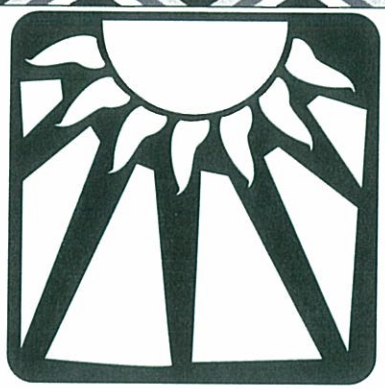


Your Sustainable Water System

A Guidebook for Oshara Residents on the Water Conservation, Wastewater Reclamation and Landscape Irrigation Systems in use at Oshara Village

Oshara Village™

LIVE WORK PLAY

NEW VILLAGE INSTITUTE

Oshara Village™

Your Sustainable Water System

Table of Contents

INTRODUCTION

WELCOME TO OSHARA VILLAGE

Oshara Village residents already know that Oshara is a unique model in the Southwest for sustainable village and home design. Among the many sustainability features incorporated into Oshara's design, one of the most important is Oshara's conscious use and reuse of water, including a state-of-the-art, onsite, biological treatment plant and an irrigation system using the community's reclaimed water. These systems treat and reuse waste water for irrigation efficiently, safely and invisibly giving water a second life at Oshara before releasing it back to nature. Oshara's waste water and irrigation system and the numerous design features make Oshara one of the most innovative and comfortable communities in the region, allowing Oshara residents to conserve water without effort.

THE OSHARA MODEL

Oshara Village is designed to rest lightly on the land. Oshara boasts a lower "water budget" per household than other existing developments in Santa Fe and surrounds. In order to meet this budget without demanding large lifestyle concessions from residents, Oshara developers and designers devised fool-proof systems and easy to follow covenants. Oshara residents can be proud of their place as leaders in water conservation while enjoying comfortable lifestyles requiring minimal or no change of habits.

The nationwide trend towards green development and smart use of resources will guide developments across the country to follow Oshara Village's lead. Each phase of Oshara's development will demonstrate innovative models for sustainable living with grace, beauty and comfort.

Oshara Village's design required a new way of thinking about building homes and community. Architects, designers and builders integrated many of the best environmental design practices including:

- Advanced building insulation methods
- Increased use of Green Building materials
- Recent innovations in energy-efficient appliances
- New trends in energy production and solar-ready roofs
- Advances in biological treatment of waste water
- Readily available water-conserving appliances

Oshara Village residents also benefit from an integrated community design based on the principles of New Urbanism. New Urbanism, an urban planning movement, seeks to provide solutions to contemporary problems such as Global Warming and Peak Oil by designing communities so that people have appropriate choices in how they live and work. Alan Hoffman, Oshara Village's town founder, believes that New Urbanism is a misnomer; Oshara Village is reclaiming sensible design features that have made communities livable, beautiful and environmentally friendly throughout history. Oshara Village incorporates these principles in its layout, choice of housing options, public transportation connections and energy-efficient design. It also gracefully accommodates "live-work" residents and small businesses.

Homeowners can walk to work and will find much to enjoy at Oshara Plaza, with businesses and restaurants catering to their needs. At the same time, Oshara Village is linked with local and regional public transportation systems to make it easy to get into Santa Fe for work or play. These features add to the security of Oshara Village residents by helping to buffer their investments and lifestyles from the vagaries of political, economic or environmental fluctuations because of good community connections and thoughtful home design.

DEFINITIONS

Aquifer: a sand, gravel or rock formation capable of storing or conveying water below the surface of the land. (Natural Resource Conservation Service – (www.mt.nrcs.usda.gov/technical/ecs/watersheds/galsourcebook/gscbkgl.html)

Watershed : The specific land area that drains water into a river system or other body of water. (www.unesco.org/education/tlsf/theme_c/mod13/www.worldbank.org/depweb/english/modules/glossary.htm)

Water Table : The top of an unconfined aquifer; indicates the level below which soil and rock are saturated with water. (www.apsu.edu/wet/whatis.html)

Blackwater: Water that contains animal, human, or food waste, considered as effluent. www.nsc.org/ehc/ glossary.htm and (www.ecoselect.net.au/glossary)

Greywater: Greywater is wastewater generated by household processes such as washing dishes, laundry and bathing. Greywater is distinct from wastewater that has been contaminated with sewage, which is known as blackwater. (www.wikipedia.org/wiki/Greywater)

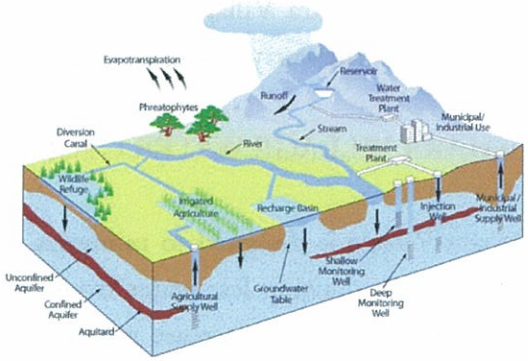
Groundwater: Any water naturally stored underground in aquifers, or that flows through and saturates soil and rock, supplying springs and wells. (www.cnie.org/pop/pai/glossary.html)

Infiltration: In hydrologic terms, movement of water through the soil surface into the soil. (www.weather.gov/glossary/glossary.php)

WATER AND COMMUNITIES

The watersheds in and around Santa Fe that provide our drinking water and recharge the underground aquifers that supply our wells are dynamic systems. Living within those systems while recycling and efficiently reusing their resources "from source to sink," or from well or reservoir to the lowest point in the landscape, will help determine the long-term sustainability of our communities here in the semi-arid Southwest.

Watersheds and aquifers are two parts of the same system, the visible or above ground, and the invisible or underground. Santa Feans are lucky to have such spectacular views of their watersheds. The mountains are ideal collectors of rain and snow that drain down into the valleys and arroyos of Santa Fe. In healthy ecosystems, that water soaks into the soil and recharges the aquifer underground, supporting plants and wildlife on its journey. Plants and trees help complete the cycle by transpiring or releasing water vapor into the atmosphere to be retuned to the mountains as precipitation.



Human activity over hundreds of years has altered that cycle. Cities are pumping well water at a higher rate out of the aquifer than it is being recharged. Water systems are channel runoff collected high on the mountainsides in Santa Fe's reservoir and move it via pipes through our homes, though sewers and directly to our waste treatment plant not allowing it to recharge the aquifer along the way. Storm drains also efficiently draining rainwater from structures and paved roads out of our water system to below the city. These are common practices that have practical explanations, but combined, they cause us to overdraw the "bank account" of our most valuable resource without making the necessary deposits! When we interrupt the natural cycle of recharging the aquifer, the water table lowers and wells dry up. Other symptoms can include loss of large trees over time, and regional climatic changes. It is vital for the continued health and thriving of our communities and ecosystems that we rethink our water use and develop smarter, more appropriate strategies.

CITY WATER CYCLE

Communities in the Southwest and across the nation, including Santa Fe are facing difficult questions about how to provide sustainable water supplies to their growing populations over the next decades. Many cities simply buy water from other watersheds which exacerbates the problem on a regional scale. There are already more sensible solutions available. In established cities, these solutions can be difficult to implement economically and logistically, but some programs such as Santa Fe's Toilet Retrofit Program are making progress. The City of Santa Fe also reuses some treated water for golf courses and uses sludge left over from the sewage treatment process as compost for land restoration.

New real estate developments in the Southwest are being challenged to adhere to far stricter water budgets and provide innovative solutions to this problem in order to get building permits. Fortunately, Oshara Village built some simple solutions into the community's design so that homeowners can worry less about future water supplies.

OSHARA VILLAGE WATER CYCLE

Oshara Village is designed to minimize the community's impact on our regional water supply starting with drawing less water from the aquifer for community use in the first place. Water conserving appliances decrease water use without requiring residents to take extra measures to conserve. Using reclaimed water for irrigation also means that Oshara residents are not paying for irrigation water.

Oshara Village's water budget is far below the national average and impressively low for the region. According to "Water Use in Santa Fe" a publication by the City's Planning Division produced in 2001, the annual per household figures for the most water-conserving neighborhoods in Santa Fe, Nava Ade and Tierra Contenta, was 65,200 gallons which equals 179 gallons per household per day. The largest homes in Oshara will beat these figures by approximately 22,200 gallons per household annually. Oshara Estate Homes are budgeted with 43,000 gallons per household per year or 118 gallons per household per day.

How will Oshara Residents achieve this?

Oshara Home Type	Gal/ Day
Townhome	101
Live/Work Unit	107
Patio Home	112
SF Home	118
Estate home	118
Santa Fe City Average	179
Nava Ade & Tierra Contenta	118
(2001 City Statistics)	

- Re-use of Waste Water for Landscape Irrigation
- Sensible Landscape Design
- Advanced household water conservation

Oshara Village's Covenants are guideposts for the community's responsible use of Santa Fe's precious water resources and for the community's conservation efforts. They enable Oshara residents to achieve these goals with ease.

CHAPTER 1 OSHARA'S COVENANTS

CORNERSTONES FOR SUSTAINABLE LIVING

Oshara Village's simple covenants and design parameters are part of *The Oshara Model*, making it possible for Oshara homeowners to live comfortable lifestyles while achieving impressive water and energy savings. They allow Oshara Village to easily demonstrate to homeowners in other parts of the city and county a more efficient and comfortable way to conserve. Oshara residents are, therefore, early adopters of up and coming methods for saner living which generates a smaller footprint. By following covenants and by opting for additional voluntary sustainability features, residents can play a vital role in the move towards a more sustainable future while decreasing their footprint on the land and their monthly energy bills.

AN ENERGY FOOTPRINT IS A MEASURE OF LAND REQUIRED TO ABSORB THE CO_2 EMISSIONS GENERATED BY OUR ENERGY USE. THIS APPROACH FOCUSES ON THE OUTCOME OF ENERGY USE, THAT IS CO_2 EMISSIONS, TO HIGHLIGHT THE PROBLEM AND PAVE THE WAY FOR CORRECTIVE ACTION TO BE TAKEN.

Oshara Village homeowners benefit from smart design. By creating homes that are already energy-efficient and water conserving, Oshara's developers, architects and builders offered Homeowners choices that accommodate variations in residents' personal lifestyles and habits. Informed homeowners can encourage wise water use at home and in the community by example and by innovation.

COVENANTS

The fourteen water- and energy-conserving covenants affecting homeowners have been divided into two categories: indoor water use and outdoor water use.

Some of the covenants concerning water use and appliances stipulate a certain number of gallons per use. The chart below translates that required daily use into annual use and compares it to gallons used in conventional homes daily and annually. The differences can be dramatic.
http://www.gdrc.org/uem/footprints/energy-footprint.html

http://www.eia.doe.gov/kids/energyfacts/saving/efficiency/savingenergy.html

COVENANTS FOR INDOOR USE

Voluntary allowances and mandatory covenants can be combined to achieve peak energy and water conservation. New Village Institute and your builder may know of additional options that you may want to consider in order to achieve even greater savings.

Voluntary Measures Homeowners May Take

- Water may be conserved through greywater use in certain indoor plumbing fixtures.
- Photovoltaic and solar hot water conduits may be used.
- All homes shall conform to the County of Santa Fe's water harvesting code requiring cisterns for building over 2,500 sq.ft., buildings under 2500 sq. ft. of roofed space can use rain barrels.

Mandatory Measures (Provided by Builders)

- Waste water from all toilets, sinks, showers and bathtubs shall be treated at the Water Reclamation Facilities, where it shall be converted to Reclaimed Water for irrigation.
- Toilets shall be either- "dual-flush" models (i.e., have different water-use settings for liquid and solid waste) or low-flow models (1.6 gallons per flush maximum).
- Bathtub faucets, lavatory faucets and showerheads—maximum capacity of 2.5 gallons per minute.

- No more than one (1) automatic clothes washing machine per Residential Lot. Only models that use fourteen (14) gallons per load or less and have cycle or water level adjustments that permit reduced amounts of water to be used for reduced loads are allowed.
- No more than one (1) automatic dishwasher per Residential Lot. Only models designed to use five (5) gallons per load or less and have cycle or water level adjustments that allow reduced amounts of water to be used for reduced loads are allowed.
- Water conserving appliances (i.e., requiring low or reduced water flow) shall be installed and used at the time of construction or replacement of appliances. All appliances shall meet "Energy Star" standards or its equivalent.
- All water heaters in residential structures shall have recirculating pumps to reduce the amount of time for water to be heated as well as timers that can be set by users.
- Hot water pipes shall be insulated.

Allowed Additional Features

- Standard air conditioners with compressors (must be ENERGY STAR ® rated)

Prohibited Appliances and Equipment

- Evaporative coolers
- Reverse osmosis filtration
- Other water filter/backwashing technology,
- Water softeners (Chloride)
- Water wells

WHAT DOES THIS MEAN FOR HOMEOWNERS?

The conservation measures addressed in the covenants have already been built into all homes at Oshara Village and require no additional effort on the part of Homeowners unless they are modifying or replacing appliances or fixtures in their homes. Homeowners wishing to install energy-saving solar hot water systems can speak with their builders about installation procedures and costs or contact New Village Institute for more information. All Oshara homeowners will find their homes conveniently designed for easy retrofitting of these features, saving installation time and money.

For more information on Appliances for Oshara Village homes, please refer to Chapter 4.

COVENANTS FOR OUTDOOR USE

Mandatory Measures (Provided by Builders)

- Low water use landscaping techniques shall be utilized. Geoflow & Rewater only.
- Use of Reclaimed Water shall meet the requirements of the New Mexico Environment Department and the Uniform Plumbing Code.

Prior to the Occupancy Date, each residential structure shall have installed a totalizing meter approved by Santa Fe County Utilities Department to measure the potable water consumed by the Phase I Residential Lot.

Allowed Additional Features

- Removable wading pools of 8 feet in diameter or less. 1 per residential lot.
- Hot tubes that are insulated, covered and use less than 900 gallons per year are permitted.

Prohibited Additional Features

- Non-native grasses
- Potable water connections of any kind installed on exterior of Phase 1 Residential Lots
- Individual swimming pools and water consuming spas, permanent or removable

WHAT DOES THIS MEAN FOR HOMEOWNERS?

Each home at Oshara Village has a reclaimed water, buried irrigation system designed for flexibility, ease and reliability, and requiring little maintenance on the part of the homeowner. The Community Ecologist monitors the irrigation system and can answer questions about use, repairs or modifications. (See Chapter 3 for description of Oshara's unique reclaimed-water irrigation system.)

CHAPTER 2 WASTE AS RESOURCE

OSHARA'S BIOLOGICAL ALTERNATIVE TO POURING RESOURCES DOWN THE DRAIN

For ages, mankind has been disposing of waste downstream. Today most of us don't want to think about what goes down our shower, sink and laundry room drains, let alone toilets! In the US, we use more than 5 billion gallons of purified drinking water every day just to flush our toilets (based on an average 4 flushes per day of 5 gallons per flush x 300,148,860 people and counting!). That's enough to supply drinking water to the entire population of Chicago for more than 6 years. As crazy as it sounds, our current use of pure water for waste disposal began almost 4000 years ago on the island of Crete.

The Ancient Minoans of Crete devised elaborate indoor plumbing systems with opulent hot and cold running water fountains, and underground sewage systems made of terra cotta and stone. The first flush toilet known to humankind—with a water reservoir and a wooden seat— was discovered in the rubble of the Minoan Palace of Knossos!

Romans of the Old Empire elaborated on Minoan engineering, developing brilliantly designed and extensive water supply, plumbing and sewage systems. By the 4th century A.D., Rome had over 220 miles of underground piping and aqueducts, 11 public baths with indoor hot and cold running water and radiant heat, one of them covering over 28 acres of land and seating more than 3000 people, 1,352 public fountains and cisterns, 856 private baths, and elaborate sewer systems. Some private homes in the empire had more than 30 taps (just like some large Santa Fe homes!) At the Empire's peak these systems delivered almost 300 gallons of water per citizen per day, but this was not sustainable. The fall of the Roman Empire has been attributed to many political, societal and environmental causes, including depletion of local water resources, inadequate sanitation and lack of understanding of how to hygienically treat the vast quantities of contaminated wastewater produced.

It's remarkable that many of our modern notions about plumbing are still rooted in ancient history, such as the concept of an inexhaustible clean water supply, or of an invisible, isolated and ignored waste stream. The Romans were brilliant engineers and innovators, but never had to live within their means; they were the largest consumers and waste producers of their time. We are only recently emerging from a Roman mentality and are beginning to tackle these age-old problems with innovative biological solutions.

Oshara Village breaks new ground with its on-site, state-of-the-art wastewater reclamation facility which reclaims waste water from all homes and businesses in Oshara using biological processes. Oshara does not flush its waste downstream; it gives it a second life in Oshara's landscape and soil.

OUR FRIEND, THE SEQUENCING BATCH REACTOR (SBR) OSHARA'S WATER RECLAMATION PLANT

Oshara Village's Wastewater Reclamation Facility houses a simple and efficient system referred to as the advanced Sequencing Batch Reactor (SBR). Oshara's SBR—we call it *"ESBER"* is different from conventional wastewater treatment facilities in that every drop of water that disappears down every drain and toilet in Oshara feeds into a living system that relies, in part, on Oshara residents to maintain its health.

Oshara's wastewater travels through a series of settling and conditioning tanks, each preparing the wastewater for cleaning through the natural process of organic microbial treatment. These natural biological and chemical processes help to render harmful compounds into safer ones before entering the SBR tank. The SBR tanks are carefully monitored to provide an ideal habitat

DEFINITIONS

Effluent: water mixed with waste matter

Reclamation: the recovery of useful substances from waste products

Wastewater Treatment: the management of someone or something; i.e. "the treatment of water sewage"

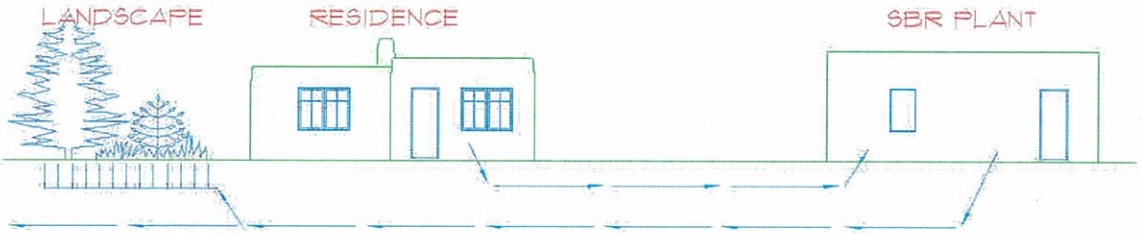
Microorganism: any organism of microscopic size (beneficial or harmful)

Pathogen: Any disease-producing agent (especially a virus or bacterium or other microorganism)

(www.wordreference.com)

"Esber", Oshara's Wastewater Reclamation Facility, 2007

ALL WASTE IS A RESOURCE.



This simple line drawing or flow diagram representing how waste moves from your home to the SBR Plant and then back to your garden.

for microorganisms that feed on the waste. They safely consume the pathogenic components in wastewater leaving safe by-products and cleaner effluent. After the effluent passes through this series of conditioning, microbial and disinfecting processes, it reemerges from the facility as high quality effluent suitable for almost all human use. SBR achieves this result naturally, with a minimum of chemicals, providing the safe and purified water for use in Oshara's community irrigation system. (See Chapter 3)

The designers of water reuse and irrigation systems made knowledgeable projections of Oshara Village's water use taking into account stringent state and county requirements, average usages throughout the city and county and Oshara's covenants and design features that make higher conservation standards possible. The natural method of biological digestion was another highly effective tool available to Oshara to help the community meet its water budget while maintaining a high quality of life for residents. As a result, our water budget can "afford" to better support trees, shrubs and other plantings that make Oshara beautiful and more comfortable than conventional developments.

WHAT WE PUT DOWN OUR DRAINS AT OSHARA VILLAGE ENDS UP IN OUR GARDENS!

WATER PURITY AND SAFETY

The water re-use facility is strictly monitored and safely sampled by both technicians and computer during each stage of conditioning and reclamation to ensure that discharged effluent meets the highest standards required by the State of New Mexico and the EPA. The biological reclamation system has a proven track record of quality and dependability. Oshara residents also play a role in meeting these high standards by considering more carefully what they introduce to our biological system via drains and toilets.

All Oshara landscaping, both public and private, receives a consistent amount of reclaimed water through timed irrigation throughout the year. Because the system is resilient and the rules are

not difficult to follow, Oshara residents can easily learn to be responsible partners in this larger biological community. It requires simply that residents be just a little more thoughtful than we might normally be about what we send down our drains and toilets. This booklet, and the quick reference guide are provided as a reminder of how to effectively participate.

OUR DRAINS FILL OSHARA'S WATERING CAN

We can choose as a community to keep Oshara's water reuse system healthy and our groundwater and soils clean, by being more careful about what we introduce into drains at Oshara.

Larger municipal wastewater treatment facilities, such as the City of Santa Fe's facility on the south end of town, have to deal with a variety of contaminants introduced into the water through drains, road runoff and industrial processes. These chemicals are used in hobby, garden, home repair, light industrial and industrial and agricultural processes. Even pharmaceuticals are turning up in water supplies.

IF IT WOULD BE HARMFUL FOR YOU TO CONSUME IN LARGER QUANTITIES (SUCH AS DRINKING A GLASS OF BLEACH!), IT WILL ALSO HURT SBR AND THE MICROBES THAT HELP PURIFY OUR WATER.

What does this mean for Homeowners? Do's and Don'ts

There are a few simple rules about living with "Esber". Mostly we must remember that just like city sewage treatment plants, or water reuse system "Esber" can handle dilute quantities of harmful chemicals up to a certain threshold point. Past this point, the system's biological workers—the microbes—die and have to be restocked. Let's keep "Esber" healthy and our community free of harmful chemicals.

Most homeowners in Santa Fe have some sort of "Household Hazardous Waste" tucked away in a cupboard that requires special handling and disposal. Household Hazardous Waste is the term used for a product sold commonly in smaller quantities. Twelve (12) ounces spray bottles for example, of household cleaner, insecticides, home repair products, etc. are classified as Hazardous Waste when in 55 gallon drum and have EPA regulated special requirements for disposal. Manufacturers are not required to label many household products with hazardous ingredients. So just because you bought a household cleaner at the supermarket, doesn't mean you should dump it down your drain.

List of Common Household Waste Products

The following list shows common household items containing potentially hazardous ingredients that might be found in your garage, basement, or other storage space in your home.

Cleaning Products

Anti-bacterial Soap (all kinds)
Oven cleaners
Drain cleaners
Caustic Oven cleaners
Wood and metal
cleaners and polishes
Toilet cleaners
Tub, tile, shower cleaners
Bleach (laundry)
Pool chemicals

Indoor Pesticides

Ant sprays and baits
Cockroach sprays and baits
Flea repellents and shampoos
Bug sprays
Houseplant insecticides
Moth repellents
Mouse and rat poisons
and baits

Automotive Products

Motor oil
Fuel additives
Carburetor and fuel
injection cleaners
Air conditioning refrigerants
Starter fluids
Automotive batteries
Transmission and brake fluid
Antifreeze

Workshop/Painting Supplies

Paint
Adhesives and glues
Furniture strippers
Oil or enamel based paint
Stains and finishes
Paint thinners and turpentine
Paint strippers and removers
Photographic chemicals
Fixatives and other solvents

Lawn and Garden Products

Herbicides
Insecticides
Fungicides/wood preservatives

Miscellaneous

Batteries
Mercury thermostats or
thermometers
Fluorescent light bulbs
Driveway sealer

Other Flammable Products

Propane tanks and other com
pressed gas cylinders
Kerosene
Home heating oil
Diesel fuel, Gas/oil mix
Lighter fluid

CHAPTER 3

LANDSCAPE IRRIGATION IN OSHARA VILLAGE

An important cornerstone of Oshara's sustainable design is the advanced landscape irrigation system. At Oshara 100% of all wastewater is treated on site (including both greywater and sewage) by Esber, the village SBR, which purifies it to State of New Mexico and EPA standards, and pumps it back to irrigate and sustain your landscape –even in periods of drought.

All landscape contractors working in Oshara Village must be approved by Oshara Village, LLC and have been specially trained to ensure they will provide homeowners with correctly installed systems. Every landscape contractor is required to revisit each landscape installation to ensure that the irrigation is working properly and to "balance the system," checking for wet or dry spots and adding or removing emitters as required.

Watering is done automatically several times a week depending on the season and climatic conditions. All irrigation pipes are buried approximately 6 inches below the surface, and are designed to release an optimal amount of water directly to the roots of your plants. This avoids surface evaporation, saving even more water than ordinary watering systems, and helps your plants become more quickly established, resilient and hardy. Watering is regulated and delivered by a reliable Geoflow drip irrigation system, which is designed to repel roots from its emitters and is self-cleaning. For lawns or close plantings the Geoflow tubing is normally set up in a grid pattern, while individual and more isolated plants and trees are watered by individual emitters connected to the Geoflow system.

Oshara Village's irrigation system is controlled by an advanced and reliable computer system at the water reclamation plant which is located in the small barn across the arroyo on the Southside of the village. Homeowners will never have to worry about timers, valve boxes or other gear. You won't need to use a garden hose or sprinklers, which is why outside hose bibs will not be found in Oshara. Nor will you have to worry about maintaining pop-up sprayers or other unsightly soaker hoses.

Water use in the summer is greater than at other times, but the advantage of the Oshara system is that watering can be regulated automatically on a daily basis in every season, ensuring adequate

soil moisture at all times. Any excess water is recycled back into the primary system, where it can be used for agriculture or aquifer recharge.

As a homeowner, your most important task is to simply monitor your garden and immediately report any leaks (i.e. pooling water) or plant stress to your landscape contractor. And remember to use biodegradable detergents and cleaners, and not to dump toxics down the drain or toilet. These simple steps will help your plants to thrive and the system function well for all of us.

LANDSCAPE DESIGN AND MODIFICATIONS

As a resident and community member at Oshara Village, you will choose the landscape plan that best fulfills your sense of beauty and function. You and your irrigation contractor will decide on a plan which will harmonize with the maximum quantity of water specified for your lot and home type. Your design will be reviewed and approved by the Community Ecologist who will be happy to assist you with design elements, at your request. We want you to take full advantage of the irrigation water available to you, recognizing that different families will have varied tastes and priorities. Once your garden has been installed, the water will begin to flow automatically. Your most important task will be to monitor the operation of the watering system and report any problems to your landscaper.

You can also modify the size of your landscape as long as you do not exceed your maximum water budget. This can ONLY be done subject to the limitations of your water budget and the number of emitters allocated to each lot. The Community Ecologist can help you evaluate your plan, assess the availability of additional water, and advise you of what you can and can't do.

BE CAREFUL WHEN DIGGING IN YOUR GARDEN

Remember, the Geoflow irrigation tubing and emitters are about 6 inches below the surface, so inserting any sharp object –like a spade– into the planted and irrigated area can puncture tubing. Look carefully before you dig, bury pipes, wires, add plantings, walkways or garden structures, etc.

The Geoflow irrigation system will function beneath the surface with little care. In the unlikely event that you notice any of the following conditions, please contact the Community Ecologist right away:

- Surface puddles or flow of water (other than rainfall);
- Plant stress, including wilting or yellowing, tilting from vertical, dryness or brownout; or
- Any annoying odors coming from the area of the irrigation system.

Most importantly, enjoy your landscape, and know you are part of a unique and highly efficient effort to promote sustainable use of precious natural resources at Oshara Village.

CONTACT INFORMATION

If you have any questions about your sustainable reclaimed watering system, or your garden, please contact the Community Ecologist or consult your handbook for information. Contact information for Community Ecologist: Mick Nickel email: Mickleenickel@yahoo.com Phone: 505.577.4375

For "SPECIFICATIONS FOR IRRIGATION AND LANDSCAPE PLANNING" PLEASE CONSULT THE OSHARA VILLAGE PATTERN BOOK AND DESIGN CODE ON THE OSHARA VILLAGE WEBSITE, OsharaVillage.com, PAGES 55-67.

CHAPTER 4

CHOICES AND REQUIREMENTS FOR WATER-CONSERVING FIXTURES & APPLIANCES

FIXTURES AND APPLIANCES FOR WATER AND ENERGY CONSERVATION

Water and energy conservation are at the heart of Oshara's commitment to sustainability. The choice of fixtures and appliances plays an important part in lowering costs of operating your home and conserving valuable resources. These requirements are contained in some simple covenants that each homeowner agrees to abide by and are summarized in Table 5.1 below.

Oshara Covenant Requirements of Water Conserving Appliances and Fixtures

- Toilets: Dual Flush 1.6 gal
- Bathtubs, Showerheads, Lavatory Faucets 2.5 gal
- Washers (1 only allowed) 14 gal per load
  Must have adjustment to reduce water use for small loads
- Automatic Dishwasher (1 per household) 5 gal per load
  Must have adjustment to reduce water use for small loads

Other Water Conserving Requirements

- Future replacements of fixtures and appliances must also be water wise and Energy Star rated.
- Reducing demand for water is the most effective and economical strategy, and is ensured by Oshara's water conservation covenants.
- Further water savings are achieved by recirculation pumps with timers on your hot water tanks to reduce the amount of time (and water flow) for hot water to be delivered to each faucet. Reducing the amount of hot water used also reduces the energy required to heat that water. Homeowners will not have to worry about this Santa Fe County-mandated feature since your builder will have already installed this system in your house.
- Reverse Osmosis water filters are prohibited in Oshara because they waste about 6 gallons of water for each gallon of purified water they produce. Other drinking water filtration and purifications systems are available.
- Your Oshara-approved builder has already had to comply with both Santa Fe County's water conservation mandates, plus the additional requirements of the Oshara Village developers.

WATER CONSERVING FIXTURES

The easiest and most inexpensive method is to use state-of-the-art water-conserving fixtures, fittings and appliances. Second- and third-generation water-conserving fixtures are much improved over earlier efforts, reducing or eliminating operation and maintenance problems.

TYPICAL WATER USAGE

FIXTURES AND APPLIANCES

	CONVENTIONAL MODELS	CONSERVING MODELS
Faucet	3 - 7 gpm	1.5 - 2.5 gpm
Showerhead	3 - 8 gpm	2 gpm
Toilet	3 - 5 gpf	.5 – 1.6 gpf
Dishwasher	7 - 10 gpl	4.5 gpl
Washing Machine	43 gpl	27 gpl (front loading)

gpm = gallons per minute *gpf = gallons per flush* *gpl = gallons per load*

Table compiled by NVI 2007

ENERGY STAR APPLIANCES

Though this booklet is mainly focused on water conservation benefits and technologies, conserving energy often goes hand in glove with saving water. For example, Oshara builders are required to install major appliances such as washing machines and dishwashers that are both water-conserving and Energy Star rated.

ENERGY STAR® is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy helping us all save money and protect the environment through energy efficient products and practices. Energy Star appliances and household products meet strict energy efficiency guidelines set by the EPA and US Department of Energy.

- Results are already adding up. Americans, with the help of ENERGY STAR, saved enough energy in 2005 alone to avoid greenhouse gas emissions (GHG) equivalent to those from 23 million cars — all while saving $12 billion on their utility bills.

- Energy efficient choices can save families about a third on their energy bill with similar savings of greenhouse gas emissions, without sacrificing features, style or comfort. ENERGY STAR® helps you make the energy efficient choice.

- ENERGY STAR® appliances are available in wide range of styles, colors, sizes and price categories from budget-minded to high-end. Many manufacturers now produce a variety of Energy Star rated appliances. For more information see www.aceee.org or www.EnergyStar.com. For local suppliers see "Appliances -Household - Major Dealers" in the Yellow Pages. More information is available in the insert at the back of this booklet or at www.NewVillageInstitute.org.

Oshara Village has also set a new standard for energy savings in the home by requiring a "super insulated building envelope." This means that your walls and roof are designed to prevent heat loss and have extra insulation in them. For more information on overall energy saving options, see Appendix A, "Choosing Sustainability"

Further Tips on Water Conservation

Ask your builder to offer you a choice of water-wise fixtures, such as kitchen faucets and sprayers. You can also upgrade on your own, often at very little cost. A new aerator for your bathroom sink can save you gallons a day and cost only a dollar or two. But remember, there is no substitute for using good old fashioned common sense. Try to limit spraying when washing veggies and rinsing dishes. Don't let water just run down the drain for no reason. Put a stopper in the sink when rinsing dishes. Use a scrub brush to remove food scrapes from dishes, or soak dishes briefly to loosen dried-on food. Then you won't need that extra Heavy Duty Cycle on your dishwasher. Our water reclamation system loves it when you drain really dirty water down your garbage disposal. We do not recommend that you go to the trouble of carrying out dishpans of dirty water to your house or garden plants. Use what you need for supplemental watering, just don't waste it or over-water your plants. Remember, your outdoor plants are supposed to droop in the hot summer sun. Be sure to fix any leaking faucets or toilets immediately. This can often be done in just a few minutes without calling a plumber.

NVI is also working to research and evaluate new products and strategies and will make this information available through the website www.NewVillageInstitute.org

CHAPTER 5
WATER HARVESTING AND SITE DESIGN

Oshara Village homeowners will work with their builders or landscape contractors to design or pick out each home's landscaping. Oshara builders may have different methods of designing and may work with different landscaping contractors for installation, so Oshara residents can chose how much they would like to be involved in home landscaping. Once landscaping is installed, Oshara Homeowners will find Oshara Village's public and private landscaping to be practically maintenance free!

French Drains - a hole or trench in the ground designed to capture water flow from canales or gutters in order to infiltrate the water into the ground. French drains should be placed at a minimum of three feet from any wall or foundation. If necessary, a trough should carry the water from where it falls to the French drain. French drains should be sized to capture water from 2 consecutive 2-inch rainfalls and be lined on the sides nearest foundations or walls to prevent infiltration near structures. Overflows should be built on the side farthest from walls to ensure that any overflow moves away from structures. Overall grading should always lead any rainfall hitting the ground away from structures and foundations.

Swale - An on-contour ditch dug in the ground with the extra soil piled on the downhill side used to capture overland water flow and infiltrate it into the ground. Swales are usually planted so that the plants benefit from passive watering and the root system strengthen the structure. Swales are an inexpensive and ecological way to increase water flow to plants. A swale is essentially a long infiltration pond that you can plant in and around.

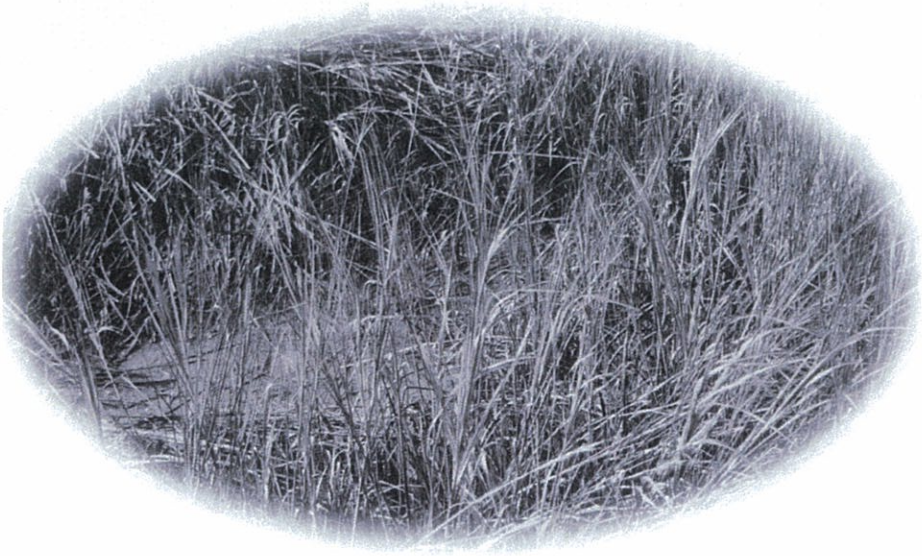
Oshara homeowners with a green thumb or those interested in permaculture, vegetable gardening or other pursuits will have the irrigation system's water budget to work with as a foundation. Additional water harvesting techniques will provide more water for more intensive plantings. Please keep the placement and function of the system in mind as you garden.

The Geoflow system will provide a regular source of water to your plantings, so water harvesting methods including cisterns, lined French drains, swales and other contouring may be used as an additional measure to increase water to certain parts of your garden or to remove it and improve site drainage. When doing any digging or planting please remember that the Geoflow tubing is buried six inches below the surface.

REMEMBER

NO IRRIGATION WITHIN 3 FEET OF ANY FOUNDATION.

BE CAREFUL WHEN YOU DIG.



CHAPTER 6

MODIFICATIONS TO YOUR LANDSCAPING

ADDING OR CHANGING PLANTINGS

If you are using less water than your water budget allows... Congratulations! You may add or change plantings if you wish. Please keep the following guidelines in mind as you make modifications.

Only Geoflow or Rewater components will work with the Geoflow system. Regular drip tubing and emitters from irrigations supply stores in town are not designed to repel roots, so standard emitters may quickly be clogged with roots as plants seek out the richer reclaimed water. In order to keep your plants green and our community's system healthy, please use components that work with Geoflow.

As a general rule, it is easier to add individual plants than it is to add a large section of newly planted area. The alternative irrigation delivery system can be more easily added to the system for individual plants than for a large area, which would require an expansion of the design.

Oshara Village's reclaimed water and irrigation system will deliver a given amount of water over time to your garden and is determined by the number of emitters. Oshara Village has put out a list of plants that will thrive with our system. Your landscaper and the Community Ecologist can advise you as well. Remember that water harvesting measures such as cisterns, lined French drains and swales can deliver additional water to specific plantings.

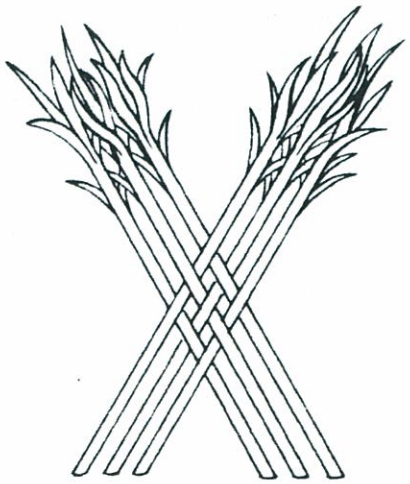
For "SPECIFICATIONS FOR IRRIGATION AND LANDSCAPE PLANNING" PLEASE CONSULT THE OSHARA VILLAGE PATTERN BOOK AND DESIGN CODE ON THE OSHARA VILLAGE WEBSITE, OsharaVillage.com, PAGES 55-67.

NOW IT'S UP TO YOU

As residents of Oshara Village, you will benefit from the most advanced water conservation and landscape irrigation system available in America today. This robust system has been professionally engineered and installed to provide you and future generations with a reliable source of water for your plants, lawns and trees. The Water Conservation Covenants are aimed at making *The Oshara Model* the nation's leader in water conservation while saving you money. You can be proud to be on the leading edge of an important worldwide trend: Responsibly conserving and reusing water.

Oshara Village, LLC, the developers of Oshara, and New Village Institute congratulate you for your forward thinking in choosing to live in this community, and thank you for your participation. We hope you enjoy being a member of a community devoted to healthy and sustainable living.

For further information contact: info@OsharaVillage.com or info@NewVillageInstitute.com



NEW VILLAGE INSTITUTE

Cultivating Sustainable Community,
Livelihood, Technology and Culture

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Choosing Sustainability

NVI Studies Energy Savings Possible for American Families Making Sustainable Choices

Some Americans have become aware of the need to reduce fossil fuel energy consumption in their homes and vehicles to improve national security, save money and slow Global Warming. Fuel-efficient vehicle sales have soared, and interest in sustainable lifestyles has been growing. If more people understood just how much of a positive impact their choices in home design, neighborhood selection and transportation options could have on their own quality of life and environment, even more people would choose sustainable living.

Toward this end, New Village Institute has commissioned two studies designed to calculate the energy savings for a family choosing to live in an energy efficient home within a mixed-use, walkable community such as the new Oshara Village now under construction in the Santa Fe Community College District. This "real world" comparison shows that by consciously adopting the standard features available off the shelf today in the Oshara Village, a family can save significant amounts of fossil fuel-based energy, reduce Greenhouse Gas emissions and save money in the process.

Home Energy Use

The first study examined a 2,000 square foot Oshara Model Home that incorporated energy-saving features in the building envelope, Energy Star-rated lights and appliances, passive solar orientation for space heating, an efficient boiler-fired in-floor radiant heating system, a modern catalytic wood-burning stove, and solar hot water heating. Solar electric (PV) panels were not included in the Oshara Model Home (however a pre-installed conduit is required to allow for easy PV installation later when solar cells are more cost effective).

Energy use was compared to an ordinary new house with an identical floor plan, but constructed using current standard 2" x 6" frame building practices that meet all state building and energy codes, utilizing standard fiberglass batts, a forced-air central HVAC and no regard for solar orientation.

The study found that an Oshara resident choosing the normal cost-effective energy conservation features and the required standards would use 51.8% less energy in the home than a typical homeowner. Further, it should be noted that the sustainability features in the Oshara Model will not increase the net monthly

housing costs (mortgage plus utilities) because the slightly higher mortgage payment will be offset by the energy savings; Moreover as energy costs continue to increase, the dollars saved will increase.

Transportation Energy Use

The second study compared the driving patterns anticipated for people who choose to live and work in Oshara Village to those of average New Mexico residents. Because Oshara is a mixed-use village with retail shops, restaurants, services and live/work units, with on-site employment and easy access to public transit, Oshara residents will be able to work, play and attend churches, schools, and access healthcare, wellness, recreational and higher educational activities with far fewer vehicle trips than people living in a Conventional Subdivision Development.

The study found that Oshara residents who drove cars with average fuel-efficiency (22.4 miles per gallon) would use 61.3% less energy for driving than normal. The study also found that if, Oshara residents choose to drive a gas/electric hybrid or other fuel-efficient car they would use 80.4% less energy for driving than normal.

Combined Energy Use

The overall energy savings for an Oshara resident choosing sustainability (home and transportation energy use combined) range from 54.1% to 58.7% depending on their vehicle's fuel efficiency.

This equates to reducing the Carbon Footprint for an Oshara family that chooses sustainability by about 26,000 pounds of CO_2 each year.

These overall energy savings could be further enhanced with the use a fuel-efficient hybrid as a second car, though many Oshara residents could manage well with only one car.

The assumptions for the studies along with methodology, data tables and conclusions are posted on www.NewVillageInstitute.com and www.OsharaVillage.com.

Summary Table of Energy Studies

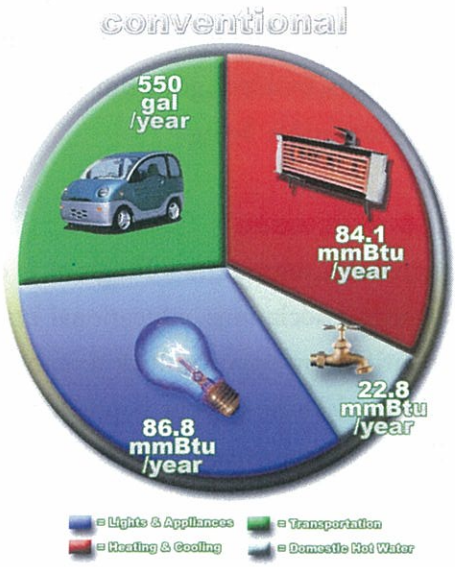
(in gallons of gasoline)*

Home Energy Use	Conventional	Oshara	Savings
	1,708	824	52.8%
Transportation Energy Use	Conventional	Oshara	
Average (22 mpg)	550	213	61.3%
Fuel Efficient (44 mpg)		108	80.4%
Combined Energy Use	2,258	932	58.7%
		1,037	54.1%
Carbon Footprint (pounds)	45,160	18,640	26,520

** In order to facilitate the analysis of total energy use, numbers in both studies are expressed as equivalent gallons of gasoline, which are easier for people to understand than BTUs or kilowatt-hours and provide a consistent measurement unit for both home and transportation energy use.*

Summary Table of Energy Use by Category

Energy Use Category	Typical New Home *Million BTU/yr*	Oshara Home *Million BTU/yr*	Use *(%)*	Reduction *(%)*
Heating and Cooling	84.1 MMBtu/yr	50.3 MMBtu/yr	49.2%	50.8%
Domestic Hot Water	22.8 MMBtu/yr	4.5 MMBtu/yr	19.7%	80.3%
Lights and Appliances	86.8 MMBtu/yr	47.4 MMBtu/yr	54.6%	45.4%
Transportation *(in gallons of gasoline)*	550 gal	108 gal	19.6%	80.4%
Oshara Energy Savings				58.7%



About New Village Institute — NVI

Mission

NVI is a tax-exempt nonprofit educational organization based in Santa Fe, New Mexico, USA that aims to cultivate sustainable community, livelihood, technology and culture. With the looming challenges of Global Climate Change, energy and water scarcity and suburban sprawl impacting quality of life and our environment, it is the mission of NVI to develop and demonstrate viable options in neighborhood design, Green Building and local resource management. We do this by assisting homeowners, builders, government and private companies to identify and implement strategies for more sustainable living.

Program & Projects

NVI's Sustainable Communities Program is creating strategic partnerships with specific companies, homeowner associations, educational institutions and individuals to address particular problems and identify new opportunities to enhance community sustainability. The "Sustainable Water Use Guidebook" now in your hands is the result of one such collaboration. The Developer of Oshara Village commissioned NVI to produce this booklet to help Oshara residents live more sustainably.

In 2008 NVI will partner with Full Circle Synergy, to provide public outreach and educational services for the Oshara Synergy Home. This "working demonstration" facility will showcase a variety of Sustainable Technologies and Green Building Systems functioning as an integrated whole. NVI will offer tours, presentations and workshops
at this innovative and inspiring facility.

Membership

NVI is currently developing a membership structure and expanded website with plans to roll these out in 2008.

Please check NVI's website for updates, events and information: NewVillageInstitute.org.

For specific questions about NVI programs please call 505.310.0768.