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Assignments

The assignments section contains our introduction letter as well as our list of complications we ran into while trying to complete our project. This section also contains all of our class work. This includes the problem background and problem statement, goals and objectives, weighing alternatives, implementation strategies, monitoring and evaluation and our work timeline.

Communication and Contacts

The communication and contacts section contains the emails we have sent and received in chronological order and the contact information for the member of the Ah Pah Village planning board

Notes

The notes section includes calculations that were done in association with water usage and the rainwater catchment system. It also contains maps of the area and notes from phone calls, meetings, research, other projects and general semester information.

Legal Research

The legal research section contains information we have found about legal concerns for the project. Water rights and needed permits and regulations are addressed. Also included is information for the Yurok Tribe Environmental Program.

Water System

The water system section contains our water system option descriptions for options one through five as well as the accompanying illustrations.

Components

The components section contains the component descriptions and product information for the components used in the water systems that we designed. The components are included in this order:

- dishwasher
- washing machine
- clothes dryer
- kitchen sprayer and accompanying handle
- shower head
- shower manager
- water level sensor

- water heater
- storage tank
- solar water pump
- outdoor spigot
- aerators
- indoor bath faucets
- micro-hydro generator
- dry composting toilets
- flushing toilets

We have also included extra components for products that could be added to the village to make it even more efficient and sustainable as well as component resources which provides information on the components that we did not cover in the project.

Introduction

"Through a unique blending of traditional and modern knowledge, practice, and technology, the village will be totally self-sustaining." –The Ah Pah Village Website

Upon our first meeting with the Blue Creek Ah Pah Traditional Village planning board we were humbled by the enthusiasm and drive that the board has to create a village that incorporates traditional and modern ideas to help teach, heal and practice their culture. The goal that they wanted us to accomplish in designing the water system is to use the water as efficiently as possible and to be as sustainable on site as possible. It is from this goal and their goals for the village for the village that we approached the project.

The parameters that we received for the project include:

Site Use:

8 people everyday November through April

20 people everyday May through October

70 people twelve days of the year

100 people two days of the year

400 people two days of the year

Facilities Needed:

10 showers

9 bathroom sinks

9 toilets

4 kitchen sinks

1 dishwasher

6 outdoor spigots

Sprinkler system

We designed several options of water systems that we feel incorporate modern technology and classic ideas of water collection, transportation, use and treatment. They are discussed and illustrated in detail in the following report. We have also included product information that we feel would be the most beneficial to utilize in the system. If there was an aspect of the system that we did not feel that we could advise the board on, we have provided information as to why and the contact information for professionals who would be better equipped.

Complications

-Due to the fact that the village site is still in its planning stages and the land has not been surveyed, we could not get any measurements of distance or spacing. This was detrimental to fully designing a layout of the water system and how it would be fit around the buildings that are planned for the village site.

-The spring that is located uphill from the village site has not been measured for flow rate and we do not know the altitude of the spring in relation to the village site. When we asked for permission to visit the site and take readings ourselves, we were not responded to and therefore could not go out to the project site.

-The planning board of Ah Pah Village was very enthusiastic when they gave us the project but have since been very hard to get a hold of and very limited in the information that they could give us. For the site use, water use and spring rates we had to use any information that we could get.

-We were late in getting started with the project because initially we were given a different project to complete that has since been deemed not a full project and has been discarded.

-We could not find water use numbers so we had to calculate the amount of water each person would use by approximating how many times people would use each of the product components (sinks, toilets, etc.) and approximate how much water that each of those components would use. This is how we reached out water usage numbers.

-We could not find exact numbers for the evapotranspiration rate and plant factor to be able to plug into the greywater area calculation. We used the evapotranspiration rate from San Francisco, California because the climate there was the most similar of all the options to the Klamath Basin. The plant factor that we used is the one for medium –use plants in a coastal area.

-For some of the components for the water system, a professional is required for the design and construction. Due to the serious consequences that could occur if the wrong filtration system/greywater system/ septic system is implemented, we will not be advising the board on any of those topics.

Problem Background

The history of the Yurok people is riddled with controversy, like all other tribes in the United States. Their history pre-settler was quiet and successful. They managed the land well and lived good lives. In more technical terms, the Yurok people are a non-nomadic hunter and gatherer tribal nation that resides in the Klamath River area and neighboring California coast although most ethnographers believe that the majority of the Yurok population lived inland along the Klamath River. Their culture and daily life revolved around the water, either the river or the coast. The earliest dated Yurok village was 1300 AD. The Yurok were considered the hub of Northwestern California due to the rich natural materials they had to use and their strong traditions. The Yurok people were able to achieve specialized technology for their environment including expert water craft (dugout canoes) and fishing apparatus such as fishing dams, harpoons and gill nets. The village sites harvested hundreds of plants and animals, focusing on staples of their lives and culture that provided for the villages throughout the year. Due to their expertise in providing for the people, the Yurok had time to nurture arts in a way that was not common among indigenous peoples in California or many other places in the country. This established them as a wealthy and evolved tribe. Nonetheless, the influx of settlers and explorers had a severe impact on the tribe. Starting around 1775 with explorers Bodega, Hezeta, de la Campa and Mourelle, the Yurok people were revealed to the world. In 1850, real estate development reached the Klamath River and violence ensued between the would-be developers and the Yurok people. When the gold rush of California moved north to Gold Bluffs, the Yurok people were even more vulnerable to outside influences. The Yurok people were faced with disease and massacres that killed off an estimated seventy five percent of it's

population. In 1855, the Yurok people that remained were forcibly moved to the Yurok reservation. Currently the Yurok reservation is 63,035 acres on the shores of the Klamath River and the Yurok tribe has about four thousand members living in California and about five thousand nation wide.

Throughout history the Yurok people have gone through many hard times, including losing their traditional lands and seeing the deterioration of their traditional culture. In recent years there has been a large push in the Yurok community to revitalize their culture, including their native language, traditional arts and ancient spirituality. One of the issues that the Yurok community has encountered is that there are no places that the people can go to truly reconnect with their roots. From this issue, the Ah Pah Village was dreamt up. The idea came from a group of Yurok people including Yurok council member and former Humboldt State University professor, Dale Ann Frye Sherman, her husband, Humboldt State University professor Marlong Sherman, Dale Ann's cousin and village headman David Frye and Willard Carlson Jr. another village headman.

The Ah Pah village is based just north of the city of Orick along the shores of Blue Creek which is a off shoot of the Klamath River. It is on the border of the Yurok reservation and the Frye property. While not officially associated with the tribe, the village is the dream of a group of dedicated and caring Yurok and non-Yurok people who are trying to reconnect the Yurok people with their traditions, spirituality and culture. The Ah Pah village will be a self-sustaining and traditionally built and planned village. The outlined goals of the village include, "bringing people home to reconnect with their ancestors and community, reawakening traditional Yurok

community, society and governance, facilitating ways Indigenous people can reconnect to the land, facilitating ways Indigenous people can exercise true tribal sovereignty, facilitating ways to recreate sustainable Indigenous cultures, promoting ecological awareness locally and globally." It is these goals that are defining the parameters and planned uses for the village.

One of the many purposes of the village is to revitalize the Yurok culture and the hope of the planning members of the village is to have place where this goal can be accomplished. In time the village is planned to facilitate and encourage "Traditional means of fishing, the gathering of traditional plants and herbs, preserving and promoting the continuity of Native cultures, protecting salmon, water and native resources, replication for other Indians and their families, as well as an inter-tribal model for redevelopment of Indigenous cultures, protecting sacred sites, ecological sustainability, and better the physical & mental health through the return to indigenous cultures." These results would significantly help the revitalization of Yurok culture and also accomplish the goals and objectives that the planning members of the village have laid out.

Other planned uses for the Ah Pah village include a fish camp and boat dock to serve as base camp for locally owned and Yurok run Blue Creek Guide Services, become a stop over for ecotourism so that people can "learn more about and better understand the dominant culture's past and present impact on the indigenous people and the ecology of the region, specifically, and the earth in general." Also the village will provide a place where native Yurok people can practice their traditional arts including craftspeople, artisans, fishing and river guides, demonstration dancers, teachers, speakers and storytellers.

Currently the Ah Pah project is still very much in the designing phase. Monies have been obtained for some of the project although further donations are needed. The village site has been cleared of brush, graded for construction, seeded with indigenous grasses and most recently there has been construction of a tool shed. Areas that are in the planning stage include a water system that would implement a completely contained system at the site using a spring located up the hill from the village site and a greywater system that would treat most of the wastewater. A similar project was done in Orleans, California at the Wild by Nature Environmental Center. There a group of Humboldt State University students designed a rainwater catchment and greywater system for the facility. While our project is similar in many ways, it differs tremendously as well. We are planning a complete water system from the source all the way to treating the waste water. The other big difference is that we have no site plans to go off of, therefore our plans have to be applicable to a wide range of sizes of buildings, distance between buildings and number of people at the facility at different times.

Goals and Objectives

Goals:

To provide safe water for the Ah Pah village for drinking, washing, cooking and irrigation.

To develop a water system plan for the Ah Pah village (from collection to disposal) that is as efficient, sustainable and feasible as possible.

Objectives:

To provide multiple water system plan options for presentation to the Ah Pah village planning board.

To have these solutions available to present to the Ah Pah planning board by Sunday, May 11, 2008.

To provide the Ah Pah planning board with components for the project that are water and energy efficient and feasible within the designed systems and required facilities.

Provide the Ah Pah village planning board with contact information for contractors who can design and implement system components that we are not qualified to advise on.

Jill Anderson

Jaclyn Colloton

Priscilla Viramontes

Weighing Alternatives

We formulated five different alternative water systems for the Ah Pah Village project.

Option 1

Water is pumped from the spring into a storage tank, ranging in size from five to ten thousand gallons. The water pump is powered by a combination solar power (from a solar panel placed on the hill) and micro-hydro system. The tank is equipped with a shut off valve triggered when the water level in the tank reaches a certain amount. The excess power generated by the solar panel and micro-hydro system, once the tank is full, could be directed to a battery that would be used (as a back up) if the pump is needed at night. The water then travels through the pipes and also through a filter which, if necessary, would be powered by the micro-hydro system. The water pressure would be because of the natural drop in elevation from the spring site to the village site. Upon reaching the village the water would either be directed into the kitchen or bathroom. In the kitchen the water will be sent to the sink and dishwasher and laundry facilities if needed. The appliances placed in the kitchen would be water and energy efficient. The water is collected from the kitchen and sent to a grey water system where it would be filtered for use in the lawn/sprinkler system and spigots. When the water is directed into the bathroom it will be used first in the sinks and showers. Then it is collected and the necessary water needed to flush the toilets will be used and afterwards sent to the septic system for safe disposal. Any remaining and usable water from the bathroom would be sent to the grey water system and filtered for outdoor use. The appliances placed in the kitchen would be water and energy efficient.

Option 2

Water is pumped from the spring into a storage tank, ranging in size from five to ten thousand gallons. The water pump is powered by a combination solar power (from a solar panel placed on the hill) and micro-hydro system. The tank is equipped with a shut off valve triggered when the water level in the tank reaches a certain amount. The excess power generated by the solar panel and micro-hydro system, once the tank is full, could be directed to a battery that would be used (as a back up) if the pump is needed at night. The water then travels through the pipes and also through a filter which, if necessary, would be powered by the micro-hydro system. The water pressure would be because of the natural drop in elevation from the spring site to the village site. Upon reaching the village it travels to the kitchen first where it will be used in the sinks, dishwasher and laundry facilities. The water would then be collected and re-filtered in a filtration system for use in the bathroom sinks and shower. The toilets in the bathroom will be waterless composting toilets. The water from the sinks and showers will go to the grey water system and then used in the sprinkler system and outside spigots.

Option 3

the bathroom. In the bathroom the water would be sent to the sinks, the waste water from the sinks would be used to flush the toilets. If the water is sent to the kitchen or showers it would go through a temperature controlled water heater and then to the two facilities. In the kitchen the water would be used in the sinks and appliances. All of the wastewater from the bathroom, kitchen and showers facilities would be sent to a septic system.

Notes:

- All the appliances used at Ah Pah Village will be water and energy efficient.
- Aerators, flow controllers, water timers, motion sensors, biodegradable cleaning products (a must) and on demand water heating would be employed at all possible outlets.
- Recycled materials would be used throughout the village's water system.
- A rainwater catchment system could be implemented if there is a need for water that the system does not provide. If, for example, the rainwater catchment system (used to provide water to the workshop separate from the bathroom and kitchen facilities) needed 5000 gal/year, how large would the catchment area need to be? The average rainfall for Orick according to worldclimate.com is 68 inches/year. 5000 gal/year is 1,155,080 cubic inches/year. Dividing 1,155,080 cubic inches/year by the average rainfall 68 inches/year, gives a rainwater catchment area of 16986.7 square inches. Converting into feet would give us an area of 118 square feet.
- At this moment we do not have specific pricing information as we do not yet know how large the system needs to be. In our meetings with the planning commission of Ah Pah Village we have learned that price is a low priority and sustainability is a high priority. We have tried to keep this in mind during our research.
- We understand that the water systems we have designed are very similar, but we feel the small differences make a big impact on the system. If we had our choice we would present the planning commission of Ah Pah Village with three alternatives that do not require a septic system. We feel that the use of a septic system has multiple problems and requires a large amount of upkeep that our other systems do not require. However, to provide the commission with a wide range of alternatives we have chosen to keep some septic system alternatives.

We have chosen four options to present to the planning board. These options are Option 2, Option 3, Option 4 and Option 5. This gives the planning commission two non-septic alternatives and two septic alternatives with subtle differences in other parts of the system as well. These options will be greatly elaborated for presentation to the commission.

Option 2

Advantage: Does not include a septic system. The water is used more than once before going through the grey water system.

Disadvantage: Water would require two filtrations and two storage systems.

Option 3

Advantage: Uses water efficiently, especially in the bathroom facility.

Disadvantage: Water would require two filtrations and two storage systems. The system also includes a septic system. The system may also need to be supplemented by a rainwater catchment system.

Option 4

Advantage: Water system does not include a septic system. The system design is relatively simple and only requires one filtration and one storage tank. There should be plenty of water for the sprinkler system and outdoor spigots.

Disadvantage: Water is only used once before sent to the grey water system.

Option 5

Advantage: Sprinkler system water does not need filtration and does not depend on wastewater from bathroom or kitchens. The system does not include a greywater system that would require space and attention at the site. The sink and toilet combinations use water efficiently and twice.

Disadvantage: All the waste water goes to the septic system and is only used once.

Based on the advantages and disadvantages of our four selected options, we will be highly recommending Option 4 if the village is not used on a large scale daily. If the village is going to be a high use site, with lots of people and water needed on a daily basis, we are going to recommend that the commission implement Option 3 because the septic system would be small and take care of excess waste water.

Water is pumped from the spring into a storage tank, ranging in size from five to ten thousand gallons. The water pump is powered by a combination solar power (from a solar panel placed on the hill) and micro-hydro system. The tank is equipped with a shut off valve triggered when the water level in the tank reaches a certain amount. The excess power generated by the solar panel and micro-hydro system, once the tank is full, could be directed to a battery that would be used (as a back up) if the pump is needed at night. The water then travels through the pipes and also through a filter which, if necessary, would be powered by the micro-hydro system. The water pressure would be because of the natural drop in elevation from the spring site to the village site. Upon reaching the village it travels to the kitchen first where it will be used in the sinks, dishwasher and laundry facilities. The water would then be collected and re-filtered in a filtration system for use in the bathroom sinks and shower. Then it is collected and the necessary water needed to flush the toilets will be used and afterwards sent to the septic system for safe disposal. The remaining water not used in the toilets would travel through the grey water system and be used in the outdoor sprinkler system and spigots.

If the remaining water from the facilities is not enough for the outside needs, a rainwater catchment system could be installed for supplementing the amount of water.

Option 4

Water is pumped from the spring into a storage tank, ranging in size from five to ten thousand gallons. The water pump is powered by a combination solar power (from a solar panel placed on the hill) and micro-hydro system. The tank is equipped with a shut off valve triggered when the water level in the tank reaches a certain amount. The excess power generated by the solar panel and micro-hydro system, once the tank is full, could be directed to a battery that would be used (as a back up) if the pump is needed at night. The water then travels through the pipes and also through a filter which, if necessary, would be powered by the micro-hydro system. The water pressure would be because of the natural drop in elevation from the spring site to the village site. Upon reaching the village the water would be diverted wither to the bathroom or kitchen facilities. In the bathroom there would be water directly feeding in to the sinks and showers, then collected and fed into the grey water system for use in the sprinkler system. The toilets in the bathrooms would be waterless composting toilets. In the kitchen, water would be put to use in the sinks, dishwasher and laundry facilities and then fed into the grey water system. Once through the grey water system, it would be used in the sprinkler system and the outdoor spigots.

Option 5

Water is pumped from the spring into a storage tank, ranging in size from five to ten thousand gallons. The water pump is powered by a combination solar power (from a solar panel placed on the hill) and micro-hydro system. The tank is equipped with a shut off valve triggered when the water level in the tank reaches a certain amount. The excess power generated by the solar panel and micro-hydro system, once the tank is full, could be directed to a battery that would be used (as a back up) if the pump is needed at night. The water then travels through the pipes and also through a filter which, if necessary, would be powered by the micro-hydro system except for the water needed for the outdoor sprinkler system, which would bypass the filter. The water pressure would be because of the natural drop in elevation from the spring site to the village site. After passing through the filter the water would be diverted either to the kitchen or

Implementation Strategies

Jacki Colloton

ENVS 410

Jill Anderson

Priscilla Viramontes

Implementation (Presentation)

Since the implementation of our project is preparing and making presentation of the different water system alternatives to the Ah Pah Village board of advisors, our implementation will be creating a presentation. We will be creating a Powerpoint presentation and a full copy of our project to be given on the presentation date. The Powerpoint presentation will include renderings of the different water system alternatives, provide the pros and cons for all the different alternatives, detail the different components of the water systems, provide some monetary information about the components, and we will also be giving our opinion on the preferred alternative water system. A copy of the Powerpoint presentation will be included in both hardcopy and on disk to serve the board of advisor's purposes in the future.

Strategies for Completion (Timeline)

Tuesday, 15 – Edit problem background, weighing alternatives, goals and objectives. FINAL COPY

Thursday, 17 – Choose universal components for alternatives and plug them into the alternative descriptions.

Sunday, 20 – If no information on the spring/measurements of site have been provided a field trip will commence to take flow rate readings on site.

Tuesday, 22 – Choose specific components for each alternative and plug them in to alternative descriptions.

Thursday, 24 – Elaborate and edit alternative descriptions

Tuesday, 29 – Elaborate and edit alternative descriptions

Thursday, 1 – If Classroom is free, the goal is to have the drawings finished on this day

Tuesday, 6 – FINAL COPY FOR ALL HARD COPY IS DUE TODAY!!! This will allow time for any editing or forgotten components to the project.

Thursday, 8 – Create powerpoint presentation and assign speaking duties for presenting

Sunday 11 – Presentation!!! (tentative)

Monitoring and Evaluation

Due to the fact that this project is in its beginning stages we cannot monitor or evaluate the systems effectiveness. This must be performed by the Ah Pah planning board once the village is completed. We suggest that the Ah Pah planning board contact the Yurok Tribe Environmental Program Water Division. This division would be able to test and regulate the water system as well as instructing others on how to accomplish regular water testing.

The most effective way to maintain efficiency of the water system is to routinely maintain and monitor the components of the water system to keep them in proper working order. Technology is constantly changing and every so often components may become outdated and a more efficient product may appear on the market. A cost-benefit analysis should be conducted at that time to ensure the most appropriate technologies.

Note: The contractors who design and install the septic system would be the best to advise the planning board on how to maintain and test the system for efficient use.

Yurok Tribe Environmental Program

Water Division Contacts

Ken Fectcho, Assistant Director of Water Division

Bill Patterson, Environmental Program Specialist for Wetlands

(707) 482-1618

101 Klamath Circle

Klamath, CA, 95548

Date	Group member	Time	Action
1/31/2008	Jacki, Jill, Priscilla	1 hour	Selected project, home work: research what we could do for the project. Collaborated on information found and decided to try to make connection through email, received a response inviting us to go to the site.
2/5/2008	Jacki, Jill, Priscilla	.5 hour	Called Willard and DaleAnn to see what they would be interested in having us do for them and confirmed that Jill and Priscilla would be going to the site.
2/7/2008	Jacki, Jill, Priscilla	1 hour	Worked on project during allotted class time
2/12/2008	Jacki, Jill, Priscilla	1.5 hours	Worked on project during allotted class time
2/14/2008	Jacki, Jill, Priscilla	1.5 hours	Worked on project during allotted class time
2/17/2008	Jill, Priscilla	5 hours	Went to the Ah Pah site and discussed the original Bridge project.
2/19/2008	Jacki, Jill, Priscilla	1.5 hours	Worked on project during allotted class time
2/21/2008	Jacki, Jill, Priscilla	1.5 hours	Worked on project during allotted class time
2/24/2008	Jacki, Priscilla	2.5 hours	Went to a planning meeting at DaleAnn's house, set up a meeting with PennElyse. Met with PennElyse to get more details about our original Bridge project, but found out that the water project would be a better choice so we switched to the current project.
2/26/2008	Jacki, Jill, Priscilla	1.5 hours	Worked on project during allotted class time
2/28/2008	Jacki, Jill, Priscilla	1.5 hours	Worked on project during allotted class time
3/4/2008	Jacki, Jill, Priscilla	1.5 hours	Worked on project during allotted class time
3/5/2008	Priscilla	1.5 hours	Met with DaleAnn and spoke about the project.
3/6/2008	Jill	.5 hour	Spoke to CCAT about possible alternative projects.
3/11/2008	Jacki, Jill, Priscilla	1.5 hours	Worked on project during allotted class time
3/13/2008	Jacki, Jill, Priscilla	1.5 hours	Worked on project during allotted class time
3/18/2008	Jacki, Jill, Priscilla	1.5 hours	Worked on project during allotted class time
3/20/2008	Jacki, Jill, Priscilla	1.5 hours	Worked on project during allotted class time
3/25/2008	Jacki, Jill, Priscilla	1.5 hours	Called and spoke with DaleAnn, Mike and Willard about the project, specifically the lawn.
3/27/2008	Jacki, Jill, Priscilla	1.5 hours	Worked on project during allotted class time
4/1/2008	Jacki, Jill, Priscilla	1.5 hours	Worked on project during allotted class time
4/3/2008	Jacki, Jill, Priscilla	1.5 hours	Worked on project during allotted class time
4/8/2008	Jacki, Jill, Priscilla	1.5 hours	Worked on project during allotted class time
4/10/2008	Jacki, Jill, Priscilla	1.5 hours	Worked on project during allotted class time
4/15/2008	Jacki, Jill, Priscilla	3.5 hours	Worked on project during allotted class time, met in the library for a few hours.
4/17/2008	Jacki, Jill	3.5 hours	Worked on project during allotted class time, met in the library for a few hours.
4/20/2008	Jacki, Jill, Priscilla	1 hour	Attempted to visit the site to locate the spring, but never got permission or directions. Called and spoke with DaleAnn and Mike about the project and set a date to present our findings to them.
4/22/2008	Jacki, Jill, Priscilla	1.5 hours	

4/24/2008	Jacki, Jill, Priscilla	1.5 hours	Worked on project during allotted class time
4/27/2008	Jacki, Jill	3 hours	Worked in library on project.
4/29/2008	Jacki, Jill	3.5 hours	Worked on project during allotted class time, met in the library for a few hours.
5/1/2008	Jacki, Jill, Priscilla	6.5 hours	Worked in library to finish the componets sections of the project.
5/5/2008	Jacki, Jill, Priscilla	5 hours	Worked in library to finish the componets sections of the project.
5/6/2008	Jacki, Jill, Priscilla	5 hours	Worked in library to finish the rest of the paper, and to begin the PowerPoint presentation.
5/8/2008	Jacki, Jill, Priscilla	3.5 hours	Turned in completed paper, worked on PowerPoint.
5/11/2008	Jacki, Jill, Priscilla	2 hours	Ah Pah Board Presentation at 1:00 pm.
5/13/2008	Jacki, Jill, Priscilla	1 hour	Final presentation day!

The entire semester we worked independently at home on this project for an unknown number of hours.

From: "David Julius Frye" <sevencedarnaj@hughes.net>
Subject: Re: Blue Creek - Ah Pah Message Received
Date: Wed, February 13, 2008 7:36 pm
To: jda19@humboldt.edu

Our next village planning meeting will be at 12:00pm on 2-24-08.
It will be held at Dale Ann Sherman's house located at 1420 M St. Eureka.

Thank you,
David Frye

----- Original Message -----

From: <jda19@humboldt.edu>
To: "David Julius Frye" <sevencedarnaj@hughes.net>
Sent: Monday, February 11, 2008 11:17 PM
Subject: Re: Blue Creek - Ah Pah Message Received

> Hello,

>

> That would be great. When and where is the next village planning meeting?

>

> -Jill

>

> It would be nice to hear more from you. Maybe you could come to a village
>> planning meeting? Thank you David Frye

>> ----- Original Message -----

>> From: <jda19@humboldt.edu>
>> To: <willard@bluecreekahpah.org>; <sevencedarnaj@hughes.net>;
>> <mike@bluecreekahpah.org>; <daleannyurok@aol.com>
>> Sent: Sunday, February 03, 2008 10:22 PM
>> Subject: Blue Creek - Ah Pah Message Received

>>

>>

>>> Sunday 02/3/2008

>>>

>>> E-Mail Message

>>>

>>> Jill Anderson, jda19@humboldt.edu

>>>

>>> Message:

>>>

>>> Hello,

>>>

>>> I am an Environmental Science student at Humboldt State University.

>>> Myself

>>> and two other students are Seniors and we are beginning to prepare to do
>>> our senior project. We herd about this village project and we would like
>>> to volunteer for you as our senior project. It would be wonderful if we
>>> could assist in making this village project as ecologically sustainable
>>> as
>>> possible.

>>> If you think that you might like our help, please email us and let us
>>> know

>>> what sorts of projects you have in mind for us.

>>>

>>> Thank you,

>>>

>>> Jill, Pricilla, and Jackie

>>>

>>

>

>

wow that sounds great, thats awesome you got a response, if we could find out when there next meeting is that would be cool, but yeah so far we decided to do some more research and talk to some people. i have an appointment with marlon sherman (NAS professor) tommorow so i'm sure i'll come to class with some info. talk to you soon.
priscilla

> Hi ladies,

>

> Sorry I missed class today. Besides meeting with you, did I miss anything important? Also I just wanted to let you know that I looked at the website for the village project and emailed the general address. They want to know more about us and said that we could attend a village planning meeting.

> Unfortunately he didn't give me any idea as to when the next meeting will be or where. Before I responded I wanted to check in with you two. I plan on attending the next class.

>

> -Jill

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Jill

So here are my notes from the meeting on Sunday. Feel free to enjoy them at your leisure.

In attendance: Marlon and Dale Ann Sherman, Mike and Peggy Meuser, Willard Frye, Mike Ward and Linda (whose last name I did not catch)

Mike Meuser says he will be getting the maps to us when he can but he did get the email.

On a telephone conference with PennElys Goodshield we set up a meeting with her on Tuesday at 2:00 (yes during class) at the Intercept office on campus. She will discuss what she expects with the bridge and more details than we could get from any other meeting.

It was determine that Greendiamond does own the bridges and therefore is responsible to maintain the bridge. Willard said that the person at Greendiamond (formerly Simpson) is Robert Miller, who is a boss and takes care of use permits. Email Willard and he will be able to provide us with Miller's contact info.

The Greendiamond offices are north of Orick(?) red building on right side of road, across from fern canyon and the bronze elk (with the elk fields).

The next meeting date is Sunday, March 16th at 12:00 at Dale Ann's. This is the first sunday on spring break. We are not expected to be there but if we have made contact with Greendiamond we should let PennElys know and she can give them an update.

We are meeting in the class room and then walking over to Intercept together to meet with PennElys on Tuesday. So see you in class!!

Jacki

[Delete & Prev](#) | [Delete & Next](#)Move to:

From: jda19@humboldt.edu
Subject: Re: Blue Creek - Ah Pah Message Received
Date: Thu, February 28, 2008 2:27 pm
To: mike@learn2map.com

Hi Mike,

We would like a topographical map that shows the water resources in the area. We are going to be working on creating a water system for the village, so if there is anything else that you think we could use, that would also be great. We talked to PennElyse and we decided that it would be best to focus all our efforts on this system.

Thanks,

Jacki, Priscilla, and Jill

> Hi Jill - Met Jackie and saw Priscilla again at Dale Ann's this last
> weekend. We talked with Willard and he says that the bridges are on
> Green Diamond land and gave a contact name to Priscilla and Jackie.
>
> I can certainly do the map(s) you need. Give me a bit more detail
> about what you would like to see on the maps - topo, flat, etc. and
> anything else for that matter.
>
> thnx
>
> Mike Meuser
>
>

Current Folder: **ahpah**[Sign Out](#)[Compose](#) [Addresses](#) [Folders](#) [Options](#) [Search](#) [Help](#)[Message List](#) | [Delete](#)[Previous](#) | [Next](#)[Forward](#) | [Forward as Attachment](#) | [Reply](#) | [Reply All](#)**Subject:** sustainable blue creek-ah pah**From:** mike@learn2map.com**Date:** Wed, February 27, 2008 10:42 pm**To:** daleAnnYurok@aol.com ([more](#))**Cc:** yurokcarlson@yahoo.com ([more](#))**Priority:** Normal**Options:** [View Full Header](#) | [View Printable Version](#) | [Download this as a file](#) | [View Message details](#)

Hi - Today I attended an HSU talk entitled, State of Sustainability: Through the Tipping Point. It was given by an old friend whose name, oddly enough, is Gil Friend.

It reminded me of what we say on the website"

"The village will be self-sustaining"

"The goals of this village project will be to see the completion of ... (an) ecologically sustainable Yurok village"

"Over time, village residents will facilitate and encourage ... ecological sustainability"

What does this mean? I'll take a stab at it. Perhaps we can get it on a meeting agenda so that we can develop it further.

In the broadest sense, sustainability means sustaining (or working to get back to that point) the balanced relationship between culture and nature that, up until european contact, provided the Yurok people with a just, balanced and pleasant place to live that provided the varieties and quantities of nature provided "stuff" to satisfy spiritual and bodily needs.

This "balancing act" has often been dismissed or disregarded by saying - oh, there was so much stuff and so few people that sustainability was a "slam dunk."

My limited knowledge of the reality back then is that there were cultural systems of sharing, caring, conservation, cultivating ... that maintained the balance between culture and nature for eons like assuring that there were salmon for upriver tribes; using downed redwood or taking if from living trees in such a way that they continued to thrive; burning and pruning to encourage growth of desired plants; maintaining the ecosystem for needed animals... much much more of course.

In the present things come to mind like:

* using photovoltaic and small hydro-power to attain net-zero energy use (using no more than is produced on-site)

* if generators are required, use diesel versions - perhaps running

From: DaleAnnYurok@aol.com
Subject: Re: Thanks for contacting me
Date: Wed, February 27, 2008 11:07 pm
To: jda19@humboldt.edu
Cc: mike@learn2map.com

Hi:
public restrooms for women and men.
4 showers and 4 sinks, 4 toilets for the women's side. Then, the same for the men's side.

The kitchen will have a 3 giant sinks, commercial hose for dishwashing, a dishwasher, commercial oven, range top.

Also, there should be running water at the work shop (outside shower) and on the grounds for watering the lawn. (Lawn system) Also, the work shop should have a sink, shower, and toilet.

Then, there should be running water from faucets at 4-6 places along the lawn near and around the dance pit.

Glad you're all on the project.
Dale Ann

Delicious ideas to please the pickiest eaters. [Watch the video on AOL Living.](#)

Attachments:

untitled-1
Size: 0.8 k
Type: text/plain

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i would feel more comfortable if we talked to her in person about that, is the issue that important rite now? shouldn't we be thinkin about exactly wut type of water system we'll be using anyway?

> So I was thinking we should at least thank her for the facilities
> information. Also, I was thinking that we should bring up our concerns
> about the lawn, so I wrote up a letter we could send her describing our
> issues with it, it is pasted below. I want your feed back, please send me
> a revised copy if you think it needs it. If not just let me know its ok. I
> won't send it until I hear from both of you :) -Jill

>

> ***

>

> Hi Dale Ann,

>

> Thank you for the information on the plumbing facilities. We started
> brainstorming today and we plan to begin researching our ideas this
> weekend.

>

> One thing we were unsure about was the lawn watering system. From what we
> understand so far, you plan on only using native plants. If this is the
> case we don't think that you will need a full on sprinkler/lawn type
> system. This is because the plants are native, they have evolved in this
> area and are perfectly suited to the climate here. Which means that they
> would be able to survive here without human care such as watering or
> fertilizing.

>

> Watering or fertilizing (especially when unnecessary) can actually be
> taxing on the environment. Fertilizing obviously could inadvertently
> introduce toxins into the ecosystem (too much of a "good" thing). Watering
> wouldn't be as bad, except for the fact that your site is located on/near
> a slope. Excess water here could potentially loosen the soils in the slope
> to the point that it could cause the slope to become unstable in the
> future.

>

> We suggest that unless you plan on using many nonnative plants, a full on
> sprinkler/lawn type system is unnecessary. What we could do is set up the
> faucets, around the lawn and dance pit, so that a hose can be connected to
> them for hand watering. If you still want a full on sprinkler/lawn type
> system, then we have a few ideas already in our notes.

>

> Thank you,

>

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Jill And Priscilla,

I will not be attending class on Thursday of this week (so today). There is something that has come up at my job that we are trying to deal with and therefore we have all been called in to an emergency meeting. I will also be a little late on Tuesday but I will be there...probably no more than ten -fifteen minutes.

If you plan on working on the goals and objectives I have a couple of ideas.

Make sure that the goals include being feasible, reasonably priced, as eco-friendly as possible etc.

For objectives I think one should be a wide variety of alternatives for the people to choose from.

Think about it. I will email more ideas later and if you could email me what you work on I would greatly appreciate it. Sorry for all of this!

Jacki

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Hi - 2 versions of maps - one with and one without labels. From talking to Willard, i think I have the spring about right. I should be up there soon with willard and then can walk to it and zero in a bit more. let me know if this helps, if you need more.

Also, you wanted maps to show bridges, but these topos don't really show the roads correctly, but you can get an idea. Really need to be there onsite with me and Willard and a GPS to nail it down.

best

Mike
442-6326

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----- File information -----
File: o41123d8.jpg
Date: 25 Mar 2008, 23:08
Size: 559251 bytes.
Type: JPEG-image

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File: o41123d8-w-labels.jpg
Date: 25 Mar 2008, 23:11
Size: 562607 bytes.
Type: JPEG-image

Attachments:

From: "PennElys GoodShield" <pennelys@sustainableations.org>
Subject: Re: Ah Pah Water Systems Project
Date: Mon, April 7, 2008 1:08 am
To: jpc26@humboldt.edu

I will send the word out to get accurate responses!
I would assume that year-round, a family of 5 or 6 will be using it, and that periodically up to 60 people will use it for only about a week at a time (for the brush dance - only once a year) They do want to have camps and visitors regularly, but Im sure this load won't be more than 20 at a time. Again, let me talk to people! Willard would be the best one to talk to about this, I believe!

On 4/3/08 2:03 PM, "jpc26@humboldt.edu" <jpc26@humboldt.edu> wrote:

> PennElys,
>
> Since our first meeting about designing a water system for the Ah Pah
> village, we have come up with multiple ideas for designs. However for us
> to get specific about the different components of the systems we need some
> questions to be answered. How much water do you foresee the system
> needing? Or if that answer is not available perhaps, how often is the
> site going to be used and by how many people? we are trying to figure out
> size of tanks, septic systems, gray water systems etc. So if you have any
> information we would greatly appreciate it.
>
> Thanks so much
> Jill, Priscilla, Jacki
>

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Hey Jill,

So priscilla and I met today. i got an email from PennElys about water usage. She said that there will be a family of five or six there throughout the year (I assume a groundskeeper/security type thing). She also said that about twice a year a group of about 60 will use the facility. She also wrote that they are planning on having camps and visitors regularly but never more than twenty at one time. I just couldn't believe that they want all these facilities for that little of use but ok.

So priscilla has not called Dale Ann yet with all of our questions and PennElys advised me to email Willard about the water usage. Also Priscilla finally got a copy of that other senior project, the one at Orleans. Holy crap! they are way detailed and just looking at that makes me realize how much work we have! We really do need that water usage and also some sort of site plan with measurements and placement of buildings to do this project. Priscilla also had not done much work on the whole pricing of items, she actually did more research than anything else. She did rule out greywater for showers (not allowed) and something else I can't remember. But please come on thursday so we can take a look at the other project more in depth and you and I can figure out where to go from here!

See ya thursday!

Jacki

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Hi Dale Ann,

We have a few questions. The first is are you going to be needing a washing machine and dryer on site? Also, do you have any kind of blue prints or plans or anything that we could get detailed size information from? Such as the size of the lawn, distance from the spring, size and locations of the buildings, etc. This last question is when would you like us to present our findings? The best day for us is May 11, but we are willing to work around your schedule.

-Jill, Jacki, and Priscilla

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Hi Jill - Mike here. Willard doesn't do email yet so I'm his surrogate for now. I'll be seeing him this evening or tomorrow and will get the answers for you.

There are HSU students coming to Ah Pah on the 20th. They'll have GPS units. I can ask them to GPS the site of the spring so you'll have a more accurate location for it as well.

Mike

On 10 Apr 2008 at 21:55, jda19@humboldt.edu wrote:

> Thursday 04/10/2008

>

> E-Mail Message

>

> Jill, jda19@humboldt.edu

>

> Message:

>

> Hi Willard,

> I am one of the students working on the Ah Pah village water
> system, and I have a question for you. Do you have any idea what the
> water usage will be for the site? For example do you have any idea
> how many people will be using it on a regular basis, and on special
> occasions what is the maximum amount of people you expect to be
> using the water? Also do you know the flow rate of the spring and
> depth of the spring?

>

> -Jill

>

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Dale Ann,

We have been in contact with Willard and Mike about trying to figure out the elevation of the spring in relation to the village site as well as the flow rate of the spring itself. Unfortunatley no one seems to know exact number for us. We heard through the grapevine that there will be a group of HSU students heading up to the site on Sunday the 20th to do some GPS mapping and surveying. Priscilla, Jacki and I were wondering if it would be OK for us to head up there on that date as well to locate the spring, take some flow readings and figure out the elevation relation. Just let us know if that would be ok!

Thanks

Jill, Jacki and Priscilla

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water filters for a large scale group, maybe bypassing the toilet and shower water through a smaller and less intensive filter.

look into gravity pumps and gravity flow into a storage tank, (if usable once we figure out elevation)

also water heaters is one thing that we have not researched that needs to get done

CCAT for composting toilets, greywater and sink water to toilets.

County Department of Health, for water storage after filtration

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Subject: Re: Miele

From: moreinfo@mieleusa.com

Date: Wed, April 16, 2008 10:02 am

To: jda19@humboldt.edu

Priority: Normal

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Dear Ms. Anderson,

Thank you for your interest in Miele products.

The W4840 washer uses a minimum of 7 gallons of water, 10.75 gallons for a standard test load and a maximum of 19 gallons, depending on the program chosen.

For more detailed information please visit our web site at www.miele.com or to speak with one of our representatives call 800-843-7231.

Thank you

Michele Adam
Customer Support
Miele, USA
moreinfo@mieleusa.com

Jill Anderson

Email : jda19@humboldt.edu

Telephone :

Fax :

Question : In regards to Washing machine product number W4840, I was curious how much water is used per load? If you could answer my question I would greatly appreciate it.

Attachments:

[untitled-\[1\]](#)

0.8 k

[text/plain]

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From: "Metcalf, Kevin" <KMetcalf@co.humboldt.ca.us>
Subject: RE: Water storage
Date: Thu, April 17, 2008 8:56 am
To: jpc26@humboldt.edu
Cc: "Hill, Harriet" <HHill@co.humboldt.ca.us>

Hi, we often look at the Centers for Disease Control and Prevention website for such answers. The topic of emergency preparedness covers safe water storage. See the link below:

<http://emergency.cdc.gov/preparedness/kit/water/>

If containers of filtered water from the house will be use, I recommend you follow the guidelines above. The guidelines inform how to sanitize containers and to replace water stored this way every six months. There should also be some evaluation of the water system itself in regards to it's source, construction, ability to exclude surface water and contaminants (spring, creek, or well), the surrounding land use, and any record of chemical and bacteriological water testing. Does the water supply meet turbidity and bacteriological water quality standards year round? Once you know the source is safe you may consider a larger storage tank for bulk water storage which has some pros over storage of consumer sized containers.

This should help or give you a start. Please feel free to give our drinking water program contact, Harriet Hill, a call at 707 268-2228 (you can email her too). She may need to know more about the source to provide further guidance.

Thank you for working on this subject.

Kevin Metcalfe, REHS
Consumer Protection Program Supervisor
Humboldt County Division of Environmental Health
100 H Street, Suite 100
Eureka, CA 95501
kevin.metcalf@co.humboldt.ca.us
(707) 268-2210 voice (707) 441-5699 fax

Vaccinate your pets!

-----Original Message-----

From: jpc26@humboldt.edu [mailto:jpc26@humboldt.edu]
Sent: Wednesday, April 16, 2008 8:46 PM
To: Metcalfe, Kevin
Subject:

Mr. Metcalfe

We are a group of HSU students whose senior project is to design a water system for the planned Ah Pah Village of the Yurok reservation. During our research we have some across a few questions that we believe you might be helpful with.

At the project site there will be a family of 5 or 6 there year round, which works fine with a whole house water filter. However there will be groups of 20-30 there about twice a month and groups of 60+ there three

a year. Is it possible to store filtered water for long periods of time and have it remain sanitary and usable? What kind of guidelines are there that limit the amount of time treated water can be stored?

If you could provide us with answers, contacts for people who could provide us with answers or just point us in the right direction would be helpful!

Any help that you can possibly give us would be greatly appreciated!
Thank you so much!
Jaclyn Colloton, Jill Anderson, Priscilla Vasquez

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Hi Jill,

Anything else, please just let us know.

Regards,
Cathy

Original Message:

From: jda19@humboldt.edu
Date: Fri, 18 Apr 2008 10:55:00 -0700 (PDT)
To: info@caromausa.com
Subject: RE: Question regarding toilets

Hi Cathy,

I actually hunted around on your website some more and found that all your "easy height" toilets are ADA compliant. Thank you for your help.

Jill

> Hello Jill,

>

> Thank you for your interest in Caroma toilets. In order to forward your
> question to the correct person, can you please let me know where you are
> located?

> Thanks

> Cathy

>

>

> Original Message:

> -----

> From: jda19@humboldt.edu
> Date: Wed, 16 Apr 2008 21:14:13 -0700 (PDT)
> To: info@caromausa.com
> Subject: Question regarding toilets

>

>

> To whom it may concern,

>

> I am curious, are your "Easy Height" toilets ADA compliant? I noticed that
> you have an ADA button kit, but I need the bowl to be ADA aswell. If they
> are not all ADA compliant could you give me a list of those that are?

If we can't figure out the flow rate (I haven't gotten a call back yet)
> then we should just guestimate it and say that this is just a hypothetical
> example...I found this: [http://en.wikipedia.org/wiki/Spring_\(hydrosphere\)](http://en.wikipedia.org/wiki/Spring_(hydrosphere))
> look at the chart. I just spent hours trying to figure out anything about
> the spring location or flow rates of nearby springs but found nothing.
>

>> ----- Original Message

>> -----

>> Subject: Re: Help with a Water Filter

>> From: "Eileen M. Cashman" <emc7001@humboldt.edu>

>> Date: Fri, April 18, 2008 12:22 am

>> To: jpc26@humboldt.edu

>> -----

>>

>> Well, that sounds like a very ambitious project that involves quite a

>> bit

>> of technical information. Sounds like an engineering project actually

>> and

>> I am a bit concerned that you may have taken on more than you are

>> prepared

>> for.

>>

>> You might try getting in touch with Dustin Poppendieck in our department

>> who is currently teaching the water quality class. Bob Gearheart is of

>> course our resident expert. Designing a water system is a very

>>> groups of 20-30 stopping by twice a month. Also there will be a group

>>> of

>>> 60+ there for three days at a time twice to three times a year. We are

>>> getting our water from a spring located on the property and the water

>>> will

>>> arrive at the site untreated. We were wondering what kind of filter we

>>> should be looking for to get the water up to usable drinking, cooking

>>> and

>>> bathroom use, and what kind of filter would be most water and energy

>>> efficient for us.

>>> If you could provide us with any information, contacts with someone who

>>> could help or just point us in the right direction we would be

>>> extremely

>>> grateful.

>>> Thank you so much

>>> Jaclyn Colloton, Jill Anderson and Priscilla Vasquez

>>>

>>

>>

>> --

>> Eileen M. Cashman

>> Associate Professor

>> Environmental Resources Engineering

>> Humboldt State University

>> Arcata, CA 95521

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Universal Products and Components for All Systems

Dishwasher

ASKO D3531XLHD Dishwasher

A Ten Program, quiet system washer with a premium insulation package that is EnergyStar certified and reported as using 194 Kwtt/year. The normal wash cycle for this washer only uses 3 gallons, far below the average dishwasher.

The cost runs about \$1600 from Canclini TV and Appliances in Fort Bragg, CA. (707) 964-5611

Washing Machine

Miele LC W 4840 Washing Machine

This super large capacity washer with 11 different wash programs, 6 water temperature control settings and a child lock feature. This washer is EnergyStar certified and scored a high eighty one out of a possible one hundred on Consumer Report.

The cost of the washer runs about \$1900 with no vendors located in the area

Drying Machine

GE Profile Harmony Dryer Model # DPGT750ECPL

This washer has a 7.3 cubic foot king size capacity, six custom cycle settings and is toted as the fastest premium dryer you can buy. This dryer is EnergyStar certified and uses only 240V of power.

The cost for this dryer runs about \$800 and can be purchased at Reliance Corp. Appliances (541) 469-5417 or at Canclini TV and Appliance (707) 964-5611

Sprayer for Kitchen

Bricor Pre-rinse Sprayer for Commercial Kitchens

This sprayer meant for heavy duty kitchen work has an Flow Impact Intensity (FIT) value of 16.43, showing an incredible overall strength of water delivery. The water flows at a rate of 0.5975 gallons per minute at 60 psi, far more water efficient than other commercial sprayers.

Product is available online at www.Bricor.com or by phone: (830) 624-7228.

Shower Head

Bricor B100 Ultra Max

Showerhead has an ultra low flow of only 0.5525 pgallons per minute yet when tested, received one of the highest performance rates of any showerhead with a postive rating of 10.35.

Product available online at www.Bricor.com or by phone: (830) 624-7228.

Shower manager

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To whom it may concern,

I am interested in using your pre-rinse sprayer for commercial kitchens. I was wondering if it would work with this faucet: Danze Parma single handle pre-rinse faucet, model number D457158. If not could you suggest one that I could use instead? Also could I find out where to order and prices for the sprayer and the B100 ultra max shower head?

Thank you,

Jill Anderson

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Hi Jill,

Yes, it will work with your existing unit.

The single unit, retail cost for the sprayer is \$79.95. The single unit retail cost of just one B100MAX showerhead is \$69.95. The price goes down with the volume being purchased as the attached price sheet will indicate.

Also attached is How to Purchase, and once we have you set up in our system we can extend you net 30 days after the ship date by invoice.

Thanks very much for your interest.

PS. We must have your psi water pressure where you intend to install and run these units in order to maximize their water savings and total energy efficiencies.

Best regards,

Marketing

Need a new ride? Check out the largest site for U.S. used car listings at [AOL Autos](#).

Attachments:

untitled-[1.1]	0.8 k	[text/plain]	Download View
2008 Priceshet.doc	96 k	[application/octet-stream]	Download
HOW TO ORDER BRICOR.doc	47 k	[application/octet-stream]	Download
Take your own psi reading.pdf	137 k	[application/pdf]	Download

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Jill I just recieved this, how do you want to proceed?

----- Original Message -----
Subject: RE: Storing Filtered Water
From: "Hill, Harriet" <HHill@co.humboldt.ca.us>
Date: Mon, April 21, 2008 2:54 pm
To: jpc26@humboldt.edu

Wow...it feels weird to be called "Field Inspector Hill" - like some character out of a mystery novel. Still, I know you got this corny title directly from our website! I am sorry I did not respond last week - I was sick on Friday.

Anyway, you have an interesting situation. I need to know quite a few more things before I can advise you. A few example questions:

Is this spring already running on the surface, or does it run underground such that it can be contained in a proper springbox?

What land uses are there above and in the immediate area of the spring (Cows or horses? Septic systems?)

Have you tested the turbidity of the water before and after storms to see if it fluctuates? (if it does, that means it is influenced by surface water and may require continuous disinfection such as a chlorinator).

Have you had it tested for total/fecal coliform bacteria? Again, the worst case scenario for bacteria would be just after a storm.

Is there any objection to chlorinating the water in the tank?

How many days/nights will these larger groups (especially the 60+ group) stay when they come?

What kind of filter will be installed?

What kind of toilets will there be - flush or otherwise?

Will the groups be served food on site?

I think this will be easiest to figure out if you just give me a call.. I am here until 5 pm and in tomorrow from 2-6pm. If I am not at my desk when you call, please leave a message as to where and at what times I can reach you. Thanks for your interest!

Harriet Hill, REHS
Humboldt County Division of Environmental Health
100 H St., Suite 100

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Subject: Re: Caroma Pricing

From: jda19@humboldt.edu

Date: Wed, April 23, 2008 1:27 pm

To: "ABC" <anna@abcgreenbuilding.com>

Priority: Normal

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Hi Anna,

Thank you soooo much!

-Jill

- > Hi Jill,
- > I got the retail pricing for the toilets you asked for:
- >
- > Adelaide Cube 270 Easy Height: \$335
- > Adelaide Cube Tank: \$337
- >
- > Adelaide Standard Easy Height: \$335
- > Adelaide Standard Tank: \$311
- >
- > Bondi 270 Easy Height: \$294
- > Bondi 270 Tank: \$212
- >
- > Sydney 270 Easy Height: \$294
- > Sydney Tank: \$190
- >
- > Caravelle 270 Easy Height: \$210
- > Caravelle Tank: \$136
- >
- > All these prices are for the white models.
- > Hope this helps you. Call if you have any other questions!
- > Anna
- >
- >
- > --
- > Alternative Building Center
- > 4 West Fourth Street
- > Eureka, CA 95501
- > Ph: (707) 445-4733
- > Fx: (707) 445-4222
- > www.abcgreenbuilding.com
- >

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hi,

Im sorry to hear that. I hope they will be ok :) I have been working on rewriting stuff and I am going to go to a computer lab and print a TON of stuff for our project. Also I am going to go get a binder for the Ah Pah people and start that as well. I haven't started the drawing stuff yet but I will try to get to it this weekend, I should be able to. Perhaps Priscilla and I could start on the monitoring and evaluation stuff today. Mainly all I can think of is that they should regularly check the water for safety, perhaps reevaluate if there is enough water all year long (somehow...)-any ideas? Have a good weekend!

-Jill

> Jill,

>

> An emergency has come up with a friend of mine and I will not be able to
> make it to class on 2/24 (Thursday).

>

> I will finish all of the work I was supposed to do (septic system, storage
> tanks, etc.) and have them ready to go on Tuesday. On tuesday we will
> have to start writing everything up, formatting, and putting everything
> together! Don't panic! we'll be fine!!!

>

> Have fun with your parents this weekend!

>

> Jacki

>

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From: "Clark, Jim" <JClark@co.humboldt.ca.us>
Subject: RE: Large Capacity Septic System
Date: Thu, May 1, 2008 9:19 am
To: jpc26@humboldt.edu
Cc: "Jim & Donna" <DANCEBIRDS@SBCGLOBAL.NET>

Thanks for your inquiry,

Due to a change in policy, we no longer provide lists of acceptable contractors. It was thought that such a list might be interpreted as an endorsement.

Generally speaking though, registered professional geologists and engineers with experience in design of large septic systems are qualified in jurisdictions outside of reservation boundaries. I suggest considering local qualified professionals familiar with north coast conditions and who have worked previously and successfully with local tribal entities.

I am glad to see interest in sustainable communities. A Health impact assessment of the Humboldt County General Plan update was recently done and the material is available at <http://www.humanimpact.org/HumboldtGPU.html>. While the material does not address on-site sewage disposal directly, the sustainability theme runs through it.

-----Original Message-----

From: jpc26@humboldt.edu [mailto:jpc26@humboldt.edu]
Sent: Wednesday, April 30, 2008 6:53 PM
To: Clark, Jim
Subject: Large Capacity Septic System

Mr. Clark,

The Yurok tribe are planning on constructing a sustainable and multi-use village on their reservation that would require a large capacity septic system. It has been suggested that you might have a list of contractors who install septic systems. If you have any information that would be helpful we would greatly appreciate it!

Thank you

Jill Andersen, Priscilla Virramontes, Jaclyn Colloton

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Contacts

Dale Ann Frye-Sherman: (707) 269-7078, (707) 496-0217
Email: DaleAnnYurok@aol.com

Willard Frye-Sherman: (707) 954-8833
Email:

Pennelys Goodshield: (707) 677-3588
Email: pennelys@sustainablenations.org

Mike Meuser: (707) 442-6326
Email: Mike@learn2map.com

Priscilla: (707) 826-7043
Email: pmv3@humboldt.edu

Jackie: (408) 439-8244
Email: jpc26@humboldt.edu

Jill: (916) 698-0731
Email: jda19@humboldt.edu

Contacts

Dale Ann Frye-Sherman

(707) 269-7078

(707) 496-0217

Email: DaleAnnYurok@aol.com

Willard Frye-Sherman

(707) 954-8833

Email:

Pennelys Good Shield

(707) 677-3588 (home#)

Email: pennelys@sustainablenations.org



tools and resources for re-imagining our
relationships with the earth and one another

Mike Meuser

Free maps and GIS resource - learn2map.com
mapcruzin.com - redwoodcoastmedia.com
climateshift.com - reimagination.com

325 Harris St. #108
Eureka, CA 95503

(707) 442-6326
www.MapCruzin.com

email:

Mike@learn2map.com

Pricilla - (707) 826-7043 PMV3@h

Jackie - (408) 439-8244 JPC26@h

Jill - (916) 698-0731 JdA19@h

Water Usage

Number of people expected at Ah Pah village for the year:

May-October (184 days): 20 people/ day

November-April (182 days): 8 people/ day

12 days out of the year: 70 people/ day

2 days out of the year: 100 people/ day

1 day out of the year: 400 people/ day

Expected approximant water usage per person per day: 24.2 gallons/ person/ day

Shower with recommended efficient shower head and 11 minute shower timer: 6 gallons/ day

Toilet with one 1.6 gallon flush and two 0.8 gallon flushes: 3.2 gallons/ day

Wash hands with 1.5 gallon/ minute faucets 4 times for one minute each: 6 gallons/ day

Brush teeth with 1.5 gallon/ minute faucets 2 times for two minutes each: 6 gallons/ day

Water used in cooking and for drinking eight 8oz glasses: 1 gallon/ day

Water used for miscellaneous/unforeseen uses: 2 gallons/ day

Other water usages per year: 3631 gallons/ year

Laundry w/ recommended machine 1 load every other day at 11 gal/ cycle: 2013 gallons/year

Dishes w/ recommended machine 1 load every day at 3 gal/ cycle: 1098 gallons/ year

Water used for cleaning/maintenance at 5 gallons twice a week: 520 gallons/ year

Expected water usage in gallons/ day for the given number of people at 24.2 gallons/ day:

May-October: 484 gallons/ day

November-April: 193.6 gallons/ day

12 days out of the year: 1694 gallons/ day

2 days out of the year: 2420 gallons/ day

1 day out of the year: 9680 gallons/ day

Expected water usage/ person/ year: 159, gallons/ year

May-October: 89,056 gallons

November-April: 35,236 gallons

12 days out of the year: 20,328 gallons

2 days out of the year: 4840 gallons

1 day out of the year: 9680 gallons

159,139 gallons/ year + 3631 gallons/ year = **162,770 gallons/ year**

1 person
24.2 gal/day

May - Oct

184 days	20 ppl	24.2 gal	= 89,054 gal
1 day	1 person	484 gal/day	

Nov - April

182 days	8 ppl	24.2 gal	= 35,235.2 gal
1 day	1 ppl	193.6 gal/day	

12 days

12 days	70 ppl	24.2 gal	= 20328 gal
1 day	1 ppl	1694 gal/day	

2 days

2 days	100 ppl	24.2 gal	= 4840 gal
1 day	1 ppl	2420 gal/day	

1 day

1 days	400 ppl	24.2 gal	= 9680 gal
1 day	1 ppl	9680 gal/day	

159,139

people / day

$$\begin{array}{r} 6/365 \\ 20/ \\ \hline 60/ \end{array}$$

$$\frac{60}{6} = 20$$

~~Shower~~ 2x
gal per day

- Shower \rightarrow .5525 gpm @ 11 minutes
- 3x toilet \rightarrow .8 + 1.6 gpf
- 3x Wash hands \rightarrow 1.5
- 2x brush teeth \rightarrow 1.5
- drink water \rightarrow 64 oz / day
- COOK w/ water \rightarrow

- one person

- 1 shower / day at .5525 gpm @ 11 minutes:
6.07 gal / ~~20~~ day
- toilet "number one" at .8 gpf at 2 flushes:
1.6 gal / day
- toilet "number two" at 1.6 gpf at 2 flushes:
1.6 gal / day
- Wash hands at 1.5 gpm at 2 minutes
4 times a day: 6 gal / day
- brush teeth @ 1.5 gpm at 2 minutes
2 times a day: 6 gal / day
- COOK / drink: 1 gal / day

Need a Washer + Dryer?

Blue prints / plans (Detailed size info)?

When to present best for us May 11

Water usage how many days/year
Group sizes will be there?
What facilities to use

~~Do you know spring flow rate?~~

~~Go to site on Sunday?~~

~~directions?~~

expects?

lawn dimension

Rain Water Catchment Size

According to worldclimate.com, Orick, a city near the site receives on average 68.5 inches of rain per year. Assuming that we need to collect XXX gallons of rain water per year, the size of the rain water catchment system will need to be XXX square feet.

The following excel file illustrates this:

gallons needed per year: 5000	cubic feet per gallon: 7.48	cubic inches per cubic foot: 1728	cubic inches of water needed per year: 1155080.2
inches of rain fall per year 68.5	cubic inches of water needed per year: 1155080.214		area of rain water catchment system in inches squared: 16862.5
area of rain water catchment system in feet squared: 117.1			

ORICK PRAIRIE, HUMBOLDT COUNTY, CALIFORNIA USA

WorldClimate

Weather station **ORICK PRAIRIE, HUMBOLDT COUNTY** is at about 41.36°N 124.01°W. Height about 48m / 157 feet above sea level.

Average Rainfall

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
mm	292.5	234.6	231.8	127.3	84.9	31.6	8.0	15.8	34.9	132.5	242.9	301.4	1739.2
inches	11.5	9.2	9.1	5.0	3.3	1.2	0.3	0.6	1.4	5.2	9.6	11.9	68.5

Source: ORICK PRAIRIE, HUMBOLDT COUNTY data derived from NCDC Cooperative Stations. 51 complete years between 1937 and 1995

Map of the area around ORICK PRAIRIE, HUMBOLDT COUNTY from tiger.census.gov.
Locations outside the continental US are not mapped.

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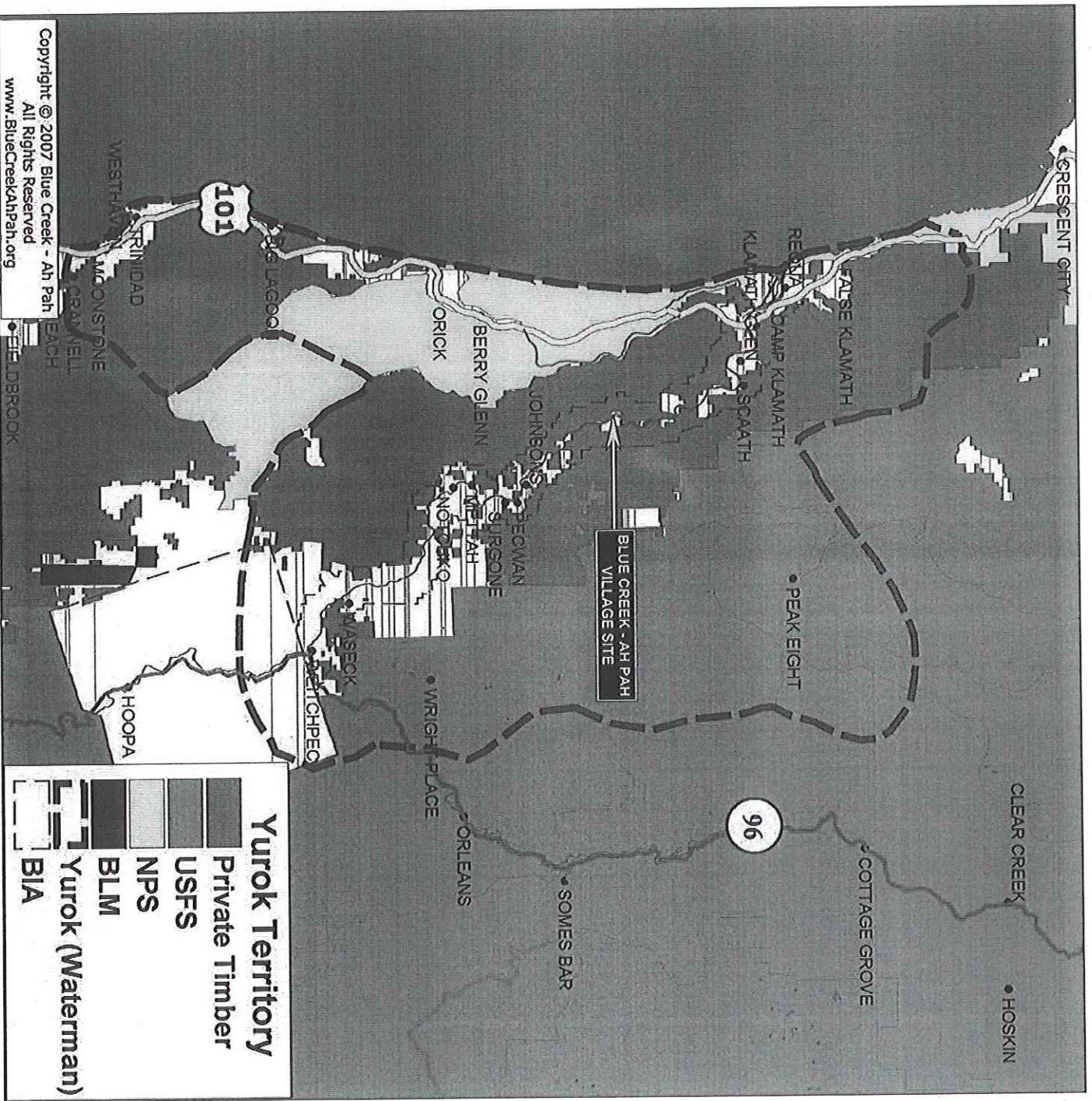
WorldClimate

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Frequently Asked Questions. DISCLAIMER.

$$\frac{268 \text{ in}}{\text{year}} \Bigg| \frac{1 \text{ year}}{1155080 \text{ in}^3} = \frac{16984.5 \text{ in}^2}{144 \text{ in}^2} = 118 \text{ ft}^2$$

$$\frac{5,000 \text{ gal}}{\text{year}} \Bigg| \frac{1 \text{ ft}^3}{7.48 \text{ gal}} \Bigg| \frac{1728 \text{ in}^3}{1 \text{ ft}^3} = \frac{1155080 \text{ in}^3}{\text{year}}$$

Rain
water
catchment



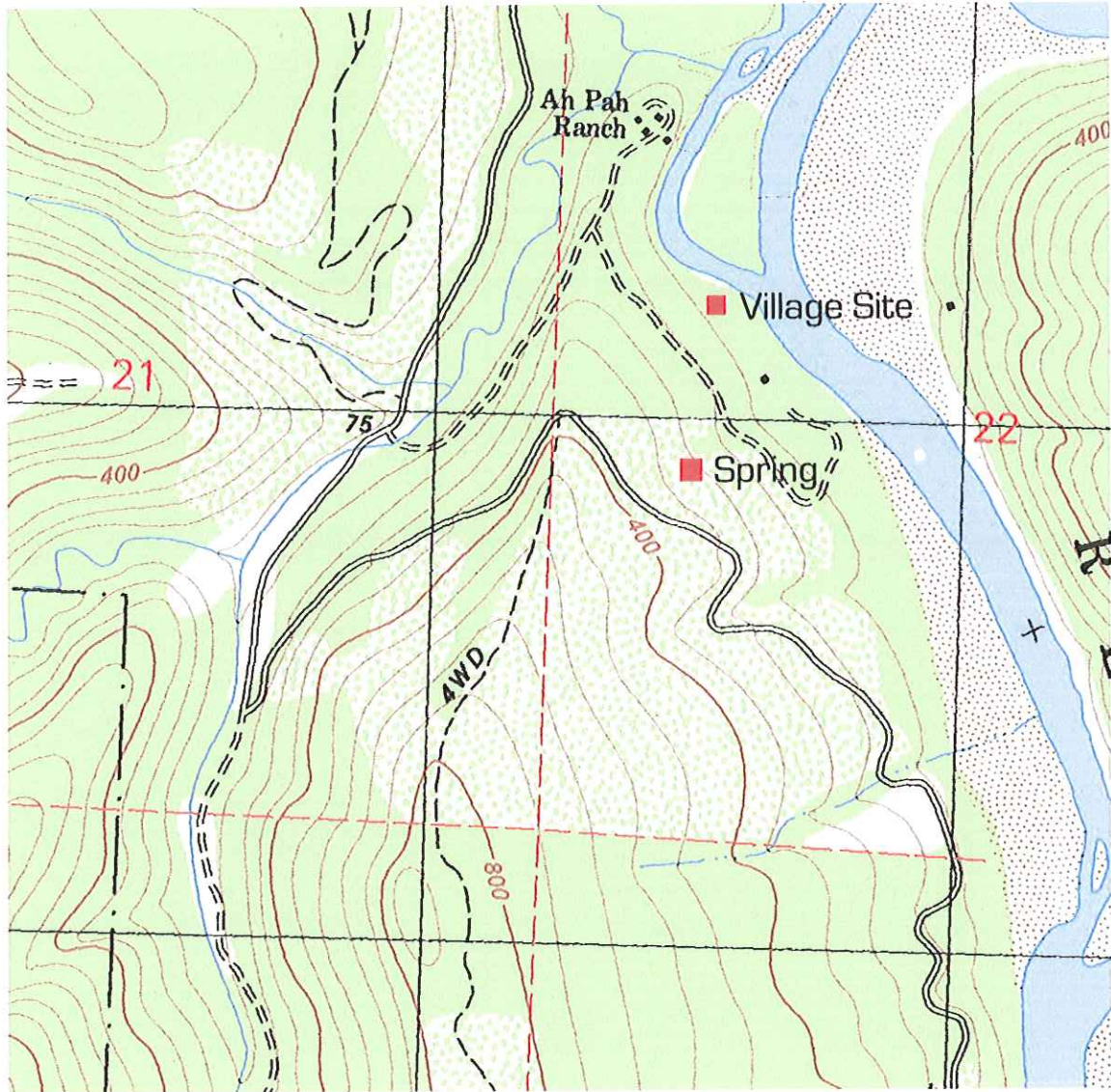




Image © 2008 DigitalGlobe
© 2008 Tele Atlas

Google™

Pointer 41°25'01.35" N 123°56'29.61" W elev 92 ft Streaming ||||| 100%

Eye alt 1895 ft

Water system notes

Things to look up:

- Micro hydro
- Greywater systems
- Natural filtration systems
- Composting toilets
- Gravity fed pumps
- Energy efficient water heating systems
- Any water saving plumbing information

Facilities

- Ten showers ✓
- Nine bathroom sinks
- Nine toilets ✓
- Four kitchen sinks (one is a heavy duty hand held faucet) ✓
- One dishwasher ✓
- Six faucets
- Lawn system?

Methods

- Reuse shower or sink water to flush toilets
- Have a grey water system collect the kitchen water to water the lawn
- Composting toilets
- Any left over water for a septic system
- If spring is high up a hill; then as the water travels down through pipes; then it would pass through a micro hydro system (use primarily to heat water and pump water), as the water continues down the hill it will pass through a filtration system, then it would be distributed.

Notes from Orleans

- Water rights? deed? ← Research ^{new section} Priscilla?
- pump, tank etc: hidden from view?
paint tank?
- is septic feasible at our location?
- find codes for grey water etc.?
- look up types of grey water &
Natural filtration: Living wall, Reed bed...
- Average Rain fall Dept of Water
resources & min Rainfall CA: ET map
- evapo transpiration / plant factor? Need?
- ↳ Should have been located close to
River. check for Spring
- Ram pump? positive displacement pumps
- Solar index for power (availability of light)
- ↳ Solar submersible.
- Stable clothes Washer
- Water overflow on Rain water?
- Water weight must be supported by
collection - first ten minutes or so
to clean collector.
- Roofing Galvalume
- Check FreeCycle for free stuff / donations
- California Grey water Guidelines
- look up types of Grey water
- Black water: toilet, dish water after disposal
- Oasis design

2:10 pm Penelope

2/24

Water system - clean spring
energy audit of Grey water system

1st step find spring, where is everything

2nd pump system (gravity fed)

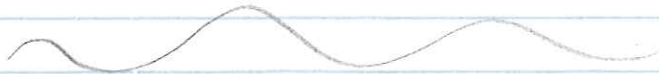
3rd main system (size & type)

4th audit energy

5th when will it be cleaned & how

6th how is it dispersed

7th how to pay for it



thnx

Mike

- Reuse shower water to flush toilets
or sink

- have grey water system from kitchen to use to water lawn

- Composting toilets

- any left over water
Septic system

- electricity
- o pump
- o ~~dishwasher~~
- o heating



Facilities:

- o 10 showers
- o lawn system
- o 9 sinks (bath)
- o 9 toilets
- o 4 Sinks (kitchen) (faucets)
- o 1 Dishwasher
- o 4 faucets (outside)

Bridge

Make a binder

Green diamond owns the two bridges, get in contact + ask how we can fix it. in _____ County

Call then send letter
aerial maps to determine the locations of the bridges
(ask Mike Mense about maps)

Send two letters if no response call first both times.

ask do they want letters from the community requesting what is their process how can we get it started? Go to meeting? Sustainable ways to build the bridges? how many people use it. photos of bridge.

Business phone call time called, time spoke, time hung up, who talked to. Dale Anne will give an idea who to talk to.

liability, fire escape route, medical escape, spiritual reasons, more people more ideas Margaret Carlson lives here + uses that as [Frige] entrance, educational area for NA, Spot is VERY important for NA.

how does bridge / culvert impact salmon?

Mikes email:

mike@learn2map.com

call at midnight

Flooded spot right before
entrance - ownership & repair

aerial map: USES, Coast
guard, NOAA.

Addressing issues of water rights

Ah Pah Village is located in the Yurok reservation in between Klamath and the city of Orick; it is also part of Yurok ancestral land. A tribe that is recognized by the United States holds a special trust relationship with the federal government, one that is of government to government. Because tribes retain certain inherent powers of self government to which they have a right to operate under their own government systems; they are considered "domestic dependent nations" by the United States and are entitled to certain federal benefits, services and protections.

The spring in Ah Pah village that is going to be used for the village's main water supply is located on allotment land. In 1887, the General Allotment Act was passed, a policy that mandated the act of dividing up tribal land into individual Indian allotments. "Federal Indian water rights are defined and governed by a body of federal law that recognizes that Indian tribes have unique property and sovereignty rights in the water on their reservations (ucowr.siu.edu)" In *winters v. United States*, 207 U.S. 564 (1908), the Supreme Court ruled that "Indians had a command of the lands and the waters--command of all their beneficial use, whether kept for hunting, "and stock," or turned to agriculture and the art of civilization (ucowr.siu.edu)". "With rare exceptions, a state has jurisdiction within a reservation only to the extent that Congress has delegated specific authority to it or in situations in which neither federal nor tribal law preempt state law (fhwa.dot.gov)". Tribes are however dependent upon congress and the Secretary of Interior for approval of certain activities such as economic development, environmental regulation and law enforcement. The Bureau of Indian Affairs carries the responsibility for the administration and management of tribal lands.

Permits and regulations

Because tribes are domestic dependent nations, they are not required to follow state laws and regulations; therefore they are not required to attain state permits for greywater systems or storage tanks. However tribes do follow federal guidelines, the installation of a water system would follow any guidelines the Environmental Protection Agency has set. The Indian Health Service is a main source of health and environmental guidelines tribes look upon for complete consultation. The California area Indian Health Service, Office of Environmental Health and Engineering (OEH&E) has a field office located in Arcata; staff include professional engineers, engineer technicians, environmental health specialists, utility consultants, and administrative support.

Indian Health Services

Arcata Field Office

Arcata Field Office

1125 16th Street
Suite 100
Arcata, CA 95521-5585
(707) 822-1688
FAX (707) 822-1692

Sr. Field Engineer	LT Julia Kane (julia.kane@ihs.gov)
Civil Engineer	Barry Jarvis, P.E. (barry.jarvis@ihs.gov)
Engineering Technician	Denise O'Gorman (denise.o'gorman@ihs.gov)
Engineering Technician	Maureen Harrington (maureen.harrington@ihs.gov)
Office Automation Clerk	Sarah Wikoff (sarah.wikoff@ihs.gov)

IHS Environmental Health Services

(916) 930-3981 + Extension

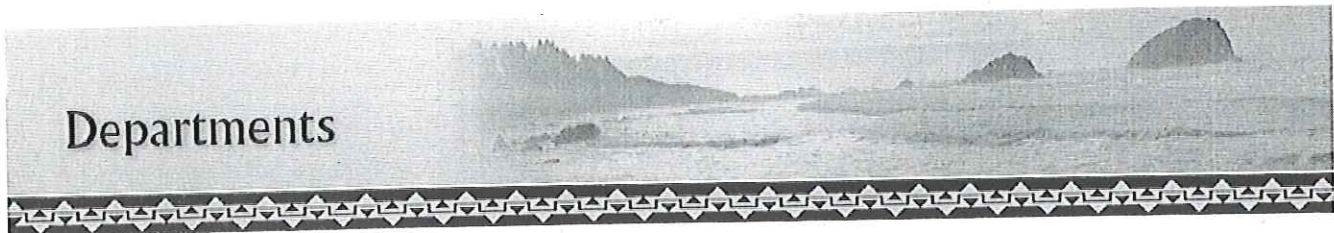
Environmental Health Services program provides comprehensive environmental health services. Program emphasis areas include water quality, waste management, food safety, air quality, industrial hygiene/occupational health, institutional environmental health, vector control, hazardous materials management, and emergency response.

CAPT Paul Young R.E.H.S. (Extension 336) (paul.young@ihs.gov)

- Administrative direction for environmental services
- Area Consultant for Environmental Health activities
- Direct Resource Allocation

Robert Newsad R.E.H.S. (Extension 337) (robert.newsad@ihs.gov)

- Deputy Director Area Consultant for Environmental Health activities
- Area Injury Prevention Consultant
- Area Food Sanitation Consultant

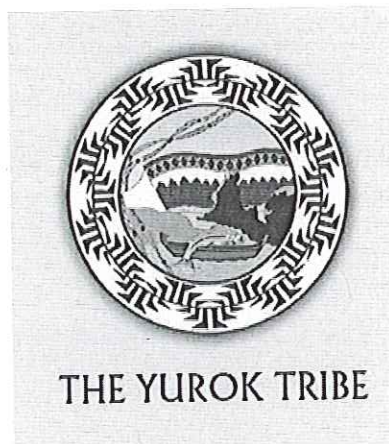



- Culture
- Klamath Lodging & Dining
Things to Do
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The mission of the Yurok Tribal Environmental Program is to protect and restore Tribal natural resources and community health through the exercise of sovereign rights, culturally integrated methods and high quality scientific practices in coordination with the community, Tribal departments, Tribal Council and other agencies.

Yurok Tribe Environmental Program

- Real Time Monitoring
- Staff
- Cultural Resources Division



<p>The Regional Tribal Operations Committee (RTOC), Environmental Results Reporting Tool (ERRT) is now available online. Please click here for more information Also Available: RTOC BUDGET WORKGROUP DOCUMENTS</p>	<p>A proud host site of the AmeriCorps Watershed Stewards Project</p> 
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Water – Monitor and assess the conditions and trends of surface water, groundwaters and coastal water of the Reservation and area draining on to the Reservation. Establish and enforce water quality standards. Support restoration activities with Tribal Fisheries and Watershed departments. Contact Ken Fetcho, Assistant Director – Water Division ([view Tribal water quality permits here](#))

Air – Educate Tribal members on the hazards of air pollution. Represent Tribal cultural burning interests in regional policy forums. Provide information exchange on local air quality conditions and hazards. Develop Tribal Implementation Plan (TIP) for air quality. Burn Permit Applications are available through this link. Contact Micah Gibson, Environmental Technician

Solid and Hazardous Waste – Educate Tribal members on environmental and health benefits from responsible solid waste management. Offer workshops on waste reduction practices for Tribal members and Tribal departments. Enhance Tribal infrastructure to handle the Reservation waste stream. Educate concerning and respond to hazardous waste issues, including underground storage tank contamination. More information about the Requa Air Force Station can be found here. More information about the Tribal Office Recycling Program can also be found here. Contact Laura Mayo, Assistant Director - Cross Media Division

Pesticides – Coordinate with local stakeholders adjacent to the Reservation on pesticide uses affecting Tribal and other local residents. Monitor for pesticide presence and effects in water, plant, and animal tissues. Conduct public outreach and notification of pesticide use within the Reservation by private landowners. Uphold and pursue the elimination of all pesticide use within the Reservation. Contact Megan Rocha, Environmental Protection Specialist.

Environmental Education – Develop curriculum for educating children and adults about various environmental issues. Provide internship and co-op opportunities for youth and re-trained adults in the environmental field.

Environmental Compliance – Conduct necessary environmental compliance under the National Environmental Policy Act of 1969 (NEPA) as required by federal funding agencies (i.e. HUD, IHS, BIA) for Tribal departments, as well as any environmental compliance required by the Tribe. Provide professional technical assistance and services in any of the areas described above for other Tribes, non-profits, consulting firms or agencies. Contact Megan Rocha, Environmental Protection Specialist.

Cultural Resources Protection - To provide in-house services to assist departments with Sec. 106, CEQA, and cultural resources compliance, conduct Section 106 reviews for outside agencies and clients, and identify, document, and promote the protection of cultural resources within Yurok ancestral lands. Contact Kate Sloan, Assistant Director and Tribal Archaeologist

Environmental Complaints Investigation - Receive Environmental Complaints from Tribal Members on a variety of issues. Work with Tribal Departments to resolve complaints as possible. Work with Public Safety and the Tribal Court system to resolve complaints through ordinance enforcement as applicable. To make a complaint, [click here](#) to download the complaint form and return it to Laura Mayo, Assistant Director - Cross Media Division.

Staff ([click for organizational chart](#))

Klamath Tribal Office

Director (Vacant)
(707) 482-1350 ext. 355
190 Klamath Blvd.
Klamath, CA 95548
(707) 482-1350

Laura Mayo
Assistant Director Cross Media Division
ext. 356

Cody Watt
Environmental Program Specialist - Data Management
ext. 354

Micah Gibson
Environmental Program Specialist - Air and Water Quality
ext. 369

Ken Henderson
Environmental Program Specialist - UST/Solid Waste

Water Division Building

101 Klamath Circle
Klamath, CA 95548
Ken Fectcho
Assistant Director Water Division
(707) 482-1618

Environmental Program Coordinator
Hydrology (vacant)

(707) 482-1618

Bill Patterson
Environmental Program Specialist

Wetlands

(707) 482-1618

AmeriCorps Watershed Stewards Project Volunteers

Arieh Scharnberg & Scott Sinnott

(707) 482-1618

Cultural Resources Division

Klamath Lodge

15900 Highway 101

Klamath, CA 95548

(707) 482-1822

Kate Sloan

Assistant Director Cultural Resources Div.

Tribal Archaeologist

ext. 204

Megan Rocha

Environmental Program Specialist - NEPA/Pesticides

ext. 206

Joe Hostler

Environmental Program Specialist

ext. 205

Robert McConnell (Weitchpec Office)

Archaeological Field Coordinator

(530) 625-4130

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Water Systems

We understand that the water systems we have designed are very similar, but we feel the small differences make a big impact on the system. We wanted to be able to present the board with systems that are feasible for their site and are also sustainable in varying degrees. We feel that the use of a septic system has multiple problems and requires a large amount of upkeep that our other systems do not require. However, to provide the commission with a wide range of alternatives and because a grey water system large enough to treat the amount of waste at the site is not realistic at the Ah Pah Village site, we have chosen to keep some septic system alternatives.

We highly recommend Water System Option Three as the preferred water system for the Ah Pah Village project. We realize that Option Four is more sustainable and environmentally-friendly, however due to the high use of the site during times of the year we feel it would not fulfill the needs of the village. Option Three is a highly feasible, efficient and will fulfill all the goals of the project.

Water System Option 1

Water is pumped from the spring into a 10,000 gallon storage tank. The water pump is powered by a combination solar power (from a solar panel placed on the hill) and micro-hydro system placed on the pipeline running to the village site from the tank. The pump is equipped with a shut off mechanism triggered when the water level in the tank reaches a certain amount. The excess power generated by the solar panel and micro-hydro system, once the tank is full, could be directed to a battery that would be used (as a backup) if the pump is needed at night or for other uses around the property.

The water then travels through the pipes and also through a filter which, if necessary, could be powered by the micro-hydro system or the excess energy from the solar pump. The water pressure for the movement of the water through the system would be attained through the natural drop in elevation from the spring site to the village site.

Upon reaching the village and having been filtered, the water would either be directed into the kitchen or bathroom, or to the water heater and then to the kitchen or bathroom. In the kitchen the water will be sent for use in the sink, dishwasher and laundry facilities if needed. All appliances in the kitchen including the dishwasher, washing machine, clothes dryer and faucets will be as water and energy efficient as possible. The faucets will be outfitted with aerators to maximize the flow of water and biodegradable soap will be used throughout the village. The water from the kitchen is collected and sent to a grey water system where it would be filtered for use in the lawn/sprinkler system and outdoor spigots.

In the bathroom the water will be used first in the sinks and showers. The shower heads, faucets and toilets are all as energy and water efficient as possible. The shower heads will be outfitted with aerators and shower managers to ensure efficiency. The faucets will also be outfitted with aerators. It will then be collected and the necessary amount of this water will be used to flush the toilets and afterwards sent to the septic system for safe disposal. Any usable and remaining water that was not sent to flush the toilets water, would be collected and sent to the grey water system and filtered for outdoor use.

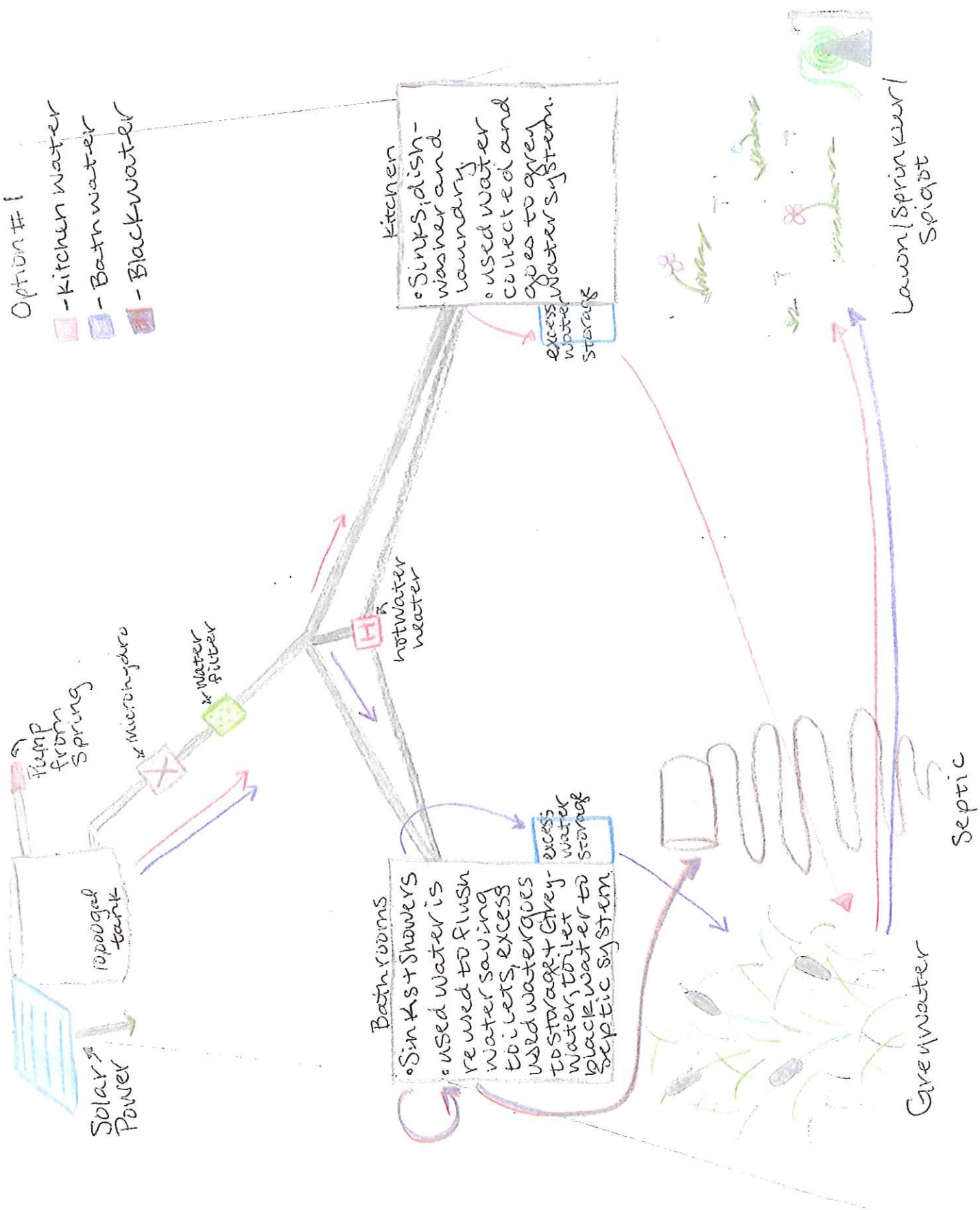
Advantages

- Does not require a septic system
- Plenty of water available for outdoor use

Disadvantages

- Requires septic system
- Water is only used once before sent to grey water or septic systems

- Option #1
- Kitchen water
 - Bath water
 - Blackwater



Kitchen

- Sinks, dish-washer and laundry used water collected and goes to grey water system.

excess water storage

Bathrooms

- Sink + Showers used water is re used to flush water saving toilets, excess used water goes to storage + grey-water, toilet black water to septic system

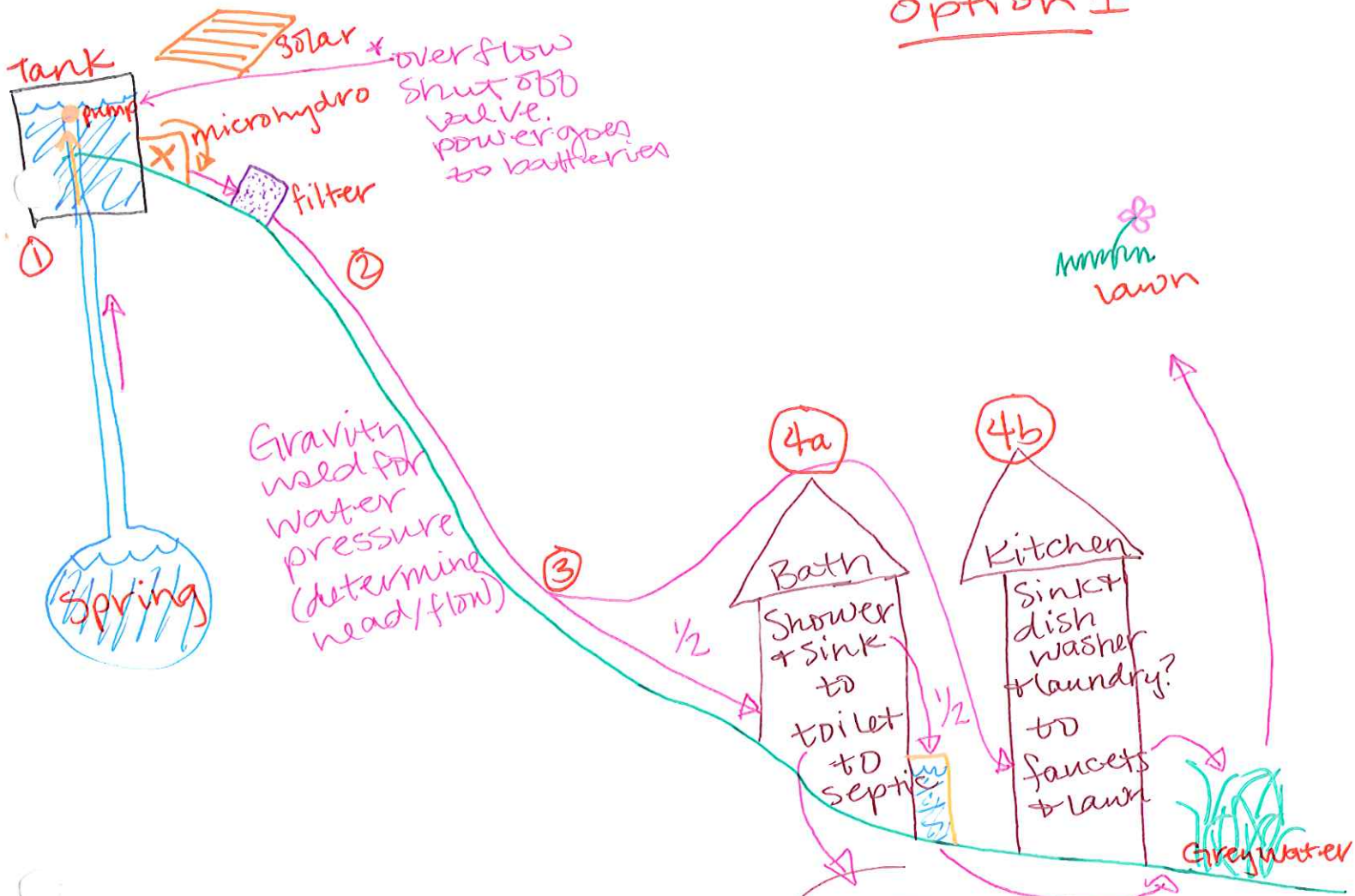
excess water storage

Lawn/Sprinkler/Spigot

Septic

Greywater

Option 1



Steps

- ① Water is pumped from the spring and stored in a 5-10,000 gallon tank using a combination of solar + microhydro power.
- ② the water stored in the tank flows through a filter on its way down the hill to be dispersed to the village via Gravity power.
- ③ as the water flows down the hill some is diverted to the bathrooms + some to the kitchen.

④a) Bathwater is first used for use in the sinks + showers, this water is collected and used to flush the water saving toilets. The toilet water goes to septic and the excess goes to greywater for use in the lawn system.

④b) Kitchen water is collected + put through the septic system for lawn use.

Septic * make sure road safe to navigate a truck to service septic.
** septic waste to heat water?

Water System Option 2

Water is pumped from the spring into a 10,000 gallon storage tank. The water pump is powered by a combination solar power (from a solar panel placed on the hill) and micro-hydro system placed on the pipeline running to the village site from the tank. The pump is equipped with a shut off mechanism triggered when the water level in the tank reaches a certain amount. The excess power generated by the solar panel and micro-hydro system, once the tank is full, could be directed to a battery that would be used (as a backup) if the pump is needed at night or for other uses around the property.

The water then travels through the pipes and also through a filter which, if necessary, could be powered by the micro-hydro system or the excess energy from the solar pump. The water pressure for the movement of the water through the system would be attained through the natural drop in elevation from the spring site to the village site.

Upon reaching the village the water travels to the kitchen first where it will be heated as necessary and used in the sinks, dishwashing and laundry facilities. All appliances in the kitchen including the dishwasher, washing machine, clothes dryer and faucets will be as water and energy efficient as possible. The faucets will be outfitted with aerators to maximize the flow of water and biodegradable soap will be used throughout the village.

The water would then be collected, re-filtered and heated as necessary for use in the bathroom sinks and showers. The shower heads and faucets are all as energy and water efficient as possible. The shower heads will be outfitted with aerators and shower managers to ensure efficiency. The faucets will also be outfitted with aerators. The toilets will be waterless composting toilets that require no water or energy to run or septic system to treat waste. Instead the waste can be composted and used in the lawn and/or garden. The water from the sinks and showers will be collected to go to the grey water system and then used in the sprinkler system and outside spigots.

Advantages

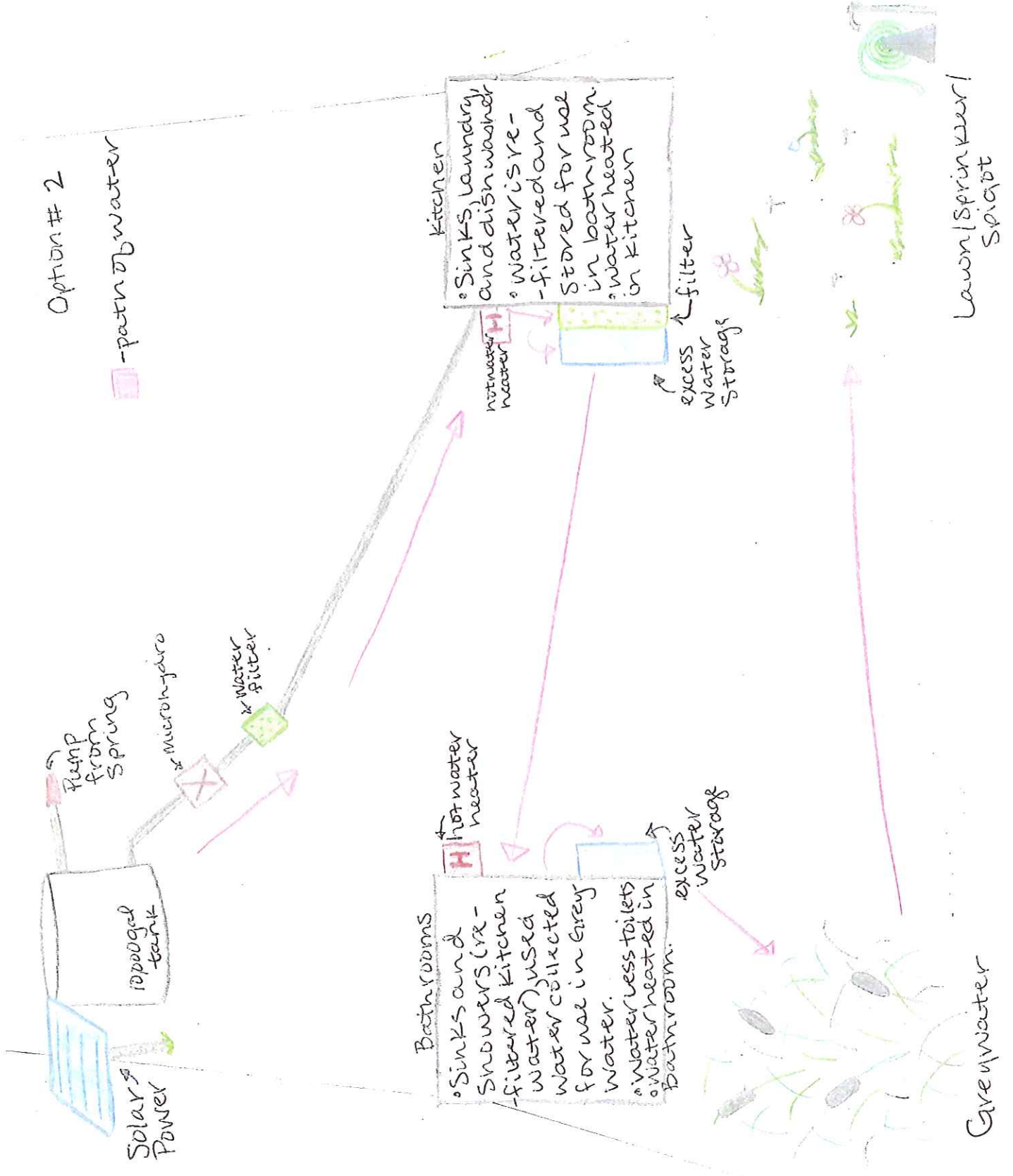
- Does not require a septic system
- The water is used more than once before going through the grey water system

Disadvantages

- Water would require two filtrations
- Water would require two rounds of heating

Option # 2

-path of water



Kitchen

- Sinks, laundry and dish washer
- Water is re-filtered and stored for use in bathroom
- Water heated in kitchen

Bathrooms

- Sinks and showers (re-filtered kitchen water) used for use in grey water.
- Water less than 100°F water heated in bathroom.

Lawn/Sprinkler! Spigot

Greenwater

Option 2



Gravity used for water pressure (determining head/flow)

Steps: see ①+② from option 1

- ③ water is first used in the kitchen for the sinks + ~~showers~~ Dish washer, then collected + re filtered.
- ④ The kitchen water is then used for the bath sinks + showers. The toilets are water less.
- ⑤ The bath water is collected for use in a Grey water system, for use in the lawn

all Shower timers, bath faucet motion detectors, eco friendly cleaning products, on demand heating more energy efficient, septic: Nitrogen problem + solution?
 Rain efficient pipes (recycled), aerators, water temp control, water efficient appliances

Rain water to sinks to toilets or for stand

Water System Option 3

Water is pumped from the spring into a 10,000 gallon storage tank. The water pump is powered by a combination solar power (from a solar panel placed on the hill) and micro-hydro system placed on the pipeline running to the village site from the tank. The pump is equipped with a shut off mechanism triggered when the water level in the tank reaches a certain amount. The excess power generated by the solar panel and micro-hydro system, once the tank is full, could be directed to a battery that would be used (as a backup) if the pump is needed at night or for other uses around the property.

The water then travels through the pipes and also through a filter which, if necessary, could be powered by the micro-hydro system or the excess energy from the solar pump. The water pressure for the movement of the water through the system would be attained through the natural drop in elevation from the spring site to the village site.

Upon reaching the village the water travels to the kitchen first where it will be heated as necessary and used in the sinks, dishwasher and laundry facilities. All appliances in the kitchen including the dishwasher, washing machine, clothes dryer and faucets will be as water and energy efficient as possible. The faucets will be outfitted with aerators to maximize the flow of water and biodegradable soap will be used throughout the village.

All the water from the kitchen would then be collected, re-filtered and heated as necessary for use in the bathroom sinks and shower. The shower heads, toilets and faucets are all as energy and water efficient as possible. The shower heads will be outfitted with aerators and shower managers to ensure efficiency. The faucets will also be outfitted with aerators. The water from the sinks and showers is collected and the amount necessary water to flush the toilets will be used and afterwards sent to the septic system for safe disposal. The water from the sinks and showers that is not used in the toilets would travel through the grey water system and be used in the outdoor sprinkler system and spigots. If that water from the bathroom facilities is not enough for the outside needs, a rainwater catchment system could be used to supplement.

Advantages

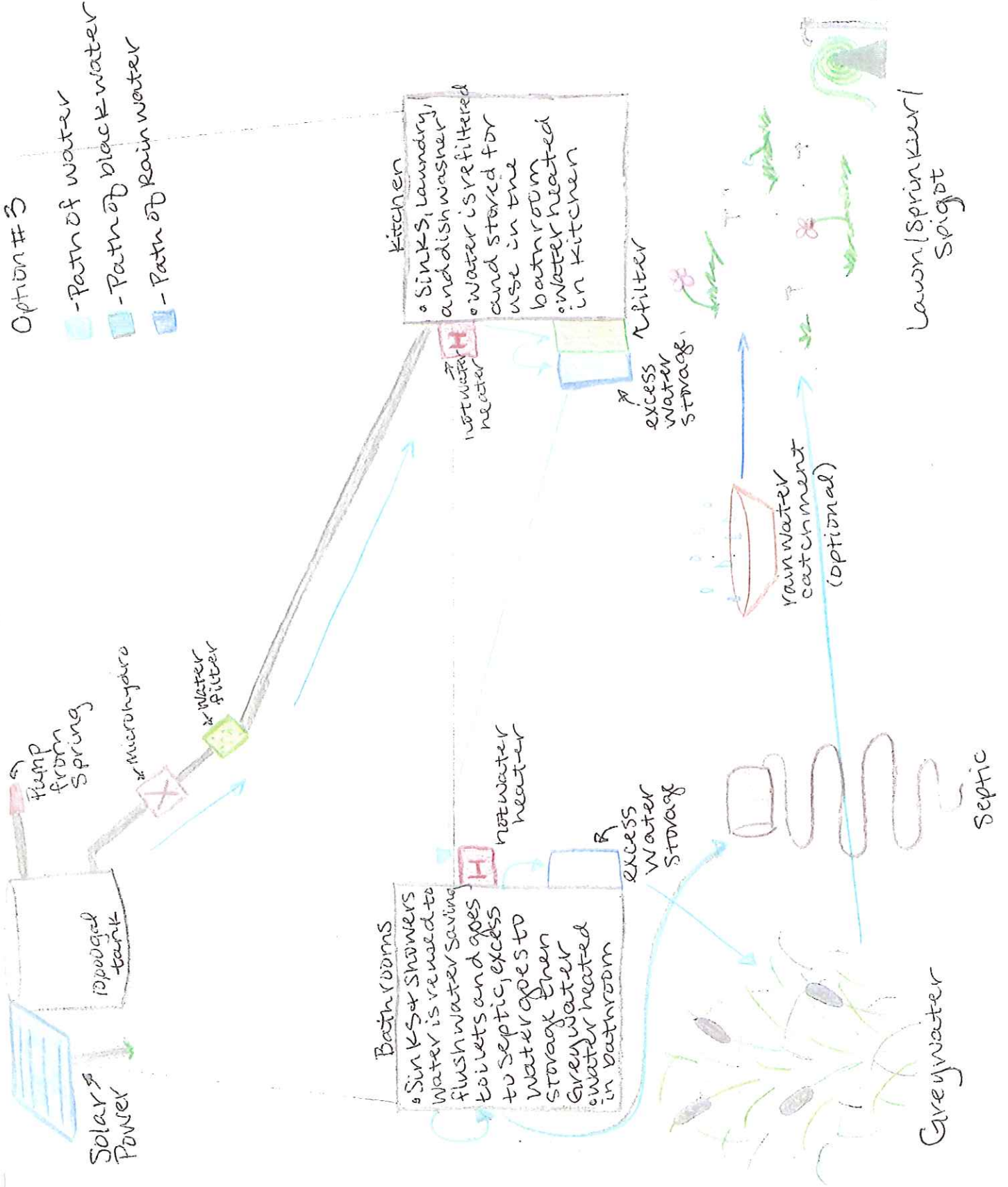
- Uses water the most efficiently

Disadvantages

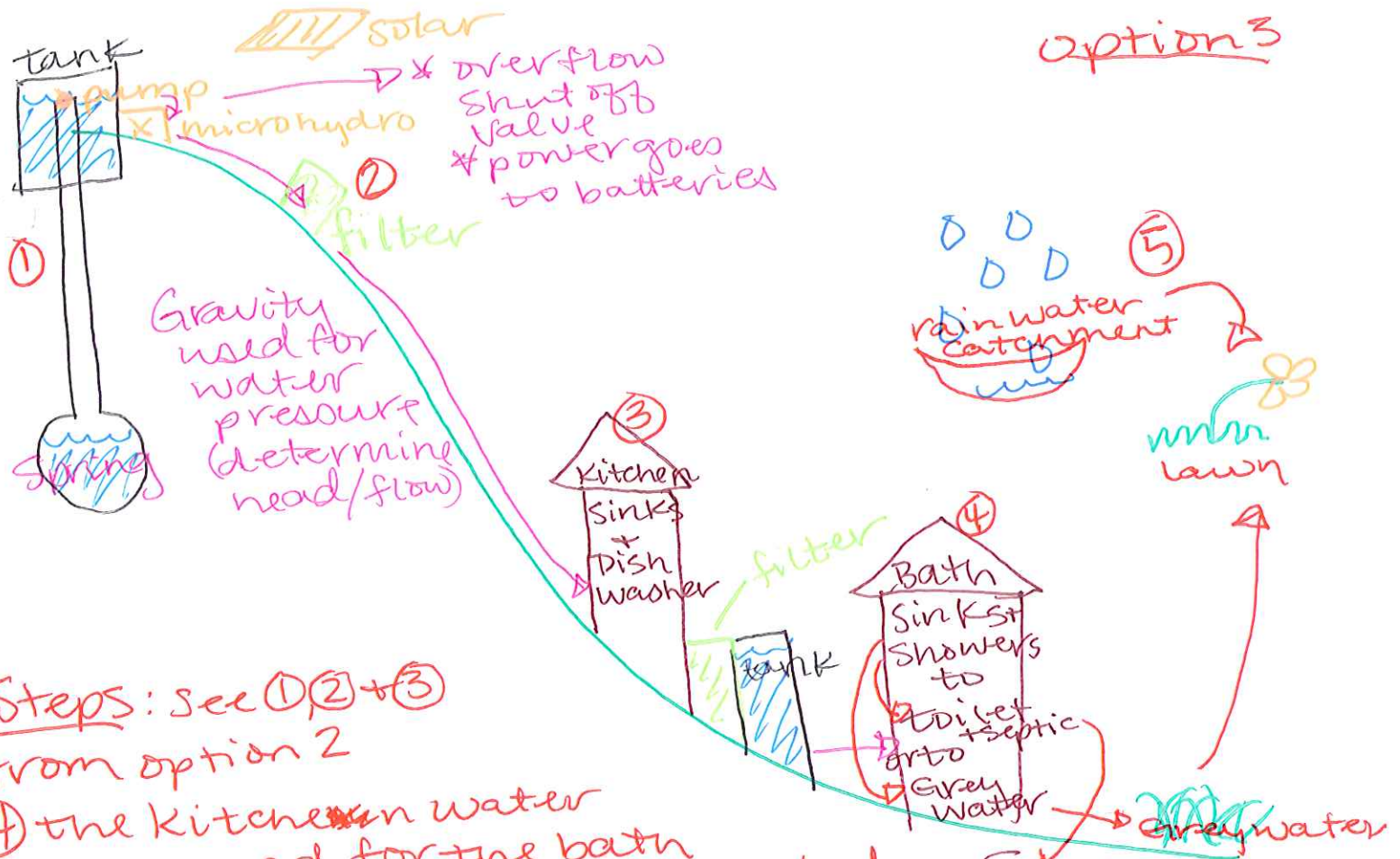
- Water would require two filtrations
- Water would require two rounds of heating rounds
- Water system requires use of a septic
- System may also need to be supplemented by rainwater catchment for outdoor use

Option #3

- Path of water
- Path of black water
- Path of Rain water



option 3



Steps: see ①, ② + ③ from option 2

④ the kitchen water is then used for the bath sinks and showers, recollected and used to flush the toilets. the toilet water goes to septic the rest goes to grey water for lawn use.

⑤ rain water catchment can be used to collect more water for ~~toilet~~ the lawn (esp food stuffs)

* make sure road safe to navigate a truck to service septic waste to heat water

for #4 could sink/toilet combos be used to easily separate water for the lawn + toilet systems?

Water System Option 4

Water is pumped from the spring into a 10,000 gallon storage tank. The water pump is powered by a combination solar power (from a solar panel placed on the hill) and micro-hydro system placed on the pipeline running to the village site from the tank. The pump is equipped with a shut off mechanism triggered when the water level in the tank reaches a certain amount. The excess power generated by the solar panel and micro-hydro system, once the tank is full, could be directed to a battery that would be used (as a backup) if the pump is needed at night or for other uses around the property.

The water then travels through the pipes and also through a filter which, if necessary, could be powered by the micro-hydro system or the excess energy from the solar pump. The water pressure for the movement of the water through the system would be attained through the natural drop in elevation from the spring site to the village site.

Upon reaching the village the water would either be directed into the kitchen or bathroom, or to the water heater and then to the kitchen or bathroom. In the kitchen, water would be put to use in the sinks, dishwasher and laundry facilities and then collected and fed into the grey water system. All appliances in the kitchen including the dishwasher, washing machine, clothes dryer and faucets will be as water and energy efficient as possible. The faucets will be outfitted with aerators to maximize the flow of water and biodegradable soap will be used throughout the village. Once the water has passed through the grey water system, it would be used in the sprinkler system and the outdoor spigots.

In the bathroom there would be water directly feeding in to the sinks and showers, then collected and fed into the grey water system for use in the sprinkler system. The shower heads and faucets are all as energy and water efficient as possible. The shower heads will be outfitted with aerators and shower managers to ensure efficiency. The faucets will also be outfitted with aerators. The toilets will be waterless composting toilets that require no water or energy to run or septic system to treat waste. Instead the waste can be composted and used in the lawn and/or garden.

Advantages

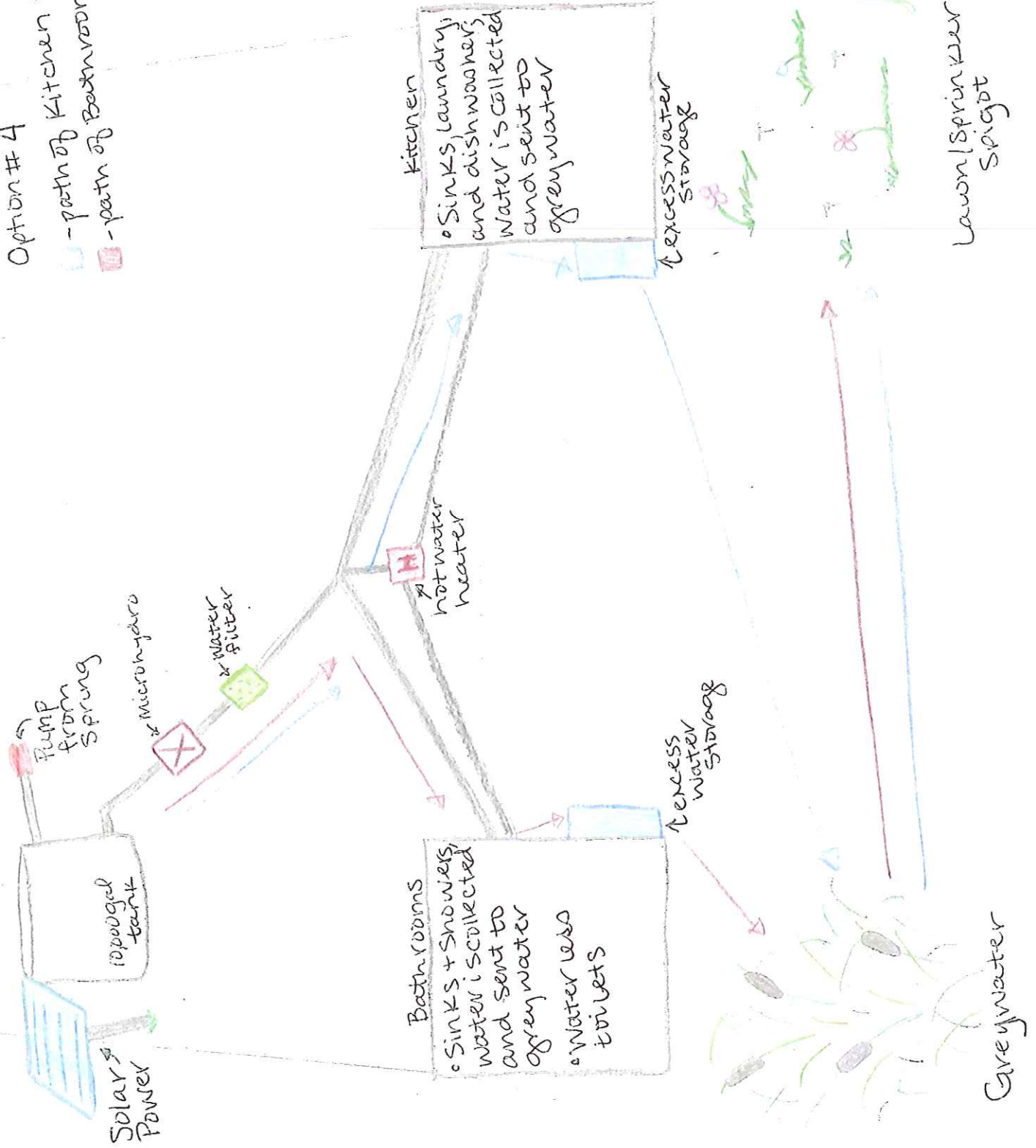
- Water system does not require a septic system
- System design is relatively simple and only requires one filtration
- There will be plenty of water available for the sprinkler system and outdoor spigots.

Disadvantages

- Water is only used once before sent to the grey water system

Option # 4

- path of Kitchen Water
- path of Bathroom Water



Greywater

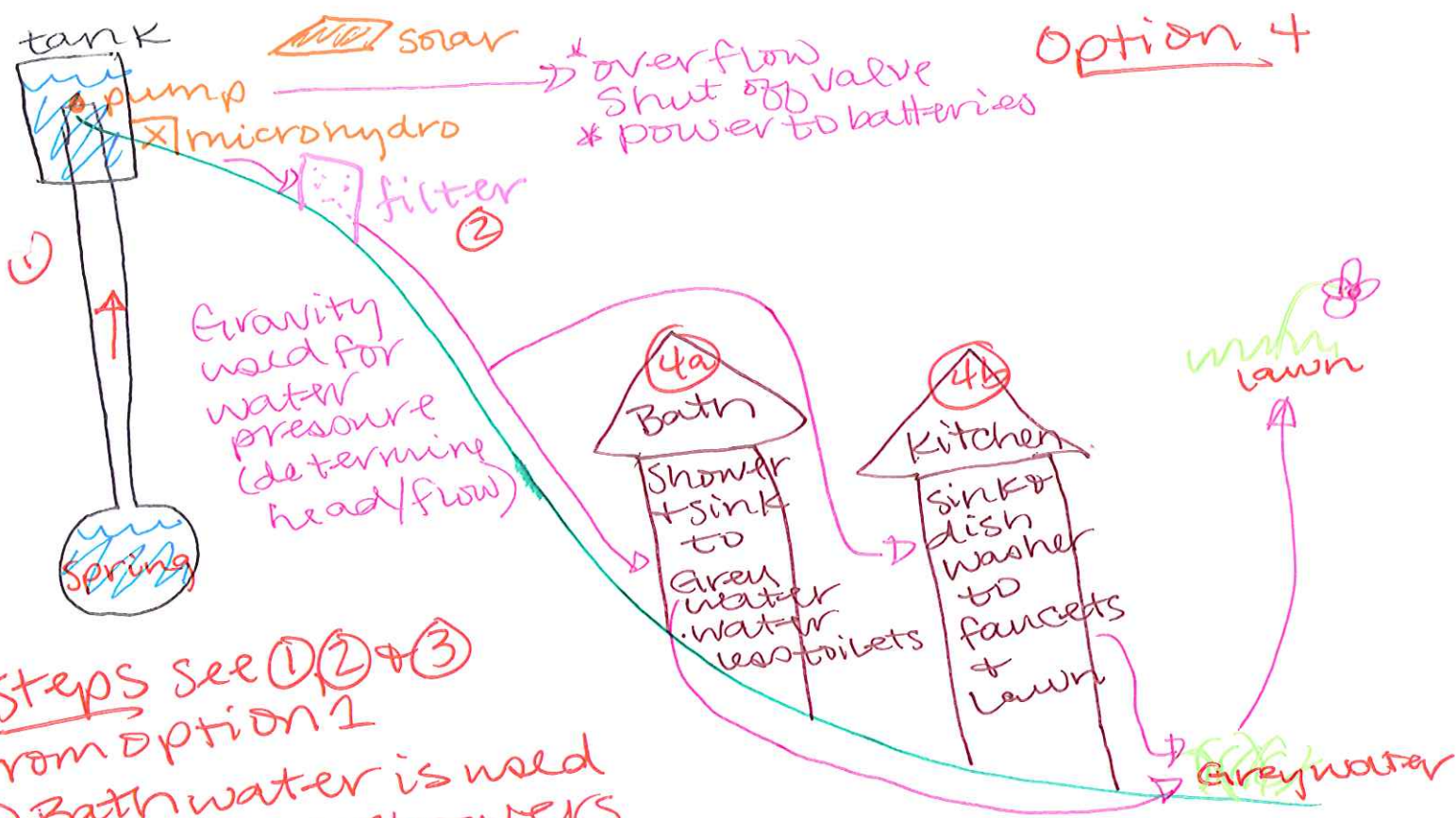
Lawn/Sprinkler Spigot

Kitchen
Sinks, laundry, and dishwashers; water is collected and sent to greywater

Bathrooms
Sinks + Showers; water is collected and sent to greywater
Water used in toilets

Excess Water Storage

Excess Water Storage



Steps see ① ② + ③ from Option 1

④a Bath water is used for sinks + showers then goes to Grey water & eventually the lawn

④b Kitchen water is used for sinks + dish washer & then to faucets + lawn. Greywater then to

* toilets are water less

Water System Option 5

Water is pumped from the spring into a 10,000 gallon storage tank. The water pump is powered by a combination solar power (from a solar panel placed on the hill) and micro-hydro system placed on the pipeline running to the village site from the tank. The pump is equipped with a shut off mechanism triggered when the water level in the tank reaches a certain amount. The excess power generated by the solar panel and micro-hydro system, once the tank is full, could be directed to a battery that would be used (as a backup) if the pump is needed at night or for other uses around the property.

The water then travels through the pipes and also through a filter which, if necessary, could be powered by the micro-hydro system or the excess energy from the solar pump. The water pressure for the movement of the water through the system would be attained through the natural drop in elevation from the spring site to the village site.

Upon reaching the village, some water would bypass the filter and go directly to the outdoor sprinkler system and spigots.

After passing through the filter the water would be diverted either to the kitchen or the bathroom. If needed the water will go through a water heater for necessary use in the kitchen or the bathroom. In the kitchen, water would be put to use in the sinks, dishwasher and laundry facilities. All appliances in the kitchen including the dishwasher, washing machine, clothes dryer and faucets will be as water and energy efficient as possible. The faucets will be outfitted with aerators to maximize the flow of water and biodegradable soap will be used throughout the village.

In the bathroom the water would first be sent to the sinks and the showers. The shower heads, toilets and faucets are all as energy and water efficient as possible. The shower heads will be outfitted with aerators and shower managers to ensure efficiency. The faucets will also be outfitted with aerators. The water from the sinks and showers is collected and the amount necessary water to flush the toilets will be used and afterwards sent to the septic system for safe disposal.

All of the wastewater from the bathroom, kitchen and showers facilities would be sent to a septic system.

Advantages

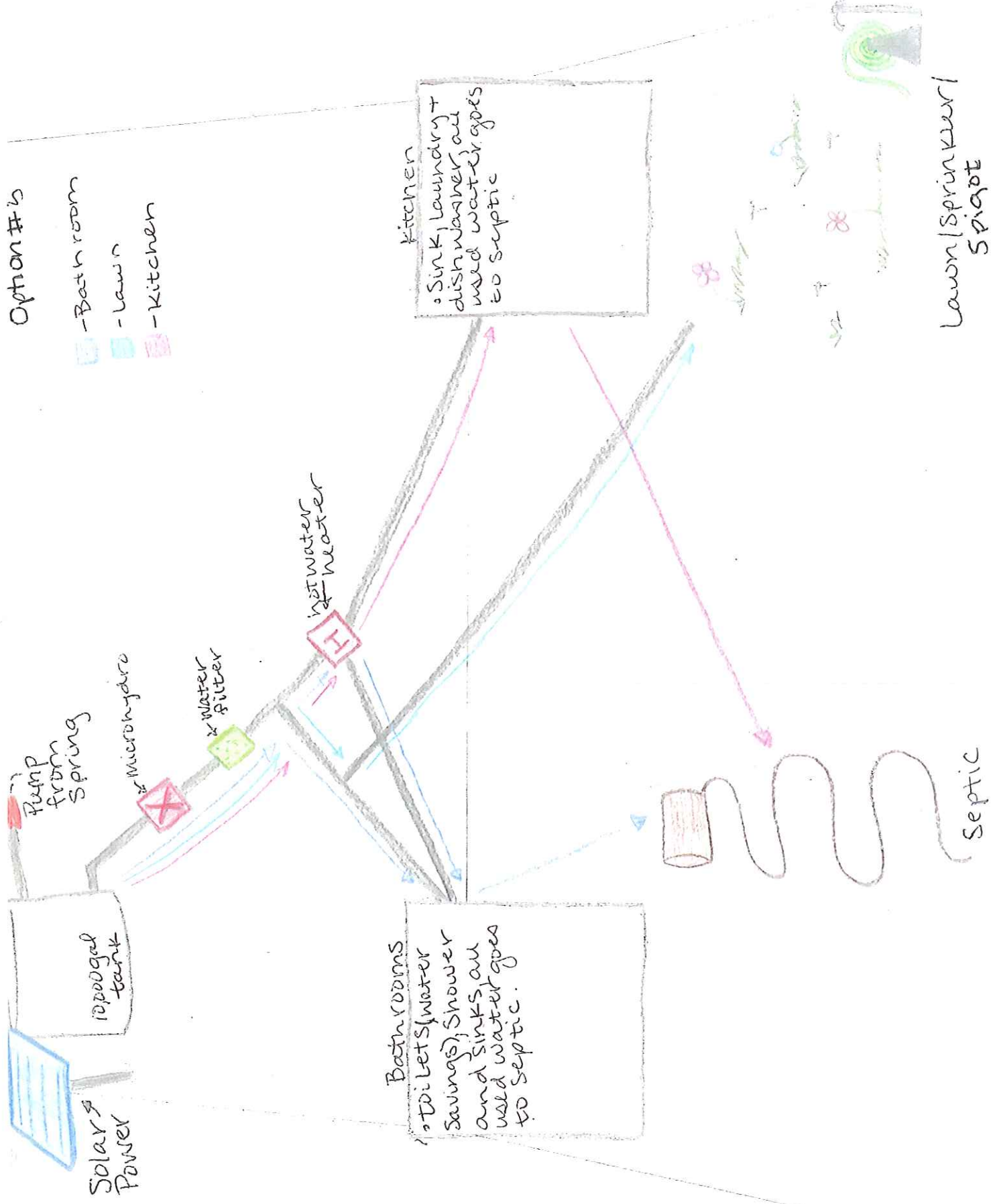
- Sprinkler system water does not need filtration
- Sprinkler system water does not depend on wastewater from bathroom or kitchens
- The sink and toilet combinations use water efficiently.

Disadvantages

- All the waste water goes to the septic system
- Water is used in system only once

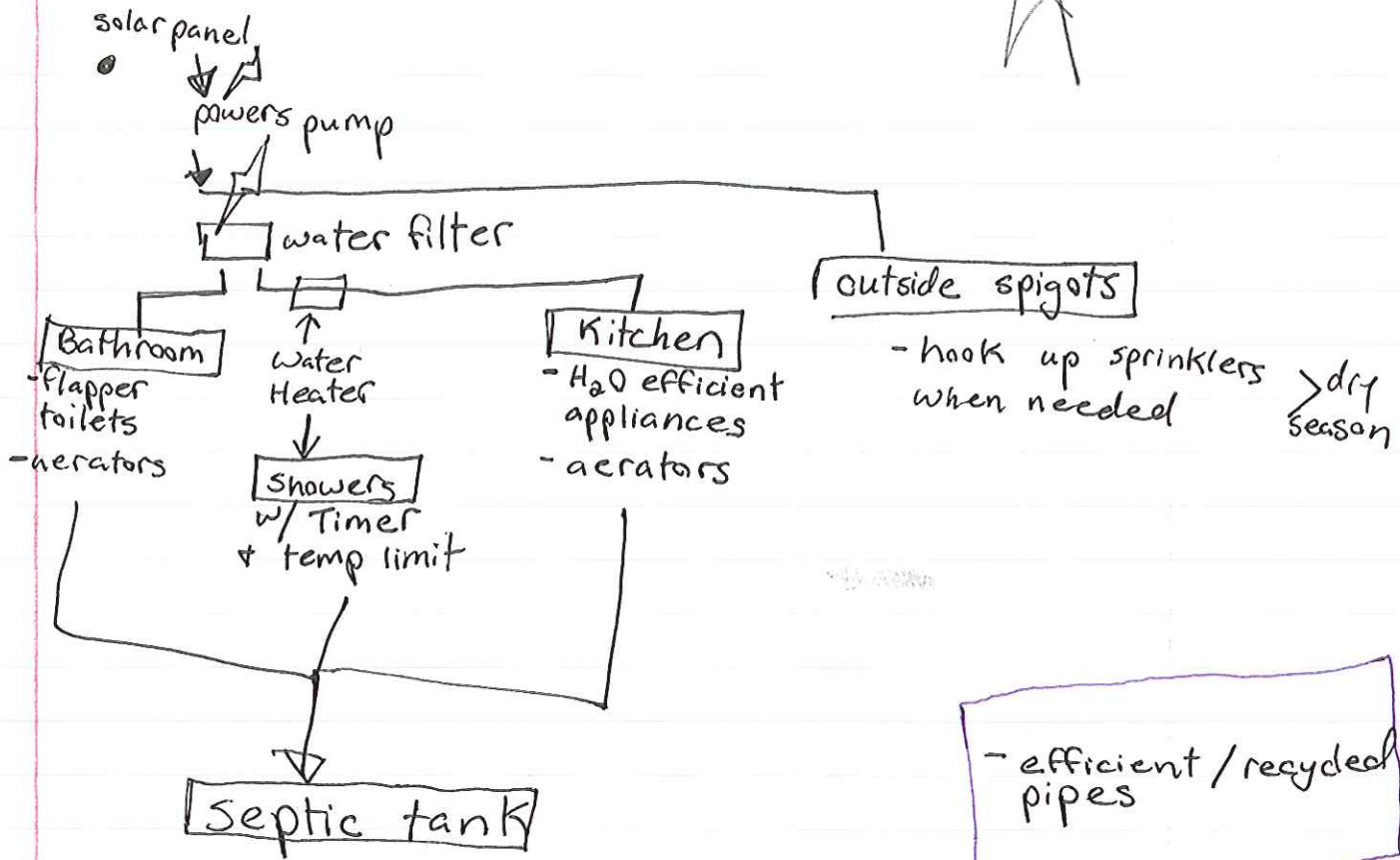
Option #1's

- Bath room
- Lawn
- Kitchen



Lawn/Sprinkler/Septic

Option 5

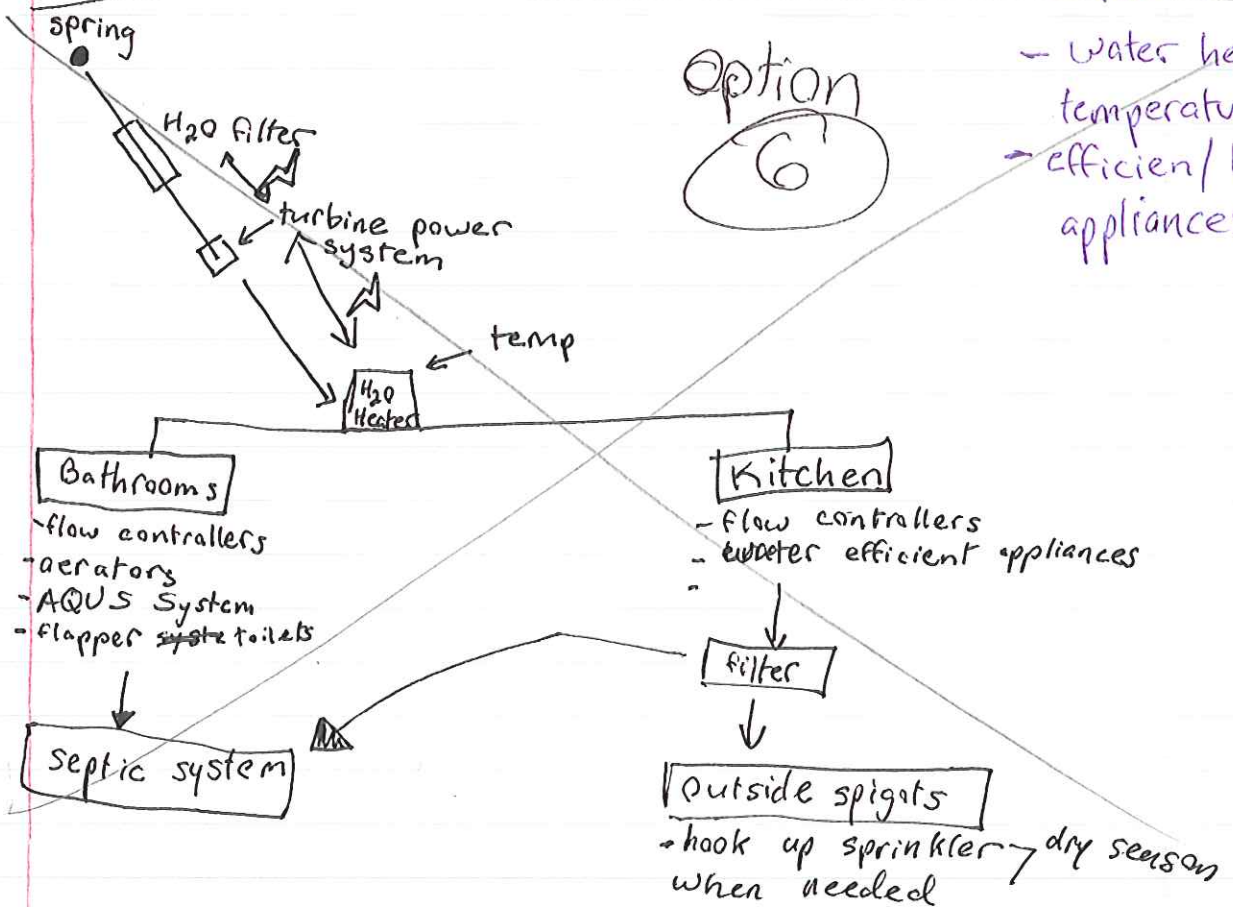


- efficient / recycled pipes

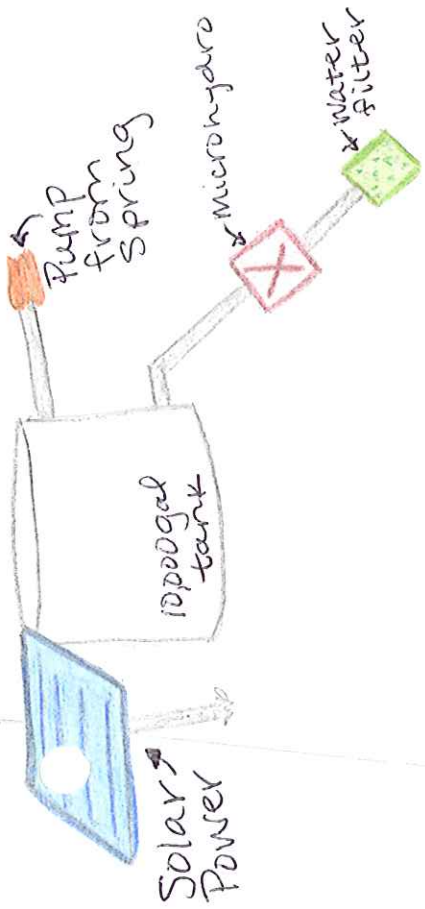
- aerators
- flow controls

- water heater temperature control
- efficient / H₂O saving appliances.

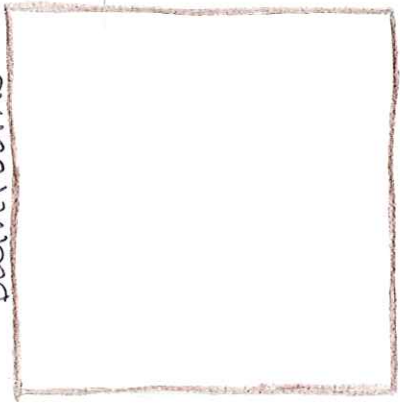
Option 6



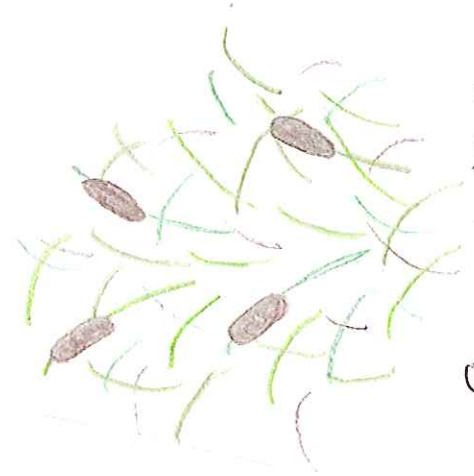
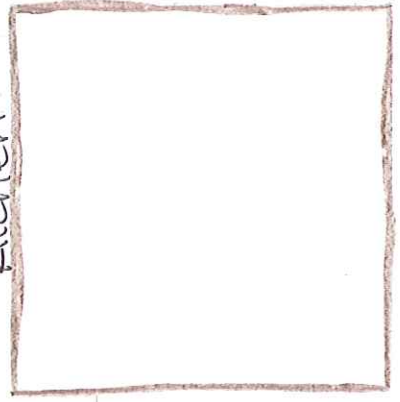
Option #



Bathrooms



Kitchen

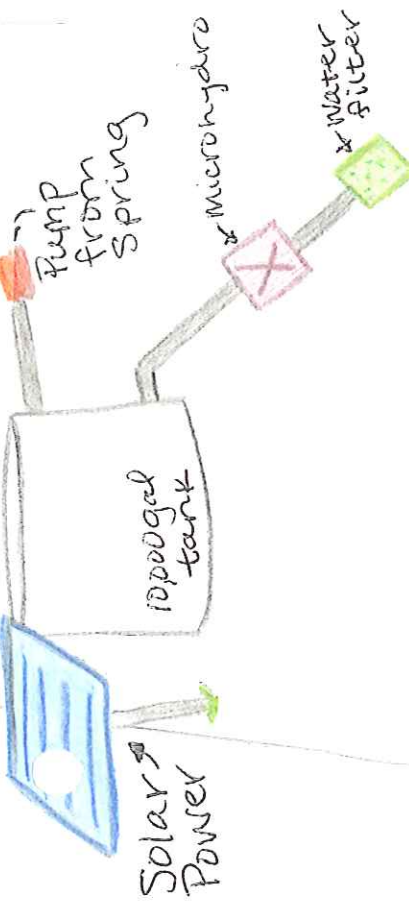


Greenwater

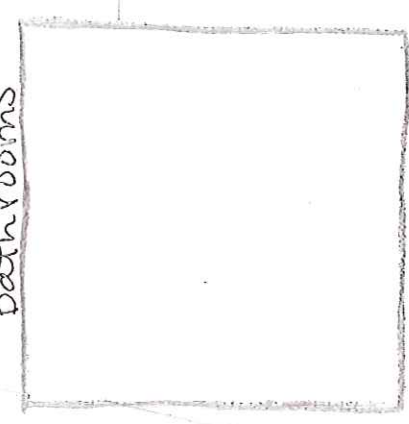


Lawn/Sprinkler/Spigot

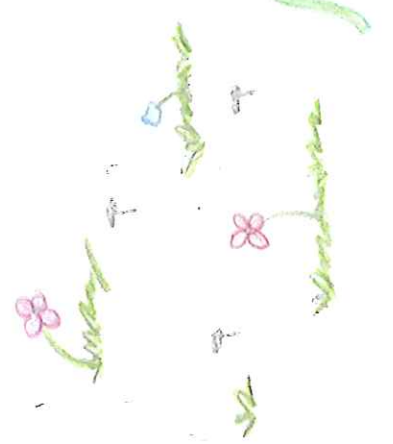
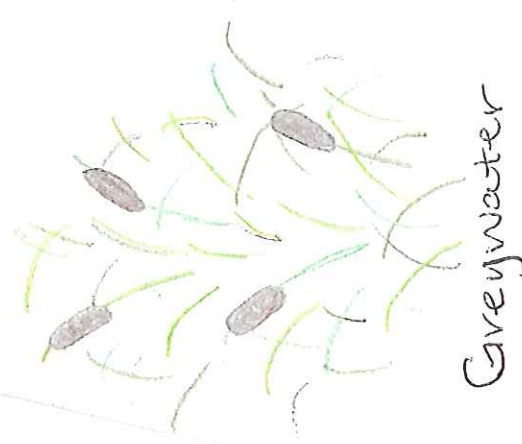
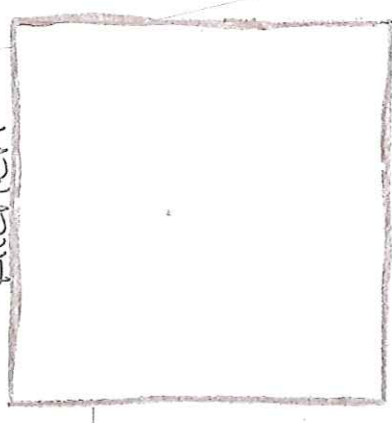
Option #



Bathrooms



Kitchen



Lawn/Sprinkler/Spigot

Component Resources

For components where professional knowledge and expertise are required, we have provided resources for the consultation or hiring of professionals.

Septic System

For a septic system that would be large enough to treat the wastewater at Ah Pah Village, it might be considered a large-capacity septic system (LCSS) by the Environmental Protection Agency. A large capacity septic system is defined as treating solely sanitary waste either from multiple dwellings or from a non-residential establishment and the system has the capacity to serve 20 or more persons per day. Large-capacity septic system can generally be found in at apartments, schools, trailer parks, highway rest stations, campgrounds, etc. The Environmental Protection Agency regulates the use and maintenance of LCSSs to protect underground drinking water and any illegal discharges can contaminate water resources in the surrounding area. EPA **does not** regulate septic systems used by single-family homes or non-residential septic systems receiving solely sanitary waste that serve fewer than 20 persons per day. However, if these systems are improperly sited, operated or maintained they can threaten water quality. EPA has the authority to address malfunctioning systems on a case-by-case basis.

We understand that the daily usage of Ah Pah Village will not be more than twenty people per day for most of the year but with Blue Creek in close proximity and the multiple uses planned for the space, we believe that a large capacity septic system may be necessary. Due to the nature of the village and the surrounding water resources we believe that it is important to hire a professional septic system contractor to design and install the system on site. We have found local contractors and have provided their contact information here:

KW Reynolds Asphalt Maintenance

1175 K St
Eureka, CA
(707) 444-2024

Hilfiker Pipe Company

3900 Broadway St
Eureka, CA
(707) 443-5091

Niekrasz Plumbing Incorporated

2228 Chaney Ln
Eureka, CA
(707) 442-7181

Johnston Contractors

2288 Buena Vista Ave.
Livermore, CA 94550
(925) 447-5200,
Fax: 925-447-0919
<http://www.septicwizard.com>

Water Filtration

The water being onsite is going for multiple uses and requires a wide range of filtrations. There are much higher standards for drinking water than for toilet water and different requirements for toilet and shower water. If water is mistreated or not filtered properly, the health of people, animals and the land surrounding can be jeopardized. Water can become contaminated and high levels of contaminants can cause acute health effects such as nausea, lung irritation, skin rash, vomiting, dizziness, and even death. Contaminated water can also cause chronic health effects that can include cancer, liver and kidney damage, disorders of the nervous system, damage to the immune system, and birth defects.

Every engineer or board of health member we contacted reported that choosing filtration for a water system is not a task for students and should only be done by a trained and certified professional. Humboldt County Department of Health and Human Services, Land Use Division will be the most helpful in steering the planning in the healthiest direction for safe and usable water.

Jim Clark REHS
Program Supervisor
(707) 268-2215
Jim.Clark@co.humboldt.ca.us

Dave Spinosa, REHS
Program Manager
(707) 268-2209
Dave.Spinosa@co.humboldt.ca.us

Adam Molofsky, REHS
Field Inspector - Northern District (Arcata and north)
(707) 268-2240
Adam.Molofsky@co.humboldt.ca.us

Lawn Irrigation

Lawn irrigation is a project within our project. Due to the irrigation coming from greywater and the unknown specifics about placements of sprinkler heads, spigots, pipes, and the unknown size and measurements of the lawn, we were unable to design a lawns system beyond providing water for it.

However the Environmental Protection Agency has recommended two irrigation experts that can design a greywater lawn irrigation system that fulfills the goal of Ah Pah Village.

Gordon Kunkle,

Member of Hunter industries, Kunkle serves much of California including Humboldt County. He specifically works on commercial, residential and golf course irrigation projects. Kunkle is a certified Irrigation System Auditor, Designer, Installer and Maintainer.

gkunkle@hunterindustries.com
503-720-0258.

Mitchel Walker

Works with Masuen Consulting, his services are California statewide. He specifically works on commercial and golf course irrigation projects. He is a certified Irrigation System Auditor, Designer, Installer and Maintainer.

mitch@masuenconsulting.com
866-928-1533.

Greywater Treatment System

A Greywater system would treat and filter the greywater from the village into usable water for irrigation of non-food plants. Greywater is household water generated from everyday activities including waste water from kitchen sinks, laundry machines, dish washing machines, bathroom sinks and showers. Toilet water is considered black water and cannot be incorporated into the greywater system because it is toxic to humans. In order to maintain the greywater system, harsh chemicals may not be used in any of the water traveling into the greywater system. Instead biodegradable and plant-safe soaps and detergents must be used. In the Project Components section of our report we have included the names of multiple soaps and detergents that are greywater safe.

To estimate how much land area the village would need to treat all of the greywater produced by the village, we used the equation:

$$LA = \frac{GW}{(ET * PF * 0.62)}$$

LA= Landscape area (square feet)

GW= greywater produced per week (depended on time of year and people using the facility)

ET= evapotranspiration rate (inches per week = 1.0)

PF=Plant factor (using medium water usage = 0.5)

0.62= conversion factor from inches of ET to gallons per week

The amount of greywater produced by the family of eight, from November to April, would be approximately 1,400 gallons per week. To treat this much greywater, the system would have to be 4,516 square feet.

The amount of greywater produced when groups of twenty are at the site, from May to October, would be approximately 3,500 gallons per week. To treat this much greywater the system would have to be 11,290 square feet.

The amount of greywater produced when groups of seventy visit the site, from November to April, would be approximately 4,500 gallons per week. To treat this much greywater the system would have to be 14,516 square feet.

The amount of greywater produced when groups of seventy visit the site, from May to October, would be approximately 6,000 gallons per week. To treat this much greywater the system would have to be 19,355 square feet.

The amount of greywater produced during the weekend of the Brush Dance or other large ceremonies, assuming that it was during June/July, would be approximately 21,500 gallons per week. To treat this much greywater the system would have to be 69,355 square feet.

Due to the large range of sizes needed to treat all the greywater from the village, the close proximity of the village to Blue Creek and the high permeability of the soil in the area, we cannot safely design a greywater treatment system for the village. If done incorrectly the greywater can become oversaturated with wastewater, leak into the creek and pollute the ecosystem. Also if after treatment the water is not used properly the health of the food plants and the people visiting the village could be compromised. Therefore we recommend that a professional be consulted for the design and construction of the greywater system.

Dishwasher

ASKO D3531XLHD Dishwasher

A Ten Program, quiet system washer with a premium insulation package that is EnergyStar certified and reported as using 194 Kwtt/year. The normal wash cycle for this washer only uses 3 gallons, far below the average dishwasher.

The cost runs about \$1600 from Canclini TV and Appliances in Fort Bragg, CA. (707) 964-5611

Eco Tips for Dishwashing

- Make sure to always run a full dishwasher, never half loads
- Compost any leftover food in a composting bin for a garden or the lawn
- Use biodegradable, nontoxic and/or non-phosphate dish soap such as the ECOVER product line of biodegradable and non-toxic soaps and dishwashing powders
- Use the light cycle whenever possible over the more high water use high or normal cycles

81/100 CR

*

ASKO D3531XLHD Dishwasher

Print - Close Window

The TouchProof™ stainless steel dishwasher that started the sleek, clean look.

The D3531XLHD (Tall Tank, Handle) is a hidden-control unit with push buttons and an LCD panel that shows the ten program names, time remaining, temperatures, and options. It also remembers the last program used. This model comes in TouchProof™ stainless steel with a straight handle.

energy &
kwth/yr:
194

Control Panel



Color options

- stainless steel

Feature Highlights

- Quiet System Premium insulation package
- Ten programs: Auto wash, Mixed, Heavy, Normal, Delicate, Quick, Rinse & Hold, Rinse & Dry, Upper Rack Only and Lower Rack Only
- New LCD control panel allows you to select the wash program and options and choose a specific wash temperature
- SensiClean™ automatically controls wash program
- SensiDry™ automatically controls drying program
- Half Load lets you wash in either the upper or lower basket
- Express option shortens the program time
- Safe & Handy™ upper cutlery basket
- Three Turbo Fan™ drying options: short, normal and extra dry
- Nine wash temperatures, up to 170° F
- Hidden controls
- Available in TouchProof™ stainless steel with a straight handle

Dimensions of Tall (XL) Tank Model

Height:	34-3/8" - 37"
Width:	24"
Depth:	25-5/8"
Depth from Cabinet with Door Open:	48-1/4"



Standard ASKO Dishwasher Features

- 18:9 stainless steel tank, spray arms and filtration system won't rust, chip or absorb odors.
- One-piece, galvanized steel base pan provides superior structural integrity and reduces vibrations. Not available on any competitively made U.S. unit.
- Two pumps/two motors (versus one each on most dishwashers) save water and electricity, and last longer.
- Door springs are designed to last 20 years.
- No space-stealing central water tower or connectors.
- 12+ International place setting capacity.
- Controls are double-sealed from moisture.
- Racks are coated with Viscant™ graphite nylon. Tines are double-coated and cushioned on top.

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~\$1600-

• Store in Fort Bragg
Canelini TV + Appliances
707-964-5111
• Uses 3 gallons/normal cycle

82/100 CR

White Kenmore Elite 24 in. Elite™ Built-In Dishwasher w/ Ultra Wash HE Filtration

energy \$
kWh/yr: 305

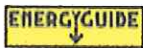
Kenmore item# 02213152000 Mfr. model# 13152

- Availability for home delivery varies by location.
- [Eligible For Store Pick Up](#)

Other colors available:

- 
- 
- 

- Protect this purchase with a Protection Agreement see options
- Installation is available for this item see options
- Remember to use your [Sears Card](#).
- [Price Match Policy](#)



ENERGY STAR™ qualified appliance. This sleek-looking dishwasher features the innovative Ultra Wash HE Filtration Wash System that cleans dishes better while saving you money by requiring less water and energy to operate. The SmartWash™ HE cycle delivers ultimate washing performance by sensing both the load size and soil level and then adjusting the dishwasher time and temperature accordingly. The QuietControl™ sound package provides a dishwasher so quiet, you'll forget it's on.

- High-Efficiency dishwasher saves up to 41% water and 34% energy
- Fully integrated door with handle 6 cycles; 7 options
- QuietControl™ insulation system
- Smooth glide nylon-coated racks
- Giant Tub™ capacity
- Cutlery holder and utensil basket
- SteamSanitize cycle
- ENERGY STAR qualified

uses 5 gallons / normal cycle

Green Ratings Dishwashers

Listed in order of energy use. You can sort the ratings chart by any column by clicking on the header of the column. Overall score is based mainly on washing but includes energy and water use, noise, loading flexibility, and ease of use and should always be taken into consideration in choosing. The Ratings don't indicate which models have received the government's Energy Star designation because we believe our tests, reflected in the Energy use column, more accurately reflect real-life use.

Ratings last updated: January 2008

Click for more information



Brand and model

Price Overall score



Small type: similar model(s)
 CR Best Buy indicates an exceptional value
 Discontinued, similar model(s) available



Brand and model	Price	Overall score	Energy Star	Water Used
Kenmore (Sears) Elite UltraWash HE 1315[2]	\$1100	82	Yes	5
Asko Encore D3531XLHD[SS]	\$1600	81	Yes	3
Kenmore (Sears) Elite UltraWash HE 1312[2]	\$900	81	Yes	5
Kenmore (Sears) Elite UltraWash HE 1342[] \$900				
Miele Inspira G2120SC[W]	\$1050	80	No	6

Washing Machine

Miele LC W 4840 Washing Machine

This super large capacity washer with 11 different wash programs, 6 water temperature control settings and a child lock feature. This washer is EnergyStar certified and scored a high eighty one out of a possible one hundred on Consumer Report.

The cost of the washer runs about \$1900 with no vendors located in the area.


Eco Tips for Laundry

- Always wash full loads of laundry rather than smaller loads
- Use powder detergent, that way you are only paying for the soap, not the water in the liquid detergent
- Make sure to use nontoxic, biodegradable and/or non-phosphate laundry soap such as the ECOVER line
- Wear clothes more than once if possible
- Use the cold water setting to reduce energy use for the heating of water
- Use roll-on stain removers instead of aerosols to reduce CFCs and VOCs
- Use non-chlorine liquid bleach or bleach powder to keep chlorine out of the greywater system and also to not pay for the liquid in liquid bleach

Green Ratings Washers / Dryers

Washing machines are listed in order of energy efficiency. You can sort the ratings chart by any column by clicking on the header of the column. Overall score for washers is based on washing ability, efficiency, capacity, and noise. Dryers are listed in order of overall score, which is based on drying performance, drum volume, and noise. Energy efficiency among dryers is not significantly different, however, gas dryers are generally less expensive to run and have less impact on the environment. Dryers with moisture sensors can use less time to dry when an automatic dry cycle is used and therefore be more efficient with energy usage.

Ratings last updated: February 2008 (Washers); November 2007 (Dryers)

Click  for more information

Excellent Very good Good Fair Poor

Brand and model

Price Overall score

Washing ability
 Energy efficiency
 Capacity

Small type: similar model(s)
 CR Best Buy indicates an exceptional value
 Discontinued, similar model(s) available

0 100
P F G V E

Front-loading washers

Model	Price	Overall score	Washing ability	Energy efficiency	Capacity
LG Tromm SteamWasher WM2688H[WM]	\$1500	81	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
LG WM0642H[W]	\$900	81	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Miele Touchtronic W4840	\$1900	83	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Frigidaire Gallery GLTF2940F[S] A CR Best Buy					
Frigidaire FTFB2940F[] (Best Buy) \$850	\$650	78	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Frigidaire LTF2940F[] (Lowe's) \$650					
Bosch Nexxt 500 Series WFMC330[1]UC	\$1050	77	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

W 4840 Washing Machine

Standard features

Super Large capacity
4.00 ft³ capacity (IEC equivalent)
Stainless steel HoneycombTM wash drum
Advanced Touchtronic Controls
Display function
24-hour delay start
Fault indicators
Child lock feature
Self diagnostics
PC update function
Interior light

186 kWh consumption per year

110 volts

Wash Programs / Options

11 MasterCareTM wash programs
6 standard wash programs
Create your own Custom wash program
Extended option
Heavy soil option
Sensitive option
Buzzer option

6 water temperature settings

6 spin settings (0 - 1400 rpm)

Program sequence lights

Optional Accessories Not Included

Optional WTS430 laundry stand with storage drawer

Design considerations

Angled control panel

Stainless steel porthole door with metal hinges

Available in white finish

Learn more

Detergent Recommendations

Also see: High-Efficiency Detergents & Fabric Care Products

About Miele Laundry

Find an authorized, Miele appliance dealer selling this product now!

- energy*
- No close vendors
- ~\$1900
- 81/100 CR

• Water/cycle



Product Specification Files

File	Type	Size
W4000 Super-Large-Capacity Washers	pdf	19 KB

Operating Instruction Manuals

File	Type	Size
Operating and Installation manual	pdf	2.39 MB
Installation manual Washer/Dryer Stand	pdf	170 KB

To help you buy:

Item Number	Description
11484001USA	W4840 LC Washer



[View Larger](#)

- CleanSpeak™ system communicates with WPGT9360E
- English/Spanish LCD option
- Reversible control panel
- 7.3 cu. ft. king-size capacity
- Dual electronic thermistors
- Separate blower and tumble motors
- Moisture sensor with two sensing bars
- Adaptive cool down
- Fastest premium dryer you can buy!
- King-size opening with double-paned glass window
- Variable heater
- Long venting capabilities up to 150 ft.**
- Stainless steel drum
- Variable end-of-cycle signal
- Six custom cycle settings
- Supreme quiet performance

GE

- ≈ \$ 800
 - Has a company on washer but one on reverse is more efficient
 - Buy at: Reliance Corp Appliance: (541) 469-5477 or Conclintv+ "": (707) 964-5611
- GE Profile Harmony Dryer
Model: DPGT750EC1GC

Dryer

GE Profile Harmony Dryer Model # DPGT75OECPL

This washer has a 7.3 cubic foot king size capacity, six custom cycle settings and is touted as the fastest premium dryer you can buy. This dryer is EnergyStar certified and uses only 240V of power.

The cost for this dryer runs about \$800 and can be purchased at Reliance Corp. Appliances (541) 469-5417 or at Canclini TV and Appliance (707) 964-5611

Eco Tips for Drying

- Dry clothes by hanging them outside whenever possible
 - Compost dryer lint
 - Use settings that automatically sense when items are dry
 - Use all natural dryer sheets, such as the Etsy Flax Dryer sheets
- Available at: http://www.etsy.com/view_listing.php?listing_id=8394880

Brand and model


Price Overall score

Price
 Overall score

Small type: similar model(s)
 CR Best Buy indicates an exceptional value
 Discontinued, similar model(s) available

0 P F G V G E 100


Dryers

GE Profile Harmony DPGT750EC[WW] (Electric) \$800  83 Yes

GE Profile Harmony DPGT750GC[] (Gas) \$850

Kenmore (Sears) Elite 6697[2] (Electric) A CR Best Buy

- Kenmore (Sears) Elite 6784[] (Electric) \$570
- Kenmore (Sears) Elite 6785[] (Electric) \$570
- Kenmore (Sears) Elite 6786[] (Electric) \$570
- Kenmore (Sears) Elite 7784[] (Gas) \$630
- Kenmore (Sears) Elite 7785[] (Gas) \$630
- Kenmore (Sears) Elite 7786[] (Gas) \$630

LG DLE5977[W] (Electric) \$850  83 Yes

LG DLG5988[] (Gas) \$900

Sprayer for Kitchen

Bricor Pre-rinse Sprayer for Commercial Kitchens

This sprayer meant for heavy duty kitchen work has an Flow Impact Intensity (FIT) value of 16.43, showing an incredible overall strength of water delivery. The water flows at a rate of 0.5975 gallons per minute at 60 psi, far more water efficient than other commercial sprayers.

Product is available online at www.Bricor.com or by phone: (830) 624-7228.

This product is only the sprayer, not a complete kitchen faucet. According to the company it can be used with the Danze "Parma" single handle pre-rinse kitchen faucet, model number: D457158. It has a flow rate of 2.2 gallons per minute (on its own), it is ADA compliant and costs about \$277.00

Product is available at Thrifty Supply

720 West Washington, Eureka, CA

Telephone number: 707-443-8095

Eco Tips for Kitchen Sink

- Compost any food scraps rather than throwing them away
- Washing dishes in the dishwasher is usually more water efficient than doing them in the sink
- Shut off water whenever not in use, and shut it off completely
- Use cold water whenever possible to avoid using energy for water heating



New Pre-rinse Sprayer for Commercial Kitchens

0.5975 gpm @ 60 psi with an FIT Value Off
**The Charts as it is too powerful a stream
to compare to a showerhead...FIT Value of
16.43**

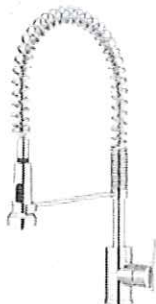
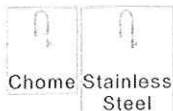
[Click here to see the Test Summary](#) by PG&E's Food
Service Technology Center

[Click here for IAPMO Certification\(s\)](#)

Danze

Parma™ Single Handle Pre-Rinse
Kitchen Faucet
Product #D457158

Available Finishes



Product Description:

- Ceramic disc valve.
- 2 function spray/aerated stream spout.
- Quiet running hose.
- 1/2"-14NPS connection.
- Single hole mount.

Product Package Dimensions

17.52"(L) x 15.94"(W) x 2.76"(H) , 9.27(lbs)

Shower Head

Bricor B100 Ultra Max

Showerhead has an ultra low flow of only 0.5525 gallons per minute yet when tested, received one of the highest performance rates of any showerhead with a positive rating of 10.35.

Product available online at www.Bricor.com or by phone: (830) 624-7228.

Eco Tips for Showers

- Do not over shower whenever possible
- Turn off the shower when soaping up or washing hair
- Get into shower immediately, do not wait for water to heat up
- Use the coldest water comfortable to save on energy needed to heat the water
- Use eco-friendly/biodegradable soaps and shampoos. There are numerous products on the market that fit this description such as Nature's Gate, J.R. Liggett's, Earthbath and Jason Fragrance among others.
- Install Shower Managers to maximize efficiency and keep the length of showers to a minimum

New B100 ULTRA MAX

An ULTRA Low Flow delivery of only 0.5525 gpm, but with the highest performance value rating of any showerhead tested. P = 10.35

(Click image to enlarge)

2" Showerhead



Polished Chrome
B100 ULTRA MAX

- **Ideal for RV campers with 12 gal. tanks**
- **Instantaneous hot water systems**

Shower manager

The Shower Manager is a two-phase device that permits a full flow of water for a time period (5, 8, or 11 minutes), then proceeds to sound a beeper and then cuts the flow in half. The Shower manager is easily installed onto any shower head and can significantly decrease the water usage of a facility.

The Shower Manager costs \$114.95 and can only be bought online at www.showermanager.com

Eco Tips for Showers

- Do not over shower whenever possible
- Turn off the shower when soaping up or washing hair
- Get into shower immediately, do not wait for water to heat up
- Use the coldest water comfortable to save on energy needed to heat the water
- Use eco-friendly/biodegradable soaps and shampoos. There are numerous products on the market that fit this description such as Nature's Gate, J.R. Liggett's, Earthbath and Jason Fragrance among others.

The Shower Manager Team



Shower Manager Single Unit
Buy online and Save \$15.00 off retail! Only \$114.95 each.

COMING
SOON!

Patented Shower Timer Lets You Control Shower Times

You set the time limits to fit your life style!

The Shower Manager is a two-phase device that permits a full flow of water for a time period you determine, (5, 8 or 11 minutes) and then cuts the flow by half when that time limit expires. You set the high flow interval to fit your lifestyle and lock it in using a security key.

Cheaters Don't Prosper

As the bather nears the end of the high flow phase of the shower, a beeper sounds. One minute later the water flow is cut to just enough to permit rinsing, but the restricted flow reminds the user that it is time to get out of the shower. The hi-tech device also has a five minute reset interval that prevents tampering by a bather looking to extend the high-flow period. We found five minutes is long enough the bather will not stand there waiting for the unit to reset but not so long as to upset the next bather in line.

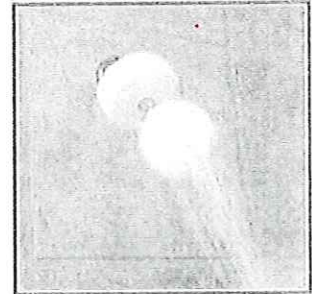
Easy and Safe

Don't worry that you will have to replace your existing showerhead, The Shower Manager is easily installed with your existing shower head in just a couple minutes. The Shower Manager is completely safe, it does not affect the temperature of the water, and is powered by a transistor radio battery.

Full Flow



Conservation Flow



Buy With Confidence

Included with your new Shower Manager is a **full 30-day unconditional warranty** and easy-to-follow installation and operation instructions.

The Shower Manager is not available in stores, you can only get it at our secure online store. Chances are you know someone with teenagers or living under water restrictions that could really use the benefits and savings of The Shower Manager. **Remember the drought proof gift and give The Shower Manager**.

Water Level Sensor

Global Water WA400 Water Level Alarm

Product ID: gwWA400

The WA400 features a weather resistant PVC enclosure for outdoor applications, a bright flashing strobe light and loud sounder for alarm notification. The WA400-DC battery powered version will strobe and sound for up to 12 hours on its eight standard 1.5 volt AA batteries.

The sensor may be purchased online at www.Omnicontrols.com for approximately \$242.25

<http://www.omnicontrols.com/detail.aspx?ID=4403>

Eco Tips for the Water Level Sensor

- Set the water level according to the time of year, certain times of the year requires less water. By having less water stored you avoid issues related to standing unfiltered water (for example mosquito breeding and contamination).



Product Name:
High Water Alarm

Product ID: gwWA400
Manufacturer: Global Water

Price: \$242.25

- Weather resistant housing
- Self-powered model for stand alone applications
- Bright strobe and loud sounder
- Easy to install just about anywhere
- Robust and reliable
- Choose the power option that best suits your application
- Integrates well with our water detection sensors, float switches, and controllers

High Water Alarms Product Description

Global Water's WA400 Water Level Alarm is robust and easy to install anywhere you need a reliable high or low water level alarm. The WA400 features a weather resistant PVC enclosure for outdoor applications, a bright flashing strobe light and loud sounder for alarm notification, and a choice of versions and accessories.

Options for your Applications

The WA400-DC battery powered version may be quickly deployed in temporary emergency applications or anywhere you need a level alarm where no AC power is available. The unit will strobe and sound for up to 12 hours on its eight standard 1.5 volt AA batteries.

The WA400-AC externally powered version allows you to use the alarm with water level sensors, any standard float switch, or any contact closure. Our WA400-BU version includes an automatic battery backup in addition to standard AC power—a great feature if your AC power source may be unreliable.

High Water Alarms Specifications

Input: Contact Switch Closure, 40mA Load

Outputs: 12 VDC (switched) power terminals, 25mA Maximum

External NO relay contact: 5A @30VDC

Power:

WA400-AC: 115 VAC

WA400-DC: Eight 1.5 volt AA batteries (apprx. 12 hr continuous)

WA400-BU: 115 VAC with eight 1.5 V AA batteries as backup

Visual Alarm: Strobe w/red lens (apprx. 1 Hz)

Audible Alarm: 95dB, 2900 Hz sounder (@ 10 cm)

Enclosure: PVC, weather resistant w/wall brackets

Weight: 2.5 lbs (1.1 kg)

Dimensions: 14" long x 2-1/2" diameter (35.5cm long x 6.4cm diameter)

Water Heater

GE Outdoor Tankless Gas Water Heater

Model Number: GN94ENSRSA

The GE Outdoor Tankless Water Heater is the first EnergyStar rated water heater since the United States Department of Energy created EnergyStar requirements for water heaters in early 2008. This water heater features on-demand water heating, an energy factor of 0.82 and can reduce water heating costs by 25%.

The water heater can be purchased starting May 1, 2008 at **CARMONA'S APPLIANCE CENTER**
905 Mistletoe Lane
Redding, CA 96002

Phone Number: 530-222-2288

Eco Tips for Water Heater

- Use cold water whenever possible to eliminate energy use for heating
- Make sure to maintain and clean your water heater to keep it as efficient as possible
- Insulating your water heater can increase the efficiency of a water heater



GE Appliances

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GE® Outdoor Tankless Water Heater

Model#: GN94ENSRSA

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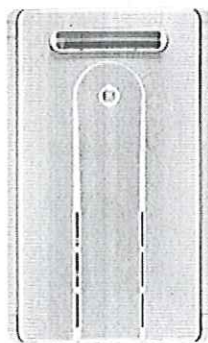


Photo Gallery



[FIND A GE DEALER](#)

APPROXIMATE DIMENSIONS (HxDxW)

22 7/8 in x 9 13/16 in x 14 in

CAPACITY

Capacity	Indoor Compact
Max Flow Rate Capacity (GPM) @ 35 Degrees F Rise	9.4
Max Flow Rate Capacity (GPM) @ 77 Degrees F Rise	4.3

FEATURES

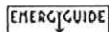
Fuel Type	Natural Gas (factory set)
Ignition System	Direct Electronic Ignition
Installation Location	Outdoor Wall Mounted
Freeze Protect	-30 Degrees F, Activates at 37 Degrees F
Heat System	Demand-Activated Technology
Overheat Protection System	Yes
PreciseTemp	+/- 3 Degrees F
Temperature Settings	98 Degrees F - 140 Degrees F
Condensate Collector	Integrated (tubing not included)
Electronic Controls with LED	Remote Controller
Temperature Setting Memory	Yes
Temperature Settings Factory Default	104 Degrees F
Direct-Wire Remote Control	Min. Wire Gauge 22 AWG
Mounting Brackets	Included
Mounting Location	Stud or Masonry Wall

ECONOMICAL / QUIET

Venting Type	Direct Vent
Operating Sound Level	55 DBA

APPEARANCE

Color Appearance	Silver Metallic
Color Appearance Code	SA



WEIGHTS & DIMENSIONS

Overall Depth	9 13/16 in
Overall Height	22 7/8 in
Overall Width	14 in
Approximate Shipping Weight	53.00 lb
Net Weight (lbs.)	46.00 lb
Connection Sizes - Gas Inlet (MNPT)	3/4"
Connection Sizes - Hot Water Outlet (MNPT)	3/4"
Connection Sizes - Water Inlet (MNPT)	3/4"

POWER / RATINGS

Electrical Connection	Hard-Wire
Electrical Consumption Normal	60 Watts
Electrical Consumption Standby	2.8 Watts
Energy Factor	0.82
Gas (BTU/HR)	199,000
Maximum Gas Supply Pressure WC (inches)	10.5
Minimum Gas Supply Pressure WC (inches)	5
Operating Water Pressure	20-150 PSI
Volts/Hertz	120V; 60Hz
Minimum Continuous Flow Rate (GPM)	0.45
Minimum Starting Flow Rate (GPM)	0.64

ACCESSORIES

Direct-Wire Remote Controller	AGTRC1
Dual-Connect Cable Kit	AGTDC1
Multi-Connect Cable Kit (to be used with AGTCK1)	AGTMC1
Multi-Connect Kit with Control Board	AGTCK1
Pipe Cover	AGTPCM

WARRANTY

Parts Warranty	Limited 5 Year Limited 10 Year Heat Exchanger
Labor Warranty	Limited 1-year entire appliance
Warranty Notes	Limited 1 Year

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Water Storage Tank

10,000 Gallon Fresh Water Poly Tank-LG 141Dx160H Product Number: 0015-055

American tank Company's freshwater tank are designed to make residential water safe and dependable. Molded out of FDA approved materials, they also meet the Nationals Sanitation Foundations requirements for safe storage of potable water. The tank also comes with a three year warranty and has been manufactured to meet ASTM D1998-93 Standards and meet or exceeds most Fire regulations.

The water tank is available online at <http://www.watertanks.com/category/367/> for approximately \$4,346.25.



American Tank Company's freshwater Tanks are the most cost effective way to store drinking water for residential and commercial installations.

Also used for vineyard or agricultural irrigation, fire protection, water treatment, and other water related uses. Where very large capacities of water are required, multiple tanks may be plumbed together. These durable tanks are designed and manufactured to make water storage safe, dependable and

affordable.

American Tank Company's freshwater polyethylene (poly) storage tanks are manufactured by means of the rotational molding process, which produces a one-piece, seamless tank. Linear poly tanks are molded from 100% FDA approved materials and will not impart any taste or residue, meeting the National Sanitation Foundation (NSF) requirements for safe storage of drinking water (potable water).

American Tank Company's freshwater tanks are UV stabilized and will not breakdown under harsh outdoor weather conditions, and will not rust, chip, peel, or corrode. Green opaque color helps prevent water borne algae growth. To insure the highest quality, all Freshwater Poly Tanks have been manufactured according to ASTM D1998-93 Standards and meet or exceed most Fire regulations.

American Tank Company's freshwater tanks can be placed on any flat, firm, level surface for simple installation, and being lightweight, easily rolled into place by hand. Great for remote cabins and hard to reach locations! Pre-installed fittings include 1½" top-inlet & 2" lower-outlet for simple hookup, and the standard 16" threaded manway with a 5" vented inspection port allows for easy access to the tank. Extra fittings can be easily added and allow for the installation of additional accessories and system components.

American Tank Company supports the manufacturer's 3-year warranty on freshwater tanks which are designed and warranted for water use only, at ambient temperature and are not intended nor warranted for chemical storage.

Product Description	Retail Price	Your Price
10,000 Gal Fresh Water Poly Tank-LG 141Dx160H Color: Green Gallons: 10000 Dia. 141" Height: 160" Lbs: 2100 Product #: 0015-055	\$7,366.53	\$4,346.25 Call to Order

Solar Water Pump

Solar Water Technologies INC

Size of pump needed unknown to date; the most popular size is the SWT-150. It is powered by two 75 Watt solar panels, can deliver up to 1500 gallons per day and can lift the water from 200 vertical feet. The system comes with a pump, an automatic water shutoff controller, the appropriate number of solar panels, and mounting hardware. The system is appropriate for village water supply applications. The pump has a one year warranty and the solar panels have a ten year warranty. If higher flow rates are required systems can be linked together.

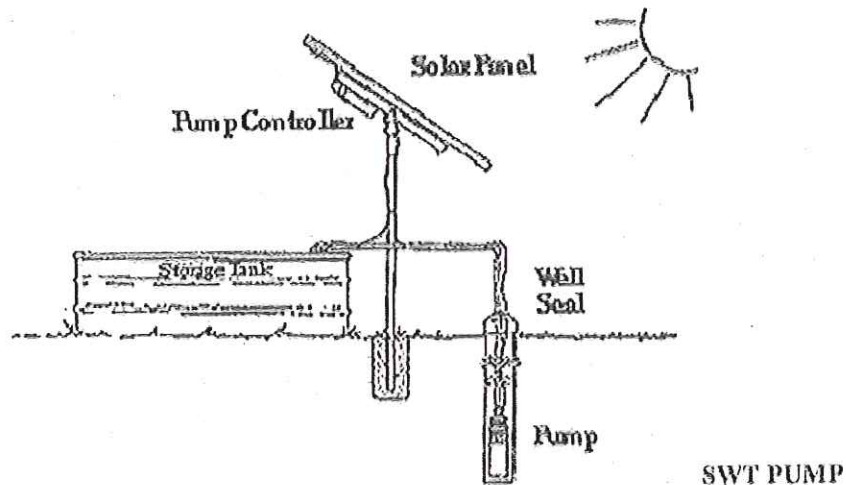
For more information including purchasing information see: <http://www.solarwater.com/>

Eco Tips for Solar Water Pump

- Properly maintain the pump through routine inspection and maintenance
- By making sure that the solar panel on the pump is properly located and free of debris, efficiency can be maximized.

317 S Sidney Baker Street; Suite 400-112
Kerrville, TX 78028
PH: 800-952-7221 (Toll Free within USA)
PH: 830-370-2021 (International)
Fax: (830) 895-2208 (USA and International)

SYSTEMS COMPONENTS



The SWT™ Pump Is A Submersible Positive Displacement Diaphragm Pump.

- Operates At 12 To 30 Volts Of Direct Current Supplied From Solar Panels [Can Also Be Connected To Battery Power]
- Produces Pressures Of Up To 85 PSI Or Lifts From 200 Feet [60 Meters] Deep And Flows To 2.1 GPM [7.95 LPM]
- Pump Comes Pre-Wired From The Factory And Features 1/2" [12.7 mm] Stainless Steel Connector For Drop Pipe
- One Year Warranty And 8000 Hour Average Operating Life

SWT CONTROLLER

The SWT Controller Is A Microprocessor Used To Monitor Power Between SWT Pump And Solar Panels, Forming An Integral Part Of The SWT System.

- Automatically And Continuously Adjusts Voltage And Amperage To Obtain Optimum Power Matching As Panel Production Varies Throughout The Solar Day
- Boosts Power In Low Light Conditions To Increase Output
- Includes Simple Reliable Automatic Water Sensor Shut-Off
- Capable Of Running 2nd Pump For Higher Production Needs

BP SOLAR PANELS

Manufactured By Industry Leader BP (British Petroleum) Solar, Inc.

Backed By 10 Year (50 watt panels) or 20 Year (75 & 90 watt panels) Product Warranty
Highly Resistant To Hail And Other Environmental Factors
Superior Efficiency And Durability

Outdoor Spigot

AHD355 Arrowhead Brass Solid Flange Sill Faucet

Item No: AHD355

This spigot has one of the highest ratings on the Faucet Depot website and comes with a three quarter in F.I.P and a hose connection with a weather and rust resistant, heavy-duty handle.

These spigots are available online at:

<http://www.faucetdepot.com/faucetdepot/productdetail.asp?link={C92F2608-173A-4ADF-B099-0E9FFDFEC274}&Product=18262> for \$7.25 each.

Eco Tips for Outdoor Spigots

- Install aerators to maximize on the flow of the spigot
- Make sure to fully turn off water when not in use
- Never leave the water running

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Arrowhead Brass AHD355 Solid Flange Sill Faucet - Chrome

Home > Household Plumbing > Outdoor Products > Outdoor Faucet > Arrowhead Brass AHD355 Solid Flange Sill Faucet - Chrome



255 255SW 255BFP 255LK
355 355BFP 355LK

Item No: AHD355
Retail Price: \$7.25
Our Price: \$7.25
This item normally ships within 5-10 business days.

Product Description

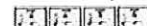
AHD355 Arrowhead Brass Solid Flange Sill Faucet

- 3/4" F.I.P. x 3/4" Hose Connection with Oval Handle



[View All Items by this Manufacturer](#)

Faucet Depot Rating: Great Choice



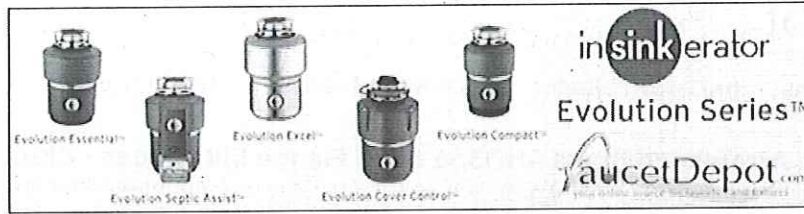
Our Sister Sites

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- www.hansgrohedepot.com

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Aerators

We have compiled a spreadsheet of aerators by the top manufacturing corporation, Neoperl. We have included these aerators because they aerate the water to a rate of 1.5 gallons per minute or less. Many of them have certifications from such organizations as the American Society of Mechanical Engineers, the NSF International and the Canadian Standard Association. Depending on the size of pipes being used on the site, as well as the faucets being used, there are a range of aerator sizes for the site. Every faucet in the kitchen and bathroom will contain an aerator.

Eco Tips for Aerators

- Install aerators in faucets, showers and spigots whenever possible to maximize on the flow of those components
- Replace aerators promptly when they cease being effective, information on how to spot a used up aerator can be found on Neoperl's website, www.neoperl.com



Indoor Bath Faucets

We have compiled a list of indoor bath faucets that meet our standard requirements for the faucets. Our requirements were a flow rate of 1.5 gallons per minute or less, they must be American Disabilities Act compliant, have a five year or more warranty and be priced fewer than three hundred dollars. The listed faucets all meet these requirements and choosing among them is a personal preference.

Eco Tips for Faucets

- Make sure to completely turn off the water when not in use
- Do not run the water if you are not using it
- Use the coldest water possible to save energy from heating
- Install aerators for the faucets to maximize the efficiency of the faucet
- Always use biodegradable/eco friendly hand soap whenever possible. Numerous biodegradable products are on the market including Nature's Gate, J.R. Liggett's, Earthbath and Jason Fragrance among others.



Home | Search:



Product Search

Model Number:

Advanced Search

Room/Function (required)
 Bar/Laundry

Finish
 All

Collection
 All

Holes
 All

US List Price
 --- to ---

BRIZO
Intrinsic Beauty

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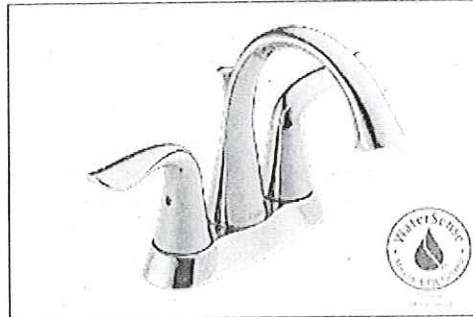
DESIGNING WITH DELTA

Subscribe to our eNewsletter

[See the entire Lahara Series](#)

Lahara Two Handle Centerset Lavatory Faucet - with Lever Handles

Chrome



E-mail this page

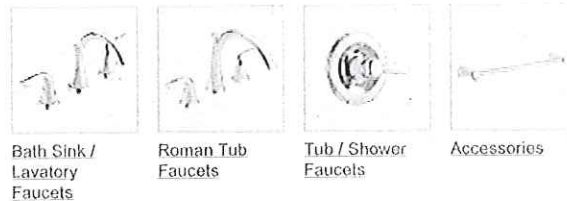
Where to Buy Delta

	Model	US \$ List Price ¹
Faucet	2538	\$131.55
= Total Price		\$131.55

3-hole 4" installation
 Will it fit my bath sink? ADA Compliant

Matching Products
 Product Features & Benefits
 Repair Parts, Product Care & Specifications

Chrome



- Lahara, inspired by the beauty and bliss created by waves
- Lahara offers a complete suite of products and timeless styling highlighted in four popular finishes.
- Lifetime Faucet and Finish Warranty.

Description:

Two Handle Centerset Lavatory Faucet - with Lever Handles
Spout Type: Rigid spout
Valve Type: Washerless stem cartridge
Tub/Shower Type: NA
With Pop-up: yes
Flow Rate: 1.5 gpm

The following product documentation is available for this model:

[Parts & Accessories Diagram](#) (exploded view diagrams)

Visit our [Repair Parts, Product Care & Specifications](#) Section to find general information regarding troubleshooting, maintenance, and replacement parts.

If you need to purchase replacement parts

 [Maintenance & Installation Sheet \(instructions\)](#)

 [Technical Specifications \(measurements\)](#)

1. The manufacturers list price (U.S. dollars) is shown for comparison only. The actual retail price may be lower than the price shown.

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Brand Name	Model Name	Model Number	Kitchen or Bath	Price	Flow rate
Delta	Lahara	538	Bathroom	202.95	1.5
Delta	Lahara	2538	Bathroom	131.55	1.5
Delta	Lahara	3538	Bathroom	228.95	1.5
Delta	Lahara	4538	Bathroom	185.05	1.5
Moen	Rothbury	6201	Bathroom	232	1.5
Moen	Rothbury	6205	Bathroom	252.5	1.5
Brand Name	Model Name	Model Number	Kitchen or Bath	Price	Flow rate
NEOPERL	Cache Perlator Junior 1.5 gpm Aerated	BF.2107.1	n/a		1.5
NEOPERL	Cache Perlator Regular 1.5 gpm Aerated	40.3232.010	n/a		1.5
NEOPERL	PCA Cache Cascade Regular 1.5 gpm Aerated	40.1256.010	n/a		1.5
NEOPERL	PCA Cache Perlator Junior 1.5 gpm Aerated	BF.2707.1	n/a		1.5
NEOPERL	PCA Cache Perlator Regular 1.5 gpm Aerated	40.2256.010	n/a		1.5
NEOPERL	PCA Cascade Regular 1.5 gpm Aerated	40.1056.000	n/a		1.5
NEOPERL	PCA Cascade SLC Regular 1.5 gpm Aerated	40.0056.000	n/a		1.5
NEOPERL	PCA Perlator Junior 1.5 gpm Aerated	B2.2707.1	n/a		1.5
NEOPERL	PCA Perlator Regular 1.5 gpm Aerated	40.2056.000	n/a		1.5
NEOPERL	PCA Perlator Tom Thumb 1.5 gpm Aerated	02.5607.1	n/a		1.5
NEOPERL	Perlator Junior 1.5 gpm Aerated	B2.2107.1	n/a		1.5
NEOPERL	Perlator Regular 1.5 gpm Aerated	40.3032.000	n/a		1.5
NEOPERL	Careguard Regular 1.5 gpm Laminar	02.8201.0	n/a		1.5
NEOPERL	PCA Cache Perlator Junior 1.5 gpm Laminar	BF.D707.1	n/a		1.5
NEOPERL	PCA Cache Perlator Regular 1.5 gpm Laminar	40.2156.000	n/a		1.5
NEOPERL	PCA Care Regular 1.5 gpm Laminar	A5.4162.0	n/a		1.5
NEOPERL	PCA Perlator Junior 1.5 gpm Laminar	B2.D707.1	n/a		1.5
NEOPERL	Perlator Junior 1.5 gpm Laminar	B2.D107.1	n/a		1.5
NEOPERL	PCA Spray Regular 1.0 gpm	A5.9046.1	n/a		1
NEOPERL	PCA Spray Junior 1.0 gpm	A5.9036.1	n/a		1

Kitchen faucet	Model Name	Model Number	Kitchen or Bath	Price	Flow rate
Danze	Parma Single Handle Pre-Rinse Faucet	D457158	Kitchen	276.6	2.2

Model Name	ADA Compliant	Features	Warranties
Lahara	Yes	single handle	5 year for comm/indus/res
Lahara	Yes	centerset two lever handles	5 year for comm/indus/res
Lahara	Yes	wide set two lever handles	5 year for comm/indus/res
Lahara	Yes	mini wide set two lever handles	5 year for comm/indus/res
Rothbury	Yes	two handle centerset	5 year for comm use
Rothbury	Yes	wide spread two lever handles	5 year for comm use
Model Name			
Cache Perlator Junior 1.5 gpm Aerated	NSF61, ASME1, CSA	flow restricted	
Cache Perlator Regular 1.5 gpm Aerated	NSF61	flow restricted	
PCA Cache Cascade Regular 1.5 gpm Aerated			
PCA Cache Perlator Junior 1.5 gpm Aerated	NSF61, ASME1, CSA	pressure compensating	
PCA Cache Perlator Regular 1.5 gpm Aerated			
PCA Cascade Regular 1.5 gpm Aerated			
PCA Cascade SLC Regular 1.5 gpm Aerated			
PCA Perlator Junior 1.5 gpm Aerated		pressure compensating	
PCA Perlator Regular 1.5 gpm Aerated			
PCA Perlator Tom Thumb 1.5 gpm Aerated			
Perlator Junior 1.5 gpm Aerated		flow restricted	
Perlator Regular 1.5 gpm Aerated			
Careguard Regular 1.5 gpm Laminar			
PCA Cache Perlator Junior 1.5 gpm Laminar	NSF61, ASME1, CSA	pressure compensating	
PCA Cache Perlator Regular 1.5 gpm Laminar	NSF61, ASME1, CSA, VHA	pressure compensating	
PCA Care Regular 1.5 gpm Laminar	NSF61, ASME1, CSA, VHA	pressure compensating	
PCA Perlator Junior 1.5 gpm Laminar	NSF61, ASME1, CSA, VHA	pressure compensating	
Perlator Junior 1.5 gpm Laminar	NSF61, ASME1, CSA, VHA	flow restricted	
PCA Spray Regular 1.0 gpm	NSF61, ASME1, CSA, VHA	pressure compensating	
PCA Spray Junior 1.0 gpm	NSF61, VHA	pressure compensating	

Model Name
Parma Single Handle Pre-Rinse Faucet

ADA Compliant/certifications
yes, ASME A112.18.1, CSA B125, NSF 61-9

Brand Name	Model Name	Type	Model Number
Delta	Lahara	Faucet	538
Delta	Lahara	Faucet	2538
Delta	Lahara	Faucet	3538
Delta	Lahara	Faucet	4538
Moen	Banbury	Faucet	84912
Moen	Banbury	Faucet	84913
Moen	Caldwell	Faucet	84666
Moen	Caldwell	Faucet	84667
Moen	Lindley	Faucet	84914
Moen	Lindley	Faucet	84915
Moen	Lindley	Faucet	84916
Moen	Muirfield	Faucet	84000
Moen	Muirfield	Faucet	84438
Moen	Muirfield	Faucet	84439
Moen	Rothbury	Faucet	6201
Moen	Rothbury	Faucet	T6205
Price Pfister	Ashfield	Faucet	42-YP**
Price Pfister	Ashfield	Faucet	T42-YP**
Price Pfister	Ashfield	Faucet	T40-YP**
Price Pfister	Ashfield	Faucet	49-YP1*
Price Pfister	Ashfield	Faucet	40-YP**
Price Pfister	Ashfield	Faucet	T49-YP1*
Price Pfister	Ashfield	Faucet	49-YW1*
Price Pfister	Ashfield	Faucet	T49-YW1*
Price Pfister	Hanover	Faucet	43-TM**
Price Pfister	Hanover	Faucet	49-TM**
Price Pfister	Langston	Faucet	43-LN**
Price Pfister	SKYE	Faucet	42-SY**
Price Pfister	SKYE	Faucet	46-SY**
Price Pfister	SKYE	Faucet	49-SY**
NEOPERL	Cache Perlator Junior 1.5 gpm Aerated	Attachable Aerator	BF.2107.1
NEOPERL	Cache Perlator Regular 1.5 gpm Aerated	Attachable Aerator	40.3232.010
NEOPERL	PCA Cache Cascade Regular 1.5 gpm Aerated	Attachable Aerator	40.1256.010
NEOPERL	PCA Cache Perlator Junior 1.5 gpm Aerated	Attachable Aerator	BF.2707.1
NEOPERL	PCA Cache Perlator Regular 1.5 gpm Aerated	Attachable Aerator	40.2256.010
NEOPERL	PCA Cascade Regular 1.5 gpm Aerated	Attachable Aerator	40.1056.000
NEOPERL	PCA Cascade SLC Regular 1.5 gpm Aerated	Attachable Aerator	40.0056.000
NEOPERL	PCA Perlator Junior 1.5 gpm Aerated	Attachable Aerator	B2.2707.1
NEOPERL	PCA Perlator Regular 1.5 gpm Aerated	Attachable Aerator	40.2056.000
NEOPERL	PCA Perlator Tom Thumb 1.5 gpm Aerated	Attachable Aerator	02.5607.1
NEOPERL	Perlator Junior 1.5 gpm Aerated	Attachable Aerator	B2.2107.1

NEOPERL	Perlator Regular 1.5 gpm Aerated	Attachable Aerator	40.3032.000
NEOPERL	Careguard Regular 1.5 gpm Laminar	Attachable Laminar Flow Device	02.8201.0
NEOPERL	PCA Cache Perlator Junior 1.5 gpm Laminar	Attachable Laminar Flow Device	BF.D707.1
NEOPERL	PCA Cache Perlator Regular 1.5 gpm Laminar	Attachable Laminar Flow Device	40.2156.000
NEOPERL	PCA Care Regular 1.5 gpm Laminar	Attachable Laminar Flow Device	A5.4162.0
NEOPERL	PCA Perlator Junior 1.5 gpm Laminar	Attachable Laminar Flow Device	B2.D707.1
NEOPERL	Perlator Junior 1.5 gpm Laminar	Attachable Laminar Flow Device	B2.D107.1
NEOPERL	PCA Spray Regular 1.0 gpm	Attachable Spray Device	A5.9046.1
NEOPERL	PCA Spray Junior 1.0 gpm	Attachable Spray Device	A5.9036.1

Micro-Hydro Power Generator

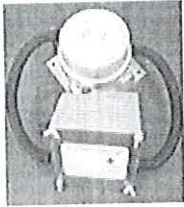
Water Baby Generator, 1 Nozzle (12/24 volt)

Great power generator when there is a low flow rate and low head (drop in altitude) of the water source as from the spring on the village site. This generator can generate anywhere from 25 watts to 250 watts of power depending on the flow and head. It uses a double stator, brushless permanent magnet generator with a 2" (50mm) pitch diameter bronze turbine wheel.

The cost for this product is \$1945 and is available online at www.hydropower.com

"Innovative Micro-Hydro Systems Since 1980"

Water Baby More info to follow ...

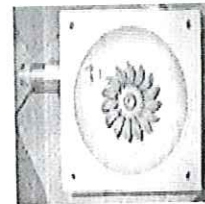


1 Nozzle
Water Baby

The **Water Baby** operates much the same as the Stream Engine but requires very little water. It will operate on as little as .18 l/s (3 gpm) but requires at least 30 meters (100 feet) of head.

The Water Baby is available either as a low voltage model (12/24 volt) or a high voltage (48/120 volt) model.

The Water Baby
(Bottom View)



www.microhydropower.com

Dry/Composting Toilet

Envirolet has multiple composting toilet systems that can be purchased ready to use. The waterless remote system uses no water and has options that use no energy as well (although using models that require energy increases the capacity that the toilet can handle). The toilets have a life time warranty and range in price from \$2030.00 to \$2200.00.

The toilets can be purchased from: <http://www.envirolet.com/>

Eco Tips for Toilets

- Use recycled content, rapid dissolving toilet paper and as little of it as possible.
- Ecover has a biodegradable toilet bowl cleaner.
- Composting toilets can be made rather than purchased, more information about making a composting toilet are in the following pages.



Envirolet® Waterless Composting Toilet Sys

To order, please choose Envirolet® Waterless Remote System at bottom of page.

Combine Function & Elegance

If your cottage is built above ground or your home has a basement, you may wish to consider an Envirolet® Waterless Remote System. The advantage of this System is that it offers a unique combination of both style and function. The Remote waste treatment center installs below the floor, directly under the Toilet, either in the basement or on the ground outside.

Waterless Remote Systems come with an attractive, low profile bathroom Toilet that is optionally available in a multitude of beautiful colors, each with a solid oak seat, and comes standard in white.

This deluxe Toilet is manufactured from durable, easy-to-clean, high gloss HDPE plastic and will provide many years of trouble-free service. **New!** Waterless Toilets feature a removable bowl for easy cleaning!

Another benefit is the increased capacity of the Remote waste reduction system, rated for up to ten persons per day (depending on power type) and additional guests from time to time. Made from high impact, all weather durable plastic, the Waterless Remote is our highest capacity System.

As with all Envirolet® Toilet Systems, cleaning is minimal, and in fact, less than most flush toilets. Powered units have a switch to control the fans and/or the heating system, and you can introduce the organic products either through the Toilet or through the service port on the Remote System.

Standard installation of the Remote treatment module requires a minimum clearance of 33", from the ground to the bottom of the floor. A 30" space is sufficient if the bathroom Toilet is slightly raised. The Toilet can be installed on an upper floor some distance away from the treatment center, using our included Flex Duct for both drain and vent.



This system is ideal for cold weather use. Your SANCOR® representative can provide installation assistance or any other information.

ENERGY CHOICES

Envirolet® is available in choice of Non-Electric, 12VDC Battery (Solar optional) and 120VAC Electric.

waterless remote specifications

model	power	power use (energy)	power use (normal)	weight (lbs.)	capacity* (full-time)	capacity* (vacation)
Envirolet® WRS/NE	Non-Electric	N/A	N/A	110	4	6
Envirolet® WRS/DC	12VDC	0.5A	1.0A	118	6	8
Envirolet® WRS/AC	120VAC	40W	540W	120	8	10+

***Capacity:** Persons per day rating is based on three uses per person per day. All Systems will handle *occasional* additional use.

Size All Remote Systems: 25" Width x 33" Length/Depth x 28.5" Height

Size Waterless Toilet: 16.5" Width x 22.5" Length/Depth x 20.5" Height (Height to toilet seat 15")

Drains: All Non-Electric and 12VDC Battery Systems are fitted with special Filter Drain that must gravity feed to a proper drain site. A drain is a recommended accessory for 120VAC models that will experience heavy use or power outages.

Venting: It is recommended to keep your vent completely vertical (i.e., straight up).

Warranty: Lifetime on the body and 5-Years on all internal components.

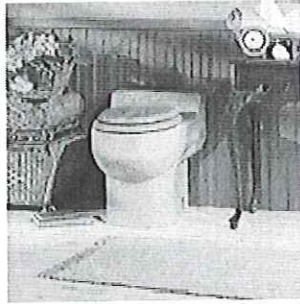
Helpful Links:

- Waterless Remote System [customer installation photos](#)
- Waterless Toilet [bowl removal photos](#)



Envirolet Waterless
Remote Composting
Toilet System (Non-
Electric)

Regular \$2,329.00
Sale! Save \$300!
\$2,029.00



Envirolet Waterless
Remote Composting
Toilet System (12VDC
Battery)

Regular \$2,529.00
Sale! Save \$300!
\$2,229.00



Envirolet Waterless
Remote Composting
Toilet System (120VAC
Electric)

Regular \$2,499.00
Sale! Save \$300!
\$2,199.00

Dry/Composting Toilets

Composting dry toilets provide an alternative to using regular flush toilets that require both water and a septic system. By mixing water with human waste in conventional flush toilets; you are creating blackwater which is a highly toxic substance that is very hard to treat and therefore can be very dangerous. Purifying blackwater requires expensive treatment, and even after the water is cleaned it is still not safe for your health and can contain pharmaceutical residues, toxic chemicals, and heavy metals (zoomzap.com). Dry toilets are becoming increasingly popular, because you save large amounts of water daily and you do not have to go through the hassle of installing a sewage disposal system.

Benefits of a Dry composting toilet

- human waste is sanitized and recycled into fertilizer for non-edible plants
- When human waste is sanitized; toxic microbes that were once harmful are changed into stable substances that are no longer harmful to our health
- Unlike conventional flush toilets; composting toilets provide no threat to our environment or health when installed properly.
- Saves water
- Comfortable and odorless!!
- “Building and operating a DCT is economically inexpensive. Regarding its ecological cost, we can be proud that the DCT takes advantage of the biological cycles of the environment to treat human excrement, which is essentially nothing more than organic matter - the same as the leaves of a tree - and which can be broken down into nutrient-rich compost for the soil. The DCT is an excellent **SUSTAINABLE TECHNOLOGY**, ideal for treating the excrement of the six billion inhabitants of today's world (zoomzap.com)”.

Helpful links:

- <http://www.zoomzap.com/techniques/SES-eng.php> : a practical guide that explains how composting toilets work
- <http://www.networkearth.org/naturalbuilding/toilets.html>
- <http://vsl.cape.com/~cdt/about.htm> : information on buying a composting toilet
-

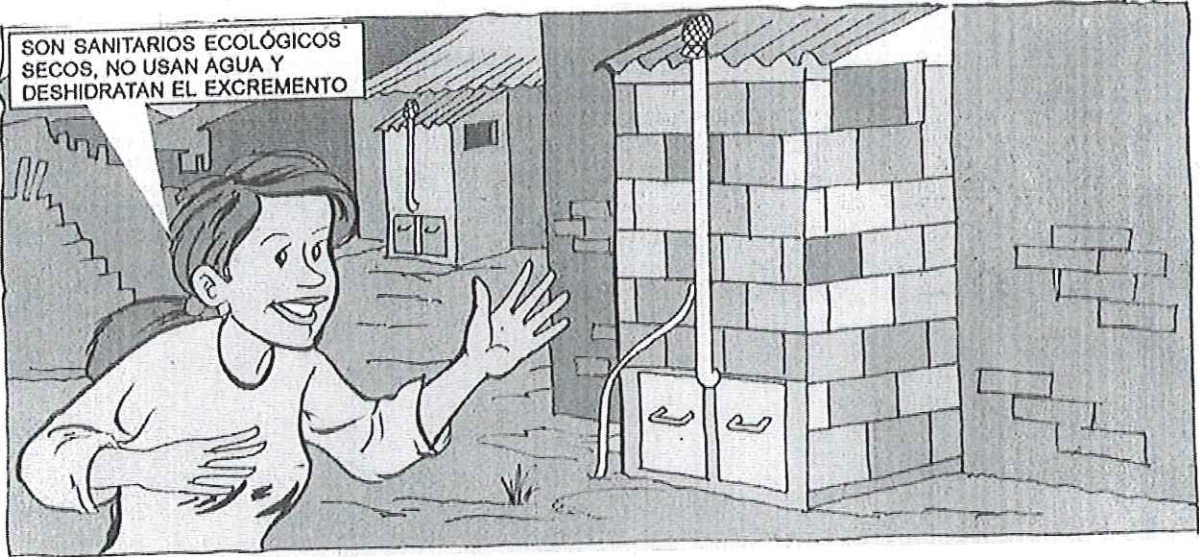
For H.

DRY ECOLOGICAL LATRINES

Excerpt from the publication "Sanitario Ecológico Seco" (Dry Ecological Latrine)
of the Centro Mujeres Tonantzin, Ciudad Juarez, Chihuahua, Mexico.

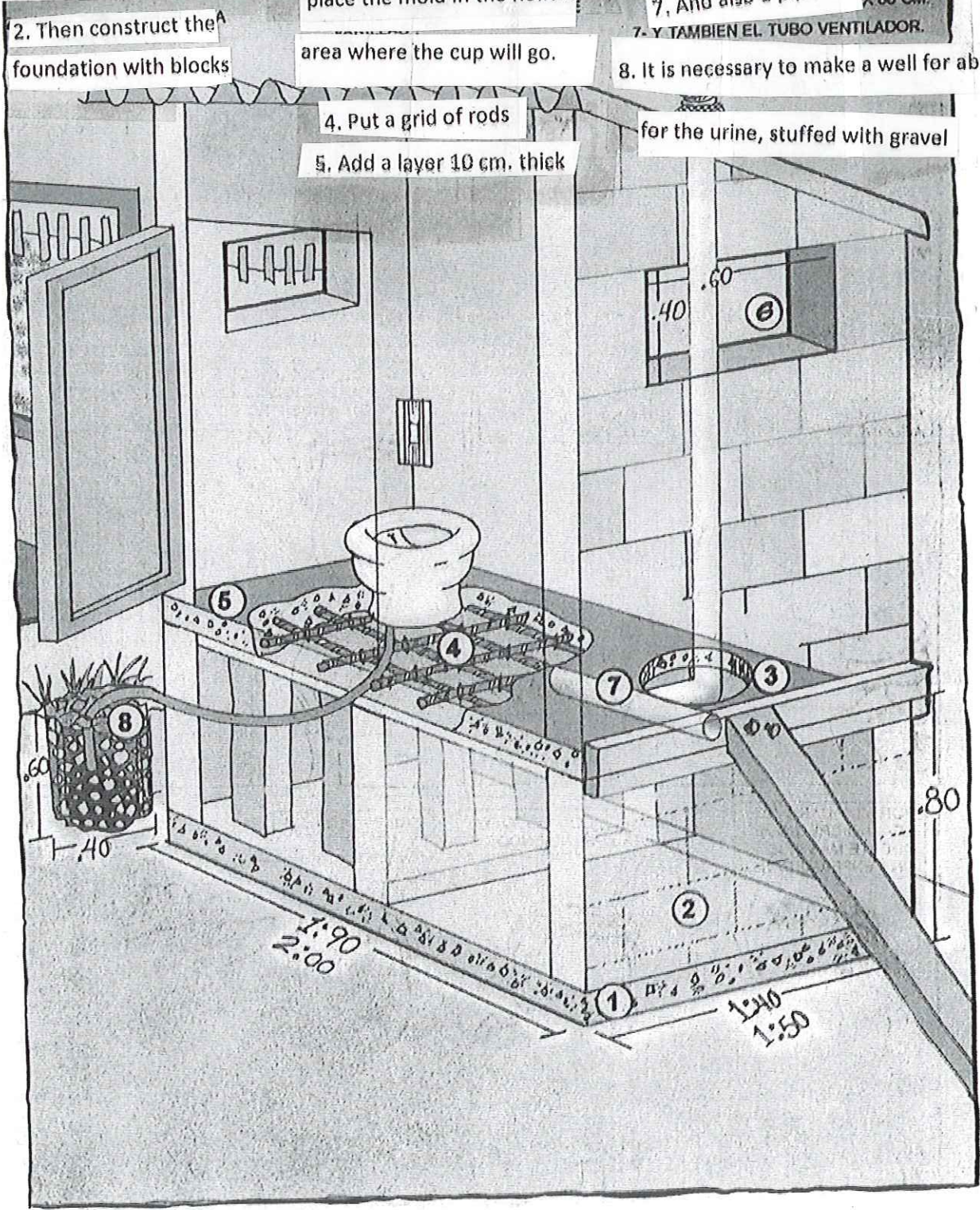
Versión en Español

SON SANITARIOS ECOLÓGICOS
SECOS, NO USAN AGUA Y
DESHIDRATAN EL EXCREMENTO



The dry ecological latrines have two chambers (A and B), they use no water,
and separate urine from fecal matter by means of the ecological toilet.

1. First, pair the soil and make a surface of cement around 10 cm. thick
2. Then construct the foundation with blocks
3. Make a centering and place the mold in the hollow area where the cup will go.
4. Put a grid of rods
5. Add a layer 10 cm. thick
6. Do not forget to put 2 windows for ventilation, 40 x 60
7. And also a pipe fan
8. It is necessary to make a well for absorption

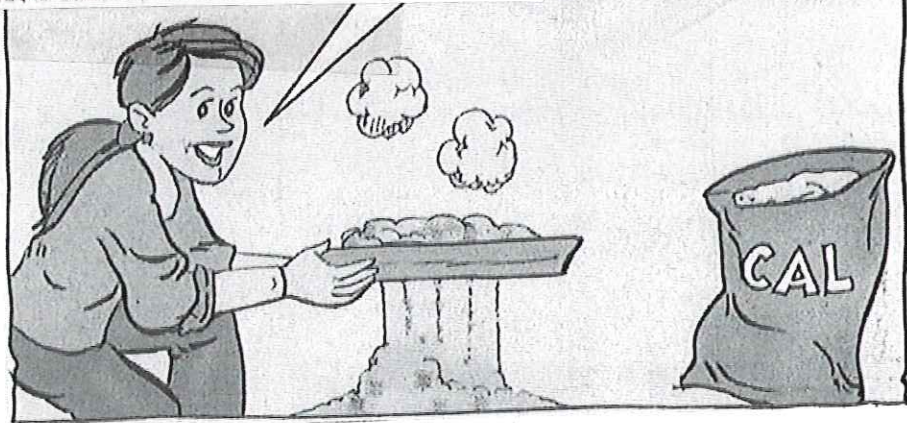


This is the way you construct a dry ecological latrine.

Before using for the first time, you have to prepare the soil so that it will remain sanitary and will work better, laying a cloth of mosquito net, mix the soil with lime or ash

The toilet is covered with 5 centimeters of this soil

SE PREPARA LA TIERRA Y SE REVUELVE CON UN POCO DE CAL O CENIZA)



The latrine functions with a mix of 3 parts of soil and 2 parts of lime or ash (you can also use wood chips).

SE CUBRE EL FONDO CON UNA CAPA DE 5 CENTÍMETROS DE ESTA TIERRA



The latrine is prepared with a layer of this mix.



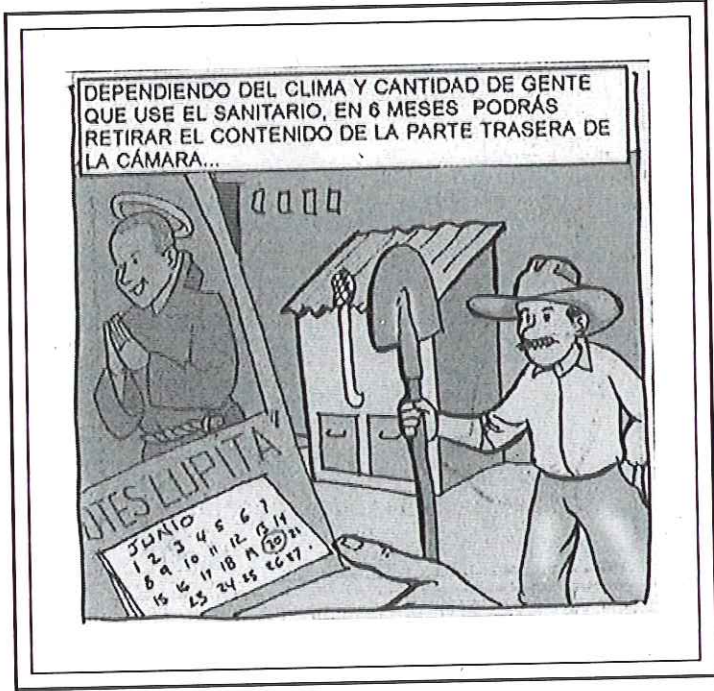
The ecological toilet separates urine from feces, and the urine is sent to an underground deposit filled with gravel.



After each use, a small amount of soil is dumped into the chamber.



The chamber needs to be maintained in optimal conditions every so often (add a cup of lime twice a week):



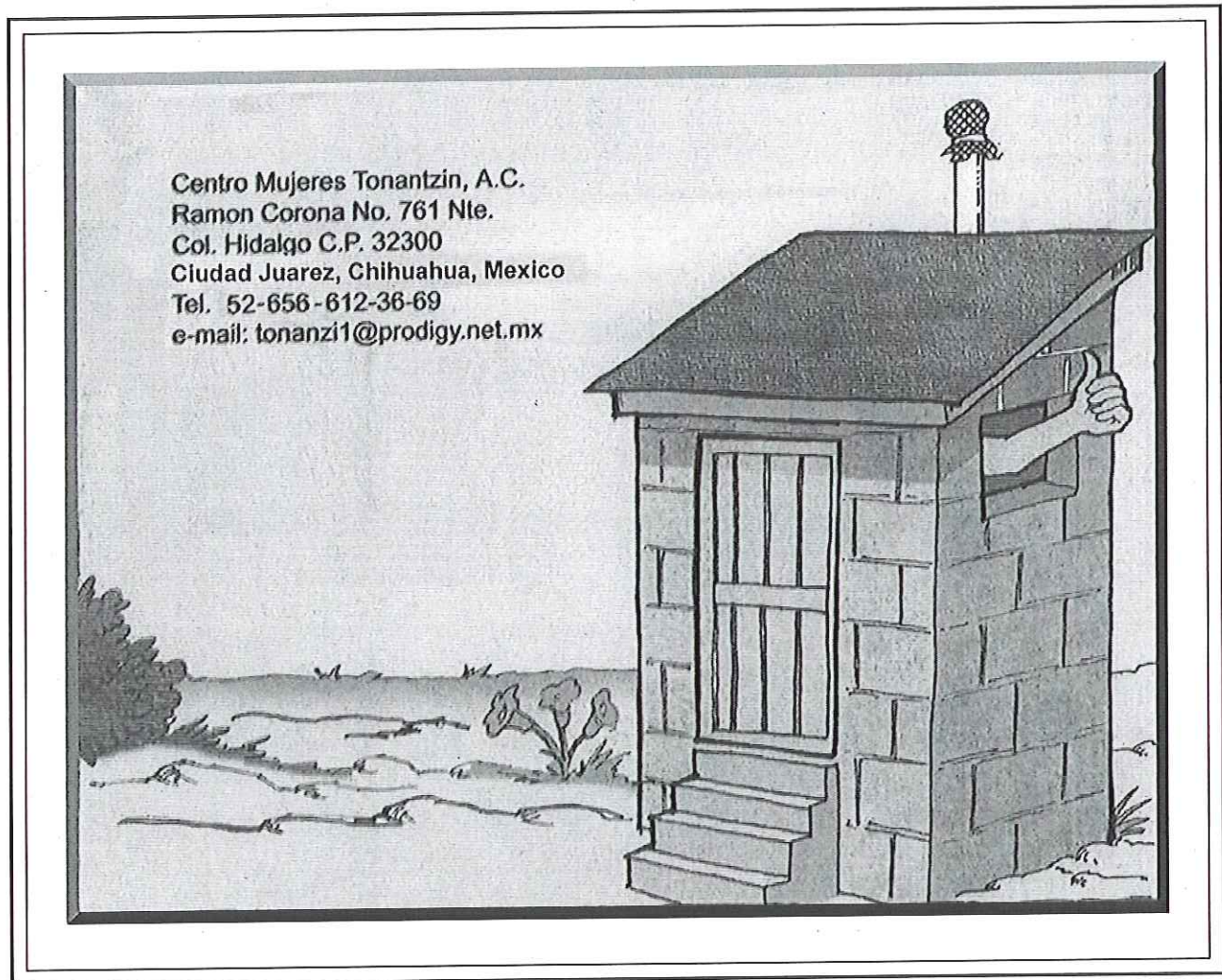
After a period of use, the A chamber rests for at least 6 months, while the B chamber is being used.



After the B chamber has been used for 6 months or more, the humus in A chamber is removed and spread in the field.



Ventilation of the chamber is very important.



The dry ecological latrine is the practical solution to sustainable human waste management.

"Cleaner is not he who cleans more, but he who dirties less."

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You are visitor No.  Thanks for visiting.

Solar

- o how much is available in area
- o for a solar that is 11% efficient, how much power can be generated from that panel.

Phoenix Public Facilities Application Guide

Our acclaimed planning guide helps maintenance professionals determine capacity, choose a site, optimize building design, and devise an efficient maintenance schedule.

Choosing a Composting Toilet: Eight Key Questions

Composting is a familiar process to many people. Organic materials, such as leaves, lawn clippings and food waste, are placed in a pile or enclosure. Over time, in the presence of oxygen, heat and moisture, biochemical processes convert the waste to stabilized compost, which resembles rich, dark, potting soil. Pathogens are nearly eliminated and the volume of the organic material is reduced by 90 percent or more.

The same biochemical processes are employed by composting toilets to treat human waste. A composting toilet is a system that provides an environment within a container for aerobic (in the presence of oxygen) decomposition and stabilization of waste. It is a miniature, on-site sewage treatment plant. It is not a dehydration system that uses heat to dry waste; nor a "waste reduction" system that circulates large volumes of air over the waste to evaporate liquid; nor a "recycling system" that merely stores the waste for periodic removal and composting at a remote facility.

Not all composting toilets are created equal. They vary in size, materials, features, effectiveness, maintenance, energy requirements and safety. In choosing a composting system, we recommend considering the following questions:

1. What are the durability, suitability and longevity of the materials used in manufacturing?
2. Does the size and shape of the composting vessel make sense?
3. Does compost removal require a pumper truck or climbing into the tank?
4. Can you remove compost without also removing fresh waste?
5. What are the energy and ventilation requirements?
6. What are the long term operating costs?
7. Would you personally be willing to perform the required maintenance?
8. Do the specifications make sense?

At Advanced Composting Systems, we manufacture the Phoenix Composting Toilet, a large and very rugged composting system that provides for the safe and effective stabilization of human waste on site. The insulated tank, efficient ventilation system and automatic controls assure the lowest possible heat and electrical requirements; most often these requirements can be met with solar energy. The Phoenix's built-in rotating tines and vertical design assure higher quality compost and easier, safer maintenance.

The Planning Procedure

The process for planning and designing a Phoenix composting toilet facility for a specific application requires several important steps. The following application guide will help in this process. If you need further information for a unique situation, please contact us. ACS designs, supplies, and installs complete turnkey facilities satisfying a wide range of criteria. We also perform site visits to help select a building location.

An outline for the planning process follows. Some steps will be easy, others will require research, design decisions and tradeoffs. All are important to guarantee a successful project. Our application guide follows this outline. Refer to it to assist with each step.

Requires energy?
Capacity?
- \$1 = PF-201 \$1710
PF-200 \$1612
PF-199 \$1517
+ \$1 300
aaren

Phoenix considerations

1. Is a composting toilet appropriate for this application considering the type of user, environment and maintenance commitment?
2. Determine the amount, type and season of use expected for the design life of the facility.
3. Determine the capacity of the Phoenix, model and quantity of systems needed for the expected environment (temperature, maintenance and use). Will supplemental heat be required to facilitate composting?

Facility considerations

1. Accessibility for the handicapped. Is formal ADA accessibility compliance required?
2. Sunlight availability for solar heat and electricity. What, if anything, will obstruct direct sunlight?
3. Sloped ground to provide a daylight basement.
4. Avoid confined space problems!
5. Does the leachate require a holding tank or evaporator for zero discharge or is an on site leachfield possible?

Operational considerations

1. Maintenance! Maintenance! Maintenance!
2. What will you do with the removed compost?

When does a Phoenix make sense?

Employing a Phoenix does not always make sense; certain management and site conditions suggest a composting toilet while others are inimical to its success. A better alternative may be a conventional system, vault toilet or pit privy.

What circumstances exploit the Phoenix's unique characteristics?

At *heavily used backcountry sites* where access and transportation are limited the Phoenix needs only simple manual maintenance.

In *environmentally sensitive areas* such as lakeshores, the Phoenix offers zero discharge.

Where *no utility electricity is available*, a photovoltaic system can be used to supply the Phoenix's minimal electrical needs.

Where *water scarcity precludes flush toilets*, the waterless Phoenix will operate. To facilitate maintenance, provide a small amount of pressurized water from a rain water cistern.

Winter freezing conditions which may damage pipes and fixtures in a conventional flush system will not damage the Phoenix. As long as the tank is in a heated space, the composting process continues. A drain-back water supply for sink faucets offers the same freeze protection.

In *high density campgrounds*, a Phoenix facility's odorless toilet room and aerobic decomposition are more aesthetic than a vault toilet's penetratingly offensive odor.

When does a Phoenix not make sense?

Consistently cold conditions that reduce the Phoenix's capacity below use requirements will result in incomplete stabilization of end product and unhealthy and unpleasant maintenance.

If sewer and water connections are available, a flush system often will be less expensive.

Severe vandalism could destroy a composting system. A concrete vault and toilet building offer more immunity.

Inconsistent or improper maintenance will reduce tank capacity and composting efficiency resulting in poorly decomposed end product.

Capacity Planning

Sizing the facility. How many tanks and how many toilets will a facility need? The answers depend on total annual use, and peak daily use. "Uses" should not be confused with the number of people in an area: "uses per person" varies depending on the nature of visitor activities in an area.

The number of total annual uses determines how many tanks are needed. The peak daily use determines how many toilets must be installed (a tank can accommodate two toilets).

When calculating rates of use, planners should account for the accelerated rates of use that can occur following the opening of a new facility (if you build it, they will come and go).

The Phoenix's capacity is rated in average uses per day and varies according to the tank's temperature, the type of use, and the frequency and quality of maintenance.

Predicting facility use. The total annual use for a facility can be inferred (with varying degrees of accuracy) from a surprising variety of data. Here are a few common situations:

Highway rest areas. The Federal Highway Administration has quantified toilet use as a function of traffic counts. Thus historical traffic count data can be used to estimate current use and project future use.

Existing facilities. The amount of use at an existing toilet facility can be calculated from:

Water consumption, provided that the water is metered. This is true even when water is used only for washing, as in the case of a facility equipped with pit toilets.

The *volume of waste* pumped from a vault or portable toilet (20 uses per gallon, or 5 uses per liter).

The *consumption of toilet paper*. For example, 90 uses per roll seems to be the norm for restricted delivery holders.

Door counters. We sell an automated door counter that can be retrofitted to any facility with a toilet room door. This, obviously, is the best method for ascertaining the amount of use.

Campsite capacity and occupancy. In campgrounds, the daily per capita use of toilet facilities is a function of access, recreational opportunities, and the amount of time spent in the area:

At campgrounds accessible by vehicles, daily per capita use ranges from 3 to 5. The average group numbers 3 persons, but may be larger in campgrounds that attract a high percentage of family use. Campgrounds offering close-at-hand recreational opportunities, such as swimming or fishing, experience longer stays and higher per capita use than sites that are used mostly for overnight stops.

At backcountry campgrounds, daily per capita use ranges from 2 to 3. Tallies from trailhead registers, and the number of

campsites, can be used for estimating backcountry facility use.

At facilities for day hikers, daily per capita use is between zero and one. Tallies from trailhead registers, and/or vehicle traffic counts, can be used to estimate the amount of day use.

Parking areas. The number of parking spaces, visitor turnover rates, and remoteness affect the rate of toilet use.

Determining the Phoenix's capacity. Capacity is the amount of use (expressed as "uses per day") the Phoenix can sustain while producing stabilized, non-offensive, liquid and solid end products with low coliform counts; solids with a moist but not saturated texture; liquids with a high proportion of nitrate nitrogen. Removing compost from a Phoenix that has been (a) properly maintained, and (b) used within its capacity rating, will not be an unpleasant operation.

Our ratings are conservative, and are derived from operational experience. We have equipped representative facilities with data loggers to record key parameters. We visit many Phoenix installations to retrieve use data (the Phoenix is the only system that includes door use counters and has done so since its inception), and to assist with removing the compost. Our extensive hands-on experience with the capacity-environment-maintenance relationship has allowed us to quantify the rate of composting as a function of maintenance and ambient temperature. We continue to refine our numbers by monitoring existing facilities, and through an ongoing research and development program.

Temperature. The rate of decomposition within a Phoenix, and all other composting systems, primarily depends on the internal temperature of the compost pile. The higher the pile's temperature, the more rapid the decomposition, and thus the higher the capacity of the tank. Moreover, a relatively small increase in compost temperature results in a relatively large increase in the rate of decomposition.

Proper temperature management is critical to successful composting. Two temperatures affect the composting process:

Ambient temperature is the temperature of the tank's surroundings and ventilation air supply. This temperature can differ significantly from the out-of-doors air temperature, and/or from the temperature of the ground. A low ambient temperature increases the heat loss from the Phoenix and depresses the compost temperature.

Compost temperature is the temperature of the compost pile. When significant composting activity occurs, the compost temperature almost always will be higher than the ambient temperature. Conversely, a low compost temperature indicates a cold tank and a lack of significant composting activity.

Compost self-heating. The biochemical reactions of the composting process produce carbon dioxide and water, and release energy, heating the compost pile. The rate of the biological and chemical processes involved in composting approximately doubles for every 18 degrees F (10 degrees C) of increase in compost temperature. Self-heating occurs when the pile has sufficient mass and oxygen, and when the ambient temperature is high enough that the reactions can be sustained. The Phoenix's low ventilation rate and insulated tank hold the heat generated by the compost pile.

Composting activity is very slow at ambient temperatures below 55 degrees F (10 degrees C), but accelerates rapidly as the ambient temperature rises. Our target minimum ambient temperature is 65 degrees F (19 degrees C).

Ventilative and evaporative cooling. The Phoenix is kept odorless by drawing air through the toilet and tank, and expelling it through a vent in the roof.

Air flowing through the Phoenix accelerates evaporation of the liquid, cooling the pile. In addition, heat from the pile is lost when the temperature of the ambient air drawn into the tank is lower than the temperature of the pile. The Phoenix minimizes these losses by ventilating at the lowest rate necessary to control odors and supply oxygen for aerobic decomposition. It is better to use an external evaporator when liquids must be evaporated on-site.

Cold composting conditions. At ambient temperatures below 55 degrees F (13 degrees C), heat loss through the tank wall prevents significant self-heating. Consequently, supplemental heat is mandatory to promote composting. The Phoenix, which is insulated, has been designed to be heated easily. Air enters the tank at a single port that can be connected to a heat source, such as a solar collector.

The Phoenix can be used at a reduced rate at ambient temperatures colder than 55 degrees F (13 C). Liquids will still evaporate and drain. Some use is possible even while the tank is frozen, for the compost pile will melt slowly and be treated when temperatures rise. Nevertheless, it should be kept in mind that at very low temperatures, significant composting does not occur and the tank essentially functions as a holding vessel.

Unlike conventional plumbing, which can rupture when frozen, the Phoenix tank is not damaged by freezing.

Maintenance

Maintenance is the other major parameter affecting capacity. Frequent, thorough maintenance -- spraying liquid, adding bulking material, and mixing the compost pile -- increases the rate of decomposition.

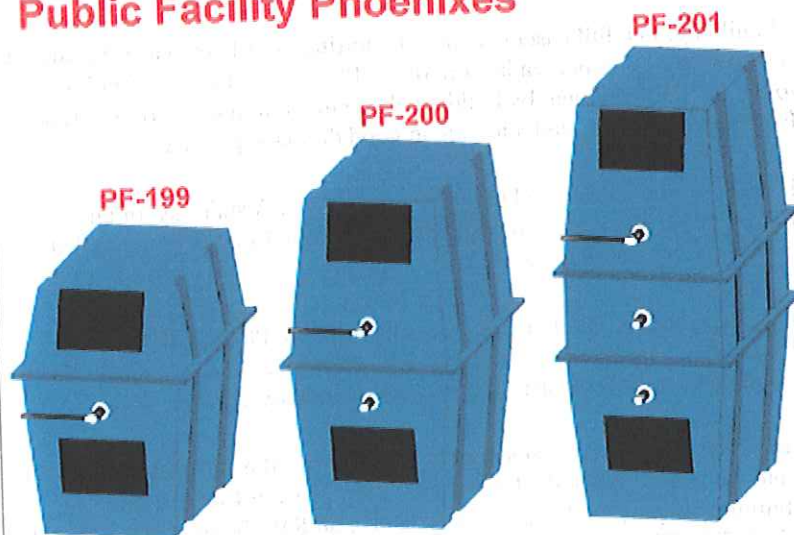
Moisture management. The proper moisture level and porosity of the compost pile (from the addition of bulking agents, such as wood shavings) must be established. The Phoenix includes a liquid spray system to help maintain moisture levels. The addition of bulking material is a simple task when performed frequently. The Phoenix includes built-in rotating tines to mix the bulking material with waste; additional raking often is unnecessary.

Pile aeration management. Because raw fecal matter is too wet and nonporous to compost, it must be mixed with a bulking agent -- we recommend white wood shavings -- to provide the structural support and the airspaces necessary for aerobic decomposition. The bulking agent must be thoroughly mixed into the pile. The more frequently the bulking agent is added to the pile, the less frequently mixing the pile will be required.

User behavior. At day use facilities, the urine-to-feces ratio is higher than at overnight facilities. This translates into an increase in capacity of 30 percent.

Total sustainable use. The amount of use that the Phoenix can sustain in any month correlates reasonably well with the average ambient temperature for that month. Use at 150 percent of capacity can be sustained for long periods as long as monthly averages are within ratings. Even higher rates of use can be accommodated for short periods, such as a Fourth of July Weekend. The capacity of properly maintained Phoenix systems for different ambient temperatures is shown in **Table 1**. A sample capacity calculation is presented in **Table 2**.

Public Facility Phoenixes



	PF-199	PF-200	PF-201
Height	53"	68"	84"
Width	40"	40"	40"

Front-back	62"	62"	62"
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Table 1

Phoenix capacity in uses per day and (year)

as a function of ambient temperature

Temperature	Model 200	Model 201
=< 32 F (frozen tank)	200 cumulative	300 cumulative
55 F	15 (5,500)	25 (9,000)
65 F	30 (11,000)	50 (18,000)
75 F	60 (22,000)	100 (36,000)

Adjustment. If day use is the predominant use (higher urine to feces ratio), increase the capacities for 65 and 75 degrees by approximately 30 percent.

Table 2. Sample capacity calculation for a Phoenix PF-201 (GIF, opens in new window).

Facility design & site selection requirements and tips

Selecting a site. Choosing a site for a Phoenix facility will have dramatic effects on system capacity, building design, user accessibility, energy use, maintenance effort, and construction cost. Therefore, thoughtfully consider the needs of the composting toilet (and maintenance personnel) when selecting a site.

Sloped terrain. The Phoenix can be installed on level ground, but taking advantage of sloped terrain will reduce the excavation requirements and allow easier access to the tanks for maintenance. It is more convenient for maintenance persons to enter a **daylight basement (Figure 2)** through a vertical door than to descend stairs into a full basement. A daylighted basement can also be smaller, since large doors in front of each Phoenix permit the required maintenance area to extend outside the building. We recommend a daylight basement if the terrain slopes 20 degrees or more. Access to the toilet rooms is provided easily by extending a small deck to the hillside.

Flat terrain requires a full basement or an elevated building. In a full basement, an **alternating-tread staircase (Figure 1)** allows compact, convenient access to the tank area. Providing a 5-foot area in front of the Phoenixes, artificial lighting, and reflective white walls, facilitates maintenance. Avoid a flooded basement by building above maximum high ground water, elevating the building slightly, sloping soil away from the foundation, and adhering to good drainage practices.

If high ground water or impenetrable rock precludes excavation, an elevated building is necessary. A stairway, or an extended ramp for universal access, is required for user access. We have constructed a **bench type toilet (Figure 3)** that reduces floor height, and a serpentine ramp around the building, for these situations.

Disposal of liquids. Suitable conditions must exist for disposing of the liquid end product from the Phoenix. If local conditions, such as high ground water, preclude a leach field, then provide a holding tank, a raised bed evapotranspiration system, or a Phoenix liquid evaporation system. A holding tank requires strict attention to prevent overflows.

Preventing unauthorized dumping and vandalism. If the Phoenix is located near a parking area, the design must prevent the emptying of recreational vehicle holding tanks into the toilet. Locate the building far enough away from the parking area that drain hoses cannot reach it, or elevate the building slightly so that the toilet is above an RV's holding tank. Provide a waste dump near the building that offers a convenient alternative, and post signs advising users against dumping chemical toilets and holding tanks into the Phoenix.

Similarly, locate trash cans and cigarette disposal containers immediately outside the building to reduce misuse of the Phoenix. If trash collection needs to be minimized, a trash container inside the toilet room will intercept those intent upon misuse, while not attracting others to dispose of their trash.

Designing the building. Nearly any building design satisfying the following conditions is compatible with the Phoenix:

- The Phoenix must be located directly below the toilet or toilets.
- The tank must rest upon a smooth, level, flat surface
- Convenient access, good lighting and ventilation, and adequate space in front of the Phoenix, must be provided for maintenance operations.
- Adequate space for storing the bulking agent and supplies must be provided.
- The Phoenix 4-inch DWV ventilation pipe should be supported by the building framing, and extend above the roof ridge for proper air flow.
- A drain, holding tank, or evaporation system for the liquid end product must be provided.
- Electricity must be available for the Phoenix's ventilation fan, pump(s), and other systems.
- The tank area must be maintained at or above the temperature upon which the Phoenix's capacity rating is based.

Placing the tank. The dimensions of the Phoenix's components are shown above. Installation clearances are shown in [Figure 5](#).

Provide convenient access to the Phoenix so that the composted end product can be removed easily from the basement area. It is very convenient with a daylight basement to locate a 3-foot-wide or larger door directly in front of each Phoenix so that the composted material can be shoveled directly into a wheelbarrow or other container (we provide a bin). For full basements, a good stairway is essential. Ladders and wall-mounted rungs not only are inconvenient, they are dangerous. Lapeyre manufactures a very compact 56-degree alternating tread stair that is quite convenient for basement access.

Placing the toilets & urinals. One or two toilets can connect to a Phoenix tank. The twelve-inch diameter toilet chutes can enter the Phoenix tank top anywhere within the dashed lines in Figure 5, although centering the chutes is preferable. For a two-toilet installation, the toilets must be located back-to-back against a common partition wall. Dimensions of the Phoenix toilets and installation clearances are shown in the following figure.

A trapless porcelain or stainless steel urinal can be connected to the Phoenix with conventional 1-1/2-inch DWV pipe. The pipe must slope continuously toward the Phoenix and enter the tank at least 6 inches away from side walls. The DWV pipe connects to the urinal drain and extends vertically through the floor or horizontally through the wall.

Options for managing Phoenix Leachate. Your selection of a site and building design should accommodate a sensible system for disposing of the liquid end product from the Phoenix, as not all liquid will be evaporated. Three strategies are viable (but some are better than others):

Ground disposal on-site. If soil conditions and pertinent environmental considerations allow, the simplest strategy is piping the liquid to a small leach field. If high ground water and/or a thin soil layer is a problem, an earthen raised bed can be constructed.

Off-site disposal. The excess liquid can be transferred into a holding tank, and subsequently disposed of at an approved site.

Evaporation on-site. A secondary evaporation system is a viable strategy in warm, dry climates. Under favorable conditions, the Phoenix's companion evaporation system can evaporate all of the liquid end product and limited amounts of graywater. In cold, humid sites, no appreciable evaporation occurs. Please see Appendix A, and/or contact us, for site-specific information on evaporation systems.

The ventilation system. The Phoenix is equipped with a rugged, efficient, ventilation system. The fan housing mounts directly over a precut hole on either side of the tank top, or at any other accessible location in the tank top. This allows the fan to be cleaned easily without removing it from the housing, or to be replaced easily.

Four-inch flexible hose connects the fan housing to 4-inch DWV pipe. The hose and pipe are easily contained within a 2x6 framed wall. The pipe and hose should slope continuously towards the fan housing so that liquid from rain or condensation will run back to the fan drain.

The 4-inch DWV pipe should exit through the roof near the ridge to avoid potential snow loads and downdrafts. Several shroud arrangements can conceal one or several juxtaposed Phoenix and evaporator vent pipes as long as the exhaust air exits several feet above the roof in an upward direction. Do *not* enclose any vents in a louvered cupola.

If the Phoenix is used in subfreezing temperatures, insulating the exterior vent pipe and the interior sections passing through cold areas helps prevent condensation and freezing. The room in which the Phoenix is located should be provided with a 25-square-inch (150-square-cm) opening for ventilation makeup air.

The electrical system. All electrical devices and accessories supplied with the Phoenix operate on direct current: exhaust fans, pumps, light fixtures, and the system monitor and controller. Twelve-volt systems are the default, but 24-volt systems are available (we install both, and can help you determine which is best for your situation). If power from a utility's electrical grid is not available, electrical requirements can be met from an independent generating system, such as our photovoltaic system. We provide an a.c. power supply for use where 120-volt a.c. is available.

Photovoltaics. If a photovoltaic system is required, provisions must be made for mounting the photovoltaic array in an unshaded area, routing the array output conductors into the building, and locating the batteries and controller in the maintenance area. If utility supplied 120-volt a.c. electricity is available, locate an electrical outlet close to the Phoenix for the power supply and controller.

Strategies for managing the tank temperature. As explained above, the Phoenix must be in a warm environment to compost effectively. The composting process itself generates energy that increases the temperature of the compost pile, but first the compost pile must be warm enough for sufficient activity to take place. As the temperature of the Phoenix is increased, the rate of composting and heat generation increases.

In a below-ground basement, the predominant influence on the temperature of the tank room is the temperature of the ground, which can be much cooler than the outside air temperature during the season of use. Moreover, in some climates the outside air temperature varies greatly throughout a 24-hour period. If the ambient temperature in the Phoenix room drops below 65 degrees F (19 degrees C), the tank cools and the rate of decomposition declines sharply, reducing capacity. At ambient temperatures of 55 degrees F (13 degrees C) and lower, composting slows to a virtual standstill.

Preventing a cold tank room. Basically, there are two strategies:

Insulation. The first step is insulating the entire tank room, including the floor and foundation walls to reduce heat loss to the ground.

Supplemental heat for the tank room and/or tank. In a well insulated room, a relatively modest input of energy results in a significant rise in temperature. We have constructed many buildings incorporating an active solar collector in the roof framing. Hot air from this collector is ducted into the tank room, or to the Phoenix's air inlet. Conventional electric or gas space heaters also can be used to heat the room.

Maintenance requirements

The Phoenix operates much like a garden compost pile, requiring adequate food, air, moisture, and heat to support the organisms that transform wastes into a stable end product. The key to successfully operating a composting toilet is maintenance and the easier it is to perform, the more reliably it will be done. The Phoenix's design invites proper maintenance with its convenient access doors, rotating tines, separation of liquid from solid waste, and liquid spray system.

- Rotating tines stir the compost pile from outside the tank and control the movement of compost downward to the access area.
- Internal baffles separate the liquid and solid end products before the liquid receives secondary aerobic treatment beneath the lower baffles.
- Fresh water and/or treated liquid is automatically sprayed periodically onto the compost pile to inoculate the pile with bacteria, and to maintain the compost pile's moisture so that the solid end product is merely moist, not dripping wet, and can be removed easily from the entire tank bottom below the lower tines.

Maintenance requirements and frequency depend upon the amount of use the system receives. The bulking agent must be mixed into the waste pile thoroughly, and trash removed, at least every few hundred uses. A heavily used system requires frequent attention and considerable bulking agent (about 1 gallon/100 uses). Locate a storage bin for bulking agent, and a container for liberated trash, conveniently near the Phoenix.

Waste pile moisture must be checked and either more bulking agent or liquid added as needed. Systems in hot, dry climates, or systems that are used very lightly, require more attention to moisture control. Keeping the waste pile moist also prevents fires from vandalism or misuse. All Phoenixes include a programmable automatic spray system that uses liquid end product and/or fresh water to moisten the compost pile periodically.

Under many circumstances users can add bulking material through the toilet after each use, a "wood shavings flush." This reduces mixing requirements so that periodically rotating the tines is sufficient to maintain a homogeneous mixture.

We strongly recommend keeping a log of conditions and actions (e.g. door counter readings, amount of bulking agent added, compost pile height) for a historical record and continuity among maintenance persons. We provide a suggested format and a get-started set of log pages along with our operating manual.

The finished end product must be handled carefully since it can contain some parasites and pathogens. However, it also contains valuable nutrients. Burying it near some plants will allow these nutrients to be reused. If it is pasteurized first, the small quantity of Phoenix solid end product can be used for revegetation (the pasteurizer's heat source can be a solar collector).

Solid end product (compost). The amount of end product, and the frequency of its removal from the Phoenix, depends upon the amount of use, the rate of decomposition, and the quality of maintenance the system receives. The volume of finished end product is reduced by evaporation, draining (which also carries away dissolved and suspended solids), and decomposition. Coarse wood shavings, recommended for a bulking agent, do not decompose completely. However, they do compact and smaller particles fill some of the air voids.

Finished material should be removed from the Phoenix at least every two years. Approximately 12 bins of material (90 U.S. gallons, 350 liters, or 12 cubic feet) should be removed from beneath the tines. The amount of solid end product which must be removed from the Phoenix so use is sustainable will be about 30 liters (8 gallons) for every 1,000 uses, less if the tank is used at a lower rate or receives mostly urine. If this is too much, some material can be reintroduced at the top of the tank to maintain the compost level or some loosened material can be left in the clean out area below the tines.

Under the EPA's sludge rule, 40 CFR part 503, Phoenix compost is a class B material suitable for land disposal in an area with restricted public access, e.g., burying on site. Finished compost must be handled carefully since it can contain some parasites and pathogens. However, it also contains valuable nutrients which can be reused by plants. If the compost is pasteurized, (a solar pasteurizer is easy to construct and very effective in sunny areas) it can satisfy EPA Class A requirements and may be applied on site with no restrictions.

Liquid end product. After filtering through the compost pile, the liquid receives secondary treatment in the well-aerated,

stable, peat moss medium beneath the bottom baffle. The stability and tremendous surface area of peat provides an excellent filtering medium for treating liquid.

The amount of liquid discharged from the Phoenix depends upon the amount of use it receives, and the temperature and relative humidity of the ventilation air. Approximately 20 liters (5 gallons) of liquid is added to the Phoenix for every 100 uses.

Incoming ventilation air circulating above the secondary liquid treatment medium can evaporate some of this liquid. The remaining liquid draining from the tank should be directed to a leaching field, holding tank, or a secondary evaporator. The liquid end product contains considerable bacteria and dissolved salts, but generally has a low coliform indicator concentration (<200 org/100 ml), low BOD, (<50mg/liter) and low TSS (<100 mg/litre) compared to septic tank effluent, so a short (10-foot) leach line is all that is necessary.

Zero discharge on-site. If the Phoenix is located in an area where zero discharge is desired or mandatory, the liquid can be stored in a holding tank for periodic removal, or it can be eliminated with a secondary evaporation system. Either a small evapotranspiration bed or a compact active evaporator system can be employed. We can assist with design of the former and can supply the latter. Our liquid evaporation system includes a storage tank for peak loading, and a vent system and controls to optimize evaporation while using energy efficiently. Please get in touch with us for additional information.

Appendices

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Flushing Toilets

We have compiled a list of flushing toilets to choose from that are all more water efficient than the standard 1.6 gallon flush, US EPA water sense certified, and ADA compliant. There are two brands to choose from; 5 Caroma toilets and 2 Kohler toilets.

The Caroma toilets all have dual flush technology, which is a combined 1.6 gallon flush for solid waste and a 0.8 gallon flush for liquid waste. This technology saves approximately 585 gallons per year when compared to the standard 1.6 gallon flush. These toilets have a two year warranty and are available at the Alternative Building Center. The toilets range in price from \$346.00 to \$672.00 the only difference being the decorative style (the color for this price range is white).

Alternative Building Center: 707-445-4733

4 West Fourth Street
Eureka, Ca 95501

The Kohler toilets both have a single 1.28 gallon flush, which saves about 350 gallons per year when compared to the standard 1.6 gallon flush. These toilets have a one year warranty and are available at The Home Depot. The toilets range in price from \$323.00 to \$355.00 the only difference being the decorative style (the color for this price range is white).

The Home Depot: 707-464-9463

520 US Highway 101 North
Crescent City, CA 95531

We choose to highlight the Caroma "Caravelle" 270 EH because it is the least expensive Caroma toilet (the more water efficient of the two brands).

Eco Tips for Toilets

- If its yellow let it mellow, if its brown flush it down.
- Use recycled content toilet paper and as little of it as possible.
- Ecover has a biodegradable toilet bowl cleaner.

Exceptional
Smart
design...
Conservation with style



Resources

- [Codes & standards](#)
- [Eco-statement](#)
- [Frequently asked questions \(FAQs\)](#)
- [How to and video tutorials](#)
- [Terminology](#)
- [Water savings calculator](#)

Terminology

The bathroom products industry has words commonly used to describe toilets and sinks. Below are descriptions to provide an understanding of these words and clarify the meanings.

- [Caroma Smart™ technology](#)
- [Dual flush toilet](#)
- [Easy Height](#)
- [gpf](#)
- [High efficiency toilet \(HET\)](#)
- [IAPMO and UPC/cUPC](#)
- [NTH, 1TH, 3TH](#)
- [Rough in](#)
- [Round Front Plus](#)
- [WaterSense-approved](#)

Caroma Smart™ technology

With today's movement towards sustainability, businesses and households are looking for innovative new ways to help save precious resources and the environment. Caroma has introduced the first product using the leading-edge Caroma Smart™ technology. It has been developed and mastered over the last decade, delivering the ultimate of design, water savings, and performance.

The Caroma Smart™ technology sets a new benchmark for the industry by reducing water consumption even further than a high efficiency toilet (HET). The HET category with its 1.28 gallons per flush (GPF) has become North America's conservation standard in the past few years. With the dual flush option, Caroma's new Sydney Smart HET can reduce water use by as much as 2,975 gallons per household per year over an HET. Savings compared to standard single flush low flow toilets, mandated by the US government since 1994, are as much as 5,242 gallons per year. The Sydney Smart™ only uses 0.8/1.28 gallons per flush (half/full flush). It averages .89 gpf, the lowest water consumption of any toilet in the market. The Cube³ Ultra urinal, a new high efficiency urinal (HEU) introduces Smart Demand, the first liquid-sensing automatic flushing mechanism that detects usage rather than motion to activate the electronic flush valve.

Dual flush toilet

A dual flush toilet has two buttons for flushing, a half flush and full flush. The half flush, for liquid, uses 0.8 gallons per flush. The full flush, for solids, uses 1.28-1.6 gallons per flush depending on the model. Using the 1.6/0.8 dual flush technology can reduce water usage by 40% compared with traditional toilets that use 2.9 gallons in a single flush and by more 76% if using a 3.5gpf toilet.

Easy Height

An Easy Height toilet is taller than most toilets and is required for facilities needing to meet the American with Disabilities Act (ADA). Height to the top of the bowl is 16" to 17" depending on the model.

gpf

Gallons per flush. The amount of water used for one toilet flush. For example, 1.6/0.8 gpf toilet uses 1.6 gallons per flush for a full flush and 0.8 gallons per flush for a half flush.

High efficiency toilet (HET)

Under federal law in the United States, toilets must not exceed 1.6 gallons of water per flush. High efficiency toilets (HETs) go beyond the standard and use less than 1.3 gallons per flush (a 20% savings over conventional 1.6 gpf toilets). The WaterSense label will be used on HETs that are certified by independent laboratory testing to meet rigorous criteria for both performance and efficiency. Only HETs that complete the third-party certification process can earn the WaterSense label.

IAPMO and UPC/cUPC

The International Association of Plumbing and Mechanical Officials work together with government and industry to implement comprehensive plumbing and mechanical systems worldwide. IAPMO has developed the Uniform Plumbing Code (UPC). IAPMO Research and Testing is the product certification body which tests and inspects samples from supplier's stock or from the market to verify compliance to the requirements of the UPC (for the

United States) and cUPC (for the United States and Canada).

NTH, 1TH, 3TH

NTH (no tap/faucet hole) - the taps and faucet are attached separate from the sink, so there are no holes in the sink

1TH (one tap/faucet hole) - the sink has one hole for an integrated hot and cold water faucet

3TH (three tap/faucet hole) - the sink has three holes (for hot and cold water taps and the faucet)

Rough in

The distance from the center of the drain to the wall face.

Round Front Plus

Round Front Plus bowls are unique to Caroma. The bowls are longer than traditional Round Fronts. The distance from seat bolt holes to the front of the rim is 16 1/2" to 17 1/8".

WaterSense-approved

WaterSense is a partnership program sponsored by the U.S. Environmental Protection Agency making it easy for Americans to save water and protect the environment. Toilets are certified by independent laboratory testing for water efficiency and flush performance. To be WaterSense-approved, the toilet must flush a minimum of 350 grams of water and have a non-adjustable valve (so it can't be manipulated to flush more water). Caroma has more WaterSense-approved toilet than any other brand in the market.

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Brand Name	Model Name	Model Number	HET	Tank	Bowl	GPF	Waranty	location	ADA?	Price w/o seat	water usage for one person/ year	saves compared to standard 1.6 gallon flush
	Adelaide											
Caroma	Cube EH Adelaide 270	814790	825500	1.6/.8	2 year	ABC	yes			672	1171.2	585.6
Caroma	Standard EH Bondi	814328	825500	1.6/.8	2 year	ABC	yes			646	1171.2	585.6
Caroma	270 EH	726350	607177	1.6/.8	2 year	ABC	yes			506	1171.2	585.6
Caroma	Caravelle 270 EH	629435	609177	1.6/.8	2 year	ABC	yes			346	1171.2	585.6
Caroma	Sydney 270 EH	622320	609177	1.6/.8	2 year	ABC	yes			484	1171.2	585.6
Kohler	Cimarron Eco-Smart	K-3496-HE	K-4286	1.28	1 year	HD cressei seat	yes (with open front)			322.85	1405.44	351.36
Kohler	Kelston	K-11453	K-4474	K-4306	1.28	1 year	HD cressei seat			355	1405.44	351.36

Extra Components

When doing research we have come across many different components that we believe could be added to enhance the water systems that we have presented. We have decided to include a few choice components here.

Rainwater Catchment

We decided against including rainwater catchment as a main component for the water systems due to the visual integrity of the village and the unreliable nature of the water source. Using the average rainfall in Orick, California we calculated the size of area needed to collect 5000 gallons of water per year at the village site and determined that 118 square feet would be needed. There is not an available size at the village site for a system this large and therefore rainwater catchment was not considered a primary source of water for the village. Rainwater catchment is a good supplementary source of water for the system that can be utilized on the rooftops of any of the buildings or even the water tank. Of course the water would have to be added to main system for filtration and distribution to the different areas of the village but can be added at any time if it is found that the water supplied by the spring is not fulfilling the need for the village.

WASHUP



The WASHUP is a conceptual design that would reuse washing machine water to flush the toilets that it is attached to. This design best utilizes space and water efficiency but overlapping the toilet and laundry machine and reusing rather than wasting the water.

Plant Watering Dish Drainer



Dish Drainer Project
ESAD de Reims
2007

This dish drainer waters plants as the dishes dry. This product can hold dishes and utensils from two people at a time. With the help of the branches around the pot, dish drainer grabs the dishes.

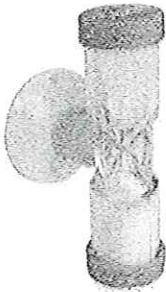
Sprinkler Controller - Cyber Rain



<http://www.cyber-rain.com>

Cyber-Rain works through a computer to automatically adjust the amount of watering through the sprinkler system based on weather and seasonal conditions. This saves time, water and plant replacement costs by stopping the sprinkler system on rainy days, automatically decreasing the watering schedule on cold or humid days, and increasing it on hot and dry days.

Shower Timer



<http://www.rippleproducts.com>

This timer comes equipped with a suction cup and is made with water proof materials that make it shower friendly. The product is made with TPE plastics and absolutely no PVC.

Insect Repellant for Gardens – Garlic Barrier

Garlic Barrier is a strong liquid garlic extract that acts as an insect repellant for plants and trees. Just one gallon of Garlic Barrier, when properly mixed with water covers 10-12 acres of crops. There is no garlic taste after application and the garlic odor dissipates in under half an hour. OMRI listed Garlic Barrier as suitable for organic farm use.