San Miguel
Water Reclamation Proposal

For the County of San Luis Obispo
By William Griffith

APPROVAL PAGE

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Recycled Water Proposal

Goal

To augment California's water supplies, several communities throughout the state have implemented recycled water projects. Recycled water, or reclaimed water, is treated wastewater that is processed to remove the effluent from impurities and is then used for beneficial purposes. This practice is used to help meet the demands of the municipality in environmentally conscious communities, or where water is a dwindling commodity,

Due to its available water supply and the overall availability of high quality throughout the State of California, the Town of San Miguel would greatly benefit from the adoption of a water reclamation plant and distribution system. This “second chance” at using water would not only serve as an excellent source of water for irrigation, but it could also possibly be used for several other beneficial purposes.

Study Area Characteristics

San Luis Obispo County General Plan

The Conservation and Open Space Element of San Luis Obispo County's General Plan recognizes the value and importance of water within the county. Under several goals in the Water Resources chapter of the Conservation and Open Space Element, the General Plan proposes solutions to the issues that the County of San Luis Obispo faces. The first relevant concern the Water Resources chapter lists is the the protection of natural resources regarding the county’s water supply, and securing water for agricultural and urban uses. Another issue the General Plan mentions that relates to the Town of San Miguel is the management and monitoring of groundwater, which is also a requirement under California law. Other issues listed include water quality (which has been compromised due to runoff and seawater intrusion), flooding, and the conservation of water supplies throughout San Luis Obispo County. (SLO County, 2010)

Goals, policies, and implementation procedures are then discussed in the Water Resources chapter to mitigate the many water related issues of the County. Those that are relevant to recycled water in San Miguel are found in the “Use reclaimed water” policy. This section states that the county's goal is to make recycled water make up at least 5% of the county's total water use by 2015, and 10% by 2020. (SLO County, 2010)

Paso Robles Groundwater Basin

Measuring 505,000 acres (790 square miles), and spanning from the southern end of Monterey County to Northern San Luis Obispo County, the Paso Robles Groundwater Basin (PRGB) acts as the sole water source for San Miguel. The PRGB also services Paso Robles, Atascadero, and Templeton. The San Miguel CSD provides water to its community through pumping water from three wells throughout the community service district. The annual average amount of water the San Miguel CSD extracts from the PRGB from the year 1999 to 2009 was 309 acre feet (Furgo, 2010). In the Fall of 2010, the PRGB was announced to be approaching overdraft conditions. This indicates that the Paso Robles Groundwater basin is being drawn from faster than it is being recharged. The County's Board of Supervisors also gave the basin a Level of Severity (LOS) III designation in the beginning of 2011. A LOS III exists when the demand for water is equal to the amount available (Sneed, 2010).

Use of the water pumped from the underground basin is divided into four sectors: agriculture, urban, rural/small community, and small commercial. The largest second of the water are the area's agricultural businesses. The second largest sector is urban users, followed closely by rural/small community, then small commercial. (Furgo, 2010)

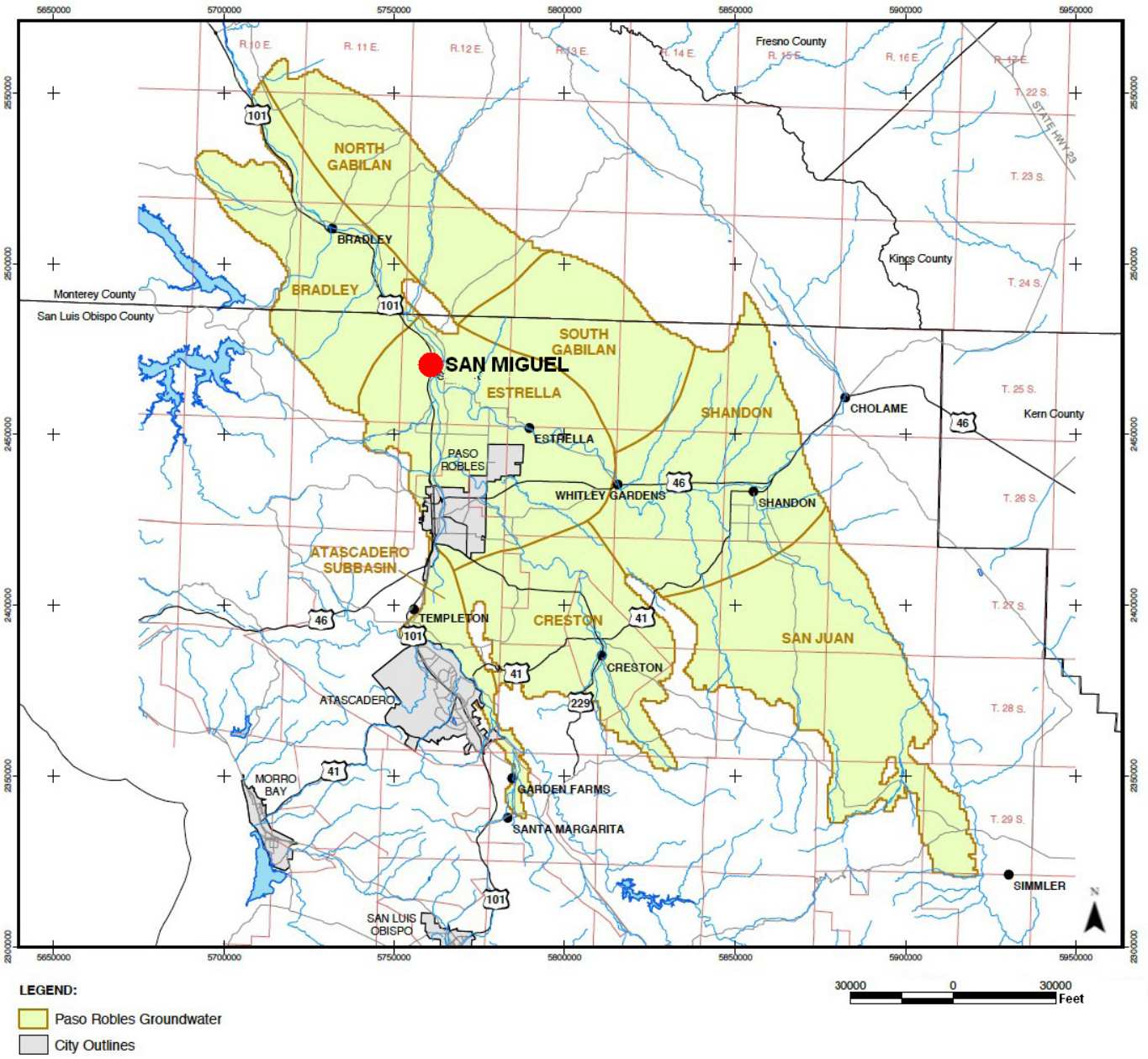


Figure 1: A map of the Paso Robles Groundwater Basin

Source: Furgo, 2010

San Miguel

The Town of San Miguel is located at the Northern end of San Luis Obispo County. According to an estimate by the United States Census, San Miguel is home to 2,205 people as of 2009.

Figure 2: A location map of San Miguel (Not to scale)

Water Demand

In 2009, San Miguel extracted 379 acre feet of water from the Paso Robles Groundwater Basin, which is a 40% increase from San Miguel's pumping rate in 1998. The Paso Robles Groundwater Basin Water Balance Review and Update by Furgo states that the annual consumption rate of water per person is .17 acre feet (55,395 gallons). (Furgo, 2010)

Wastewater

The Town of San Miguel uses a Community Service District owned and operated wastewater treatment and disposal facility. This facility is located at the northern end of town and between Mission Street and The Salinas River. The treatment plant's capacity is 200,000 gallons per day, and consists of four partially aerated lagoons, and four percolation ponds. After wastewater is processed, it is disposed of into the percolation ponds which allow the water to seep into the groundwater supply. Solid waste separated from the sewage is placed into drying beds. During a dry season, the facility processes up to 120,000 gallons of wastewater per day. This is 60% of the plant's operational capacity of 200,000 gallons. (San Miguel Ranch EIR, 2009)

Figure 3: San Miguel's wastewater treatment facility

Source: Google Maps

Case Studies

When making a recommendation regarding the use of recycled water for the community of San Miguel, an understanding of the wastewater cleansing process is required, as well as knowledge of communities that recycle and reuse water. The purpose of these case studies is to gather information regarding cities' recycled water uses, reclamation procedures, and the associated costs.

Simi Valley

Figure 4: A map displaying Simi Valley's location (Not to scale)

Located in the southeast corner of Ventura County in Southern California, Simi Valley is home to 126,902 residents according to the Unites States Bureau of Finance. The city's climate can be described as hot and dry throughout the majority of the year with an average annual precipitation rate of 16 to 20 inches (Idcide,2011). Simi Valley's 33 acre water reclamation plant, The Simi Valley Water Control Plant, is located on the western end of Simi Valley. The

plant features a tertiary treatment process for its wastewater and is controlled by the Sanitation Services Division of the Department of Public Works. The 10 million gallons of wastewater the plant treats daily comes from several sources, the main generators being residential, business, and industrial uses. The bulk of treated water is inserted into the Arroyo Simi, which is a 10 mile flood control channel that travels the length of the City. The remainder of the water is used to dust control and irrigation at the Simi Valley landfill. The $12.5 million annual expense of running and maintaining the facility is paid for by fees charged to users of the service. (City of Simi Valley, 2011)

San Luis Obispo

Figure 5: A map displaying San Luis Obispo's location (Not to scale)

The City of San Luis Obispo is home to 45,106 residents, according to the Census Bureau. The city is located in San Luis Obispo County, along the coast midway between Los Angeles and San Francisco. The area experiences mild winters, generally warm summers, and has an average annual rainfall of 24.4 inches (IDcide, 2011). The community's water sources include: Santa Margarita Lake, Whale Rock Reservoir, Nacimiento Reservoir, groundwater, and recycled water (City of San Luis Obispo, 2011).

In 1994, the San Luis Obispo wastewater treatment facility received a $10 million to produce recycled water. Known as the San Luis Obispo Water Reclamation Facility, the plant costs an annual $3.2 million to operate, and receives its wastewater from a range of uses including water from toilets, sinks, showers, laundromats, and industrial activities. This improvement allows the city to discharge treated water into the San Luis Obispo creek, and use the recycled water to irrigate landscaping and parks throughout the community. The plant uses a tertiary treatment process to reclaim 4.5 million gallons of sewage a day through a network of 130 miles of pipeline that run throughout San Luis Obispo City. Although the water is not approved for drinking, recreation, and food preparation, it is not considered non-harmful if accidentally consumed. (City of San Luis Obispo, 2011)

Irvine Ranch Water District

Figure 6: A location map of Irvine (Not to scale)

The Irvine Ranch Water District (IRWD) provides drinking water sewage collection, recycled water, and other water related services to Central Orange County, and has been doing so since 1961. Because 25% of the water that the Irvine Ranch Water District provides is recycled water, the IRWD is considered a leader in water recycling. The district services the City of Irvine, parts of nearby communities, and unincorporated areas of the county, which add up to a total of 179 square feet of service area. The district services these areas through two tertiary level wastewater treatment plants, and delivers the processed water through hundreds of miles of piping. The recycled water uses include industrial uses, cooling towers, and flushing toilets. These services are funded through monthly service charges paid by individual users. (Irvine Ranch Water District, 2011)

Public Outreach

Public Opinion

To get an overall opinion of recycled water from the people of San Miguel, 14 residents of the community were interviewed for their feelings on the subject. The interview questions included:

- What is your opinion on using recycled water?
- Would you feel comfortable using it?
- Do you have any opposition on using it to water your lawn or landscaping such as in schools, or parks?
- Do you have any concerns about the local water supply?
- Would you be willing to pay a service fee for facility operation?

After questioned, the interviewees were given a pamphlet containing information regarding the Paso Robles Groundwater Basin, San Miguel's wastewater information, and recycled water information. An example of the pamphlet can be found below. Results of the interview can be found in the Public Outreach section of the Weekly Deliverables.

Recycled Water General Information

•Recycled water, also known as reclaimed water, is treated sewage that has been cleansed of solids and other impurities.

•The use of reclaimed water can help ease pressure on drinking water supplies.

•Recycled water can provide, or supplement, a locally controlled water supply.

•According to the Environmental Protection Act, there have been no documented cases of human health problems due to consumption of contact with water that has met treatment standards.

•If treated thoroughly, reclaimed water quality can surpass that of bottled water.

•Uses for recycled water include:
- •Irrigation of schools, parks, lawns, and landscaping
- •Replenishing groundwater basin
- •Dust control
- •Industrial uses
- •Flushing toilets

Water Reclamation and San Miguel

Information Regarding San Miguel's Water Supply and Water Reclamation

Figure 7: The outside of the public outreach pamphlet

Paso Robles Groundwater Basin

•The basin is 790 square miles and spans the southern end of Monterey County and Nothern

•San Luis Obispo County communities that use the Paso Robles Groundwater Basin (PRGB) include San Miguel, Paso Robles, Atascadero, and Templeton

•According to a county planning commission meeting, the PRGB is in overdraft. This means more water is being pumped out than is being replaced.

•The PRGB is the primary supplier of water for San Miguel.

•Water is drawn through three wells that meet water quality standards

The Town of San Miguel

•The average annual water use per person is 55,395 gallons.

•San Miguel's urban pumping rate (UPR) in 2009 was 123,497,692 gallons.

•Water drawn from the PRGB is held in two tanks in San Miguel. Their combined capacity is 700,000 gallons.

•The San Miguel Community Service District owns and operates a 200,000 gallon maximum capacity wastewater treatment plant composed of 4 partially aerated lagoons and 4 percolation ponds.

Wastewater Treatment

Water reclamation can be a multi-stage process that consists of up to three main stages. Each subsequent stage further removes contaminants from effluent until it is up to 99.5% free of all original pollutants. Water treated from almost each stage can be used for different applications.

Preliminary Treatment

This stage removes larger debris and particles that are easily collectable and those that could be detrimental to the lifespan of machinery down the treatment process. Waste that is removed in this stage include objects such as plastic bags, cans, glass, stones, and finer debris.

Primary Treatment

Wastewater goes through sedimentation tanks where grease, oils, and other buoyant waste float to the surface while denser material floats to the bottom. The waste on the surface and bottom of the tanks is removed and discarded.

Secondary Treatment

Here, the wastewater is introduced to microorganisms and algae, which break down harmful organic matter. The living component also helps convert dissolved organic matter into a denser material that can sink to the bottom of the tanks where it can be separated and collected.

Tertiary Treatment

The tertiary, or third, stage is the final stage of wastewater treatment. This stage can vary depending on what the product's purpose is. Aspects of the tertiary stage includes sand and carbon filters, bleaching to remove harmful organisms, and the removal of chlorine.

Suggested Water Recycling Uses by Treatment Stage

Primary

(Sedimentation):

No uses recomended for this level

Secondary

(Biological Oxidation, Disinfection):

- **Surface irrigation of orchards and vineyards**
- **Non-food crop irrigation**
- **Restricted landscape irrigation**
- **Groundwater recharge of non-potable water**
- **Industrial cooling**

Tertiary / Advanced

(Filtration, Disinfection) :

- **Landscape and golf course irrigation**
- **Toilet flushing**
- **Vehicle washing**
- **Food crop irrigation**
- **Unrestricted recreational impoundment**

Figure 8: The inside of the public outreach pamphlet.

Recycled Water

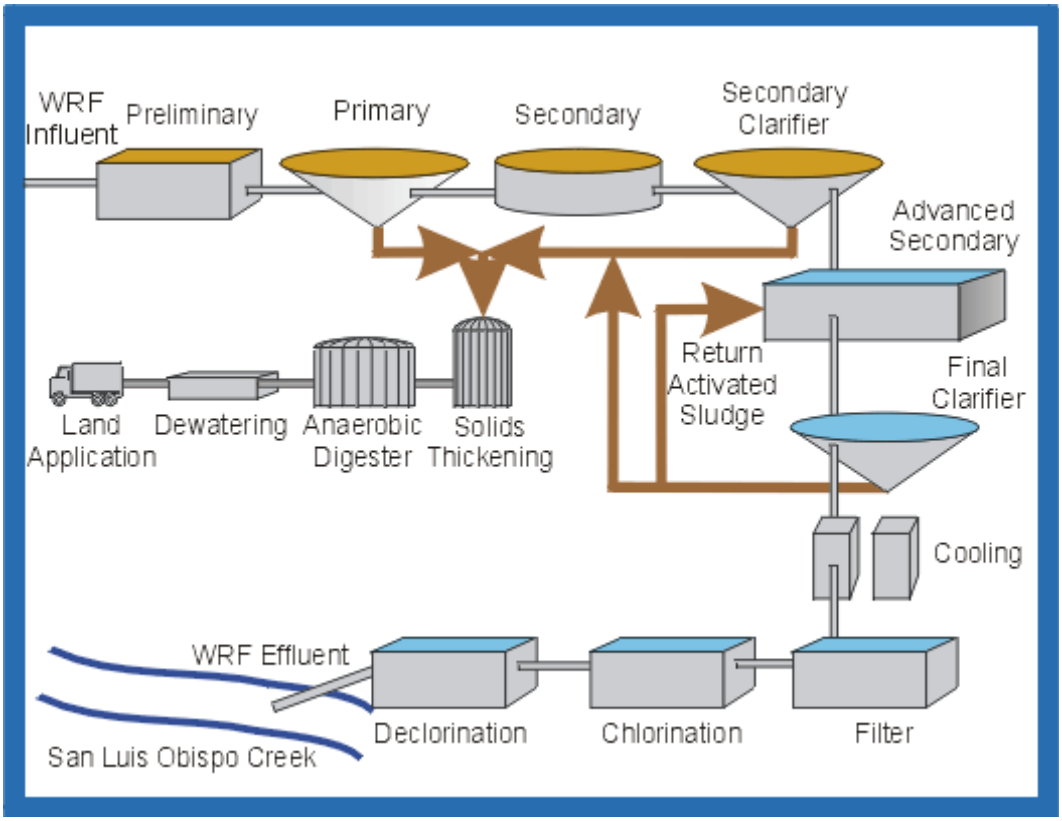


Figure 9: The waste water treatment procedure

Source: City of San Luis Obispo

Reclaimed water, also known as recycled water, is treated sewage that was been cleansed of solids and other impurities. The water is used for irrigational applications such as landscaping and agricultural uses. Other non-irrigational uses for recycled water include replenishing groundwater basins, flushing toilets, dust control, and industrial uses. Aside from relieving pressure on water sources, the PRGB in San Miguel's case, another benefit of using recycled water is it can provide, or supplement, a locally controlled water supply. According to the Environmental Protection Agency (EPA), there have been no documented cases of human health problems due to consumption or contact with water that has been treated to set standards and regulations. (EPA, 2011)

Treatment Procedures

Communities that recycle and use reclaimed water all use a similar multistep process. Simi Valley, Irvine Water District, San Luis Obispo, and several other cities use this standard water reclamation process known as tertiary treatment that consists of four stages.
The first stage of the effluent's treatment is the preliminary stage. This step of the treatment process removes large debris through mechanical screens and is then sent to grit tanks. These tanks are used to separate finer debris from the flow, including egg shells, gravel, and other material that can be detrimental to the lifespan of the machinery further down the process. Air is pumped into the flow which aids in suspending waste and allows denser material sink to the bottom of the tanks where it is caught and disposed of in a landfill. (City of San Luis Obispo, 2011)

The primary treatment stage begins when the flow enters the primary clarifiers. Left over solids sink while buoyant materials, such as soaps and oils, float to the top of the tanks. Waste is then separated from the water, leaving the flow free of 80% of the original pollutants. Biofiltration and secondary clarification mark the start of secondary treatment. Here, effluent is pumped into biofilters (a.k.a. trickling filters) where floating and dissolved matter are consumed by microorganisms who convert said material into a dense substance that can settle to the bottom of the tanks where it can be easily collected. The flow is now free of 90% of the original pollutants, and is sent to aeration tanks where ammonia is removed. This cleanses the flow of another 5% of pollutants and marks the end of advanced secondary treatment. (City of San Luis Obispo, 2011)

The tertiary stage of treatment filters the flow through coal and sand to enhance clarity. The product is then chlorine treated to kill harmful organisms, leaving the wastewater free of 99% of the original contaminants. (City of San Luis Obispo, 2011)

Suggested Water Recycling Treatment and Uses

Increasing Levels of Treatment; Increasing Acceptable Levels of Human Exposure

Primary Treatment: Sedimentation	**Secondary Treatment:** Biological Oxidation, Disinfection	**Tertiary / Advanced Treatment:** Chemical Coagulation, Filtration, Disinfection	
No uses Recommended at this level	• Surface irrigation of orchards and vineyards • Non-food crop irrigation • Restricted landscape impoundments • Groundwater recharge of non potable aquifer • Wetlands, wildlife habitat, stream augmentation • Industrial cooling processes	• Landscape and golf course irrigation • Toilet flushing • Vehicle washing • Food crop irrigation • Unrestricted recreational impoundment	Indirect potable reuse: Groundwater recharge of potable aquifer and surface water reservoir augmentation

Table 1: Treatment levels and their respective uses

Source: EPA, 2011

Recycled Water in San Miguel

To aid San Miguel in dealing with its dwindling water source, it is recommended that the wastewater treatment plant is upgraded to a wastewater recycling facility capable of processing sewage to a tertiary treatment level. Water that is processed at the site will be used to irrigate landscaping on commercial and public properties on Mission Street, the park on 13th Street, and the field at the elementary school. Remaining water may be stored or used for direct recharge into the Paso Robles Groundwater Basin. Water recycling capabilities will also aid the Town of San Miguel in water conservation efforts in the future, as the Town's population grows, water demand increases, and water recourses continue to shrink. As the community expands different applications of recycled water usage may be employed. Examples for additional uses include direct ground water recharge, industrial uses, and irrigation for private properties.

Cost

Lower Estimate*

	Units	Cost	Total
Plant Upgrade	**1**	**$1,000,000**	**$1,000,000**
Distribution System	**4,047 ft**	**$200 per ft**	**809,400**
Storage Tank/Pump	**1**	**$50,000**	**$50,000**
Park/School Retrofit	**2**	**$10,000 each**	**$20,000**
Total			**$1,879,400**

Table 2: A lower estimate of costs regarding a plant update and other required equipment

**Cost figures provided by San Luis Obispo Waste Water Division*

Upper Estimate*

	Units	Cost	Total
Plant Upgrade	**1**	**$1,000,000**	**$1,000,000**
Distribution System	**4,047 ft**	**$200 per ft**	**809,400**
Storage Tank/Pump	**1**	**$100,000**	**$100,000**
Park/School Retrofit	**2**	**$25,000 each**	**$50,000**
Total			**$1,959,400**

Table 3: An upper estimate of costs regarding a plant update and other required equipment

**Cost figures provided by San Luis Obispo Waste Water Division*

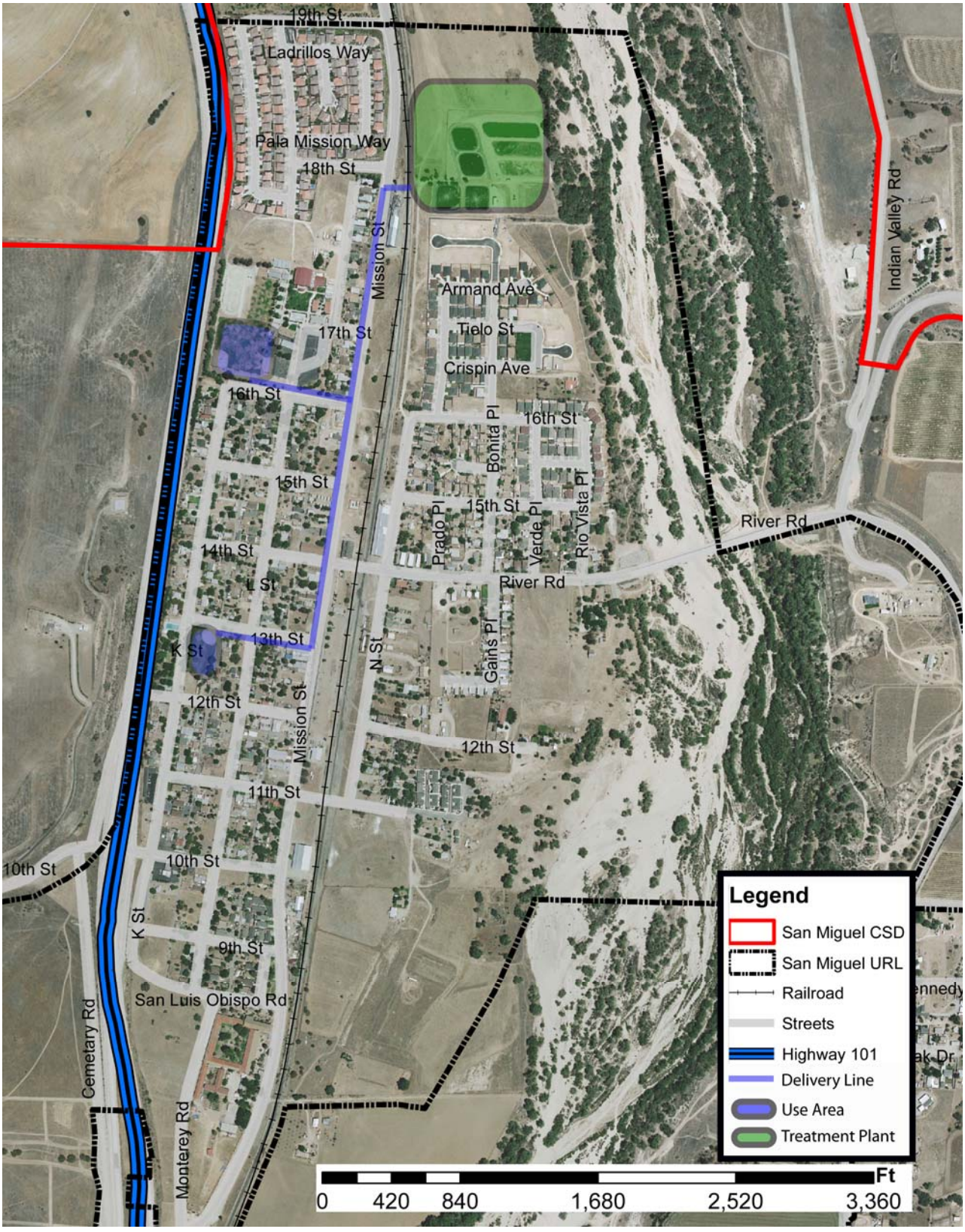


Figure 10: A map indicating where recycled water will be used

Alternatives

In the event that San Miguel does not use recycled water for irrigation within the town, the community can take advantage of water catchment and grey water systems to supplement the existing water supply. While neither of these may be the optimum solution to irrigating Mission Street's landscaping, the elementary school, and the park on 13th street, they both work towards achieving the goal of conserving water and lessening the need to draw from the Paso Robles Groundwater Basin.

Grey Water Systems

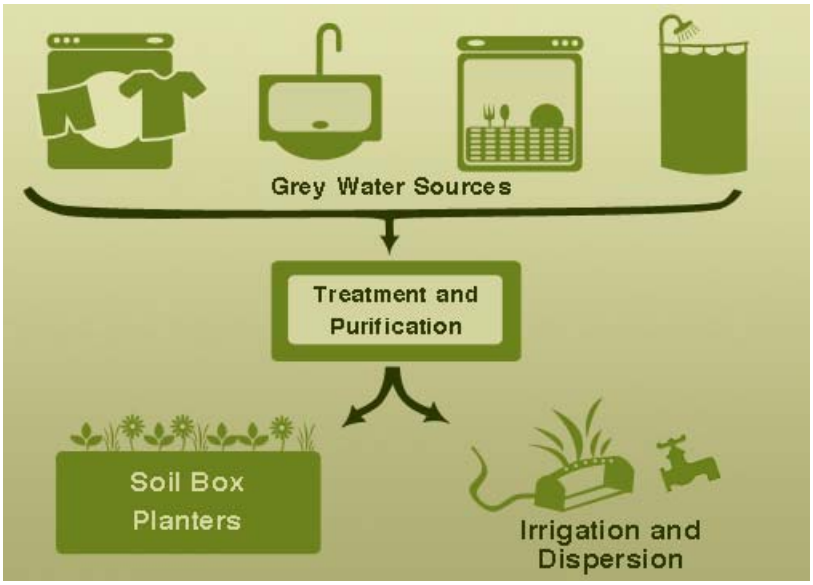


Figure 11: An image displaying the sources and applications of grey water

Source: (Greywater Action, 2011)

Grey water is wastewater expelled from showers, sinks, and other water-using domestic activities excluding toilet waste. On average, grey water makes up 50% to 80% of a home's discharged water. This water can be recycled and reused for several on-site applications including irrigation and toilet flushing. The utilizing of grey water is practiced where water is in short supply, and is done through several different methods. (Greywater Action, 2011)

Aside from relieving strain on water supplies, the reuse of grey water has other benefits. First, grey water can be nutrient rich. It carries phosphorus, nitrogen, and potassium, which are

excellent nutrient sources for vegetation. Another advantage of using grey water is it diverts water away from treatment plants and septic tanks, lessening its impact on local infrastructure. Due to the existence of several grey water systems, there is no standard process but most consist of collection, filtration, and dispersion. Utilization of grey water can range from using a bucket to catch used water, to diverting grey water sources into a filter, where it is cleansed to be used. (Greywater Action, 2011)

Rainwater Catchment

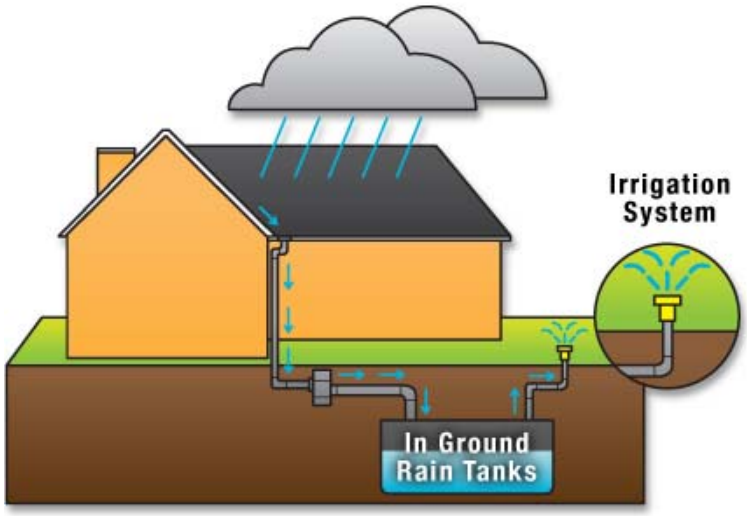


Figure 12: An illustrated example of a rainwater catchment system

Source: HarvestH20, 2011

Rainwater catchment is the harvesting and storing of rainwater for future use. This archaic method of water conservation can be done anywhere with moderate rainfall. Although this practice can be seen in several different forms in places of equally different economic, its principles are all virtually the same. Water is caught by any large surface that can capture or carry water to where it can be used or stored. While the caught water may seem potable, the water may pose health risks if it is not decontaminated before consumption. This is due to possible acidic content, animal feces, or bacteria that could possibly get in the water. Exposed collection pools can also become breeding grounds for mosquitoes and other pests. Other disadvantages of rainwater catchment are maintenance, the size of space required, and other airborne pollutants that may be in the rainwater. (HarvestH20, 2011)

Weekly Deliverables

Background Report

Introduction

To carry out the task of recommending a water reuse plan to the community of San Miguel, background information of the town's water related data must first be compiled and reviewed. This report is written to gain an understanding of these aspects, and collect information relevant to San Miguel's usage, traits, and other water related elements.

San Luis Obispo General Plan

The Conservation and Open Space Element of the San Luis Obispo County General Plan addresses the water and its importance to the county. The Water Resources chapter of this Element goes into the details of this relationship through stating its major issues and corresponding goals. While the beginning of the chapter states the general, and more obvious, reasons to why water is an important commodity to the community, it later discusses the finer aspects of water, its challenges, and its solutions.

The first major concern is the county's water supply. Guiding water use to conflicting demands, and securing water for agricultural and urban uses, and the protection of environmental resources are all priorities in the General Plan. The second issue is the management and monitoring of groundwater. Not only has this become a requirement under California law, the county's growth and the limited availability of groundwater also make management a necessity. Water resource management as a whole is also a focus of the county. To deal with managing the water resources in the county, funds are required to ensure the availability of adequate infrastructure (such as pipelines and facilities), and to support the collection of resource data and water management programs. Other issues the Open Space and Conservation element lists in the Water Resources chapter are flooding, water quality, and water conservation, SLO County, 2010)

To mitigate these issues, the Water Resources chapter lists goals, policies, and implementation strategies that address the problems the county faces. Goals, policies, and implementation that are relevant to the project's interest can be found under the “Use

reclaimed water" policy. The county's goal is to become a leader in the use of reclaimed water by making reclaimed water make up at least 5% of the county's total water use by 2015 and 10% by 2020. Implementation measures to accomplish this are finding partners and sites for such projects, created public education programs for water reuse, recharging groundwater resources with reclaimed water, and finding sources of funding to support this policy. (SLO County, 2010)

Other support for the use of reclaimed water found in the Water Resources chapter can be found under the Water Conservation goal. Policy 4.4 advocates the reuse of wastewater, particularly in landscaping, parks, and public facilities. Policy 4.5 supports the use of reclaimed water to recharge ground water. The use of greywater systems, rainwater catchments, and other water reuse systems are also encouraged. (SLO County, 2010)

Paso Robles Groundwater Basin

The Town of San Miguel's sole water source is the Paso Robles Ground Water Basin. San Miguel is one of the four major communities that draw from the basin, along with cities of Paso Robles, Atascadero, and the Town of Templeton. The San Miguel CSD provides potable water services to its community. The groundwater basin is 505,000 acres in size and spans the southern end of Monterey County and Northern San Luis Obispo County. The Paso Robles Groundwater Basin is divided into eight sub areas; San Miguel is located in the Estrella Subarea. (Furgo, 2010)

The Paso Robles Groundwater Basin is recharged through five components. The first are subsurface inflows bring an estimated annual 6,729 acre feet of water to the basin. Deep percolation from rainfall brings in varying amounts of water depending on how intense rainfall is, which can be considered negligible in drier years such as 2007 and 2009, or in rare cases, very significant like the 18,478 acre feet of water 2005's rainfall generated. Streambeds are also responsible for basin recharge, but like rainfall, effects on the basin can differ year to year significantly. This method of recharge brings an average of 9,874 acre feet of percolated water. About 2.2 percent of agricultural irrigation returns to the basin through percolation. From 1998 to 2009, an average value of 1,264 acre feet of water was returned to the basin through agricultural irrigation runoff. Wastewater discharge is the fifth method of basin

recharge. This includes treated effluent from wastewater treatment plants and on-site septic systems. The Paso Robles Ground Water Basin receives 4,102 acre feet via wastewater discharge. (Furgo, 2010)

Groundwater pumped from the basin is routed to several uses. Agricultural related uses pumped 63,077 acre feet in 2009. Urban uses extracted 16,382 acre feet in 2009. Rural domestic and small community pumping extracted about 6,951 acre feet of water in the same year. The total projected outflow, based on past trends, is 94,574 acre feet in 2010. The San Miguel CSD, alone, draws an average of 309 acre feet per year based on trends between 1998 and 2009. (Furgo, 2010)

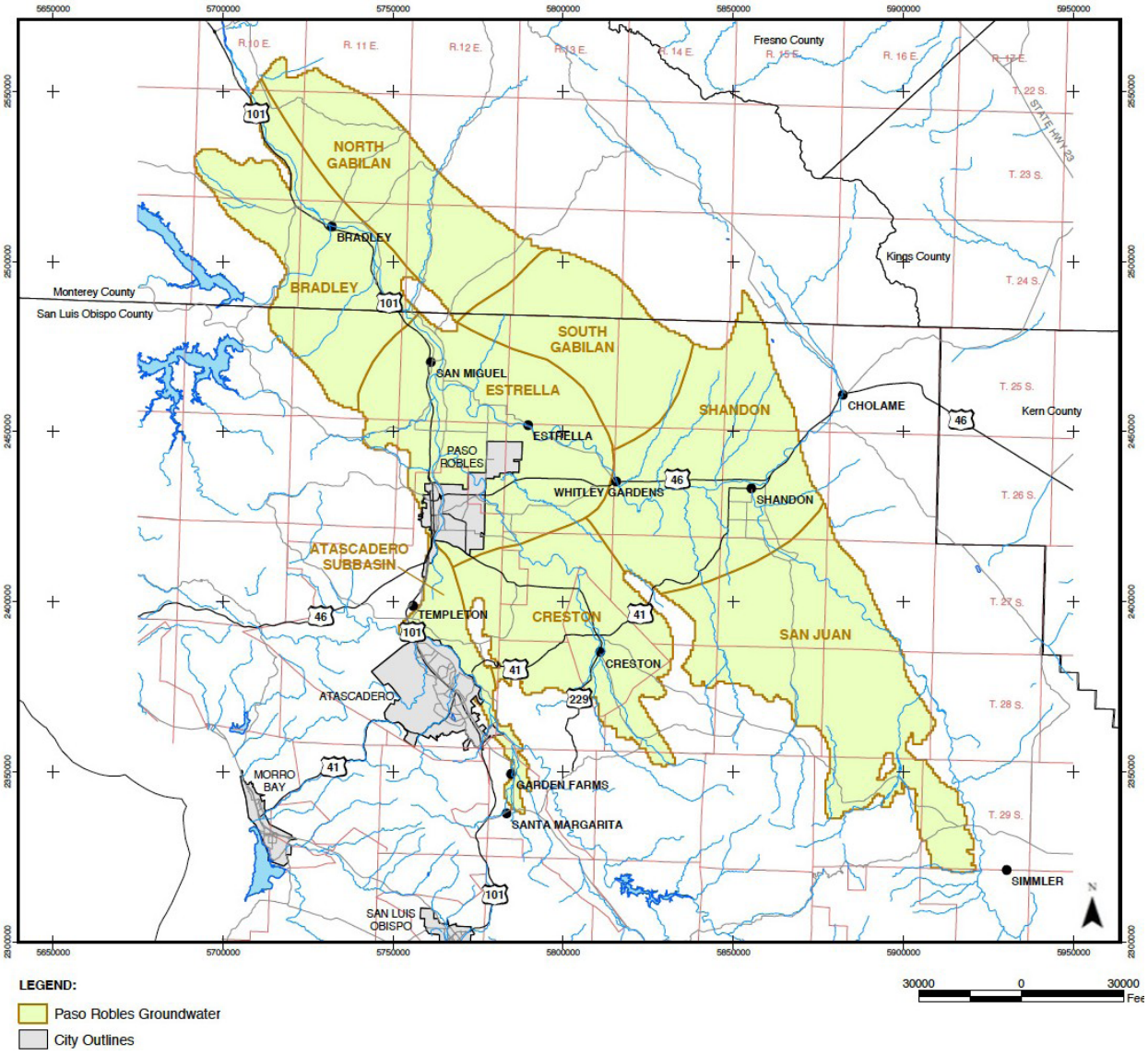


Figure 13: The Paso Robles Groundwater Basin

Source: Paso Robles Groundwater Basin Water Balance Review and Update, 2010

San Miguel

Water Demand

San Miguel's urban pumping rate (UPR) in 2009 was 379 acre-feet, or 123,497,692 gallons, all of which currently comes from the Paso Robles Groundwater Basin. This a roughly 40% increase from San Miguel's UPR in 1998, which was 239 acre-feet (77,878,491 gallons) (San Miguel Ranch EIR, 2009). The average residential use of water per person is 139 gallons per day according to the CSD, or .17 acre feet (55,395 gallons) annually according to the Paso Robles Groundwater Basin Water Balance Review and Update by Furgo. Although this number may seem high, daily water usage throughout the State of California can range from 50 to 300 gallons per person, according to the USDA Forrest Service. Reasons for the significant fluctuation of water usage includes the diverse climate of California, the agricultural lifestyle of a region such as the Central Valley's, and areas that promote water conservation such as San Francisco

Water Storage

The total water storage capacity for the San Miguel Community Service District (CSD) is 700,000 gallons. This water is stored in two separate tanks in San Miguel. A 650,000 gallon is located west of Highway 101, and the other water storage tank is located in San Lawrence Terrace, which holds the remaining 50,000 gallons of water (San Miguel Ranch EIR, 2009). Although the current storage capacity is adequate for Cal Poly City and Regional Planning 2011 Community Update's projected population for 2035 when considering the daily consumption of 139 gallons per person, the community plans to expand water storage capacity to 1.3 million gallons.

Drainage

San Miguel lacks a formal drainage system throughout the majority of the town which causes the community to experience flooding throughout much of the town's core. Most of the flooding caused by the absence of proper infrastructure takes place along Mission Street between 11th and 14th Streets, and between Mission and N streets, north of 14th street. These areas of flooding can be seen on figure 2 . The existing San Miguel drainage system

handles runoff by guiding water away from the developed areas and into drainage ponds. (San Miguel Drainage and Flood Control Study, 2003)

Figure 14: Flooding Areas in San Miguel

Source: San Miguel Drainage and Flood Control Study, 2003

Wastewater

The Town of San Miguel currently uses a CSD owned and operated wastewater treatment and disposal facility. The capacity of the treatment plant is 200,000 gallons per day, and consists of four partially aerated lagoons and four percolation ponds. After wastewater is treated at the facility, it is disposed of into percolation ponds which allows the water to seep into the groundwater supply. Any waste remaining is disposed of into drying beds. During a non-rain season, the facility processes up to 120,000 gallons of wastewater per day and operates at 60 percent. (San Miguel Ranch EIR, 2009)

Case Studies

Introduction

To make any recommendation for the community of San Miguel when discussing a water recycling facility and recycled water usage, an understanding of the wastewater purification procedure is required, as well as knowledge of communities that currently use recycled water. The purpose of these case studies is to accomplish said goals, which are to gather information of cities' recycled water uses, recycling processes, and the associated costs.

Simi Valley

Located in the southeast corner of Ventura County, California, Simi Valley is home to 126,902 residents according to the United States Bureau of Finance. The US Census estimates the median income for households in Simi Valley is $88,406 (US Census Bureau, 2011). The climate of the City can be described as hot and dry throughout the majority of the year with an average annual precipitation rate of 16 to 20 inches (IDcide, 2011) . The city's water is provided by the Calleguas Minicipal Water District and to a lesser extent, and nearby wells. (City of Simi Valley, 2011)

The Simi Valley Water Control Plant is located on the western end of Simi Valley on 33 acres and is controlled by the Sanitation Services Division of the Department of Public Works. The plant currently treats approximately 10 million gallons of wastewater daily. The wastewater comes from several sources, the majority being generated from residential uses, local businesses and industries. After the water is treated, most is dumped into the Arroyo Simi, which is a 10 mile flood control channel that travels the length of the city. The remainder of the water is used for dust control and irrigation at the Simi Valley Landfill. The plant is funded by user fees to pay for the $12.5 million annual expense of running and maintaining the facility. (City of Simi Valley, 2011)

Figure 15: The Simi Valley Water Control Plant

Source: Google Earth

Process

The process of wastewater treatment in Simi Valley is a multistage procedure that treats the 10 million gallons of discharge that the city produces daily. First, waste is collected and transferred to the wastewater treatment facility through roughly 500 miles of pipeline, which is then screened for debris at the headworks building. The extracted debris is dried, compacted, and sent to a landfill. Finer debris such as gravel, eggshells, and inorganic materials are separated from the wastewater using an aerated grit chamber and centrifugal separators. The separated debris is moved to a landfill. This part of the process is done to extend the life of the treatment system. Water is then slowed down to let the remaining solids float to the bottom using long rectangular tanks. Remaining dissolved solids are removed through the aeration tanks where the flow is pumped with air. This stage also includes the removal ammonia and other elements that are harmful to life. (City of Simi Valley, 2011)

Remaining bacteria that has been removed from solids are separated from the water in large circular tanks, which are known as secondary clarifiers. Bacteria will sink to the bottom, and water will rise to the surface, allowing it to be carried to tertiary treatment, which uses an anthracite (a variety of mineral coal) gravity filter to further cleanse the reclaimed water. Chlorine bleach is added to the filtered water to eliminate disease carrying organisms. Because chlorine is harmful to wildlife that the certain agencies rather preserve, sodium bisulfate is added to remove left over traces of chlorine. While some of the treated water is

used for irrigation and dust control at the Simi Valley Landfill, the majority of the treated water is reintroduced to the environment through being directed into the Arroyo Simi. The solids that are not disposed of in the landfill are transported to the anaerobic digesters where volatile gas is separated and the waste is further reduced. The remaining solid waste, or sludge, is dehydrated using pressure and is then sent to open air drying beds. After the waste is dried it is sent to the Simi Valley Landfill. (City of Simi Valley, 2011)

The City of San Luis Obispo

Located between Los Angeles and San Francisco on the coast, San Luis Obispo is home to 45,106 residents, according to the Census Bureau in 2010. Median household income for the city is $37,289 (US Census Bureau, 2011). San Luis Obispo's climate can be described by having mild winters and generally warm summers. Average rainfall for the community is 24.4 inches per year (IDcide, 2011). Main sources of water for the city include: Santa Margarita Lake, Whale Rock Reservoir, Nacimiento Reservoir, ground water, and recycled water (City of San Luis Obispo, 2011).

In 1994, San Luis Obispo's Water Reclamation Facility began processing wastewater and producing recycled water after an upgrade to the former facility. The facility costs approximately $3.2 million a year and receives its wastewater range domestic uses including water from toilets, sinks, showers, to laundromats and industrial uses. This improvement allows the city to discharge treated water into San Luis Obispo Creek. Unlike the Simi Valley Water Control Plant, the San Luis Obispo Water Reclamation Facility directly reuses treated water for various applications. The annual generation of up to 1233 acre-feet of recycled water can be used for irrigating parks, street landscaping, crops, home owner association common areas, and many other uses except for swimming and drinking. Although the recycled water is not approved for drinking, recreation, and food preparation, it can be considered non-harmful if accidentally consumed or made contact with. (City of San Luis Obispo, 2011)

Process

The San Luis Obispo Water Reclamation Facility receives wastewater from its collection system which consists of a network of 130 miles of sewer pipe with an average depth of 6 feet, over 2,500 manholes, and eight sewage pumps. This wastewater collection system delivers roughly 4.5 million gallons to the facility per day, and is designed to handle a maximum of 5.1 million gallons per day. Other than differences in input and output figures, the San Luis Obispo Water Reclamation Facility is very similar to that of Simi Valley's by sharing an identical treatment process. (City of San Luis Obispo, 2011)

Raw wastewater is first run through the headworks which screens the sewage and removes any large solids. Like the Simi Valley facility, the screened wastewater is pumped into the grit chambers where fine inorganic debris is separated from the flow. The separated solid material is processed and transported to a landfill. (City of San Luis Obispo, 2011)

The flow then goes into the first stage of “preliminary treatment” which is delivery to aerated grit tanks. Here, air is pumped into the flow which creates a rolling motion. This is done to keep human waste suspended and allow sand and other small particles to sink to the bottom where it is collected and disposed of into a landfill. After the flow has gone through the aerated tanks, it is sent to the primary clarifiers for “primary treatment.” The clarifiers let the remaining dense solids settle to the bottom which become “sludge”, and the buoyant particles rise to the surface where they become “scum.” After the flow leaves the clarifiers, nearly 80%of the pollutants have been removed. The sludge and scum are transported to the Dissolved Air Flotation Thickener where they are processed and pumped into digesters. The next step is “secondary treatment” where the wastewater is pumped into trickling filters to remove dissolved pollutants. These filters also contain algae and other organisms that convert dissolved waste into a heavier material which allows the capture of waste. By this stage, approximately 90% of the original pollutants have been removed from the wastewater. (City of San Luis Obispo, 2011)

The flow is then sent to aeration tanks where ammonia and other elements that are harmful to wildlife are removed. After this stage, the wastewater is 95% free of the original pollutants. The flow is sent to the final stages which include, filtration by a coal and sand filter, cooling (to maintain a temperature safe for wildlife), and chlorination (to remove any harmful organisms). The final product is 99% free pollutants and although non-potable, exceeds many drinking water standards. (City of San Luis Obispo, 2011)

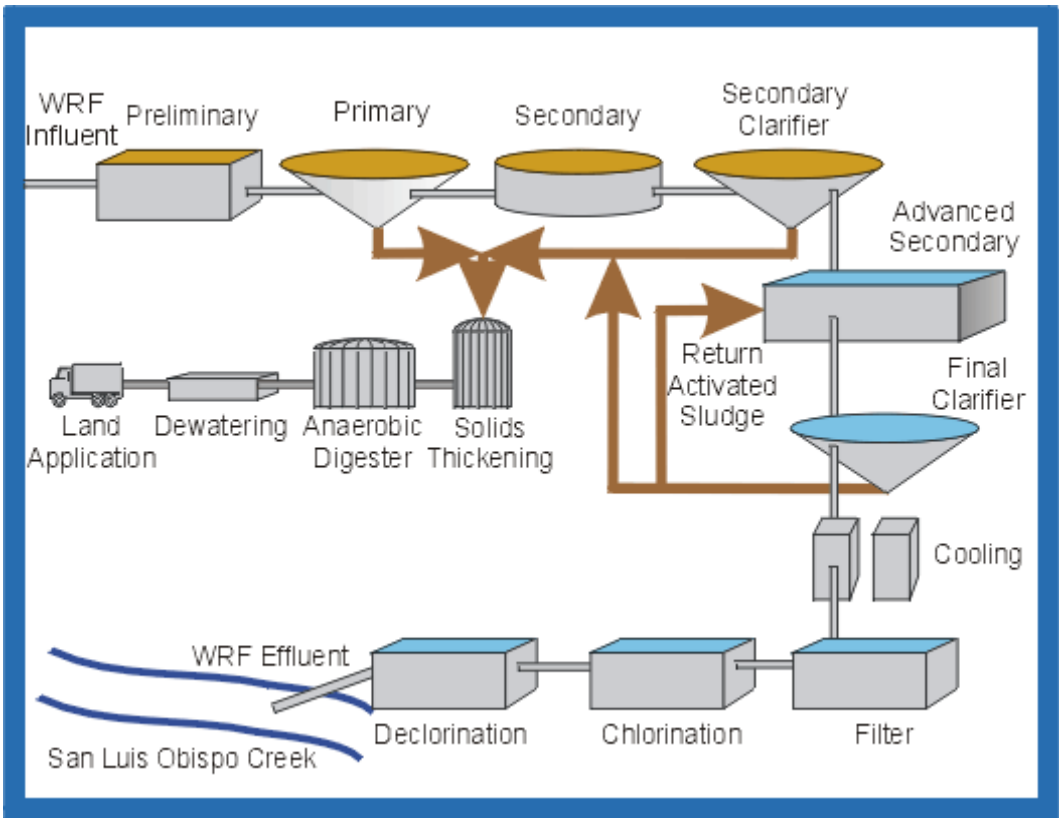


Figure 16: A diagram of the water recycling process of the San Luis Obispo Water Reclamation Facility

Source: City of San Luis Obispo

Irvine Ranch Water District

The Irvine Ranch Water District provides drinking water, sewage collection, recycled water, and other water related services to Central Orange County, and has been doing so since 1961. The District services the City of Irvine and parts of Lake Frost, Costa Mesa, Newport Beach, Santa Ana, Tustin, Orange, and unincorporated areas of Orange County, with a total service area of 179 square miles. The District uses two treatment plants (Michelson Water Reclamation Plant and Los Alisos Water Reclamation Plant) and hundreds of miles of pipes to meet the service its clientele's needs. Servicing roughly 25% of its service area with recycled water, the Irvine Ranch Water District uses this recycled water to irrigate landscaping, agriculture, school grounds, parks, and golf courses. Recycled water is also used for industrial uses, cooling towers, and flushing toilets. Funding for this service is done through monthly service charges paid by individual users. (Irvine Ranch Water District, 2011)

Process

Irvine Ranch Water District's method of recycling water is identical to that of the San Luis Obispo Water Reclamation Facility and the Simi Valley Water Control Plant. It is a multiphase procedure that involves the separation of solids from the wastewater using the same equipment as the San Luis Obispo facility. Where the Irvine district differs from the Simi Valley's plant is how it delivers its recycled water. Throughout the service area, the District supplies its clientele through three pipelines which include one for wastewater collection, another for drinking water delivery and a third designated for the delivery of recycled water. This third line delivers recycled water that meets or exceeds state and federal standards. (Irvine Ranch Water District, 2011)

Reclaimed Water In San Miguel

Reclaimed water, also known as recycled water, is treated sewage that was been cleansed of solids and other impurities. The reclaimed water is used for irrigational purposes such as landscaping and agricultural uses. Other non-irrigational uses for recycled water include replenishing groundwater basins, flushing toilets, dust control, and industrial uses. According to the Environmental Protection Agency (EPA), there have been no documented cases of human health problems due to consumption or contact with water that has been treated to set standards and regulations. (EPA, 2011)

Recycled water can benefit a town or community service district in several ways, and it can satisfy almost any water demand as long as the wastewater has been treated to a level that is appropriate for its designated use. While treated water is most often used for non-potable applications, recycled water can be indirectly used for drinking water purposes. This is done through recharging groundwater basins and surface reservoirs with recycled water. Another benefit recycled water has to offer is the ability to provide, or supplement, a locally controlled water supply. Having access to this resource will help ease pressure on primary drinking water supplies. (EPA, 2011)

Using recycled water is also beneficial towards the environment. Rather than dumping wastewater back into an ocean or stream and potentially harming the ecosystem, wastewater can be converted and reused. Using recycled water can also decrease drawing from ecosystems that depend on sufficient water flows for its inhabitants to live and reproduce.

Water Reclamation Stages

The process of water reclamation has several treatment levels, most with different appropriate applications. To supply the public with water safe enough for direct contact, waste water must go through three levels of treatment which consist of the primary, secondary, and tertiary treatment stages. The primary level of treatment is the sedimentation stage where larger pieces of debris are separated from the flow. Secondary treatment further separates debris from the wastewater but it is done with the aid of algae and other organisms. The third, or tertiary, stage uses filters and disinfectants to further clean the wastewater, making it safe for

direct human contact. These stages and the applications of their products can be seen on the table below.

Suggested Water Recycling Treatment and Uses

Increasing Levels of Treatment; Increasing Acceptable Levels of Human Exposure

Primary Treatment: Sedimentation	**Secondary Treatment:** Biological Oxidation, Disinfection	**Tertiary / Advanced Treatment:** Chemical Coagulation, Filtration, Disinfection	
No uses Recommended at this level	• Surface irrigation of orchards and vineyards • Non-food crop irrigation • Restricted landscape impoundments • Groundwater recharge of non potable aquifer • Wetlands, wildlife habitat, stream augmentation • Industrial cooling processes	• Landscape and golf course irrigation • Toilet flushing • Vehicle washing • Food crop irrigation • Unrestricted recreational impoundment	Indirect potable reuse: Groundwater recharge of potable aquifer and surface water reservoir augmentation

Source: EPA

Wastewater Treatment Process

Overall, most cities and towns in California use a similar process of treating and recycling their wastewater. From Simi Valley to the Irvine Water District, the three stage recycling treatment method. Although the City of San Luis Obispo hasn't won any awards for it water reclamation facility, nor has it pioneered anything revolutionary in the world of wastewater treatment, it does use a water reclamation practice that is representative of standard method. The San Luis Obispo Water Reclamation Facility services the 45,106 residents of the City of San Luis Obispo and tends to its daily generation of 4.5 million gallons of wastewater, but can handle up to 5.1 million gallons. The facility costs $3.2 million annually to operate and collects its wastewater from a variety of sources such as toilets, sinks, showers, laundromats, and industrial uses. The final product of the San Luis Obispo Water Reclamation Facility exceeds drinking water standards, and is used for several irrigational projects for parks and other landscaping.

Figure 17: San Luis Obispo's Water Reclamation Facility

Source: Google Maps

The first stage of treatment for the effluent that flows into the water reclamation facility is the headworks. Here, the raw sewage runs through to bar screens to remove large debris. The screens are mechanically cleaned to ensure the flow is not stopped. (City of San Luis Obispo, 2011)

Sewage is then transferred into grit tanks which marks its entrance into the "preliminary

stage”. The grit tanks are used to separate finer debris from the flow which includes egg shells, gravel, and other inorganic materials. Not only is this done to filter the wastewater further but by removing said materials, the service life of machines further down the process will be prolonged. The debris is separated by air being pumped into the flow which keeps human waste suspended and allows for dense material to sink to the bottom where it is caught and disposed of in a landfill. (City of San Luis Obispo, 2011)

Figure 18: An image of the aerated grit tanks separating mater and grainy solids from wastewater
Source: The City of San Luis Obispo

The sewage then enters the primary treatment stage after it enters the primary clarifiers. Left over solids sink to the bottom, and buoyant material floats to the top. Solid waste is removed from the flow leaving 20% of the remaining original pollutants in the treated wastewater. Biofiltration and secondary clarification mark the start of secondary treatment. Here, effluent is pumped into biofilters (a.k.a. trickling filters), to remove floating and dissolved matter. As the wastewater sits in the biofilters, a green film grows on its surface. This green coating consists of algae, bacteria, and other organisms that consume dissolved organic material and convert the material into a dense substance that can settle to the bottom of the tanks. The newly settled waste is separated from the water leaving the flow free of 90% of the original pollutants. As the flow is transferred to the aeration tanks, the compound, ammonia, is removed due to its toxicity through what is called an “activated sludge process.” This marks the end of advanced secondary treatment and the removal of 95% of all original pollutants. (City of San Luis Obispo, 2011)

The treated wastewater then is put through filters composed of coal and sand to enhance the clarity of the flow. This stage is the tertiary stage where wastewater is freed of 99% of the

original pollutants. Additional treatments the water receives include cooling which keeps the water to be sent back in the stream at a safe temperature for wildlife. The chlorine chamber is the final stage of the water's treatment. Here, bleach is added to the flow, which kills harmful organisms, then de-chlorinated to be non-harmful. (City of San Luis Obispo, 2011)

Distribution System

Treated water is delivered to its destination through a dual water distribution system which involves the transportation of water supplies from two sources in two separate distribution networks. This system exists where recycled water is used and is distinguished by its purple piping to make itself easily identifiable. By doing this drinking water is kept completely separate from the recycled water. (Irvine Water District, 2011)

Cost

Trying to put a price on a water reclamation facility for the Town of San Miguel is a difficult task requiring numerous considerations and speculations. As of now, no facility has been proposed and the San Miguel Community Service District does not know how much such a project would cost. The cost of a reclamation facility is largely dependent on the amount of water that the facility would process. San Miguel's treatment plant processes about 120,000 gallons of sewage per day and can handle a maximum of 200,000 gallons per day. To get a cost estimate of how much modifying the existing San Miguel water treatment facility to be capable of secondary treatment, an existing wastewater treatment facility expansion project can be used for reference. The City of Westmorland, California, had a 375,000 gallon per day facility similar to San Miguel's, due to Westmorland's two aeration basins and four stabilization ponds. The project expanded the facility's capacity to 500,000 gallons per day, and gave the facility the ability of treating wastewater to a secondary treatment level. This project cost $4,407,220. Although there are many factors that must be considered when comparing Westmorland and San Miguel, such as location, gathering system, and time, this case can give an idea of the cost of a water reclamation facility for San Miguel. (North American Development Bank, 2010)

Public Outreach

Public Opinion

To get an overall opinion of recycled water from the people of San Miguel, 14 residents of the community were interviewed for their feelings on the subject. The interview questions included:

- Are you familiar with reclaimed water?
- Would you feel comfortable using it?
- Do you have any opposition on using it to water your lawn or landscaping such as in schools, or parks?
- Do you have any concerns about the local water supply?
- Would you be willing to pay a service fee for facility operation?

The first question asked generated responses that were fairly accurate to the definition of recycled water. Most of the interviewees said that it was water that has been cleaned of impurities, while two of those interviewed needed an explanation of what it was. Some also knew applications of recycled water based on prior knowledge and seeing purple signs that inform the public where reclaimed water is used for irrigation. Roughly half (6) of those interviewed thought reclaimed water was just a replacement for drinking water.

After explaining the water reclamation process and standards, all those interviewed said they would be comfortable with using recycled water for certain applications. All 14 said they would have no problem with using reclaimed water for irrigation, industrial uses, groundwater recharge, and dust control. However, some (3) of those interviewed did express some concern about using the recycled water on school grounds, despite being informed about standards recycled water can reach. 11 were also reluctant to drink cleansed water.

Initially, most did not know where or what the San Miguel water supply is, or the condition of the water supply. After explaining that San Miguel draws its water from the Paso Robles Groundwater Basin and that it is in an overdraft status (which was also explained), the interviewees expressed interest in where their water comes from. One interviewee denied that the ground water basin is being overdrawn; while another accused the local vineyards of the

basin's status, but all realize the importance of water conservation.

One of the most important questions asked was if the users of a recycled water service would be willing to pay service fees. While none of the people interviewed outright rejected the idea of paying for recycled water services, they did want to know exactly how much it would cost before giving a definite answer. Unfortunately, an accurate estimate could not be given but interviewees were given Irvine Ranch Water District recycled and drinking water rates, and were told recycled water was 14% cheaper than drinking water. Although many were still skeptical of recycled water's associated costs, 9 of those interviewed said they would pay service fees as long as they were reasonable. To further educate the public on matters regarding recycled water and San Miguel’s water attributes, a pamphlet was given to those interviewed. An example of the pamphlet can be seen on the next page.

Recycled Water General Information

•Recycled water, also known as reclaimed water, is treated sewage that has been cleansed of solids and other impurities.

•The use of reclaimed water can help ease pressure on drinking water supplies.

•Recycled water can provide, or supplement, a locally controlled water supply.

•According to the Environmental Protection Act, there have been no documented cases of human health problems due to consumption of contact with water that has met treatment standards.

•If treated thoroughly, reclaimed water quality can surpass that of bottled water.

•Uses for recycled water include:
- •Irrigation of schools, parks, lawns, and landscaping
- •Replenishing groundwater basin
- •Dust control
- •Industrial uses
- •Flushing toilets

Water Reclamation and San Miguel

Information Regarding San Miguel's Water Supply and Water Reclamation

Figure 19: Side one of the public outreach pamphlet

Paso Robles Groundwater Basin

•The basin is 790 square miles and spans the southern end of Monterey County and Nothern

•San Luis Obispo County communities that use the Paso Robles Groundwater Basin (PRGB) include San Miguel, Paso Robles, Atascadero, and Templeton

•According to a county planning commission meeting, the PRGB is in overdraft. This means more water is being pumped out than is being replaced.

•The PRGB is the primary supplier of water for San Miguel.

•Water is drawn through three wells that meet water quality standards

The Town of San Miguel

•The average annual water use per person is 55,395 gallons.

•San Miguel's urban pumping rate (UPR) in 2009 was 123,497,692 gallons.

•Water drawn from the PRGB is held in two tanks in San Miguel. Their combined capacity is 700,000 gallons.

•The San Miguel Community Service District owns and operates a 200,000 gallon maximum capacity wastewater treatment plant composed of 4 partially aerated lagoons and 4 percolation ponds.

Wastewater Treatment

Water reclamation can be a multi-stage process that consists of up to three main stages. Each subsequent stage further removes contaminants from effluent until it is up to 99.5% free of all original pollutants. Water treated from almost each stage can be used for different applications.

Preliminary Treatment

This stage removes larger debris and particles that are easily collectable and those that could be detrimental to the lifespan of machinery down the treatment process. Waste that is removed in this stage include objects such as plastic bags, cans, glass, stones, and finer debris.

Primary Treatment

Wastewater goes through sedimentation tanks where grease, oils, and other buoyant waste float to the surface while denser material floats to the bottom. The waste on the surface and bottom of the tanks is removed and discarded.

Secondary Treatment

Here, the wastewater is introduced to microorganisms and algae, which break down harmful organic matter. The living component also helps convert dissolved organic matter into a denser material that can sink to the bottom of the tanks where it can be separated and collected.

Tertiary Treatment

The tertiary, or third, stage is the final stage of wastewater treatment. This stage can vary depending on what the product's purpose is. Aspects of the tertiary stage includes sand and carbon filters, bleaching to remove harmful organisms, and the removal of chlorine.

Suggested Water Recycling Uses by Treatment Stage

Primary

(Sedimentation):

No uses recomended for this level

Secondary

(Biological Oxidation, Disinfection):

- **Surface irrigation of orchards and vineyards**
- **Non-food crop irrigation**
- **Restricted landscape irrigation**
- **Groundwater recharge of non-potable water**
- **Industrial cooling**

Tertiary / Advanced

(Filtration, Disinfection) :

- **Landscape and golf course irrigation**
- **Toilet flushing**
- **Vehicle washing**
- **Food crop irrigation**
- **Unrestricted recreational impoundment**

Figure 20: Side two of the public information pamphlet

Proposal and Contract

April 6, 2011
Water Reuse Proposal
Travis Griffith

CONSULTANT PROPOSAL AND SCOPE OF SERVICES AGREEMENT
For (County of San Luis Obispo)

Travis Griffith, hereinafter referred to as CONSULTANT, agrees to provide consultant services to the County of San Luis Obispo, hereinafter referred to as CLIENT, as further described below. This proposal is made as partial fulfillment of the requirements of City and Regional Planning 463 – Senior Project, a course conducted under the auspices of the Department of City and Regional Planning, College of Architecture and Environmental Design, California Polytechnic State University, San Luis Obispo, California.

1. **TERM**. The term of the proposed SCOPE OF SERVICES AGREEMENT (hereafter referred to as SCOPE) shall be from the date of CLIENT approval of this proposal until acceptance or completion of said services but no later than June 9, 2011. All work products shall be submitted to CLIENT representative no later than 5:00 p.m., Thursday, June 9, 2011. Materials received after that time will not be accepted.

2. **CLIENT REQUIREMENTS**. This SCOPE is based on and is intended to fulfill the CLIENT requirements, as described in the CRP 463 Course Syllabus, Spring 2011. Said document is hereby incorporated into this proposal by reference.

3. **FEE SCHEDULE**. As this SCOPE is intended to meet academic requirements, no actual fees will be paid or received. However, a preliminary budget has been prepared which identifies hours by task or work product (based on $65/hour). Reimbursable expenses (ie: travel costs, copies, phone, etc.) are estimated at 10% of the labor costs. Overall fee to complete the services specified in this agreement is estimated at ($11,505). A more detailed fee estimate will be prepared and submitted at week #2.

4. **CLIENT CONSIDERATION.** CLIENT representative, Scott Bruce/John Knight, agrees to assist CONSULTANT by providing base information, technical support and guidance during the course of this project; pursuant to his role as instructor for said course, to the extent feasible and reasonable.

5. **CONSULTANT'S OBLIGATIONS**. For the consideration noted above, and to fulfill the requirements of CRP 463, CONSULTANT proposes and agrees to: A) provide consultant services as described more particularly below, B) to meet University and Department of City and Regional Planning requirements regarding senior project completion, and C) to complete all required work in a timely, thorough and professional manner, to the approval of the CLIENT representative.

6. **AMENDMENTS**. Amendments to this proposal, once accepted, are strongly discouraged. Any amendment, modification or variation from this proposal shall require prior written approval by the CLIENT representative and where necessary, by the Department of City and Regional Planning, and then only for compelling reasons that are beyond control of CONSULTANT, or as determined necessary by the CLIENT representative.

A. **Proposed Project**

Due to concerns over future water availability in Southern California, the current state of the Paso Robles ground water basin, and a growing population, this project involves the introduction of water reclamation systems to the community San Miguel. Taking an advantage of such a program would be a way for the town of San Miguel to conserve water, protect the environment, and provide the town with an additional water source. The outcome of this project will be a proposal for a water reclamation facility.

B. **Key Tasks & Deliverables:** The following key tasks will be completed: (See attachment).

C. **Methods and Resources:** The primary methods and resources that will be used include: Word processor software, photo doctoring software, spreadsheet software, Internet, county information

D. **Budget:** The preliminary budget is estimated at: $11,505

E. **Schedule of Services:** The 10 week schedule is as follows: (See attachment).

8. **CONSULTANT TEAM**. CONSULTANT's team shall consist of the following member(s): Travis Griffith. CONSULTANT hereby states and agrees that team members will be equally and jointly responsible for completion of all work products, and that final work projects will clearly and accurately identify individual team member's contribution to the total work product to enable the Instructor to assign final class grades.

9. **COMPLETE AGREEMENT.** This written agreement, including information incorporated specifically by reference, shall constitute the complete agreement between CONSULTANT and CLIENT. CONSULTANT understands that failure to meet the requirements and obligations under this agreement will result in failure to pass CRP 461/462 – Senior Project.

10. **AGREEMENT APPROVED**:

CONSULTANT:

Travis Cattani 4-13-11

(signature of team member 1) date

(signature of team member 2, if applies) date

CLIENT REPRESENTATIVE (Instructor):

4-13-11

Scott Bruce/John Knight date

CLIENT REPRESENTATIVE (City of Santa Maria/County of San Luis Obispo if applicable).

(print name) date

Task Description:

A list of tasks will be required to produce the final product. The task description and sequence is listed below.

1. Meetings and Coordination

   Completion of the final product will require weekly meetings between the planning consultant and the client. These meetings will review project progress and how it follows the contract. The meetings will be held on Wednesdays at 6:20. On the 7th week, the consultant present all material gathered up to that point.

   Product: Weekly meeting minutes approx. 1 page long in both hard copy & electronic format (via e-mail).

2. Background Report

   In this section will contain information relevant to San Miguel's water supply and usage. The document cover how much and how often San Miguel draws from water from its resources, and how the water is distributed. Most of this information can be found in the Community Services and Facilities section from the CRP 411 class.

   Product: A four page, 8 ½ x 11, color, report of background information regarding San Miguel's water usage and information of the water resources. The document will include graphics and maps, and it will be delivered electronically in PDF format.

3. Case Studies

   Research of other towns and cities that currently use reclaimed water will be done. This information will reveal where these communities have succeed and failed, and why. Communities of similar size and characteristics will be focused on.

   Product: A five page, 8 ½ x 11, case study report containing information of community water reclamation facility experiences. The document will include color graphics and will be delivered electronically in PDF format.

Information in this section will be vital when deciding what will be used in San Migue.

Product: Water reclamation system data will presented in this section in a PDF documen and delivered electronically. The report will be approximately five pages long, 8 ½ x 11, complete with colored graphics.

5. Public Opinion and Outreach Program

   Roughly 20 street interviews with the public of San Miguel will be produced here. These interviews will contain opinions of water reclamation from people of San Miguel, and hopefully some County officials. This will be done in person and perhaps electronically in the case of County officials. An outreach program will also be made to educate community members about water reclamation information such as where it comes from, how its done, and costs associated with it. This will be done by creating a fold out pamphlet.

   Product: The interview, a PDF file documenting interviews and public opinions, and a five panel fold out pamphlet with color graphics, all 8 ½ x 11, will be delivered in PDF format electronically.

6. 75% Presentation

   The presentation will be a disclosure of all information gathered up to this point. It will be a condensed report of all tasks above .

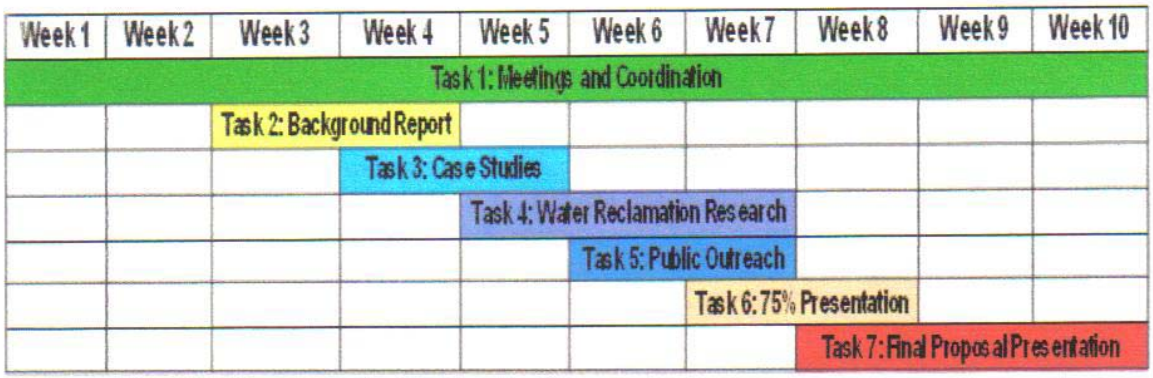
   Product: This will be a 15-20 slide Power Point presentation with colored graphics. It will be shown to the class

7. Final Proposal and Presentation

   The final product will include all relevant information from the above tasks. This task will conclude what is best for the town of San Miguel and why. It will also include, in detail, the type of system to be used and where it will be placed. The presentation aspect

Product: The final proposal will be presented in a PDF document complete with relevant information. appropriate images, and recommendations. It will be a 12-15 page report delivered electronically and an 8 ½ x 11 hard copy. The presentation will be a 15-20 slide report given in Power Point format.

Schedule:



Cost:

Task List	# of Hours	Cost
Task 1: Meetings and Coordination	7	$455
Task 2: Background Report	20	$1,300
Task 3: Case Studies	25	$1,625
Task 4: Water Reclamation Research	30	$1,950
Task 5: Public Outreach	30	$1,950
Task 6: 75% Presentation	10	$650
Task 7: Final Proposal/Presentation	60	$3,900
Total		$11,830

Brief Project Summary

Due to concerns over future water availability in Southern California, the current state of the Paso Robles ground water basin, and a growing population, this project concerns the introduction of water reclamation system to the community San Miguel. Taking an advantage of such a program would be an effective way for the town of San Miguel to conserve water, protect the environment, and provide the town with an additional water source. The outcome of this project will be a proposal for a water reclamation facility.

Understanding

Reclaimed water is “used” water, or sewage, that has been treated through the removal of solids and other impurities. The treated water can then be used for several different applications such as irrigation, aquifer recharge, and industrial uses. Having the opportunity to use water more than once will be very beneficial to the community by being able to tend to the town's needs without straining the fresh water supply. This project will be loosely based on the Public Facilities and Utilities section of the CRP 411 San Miguel Community Plan Update. The proposal for San Luis Obispo County will include background reports, case studies, water reclamation system research, a public opinion and outreach program, and recommendations regarding how a water reclamation facility would fit into San Miguel.

The Conservation and Open Space element of the San Luis Obispo County General Plan states that major current county issues include the water supply and its conservation. More specifically, the county's conflicts are deciding where to guide future water use and securing enough water for agricultural uses. One goal of the county is to have a reliable and secure regional water supply. Policies to achieve this stress the use of reclaimed water as a valuable and necessary resource.

Approach

Previous classes, CRP 410 and 411, produced valuable material regarding San Miguel's water systems in the Community Services and Facilities, which will serve as a significant reference source to complete the water reclamation facility proposal. Other tools and resources that will be used include public opinion, professional input, county documents and guidelines, internet research, spreadsheet and word processing software.

The final product will be a water reclamation facility proposal for the town of San Miguel. The proposal will include background information regarding San Miguel's water supply and usage, case studies of cities that use reclaimed water, research and data pertaining to water reclamation facilities, a public opinions and outreach program, and recommendations.

Weekly Meeting Notes

April 13, 2011

The 6:20 meeting of April 13, 2011, covered the consultant's (Travis Griffith) progress covered up to that date. While the week's designated task of creating a background report was met, concern over the final result of the project was discussed. The result was a refinement of the final product and to continue on the path set by the consultant/client contract. This contract was signed and will be put into PDF format before sending it to John Knight. Also, notes for each meeting were assigned and are to be turned in the Thursday after every meeting, and there was discussion of using a computer program to conduct future meetings between the consultant and John Knight.

April 20, 2011

On Wednesday's meeting of April 20th, many subjects about the project were discussed including the final product which will be a proposal for the irrigational use of reclaimed water inappropriate places throughout San Miguel. To complete the task of finding information regarding the more technical and monetary aspects of water reclamation, the consultant was given contacts to reach to gather the necessary information. Other items covered include how to expand on the background report and the case studies.

April 27, 2011

- I have to prepare notes and a schedule for a better phone meeting experience.
- The meeting included talk of getting in contact with the San Miguel CSD and San Luis Obispo Public Works.
- I must resend you my schedule.
- I fell a little behind due to cost estimates being difficult to find.
- I should include alternatives to my original proposal somewhere in my project.

May 18, 2011

- Presentation Recap: The next presentation needs a hook, more images, maps, more information on what I propose to do for San Miguel, and I need to work on my presentation skills.
- Project Status: I am on track and have some figures on costs but would like to have a more accurate estimate. I am also working on the final deliverable which includes refinement of text, images, and maps.

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