish Indian Tribe Wastewater Planning Committee are outlined in **Appendix 3.1**. In general, residential growth in this area is limited, due to the presence of the Skokomish River floodplain. Projection of wastewater flows assumed that land near Hwy 101 was above the floodplain, and available for development.

Residential growth was projected along Hwy 101 at a rate of 2% per year. Commercial growth was projected on a per acre basis in a narrowly defined corridor as approximated on the mapping.

The Tribal Center is planned for relocation during Phase 1, as is construction of a new Boys and Girls Club near the elementary school.

The Casino was projected to grow 400% over a period of 5 years, during Phase 1. Core Reservation population and flow estimates are included in **Figures 4.01** and **4.02**.

4.1.2 Hydrology

Section 3.1.3 of this report includes hydrology information for the Core Reservation Planning Area of the Skokomish Reservation.

4.1.3 Geology

Geologic and soils maps for the Skokomish Reservation are included in section 3.1.4.

Two or three sites appear to be favorable for rapid infiltration in the Core Reservation Area.

- Along Hwy 101, on the east side
- Near the top stream banks, east of Hwy 101, where Outwash is the geologic profile
- On the WSDOT property, where Outwash is the geologic profile.

There are also indications that suitable sites are available in or near Potlatch State Park and up on the new Skokomish Housing Area site.

The absence of outwash at the surface indicates low infiltration potential. Areas with outwash near (but not at) the surface (within 10 feet or so) may be suitable for deep systems (ponds, trenches, galleries, etc) but there is no way to determine this from the maps. As was outlined in section 3.1.4, Grove gravelly loam is the soil type favorable for rapid infiltration.

(Additional soils-related investigations were performed as this report was being finished. See ***Appendix 4.1*** *for more information about testing done in the Core Reservation Planning Area.)*

4.1.4 Cultural Resources

Section 3.1.6 includes discussion of cultural resources for the Skokomish Reservation.

4.1.5 Environmental Issues and Permitting

The environmental and permitting issues associated with the Core Reservation area are very similar to those described for the Hoodsport and Potlatch areas in Sections 2 and 3, specifically 2.1.5 and 3.1.4. Within the Core Reservation study area, the major surface water bodies include Hood Canal, Entai Creek, numerous unnamed streams, and an extensive number of wetlands. Potential impacts to wetlands and/or water bodies are likely the environmental issue of greatest concern. A field reconnaissance should be conducted prior to siting any treatment or disposal facilities to determine the location and extent of streams and wetlands. Conducting this review early in the process would potentially allow for wetland avoidance by making siting adjustments. Similarly, wetland delineations should be conducted when pipeline routes are determined so that wetland impacts can be avoided, or minimized to the greatest extent possible.

Appendix 2.2 provides a matrix summarizing the various permits that may be required for the Hoodsport Rural Activity Center, Potlatch, and Core Reservation Wastewater Management Planning areas.

4.2 Additional Information

4.2.1 Treatment Soils Can Provide

Section 3.2.1 includes discussion of soils for the entire Reservation.

4.2.2 Wetland Effluent Disposal

(The Skokomish Indian Tribe is interested in considering the used of wetlands to manage highly treated wastewater. The firm Jones and Stokes was retained to explore this potential on the Skokomish Reservation. The following is a summary of the Jones and Stokes report. The complete report can be found in ***Appendix 4.2****)*

The feasibility of using natural or created wetlands is being considered as one of several options for effluent disposal to be evaluated in the update to the Skokomish Tribe Wastewater Facility Plan.

For the purpose of the analysis, it was assumed that the proposed wastewater treatment plant (WWTP) would treat wastewater to a “Class A” reclaimed water quality standard as defined by RCW 90.46 and the “Water Reclamation and Reuse Standards” manual (Washington State Department of Health and Washington State Department of Ecology 1997).

NATURAL WETLANDS

The Washington Department of Health and the Washington State Department of Ecology (1997) have developed a manual of Water Reclamation and Reuse Standards manual, including reclaimed water standards for use in wetlands. As a general guideline, discharge of reclaimed water into Category I or to saltwater dominated wetlands is not recommended except where it can be demonstrated that no existing wetland functions would be decreased and that overall net environmental benefits would result from the discharge.

Jones & Stokes conducted a “desktop” review of wetlands in the Core Reservation Area. Wetland information was derived from GIS data and mapping (Skokomish Tribe 2006) based on the

National Wetland Inventory (NWI), and a reservation-wide wetland inventory of Skokomish Tribal lands conducted by Sheldon & Associates (1994). No isolated or highly degraded wetlands (i.e., Category III or IV) wetlands occur in close proximity of the proposed WWTP. However, based on the desktop review, Jones & Stokes investigated four candidate wetland disposal locations in the "North Wetland", a Category I wetland located east of the proposed WWTP, and within one half mile the proposed WWTP. The sites were selected based on considerations of access, distance from the treatment plant, wetland class and condition, soils, and land use, and the possibility that, based on review of aerial photographs, the sites might benefit from reclaimed water. Field investigation revealed that none of the candidate sites were feasible for use of reclaimed water since all sites contained intact wetlands and no overriding net environmental benefit could be achieved from discharging reclaimed water to those sites.

CONSTRUCTED WETLANDS

Constructed wetlands are artificial wetlands constructed on non-wetland sites and designed to provide some measure of social or environmental benefit or treatment (i.e., polishing).

CONSTRUCTED BENEFICIAL USE WETLANDS

Constructed beneficial use wetlands can be used for recreational, cultural, or environmental benefits. Beneficial use wetlands can also be used as mitigation for the conversion or loss of wetlands caused by the development of a proposed project. Wetlands for this use are usually become "waters of the U.S." (i.e., jurisdictional wetlands).

The required quality of reclaimed water discharged to constructed beneficial use wetlands differs from the use of constructed wetlands for additional wastewater treatment (i.e., treatment wetlands). Reclaimed water discharged to constructed beneficial use wetlands must be Class B or better, while a lesser standard is applicable constructed wetlands used for treatment.

CONSTRUCTED TREATMENT WETLANDS

Constructed treatment wetlands are systems that are engineered and constructed in non-wetland sites and managed for the primary purpose of wastewater treatment. Constructed treatment wetlands are considered part of the wastewater collection and treatment system and are not considered "waters of the state" or "waters of the U.S."(i.e., and therefore not jurisdictional wetlands).

Findings and Recommendations

NATURAL WETLANDS

An analysis of the feasibility of using reclaimed water in natural wetland included a review of literature and background GIS information of the Reservation, and field reconnaissance of four candidate wetland sites located in the North Wetland (a Category I wetland) east of Highway 101.

The analysis concluded that none of the four sites were found suitable for discharge for a variety of reasons, but with one overriding conclusion that none of the sites possessed degraded wetland functions or habitat conditions that would benefit from the discharge of reclaimed water.

CONSTRUCTED BENEFICIAL USE WETLANDS

Beneficial use wetlands can have recognized cultural, recreational, or environmental benefits that are associated more with the use of reclaimed water to achieve those benefits than for the purpose of effluent treatment.

As a next step, the applicability and benefits of using constructed beneficial use wetlands for the Skokomish WWTP project should be determined if the Tribe is interested in using reclaimed water for cultural, educational, or scientific use. This decision should be based on such considerations as the goals and objectives for use of reclaimed wastewater, definable environmental and social benefits to be derived, and engineering considerations such as the location and size of the wetland and cost.

This analysis could include the feasibility and value or using a constructed beneficial wetland as storage in conjunction with a seasonal land application (e.g., to forest land) and infiltration discharge.

CONSTRUCTED TREATMENT WETLANDS

Constructed treatment wetlands are recognized primarily for their value to treat wastewater rather than to provide wetland functional benefits. Constructed treatment wetlands are usually constructed in an upland setting, with the size and configuration of the wetland based on the desired pollutant reduction prior to discharge. Treatment wetlands require an ultimate discharge of the treated wastewater, either through infiltration, spray irrigation, or as a point discharge to a receiving water.

Class A reclaimed water cannot be achieved using constructed wetlands for treatment unless the effluent from the wetland is filtered prior to discharge (Fricke pers. comm.). The feasibility of using constructed surface-flow and subsurface flow wetlands for treatment, should be explored further if the Tribe chooses to consider discharging effluent of a lesser quality than Class A. For example, a treatment wetland could possibly be used to polish Class D effluent from the WWTP to a Class C quality for discharge. The feasibility of this analysis would be dependent on type of disposal (e.g., spray irrigation or infiltration) and the water quality requirements. This analysis is largely an engineering exercise based on projected flows, projected quality of effluent to be treated, the desired quality for discharge, land availability, and costs for construction, operation, and monitoring.

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5.0 Technology Selection and Project Definitions for Skokomish Systems

5.1 Technologies

5.1.1 Inventory of Applicable Technologies

The Wastewater Master Plan (November 1998) identified two acceptable treatment alternatives, the Biolac aerated lagoon system (manufactured by Parkson, Inc.) and the Sequencing Batch Reactor (SBR) system. The Biolac system does not provide adequate nutrient removal, and it can not meet the desired Class A effluent standards.

The Membrane Bioreactor (MBR) system (manufactured by Enviroquip, Zenon, and Koch) has become more prevalent and widely accepted as a reliable, cost-effective treatment technology for small flows. Several systems are operating successfully in the Northwest, as well. In addition, it has proven successful at treating to DOE's Class A standards for reclaimed wastewater Consequently, the MBR and SBR are the preferred alternatives.

Based on current Tribal Council direction, the preferred treatment plant will be a "good neighbor" facility, with low visibility and high air quality (EPA FARR guidelines), including odor control. The plant should optimize the use of space, and be easily upgraded for increased flows as needed for phasing or future growth. Though the Tribe has not adopted its own standards or Washington Department of Ecology (WDOE) standards, regulatory direction concerning water quality in this region should meet or exceed effluent discharge requirements that are equivalent to DOE's Class A reclaimed water standards. Class A reclaimed water is of such high quality that its use is unrestricted and direct human exposure (but not routine consumption) is allowed.

Estimated land area needed for the water reclamation plant and effluent disposal options are in **Figure 5.01**.

Of the area required for the treatment plant approximately 75 percent of the plant will be used for treatment of the wastewater, which includes tanks and equipment for influent pumping, influent screening, flow equalization, bioreactors, membrane skids/cells, and disinfection equipment. Also included are facilities for storing materials, treatment chemicals, operator offices, and laboratory.

As much as 25% of the land for the plant may be needed for sludge management. The Master Plan includes a description of sludge management alternatives. Sludge, or biosolids, may be stored and dried on-site, or hauled off to reduce the capital cost of the plant. There is an on-site sludge composting program at the Washington Corrections Center in Shelton which may be available to receive the sludge. For purposes of this study, provisions of sludge treatment include sludge stabilization and dewatering sufficient for disposal on land or in a landfill.

Criteria used to review the treatment alternatives include:

- Effectiveness and reliability
- Land requirements and future expansion requirements

- Cost and operations and maintenance requirements
- Environmental impacts and aesthetics

5.1.1.1 MBR Treatment Plant(s)

The MBR design provides a more consistent, high quality effluent, with fewer solids to handle. Wastewater is drawn through membrane filters by applying a suction pressure across the membrane. The pressure differential is generally provided by pumping; however some experimental gravity systems are being tested. Pumping increases operation costs.

The risk of exceeding water quality standards with the MBR plant is low because the membrane acts as a positive barrier to solids carryover.

5.1.1.2 SBR Treatment Plant(s) with Filtration

In most treatment plant designs, to meet Class A standards the SBR is followed by an effluent polishing system using a sand filter. The MBR facility does not require advanced treatment because the membrane is a positive barrier that provides that same level (or better) particle removal as the sand filter. To meet Class A reuse standards, particles are removed down to 5NTU's.

The SBR effluent quality is generally more sensitive to BOD loading in the influent. If the plant is overloaded and low dissolved oxygen conditions occur, the settling characteristics of the sludge may be affected and not enough solids are removed during the settling process. The remaining solids would then have to be removed by the filter, which in turn would affect its performance. However, the membrane in a MBR provides a positive barrier that always prevents solids from passing through in the effluent, even if the biological process is upset from overloading.

The risk of a biological system upset with an SBR is much higher, but with flow equalization and good operator attentiveness, SBR's can be very reliable and consistently produce a high quality effluent. However, effluent quality from an SBR may have BOD, TSS and TKN loading as much as 2 to 3 times the effluent quality from an MBR.

5.1.2 Effluent Disposal Technologies

5.1.2.1 Rapid Infiltration

Rapid infiltration is the most efficient means for effluent disposal, in terms of capital and O & M costs, as well as in terms of the land requirements. However, rapid infiltration requires good geotechnical conditions, in order for it to work. These conditions include good soils, good geologic subsurface conditions and a relatively flat site.

In rapid infiltration systems, effluent flows through an array of parallel perforated pipes that are buried in a gravel filled basin. The flow is distributed evenly across the gravel bed and allowed to percolate into the groundwater. No significant impact to the groundwater would occur, because of the high quality of the effluent.

5.1.2.2 Forest Irrigation

Forest irrigation is land intensive and has high capital and O & M costs. An economic benefit can be developed from forest irrigation for effluent disposal, which may offset the costs. Land available for forest irrigation for both the Potlatch and Core Area is high above the proposed treatment plant location, and far away. Costs for pumping water and storing water, during the wet season, appear to be prohibitive.

Forest irrigation may be used in a natural forest or plantation (such as hybrid poplar). The effluent must be applied at agronomic rates, appropriate for the trees and depending upon the rate of evapotranspiration. Since uptake varies with weather, age, and season, effluent must be stored. Storage is also land intensive, requiring several acres to store 4 to 6 months of effluent. Storage would consist of a lined lagoon 8 to 10 feet deep.

5.1.2.3 Wetland Use of Treated Effluent

Wetland augmentation is the discharge of effluent into an existing wetland, "augmenting" the existing water supply. The existing wetlands on the Skokomish Reservation are Type 1, high quality wetlands. Augmenting the water supply of a Type 1 wetland cannot enhance the quality of the wetland, therefore wetland augmentation is not allowed.

Constructed wetlands may be an option for effluent disposal; however constructed wetlands would not be considered a final point of disposal. Water would be discharged at some point from the constructed wetland, either to a surface water body or to a rapid infiltration basin. In addition, the water quality of a constructed wetland would not be Class A. Water fowl impacts to water quality would cause problems in meeting water quality goals for Hood Canal.

(See Section 4.2.2 for details on using wetlands. ***Appendix 4.2*** *is a technical memorandum by Jones and Stokes.)*

5.1.3 Technology Alternatives Considered

Alternatives for wastewater treatment and effluent disposal were developed as follows:

- Alternative 1, Potlatch Bubble – Consisting of four sub alternatives each with conveyance piping and pumping, either of two treatment types (MBR and SBR), and two types of effluent disposal (rapid infiltration and forest irrigation)
- Alternative 2, Core Reservation - Consisting of four sub alternatives each with conveyance piping and pumping, either of two treatment types (MBR and SBR), and two types of effluent disposal (rapid infiltration and forest irrigation)
- Alternative 3, Potlatch and Core Reservation Combined – Consisting of combining Alternatives 1 and 2 together to form one alternative to service both areas.

The configuration of each alterative is shown in **Figures 5.02, 5.03**, and **5.04**, respectively.

5.1.4 Recommended Technology

Each alternative was compared on a cost and non-cost basis. Comparison of costs is presented in the following section. Non-cost criteria used in the comparison were as follows:

1. Land acquisition
2. Ease of construction
3. Expandability
4. Flexibility for meeting future regulations
5. Ability to permit and satisfy environmental concerns
6. Visual impact
7. Ease of operation and maintenance

8. Odor potential
9. Environmental Impact
10. Land requirements

Of the technologies considered, it was determined that MBR treatment with rapid infiltration disposal was found to be preferred over SBR and/or forest irrigation for the following reasons:

1. MBR and RI require the least amount of land to acquire because they consume the least amount of land area.
2. Ease of construction for both options is similar
3. Both technology options are similar in their expandability, that is, treatment technology can be designed for a phased expansion. Rapid infiltration beds can also be sized for phased expansion.
4. Each technology is highly reliable and can be easily modified to meet future regulations.
5. MBR does a better job of meeting environmental concerns because it reliably produces a very high quality effluent
6. The SBR and MBR both have small visual impact because they can be easily screened with a building. The RI system has a much smaller visual impact than the much larger forest irrigation system.
7. Operation and maintenance of the MBR is easier than the SBR. The RI system has low O&M requirements when compared to the forest irrigation system.
8. Both technologies are similar in odor potential, because odors from both can be controlled with odor control systems
9. Forest irrigation system has the largest environmental impact because it uses the most land.
10. Both MBR and RI are the least land intensive of the technology options.

The MBR system was identified as the preferred method based on all the non-cost criteria reviewed.

5.2 One vs. Two Plants for Potlatch and Core

This report was started on the assumption each of the three Planning Areas (Hoodsport, Potlatch Bubble and Core Reservation) would be handled separately. During planning, the possible advantages of serving the Potlatch Bubble and the Core Reservation were actively discussed. Distance between the two service areas was one important factor (see **Figure 5.05**). Another was operating costs associated with one vs. two treatment plants. A third factor, schedule, emerged as significant.

The following sub-sections capture the discussion and recommendation to develop separate systems for the Potlatch Bubble and the Core Reservation.

5.2.1 Capital Cost Comparison

5.2.1.1 Conveyance Cost Comparison

All costs were developed for the ultimate system development.

The combined treatment alternative requires conveyance of Potlatch area flows to the Core Reservation treatment plant. The total additional cost for conveyance to the combined plant is $1,266,000.

Approximately $600,000 of this additional cost could be saved if the Core Area plant is sited to the east of the WSDOT parcel, allowing the elimination of the pump station to the plant. The cost of a separate plant for the Core Area would also be reduced by relocating the plant (approximately $400,000).

An inventory of the additional conveyance system components needed include:

1. A gravity sewer from the existing Potlatch Park drainfield to connect the new Tribal housing to the main sewer in Hwy 101 (approximately 2000 ft long, estimated at $80,000).
2. The pump station at Potlatch State Park would be redesigned to pump wastewater to the Core Reservation Area treatment plant. The existing pump station will be redesigned regardless of whether a combined or separate treatment system is constructed. Cost impacts for the combined system pump station redesign are associated with increased flows (additional flow from the new housing project) and decreased system headloss (since the pumps no longer discharge upslope in the Park). The increased cost is approximately $50,000.
3. Additional sewer is required to connect the Potlatch Area to the Core Reservation Area treatment plant (0.8 miles, estimated at $536,000).
4. The pump station to lift the flows from Hwy 101 to the treatment plant (assuming the plant is built west of the highway, on the former WSDOT parcel) must be redesigned for the increased flows (estimated at $600,000).

5.2.1.2 <u>Comparison of Treatment/Re-use/Disposal Costs</u>

A single treatment plant would cost less than two separate plants (approximately $310,000, or 4%of the plant costs). The estimated savings is based on a conceptual level review of treatment plant costs. In general, larger facilities have an economy of scale, meaning that a linear increase in capacity does not result in a linear increase in cost.

Effluent disposal costs are approximately $49,000 less for the combined treatment plant, roughly 8% of the total disposal costs. However, the estimates are based on the assumption that the infiltration rates are ½ inch / hour for both the Potlatch and the Core Area. Preliminary geotechnical data suggests the rates may be higher for the Core Area, reducing costs, and potentially difficult to achieve near the Potlatch Area. A favorable infiltration site for the Potlatch Area has not yet been located, however, recent field investigations indicate that some favorable sites may be located at or near Potlatch State Park west of the Park in the new Skokomish Indian Tribe housing area. *(Please see **Appendix 4.1** for the most recent information.)*

5.2.2 Operation and Maintenance Cost Comparison

Operation and maintenance costs for a combined system are approximately 25% less, primarily because of reduced staffing but also because of reduced power costs. The annual operation and maintenance costs for the combined system were estimated at $380,000.

5.2.3 Lifecycle Cost Comparison

Present worth costs for both separate and combined systems were compared in

Figure **5.06**. The alternative with the lowest present worth cost is a combined system with SBR treatment and rapid infiltration effluent disposal.

However, the capital cost for a separate system, MBR and rapid infiltration is only 4% higher (approximately $730,000). The reduced risk of exceeding water quality goals may be considered "worth" the additional capital cost.

The present worth analysis estimates that annual labor and power costs will be 29% more for separate MBR plants, than for a combined SBR plant (approximately $106,000).

5.2.4 Recommended Plant Configuration for Skokomish Reservation

The most effective system, to achieve water quality goals, facilitate project phasing, and meet "good neighbor" objectives is the separate MBR and rapid infiltration systems.

To facilitate review of the difference in cost and design for combined vs. separate systems, a summary of cost differences for the MBR and rapid infiltration system is provided:

1. Conveyance costs are higher for a combined system ($627,000 if the plant is located east of Hwy 101, or $1,270,000 if located west of Hwy 101),
2. Treatment plant capital costs are higher for separate plants ($310,000),
3. O & M costs are higher for separate treatment plants ($92,000 annually).

Additional field investigation and evaluation is required in locating a good site for a rapid infiltration system for the Potlatch Area. *(Please see **Appendix 4.1** for the latest information.)*

Based on the information outlined above, and concerns that the construction schedule for a combined system may not meet the needs for the new tribal housing development, the recommended system is for separate treatment plants for the Potlatch and Core Reservation service areas.

5.3 Proposed Potlatch Project Definition

5.3.1 Project Definition

The recommended system for the Potlatch service area is a separate MBR treatment plant with a rapid infiltration effluent disposal system.

Tribal review determined this to be the most effective system, to achieve water quality goals, facilitate project phasing and related construction schedules, and to meet "good neighbor" objectives.

A preliminary layout of the conveyance system and phasing of the project is shown in **Figure 5.07**.

5.3.2 Planning Level Costs and Project Phasing

Phased system costs for the Potlatch Area were developed after reviewing four alternative treatment and disposal systems.

Estimates for the number of services were developed per Section 3.1.2, through the population assessment process. The phased system costs for the Potlatch Area are summarized in **Figure 5.08**. The table includes phased costs for both the Potlatch and Core Areas.

An important element in the process of developing system costs is the cost per service. The cost estimate includes infrastructure costs for hooking up each service, or in some cases each septic tank, for example at Minerva RV Park. The final cost for the entire system is then analyzed using Equivalent Residential Units (ERU's) to distribute costs fairly among users. In this way the Casino flows and loadings can be expressed in terms of ERU's, equalizing the financial burden fairly. By definition, a household is 1 ERU, however homes in Minerva RV Park may be slightly lower than 1 ERU.

Treatment costs for Phase 1 are based on an over-sized plant being constructed, equal to one-half the size needed for the ultimate build out in 20-years. Typical process design for treatment plants provide for redundancy to allow the plant to stay operational during maintenance. Because the Phase 1 flows are less than 50,000 gpd, a package plant would typically be constructed. But package plants can be 10% higher in cost. Further review of this approach to estimating the costs will occur as the project is developed.

5.4 Proposed Core Reservation Project Definition

5.4.1 Project Definition

The recommended system for the Core Reservation service area is a separate MBR treatment plant with a rapid infiltration system.

Tribal review determined this to be the most effective system, to achieve water quality goals, facilitate project phasing and related construction schedules, and to meet "good neighbor" objectives.

A map of the Core Area phased conveyance system is shown in **Figure 5.09**.

5.4.2 Planning Levels Costs and Project Phasing

The conveyance system was assumed to be a pressure system or septic tank effluent pumping system (STEP) based on the work done in the 1998 Wastewater Master Plan prepared by KCM. The phased costs for the Core Area are included in **Figure 5.08**.

A discussion on the number of services and ERU's is included in Section 5.3.2.

5.5 Combined Potlatch "Bubble" and Core Reservation Action Steps

The Potlatch Housing Project is underway and decisions concerning wastewater management are the highest priority among the various efforts necessary to implement the defined projects serving Potlatch and the Core Reservation. Every effort must be made to avoid costly duplicate or "interim" wastewater management approaches in the Potlatch Planning Area. Further, the Washington State Parks Department is in urgent need of a Potlatch State Park wastewater solution to assure protection of the environment and funding availability.

Further, the Core Reservation project is in need of prompt attention. The Tribe's desire to relocate the Tribal Center and meet expanding economic development centered around the Lucky Dog Casino demand quick and thoughtful management of wastewater issues.

The following steps offer an overview of how the defined projects can be successfully implemented over a three year period.

1. Complete Facilities Plan Amendments to the Department of Ecology approved Skokomish Indian Tribe Wastewater Master Plan for the Potlatch and Core Reservation Project Definitions.
4. Prepare environmental documentation suitable for funding that relies on the State Environmental Policy Act (SEPA), State Environmental Review Process (SERP) for State Revolving Fund loans and National Environmental Policy Act (NEPA) documentation.
5. Seek and secure Ecology approval of the Facilities Plan Amendments.
6. Select a design firm using Washington State procurement procedures and federal procurement procedures.
7. With Environmental Protection Agency and Department of Ecology consultation, approve a scope of services, review points, schedule and contract with the design firm.
8. Design facilities and submit design status reports and final design to the Environmental Protection Agency and Washington Department of Ecology for review and approval.
9. As design is initiated, determine what organization will be the operator. Involve the operator in the design process and establish an operator training program to be conducted by the designer in a manner timely with plant completion.
10. To the greatest extent possible, determine final siting of key facilities in advance of completing final design. Prepare site specific environmental documentation and, if necessary, mitigation plans. Make certain appropriate consideration is given to the potential for disturbing cultural resources and avoid or carefully plan for construction in these areas. As soon as possible acquire sites and initiate necessary permitting activities.
11. Determine the approach for construction supervision and assign responsibilities/authorities for accepting construction work. Hire or retain necessary professional services or staff. Also assure plans are prepared for discovery of cultural resources and appropriate response plans are in place to assure sensitive and prompt handling consistent with State of Washington and Tribal requirements.
12. At or before the time of design approval but following preparation of plans, specifications and estimates, solicit construction bids in accordance with the construction plan. Bidding procedures must be consistent with federal and state requirements and any special requirements depending on fund sources.
13. With final approval of design, assure necessary permit applications are timely submitted and construction contracts are awarded.
14. Complete construction consistent with the construction plan.

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6.0 Consolidated Ownership/Operations and Maintenance

6.1 Background and Process Overview

One of the principal requirements for every new sewer system is to establish who will own, operate and maintain their particular system. The Skokomish Tribal Council, the Board of PUD # 1 and the Mason County Board of Commissioners began their discussions on these issues at the most general level, as early as July and August of 2006. Since then, the staffs of these elected bodies, meeting as the TriParty Staff, have held a series of discussions to develop answers to the issues. For the purpose of these discussions, the following definitions have been developed:

Ownership: The role played by the party who holds the permit for the legal operation of a system; also responsible for the design, development and financing of the system, along with the necessary land acquisition and construction oversight. Once the system has been commissioned, the owner is responsible for setting and maintaining rates sufficient to ensure financial solvency of the system at a minimum and, ideally, a strong credit rating with critical bond rating agencies.

Operations: The role played by the party who is charged with the physical operation of the Wastewater Treatment facility, sending periodic bills for service, collecting customer payments, dealing with customers as they come and go on the system, and handling day-to-day financial matters within the budget established by the owner.

Maintenance: This is the role played by the party who performs preventive and reactive maintenance to the physical assets of the system, monitoring system performance to ensure compliance within the permit requirements, and making recommendations to the operator regarding plant upgrades and equipment replacement.

Consultants to the TriParty Staff generated a list of possible alternative models for ownership, operation and maintenance. The Tri- Party Staff was able to narrow the list of alternatives just through conversation, some being to complex and time-consuming to establish and others being infeasible from a practical or political perspective. At a subsequent meeting, the consultants facilitated the TriParty Staff's development of set of criteria to be applied to the remaining alternatives (see **Figure 6.1**). These criteria were loosely applied by the TriParty Staff to those alternatives and a few more of them were eliminated. Next, the consultants were asked to develop some possible scenarios around the remaining alternatives, setting a more detailed evaluation of the remaining alternatives. This evaluation was held in early February of this year and, as a result of the Tri-Party Staff's review, the following alternatives were recommended to the elected officials of the three entities for their review and approval.

6.2 Criteria for Reviewing Ownership

- Financial capacity
  - Ability to forecast, plan for and finance capital needs
  - Ability to issue debt and maintain suitable capital bond rating
  - Ability to generate revenue (rate-setting willingness/courage)
- Public willingness/acceptance of entity role
- Public willingness/acceptance of project
- Experience and capacity to oversee planning, design, permitting and construction
- Stability of governance and institutional structure
- Relates productively to community vision and intergovernmental (single and multi) objectives
- Regulatory and grant agencies accept owner eligibility and credibility

6.3 Criteria for Reviewing Operations and Maintenance

- Staff capacity, training and experience and equipment
- Systems and management methods
- Revenue collection capacity
- Systems
- Ability/willingness to exercise enforcement authority
- Ability and experience to balance cost and operational reliability
- Capacity, authority and ability to execute the plan/vision

6.4 Scenarios Considered

The Tri-Party staff developed role scenarios in terms of options for which entity could own and which could operate the recommended wastewater facilities for each planning area. These are summarized below.

6.4.1 Hoodsport RAC Central Wastewater Facilities

- County owns and operates
- County owns and PUD operates under contract with the County
- County owns and contracts with another public or private entity for operations
- County owns in the short term and PUD owns in the longer term. PUD operates with mutual aid agreement for operations among the three entities

6.4.2 Core and Potlatch Central Wastewater Facilities

- Skokomish Indian Tribe owns and operates
- Skokomish Indian Tribe owns and PUD operates under contract with the Tribe
- Skokomish Indian Tribe owns and PUD operates in the short term, then Tribe operates in the longer term, with mutual aid agreement for operations among the three entities

6.4.3 Managed On-site Facilities

- County manages and operates
- PUD manages and operates under contract with owners
- Private entity manages and operates under contract with owners
- Skokomish Indian Tribe manages and operates on Reservation

- Whatever entity operates the central facilities should operate the managed on-site facilities for that area

6.4 Recommended Approach

The recommended approach to ownership and operations is based on the entities' understandings of their respective capacities to take on the ownership or operations role and to meet the established criteria for the role.

HOODSPORT RAC CENTRAL WASTEWATER FACILITIES

The recommended approach for the Hoodsport RAC is for the County to finance, design and construct the wastewater facilities and to establish the utility and rates for the system. The County and PUD would consider transfer of ownership after some period of County ownership. Operations would be done by the PUD under contract with the County.

A proposed mutual aid agreement would be executed between the County, Skokomish Tribe and PUD #1. This agreement would provide the terms for providing operations and maintenance assistance among the entities upon request by one of the entities.

CORE RESERVATION AND POTLATCH CENTRAL WASTEWATER FACILITIES

The recommended approach for the Skokomish Reservation Core and Potlatch areas is for the Skokomish Tribe to finance, design and construct the wastewater facilities and to establish the utility and rates for the system. The Tribe would contract with the PUD for operations initially, and the Tribe would operate the facilities in the longer term when it gains the required staff and systems capacity and experience.

As discussed above, a mutual aid agreement executed between the three entities would provide back-up assistance for operations and maintenance among the entities.

MANAGED ON-SITE FACILITIES

The recommended approach for operations of "managed" on-site facilities is for the entity that operates the central facilities to also operate the managed facilities for that area. If the PUD becomes the primary operator of central wastewater facilities, then the PUD would be the primary contract operator for managed on site facilities for the Hoodsport to Skokomish region

AGREEMENTS NEEDED

In order to pursue the approaches recommended above the following agreements would be needed:

- Contract between Mason County and the PUD for the PUD to operate and maintain facilities in the Hoodsport RAC
- Mutual aid intergovernmental agreement between Mason County, the Skokomish Indian Tribe and PUD #1

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7.0 Summary Cost Estimates and Schedules

The following table presents a summary of the estimated project costs by stages. Facilities planning is the next step toward completion of the three projects defined in this report. Although the Skokomish Indian Tribe is not compelled to following Washington Department of Ecology's planning procedures (the Tribe is within the federal Environmental Protection Agency's jurisdiction), Skokomish officials have decided to follow the steps set forth in Washington Administrative Code 173.240. Not only will this simplify collective management of the three proposed projects, it also clearly indicates the Skokomish Indian Tribe's intention to meet or exceed both federal and state water quality requirements.

Under 173.240 a Facilities Plan is submitted for review and approval. The Facilities Plan describes in general terms the wastewater management approach, general location of facilities and financial considerations. This is followed by initiation of design and submittal of an Engineering Report that describes treatment processes, facility sizing and other factors that serve as the basis for final design. Ecology approval of the Engineering Report leads to preparation of the final designs, specifications and estimates necessary to secure bids for construction.

In the table below, costs for facilities planning are distinguished from design and design-related activities since grant funding necessitates this distinction. Similarly, design, engineering assistance during construction, permitting and project administration are included under design to make these activities distinct from actual construction as necessitated by grant funding.

The estimates for facilities planning, design, and construction/land acquisition are summed in the total cost to complete column. It is once again important to stress that these are planning level cost estimates. The construction costs are composed of unit cost estimates (such as the cost of a lineal foot of a certain type of pipe multiplied by the estimated feet required) and lump sum estimates for structures, etc. The sum of these construction estimates and a contingency factor of 15% to 25%, comprise the construction cost estimate for a project.

Other cost elements, such as design and project administration, are estimated as percentages of the construction cost. It is very likely that during preparation of an Engineering Report and during final design, construction cost elements will change. Accordingly, these estimates should not be considered final.

Cost Estimate Summary

Planning Area	*Facilities Plan*	*Eng. Rpt. & Admin./Design*	*Construction & Land*	*Total Cost to Complete*
Hoodsport RAC	$108,683	$1,921,340	$8,025,362	$9,946,702
Potlatch "Bubble"	---	$432,180	$3,001,250	$3,433,430
Core Reservation	---	$813,780	$5,651,250	$6,465,030
Potlatch+Core Reservation	$175,257	---	---	$0
Total for 3 Planning Areas	$283,940	$3,167,300	$16,677,862	$19,845,162

Details behind the numbers presented in the table above can be found in **Figure 7.01**. Three engineering firms developed estimates for this project definition effort. Their estimating approached differed somewhat. The Hoodsport estimates are presented in tabular form in **Figure 2.23a**. The estimates developed by engineers have an asterisk beside them. The numbers for the Potlatch "Bubble" and Core Reservation projects (found in the table at the bottom of **Figure 7.01**) were all prepared by engineers using the technique described above. Consequently, there are slight differences in developing the estimates, but these differences are not consequential at this stage of cost estimating.

During preparation of the Facilities Plans, it is recommended that a common cost estimating approach be used. It is especially important that a common estimating system be used during design. This is easily achieved if a single firm or joint venture is employed as designer.

NOTE:

As this report was being prepared an opportunity for funding a major portion, if not all, of the cost of preparing Facilities Plans arose. It appears that sufficient funding will be available to prepare these plans provided the Tri-Party group (the Skokomish Indian Tribe, Mason County PUD #1 and Mason County) can act quickly enough to meet the timing conditions for use of the money.

For this reason the Facilities Plan elements of the table presented above and the table presented in ***Figure 2.23a*** *are shaded.* ***It is also critical to note that the "Cost to Complete" column in the table above <u>no longer includes numbers in the "Facilities Plan" column</u>.***

Several schedules for the projects defined in this report have been developed. The example schedule for Hoodsport, presented in **Figure 2.24**, indicates the possibility of completion by early 2010. Similar schedules could also apply for the Potlatch "Bubble" and the Core Reservation. However, the greatest urgency surrounds the Potlatch "Bubble."

As noted in Section 5, several factors make the Potlatch effort critical:

- New Skokomish Indian Tribe housing is being constructed in the Potlatch service area. A wastewater project timely completed would avoid the need for interim septic systems serving the new housing.
- Potlatch State Park has funding and is in urgent need of a wastewater project to satisfy legislative concern for improved wastewater management.
- A land transfer involving the Tribe, State Parks and the Minerva Beach Community presents timely opportunity for improved wastewater management.

The Hoodsport and Core Reservation projects also have many factors arguing for their prompt completion. Relocation of the Tribal Center and commercial redevelopment pressures in both Hoodsport and the Core Reservation need wastewater management attention.

Throughout the planning process to develop the project definitions in this report there has been agreement that if at all possible the projects should be designed so as to not preclude the very long term possibility that all three wastewater systems might one day be connected. Further, if similar design standards, similar equipment and similar operating procedures were designed into the projects, there would likely be cost savings achieved through joint operations (see Section 6).

Because it would be efficient for the three projects to be similarly designed, because the TriParty group has agreed to pursue funding and development of the projects collectively, and because prompt completion is important for all three projects, it is recommended a single design firm or joint venture be retained to engineer all three projects. Assuming a firm or joint venture with sufficient capacity is retained, all three projects could move forward together and benefit from joint equipment selection and other design design decisions being made concurrently rather than sequentially. Additionally, worked together, the collective effort becomes large enough to enjoy a more favorable bidding climate with larger contractors seeing opportunities to have one vs. three mobilizations, etc.

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8.0 Funding

Wastewater management infrastructure is expensive. Regardless of the treatment technology, the underground conveyance systems and treatment facilities involve are comparatively long-lived, but capital intensive. Typically, areas that are more densely populated develop wastewater infrastructure as population increases. In the Hoodsport-Skokomish region, however, no conveyance systems are in place and treatment is generally conventional individual on-site septic systems. This means conveyance must be built in already-built environments with various other buried utilities and/or developed public rights-of-way. This adds to the cost.

The following table lists funding that has already been offered for the Hoodsport-Skokomish region. The funding in the shaded area is spent. The rest of the funding remains available as of early 2007.

Grants for Hoodsport-Skokomish Wastewater Management			
Puget Sound Early Action	$57,000	Alternatives Study	Spent and completed
Puget Sound Action Team-Hood Canal Coordinating Council	$177,320	Project Definitions	Spent and completed
STAG '03 for Hoodsport	$667,800	Construction	Grantee = PUD (45% needed match $601K)
STAG '06 for Hoodsport – Skokomish Region	$4,300,000	Construction	Grantee = unassigned (45% needed match $3,870K)
Centennial Clean Water Fund	$1,000,000	Design/Construct	Grantee = unassigned
State Parks – Potlatch	$1,050,000	Design/Construct	'06 Leg. Appropriation
Unused "Earmarked" or Committed Funds	**$7,017,800**		

All of the funding listed above is in the form of grants. The two State and Tribal Assistance Grants (STAG) require 45% matching funds. Federal money may not be used f6r matching purposes, however state and private grants and loans as well as "in kind" efforts such as allowable staff costs may be suitable for match. Neither State and Tribal Assistance Grant is "under contract" (no specific grant agreement has been established that specifies exactly how the money is to be used and what entity is responsible for its proper management). The '03 money in particular may be at risk for continued re-appropriation.

STAG funds are administered by the Environmental Protection Agency. In the table they are listed as being for construction. It is possible to use these funds for design, but the justification and administration of STAG money for services which are not competitively bid is comparatively complex and is not commonly done in US Region 10.

The Washington State Centennial Clean Water Fund grant may be used for both design and construction and is generally suitable for meeting federal grant match requirements. Like the STAG funding, no contract has been executed for this grant. The $1,050,000 state legislative appropriation listed is money assigned to the Washington State Parks Department for improving wastewater management at Potlatch State Park. It is intended to be obligated by the end of June, 2007, and its expenditure is expected to result in suitable resolution of wastewater management for the park. The State Parks Department has been a willing and active participant in discussions and planning for a wastewater project in the Potlatch Planning Area. The $1,050,000, by current estimates, may be approximately the right amount to cover State Park's appropriate share of the project defined for Potlatch.

As always, grants are more desirable than even zero interest loans. The absence of any existing utility to initiate borrowing, the need for nearly all facilities to be completed and operational before there is any revenue to pay back borrowed money, and the comparatively small number of customers relative to the substantial operating and capital requirements leave limited capacity to handle borrowing as a major sources of funding.

8.1 Potential Funding Sources

The TriParty Staff reviewed potential funding sources and completed development of a grant and loan source inventory. The inventory is presented on the next three pages. It is divided into three sections that list relevant sources for planning, designing and constructing wastewater management facilities. Among the most conveniently available loans are those from the Washington Public Works Board that administers the Public Works Trust Fund. Grants are typically available competitively on an annual cycle such as those from the Department of Ecology's Centennial Clean Water Fund.

Federal funding typically requires completion of a National Environmental Policy Act (NEPA) environmental review. Many organizations elect to prepare a State Environmental Policy Act (SEPA) reviews concurrently. See Sections 2.1.5, 3.1.5, 4.1.5 and the related **Appendix 2.2** for additional details.

Funding Sources Table

TriParty Staff

1/13/07

Source	*Maximum*	*Match*	*Interest*	*Term*	*Available Grants*	*Availability of Funds*
Planning						
Public Works Trust Fund: Applications due 5th of each month. Awards occur monthly.	$100,000	None	0%	1-6 years	None	90 days after approval
Community Development Block Grant: Planning Only Continuously open, planning only Awards follow staff resources meeting	$35,000	Should Offer	-	-	Jurisdictions with >51% lower/middle income	90 days following approval
Community Economic Revitalization Board: Submit 45 days prior to quarterly meetings in January, March, July and November. Award follows Board meeting.	$50,000	10%	-	-	Yes	When grant contract is executed
USDA Rural Development: Predevelopment Grants[i] Must meet with RD to determine if eligible	$28,000	None	-	-	Available only if future funding is through RD	When grant contract is executed
USDA Forest Service:	Funding is cut					
State Revolving Fund: Applications due in October Awards announced in January	<50% of funds available	-	0% - 2.6%	6 -20 yrs.		Spring

Source	Maximum	Match	Interest	Term	Available Grants	Availability of Funds
Design						
State Revolving Fund: Applications due in October Awards announced in January	<50% of funds available		0% - 2.6%	6 -20 yrs.		Spring
Centennial Clean Water Grant Fund: Applications due in October Awards announced in January	<50% of funds available		0% - 2.6%	6 -20 yrs.		Spring
State Revolving Fund: Applications due in October Awards announced in January	<50% of funds available	-	0% - 2.6%	6 -20 yrs.		Spring
Public Works Trust Fund: Pre-Construction Applications due 5th of each month. Awards occur monthly.	$1,000,000	15% 10% 5%	0.5% 1.0% 2.0%	20 yrs		90 days after approval
State and Tribal Assistance Grants: Congressional grant administered by EPA		45%	-	-		When grant contract is executed
US Dept. of Commerce: Federal Economic Development Administration						
Bureau of Indian Affairs*						

Source	Maximum	Match	Interest	Term	Available Grants	Availability of Funds
Construction *-continues on next page-*						
Public Works Trust Fund: Construction Applications due in May. Awards occur in August.	$10,000,000	15% 10% 5%	0.5% 1.0% 2.0%	20 yrs	None	May following award
Community Trade and Economic Development: Jobs/Communities Can be Legislative ear mark		-	-	-		
Community Trade and Economic Development: Job Development Can be Legislative ear mark		-	-	-		

Source	***Maximum***	***Match***	***Interest***	***Term***	***Available Grants***	***Availability of Funds***
Centennial Clean Water Grant Fund: Facility Projects Applications due in October Awards announced in January	<50% of funds available	-	0% - 2.6%	6 -20 yrs.		Spring
Community Development Block Grant: General Purpose Apply in November Award by April	$1,000,000	Should Offer	-	-	Jurisdictions with >51% lower/middle income	June
Community Development Block Grant: Community Investment Fund[ii] Continuously open Awards follow staff resources meeting	$1,000,000	Should Offer	-	-	Jurisdictions with >51% lower/middle income	90 days after approval
Community Economic Revitalization Board: Submit 45 days prior to quarterly meetings in January, March, July and November. Award follows Board meeting.	$1,000,000	10%	-	Tied to cost of 10 yr. bond		When grant contract is executed
State and Tribal Assistance Grants: Congressional grant administered by EPA		45%	-	-		When grant contract is executed
Centennial Clean Water Grant Fund: Hardship Facility Projects Applications due in October Awards announced in January	$10,000,000	Grant matched by mandatory SRF loan	0% - 1.5%	6 -20 yrs.	<$5,000,000 based on hardship	Spring
Centennial Clean Water/State Revolving Fund: Activity Applications due in October Awards announced in January	$500,000	Cash, in-kind, other grants/loans	0% - 1.3%	5 yrs.	Up to 75% grant based on hardship	Spring
USDA: Tribal Wastewater Assistance*	$1,000,000					
Indian Health Services*						
Private Foundation Assistance						
Tacoma City Light*						

*Available to Skokomish Tribe

Half of one percent of the money for the Water and Waste grant program is available for Engineering Report and NEPA documentation.

i Must be in top three on County's WA-CERT list.

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The preceding inventory is neither complete nor static. It is a starting point. Public Utility District #1, the Skokomish Tribe and Mason County is each experienced at making application for, being awarded and managing grants and loans. Individuals on the staffs of each entity can make application for and pursue grant and loan opportunities. To aid this effort, it is recommended files of relevant wastewater grant and loan applications and relevant data be actively maintained by some person or position responsible to the TriParty group so as to assure consistency and simplicity when submitting grant and loan applications

8.2 Unified Funding Strategy

The TriParty Staff and the elected officials of the three parties to the August Memorandum of Understanding have had frequent and substantial discussion concerning the pursuit of funding. Prior to the February 6, 2007, meeting of elected officials from the PUD, the Tribe and the County, staff used a funding planning tool to consider various approaches for using the grant funds already available and filling in the voids with applications for other assistance. Attempting to fairly allocate existing grant resources among the three planning area projects proved complex and ineffective, not unlike "fitting square pegs in round holes." Dealing with various stages (pre-design, design, construction) of the three projects in aggregate proved more satisfactory.

The TriParty staff's review showed better ability to promptly use existing grants and probably better chances and flexibility in getting additional funding by the parties working together. This viewpoint was presented to elected officials on February 6th. Although no specific action was taken, the group reaffirmed an earlier position to pursue funding collectively, not competitively, to fullest extent possible with the understanding that…

> Full commitment exists currently by all entities to this memorandum to plan, design, and implement and operate wastewater solutions all three planning areas although work schedules and completion dates may vary.
>
> *August 31, 2006*
> *Memorandum of Understanding*

The parties recognize that a unified funding approach among the three parties makes efficient use of funding resources, provides a stronger voice in securing funds, and draws on the best talent from each entity to vigorously pursue the common goal of completing projects in all three Planning Areas. The parties will work jointly to secure and manage funding. It is completely clear that the parties to the Memorandum of Understanding do not collectively constitute a corporate entity. As a group they have no ability to execute grant and loan contracts with funding agencies. Agreements will need to be executed by one or more of the parties for each funding opportunity.

The proposed Unified Funding Strategy to pay for the implementation of all three project definitions includes the following:

1. Arrange "fiscal agent" status for one entity
2. Find $160,000 to do pre-design (complete Facilities Plans)
3. Concurrent with the preceding step, fund NEPA/SEPA as required for grants
4. Plan for state and private funding and "in-kind" efforts to serve as

federal match with particular attention to federal eligibility

5. Work through agreements necessary to sign grant contracts for pre-design
6. Arrange management structure and staff (someone providing on-going attention to TriParty matters) to suit funding strategy and figure out how to pay for it during pre-design, design and construction
7. Pursue construction funding gap on various fronts

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