

Mokelumne River Watershed Owner's Manual

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Requests to reprint parts or all of the *Mokelumne River Watershed Owner's Manual* should be directed to the San Joaquin County Resource Conservation District 1222 Monaco Court #23 Stockton, California 95207 (209)-946-6241 or via e-mail through its website at www.sjcrecd.org

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About Home*A*Syst

Home*A*Syst and Farm*A*Syst are national programs supported by the USDA Cooperative State Research Education and Extension Service (CREES), the USDA Natural Resources Conservation Service (NRCS), and the U.S. Environmental Protection Agency (EPA).

For more information, contact: Farm*A*Syst/Home*A*Syst, 303 Hiram Smith Hall Madison, Wisconsin 53706; 608-262-0024 or HOMEASYS@UWEX.EDU

About NRAES

The Northeast Regional Agricultural Engineering Service is a program focused on delivering engineering-related educational materials and training opportunities in support of northeast cooperative extension. All NRAES activities are guided by faculty members from northeast land grant universities. The program is guided by the NRAES Committee, which consists of a representative from each northeast state and the District of Columbia as well as the NRAES director and an administrative liaison appointed by the Northeast Cooperative Extension directors Committee. NRAES is housed in the Department of Agricultural and Biological Engineering at Cornell University.

For more information or for a free publications catalog, contact NRAES, Cooperative Extension 152 Riley-Robb Hall Ithaca, New York 14853-5701 (607) – 255-7654 or NRAES@CORNELL.EDU

Initial Home Assessment*

This checklist is a way to quickly scan for potential problem areas in your home. It will help you think about possible risks, and introduce you to many of the topics covered in this handbook. Sections in the handbook cover many other situations and practices not included in this initial assessment. If you answer “yes” to any of these questions, or think there might be risks or areas that need improvement, refer to the appropriate section in the handbook. Skip over any sections that don’t apply to your home.

Site Assessment: Protecting Water Quality Around Your Home	YES	NO
Is your soil sandy or gravelly, allowing water to drain through it quickly?		
Is there a potential source of contamination—such as manure, pesticide, or fertilizer storage; a fuel tank; a septic system drain field; or eroding soil—on your property within 100 feet of a well, stream, lake, or wetland?		
Is the water table less than 10 feet below the soil surface?		
Stormwater Management	YES	NO
Do the downspouts from your roof gutters empty out onto paved surfaces instead of onto grass, mulch, or gravel and thus keep rain from soaking into the ground?		
Are fertilizers, pesticides, or salts stored where floodwaters might reach them?		
Are some parts of your property, particularly slopes, sparsely planted and without mulch, exposing the soil to erosion?		
Drinking Water Well Management	YES	NO
Has it been more than two years since your water was tested for bacteria and nitrates?		
Do you have a dug or driven well instead of a drilled well?		
Does your well casing extend less than 12 inches above the ground, or is there a low area where rainwater runoff can collect around the well casing?		
Do you have abandoned wells on your property that have not been properly filled and capped?		
Household Wastewater: Septic Systems and Other Treatment Methods	YES	NO
Has it been more than three years since your septic tank was pumped or inspected?		
Have you noticed any signs of a failing septic system such as slow drains, odors, or soggy ground cover over the drain field?		
Do you have standard toilets and faucets instead of water-conserving fixtures?		

* “Adapted with permission from NRAES-87, Home*A*Syst: An Environmental Risk-Assessment Guide for the Home

Initial Home Assessment *(continued)*

Managing Hazardous Household Products	YES	NO
Do you use products without knowing whether or not they are hazardous?		
Do you ever pour hazardous substances such as antifreeze, oil, paints, stains, polishes, or solvents down a sink drain, down a storm drain, in a ditch, or on the ground?		
Do you burn plastics, batteries, or chemicals that could contaminate air?		
Lead In and Around the Home: Identifying and Managing Its Sources	YES	NO
Was your home built before 1978 (the year lead was banned from residential paint)?		
Do children under the age of six live in your home?		
Are painted surfaces inside or outside your home peeling, chipping, or chalking?		
Does drinking water flow through lead pipes or contact lead solder?		
Yard and Garden Care	YES	NO
If you use fertilizer, has it been longer than three years since you had your lawn and garden soil tested for nutrients?		
Do you ever use pesticides without reading the label or following the recommended doses or application instructions?		
Do you have areas of bare soil on your property that are susceptible to erosion?		
Liquid Fuels: Safe Management of Gasoline, Heating Oil, Diesel, and Other Fuels	YES	NO
Do you store fuel for lawnmowers or other gas-powered equipment in non-approved containers such as glass jars, plastic jugs, or rusted cans?		
Do you store fuel or heating oil in an underground storage tank?		
If you have an aboveground fuel tank, does it lack protection against spills or leaks—for example, a catch basin or concrete spill pad?		
Managing Household Waste: Preventing, Reusing, Recycling, and Composting	YES	NO
Do you purchase products that you really don't need?		
Do you buy products wrapped in excess packaging?		
Do you throw away yard or food wastes that could be composted?		

A Letter From The Watershed Coordinator

Thank you!

By filling out the initial home assessment and accepting this workbook, you are taking the first steps toward improving your Mokelumne River Watershed. By taking the small steps recommended inside this workbook, you are helping to secure a safer, cleaner source of vital freshwater for your children, grandchildren, and generations to come.

Don't doubt whether the small actions of one person can make a difference. They do! And the steps you take can influence how your neighbors, children, and others treat the watershed as well.

Fresh water is a vital part of our everyday life. We drink it, cook with it, bathe in it, wash our dishes, clothes, and cars with it, nourish our gardens and flowers with it, irrigate our food crops, sustain our pets and livestock with it, and use it for recreational purposes like swimming, fishing, and boating. Without quality fresh water, our quality of life will be diminished.

Whether you own or rent where you live, this guide will show you how to make small changes that can help save you money, and benefit the environment.

The journey of a thousand miles begins with one small step. Thank you for taking that first step.

Sincerely,

John C. Brodie
Watershed Coordinator

Your use of this handbook is strictly voluntary. No one will peek over your shoulder to make sure you follow all the recommendations in this handbook. Only you will know the answers you give on the initial assessment sheet, and only you will know what actions, if any, you take.

You may have been asked if we can contact you in the future about this handbook and the initial assessment you filled out. Copies of the initial assessment form were collected separately from your contact information so no one can determine which sheet belongs to a particular person or family. If you are contacted, it will be to ask general questions about the effectiveness and clarity of this workbook. Only with your permission will we ask any specific questions about any changes you might have made in your home environment or behavior.

We hope that any action you take will be because it is something you believe in, and because you understand how important it is to act now. The steps outlined in this handbook are simple and inexpensive, yet they can have a tremendous impact on the quality of the Mokelumne River. That is true even if you or your household is the only one you know of taking some of these steps.

We hope that you will share these tips and suggestions with your friends and neighbors in the Watershed. Contact the San Joaquin County Resource Conservation District to obtain additional copies of this free handbook, or for more information on the subjects covered within.



Thank you so much for exploring ways to improve the Mokelumne River Watershed. You will reap the benefits of improvements to the river, as will other residents of the community, and the plants and animals that depend on the river for food and shelter.

Using This Handbook



During the course of reading the text, you will come across certain key words that will be printed in *italics*. These words are important to understanding this handbook. Definitions for these words can be found in a glossary at the back of this handbook.

You can complete this handbook in as timely a manner as is best for you. The most important thing is not when you complete this handbook, but that you do complete this handbook.

If you decide to make some of the changes that are recommended, you should establish a ranking system for the changes you want to make, and how soon you plan to implement those changes. For example, we recommend for the sake of your family's health and the health of the environment that you first address any high risks you find, if possible. And, be sure to write down a specific date to complete any of the changes you wish to make.

Involve the Entire Family

Working together on these assessments can be a worthwhile educational experience for everyone. If you value a clean environment and healthy surroundings, then using this handbook to help you make changes will be beneficial in several ways. It might even help you save money, or enhance the resale value for homeowners.

Directions For Completing Assessments

Using a pencil, answer the questions "yes" or "no" or check the appropriate box. You might need to locate your home maintenance records, ask family members or neighbors, or seek assistance or further information.

For answers to general questions or for help in getting more information, feel free to contact the Watershed Coordinator at the San Joaquin County Resource Conservation District at 209-946-6241. Or contact the watershed coordinator via e-mail at: waterinfo@sjcrd.org

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Mokelumne River Watershed Owner's Manual

Introduction

The Mokelumne River is a tremendous asset to Lodi and northern San Joaquin County. It is more than a natural resource—it is a community resource. Local recreation areas such as Lodi Lake Park exist solely because of the river. The Mokelumne River is enjoyed by anglers, pleasure boaters, and swimmers. Birdwatchers, hikers, and other nature lovers stroll the river's banks to admire and even study the plant and animal life that the river attracts and sustains.

The Mokelumne also enhances the economic fortune of the area. The recreational activities mentioned above help bring tourism and tourist dollars to the area. The river is a source for irrigation water, which is vital to the health of the area's vineyards, orchards, and farms—the engine that drives the local economy.

It's easy to see that the Mokelumne River contributes significantly to the quality of life in Lodi and northern San Joaquin County. That is why it is so vital to maintain and improve the quality of the water in the river.

Most people know that pollution from human activities can harm the water in rivers like the Mokelumne. Many people believe that most pollution comes from heavy industry or *point sources*. That was once the case, but the U.S. Environmental Protection Agency now says most states are reporting that the largest share of pollution is coming from what are called *non-point* sources.

Non-point source pollution comes from natural and man-made contaminants that are picked up by *runoff*. Runoff water can come from rain, sprinkler systems, or even water from washing a car in your driveway or the street in front of your house. This is where this manual—and you—are most important.

The Mokelumne River Watershed Owner's Manual will show you ways to reduce the amount of runoff generated at your home that enters the Mokelumne River. It will also show you how to reduce the amount of contaminants—natural and man-made—in that runoff.

Protecting groundwater and surface water quality is essential to you, your community, and others “downstream.” Making the changes recommended in this handbook will be a real investment in the future for your family and this community. The techniques described in this manual are simple and inexpensive, yet they can have a dramatic impact on the quality of the river that is a centerpiece for our community.

Section 1: Physical Characteristics of Your Homesite¹

What we do every day in and around our homes can affect water quality. Our use of everyday household products can impair the quality of water in nearby lakes, streams, and wetlands. Our activities and the products we use can also affect water below the ground—the water that supplies the wells we use for drinking water. In this section of the book, we will introduce you to some of the ways to protect these important *groundwater* resources. The city of Lodi and many other cities and towns get the water they distribute to residents from wells. By understanding your behavior at home, and making changes where necessary, you can help protect the water in these wells from contamination.



Common activities like driving your car, cutting your grass, or fertilizing your lawn or garden can affect water quality—even if you do them far away from the river or areas where there are wells for drinking water. By paying careful attention to how you manage activities in and around your home, you can protect your *watershed* and the water you drink. Activities that can impair water quality include the use and storage of fuel for lawn and garden tools, pesticide and fertilizer use and storage, waste disposal methods, and soil erosion. Animal wastes from pets are another threat to water quality, particularly if large amounts from horses, dogs, or other animals are allowed to accumulate on your property. For those who live in rural areas without city water and sewer services, drinking-water well construction and maintenance and septic system maintenance are other important factors.

Soil Type and Water Contamination

Water and other fluids can seep through nearly all soils. Different soils permit water and contaminants to seep through or run off at different rates. For example, fertilizers applied to lawns can flow downward into groundwater or across the land into surface water like the Mokelumne River. The size of soil particles influences which pollutants are able to reach groundwater. Some soils are better at trapping pollutants than others.

Clay soils, which are made up of tiny particles, slow the downward movement of water, and in some cases can block water movement completely. Sandy soils allow for quick water movement, and silty soils occupy the middle range. Soils made up of large particles pose the greatest risk, because water seeps down through them readily without filtering out or decomposing pollutants. The ideal soil is a mix of midsize particles to allow infiltration and tiny particles, like clay or organic matter, to slow water movement and filter pollutants.

Soil type can also affect surface water contamination. Although *runoff* occurs from all soil types, clay soils (the least porous) are more likely to cause surface water runoff. During a storm or flood, or even when watering your lawn, this runoff can wash contaminants from the land's surface into nearby surface waters. Eroding soil is also considered a water pollutant. Bare soil, especially on sloping land, can run off into streams, rivers, lakes, or estuaries.

¹ Collaborating author Alyson McCann, University of Rhode Island Cooperative Extension.

The Importance of Soil Depth

The depth of soil influences risks to groundwater. Usually, the deeper the soil, the farther water must seep down before reaching groundwater. Deep soils offer a better chance of filtering or breaking down pollutants before they reach groundwater. Generally, soils that are less than three feet deep present the highest risks for groundwater contamination.



Characteristics of Bedrock

Bedrock depth varies. It can be at the land's surface as in some foothill areas and the mountains, or it can be hundreds of feet down as in most of the Central Valley. The type of bedrock also influences pollution risks. Shale, granite, and other non-porous types of rock make an effective barrier that blocks the downward movement of water and contaminants. Other rocks such as limestone can be very porous, allowing water to move freely into groundwater. When bedrock is split or fractured, water can move through it unpredictably, spreading pollutants rapidly over long distances.

Depth to Water Table

If you dig a hole in your yard, you will eventually reach soil saturated with water. This *water table* marks the boundary where spaces between soil and rock contain air, roots, soil organisms, and some water, and the groundwater. In a wetland, the water table is at or just below the surface. In general, the closer the water table is to the surface, the more the groundwater is vulnerable to contamination.

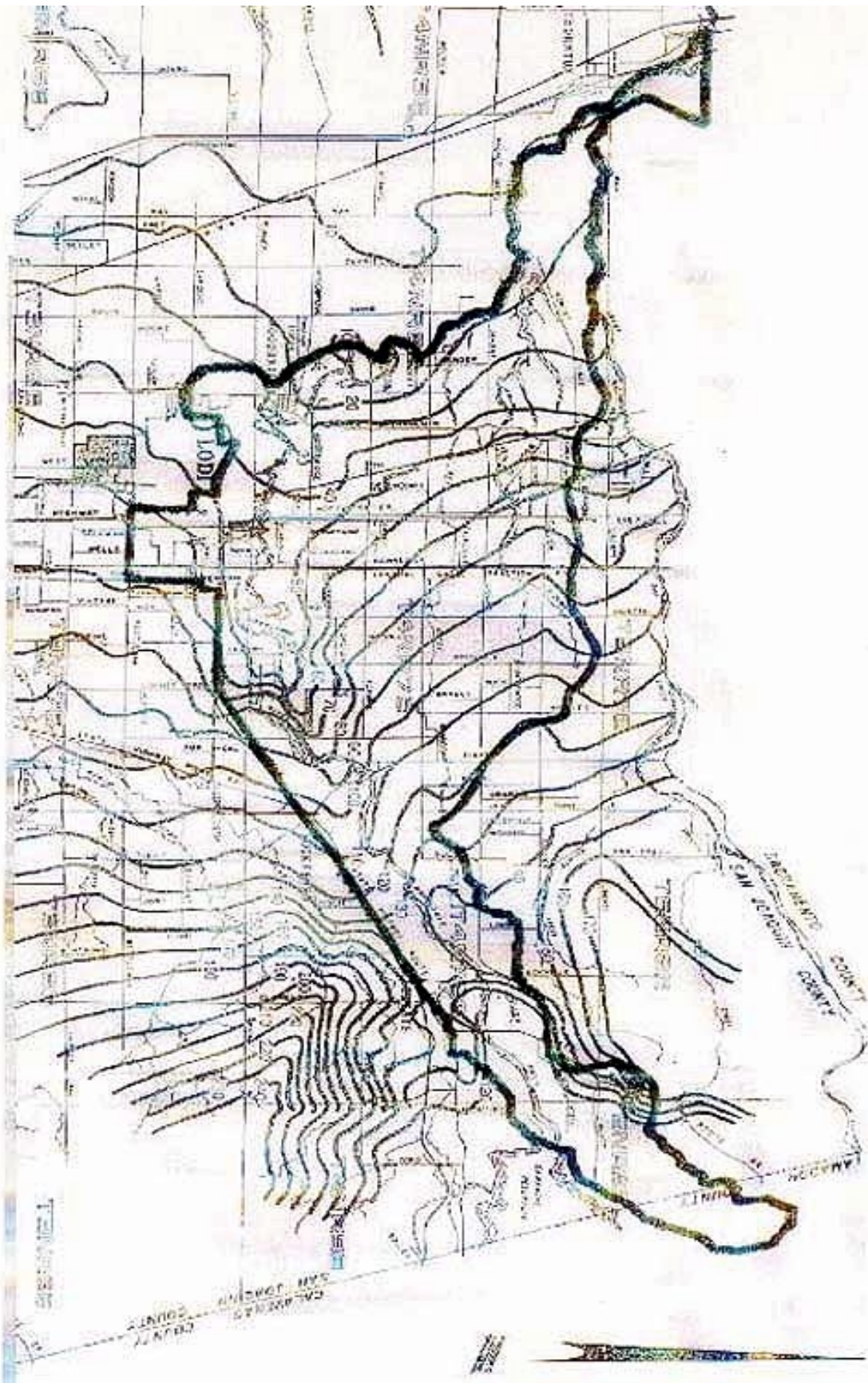
Groundwater and surface water are interconnected. Groundwater generally flows downhill, following the same path as surface water, and eventually discharges into rivers, lakes, springs, wetlands, bays, or estuaries. If you keep impurities out of surface water but don't protect groundwater—or vice versa—contaminated water can occur where you least expect it.

General Characteristics in the Mokelumne River Watershed

Most of the soils in the Mokelumne River Watershed are of the medium risk silt/loam type. Soil depth is generally over 100 feet across San Joaquin County and within the watershed. The U.S. Geological Survey reports the bedrock underlying California's Central Valley is almost impermeable, and flow through bedrock is not significant.

Depth to the water table is generally about 30 feet in the greater Lodi area. However, the depth to water table gets shallower moving west from the city of Lodi towards the Delta. In some of these western areas of the watershed, the depth to the water table is 10 feet or less. Review the enclosed water table map to estimate depth to the water table in the area where you live.

With these considerations in mind, most (if not all) of the Watershed can be considered at medium risks for soil types, low risk for soil depth and bedrock. Determine to the best of your ability the depth to the water table at your residence using the map on the next page.



Assessment 1-1: Physical Characteristics of Your Homesite*

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Soil type and risks to lakes, rivers, wetlands, or other surface water from runoff	Sand/gravel (large particles)	Silt/loam (mid-size particles)	Clay (very tiny particles)	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Soil type and risks to groundwater from infiltration	Clay (very tiny particles)	Silt/loam (mid-size particles)	Sand/gravel (large particles)	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Soil depth	Deep (over 12 feet)	Moderately deep (3-12 feet)	Shallow (less than three feet)	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Bedrock	Solid, not permeable or fractured	Solid limestone or sandstone	Fractured bedrock-any kind	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Depth to water table	Over 20 feet	10-20 feet	Less than 10 feet	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Nearness to surface water	Over 100 feet	25-100 feet	Less than 25 feet	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High

Do not depend solely on the physical characteristics of your soil, bedrock, or other site features to protect water quality. You must take informed steps to prevent pollution. Although you can't change your soil type or the depth to bedrock, you can account for these factors when choosing home management practices that do a better job of preventing environmental problems.

Note especially the medium and high risks you identify. Keep them in mind as you complete work on other sections of this handbook.

* Source: NRAES-87, Home*A*Sys: An Environmental Risk Assessment Guide for the Home.

Section 2: Stormwater Management²

This section examines potential risks to the environment and your health from stormwater *runoff*, and is intended to help you reduce the pollutants in runoff from around your home, and help you use landscaping and site management to control runoff. Stormwater is water from rain or melting snow that does not soak into the ground. It flows from rooftops, over paved areas and bare soil, and through sloped lawns. As it flows, this runoff collects and transports soil, pet waste, fertilizer, pesticides, oil, grease, litter, and other potential pollutants. Heavy rain isn't needed to send pollutants down *storm drains* and on their way to local streams, rivers, lakes, and wetlands. A garden hose alone can supply enough water to transport these contaminants.



Contrary to popular belief, storm drains do **not** carry stormwater to a wastewater treatment plant. Any pollutants picked up by stormwater in Lodi and much of northern San Joaquin County ends up in the Mokelumne River. Stormwater pollution is treated differently than water pollution from discharge pipes because it comes from many sources. This *non-point source* pollution is carried by stormwater from every street, parking lot, sidewalk, driveway, yard, and garden. The problem can only be solved with everyone's help. But, it doesn't require everyone's participation to make a difference. You can reduce the amount of contaminants that enter the Mokelumne River by reducing the amount of contaminants that get into stormwater from your home.

Stormwater pollution comes from many different sources. Silt, sand, clay particles and other debris that clouds water and degrades habitat for fish and water plants comes from several places in a watershed. These include: construction sites, bare spots in lawns and gardens, wastewater from washing cars and trucks on streets, driveways, or parking lots, and unprotected stream banks. Nutrients such as phosphorus that promote the growth of algae, which crowds out other aquatic life, comes from overused or spilled fertilizers, pet waste, grass clippings and leaves that are left on streets and sidewalks, or leaves that are burned in ditches. Disease organisms such as bacteria and parasites that can make the river and nearby lakes unsafe for swimming and wading get into stormwater from pet waste and garbage. Toxic chemicals and metals that threaten the health of fish and other aquatic life come from cars and trucks (brake and tire wear), motor vehicle exhausts, leaks and spills of oil, gas, and engine coolant, galvanized metal gutters and downspouts, burning leaves, and garbage.

By making yourself aware of the problems, and taking some simple steps to reduce the amount of contaminants that enter stormwater, you can make a difference that will benefit you, your family, the community, and the Mokelumne River. Please fill out the assessment on the next page to help identify stormwater risks on your property. Then, read about ways to reduce contaminants from your home and neighborhood that enter storm water on the following pages. Note all medium and high risks on the action checklist at the end of this section. Using the checklist and information contained in this section, you can formulate an action plan to reduce pollution from your home.

² Collaborating authors Carl DuPoldt, Natural Resources Conservation Service, and Carolyn Johnson, University of Wisconsin Cooperative Extension.

Assessment 2-1: Reducing Pollutants in Runoff*

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Automotive wastes	Oil drips and fluid spills are cleaned up. Dirty car parts and other vehicle wastes are kept out of reach of stormwater runoff.	Drips and spills are not cleaned up. Car parts and other vehicle wastes are left on unpaved areas outside.	Used oil, engine coolant, and other wastes are dumped down the storm sewer, in a ditch, or on the ground.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Car washing	Cars and trucks are taken to a commercial car wash or spray booth.	Cars, trucks, or other items are washed on a lawn or gravel drive.	Cars, trucks, or other items are washed on a driveway, street, or other paved area.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Storage of pesticides, fertilizers, and other potentially harmful chemicals	Chemicals are stored in waterproof containers in a garage, or shed that is protected from stormwater.	Chemicals are stored in waterproof containers but within reach of stormwater.	Chemicals are stored in non-waterproof containers outdoors or within reach of stormwater.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Handling and use of pesticides, fertilizers, and outdoor chemicals	Spills are cleaned up immediately, particularly on paved surfaces. Minimum amounts of chemicals are applied according to label directions. Applications are delayed to avoid rain.	Applications are not delayed to avoid rain.	Spills are not cleaned up. Products are used in higher amounts than what is recommended on the label.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Pet and animal wastes	Animal and pet wastes are flushed down the toilet or buried away from gardens, wells ditches, or areas where children play; or are wrapped and placed in the garbage for disposal.	Animal wastes are left to decompose on grass or soil. Wastes are scattered over a wide area.	Animal wastes are left on paved surfaces, concentrated in pen or yard areas, or dumped down a storm drain or in a ditch	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Grass clippings, leaves, and other yard waste	Grass clippings, leaves, and other yard wastes are swept off paved surfaces and onto lawns away from water flow routes. Leaves and other yard wastes are composted.	Leaves and other yard wastes are piled on the lawn next to the street for collection.	Grass clippings, leaves, and other yard wastes are left on driveways, streets, and other paved areas to be carried off by stormwater. Yard waste is burned on-site.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High

* Source: NRAES-87, Home*A*Syst: An Environmental Risk Assessment Guide for the Home.

Reducing Pollutants in Runoff

Oil stains on your driveway and outdoor spills of engine coolant, fuel, or other automotive fluids are easily carried away by runoff. An oily sheen on runoff from your driveway is a sure signal to be more careful. Pans, carpet scraps, and matting can catch drips while routine care can prevent cars from leaking, and help identify leaks. If you change your own oil, avoid spills and always collect waste oil for recycling. Oily automotive parts should be stored where rain and runoff cannot reach them. Never dump used oil, engine coolant, or gasoline down a storm drain, in a ditch, or on the ground. They will end up in the river or can pollute your drinking water.

Washing your car in the driveway creates runoff without the help of a rainstorm—your hose provides the water. The dirty, soapy runoff drains directly into storm sewers, picking up oil and other pollutants as it goes. Try washing your car on the lawn or, better yet, take it to a commercial car wash or spray booth that sends its dirty water to a wastewater treatment plant.



Household Product Storage

Most people store lawn and garden products like weed killers, insecticides, and fertilizers. If stormwater or floodwater reaches these products, it can transport them into storm drains, surface water, or possibly wells. A variety of other products including pool chemicals and stored fuel for lawnmowers can also cause trouble if they are washed away. It is vital to keep these products in waterproof containers and store them high and out of the path of runoff or floods. One way to avoid storage problems is to buy only what you need for a particular task and use up the product.

But safe storage is only one part in preventing contaminated runoff. When mixing fuels for leaf blowers or chainsaws, or mixing chemicals like fertilizers, try to do it within a washtub so spills will be contained. If chemicals are spilled, act quickly to contain and clean up the spill, particularly on paved surfaces. See Section 6, Yard and Garden Care for more information on the proper use and handling of yard and garden products.

Pet and Animal Wastes

Droppings from dogs, cats, and other commonly kept animals like exotic birds, horses, rabbits, and others can contain substances that promote the growth of algae if they enter rivers and lakes. These droppings can also be a source for disease. The risk of stormwater contamination rises if pet wastes are left on sidewalks, streets, or driveways where runoff can carry them into storm drains. Droppings that are not mixed with litter or other materials should be flushed down the toilet. In some cases, droppings can be buried or wrapped and put in the garbage for disposal.

Yard and Garden Wastes

Rain or sprinklers can wash grass clippings and other wastes from sidewalks, driveways, or roads into storm drains. Leaves and other plant debris are found naturally in streams and lakes, but excessive amounts of plant matter can build up, especially in areas with many homes. It is best to sweep clippings back onto the grass and compost leaves and other garden wastes on your property. This recycles nutrients. Burning yard waste is against the law within the city limits of Lodi, and is also a fire hazard during dry months—especially in northeastern sections of the watershed dominated by rangeland.

Assessment 2-2: Landscaping and Site Management to Control Runoff*

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Bare soil in lawns and gardens	Bare spots in the lawn are promptly seeded and topped with a layer of straw or mulch. Bare soil in gardens is covered with mulch.	Grass or other ground cover is spotty, particularly on slopes.	Spots in the lawn or garden are left without mulch or vegetation for long periods.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Bare soil during construction	Bare soil is seeded and mulched as soon as possible (before construction is completed). Sediment barriers are used until grass covers soil.	Soil is left bare until construction is completed. Sediment barriers are installed and maintained to detain muddy runoff until grass covers soil.	Soil is left bare and no sediment barriers are used.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Paved surfaces	Paved surfaces are minimized. Alternatives such as wood chips or paving blocks are used for walkways, patios, and other areas.	Some small areas are paved for patios or basketball.	Paved surfaces are used extensively.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Stormwater diversion	Yard is sloped away from the foundation. Downspouts direct roof drainage away from the house.	No special water diversion methods are installed. Stormwater does not flow near the foundation.	No water diversion methods are tried. Stormwater flows near the foundation.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Roof drainage	Downspouts and drip lines direct roof drainage onto a lawn or garden where water soaks into the ground.	Some downspouts and drip lines discharge water onto paved surfaces or grassy areas where water runs off.	Most or all drip lines or downspouts discharge onto paved surfaces, or are connected direct to storm drains.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Landscaping and buffer strips.	Yard is landscaped to slow the flow of stormwater and provide areas where water soaks into the ground. Unmowed buffer strips of thick vegetation are left along streams or lakeshores.	No areas are landscaped to encourage water to soak in. Yard is relatively flat and little runoff occurs. Mowed grass or spotty vegetation exists adjacent to a stream or lake.	There is no landscaping to slow the flow of stormwater, especially on hilly, erodable properties. Stream banks or lakeshores are eroding.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High

* Adapted with permission from NRAES-87, Home*A*Syst: An Environmental Risk Assessment Guide for the Home.

Landscaping and Property Management to Control Runoff

Areas of bare soil are often found in vegetable and flower gardens, on newly seeded lawns, and around construction projects. Rainwater can remove large amounts of soil and carry it to rivers, lakes, and wetlands. Planting grass or other *ground cover* is the best way to stop erosion. It is best to use native plants and grasses in order to reduce the need for expensive fertilizers and the watering that will be required for non-native plants not adapted to the long, dry summers of the Central Valley. Putting straw or chip mulch on gardens or newly seeded areas will slow erosion.

Hard Surfaces

Concrete and asphalt roads, driveways, and walkways prevent rain from soaking into the ground. When you have a choice, consider alternative materials such as gravel or wood chips for walkways. Avoid paving areas for patios, or consider a deck as an alternative. Where you need a more solid surface, consider using interlocking cement blocks or rubber mats that allow spaces for rainwater to seep into the ground. If you must pave or pour concrete, keep the paved area as small as possible.

The roof of your house is similar to a paved area in that it sheds water. If downspouts from roof gutters empty onto grassy areas, the water will have a chance to soak into the ground, and there is less water to carry contaminants into storm drains. Wherever possible, aim downspouts away from foundations and paved surfaces. For roofs without gutters, plant grass or spread mulch or gravel under the drip line to prevent soil erosion and increase the ground's ability to absorb water running off of the roof.

Preventing and Reducing Runoff

Keeping water from leaving your property, or at least slowing its flow as much as possible, is an essential part of stormwater management. In residential neighborhoods, many lawns are sloped to encourage water to runoff onto streets. To slow the flow of stormwater or sprinkler runoff, landscape low areas with shrubs and flowers to encourage water to soak into the ground. It is best to



use native plants and flowers.³ Since native plants are adapted to the soil types and local climate, they won't require fertilizers or watering. Plus, they'll add beauty to your property.

If you have a large lot, consider "naturalizing" areas with prairie, woodland, or wetland plants. If your property adjoins the river, a stream, or lake, one of the best ways to slow and filter runoff is to leave a buffer strip of thick vegetation along the waterfront. This vegetation will also help provide homes for birds, beneficial insects such as butterflies, and other wildlife.

³ Contact the San Joaquin County Resource Conservation District or the California Native Plant Society for advice on choosing native plants and flowers for areas around your home. See page 65 for contact information.

Section 3: Drinking Water Well Management⁴

Not everyone in the Mokelumne River Watershed gets drinking water from a well on personal property. But, drinking water for nearly everyone in the watershed comes from a well. For example, the drinking water distributed to residents by the city of Lodi is pumped from wells. This section of the handbook might not apply to you as someone who uses a private well for drinking water. But it is important to understand that your actions do affect the groundwater sources that many people in this watershed rely on for drinking water. It is also possible that you might have an old well on your property.

This section of the handbook should also help private well owners and users to better understand the condition of wells, and how they should be cared for. Assessment tables in this section help to identify situations and practices that are safe. These tables also identify situations and practices that require prompt attention.



The first table covers how a well's location in relation to other features on or near your property will determine some pollution risks. The nearness of the well to sources of pollution and the direction of groundwater flow between pollution sources and your well are the primary concerns.

The second table focuses on well construction, maintenance, water testing, and unused wells. Old or poorly designed wells increase the risk of groundwater contamination by allowing rain to reach the *water table* without being filtered through soil. Good maintenance means keeping the well area clean and accessible, keeping pollutants as far away as possible, and having a qualified well-driller or pump installer check the well periodically, or when problems are suspected. Testing the water helps you monitor water quality, and identify potential health risks to you and your family. And abandoned wells, if improperly sealed, can provide contaminants with a direct route to groundwater.

Fill out the assessment tables to the best of your ability. Then, read about ways to protect wells and groundwater from contamination. Note all medium and high risks on the checklist at the end of this section. Using the checklist and information contained in this section, you can formulate an action plan to protect groundwater drinking wells and reduce pollution from your home.

⁴ Collaborating author Bill McGowan, University of Delaware Cooperative Extension.

Assessment 3-1: Well Location*

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Position of well in relation to pollution sources	Well is uphill from all pollution sources. Surface water doesn't reach well or is diverted.	Well is level with or uphill from most pollution sources. Some surface water runoff may reach well.	Well is downhill from pollution sources or in a pit or depression. Surface water runoff reaches well.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Separation distances between well and pollution sources	Distances from potential pollution sources meet or exceed all state minimum requirements.	Some but not all distances from potential pollution sources meet state minimum requirements.	Distances from most or all potential pollution sources do not meet state minimum requirements.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Soil type	Soil is fine-textured like clay loams or silty clay.	Soil is medium textured like silt or loam.	Soil is coarse-textured like sand, sandy loam, or gravel.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Subsurface conditions	The water table or fractured bedrock is deeper than 20 feet.	The water table or fractured bedrock is about 20 feet.	The water table or fractured bedrock is shallower than 20 feet.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High

* Adapted with permission from NRAES-87, Home*A*Syst: An Environmental Risk-Assessment Guide for the Home

Well Location

When possible, locate a well where *surface water* (for example, stormwater runoff) drains away from it. If a well is downhill from a leaking fuel storage tank, septic system, or over-fertilized farm field, it runs a greater risk of becoming contaminated than a well uphill from these pollution sources. In areas where the water table is near the surface (western areas of the watershed) groundwater often flows in the same direction as surface water. But, the slope of the surface does not always indicate the direction of groundwater flow.

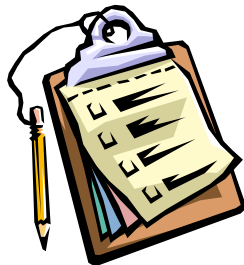
Soil and Bedrock Type, Distance to the Water Table

Pollution risks are greater when the water table is near the surface because contaminants have a short distance to travel. Groundwater contamination is more likely if soils are shallow (not the case in the Mokelumne River Watershed) or if they are highly porous (sandy or gravelly). For more information on soil and bedrock characteristics, and the water table in San Joaquin County, see Section 1 Physical Characteristics of Your Homesite on page 2.

New Wells

It is best to provide as much separation as possible between your well and potential pollution sources. These potential pollution sources include underground fuel storage tanks, septic systems, and abandoned wells. Separating your well from a pollution source might reduce the chance of contamination, but it does not guarantee that the well will be safe.

Fill out the assessment on the next page to rate your risks for well construction, maintenance, water testing, and unused wells. Then read the text on the following page to find out ways to reduce your risks. Some choices might not correspond to your exact situation, so choose the response that best fits. Be sure to record any medium or high risks on the action checklist on the last page of this section.



Assessment 3-2: Well Construction, Maintenance, and Testing*

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Well age	Well is less than 20 years old.	Well is 20-50 years old.	Well is more than 50 years old.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Well type	Drilled well.	Driven point (sand point) well.	Dug well.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Casing height above land surface	Casing is 12 or more inches above the surface. If the area floods, casing is 1-2 feet above the highest recorded flood level.	Casing is at the surface or up to 12 inches above the surface.	Casing is below the surface or in a pit or basement.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Condition of casing and well cap (seal)	No holes or cracks are visible. Cap is tightly attached. A screened vent faces the ground.	No holes or cracks are visible. Cap is loose.	Holes or cracks are visible. Cap is loose or missing. Running water can be heard or seen.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Casing depth relative to land surface	Casing extends 50 or more feet below the land surface.	Casing extends 20-50 feet below the land surface.	Casing extends less than 20 feet below the land surface.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Backflow protection	Measures are taken to prevent backflow and, where necessary, anti-backflow devices are installed.	Measures are sometimes taken to prevent backflow. No anti-backflow devices are installed.	No measures are taken to prevent backflow. No anti-backflow devices are installed.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Well inspection and "tune-up"	Well was inspected within the last ten years.	Well was inspected 10-20 years ago.	Well was inspected over 20 years ago, or don't know when well was last inspected.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Water Testing	Consistent, good water quality. Tests meet standards for bacteria, nitrate, and other contaminants.	Some tests do not meet standards or tests approach standards.	Water is not tested. Water is discolored after a rainstorm. There are noticeable changes in color, odor, and taste.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Unused wells on your property or in your area	There are no unused wells, or there are unused wells that are properly sealed.	There are unused wells that are not sealed but are capped and isolated from contaminants.	There are unused, unsealed wells that are in poor condition, near pollution sources, and/or uncapped.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High

* Adapted with permission from NRAES-87, Home*A*Syst: An Environmental Risk-Assessment Guide for the Home.

Well Construction, Maintenance, and Unused Wells

Most residential wells today are drilled wells, and are usually four to eight inches in diameter. Well drillers commonly install a steel or plastic pipe casing to prevent the well hole from collapsing during drilling (residential wells can be 200 feet deep or more). The space between the casing and the sides of the hole is a direct channel for surface water and pollutants to reach the water table. Drillers usually fill the space with cement or clay.

The depth of casing required for your well depends on the depth to groundwater and the nature of the soils and bedrock below, but a minimum 20 feet of casing should be used for all wells. The casing should extend at least 12 inches above the surface of the ground. If there are floods where you live, the casing should extend up to two feet above the highest recorded flood level for the property. The ground around the casing should slope away from the wellhead in all directions to prevent water from pooling around the casing. The well cap should be firmly attached to the casing, with a vent that allows only air to enter. If your well has a vent, be sure it faces the ground, is tightly connected to the well cap, and is properly screened to keep insects out.



Well Inspection

You should visually inspect the condition of your well casing for holes or cracks. Examine the part that extends up out of the ground. Remove the cap and inspect the inside casing using a flashlight. If you can move the casing around by pushing it, there could be a problem with the well casing's ability to keep out contaminants. Well equipment doesn't last forever and should be inspected by a qualified well driller or pump installer every 10-15 years. Keep well construction details along with dates and results of maintenance visits for the well and pump. These records will help you and future owners follow a good maintenance schedule.

Abandoned, Unused Wells

Some properties have wells that are no longer used. Older homes can have an abandoned shallow well that was installed when the house was first built. If not properly filled and sealed, these wells can provide a direct channel for pollutants in runoff to reach groundwater. A licensed, registered well driller or pump installer should be hired to close these wells. Effective well plugging calls for experience with well construction materials and methods. Money spent sealing a well will be a bargain compared to the potential costs of clean up or the loss of property value if contamination occurs.

Water Testing

If you have a well, your water should be tested once each year. Water should be tested more often if: someone in your household is pregnant or nursing, there are unexplained illnesses in the family, neighbors find a dangerous contaminant in their water, you note a change in water taste, odor, color, or clarity, or if there is a spill of chemicals or fuel into or near your well. The four most common indicators of trouble in well water are: *bacteria*, *nitrates*, *pH*, and *total dissolved solids (TDS)*. You can seek further advice on testing from your local Cooperative Extension Office or health department.

Section 4: Household Wastewater⁵

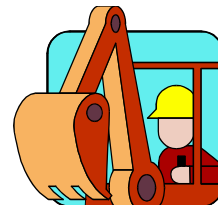
This section provides general guidelines for safe management of household wastewater. Wastewater treatment systems help protect your health and the environment. Household wastewater from sinks, toilets, washing machines, and showers carries dirt, soda, food, grease, and bodily wastes out of your house. This wastewater also carries disease-causing bacteria, viruses, and other *pathogens* as well as nitrogen, phosphorous, and organic wastes (*nutrients*). These nutrients promote weed growth and lower oxygen levels in surface water and thus affect fishing and recreational use of rivers and lakes.

Wastewater treatment systems are designed to remove or break down these contaminants before they enter groundwater, or nearby lakes, streams, or wetlands. Most people in the city of Lodi and communities like Woodbridge are connected to community sewer systems. Houses in these communities are connected to *sanitary sewer* systems. The sanitary sewage system transports household wastewater to a sewage treatment plant. This wastewater is filtered, treated, and disinfected before it is discharged into a stream or river.

This section of the handbook is generally more for residents who have septic systems buried in their yards. But even if wastewater is sent to a sewage treatment plant, there are still ways you can reduce the impact your wastewater has on your community and the environment. Conserving water and being careful about what you put down the drain are easy ways to help.

Wastewater treatment is often out-of-sight and out-of-mind until problems occur. Knowing the basics about your household system and taking simple precautions can prevent problems. It's a wise investment to keep your system working well because replacing a failed system can cost thousands of dollars.

A typical septic system consists of a septic tank, distribution system, and drainfield. These drainfields are sometimes known by other names such as: soil absorption field, leach field, or tile field. There are also some alternative household wastewater treatment options. This handbook will deal with the most common septic system. For information on alternative systems, contact your local Cooperative Extension agent, or the San Joaquin County Health Department.



Fill out the assessment tables to the best of your ability. Then, read about ways to manage and reduce household wastewater. Note all medium and high risks on the checklist at the end of this section. Using the checklist and information contained in this section, you can formulate an action plan to pinpoint and minimize risks before they become expensive health or environmental problems.

⁵ Collaborating author Barbara Kneen Avery, College of Human Ecology, Cornell Cooperative Extension.

Assessment 4-1: Septic System Design and Location*

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Capacity of System	Tank is designed to handle more wastewater than required, based on the size of the home.	Capacity just meets load requirements, but I watch out for factors indicating system overload. Water conservation measures are taken.	Bathrooms, bedrooms, or water using appliances are added without reexamining the capacity of the wastewater system.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Separation distance	Drainfield is at least 100 feet from any well or surface water.	Drainfield is between 50 and 100 feet from a well or surface water.	Drainfield is less than 50 feet from a well or surface water.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Age of system holding tank YEAR INSTALLED:	System is 5 years old or less	System is between 6 and 20 years old.	System is more than 20 years old.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Effluent filter	An effluent filter is installed and cleaned regularly.	An effluent filter is installed but not cleaned often enough.	There is no effluent filter installed on the septic tank outlet.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Safety devices	An alarm on the pumping chamber or holding tank indicates that the tank is full or power has been cut off to the pump.		There is no alarm to indicate tank overflow or that power has been cut off to the pump.	<input type="checkbox"/> Low <input type="checkbox"/> High
Backflow protection	A backflow valve is installed to prevent backup during floods.		No backflow valve is installed to prevent backup during floods.	<input type="checkbox"/> Low <input type="checkbox"/> High

* Source: NRAES-87, Home*A*Syst: An Environmental Risk-Assessment Guide for the Home

Septic System Design and Location

Your household septic system must be designed for the maximum occupancy of your home. Both the septic tank and drainfield should have the capacity to treat all the wastewater generated in your house, even at times of peak use. In San Joaquin County, a three-bedroom home requires a septic tank with a capacity of 1,200 gallons. For a four-bedroom home, the tank capacity requirement is 1,600 gallons. For each additional bedroom, increase the tank capacity by 400 gallons.

The septic tank should be large enough to hold two days worth of wastewater (two days is long enough to allow solids to settle out by gravity). Household water use in excess of the system's design capacity can lead to incomplete wastewater treatment or system failure. More frequent pumping of your septic tank or conserving water can extend the life of the system. Adding a bathroom or a water-using appliance (such as a Jacuzzi, dishwasher, or water softener) might require an expansion of your septic system.



Septic Systems Performance and Safeguards

If you have a septic system, then it is likely your household water is supplied by a well on your property. To prevent contamination of water supplies, San Joaquin County requires leach lines be at least 100 feet from any drinking water well or streambed, and 200 feet from a lake. (If your septic system was installed prior to 1972, the separation required in San Joaquin County is 50 feet from a drinking water well or flowing water.) The greater the separation, the less chance there is of contaminating the water supply. It is better if your septic system is downhill from a well.

Septic systems should last 15 to 40 years or more, depending on how they were designed and how well they are maintained. If your septic tank is made of steel, it will rust and need replacement. The older a system is, the more likely that it does not meet the latest standards.

Solids that do not settle out in the tank can be carried out of the tank with effluent and clog the drainfield. This will lead to premature system failure. By placing an effluent filter on the outlet, you can capture small particles and prevent them from clogging the drainfield. Bacteria that slowly digest wastes in the tank produce gas bubbles. A gas baffle near the outlet deflects the bubbles and the disturbed sludge away from the outlet.

An alarm should be installed on holding tanks or pumping chambers to warn you if the tank is nearly full. If your system depends on a pump (instead of gravity), you should have a backup power supply available in addition to adequate storage capacity in the tank. In flood hazard areas, backflow valves should be installed on the main distribution line to prevent waste from flooding back into the tank and your home.

Assessment 4-2: On-site System Maintenance*

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Maps and records	I keep a map and good records of repairs and maintenance.	The location of my tank and date of last pumping are known but not recorded.	The location of my system is unknown. I do not keep a record of pumping and repairs.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Tank pumping (including holding tanks)	<p>The septic tank is pumped on a regular basis as determined by an annual inspection, or about every three to five years.</p> <p>The holding tank is pumped as needed.</p>	The septic tank is pumped, but not regularly.	<p>The septic tank is not pumped.</p> <p>The holding tank overflows or leaks between pumpings.</p>	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Condition of tank and baffles	The tank and baffles are inspected for cracks; repairs are made promptly.		The condition of the tank and baffles is unknown.	<input type="checkbox"/> Low <input type="checkbox"/> High
Drainfield protection	Vehicles and other heavy objects or activities are kept from the drainfield area.	Occasionally, the drainfield is compacted by heavy objects or activities.	Vehicles, livestock, heavy objects, or other disturbances are permitted in the drainfield area.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Diverting surface water	All surface runoff is diverted away from the drainfield.	Some surface water flows into the drainfield area.	Runoff from land, rooftops, driveways, etc. flows into the drainfield.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Plantings over the drainfield	Grass or other shallow-rooted plantings are over the drainfield.		Trees and shrubs are growing on or near the drainfield.	<input type="checkbox"/> Low <input type="checkbox"/> High
Signs of trouble	Household drains flow freely. There are no sewage odors inside or outside. Soil over the drainfield is firm and dry. Well water tests negative for coliform bacteria.	Household drains run slowly. Soil over the drainfield is sometimes wet.	Household drains back up. Sewage odors can be noticed in the house or yard. Soil is wet or spongy in the drainfield area. Well water tests positive for coliform bacteria.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High

* Source: NRAES-87, Home*A*Syst: An Environmental risk-Assessment Guide for the Home

On-Site System Maintenance

Keeping good records each time your septic system is pumped, inspected, or repaired will help you make cost-effective maintenance decisions. This information is also valuable if you sell or transfer your property.

If you have not worked with your septic system before, you might need to contact the previous homeowner or a pumper's records for information that could include the location of your system and most recent pumping, or other maintenance performed. If you secured a county permit prior to installing your septic system, the Environmental Health Division in the San Joaquin County Public Health Office will have a map showing the location of the septic system on your property.

Regular pumping is the most important action you can take to maintain your system. As more solids accumulate in the tank, particles are more likely to flow out of the tank and into the drainfield. The cost of pumping the septic tank (typically less than \$300) is far less than the expense of replacing a drainfield clogged by escaping solids (could approach \$10,000). The best way to determine when to pump your tank is to have it inspected annually.

Pumping as needed based on the results of periodic inspections will minimize your maintenance costs and maximize the system's longevity. Inspection can also identify problems before they cause a backup or a drainfield failure. Generally, your tank should only need to be pumped every three to five years. But the need for pumping will vary based on the size of your septic tank, the amount of wastewater generated by your household, the amount of solids carried in the wastewater, and the age of your septic system.



After pumping, the tank and other components should be inspected by a professional for cracks, and the condition of the baffles. Leaks should be repaired promptly. **Never** crawl inside or lean into a septic tank without proper ventilation and safety precautions as the gases inside septic tanks can be deadly!

It is also important to protect your drainfield or leach lines. A septic system depends on good soil conditions for treatment and disposal of effluent. Water must be able to percolate through the soil at a reasonable rate. To prevent soil compaction, don't drive vehicles on the drainfield. Do not pave, build, pile heavy objects, or place a swimming pool over a drainfield. These activities compact the soil, and microbes in the soil need oxygen to help them digest wastes.

Signs of Trouble

Some signs that your system might be failing or in need of maintenance include:

- Foul odors in your home or yard.
- Slow or backed up drains could be caused by a clog in the house pipes, septic tank, drainfield, or roof vent for your household plumbing.
- Wet, spongy ground or lush plant growth could appear if there is a leaking tank or failing drainfield.

- ❑ Repeated intestinal illnesses in your family could occur if your drinking water supply is contaminated by poorly treated wastewater. Have your drinking water tested annually for coliform bacteria and nitrates.
- ❑ Algal blooms and excessive weed growth in nearby ponds or lakes can be caused by phosphorous leaching from septic systems.

Respond quickly to any problems you observe. It could be necessary to expand or modify your system to avoid further problems. Try to base your decision on what is best for the health of you and your family, and for the environment. Keep in mind that what seems like the least expensive option could be very costly in the long run.



Assessment 4-3: Septic or Sewage System Inputs*

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK	
Solid wastes	There is no garbage grinder (dispose-all) in the kitchen. No grease or coffee grounds are put down the drain. Only toilet tissue is put in the toilet.	There is moderate use of a garbage grinder, and some solids are disposed of down the drain.	There is heavy use of a garbage grinder, and many solids are disposed of down the drain. Many paper products or plastics are flushed down the toilet.	<input type="checkbox"/>	Low
				<input type="checkbox"/>	Medium
				<input type="checkbox"/>	High
Cleaners, solvents, and other chemicals (also applies to holding tanks)	There is careful use of household chemicals (paints, cleaning products). No solvents, fuels, or other hazardous chemicals are poured down the drain.	There is occasional disposal of hazardous household chemicals in the wastewater system.	There is heavy use of strong cleaning products that end up in wastewater. Hazardous chemicals are disposed of in the wastewater system.	<input type="checkbox"/>	Low
				<input type="checkbox"/>	Medium
				<input type="checkbox"/>	High
Water conservation	Only water conserving fixtures and practices are used. Drips and leaks are fixed immediately.	Some water conserving steps are taken (such as using low-flow shower heads or fully loading washing machines and dishwashers).	Standard high-volume bathroom fixtures are used (toilets, showers). No effort is made to conserve water. Leaks are not repaired.	<input type="checkbox"/>	Low
				<input type="checkbox"/>	Medium
				<input type="checkbox"/>	High
Water usage	Laundry and other major water uses are spread out over the week.		Several water using appliances and fixtures are in use in a short period of time.	<input type="checkbox"/>	Low
				<input type="checkbox"/>	High

* Source: NRAES-87, Home*A*Syst: An Environmental Risk-Assessment Guide for the Home

Septic or Sewage System Inputs

Don't treat the wastewater treatment system like a trash can or compost pile. Tissues, disposable diapers, baby wipes, sanitary napkins, tampons, condoms, cigarette butts, and other solid waste should be disposed of in the trash and not down the toilet. Since they do not break down easily, they can cause septic tanks or the settling tanks in sewage treatment plants to fill up faster.

Using the disposal or grinder in the kitchen sink can also add to the load on the system. Excess grease, fats, and coffee grounds can clog your septic system. Instead, consider composting food waste as an alternative. Your local cooperative extension office can provide you with information about composting.

Household Chemicals

Wastewater treatment systems were not designed to neutralize the wide variety of common household chemicals. Paints, solvents, acids, drain cleaners, oils, and pesticides can pass untreated through septic systems and contaminate the groundwater. High concentrations or large volumes of *water-soluble* cleaners or bleach can harm septic tank microbes. Section 5, Managing Household Hazardous Products (page 27) of this handbook gives you information about the proper disposal of household chemicals.

Avoid using chemical products advertised to improve septic system operation. They cannot replace routine pumping and could even be harmful. Buying and adding yeasts, bacteria, or enzymes is unnecessary as there should already be plenty of the right microbes digesting wastes in your system. Additives containing solvents to unclog your system can kill these microbes, and might contaminate your drinking water supply.

Water Conservation and Wastewater

It is estimated that the average American uses about 200 gallons of water per day. This includes water for drinking, bathing, washing clothes and dishes, and brushing your teeth. Reducing the flow of wastewater through the septic tank allows more time for solids to settle out and less chance of solid particles being carried into the drainfield or clogging the system. Less water in the drainfield means better aeration for microbes at work in the system. Here are some steps you can take to reduce the amount of water you use.

1. Take shorter showers, and turn the water off when washing and shampooing hair.
2. Repair leaky faucets, fixtures, and toilets immediately.
3. Run water only when necessary; for example, turn off the water while brushing your teeth or shaving.
4. Only run dishwashers and clothes washers when full.
5. Scrape but do not pre-rinse dishes before loading them into the dishwasher.
6. Adjust water softener settings to reduce the amount of water needed for backwashing and regeneration.
7. Spread out laundry or other major water-using chores over the week or day.

Section 5: Managing Hazardous Household Products⁶



Some products used around the home contain ingredients that can pose threats to your health or the environment unless they are properly handled. Vapors from solvents, like paint thinner, can be hazardous to breathe. Other products like motor oil or pesticides, if disposed of on the ground, can contribute to the pollution of a stream or drinking water. This section will help you make choices that will reduce risks to your family and your Watershed. **You** are responsible for the safe use, reuse, or disposal of any products in and around your home. Household products can be hazardous if they include ingredients that, if improperly managed, can pose dangers to human health or the environment.

Unless product warnings and label directions are followed, health problems can be caused by some of the products in your home. Health effects can range from minor problems such as irritated skin or watery eyes, to more serious problems such as burns, poisoning, or even cancer. The potential harm from exposure to a hazardous product depends on: the type of chemicals in the product, how much of the chemical you are exposed to, how frequently you are exposed, and your size, weight, and overall health.

Ingredients in some household products can be hazardous to plants and animals in natural environments. For example, pesticides or motor oil washing into a stream can harm fish. Human health can also be threatened if our food, water, or air becomes contaminated through improper use or disposal of a household product. Most chemicals likely to cause environmental problems are regulated by federal and state laws. But, because it is difficult to keep track of the small quantities used by homeowners, we must all do our parts to minimize the impact of use and disposal.

To protect the environment, don't dump oils, paints, pesticides, or any other household chemicals on the ground, on roads, or down storm sewers. Don't dump products into a wetland, stream, or any other body of water. Don't wash chemicals off the driveway with a hose. Don't pour pesticides or non water-soluble chemicals into a drain that leads to a septic tank, or spray pesticides on a windy day. Be sure to use up a product according to label directions, and share any leftovers with a neighbor or local organization. Find out if a product can be recycled and where to recycle it, or bring appropriate products to the hazardous waste collection program sponsored by communities like Lodi.

Fill out the assessment on the next page to help identify your risks from hazardous products. Then read about recommended ways to select, purchase, use, and store these products at your residence on the following pages. Note all medium and high risks on the checklist at the end of this section. Using the checklist and information contained in this section, you can formulate an action plan to reduce the chances of hazardous household products harming your family or the environment. Also, plan to use the Hazardous Products examples and inventory list to learn about possible hazardous household products in your home.

⁶ Collaborating author Elaine Andrews, Environmental Resources Center, University of Wisconsin Cooperative Extension.

Assessment 5-1: Product Selection, Purchase, Use, and Storage*

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Product selection	I always read labels; I understand signal words; and respect the health or environmental hazards labels describe. I choose the least hazardous product needed for the job.	I don't read labels or don't understand what they mean, but I use a "common sense" approach to safety.	I never read labels. I purchase products without considering what the product is made of or how it will be used.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Quantities purchased	I buy only what is needed for a specific job. I use up most of the product within a few months after purchase or give excess away to someone else.	I buy excess product, but provide safe and accessible storage.	I buy more than is needed, then purchase additional product without checking on current supplies.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Safety precautions	I follow label instructions and take recommended precautions against exposure (such as providing good ventilation and wearing safety goggles and gloves). I never mix products.	I occasionally read label instructions. I take some precautions. I occasionally mix products for specific cleaning tasks, but I always check safety precautions first.	I never follow label instructions and take no precautions-even when recommended. If one product doesn't work, I add in another without checking safety precautions.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Child safety	I store hazardous products in a locked cabinet or other location inaccessible to children.	I keep products out of the direct reach of children (on a high shelf, for example) but still accessible.	My products are easily accessible to children (for example, in an unlocked cabinet on the lower shelf).	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Containers, storage location, and spill protection	I store leftovers in their original containers, properly sealed. Products are stored by type. My home environment is protected against leaks or spills.	I store original containers in a disorganized way. I don't provide protection against leaks or spills.	I store products in areas with poor ventilation such as basements, closets, or crawl spaces. Containers are damaged or left open.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Ventilation	I store volatile products (like solvents and petroleum-based fluids) in places with good ventilation.	I don't pay attention to storage location, but each container is in good shape and tightly sealed.	I store products in areas with poor ventilation such as basements, closets, or crawl spaces. Containers are damaged or left open.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High

* Adapted with permission from NRAES-87, Home*A*Syst: An Environmental Risk-Assessment Guide for the Home.

Product Selection, Purchase, Use, and Storage

By carefully selecting a product for the job needed, you can control the degree of “hazard” at your home or property. It can be difficult to find out what is hazardous and how and to whom something is a hazard. Labels contain important information and often tell if a product could be hazardous. But, absence of a warning does **not** mean that the product is safe. Old products or those not designed for household use might not contain consumer information on the label.

Information on the product label can help you decide whether a product is right for the job and if it can be used safely in your situation. Household consumer products that are hazardous or contain hazardous substances are required to have human safety information or warning labels. Before you purchase or use a product, take the time to read the label. These labels provide details about how to safely use, store, and dispose of a product as well as first aid instructions when appropriate.

Signal words such as **caution**, **warning**, and **danger** draw your attention to important human safety information. On household products, they describe immediate health effects resulting from improper use. Products labeled **danger**, **flammable**, **poison**, **vapor harmful**, or **fatal if swallowed** can contain ingredients that could cause environmental damage as well as health problems if used, stored, or disposed of improperly.



When choosing among several brands of the same kind of product, read the labels to learn which product will meet your needs most safely. If you don't check first, you might buy a hazardous product such as a solvent-based cleaner when a detergent-based cleaner is available—or a common alternative like a kitchen cleanser will work.

Buy Only What You Need

If you buy more than what you need, household products will accumulate and create storage problems. If unused for long periods of time, product containers can become damaged and leak or products might change chemically and be less effective when you try to use them again.

Safe Storage

Leftover or used chemicals such as strippers, paint, waste oil, used engine coolant, and solvents may need to be stored until their next use or disposal. When storing these products, the primary concerns are child safety, indoor air quality, and prevention of damage to the household equipment or the environment. If you can smell a household product while it is in storage, the product lid may be loose, or ventilation may be inadequate to protect your health.

Be sure to separate *corrosives* like acids or lye from each other and from other hazardous products to prevent dangerous *chemical reactions*. Reactions occur when corrosives leak from their containers and drip or flow to other products. Corrosive materials are often stored where equipment and appliances are located. Be aware that they can corrode air conditioning and heating systems, hot water heaters, and other equipment or appliances. Routinely check areas where you store household products to make sure containers are closed tightly and not leaking, and that the sides of containers are not bulging.

Assessment 5-2: Product Disposal*

WASTE CATEGORY	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Household trash Trash containing plastics or empty containers of hazardous ingredients.	I rinse empty yard and garden pesticide containers and include rinse water in yard and garden management. I dispose of ash, mixed trash, and empty product containers at the community landfill. I do not burn trash.	I dispose of ash from mixed trash, leftover pesticides, and solvents on my property, but away from my well or waterway. I burn hazardous containers.	I always dispose of ash from mixed trash, leftover pesticides, and solvents near a well or waterway. I burn hazardous containers near people or animals.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Strong acids and Bases Found in hobby and recreation products, concentrated building cleaners, and building repair products.	I share any leftover products. I dilute strong acids and bases and pour them down a drain that connects to a sewage treatment facility.	I pour strong acids and cleaners down the drain without first diluting them with water. I send leftovers to a landfill (with proper protection for garbage haulers and employees).	I pour strong acids and cleaners directly into a storm sewer or waterway or on a paved slope leading to a waterway.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Antifreeze, waste motor oil	I recycle antifreeze and waste motor oil by taking them to properly qualified dumping stations.	I pour my used antifreeze into a septic system or municipal treatment system.	I dump used antifreeze and waste oil always in the same place near a well or waterway. I dump these materials directly into a waterway.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Batteries May contain mercury, cadmium, or lead.	I recycle batteries or take them to a hazardous waste disposal program.	I dispose of batteries in a community landfill.	I always dump batteries near a well or waterway.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Bottled gas	I recycle bottled gas containers.	I store containers that may still contain some gas.	I put containers in my trash or leave them lying around.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High

* Source: NRAES-87, Home*A*Syst: An Environmental Risk-Assessment Guide for the Home.

Assessment 5-2: Product Disposal *(continued)*

WASTE CATEGORY	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Cleaning and repair products containing hazardous solvents (non-water-soluble) and paint	I share leftovers when possible. I take leftover products containing mercury, pesticides, or hazardous solvents to a hazardous waste disposal program.	I dispose of leftover products in a community landfill.	I always dump leftover products. I dump leftovers near a well or waterway. I dump all my leftovers directly into a waterway. (NOTE: <i>this is illegal</i>)	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Fluorescent bulbs Contain mercury	I recycle burned-out fluorescent bulbs or lamps.	I put my burned-out bulbs in the trash	I leave my burned-out bulbs at a dump.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Pesticides	I use preventative actions to control pests, indoors and outdoors. I explore options for non-chemical pest controls. I properly choose, store, handle, apply, and dispose of chemical pest controls.	When solving pest problems, I do not practice much prevention nor explore non-chemical options.	I DO NOT handle pesticides as directed on the label.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High

Product Disposal

Unless a product is used up, you will have to dispose of it. For some products that are especially hazardous, like pesticides, even the product container will have to be disposed of properly. Disposal should be your last option because it is wasteful, and unless done properly, it can be unsafe for you and the environment. You can avoid the disposal problem by buying only what you need, using up leftovers, or recycling. By giving left over products to a neighbor or a local organization that can use them, you can turn a potentially wasteful problem into a cost-saving opportunity.

Household hazardous waste collection programs are held in San Joaquin County. Since only certain hazardous products are accepted, contact the program at (209) – 468 – 3066 to learn exactly what materials are accepted, and to get the dates and locations for collection sites. Used motor oil and engine coolant, for example, are accepted by some automobile shops and auto parts stores for recycling.

Paint and Pesticides

Municipalities that collect leftover hazardous household products report that paints make up about half of the material that people bring and thus are a costly (but avoidable) disposal expense. The best practice is to calculate how much paint you'll need before you buy it. Most leftover paint can be safely managed by sharing it with neighbors or organizations. But, exterior paints containing mercury, lead, or pesticides should be treated as hazardous waste.



Before using a pesticide, be sure that you have exhausted other options for managing the pest, weed, or fungus problem. There are several simple ways to do this: maintaining regular cleaning habits, especially in the kitchen area, caulking cracks and other openings to the outside, keeping screens repaired, and keeping houseplants healthy by providing appropriate care. If you do need to use a pesticide, be sure to read label information carefully before purchasing and buy only what you need.

Pay attention to use and disposal recommendations on labels. Before disposal, use up the product if possible. Rinse empty containers of liquid pesticides and use the rinse water as part of your yard and garden management. Section 7 of this handbook provides advice for managing yard and garden pesticides.

It is never appropriate to dump or burn hazardous products on your property, and products should **never** be poured down storm sewers. *Water-soluble* cleaning products can be safely disposed of down home drains if you flush the drain with plenty of water.

Septic system owners must be especially careful. The rule of thumb for septic systems is moderation. Don't dump large amounts of anything into a septic system. These systems are not designed to treat chemicals. If the product is specifically designed for home use with water, then moderate use will not harm the system.

Hazardous Product Examples and Inventory*

Category/Product	Is it properly stored?	Is information about proper disposal needed?	Are there special precautions to keep in mind?
HOUSEHOLD TRASH			
Ash/sludge from burned home or garage trash			
Fluorescent bulbs (might contain mercury)			
Waste motor oil			
Plastic wraps and containers (only hazardous when burned)			
Pesticide or solvent containers			
Empty containers from other product categories listed below			
CLOTHING AND FABRIC CARE PRODUCTS			
Mothballs			
Dry-cleaning fluids			
Spot removers (solvent-based)			
Shoe/leather polishes			
HOBBY AND RECREATION PRODUCTS			
Artist paints and solvents			
Charcoal lighter fluid			
Strong acids/bases			
Bottled gas			
Household batteries (might contain mercury or cadmium)			
BUILDING/WOOD CLEANERS AND REPAIR PRODUCTS			
Building and wood cleaners with organic ingredients:			
<ul style="list-style-type: none"> • Wood polishes 			
<ul style="list-style-type: none"> • Products for wood floor and panel cleaning 			
Building and equipment maintenance products:			
<ul style="list-style-type: none"> • Strong acids/bases 			
<ul style="list-style-type: none"> • Lead-based paint 			

* Source: NRAES-87, Home*A*Syst: An Environmental Risk-Assessment Guide for the Home.

Hazardous Product Examples and Inventory *(continued)*

Category/Product	Is it properly stored?	Is information about proper disposal needed?	Are there special precautions to keep in mind?
BUILDING/WOOD CLEANERS AND REPAIR PRODUCTS (continued)			
Building and wood cleaners with organic ingredients:			
<ul style="list-style-type: none"> Oil/alkyd paints and primers 			
BUILDING/WOOD CLEANERS AND REPAIR PRODUCTS			
<ul style="list-style-type: none"> Marine and exterior paints containing mercury and/or pesticides 			
<ul style="list-style-type: none"> Aerosol paint products 			
<ul style="list-style-type: none"> Stains and finishes 			
<ul style="list-style-type: none"> Roof coatings and sealants 			
<ul style="list-style-type: none"> Rust removers 			
<ul style="list-style-type: none"> Silicon lubricants 			
<ul style="list-style-type: none"> Other lubricants 			
<ul style="list-style-type: none"> Adhesive removers 			
<ul style="list-style-type: none"> Paint and finish preparation products 			
<ul style="list-style-type: none"> Adhesives such as glues and caulk 			
<ul style="list-style-type: none"> Wood-preserving products 			
<ul style="list-style-type: none"> Products for brush or spray gun cleaning 			
<ul style="list-style-type: none"> Water repellents for wood and cement 			
<ul style="list-style-type: none"> Solvents, such as those used in degreasers and paint thinners, stains, and varnishes 			
PESTICIDES			
Pesticides labeled “restrictive use”			
General use pesticides			
Old and unwanted pesticides			

Hazardous Product Examples and Inventory *(continued)*

Category/product	Is it properly stored?	Is information about proper disposal needed?	Are there special precautions to keep in mind?
VEHICLE MAINTENANCE CHEMICALS			
Vehicle maintenance products such as engine coolant, oil and grease, and transmission fluid			
Solvents for oil and grease removal and disposal			
Engine and parts cleaners such as carburetor and brake cleaner			
Paints and paint preparation products			
Lead acid batteries			
Battery terminal protector			
Tire cleaners			
Rust removers			
Ignition wire dryer			
Gasket removers			
Aerosol paint and primer products			
Brake quieter			
Brush and spray gun cleaners			

Section 6: Yard and Garden Care⁷

Most homes today, especially in residential areas, are landscaped with lawns, gardens shrubs, and trees. This section of the handbook examines the potential impact of yard and garden care on the environment.

The natural settings of your home and property might be the last places you might look for pollution and stormwater runoff problems. But on average, homeowners use ten times more chemical fertilizers and pesticide per acre than farmers use on farmland. Especially if applied improperly, these chemicals can pollute nearby lakes and streams and find their way into drinking water wells.

Indiscriminate watering of lawns and gardens wastes large amounts of water. Other problems occur when exposed soil washes away during a storm, harming wildlife habitat and choking waterways.

Gasoline-powered mowers, weed cutters, leaf blowers, and other devices pollute the air. A lawnmower powered by a two-cycle engine spews the same amount of exhaust as a car driven 350 miles!

Though it might seem that what you do at your property is minor, the effects of chemicals, soil loss, and wasted water from thousands of homes in a watershed can add up in a hurry.



Fortunately, you can have a low maintenance yard without losing the well-kept appearance of your home. Good management practices not only benefit the environment, they can also save you time and money.

Imagine how much less time lawn care would take if grass clippings were left on the lawn instead of being raked and/or bagged. Think about the cost, time, and effort it would take to replace a lawn or garden damaged by over-fertilization or misuse of pesticides.

The assessment table on the following page will help you identify potential environmental risks related to your yard and garden maintenance practices. Although some choices might not correspond exactly to your situation, choose the response that best fits. Then read the text in the following section to identify simple and inexpensive ways you can reduce your risks.

⁷ Collaborating authors K. Marc Tefteau, Wye Research and Education Center, University of Maryland Cooperative Extension and Ray Bosmans, Home and Garden Information Center, University of Maryland Cooperative Extension.

Assessment 6-1: Yard and Garden Care*

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Fertilizers	Soil is tested for nutrients, and fertilizer is used as recommended	Soil is tested, but more fertilizer is used than recommended.	Soil is not tested, and fertilizer is used in large amounts.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Pesticides	Label instructions for chemicals are strictly followed or non-chemical or low-toxicity methods (such as integrated pest management) are used to control pests.		Chemicals are used without regard to label instructions or conditions.	<input type="checkbox"/> Low <input type="checkbox"/> High
Lawn (turf) type and maintenance	Grass is suited to soil type, available sunlight, and climate. Grass is pest-resistant and mowed to the proper height.	Grass is suited to the site but is well fertilized and mowed short.	Grass type is not suited to available light, soil type, or climate. Grass is pest-prone and mowed too short.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Ground cover and other plantings	Ground covers, flowers, trees, and shrubs are planted to reduce soil erosion. Plantings resist insects and disease.	A slow-spreading ground cover is used.	A hilly landscape or lack of ground cover causes soil erosion. Plants require insect and disease fighting chemicals to survive.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Composting	The compost pile is well-maintained: it is aerated regularly and contains yard waste, vegetable food scraps, and a nitrogen source such as manure	The compost pile is poorly maintained: it is not aerated or lacks the proper mix of materials. Dog, cat, and other pet wastes are added to the pile.	The compost pile is poorly maintained: it contains excessive high-nitrogen material and is not turned regularly. The pile is less than 50 feet from a shallow well or surface water.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Water requirements of plants	Grass, flowers, trees, and shrubs are able to survive with normal rainfall.	Landscape plants require light to moderate watering.	Heavy watering is required to keep the lawn and other plants alive.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Watering methods	Watering is done in the morning or evening, only as needed. Low-water use devices (like soaker hoses) are used. The sprinkler system is on manual control.	Watering is excessive. (For example, the sprinkler is left unattended, and much water lands on the pavement.)	Watering is done during the heat of the day. The sprinkler system is used daily without regard to weather conditions. There is excessive water runoff.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High

* Source: NRAES-87: Home*A*Syst: An Environmental Risk-Assessment Guide for the Home

Managing Lawns, Gardens, and Landscaping

Normal applications of lawn and garden products generally pose few problems. A properly maintained home landscape can even help reduce soil erosion and increase water retention and soil fertility. Poor maintenance through either neglect or excessive chemical use can lead to soil problems, polluted runoff, and unsafe well water.

The first step is to have your soil tested. Soil already has some of the nutrients needed for good plant growth (i.e., nitrogen, phosphorous, and potassium). It is important to find out how much of each nutrient is present so you will know how much and what kind of fertilizer to use. Adding fertilizer without first testing your soil is like taking medicine without knowing if you need it. Check with your local cooperative extension office or garden supply store about soil testing.

The soil tests will let you know if your lawn needs fertilizer, and if it does, how much and where. If you apply fertilizer at the wrong time or in the wrong amount, you can make conditions worse and insect and disease problems can increase. Excess fertilizer is likely to wash away before grass can take it up. Fertilizer in runoff contributes to unwanted plant growth in nearby streams and lakes. In sandy soils, nitrogen and other chemicals can seep downward and enter groundwater that is used for drinking.



If you hire a lawn-care service, make sure they test your soil before applying fertilizer. Insist that the fertilizers only be applied when the weather is favorable (no wind, rain is not expected for at least 24 hours). Be sure to keep pets and children away from treated lawns for at least 24 hours. Always sweep excess fertilizer off of walks and back onto the lawn so it doesn't get washed into storm drains by rain or sprinklers. Non-chemical fertilizers such as compost, fish meal, and other soil treatments should be applied based on the needs of your lawn.

Proper Lawn Care

Cutting grass to the right height is important. Lawns cut too short invite weeds to invade. Grass clippings should be left on the lawn. In many cases, they supply enough natural fertilizer so that only minimal additional fertilizer is needed to keep your lawn green and healthy. Clipping should be swept off of paved surfaces so they don't get carried away by stormwater.

Switching to a human-powered or *reel mower* can reduce air and noise pollution, and provide exercise. If you reduce your lawn size and grow plants that require little maintenance, a reel mower can be very practical. If your lawn is too large to efficiently use a reel mower, consider an electric lawnmower.

Making *compost* is a cost-effective, natural way to handle leaves, grass clippings, and other yard wastes. Composting creates an organic, slow-release fertilizer and soil-enhancing material. It takes advantage of nature's recycling system for breaking down plant and other organic materials. To compost, simply put yard wastes in a pile, or install home made or purchased bins to contain the material. In addition to yard waste, you can add vegetable trimmings and fruit peels, and coffee

grounds from your kitchen. The compost pile will remain relatively odor-free if it is turned and aerated regularly.

Finished compost can be mixed into garden soil or spread on lawns as a slow-release fertilizer. Check the library, your local Cooperative Extension Office, or garden stores for suggestions and other ideas (see page x for contact information).

Residents of rural areas should be cautious about using animal manures in compost. Many animal manures contain high levels of nitrogen, and different types of manures have different nitrogen levels. If you mix manure from horses, sheep, cows, or other plant-eating animals into your compost, add plenty of high-carbon materials such as leaves, straw, or sawdust to keep concentrations of nitrogen and other nutrients low. This will help prevent contamination of runoff and groundwater. Do not put pet wastes (for example, cats and dogs) into compost piles due to potential parasite and disease problems.

Pesticide Use

Pest prevention is often simpler and cheaper than pest removal. Pests will be less of a problem if you have disease resistant grasses and other plants. Grass and native plants suited to local rainfall amount, temperature, soil type, and available light will always be more resistant, and require less chemicals than other types. Consult with your cooperative extension office or the California Native Plant Society for advice.

If properly used, pesticides can pose only a minimal risk to your health and the environment. Correctly identifying the pest is the most crucial step. Many plant problems are related to temperature extremes, over-watering, drought, damage caused by lawnmowers, or overuse of chemicals, rather than by insects.

When using pesticides, apply them only where pests occur. Select chemicals that are the least toxic or that break down quickly into less harmful substances. Be sure to read the label carefully and follow all directions for application rates and methods. And always ask yourself if you can tolerate a few more weeds and “bugs” around your home for the sake of clean groundwater and an environment with fewer chemical pollutants.

Integrated Pest Management or *IPM* is a systematic approach to controlling pests in your landscape. Weeds can be controlled by hand-pulling or hoeing, and bugs can be removed by picking them off vegetables and garden plants. Cleaning up dead leaves and debris removes potential pest homes. Using natural predators to control pests is another method. Release beneficial insects and microorganisms that feed on pest insects into your garden. For IPM to work, you will have to give a little more time and attention to your yard and garden.



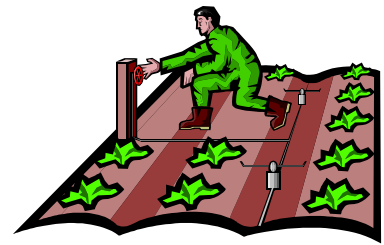
When you have no other choice, try to find nontoxic or low-toxic chemicals such as insecticidal soaps. Follow directions carefully, and mix only the amount you need.

Watering Practices

The average American uses about 200 gallons of water each day. This includes water used for cooking, bathing, washing clothes and dishes, and drinking. Up to half of that total is used for landscaping and gardening, depending on climate, the time of year, and the plant species on your property. Because of the long dry season in California's Central Valley, many homes have automatic sprinkler systems for lawns, gardens, and landscape plants. It is not unusual to go up to five months without rain in the watershed. Because so many people must water their lawns and gardens, it is vital to use efficient watering practices.

Watering should be timed to meet the biological needs of plants. Watering slowly and deeply helps develop deep roots, and in the long run plants will require less frequent watering. Because of the long dry season, the use of native plants that are accustomed to the hot, dry summers of the valley might be the only way to reduce your water usage. Consider using drought-resistant turfgrass species for your lawn, such as tall fescues or buffalo grass. Perennial flowers conserve water because their roots grow deeper than annual flowers and require little or no watering once they are established.

Plants can absorb only so much water. Overwatering wastes water and can injure certain plants. Some estimates indicate that up to 85% of all landscape problems are directly related to overwatering. Placing several containers with marks at one-inch intervals under your sprinklers will help you gauge how much water your lawn or garden is getting. Drip irrigation systems and soaker hoses deliver water to the intended plants more efficiently than *broadcast spraying*.



The time of day when you water matters, too. Early morning is the best time of day. It allows the water to get deeper into the soil with minimal evaporation. If you water during the heat of the afternoon, much water can be lost to evaporation. Try using a wood chip or other kind of mulch in gardens and around shrubs and trees. Mulch helps to cover and cool the soil, and it helps discourage evaporation, weed growth, and erosion.

Preventing Erosion

Soil washed away by runoff can pollute streams, lakes, and wetlands. Even if you don't live near water, soil can eventually be carried to surface water in runoff from. Gardens, lawns, and construction sites with areas of bare soil, especially on sloped land, are prone to soil erosion.

Using mulch or planting ground-cover vegetation can help reduce erosion and protect soil at the same time. Using landscape fabric is another option. On steep slopes, plant a vigorous ground cover and avoid turfgrasses, which require mowing and watering. You can also help prevent soil loss by building terraces or retaining walls on slopes. Again, be sure to choose plants that are suited to the area and resistant to insects and diseases.

In general, your lawn will require three to four feet of water per year (including rainfall). If you are putting more than this amount on your lawn (use the container method mentioned above to measure), you are likely overwatering. Consult your Cooperative Extension Office or local garden store for advice on improving watering efficiency.

Local Laws Governing Water Use for Lawns and Gardens

If you live within the city limits of Lodi, you are subject to the requirements of the City of Lodi Water Conservation Ordinance. This conservation measure seeks to help the city conserve precious freshwater resources while still providing ample water for landscaping and other household needs. Lodi residents should be aware of some simple guidelines contained in the ordinance designed to eliminate the wasting of water. These provisions include:

- Watering of lawns, gardens, outdoor plants, and landscaping is allowed only on permitted watering days. Houses with odd-numbered addresses may water on Wednesdays, Fridays, and Sundays. Houses with even-numbered addresses may water on Tuesdays, Thursday, and Saturdays. Watering is not allowed on Mondays.
- Watering lawns, gardens, outdoor plants, and landscaping is only permitted before 10 a.m. and after 6 p.m. from May 1 through September 30 each year. Watering between 10 a.m. and 6 p.m. is prohibited during these months.
- Allowing excess water to flow into a gutter or any drainage area for longer than three minutes is prohibited.

The ordinance also bans the use of a hose for washing down sidewalks, driveways, parking areas, patios, and other paved areas or buildings including tennis and basketball courts. There are no open hoses allowed. A bucket should be used to wash motor vehicles, trailers, boats, and other moveable equipment. A hose can be used only to rinse these items, but not for more than three minutes.

A common sense suggestion is to shut off all automatic sprinkler systems during and following rain. This is especially true from November 1 through February 28, which are the predominant months for rain in California's Central Valley. During this time, one watering per week or less should be more than enough. It is best to turn automatic sprinkler systems off from November 1 to May 1, and use the systems on a manual setting only if it has not rained for more than two weeks.

Section 7: Liquid Fuels: Safe Management of Gasoline, Heating Oil, Diesel, and Other Fuels⁸

We use liquid fuels every day to power vehicles, run machines, and heat homes. If you are like most people, you own at least one fuel-burning device such as a lawnmower. You likely keep fuel for these devices in portable containers that hold from one to five gallons. For home heating and vehicle use, especially in rural areas, you might have larger quantities of fuel in underground, basement, or aboveground storage tanks.

Fuel stored in portable containers, and in the gas tanks of fuel-burning devices such as leaf blowers, weed trimmers, chain saws, auxiliary generators, or motorboats, is a potential risk to groundwater and surface water. Fuels are hazardous and can pollute the water you drink and the air you breathe if improperly managed. As little as one gallon of gasoline can quickly contaminate groundwater above health advisory levels. Petroleum products contain many toxic compounds, including *benzene*, which is known to cause cancer.

Don't depend on taste or smell to alert you about fuel in your drinking water. Unknown or forgotten underground tanks have come back to haunt property owners. Contaminated soil and water can make property values plummet, trigger environmental liability and costly cleanups, and drive away lenders and prospective buyers. Fuel vapors can ignite fires or collect underground and explode.



Aboveground and underground fuel storage tanks generally are not found in residential areas of Lodi, however they might be used by some businesses, or by residents in rural areas of the watershed. Fuel stored in large tanks pose greater risk of contamination than the small quantities stored for lawnmowers and similar equipment. Though it is important to pay particular attention to the high potential risks from large tanks, storing any amount of fuel increases the environmental risks around your home. For suggestions and precautions regarding management of large fuel tanks on your property, refer to the “Special Considerations” section of this handbook.

Improving fuel storage and management protects the health of your family, the community, and the environment. Better management will also safeguard your home. Check all the places where you store fuels at your home. Use the assessment table on the following page to evaluate your practices.

The assessment table will help you identify potential environmental risks from fuel storage on your property. Although some choices might not correspond exactly to your situation, choose the response that best fits. Then read the text in the following section to identify simple and inexpensive ways you can reduce risks to your family and the environment.

⁸ Collaborating authors Richard Castelnuovo, National Farm*A*Syst Office, Madison, Wisconsin and Dean Solomon, Michigan State University Extension.

Assessment 7-1 Liquid Fuels: Portable Fuel Containers*

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Quantities Stored	Moderate amounts of fuel are purchased. Fuel is stored for less than six months.	Fuel is stored more than six months before use.	Excess quantities of fuel are purchased. Fuel is stored more than twelve months.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Container Safety	Fuel is stored in UL-approved or original sale containers.	Fuel is stored in a UL-approved or original sale container with signs of age or damage	Fuel is stored in a non-approved container (for example, a glass jar or open container)	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Storage Location	Fuel is stored in a well-ventilated, unattached garage or shed away from the house. Concrete floor is best.	Fuel is stored in a garage attached to the house. The area is poorly ventilated.	Fuel is stored inside the home or in the basement. Dirt floor is least safe.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Management and Disposal	Fuel is used up in devices, so disposal is unnecessary.	Fuel is stored on-site indefinitely or until evaporated.	Fuel is poured down a house drain or storm drain, poured on the ground, or sent to a landfill. (These practices are illegal)	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Leak Detection	Storage containers and fuel-driven devices are examined often for leaks.	Storage containers and fuel-driven devices are sometimes examined for leaks.	Storage containers and fuel-driven devices are never examined for leaks.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High

* Adapted with permission from NRAES-87, Home*A*Syst: An Environmental Risk-Assessment Guide for the Home

Portable Fuel Containers and Tank Location

It is best to purchase and store minimum amounts of fuel for short periods. This means you should buy in small quantities and buy no more than you need for a month or so of mowing the lawn. It is also important to use only safe, approved, or original sale containers to store fuels. UL-approved containers (red for gasoline, blue for kerosene, and yellow for diesel) can be purchased in places as convenient as your local hardware store. The container should be clearly labeled to identify its contents, and fitted with a spout or other device to allow pouring without spilling.

Be careful when pouring gasoline, a fuel mixture, or other recommended fuels into a motorized device. Use a drip pan under your work area to avoid spills. Absorb any spills with kitty litter, sawdust, or corn meal. You can dispose of the materials from a small spill by placing them in a plastic bag in the garbage. Materials from a large spill should be taken to a hazardous waste disposal event.

Storing fuels in an uncovered or unapproved container, such as a glass jar or plastic jug, is dangerous. For an extra measure of spill protection, keep fuel containers inside a bucket or other container that can prevent leaks from spreading.

Keep Containers Safe and Check Them Regularly

To reduce the health hazards and fire danger of fuel vapors, be sure to keep fuel containers and fuel-powered devices in a secure, well-ventilated place with a paved floor. Storage in an unattached shed or garage is safer than storing them in a garage attached to the home. Store containers off of the floor and keep them out of the reach of children. Make sure the lids are tight to prevent easy access.



Check for leaks from storage containers and fuel driven devices periodically, especially if they haven't been used for some time. Small leaks can add up over time. It's best to keep a regular schedule of inspection and maintenance. Always recycle or safely dispose of engine maintenance products (see Section 5, Managing Hazardous Household Products for more information about disposal and recycling).

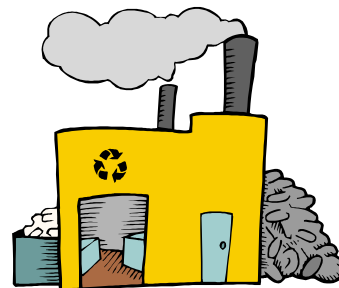
It is crucial to know about fuel storage tanks on your property. This includes tanks that are currently in use and those that are abandoned. As a tank owner, you have many responsibilities and must keep up with increasingly strict laws. You are also financially responsible for leaks from a tank on your property, even if you are unaware that the tank exists.

Standard homeowners insurance typically will not cover the costly clean-ups that can be required. To learn more about your legal responsibilities, contact state environmental and health officials.

Section 8: Managing Household Waste: Preventing, Reusing, Recycling, and Composting⁹

There are many alternatives for disposing of household waste, and many ways to reduce the amount of waste we each generate. Consumption practices and waste disposal have a definite effect on air, soil, and water quality in your home, on your property, and in your community.

Surveys show that most consumers do not realize what makes up solid waste. Many people think that we throw away more plastics by weight than we really do, or that disposable diapers are a larger part of the *solid waste stream* than they really are. In reality, U.S. EPA figures show paper and paperboard make up nearly 39 percent of this country's solid waste; the largest percentage of any type of solid waste. Yard waste like leaves and grass clippings is the next largest component at nearly 15 percent. Plastics actually come in third at just under 10 percent.



But it is important to understand the extent of the waste we produce as a nation. The United States leads the world in the amount of waste produced, energy consumed, and in use of the earth's natural resources. This is **not** a good thing. Consider that we as a nation use up to 50% of the world's non-renewable resources, and by some estimates produce 38% of the world's waste. By contrast, the U.S. has only 6% of the world's population. Changing from a resource-consuming lifestyle to a resource conserving one will help maintain natural resources while creating less waste.

For purposes of working through this section, here are some terms you should know: *Trash* or *waste* includes items and materials that are no longer wanted, anything that is useless or discarded. *Reusables* are items that are used again by a different user for a different purpose. For example, a jelly jar that is used as a drinking glass but not reprocessed into raw materials, and then a new product. *Recyclables* are materials like glass, metal, paper, oil, and even refrigerators that are collected, separated, and processed back into raw materials to be made into new products. *Compostables* are primarily yard and food wastes that can decompose and return to the earth as nutrients or soil. *Garbage* is generally food waste or wet food of either plant or animal origin. *Municipal solid waste (MSW)* is household waste combined with commercial, business, and institutional waste.

Use the assessment table on the following page to identify areas where you can minimize waste. Indicate your waste potential in the right-hand column. Some choices might not correspond exactly to your situation, so choose the response that best fits. Then read the text on the following pages for ideas on how to prevent and minimize waste around your home. Take note of all medium and high waste potentials, and write them down on the checklist at the end of this section.

⁹ Collaborating authors Shirley Niemeyer, University of Nebraska-Lincoln; Michael P. Vogel, Montana State University Extension Service; and Kathleen Parrott, Virginia Polytechnic Institute and State University.

Assessment 8-1: Preventing and Minimizing Waste, Reusing, Recycling, Composting*

	LOW WASTE POTENTIAL	MEDIUM WASTE POTENTIAL	HIGH WASTE POTENTIAL	YOUR WASTE POTENTIAL
Quantities purchased	I only buy what I need and avoid accumulating unused products.	I sometimes buy more product than I can use.	I often buy more product than I can use.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Product durability and potential for reuse	I select products based on their durability, ease of repair, and potential for reuse.	I sometimes consider durability, ease of repair, or potential for reuse.	I never consider durability, ease of repair, or potential for reuse.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Recyclability of packaging	I regularly purchase containers/packaging that can be recycled locally.	I sometimes consider recyclability when making purchases.	I never consider recyclability.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Packaging selected	When safe to do so, I select packaging that minimizes waste.	I sometimes consider packaging that minimizes waste.	I never consider packaging that minimizes waste.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Reusing	I reuse as many household wastes as possible	I reuse items when it is convenient to do so.	I never reuse items.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Recycling	I recycle as many household wastes as possible.	I recycle when it is convenient to do so.	I never recycle.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Composting	I compost all yard wastes and kitchen vegetable scraps at home or in a city program.	I compost some yard or kitchen wastes.	I never compost.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High

* Adapted with permission from NRAES-87: Home*A*Syst: An Environmental Risk-Assessment Guide for the Home.

Preventing and Minimizing Waste

Each day we make purchasing decisions, and every purchase involves a certain amount of waste production and use of natural resources. Your decision to select a certain product or no product at all will determine the type and volume of waste that you will someday discard. You can use your purchasing power to minimize your impact on the environment by selecting products that minimize waste, last longer, and use less natural resources. These practices are sometimes referred to as *precycling* and *enviro-shopping*.

Enviro-shoppers typically ask the following questions before making a purchase:

- How much do I need?
- Are my purchases long-lasting and reusable?
- Is the product package recyclable?
- Is the product or its packaging made from recycled materials?
- Do I buy products with the least amount of packaging?

These questions are very important. Primarily, enviro-shopping means buying only what you need. A good price on bulk packaging might seem like a good deal, but you can end up wasting money and natural resources because unused or spoiled product will eventually have to be thrown away. Similarly, long-lasting and reusable products might seem more expensive but they can be a better investment in the long run. Look for products that can be: fixed when broken, reused, passed on to someone else, or used for another purpose. For example, reusable gift bags can reduce the need to buy wrapping paper.

Many product containers and packaging materials are potentially recyclable. To promote recycling, many manufacturers use a recycling symbol featuring chasing arrows (below). But be aware that this symbol could mean that the product or packaging is made from materials that are **suitable** for recycling if your local recycling program will take them. If you can't recycle it locally, you might be able to take materials to a neighboring community that will accept it. But, be careful not to waste more natural resources (like gasoline) than you will save by recycling. Combine a trip to the recycling center with other tasks.



A variety of products, from carpets to detergent bottles to trash bags, are made from recycled material. Materials will be made into new products once recycled only if there is a market for them. You can support and encourage markets for recycled material products by buying recycled. Look for the words “made from recycled materials” or “made from *post-consumer* recycled materials.” Post-consumer recycled materials are those made from materials that have been recycled by consumers like you. For example, billions of recycled beverage cans are melted down and made into new cans each year.

About one-third of the paper, plastic, glass, and other material we throw away comes from packaging. While packaging provides some useful services like preventing food spoilage and ensuring consumer safety, some unnecessary packaging wastes natural resources and becomes waste soon after a product is purchased. Good enviro-shopping means choosing products that have the least amount of packaging while still assuring your safety.

Reusing, Recycling, and Composting

Reusing items should be the first objective in minimizing waste, because it typically has the least environmental impact. Returnable glass beverage bottles are an example of a reusable product. Reuse is often limited only by the imagination. If you take some time to think, it is easy to find uses for more materials than you realize. Sharing old clothes and used furniture is a common form of reuse. If you can't share them with family or friends, or sell them at a garage sale, why not donate items (in good condition) to homeless shelters, thrift shops, or organizations like Goodwill.

See if a local gift shop or store will take foam packaging "peanuts," or whether neighbors or local organizations have any use for excess paint, lumber, or empty plastic pails. Or, put a list of excess materials on a postcard or piece of paper and post it on a local community bulletin board.

Recycling

Many communities in California, including Lodi, operate curbside recycling programs. Have you checked recently to see what kinds of items are generally accepted in the containers provided by the municipality where you live? Materials accepted by these programs go far beyond glass and aluminum. Many programs also accept catalogs, envelopes, junk mail, aluminum foil and trays, plastic bottles and jugs, tin and steel cans, chipboard, corrugated cardboard (including shoeboxes), and newspapers. Check with the city or your waste-hauling contractor to get a complete list of acceptable items. The more items you can put in the recycling bin, the less will go to a landfill. And, recycling helps to save natural resources. Use the information sheet on the next page to keep track of what is recycled locally, where to take the items (if they aren't accepted in curbside pick-up), and how to prepare them for recycling.

Many local communities also collect yard and garden waste such as grass clippings, cuttings from trees and shrubs, and weeds. You might consider using some or all of your yard and garden waste for composting. When combined with some kinds of kitchen scraps, yard and garden waste can be turned into a natural soil conditioner and fertilizer.



Materials from around the home that can be composted include: leaves, grass clippings, plant trimmings, straw, kitchen scraps (like coffee grounds and vegetable trimmings, but **not** animal wastes, fat, bones, or pet waste), ash from your wood-burning fireplace, and even small amounts of paper.

The end product is a dark brown, crumbly material that has a clean, earthy scent. You can spread it on lawns, or mix it with garden soil. To compost at home, you can use one of the many compact and efficient composting bins on the market, or you can build your own. The local cooperative extension service can provide you with more detailed information about composting.

What Can You Recycle In Your Area*

Item	Recycled where?	How should it be prepared?
Paper/cardboard		
Glass		
Plastic		
Aluminum		
Steel		
Other metals		
Automobile batteries		
Oil		
Tires		
White goods/appliances		
Wood/lumber		
Bricks/concrete		
Other:		

* Source: NRAES-87, Home*A*Sys: An Environmental Risk-Assessment Guide for The Home

Section 9: Special Considerations

This section of the handbook deals with situations that might affect some people in the watershed, but not the majority of people. For example, very few houses in San Joaquin County have basements. Few people in Lodi are likely to have underground or aboveground storage tanks for gasoline, diesel fuel, or heating oil. However, there are some people in the watershed who have such tanks on their property, or who have houses with basements. This section of the handbook will offer advice on how to safeguard your property and the watershed in these special circumstances.

This section of the handbook will offer helpful hints for the following special situations:

- Swimming pool and spa water
- Basements
- Riverfront property
- Lead-based paint
- Underground and aboveground storage tanks for gasoline, diesel fuel, heating oil, and other types of fuel.

While there may be relatively few homes in the watershed where these examples apply, potential threats from these circumstances to your property, the community, and the environment are so great that it is vital they be addressed in this handbook.

Please fill out any sections in the assessment on the next page that might apply to your home or property. They will help identify potential risks on your property from these special considerations. Then, read about ways to reduce threats at your home and in your community on the pages following these assessments. Note all medium and high risks on the checklist at the end of this section. Using the checklist and information contained in this section, you can formulate an action plan to reduce potential pollution.

Though only one or maybe none of the special considerations might apply to your property, it might be a good idea to read through this section for your own knowledge.



Special Considerations Assessment*

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Pools/Spas				
Emptying swimming pools and spas	I dechlorinate the water and use it to water lawns, gardens, and plants over a period of several days.	I dechlorinate the water and empty the water into the storm drain or surface water.	I don't dechlorinate the water before discharging it into a storm drain or surface water. (Note: This is illegal)	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Basements				
Basement protection	Stormwater is diverted from basement windows by window well covers or other devices. Yard is sloped away from the foundation. Downspouts direct roof drainage away from the house.	No special water diversion methods are installed, but stormwater has never entered the basement.	No water diversion methods are attempted. Stormwater runoff has entered the basement or flows near the foundation.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Lead				
Age of home	Built after 1978.	Built between 1950 and 1978.	Built before 1950.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Interior paint	No lead-based paint (LBP).	LBP present but intact.	Defective LBP: it is chipping, peeling, or chalking; or paint disturbed by recent remodeling.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Windows and doors	No LBP, or windows and doors with lead based paint have been replaced.	LBP present but intact.	Defective LBP: it is chipping, peeling, or chalking; or untrained workers have recently removed the paint.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High

* Parts adapted with permission from NRAES-87: Home*A*Syst: An Environmental Risk-Assessment Guide for the Home.

Special Considerations Assessment *(continued)*

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Lead				
Water supply	No lead water pipes, leaded solder, or brass fixtures used in plumbing.	Lead present in plumbing, but water has been tested and precautions have been taken.	Lead likely to be present in plumbing, but water has not been tested and no precautions have been taken.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Water acidity or corrosiveness	Hardness is around 80 milligrams/liter pH = 7.5-8.5	Hardness is 60-80 milligrams/liter pH = 6-7.5	Hardness is below 60 milligrams/liter pH = less than 6	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
LBP on exterior of house	No LBP, or LBP is present but intact. There is a lawn or dense landscape plantings around the side of the home.	LBP is weathered or chalking. There is LBP in the soil around the home, but foot traffic is kept away.	LBP is chipping, peeling, or chalking. There is bare soil or foot traffic below painted walls.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Major roadways	There is no major roadway nearby.		There is a major roadway within 85 feet.	<input type="checkbox"/> Low <input type="checkbox"/> High
Lead-related industry	No lead-related industry or incinerators in the area.		Lead smelter, battery manufacturer or recycler, or other lead-related industry nearby.	<input type="checkbox"/> Low <input type="checkbox"/> High
Fuel Tanks				
Water table	The water table (distance to groundwater) is consistently more than 10 feet below the surface.	The water table is between 5 and 10 feet below the surface.	The water table is 5 feet or less below the surface.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Leak detection procedures	Tank is regularly tested for "tightness" and monthly fuel use accounting is done.	Monthly fuel use accounting is done.	No testing of fuel use is done.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Spill and overfill protection	Filling is closely supervised.		Filling is unattended.	<input type="checkbox"/> Low <input type="checkbox"/> High
Tank containment (aboveground tanks)	Tank is on a containment pad/dike capable of holding 125% of the tank volume.	Tank is on an impervious surface without a berm or dike for containment.	Tank has no protection to contain major leaks and spills.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High

Special Considerations Assessment (*continued*)

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Fuel Tanks				
Tank security (for gas and diesel)	Tank or pump is surrounded by a 6 foot locked fence, plus there is a lock on the pump.	Fill hose is locked (required by law).	There is no fence or enclosure around the tank, and there are no locks.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Damage protection	Tanks and pumps are on stable concrete or steel supports. Tank is well-protected from damage by impact.		Tank is in contact with the ground or on poor footings. Tank is not well-shielded from impact.	<input type="checkbox"/> Low <input type="checkbox"/> High
Inactive tanks	Inactive tanks have been removed.	Inactive tanks have been left in place, emptied, and filled with approved material.	Inactive tanks have been abandoned and left underground (or aboveground).	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Inspection for contamination	Tank sites have been checked for signs of soil and groundwater contamination.		Tank sites have not been checked for signs of contamination.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
River Frontage Property				
Nature of riverbank	There is at least a six foot buffer of riparian plants along the bank. There are no artificial bank strengthening materials (concrete rip rap, brick, wooden beams, etc.) and no signs of erosion or undercutting.	There is a small buffer of riparian plants and/or some artificial bank strengthening material. There are some signs of bank erosion and/or undercutting.	There is no buffer strip of riparian plants. Artificial bank strengthening material is leaning or falling into the river, or there is severe undercutting and I am losing property to the river.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High

Swimming Pools and Spas

Many people are fortunate to have a swimming pool or spa/hot tub. When performing maintenance on pool and spa structures or their filtering systems, it is sometimes necessary to drain them completely. Because chemicals are added to pool water, special care must be taken when they are drained. The law allows pool and spa water to be discharged into a storm drain, but only when certain conditions are met.



Pool and spa water can contain chlorine, copper, and *filter backwash* which can all be toxic to aquatic life. Chlorine is used in pools and spas to purify the water. But chlorine also kills bacteria, and is used to make insect and weed killers. Recommended chlorine levels for spas and swimming pools is between 2 and 4 ppm. Chlorine levels higher than 0.01 parts per million (ppm) are harmful to aquatic organisms, and exceeds the level allowed by the California Department of Fish and Game for discharge into surface water. So, before pool water can be sent to a storm drain, it must first be dechlorinated.

There are two common ways to dechlorinate water. First and easiest, you can just stop adding chlorine to your pool or spa and wait until the chlorine naturally dissipates. Or, the water can be treated with a chemical dechlorinator. Either way, use a pool testing kit to be sure the water is safe. But rather than send the dechlorinated water straight to the storm drain, consider using it to water lawns, gardens, and plants. It's a great way to conserve water.

Copper found in pool water can come from algae control products and from copper plumbing and equipment. This is especially true for spas or hot tubs with heaters. The recommended dosage for most algaecides is generally about 100 times higher than concentrations that are toxic to many aquatic organisms. The Environmental Protection Agency says copper levels in a pool greater than 0.10 ppm could be harmful to aquatic life. A pool maintenance company or pool supply store can test your water for copper, and recommend the best way to reduce or eliminate copper levels.

And once you do the work on your pool or spa, **never** discharge wastewater from acid washing, plastering, grouting, or filter backwash into the storm drain.

Maintaining the proper chemical balance of pool and spa water, and regularly cleaning and inspecting the pools filtration system will minimize the need to drain your pool or spa, and prevent unnecessary corrosion of copper pipes and equipment. It will also save you money in the long run by prolonging the life of your spa and pool equipment.

Riverfront Property

Residents fortunate enough to live along the Mokelumne River or one of its tributaries can have an even more direct effect on the quality of the river than others who live farther away. Although people who live miles away from river and stream banks can still improve water quality by addressing risks, people who live along the river can have a greater impact on what the river is or will become.

Start by looking at your property. Chances are, it slopes towards the river. That means runoff from rainfall and lawn watering will flow directly to the river. If you mow your lawn all the way to the riverbank, runoff (and the fertilizers, insecticides, and pet wastes it contains) has a greater chance of

finding its way into the river. It might be even more important for you to consider “naturalizing” your yard with wetland, woodland, or other *riparian vegetation*.



One of the best ways to slow and filter runoff is to make sure there is a buffer strip of thick vegetation and trees along the waterfront. Roots from native trees and vegetation will help control erosion of your property by stabilizing and strengthening stream banks. This vegetation also provides habitat for wildlife such as birds and butterflies.

Trees and wetland plants also act as a sponge by helping to absorb floodwater, slowly releasing it over time. While buffer strips and riparian plants can't stop floodwaters from rising, they can slow down water flows and will reduce erosion damage compared to properties where the lawn is mowed to the riverbank. Get more information and ideas on ways to enhance your waterfront property from several sources. Contact the San Joaquin County Cooperative Extension Service, the Natural Resources Conservation Service, the San Joaquin County Resource Conservation District, or the East Bay Municipal Utilities District. See page *x* for contact information.

Basement Seepage and Flooding¹¹

Stormwater in a basement can be a hazard in two ways: if water carries contaminants or disease organisms into your home; and if water picks up chemicals stored in your basement and carries them into the sewer or ground. To help prevent water from entering your basement, seal common stormwater entry points like basement doors and windows against leaks. It is best if window and door sills are at least a foot above the ground. Window wells that extend above ground level can help divert stormwater, and windows at or below ground level can be protected with clear plastic covers. Be sure to slope your yard away from the foundation to prevent water from pooling near the house and leaking into the basement.

¹¹ Collaborating authors Carl DuPoldt, Natural Resources Conservation Service and Carolyn Johnson, University of Wisconsin Cooperative Extension.

Lead In The Home¹²

Lead poisoning is a serious but preventable health problem. This soft metal has been used in a variety of products including paint, solder, water pipes, and crystal. Lead is dangerous because it never breaks down into a harmless substance. Many homes have one or more sources of lead. These sources include lead-based paint (LBP), drinking water delivered through lead pipes or in contact with lead solder, household dust (which can contain lead dust from deteriorating LBP or remodeling), and soils contaminated by leaded gasoline exhaust and disintegrating LBP.

Lead can have wide-ranging effects on humans. Even very low lead levels in children can slow mental development and cause learning and behavioral problems. Lead can also cause high blood pressure in adults. Higher levels of lead can damage the reproductive and nervous systems.

Lead has been eliminated from residential paint, gasoline, solder and water pipes over the years. But, many older homes can still contain LBP. Newer homes can contain lead from other sources. The US Department of Housing and Urban Development reports that 74% of all homes built before 1980 have dangerous levels of LBP. Homes built before 1950 are very likely to have high lead levels because some pre-1950 paint was 50% lead.

To find out if the paint in your older home contains lead, have it analyzed by experts who test samples in a laboratory. Do-it-yourself home kits are available in some stores, however they will indicate the presence or absence of lead **but not** how much lead is present. Check with local health officials to find out what testing options are available.

Lead was added to paint to inhibit the growth of mold on the surface of the paint. Paints with higher lead levels were used where exposure to moisture is greatest: on windows, doors, and exterior walls. If LBP is intact it poses little risk, but if it is chipping or chalking off then the risk of exposure is greater. Remodeling or renovating areas where there is LBP is particularly risky. Scraping, sanding, or burning LBP creates extremely hazardous conditions and caution is needed, especially if children, pregnant women, or pets are present. LBP removal by untrained workers who do not use the proper methods and equipment can create a much greater health hazard than just leaving the paint alone.

In some private wells, underwater pumps with brass fittings can cause elevated lead concentrations in drinking water, especially with new pumps or if the water is soft. Water that is soft or acidic can be corrosive and tends to dissolve lead from pipes and fitting more easily. Lead can also enter drinking water through lead pipes and connectors, lead-soldered joints in copper plumbing, and lead-containing brass faucets and pump components.

Contact your local health agency for instructions on how to take a water sample for your home. Action is recommended if lead levels are greater than 15 parts per billion (ppb). One simple way to reduce lead concentration in your plumbing system is to flush the system. Installing a water treatment device such as a reverse osmosis system may be necessary for severe lead contamination.

If high levels of lead are found, there are some simple steps you can take to reduce your risk. For example, plant grass or cover soil with mulch to prevent your family from tracking soil indoors. It

¹² Collaborating author Karen Filchak, University of Connecticut Cooperative Extension.

will also reduce the lead-contaminated dust your family will breathe. Also, use only cold tap water for cooking and drinking because hot water is more likely to dissolve lead.

Lead Outside The Home

Lead contaminated soil is a problem when children play outside, when soil is tracked inside the home, and when vegetables are grown in contaminated soil. Soil can be contaminated by flaking, peeling, or chalking LBP that follows the *drip line* of the house. Lead levels tend to be highest where house walls meet the ground. Leaded gasoline exhaust has been responsible for high levels of lead in soil in high auto traffic areas, with the highest levels recorded near major roadways. The shift to unleaded gasoline has reduced the risk, but lead levels can still be high even years after contamination.

If you live near industrial sources such as incinerators, lead smelters, or battery recyclers, you should be concerned about lead in your soil. Urban residents should consider having soil tested for lead before planting a vegetable garden. Testing the soil is the only way to detect a lead problem. Soils with lead levels of 400 ppm or more should not be used to grow vegetables unless the top 6 to 8 inches of soil is replaced with non-contaminated topsoil. Lead is usually found in the top 2 to 3 inches of undisturbed soil.

Under new standards, lead is considered a hazard if there are greater than 400 ppm of lead in soil in childrens' play areas, or 1200 ppm average for bare soil in the rest of the yard.

Soil lead levels within 85 feet of busy roadways are typically 30 to 2,000 ppm higher than natural levels. Some soils have lead levels as high as 10,000 ppm. Soil adjacent to houses with exterior LBP may also have lead levels as high as 10,000 ppm. Levels near industrial sources can be dangerously high, especially downwind. Rural residents who live near old orchards, or suburban dwellers who live in a subdivision built on an old orchard should also consider having soil tested. Some old orchards can have high lead levels due to lead-containing pesticides that were applied during the 1940's.

Aboveground or Underground Fuel Tanks¹³

It is vital to know about fuel storage tanks on your property, including both tanks now in use and those that have been abandoned. You are financially responsible for leaks from a tank on your property, even if you are unaware that the tank exists. Standard homeowners insurance does not typically cover the costly cleanups from a leaking tank.

The greater the distance between any tank and nearby drinking water wells or surface water, the better. The minimum distance allowed in San Joaquin County is 100 feet. Other factors do influence the risk related to distance. Tanks are safer when located downhill from wells. Sandy and gravelly soils that allow pollutants to seep more rapidly into groundwater are another factor.

Pipes, hoses, valves, and fittings connected to a tank can be a major source of leaks. They are often overlooked, especially if buried underground. Piping generally fails due to corrosion, accidents, and weather-related factors. Professional installation and inspection are the key to avoiding problems.

Leak Detection

Leak detection is more complicated for underground tanks, and critical for tanks over 15 years old. Set up a regular inspection schedule for leaks and damage to all tanks, including any heating oil tanks in your basement. One way to check for leaks is to monitor the level of fuel over time. Precisely measure and record the amount of fuel in your tank each month. Compare your records to the amount of fuel delivered and dispensed. Differences in your records could indicate a leak, but this method is not always accurate and small leaks can be missed. Underground heating fuel tanks dispense automatically when in use, and are best monitored during the summer.

Your senses are a vital part of leak detection. Warning signs include:

- Any unexplained oil-like substance on streams.
- Wet places near the tank.
- Soil near the tank is stained with petroleum.
- A strong and constant smell of petroleum near the tank.
- You or your neighbors smell fuel odors near plumbing or sewer line openings, or taste fuel in your drinking water.

Normally, you should be able to see leaks from an aboveground tank, but be aware of possible leaks in areas you can't easily see, such as any place the tank is in contact with the ground. Also be aware of unusual or changing operating conditions at the pump. If your suction pump rattles, the fuel flows unevenly, or if the pump hesitates too long before dispensing, your piping may be damaged or leaking.



Spill Protection

The most common—and most avoidable—cause of spills is overfilling. Close supervision of fuel transfer is one of your best forms of protection. Never walk away while filling a vehicle with fuel.

¹³ Collaborating authors Richard Castelnovo, National Farm*A*Syst Office, Madison, Wisconsin and Dean Solomon, Michigan State University Extension.

Automatic shutoff devices are available to help prevent spills, but they're not suitable for every tank. Box-like containment structures for aboveground tanks can prevent leaks and spills from spreading. Containment measures should be able to keep the entire contents of a tank from escaping. It is best to construct a concrete dike and spill pad.

Aboveground tanks are also susceptible to damage from vehicles and other objects. Be sure tanks are placed on a solid, stable base or on footings made of brick, cinder block, or concrete. If the tank is not enclosed in a structure, be sure to install posts or other barriers around it. If you have a basement tank that holds household heating oil, be sure nothing is stored around or under the tank.

Abandoned Tanks and Tank Removal

Abandoned or inactive tanks are an environmental threat until they are removed. Sometimes leaks are discovered when a tank is removed. Soil around and under the tank should be inspected for obvious sign of leaking (odors, stains, or visible fuel). If you suspect contamination, a more thorough site assessment should be quickly arranged.

Whenever a leak is discovered, it should be immediately reported to local officials and state regulators. You are expected to minimize harm to the environment as soon as possible whenever a leak is detected. State funds may be available to help defer cleanup costs.

State Laws Governing Underground Fuel Storage Tanks

California laws covering underground fuel storage tanks have changed. All underground tanks are required to be double-walled and protected against corrosion. Piping and spill protection for these tanks must also be reinforced. There are new monitoring, reporting, and record-keeping requirements, and, specific requirements for spill containment. The changes are too numerous and varied depending on type of tank and fuel delivery system to all be included them in this handbook.

If you have specific questions or concerns about underground fuel storage tanks, contact with San Joaquin County Environmental Health Division at (209)-468-3420. Permits for tank installation, removal, and repair in San Joaquin County are available on the world wide web at: <http://www.geocities.com/unitiii> Information about state requirements and laws governing underground fuel storage tanks is also available on the world wide web from the State Water Resources Control Board at: <http://www.swrcb.ca.gov/cwphome/ust/usthmpg.htm>

For More Information

Contact	Telephone Number	Website
Alternative Roofing plans		www.roofmeadow.com
California Conservation Dept.- Recycling Division	(916)-323-3836	www.consrv.ca.gov
California EPA-Toxics Help Desk	(916)-327-1848	www.calepa.ca.gov
California Health Services Dept.- Drinking Water and Environmental Management	(916)-322-2308	www.dhs.ca.gov/ps/ddwem/
California Pesticide Regulation Department-Environmental Monitoring and Pest Management	(916)-324-4100	www.cdpr.ca.gov
California Toxic Substances Control-Public Assistance	(916)-322-0476	www.dtsc.ca.gov
California Water Resources Control Board (CWRCB)	(916)-341-5250	www.swrcb.ca.gov
CWRCB-Nonpoint Section	(916)-341-5494	www.swrcb.ca.gov
CWRCB-Stormwater Programs	(916)-341-5529	www.swrcb.ca.gov
California Native Grass Association		www.cgna.org
California Native Plant Society	(916)-447-2677	www.cnps.org
Landscape Management Outreach Partnership	(800)-449-4840 (209)-468-3066	
Lodi Public Works Dept.- water/wastewater	(209)-333-6740	www.lodi.gov/html/pub_works.html
Lodi Public Works Dept.-Water Conservation Officer	(209)-333-6829	
Lodi Refuse and Trash Collection	(209)-369-8274	
Lodi Storm Drain Detectives		www.lodi.gov/html/pub_works.html
Motor oil and filter recycling	(800)-253-2687	
Recycling, Source Reduction	(209)-468-3066	
Regional Household Hazardous Waste Program	(800)-449-4840	
San Joaquin County (SJC) Cooperative Extension-Farm & Home Advisors	(209)-468-2085	http://cesanjoaquin.ucdavis.edu
SJC Public Works-Solid Waste	(209)-468-3066	www.co.san-joaquin.ca.us/pubworks
SJC Public Health Services-Environmental Health	(209)-468-3420	
SJC Resource Conservation District	(209)-946-6241	www.sjcrd.org
SJC Sewer and Water	(209)-468-3090	www.co.san-joaquin.ca.us/pubworks
United States Department of Agriculture-Natural Resource Conservation Service	(209)-946-6229	www.nrcs.usda.gov

Glossary of Terms

Bacteria – microscopic, one-celled organisms that can live in soil, water, air, or other organisms. Many kinds of bacteria are helpful and can be used to help break down garbage or sewage (as in septic systems). Harmful types of bacteria can cause disease in humans, animals, or plants.

Bedrock – solid rock, generally unbroken and covered by soil and rock fragments. Solid rock underneath soil or exposed at the surface. Depending on the type of rock that makes up bedrock, it could be porous or impermeable.

Benzene – a natural component of petroleum and petroleum-based products. Short-term exposure can cause dizziness, drowsiness, and/or nausea. Can also result in irritation to eyes, skin, and lungs. Prolonged exposure to benzene vapors can cause irregular heartbeat, stumbling, sleepiness, or even death. Cancer and/or blood disorders might result from repeated exposure.

Broadcast Spraying – a method for applying fertilizers or pesticides by scattering over a wide area. Not recommended, especially for home applications. Applied in this manner, fertilizers and pesticides are subject to wind drift and can miss intended target areas.

Chemical Reactions – when elements and compounds react together to produce different compounds. For example, when bleach and ammonia are mixed together, they form the toxic gas chloramine.

Compost – yard and food waste that has naturally broken down. An earthy smelling, soil-like substance that can be used as fertilizer or combined with soil to enrich it.

Compostables – items that can be used to make compost, including yard waste and some kitchen waste. Yard waste can include leaves, shredded branches, and grass clippings (though grass clippings should be left on the lawn). Kitchen waste suitable for composting includes vegetable and fruit scraps, coffee grounds, and eggshells. Never put meat scraps, fat, lard, bones, whole eggs, or pet waste into compost as these items draw pests and create a haven for harmful bacteria.

Corrosive – any chemical that causes a breakdown of materials. This breakdown can be either a chemical or physical interaction that changes the structure of a material and its physical properties. A typical corrosive is acid.

Drip Line – the area where stormwater runs off of a roof without gutters.

Enviro-shopping – purchasing products with the least amount of packaging, or buying in bulk if the food or items will not be wasted. When buying fertilizers, pesticides, paints, or other household hazardous products, purchasing only the quantity that will be used for a specific job at one time.

Filter backwash – water or other liquid that can be contaminated by chemicals or sediment contained in a filter, such as might be used for a spa, swimming pool, or septic system. Reverse water flow back through a filter to remove entrapped solids.

Garbage – food waste or wet food of either plant or animal origin.

Ground cover – low, herbaceous plants used for covering the ground in place of grass. They can be used to slow runoff and hold sediment, especially in sloped areas.

Integrated Pest Management (IPM) – a systematic, more environmentally friendly approach to controlling landscape pests (including weeds). Using natural predators (including beneficial insects and microorganisms) to control pest insects. Non-toxic or low-toxic chemicals are used selectively and sparingly, if chemicals are used at all.

MTBE (methyl tertiary butyl ether) – a synthetic chemical added to gasoline to improve air quality. However, this chemical has been placed on the Environmental Protection Agency's list of contaminants for soil, air, and drinking water.

Municipal Solid Waste – household waste, combined with commercial, business, and institutional waste.

Nitrates – compounds consisting of potassium nitrate or sodium nitrate. Generally found in fertilizers. Nitrates are a groundwater contaminant that can migrate into aquifers.

Non-point source pollution (NPS) – contaminants from unspecified locations. NPS comes from many different sources rather than one specific, identifiable location. For example, sediment, debris, and chemicals carried into the Mokelumne River via stormwater runoff from neighborhoods. (See also *point-source pollution*).

Nutrients – when referring to water pollution, generally considered plant nutrients. Nutrients are natural or chemical substances that promote growth. In the context of this handbook, anything that promotes the growth of algae or bacteria. Sources of nutrients include sewage and septic runoff, detergents, industrial waste, fertilizer runoff, and livestock waste.

Pathogens – any disease-producing organisms.

Point-source pollution – contaminants that can be traced to a specific location or activity. For example, discharges from a manufacturing plant or a leaking fuel or chemical storage tank.

Post-consumer – when buying recycled goods, it means that all or part of the goods or packaging is made from materials that have been recycled by consumers like you.

Pre-cycling – Selecting products that last longer, use less natural resources, and produce a minimum of waste; or selecting products that have multiple uses, can be easily repaired when broken, or passed on to someone else.

Recyclables – materials like glass, plastic, paper, metal, or even appliances that are collected, separated, and processed back into raw materials and made into new products.

Reel mower – a type of lawn mower that uses human-power. When pushed, the mower’s wheels provide the force that turns the blades to cut the grass. Using a reel mower reduces air and noise pollution while providing exercise for the user.

Reusables – any item that can be used several times for the same purpose. For example, reusable canvas shopping bags can eliminate the need for paper or plastic bags at grocery stores. These bags are often easier to carry, and are stronger and less susceptible to tearing or breaking.

Riparian vegetation – grasses, shrubs, and trees that grow along the bank of a river or other body of water. These plants are adapted to wet conditions, and perform the dual purposes of stabilizing streambanks to reduce erosion and sedimentation, and can help reduce damage from flooding by slowing the rate of water flow. They also serve as a filter for runoff by helping remove debris and contaminants.

Runoff – In the context of this handbook, rainwater not absorbed into the ground or rainwater that flows across property, roofs, driveways, sidewalks, and streets.

Sanitary sewer – the sewer that carries waste water from inside the home (for example, water from sinks, dishwashers, tubs, and toilets) to a sewage treatment plant for removal of soaps, solids, and other contaminants.

Solid waste stream – the total flow of solid waste from homes, businesses, institutions, and manufacturing plants that are recycled, burned, or disposed of in landfills.

Storm drain – any drain designed to carry rainwater or runoff out of a specific area. Storm drains are found in streets and parking lots. They convey water directly to a river or catch basin, not to a treatment plant. All contaminants picked up by stormwater as it flows across paved areas are deposited directly into the river.

Surface water – any water that is permanently or regularly on the earth’s surface, such as a pond, lake, wetland, estuary, river, stream, or bay.

Total Dissolved Solids – a sum of the disintegrated organic and inorganic material in water. Excessive dissolved solids make water unfit to drink or use in industrial processes.

Trash – items and materials no longer wanted or used. Anything that is useless or worthless. Waste.

Waste – items and materials no longer wanted or used. Anything left over or superfluous. Trash

Watershed – the land area that contributes water to a specific surface water body.

Water soluble – capable of dissolving in water.

Water table – the level at which the soil is saturated with water.