c. WM Lyles gravity sewer hybrid contains STEP.
d. This fact neutralizes reasons number one, two, three, and four to eliminate STEP.
e. Additional funds and schedule delays are subjective and not part of the RFQ selection criteria. Timing was an evaluation criterion and we stated that simplicity of design (minimal complexity, low risk) facilitates rapid design process.

Reason #2: STEP did not present sufficient cost savings –

a. "Sufficient cost savings" was not a criteria identified in the RFQ process. California Contract Code 20133 (4) (B) (i) Competitive proposals shall be evaluated by using only the criteria and selection procedures specifically identified in the request for proposal. These same criteria should apply to the RFQ.
b. The RFQ process is utilized to evaluate the qualification of the team, not hypothetical costs. Actual costs cannot be established until bids are received in the RFP. The WM Lyles team had performed enough project analysis to deliver confident statements during our interview.
c. Cost is the #1 concern to the community and as Mr. Waddell pointed out STEP is less expensive than gravity sewer.
d. The community survey is being utilized as justification that STEP does not provide enough savings. STEP definitively provides savings. The community survey is irrelevant within the context of the RFQ. Had it been part of the criteria the WM Lyles team would've addressed the accusations.
e. Understanding all risks involved the WM Lyles team stated that our proposal would contain a maximum guaranteed price. Should the gravity sewer teams be required to submit a guaranteed maximum price (no change orders) that 20% cost savings could be increased substantially.

Reason #3: EIR analysis does not establish STEP as environmentally superior and no evidence indicates that a properly maintained gravity hybrid system poses a significant threat to the environment.

a. The RFQ documents treated both STEP and gravity as equal. The RFQ does not include any evaluation criteria that would have asked teams to respond to this issue at that time.
b. This statement doesn't state that STEP is better than gravity or gravity is better than STEP. Therefore, why is it mentioned as a justification for not promoting a STEP team?
c. The EIR does not directly compare STEP against gravity sewer; it compares the four alternative collection and treatment systems combined. It appears that a direct comparison of STEP and gravity was actually avoided.
d. The "Statement of Key Environmental Issues" submitted by the local San Luis Obispo environmental groups disagree with the "no significant threat to the environment" statement.

Reason #4: The STEP/STEG collection system will require extensive planning and design work to be completed and compared to the gravity/hybrid collection system option.

a. Our hybrid solution will take no more work or additional time than the other teams. In fact the simplicity and low risk attributes of a STEP collection system would likely require less intensive planning and design work.
b. The gravity sewer/hybrid system is not defined. Please take into account that with the MWH design gravity sewer over half the town is flowing the wrong way (toward Tri-W) away from the out of town treatment. If the lowest cost, best engineered gravity hybrid system was selected, it would likely require as much, or more, planning and design than a gravity/STEP hybrid.
c. No performance time frame was given in the RFQ, rendering this another subjective reason and possibly violating 20133 for not sticking to the specific project RFQ Evaluation and Ranking criteria.
d. During the interview our team stated that our STEP/STEG gravity sewer solution would be installed much faster than the gravity teams.

Reason #5: STEP/STEG has significant uncertainty over how to obtain easements from each private property owner for the installation of new STEP tanks.

a. There are thousands of low pressure sewer (STEP, Grinder, and Vacuum) systems installed across the country that do not support staff's subjective opinion of public utility infrastructure on private property. The SOQ panel interviewed Mike Saunders who had successfully overcome this issue in Port Charlotte, Florida with a STEP system.
b. Within the context of sustainability "only systems can be sustainable" however the County is choosing to not own or maintain a critical piece of the collection system which is the gravity sewer lateral connection to the home. It is very well documented that the lateral is typically the largest source of I/I in gravity sewer systems, but the County will have no control over this critical system component. Repairing and replacing privately owned laterals can cost up to $8,000, and since they are not publically funded or maintained, rarely get replaced at, or before, failure. Since the lineal footage of sewer laterals can be comparable to the footage of mainline, unmaintained gravity sewer lateral can and have been documented to be, considerable threats to the environment.
c. The County will own the STEP/STEG tanks and have full control in the event I/I is detected at the home. I/I can be independently monitored at each tank.

Reason #6: STEP/STEG shifts the impact of major construction from the county road right of way to individual private property.

a. However the overall impact of major construction is much greater with gravity sewer.
b. Please review the graphics in Appendix A. depicting the gravity and STEP impacts for both best and worst cases scenarios.

Reason #7: STEP/STEG will create significant additional costs for some property owners.

a. This statement is not part of the RFQ criteria and is a requirement being imposed by staff. It doesn't have to create additional costs for property owners, the on lot expenses could be structured as part of the system funding. This issue should be easily mitigated during the design phase of the project after the contract is awarded.

So what are staff's remaining arguments? Only subjective criteria that is prone to opinion and laden with bias against STEP, for example:

- On lot easements – Orenco has provided examples of how this has been done successfully but staff continues to ignore and feign that this issue is just too difficult to overcome. While detracting from pertinent issues like gravity sewer sanitary sewer overflows, sea water intrusion etc.
- Los Osos is too big for STEP/STEG – This is said often but with no detail. For the record there are no engineering design principles (hydraulic, physical, or mechanical) that deem Los Osos as too big. This statement is just rhetoric.
- Lot's are too small – In Design Build staff needs to let the experts deal with the difficulties of small lots. That's why we guarantee our work.

In summary, throughout the County's process the STEP/STEG collection has proven to be economically and environmentally superior over gravity sewer in each of the following major areas of concern:

- Lower installed capital costs
- Less construction impact across the entire collection system
- Less soil disturbance across the entire collection system
- Fused pipe vs. gravity sewer Bell and Spigot jointed pipe
- No exfiltration (or exfiltration is easily detectable through a drop in the pressure main) vs. gravity sewer that could exfiltrate for years undetected.
- Lower to no infiltration and inflow
- Lower Biochemical Oxygen Demand load at the WWTP.
- Lower biosolids production
- Lower Green House Gas emissions
- Given the chance Orenco can also prove that STEP/STEG has a much lower Full Life Cycle Cost over gravity sewer.

Within the overall project context there are no logical reasons STEP should not be carried through to the RFP stage.

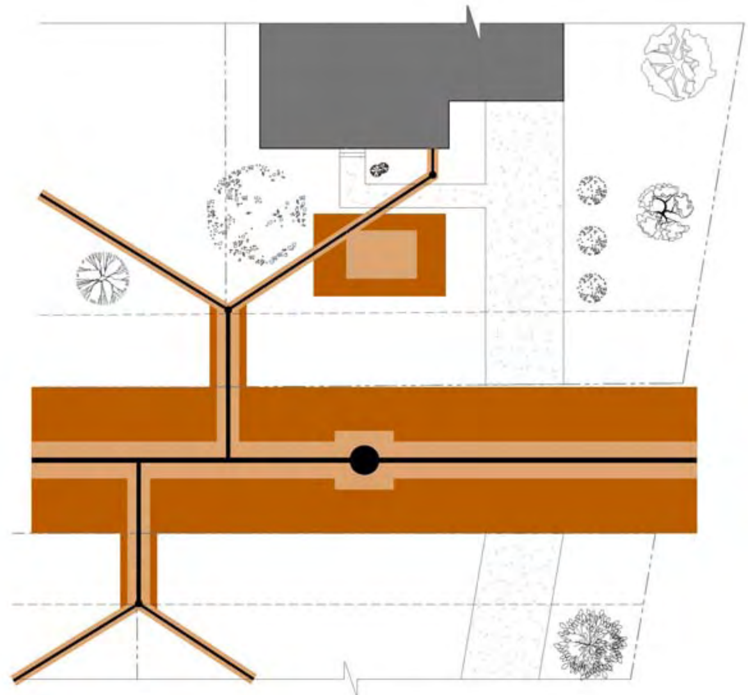
Thanks for taking the time to consider these comments. You can reach me (800.718.4046) or Mike Saunders (866.914.9454) anytime.

Sincerely,

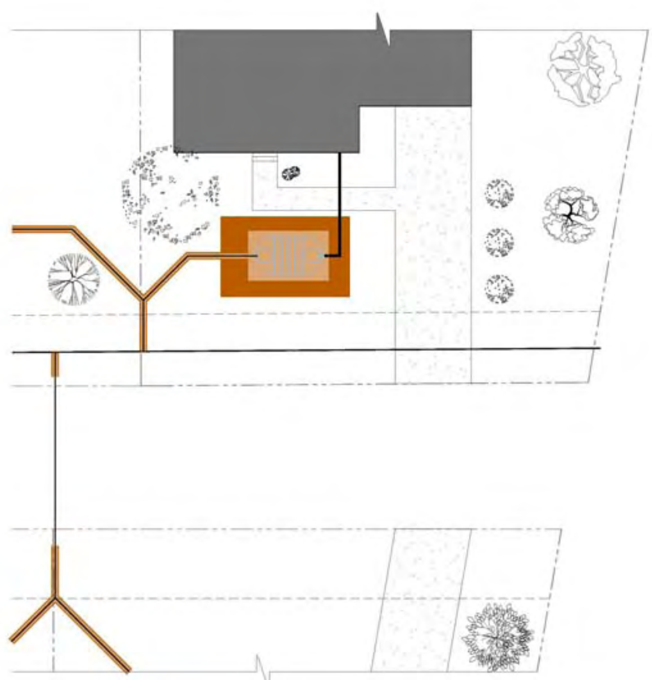
William Cagle
Program Leader, National Accounts

Appendix A

The following two illustrations compare gravity sewer soil disturbance against STEP sewer soil disturbance. STEP is by far superior with less overall impact.



The above drawing is a depiction of the overall gravity sewer soil disturbance impact drawn to scale within the context of applicable codes, setbacks, etc.



The above drawing is a depiction of the overall STEP soil disturbance impact drawn to scale within the context of applicable codes, setbacks, etc. The lightly colored tan areas are best case scenarios the darker brown areas are worst case.

"Bill Cagle"
<bcagle@orenco.com>
05/28/2009 09:59 AM

To <planningcommission@co.slo.ca.us>
cc
bcc
Subject GHG Response

Honorable Planning Commissioners:

Attached are Orenco's comments regarding the presentation given by staff during the April 30th Planning Commission meeting.

Please don't hesitate to call me 800.718.4046 or Mike Saunders 866.914.9454 if you have any questions. Thanks

Respectfully,

Bill Cagle
National Accounts
Orenco Systems Inc.
www.orenco.com
bcagle@orenco.com
(P) 800.718.4046 direct
(F) 541.459.2884

Green House Gas TM.pdf GHG SLO Planning Comm 5.27.09.pdf

San Luis Obispo County
Los Osos Wastewater Project Development

TECHNICAL MEMORANDUM

PROJECTS ALTERNATIVES
GREENHOUSE GAS EMISSIONS INVENTORY

FINAL DRAFT
June 2008

2700 YGNACIO VALLEY ROAD • SUITE 300 • WALNUT CREEK, CALIFORNIA 94598 • (925) 932-1710 • FAX (925) 930-0208

San Luis Obispo County
Los Osos Wastewater Project Development

TECHNICAL MEMORANDUM

PROJECTS ALTERNATIVES
GREENHOUSE GAS EMISSIONS INVENTORY

TABLE OF CONTENTS

Page No.

LIST OF TABLES

LIST OF FIGURES

PROJECTS ALTERNATIVES GREENHOUSE GAS EMISSIONS INVENTORY

1.0 PURPOSE

The purpose of this technical memorandum (TM) is to evaluate greenhouse gas (GHG) emissions for the proposed Los Osos wastewater treatment facility as discussed in the Viable Project Alternatives Fine Screening Analysis (Carollo, August 2007) and subsequent technical memoranda. The County of San Luis Obispo (County) seeks to estimate the annual greenhouse gas (GHG) emissions of two collection system alternatives, 1) Gravity Collection System and 2) STEP Collection System; and three treatment alternatives, 1) Oxidation Ditch Treatment, 2) BIOLAC Treatment, and 3) Air Diffusion System (ADS) Pond Treatment. This TM provides a comprehensive GHG inventory including both annual O&M and construction emissions that will aid in comparing alternatives.

The information in this TM will be used as 1) a basis for evaluating the impacts of project alternatives for the environmental review document, and 2) a basis for further developing the project alternatives.

2.0 BACKGROUND

The state of California adopted the Global Warming Solutions Act of 2006 (also known as Assembly Bill 32, AB 32) in September of 2006. This Act is the first regulatory program in the U.S. that will require public and private agencies statewide to reduce GHG emissions to 1990 levels by 2020. Currently, there is no mandate on publicly owned treatment works (POTWs); however, the California Air Resources Board (ARB) has stated that POTWs would be included in the near future and early voluntary reporting is recommended.

Pursuant to AB 32, this TM uses the California Climate Action Registry General Reporting Protocol (CCAR GRP), a set of measuring standards and protocols aligned with the international GHG Protocol Initiative and adapted to California. Assembly Bill 32 recommends using this protocol “where appropriate and to the maximum extent feasible.” Agencies that choose to participate in the CCAR process will not be required to significantly alter their reporting or verification program except as determined by ARB for compliance purposes.

Not all GHGs identified in AB 32 will be regulated for POTWs. This TM focuses on carbon dioxide, methane, and nitrous oxide GHG emissions as these gases are relevant to and comprise the majority of GHG emissions generated from the conveyance and treatment of wastewater. The estimated annual GHG emissions are a result of the construction and operations phases of the proposed alternatives. In general, annual GHG emissions generated are a function of the flow treated, the influent water quality, and the treatment processes used. A description of the calculation methodology is provided in the following section.

3.0 METHODOLOGY

The development of GHG emissions estimates requires a set of “boundary” conditions to define the life cycle stages, the unit processes, and the time frame that is included in the analysis. For this inventory, the construction and operations phases of the collection system and treatment facilities are considered. This includes:

- Construction of the collection system and treatment facilities (includes operation of construction equipment),
- Operation of the collection system and treatment facilities,
- Production and hauling of materials consumed and excavated for the construction of the collection system and treatment facilities,
- Production and hauling of chemicals consumed for the treatment of wastewater and biosolids annual operations,
- Hauling of septage from STEP tanks to the treatment facility,
- Release of methane from collection systems and treatment facilities, and
- Hauling of biosolids to the final disposal site.

A summary sheet is created as a result of the inputs and the calculations performed in the spreadsheets that support the inventory. The summary sheet is included in the Appendix of this TM, in addition to a listing of all the assumptions applied to complete the analysis.

Figure 1 illustrates the system boundaries used for this analysis.

3.1 Categorize and Identify Sources of GHG Emissions

There are two categories of emissions, direct and indirect, that were identified and evaluated for both the construction phase and the on-going operations phase (annual emissions).

- *Direct emissions* are those resulting from sources owned or controlled by the agency, such as stationary combustion sources, mobile combustion sources, and treatment unit processes. For this inventory, this includes treatment unit process emissions (e.g. septic tank venting).

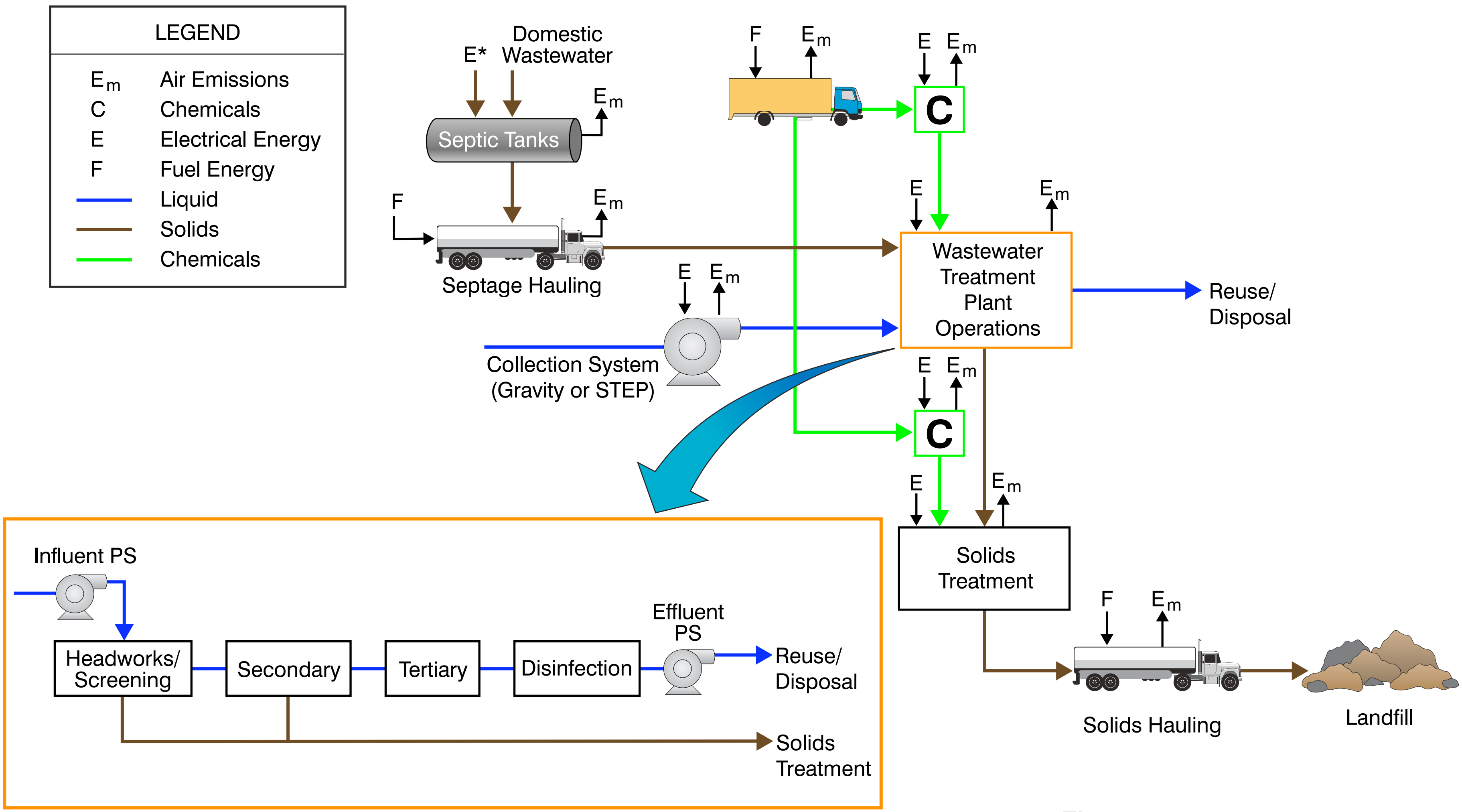


Figure 1
ALTERNATIVES SYSTEM BOUNDARY
LOS OSOS WASTEWATER PROJECT DEVELOPMENT
SAN LUIS OBISPO COUNTY

* Production of STEP Tanks

los608f1-7630.ai

- *Indirect emissions* are those originating from the actions of the agency, but are produced by sources owned or controlled by another entity. For this inventory, this includes: use of construction equipment, transport of septage, construction materials, and chemicals to the facilities, transport of biosolids to the disposal site, and purchased and consumed electricity for the operation of the facility, collection system, and the manufacturing of materials and chemicals used in the facility and collection system.

Indirect GHG emissions resulting from the construction phase are annualized over a 30-year time horizon to convert to annual emissions. These were added to the estimated annual GHG emissions resulting from operations to calculate the total annual GHG emissions.

3.2 Estimate GHG Emissions in Terms of "CO_2 Equivalents"

The major sources of GHG emissions were identified and categorized, and appropriate emission factors were determined. The data was then transferred into Carollo's GHG emissions inventory to calculate the quantities of carbon dioxide, methane, and nitrous oxide emissions generated from each source.

- *Electricity consumption (kilowatt-hours) x Emission Factor*
- *Vehicle fuel consumption (gallons or miles traveled) x Emission Factor*
- *Construction Material or Chemical Produced (unit weight) x Specific Energy (unit energy per unit weight of material or chemical) x Emission Factor*
- *Material Produced (unit weight) x Emission Factor*

Emissions were converted into carbon dioxide equivalent (CO_2e) emissions. The major GHG in the atmosphere is carbon dioxide. Other GHGs differ in their ability to absorb heat in the atmosphere. For example, methane (CH_4) has 21 times the capacity to absorb heat relative to carbon dioxide over a hundred-year time horizon, so it is considered to have a global warming potential (GWP) of 21. Nitrous Oxide (N_2O) has 310 times the capacity over a hundred-year time horizon having a GWP of 310. Therefore, a pound of emissions of carbon dioxide is not the same in terms of climatic impact as a pound of methane or nitrous oxide emitted. Carbon dioxide equivalent emissions are calculated by multiplying the amount of emissions of a particular GHG by its GWP (see Table 1).

Example: What is the CO_2e of one ton of methane emissions?

1 ton CH_4 x 21 (GWP, tons CO_2e/tons of CH_4 emitted) = 21 tons CO_2e

Table 1	Greenhouse Gases and Their Associated Global Warming Potentials (GWPs) Los Osos Wastewater Project Development San Luis Obispo County
Greenhouse Gas	**GWP* (unit mass CO_2e/unit mass of GHG emitted)**
Carbon Dioxide (CO_2)	1
Methane (CH_4)	21
Nitrous Oxide (N_2O)	310

* GWPs from the Intergovernmental Panel on Climate Change Second Assessment Report (1996) for a 100-year time horizon. These GWPs are still used today by international convention and the U.S. to maintain the value of the carbon dioxide "currency," and are used in this inventory to maintain consistency with international practice.

4.0 DESCRIPTION OF GHG EMISSIONS ESTIMATES

This section provides a summary of the alternatives being evaluated and brief descriptions of the types of annual GHG emissions considered in this project and the sources of information.

Table 2 provides a summary of the alternative details used as a basis for the GHG inventory. The information provided in Table 2 is based on the alternatives developed in the Viable Project Alternatives Fine Screening Analysis (Fine Screening Analysis). Since the release of the Fine Screening Analysis in August 2007, updates have been made to the alternatives that are considered in this inventory and are presented in the Flows and Loads TM, Septage Receiving Station Option TM, Solids Handling Options TM, and the Partially Mixed Facultative Pond Options TM.

See the Appendix for a listing of assumptions and reference information used to complete the inventory and tables presenting the results of the direct and indirect GHG emissions described below.

4.1 Direct Emissions

4.1.1 Septic Tank Venting

Greenhouse gas (methane) emissions are generated from the anaerobic biodegradation of domestic wastewater within septic tanks in the community. The emissions generated are vented to the atmosphere contributing to the total carbon footprint calculated for the existing system and each project alternative.

Table 2 Summary of Project Alternative Details Used to Estimate Greenhouse Gas Emissions
Los Osos Wastewater Project Development
San Luis Obispo County

Alternative	Collection System	Treatment Technology	Tertiary Treatment Technology*	Solids Treatment & Disposal
Alternative 1	Gravity	**Oxidation Ditch** - Headworks, Oxidation Ditches, Secondary Clarifiers, UV Disinfection, Effluent PS**	Nitrification/ Denitrification & Filtration	Sub-Class B Biosolids
Alternative 2	STEP	**Oxidation Ditch** - Headworks, Oxidation Ditches, Secondary Clarifiers, UV Disinfection, Effluent PS	Nitrification/ Denitrification with methanol & Filtration	Sub-Class B Biosolids
Alternative 3	Gravity	**BIOLAC** - Headworks, Biolac Basins, Secondary Clarifiers, UV Disinfection, Effluent PS	Nitrification/ Denitrification & Filtration	Sub-Class B Biosolids
Alternative 4	STEP	**BIOLAC** - Headworks, Biolac Basins, Secondary Clarifiers, UV Disinfection, Effluent PS	Nitrification/ Denitrification with methanol & Filtration	Sub-Class B Biosolids
Alternative 5	Gravity	**ADS Ponds***** - Headworks, ADS Ponds, UV Disinfection, Effluent PS	Nitrification/ Denitrification with methanol & Filtration	Sub-Class B Biosolids
Alternative 6	STEP	**ADS Ponds***** - Headworks, ADS Ponds, UV Disinfection, Effluent PS	Nitrification/ Denitrification with methanol & Filtration	Sub-Class B Biosolids

* Tertiary treatment is not part of the base case project, however it will be considered in future projects since nitrification, denitrification, and/or filtration may be required to meet reuse/disposal water quality requirements.

** PS stands for Pump Station.

*** This inventory considered the Air Diffusion System (ADS) pond option, also known as the Nelson System since Nelson Environmental pioneered the pond system. In the ADS pond option, oxygen and mixing are provided by fine bubble diffusers that are laid out at the bottom of the ponds ensuring oxygen is vertically distributed throughout the pond. Based on the *2006 IPCC Guidelines for National GHG Inventories*, which is followed by the U.S. EPA, if a pond produces an aerobic environment it will produce little or no methane. This inventory assumes the ADS option does not generate any methane emissions. This is a conservative assumption as anaerobic pockets may occur in the accumulated solids, however it is consistent with the IPCC Guidelines.

Estimates of the annual methane emissions vented from septic tanks are included for the prohibition zone only at build-out. Alternatives considering a gravity collection system will not generate this type of emission since the septic tanks will be removed within the prohibition zone. The existing system and project alternatives considering a septic tank effluent pumping (STEP) collection system will have this type of emission within the prohibition zone.

Methane emissions are presented for the STEP collection system alternatives. Per Tables 10 and 11 of the Flows and Loads TM (February 2008), the BOD concentration of raw domestic sewage entering the septic tanks is 340 mg/L, a portion of the BOD remains with the settled solids and a portion leaves with the septic tank effluent, and the BOD concentration remaining in the septic tanks is 200 mg/L. The 200 mg/L BOD remaining in the tank is then converted to methane as the solids are digested. The estimate of annual pounds of BOD remaining in the septic tanks is based on a build-out population projected to be 18,428 and a daily flow per capita estimated to be 60 gallons per day with conservation (Flows and Loads TM, February 2008).

The approach used for calculating septic tank methane emissions are established in the *2006 IPCC Guidelines for National GHG Inventories* which is followed by the U.S. EPA. The approach assumes 16.25 percent of wastewater BOD_5 is anaerobically digested in a septic tank. This proportion of BOD is then multiplied by an emission factor of 0.6 kilograms of methane per kilogram BOD_5.

Odor control devices, such as those produced by Wolverine® for residential use, have been advertised as being capable of reducing methane and hydrogen sulfide emissions. An objective review of this device has shown that the vendor has no data to support the claim of reducing methane emissions.

4.2 Indirect Emissions

4.2.1 Operation of Collection System and Treatment Facilities

Greenhouse gas emissions estimates from the operation of the collection system pump stations and treatment facilities are based on the total annual energy demand (kilowatt-hours per year). The annual energy demands were estimated for the collection system options (gravity and STEP), the pump stations (PS) and treatment processes listed under the treatment technology options, the tertiary treatment options, and the solids treatment options. The total annual energy demand estimates were based on the operation and maintenance (O&M) estimates developed by Carollo Engineers.

Plant staff commuting and the periodic use of equipment for maintenance is not included in this GHG inventory since it is assumed to result in minimal impact relative to the operation of the collection system, pump stations, and treatment system and will not differ significantly among the alternatives.

4.2.2 Construction of the Collection System

Estimates of GHG emissions generated from the construction of the gravity and STEP collection systems were developed using previous estimates of pipeline lengths and Carollo's 3B Conceptual Pipeline Model to estimate material excavation. In order to install the pipeline, sections of roadway need to be removed and replaced. Estimates for roadway removal were also developed and presented in the Fine Screening Report and are considered in this inventory.

Construction crew commuting is not included in this GHG inventory since it is assumed to result in minimal impact relative to the construction and operation of the collection system and pump stations and will not differ significantly among the alternatives

4.2.3 Construction of Treatment Facilities

Estimates of GHG emissions generated from the construction of the treatment facilities were based on materials and processes required for each treatment process included in the project alternatives. The treatment trains for all alternatives consist of an headworks, filtration, ultraviolet (UV) disinfection, and an effluent pump station. The treatment processes that differ among the alternatives are the secondary and nitrification/denitrification processes.

Construction crew commuting is not included in this GHG inventory since it is assumed to result in minimal impact relative to the construction and operation of the treatment system and will not differ significantly among the alternatives

4.2.4 Chemical Production

The California Climate Action Registry General Reporting Protocol (CCAR GRP) considers energy required for the production of chemicals consumed in treatment processes to be outside the boundary of this type of inventory. However, in order to provide a more complete comparison of the impacts of the alternatives, and because of its relative contribution to the overall carbon footprint of the project, the energy consumed for chemical production was included in this inventory. The energy per unit chemical consumed is calculated using conversion factors from the text “Energy in Wastewater Treatment” by William F. Owen. Annual chemical consumption for each alternative is based on estimates developed by Carollo.

4.2.5 Construction Material Handling

Estimates of GHG emissions generated from the transport of construction materials are based on the type of truck used, the type of fuel consumed, and the distance from the materials' distribution center. Carollo applied assumptions for the truck type and fuel type consumed, and based the volume of material to be hauled and the source of materials on Carollo reference projects.

4.2.6 Solids Handling

Estimates of GHG emissions generated from the transport of Sub-Class B biosolids are based on the type of truck used, the type of fuel consumed, and the distance traveled to the disposal site. Per the Solids Handling Options TM, Sub-Class B biosolids are assumed to be hauled to a composting facility, McCarthy Family Farms in Kings County, CA, which is about a 130-mile trip. Carollo applied assumptions for the truck type and the fuel type used, and the disposal site was provided by the County.

4.2.7 Septage Handling

Estimates of GHG emissions for the transport of septage from the community of Los Osos the Los Osos WWTP for the project alternatives are based on several criteria. The criteria include the type of truck used, the type of fuel consumed, the annual number of truck trips required to transport domestic septage for the existing system and each project alternative, and the average distance traveled to the Los Osos WWTP. Carollo applied assumptions for the truck type, the fuel type used, and the average distance from the community's septic tanks to the Los Osos WWTP, while the number of truck trips was estimated per information provided in the Septage Receiving Station Option TM (Carollo, April 2008).

4.2.8 Chemical Handling

Estimates of GHG emissions generated from the transport of chemicals are based on the type of truck used, the type of fuel consumed, and the distance from the chemical's distribution center. Carollo applied assumptions for the truck type and fuel type consumed, and based the source of chemicals on Carollo reference projects.

5.0 EXISTING SYSTEM

The community of Los Osos, California is located on the coastline of Central California adjacent to the Morro Bay State and National Estuary. The existing system relies on privately owned septic tanks for its approximately 14,600 residents. The State Water Resources Control Board's On-Site Wastewater Treatment System Regulations (Assembly Bill 885, AB 885) will require that all septic tanks be pumped and inspected once every five years. For this inventory, GHG emissions related to the manufacturing, transport, and installation of the existing septic tanks are not included. It is assumed that the septic tanks will be pumped every five years and the septage will continue to be hauled to the Santa Maria WWTP. The BOD remaining in the septic tanks is converted into methane through anaerobic digestion and is vented to the atmosphere.

6.0 SUMMARY OF GHG EMISSIONS ESTIMATES FOR ALTERNATIVES

As part of the evaluation of the existing system and the project alternatives, GHG emissions estimates were developed. The resulting annual GHG emissions estimated for the construction and operation of each alternative are summarized in Figure 2 and Table 3. The differences in annual generation of GHG emissions among the alternatives are primarily drawn from energy consumption, chemical production, and methane generation. Greenhouse gas emissions resulting from construction processes and material handling are also presented as a “one-time” emission in Figure 3 and Table 4.

6.1 Annual GHG Emissions

6.1.1 Energy Consumption

Energy consumed for the operations of both the collection system and treatment facility is considered. This category represents the annual electricity consumed for daily operations.

- The STEP collection system alternatives overall are the least energy intensive options. The STEP collection system alternatives can be considered nearly the same in energy consumption due to the uncertainty associated with these types of analyses.
- The Oxidation Ditch alternative in combination with the gravity collection system is the most energy intensive primarily due to the energy consumed for the oxidation ditch treatment process.
- The Biolac alternative in combination with the STEP collection system is the least energy intensive option.

6.1.2 Chemical Production

As mentioned in section 6.1.2, the alternatives served by gravity result in significantly less emissions than those served by STEP. This is also in part due to the STEP alternatives and the gravity ADS Pond alternative requiring more chemicals (i.e., methanol) for treatment purposes. Methanol serves as a carbon source in the denitrification process, and requires an energy intensive process for its production that leads to generation of indirect GHG emissions.

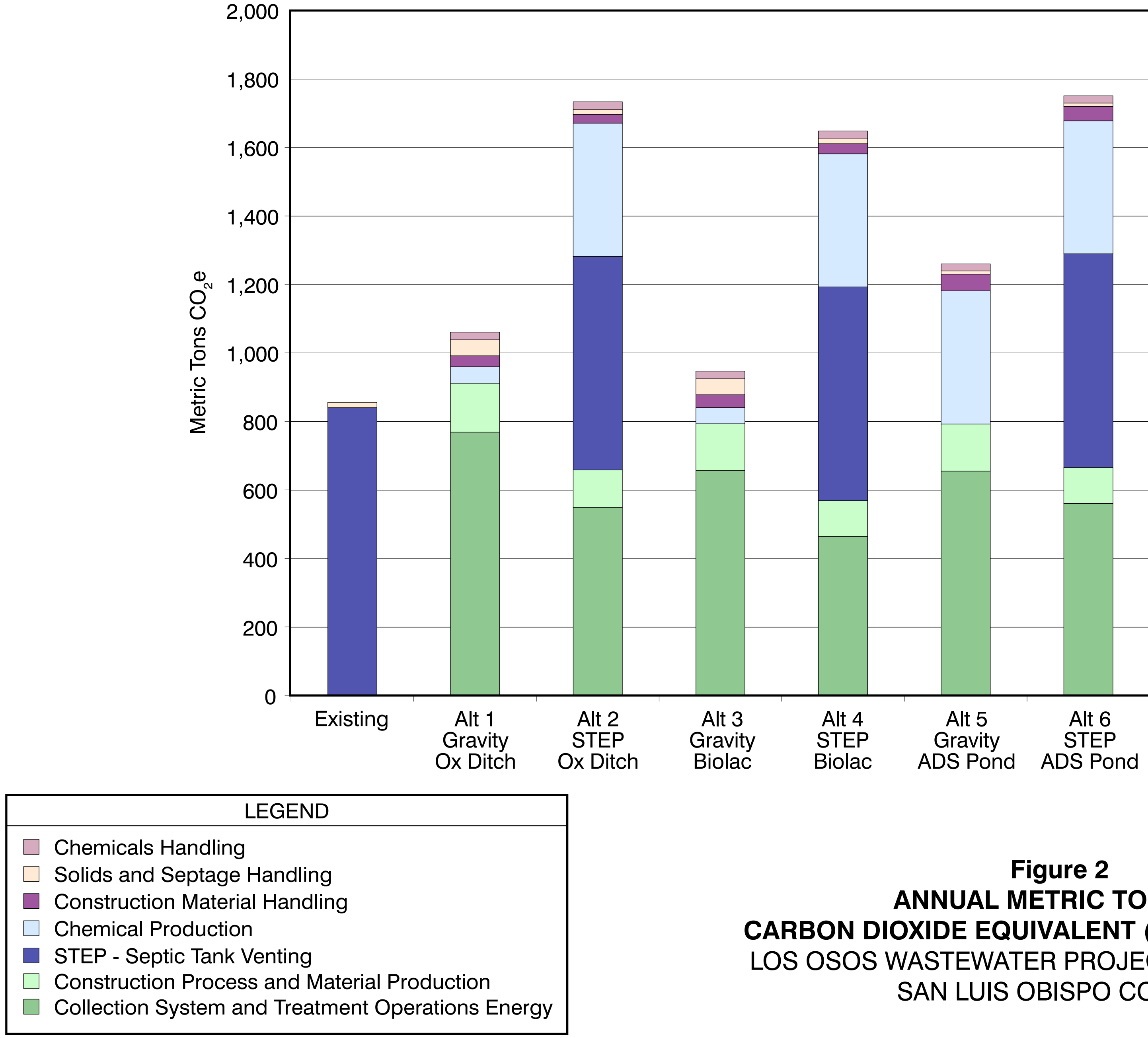


Figure 2
ANNUAL METRIC TONS OF
CARBON DIOXIDE EQUIVALENT (CO_2e) EMISSIONS
LOS OSOS WASTEWATER PROJECT DEVELOPMENT
SAN LUIS OBISPO COUNTY

los608f2-7630.ai

Table 3 Annual Total Metric Tons of Carbon Dioxide Equivalent (CO_2e) Emissions
Los Osos Wastewater Project Development
San Luis Obispo County

	INDIRECT						DIRECT	
Alternative	Collection System & Treatment Operations Energy	Construction Process & Material Production	Chemical Production	Construction Material Handling	Solids & Septage Handling	Chemicals Handling	STEP - Septic Tank Venting	TOTAL Metric Tons CO_2e Emissions per year
Existing	0	0	0	0	16	0	840	**856**
Alt 1 - Gravity Ox Ditch	769	143	48	32	47	22	0	**1,061**
Alt 2 - STEP Ox Ditch	549	103	389	22	14	23	624	**1,724**
Alt 3 - Gravity Biolac	657	136	47	38	47	22	0	**947**
Alt 4 - STEP Biolac	464	99	389	26	14	23	624	**1,639**
Alt 5 - Gravity ADS Pond	655	138	389	49	9	20	0	**1,260**
Alt 6 - STEP ADS Pond	560	100	389	39	10	21	624	**1,742**

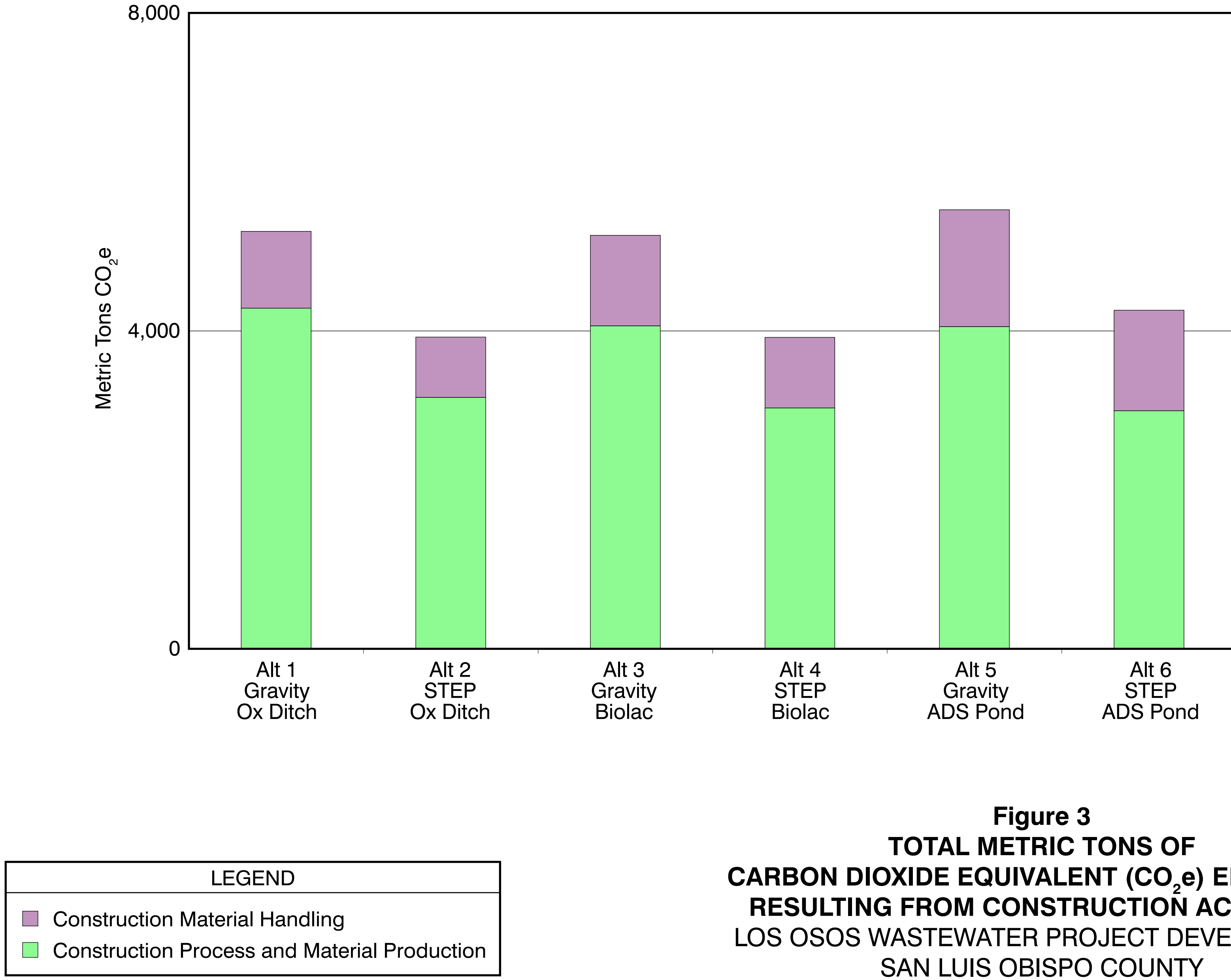


Figure 3
TOTAL METRIC TONS OF
CARBON DIOXIDE EQUIVALENT (CO_2e) EMISSIONS
RESULTING FROM CONSTRUCTION ACTIVITIES
LOS OSOS WASTEWATER PROJECT DEVELOPMENT
SAN LUIS OBISPO COUNTY

los508f3-7630.ai

Table 4	Total Metric Tons of Carbon Dioxide Equivalent (CO_2e) Emissions Resulting from Construction Activities Los Osos Wastewater Project Development San Luis Obispo County		
	Indirect		
	Construction Process and Material Production	Construction Material Handling	Total Metric Tons CO_2e Emissions
Existing	0	0	**0**
Alt 1 - Gravity Ox Ditch	4,286	965	**5,251**
Alt 2 - STEP Ox Ditch	3,088	656	**3,744**
Alt 3 - Gravity Biolac	4,064	1,139	**5,203**
Alt 4 - STEP Biolac	2,955	786	**3,740**
Alt 5 - Gravity ADS Pond	4,055	1,469	**5,524**
Alt 6 - STEP ADS Pond	2,919	1,163	**4,082**

6.1.3 Methane Generation

The alternatives served by gravity result in significantly less emissions than those served by STEP. This is because septic tanks throughout the STEP collection system vent large amounts of methane annually due to the anaerobic digestion of settled solids within the tanks. Remember that methane has a GWP 21 times that of carbon dioxide.

6.2 Total Construction GHG Emissions

Total (or one-time) construction GHG emissions refer to the total emissions generated from construction processes and material handling without annualizing the emissions over the 30-year time horizon. These "one-time" emissions are presented in Figure 3 and Table 4.

These results show a different outcome due to the difference in materials (production and handling) and processes required for the construction of the collection systems and treatment processes for each alternative. Due to the uncertainty associated with these types of analyses, the material production and onsite construction processes are considered the same across alternatives served by the same type of collection system. However, the material handling (in other words, the transport of materials) varies across the alternatives due to the different sources or disposal locations of the materials.

6.3 Summary

In summary, for gravity collection system alternatives, the Biolac alternative generates the least GHG emissions compared to the Oxidation Ditch and ADS Pond alternatives. This is due to the alternative's low chemical use and absence of septic tanks or other treatment process that would lead to methane generation and venting. However, for the STEP collection system alternatives, due to the uncertainty in these analyses, the levels of GHG emissions generated by each of the alternatives are considered nearly the same.

APPENDIX - ASSUMPTIONS AND GHG SUMMARY TABLES

APPENDIX - ASSUMPTIONS AND GHG SUMMARY TABLES

ELECTRICITY CONSUMPTION FOR OPERATIONS

- Treatment estimates include secondary treatment technology, nitrification/denitrification, tertiary treatment, and solids treatment.
- Pump station estimates include residential on-lot pumps (STEP system) or collection system pump stations (gravity system).
- Alternatives include community septage only at buildout for the prohibition zone.
- Existing system considers the existing septic tanks pumped every five years and the septage will continue to be hauled to the Santa Maria WWTP.
- Alternative 1 (Gravity Ox Ditch) system includes headworks/screening/septage receiving, oxidation ditch, secondary sedimentation, UV disinfection, and effluent pumping.
- Alternative 2 (STEP Ox Ditch) system includes headworks/screening/septage receiving, oxidation ditch, secondary sedimentation, UV disinfection, and effluent pumping.
- Alternative 3 (Gravity BIOLAC) system includes headworks/screening/septage receiving, BIOLAC process, secondary sedimentation, UV disinfection, and effluent pumping.
- Alternative 4 (STEP BIOLAC) system includes headworks/screening/septage receiving, BIOLAC process, secondary sedimentation, UV disinfection, and effluent pumping.
- Alternative 5 (Gravity ADS pond) system includes headworks/screening/septage receiving, ADS ponds, UV disinfection, and effluent pumping.
- Alternative 6 (STEP ADS pond) system includes headworks/screening/septage receiving, ADS ponds, UV disinfection, and effluent pumping.
- Solids treatment for all alternatives assumes thickening, dewatering, and hauling of subclass B solids to a landfill.
- Air Diffusion System ponds and Partially Mixed Facultative Ponds produce an aerobic environment, and therefore will produce little or no methane per *2006 IPCC Guidelines for National GHG Inventories*.

- Plant staff commuting and the periodic use of equipment for maintenance is not included in this GHG inventory since it is assumed to result in minimal impact relative to the operation of the collection system, pump stations, and treatment system and will not differ significantly among the alternatives.

CONSTRUCTION MATERIALS AND PROCESSES

- Gravity collection system construction includes installation of sewers and force mains, pump stations, laterals in right-of-way, on-lot laterals, removal of septic tanks, and roadway removal and materials.

- STEP collection system construction includes installation of sewers and force mains, laterals in right-of-way, on-lot laterals, removal and installation of septic tanks, and roadway removal and materials.

- STEP tank supplier is assumed to be Orenco System Inc. The local distributor is Bio-solutions in Agoura Hills, CA, and the tanks are assumed to be hauled 33 (unassembled, 11 high and 3 stacks) at a time on a step-deck truck to the Los Osos WWTP.

- STEP tanks are assumed to be placed with four (4) feet of cover, with 6" of aggregate base.

- For the installation of the STEP collection system, existing septic tanks will either be abandoned or removed (if the STEP tanks will be installed in the same location). The disposal of the removed septic tanks is not included in this inventory.

- Gravity and STEP collection system construction does not include manufacturing of pump or pump station equipment.

- The gravity collection system options will be installed using open trenching. Pipe lengths are based on the "Los Osos Wastewater Project Area A, B, C, & D - Bid Schedule" and the Fine Screening Report, assuming 4,769 connections and 12,000 feet of 18" diameter pipe from the central pump station to the out of town treatment facility (probable route).

- The STEP collection system options will be installed using horizontal directional drilling (HDD), pipe lengths are based on Ripley Pacific Team Los Osos Wastewater Management Plan Update (July 2006) and the Fine Screening Report, assuming 4,769 connections and 12,000 feet of 14" diameter pipe from a central location in town to the out of town treatment facility.

- Excavated material quantities for the collection system were calculated based on Carollo reference projects and the Carollo 3B pipeline model.

- Excavated material for the installation of the collection system pipeline will be reused onsite as backfill.
- Excavated material for construction of treatment facilities will be reused onsite as backfill. Excess excavated material will be off-hauled to the Cold Canyon landfill via 23-ton truck (assumed the same landfill as that used for solids disposal).
- Assuming the installation of laterals and the out of town conveyance will not require the removal or replacement of pavement or aggregate base.
- Biolac lining requirements are based on a Carollo reference project.
- Concrete, excavation, and backfill estimates for treatment construction are based on construction estimates prepared by Carollo.
- Assuming asphalt will be transported from Santa Maria, CA in 7.5 cubic yard capacity trucks.
- Aggregate base assumed to be supplied from Santa Maria, CA in 16 cubic yard capacity trucks.
- Assuming concrete will be transported from San Luis Obispo in trucks with 10 cubic yard capacity.
- Riprap will be hauled 18 tons per truckload to the Los Osos WWTP from Santa Maria, CA.
- The generation of construction material waste will not be significantly different across the alternatives and will result in minimal impact.
- Construction crew commuting is not included in this GHG inventory since it is assumed to result in minimal impact relative to the construction and operation of the collection system, pump stations, and treatment system and will not differ significantly among the alternatives.

CHEMICAL CONSUMPTION & HANDLING

- Assuming polymer for thickening and dewatering is 40% active.
- Information for polymer was provided by Nalco Chemicals Co. Polymer is assumed to be supplied in 250-gallon totes, delivered by carrier truck with an average capacity of 11 totes, and assumed shelf-life is 6 months. Minimum delivery frequency of 4 months is assumed.
- Quantities of polymer, alum, and methanol are based on the O&M estimates prepared by Carollo.

- Assuming that odor control chemicals will only be needed at the headworks and the thickening/dewatering building per Carollo reference projects.

- Typical building sizes were assumed for the headworks and thickening/dewatering buildings; air space to be treated is estimated at 90,000 cubic feet for the headworks and 25,000 cubic feet for the thickening/dewatering building. Sodium hydroxide concentration is 50% and sodium hypochlorite concentration at 12.5% based on Carollo reference project odor control system by RJ Environmental.

- Three-stage, packaged odor control scrubbers using sodium hydroxide and sodium hypochlorite were assumed.

- Sodium hypochlorite and sodium hydroxide suppliers are assumed to be located in Los Angeles, CA, and delivered via a 6,800-gallon tanker truck. Sodium hypochlorite shelf-life is 2 weeks per Carollo reference projects.

- Chemicals used for UV lamp cleaning are assumed to be negligible.

- Methanol is assumed to be supplied from Unibar (Fresno, CA) and delivered via a tanker truck with a capacity of 45,000 lbs (or 6,800 gallons).

- Assuming alum is 47% active, supplied in a 48,000 lb capacity tanker truck. Supplier is assumed to be located in Los Angeles per Carollo reference projects.

BIOSOLIDS & SEPTAGE HANDLING RESULTING FROM OPERATIONS

- Trucks hauling septage are assumed to be tankers with a 3000-gallon capacity per Septage Receiving Station Option TM, April 2008.

- Septage is assumed to travel 3 miles one-way to the Los Osos WWTP per Carollo estimate based on capacity of truck and average distance from community septic tanks to the WWTP.

- At build-out no septic tanks will exist within the prohibition zone for the gravity collection system project alternatives per Septage Receiving Station Option TM, April 2008.

- At build-out all septic tanks within the prohibition zone for the STEP collection system will contain 200 mg/L BOD in the septage. Per the Flows and Loads TM, the septic tank influent is 340 mg/L and a portion of the BOD is assumed to leave the septic tank.

- Population at build-out is estimated to be 18,428 and the daily flow per capita is estimated to be about 60 gallons per capita per day with conservation per the Flows and Loads TM, Table 6, February 2008.

- 16.25% of wastewater BOD_5 is anaerobically digested in septic tanks per "Improvements to the U.S. Wastewater Methane and Nitrous Oxide Emissions Estimates," U.S. EPA, Elizabeth A. Scheehle and Michiel R.J. Doorn.

- Trucks hauling solids are assumed to be enclosed long-bed trailers with a 40,000 lb capacity per the Biosolids Handling Options TM, April 2008.

- Hauling of sub-class B biosolids requires four trucks per week for the gravity collection system and one truck per week for the STEP collection system per the Biosolids Handling Options TM, April 2008.

The following tables summarize the GHG emissions generated by category for the existing system and the project alternatives. Brief explanations of the results of each table follow.

GHG EMISSIONS SUMMARY

Refer to CCAR:GRP 2007, Appendix C, for Emission Factors.	Subregion Electricity Emission Factors, gCO_2e/kWh	Petroleum Fuel Emission Factors, kg/MMBtu	Natural Gas Emission Factors, kg/MMBtu
Carbon Dioxide (CO_2)	364.9	62.30	53.05
Methane (CH_4)	0.0638	0.002	0.0059
Nitrous Oxide (N_2O)	0.5202	0.0006	0.0001

Legend
Inputs
Calculations
Carried Over
Not applicable

	Global Warming Potential
Carbon Dioxide (CO_2)	1
Methane (CH_4)	21
Nitrous Oxide (N_2O)	310

INDIRECT EMISSIONS

Table 1. CO_2-Equivalent Emissions Resulting from Electricity Consumption for Operation of the Treatment Facility & Pumping Stations

	Annual Electricity Consumption (kWh)	Multiply by Average Emission Factor, gCO_2e			Total CO_2e Emissions not including T&D Loss		Total CO_2e Emissions including T&D Loss
		Carbon Dioxide	Methane	Nitrous Oxide	gCO_2e	Metric Tons CO_2e	Metric Tons CO_2e
Existing	0	0	0	0	0	0	**0**
Alt 1 - Gravity Ox Ditch	1,934,998	706,144,446	123,492	1,006,500	707,274,438	707	**769**
Alt 2 - STEP Ox Ditch	1,382,920	504,673,017	88,258	719,333	505,480,608	505	**549**
Alt 3 - Gravity Biolac	1,654,383	603,738,799	105,583	860,536	604,704,918	605	**657**
Alt 4 - STEP Biolac	1,168,920	426,577,374	74,601	608,020	427,259,995	427	**464**
Alt 5 - Gravity ADS Pond	1,648,651	601,647,003	105,218	857,555	602,609,775	603	**655**
Alt 6 - STEP ADS Pond	1,410,123	514,600,287	89,995	733,483	515,423,764	515	**560**

Table 2. Annualized CO_2 Equivalent Emissions Resulting from the Processing and Production of Construction Materials over a 30-year Time Horizon

	CO_2e Generated per Process & Material Produced						
Material Name	**Existing**	**Alt 1 - Gravity Ox Ditch**	**Alt 2 - STEP Ox Ditch**	**Alt 3 - Gravity Biolac**	**Alt 4 - STEP Biolac**	**Alt 5 - Gravity ADS Pond**	**Alt 6 - STEP ADS Pond**
Treatment - Concrete	0	22,319,161	20,006,459	14,157,381	15,127,607	7,639,046	7,417,280
Treatment - Earthwork	0	203,466	220,599	860,886	597,393	5,454,224	5,461,539
Septic Tanks	0	0	12,690,162	0	12,690,162	0	12,690,162
Collection System	0	18,912,063	1,245,652	18,912,063	1,245,652	18,912,063	1,245,652
Lining - Polyethylene	0	0	0	298,124	203,291	1,860,131	1,860,131
Piping - PVC	0	101,425,680	68,770,191	101,425,680	68,770,191	101,425,680	68,770,191
LDPE (2% Black C) Tubing	0	0	0	0	0	2,212,939	2,212,939
Total Metric Tons CO_2e:	**0**	**143**	**103**	**136**	**99**	**138**	**100**

In grams...

In Metric Tons...

Table 3. Total CO_2 Equivalent Emissions Resulting from the Processing and Production of Construction Materials

	CO_2e Generated per Process & Material Produced							
Material Name	**Factor for 30-year Time Horizon**	**Existing**	**Alt 1 - Gravity Ox Ditch**	**Alt 2 - STEP Ox Ditch**	**Alt 3 - Gravity Biolac**	**Alt 4 - STEP Biolac**	**Alt 5 - Gravity ADS Pond**	**Alt 6 - STEP ADS Pond**
Treatment - Concrete	1.0	0	669,574,835	600,193,766	424,721,440	453,828,224	229,171,373	222,518,394
Treatment - Earthwork	1.0	0	6,103,983	6,617,964	25,826,565	17,921,775	163,626,709	163,846,183
Septic Tanks	1.0	0	0	380,704,864	0	380,704,864	0	380,704,864
Collection System	1.0	0	567,361,877	37,369,547	567,361,877	37,369,547	567,361,877	37,369,547
Lining - Polyethylene	3.0	0	0	0	2,981,241	2,032,912	18,601,311	18,601,311
Piping - PVC	1.0	0	3,042,770,396	2,063,105,724	3,042,770,396	2,063,105,724	3,042,770,396	2,063,105,724
LDPE (2% Black C) Tubing	2.0	0	0	0	0	0	33,194,090	33,194,090
Total Metric Tons CO_2e:		**0**	**4,286**	**3,088**	**4,064**	**2,955**	**4,055**	**2,919**

In grams...

In Metric Tons...

Table 4. CO_2 Equivalent Emissions Resulting from the Production of Chemicals

	CO_2e Generated per Chemical Produced						
Chemical Name	**Existing**	**Alt 1 - Gravity Ox Ditch**	**Alt 2 - STEP Ox Ditch**	**Alt 3 - Gravity Biolac**	**Alt 4 - STEP Biolac**	**Alt 5 - Gravity ADS Pond**	**Alt 6 - STEP ADS Pond**
Sodium Hypochlorite	0	12,062,971	12,062,971	12,062,971	12,062,971	12,062,971	12,062,971
Sodium Hydroxide	0	20,531,083	20,531,083	20,531,083	20,531,083	20,531,083	20,531,083
Polymer - Thickening	0	1,590,744	426,785	1,357,952	329,788	0	0
Polymer - Dewatering	0	4,772,231	1,280,355	4,073,856	989,365	975,515	819,432
Alum	0	5,401,095	5,431,954	5,401,095	5,431,954	5,401,095	5,431,954
Filter Polymer	0	3,597,111	3,617,307	3,597,111	3,617,307	3,597,111	3,617,307
Methanol	0	0	346,060,631	0	346,060,631	346,060,631	346,060,631
Total Metric Tons CO_2e:	**0**	**48**	**389**	**47**	**389**	**389**	**389**

Table 5. Annualized CO_2-Equivalent Emissions Resulting from Fuel Consumption for Construction Material Handling over a 30-year Time Horizon

	Annual VMT*	**Annual Gallons Diesel**	**Carbon Dioxide**	**Methane**	**Nitrous Oxide**	**Total CO2e Emissions**	
			(kg CO2/year)	**(g CO2e/year)**	**(g CO2e/year)**	**kilograms/year**	**Metric Tons/year**
Existing	0	0	0	0	0	0	**0**
Alt 1 - Gravity Ox Ditch	18,137	3,210	31,972	22,852	281,118	32,276	**32**
Alt 2 - STEP Ox Ditch	12,299	2,177	21,682	15,497	190,641	21,888	**22**
Alt 3 - Gravity Biolac	21,380	3,784	37,689	26,939	331,389	38,048	**38**
Alt 4 - STEP Biolac	14,713	2,604	25,936	18,538	228,046	26,183	**26**
Alt 5 - Gravity ADS Pond	27,569	4,879	48,599	34,737	427,319	49,062	**49**
Alt 6 - STEP ADS Pond	21,784	3,856	38,401	27,448	337,649	38,766	**39**

*Vehicle-miles traveled, VMT

Table 6. Total CO_2-Equivalent Emissions Resulting from Fuel Consumption for Construction Material Handling

	Total VMT*	**Total Gallons Diesel**	**Carbon Dioxide**	**Methane**	**Nitrous Oxide**	**Total CO2e Emissions**	
			(kg CO2e)	**(g CO2e)**	**(g CO2e)**	**kilograms**	**Metric Tons**
Existing	0	0	0	0	0	0	**0**
Alt 1 - Gravity Ox Ditch	364,965	96,301	959,156	459,857	5,656,965	965,273	**965**
Alt 2 - STEP Ox Ditch	338,477	65,307	650,455	426,482	5,246,400	656,128	**656**
Alt 3 - Gravity Biolac	495,054	113,522	1,130,678	623,769	7,673,344	1,138,975	**1,139**
Alt 4 - STEP Biolac	443,664	78,120	778,078	559,017	6,876,791	785,514	**786**
Alt 5 - Gravity ADS Pond	680,725	146,384	1,457,985	857,714	10,551,244	1,469,394	**1,469**
Alt 6 - STEP ADS Pond	655,798	115,666	1,152,036	826,306	10,164,874	1,163,027	**1,163**

*Vehicle-miles traveled, VMT

Table 7. CO_2-Equivalent Emissions Resulting from Fuel Consumption for Solids & Septage Handling

	Annual VMT*	**Annual Gallons Diesel**	**Carbon Dioxide**	**Methane**	**Nitrous Oxide**	**Total CO2e Emissions**	
			(kg CO2/year)	**(g CO2e/year)**	**(g CO2e/year)**	**kilograms/year**	**Metric Tons/year**
Existing	8,827	1,562	15,560	11,122	136,813	15,708	**16**
Alt 1 - Gravity Ox Ditch	26,180	4,634	46,151	32,987	405,787	46,589	**47**
Alt 2 - STEP Ox Ditch	7,824	1,385	13,793	9,859	121,277	13,924	**14**
Alt 3 - Gravity Biolac	26,180	4,634	46,151	32,987	405,787	46,589	**47**
Alt 4 - STEP Biolac	7,824	1,385	13,793	9,859	121,277	13,924	**14**
Alt 5 - Gravity ADS Pond	5,151	912	9,080	6,490	79,837	9,166	**9**
Alt 6 - STEP ADS Pond	5,500	973	9,695	6,930	85,249	9,788	**10**

*Vehicle-miles traveled, VMT

Table 8. CO_2-Equivalent Emissions Resulting from Fuel Consumption for Chemicals Handling

	Annual VMT*	Annual Gallons Diesel	Carbon Dioxide (kg CO2/year)	Methane (g CO2e/year)	Nitrous Oxide (g CO2e/year)	Total CO2e Emissions kilograms/year	Total CO2e Emissions Metric Tons/year
Existing	0	0	0	0	0	0	**0**
Alt 1 - Gravity Ox Ditch	15,552	2,222	22,128	19,596	241,056	22,389	**22**
Alt 2 - STEP Ox Ditch	15,842	2,273	22,639	19,961	245,551	22,905	**23**
Alt 3 - Gravity Biolac	15,552	2,222	22,128	19,596	241,056	22,389	**22**
Alt 4 - STEP Biolac	15,842	2,273	22,639	19,961	245,551	22,905	**23**
Alt 5 - Gravity ADS Pond	14,232	2,033	20,250	17,932	220,596	20,489	**20**
Alt 6 - STEP ADS Pond	14,522	2,084	20,761	18,298	225,091	21,005	**21**

*Vehicle-miles traveled, VMT

DIRECT EMISSIONS

Table 9. CO_2-Equivalent Emissions Venting directly from Septic Tanks

	Annual lbs of BOD Digested in Septic Tanks	Methane (kg CH4/year)	Total CO2e Emissions kilograms/year	Total CO2e Emissions Metric Tons/year
Existing	146,690	40,006	840,132	**840**
Alt 1 - Gravity Ox Ditch	0	0	0	**0**
Alt 2 - STEP Ox Ditch	108,912	29,703	623,769	**624**
Alt 3 - Gravity Biolac	0	0	0	**0**
Alt 4 - STEP Biolac	108,912	29,703	623,769	**624**
Alt 5 - Gravity ADS Pond	0	0	0	**0**
Alt 6 - STEP ADS Pond	108,912	29,703	623,769	**624**

TOTAL (Indirect + Direct) EMISSIONS

Table 10. Summary Table - Annual Total Metric Tons of Carbon Dioxide Equivalent Emissions

	INDIRECT						DIRECT	
	Collection System & Treatment Operations Energy	Construction Process & Material Production	Chemical Production	Construction Material Handling	Solids & Septage Handling	Chemicals Handling	STEP - Septic Tank Venting	TOTAL Metric Tons CO_2e Emissions
Existing	0	0	0	0	16	0	840	**856**
Alt 1 - Gravity Ox Ditch	769	143	48	32	47	22	0	**1,061**
Alt 2 - STEP Ox Ditch	549	103	389	22	14	23	624	**1,724**
Alt 3 - Gravity Biolac	657	136	47	38	47	22	0	**947**
Alt 4 - STEP Biolac	464	99	389	26	14	23	624	**1,639**
Alt 5 - Gravity ADS Pond	655	138	389	49	9	20	0	**1,260**
Alt 6 - STEP ADS Pond	560	100	389	39	10	21	624	**1,742**

Table 11. Summary Table - Total Metric Tons of Carbon Dioxide Equivalent Emissions due to Construction Activities

	INDIRECT		
	Construction Process & Material Production	Construction Material Handling	TOTAL Metric Tons CO_2e Emissions
Existing	0	0	**0**
Alt 1 - Gravity Ox Ditch	4,286	965	**5,251**
Alt 2 - STEP Ox Ditch	3,088	656	**3,744**
Alt 3 - Gravity Biolac	4,064	1,139	**5,203**
Alt 4 - STEP Biolac	2,955	786	**3,740**
Alt 5 - Gravity ADS Pond	4,055	1,469	**5,524**
Alt 6 - STEP ADS Pond	2,919	1,163	**4,082**

INDIRECT EMISSIONS

Recall *indirect emissions*, consistent with the CCAR protocol, are those originating from the actions of the agency, but are produced by sources owned or controlled by another entity. For this inventory, this includes: use of construction equipment, manufacturing and transport of the STEP tanks, transport of septage, construction materials, and chemicals to the facilities, transport of biosolids to the disposal site, and purchased and consumed electricity for the operation of the facility, collection system, and the manufacturing of materials and chemicals used in the facility and collection system.

Table 1. Carbon Dioxide Equivalent (CO_2e) Emissions Resulting from Electricity Consumption for Operation of the Treatment Facility & Pumping Stations

This table shows the carbon dioxide, methane, and nitrous oxide emissions generated from the production and delivery of electricity based on estimated demands at buildout, which is consumed for the operation of the treatment facility and pumps throughout the collection systems. The existing system does not require electricity and therefore does not generate CO_2e emissions in this category. In general, the alternatives considering a gravity collection system consume more electrical energy than the STEP alternatives due to variation in unit process sizing and the slight difference in collection system energy requirements. Alternative 1 (oxidation ditch alternative with a gravity collection system) is the most energy intensive primarily due to the oxidation ditch process energy consumption. Alternative 6 (air diffusing system pond alternative with a STEP collection system) is the least energy consuming alternative and is closely followed by Alternative 4 (Biolac alternative with a STEP collection system).

Table 2. Annualized Carbon Dioxide Equivalent (CO_2e) Emissions Resulting from the Processing and Production of Construction Materials over a 30-year Time Horizon

This table shows the carbon dioxide, methane, and nitrous oxide emissions generated from the processing and production of construction materials, which are consumed for the construction of the treatment facility and each collection system based on estimated demands at buildout, annualized over a 30-year period. The construction material processes considered are the excavation and backfill processes for the treatment facility (treatment), the septic tanks, and the collection system. The construction materials for which material production (energy consumed for production processes) is evaluated are concrete, fiberglass, polyethylene lining, PVC piping, and low-density polyethylene tubing.

The existing system does not require new construction and therefore does not generate CO_2e emissions in this category. In general, the alternatives considering a gravity collection system generate more CO_2e emissions than the STEP alternatives due to less demand for the construction of the STEP collection system and variation in unit process sizing. Alternative 1 (oxidation ditch alternative with a gravity collection system) generates the most CO_2e emissions primarily due to the PVC piping production required. Alternatives 2, 4, and 6 (alternatives served by a STEP collection system) generate the least CO_2e emissions in this category.

Table 3. Total Carbon Dioxide Equivalent (CO_2e) Emissions Resulting from the Processing and Production of Construction Materials

This table shows the total carbon dioxide, methane, and nitrous oxide emissions generated from the processing and production of construction materials, which are consumed for the construction of the treatment facility and each collection system based on estimated demands at buildout. The construction material processes considered are the excavation and backfill processes for the treatment facility (treatment), the septic tanks, and the collection system. The construction materials for which material production (energy consumed for production processes) is evaluated are concrete, fiberglass, polyethylene lining, PVC piping, and low-density polyethylene tubing.

The existing system does not require new construction and therefore does not generate CO_2e emissions in this category. In general, the alternatives considering a gravity collection system generate slightly more CO_2e emissions than the STEP alternatives due to less demand for the construction of the STEP collection system and variation in unit process sizing. Alternative 1 (oxidation ditch alternative with a gravity collection system) generates the most CO_2e emissions primarily due to the PVC piping production required. Alternatives 2, 4, and 6 (alternatives served by a STEP collection system) generate the least CO_2e emissions in this category.

Table 4. Carbon Dioxide Equivalent (CO_2e) Emissions Resulting from the Production of Chemicals

This table shows the carbon dioxide, methane, and nitrous oxide emissions generated from the production (resulting from the energy consumed for production processes) of chemicals, which are required for odor control and treatment based on estimated demands of the alternatives at buildout. The chemicals include sodium hypochlorite, sodium hydroxide, thickening polymer, dewatering polymer, alum, filter polymer, and methanol.

The existing system does not require the use of chemicals and therefore does not generate CO_2e emissions in this category. In general, the alternatives considering a STEP collection system generate more CO_2e emissions than the gravity collection system alternatives (with the exception of Alternative 5) due to the methanol requirements of the denitrification process.

Table 5. Annualized Carbon Dioxide Equivalent (CO_2e) Emissions Resulting from Fuel Consumption for Construction Material Handling over a 30-year Time Horizon

This table shows the carbon dioxide, methane, and nitrous oxide emissions generated from the transport of construction materials, which are consumed for the construction of the treatment facility and each collection system based on estimated demands at buildout, annualized over a 30-year period. The construction materials for which material handling (transport of materials from distributor and to disposal site) is considered are concrete, fiberglass, polyethylene lining, PVC piping, low-density polyethylene tubing, and remaining excavated material.

The existing system does not require new construction and therefore does not generate CO_2e emissions in this category. In general, the alternatives considering a STEP collection system generate less CO_2e emissions than the gravity collection system alternatives due to the handling of excavated material.

Table 6. Total Carbon Dioxide Equivalent (CO_2e) Emissions Resulting from Fuel Consumption for Construction Material Handling

This table shows the total carbon dioxide, methane, and nitrous oxide emissions generated from the transport of construction materials, which are consumed for the construction of the treatment facility and each collection system based on estimated demands at buildout. The construction materials for which material handling (transport from material distributor and/or to disposal site) is considered are concrete, fiberglass, polyethylene lining, PVC piping, low-density polyethylene tubing, and remaining excavated material.

The existing system does not require new construction and therefore does not generate CO_2e emissions in this category. In general, the alternatives considering a STEP collection system generate less CO_2e emissions than the gravity collection system alternatives due to the handling of the excavated material.

Table 7. Carbon Dioxide Equivalent (CO_2e) Emissions Resulting from Fuel Consumption for Solids & Septage Handling

This table shows the carbon dioxide, methane, and nitrous oxide emissions generated from the handling (transport) of solids and septage, which are generated at the treatment facility and in the septic tanks of the existing and STEP collection system alternatives based on estimated demands at buildout. The existing system's septage is hauled to the Santa Maria Wastewater Treatment Plant (WWTP), while the septage generated in STEP collection system is hauled to the Los Osos WWTP. Solids generated at the Los Osos WWTP are hauled to McCarthy Family Farms in Kings County, CA.

Alternatives 1 (oxidation ditch with gravity collection system) and 3 (Biolac with gravity collection system) generate more CO_2e emissions than the other alternatives due to the volume of septage and solids generated at the septic tanks and plant, respectively, which subsequently have to be transported to a disposal site.

Table 8. Carbon Dioxide Equivalent (CO_2e) Emissions Resulting from Fuel Consumption for Chemicals Handling

This table shows the carbon dioxide, methane, and nitrous oxide emissions generated from the handling (transport) of chemicals, which are required for odor control and treatment based on estimated demands of the alternatives at buildout. The chemicals include sodium hypochlorite, sodium hydroxide, thickening polymer, dewatering polymer, alum, filter polymer, and methanol.

The existing system does not require the use of chemicals and therefore does not generate CO_2e emissions in this category. In general, the alternatives are generating nearly the same amounts of CO_2e emissions.

DIRECT EMISSIONS

Recall *direct emissions*, consistent with the CCAR protocol, are those resulting from sources owned or controlled by the agency, such as stationary combustion sources, mobile combustion sources, and treatment unit processes. For this inventory, this includes treatment unit process emissions (e.g. septic tank venting).

Table 9. Carbon Dioxide Equivalent (CO_2e) Emissions Venting directly from Septic Tanks

This table shows the methane emissions generated (and vented) from the anaerobic digestion of settled solids within the septic tanks for the existing and STEP collection system alternatives. Remember that methane has a GWP 21 times that of carbon dioxide. The existing system generates the largest amount of methane annually due to the high concentration of BOD in the septic tanks.

May 27, 2009

Orenco Systems®
Incorporated

814 AIRWAY AVENUE
SUTHERLIN, OREGON
97479

TOLL FREE:
(800) 348-9843

TELEPHONE:
(541) 459-4449

FACSIMILE:
(541)459-2884

WEB SITE:
www.orenco.com

Department of Planning and Building
Attn: Ms. Sarah Christie
Chairperson SLO Planning Commission
976 Osos Street, Room 300
San Luis Obispo, CA. 93408

Subject: **Green House Gas (GHG)**

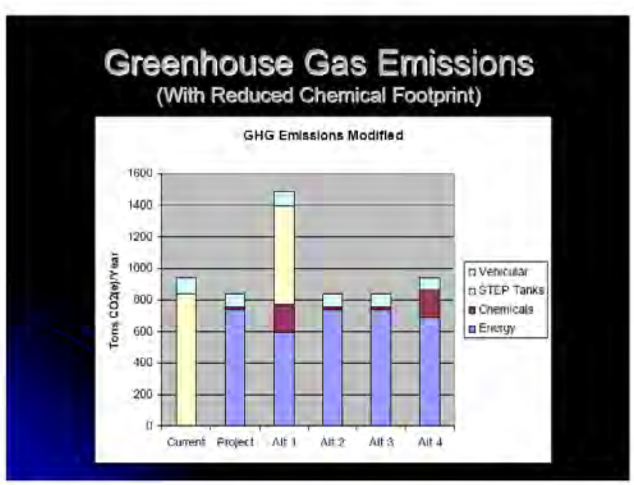
Honorable Planning Commissioners:

On April 30, 2009, San Luis Obispo County Staff presented data that was intended to convey gravity sewer wastewater collection system as a much lower producer of GHG emissions than a comparable STEP (Septic Tank Effluent Pump) wastewater collection system. Subsequent to the staff presentation, Carollo Engineering, on behalf of the County, has prepared a GHG Technical Memorandum. Orenco Systems, Inc. has reviewed the data and believes that the data has been manipulated and misrepresented with the apparent intent of supporting a gravity sewer project. Specifically, data has been misrepresented in the following ways:

1) Significant GHG emissions associated with gravity sewer construction have been presented with the apparent intent of hiding the magnitude of this GHG impact.

2) Theoretical methane emissions from septic tank venting have been exploited to the maximum extent possible with the apparent intent of promoting high GHG emissions for STEP systems.

The staff presentation included the following graphic comparing GHG emissions for the four project options.



For reference, Alternative 1 is the only collection/treatment option that includes STEP collection. Also, it is important to note that this comparison is not a comparison of STEP and gravity but is actually a comparison of project alternatives that are inclusive of dissimilar treatment strategies.

Orenco Systems, Inc. previously provided comments regarding the GHG Technical Memorandum that was prepared by Carollo Engineering. A copy has been attached for reference. To-date, our comments have not been addressed, nor has the Technical Memorandum been finalized. Much to our dismay, the Technical Memorandum has been conveyed publically as a finalized document that labels STEP collection as an inferior option for wastewater collection when comparing GHG emissions with conventional gravity sewer.

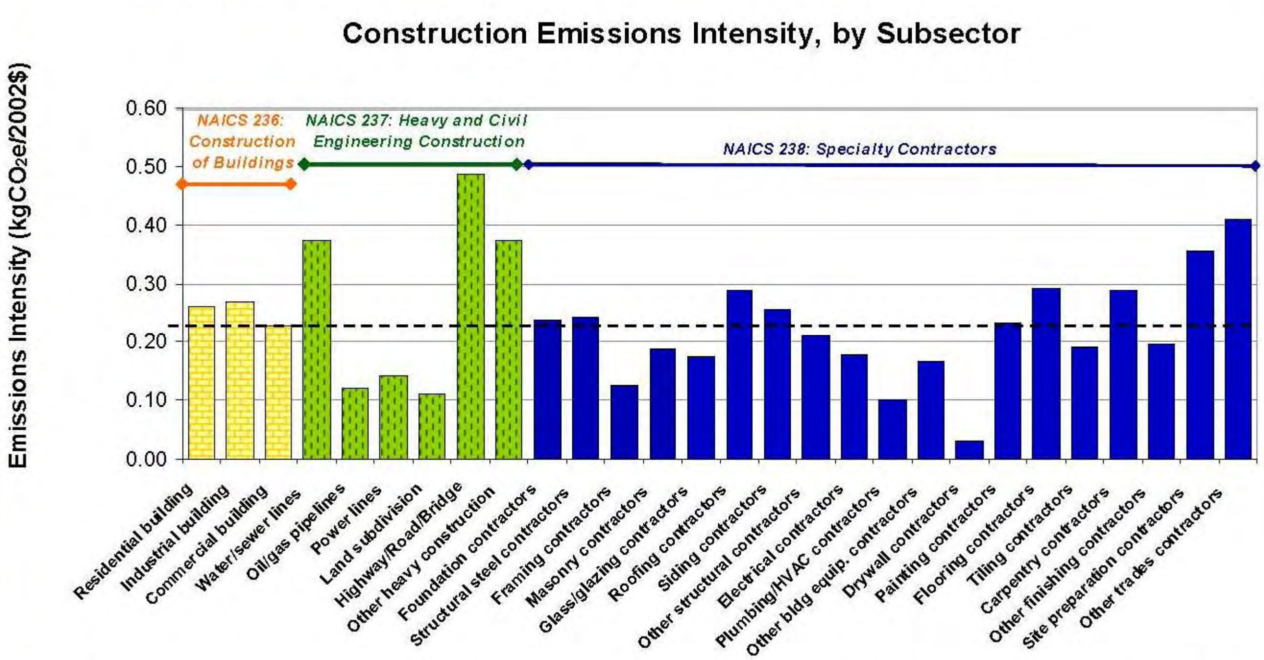
Discussion of our two major concerns regarding the presentation of data follows:

<u>Construction Related GHG Emissions</u>:

GHG emissions data, first presented by Carollo Engineering in the Technical Memorandum, and now being presented by staff has minimized the impact of GHG emissions associated with construction activities. In fact the staff presentation appears to avoid any discussion of GHG emissions associated with construction activities altogether. Construction GHG emissions are largely associated with fossil fuel consumption, electrical consumption, material production and material transportation.

The GHG emissions associated with construction of the gravity sewer options are extremely large. In rough numbers, STEP construction related GHG emissions are approximately 1/2 that of gravity sewer. In February of 2009, the EPA authored a document entitled "Potential for Reducing Greenhouse Gases in the Construction Sector". Figure 4 of this document shows water/sewer construction as one of the most intensive producers of GHG emissions per dollar spent. Figure 4 is included below for reference.

Figure 4: Construction Industry Emissions Intensity, with Breakdown by Subsector, in $MTCO_2e/2002k\$$

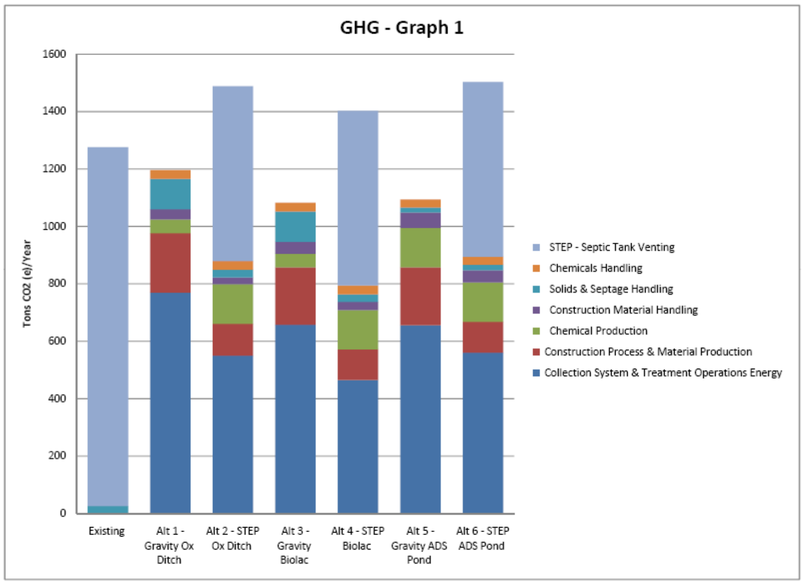


Note: A table of emissions and value added for each subsector is available in Appendix B, and descriptions of NAICS codes for construction subsectors are located in Appendix C.

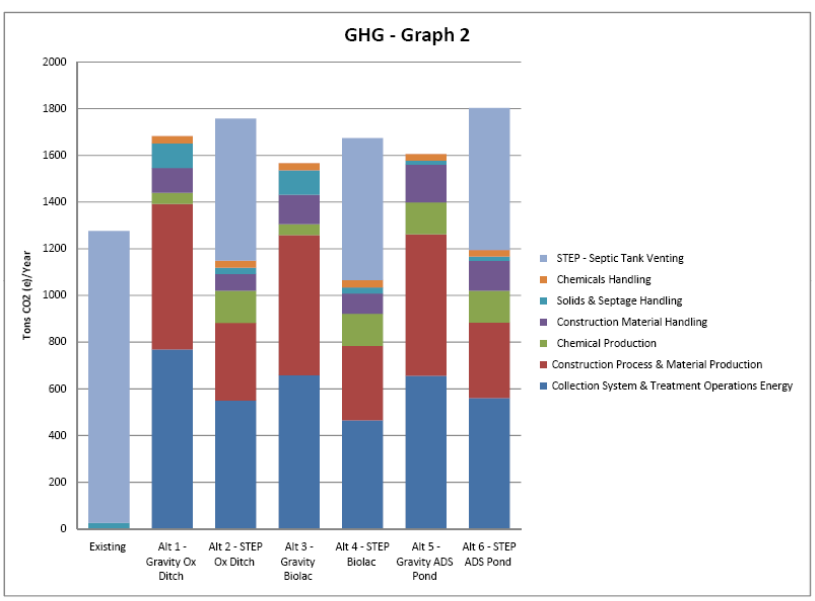
Despite the significant GHG emissions associated with gravity sewer construction, the GHG Technical Memorandum included a methodology that appears to hide the magnitude and overall impact. The analysis annualized the immediate construction related impacts over a 30 year period. Essentially, they took an immediate and very large impact and averaged it over 30 years.

Through numerous literature reviews of pertinent GHG inventory guidelines we have been unable to find any support for the annualization of construction related GHG emissions. Furthermore the annualization of construction GHG emissions fails to support Green Building initiatives.

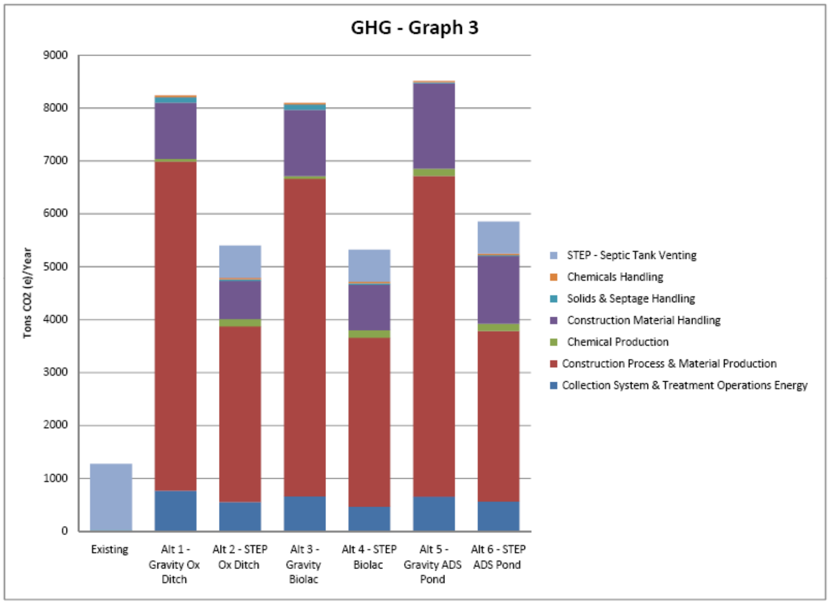
Graph 1, produced by Orenco Systems and shown below, includes GHG emissions associated with construction and annualizes them over 30 years. As you can see, annualizing this impact has made the two applicable impacts (construction material handling, construction & material production) appear to be marginally significant in the overall accumulation of GHG emissions. By this apparent manipulation of data, the benefits of STEP collection construction and material handling are hidden from the reader by making gravity sewer construction and material handling less significant in the annual emissions. Again remember, the GHG emissions for construction have been divided by 30 which makes gravity sewer annual emissions smaller relative to the other impacts.



If we simply change the annualization period for the construction impacts to 10 years, the outcome of the analysis changes significantly. Graph 2, shown below was developed by changing the annualization period from 30 years to 10 years. At 10 years, the gravity sewer options have changed significantly and the construction related GHG emissions are a dominant impact to the outcome of the analysis. We're not speculating that 10 years is an appropriate annualization period, we're simply trying to show how a subtle change in the approach can change the outcome significantly.



To further demonstrate this issue, we could restate the GHG impact of construction related activities without annualizing the data. Graph 3 shows the GHG emissions for construction related activities as an initial impact. Without annualizing the construction related impacts, the construction related GHG emissions are the dominant factor that affects the outcome of the GHG analysis. At the very least, it becomes very obvious that the construction related GHG emissions should not be ignored in the overall discussion. In rough numbers, the construction related GHG emissions are equal to approximately 7 years of operations GHG emissions.



We believe that construction related GHG emissions should be detailed and evaluated separate from operational GHG emissions. Again, in rough numbers, any alternative inclusive of STEP collection would have approximately 1/2 the construction GHG emissions when compared to gravity sewer based options. If GHG construction emissions of STEP collection was compared directly with gravity collection (no treatment), we believe STEP would be much lower than 1/2 of the of gravity.

<u>Methane from Vented STEP Tanks:</u>

Our second major issue is with the leverage staff has capitalized on with regards to septic tank venting. It has become very clear that their case is solely built on leveraging vented STEP tanks as the overriding concern in a GHG comparison. Methane gas, having a GHG impact that is 21 times that of CO_2 can have a drastic impact on the overall GHG computation with very subtle changes in the quantity of methane discharged. This became apparent when the GHG calculations for gravity sewer utilized a methodology that would truck biosolids 100 miles away to a compost site rather than use local landfilling or land application. Essentially, CO_2 emissions for hauling were lower than risking any methane impacts from biosolids.

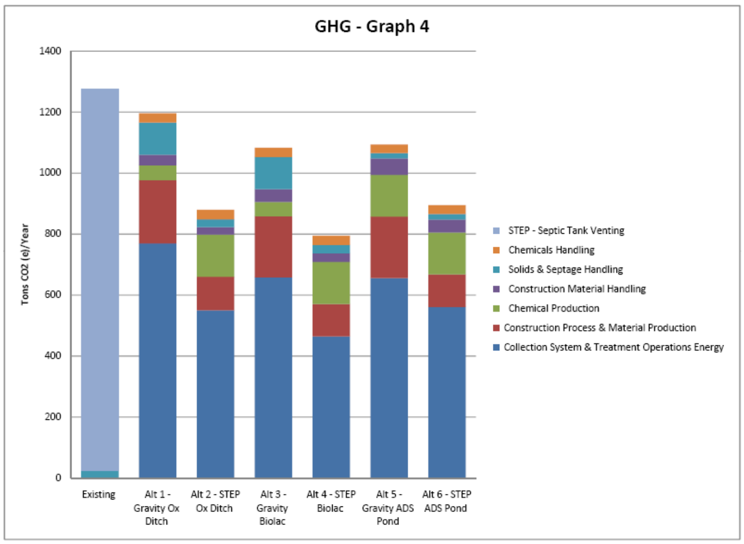
Our comments on the technical memorandum questioned the magnitude of the STEP tank methane being produced. We questioned the inconsistency between the construction impacts and the methane STEP tank emissions. While construction impacts were averaged over 30 years, septic tank emissions were derived from day one, assuming non existing tanks that would materialize upon full build out A real and immediate impact in the gravity sewer column was averaged, while a nonexistent impact from nonexistent STEP tanks was utilized in day one of the analysis.

We also questioned the science behind methane production as ground temperatures in the Los Osos region do not support methane production. Furthermore, more frequent pump-out intervals can also be utilized should methane production occur. It is critical to note that the accuracy of GHG emissions must be verifiable. We do not believe that the quantity of methane gas from vented STEP tanks is accurate nor is it verifiable.

During the Design/Build interview we provided a mitigation strategy that was intended to identify and terminate methane emissions should they occur. Given the uncertainty in this emission, this strategy would provide actual data that could be utilized in a GHG inventory. Mr. Hutchinson was on the interview team and should be familiar with the mitigation strategy presented. Essentially, we proposed to measure methane production from STEP tanks with readily available monitors. This monitoring would be added to the proposed preventative maintenance schedule. If methane production was measured from tank vents, we would proactively pump the tank of solids. We understand that Mr. Hutchinson acknowledged this strategy but pointed to the negative impact (more truck traffic) of a more aggressive pump-out schedule. Again, the GHG Technical Memorandum utilized 100 mile trips to dispose of gravity sewer biosolids to avoid methane production. If Mr. Hutchinson has a problem with the truck traffic, we would suggest that methane be quantified for local biosolids handling.

It is very important to note that a more aggressive pump-out schedule may not be necessy. Furthermore, we proposed that a more aggressive pump-out schedule could be handled with a dewatering septic truck to significantly reduce the number of pump-out trips. Finally, despite our recommendation of 10 year pump-out intervals, the GHG emissions are already based on an aggressive 5 year pump-out interval. If 5 years became 3 years, we don't believe that the impact to the overall GHG calculation would be significant.

In the overall production of GHG emissions, the elimination of any potential Methane emission, partnered with a lower impact methodology for sludge handling would generate a significantly different outcome than the analysis completed by staff. Graph 4 demonstrates the comparison of GHG emissions when methane gas is mitigated. Please note that the significance of the solids handling, with regards to GHG emissions is minimal. Also note that this graph utilizes a 30 year annualized construction impact for GHG emissions.



The EIR readily uses mitigation strategies for very significant environmental impacts associated with gravity sewer. The EIR makes no effort to consider or document any mitigation strategy for a STEP option. The mitigation strategy presented is reasonable, low cost and should have been considered.

We do not believe GHG emissions for STEP operation to be higher than gravity sewer.

Thanks for taking the time to consider these comments. You can reach me (800.718.4046) or Mike Saunders (866.914.9454) anytime.

Sincerely,

Michael Saunders
National Accounts Manager

Members of the Planning Commission

In a letter to the Commission last week, I pointed out that the soil displacement numbers presented in an important report describing the impact of the STEP collection system were wrong. The report is, *Statement of Key Environmental Issues for the Collection System of the Los Osos Wastewater Treatment Project* (September2008) collaboratively authored by the local chapters of the Surfrider Foundation and the Sierra Club, SLO Green Build, the Terra Foundation, Los Osos Sustainability Group and the Northern Chumash Tribal Council.

There are three levels of error in the way soil displacement is calculated. The fundamental assumptions concerning the length and width dimensions of a 1,500 gallon STEP tank are wrong. Additionally, the side clearance for the excavation is less than specified in Orenco's installation instructions. Lastly, there is a math error in calculating the excavation volume from the length, width and height data. The initial error for the single installation is then compounded by multiplying it by the total number of tanks (4,769). As a result, the report's calculation underestimates the soil displacement for the STEP installation by a factor of two.

Originally, I attributed the errors to whoever might have assembled the information for the environmental groups' report. In a more careful reading of *Statement of Key Environmental Issues*, I discovered that the source of the erroneous tank dimensions and calculations is provided in footnotes.

According to the footnotes, the incorrect information was provided to the report's authors by Dana Ripley. The relevant report sentences together with their source footnotes are:

STEP tanks require soil displacement approximately 8'W x 14'L x 8'D (approximately 23 cubic yards) to accommodate the 1,500 gallon tank measuring 6'W x 11'L x 6.25'D.[23]

> [23] *Dana Ripley, Ripley Pacific Company. Personal communication with Dr. Mary Fullwood, August 17 and 19, 2008.*

The cubic yard soil disturbance estimates are 440,000cy for gravity versus 260,000cy for STEP.[30]

> [30] *Dana Ripley, Ripley Pacific Company. Personal communication with Dr. Mary Fullwood, September 1, 2008*

(My letter last week included copies of the appropriate Orenco tank specifications and tank installation instructions - as well as an accurate volumetric calculation).

Dana Ripley prominently cites the conclusions of the environmental group's report in his rebuttal to the county's treatment of his engineering team. But there is circularity in his argument since the data Mr. Ripley provided would have influenced the environmental group's assessment of alternatives. The Chumash Council would favor whatever collection system they believed had the least impact on cultural resources. The Sustainability Group has likened the STEP installation process to "microsurgery" compared to conventional surgery. But it is quite possible, it is the STEP system that involves the greater order of surface and soil disruption. . It is unknown how the environmental groups would have weighed the alternatives had they been supplied with accurate numbers on tank size and installation.

David Dubbink, Ph.D., AICP
Los Osos

June 8, 2009

Maria Kelly <mariakelly@charter.net>
06/10/2009 09:11 AM

To planningcommission@co.slo.ca.us
cc
bcc
Subject Industry Review of onsite/STEP tanks

Hello,
I am attaching a paper published in 2004 regarding the need for standardization of construction and installation of underground tanks as utilized for residential sewage. The final author on this paper is a gentleman by the name of Terry Bounds who, at the time and may still be, the Vice President of ORENCO. The company that has been in and around this community for 10 years presenting their product as a viable option. This is a simple read and very informative.

In addition, I would request that if the Planning Commission has questions regarding the specifics of design or basin management or the ISJ process, that you seek to utilize Rob Miller who is and has been the LOCSD district engineer for the past 10 years. He is from Wallace group and has been the district representative on the project team with the county.

If you are not going to capitalize on the expertise of county staff, it would seem prudent to utilize other local knowledge.

Thank you for your time and continued efforts.
Sincerely,
Maria M. Kelly
Property Owner
Los Osos

Watertight Septic Tanks.pdf

WATERTIGHT SEPTIC TANKS: NO MORE EXCUSES

Eric S. Ball, Harold L. Ball, Jeffrey L. Ball, and Terry R. Bounds*

ABSTRACT

The septic tank — a 150-year-old technology — is still the "heart" of virtually all onsite systems and most decentralized wastewater collection systems. In fact, septic tanks are very efficient anaerobic digesters that require no energy input and yet reduce contaminants in incoming raw wastewater by two-thirds.

In spite of the importance of the septic tank to the onsite industry, tens of thousands of leaky and/or structurally substandard tanks are still installed every year in the United States. If the onsite wastewater industry is to be taken seriously by the mainstream, quality components must be available — beginning with the septic tank, the one component that is common to virtually every system.

While the industry continues to be plagued with poor-quality tanks, some manufacturers do produce high-quality, watertight, structurally sound tanks. Typically, these high-quality tanks are found in locales that actually require manufacturers to prove (i.e., test) that their tanks are watertight and structurally sound.

In order for high-quality tanks to proliferate, the following key issues must be addressed:

- The onsite industry must define, understand, and acknowledge the reason why watertight and structurally sound septic tanks are important.

- Current national tank standards must be improved (current standards are inadequate) and adopted.

- 100% of all tanks must be water tested in the field during installation.

Key Words: septic tank, watertight, structurally sound, standards

BACKGROUND AND DISCUSSION

The ongoing industry-wide problem of structurally inadequate, leaking septic tanks is well established, and has become more apparent with the increasing use of effluent sewer collection systems and onsite pretreatment systems over the past 25 years.

The commonly held view — that the onsite industry does not have a widespread leaking tank problem — has been perpetuated by the following factors:

---

* Eric S. Ball, PE, VP Product Development; Harold L. Ball, PE, President; Jeffrey L. Ball, PE, VP Marketing & Sales; Terry R. Bounds, PE, Vice President; all of Orenco Systems, Inc., 814 Airway Avenue, Sutherlin, OR 97479, www.orenco.com.

1. The majority of septic tanks in the US are still used on standard gravity drainfield applications, where problems created by leaky tanks are often not readily apparent. In contrast, leaky tanks are exposed quickly when used in effluent sewers and onsite pretreatment systems where control systems and/or system management is in place.

2. Most jurisdictions do not require water testing of every installed septic tank. Only Oregon enforces this requirement on a statewide basis. People are often shocked to discover the extent of the problem when thorough investigations are launched.

3. Common myths claim, "Leaky tanks will seal themselves up over time," and, "It doesn't matter if a tank leaks…it all goes in the ground anyway." For a discussion of why it's not okay for a tank to leak, see Mark Gross' paper entitled "Watertight Tanks." (Gross, 2004)

4. Many jurisdictions that do require water testing require the tank to be watertight only up the outlet invert. This kind of test can provide a false sense of security, because groundwater and surface water can still enter any leaky joints above the outlet.

5. Septic tanks are usually buried without access risers to grade. Only Oregon and Wisconsin require access risers to grade on a statewide basis. It is not realistic to expect that tanks will be routinely inspected for leakage or the need for septage pumping, if one has to dig (and often locate first!) to perform the inspection. The end result is that no maintenance is done until there is a failure. At this point, a pumper is typically called in, who then charges an hourly rate to find and expose the septic tank access, which normally exceeds the cost of a riser and lid.

While no nationwide studies have been performed to determine the percentage of installed tanks that leak and/or fail structurally, a quick review of a few effluent sewer collection systems and localized tank studies provides a glimpse into the types of problems that are common:

1. In the late 1970s, Glide, Oregon, installed what was, at the time, the largest effluent sewer in the United States, with nearly 500 tanks. One of the earliest dilemmas faced by the project's engineers was how to get watertight tanks. No regional tank manufacturers were willing to bid the tanks with a one-year warranty on watertightness, as called for in the specifications. The first 75 tanks brought in, fiberglass tanks built in Colorado, failed at a rate of over 90% during the above-ground water test prior to installation. The project engineers ended up designing a structurally sound, watertight concrete tank that local manufacturers were willing to build. Both concrete and fiberglass tanks were used on the final 400+ installations.

2. In the early 1980s, the community of Dexter, Oregon, installed an effluent sewer for approximately 100 homes. The first 96 tanks installed were polyethylene. All collapsed within one year and were replaced with concrete tanks. The collapsing tanks allowed infiltration — along with lots of silt — into the tanks and collection lines. Three months after startup, flows to the recirculating sand filter were more than 10 times the average flow due to the infiltration. Some tanks were reportedly one-third full of silt. The volume of silt that made its way through the collection system was a major contributing factor for the need to reconstruct the recirculating sand filter eight years later.

3. In 1990, Penn Valley, California, had an effluent sewer installed using approximately 225 concrete 1000-gallon tanks. In 1991, it was estimated that approximately 75% of these tanks were leaking (infiltration), mainly from the joint created between the monolithically cast tank and its set-on-top lid. A video camera was inserted into many of the tanks to document and observe the infiltration, which in some cases actually exceeded the capacity of the tank's discharge pump.

4. In 1996, the City of Browns, Illinois, installed an effluent sewer with approximately 100 "clamshell" concrete tanks. The first 22 tanks delivered leaked at the midseam. The tank manufacturer repaired these tanks in the field and then began using an improved sealing method on the remaining tanks. After the project was completed, the tank manufacturer reported that a monolithically poured tank would have been a better design to meet the watertight specification.

5. In 1995-1996, Mohave County, Arizona, water tested 500 septic tanks. At the beginning of the testing, approximately 80% of all tanks failed the water test. Note: the water level in the tested tanks was raised only to the invert of the outlet, so that seams, joints, and tank lids above this level were not tested. By the end of the test period, 22% of the 500 tanks had failed the "partial" water test. (Bishop, 1996; McCloy, 1995)

6. In 2002, Clermont County, Ohio — a progressive county that uses many advanced onsite systems — implemented a requirement that all septic tanks must be water tested at the time of installation. This new requirement led to many tank manufacturers and installers trying to repair tanks in the field. In fact, one local manufacturer now refuses to sell tanks in Clermont County because of this rule. The State of Ohio is now considering making this rule mandatory statewide. (Benson. 2003)

7. In 1991, Grant County, Washington, presented a report (Glassco, 1991) on leaking septic tanks indicating that, of the tanks they tested during installation, nearly every one leaked and had to be repaired. The study also claimed that 95% of tanks statewide are inspected "dry" and do not receive liquid until after they are buried.

8. In the early 1990s, a small 30-home effluent sewer was installed up a ravine just outside Los Gatos, California. Fiberglass tanks were originally specified, but the installing contractor convinced the engineer to accept a polyethylene tank. Many of the tanks collapsed and were replaced, or, because of the tough terrain, were encased in concrete to prevent further collapse.

9. In the past three years, two effluent sewers in Arkansas, The Bridge subdivision and Shilo Creek, have had multiple polyethylene tanks collapse and require replacement. (Nealey, 2004)

10. In 2001-2002, an Arkansas firm purchased more than 100 fiberglass tanks, shipped to them in halves. After assembling the tank halves, they water tested every tank and found not a single one to be completely watertight. Every tank had to be repaired; most had 10 or more leaking spots, and sometimes as many as 40 pinhole leaks. (Nealey, 2002)

11. In 1994-1995, the City of Gloucester, Massachusetts, installed the first phase (278 tanks) of its effluent sewer. A specification was written for structurally sound, watertight tanks, and regional tank manufacturers were invited to submit tanks that met the specification. None was submitted, and the City ended up buying fiberglass tanks shipped from California.

These examples are just the tip of the iceberg and represent experiences of only a handful of people. If one has any doubt of the seriousness of the problem, go to a few of the local tank manufacturers, fill a tank completely to its soffit (with inlet and outlet plugged with a cap) and watch what happens. More often than not, the tank will leak. To test structural integrity, pull six or seven inches of mercury vacuum on the tank. The percentage of resulting structural failures will surprise many. Granted, some manufacturers build nearly all tanks 100% watertight and structurally sound; this is not the case, however, for the majority.

Some Differing Views

A recent National Precast Association article (Frank, 2004) suggested two main reasons many in the onsite industry think there is a significant problem with leaky concrete tanks: (1) because "…of a few bad apples that have damaged the reputation of the industry," and (2) "…regulators…do not…consistently specify and enforce conformance to appropriate standards." While reason (1) severely underestimates the problem and is an unfair label, reason (2) is right on the mark. The leaky tank problem—for all types of tanks, not just concrete—is far more widespread than a "few bad apples." While there are likely a few unscrupulous producers (as there are in virtually every industry), it is not really a fair assessment of all the tank manufacturers producing leaky tanks. Because of the nearly universal lack of testing and enforcement of watertightness, many manufacturers simply don't know their tanks leak or don't think it matters. And even if they are aware of the importance, many can't build a truly watertight tank and compete when there's not a level playing field in their market.

It has been proposed in a draft NOWRA tank model code that tanks and appurtenances could be watertight to different conditions, depending on site conditions and risks associated with inflow and/or outflow from a non-watertight tank. For example, "classifications" could be developed in which a tank is watertight to the inlet, outlet, top seam, or riser connection. This is a bad approach. There is never any guarantee infiltration will not occur. Even if high ground water conditions are not present, surface runoff and saturated soil conditions from rain events can cause infiltration.

Some have argued that a drainfield could be sized to account for extra water. Since the "extra water" is not quantifiable and could amount to thousands of gallons per day, this is not a practical solution.

SOLUTIONS AND RECOMMENDATIONS

So how do we overcome this industry-wide problem? Industry must adopt the following:

1. Provide loading conditions for which all septic tanks should be designed and on which national standards should be based.
2. Require structural calculations that show a tank's ability to withstand the loading conditions.
3. Require documented testing — both structural and watertightness — of each model a manufacturer makes. Do periodic testing to ensure quality is maintained.
4. Require watertightness testing of every single tank at the time of installation.

Loading conditions and testing methods are provided below.

Septic tanks — whether they are used for “standard” gravity drainfields, advanced pre-treatment, or effluent sewers — are almost always buried in the ground. They are, therefore, subject to loading conditions that can be quantified. All tanks should be built to withstand the following loading conditions.

Recommended Loading Criteria:

- There shall be 130 lb/ft^3 for minimum weight of saturated backfill, or 100 lb/ft^3 for unsaturated backfill (500 lb/ft^2 minimum).
- Minimum lateral loading shall be 62.4 lb/ft^3. Lateral loading shall be determined from ground surface.
- The tank shall also support a concentrated wheel load of 2500 lb. Note: This does not mean the tank is designed for traffic, but instead recognizes that tanks may be occasionally or accidentally driven over.

Four typical loading conditions should be analyzed:

1. Four-foot bury + full exterior hydrostatic load (groundwater to grade).
2. Four-foot bury + full exterior hydrostatic load + 2500 lb. wheel load.
3. One-foot bury + unsaturated soils + 2500 lb. wheel load.
4. Tank full, interior hydrostatic load and unsupported by soil. This case represents the tank full of liquid at 62.4 lb/ft^3. This condition addresses seam and haunch stress-strain relationships that occur during watertightness testing, as well as poor soil bedding conditions that provide inadequate support.

Allowing tanks with installation limitations that fall below these suggested loading conditions can be problematic. Some manufacturers limit groundwater levels above the tank bottom, prohibit tanks from being completely pumped out, prohibit tanks from being used as pump tanks (because of liquid level drop), or prohibit installation in certain soil types. Reasons not to allow “installation-limited” tanks include the following:

1. It is not common for the site conditions of every tank installation to be evaluated properly and effectively. Potential seasonal groundwater conditions are often difficult to predict, especially when influenced by surface water runoff.

2. Ensuring that a septic tank doesn’t get pumped when groundwater reaches a certain level is not a practical approach.

3. It is very common to bury tanks down to four feet. All tanks should be designed to at least this minimum.

4. Contractors are often making the judgment call on whether site conditions are adequate for a tank with installation limitations. However, most contractors do not have the soils and/or engineering background to do a proper site analysis.

Proposed Minimum Testing Requirements:
In addition to undergoing an engineering analysis that shows a tank can withstand the four loading conditions above, all residential size (2000 gallon or smaller) septic tanks should be able to pass two easily performed tests:

1. The first is the “parking lot” test to validate watertightness and some structural loading conditions (Load Case 4 in the “Recommended Loading Criteria” above). This test involves placing a tank on top of the ground with no external support, and then completely filling it with water. The tank should be 100% watertight with minimal deformation; in other words, the tank should be usable as it sits above ground. This test should be performed over a 24-hour period to account for water absorption (primarily concrete) and creep (primarily polyethylene and polypropylene).

2. The second is a vacuum test to validate structural strength. With the tank standing unsupported on the ground, a vacuum of minimum 6.5 in. Hg (equiv. to 3.2 psi or 7.4 ft of water pressure) is pulled on the tank, approximating the load on an empty tank buried four feet, water to grade, and a 2500-lb wheel load. This level of vacuum is maintained over a minimum eight-hour period. Deformation criteria are the same as in the parking lot test. It’s important to remember that the 6.5-in. vacuum is a minimum and does not consider any safety factor. The tank should be capable of withstanding a higher vacuum level, depending on a desired or necessary safety factor that is applied. Note: A vacuum test is not recommended to verify watertightness. It is possible for a tank to pass a vacuum test, but fail a watertest for the following reasons:

    - It can take a very long time for a vacuum drop in a tank with pinhole leaks.
    - Water can wick (by capillary action) through a tank that has passed a vacuum test.
    - The internal vacuum can pull joints and seams airtight that would otherwise leak with the forces of a watertest.

    While the above two tests do not necessarily need to be performed on every tank, a manufacturer should be required to perform these tests periodically to ensure the tank is being manufactured properly. Some of the more savvy manufacturers perform a quick (approximately 30 minutes) version of the parking lot test on every tank to eliminate having to deal with repairs in the field.

3. EVERY septic tank must be water tested in the ground, either before backfilling or after partial backfill. In this test, the water level is brought up two inches into the access riser, so that the inlet, outlet, and riser connections are all proven to be watertight prior to final backfilling. If risers have joints between sections, they also must be tested for watertightness. Note: The common complaint that water is not easily available is not a good excuse. Every tank should be started up full of fresh water and never allowed to fill up only with raw sewage.

CONCLUSION

NOWRA's Model Tank Code should include the recommended loading criteria and testing methods outlined above. Further, existing septic tank "standards" are inadequate in terms of structural requirements and watertightness testing requirements, and should be updated to reflect the level of loading and testing provided here.

Without high quality, long-lasting components — starting with the septic tank — our industry will continue to suffer from the reputation of delivering temporary solutions until the "real" sewer comes. The benefits to our industry, to the environment, to and our customers of truly structurally sound, watertight tanks is well worth the extra effort required to produce them.

REFERENCES

Benson, Ralph. 2003. Personal communication.

Bishop, Colin. 1996. Results and discussion of watertightness testing of septic tanks in Mohave County, Arizona. In: Proceedings of the 1996 NOWRA Annual Meeting. NOWRA, P.O. Box 1270, Edgewater, MO 21037.

Frank, Dean A. 2004. Serious about septic tanks. MC Magazine, National Precast Concrete Association, January/February 2004.

Glassco, John, 1991. Report on leaking septic tanks in Grant County 1989-1990. Grant County Health District. Ephrata, Washington.

Gross, Mark. 2004. Watertight tanks. In: Proceedings of the 5th Southwest Onsite Wastewater Management Conference & Exhibition, Laughlin, Nevada, January 28-29, 2004.

McCloy, Mike. 1995. AZ seeks to plug septic tank leaks. Phoenix Gazette, August 4

Nealey, Sonny. 2002. Personal communication.

Nealey, Sonny. 2004. Personal communication.

Elizabeth Dietzmann, J.D.

Some Thoughts on Obtaining Easements for STEP Systems (Part One)

Editor's Note: This article is the first in a two-part series that will be concluded in the next issue.

Obtaining easements for a wastewater project has traditionally been a straightforward, if sometimes tedious, process. A typical gravity sewer collection system is owned by a governmental entity, and the actual mains are either located in the right-of-way or along the edge of the customer's property. If the mains are located along the edge of the customer's property, an easement is needed for that strip of land where the actual mains will run. The actual service line that runs from the main to the customer's house is owned by the customer and so no easement is needed.

Now along come septic tank effluent pump/gravity (STEP/STEG) collection systems, which for the sake of brevity, I will refer to as STEP systems, and all bets are off. I am seeing more and more STEP systems—either used with decentralized treatment or as part of a hybridized system to supplement gravity sewer in hard-to-serve areas. There are many aspects of STEP systems as they relate to easements that have not really been considered. STEP easements require a new kind of easement language. Traditional easement language will not cover the complexity of a STEP system, and new easement language that is tailored to STEP systems must be utilized. A thorough analysis of STEP easements may also lead to reconsideration of the ownership of the onsite STEP components on replacement projects and the requirements of developers to include necessary easement language on new projects.

Perhaps the easiest way to discuss the new language requirements for STEP systems is to discuss the language in traditional easements. Keeping in mind that people from all 50 states may read this, and that in many respects easements are creatures of state law, I will make some broad distinctions. Basically, there are three types of easements.

Blanket Easements

The oldest and least used today is called a blanket easement. This is an easement that, technically, covers the entire piece of property so that the government entity can run the pipe, electric line, road, or railroad track wherever it wants. More importantly, wherever that line is run becomes the de facto location and description of the easement. You almost never see this type of easement today. I don't know of any property owner in his or her right mind who would sign one. I see them most often in old deed records from the 1800s and early 1900s, when railroads, electric cooperatives, and water districts were trying to get organized and tracts of land were much larger. In today's world, with land being increasingly divided into smaller and smaller parcels, these easements would make land worthless. Some jurisdictions will not even accept blanket easements because they impose too great a potential cloud on the title of the real estate.

Centerline Easement

More recently, centerline easements are most commonly used. Many of the state and federal public project funding agencies have required this type of easement for many years, and so most local governments are accustomed to using centerline easement language. A centerline easement is pretty self-descriptive. The easement is described as an easement of a certain width lying along the centerline of the pipe as constructed. Providing that the property owner has some idea based on the plans and specifications of the project of where the actual pipe will run, these are not terribly controversial.

Deeded Easement

If the situation calls for it and there are economic development reasons, or the parcel has too may other existing structures located on it, the property owner may insist on a deeded easement. This third type of easement is the most precise but also the most expensive. For all intents and purposes, it is cost prohibitive on most public projects that involve existing homes, but it is possible to have a registered land surveyor work with an engineer to draft the actual meets and bounds legal description, down to the foot, of where the easement will run. This is commonly done today on new development, such as subdivisions or shopping centers, where all the utility easements are marked on the original plat.

Easement Contents

STEP easements will most likely be centerline easements, but the tricky part comes in the detail and the complexity of that easement. If you think about the components of a STEP system, you will get a sense of what the easement needs to contain. First, you have the collection main along the front or possibly the back of the property. This is analogous to a gravity sewer main. Then think about the onsite components of a STEP system: the service line leading from the collection main, the actual STEP tank itself, the control panel if separate from the STEP tank, and a power supply from either the house or a power pole. Add to that the temporary construction easements for all of that and you have quite a complicated document.

I would like to point out that after I opened my big mouth and whined on a Rural Development (RD) project because their accepted easement form did not address any of these issues, and that I had to get special approval from the regional counsel's office to add any language about STEP easements, I received a notice that all future project easements had to address STEP systems if they were being used. There was no mention of how that should look, of course, just that we had to include it. So I took the hint and wrote my own, which has been picked up on several RD projects. Hey, I like those guys. All they had to do was ask and I would have done it for them anyway!

So, based on the projects I have worked on, this is what a STEP easement description is going to have to look like. The easement sizes are not written in stone, but a number of engineers have felt comfortable with them:

- **a perpetual 20-foot-wide easement** with the right to erect, construct, install, and lay and thereafter use, operate, inspect, repair, maintain, and remove a wastewater collection main along the front of the property to be served, said easement to be centered on the line as installed;
- **a perpetual 15-foot-wide easement** with the right to erect, construct, install, and lay and thereafter use, operate, inspect, repair, maintain, and remove a service line on the property to be served, said easement to be centered on the line as installed;
- **a perpetual 7.5-foot-wide easement** around the perimeter with the right to erect, construct, install, and lay and thereafter use, operate, inspect, repair, maintain, and remove an effluent tank and control panel and any other necessary wastewater collection system appurtenances on the property to be served, said easement to be centered on the effluent tank as installed;
- **a 15-foot-wide easement** with the right to erect, construct, install, and lay and thereafter use, operate, inspect, repair, maintain, and remove an electrical line or junction box on the residence or structure to be served or electric pole for the operation of the effluent pump and any other necessary wastewater collection system appurtenances on the property to be served, said easement to be centered on the electrical components as installed; and,
- **a 30-foot-wide temporary construction easement** for the above-described perpetual easements, which will terminate upon the completion of the construction and/or installation of the wastewater collection line, effluent tank, electrical components, and service line on the above-described easements.

The fun continues if the project is replacing existing septic systems or gravity sewer. Then you will also have to determine if the new STEP tank is going to be located in the same place as the old septic tank, or if you need an additional temporary easement to either remove or crush the old tank in place. Once all these issues are taken into consideration, you still have to decide who is going to own the STEP system. Maybe the governmental entity has decided to build it itself for the sake of engineering and construction consistency. Then you would need only temporary easements. Maybe the homeowner is going to own the STEP components, so you don't need any easements at all. Or maybe the governmental entity is determined to build, own and maintain the STEP components.

So the complexity of STEP easements that really do the job have to be weighed against the compelling desire of management entities to have consistent maintenance and billing procedures. Is owning and controlling the STEP systems worth the upfront work that will require the engineers and attorneys to really think about the details of the projects, prepare STEP easements properly, and force the government entity to do quite a bit of project PR and homeowner education? I feel that it is, because the benefits more than outweigh the inconveniences. Not only do you maintain control of the STEP systems, you also end up with a truly informed public who are more likely to support many other even less popular aspects of the project, such as rate setting. It is shortsighted of the governmental entity to opt out of owning the STEP systems because obtaining STEP easements is too hard or they don't want to be bothered with managing the STEP systems.

Dealing with new construction is much simpler. The key is that the developer must include STEP easement language in his deed restrictions and on his plats. It has to be made crystal clear that no matter who installs the STEP components, they are the property of the governmental entity, and that entity has the right to enter the property for repairs, etc. If you fail to insist that the developer include this language, you may be forced to go back to new homeowners and get easements from them just like I outlined above.

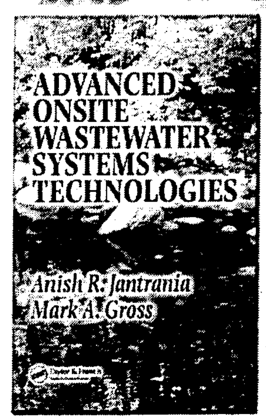
Keep in mind that most developers are either reusing the same deed restrictions and restrictive covenant language from their last project or one that they copied from someone else. Developers hate spending money on attorney fees. The governmental entity should be prepared to "step" up (I couldn't resist) with draft language that spells out the easement language and to make sure that it is included in the plat, restrictive covenant, and deed restrictions. Usually, as long as it won't cost too much, the developers are so delighted at the prospect of receiving wastewater service without having to spend a fortune on gravity sewer—all on the front end of the project—that they will gladly comply with these requests.

So, we have done a good job of unraveling the complexities of STEP easements. We have a good, tight easement that describes exactly what it needs to describe. The really interesting question is, after all the work is done to create the perfect STEP easement, what does a governmental entity do if a homeowner refuses to sign it? Beg? Plead? Use the power of eminent domain? That topic is what I will discuss in part two of this article. The U.S. Supreme Court opinion in the Kelo case has sent shockwaves through property rights advocates groups and even made the cover of *USA Today*. What does this case mean for the ability of governmental entities to use the power of eminent domain to enforce STEP easements? Stay tuned for the next exciting installment of "Some Thoughts on Obtaining Easements for STEP Systems."

Elizabeth Dietzmann, J.D., is a consultant in the planning, development, and management of decentralized wastewater systems. She can be reached at **edietzmann@earthlink.net.**

NEW BOOK

Explores Advanced Onsite Wastewater Systems



Advanced Onsite Wastewater Systems Technologies explores the use of these technologies on a wide-scale basis to solve the problems associated with conventional septic tank and drainfield systems. The book is slated for publication in January 2006. The authors, Anish R. Jantrania and Mark A. Gross, discuss a regulatory and management infrastructure for ensuring long-term, reliable applications of onsite systems for wastewater management. The book and its supporting Web site (**www.advancedonsitesystems.com**) are an information catalog for advanced onsite wastewater technologies. This combination offers tools aimed at helping onsite wastewater professionals communicate effectively with each other and their clients, thus minimizing the confusion and misunderstandings often related to the use of advanced onsite systems.

The authors provide an overview of advanced onsite systems technologies and compare them to conventional onsite systems and centralized wastewater systems. They present key concepts for decentralized wastewater solutions and information about currently available advanced onsite wastewater treatment and effluent dispersal technologies. The book delineates a management, regulatory, and planning framework for adopting the use of advanced onsite systems technologies as alternatives to conventional septic systems and centralized collection and treatment plants. It concludes with an exploration of the future of advanced onsite systems technologies and their uses.

A toolbox for service professionals, regulators, and community planners, the book highlights objective methods to assess the performance of technologies and examples of real-world applications. The authors detail a solution-driven and performance-based regulatory framework for the use of advanced onsite systems as a true alternative to centralized collection and treatment plants and offer guidance on how to plan for future growth with such systems.

The book can be ordered online at **www.crcpress.com** or via phone at (800) 272-7737.

LEGAL COMMENTARY

By Elizabeth Dietzmann

In the first part of this commentary, I talked about STEP/STEG system easements—what they are, issues of ownership, and appropriate legal language. Typically, easements for STEP/STEG systems (or STEP systems, for brevity) are more complicated than "big-pipe" sewer easements for at least two related reasons. One, the components of a STEP system likely will be located in a homeowner's yard. This isn't much of a problem in new developments, but replacement projects are another matter. Typically they're paid for with state and federal funds that are loaned to a governmental entity, such as a town or water district. That creates complication No. 2: The funding agency will require mandatory connections, which will in turn necessitate STEP easements from each homeowner.

Mandatory connections have always been a source of controversy in any type of public sewer project. For a number of sound reasons, the lending agency wants to make sure that all the people within the project area connect to the system. Requiring people to connect means that you know exactly how many users there will be. That allows you to design the treatment capacity to serve the actual number of users, which in turn allows you to calculate the cost of construction, which allows you to determine user fees, which allows you to make sure that the project will generate sufficient user fees to cover the debt service, O&M, and capital replacement costs.

Nevertheless, many projects have failed or run into expensive legal battles over the issue of mandatory connections. People just don't like being told they must connect to sewer. (Granted, this is usually not an issue inside city limits). In a system using STEP collection, this means in its simplest form that all homeowners within the project area will be required to have the on-lot STEP components installed in their yards. This is not a problem if they agree to sign an easement that is written like the one discussed in part one of this article. But what if they refuse?

The prevailing view of state and federal funding agencies (US Department of Agriculture, Community Development Block Grant programs) has been that in exchange for receiving that grant or loan, the public entity is expected to exercise the right of eminent domain and condemn the necessary property in order to comply with the mandatory connection requirement. While this may work just fine with collection lines lying along the front of a homeowner's property, it becomes a potential legal nightmare when you are talking about condemning the middle of someone's backyard. That is the real question here: Can a public entity use eminent domain to enforce a mandatory connection policy by condemning the area needed to install STEP collection in the homeowner's yard?

It is my opinion that the answer may be no, and that the power of eminent domain may not work on STEP systems. This is especially true after the decision in the case of Kelo v. City of New London, which held that local governments can seize private property for economic development. The ruling has created a backlash among state legislatures and land rights advocates alike.

Now for a quick lesson on the power of eminent domain so that we can track how it may affect STEP systems. We are talking about the Fifth Amendment, which provides, among other things, that no private property shall be taken for public use without just compensation. This is commonly referred to by lawyers as the Takings Clause to the Fifth Amendment. The issue in many condemnation cases is compensation, but in the Kelo case the key issue is public use. What constitutes public use? The fact was that, historically speaking, there was a common understanding among local governments and ordinary citizens that eminent domain would only be used for projects that would be owned and open to the public, such as roads or public buildings.

Then, in 1954, the Supreme Court handed down a decision in Berman v. Parker, 348, which upheld the constitutionality of urban renewal and basically changed the meaning of "public use." After that, it was generally understood that "public use" had come to be interpreted to mean "public purpose," and that for the most part this was left up to the state legislatures to decide. In fact, since then the Supreme Court has had a fairly long-standing policy of allowing deference to legislatures in this area. If a state chose to define "public purpose" more restrictively, that was the state's business. Some states did, Connecticut being one of them.

Under Connecticut law, condemnation for the sake of economic development was an acceptable public purpose, and the City of New London decided to use power of eminent domain to take property from a number of landowners (homes, apartments, shops) and turn it over to a private development authority. To the surprise of many, the Supreme Court agreed with the city and held by a 6-5 decision that the plan to redevelop the area unquestionably served a public purpose and that it satisfied the Takings Clause.

This has stirred up a hornet's nest of controversy, with watchdog groups closely scrutinizing state condemnation laws and legislative candidates promising "reforms" on both sides of the issue. The underlying issue in Kelo was whether or not the state could condemn property for the benefit of private parties—the developers.

But what if the taking has the opposite effect? What if it transfers ownership of land in the middle of someone's backyard to a government entity for the sole purpose of forcing that person to accept wastewater service? What if condemnation is used to enforce a mandatory connection requirement that may not even be necessary for the project to succeed as a whole? I have not found a case in which condemnation has been used to seize the land necessary for installation of the on-lot STEP components. Of course, it will depend on how the state statutes define "public purpose," but in its simplest sense it seems illogical to argue that taking the land for the on-lot STEP components would serve a public purpose when the only person who would be using that portion of the system is the homeowner himself.

Contrast this with possible condemnation of the land needed to run the collection main, probably located along the front of the homeowner's property and clearly used by the public as a whole. Of course, it may be possible to argue that condemning a portion of a homeowner's backyard is a taking for the public use because the financial viability of the entire project may depend on the total number of connections (the reasoning behind mandatory connections). But each condemnation case is heard separately, so it is hard to imagine that one less connection would have that much impact.

I suppose some creative attorney could argue that installing wastewater infrastructure is a form of economic development because property values will increase, new homes might be built, and new businesses might follow the sewer lines. That seems extreme, though. We are still looking at part of one guy's backyard here. As Justice O'Connor noted in her dissent, "public use" has a long-standing, straightforward definition—the government may transfer private property to public ownership for things such as roads, hospitals and military bases. And the aftermath of the Kelo case all but guaranteed that state condemnation statutes will come under extremely close scrutiny.

Even if the answer is yes, and taking a portion of someone's backyard is a public purpose, then the issue of compensation comes up. Remember that no private property shall be taken for public use without just compensation? Well, compensation can become an incredibly complicated issue when you are looking at trying to figure out the value of a chunk of land out of the middle of someone's backyard. I have talked with several appraisers who do this kind of work, and they are all at a loss. By comparison, taking a whole parcel of land or a strip of land is relatively simple for the purposes of calculating the compensation.

Then there are the silly issues like maintenance of that small parcel of land once it is no longer owned by the homeowner—who mows it? And the reality is that even if condemnation is legal and can be used to seize the small parcels of land needed for on-lot STEP components, few government entities relish the thought of sending armed officers onto a homeowners' property to guard the backhoe operator who is trying to set that new STEP tank in the ground. And, rest assured, there will always be that one guy who refuses to sign the easement. Ironically, this homeowner will usually agree to grant the easement for the connection line, therefore allowing the project to proceed; he just will not agree to sign an easement for the on-lot STEP components.

I don't know where the answers lie to this muddled mess. But just be aware that the costs of protracted legal battles over condemnation probably need to be weighed against the savings derived from using STEP collection. The real change needs to come from the funding agencies, who need to seriously re-think their policy on mandatory connections.

ELIZABETH M. DIETZMANN is an attorney in Rolla, MO. Write to her at edietzmann@earthlink.net

OW - January/February 2006

Home | Search | Subscribe | About | News | Advertise | Register | Services | Industry Events
Keep Informed | Contact Us | Current Issue | Back Issues | Forester*Press* | StormCon

© FORESTER COMMUNICATIONS, INC.
P.O. Box 3100 • Santa Barbara, CA 93130 • 805-682-1300

AQUALAW
WATER AND WASTEWATER SOLUTIONS

ELIZABETH M. DIETZMANN
ELIZABETH@AQUALAW.COM

PH: 804.716.9021
FX: 804.716.9022

May 29, 2007

Mr. Bill Cagle
Orenco Systems Incorporated
814 Airway Avenue
Sutherlin, Oregon 97479

Re: STEP Collection easement articles

Dear Bill:

Thanks for your inquiry regarding my two-part series on STEP collection easements published in *Small Flows Quarterly.* The articles probably could've taken up the entire magazine, but because of space limitations, I can't always include every detail that sparks my passion. So, I'm happy to provide additional explanation and clarification for the articles.

The main point of the two articles was to make stakeholders aware that public funding agencies do not need to require mandatory connections for clustered systems (please see all my other articles in *SFQ* extolling the advantages of clustered systems) and that if they insist upon doing so, the main enforcement tool, condemnation, won't work for on-lot collection components. In addition, traditional easements can be used for clustered systems, provided they contain some basic language covering the inherent nature of STEP systems.

In the first article, I gave examples of the strengths and weaknesses of different types of easements that can be utilized for a STEP collection system. Please see the enclosed sample easement for an example of what a good STEP easement should look like. In lieu of obtaining individual easements, governmental entities and utility cooperatives often include the requirement for an easement in the overall "service tariff," or the codification of the rules and regulations under which customers agree to receive service. I can send you an example if you would like one.

You stated that some people are taking my articles out of context to oppose STEP. I will be more than willing to explain my position to anyone who has misinterpreted my articles! For the record, let me make this perfectly clear: STEP collection is one of the most undervalued, underutilized technologies the wastewater engineering community has at its disposal. First, STEP is the only collection system that provides primary treatment prior to the treatment plant. Second, the fact that it is watertight saves the costs of conveyance and treatment and virtually eliminates the I and I problems associated with traditional gravity sewer. I have looked at an excellent summary of STEP collection, done by Dana Ripley. P.E., for the City of Los Osos, California, which details these benefits and more. You can find the study on their website at http://www.losososcsd.org/wwp/index.html.

Some people have the mistaken perception that STEP is not popular because the utility owns infrastructure on-lot. I believe it is irresponsible for any utility *not* to own and operate the on-lot infrastructure. In communities served by gravity sewers, even though the on-lot laterals are not traditionally owned by the utility, the utility still owns the problems of leakage and infiltration associated with laterals. When a utility doesn't own this portion of the infrastructure, they can't do a lot to fix it. This places a burden on the collection and treatment systems.

You've heard the adage, "Those who cannot remember the past are condemned to repeat it?" Well, the repetition of mistakes in the construction and management of traditional gravity sewers has greatly contributed to our nation's infrastructure shortfall. And if memory serves me, Orenco has consistently, and for the right reasons, recommended that utilities own and operate the on-lot STEP components. Although this is an unpopular position, you are fighting the good fight and I applaud you for that.

I hope this helps to clarify the intent behind these articles. Please don't hesitate to contact me should you need any additional help.

Sincerely,

Elizabeth M. Dietzmann

lisa schicker
<lisaschicker@hotmail.com>
06/22/2009 11:41 AM

To Warren Jensen <wjensen@co.slo.ca.us>

cc <planning@co.slo.ca.us>, Planning Commission <planningcommission@co.slo.ca.us>, <bgibson@co.slo.ca.us>, <kachadjian@co.slo.ca.us>,

bcc

Subject Your report on the Public Works Contract procurement process and design build process for Los Osos

Good Morning Warren:

I am just checking in with you, I wanted to see how the report is coming along - there seems to be a lot of issues facing the county right now, and I think the conflict of interest/violation of design build/contract procurement process that many of us in Los Osos are concerned about - has far-reaching implications County-wide.

Before you complete your report, I want to make sure that these points of concern are addressed.

Our concerns relate to the promise that Los Osos taxpayers receive a fairly bid project, which includes an unbiased and legal contract procurement process. Evidence and activities thus far have occurred that suggest that there is trouble with these processes.

My concerns are that the design build process as described by state law, the contract procurement process and a fair presentation of all options and costs has now been circumvented and tainted by the personal and business relationships of key people directing these efforts - there is history of this in Los Osos and at the County to support these concerns with Los Osos projects and other projects, too.

As part of your report and evaluation of the past facts about Paavo, MWH, Wallace and Lou Carella, I want to know if the current county project team (Paavo Ogren, Lou Carella, et al) have completed conflict of interest statements and if they have provided disclosure of all potential incompatible activities, including the disclosure of their prior business relationships in both public and private roles.

Have the previous business relationships been disclosed prior to putting former business partners (Carella/Carollo and Wallace) directly on a panel, tasked with interviewing, reference checking and short listing engineering teams for a very lucrative county contract - with their own former business associates (MWH?) - and including Paavo Ogren sitting on the appeal panel?

I believe the documentation submitted and your own County records demonstrate that the same people, working both for our county government and at the same engineering firms, have been "feeding" each other work, trading positions and hiring each other now for 10+ years, using the taxpayers' money to do so - in Los Osos (CSD and County), and on the Lopez Lake dam retrofit project, among others......

Of course it is legal to work on projects together with reputable firms, but if there is financial interest and former business relationships, they must be disclosed per the Sherman Act. Because many of these jobs have gone way over bid, increasing 100%, such as Lopez Lake, (when including contract amendments and construction change orders), citizens are rightfully concerned.

Since the County is responsible for using the peoples' money for these contracts that are being made among prior business partners, and there is plenty of evidence to show this, then at least some of the questions that your report needs to answer is,

Have all potential incompatible activities among the former business partners (Paavo Ogren, currently County Public Works Director (formerly of Canon and Wallace firms), Lou Carella, formerly of MWH, RMC and Carollo) and Wallace (previously employed by the County) been previously disclosed - before the contract procurement process was approved or before the design build process was allowed to accept costly change orders? Contract change orders are typically not allowed with design build contracts, that was the advantage of going that way, to guarantee that costs would be capped. These firms are known for amending their work numerous times, so contracts that cost very little up front, end up costing a bundle! (see my files submitted on MWH billing practices)

Is there a conflict of interest due to the relationships among the former business partners (Ogren, MWH, Carella and Wallace)? Have all firms completed conflict of interest and incompatible activities statements? Can the public review these statements?

In light of what we now know, is it legal to allow these former business partners to interview and sit on the appeal panel when interviewing their former business partners, who are competing with others for County Contracts?

How is fair competition assured in this type of environment - how are the taxpayers served best?

These are just some of the issues that concern me, I look forward to reading your report.

Despite what others may think or say about me, it has never been my intention to derail a project, but only to improve it -to deliver the most environmentally preferred, technically sound, affordable project for our town - I stand behind these words with dedicated effort, action and participation in the process for many years now. I hope you understand why these issues I bring before you are so important to reaching this goal.

Thanks very much from Lisa

Lisa Schicker
805-528-3268

Morning Headlines

Monday, June 22, 2009

-
- Former official says Los Osos sewer project director has conflict of interest
  County Counsel Warren Jensen may complete a formal response this week to complaints from a former Los Osos official that the man directing that community's sewer project has a conflict of interest.
-

"Don Bearden "
<dabearden @charter .net>
06/21/2009 12:30 PM

To <planningcommission@co.slo.ca.us>
cc
bcc
Subject Comments for June 29, Los Osos Wastewater Project

Commissioners,

At a previous meeting of the Planning Commission I submitted an AIRVAC drawing, "Los Osos Wastewater Project, California Preliminary Vacuum Collection System Layout" to each commissioner.

This drawing showed 13 gravity pump stations being replaced by one vacuum pump station in Area A. If Los Osos was flat then this layout would work, but Los Osos is not flat and the hills are higher than the 15 to 20 feet that vacuum can lift.

The pocket pump stations along the bay lift sewage as follows:

4th Street	approx. 31 feet
7th Street	approx. 22 feet
8th Street	approx. 18 feet
9th Street	approx. 12 feet
10th Street	approx. 20 feet
11th Street	approx. 35 feet
12th Street	approx. 26 feet
13th Street	approx. 22 feet

Most of these lifts are out of the range of the 15 to 20 feet lift available for vacuum.

A 100% vacuum system would require a different routing than that shown on the preliminary layout, perhaps requiring easements for vacuum mains through private property. I don't think AIRVAC should have presented a layout that would not work.

All in all, if vacuum is to be considered, then a more detailed engineering analysis is needed. I don't know how fast it could be done or how much it would cost.

Don Bearden
1411 - 7th Street
Los Osos, CA 93402-1617
805-528-3579

"Don Bearden" <dabearden@charter.net>

06/21/2009 12:53 PM

To <planningcommission@co.slo.ca.us>

cc

bcc

Subject Fw: MCWRA ordinance that requires farmers to abandon their wells.

Commissioners,
FYI
Don Bearden

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

From: Bob Holden
To: Don Bearden
Cc: Paavo Ogren
Sent: Tuesday, June 16, 2009 12:11 PM
Subject: RE: MCWRA ordinance that requires farmers to abandon their wells.

Don,
I think that farmers that look at the facts will love the water.

Here is the County's ordinance. Our agency encouraged the GM of the Water Resources Agency to not declare that the CSIP project was complete. Therefore, most of the ordinance is not in effect.

Bob

From: Don Bearden [mailto:dabearden@charter.net]
Sent: Tuesday, June 16, 2009 8:22 AM
To: Bob Holden
Subject: MCWRA ordinance that requires farmers to abandon their wells.

Mr. Holden,

Thank you for the information on Monterey County Water Recycling. I don't know if our farmers in Los Osos will be as accepting of recycled water as the Monterey farmers.

You explained that the farmer participation in recycled water use was voluntary; however, you still had passed an ordinance that requires farmers to abandon their wells and take all water from the reclaimed water pipeline. I understand that the ordinance was not placed in effect.

Can you tell me when the ordinance was passed, what the ordinance number was, and what its wording was?

Thanks again for the tour.

Don Bearden
homeowner
1411 - 7th Street
Los Osos, CA 93402-1617

805-528-3579

No virus found in this incoming message.
Checked by AVG - www.avg.com
Version: 8.5.339 / Virus Database: 270.12.73/2180 - Release Date: 06/16/09 07:41:00

Ordinance 3790.pdf

Monterey County
Water Resources Agency

Ordinance No. 03790

AN ORDINANCE OF
THE MONTEREY COUNTY WATER RESOURCES AGENCY
ESTABLISHING REGULATIONS FOR THE CLASSIFICATION,
OPERATION, MAINTENANCE AND DESTRUCTION OF
GROUNDWATER WELLS IN MCWRA ZONE 2B,
TO PROTECT THE SALINAS VALLEY GROUNDWATER BASIN
AGAINST FURTHER SEAWATER INTRUSION

COUNTY COUNSEL SUMMARY

This ordinance provides for the management of all groundwater wells within the Castroville Seawater Intrusion Project area, known as Zone 2B, following completion and start-up of the Castroville Seawater Intrusion Project. It prohibits and otherwise restricts pumping from groundwater wells in Zone 2B, and it provides for the classification of the various wells, for the maintenance and limited operation of standby wells, and for the destruction of abandoned wells, contaminated wells, wells that allow cross-contamination of aquifers in intruded areas, and other wells. The ordinance establishes a procedure for the destruction of wells, a variance procedure, an appeals procedure, and penalties for violations of the ordinance.

The Board of Supervisors of the Monterey County Water Resources Agency makes the following findings:

A. Appropriate studies have been conducted by the Monterey County Water Resources Agency (MCWRA), and based upon those studies, the Board of Supervisors determines that the portion of the Salinas Valley Groundwater Basin that underlies MCWRA Zone 2B is threatened with the loss of a usable water supply as a result of seawater intrusion into that portion of the groundwater basin, in each of the aquifers at all depths underlying Zone 2B.

B. Pursuant to the MCWRA Act, West's Water Code Appendix, Chapter 52, section 52-22, the Board determines that it is necessary to take steps prohibiting and otherwise restricting the withdrawal of water from the portion of the Salinas Valley Groundwater Basin underlying Zone 2B, in order to deter the further intrusion of underground seawater in Zone 2B, by establishing and defining the area and depth from which the further extraction of groundwater is prohibited.

C. The Board has conducted a public hearing upon the proposed determination, with notice of the hearing given in the manner prescribed in Government Code Sec. 6065. At the hearing, the Board accepted evidence showing the nature and extent of the threat of seawater intrusion and the facilities proposed in order to provide to the area threatened a substitute supply of surface water.

D. Said hearing having been concluded, the Board determines that a threat of seawater intrusion exists which will be aggravated by continued groundwater extraction in the 180-foot aquifer, the 400-foot aquifer, and the deep aquifer, at all depths therein underlying Zone 2B, and that the prohibitions and restrictions on the pumping of groundwater in these aquifers are necessary in order to alleviate the seawater intrusion problem. The Board further determines that the Castroville Seawater Intrusion Project (CSIP) will provide a substitute water supply that will be adequate to replace the water supply previously available from the wells that will be affected by the prohibition against pumping.

E. The CSIP is designed to supply all of the agricultural water needs in Zone 2B. This water will be obtained from the Salinas Valley Reclamation Project (SVRP) and from the supplemental wells that will be maintained and operated by the MCWRA as part of the CSIP. Water from the SVRP will provide the basic water supply for the CSIP, and water from the supplemental wells will be used to meet peak demands during the heavy irrigation season and to provide a backup water supply when the SVRP does not produce its full quota of water.

F. Property owners and growers in Zone 2B have requested that additional wells be maintained as standby wells, as an additional assurance that an adequate water supply will be available at all times. The ultimate success of the CSIP depends upon the reduction of groundwater pumping from Zone 2B. However, the maintenance of standby wells at the expense of owners is an appropriate action and will not compromise the success of the CSIP if such standby wells are maintained and operated under the limitations set forth in this ordinance.

G. The CSIP and the regulations set forth in this ordinance are designed as measures to protect the groundwater supply in the northern part of the Salinas Valley Groundwater Basin. They are not intended to effect any diminution in the basic groundwater rights held by overlying owners in the area subject to regulation but are put into effect in furtherance of the MCWRA's duty to manage the Salinas Valley Groundwater Basin and to protect the water supplies therein. By complying with these regulations and by participating in the CSIP, the overlying owners do not waive or prejudice any water rights held by them, now or in the future. If at some time in the future, these regulations or any successor regulations are no longer necessary to protect the groundwater basin and are then modified or removed, then the groundwater rights of the overlying owners in Zone 2B will be exercisable in conformity with such laws as may then be in effect, and the overlying owners will suffer no prejudice in that regard because of the CSIP, these regulations, or any successor regulations.

H. On April 7, 1992, in Resolution No. 92-126, the Board of Supervisors described and approved the Castroville Irrigation System (now known as the Castroville Seawater Intrusion Project or CSIP), as a separate project within the Salinas Valley Seawater Intrusion Program, and certified that the Final EIR for the project (CSIP EIR) was complete and was prepared in compliance with the California Environmental Quality Act. As so described and approved, the project included the proposed enactment of an ordinance to prohibit or restrict the further pumping of groundwater from within Zone 2B. The present ordinance is consistent with the ordinance described and approved in Resolution No. 92-126 and in the CSIP EIR certified therein; it is proposed as part of the CSIP and is within the scope of the project described in the CSIP EIR; it will cause no new environmental effects beyond those considered in the CSIP EIR and no new mitigation measures need be considered for this ordinance; and it does not require further environmental review.

NOW, THEREFORE, the Board of Supervisors of the Monterey County Water Resources Agency ordains as follows:

SECTION 1. The following provisions are adopted:

PART I -- DEFINITIONS

1.01.01. GENERAL APPLICATION

As used in this ordinance, the following words shall have the meaning provided in this part.

1.01.02 ABANDONED WELL

"Abandoned Well" means any well whose original purpose and use have been permanently discontinued or which is in such a state of disrepair that it cannot be used for its original purpose. A well is deemed to be an abandoned well when it has not been used for a period of one year, unless the owner demonstrates his or her intent to use the well again for supplying water or other associated purposes. A well classified under this ordinance as a standby well shall not be deemed to be an abandoned well for as long as such classification remains in effect, despite any period of non-use of such well.

1.01.03 AQUIFER STORAGE AND RECOVERY (ASR) WELL

An "aquifer storage and recovery (ASR) well" is a well proposed, maintained, or operated by the MCWRA or by the Monterey Regional Water Pollution Control Agency as part of an aquifer storage and recovery project.

1.01.04 CATHODIC PROTECTION WELL

"Cathodic Protection Well" means any artificial excavation in excess of fifty feet in depth constructed by any method for the purpose of installing equipment or facilities for the protection electronically of metallic equipment in contact with the ground, commonly referred to as cathodic protection.

1.01.05 COMMERCIAL OR INDUSTRIAL WELL

"Commercial or industrial well" means any well used to supply water for commercial or industrial purposes, excluding any well that is used in whole or in part to supply water for agricultural irrigation. A commercial or industrial well may also be classified as a domestic well, provided that it shall not also be classified as a standby well.

1.01.06 DOMESTIC WELL

"Domestic well" means a well used for the supply of groundwater for potable uses. A domestic well may also be classified as a standby well for agricultural use.

1.01.07 GENERAL MANAGER

"General Manager" means the MCWRA General Manager or his or her designee.

1.01.08 GENDER, NUMBER, AND TENSE

Words used in any gender include any other gender. The singular number includes the plural, and the plural the singular. Words used in the present tense include the future as well as the present.

1.01.09 MONITORING WELL

"Monitoring Well" means any artificial excavation constructed by any method for the purpose of monitoring fluctuations in groundwater levels, quality of underground waters, or the concentration of contaminants in underground waters.

1.01.10 PERSON

"Person" means any individual, organization, partnership, business, association, corporation or governmental agency.

1.01.11 PROJECT START-UP

"Start-up of the Castroville Seawater Intrusion Project" or "project start-up" means the date on which the General Manager declares that the project known as the Castroville Seawater Intrusion Project is operational after reclaimed water is first delivered or deliverable through the project pipeline to all customers in MCWRA Zone 2B for agricultural irrigation.

1.01.12 PROJECT WATER

"Project water" means water supplied to property in Zone 2B by the Castroville Seawater Intrusion Project for use in the irrigation of crops.

1.01.13 SEAWATER INTRUDED

An aquifer is "seawater intruded" at any particular location of measurement when, at the location of measurement, the chloride ion concentration in the aquifer exceeds 500 mg/liter, and the General Manager determines that the contamination is not a localized contamination.

1.01.14 SECTION HEADINGS

Section headings used in this ordinance shall not be deemed to govern, limit, modify, or in any manner affect the scope, meaning, or intent of the provisions of any section.

1.01.15 STANDBY WELL

"Standby Well" means a well not routinely operated but maintained by the well-owner for purposes of providing a water supply to the well-owner's property under emergency conditions.

1.01.16 SUPPLEMENTAL WELL

"Supplemental Well" means any well maintained or operated by the MCWRA as a part of the Castroville Seawater Intrusion Project.

1.01.17 TEST WELL

"Test Well" means any artificial excavation used for water quality testing, electric logging, water quantity testing and/or other tests to determine aquifer quality and quantity characteristics.

1.01.18 WELL

"Well" or "water well" means any artificial excavation constructed by any method for the purpose of extracting water from, or injecting water into, the underground. "Well" or "water well" does not include wells used for the purpose of dewatering excavation during construction or for the purpose of stabilizing hillsides or earth embankments.

1.01.19 ZONE 2B

"MCWRA Zone 2B" or "Zone 2B" means the zone of benefit identified as Zone 2B and established by the MCWRA Board of Supervisors for the Castroville Irrigation System, now known as the Castroville Seawater Intrusion Project, in MCWRA Ordinance No. 3635, Section 4. The initial boundaries of Zone 2B are described in MCWRA Board of Supervisors Resolution No. 92-363 and may be amended from time to time.

PART II -- BASIC RULES.

1.02.01 COMPLIANCE WITH ORDINANCE

No person shall construct, own, operate, or maintain any water well located within the boundaries of MCWRA Zone 2B, as those boundaries may exist from time to time, except in compliance with this ordinance.

1.02.02 OPERATION OF WELLS IN ZONE 2B

After the expiration of 30 days following the date on which project water becomes available to any particular property within Zone 2B, no person shall operate any well within Zone 2B to provide water to such property for agricultural irrigation except when:

A. the well is a supplemental well operated by the MCWRA, or

B. the well is a standby well operated in conformity with this ordinance.

1.02.03 IMPORTING GROUNDWATER INTO ZONE 2B

After the start-up of the Castroville Seawater Intrusion Project, no well located anywhere in the Salinas Valley Groundwater Basin shall be used to supply water for use in the irrigation of agricultural lands located within Zone 2B, and no person shall cause, suffer, or permit such use of such water, unless:

A. the well from which such water is obtained is a supplemental well operated by the MCWRA as part of the Castroville Seawater Intrusion Project or the well is operated by the MCWRA as part of another water supply project, or

B. the well from which such water is obtained is a standby well operated in conformity with this ordinance.

1.02.04 EXPORTING GROUNDWATER FROM ZONE 2B

After the start-up of the Castroville Seawater Intrusion Project, no well located anywhere within the external boundaries of Zone 2B (including wells that are located within Zone 2B and wells that are located within island exclusions from Zone 2B that are surrounded by Zone 2B) shall be used to supply water for use outside of the external boundaries of Zone 2B, and no person shall cause, suffer, or permit such use of such water, except that water from wells within the external boundaries of Zone 2B may be used outside the external boundaries of Zone 2B under the following circumstances:

A. The water is used for domestic purposes on parcels that are immediately adjacent to the external boundaries of Zone 2B; or

B. The water is used for domestic purposes on other parcels where the use has been established and water delivery pipelines are in place for such delivery on or before the effective date of this ordinance.

1.02.05 DESTRUCTION OF WELLS

After the start-up of the Castroville Seawater Intrusion Project, no person shall own, operate, or maintain a well in Zone 2B if such well is required to be destroyed, in violation of such destruction requirement, and no person shall interfere with actions taken by the MCWRA to accomplish the destruction of such a well in conformity with this ordinance.

1.02.06 COMPLIANCE WITH CHAPTER 15.08 STANDARDS

Except as otherwise expressly provided herein, all wells located in Zone 2B shall conform with all of the provisions of Chapter 15.08 of the Monterey County Code.

1.02.07 CONSTRUCTION OF WELLS

No person may construct a well in Zone 2B without first obtaining a permit from the General Manager. The General Manager shall not issue a permit for construction of a well unless he or she finds that the construction will be consistent with the purposes of this ordinance and that the proposed well will be of a type specified in section 1.02.08.C, subsections 1-8.

1.02.08 CLASSIFICATION OF WELLS

A. Prior to the start-up of the Castroville Seawater Intrusion Project, the General Manager shall classify all wells located in Zone 2B and notify all well owners of the classification of their well.

B. At any time, the owner of a well may apply to the General Manager for a change in classification, pursuant to this ordinance. Upon receipt of new information or upon evidence of changed conditions, the General Manager may, on his or her own initiative, change the classification of a well, upon giving 30 days' advance notice in writing to the owner thereof. Before making any reclassification, the General Manager must find that the well no longer qualifies for its existing classification, or that the existing classification was made in error. The General Manager may, and at the request of the well owner, shall hold a public hearing to determine the appropriate classification or reclassification of any well.

C. The well classifications are as follows:

1. Supplemental well.
2. Aquifer storage and recovery (ASR) well.
3. Domestic well.
4. Commercial or industrial well.
5. Monitoring well.
6. Test well.
7. Cathodic protection well.
8. Standby well.
9. Abandoned well.
10. Other well.

D. When a well is classified or reclassified as a domestic well or as a commercial or industrial well, the General Manager shall identify by parcel number and/or street address the place where water from such well may be used, and may restrict the use of such water to a portion of the identified parcel.

PART III -- WELL DESTRUCTION

1.03.01 GENERAL RULE GOVERNING DESTRUCTION OF WELLS

Except as otherwise provided herein, all wells which are located in Zone 2B shall be destroyed in conformity with the provisions of this ordinance. The destruction of any well located in MCWRA Zone 2B shall be governed by this ordinance, and Chapter 15.08 of the Monterey County Code shall not be construed to require the destruction of any well located in Zone 2B. Chapter 15.08 of the Monterey County Code shall apply to the destruction of wells in Zone 2B only to the extent that reference is made herein to such Chapter 15.08.

1.03.02 WELLS EXEMPT FROM DESTRUCTION

The following wells which have not been abandoned and which do not fit within the description in Section 1.03.04.B are exempt from destruction, for as long as they are so classified:

A. Supplemental wells.

B. ASR wells.

C. Domestic wells.

D. Commercial or industrial wells.

E. Monitoring wells.

F. Test wells.

G. Cathodic protection wells.

H. Standby wells.

I. A well for which an application is pending for a classification that would exempt the well from destruction, provided that the applicant makes every reasonable effort to have the application determined promptly.

1.03.03 PREVIOUSLY ABANDONED WELLS

A. Each well abandoned prior to the start-up of the Castroville Seawater Intrusion Project shall be destroyed by the owner thereof in accordance with the methods prescribed or referenced in Monterey County Code Chapter 15.08. All costs associated with destruction of such wells shall be borne by the well owner.

B. If any well required to be destroyed by its owner pursuant to this section is not destroyed before the expiration of two years after project start-up, then the General Manager may cause the well to be destroyed, pursuant to the procedures specified below, in section 1.03.06, except that the cost of such destruction shall be charged to the property owner. The MCWRA may file a civil action against the owner to collect such cost, or the amount may be collected in any criminal proceeding against the owner for failure to destroy the well.

1.03.04 CONTAMINATED AND CROSS-CONTAMINATING WELLS

Each well meeting any of the criteria set forth below, other than wells which are required to be destroyed pursuant to Section 1.03.03, shall be destroyed by the MCWRA within two years after start-up of the Castroville Seawater Intrusion Project. All costs for destruction of such wells shall be borne by the MCWRA. The General Manager may extend the time for destruction of such wells when funds are not available or budgeted for such purpose. The criteria for such wells are as follows:

A. Any well that is found by the General Manager to be perforated in both the 180-foot aquifer and any underlying aquifer.

B. Any well that is found by the General Manager to have perforations in two aquifers, improper seals, or other improper construction or condition of the well, such that the well provides an actual or potential conduit for water in a seawater intruded area of an aquifer to enter a non-intruded area of a separate aquifer.

1.03.05 DESTRUCTION OF NON-EXEMPT WELLS

Each well that is not exempt from destruction, and that is not required to be destroyed pursuant to section 1.03.03 or 1.03.04, shall be destroyed pursuant to this section in conformity with a schedule adopted by the MCWRA Board of Directors. Said schedule shall provide that the destruction of such wells shall not begin (a) until the Castroville Seawater Intrusion Project has established a satisfactory record of water deliveries, as determined by the Board of Directors, or (b) until at least one year after the start-up of the Castroville Seawater Intrusion Project, whichever occurs later.

Said schedule may provide for destruction to be completed within three years after project start-up. The Board of Directors may delegate authority to the General Manager to amend the schedule from time to time. Said wells shall be destroyed by the MCWRA in accordance with the methods prescribed or referenced in Monterey County Code Chapter 15.08. The MCWRA shall bear the cost of such destruction.

1.03.06 PROCEDURE FOR DESTRUCTION OF WELLS

At least 90 days before the MCWRA destroys any particular well, the General Manager shall give written notice to the owner of the well that the well will be destroyed. Notice shall be deemed sufficient if sent by registered or certified U.S. mail, return receipt requested, to the name and address shown as that of the owner of the real property on which the well is located, in the latest available official records of the Monterey County Assessor. The notice shall identify the well in question and the property on which it is located and shall advise the owner of the proposed action to be taken, the proposed timing of the action, and his or her right of appeal as provided herein. The notice shall further state that if the property on which the well is located is leased, the owner must provide a copy of the notice to the tenant, and tenant on the property will also have a right of appeal.

PART IV -- STANDBY WELL CLASSIFICATION.

1.04.01 CRITERIA FOR CLASSIFICATION AS STANDBY WELL

The General Manager shall classify a well as a standby well, whether on the initial classification or on a change in classification, if he or she makes both of the following findings:

A. The well does not meet any of the criteria for destruction described in Section 1.03.04 of this ordinance.

B. The owner of the well will comply with all of the requirements of this ordinance applicable to standby wells.

1.04.03 INSPECTIONS

The MCWRA may at any time inspect any standby well and any well for which the owner submits an application for classification as a standby well, to ensure that the well and its appurtenant facilities do or will comply with this ordinance. Access to the well site shall be maintained by the well owner, and the MCWRA shall have the right of access to inspect the well at all times.

PART V -- STANDBY WELL REGULATIONS.

1.05.01 GENERAL RULE

A well that has been classified as a standby well shall immediately thereupon be subject to the regulations set forth below.

1.05.02 FLOWMETER

A flowmeter shall be installed on all of the standby wells at the expense of the well owner and shall be fully maintained by the owner in accordance with MCWRA requirements.

1.05.03 ACCESS

Access to the standby well site shall be maintained by the well owner, and the MCWRA shall have the right of access to inspect the well at all times.

1.05.04 USE OF STANDBY WELLS DURING FIRST TWO YEARS AFTER PROJECT START-UP

During the first 24 months after project start-up, standby wells may be used intermittently to supply irrigation water to lands within Zone 2B, without regard to whether an emergency exists. The purpose of this section is to enable growers and the Agency to make the transition from reliance on well water to reliance on project water with a minimum of interruption in the grower's water supply.

1.05.05 AUTHORIZED PURPOSES FOR OPERATION OF STANDBY WELLS

Standby wells may be operated only for the following purposes:

A. To perform routine maintenance on the standby well;

B. To provide an irrigation water supply for property in Zone 2B in an emergency as described in section 1.05.06;

C. To provide potable water when the standby well is used as a domestic well.

D. To provide a water supply for the irrigation of any crop or crops for which irrigation with water supplied by the project is prohibited by any law, rule or regulation established by any entity or agency with authority over the irrigation of such crops.

1.05.06 EMERGENCY JUSTIFYING OPERATION OF STANDBY WELL

An emergency exists and justifies use of standby wells when all of the following circumstances occur:

A. The grower has given advance notice of his or her need for project water and a schedule for delivery of water to the grower's property has been set, in conformity with procedures established by the MCWRA; and

B. The MCWRA fails to deliver project water on schedule; and

C. The grower then makes contact with the MCWRA by telephone and the MCWRA confirms that the water will not be delivered on the day scheduled for delivery.

1.05.07 COMPLIANCE WITH HEALTH DEPARTMENT REGULATIONS

No standby well shall be used as a domestic well unless such use is in compliance with applicable health regulations, and unless the well is maintained in compliance with such health regulations.

1.05.08 OWNERSHIP

Standby wells shall remain under private ownership, and are not the property of the MCWRA.

1.05.09 COSTS OF MAINTENANCE AND OPERATION

All costs associated with maintenance and operation of standby wells shall be borne by the owner or operator of said well, or by such other person as may agree to assume such costs.

PART VI -- VARIANCES.

1.06.01 APPLICATION

Any person may, at any time, apply in writing for a variance from the strict application of this ordinance. The application for the variance shall be filed with the MCWRA. The General Manager may dispense with the requirement of a written application upon finding that an emergency condition requires immediate action on the variance request.

1.06.02 PLAN FOR COMPLIANCE

The applicant shall, as part of the variance application, submit a plan describing how and when the applicant will comply with this ordinance without the need for a variance. Compliance with this plan, as presented by the applicant or as modified by the General Manager, shall be a condition of granting the variance. The General Manager may waive the requirement for such a plan if he or she finds that compliance would not be feasible.

1.06.03 FINDINGS FOR GRANT OF VARIANCE

The General Manager may grant a variance from the terms of this ordinance upon making the finding that the strict application of the ordinance would create an undue hardship, or that an emergency condition requires that the variance be granted.

1.06.04 CONDITIONS ON GRANT OF VARIANCE

In granting a variance, the General Manager may impose any conditions in order to ensure that the variance is consistent with the overall goals of this ordinance. Variances may be granted for a limited period of time. The variance and all time limits and other conditions attached to the variance shall be set forth in writing, and a copy of the written variance shall be provided to the applicant.

1.06.06 COMPLIANCE WITH TERMS OF VARIANCE

No person shall operate or maintain a groundwater well for which a variance has been granted hereunder, or use water therefrom, in violation of any of the terms or conditions of the variance.

PART VII -- APPEALS

1.07.01 PUBLIC HEARING RIGHTS OF APPLICANTS AND INTERESTED PARTIES

Applicants may attend all public meetings and public hearings held by the General Manager on their applications and may submit such written and documentary evidence as may be relevant to the consideration of an application, whether or not a public meeting or hearing is held. Any interested person, other than an applicant, may also attend the public meetings or public hearings at which the General Manager considers an appealable decision and may submit such written and documentary evidence as may be relevant to the consideration of an application, whether or not a public meeting or hearing is held, provided that such party shall simultaneously submit copies of all such information to the applicant and shall show proof of such submittal to the General Manager along with the written information provided to the General Manager. Any such interested person may then, in writing, request a copy of the General Manager's written decision.

1.07.02 RIGHT OF APPEAL

Any applicant or interested party may appeal any decision by which the General Manager (a) orders the destruction of any privately owned well under this ordinance, (b) grants or denies a variance, permit, classification, or reclassification under this ordinance; (c) gives or withholds any consent when such consent is established by this ordinance as a prerequisite to further action; or (d) imposes conditions on any such variance, permit, classification, reclassification, or consent. No person may file an appeal of a decision made after a public meeting or hearing on the issue unless that person attended the meeting or hearing upon which the appealable decision was based and expressed his or her concerns orally or in writing at that meeting or hearing, or unless such person filed papers with the general manager setting forth such person's concerns prior to such meeting or hearing.

1.07.03 PROCEDURE ON APPEAL

A. Any appeal authorized by this ordinance shall be filed and processed as provided in the section of Ordinance No. 3539, as now in effect or as subsequently amended or superseded, pertaining to appeals, and as further supplemented in this ordinance. Any appeal must be in writing and must state the grounds upon which the appeal is made.

B. Any appeal must be filed with the general manager no later than ten days after the date the general manager issues an appealable decision, except that an appeal from a decision ordering the destruction of a privately owned well must be made no later than 60 days after the date the general manager issues the decision. A decision is issued when the decision is set forth in writing and personally delivered to the applicant, or on the fifth day after mailing said decision to the applicant, to the address provided by the applicant for such mailing. As to an interested person (other than an applicant) who has requested a copy of the written decision, the General Manager's written decision is issued when it is personally delivered to such person or on the fifth day after mailing said decision to such person, to the address provided by such person for such mailing.

C. The appeal of any decision made by the General Manager following a public meeting or public hearing shall be limited to the issues raised at the public meeting or hearing and thereafter specified in the written appeal. The appeal of any decision made by the General Manager without a public meeting or public hearing may consider any issue that might have been raised at a public hearing or meeting, provided that such issue must be specified in the written appeal.

D. At the hearing on appeal, the hearing board will consider de novo the issues that are before the board on the appeal.

PART VIII -- PENALTIES.

1.08.01 INFRACTION

Any person who violates any provision of this ordinance is guilty of an infraction.

1.08.02 PUBLIC NUISANCE

Any violation of this ordinance is hereby declared to be a public nuisance.

1.08.03 CONTINUING VIOLATIONS

Any violation which occurs or continues to occur from one day to the next shall be deemed a separate violation for each day during which such violation occurs or continues to occur.

1.08.04 FINE

A. Any person who violates any provision of this ordinance which prohibits or restricts the pumping of groundwater shall be assessed a fine of $100 for each acre-foot (or portion thereof) of water pumped in violation of this ordinance.

B. Any person who violates any other provision of this ordinance shall be assessed a fine of $100 for each violation.

1.08.05 LIABILITY FOR COSTS OF ENFORCEMENT

Any person who violates this ordinance shall be liable for the cost of enforcement, which may include but need not be limited to the following:

A. Cost of investigation

B. Court costs

C. Attorney fees

D. Cost of monitoring compliance

PART IX -- CONCLUDING PROVISIONS

1.09.01 SEVERABILITY

If any section, subsection, paragraph, sentence, clause, or phrase of this ordinance is for any reason held to be invalid or unconstitutional by a decision of a court of competent jurisdiction, it shall not affect the validity of the remaining portions of this ordinance, including any other section, subsection, sentence, clause, or phrase therein.

SECTION 2. EFFECTIVE DATE. This ordinance shall take effect 30 days after its final adoption by the Board of Supervisors.

PASSED AND ADOPTED this 8th day of November, 1994, by the following vote:

AYES: Supervisors Salinas, Shipnuck, Perkins, Johnsen & Karas.
NOES: None.
ABSENT: None.

BARBARA SHIPNUCK, Chairwoman
Board of Supervisors

ATTEST:

ERNEST K. MORISHITA
Clerk of the Board

By ______________________
Deputy Clerk

(WELLORD8.ORD - 11/1/94)

Orenco replies to Mr . Dubbink

Sarah Christie to: wyattonbridge, pem3220, bwhiteoak, Carlyn Christianson 06/23/2009 07:09 PM

Cc: rhedges, dubbinnk

Hi All—

I took the liberty of offering Orenco the opportunity to respond to Mr. Dubbink's recent letters to the Commission citing Dana Ripley's mis calculations and mis representations of their material. You may not want to read their entire 24-page response, but suffice to say they do not concur with Mr. Dubbink's characterizations of the mistakes made by Mr. Ripley, and there remains a significant difference of opinion with respect to soil displacement and other impacts. In fairness, I thought the report's author should have a chance to respond to such a technically detailed critique of their work.

I am also ccing Orenco's response to Mr. Dubbink. But I sincerely hope that this not interpreted as an invitation to continue arguing back and forth with the PC in the middle. I strongly encourage the parties to communicate directly, should there be any desire to further pursue the question of soil displacement and related issues.

~sc

Sarah Christie
Legislative Director
California Coastal Commission
916-445-6067

"You can't raise consciousness by lowering the bar."
~Kenny White

M.Saunders response to D.Dubbink 062309.pdf

Orenco Systems®
Incorporated

814 AIRWAY AVENUE
SUTHERLIN, OREGON
97479

TOLL FREE:
(800) 348-9843

TELEPHONE:
(541) 459-4449

FACSIMILE:
(541)459-2884

WEB SITE:
www.orenco.com

June 23, 2009

Department of Planning and Building
Attn: Ms. Sarah Christie
Chairperson SLO Planning Commission
976 Osos Street, Room 300
San Luis Obispo, CA. 93408

Subject: **Orenco Response to Mr. Dubbink's Correspondence**

Honorable Planning Commissioners:

Please consider this letter a response to Mr. David Dubbinks soil displacement correspondence dated June 8th and June 9th, 2009.

> Of particular note: Mr. Dubbink was informed in an email dated October 5th, 2007 that the gravity sewer lateral connections were not included in his calculations. He admits that they are not, and notes that gravity sewer and STEP are approximately the same when the gravity sewer lateral soil disturbance volumes are left out. Unfortunately in February, 2008 he reported to the Technical Advisory Committee that STEP and gravity sewer have approximately the same area of soil disturbance. We can find no evidence that any Orenco calculations were shared with the TAC committee.

To put this in perspective, the total lineal feet of lateral pipe to each home is approximately equal to or a little greater than the total lineal feet of the gravity sewer mains. The greater soil disturbance is a function of the gravity sewer laterals construction. Single laterals shown on the MWH plan are a minimum 4" pipe, laid to grade, in an open trench with an approximate 4' burial depth at the property line. At grade open trench construction has very little flexibility to move around obstacles and is very damaging to tree roots etc. The gravity laterals make up approximately 22% of the area disturbance and approximately 13% of the volume disturbance. When all soil disturbance volumes for both collection systems are taken into consideration STEP comes out far superior over gravity sewer.

In the letter dated June 8th, 2009, Mr. Dubbink references a previous letter which I was not able to locate. If Mr. Dubbink corrected this error in that letter that would be great, however;

> ”The Sustainability Group has likened the STEP installation process to “microsurgery” compared to conventional surgery. But it is quite possible, it is the **STEP system that involves the greater order of surface and soil disruption.**”

Based on this statement I would have to assume that he did not correct his errors.

Most of these technical issues that are being addressed by non sewer experts leads to debate that is meaningless. That’s why the County implemented the Design Build project delivery method, which allows qualified experts to GUARANTTEE that their solution can be delivered. However meaningless debate does not end when the Design Build project delivery method is compromised.

Thanks for taking the time to consider these comments. You can reach me at my direct line 866.914.9454 anytime.

Sincerely,

Michael Saunders
National Accounts Manager

Appendix A

For clarity, Mr. Dubbink's correspondence will be in "red text" and my response will be in "blue text."

Response to Mr. Dubbink's letter dated June 8th, 2009.

There are three levels of error in the way soil displacement is calculated. The fundamental assumptions concerning the length and width dimensions of a 1,500 gallon STEP tank are wrong.
Orenco fiberglass tanks **WERE NOT** proposed for use in the Los Osos project. Alternatively, concrete tanks were proposed. The length and width dimensions for a 1500 gallon tank (6'W x 11'L x 6.25'D) would actually represent a very large 1500 gallon concrete tank with an H20 traffic rated lid. In practicality the size of concrete septic tanks are highly variable due to wall thickness and the amount of freeboard (room above the 1500 gallon level). I have found concrete 1500 gallon tanks as small as 5.5'W x 9.5'L x 5'D. Therefore the size of the concrete tank was conservatively stated on the larger side.

Additionally, the side clearance for the excavation is less than specified in Orenco's installation instructions.
The side clearance is not applicable for a concrete tank.
Orenco provides excavation limits for fiberglass tanks. Fiberglass tanks have a curved bottom. Accordingly, it is very important to compact soil that is placed under the haunches of the tank so that the tank is adequately and uniformly supported. The side clearance is stated with the intent of allowing access for equipment that is necessary for compaction.

Lastly, there is a math error in calculating the excavation volume from the length, width and height data. The initial error for the single installation is then compounded by multiplying it by the total number of tanks (4,769). As a result, the report's calculation underestimates the soil displacement for the STEP installation by a factor of two.
The Statement of Key Environmental Issues for the Collection System of the Los Osos Wastewater Treatment Project states that "the cubic yard soil disturbance estimates are 440,000cy for gravity versus 260,000cy for STEP.

If we multiply 8'W x14'L x 8'D we get 896 cubic feet of soil. If we multiply 896 cubic feet by 4769 units and divide by 27 (to convert to cubic yards) we get approximately 158,000 cubic yards of soil volume.

The 260,000 yards and the 440,000 yards were derived by a table that was completed by Orenco Systems. The derivation of these two numbers is based on both, on-site disturbance and off-site disturbance. This table was completed by Orenco in response to a table that was prepared by Mr. Dubbink. **Orenco's table was provided to Mr. Dubbink via E-mail on October 5, 2007.**

The gravity calculation was derived as follows:

Gravity		*Number or Lineal Ft.*	*Length* feet	*Width* feet	*Depth* feet	*Area* square feet	*Cubic ft.*	*cubic yd.*
Pump Stations								
Triplex		2	20	20	25	800	20,000	741
Duplex		6	14	14	25	1,176	29,400	1,089
Pocket		12	14	14	20	2,352	47,040	1,742
Manholes		807	10	10	12	80,700	968,400	35,867
Sum						85,028	1,064,840	39,439
Collection								
Depth	%							
<8'	63	160,200		3	6	480,600	2,883,600	106,800
8'-12'	34	86,360		6	10	518,160	5,181,600	191,911
12'-16'	2	5,080		6	14	30,480	426,720	15,804
>16'	1	2,540		6	20	15,240	304,800	11,289
Sum		254,180				1,044,480	8,796,720	325,804
Laterals in ROW		4,769	25	3	5.83	178,838	1,042,623	38,616
On-Site Laterals		4769	35	1	3	166,915	500,745	18,546
Septic Tank Decomissioning		4769	6	4	4	114,456	457,824	16,956
Totals						1,589,717	11,862,752	439,361

The STEP calculation was derived as follows:

STEP		*Number or Lineal Ft.*	*Length* feet	*Width* feet	*Depth* feet	*Area* square feet	*Cubic ft.*	*cubic yd.*
Collection	%							
Bored	50	127,000						
Tie-in excavations		320	8	1	3	2,560	7,680	284
Services on Main (Tie-In)		1192	3	3	3	10,728	32,184	1,192
Excavated	50	127000		2	3	254,000	762,000	28,222
Service to property line		2385	10	1	2	23,850	47,700	1,767
Pit to receive long side lateral		1192	3	3	4	10,728	42,912	1,589
Sum						301,866	892,476	31,578
Tank Excavation & Replacement		4769	18	10	7	858,420	6,008,940	222,553
Laterals		4769	35	0.33	1	55,082	55,082	2,040
Totals						1,215,368	6,956,498	256,172

Mr. Dubbink responded to the calculations and explanation provided by Mr. Saunders, in an e-mail dated October 5th, 2007. The e-mail included Mr.Dubbinks comments on the justification provided by Mr. Saunders. Mr. Dubbink comments are in red. Mr. Saunders are in blue. Mr. Dubbink did not refute the calculations provided by Mr. Saunders. **In fact Mr. Dubbink stated that the numbers would be shared with the TAC committee. Unfortunately it does not appear that this ever occured.** The e-mail is included below.

The February 4th, 2008 TAC meeting minutes state the following:

> "David Dubbink discusses area of disturbance calculated by him and areas of disturbance discussed on this report are contradictory. His calculations showed that gravity and step have approximately the same area of disturbance, but the low pressure collection systems would have less area of disturbance."

There was no mention of Orenco's calculations or Orenco's comments on his assumptions.

E-mail from Mr. Dubbinks to Mr. Saunders

From: David Dubbink [mailto:dubbink@noisemanagement.org]
Sent: Friday, October 05, 2007 8:01 PM
To: msaunders@orenco.com
Cc: abarrow
Subject: RE: Read a Lot of Los Osos dirt, any comment?

Mike

I constructed the spreadsheet that you reviewed using numbers that were in the County's fine screening report. I'm attaching a version updated with your numbers. It includes the footnotes that were with the original but not attached to your version. The notes reflect many of your concerns. They explain that the numbers in red are approximations are in need of further study. I was inviting critical review and not getting it until now. It appears that you've applied the needed study based on your experience with STEP and gravity systems. I appreciate you taking the time to do this.

The spreadsheet, with the footnotes, was shared with the TAC environmental group. I wasn't distributed to the rest of the TAC but it seems to have gotten around on its own. I'm bothered that the cautions didn't go forward with the numbers.

I'm not the "dirt" guy. My concerns about earth movement had to do mostly with archaeological resources. Since most of these are within four feet of the surface it was the area of disturbance that was of greatest interest to me. What I was trying to do was pull the numbers from the County's reports that delt with soil disturbance in a comparative framework. There are a few of us that have no pre-committment to a collection technolgy and are just trying to work our way through the advantages and disadvantages of alternatives.

I'll append a few comments questions to your notes (in black).

I asked Al for some written backup information on what your group will be presenting on Wednesday. I'd appreciate it if you could share your numbers and calculations with me - and I'd pass them on to other members of the county's TAC. I realize that you aren't hosting a public hearing but the TAC was routinely slammed for not having everything available for community review prior to meetings.

Thanks.

David Dubbink

Here are my comments.

> 1) It's interesting that a 45 degree excavation slope is incorporated into the STEP tank excavation limits and yet all of the gravity excavations are vertical. Presumably then, all of the gravity sewer is shored from top to bottom. I don't believe that the construction costs are indicative of shoring for deep excavations. In a low bid award of project, it is

extremely naive to assume that a contractor is going to shore everything excavation when the contractors goal is to build by least cost.

Excavation slope wasn't considered in either case. The spec sheet for the Orenco 1500 gallon STEP tank gives the dimensions as 14x7x6. The flange at mid point adds the other foot. The county's information sheet mistakenly gives the dimensions for the 1000 gallon tank. They add a foot for side clearance. I added the same clearance to the larger tank dimensions in the table. .

2) A lift station needs a working volume below the incoming invert of the gravity sewer pipe. This depth is typically 10' to 15' below the incoming gravity sewer invert elevation. If you have incoming sewer 12' to 16' deep, the lift station has to be 25' to 30' deep. Even an 8' deep station is going to be 20' deep. If the station doesn't have a working volume you would be surcharging the sewer system and you would have no storage volume in the event of a power outage. I wonder if their lift station estimates are based on 15' deep stations?

The numbers didn't come from the project plans. The depth was one of the missing (red) numbers. I had a conversation with one of the design engineers who told me the lift stations had been designed to hold wastes in case of a power outage. Your number makes sense.

3) Lift stations typically are 6' in diameter to 12' diameter structure. Additionally, because they are massive structures, they normally have a foundation that is 2' to 4' larger than the diameter of the wet well. A Triplex master lift station with 200 HP pumps would require at lease a 12' diameter structure to house the pumps and to create adequate cycle times for the pumps. Somehow they are going to install this 12' structure in a 12' diameter round hole. While you could use a trench box on the smaller stations, it is not normally very practical with the larger structures. Also, using a trench box or any type of shoring is very expensive and must, in many instances be designed with dewatering or safety in mind. Accordingly, most deep lift station excavations, even when they are shored, are benched. The benching allows for equipment access and multiple levels of well points. I would venture to say a 12' diameter, 25' deep lift station would have three levels of benching (including the surface) and an excavation width of more than a 100' at the surface. The smallest station, 6' diameter and 20' deep, probably has an excavation in excess of 50' at the surface. Also, in a low bid, and assuming that there is adequate space, a contractor will only use a trench box for the bottom of the excavation (if at all) and will slope the top of the excavation at 45 degrees. A contractor typically avoids shoring and/or trench boxes unless they're told to use them or unless site conditions restrict space.

The construction information wasn't part of the discussion. It may have been covered in the EIR.

4) an 8'X8'X8' pit to tie two 2" diameter directional bored pipes together??????? The directional bores are launched without a pit. Typically, once a bore is launched in one direction, it makes economical sense to turn the rig around and go 400' in the other direction. A pit is excavated that is large enough to level out the pipe and make the connection between the two pipe ends. A thermal fused coupling would be used. The

trench would not require any room for equipment or personnel. I'd say we're talking a pit 8' long by 2' wide by 3' deep.

This estimate was another of the red typeface guestimates. It was based on impressions of what seemed to be happening when some fiber optic cable was installed locally.

5) We told the County & Carollo that we would replace the tanks in the same excavation that the old tank is removed from. Since the tank is bigger we would have a slight excavation to accommodate the larger tank.

This would certainly limit additional disruption. I mentioned the omission of this factor in one of my footnotes.

6) A gravity connection will require abandonment of the existing tank or complete removal of the tank. Abandonment normally requires collapsing the tank in place or punching a whole in the bottom (drainage) and backfilling with compacted fill. Accordingly aren't we talking an excavation of the tank for gravity sewer as well? They could pump the existing tank with flowable fill but I do believe that it would be much more expensive.

This isn't determined and appears in different ways in different studies. It has been proposed that the tanks serve as cisterns for greywater.

5) Why haven't they include gravity sewer lateral excavation. We're talking 20' (front stub-out) to 80' (rear stub-out), 2' wide and 4' deep (average). The stated number in the estimate is the number of houses, it is not the area. Lineal footage could easily be more than 200,000. This equates to 1.6 million cubic feet of soil. By comparison, STEP laterals are run with a walk-behind trencher cutting a 2" to 4" wide trench.

I didn't include it because I didn't have the numbers. STEP certainly has the advantage here and there wasn't any intent to ignore it. It is interesting that without this component, the STEP and gravity systems have about the same land area disturbance.

6) The gravity calculations are based on round excavations........I've never seen round excavations shored.

I'm assuming you mean the numbers related to the lift stations and man holes.

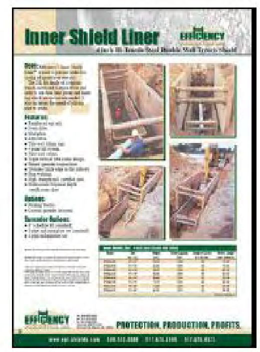
7) Laterals excavations relative to STEP & gravity sewer were not differentiated.....do they not understand that gravity sewer is a 6" lateral (in the right of way) and 4" lateral in the right-of-way that is 4' deep at the property line. The STEP lateral is a 1" service that can be installed with a trencher (2" to 4" wide) and is only about a foot deep at the property line.

I've attached what I feel are realistic calculations based on my experiences having constructed both STEP and gravity sewer systems.

Surface & Soil Disturbance

Number of Connections

	%	*Number or Lineal Ft.*	*Length*	*Width*	*Depth*	*Diameter*	*Area*	*Cubic ft.*	
Gravity									
Pump Stations									
Triplex		2	20	20	25		800	20,000	Shoring Assumed
Duplex		6	14	14	25		1,176	29,400	Shoring Assumed
Pocket		12	14	14	20		2,352	47,040	Shoring Assumed
Manholes		807	10	10	12		80,700	968,400	10' trench box required - manhole typically has an outside diameter around 64" and a diameter of 80" at
Sum							85,028	1,064,840	
Collection									
Depth	%								
<8'	63	160,200		3	6		480,600	2,883,600	
8'-12'	34	86,360		6	10		518,160	5,181,600	Two 6' trench boxes stacked
12'-16'	2	5,080		6	14		30,480	426,720	Two 6' trench boxes stacked
>16'	1	2,540		6	20		15,240	304,800	Two 6' trench boxes stacked
Sum		254,180					1,044,480	8,796,720	
Laterals in ROW		4,769	25	3	5.83		178,838	1,042,623	
On-Site Laterals		4769	35	1	3		166,915	500,745	25% rear lot & 75% front lot
Septic Tank Decomissioning		4769	6	4	4		114,456	457,824	
Totals							1,589,717	11,862,752	
STEP									
Collection									
Bored	50	127,000							
Tie-in excavations		320	8	1	3		2,560	7,680	Typically 400'
Services on Main (Tie-in)		1192	3	3	3		10,728	32,184	Pit required on bore only
Excavated	50	127000		2	3		254,000	762,000	2' Bucket Width, no shoring or dewatering
Service to property line		2385	10	1	2		23,850	47,700	1' bucket on micro excavator
Pit to receive long side lateral		1192	3	3	4		10,728	42,912	Mole to be utilized
Sum							301,866	892,476	
Tank Excavation & Replacement		4769	18	10	7		858,420	6,008,940	Trench Box could be used
Laterals		4769	35	0.33	1		55,082	55,082	
Totals							1,215,368	6,956,498	



Accordingly, it is my opinion that STEP would have approximately 23% less surface area disturbance and 41% less disturbance by volume when compared to gravity sewer. 86% of the STEP excavation is associated with the onsite tank. If trench boxes where used for the STEP tank the quantity of excavated material could be halved (the installation cost would be higher).

Specific to the June 8th letter:

1. We've repeatedly stated that our team would utilize the same excavation as the existing septic tank. Accordingly, we would anticipate approximately 80 cubic feet of surplus material remaining after an installation. Accordingly, approximately 380,000 cubic feet of total excess material would be created. The actual quantity is typically much less as many homeowners chose to retain the excavated material for use on-site. The installation of the STEP mains would create less than 7,000 cubic feet of excess material.

2. Here's are few staggering numbers to consider. The gravity sewer will displace more than 11,000,000 cubic feet of existing soil (see table). Excavation includes gravity mains, manholes (placed every 300' on average), lift stations and laterals. Of this approximately 200,000 cubic feet of existing soil will be surplus. However, approximately 570,000 cubic feet of fill material would be required to backfill the abandoned septic tanks. Accordingly more than 370,000 cubic feet of imported fill

material would be required. Additionally, much of the 11,000,000 + cubic feet of material excavated for installation of the sewer will have to be trucked to a staging area, and then returned for backfill. Typically, the existing right-of-way will not have adequate space to stage excavated material. Taking this into account, I would find Mr. Dubbink's comments on the aesthetics of noise for gravity sewer construction very interesting.

3. Anyone that has seen a gravity sewer getting built should realize that your street is closed during construction. Accordingly, you will have to park in a designated area and walk to your home. Streets can be closed for weeks. Additionally, road reconstruction will also have access impacts. During STEP construction, access can be maintained. When directional boring is utilized you may not even realize that the main has been constructed. An on-site STEP installation is typically done is half a day.

Appendix B

Response to Mr. Dubbink's letter dated June 9th, 2009.

Mr. David Dubbink sent a letter to the Planning Commissions. A copy has been attached for reference. Mr. Dubbink's comments are in red and Mr. Saunders are in blue:

Statement #1 "the following exposition is substantial evidence of why his team should have been rated below teams presenting more accurate data and exhibiting a superior understanding of the Los Osos setting

Mr. Dubbink *was not* present during the ranking process. The short listing process was intended to evaluate the qualifications or the team. STEP was an approved alternative for the RFP and yet during the process, we were asked about small lots. To this question we told the interview team that the STEP configuration had been defined by the County and not the Design Build team. We told the interview team that there were alternative configurations of STEP that could be considered to work more efficiently with small lots. We told them that these options would be detailed in an RFP response. Mr. Dubbink's assertion that soil disturbance or the inability to serve small lots should be justification for our Design Build team not being passed through to the RFP process is unfounded.

Statement #2 : The sixth argument involves soil displacement. Cagle says "the overall impact of major construction is much greater with gravity sewer". He offers a pair of diagrams as proof of his contention; one shows the area of disturbance associated with gravity system installation and the other shows the disturbance associated with STEP. The objective of this exhibit is to rebut the idea that STEP/STEG shifts construction impacts from streets to individual properties.

On April 4th, 2009, SLO County Staff presented their justifications for not ranking the Lyles Group Design Build team. Every reason given was against STEP and none of the reasons given were relative to the qualifications of the Design Build team. One of the reasons gives was as follows:

> "The STEP/STEG alternative shifts the major impact of construction excavation from the county's road right-of-way to private properties"

Throughout the process, and especially in the community survey, County Staff has continually made a point to create a perception that STEP has an incredible **on-lot** impact when compared to gravity. They never talk about the total impact, including public right-of-way. The objective of the graphic was to show the potential range of impact of the right-of-way and the on-site construction so that the full comparison could be derived. The graphic wasn't used in the Design/Build presentation and was not intended to be specific to Los Osos. It was to make the point, again, that the statement by County Staff is misleading.

The following slide was included in the W.M. Lyles Design Build Team. Please note the gravity sewer excavation shown in the right picture. The trench appears to be about 6' deep and yet causes a surface disturbance that appears to be in the range of 8' to 10' Mr. Dubbink has provided calculations stating that a gravity sewer trench that is three times as deep as the trench in this picture can be maintained at a width of 3'. At no time has the soil disturbance for gravity sewer been adequately quantified nor conveyed to the public. The rough screening analysis, fine screening analysis, the EIR, the public survey and now the staff recommendations have all failed in adequately defining soil excavation impacts.

Statement #3 : There are obvious problems. The houses (shown in darker grey) and their yards are quite large compared to what actually exists in Los Osos. The setback of the houses from the street is 44 feet where the community setback standard is 25 feet. The width of the parcels shown on the Orenco scale to a lot width of 134 feet. (The measurements were made using the scaling features of Google Earth)

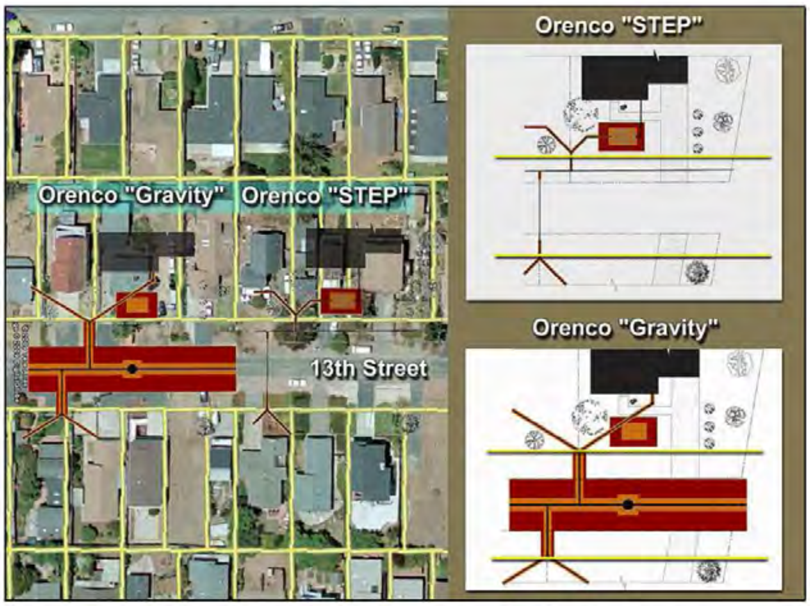
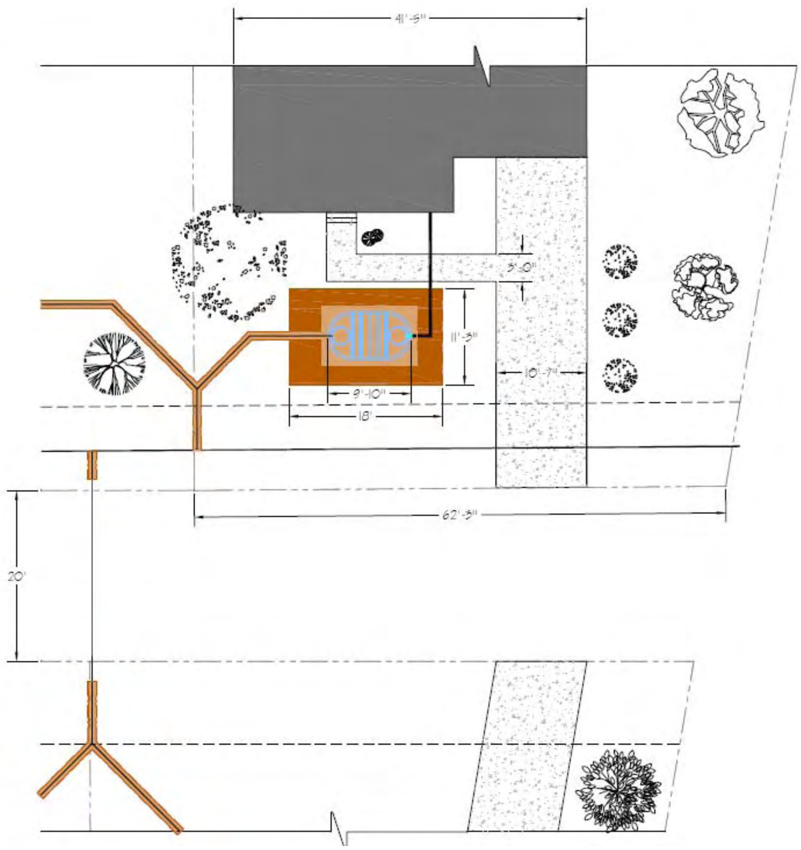


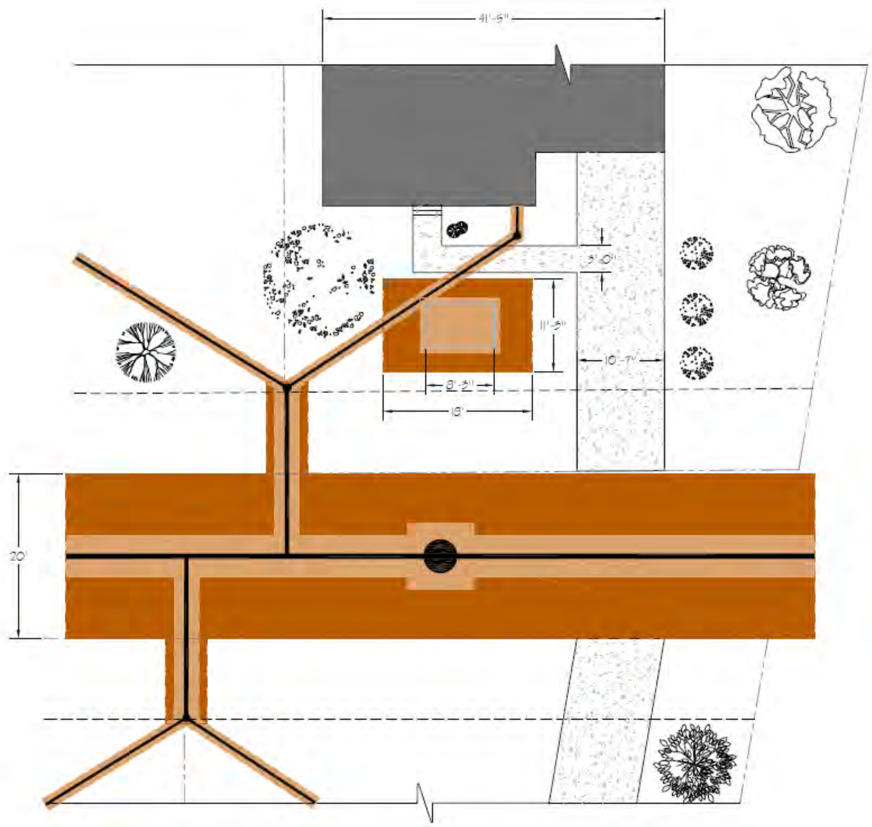
Figure 1: Orenco diagrams (right) superimposed on Los Osos base map.

Mr. Dubbink's attempt to scale the Orenco comparison of impact to the Los Osos Google map is inaccurate. Orenco's drawing is shown below with dimensions added. The front of the lot is 62'3" wide and not 134' as Mr. Dubbink has asserted. Again, the intent of the drawing was to show a "whole view" comparison and not just an on-site only comparison. It is also intended to show that excavation limits have a range depending on the soil type and shoring utilized. Mr. Dubbink has been promoting gravity sewer calculations that show a 3' wide trench that could be cut more than 20'. This trench width is inconceivable from both a logistical and construction safety perspective.



Statement #4 - The impact of the excavation for a gravity trench in the Orenco diagram is alarming. In the "best case" the width of the pipeline trench is 11 feet and in the "worst case" the trench is 43 feet across. Luckily, Orenco's depiction has no resemblance to actual plans. And it is not only the trenching that is amiss. The plans for the gravity system aligned the laterals perpendicular to the street where Orenco shows them at 45 degree angles.

Since Mr. Dubbink has more than doubled the scale of the Orenco drawing, there really isn't much credibility to this statement. The dimensioned gravity sewer drawing is shown below. In actuality we're showing the maximum limit of excavation as 20' at the surface. In reality, the excavation limit could be much more. In order to provide shoring, access for pipe assembly, dewatering, and to satisfy OSHA trench excavation requirements, a 20' deep gravity sewer excavation can easily be 20' across at the surface.



Statement #5: While changing the scale shrinks the size of the houses, the size of the excavation shrinks too. In the “best case” the tank excavation scales to 8 by 13 feet. The Orenco 1,500 gallon tank measures 7 x 15 feet in its outer dimensions and it wouldn’t fit into such an excavation. The “worst case” excavation size is 12 by 20 feet. Orenco’s tank installation manual calls for side clearances of 2 feet on all sides. The tank would barely fit if the excavation were straight-sided. If a more realistic 2:1 side slope is assumed, the excavation would be 17 x 25 feet. This substantially larger than what is shown in the Orenco diagram. The grey tone on Figure 2 shows the outline of an excavation of this size.

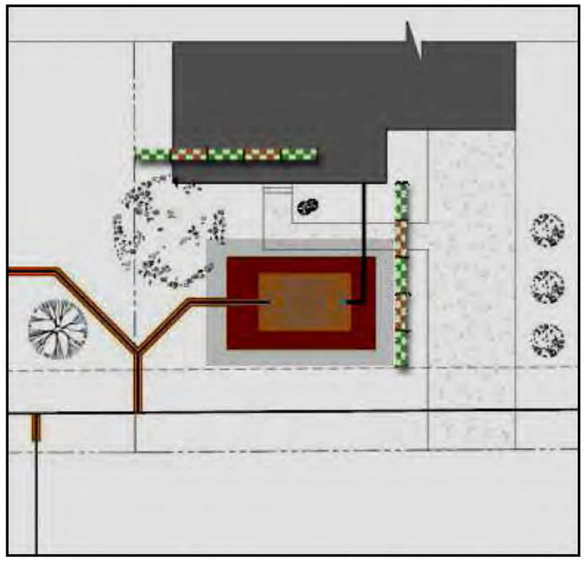


Figure 2: Alternate representation based on setback

Orenco fiberglass tanks **WERE NOT** proposed for use in the Los Osos project. Alternatively, concrete tanks were proposed. The length and width dimensions for a 1500 gallon tank (6'W x 11'L x 6.25'D) would actually represent a very large 1500 gallon concrete tank with an H20 traffic rated lid. In practicality the size of concrete septic tanks are highly variable due to wall thickness and the amount of freeboard (room above the 1500 gallon level). I have found concrete 1500 gallon tanks as small as 5.5'W x 9.5'L x 5'D. Therefore the size of the concrete tank was conservatively stated on the larger side. When an excavation is made to remove and replace the existing concrete tank, shoring can be provided with steel shoring to limit the excavation size. The maximum limits in the drawing are scaled to be 11'3" by 18'. This is more than reasonable.

Statement #6: The change of scale puts the lot width in the realm of 65 feet which is still greater than the size of a double-width lot in Los Osos. And the miniaturization of the scale has an additional effect in that it shrinks the street width by 20 feet. Figure 3 shows how the "centerline" of the road on the Orenco diagram is no longer aligns with the centerline of 13th Street.

Figure 3: Effect of scale interpreted from setbacks

While Mr. Dubbink does a better job of getting the on-site scaling right, we're not sure what his criticism of the right-of-way is. Again, he is taking the Orenco graphic out of context. The Los Osos right-of-ways are actually much larger than typical right-of-ways found in most communities. Had Mr. Dubbink actually participated in the interviews he would realize that the design build team did include a graphic that identified the large right-of-ways and proposed the use of the right-of-way as a location for installation of the STEP tank, rather than placing it on private property on a small lot.

Statement #7: Moreover, they show a lack of understanding of the Los Osos context. Mr. Cagle's assertion that the Orenco figures, are, "drawn to scale within the context of applicable codes, setbacks, etc.", is clearly off the mark. The setbacks, the house sizes, the lot widths and street right of way assumptions don't apply to Los Osos.

Again, the graphic was not provided with the intent of explaining how we would service a small lot. It was included as an exhibit to show the impact from gravity sewer that is not being discussed.

Statement #8

Figure 4: Native oaks in Los Osos front yards

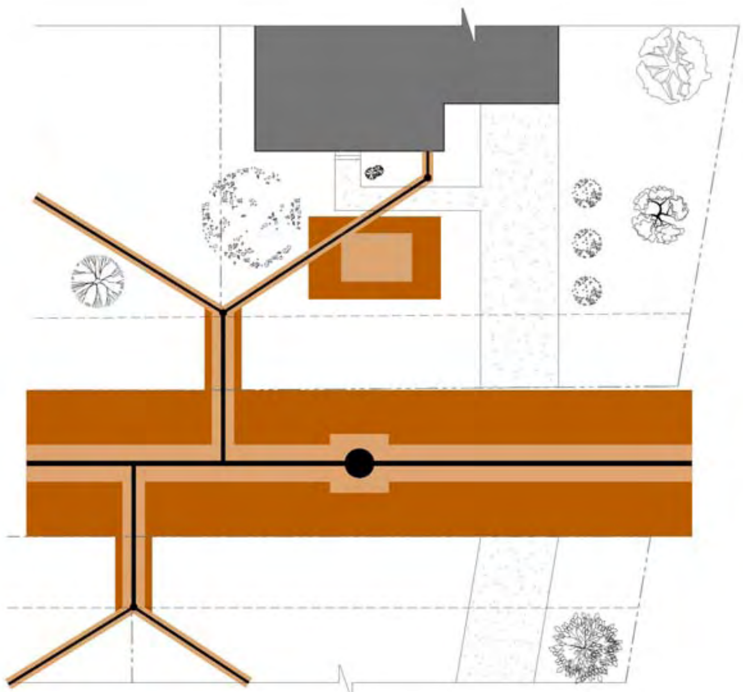
The site disturbance problem is not just about "grass and gladiolas" as it has been derisively dismissed by some. Figure 4 shows photos of two houses not far from mine. Both have stands of native oaks in the front yard and both pose significant problems in siting a STEP tank. Compounding this, the 10th Street house is at the center of a mapped archeological site (SLO-458). The choice in such situations is between removing trees and potentially disturbing cultural resources or removing the driveways which necessitates reinforcement of the a standard fiberglass STEP tank (what happens with the tank's twin turrets is unknown). It is evident that additional homeowner costs are involved. This illustrates the accuracy of the proposition that some of the savings for STEP installation are offset by increased costs to property owners. It also is evidence supporting the EIR's conclusion that the STEP alternative has the greater impact on environmental resources.

We have repeatedly stated that gravity sewer has very large on-site impacts. While STEP requires

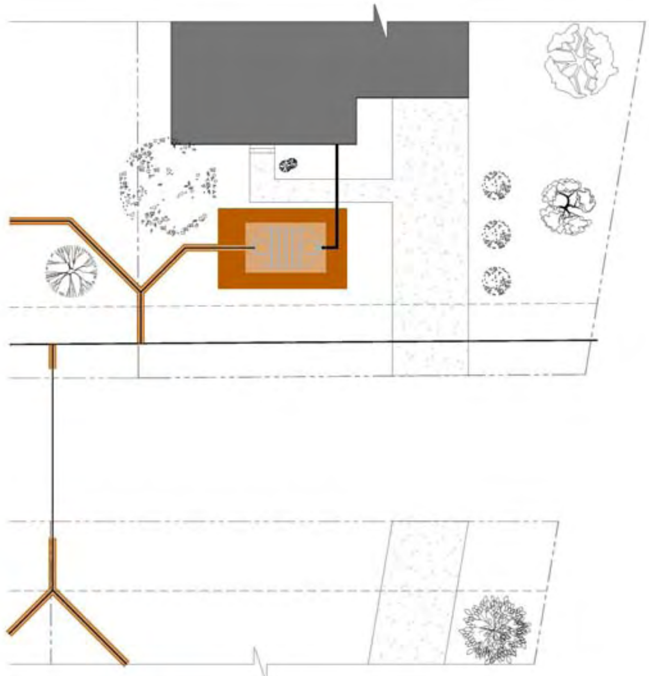
On-site STEP installation requires the removal and installation of a STEP tank in most instances. The service lines can be installed with trenchless techniques. Gravity sewer by comparison, requires removal (or possible crushing in-place) the existing tank and installation of a gravity sewer main that exits the house at an elevation that is normally 1 to 2 feet below the finished floor elevation and connect to the main at an elevation that is typically 3' to 5' below the ground elevation. Unlike a STEP connection, the gravity sewer connection cannot be routed around most of the existing trees, walls, landscaping, etc. If an open trench is cut though an oak tree root structure, the tree typically dies. If a service line is installed trenchless or if the service line can be routed around a tree, the tree can be saved. Additionally, Mr. Dubbink has incorrectly assumed that the existing septic tank can be lefty in-place as a water storage tank. This option has never been approved by State regulators and shouldn't be assumed as possible.

Appendix C

The following two illustrations compare gravity sewer soil disturbance against STEP sewer soil disturbance. STEP is by far superior with less overall impact.



The above drawing is a depiction of the overall gravity sewer soil disturbance impact drawn to scale within the context of applicable codes, setbacks, etc.



The above drawing is a depiction of the overall STEP soil disturbance impact drawn to scale within the context of applicable codes, setbacks, etc. The lightly colored tan areas are best case scenarios the darker brown areas are worst case.