Managing Water Resources for Sustainability on Vashon-Maury Island, King County, Washington

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"Whiskey is for drinking; water is for fighting over."
Mark Twain

"When the well is dry, we know the worth of water."
Benjamin Franklin

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I. Introduction

The Vashon-Maury Island (VMI or Island) watershed is an EPA-designated sole source island aquifer located in the Puget Sound. All drinking water sources on the island (springs, surface water, and groundwater) are supplied by precipitation. Understanding the water budget for VMI, and changes that are occurring in response to human activities and climate, is critical to determining the amount of water that can be consumed on a sustained basis. On VMI, there is broad local recognition of the shared responsibility for water resources and recognition that each water user can affect the quantity and quality of the water supply of others.

Vashon-Maury Island is located in the Puget Lowland within the boundaries of King County, Washington situated southwest of Seattle and north of Tacoma.[2] The Island encompasses approximately 37 square miles of which 29.7 square miles are on Vashon Island and 7.0 square miles on are Maury Island (see Figure 1). The topography of the Island varies from sea level to elevations in excess of 460 feet based on U.S. Geological Survey topographic maps. The shoreline extent of Vashon-Maury Island is just over 58 miles, most of which lies beneath steep, slide-prone slopes. The Island has more than 70 stream basins.[3] Two of these, Judd Creek (3,149 acres) and Shinglemill Creek (1,996 acres), are large with separate sub-basins. All of the stream basins drain into Puget Sound.

A. Geology

A recently updated geologic map of VMI provides a comprehensive description of its geology. In 2004, GeoMap NW completed a detailed analysis of field data and data compiled from well logs for King County as part of the Water Resources Evaluation (WRE) Project (discussed in detail below). The analysis concluded that the Island is composed of glacial derived sediments deposited during several glacial episodes. The predominant geology on Vashon-Maury Island is glacial till. This unit (as well as other till-like units) covers

[2] The two islands are linked by a narrow isthmus and are not, therefore, truly independent islands. Vashon-Maury Island is bordered on the west by Colvos Passage from the Kitsap Peninsula, on the south by Dalco Passage from Tacoma, on the east by Puget Sound and King County, and on the north by Puget Sound. Vashon Island is about 13 miles long (north to south) and 4 miles across (east to west) in the widest areas. Maury Island is about 5 miles long (northeast to southwest) and about 1 mile across (northwest to southeast).

[3] KING COUNTY, DEPARTMENT OF NATURAL RESOURCES AND PARKS, VASHON-MAURY ISLAND RAPID RURAL RECONNAISSANCE REPORT S-2 (2004) *available at* http://www.kingcounty.gov/environment/watersheds/central-puget-sound/vashon-maury-island/recon-report.aspx (last visited June 15, 2009).

approximately 68% of the Island and helps define the topography. The remaining 32% of the Island is composed of glacial outwash and alluvial deposits generally occurring on stream corridors and shoreline areas where erosion has removed the till overburden.

In addition, GeoMap NW updated the aquifer contamination susceptibility mapping on Vashon-Maury Island by compiling a new geologic map and newly gathered depth to water information. The updated aquifer contamination susceptibility mapping is the foundation for the Critical Aquifer Recharge Area (CARA) map showing critical water supply aquifer recharge sites on Vashon-Maury Island.

B. Precipitation and Climate Change

Precipitation is the main source of recharge and can vary greatly across Vashon-Maury Island. According to the National Oceanic and Atmospheric Administration's average precipitation zone maps for the Puget Sound area, Vashon-Maury Island has three zones (at 5-inch intervals) across the Island, with rainfall ranging from 45 inches to 35 inches per year. The measured variation was 18 inches from the east to west side of the Island.[4] In 2004, additional precipitation gauges were installed as part of the WRE Project to help determine the variation in precipitation across the Island.[5] New rainfall contours (zones) were generated from this new data showing a variation of about 13 inches (48 to 35 inches/year) across the island. The new precipitation data is being used to model a more representative distribution of recharge for the Island.

Recently, the University of Washington Climate Impacts Group predicted a warming trend in temperature for this region.[6] The Group predicts that by 2075 the average temperature will increase by 4 to 9 °F in the summer and by 2 to 8 °F in the winter. The predictions for the total amount of precipitation are variable depending on the model, but there is agreement that precipitation is likely to fall with higher intensity over shorter time periods. Despite unknown changes in the amount of precipitation, changes in recharge will occur on VMI due to elevated temperatures resulting in more evapotranspiration and less groundwater inflow.

C. Population and Land Use/Cover

The population of Vashon-Maury Island is growing. The Island population has grown steadily from 6,516 in 1970, to 7,377 in 1980, to 9,309 in 1990, to 10,100 in 2000.[7] The fastest growth since 1970 occurred between 1980 and 1990 when the population increased

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[4] J.R. CARR, CARR & ASSOCIATES, VASHON-MAURY ISLAND WATER RESOURCES STUDY (1983).
[5] ERIC FERGUSON, KING COUNTY DEPARTMENT OF NATURAL RESOURCES AND PARKS, VASHON-MAURY ISLAND 2005 DATA REPORT (2006), *available at* http://your.kingcounty.gov/dnrp/library/2006/kcr1941.pdf (last visited June 15, 2009).
[6] King County, Climate Change Technical Subcommittee Regional Water Supply Planning Process, Climate Change Building Blocks (2006).
[7] U.S. CENSUS BUREAU, WASHINGTON: 2000 SUMMARY POPULATION AND HOUSING CHARACTERISTICS, PHC-1-49 (2002) *available at* http://www.census.gov/prod/cen2000/phc-1-49.pdf (last visited June 15, 2009).

26%. Between 1990 and 2000 the rate of growth had slowed to 9%. According to the Puget Sound Regional Council (PSRC), the population of VMI will continue to grow.[8]

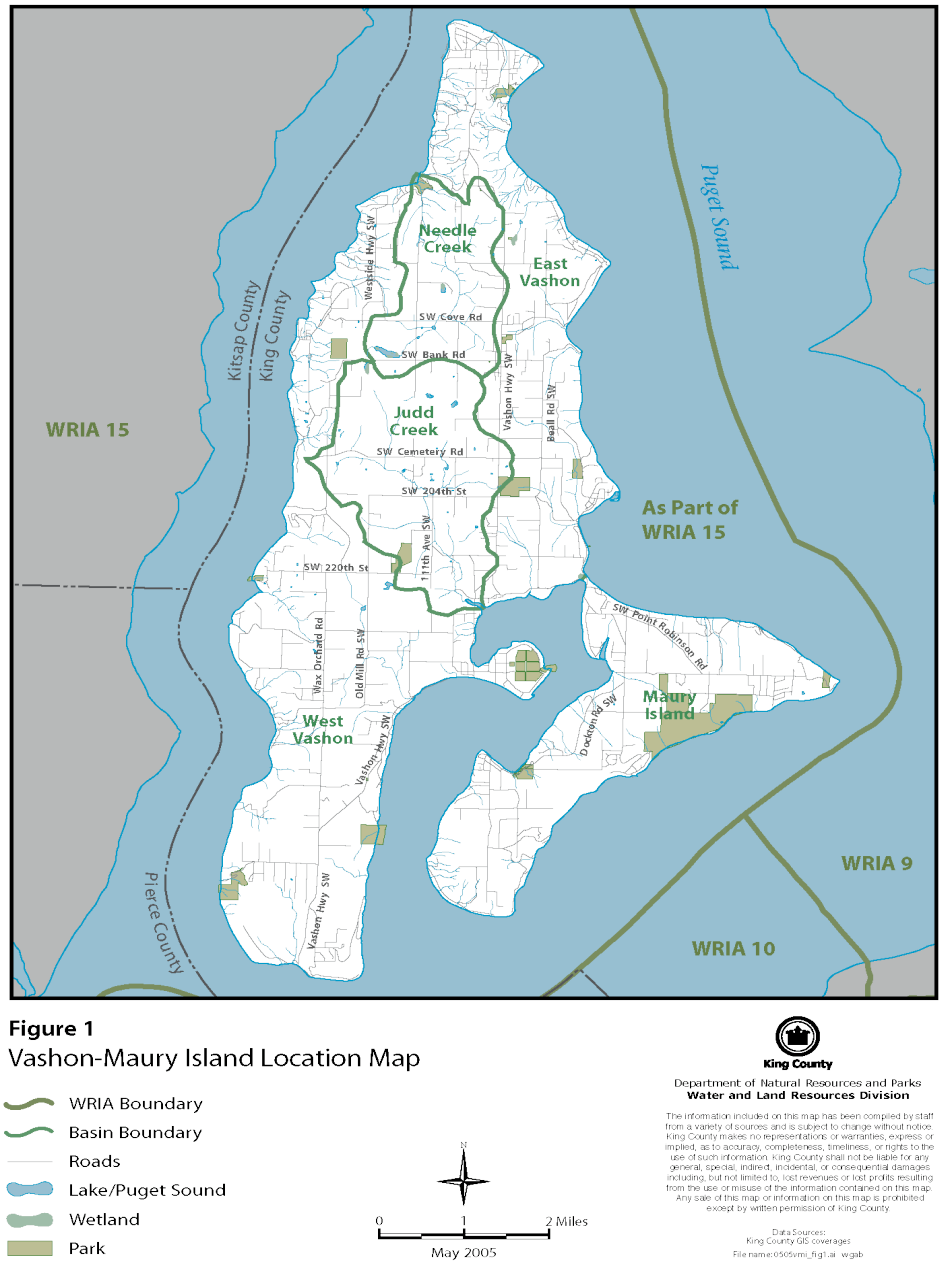

Figure 1
Vashon-Maury Island Location Map

Fig. 1. Map of Vashon-Maury Island, courtesy of King County.

[8] The PSRC estimates that the population of the Island will increase by 1,000 people by 2040, or 10% per decade. PUGET SOUND REGIONAL COUNCIL, VISION 2040: THE GROWTH MANAGEMENT, ENVIRONMENTAL, ECONOMIC, AND TRANSPORTATION STRATEGY FOR THE CENTRAL PUGET SOUND REGION (2008), *available at* http://psrc.org/projects/vision/index.htm (last visited June 15, 2009).

The number of occupied households on Vashon-Maury Island increased by 13% (3,703 to 4,193) between 1990 and 2000. The difference between the population increase and the number of households is based on the decreasing size of the average household. In 2000, this value was estimated to be 2.4 people per household, down from 2.5 in 1990. Under Washington's Growth Management Act (GMA), most local governments are required to develop comprehensive plans for growth at different densities in three categories of land: urban, rural, and resource. Vashon-Maury Island is designated as rural and is located outside the urban growth area boundary designated by King County in its 2008 Comprehensive Plan, developed pursuant to the Washington State Growth Management Act, discussed in more detail in Section III.G. Low-density residential development covers much of the Island, with zoning of one home per five or ten acres. Higher density residential areas are concentrated in the Vashon Town Center and along parts of the shoreline including Vashon Heights, Burton, and Dockton. Multifamily, commercial, and industrial uses are presently concentrated in the unincorporated town of Vashon and adjacent areas where sewer and other urban services are available. The land cover for Vashon-Maury Island is 73% forest, 16% non-forest, and 11% developed lands.[9]

There are concentrations of impervious surface in the areas of Vashon, Burton, and Dockton. There are also isolated concentrations of impervious surface elsewhere on the Island, including the Vashon School District properties, the park and ride lots, and the airport. Impervious surface is most concentrated in the town of Vashon, where runoff enters pipes that discharge into roadside ditches. Runoff from the town of Vashon discharges to the Gorsuch, Judd, and Shinglemill Creek drainage basins. Projected development in the town of Vashon is expected to increase the concentration of impervious surface. The E. Fork Judd Creek drainage basin is projected, at build-out, to be a large effective impervious area (EIA). EIA in the E. Fork Judd Creek area is projected to increase almost fourfold over the current level to 13.8%. In the sub-basin of the Shinglemill watershed, which includes a portion of Vashon Town Center, the Rapid Rural Reconnaissance projects a tripling of impervious surface to 9.9% at build-out, Overall EIA is projected to increase from 2.2% to 7.5% in the Judd Creek Drainage Basin and from 2.0% to 6.9% in Shinglemill Creek Drainage Basin.[10]

II. Vashon-Maury Island Water Resources

The majority of the residents of Vashon-Maury Island get their drinking water from public water systems. Figure 2 shows the locations of public water systems on VMI and their service areas. The additional service area shown in Figure 2 represents the only designated wastewater collection and treatment (sewered) area on the Island within the Vashon Town Center. All drinking water sources on the Island (springs, surface water, and groundwater) are supplied by local precipitation. No pipelines or aqueducts import water onto the island. The drinking water quality on the island is generally good with some exceptions in locations where nitrate levels are elevated or saltwater has intruded into the aquifer.

[9] KING COUNTY DEPARTMENT OF NATURAL RESOURCES AND PARKS, VASHON-MAURY ISLAND WATERSHED PLAN 4-5 (2005), *available at* http://www.kingcounty.gov/environment/watersheds/central-puget-sound/vashon-maury-island/watershed-plan.aspx (last visited June 15, 2009).

[10] VMI Rapid Rural Reconnaissance Report, *supra* note 3, at 2-10–2-11.

Vashon-Maury Island was designated a sole source aquifer by the U.S. Environmental Protection Agency (EPA) in June 1994. To be so designated, an aquifer must supply at least 50% of the drinking water consumed in the area overlying the aquifer and the population can have no alternative drinking water source that could physically, legally, and economically replace the supply provided by the aquifer.[11]

Large public water systems are classified by Washington State Department of Health (DOH) as Group A systems if they serve 15 or more connections. The other (smaller) public system classification in the state is called Group B; this class serves 2-14 connections. The seven largest Group A water systems serve more than 50% of the Island population (see Figure 2). The seven Group A systems on the Island with water services designated in the 1990 Vashon Critical Water Supply Plan occur in Burton, Dockton, Gold Beach, Heights, Maury Mutual, Water District 19, and Westside. Residents who are not connected to public water systems obtain their water from an estimated 800 "exempt" wells.[12] These are generally wells with small withdrawals that are "exempt" from the state's water right permitting requirements.

A. Vashon-Maury Island Water Resources Report

The first major report on Vashon-Maury Island water resources was completed in 1983 and is commonly referred to as the "Carr Report."[13] The Carr Report was prepared twenty-five years ago to answer four questions:

1. What are the characteristics of the water supply? (Where does the supply originate? Where is it located? And what is its quality?)
2. How much water is available for human use?
3. What constraints does the water resource place on population density and land use?
4. What needs to be done to protect and enhance the water resource for future generations?

The Carr Report concluded that precipitation is the only source of recharge to the Island aquifers. This finding was significant at the time, as many people then believed the Island's water supply came from distant sources such as the Olympic or Cascade Mountains.

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[11] US Environmental Protection Agency, Region 10, *Questions and Answers about Sole Source Aquifers, What Criteria have to be Met for Designation?*, http://yosemite.epa.gov/r10/water.nsf/2fb9887c3bbafaaf88256b5800609bf0/9fe289eed8753b2e882564de0056ecd2!OpenDocument .

[12] KING COUNTY DEPARTMENT OF NATURAL RESOURCES AND PARKS, VASHON-MAURY ISLAND PHASE I GROUNDWATER MODEL REPORT (2005), *available at* http://your.kingcounty.gov/dnrp/library/2005/kcr1895.pdf (last visited June 29, 2009).

[13] VMI Water Resources Study, *supra* note 4.

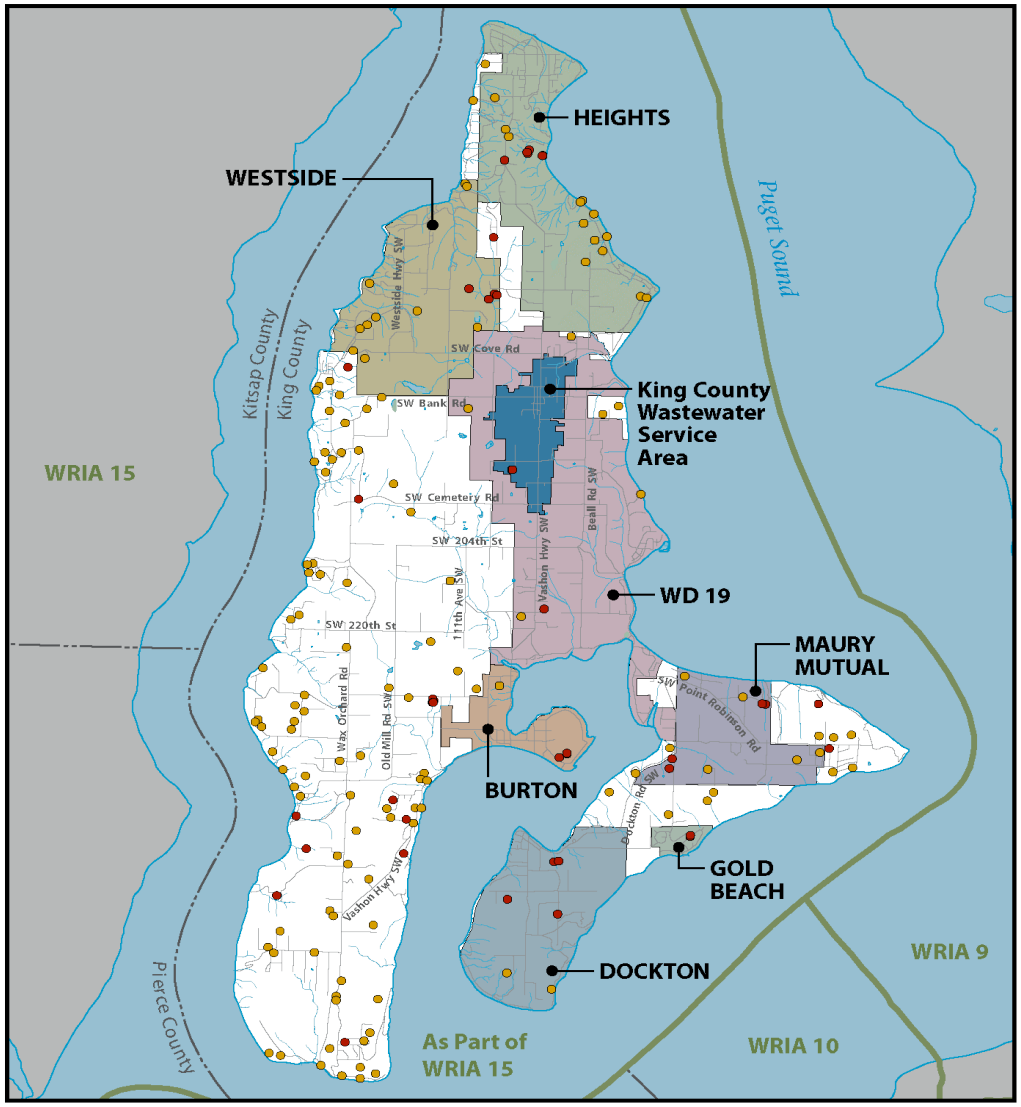

Figure 2
Public Water Systems of Vashon-Maury Island

Fig. 2. Public Water Systems (PWS) on Vashon-Maury Island, courtesy of King County. The sources for all Group A and Group B public systems are shown. The majority of the population of VMI receives their water from PWS. The seven largest Group A PWS are shown with their service areas. The King County wastewater service area is the only major part of the island that has designated wastewater collection and treatment.

The Carr Report documented that the Island's water supply is obtained primarily from wells and springs. By studying well logs compiled when the wells were drilled the Carr Report determined that approximately 95% of the wells get their water from a "principle aquifer." The principle aquifer is composed of fine to medium glacial outwash sand that yields moderate amounts of water and is generally located above sea level. A deep aquifer lies below the principle aquifer at depths of 100 – 300 feet below sea level. The deep aquifer is separated from the principle aquifer by a clay aquitard layer that limits aquifer recharge. Few wells are drilled into the deep aquifer which was estimated to be capable of yielding larger quantities of water, but its recharge capacity was determined to be more limited due to the aquitard layer.

The Carr Report developed a water budget for the Island based on measured precipitation, temperatures, and stream flows. The study found the Island receives an average of 40 inches of precipitation (primarily rain) annually. Half of the total annual precipitation received (20 inches) was calculated to be lost to direct evaporation or transpiration by plants (evapotranspiration). Another 15 inches of the total annual precipitation was calculated to be lost via direct run-off to streams. Only 4 inches of total annual precipitation was estimated to infiltrate and recharge the principle aquifer at a rate of approximately 6,000 gallons per minute. Just 1 inch was estimated to infiltrate through the clay aquitard layer to recharge the deep aquifer at a rate of approximately 2,000 gallons per minute.

The Carr Report tested groundwater quality and found it was generally good. However local areas of water quality concern were found. Some wells tested had elevated nitrate levels thought to be from septic tank effluent and animal waste. Other wells tested had elevated chloride levels indicating salt water intrusion.

Based on the estimated aquifer recharge and calculated water producing (productive) capacity of the principle aquifer that supplies 95% of the groundwater on the Island, the Carr Report calculated the Island could support a total population of 13,000 people. However, based on the potential water contamination impact from septic tank effluent described as the "groundwater renovation capacity," the study recommended that the total population on the Island should be limited to 11,000 people.

The Carr Report concluded that the Island's water supply is limited and vulnerable to contamination. The study provided a series of long-term recommendations to manage the Island's water supply including;

1) Create or designate a specific agency with responsibility for managing the islands water resources;
2) Initiate an fourteen-point water resource monitoring and investigation program;
3) Integrate the Carr Report findings into the land use plan and produce a comprehensive water management plan; and
4) Implement the water management plan as soon as possible.

For the more near-term, the Carr Report recommended implementation of a series of conservative interim measures to protect the groundwater supply while the long term recommendations were being implemented including:

1) Limit the Island's total population to a maximum of 11,000 people;
2) Adopt zoning limiting density to protect the aquifer recharge potential of the land (high = 1 unit per 10 acres, medium or low = 1 unit per 5 acres without sewer);
3) For areas where higher density is already allowed, enact building moratoria to reduce or stabilize groundwater degradation by septic systems;
4) Revise subdivision and building codes to maintain and enhance recharge capability and water quality;
5) Preserve high recharge areas as parks or open space and protect sensitive landslide areas;
6) Provide sewer collection, treatment and disposal off-island for all high population density areas (limited by the Growth Management Act to the Vashon Town Center or locations declared a to be a risk to public health);
7) Improve the sewage treatment plant (located in the Vashon Town Center) to exclude infiltration of stormwater and shallow groundwater;
8) Monitor the existing solid waste disposal landfill and develop a long term plan to dispose of solid waste off-island; and
9) Implement a program of public education to promote conservation and protection of the water resource.

B. Groundwater Management Plan

The Washington Legislature enacted the groundwater management area provisions in 1985 with amendments in 1988.[14] Subsequently, the Washington Department of Ecology (Ecology) promulgated rules for the designation of groundwater management areas, and set forth a process for the development of groundwater management programs.[15] Groundwater management plans are developed to protect groundwater quality, assure groundwater quantity, and provide efficient management of water resources for future needs while recognizing existing water rights. The intent of the plan is to forge a partnership between a diversity of local, state, tribal, and federal interests to cooperatively protect the state's groundwater resources.

King County delineated five Groundwater Management Areas (GWMAs) in accordance with the state law and regulations: East King County, Issaquah Creek Valley, Redmond-Bear Creek Valley, South King County, and Vashon-Maury Island. Once established by the County, each GWMA formed a committee of stakeholders and created a groundwater management plan.

The Groundwater Management Plan for Vashon-Maury Island was completed in 1998.[16] The VMI Groundwater Management Plan built upon the Carr Study and incorporated many new management strategies to protect the Island's groundwater quantity and quality. Some of the key findings and differences from the Carr Report are describe below.

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[14] *See* WASH. REV. CODE § 90.44.400.
[15] *See* WASH. ADMIN. CODE Ch. 173-100.
[16] KING COUNTY DEPARTMENT OF NATURAL RESOURCES AND PARKS, VASHON-MAURY ISLAND GROUNDWATER MANAGEMENT PLAN (1998). The VMI Groundwater Management Plan was accepted by King County in 1998 and subsequently certified by the Washington Department of Ecology.

While preparing the plan, the Water and Land Resources Division of King County Department of Natural Resources and Parks collected additional measurements of precipitation, temperature, and stream flows to develop a refined water budget for the Island. The new water budget concluded there was approximately 21,000 gallons per minute of water available to recharge the aquifers. This estimate was significantly (2.6 times) higher than the Carr Report which only estimated a total recharge of approximately 8,000 gallons per minute (6,000 principal and 2,000 deep). The water budget incorporated into the VMI Groundwater Management Plan suggests the Island can support a significantly higher total population. Unlike the Carr Report, however, the Plan made no estimate of the actual population the Island could support.

King County also re-evaluated the well logs and refined the aquifer characterization and concluded there were four discrete aquifers on the Island. Like the Carr Report, the VMI Groundwater Management Plan found most of VMI's wells withdraw from the shallower aquifers; as the deep aquifer is 400 hundred feet deep or more and often below sea level. The Plan found that the shallow aquifer wells are most vulnerable to contamination and wells in shoreline areas are vulnerable to saltwater intrusion if over-pumped.

The authors of the VMI Groundwater Management Plan reached a number of important conclusions to guide management of the Island groundwater resources. First, the quantity and quality of groundwater is tied to the quantity and quality of surface water. Second, adequate protection of groundwater requires protecting surface water. Third, enforcement of existing laws is essential to protect water quality and water protection polices in the land use plan must be fully implemented to protect Island water resources.

Land use activities affect both recharge and demand for water. Island residents have invested in drilling wells and obtain water supplies at substantial cost, and it is unacceptable to allow the population to increase to the point where current residents could lose their existing water supplies due to contamination or overuse. As part of the 1990 Vashon Community Land Use Plan (based on Carr Report), the groundwater supply was estimated as capable of supporting a population of around 11,000 people. Local zoning ordinances, however, could allow approximately 20,000 residents. The increased estimate of groundwater availability in the GWMP plan is constrained by the need to maintain stream flows, water tables and prevent saltwater intrusion.

There are statewide groundwater management goals to protect groundwater quantity and quality. Accordingly, the VMI Groundwater Management Plan calls for managing quantity to optimize current and long-term benefits for present and future residents through a combination of conservation, infiltrating stormwater, public education, long-term data collection and monitoring, and implementing land use control measures. The Plan calls for protection of water quality through management of hazardous materials, sewage treatment, underground storage tanks, landfills, pesticides, and sand and gravel mining.

The Plan identified a series of priority groundwater management issues to be addressed including:

1) Establish the groundwater management area as an aquifer protection area;

2) Establish a data collection and management program for quality and quantity;
3) Define action levels for indicator chemicals or contaminates;
4) Establish a response mechanism for monitoring results that reach action levels;
5) Provide public education to ensure stewardship of the resource; and,
6) Implement land use measures to prevent contamination.

C. Water Resources Evaluation

In 2001, King County Department of Natural Resources and Parks began a groundwater monitoring program to assess the current status of the groundwater quantity and quality on the Island. Ambient monitoring had not been done on the Island since the data collection for the VMI Groundwater Management Plan was completed in 1992. King County remains one of the few places in Washington State with a groundwater monitoring program. The long-term monitoring on VMI allows King County to assess the Island's water quality trends in comparison to the data collected as part of the VMI Groundwater Management Plan (1989-1992) and the Carr Study (1981-1983).

The Water Resources Evaluation (WRE) project was launched in 2004 to monitor all water resources on the Island (precipitation, surface water, and ground water). The effort to establish an accurate water balance for the Island is a priority for the Groundwater Protection Committee (GWPC). King County is assessing water availability by developing a water budget-based model at the request of the GWPC. The project is scheduled to be completed in 2010. The WRE includes two modeling efforts utilizing the new monitoring information along with all the other necessary data to better assess the Island's overall water balance. The WRE water balance is being prepared to resolve the differing estimates of groundwater availability calculated from the water budgets prepared in the 1983 Carr Report and the VMI Groundwater Management Plan. To calculate aquifer recharge, the WRE water balance formula is precipitation minus evapotranspiration and stormwater runoff. Aquifer discharge is estimated by calculating spring flow, stream baseflow, and well pumpage with the remaining flow discharging to Puget Sound.

In the first phase of modeling, WRE staff created an island-wide (steady-state) groundwater flow model to better assess the available water resources. This model used new data gathered by the WRE in addition to the data collected by earlier studies. The effort highlighted the fact that ground and surface water quantity data was not readily available or well monitored on the Island. The Phase I modeling effort produced a new estimated aquifer recharge (16,455 gallons per minute (gpm)) that was between the two previous study results (see Table 1). Much of the usage data for the smaller (Group B) public water systems and the domestic wells was estimated based on regional usage patterns.[17]

Currently, the County is conducting Phase II modeling. Phase II models will better incorporate unsaturated/saturated conditions using dynamic evapotranspiration, plus surface and groundwater interactions. Phase II modeling will also allow assessment of the effects of projected climate changes and population growth. Modeling the impact of these

[17] ECONOMIC AND ENGINEERING SERVICES, INC., CONSOLIDATED REPORT ON WATER SUPPLY IN KING COUNTY, PREPARED FOR SEATTLE PUBIC UTILITIES (2002).

projected changes will help the GWPC better assess long-term sustainability of water quantity resources on the Island.

The WRE modeling has added importance because Ecology is not granting new surface water or groundwater withdrawal rights on many parts of the island. The closure is due to Ecology's determination that the island ground water is in hydraulic continuity with major stream basins previously closed to further appropriation of surface water.

Table 1. Water Balance from Vashon-Maury Island water resource studies.[18]

	Modflow	Mike-She	Carr	VMI GW Plan
Precipitation (gpm)	49,584	52,046	48,851	56,500
Evapotranspiration	43%	41%	50%	40%
Runoff	24%	22%	37%	23%
Recharge (gpm)	16,455	19,369	6,107	20,960
Outflows				
Puget Sound	80%	37%	20%	38%
Streams	12%	53%	80%	62%

The closures are contributing to limitations on development in the areas of the Vashon Town Center zoned high-density and served by Water District 19 and inside three other designated Group A water utility service areas (see Figure 2). However, development continues to occur within closed basins utlizing exempt wells permitted predominately for domestic usage.

III. Legal framework for Management of Water on Vashon-Maury Island

The legal framework for management of the water resources for Vashon-Maury Island is established by Washington State.[19] This section provides an overview of the chronological development of the laws that establish the legal basis for existing water rights on the Island. The timeline is important to understand why new water rights are not being granted on the Island today and why new growth is continuing to occur with water provided by permit exempt wells, without benefit of water rights. This section also explains the range of resource management tools that exist today and identifies areas where new law needs to be created to protect the Island's groundwater.

The chronology of the water resources legal framework suggests a trend towards increasing regulation that parallels the growth in the state's population, demand for water, and knowledge of water resources and effective management tools. Initially, the appropriation of water resources was addressed through common law doctrines. Specific codes for surface water and groundwater soon emerged. Subsequent laws created water management tools ranging from well construction permits to elaborate water resource planning and management requirements.

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[18] Adapted from VMI Phase I Groundwater Model Report, *supra* note 12, Table 4-2.

[19] *See* WASHINGTON STATE DEPARTMENT OF ECOLOGY, WATER LAW: A PRIMER, Pub. No. WR-98-152 (2006), *available at* http://www.ecy.wa.gov/pubs/98152.pdf (last visited June 29, 2009).

Early settlers on the Island could secure a water right under two common law doctrines: the "appropriative doctrine" (post notice at point of diversion and if not protested put the water to use) or the "riparian doctrine" (just use the water adjacent to your property). In times when there was not enough water for all, the system for water right priority, or the sequence in which water rights were entitled to be used, was established through "appropriative use" and "first in time was first in right" under western water law.[20]

A. Water Code of 1917

In 1917, Washington adopted a uniform water code to govern surface water appropriation. The Surface Water Code (1) declared that all unclaimed water belongs to the public; (2) established the appropriation doctrine as the exclusive way to create a water right; (3) created a centralized water right administration agency within the state, with authority to issue permits, set a timeframe to put the water to beneficial use, and authorize water use through a certificate that established a priority date and described the quantity, place of use, and purpose of use; and (4) established an adjudication system.[21] In addition, the Surface Water Code required that new water rights meet four criteria before a right would be granted: (1) beneficial use (not wasteful); (2) water availability; (3) no impairment to existing water rights; and (4) no detriment to the public interest.[22]

B. Groundwater Code of 1945

In 1945, Washington adopted a uniform code governing groundwater appropriation that essentially extended the surface water code to groundwater.[23] Before 1945, the "reasonable use" doctrine allowed a user unlimited access to groundwater as long as the use was "reasonable," i.e. not wasteful. Whether there was an impact to any other water right, or whether the use was earlier in time was not relevant. The Groundwater Code replaced this reasonable use doctrine with a permit system, with features and attributes similar to those for surface water permits.

The Groundwater Code exempts four types of groundwater uses from the water right permitting requirements:

- Watering livestock (no gpd limit or acre restriction);[24]
- Watering a non-commercial lawn or garden one-half acre in size or less (no gpd limit);
- Water for single or group domestic uses (limited to 5,000 gpd);[25] and

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[20] *Id.* at 2.
[21] *Id.* at 3.
[22] *Id.* at 4.
[23] *See* WASH. REV. CODE Ch. 90.44.
[24] Op. Wash. Att'y Gen. 2005 NO. 17, 2005 WL 3142148 (2005).
[25] Washington Department of Ecology v. Campbell & Gwinn, LLC, 43 P.3d 4 (Wash. 2002). *Campbell & Gwinn* raised the question of how the groundwater exemption applies to a residential subdivision, in this case twenty lots. The Washington Supreme Court ruled that if you wish to develop land and supply the development with domestic water from several wells, and each well will pump less than 5,000 gpd but all the wells together will pump more than 5,000 gpd, the project is considered a single withdrawal of groundwater and is not exempt from permitting requirements.

- Water for industrial purposes, including irrigation (limited to 5,000 gpd but no acre limit).

New development using permit-exempt wells based on the above categories has become a major trend on Vashon-Maury Island and other areas of Washington State as water rights have become increasingly difficult to obtain. The Washington State Attorney General, however, issued an opinion in 1997 that clarified that even though exempt wells do not need to secure water right permits, they are still subject to other water laws.[26] This means, essentially, that exempt wells may not be used in a manner that impairs other water rights.

C. Water Rights Claims Act of 1967

In 1967, the Legislature passed the Water Right Claims Act authorizing the state to accept and register water right claims and requiring the state to record the amount and location of pre-code water rights and exempt groundwater uses.[27] Previously, both the surface and groundwater codes had allowed water users to file "claims" for water appropriated and put to beneficial use prior to the effective date of the respective codes. The initial claim periods, however, have been reopened on multiple occasions by action of both the legislature and courts to fully recognize preexisting water uses. These claims are the single largest category of potential water rights in the state, and their validity will not be known until a formal court proceeding, referred to as an adjudication, is completed for all water rights in any given basin or sub-basin.

D. Water Well Construction Act of 1971

The Water Well Construction Act of 1971 regulates water well drilling to protect public health and safety.[28] The water wells are installed for a variety of uses, including potable, nonpotable, monitoring, and other uses. Property owners or their agents (which could include well drillers) must notify the state 72 hours before starting to drill or construct a well. A driller must submit a water well report to Ecology following construction of a well. Under the Act, Ecology may limit or prohibit well drilling in areas requiring intensive control of groundwater withdrawals.

E. Water Resources Act of 1971

Under the Water Resources Act of 1971 (WRA), Ecology is authorized to "establish minimum water flows or levels for streams, lakes, or other public waters for the purposes of protecting fish, game, birds, or other wildlife resources, or recreational or aesthetical values of said public waters."[29] Such "instream flows" are water rights and have as their priority date the date of rule adoption.[30]

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[26] Op. Wash. Att'y Gen. 1997 No. 6 (1997).
[27] *See* WASH. REV. CODE Ch. 90.14.
[28] *See id.* Ch. 18.104.
[29] *Id.* § 90.22.010.
[30] *Id.* § 90.03.345.

Through administrative rulemaking, Ecology has closed Judd Creek, Fisher Creek, and Shinglemill Creek on Vashon Island to new surface water appropriation.[31] (see Figure 3). The groundwater in these basins has been determined to be in "hydraulic continuity" with the surface water and no new water rights have been issued within the basins since 1990. The combined area of the three drainage basins covers more than 50% of Vashon Island. Judd Creek was closed in 1951 on the basis that there were no waters available for further appropriation for consumptive use. Fisher Creek and Shinglemill Creek were closed in 1981 on the basis of the need for high instream flow for anadromous fish.

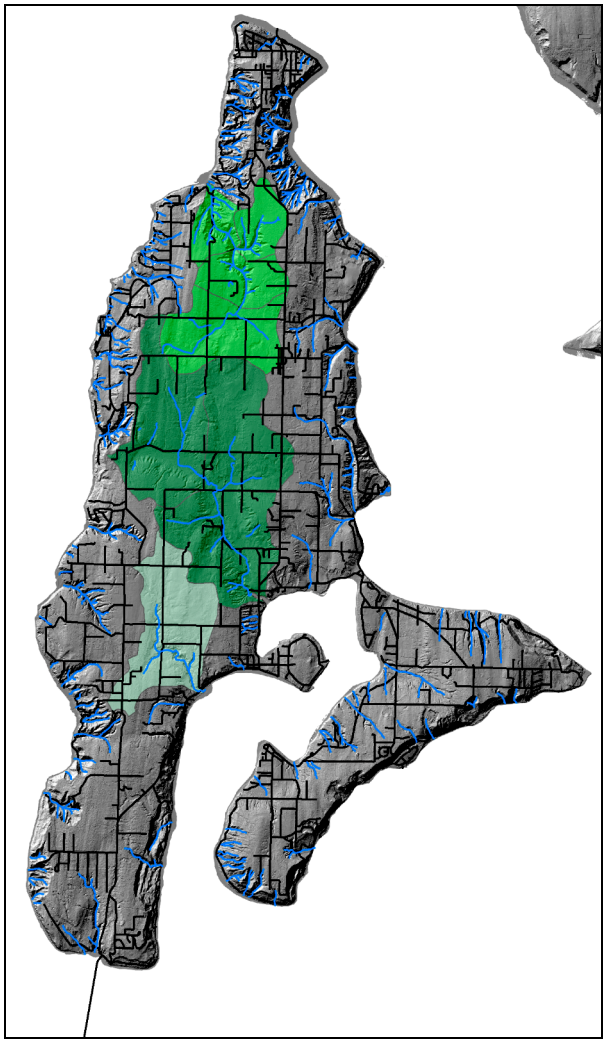

Fig. 3. Closed Basins on Vashon-Maury Island, courtesy of King County.

If a "significant hydraulic continuity [exists] between surface water and the proposed ground water source, any water right permit or certificate issued shall be subject to the same conditions as affected surface waters."[32] Since permits for the beneficial use of surface

[31] WASH. ADMIN. CODE § 173-515-040.
[32] *Id.* § 173-549-060.

waters "must be conditioned to protect the minimum levels established by code for each river basin," so must permits for groundwater when interconnected with surface waters.[33]

Case law in various appellate court decisions in Washington has clarified this obligation to analyze an application to withdraw groundwater that may be interconnected to surface water. In *Hubbard v. State*, John and James Hubbard challenged Ecology's decision to conditioned permits to withdrawn water from wells on the maintenance of the Okanogan River's minimum flow rates. Even though the point of withdrawal was located several miles from the affected stream and the effect of the pumping would result in only small and delayed effects on the flow of the river, the Washington Court of Appeals ruled that the existence of a "significant connection (hydrologic continuity)" between the aquifer and the river supported Ecology's decision to issue a conditional permit.[34] This decision also affirmed that where surface and groundwater is connected, instream flows established by rule are treated as water rights and should be protected from impairment by any subsequent groundwater withdrawals.

More recently, in *Postema v. Pollution Control Hearings Board,* the Washington Supreme Court ruled that the legal test of impairment (i.e., whether the withdrawal of groundwater affects the volume of surface water that it is connected with) is "no impairment" of an existing water right, the so-called "one molecule rule."[35] A finding of impairment, however, cannot be made merely by establishing a hydraulic continuity between groundwater and a stream where instream flows are not met part of the year.[36] Impairment must be determined on a case-by-case basis to demonstrate a specific harmful impact to an existing water right. Finally, the court ruled "that a proposed withdrawal of groundwater from a closed stream or lake in hydraulic continuity must be denied if it is established factually that the withdrawal will have any effect on the flow or level of the surface water."[37]

The *Postema* decision affirmed the *Hubbard* decision protecting instream flow water rights from impairment and clarified that hydraulic continuity alone does not automatically result in impairment of a stream flow. On VMI, these cases have supported administrative decisions to close much of the island to new water rights because of closed stream basins, and call into question continuing development using permit exempt wells.

F. Public Water System Coordination Act

In 1977, the Legislature passed the Public Water System Coordination Act. The Act allows water suppliers, working with the county governments, to develop a Coordinated Water System Plan (CWSP) within a defined geographic area.[38] The plan must include, among others, the following key provisions:

- Designation of future service areas;
- Identification of interties and other shared facilities;

[33] Hubbard v. State, 936 P.2d 27, 29 (Wash. 1994).
[34] *Id.* at 30.
[35] 11 P.3d 726, 744 (Wash. 2000).
[36] *Id.* at 741.
[37] *Id.*
[38] *See* WASH. REV. CODE Ch. 70.116.

- Use of consistent design standards and fire flow requirements;
- Development of strategies for small and failing water systems; and,
- Establishment of satellite water system management requirements for new water systems constructed within a water suppliers service area.

A CWSP was established for Vashon Island in 1990.[39] The CWSP designated the present utility service areas on the Island as shown in Figure 2. The plan called for restriction of new water systems where service cannot be provided by an existing system, satellite management of new systems where direct service is not possible, and new legal alternatives for restriction of new private (one-connection) water systems. The plan also recommended further analysis of the groundwater supply capability and the development of a strong program to protect groundwater quality.

G. Growth Management Act

The Growth Management Act (GMA) provides a clear link between the development of land and water availability.[40] Under the GMA, persons applying for a building permit for a structure that will require drinking-quality water must provide evidence of an adequate water supply for the intended use of the building. The same concept applies to the subdivision of land where a developer must show there is an adequate water supply for the intended subdivision. The GMA also includes specific requirements to "protect the quality and quantity of groundwater used for public water supplies."[41]

King County has adopted a Comprehensive Plan, most recently updated in October 2008, and development regulations to implement the GMA.[42] The Comprehensive Plan contains a number of policies related to management of growth in relation to water availability on Vashon-Maury Island. The Comprehensive Plan establishes a clear preference for new development to be served by existing public water suppliers (Group A over Group B), but allows development on self-supply permit exempt wells if service cannot be provided in a timely and reasonable manner (this is also a requirement of the CWSP). GMA development regulations also protect Critical Aquifer Recharge Areas (CARAs). CARAs seek to protect areas overlaying aquifers used for water supply from land uses that could potentially be detrimental to the water quality. All of Vashon-Maury Island is designated as a CARA because of the Island's unique status as a sole source aquifer surrounded by saltwater.

H. Watershed Planning Act 1998

The Watershed Planning Act provides a framework to collaboratively solve water issues within Water Resource Inventory Areas (WRIAs), or watersheds.[43] It allows local governments and citizens to join together with advice from state agencies to develop

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[39] HORTON DENNIS & ASSOCIATES, VASHON COORDINATED WATER SYSTEM PLAN – AEGIONAL SUPPLEMENT, PREPARED FOR KING COUNTY (1990).
[40] *See* WASH. REV. CODE Ch. 36.70A.
[41] *Id.* § 36.70A.070.
[42] KING COUNTY, KING COUNTY 2008 COMPREHENSIVE PLAN UPDATE (2008), *available at* http://www.kingcounty.gov/property/permits/codes/growth/CompPlan/2008.aspx (last visited June 29, 2009).
[43] *See* WASH. REV. CODE Ch. 98.82.

watershed management plans. According to the Act, the plan shall, at a minimum, assess the WRIA's water supply and use, recommend strategies to satisfy existing rights and meet current use and future water supply needs. The plan may include strategies for setting instream flows, improving water quality, protecting or enhancing fish habitat and storage of water. The legislature supplies grants to support these local planning and subsequent implementation efforts.

Working with the Groundwater Protection Committee, King County completed a Watershed Plan for the Island in 2005.[44] The principal reasons for preparing a watershed plan was uncertainty about the amount and availability of groundwater, a local trend showing increasing nitrates in some wells, potential for degradation of Island streams, and potential contamination of the Island's sole source aquifer. The plan was completed at the local level, but State adoption of the plan has not been possible due to conflicts in other parts of the watershed (Water Resource Inventory Area 15). Nonetheless, the County, working with the GWPC, has proceeded to implement the plan through the various water resource management structures provided under state law. The current GWPC priorities for implementation of the VMI Watershed Plan recommendations include hydrology education, water conservation, and hydrologic sustainability.

I. Municipal Water Law

The Municipal Water Law (MWL) made a number of changes that affect delivery of municipal water supplies.[45] The new provisions:

- Clarify where municipal water utilities can use existing water rights and provide an option to change place of use to an approved water "service area" established in their water rights without going through Ecology's formal water right change process;
- Define which systems and suppliers are municipal utilities (retroactively defined municipal water suppliers as entities that supply water for municipal water supply purposes include systems that supply water to fifteen or more residential users or a population of sixty or more persons for over sixty days per year);
- Establish water use efficiency standards for municipal utilities and their customers, and allow utilities to impose a fee to fund conservation activities;
- Establish a duty for municipal water supplies to provide water service within their retail service area;
- Require the state Department of Health to ensure that water system plans are consistent with local Comprehensive Plans and development regulations adopted under the GMA, and other relevant plans;
- Allowing municipal water suppliers to retain water rights, including original priority dates, for water not yet fully used under certificates issued by the state; and
- Allow use of water for environmental "mitigation" such as increasing stream flows or sustaining water levels in wetlands."

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[44] VMI Watershed Plan, *supra* note 9.

[45] 2003 Municipal Water Supply – Efficiency Requirements Act, Chapter 5, Laws of 2003 Second Engrossed Second Substitute House Bill (SESSHB) 1338 (Chapter 5, Laws of 2003).

The constitutionality of multiple provisions in this statute has been challenged in court. The initial trial court ruling found that three provisions are unconstitutional, but the rest are not.[46] The trial court's decision has been appealed by all parties, and the Supreme Court will hear the case later this year or early in 2010.

The MWL is important to the Island because it establishes a "duty to serve" new growth within the designated service areas for Group A municipal water systems. The duty to serve means a utility is obligated to serve new development if they have the necessary water rights and can provide services in a timely and reasonable (cost-effective) manner. This provision will support implementation of the water service goals established in the Vashon Critical Water Supply Plan. In addition, the MWL provides protection against water rights relinquishment and increased flexibility for the Group A municipal water systems on the Island to determine where water rights may be used. This should allow those systems to more easily move water to increase the water supply where needed, as envisioned in the 1990 CWSP. Finally, the MWL requires each municipal water supplier to establish water conservation goals and publish an annual report documenting the progress they make toward achieving their goals. To the extent water utilities aggressively pursue conservation there will be increased protection for the finite water resources on the Island.

IV. Water Rights on Vashon-Maury Island

Water right data for Vashon-Maury Island from the State Water Rights Application Tracking System (WRATS) are presented in Table 2. The total annual volume (total acre feet per year) of water in water rights certificates and permits is 4,473 acre-feet (AF). 2,148 AF of that is surface water and the remaining, 2,325 AF is from groundwater sources.

The data presented in Figure 4 sorts the water rights into three broad categories (Domestic/Municipal, Agricultural, Other) based on primary purpose of use. Of the surface water rights on the Island, 68% of the annual volume is authorized for domestic/municipal purposes, 31% for agricultural use, and 1% for other purposes. Half of the agricultural surface water rights are granted for unnamed springs and individual users. Of the groundwater rights, 60% is authorized for domestic/municipal purposes, 10% for agriculture use, and 30% for other purposes. The reason for large percentage of "other" uses is due to one historic right (circa. 1960) of 640 AF for commercial activities.

[46] Lummi Nation, v. State of Washington, No 06-2-40103-4 SEA, Summary Judgment Order (July 11, 2008), *available at* http://www.ecy.wa.gov/programs/wr/rights/Images/pdf/muni/61108OrderGrantingInPartDenyingInPartSJMs.pdf (last visited June 30, 2009).

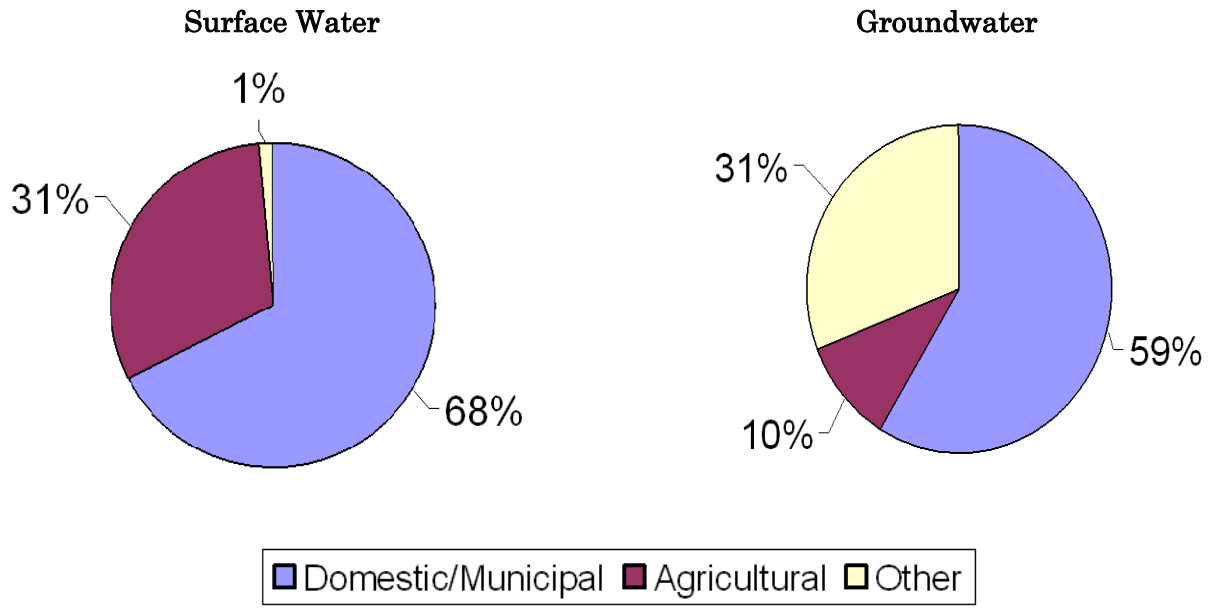

Fig. 4. Water Rights for Vashon-Maury Island.

Table 2. VMI Water Rights by Purpose of Use. (Adapted from VMI Watershed Plan)

		Domestic/Municipal			Agricultural			Other		
		Qi (cfs)	Qa (af)	Irr Acres	Qi (cfs)	Qa (af)	Irr Acres	Qi (cfs)	Qa (af)	Irr Acres
Surface Water	Certificates	6.79	1452.4	0	4.56	664.6	368.2	1.91	32	31
	Permits	0	0	0	0	0	0	0	0	0
	Applications	1.53	0	0.5	0.3	0	255	0	0	0
	Claims	0	0	0	0	0	0	0	0	0
		Domestic/Municipal			Agricultural			Other		
		Qi (gpm)	Qa (af)	Irr Acres	Qi (gpm)	Qa (af)	Irr Acres	Qi (gpm)	Qa (af)	Irr Acres
Ground Water	Certificates	2105.1	1218.5	0	452	218.6	171.5	495	702.3	3
	Permits	166.1	100.4	0	37.5	10	2	0	0	0
	Applications	2803	0	0	415	0	304	10	0	6
	Claims	200	74.3	0	0	0	0	0	0	0

Notes: Domestic/Municipal includes:
DS -Domestic Single, DM - Domestic Multi, MU - Domestic Municipal
Agricultural includes:
IR - Irrigation, ST - Stock Watering
Other includes:
CI - Commercial + Industrial, FR - Fire Protection, FS - Fish Progragation,
PO - Power, RE - Precreation + Beautification, WL - Wildlife Propagation

Surface and groundwater rights in the aggregate have nearly equal instantaneous pumping rights. Converting flow from cubic feet per second (cfs) to gallons per minutes (gpm), the Island has about 5,249 gpm in instantaneous surface water certificates and permits and 6,558 gpm in instantaneous groundwater certificates and permits.

The water rights of the seven largest Group A Public Water Systems (PWS) on the Island are presented in Table 3. Some of the larger Vashon- Maury Island Group A PWSs are fully using their water rights and have no additional rights to serve new connections. Other PWSs have not been accepting new connections because of operational or financial constraints in meeting state requirements to put their water rights to use. Vashon-Maury

Island has hundreds of unquantified "water claims" for both surface and groundwater. This is an important uncalculated category of users in addition to the number of exempt wells when assessing water availability for water rights.

Table 3. Water Rights of Group A PWSs on Vashon-Maury Island. (Adapted from VMI Watershed Plan).

	Surface Water				Ground Water			
	Certificates	**Permits**	**Applications**	**Claims**	**Certificates**	**Permits**	**Applications**	**Claims**
Water District 19	1.4 cfs 1012 AF	0.4 cfs 289 AF	0.5 cfs	--	250 gpm 300 AF	--	1340 gpm 445 AF	--
Heights Water Association	0.41 cfs 274 AFY	--	--	--	185 gpm* 236 AF*	42 gpm 47 AF	--	--
Burton Water Company	0.1 cfs	--	--	--	--	--	150 gpm	200 gpm
Dockton Water Association	0.39 cfs 41 AF	--	--	--	100 gpm 48 AF	--	--	--
Westside Water Association	0.05	2.0 cfs*	--	--	--	--	260 gpm 78 AF	--
Gold Beach Water Company	--	--	--	--	75 gpm 35 AF	--	500 gpm (2 wells)	--
Maury Mutual Water Company	0.334 cfs 100 AF	--	--	0.25 cfs	--	50 gpm 100 AF **	--	--

NOTES:
cfs = cubic feet per second
AF = acre feet
gpm = gallons per minute
* = Supplement water supply
** = Supplement water supply (total annual limit for all water rights)
-- = Not Applicable

Knowing the quantity of existing water rights on the Island is important to understanding how much of the surface and groundwater supply is already legally committed to particular uses and locations. For groundwater, water rights already exceed the Carr Report's estimate of sustainable productive capacity by 30% (2,324 AF for water rights vs. 1,791 AF for Carr's estimated productive capacity). Today, much of the agricultural use and "other" commercial use for both surface and groundwater has ceased, and the associated water rights that are unused could be found to have been relinquished for lack of beneficial use if the rights were adjudicated. The relinquished water rights could be reallocated to sustain stream flows and support planned growth.

The range of estimates of available groundwater for appropriation varies from 930 AF from Carr to 12,895 AF from the GWMP. Relying on the Carr Report (at the low end of the range), there would be no groundwater available and the aquifer would be considered over-appropriated. This is based on total annual quantity of water use authorized in groundwater certificates and permits, which is 233% of the resource. Reliance on the VMI Groundwater Management Plan (at the high end of the range), would suggest that only 17% of the resource has been appropriated.

V. Managing VMI Water Resources for Sustainability

A. King County Groundwater Protection Program

In 2001, King County created a countywide Groundwater Protection Program (GWPP) to provide a wide range of groundwater protection services.[47] The program divides the County into five groundwater planning sub areas under the guidance of a local groundwater protection committee for each area. Services provided by the County include:

- Updating and implementing groundwater management plans in coordination with water purveyors, tribal nations, state and federal agencies subject to funding;
- Providing technical expertise in groundwater, including geology, hydrology, modeling and mapping to identify critical groundwater recharge areas;
- Managing data including collecting, monitoring, mapping, reviewing, and reporting data on groundwater in King County;
- Providing education and support for public groundwater protection efforts in the unincorporated areas where services are not provided by water purveyors;
- Developing and implementing comprehensive planning policies and development regulation to integrate groundwater protection into management of public health, hazardous waste, surface water, storm water and wastewater;

B. Vashon-Maury Island Groundwater Protection Committee

On Vashon-Maury Island, the GWPC, established in 2001 as part of the GWPP, guides County groundwater protection efforts on the Island. The GWPC members were selected to include representatives from a variety of sectors of the community.[48] The VMI GWPC meets four times each year. Subcommittees meet between full committee meetings to advance the committee's work program. Each member of the committee is expected to coordinate with the entity the member represents.

Responsibilities assigned to the GWPC by King County include:

1) Advise the County executive, council and other affected agencies on the GWPP and implementation of the certified groundwater management plan;
2) Participate in implementation, develop and recommend modifications, and monitor implementation of the groundwater management plan;
3) Coordinate community groundwater protection activities in conjunction with the county and other affected agencies, including public education, public involvement and stewardship activities;

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[47] The Groundwater Protection Program is governed by Metropolitan King County Code, Ch. 9.14 *available at* http://www.kingcounty.gov/council/legislation/~/media/Council/documents/Clerk/CodeFiles/12_Title_9.ashx . Additional information on the Program is available at http://www.kingcounty.gov/environment/waterandland/groundwater.aspx .

[48] The entire list of voting and non-voting members can be found on GWPP's website at http://www.kingcounty.gov/environment/waterandland/groundwater/committees.aspx .

4) Recommend amendments to the local comprehensive planning policies that relate to groundwater protection and provide advice on state groundwater regulation;
5) Recommend groundwater protection services tailored to the unique needs of the groundwater management area and policies;
6) Review the County's annual groundwater protection work plan and the three-year work plan that identifies long-term needs for regional groundwater protection services; and
7) Make recommendations on the distribution and use of aquifer protection funds.[49]

C. Vashon-Maury Island Watershed Plan

Starting in 2004, the GWPP worked with the GWPC to prepare a local Watershed Plan for the Island's portion of Washington State Water Resource Inventory Area 15. The principal reasons for preparing a watershed plan were uncertainty about the amount and availability of groundwater, a local trend showing increasing nitrates in some wells, potential for degradation of Island streams, and potential contamination of the sole source aquifer. The GWPC prepared the Watershed Plan pursuant to guidelines adopted under the 1998 Watershed Planning Act. The watershed plan is not mandatory and having the plan does not provide legal authority to regulate water resources. The plan, however, does constitute a recognized water resource management policy document that reflects Ecology's current policy and legal framework for managing surface and groundwater as a single, hydrological continuous natural resource.

Within the 2005 watershed plan, the GWPC provides extensive recommendations to protect and ensure the Island's water supply quantity and quality. The seven highest priority action items are as follows:

1) An ongoing Island-wide education program should be developed to inform Islanders about groundwater resources, how drinking water is supplied, water availability, and water quality issues. The education program should include alternative water supply choices such as water retention, rain water harvesting, use of gray water, deepening of wells, groundwater recharge, water rationing in emergencies, reclaimed water, and desalinization;
2) A representative sample of Vashon-Maury Island exempt wells should be monitored for water use and volunteers should be solicited to participate in this study;
3) An education program should be developed and implemented that informs exempt well owners of the risks of aquifer contamination, and actions they can take to minimize the risk of contamination of their wells;
4) King County should seek funding and work with the State agencies to encourage removal of old or failing residential fuel storage tanks;
5) King County should encourage the use of demonstrated new and alternative on-site septic treatment technologies on Vashon-Maury Island;

[49] METROPOLITAN KING COUNTY CODE § 9.14.100, *available at* http://www.kingcounty.gov/council/legislation/~/media/Council/documents/Clerk/CodeFiles/12_Title_9.ashx .

6) Continue to implement and seek funding to expand the Public Health-Seattle & King County septic education program to inform property owners about septic system failures and steps they may take to ensure effective maintenance and operation of their system; and
7) King County and the GWPC should collaborate to develop an education program on pesticide and fertilizer use.

The seven priority policies from the 2005 Watershed Plan were added to the King County Comprehensive Plan in 2008, along with two additional priorities added at the request of the GWPC. These additional priorities are:

- King County should work with the Vashon community to define specific actions to implement the stormwater recommendations in the 2005 Vashon-Maury Island Watershed Plan within available resources.
- King County should protect the quality and quantity of groundwater on Vashon-Maury Island by measuring, monitoring, and reporting information on groundwater quality and quantity to provide the information needed to manage groundwater resources.

As recommended in the Watershed Plan, the GWPC has taken the responsibility to review the Watershed Plan recommendations and established priorities for implementation every two years. The Committee's 2007-2009 priorities include education, conservation, and sustainability.

D. King County Comprehensive Plan

Local governments in Washington experiencing a certain level of growth are required under the state's Growth Management Act to develop and periodically update a comprehensive plan to assure the growth is accommodated while protecting natural resources. Local governments are obligated to implement their comprehensive plan with formal development regulations (zoning, subdivision, critical areas, etc.) and capital facilities plans. State agencies and special purpose districts are generally required to conduct their operations in conformance with adopted local comprehensive plans. The Comprehensive Plan for King County, most recently updated in 2008, contains extensive policy support for the protection of the County's groundwater resources.

For all of the rural area in King County, including VMI, the Comprehensive Plan calls for protection of groundwater resources as follows:

- Implement Critical Aquifer Recharge Areas;
- Incorporate groundwater quality/quantity into land use and water service decisions;
- Implement adopted groundwater management plans with partner agencies;
- Retain a high ratio of permeable to impermeable surface area in the rural area;
- Evaluate the likely effects of climate change on aquifer recharge and groundwater;
- Educate the public to protect groundwater;
- Promote low-impact development to infiltrate storm water runoff; and

- Develop best management practices to promote aquifer recharge.[50]

Vashon-Maury Island is unique within King County in that it is an island community dependent upon a designated sole-source aquifer for its water supply. Given that a primary source of drinking water is groundwater, a higher level of protection of groundwater recharge is warranted on Vashon-Maury Island than in the rest of King County. In the 2004 update to the Comprehensive Plan, King County defined and regulated Critical Aquifer Recharge Areas (CARA) throughout the rural areas of the county to protect groundwater used for water supply. As mentioned above, all of Vashon-Maury Island was designated as a CARA because it is a sole source island aquifer surrounded by saltwater.

The 2008 Comprehensive Plan also notes that land clearing and building activities can reduce groundwater recharge and calls for low-impact development (LID) to protect and enhance native vegetation and soils, reduce impervious surfaces, and manage storm water at the source. These techniques are well suited to development in rural-residential zones like VMI and can be an effective way to protect groundwater quality and recharge.

Unlike the Comprehensive Plan, which is mandatory, the Watershed Plan is optional and there is no mandate to implement its provisions. To ensure implementation of the Watershed Plan, key policies have been incorporated into the Comprehensive Plan. Groundwater protection policies adopted specifically for Vashon-Maury Island as part of Comprehensive Plan include:

- Protection of the groundwater aquifer is of primary importance to Vashon-Maury Island;
- Plan density so that demands on water resources do not exceed capacity to provide supply without deterioration of quality;
- Water quality degradation which would be injurious to existing or planned uses should not be allowed;
- Water resource areas highly susceptible to groundwater contamination and watersheds should be maintained in non-intensive uses at low densities;
- Public water systems on VMI shall assess the ability of water sources to serve growth. Expansion of the system should be prohibited if analysis shows risk to the adequacy of service including quality of water being provided to current users;
- Special consideration should be given to the impacts of new development on VMI's groundwater resources. This should apply to major developments, development in areas highly susceptible to contamination, or development near public water supplies;
- The quantity and quality of VMI's groundwater supply should be monitored, along with building permit and subdivision data, to determine if planned densities can be achieved. If new information indicates the groundwater supply is endangered, the County shall take immediate steps to ensure new development does not impair the groundwater supply; and
- Work with residential builders to encourage the use of low-impact development practices.

[50] *See* King County Comprehensive Plan, *supra* note 42, at 4-49-4-50.

E. Sustainable Water Resource Management Strategy

In 2008, the GWPC developed a working definition, goals, and indicators of sustainable water resources for the island. The definition, taken from the Watershed Plan, states that sustainable water use for the Island is the rate at which neither water quality nor available quantity is perceptibly diminished.[51]

In order to preserve the quality and quantity of Island water resources, the GWPC set the following sustainability goals.

- An "early warning system" of sustainability indicators should be developed to identify any decline in water quality and quantity since once a decline is identified it is very difficult to reverse;
- Water quality and quantity should be maintained at current levels without decline;
- Groundwater recharge should be protected and enhanced and the water supply should be used more efficiently;
- Water resource needs of all future inhabitants should not be compromised and both preventive and adaptive strategies should be used to maintain and enhance the integrity of the hydrologic system; and
- Best available science should be used in the water resource sustainability decision-making process.

The GWPC identified eleven indicators they will use to measure the status of Island water resources. The GWPC plans to use the sustainability indicators to measure progress in meeting the goals outlined above and implementing the Watershed Plan. The GWPC will assess the indicators and monitor changing water resource conditions to identify trends. The GWPC will identify specific strategies in response to observed trends to achieve the sustainability goals as needed.

Three indicators were selected to monitor the sustainability of water quality and determine if trends indicate the water quality is being maintained or improved. For groundwater the Group A and Group B water system wells, along with nineteen long-term monitoring wells used in the Water Resource Evaluation (WRE) for the VMI Groundwater Management Plan, will be monitored to determine if they meet or exceed drinking water quality standards. Surface water quality in the streams sampled in the WRE will be monitored to determine if it meets or exceeds surface water quality standards for the protection of aquatic life. For marine water quality, oxygen and bacteria in Quartermaster Harbor will be sampled and tested to determine if it meets surface water quality standards.

Three indicators were selected to monitor sustainability of water quantity and determine if trends indicate that water quality is being maintained or improved. For seasonal groundwater levels, ten King County monitoring wells used in the WRE and two private wells near the Glacier gravel mine, along with volunteer wells, will be monitored to determine if water levels are maintained or improved over time. Summer stream flows from

[51] VMI Watershed Plan, *supra* note 9, at Appendix B.

five stream gauges maintained by King County (Shinglemill, Judd, Tahlequah, Fisher, and Green Valley) and one stream gauge maintained by Water District 19 (Beal) will be monitored to see if flows are maintained at current levels or increased. Stream flashiness will also be measured to determine if it is maintained at current levels given the impacts associated with increased development and creation of impervious area.

Two indicators were selected to monitor sustainability of the ecosystem. Stream benthic macro invertebrate populations will be measured by conducting annual monitoring at eleven locations to calculate the Benthic Index of Biologic Integrity (BIBI) and track trends over time. Salmon populations in Island streams will be measured using data from the Salmon Watcher Program, which estimates the number of salmon returning to spawn on the Island.

Three indicators were selected to determine the sustainability of water use and management. Annual total Island-wide water consumption will be compared to total population to determine if the ratio of water use increases. The summer water use peaking factor (relative to winter use) will be monitored to determine if the summer peaking factor increases. Finally, the progress in implementing the Watershed Plan will be tracked to monitor implementation of GWPC priority items that are accomplished and total accomplishments since the plan was completed.

Should additional funding and/or data become available, the GWPC would like to monitor six additional indicators of sustainability including:

- Land cover to determine if it is being maintained in a manner that preserves a natural hydrologic cycle;
- Public attitudes and involvement to see if they demonstrate strong support for water resource stewardship;
- Aggressive implementation of LID techniques to protect groundwater recharge/quality and stream flows/water quality;
- Enhanced design, operation, and maintenance of on-site septic systems to protect ground and stream water quality;
- Reduction in the amount of pesticides applied to VMI landscapes to protect and enhance ground and stream water quality; and
- Stream basins are opened or closed to water allocations based on better understanding of surface water/groundwater interaction and sustainability.

Using the sustainability measures outlined above, the GWPC plans to continue efforts to implement the recommendations contained in the Watershed Plan. One of the first tasks will be to revise the scope of the ongoing monitoring under the WRE to compile, evaluate, review, and report the findings on sustainability indicators to the GWPC and other interested parties, including the general public, on an annual basis. The GWPC also plans to identify and evaluate hydrologic management and sustainability techniques being developed in other island communities for application on VMI.

A new sub-area model, "nested" within the Island-wide WRE model, could be prepared to assess the adequacy of the water supply to meet the projected water needed to serve the land uses identified by the Comprehensive Plan. Additional modeling could be very helpful

within selected sub-areas of Vashon-Maury Island including the Town Center area. Finally, the GWPC could evaluate the potential benefits or liabilities and feasibility of modifying the State Water Resource Inventory Area to create a separate designation for VMI. This could permit the VMI Watershed Plan to be adopted by the State and open new Watershed Plan implementation funding opportunities.

VI. Challenges

A. Models and Data

The models used by the VMI WRE are a great tool for assessing water resources, yet they have limitations. One of the limitations is the lack of available data. The lack of information on water use is a significant impediment to management of the finite water resources on Vashon-Maury Island. Many of the main water users on the Island have limited or no usage data. In particular, the modeled water usage data from the Group B Public Water Systems (PWS) withdrawals and exempt wells are based on assumptions about average water use.[52] Exempt well use data collected by the WRE to date has shown that average household water use can vary widely from a little as 30 to over 400 gpd. The state Department of Health (DOH) currently requires total source meters on all Group A System sources and also requires annual reporting of water use by customer category. New DOH water use efficiency requirements will require Group A systems to install meters on all customer services by 2017. Public Health-Seattle King County requires total source meters for all Group B systems, but does not generally receive, compile, or report the water used by them. Ecology has the authority to require meters on all exempt wells by rule but has not done so on the Island. Creating a uniform metering requirement to report the use of water from all water users on VMI, in combination with coordinated reporting requirements and enforcement, would allow better water management using existing modeling tools in combination with conservation, education, and outreach efforts.

Another challenge to the WRE modeling is that the Island's geology and aquifer system is much more complex than the model. This limitation affects the accuracy of the water resources assessment. The present Island-wide assessment is a good scale of assessment for determining an Island-wide water balance to use for modeling potential impacts of build-out under existing zoning and climate change. However, for smaller areas of concern like the water utilities with supply limitations, refining this data to greater detail becomes very important in creating a useful tool for managing the localized water resources.

B. Water Rights and Exceptions

Another significant challenge to managing water resources on the Island is the continued construction of exempt wells within the drainage basins of streams that are "closed" by state rules to further appropriations of water. The designation of a "closed" basin is based on the Washington Water Resources Act, which as mentioned previously, provides administrative rule authority to set minimum flows to ensure that stream flows are maintained for fish and other environmental values. The designation of a closed basin is

[52] VMI Phase I Modeling Report, *supra* note 12.

also based, in part, on estimates of how much water is being used within the basin boundaries.

The "closed" basin designation is not related to the sole source aquifer designation on VMI, as they were done by different agencies (Washington State Ecology and U.S. EPA, respectively) at different times and under different criteria. As discussed above, Ecology closed the major drainage basins on the Island by rule in 1951 (Judd Creek) and 1981 (Shinglemill and Fisher creeks). In 1994, the EPA designated the aquifer under VMI as a sole source aquifer under the federal Safe Drinking Water Act.

Once a basin has been closed, the ability of a public water system within the basin to get new and/or expanded water rights is quite limited. As a result, much of the demand for new development on the Island is being met with wells "exempt" from the requirement to obtain a water right. To date, the impact of "exempt" wells on availability of water within the closed streams or senior water rights has not been evaluated. On the Island, these wells continue to be installed and used for domestic water supply even within closed basins (see Figure 5).

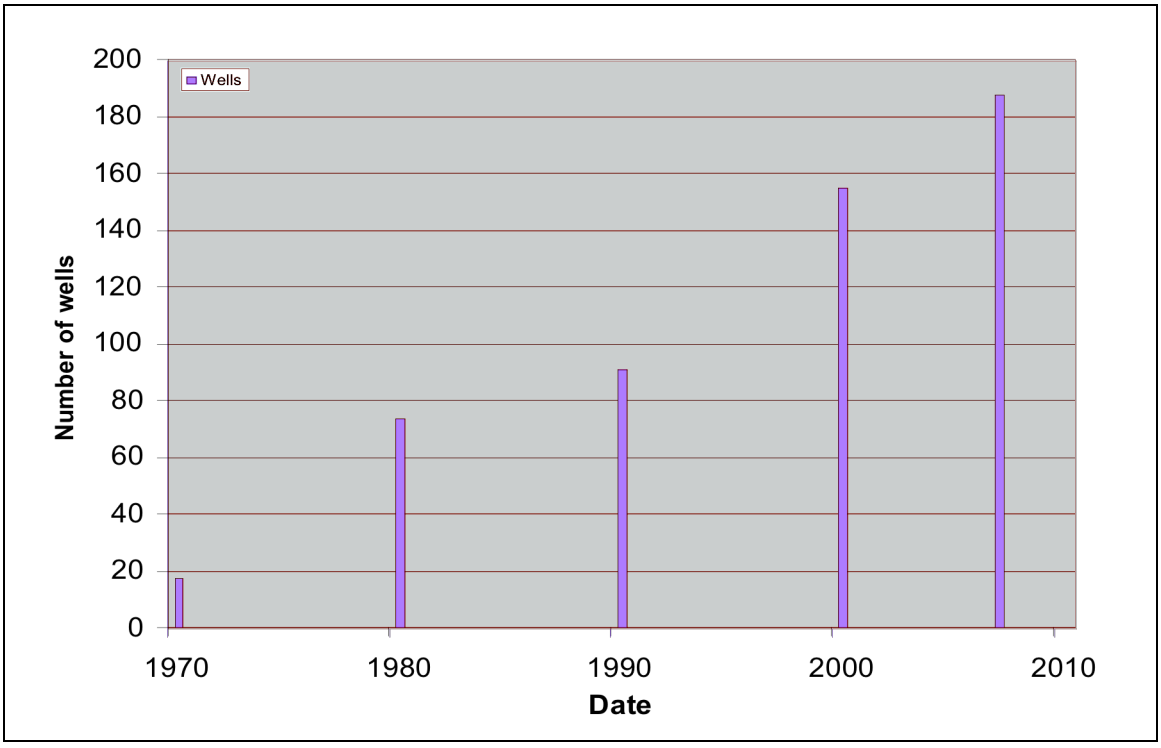

Fig. 5. Number of new water wells on Vashon-Maury Island by decade. The last year with available data is 2007. Each period is the total of wells drilled during the preceding ten years. For example, the figure for the year 2000 shows 155 wells drilled from 1991 to 2000. Reporting of wells did not start until mid-1970. Ecology estimates that up to 20% of wells drilled prior to 1990 are not reported.

On VMI, no new water rights have been issued by Ecology since 1990. As a result, water availability has become associated with the often contentious issue of new growth on the Island. Vashon-Maury Island is zoned "rural," which typically has 1 unit per 5 acres or 1

unit per 10 acres density limits. The King County Comprehensive plan for the Island has designated higher density areas within the Vashon Town Center.

The Town Center area is located in the Island's largest water system service area (Water District 19) to help focus growth. However this water system does not have any available water "shares" for new customers due to the limited success with production from new water supply projects developed under pre-existing water rights and the limitation on securing additional water rights within the closed basins of Shinglemill and Judd Creeks. Complicating the issue, Water District 19 has a conservative (high) water reliability factor to accommodate periods of peak demand during the summer and limited ability to implement aggressive water conservation or storage strategies.

At present, state and county policies continue to authorize new exempt wells as water supply for both new development and irrigation on VMI. Ecology allows the new wells through the groundwater right permit exemption under the Groundwater Code, and King County allows them through their determination that exempt wells constitute an adequate water supply under the Growth Management Act (GMA). To date neither agency has fully addressed the potential conflicts with new exempt wells being constructed within closed basins and/or existing water system service areas.

The GMA does require a local government to determine that there is an adequate supply of potable water before it can issue a new building permit or a subdivision approval. In response to the GMA, King County requires a Certificate of Water Availability (COWA) from a water service purveyor. This certificate demonstrates that the public water system has water available to serve the new connection or connections being proposed. If a water purveyor cannot serve the development in a timely or reasonable manner, then a commitment by the property owner to construct an exempt well, consistent with all applicable codes, is sufficient to allow the new development to proceed. Use of exempt wells has allowed continuing growth within closed basins and within water district service areas that have no available water shares on VMI. The full impact to VMI water resources from continued growth using exempt wells is not clearly understood due to the lack of water use data for such wells.

Ecology is the state agency responsible for administering the state's water rights and maintains a database of the recorded water rights for VMI. However, Ecology does not track current water use under those water rights, and thus does not know how much water is currently being used or whether the water being used by new exempt wells is affecting senior water rights. The lack of water use information highlights the need for better data collection, reporting, and, potentially, enforcement of water use limits. As noted in the discussion on water rights, where historic agricultural or commercial water uses on VMI have ceased and their associated water rights are unused, the rights could be relinquished for lack of beneficial use if the rights were adjudicated. The relinquished water rights could be reallocated to better sustain stream flows in the closed basins and support planned growth in the Vashon Town Center.

C. Laws, Plans, and Institutions

Getting large Group A water systems to implement a coordinated approach to provision of water service and to serve all new development within their service area is another challenge to effective water resource management on the Island. The seven largest Group A water systems on VMI, shown on Figure 2, formed a Water Utility Coordinating Committee and prepared the Vashon Coordinated Water System Plan (CWSP) in 1990.[53] The Vashon CWSP identified several objectives for the plan, including to:

- Coordinate water system development with land use plans/policies;
- Determine the most efficient means to provide adequate water service throughout the Critical Water Supply Service Area including direct service or satellite management of new small water systems; and
- Identify options for cooperative development of water facilities.

The CWSP is part of the County code and the King County Comprehensive Plan requires water service to be provided consistent with CWSP. Under the CWSP, water utilities have the authority to serve any new water use and manage any new small water system in their service area. On VMI, the larger water systems have agreed, in principle, that they have a duty to serve new development in their service area.

In practice there is limited authority for the County to mandate implementation of the CWSP, because the Washington State Department of Health, which regulates the Group A water systems included in the Plan, gives water utilities the discretion to:

- Set individual levels of reliability to meet peak water demand;
- Define individual conservation objectives and programs;
- Establish individual policies to guide provision of water service; and,
- Decide whether the water system will fund efforts to supply the water needs of new growth.

The water system discretionary factors outlined above in combination with limited availability to secure funding beyond water rates and facility connection charges, has resulted in incomplete implementation of the CWSP. Water system interties and joint supply projects are also possible under the CWSP; however few have occurred due to their high cost and limited benefit to the individual water systems. As a result, new growth continues to occur within the utility service areas using exempt wells without benefit of direct connection to the Group A water system or satellite management of the new exempt well.

In 2003, the Legislature passed the Municipal Water Law (MWL) with the intent to improve provision of water service and management of water resources. Key provisions of the MWL that may help address the water resource management challenges identified on VMI include the "duty to serve" new development when water can be provided in a "timely and reasonable" manner and the "duty to conserve" water along with the ability to fund conservation through revenue collection authority. The MWL also provided additional

[53] *See* Vashon Coordinated Water System Plan, *supra* note 39.

certainty for municipal water rights by clarifying that they can be used to provide water service to the entire service area designated in their water system plan provided it is approved by the DOH.

The full effect of the MWL is not clear at this time as water purveyors, regulators, and the courts are still working to fully define how the provisions of the law will be interpreted and implemented. In the process, some provisions of the law have been challenged as unconstitutional, and a case is currently pending in the Washington Supreme Court.[54] Ideally, the outcome will help facilitate the water service objectives first articulated in the CWSP, promote better conservation of the finite water resources on the Island, and potentially enable VMI water systems to define new water service areas that could allow movement of water from areas of surplus to areas of shortage on the Island.

D. State and Local Authority

The final challenge to effective management of water resources on VMI considered in this paper is effective coordination between the multiple state and local agencies charged with responsibility for provision of water service and management of water resources on VMI.

As noted previously, Ecology is the lead agency that deals with water rights and permits for construction of wells. DOH is the lead agency regulating Group A water systems and has signed joint plans of operation with local health jurisdictions to delegate responsibility to them for the smaller Group B water systems. Decisions on the adequacy of water supply for new development and approval of land use plans affecting water demand, as well as protecting critical water supply areas rests with local government (King County). Within King County, there are multiple departments and programs that manage water resources. These include Public Health Seattle-King County (drinking water, on-site sewage, hazardous waste), Department of Development and Environmental Services (comprehensive land use planning and development permitting), and Department of Natural Resources and Parks (water management policy, groundwater protection, and stormwater management).

The challenges associated with coordinating water resource policy, regulation and actions for the multiple agencies are not new nor are they unique to King County. While the coordination challenges for VMI are not unique, the finite water supply on the Island does present a unique challenge to meeting the sustainable water resource management objectives established by the GWPC.

VII. Sustainable Water Resource Management Opportunities

A. Sustainability Report Card

The GWPC sustainability indicators utilize data collected as part of the Water Resource Evaluation project. When the information is compiled, the GWPC plans to report the

[54] The Washington Supreme Court accepted direct review of *Lummi Nation v. State of Washington* in March 2009. Additional information on this challenge to the Municipal Water Law is available at http://www.ecy.wa.gov/programs/wr/rights/muni_wtr.html .

results in a sustainability report card. Similar to the federally mandated annual reports on drinking water quality published by each Group A water system, the sustainability report card will communicate a snapshot of current conditions and trends for each indicator. The report card format will allow the GWPC to concisely present its findings to the island residents, water purveyors, resource managers, and governing agencies.

Monitoring the sustainability indicators and evaluating observed trends can provide an opportunity to address any developing water resource issues, ideally before they become critical problems. The sustainability indicator monitoring/evaluation program is especially important to compliment and compensate for challenges facing the WRE modeling effort. The indicators will also be helpful to guide implementation priorities for the VMI Watershed Plan and inform decision-makers on the effects of water resource management policies relating to VMI in the Comprehensive Plan. Finally, the sustainability indicators can help guide the water system planning efforts of individual utilities, the Critical Water Supply Plan, and the state agencies that manage water resources on the Island. Working together through the GWPC to collect, evaluate, and develop planned responses offers the opportunity for all of these parties to coordinate their resource management efforts for the Island.

B. Conservation

The GWPC has selected conservation as one of three current priorities for implementation of the VMI Watershed Plan. The Committee recognizes that conservation efforts are a key sustainability management tool and must be based on an accurate understanding of water use. The Island has a population of about 10,100, an average household size of 2.4 persons, and a total of 4,867 residential units.[55] Public water systems serve over 90% of the population on Vashon, and there are an estimated 800 exempt wells on the Island.

Most of the public water systems have individual service meters and pay progressively higher rates for water used beyond base (non-irrigation) flows via an inverted pyramid rate structure. To a water system, conservation by customers in response to an inverted pyramid rate structure reduces the variable costs of supplying peak water demand, as opposed to the fixed costs of supplying baseflows. However, for most VMI water systems, fixed costs are high relative to variable costs. The primary opportunities for water conservation cost savings are in reduced energy costs to pump the water, reduced chemical treatment costs, and hard-to-quantify benefits like the reliability of water supply during a drought. Water conservation may also reduce certain fixed costs, by allowing pumps and some pipes to be downsized either upon their scheduled replacement or during system expansion.

Because the variable costs are relatively small, financial savings to a water utility from a water conservation program are likely to be small as well. A VMI water system may need to manage a water conservation program carefully to ensure that the costs of the program (both direct costs and reduced revenue from reduced sales) do not exceed the savings that can be realized through the program. Alternatively, water conservation costs could be rolled into the water rate base and considered as an essential strategy to meet demand for new

[55] U.S. Census Bureau 2000 Summary Population and Housing Characteristics, *supra* note 7.

service and improve system reliability. While it can be difficult for small VMI water systems to analyze these economic tradeoffs, the DOH does provide guidance on cost-effective water conservation measures for small systems.[56]

State statutes also require water utilities to consider using rates as a way of achieving conservation. The Municipal Water Law (MWL) passed in 2003 established new water use efficiency requirements for municipal water suppliers as small as fifteen connections (i.e., all Group A water systems) complementing prior authorization to fund conservation activities. This law may improve water conservation by requiring that goals and programs be established to overcome obstacles to pursuing conservation measures as a source of water for new supply and improved system reliability. However, the legal challenge to the MWL pending in *Lummi Nation* may limit its application to public water systems thereby excluding the privately owned utilities and associations from the mandate to conserve.

The GWPC's conservation work plan calls for collecting current water usage data from all public water systems and a sample of exempt well owners. The water use data is to be compared to the number of housing units to develop current averages for household water use. The seasonal difference in water use will be determined to identify winter or base water demand versus summer or irrigation water demand. To estimate potential savings for base water use, the age of Island housing units as reported in the Census will be compared to average water use efficiencies observed in similar-aged housing units for utilities that have prepared conservation assessments within the Puget Sound region. An estimate will be developed of the potential base water savings if existing island households were retrofitted with current water saving fixtures and appliances to provide an estimate of potential domestic water savings. There is potential for additional water conservation by reducing each household's demand for irrigation water. The Committee will assess the potential savings that could be generated by reducing irrigation water demand and apply the irrigation saving metric to existing and projected future water use. Compiling the estimate of potential water savings from increased conservation will allow the GWPC to evaluate the potential reduction that could be achieved in existing and future water demand through the implementation of higher conservation standards.

The conservation requirement mandated by the MWL for Group A water systems will provide a mandate to implement conservation for all Group A water systems on VMI subject to pending appeals. However, the mandate is only to adopt a utility-by-utility goal and program, which may or may not lead to consistency across the VMI. Basic conservation measures, such as metering and effectively reporting water use on the many Group B water systems and self-supplied individual systems on VMI, should be required through Ecology well drilling permits and the local public health drinking water program. Exempt wells for private users and small Group B water systems generally do not have individual service meters and pay only for the cost of water production so there is little incentive to reduce peak irrigation water demand. According to a recent analysis, residences on exempt wells tend to use more water than those on public service.[57] The Island volunteers who have allowed the WRE to install meters on their exempt wells have shown that awareness of water use brings about self-conservation. One of the volunteers participating in the

[56] VMI Watershed Plan, *supra* note 9.
[57] Seattle Public Utilities Consolidated Report on Water Supply in King County, *supra* note 17.

metering program on VMI saw that the large volume of water his household was using for irrigation correlated with the dramatic seasonal drop in the water level in their well and subsequently changed his irrigation practices to reduce the impact on the groundwater table.

C. Exempt Wells

The scientific understanding and legal recognition of hydraulic continuity between groundwater and surface water calls into question the continued development of permit exempt wells within basins closed to further appropriation of surface water. If the WRE modeling or sustainability indicator monitoring demonstrate that existing or potential future water use is unsustainable, then Ecology rulemaking authority could be used to limit or mitigate the impact of development utilizing new exempt wells. This step would increase protection for senior water rights including instream flows. Ecology has adopted administrative rules to manage or restrict use of exempt wells to protect instream flows and other senior water rights in a variety of locations around Washington State with varying results as explained below.[58] Ecology also has authority under Wash Rev. Code § 18.104 to restrict well drilling to ensure protection for areas needing intensive management. Alternatively, legislative changes to the exempt well statutory provisions may be warranted to address exempt wells issues on Vashon-Maury Island and statewide.

D. Exempt Well Legislation

Statewide, new legislation could be the most effective way to manage the continuing construction of permit exempt wells within areas closed to issuance of new water rights. Comprehensive exempt well legislation, which would have significantly modified existing provisions regarding exempt wells, was proposed, but not passed, by the legislature in its 2009 session.

Senate Bill 5888[59] would have made significant changes to the exempt well provisions to better address groundwater management. The proposed changes would have preserved the exemption from water right permit requirements *as long as the beneficial use or uses of the groundwaters do not individually or collectively exceed five thousand gallons a day* for the following purposes:

- A single domestic use or a group domestic use by six or fewer residences;
- Watering of a noncommercial lawn or garden not exceeding one-half acre in area;
- Stock watering use;
- Commercial irrigation not exceeding one-half acre in area; and
- Industrial or commercial use.

The legislation would have clarified that a permit exempt groundwater withdrawal may be supplied from more than one well, but all the wells combined may not exceed a total daily

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[58] *See* WASH. REV. CODE Ch. 90.03 and 90.44.

[59] S.B. 5888, 61st Legislature, Regular Session (Wash. 2009), *available at* http://apps.leg.wa.gov/documents/billdocs/2009-10/Pdf/Bills/Senate%20Bills/5888.pdf (last visited June 30, 2009).

withdrawal of 5,000 gpd. However, the proposed legislation made no provision to automatically limit the number of exemptions per aquifer based on calculated water availability.

Meter requirements would have been strengthened under the proposed legislation by requiring that *any* new permit exempt use *shall* be metered and records of the amounts withdrawn retained. Existing reporting requirements would have been explicitly integrated into the water right permit exemption. Implementing the metering and reporting provisions would have helped provide data needed for evaluation of VMI water resources, conservation awareness, and enforcement of exempt well water use limits if necessary.

The legislation would have prohibited new water right permit exempt withdrawals within the service area of a water system that has sufficient capacity to provide water under existing water rights, provided a purveyor determines that their system can provide water service on a timely and reasonable basis and is willing to provide the service. This provision would have helped address the continuing development of permit exempt wells inside Group A water system service areas on VMI.

The legislation would have clarified that permit exempt groundwater rights may be relinquished or abandoned through nonuse in the same manner as other water rights and that permit exempt groundwater rights are subject to regulation in favor of senior water rights in the same manner as any other water right on the basis of priority date. The legislation also would have clarified that the priority date for a water right established through the groundwater permit exemption is the date that water is first put to beneficial use for the exempt purpose in question versus the time the well is drilled.

The proposed legislation would have established a new definition of "stock watering use" to limit water use to providing water for domestic farm animals for drinking and for maintenance of animal health and welfare. The proposed definition would have clarified that stock watering does not include water used for irrigation of vegetation, production of products or dust control, all of which constitute industrial or commercial water uses under this section. The stock watering clause could be of importance on VMI should another significant livestock ranching operation start on the Island like the Misty Isle Farm.

Finally the law would have provided that by December 1, 2009, the State would identify, and rank in priority order, all areas of the state in which the metering of existing groundwater withdrawals, including permit exempt withdrawals, is needed to effectively manage the waters of the state and convey the information in a report to the legislature. The report was to include an estimate of the cost to the state to require such metering and to manage the resulting data and the cumulative cost to water right holders to implement comprehensive metering and reporting of groundwater in the highest priority areas. Metering existing groundwater withdrawals on the Island could be an effective way to provide data needed for VMI water resources evaluation, conservation awareness, and enforcement of exempt well water use limits if necessary.

While the new exempt well legislation outlined above did not pass in 2009, it does provide a comprehensive outline of the reforms needed to effectively manage exempt wells in Washington State and on VMI. While many of the proposed legislative provisions can be

implemented administratively by Ecology, it is time-consuming, expensive, and may ultimately prove to be ineffective to approach resource management at the state level on a case-by-case basis. As the GWPC evaluates the need for better control of exempt wells as part of their sustainability effort, the legislation proposed in 2009 could provide an outline of the measures need to effectively manage the impacts of exempt wells on Island water resources.

E. State Rulemaking Authority to Protect Surface and Groundwater

State administrative rules are another tool to achieve sustainable management of water resources on VMI. Ecology is charged with regulating the appropriation and beneficial use of surface and groundwater.[60] By law, Ecology has broad powers to manage water resources and adopt administrative rules. It is directed, as a matter of high priority, to ensure that the waters of the state are utilized for the best interests of the people. Ecology, whenever necessary to carry out this policy, may by rule:

- Reserve and set aside surface waters, and supporting groundwater for beneficial utilization in the future;
- Withdraw various surface waters and supporting groundwater from additional appropriations until sufficient information and data allow for the making of sound decisions;
- Limit withdrawals of groundwater so as to enforce the maintenance of a safe sustaining yield from the groundwater source and protect prior appropriation against subsequent appropriators from the same groundwater source so that any withdrawals by a subsequent appropriator of groundwater are limited to an amount that will maintain and provide a safe sustaining yield in the amount of the prior appropriation;
- Where the total available supply of groundwater is inadequate for the current needs of all holders of valid rights to withdraw public groundwater from a particular groundwater area, order the aggregate withdrawal from such area decreased so that it shall not exceed such available supply. Such decrease shall conform to the priority of the pertinent valid rights and shall prevail for the term of shortage in the available supply;
- Require as a condition of *all* surface water rights, metering of diversions, and reports regarding the amount of water being diverted and to require *new* withdrawals of groundwater to be metered and reported, as a condition for a new water right permit.

Ecology has increasingly been required to adopt administrative rules to protect groundwater in addition to surface water.[61] Examples of this trend that could be beneficial to VMI include a 2005 Entiat river basin instream flow rule that subjects all new well

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[60] *Id.*

[61] In the Entiat and Walla Walla River basins, rules were adopted to implement watershed plans developed under the Watershed Planning Act of 1998. In the Stillyguamish River basin a rule was adopted as a result of a legislative budget proviso. In the Methow River basin a rule was adopted as a result of the "Chelan" water agreement and a pilot project there. In the Kittitas and Johns Creek drainage basins rules were adopted in response to citizen petitions.

withdrawals (including exempt ones) to instream flows, but provides reservation for uses not subject to instream flows.

In 2008, in Johns Creek, the Squaxin Island Tribe petitioned Ecology for a rule to prohibit any future withdrawals from the basin. Although Ecology agreed with the Tribe's concerns that unchecked use of exempt wells for single homes and multi-home developments might reduce the amount of water flowing in Johns Creek, Ecology denied the petition. Ecology acknowledged that "exempt" wells can be drilled for domestic use without obtaining a water right but noted that state law limits withdrawal to no more than 5,000 gpd and the water can only be used to irrigate lawns and gardens up to one-half acre in size. Citing other steps that can be taken first before deciding to ban any future water withdrawals from the basin, Ecology outlined a process and commitments the agency is willing to undertake to address the Tribe's underlying concerns including:

- Working with local government and the Tribe to find funding for a groundwater study of the area;
- Signing a Memorandum of Understanding with Mason County to reinforce the county's preliminary water conservation approaches, such as low-impact development standards, water conservation, and in-house use for future residential housing;
- Clarifying to the county the state's role and position in making water availability determinations; and
- Looking to increase flows in Johns Creek, when a regional water supply extends to the Johns Creek area.

Unlike the rules on VMI that focused only on protecting instream flows, these rules limit groundwater withdrawals. While the rules impose limitations on permit exempt wells, they offer little assurance or mechanisms for compliance.

F. Growth Management Strategies

Under the Growth Management Act (GMA), groundwater resources are to be protected as "critical areas," and the "best available science" is to be used to develop policies and regulations to protect the functions and values of critical areas. The land use element of the King County Comprehensive Plan must protect the quality and quantity of groundwater used for public water supplies and must provide long-term protection of surface water.[62] If the WRE modeling results or sustainability monitoring demonstrates that more needs to be done to provide long-term protection of groundwater resources, the GMA provides a variety of tools.

Given that the surface water baseflows on the Island are dependent on groundwater and that together surface and groundwater is the only source of drinking water, a higher level of protection for the groundwater recharge areas is warranted on Vashon-Maury Island. The current zoning designations on the Island would allow an estimated 50% increase in

[62] King County 2008 Comprehensive Plan Update, *supra* note 42.

population at build-out according to one scenario.[63] The GWPC will be able to use the new information developed by the WRE modeling and the sustainability indicator monitoring to better evaluate sustainability of planned densities under the existing comprehensive plan and zoning. If necessary, the zoning could be modified to lower total zoning build-out to a level that would sustain existing development and water dependent resources.

The role of the GMA comprehensive plan in protecting water resources was further strengthened by passage of the Municipal Water Law (MWL) in 2003. Under the MWL, the water system plans of municipal water suppliers are required to be consistent with the GMA comprehensive plans. The MWL also set forth a general duty to provide retail water service within the water systems' service area. These efforts were designed to ensure that municipal water systems would deliver future water service consistent with the provisions of the local comprehensive plan. To date, implementation of these provisions has proved challenging in King County and other counties. Administrative rules to implement this provision were not available until the end of 2007. The "elements" of consistency specified in the rule were limited to the same four items that have been in the DOH planning guidance for over fifteen years, with DOH giving itself the authority to determine which, if any, other elements of a local government comprehensive plan must be consistent with the water system plan. DOH is now working to develop a guidance document to further delineate what it believes "consistency" means. King County has been in discussions with DOH since the enactment of the MWL and does not agree with some aspects of the DOH interpretation of consistency with the King County Comprehensive Plan.

Under the GMA, local governments could limit the number, location, and allowed use of permit exempt wells to serve new development, especially within stream basins already closed to further withdrawals or in areas subject to contamination such as from saltwater intrusion, by not allowing their use as water supply for new development. While exempt well regulation is typically left to Ecology as part of their water resource management responsibilities, it is possible for the County to control exempt wells used to serve development, but not irrigation, based on land use and public health laws. To date King County has limited the use of exempt wells for subdivisions to not more than six lots on one exemption. The County imposed this limit to hold projected water demand to the 5,000 gpd limit for exempt wells. The County has also established a clear preference for water service to come first from existing Group A water systems, then from existing Group B systems and finally from individual exempt wells. The County's actions are limiting the rate of development of new exempt wells.

G. Low-impact Development

Land clearing and building activities can reduce groundwater recharge. Low-impact development (LID) that protects and enhances native vegetation and soils, reduces impervious surface areas, and manages stormwater at the source can protect and enhance groundwater recharge. These techniques are well-suited to development in rural-residential areas, and can be an effective way to protect groundwater quality and quantity on VMI.

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[63] Bob Powell, Vashon-Maury Island Growth Projections – Assessment of King County Data (2007) *available at* http://dogpatch.com/kcprop/ (last visited July 1, 2009).

Ecology's Phase II stormwater rules now applicable to King County have been modified under appeal before the Washington Pollution Control Hearing Board to require use of LID for new development when "feasible." As the "feasible" circumstances for implementation of LID becomes better defined it should help to protect the groundwater on VMI. As experience with LID increases, there will be increasing opportunity to retrofit existing drainage systems. Retrofit is the key to improving aquifer recharge quantity and quality for the areas of VMI that are already developed.

Landscape level storm water infiltration projects offer a broader strategy to improve aquifer recharge quantity and quality. VMI areas with high recharge potential have been identified through the King County Critical Aquifer Recharge Area delineation process and the Vashon Water Resources Study. Redirecting storm water runoff to the recharge areas and making provisions to infiltrate the water is a sustainable strategy to enhance water resources on VMI.

Conceptual designs and cost estimates for landscape-scale facilities to capture and infiltrate stormwater runoff would need to be developed. The potential benefit to the aquifer from broad-scale capture and infiltration of the stormwater runoff could then be modeled. Cost-effectiveness of the modeled aquifer recharge enhancements could be calculated based on their estimated potential to enhance stream flows and water supplies. Finally, the GWPC could develop recommendations for implementation of the preferred cost-effective aquifer recharge enhancement strategies.

Ensuring compatible land use designations for areas with high recharge potential provides another opportunity to enhance groundwater recharge. If warranted, the comprehensive plan and zoning could be revised to limit incompatible densities to sustain the quantities of aquifer recharge. Modifying the storm water drainage codes to require retention of storm water in high recharge areas could further help maintain aquifer recharge.

H. Rainwater Harvesting

Currently, Washington requires a water right to harvest rainwater. The state has allowed "de minimus" usage without requiring the user to obtain water rights; however, an exact amount considered "de minimus" has not been defined. Ecology is considering an administrative rule to exempt small amounts of rainwater harvest from the water rights process. In order to harvest enough rainwater to create a meaningful water supply alternative on VMI, a water right would be necessary. Rainwater harvesting typically consists of collecting runoff from a roof and storing the water for later potable or nonpotable use. While rainwater harvest is not generally considered to be cost-effective for water supply, compared to drilling an exempt well on VMI today, it is being used on other islands in Washington, such as the San Juan Islands. To date, Ecology has issued two general permits for rainwater harvesting, one to the City of Seattle and the other to San Juan County. A VMI rainwater harvest water right application would need to be designed to evaluate the four criteria required to be met under Washington state law before a water permit may be issued: beneficial use (not wasteful), water availablity; no impairment to existing rights; and not detrimental to the public interest (discussed above).

From a water cycle perspective, harvesting and using rainwater that would otherwise run off the Island as storm water would keep more water on the Island. This means that less water in the ground and streams would be withdrawn or diverted for consumption and could be retained to recharge the aquifer and maintain natural stream flows.

Using rainwater harvest as a supplemental water supply to flush toilets, especially on lots with on-site septic systems, would provide additional benefits. The used rainwater is returned directly to the ground via the septic system. This approach significantly improves the groundwater benefits of rainwater harvest by providing enhanced recharge in addition to reduced groundwater withdrawal. In addition, "grey water" from sinks and bathing facilities could also be captured to augment the rainwater harvested for toilet flushing.

I. Adjudication

Another tool to sustain water resources on VMI is to adjudicate the existing water rights. As noted in the earlier review of existing water rights, there are a few sizable historic water rights that may no longer be in use which if relinquished could reduce the "permitted" demand for water. Adjudication would allow a state court to determine who has a valid water right, how much water can be used, and who has priority to use the water during water shortages. A general adjudication under existing rules would be prohibitively costly and time-consuming so it is very unlikely this approach would be use on the Island. Ecology passed new legislation in 2009 to update and streamline the adjudication process. The new legislation may reduce the cost and time, making adjudication more practical in the future. In the interim, limited enforcement of the provisions relating to relinquishment for the inactive historic water rights could help clarify actual "permitted" water use on the Island.

VIII. Desired Outcomes

As the Committee develops long-term strategies to sustain the Island's water resources, they will need to effectively coordinate their actions through the multiple agencies with implementation authority. The Carr Report prepared in 1983 included a recommendation to have one lead agency coordinate all aspects of water resources of VMI. While creating one agency is unlikely to happen given the underlying state enabling legislation, greater coordination between agencies/program could help.

The GWPC membership charter includes representatives from some of the government agencies charged with responsibility for water resource management along with utilities and water user interest groups. Expanding the committee to include representation from all of the government agencies responsible for water resource management on VMI might provide better coordination. Giving the GWPC a more direct role in oversight of key water policy and regulatory decisions affecting VMI could move closer to the one lead agency for water resource management envisioned in the Carr Report.

Having multiple agencies speak with "One Government Voice" is not a new idea in Washington State.[64] Ecology and thirteen other state agencies have agreed on roles and

[64] Memorandum of Understanding for the Coordinated Implementation of Chapter 247, Laws of 1998: Watershed Management (Engrossed Substitute House Bill 2514), and Chapter 246, Laws of

responsibilities to coordinate the watershed planning process. Settlement of a recent federal court case in Washington State included establishment of a shared responsibility for management of groundwater resources between the state and tribe in a manner similar to the way Ecology manages a surface watershed under its Water Resource Inventory program.[65] The GWPC and WRE could be expanded into a "pilot coordination project" with the Committee composed of representatives from all water resource agencies and stakeholders charged with coordinating the water resource management actions by partner agencies to achieve long-term water resource sustainability on VMI.

Implementing the Committee's long-term strategies to sustain the Island's water resources may require additional financial resources. Two possible funding mechanisms currently available under state law include adopting a groundwater protection fee via the Board of Health or forming an Aquifer Protection Area. The Groundwater Protection Program conducted an extensive analysis of the county-wide groundwater protection needs and the available funding options in their 2005 report to the King County Council and Seattle King County Board of Health.[66]

Managing the water resources on VMI to ensure they are sustained long-term will be an ongoing challenge for Island residents and government agencies. Population growth and climate change will create new challenges to the protection of water quality and quantity. The new challenges will create new opportunities for creative solutions and coordinated management to sustain the VMI water resources. Existing programs and laws provide most of the tools necessary to meet the future water resource management challenges. The GWPCs working with stakeholders, King County, and state agencies, has already completed many important studies and actions to protect and manage VMI water resources. By continuing to work together in a coordinated and cooperative manner all of the stakeholders will ensure that water resources on VMI is sustained long-term.

1998: Salmon Recovery Planning (Engrossed Substitute House Bill 2496) By the Participating Agencies Of the State of Washington, *available at* http://www.ecy.wa.gov/watershed/misc/MOU.html.

[65] Jeff Kray, *Washington Enters First Tribal-State-Federal Water Rights Settlement*, Marten Law Grounp Environmental News, Jan. 23, 2008, http://www.martenlaw.com/news/?20080123-water-rights-settlement (last visited June 30, 2009).

[66] KING COUNTY DEPARTMENT OF NATURAL RESOURCES AND PARKS, GROUNDWATER PROTECTION SERVICES AND FUNDING: 2005 REPORT TO KING COUNTY COUNCIL AND SEATTLE-KING COUNTY BOARD OF HEALTH, *available at* http://www.kingcounty.gov/environment/waterandland/groundwater/maps-reports/2005-protection-report.aspx (last visited June 30, 2009).