

RESIDENTIAL WORKING GROUP REPORT

FINAL REVIEW DRAFT

Southern Willamette Valley Groundwater Management Area

Prepared by OSU Extension Service Well Water Program
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Executive Summary

The Residential Working Group is one of four groups formed by the Southern Willamette Valley Groundwater Management Area (GWMA) Committee to assist in the development of a DEQ-approved action plan to reduce nitrate in the region's groundwater. This report presents strategies to reduce nitrate that might be coming from residential areas. The main areas of focus are lawn and garden activities, septic systems, and wells.

There are an estimated 19,300 people living within the GWMA. The 11,900 residents living in the communities of Harrisburg, Junction City and Monroe, as well as parts of Corvallis, are connected to public water and sewer systems. The 1,070 residents of Coburg are served by a public water system, but waste water is treated by individual septic systems. The remainder of the GWMA residents live in unincorporated areas on just over 2000 different parcels, most of which have septic systems and private wells. Education and outreach are the primary methods proposed to increase residents' awareness of the importance of the groundwater resource and provide information to help prevent contamination. The Working Group recommends that these efforts focus on higher risk areas. In addition, it is recommended that adequate technical support be provided to local governments that may choose to implement regulatory strategies. Finally, the Working Group has proposed specific strategies and actions beyond what can be accomplished by outreach and education alone to help reduce nitrate reaching groundwater from wells and septic systems,. Strategies and actions are recommended to overcome the financial barriers that residents face in implementing changes that could help protect the groundwater resource.

This report contains the following goals and supporting strategies to reduce residential sources of nitrate:

Goal 1 Recognition by residents throughout the region that groundwater is a valuable and vulnerable resource

Strategy 1: Launch Southern Willamette Valley GWMA public information campaign

Strategy 2: Offer groundwater educational programs to residents in Lane, Linn and Benton counties, focusing on GWMA communities

Strategy 3: Extend K-12 groundwater education and outreach programs

Strategy 4: Provide information on groundwater-friendly lawn and garden products and practices.

Goal 2 Focused outreach that addresses specific risks

Strategy 1: Establish a volunteer well monitoring network that incorporates neighbor-to-neighbor outreach.

Strategy 2: Establish a site-visit program to assist residents in assessing potential risks to groundwater.

Goal 3 Technical support for local governing bodies

Strategy 1: Offer educational support to elected officials, city and county staff, and citizens' advisory groups about the GWMA and associated issues.

Strategy 2: In partnership with representatives of local governing entities, develop a GWMA Planning Kit, containing sample language and supporting materials for zoning and other policy changes which, if implemented, could decrease the contribution of nitrate to groundwater.

Goal 4 Reduced nitrate contribution from septic systems to groundwater

Strategy 1: Ensure that site-suitable waste water treatment technologies can be used to reduce nitrate.

Strategy 2: Provide financial incentives to encourage the use of technologies that reduce nitrate contributions from septic systems to groundwater.

Goal 5 Reduced potential for wells to serve as conduits for nitrate to groundwater

Strategy 1: Focus on wells that might be conduits for nitrate to groundwater, raising landowner awareness of the risks and assisting them in resolving any issues.

Strategy 2: Provide assistance to help well owners overcome financial barriers.

Introduction

The Southern Willamette Valley Groundwater Management Area was designated by the Oregon Department of Environmental Quality (DEQ) on May 10, 2004. Studies conducted by DEQ and others over the past 20 years indicate that groundwater nitrate exceeds 7 parts per million (ppm) over widespread areas of the Southern Willamette Valley (DEQ, 2004; Hinkle, 1997). In order to protect the groundwater resource, the DEQ is authorized to declare a Groundwater Management Area (GWMA) in regions where nitrate levels exceed 7 ppm and are associated with non-point sources of contamination (ORS 468B.180). The term *non-point source* refers to pollution that is not associated with an identifiable point of discharge.

Residents living in cities within the GWMA, including Coburg, Junction City, Harrisburg, and Monroe, obtain their drinking water from public water system wells. There are also several small public water system wells that serve GWMA residents living outside of municipal areas. Public water systems must adhere to specific EPA drinking water standards for nitrate and other contaminants. The EPA drinking water standard for nitrate is 10 ppm. Public water systems are required to monitor water quality on a regular basis, report their results, and apply treatment when necessary. The declaration of a GWMA when nitrate levels reach 7 ppm promotes protective action *before* the groundwater supply reaches a level that would require public water systems to implement expensive treatment measures or locate another water source.

Virtually all residents living within the GWMA who are not served by a public water system use groundwater from household wells. Owners of individual household wells are not required to monitor regularly or adhere to drinking water standards. Many residents are unaware of their drinking water quality, the connection between land use practices and groundwater pollution, and the health implications of specific contaminants.

Nitrate contributions to Willamette Valley groundwater may be originating from a variety of sources, including septic systems, chemical fertilizer, and animal waste. These are non-point sources of contamination, and are, therefore, difficult to quantify or to manage.

In a study using isotopes of nitrogen and oxygen, Vick (2004) attempted to identify the source(s) of the nitrate in samples collected from wells in the Southern Willamette Valley. By examining ratios of the different isotopes, one can determine if the nitrate originated from modern plants and animals (manure, septic system effluent, plant processing waste, dead animals, decaying leaves) or ancient sources (chemical fertilizers derived from petroleum). The isotopic analysis concluded that the nitrate found in most Southern Willamette Valley wells most

likely originates from both modern and ancient sources. Land-use observations in the vicinity of the wells indicate that the nitrate most likely originated from agricultural use of chemical fertilizer and residential septic systems.

The Groundwater Management Area Committee (GWMA Committee) was appointed by the DEQ to provide guidance in the development of an Action Plan to reduce nitrate in the groundwater of the Southern Willamette Valley. The GWMA Committee represents the diverse land uses and stakeholder interests within the GWMA. The Residential Working Group is one of four groups established to research and develop recommendations and then report back to the GWMA Committee. Recommendations from the working groups will be used to develop the GWMA Action Plan.

The purpose of this document is to recommend strategies to reduce the contribution of nitrate from residential sources with the goal of reducing the overall level of nitrate in the groundwater of the Southern Willamette Valley.

Description of Problem

The principle residential structures or activities that may contribute nitrate to groundwater include septic systems, lawn and garden practices, and wells that are unused or in poor condition. Maps in the Appendices illustrate the geographic distribution of factors that may influence the contribution of nitrate from residential sources within the GWMA. The strategies and actions presented in this report focus on reduction of nitrate from these specific areas. Animal waste is not included because the issue of small-scale animal operations, such as horses or goats on a few acres, is already being addressed by the Agricultural Working Group. Pet waste, while a potential contributor of fecal bacteria to surface water, is not addressed in this report because multiple water quality experts agree that it does not have an impact on groundwater nitrate. In addition to recommendations *to reduce the contribution from residential sources* of nitrate to groundwater, this report recommends actions *to reduce the risks to residents* from nitrate in groundwater.

Septic Systems

Standard septic systems, even those functioning properly, release nitrate-rich water from the drainfield. If not adequately treated by soil or diluted, this effluent can increase groundwater nitrate concentrations. While values vary, 60 ppm is a commonly cited estimate for the concentration of nitrate in the water leaving a drainfield. A large number of septic systems in

close proximity may introduce more nitrate-rich water than can be diluted by the underlying groundwater, and thus contribute to increased groundwater nitrate levels.

Some residents have been required to install sand-filters to provide additional treatment of the water leaving the septic tank before it reaches the drainfield. Sand-filters have been quite successful at removing bacteria from the waste water, but less so for nitrate. While results vary, sand-filters generally do not reduce the nitrate concentration by more than half.

There are new waste water treatment technologies that can substantially reduce nitrate levels. These new technologies appear to allow for individual household wastewater treatment systems that introduce almost no nitrate to the groundwater.

Information on the number of septic systems within the GWMA is presented in Table 1.

Wells

Oregon Water Resources Department (OWRD) Minimum Well Construction Standards prevent surface water from reaching groundwater by way of the well hole. However, wells that may have been improperly constructed, damaged or altered, or are no longer in use may provide a pathway for nitrate and other surface contaminants to enter groundwater. The presence of coliform bacteria in a water sample may indicate a problem that could allow nitrate to move down the well to groundwater.

Settlement in the Southern Willamette Valley began over 150 years ago. There are many Century Farms where a family has lived on the same property for over 100 years. At the time these homesteads were developed, the shallow groundwater was easily accessible to settlers who dug wells by hand. Some of these wells are still being used and others exist as holes in the ground that allow surface water to drain to groundwater.

Another common method of accessing the shallow groundwater is to drive a well. Driven wells, sometimes referred to as sand-point wells, typically consist of a pipe, two inches or less in diameter, pounded into the earth until groundwater is encountered. Driven wells provided an easy access to water; in most cases, these wells were not installed by an Oregon licensed well contractor and do not have a well construction record (“Well Log”) on file. Despite being illegal, the practice of driving your own well still occurs in the Southern Willamette Valley.

TABLE 1. Septic Systems Within the GWMA.

Based on data from county Environmental Health records compiled by OSU Well Water Program Staff for this report.

SEPTIC RECORD SUMMARY	Benton County GWMA	Lane County GWMA	Linn County GWMA	GWMA total
Residential parcels	1903	3426	479	5808
Rural residential parcels *	533	1492	341	2366
Septic permits on file ‡	128	592	153	875
New permitted installations	74	355	unknown	unknown
Sand filters installed †	2	18	unknown	unknown
Rural residential lots for which septic permits have not been identified	405	900	188	1491

* defined as lots outside of city limits, as well as lots within Coburg city limits

‡ defined as permits issued since 1974 for new installations, repairs or alterations

† as part of a new installation, a repair, or an alteration

TABLE 2. Wells Within the GWMA.

Based on data from Oregon Water Resource Department Well Log records compiled by OSU Well Water Program Staff for this report.

WELL RECORD SUMMARY	Benton County GWMA	Lane County GWMA	Linn County GWMA	GWMA total
Residential lots	1903	3426	479	5808
Rural residential lots *	533	1181	341	2055
Well log records	525	1143	395	2063
Construction methods as recorded in well logs:				
Drilled	486	931	388	1805
Driven	18	182	4	204
Unknown	21	30	3	54
Well depths as recorded in well logs:				
Shallower than 25 feet	15	116	3	134
25 - 50 feet	271	562	229	1062
50 - 75 feet	139	246	124	509
75 - 100 feet	20	81	21	122
Deeper than 100 feet	70	104	14	188
Unknown	10	34	4	48

* defined as lots outside of city limits

Drilled wells are typically deeper than hand-dug or driven wells, and if properly constructed, do not allow surface water to migrate down the well hole. Unfortunately, not all wells have been drilled according to OWRD standards, and even those that were may have degraded with time.

Through the years, many residents have upgraded their water systems by drilling a new well. The old well, whether hand-dug, driven or drilled, may serve as direct conduit for contaminated surface water to reach the groundwater. It is difficult to estimate the number of unused wells that have not been *properly* decommissioned, but given the length of time since initial settlement in the area, the self-sufficient nature of many farm families, and the cost associated with hiring a well contractor to abandon a well according to OWRD standards, there is likely a significant number of unused wells that may be serving as pathways for nitrate to reach groundwater.

Information on the depths and types of wells within the GWMA is presented in Table 2.

Lawn and Garden Activities

In areas with well-drained soils, the nitrogen in fertilizer intended to produce a lush lawn, abundant vegetable garden, or showcase flower displays may end up as nitrate in groundwater. Regardless of the form of nitrogen applied, it is eventually converted in the soil to nitrate—the form of nitrogen taken up by most plant roots. Nitrate in soil water solution is readily taken up by actively growing plants; if plants are not actively growing, nitrate dissolved in soil water percolates down to groundwater. Ideally, nitrogen in the form of nitrate would be available in the right amount and at the right time for optimal plant growth, but this is very difficult to achieve. Homeowners can see the effect of inadequate nitrate—yellowing leaves and stunted growth. The effect of excess nitrate—nitrate moving downward to contaminate the groundwater—is hidden from view.

There are a number of steps gardeners can take to help keep nitrate from moving to groundwater:

- Follow the label on fertilizer products and measure the area to be fertilized and the amount of product to be applied.
- Use slow-release nitrogen fertilizers and organic forms of nitrogen which will provide small doses of nitrate over an extended time.
- Fertilize less with each application and only add the additional amount if it is needed.

- Use drip-irrigation and other water management techniques to greatly reduce the likelihood of washing the nitrate below the rooting zone.
- Avoid adding nitrogen, especially in the form of nitrate, when plants are not actively growing.
- Conserve the nitrogen that is already in the lawn and garden by activities such as using a mulching mower, adding organic matter to bare soil to bind nitrate, and tilling cover crops.

Many home gardeners are unaware of the connection between landscape activities and the groundwater that is supplying their drinking water. Whether the avid home gardener lives in town with water supplied by a public drinking water system, or with the garden and household well in close proximity, there are opportunities to reduce nitrate contributions to groundwater through improved home lawn and garden practices.

Health Risks

The issue of health risks associated with nitrate in drinking water is not a simple one. As nitrate cannot be tasted, seen or smelled, many people are unaware of their potential nitrate exposure. The only way to determine drinking water exposure is to test the water supply. While public water systems are tested regularly, individual well owners are often unaware of need to test their well water.

Homeowners may not be testing their well water for nitrate for a number of reasons, including:

- Lack of information about when or how to test the water
- Perception that testing is not worth the time or money
- Misconception that taste and appearance are indicators of water quality
- Anxiety over possible results

Public health officials have been concerned for over 50 years about a connection between high levels of nitrate in drinking water and methemoglobinemia, also known as blue-baby syndrome. At pre-natal visits, health care professionals routinely recommend that well water be tested for nitrate. The EPA standard for public drinking water was set at 10 ppm to protect the susceptible infant population. Recent studies reveal that there isn't a simple cause and effect relationship between nitrate and methemoglobinemia, and indicate a need to better understand the various contributing factors in addition to nitrate (Fewtrell 2004).

Until recently, it was widely believed that nitrate was only a concern for households with infants. In the past ten years, toxicology and public health research have suggested that adults may develop other illnesses as a result of consuming high levels of nitrate. Findings have been mixed, and as a result the medical community has not conclusively drawn a link between the level of exposure and the onset of adverse health conditions. These ambiguous results complicate clear risk communication and limit the ability of residents to interpret risk and take appropriate action. Helping individuals to understand the risks and determine how best to respond presents a significant, but necessary, challenge (Ward et al. 2005).

Two studies conducted by OSU graduate students provide some insight into levels of concern area residents have about nitrate in their drinking water:

Residents of the Southern Willamette Valley have not reported a high degree of concern over the safety of drinking water from local groundwater. In a study that surveyed a random sample from the 500 residences that had wells tested by DEQ in 2000-2001, residents generally described the quality of groundwater as good, and their perception of drinking water quality was not associated with actual nitrate levels. In the same study, no correlation was found between the use of home water treatment devices and well water nitrate levels (Kite-Powell 2003).

In a cultural anthropology study based on in-depth interviews with eight growers residing in the GWMA, residents generally did not believe that their well water had a problem and indicated that they were not overly concerned about nitrate related health risks. Of the residents interviewed, two households had taken steps to address a nitrate issue by either switching to bottled water or drilling a new well, and felt that the issue of nitrate in groundwater was no longer a concern to them (Rolston 2005).

These studies reveal that many residents appear to lack some of the information that would allow them to make a more considered decision about their drinking water. Professionals in the region have expressed concerns that improved risk communication may be needed for the residents living in areas known to have high nitrate levels.

Nitrate levels can vary greatly in a particular well over the course of a year, which further complicates risk communication. Mutti and Haggerty (2005) monitored 19 wells monthly for 15 months and found considerable variation in the time of year when well water had the highest nitrate concentration. Because of this, it is very possible that a well water nitrate test is not providing an accurate indication of the actual exposure to nitrate throughout the year.

People who are concerned about health risks caused by drinking water containing nitrate may pursue several different courses of action. Drilling a deeper well may allow residents to find a source of groundwater with lower nitrate levels but may be impractical based on local geology and high mineral content of deeper water. If construction standards are the cause of elevated nitrate levels, then drilling a new well or repairing the old well may improve water quality. Some households may choose to discontinue use of well water for drinking purposes in favor of a bottled water supply. Water treatment may also decrease nitrate exposure when an appropriate system is installed and maintained properly.

Process and Stakeholder Participation

Residential Working Group Contributors

The Residential Working Group is one of four working groups assisting the GWMA Committee in forming strategy recommendations for the Action Plan. The staff of the OSU Extension Well Water Program was charged with gathering stakeholder input and technical guidance to develop a report on recommended strategies to address nitrate reduction from residential sources. Three members of the GWMA Advisory Committee were assigned to the Residential Working Group, and others from the Committee others offered their input as well.

There are many state and county agencies whose work is related, at least in part, to the issue of nitrate in groundwater. Staff from these agencies offered technical assistance and guidance regarding the responsibilities of their agencies. These agencies include:

- Benton County Environmental Health Department
- Benton County Planning Department
- Lane County Environmental Health
- Lane County Planning Department
- Lane Council of Governments
- Linn County Environmental Health
- Linn County Planning Department
- Linn County Affordable Housing
- Oregon Department of Environmental Quality
- Oregon Department of Human Services Drinking Water Program
- Oregon Water Resources Department

Over 40 individuals, including residents and other interested parties not associated with the agencies listed above, subscribed to the Residential Working Group list serve and had an opportunity to offer input throughout the process.

The Residential Working Group met five times between October 2005 and March 2006. The initial meeting was scheduled for June 2005, but requests were made that no meetings be held in the summer because there were too many conflicts that would limit participation. Notes and lists of attendees for each of the meetings are posted on the web at: <http://groundwater.oregonstate.edu/willamette/residential.htm>.

Attendance at most meetings consisted of working group staff, GWMA Committee representatives, and agency personal.

Issues Addressed in Report

The GWMA Committee directive for this report is to address *solely* the issue of *reducing the level of nitrate in groundwater*. Strategies to reduce other contaminants were not to be included and no other objectives were to be incorporated. While encouraging compliance with a particular regulation or promoting a generally accepted management practice will probably occur in the course of recommended outreach and education activities, care was taken to insure that all such activities included in this report related to the nitrate-reduction purpose if they were addressed at all.

The Residential Working Group agrees that there is one exception to the nitrate-reduction directive: Many of us have a professional obligation, or at least feel a personal responsibility, to disclose the potential risks associated with drinking-water wells in what we know to be an area vulnerable to high nitrate. This responsibility extends to offering options for remediation of this risk, such as water treatment or drilling deeper wells. The conflict arises when one realizes that removing the risk of nitrate from a household water supply may in fact reduce the residents' concern about the quality of the groundwater supplying their drinking water, an activity perhaps counter to the goal of nitrate-reduction in groundwater. Giving this full consideration, the Working Group opted to include actions that would address drinking water treatment to remove nitrate.

Residential Working Group Goals and Strategy Recommendations

GOAL 1 RECOGNITION BY RESIDENTS THROUGHOUT THE REGION THAT GROUNDWATER IS A VALUABLE AND VULNERABLE RESOURCE

Because groundwater is not a visible resource, the relationship between everyday activities and groundwater quality is often not obvious. In order for residents to take appropriate action, they must first become aware, and then gain basic knowledge of their groundwater connection.

Strategy 1: Launch Southern Willamette Valley GWMA public information campaign

Recommended Actions

- Maintain a GWMA website that includes specific information for residents.
- Send press releases to local media outlets regarding the extent and purpose of the GWMA, tips for groundwater protection, human interest stories, promotion of the web site and GWMA events, and other groundwater-related topics.
- Work with organizations that have newsletters to include groundwater-related articles tailored to their interest.
- Partner with utilities to include groundwater protection tips in utility bills.
- Promote the use of a GWMA speakers' bureau with local service organizations, granges, watershed councils and other groups.
- Create displays and posters for community events, store windows, etc.

Requirements Necessary to Perform These Actions

- Project coordinator and support staff to perform actions listed above.
- People willing to be part of a speakers' bureau.
- Printing for utility bill inserts.
- Funding for production of displays, etc.

Implementation Responsibilities and Resources Identification

- OSU Extension Well Water Program can serve as project coordinator through June 2007 and may be able to continue beyond that time if funding is secured.
- Volunteers from the GWMA Staff, Committee and Working Groups to form the 'Speakers' bureau.'
- Printed materials from multiple agencies available for use.
- GWMA Lead Agency or other appropriate groups are encouraged to identify additional funds to support this strategy..

Measurements of Effectiveness

- Between April 2006 and June 2007, a methodical tally will total 30,000 passive contacts with households within the GWMA. The tally will be based on standard methods for estimating mass media contacts, utility bill insert numbers, attendance at GWMA related

events, and other appropriate metrics. (The 35,000 number approximately equals an average of 6 contacts per year for each GWMA household.)

- In Spring 2009, a random survey of GWMA residents will indicate that 80% are aware of the issue of nitrate in groundwater and can relate one place where they heard about it. (This measure is only suitable if the strategy actions extended beyond June 2007)

Strategy 2: Offer groundwater educational programs to residents in Lane, Linn and Benton counties, focusing on GWMA communities

Recommended Actions

- Offer classes providing unbiased information for residences with wells and septic systems.
- Offer nitrate screening and consultations on wells, septic systems and water treatment options at community events, Extension offices, and other venues.
- Work with Realtors to disseminate groundwater-related materials.
- Work with health care providers to address nitrate-related health issues.

Requirements Necessary to Perform These Actions

- Funding and staff to deliver classes and nitrate screening.
- Coordinator to work with Realtors and health care providers.
- Real estate professionals and health care providers to participate in project.

Implementation Responsibilities and Resources Identification

- OSU Extension Well Water Program currently conducts classes, nitrate screening, and consultations statewide, including within the GWMA area.
- OSU Extension Well Water Program can serve as coordinator for Realtor and health care project through June 2007.
- GWMA Lead Agency or other appropriate groups are encouraged to identify additional funds to support this strategy.

Measurements of Effectiveness

The timeline for evaluating success starts when the GWMA Action Plan is formally approved and the implementation phase begins.

- Each year, at least three well and septic classes for homeowners will have been held, serving approximately 100 residents.
- Every year, outreach will have been conducted at five or more events within Lane, Linn and Benton counties, yielding approximately 500 nitrate tests per year.
- By the end of year 3, partnerships will have been formed with Realtors and health care providers that disseminate groundwater information to residents.

Strategy 3: Extend K-12 groundwater education and outreach programs

Recommended Actions

- Work with existing educational programs that focus on water quality or natural resources such as 4-H clubs, the 4-H Wildlife Stewards Program, the Hydroville Curriculum Project, the SMILE Program, or Scouts.
- Where applicable, involve students and parents in activities related to the school's Drinking Water Protection Plan.
- Identify teachers interested in covering groundwater in their classroom and offer them support that meets their needs, such as tailoring activities appropriate to their students or providing a groundwater model or other equipment for their use.
- Create and distribute a GWMA Teachers' Newsletter with classroom activities linked to the state curriculum standards

Requirements Necessary to Perform These Actions

- Coordinator or coordination team for GWMA youth activities.
- Allocation of classroom time and school facilities for GWMA activities by local school staff and teachers.
- Commitment to GWMA activities by staff and volunteer youth leaders from partnering programs.
- Funding or allocations for printing, equipment, etc.

Implementation Responsibilities and Resources Identification

- OSU Extension Well Water Program can serve as coordinator through June 2007.
- GWMA Lead Agency or other appropriate groups are encouraged to identify additional funds to support this strategy..

Measurements of Effectiveness

Ongoing tasks for which OSU Well Water Program is funded by grants will be evaluated based on the anticipated funding termination date.

- By June 2007, every school in the GWMA will have been contacted and teachers from at least three different schools will have chosen to integrate groundwater activities in their curriculum.
- By June 2007, students and parents from GWMA schools with a Drinking Water Protection plans will have participated in related activities.
- By June 2007, there will be at least three GWMA projects involving K-12 students through either schools or youth groups.
- By June 2007, at least one issue of the GWMA Teachers' Newsletter will have been produced.

Strategy 4: Provide information on groundwater-friendly lawn and garden products and practices

Recommended Actions

- Partner with Master Gardeners so that they may assist in educating others in groundwater-friendly practices.
- Support a Water-Friendly Gardening speakers bureau to present at gardening clubs, community lecture series, schools, etc.
- Develop demonstration gardens that illustrate groundwater protection practices. This may be done in conjunction with K-12 activities.
- Supply groundwater-friendly lawn and garden information sheets to retail garden businesses on multiple topics, including information reminding people to read the fertilizer labels.
- In collaboration with local retail garden businesses in the GWMA, launch a “groundwater-friendly” labeling campaign to identify appropriate products.

Requirements Necessary to Perform These Actions

- A coordinator or coordination team to oversee implementation of actions.
- OSU Extension Service Home Horticulture staff and volunteer leadership in the three counties to facilitate the involvement of Master Gardeners.
- Sufficient funding for labeling campaign, garden demonstration projects, and the creation and distribution of the handouts.
- Participation of local retail garden businesses.

Implementation Responsibilities and Resources Identification

- OSU Extension Well Water Program could serve as initial coordinator. As this project matures, the responsibility can be transferred.
- OSU Extension Well Water Program is committed to training and supporting Master Gardeners throughout the state, and is able to perform this role in the GWMA.
- GWMA Lead Agency or other appropriate groups are encouraged to identify additional funds to support this strategy.

Measurements of Effectiveness

The timeline for evaluating success starts when the GWMA Action Plan is formally approved and the implementation phase begins.

- Each year, a training session in “Water-Friendly Gardening” for Master Gardeners will have been offered for each GWMA county.
- After 3 years, there will be at least one Water-Friendly demonstration garden project in each county.
- After 1 year, all retail garden businesses serving GWMA residents will have been contacted.
- After 3 years, 80% of all retail garden business serving GWMA residents will be participating in some aspect of this project.

GOAL 2 FOCUSED OUTREACH THAT ADDRESSES SPECIFIC RISKS

To ensure the efficiency and effectiveness of the GWMA efforts, it is recommended that advanced outreach activities focus on structures, practices, and site characteristics associated with a higher risk of nitrate reaching the groundwater.

Strategy 1: Establish a volunteer well monitoring network that incorporates neighbor-to-neighbor outreach

Recommended Actions

- Recruit and train volunteers to participate in the network.
- Maintain ongoing support for the monitoring network, including sample analysis.

Requirements Necessary to Perform These Actions

- A coordinator or coordination team to oversee implementation of actions.
- Volunteers willing and eager to participate.
- Training materials and equipment for the volunteers.
- Lab analysis of samples, perhaps requiring additional funding.

Implementation Responsibilities and Resources Identification

- OSU Extension Well Water Program staff are funded to set up the monitoring network with trained volunteers.
- OSU Extension is encouraged to identify long-term support staff to manage the on-going network once it is set up.
- DEQ or other labs to analyze samples.
- OSU Extension, the GWMA Lead Agency, or other appropriate groups are encouraged to identify additional funds to support this strategy..

Measurements of Effectiveness

Ongoing tasks for which OSU Well Water Program is funded by grants will be evaluated based on the anticipated funding termination date. .

- By June 2007, a volunteer monitoring network will be established by OSU with a minimum of 50 residential wells.
- By June 2007, at least 50% of volunteer monitors will report that they have discussed groundwater issues with at least three other households.

Strategy 2: Establish a site-visit program to assist residents in assessing potential risks to groundwater

Recommended Actions

- Consider staffing options that may include interns or volunteers.
- Train team in outreach and assessment techniques.
- Develop a site-assessment tool based on previous products such as Home-A-Syst.

Requirements Necessary to Perform These Actions

- Coordinator or coordination team to oversee implementation of actions.
- A source of interns or volunteers.
- A technical advisory team to assist with training and development of the assessment tool.
- Funds to cover staff time, printing and materials.

Implementation Responsibilities and Resources Identification

- OSU Extension Well Water Program or some other appropriate organization could coordinate the program if funds can be located.
- County Environmental Health department staff could provide technical assistance and other program support.
- Student interns may be able to serve as staff.
- OSU Extension, GWMA Lead Agency or other appropriate groups are encouraged to identify additional funds to support this strategy.

Measurements of Effectiveness

The timeline for evaluating success starts when the GWMA Action Plan is formally approved and the implementation phase begins.

- Within 1 year, partners and funds will be in place to develop the program.
- Within 3 years, 250 GWMA residents will have received site visits with an opportunity for risk assessment.

GOAL 3 TECHNICAL SUPPORT FOR LOCAL GOVERNING BODIES

Local governing bodies have the option to implement changes that may reduce nitrate risk, such as setting minimum density for lots with septic systems, requiring advanced waste water treatment technologies, or requiring well testing prior to receiving building permits.

Strategy 1: Offer educational support to elected officials, city and county staff, and citizens' advisory groups about the GWMA and associated issues

Recommended Actions

- Work with NEMO (Non-point Education for Municipal Officials, an EPA funded program) to design and implement an outreach plan.
- Provide workshops, briefing sheets, meeting speakers, and other educational tools and strategies for local policy-makers and those who would be implementing the policies.
- Coordinate with local partners to include relevant GWMA-related information on their websites.

Requirements Necessary to Perform These Actions

- Project coordinator or coordination team to implement actions.
- County and municipal staff to participate in project.
- Materials and supplies for training.

Implementation Responsibilities and Resources Identification

- LCOG or other suitable organizations should collaborate to seek funding and coordinate.

Measurements of Effectiveness

- One year from beginning the project, local elected officials and staff verify that they have received adequate training and support to comfortably address key GWMA issues.

Strategy 2: In partnership with representatives of local governing entities, develop a GWMA Planning Kit, containing sample language and supporting materials for zoning and other policy changes which, if implemented, could decrease the contribution of nitrate to groundwater

Recommended Actions

- Work cooperatively with the potential users of the Planning Kit to ensure that it contains appropriate tools.
- Research options used in other regions and incorporate lessons learned.
- Develop sample draft language for potential policy initiatives.
- Assist local groups in gaining input and support for potential changes.
- Communicate clearly that use of any of the tools is strictly voluntary and to be determined by local authority.

Requirements Necessary to Perform These Actions

- Project coordinator or coordinator team to oversee implementation of actions.
- County and municipal staff involvement.

Implementation Responsibilities and Resources Identification

- LCOG, University of Oregon Planning, Public Policy and Management Department, the U of O Community Service Center or other suitable organizations should collaborate to seek funds and perform this task.

Measurements of Effectiveness

- Within one year after the acquisition of funding, a pilot kit will be available for review by interested parties.
- Six months after completion of the GWMA Planning Kit, all potential users will report that they had adequate opportunity for involvement in its development.
- Two years after completion of the GWMA Planning Kit, each county will have had the support needed to consider planning, zoning, or other policy options to protect groundwater.

GOAL 4 REDUCED NITRATE CONTRIBUTION FROM SEPTIC SYSTEMS TO GROUNDWATER

Standard septic systems, even those functioning properly, release nitrate-rich water from the drainfield. If not adequately treated by soil or diluted, this effluent can increase groundwater nitrate concentrations.

Strategy 1: Ensure that site-suitable waste water treatment technologies can be used to reduce nitrate.

Recommended Actions

- In cooperation with DEQ and interested parties from other GWMA's, assemble a technical team to review relevant research, including the LaPine nitrate study, gather empirical data, and produce a proposal to amend to the Onsite Wastewater Treatment System rules, if the research shows that the proposal is needed.
- Recommend, with supporting documents, that DEQ amend Geographic Area Special Considerations rule (OAR 340-071-0400) to allow the use of best available technologies for nitrate reduction in the development, repair and replacement of onsite wastewater treatment systems in areas of the GWMA where soil or geologic conditions would preclude the use of standard septic systems. The "best available technology" should remove nitrate to the level allowable for a specific site, and take into consideration the cost to the consumer, long-term maintenance requirements, and the expected life of the system.

Requirements Necessary to Perform These Actions

- Coordinator to assemble the technical team and network with DEQ.
- Long-term commitment of technical team members for research review and rule recommendations.
- Staff to identify areas within the GWMA to which the geographic rule may apply.
- Resources to continue training and support of septic professionals, if needed.

Implementation Responsibilities and Resources Identification

- GWMA Lead Agency in conjunction with the GWMA Committee could identify a person to serve as coordinator or "Chair"
- County environmental health staff could contribute to the technical team
- DEQ On-Site staff could network with the "GWMA Septic Group"
- OSU Water Resource Graduate Program or other similar programs could provide students and faculty mentors to assist with technical team

Measurements of Effectiveness

The timeline for evaluating success starts when the GWMA Action Plan is formally approved and the implementation phase begins.

- Within 2 years, the technical team will have made recommendations to DEQ regarding Onsite Wastewater Treatment System rule changes to address nitrate reduction, if the team determines that rule changes are needed.
- Within 3 years after submission of supporting reports to DEQ, the GWMA will have a Geographic Rule in place, if it was determined to be necessary.

Strategy 2: Provide financial incentives to encourage the use of technologies that reduce nitrate contributions from septic systems to groundwater.

Recommended Actions

- Explore options to make use of the State Revolving Loan Fund to finance grants and loans to low- and moderate-income residents for installations or upgrades to meet an approved nitrate reduction standard.
- Investigate the possibilities of using current or new state income tax or county property tax credits or deductions for individuals who install onsite wastewater systems that meet an approved nitrate reduction standard, similar to the idea of a tax credit for water conserving appliances.
- Network with local, state, and federal agencies that provide financial assistance for home rehabilitation and water-quality-protection to ensure that septic system enhancement is an allowable use of those funds.

Requirements Necessary to Perform These Actions

- Staff with networking and negotiating skills.
- Cooperation from other parties.

Implementation Responsibilities and Resources Identification

- The GWMA Lead Agency in conjunction with the GWMA Committee or suitable GMWA subcommittee are encouraged to identify staff to work on this strategy

Measurements of Effectiveness

The timeline for evaluating success starts when the GWMA Action Plan is formally approved the implementation phase begin.

- Within 1½ years, State Revolving Loan Funds are available to assist with septic system improvements in all of the GWMA counties.
- Within 3 years, the viability of tax credits will be thoroughly researched and reported.
- At the end of 2 years, at least one septic system in each of the GWMA counties will have benefited from cost-share, grants, or some other form of financial assistance.

GOAL 5 REDUCED POTENTIAL FOR WELLS TO SERVE AS CONDUITS FOR NITRATE TO GROUNDWATER

Oregon Water Resources Department (OWRD) Minimum Well Construction Standards prevent surface water from reaching groundwater by way of the well hole. However, wells that may have been improperly constructed, damaged or altered after construction, test high in nitrate, or are no longer in use may provide a pathway for nitrate and other surface contaminants to enter groundwater.

Strategy 1: Focus on wells that might be conduits for nitrate to groundwater, raising landowner awareness of the risks and assisting them in resolving any issues

Recommended Actions

- In conjunction with planned outreach efforts, provide Well Action Packets to landowners who may have problem wells and refer them to OWRD to determine how to proceed.
- Create an incentives program that would encourage owners of problem wells to begin taking steps to address the situation.
- Request increased inspection of wells by OWRD and take necessary steps to support the agency in doing this.

Requirements necessary to perform these actions

- Implementation of outreach efforts addressed in Goals 1 and 2 of this plan.
- Staff time and printing to produce the Well Action Packets.
- A coordinator for the incentives program and funds to provide for the incentives, if necessary.
- Commitment by OWRD to continue technical assistance and well inspection at current levels, and additional funding for OWRD to increase these efforts.
- A person or team to secure funding for other project needs from federal, state, local, or private sources.

Implementation Responsibilities and Resources Identification

- OWRD is available to provide well inspection and technical assistance regarding well construction, abandonment, and maintenance.
- OSU Extension Service Well Water Program is available to conduct outreach activities and coordinate the production of the Well Action Packet in cooperation with OWRD.
- The GWMA Lead Agency, OWRD and other appropriate organizations are encouraged to cooperate in order to secure funding and address aspects of this strategy that are not funded elsewhere, with acknowledgement that this task could not be done by any of the groups alone.

Measurements of Effectiveness

Ongoing tasks for which OSU Well Water Program is funded by grants will be evaluated based on the anticipated funding termination date. The timeline for evaluating success for other actions starts when the GWMA Action Plan is formally approved the implementation phase begin.

- By June 2007, fifty landowners with problem wells will have been identified through outreach activities and provided the Well Action Packet.
- Within 2 years, the pilot incentives program will have served at least 25 residents, and lessons learned will be reported.
- Within 3 years, there will be sufficient funding for OWRD staff to address the expected increase in requests for technical assistance and well inspections.

Strategy 2: Provide assistance to help well owners overcome financial barriers to properly abandoning and repairing wells

Recommended Actions

- Network with local, state, and federal agencies that provide financial assistance for home rehabilitation and water-quality-protection incentives to ensure that well repair and decommissioning is an allowable use of those funds.
- Work with the business sector and service organizations to establish programs such as special-needs discounts, charitable mini-grants, earn-a-well with community service, or other creative solutions.

Requirements necessary to perform these actions

- Person or team to develop necessary partnerships.
- Staff to manage programs that are developed.

Implementation Responsibilities and Resources Identification

- The GWMA Lead Agency and appropriate organizations could work together on this.

Measurements of Effectiveness

The timeline for evaluating success for starts when the GWMA Action Plan is formally approved the implementation phase begin.

- At the end of 1 year, there will be at least one source of financial assistance available to low-income well owners throughout the GWMA, regardless of their county of residence.
- At the end of 2 years, at least 10 wells will have been either repaired or decommissioned using cost-share, grants, or some other form of financial assistance.

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A P P E N D I X

Map 1. Residential Address Points Outside of City Limits (produced by LCOG)

Map 2. Residential Parcels < 1 Acre without Septic Records (produced by Laila Parker, OSU)

Map 3. Sections with Wells < 50 Feet Deep (produced by Laila Parker, OSU)