Water Supply Alternatives

Introduction to Water Supply Issues

The Water Resource Advisory Committee (WRAC) is tasked with developing a Watershed Plan. The basis for much of this task is to determine the availability of the groundwater resources in Island County. Groundwater in some locations throughout the County has limited availability or restricted use.

A key outcome of the Watershed Planning effort is to identify alternatives to current groundwater use. The County's groundwater resources are experiencing increasing demand, and in some areas are expected to be inadequate for future demands. This paper will identify and make recommendations for prioritizing Island County's water supply alternatives.

Island County Coordinated Water System Plan

The Island County Coordinated Water System Plan (CWSP) was approved in 1990. The CWSP assessed water demand forecasts, ability of large water suppliers to supply their customers, and water supply alternatives. Redistribution of groundwater was the highest recommended alternative.

This topic paper contains specific recommendations made in the CWSP and will build upon its water supply recommendations. The approval of the CWSP represented a major step forward in groundwater resource management in Island County, and its recommendations are still relevant and applicable today. It is hoped that this topic paper will reconfirm Board of County Commissioner support of the CWSP.

Population Distribution

Island County has been subject to a significant increase in population since the 1950s. More than half of Island County's population resides on North Whidbey Island, primarily in and near the City of Oak Harbor and the Whidbey Naval Air Station.

The population of central Whidbey Island is concentrated near Coupeville. This area of Whidbey Island also supports significant agricultural land use. South Whidbey Island is primarily residential with many seasonal dwelling units (approximately two-thirds of Whidbey's seasonal population). Whidbey Island business centers are located in the Cities of Oak Harbor and Langley, the Town of Coupeville, and the communities of Freeland and Clinton.

Camano Island makes up approximately 12% of the County's total permanent population; its population doubles with seasonal population. The character of Camano is more pastoral than that of Whidbey, with most commercial activity occurring off-island (out-of-County) in the Town of Stanwood.

Water Demand Forecasts

Planning for future water supply needs requires projecting demand for both short and long-term periods, and adapting to changes in those projections. To determine future needs, a reasonable and conservative assessment must be made of the number and type of "customers" expected to be served. Island County is the fastest growing rural county in Washington State. In similar areas in the Northwest United States, daily per capita demand of between 80-120 gallons is typical. Information collected during the preparation of the Island County CWSP (1990) indicated an average water demand of about 90 gallons per capita per day. Peak use was estimated as 250 gallons per capita per day.

The Island County Comprehensive Plan (1998) estimated the County's peak population holding capacity (including seasonal residents), based on the optimal land use pattern and permitted density, as 184,000. Peak resident population (including seasonal residents) by the year 2040 was forecasted by the Office of Financial Management of Washington (OFM) and the Island County Health Department (ICHD) as 170,100 and 201,340, respectively. These projected figures for the year 2040 brackett the County's estimated holding capacity (*Island County Population Trends; Exhibit III-1, CWSP*).

Conservation

Conservation has the potential to increase the availability and reliability of present water sources. Recent state legislation requires that conservation be considered when reviewing water sources (Municipal Act 1338, RCW 90.03.386(3); Watershed Planning Act, RCW 90.82.070(2)). The Island County CWSP (1990) recommends that conservation be considered an immediate priority because of the limitation of the water resource and the cost of alternative supplies. Methods to increase water conservation in Island County can be found in the Watershed Planning "Water Conservation" topic paper.

Water Supply Options

The WRAC has identified the following six water supply options for Island County. Options have been evaluated and prioritized through balancing the advantages and disadvantages of each. Prioritization criteria include feasibility of implementation, overall effectiveness versus short and long-term costs, and public acceptance and need.

All of the following water supply options have merits; some are identified as emergency backup measures due to high economic costs (Desalination, Rainwater Harvesting, and Reclaimed Water). Groundwater Wells and Imported Water are currently employed water supply options. Redistribution of Groundwater will be further addressed in the WRAC's "Consolidation and Coordination of Water Systems" topic paper, and is the top recommendation for meeting future water supply.

Option #1: Groundwater Wells (No-Action Option)

With the exception of Oak Harbor and NAS Whidbey, Island County currently relies on local groundwater wells for its water supply (72%) because there are no significant streams or other surface water sources. This finite water supply is drawn from many different aquifers all recharged solely by rainwater.

The Island County CWSP (1990) estimates amounts of Whidbey Island and Camano Island's aquifers (*page V11-28*). These estimates will be refined using more current data in Phase II of the Watershed Planning process. Because the availability of groundwater is not uniformly distributed, County-wide estimates are of limited use in land-use planning. Instead, site specific analysis is required to evaluate specific aquifers and points of withdrawal associated with land use proposals. Phase II analysis will also evaluate water resources in Island County from the perspective of susceptibility to seawater intrusion.

Option #2: Redistribution of Groundwater

The future quantity and/or quality of groundwater resources are expected to be inadequate to meet future demands in some areas of Island County. Areas susceptible to seawater intrusion will be particularly impacted (e.g., near-shore and shoreline areas preferred for residential development).

The Island County CWSP (1990) states that the most desirable and cost-effective water supply alternative is the efficient development of local groundwater if good quality supply can be found. The resource, however, may not be available where demands occur. At present very few water systems employ inter-ties for transfer of water. Long distance transmission may be the only alternative to deliver adequate groundwater to where it is needed. The CWSP outlines the option of "redistribution of groundwater" (*Section V*). Pipelines and connections between water systems could relocate water from high quality/quantity wells to areas where groundwater quality or quantity is below acceptable standards.

Current Watershed Planning efforts may identify regions in which the potential for localized redistribution exists. Care must be taken not to underestimate the local needs of the area from which the water will be exported. Consideration of future land use potential will limit the quantity of water available for distribution.

The Island County CWSP (1990) identified redistribution of groundwater as the top recommendation for meeting future water supply. The WRAC also recommends the redistribution of groundwater as a high priority, and will further address this option in the "Consolidation and Coordination of Water Systems" topic paper.

Option #3: Imported Water

The City of Oak Harbor is the largest water purveyor in Island County, with over 3,700 connections and an average daily demand (ADD) of 2.26 million gallons per day (mgd). Ninety-five percent of the water used by Oak Harbor is purchased wholesale from the City of Anacortes. This imported water comprises 28% of the water used in Island County. Oak Harbor also supplies wholesale water to the Whidbey Naval Air Station (NAS-Whidbey), North Whidbey Water District, and Deception Pass State Park. The Navy installation consists of two separate facilities: Ault Field and the Seaplane Base.

Anacortes obtains water from the Skagit River, the City of Anacortes holding this water right. Oak Harbor is a wholesale water customer of the City of Anacortes and as such has no direct water right to the Skagit River. The amount of water sold to Oak Harbor is limited by the terms of the Water Supply Agreement between the supplier (Anacortes) and the purchaser (Oak Harbor). The Anacortes/Oak Harbor Water Supply Agreement (April 1, 1989) remains in effect for a term of 20 years. The terms of the agreement can be renegotiated and amended annually. The 2002 amendment provided up to 970 million gallons annually (equivalent to 2.66 mgd or 1,850 gpm).

The Oak Harbor water system's future service area is defined as the current City of Oak Harbor Urban Growth Area (UGA) Boundary. The UGA encompasses several smaller water districts (e.g., Hillcrest, Fairway Estates, Swantown). It is not known whether these systems will continue to operate independently or if they will request to be merged with the Oak Harbor water system. Small water districts are required to upgrade their existing infrastructure to the standards of the larger district prior to consolidation. Washington State has several funding programs to assist in system upgrades for small systems. In addition, the City of Oak Harbor Municipal Code (OHMC) Chapter 13.24.030 requires "that all sales of water beyond the water service limits of the city will be made only to another municipal or governmental unit such as Island County, a water district organized according to state law, another city, etc." The same chapter of the OHMC also states that "there must be a finding by the city council that the city has an excess water supply available for the service requested."

Some of these adjacent water systems have expressed interest in annexing to Oak Harbor and then receiving water supply from the City. In times of need, small adjacent water systems could supply well water back to the greater Oak Harbor water system, providing an additional water supply backup. The recently passed HB #1338 allows for a more efficient transfer of water rights to help in this process. The practicality of incorporating small system well supplies into the City of Oak Harbor will need to be addressed on a case by case basis. (This alternative describes a type of "redistribution" of groundwater, as discussed in Option #2.)

The reliability of water supply to Oak Harbor and NAS-Whidbey is a potential issue. The City of Oak Harbor Draft 2003 Water System Plan recommends that alternative sources be identified and evaluated for improving supply to the system (*page ix*). In addition to

emergency interties with NAS-Whidbey, Oak Harbor has emergency back-up wells that produce 0.6 million gallons per day. The City of Oak Harbor has 3.1 million gallons of storage. NAS Whidbey has approximately 10.8 million gallons of storage.

Although the CWSP recommends a Regional Water Supply Plan (*section VII*), this option entails many more pipeline connections to transport water from off-island. Pipeline construction is cost-prohibitive, however, as each mile of off-island pipeline costs a minimum of approximately $1 million. Also, the availability of water from other sources is questionable and unlikely.

A water supply option during emergencies is to haul water to storage cisterns, either by truck or boat to shoreline areas. Bottled water could be used to mitigate water quality (e.g. high arsenic levels) for small amounts of drinking water. These options are economically costly and should be utilized for water supply emergencies only. Private industry would most likely dictate the efficiency of this option.

Option #4: Desalination Plants

Desalination plants (reverse osmosis or distillation units), can offer a viable water supply alternative for islands surrounded by seawater. The City of Oak Harbor draft 2003 Water System Plan recommends that reverse osmosis units be evaluated as an alternative water supply (*page ix*).

Before desalination plants become a viable water supply alternative for Island County, several economic and ecological issues would need to be addressed. Desalination is energy intensive, high cost, and produces a high salinity waste product that needs proper marine or landfill disposal. This option has been identified as a backup measure for unique circumstances only; perhaps future technology will enable this to be a viable option.

Option #5: Rainwater Harvesting

In addition to being a water supply source, rainwater harvesting is a Low Impact Development (L.I.D.) strategy. For a more in-depth assessment of rainwater harvesting as a water supply alternative, please see the upcoming "Rainwater Catchment" Topic Paper prepared by the WRAC.

Rainwater harvesting has been shown to be an important non-potable water supply in areas with limited options. Rainwater harvesting involves the collection of rainwater from a catchment area, generally a rooftop. The rainwater is then stored in cisterns or tanks, treated as appropriate, and used for non-potable uses. The WRAC recommends that rainwater be used only for outdoor, non-potable uses, as rainwater requires at least the same level of treatment as other surface water sources. In addition, rainwater is not a reliable source of potable water in areas of low rainfall; precipitation in Island County is highly variable by area, ranging from 17 inches to 40 inches annually.

The Department of Ecology (DOE) has stated that any amount of rainwater harvesting requires a water right permit, if catchment of water is used for any purpose other than surface water flow control. Rainwater captured on the surface is defined as surface water, therefore requiring a water right permit. DOE is currently discussing a blanket permit for allowing rainwater harvesting systems to be built in certain areas without obtaining individual water right permits.

Option #6: Reclaimed Water

Using reclaimed water in areas of limited water sources may help ensure future adequacy of domestic water supplies as well as replenish groundwater aquifers. The WRAC recommends that reclaimed water be used only for non-potable uses. Reclaimed water can presently be used for irrigation, groundwater recharge, and dual plumbing (commercial only). The present "Uniform Plumbing Code" prohibits reclaimed water to be used in private residences.

Potential sources of reclaimed water are grey water, surface water runoff, and treated sewage. Greywater and treated sewage are treated to the same regulatory standards in Washington State. Surface water runoff could be captured from drainage areas associated with public roadways, and may need to be treated; it could be stored in retention ponds for groundwater recharge. Treated sewage water could also be used for groundwater recharge.

Another source of "reclaimed" water is brackish groundwater (pumped from seawater-intruded aquifers). In situations where the potable water supply would not be impacted, brackish water could be used in lieu of fresh water for special purposes.