TAC Meeting – August 20, 2007
Announcements from the Chair

Last Tuesday I presented our Pro/Con Analysis on Project Component Alternatives to the Board of Supervisors as a part of the Project Teams presentation. The purpose of the presentation was to gain approval of the project selection strategies for the Los Osos wastewater project. That approval was granted. The Board of Supervisors also asked me to extend their praise to each of you for the work this committee is doing.

Please mark your calendars for an all day community outreach featuring the TAC, the Project Team, and other community organizations on Saturday, September 29th. Details will follow.

Tonight's meeting will focus on the content of our Pro/Con Analysis of Sample Project report.

Although this report will be addressed to the Board of Supervisors and the Project Team it is mainly being designed to provide the community with a concise and understandable document that shows the five sample projects in a graphic format with a listing of the major pros and cons and estimated construction and operating cost of each.

I would like to reiterate that these are NOT the final selected projects but rather show a sampling of possible projects that are technically feasible to permit, fund and construct.

Tonight public comments and questions will be taken after a brief review of the report in its current state. At that time only comments and questions pertaining to the presentation will be allowed. I will call for all slips to be submitted before we begin your comments. Once public comment begins, in order to keep our meeting on schedule, we will stop accepting new slips for that item, so please get your slips in to us if you wish to speak.

If you have any other comment or question relating to the TAC and it role there will be a second public input period at the end of the meeting.

Questions to the Project Team will be answered as time permits at the end of the meeting. Please be sure and fill out Public Input slips and hand them in to Diana of the project staff and, if you wish to speak in both comment periods, please submit two slips.

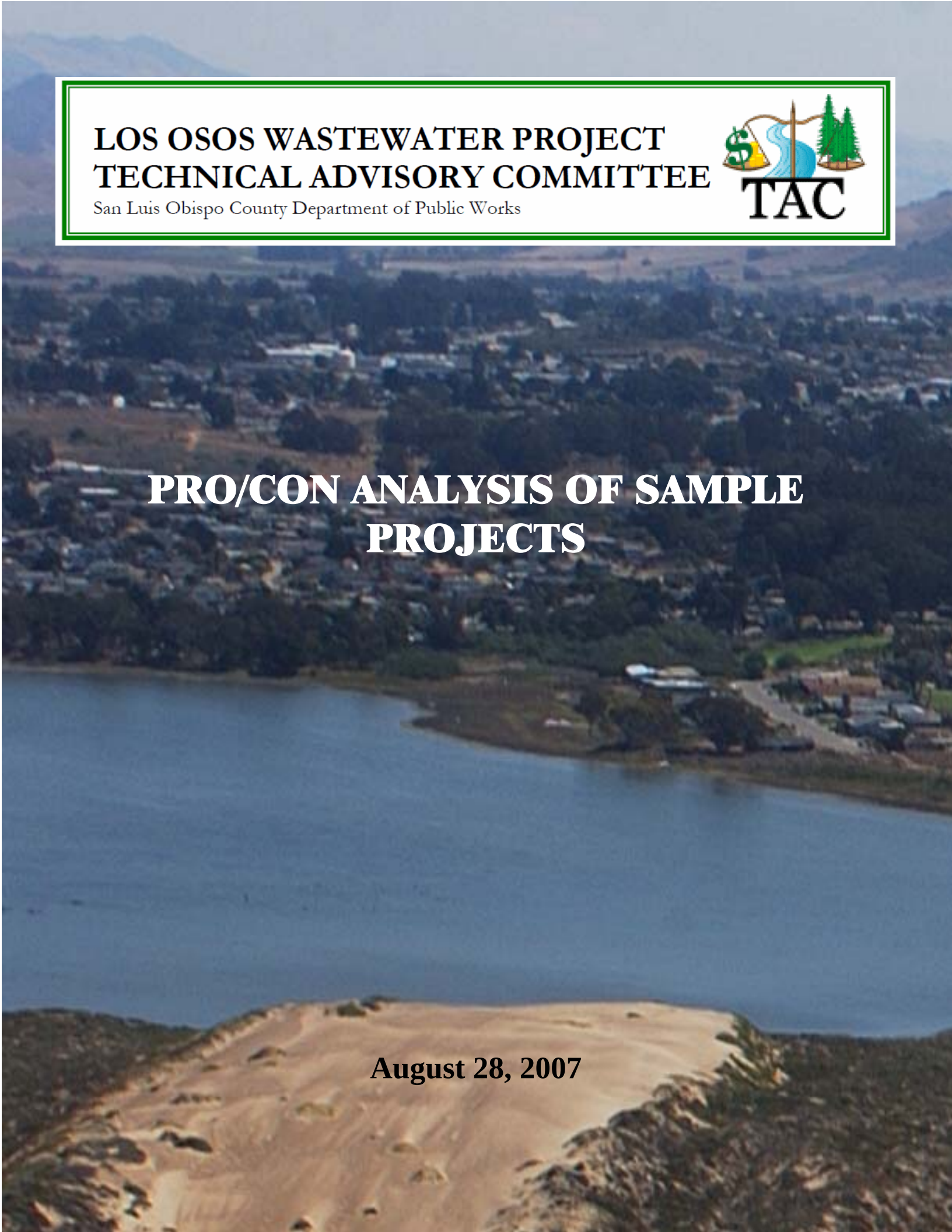
You may read the final TAC Pro/Con Analysis on Project Components by visiting our website (http://www.slocounty.ca.gov/PW/LOWWP), select the TAC page and then the link to the Pro/Con Analysis Report. We encourage your questions or comments on this report. Our e-mail address is LOWWP@co.slo.ca.us.

Before we begin I would also like to mention that I have asked the County to make available to the community the Executive Summary portion of our Pro/Con Analysis on Components with the financial data on page 7 updated to reflect any changes in the Fine Screening Report. This document would be an excellent companion document to the one we are currently finalizing.

(Questions from the TAC?)

(Go through slides of report)

Submitted by
Chairman Garfinkel
8/20/07



LOS OSOS WASTEWATER PROJECT TECHNICAL ADVISORY COMMITTEE

San Luis Obispo County Department of Public Works

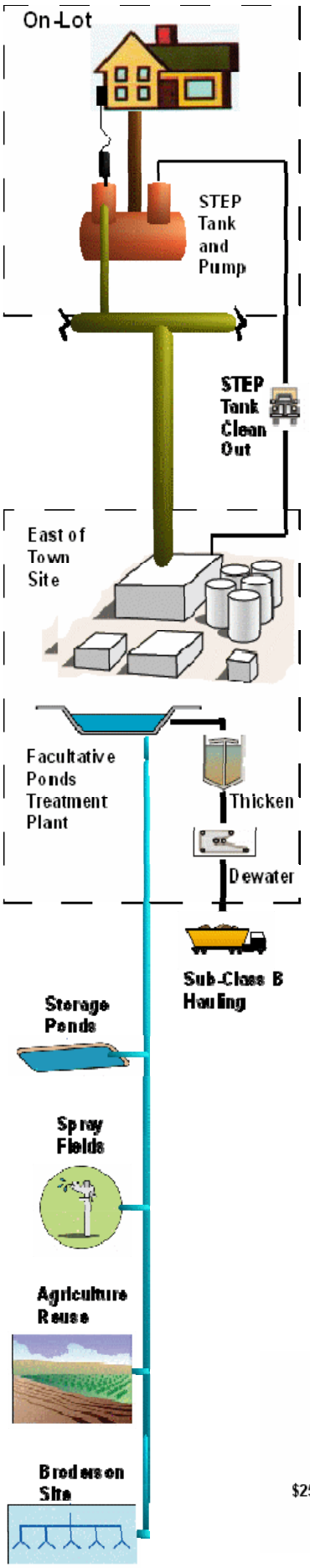
TAC

PRO/CON ANALYSIS OF SAMPLE PROJECTS

August 28, 2007

Project A

LOS OSOS WASTEWATER PROJECT
TECHNICAL ADVISORY COMMITTEE
San Luis Obispo County Department of Public Works
TAC



Collection	Treatment	Effluent Disposal	Solids Disposal	Site
STEP	Facultative Ponds	41% - 52% Reduction in Salt Water Intrusion (SWI)*	Sub-Class "B"	East of Town

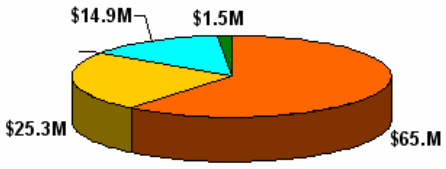
*Utilizes Spray Fields, Storage Ponds, Agriculture Reuse and Broderson Site

Pros

- Step collection has primary treatment in the tank and reduces solids. It also facilitates shallow trenching and Horizontal Directional Drilling (HDD) where feasible, results in less road impacts and traffic nuisance. No manholes or lift stations in roadway and minimal risk of inflow and infiltration of groundwater.
- Facultative Ponds energy usage approximately 600,000 kWh/y and eliminate sludge hauling (dredging is required every 20 years).
- Spray Fields have the greatest disposal capacity and provide future flexibility
- Sub-class "B" Biosolids have lowest capital and O&M costs, allow flexibility to be upgraded and have low acreage requirements
- Agriculture reuse potentially reduces pumping large volumes from aquifer
- Broderson Site provides moderate SWI Mitigation factor and is the only method studied to directly recharge upper aquifer and is already owned by CSD.
- East of town sites are in a low population density area on non-prime agricultural land. They are adequate in size and flexibility for future expansion and emergency storage in event of system failure and in close proximity to spray fields and agriculture reuse. Little traffic impact during construction and operation.

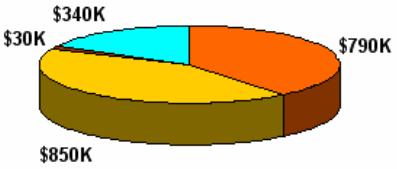
Cons

- Step collection results in construction and permanent impact on individual property, including large footprint, greater amount of yard restoration after installation, maintenance and nuisance of regular pumping of septic tank. There are potential odor issues of vents if not properly maintained (200 - 500 collection vents located throughout community). Many active on-lot components resulting in greater risk of failures.
- Facultative Ponds require larger footprint (16-20 acres), produce Methane gas (a more powerful greenhouse gas than CO2) and have greater construction impacts. Additional chemical treatment is required.
- Sub-class "B" Biosolids produce greatest volume of sludge, is the most restrictive disposal option and highly dependent on availability of receiver sites. It has the largest carbon footprint: highest hauling costs and traffic nuisance and produces lowest quality of sludge (may require additional treatment for disposal)
- Spray Field have zero Seawater Intrusion (SWI) mitigation, greatest footprint and highest land costs with the potential environmental impacts of trenching pipelines
- Agriculture Reuse also has low SWI Mitigation
- Broderson Site has construction impacts and costs from monitoring wells plus grater impacts on habitat (initial construction and reconstruction every 10 years)
- East of town sites have increased cost and impacts to pipe influent from collection area and return treated effluent to Broderson. They also lack acceptance by residents in area



TOTAL CONSTRUCTION COST $106.7M

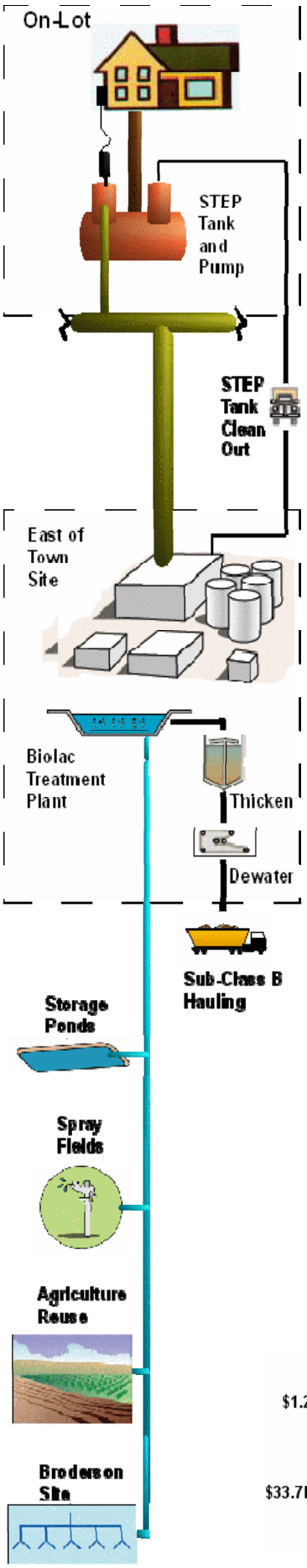
COLLECTION
TREATMENT
SOLIDS
EFFLUENT
SITE



TOTAL O&M COST $2,010K

Project B

LOS OSOS WASTEWATER PROJECT
TECHNICAL ADVISORY COMMITTEE
San Luis Obispo County Department of Public Works
TAC



Collection	Treatment	Effluent Disposal	Solids Disposal	Site
STEP	Biolac	41% - 52% Reduction in Salt Water Intrusion (SWI)*	Sub-Class "B"	East of Town

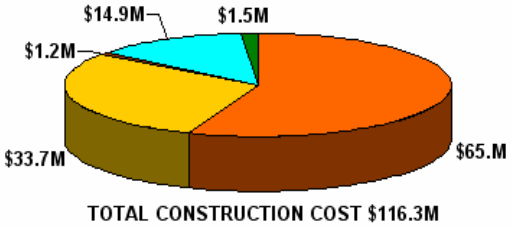
*Utilizes Spray Fields, Storage Ponds, Agriculture Reuse and Broderson Site

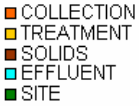
Pros

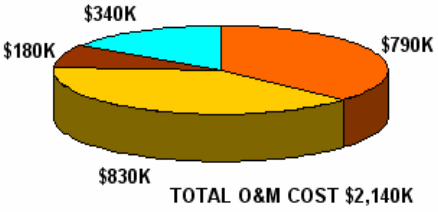
- Step collection has primary treatment in the tank and reduces solids. It also facilitates shallow trenching and Horizontal Directional Drilling (HDD) where feasible, results in less road impacts and traffic nuisance. No manholes or lift stations in roadway and minimal risk of inflow and infiltration of groundwater.
- Biolac treatment needs a small footprint (8-10 acres) and lower energy usage (800,000 kWh/yr)
- Spray Fields have the greatest disposal capacity and provide future flexibility
- Sub-class "B" Biosolids have lowest capital and O&M costs, allow flexibility to be upgraded and have low acreage requirements
- Agriculture reuse potentially reduces pumping large volumes from aquifer
- Broderson Site provides moderate SWI Mitigation factor and is the only method studied to directly recharge upper aquifer and is already owned by CSD.
- East of town sites are in a low population density area on non-prime agricultural land. They are adequate in size and flexibility for future expansion and emergency storage in event of system failure and in close proximity to spray fields and agriculture reuse. Little traffic impact during construction and operation.

Cons

- Step collection results in construction and permanent impact on individual property, including large footprint, greater amount of yard restoration after installation, maintenance and nuisance of regular pumping of septic tank. There are potential odor issues of vents if not properly maintained (200 - 500 collection vents located throughout community). Many active on-lot components resulting in greater risk of failures.
- Sub-class "B" Biosolids produce greatest volume of sludge, is the most restrictive disposal option and highly dependent on availability of receiver sites. It has the largest carbon footprint: highest hauling costs and traffic nuisance and produces lowest quality of sludge (may require additional treatment for disposal)
- Spray Field have zero Seawater Intrusion (SWI) mitigation, greatest footprint and highest land costs with the potential environmental impacts of trenching pipelines
- Agriculture Reuse also has low SWI Mitigation
- Broderson Site has construction impacts and costs from monitoring wells plus grater impacts on habitat (initial construction and reconstruction every 10 years)
- East of town sites have increased cost and impacts to pipe influent from collection area and return treated effluent to Broderson. They also lack acceptance by residents in area

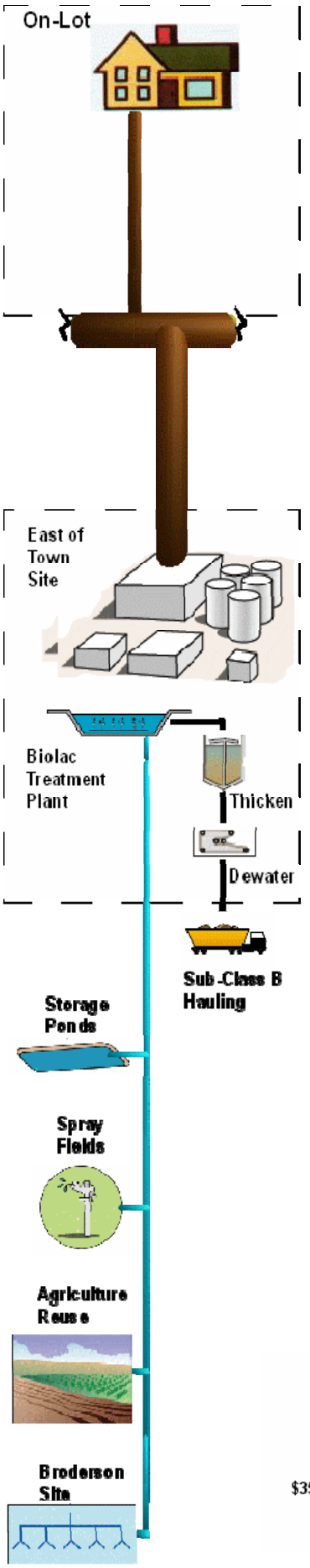






Project C

LOS OSOS WASTEWATER PROJECT
TECHNICAL ADVISORY COMMITTEE
San Luis Obispo County Department of Public Works
TAC



Collection	Treatment	Effluent Disposal	Solids Disposal	Site
Gravity	Biolac	41% - 52% Reduction in Salt Water Intrusion (SWI)*	Sub-Class "B"	East of Town

*Utilizes Spray Fields, Storage Ponds, Agriculture Reuse and Broderson Site

Pros

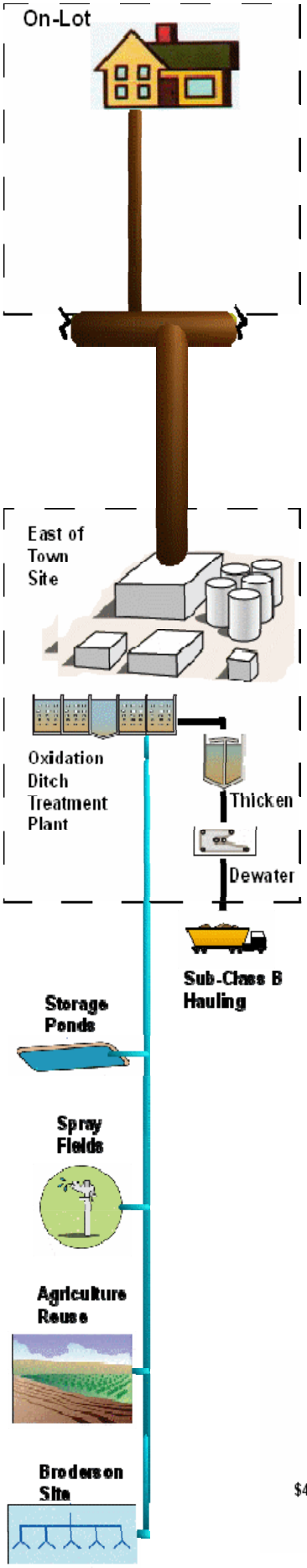
- Gravity collection has less on-lot disturbance and no easement or access required on private property. There also is no requirement to haul septage within the collection area
- Biolac treatment needs a small footprint (8-10 acres)
- Spray Fields provide future flexibility
- Sub-class "B" Biosolids allow flexibility to be upgraded and low acreage requirements
- Agriculture reuse potentially reduces pumping large volumes from aquifer
- Broderson Site provides moderate SWI Mitigation factor and is the only method studied to directly recharge upper aquifer and is already owned by CSD.
- East of town sites are in a low population density area on non-prime agricultural land. They are adequate in size and flexibility for future expansion and emergency storage in event of system failure and in close proximity to spray fields and agriculture reuse. Little traffic impact during construction and operation.

Cons

- Gravity collection requires larger pipes, deeper trenching and dewatering (resulting in need to protect water quality from disposal of collected water), significant soil erosion, and construction traffic nuisance. The needed 20 pump stations have permanent impact, requiring additional footprint and odor control. There is increased risk of inflow and infiltration of groundwater which may require additional monitoring and repair. Gravity collection pipes require cleaning every 2 years with attendant odors.
- Biolac has high energy usage (1.1M kWh/yr)
- Sub-class "B" Biosolids produce greatest volume of sludge, is the most restrictive disposal option and highly dependent on availability of receiver sites. It has the largest carbon footprint: highest hauling costs and traffic nuisance and produces lowest quality of sludge (may require additional treatment for disposal)
- Spray Field have zero Seawater Intrusion (SWI) mitigation, greatest footprint and highest land costs with the potential environmental impacts of trenching pipelines
- Agriculture Reuse also has low SWI Mitigation
- Broderson Site has construction impacts and costs from monitoring wells plus grater impacts on habitat (initial construction and reconstruction every 10 years)
- East of town sites have increased cost and impacts to pipe influent from collection area and return treated effluent to Broderson. They also lack acceptance by residents in area

Project D

LOS OSOS WASTEWATER PROJECT
TECHNICAL ADVISORY COMMITTEE
San Luis Obispo County Department of Public Works
TAC



Collection	Treatment	Effluent Disposal	Solids Disposal	Site
Gravity	Oxidation Ditch	41% - 52% Reduction in Salt Water Intrusion (SWI)*	Sub-Class "B"	East of Town

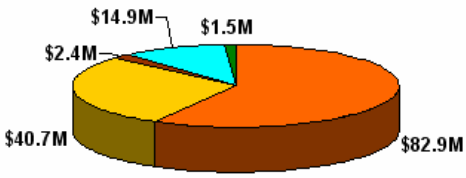
*Utilizes Spray Fields, Storage Ponds, Agriculture Reuse and Broderson Site

Pros

- Gravity collection has less on-lot disturbance and no easement or access required on private property. There is no requirement to haul septage within the collection area
- Oxidation Ditch treatment has a small footprint (8 acres)
- Spray Fields provide future flexibility
- Sub-class "B" Biosolids allow flexibility to be upgraded and low acreage requirements
- Agriculture reuse potentially reduces pumping large volumes from aquifer
- Broderson Site provides moderate SWI Mitigation factor and is the only method studied to directly recharge upper aquifer and is already owned by CSD.
- East of town sites are in a low population density area on non-prime agricultural land. They are adequate in size and flexibility for future expansion and emergency storage in event of system failure and in close proximity to spray fields and agriculture reuse.
- East of town sites are in a low population density area on non-prime agricultural land. They are adequate in size and flexibility for future expansion and emergency storage in event of system failure and in close proximity to spray fields and agriculture reuse. Little traffic impact during construction and operation.

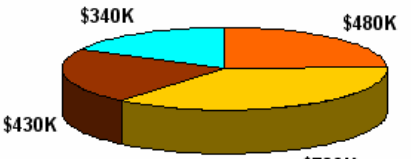
Cons

- Gravity collection requires larger pipes, deeper trenching and dewatering (resulting in need to protect water quality from disposal of collected water), significant soil erosion, and construction traffic nuisance. The needed 20 pump stations have permanent impact, requiring additional footprint and odor control. There is increased risk of inflow and infiltration of groundwater which may require additional monitoring and repair. Gravity collection pipes require cleaning every 2 years with attendant odors.
- Oxidation Ditch has energy usage of 900,000 kWh/yr
- Sub-class "B" Biosolids produce greatest volume of sludge, is the most restrictive disposal option and highly dependent on availability of receiver sites. It has the largest carbon footprint: highest hauling costs and traffic nuisance and produces lowest quality of sludge (may require additional treatment for disposal)
- Spray Field have zero Seawater Intrusion (SWI) mitigation, greatest footprint and highest land costs with the potential environmental impacts of trenching pipelines
- Agriculture Reuse also has low SWI Mitigation
- Broderson Site has construction impacts and costs from monitoring wells plus grater impacts on habitat (initial construction and reconstruction every 10 years)
- East of town sites have increased cost and impacts to pipe influent from collection area and return treated effluent to Broderson. They also lack acceptance by residents in area



TOTAL CONSTRUCTION COST $142.4M

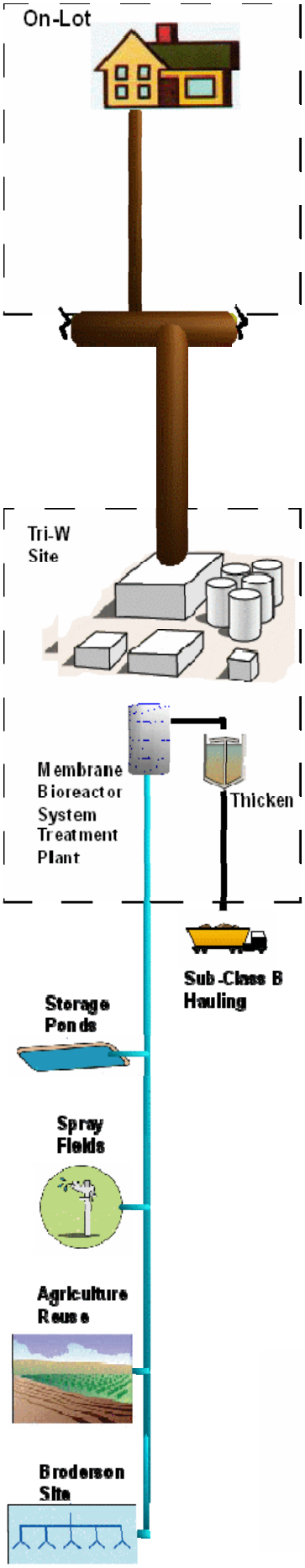
COLLECTION
TREATMENT
SOLIDS
EFFLUENT
SITE



TOTAL O&M COST $1,970K

Project E

LOS OSOS WASTEWATER PROJECT
TECHNICAL ADVISORY COMMITTEE
San Luis Obispo County Department of Public Works
TAC



Collection	Treatment	Effluent Disposal	Solids Disposal	Site
Gravity	MBR	41% - 52% Reduction in Salt Water Intrusion (SWI)*	Sub-Class "B"	Tri-W

*Utilizes Spray Fields, Storage Ponds, Agriculture Reuse and Broderson Site

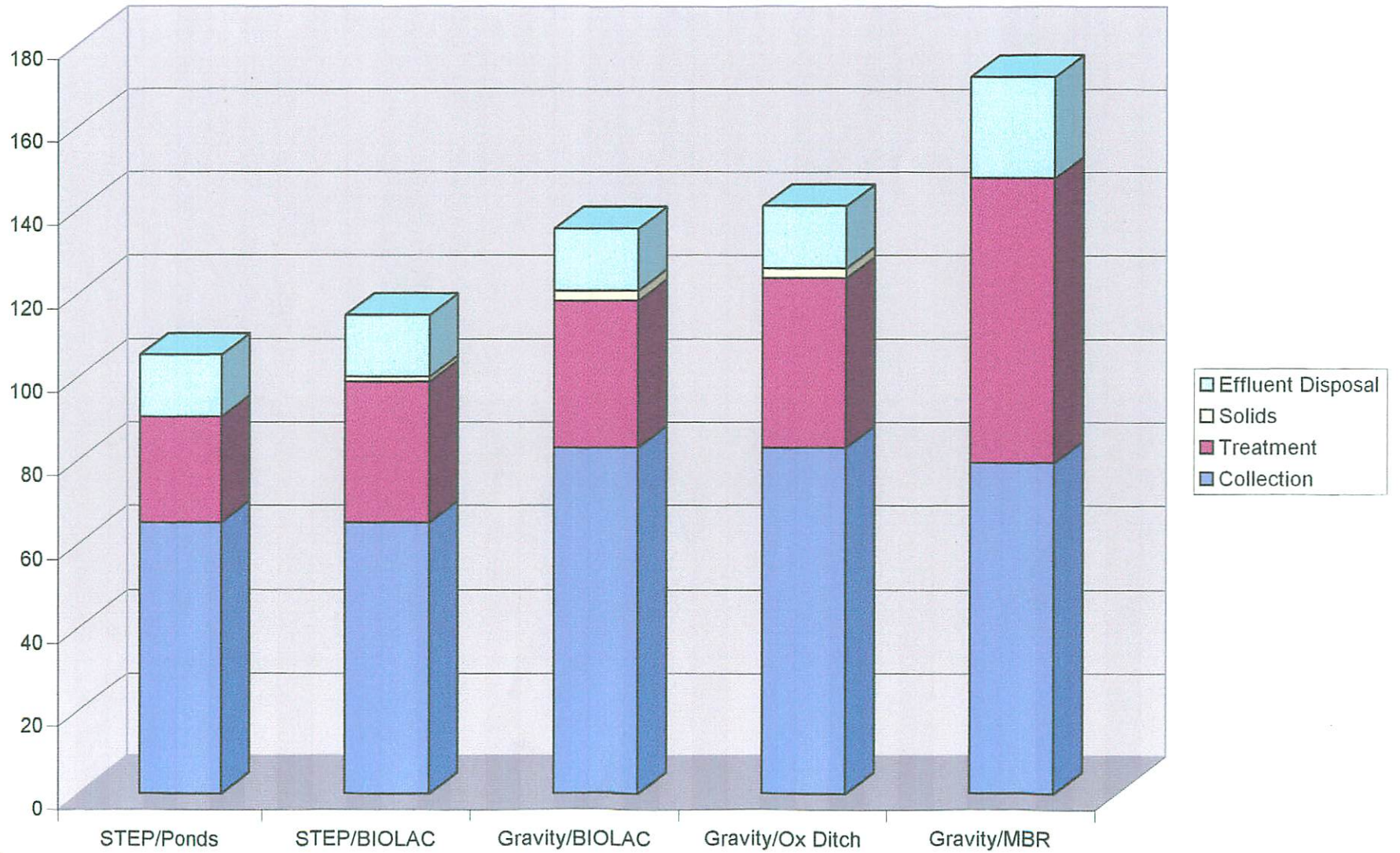
Pros

- Gravity collection has less on-lot disturbance and no easement or access required on private property. There is no requirement to haul septage within the collection area
- MBR treatment requires smallest footprint (4 acres) and produces the highest quality of effluent. As an enclosed facility it will control odors.
- Spray Fields provide future flexibility
- Sub-class "B" Biosolids have low acreage requirements
- Agriculture reuse potentially reduces pumping large volumes from aquifer
- Broderson Site provides moderate SWI Mitigation factor and is the only method studied to directly recharge upper aquifer and is already owned by CSD.
- Tri-W site is already owned by the CSD and is centrally located resulting in less collection pipe and easier discharge to Broderson

Cons

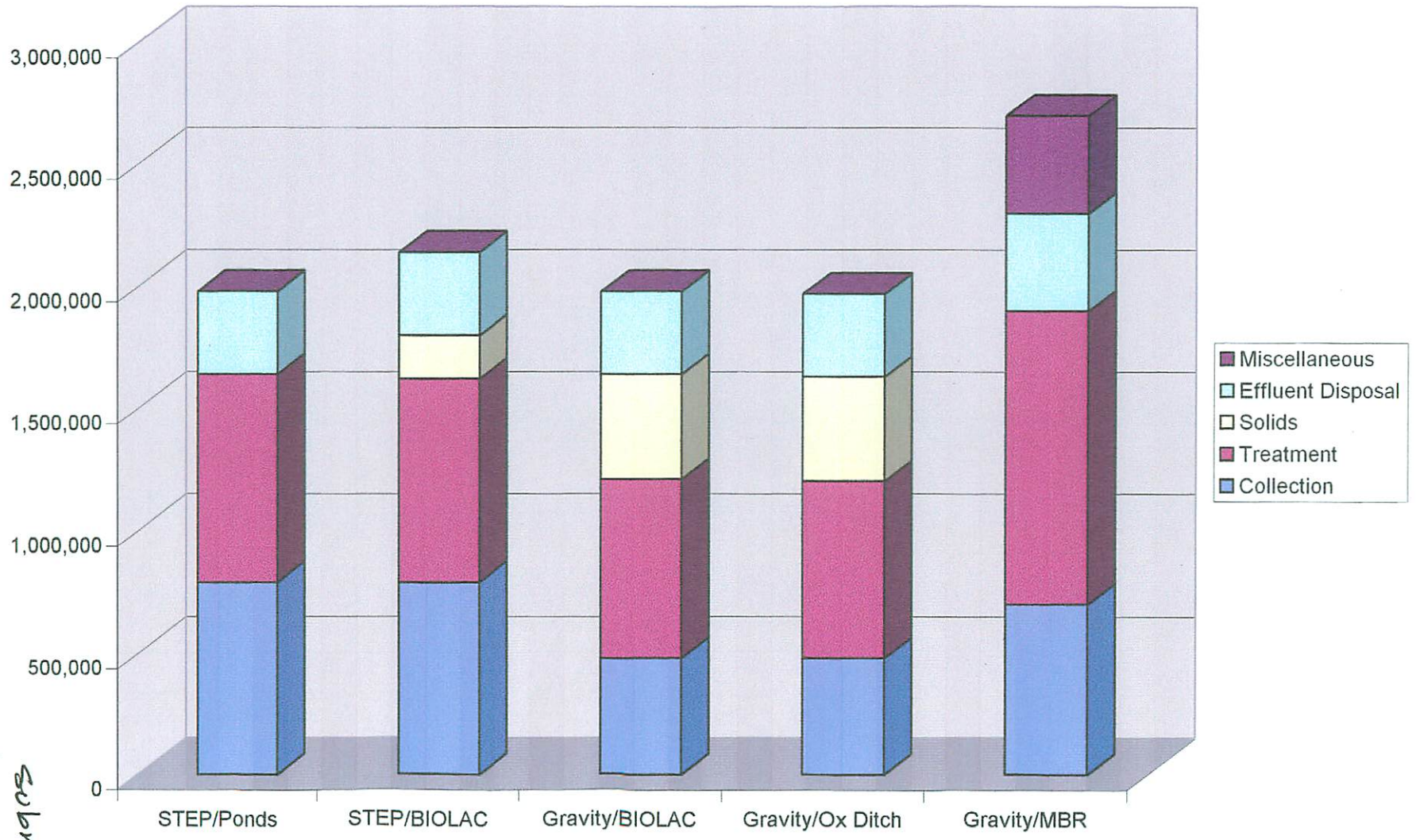
- Gravity collection requires larger pipes, deeper trenching and dewatering (resulting in need to protect water quality from disposal of collected water), significant soil erosion, and construction traffic nuisance. The needed 20 pump stations have permanent impact, requiring additional footprint and odor control. There is increased risk of inflow and infiltration of groundwater which may require additional monitoring and repair. Gravity collection pipes require cleaning every 2 years with attendant odors.
- MBR treatment has the highest energy usage (1.3M kWh/yr. EIR indicated 2.1M and expected to increase with time) and a high construction nuisance in center of town
- Sub-class "B" Biosolids produce greatest volume of sludge, is the most restrictive disposal option and highly dependent on availability of receiver sites. It has the largest carbon footprint: highest hauling costs and in-town traffic nuisance and produces lowest quality of sludge (may require additional treatment for disposal)
- Spray Field have zero Seawater Intrusion (SWI) mitigation, greatest footprint and highest land costs with the potential environmental impacts of trenching pipelines
- Agriculture Reuse also has low SWI Mitigation
- Broderson Site has construction impacts and costs from monitoring wells plus grater impacts on habitat (initial construction and reconstruction every 10 years)
- Tri-W location is in center of town near church, library, Community Center, and high density residential area and has high visual impact. It has limited flexibility for future upgrades or expansion and is distant from spray fields and agriculture reuse.

Capital Cost Comparison of Sample Project



Submitted by
Karen Vendith
8/20/07

Annual O&M of Sample Projects



Submitted by
Karen Vendiff
8/20/07

Questions for the Project Team on the Fine Screening Report
from Keith Wimer
presented to the TAC and Project Team on 8/20

Carollo Engineers and Project Team,

The following are questions regarding some of the assumptions and data in the Rough and Fine Screening Reports, which, if not adequately addressed, could lead to poor decisions down the road. Thank you for your consideration.

Keith Wimer

Chapter 1 (I/I, Water Production, SWI mitigation factors)
1. Is it true that Table 1.2 shows the I/I test tolerances for new gravity systems?
2. If so, would you provide a table or data for older systems?
3. What is a conservative estimate of I/I for the LOWWP based on data for older gravity systems?
4. What is the maximum flow potential with I/I for an older gravity system in an extremely wet year or bad storm conditions (e.g., when flood conditions exist)?
5. Did you calculate the SWI mitigation achieved by Golden State Water Company's shift in production (i.e., more water being pumped from the upper aquifer then treated)?
6. If not, how much would the shift by Golden State reduce the current Fine Screening estimates for SWI and the costs to mitigate it (e.g., at Mitigation Levels 1 & 2)?
7. I assume, if Golden State reduces pumping only from wells on the western side of the community, a 1.0 (100 %) mitigation factor will apply, since your formula for determining the mitigation factor for conservation and any other method that reduces pressure on the lower aquifer is the westside well production (i.e., 1000 AFY) divided by total well production (1790 AFY). Correct?

Chapter 2 and 7 (Ag reuse/de-nitrification costs, Conservation/SWI mitigation)
1. Do ag reuse programs ever generate revenue to offset system costs?. If so, how much revenue does ag reuse generate per AF of water reused?
2. In the estimates for Levels 2 and 3 mitigation (Table 7.3, Page 7-5), you assume de-nitrification of full flows for STEP. Why aren't reduced de-nitrification costs for ag-reuse reflected (e.g., for O & M and treatment)?
3. Why are toilet retrofits (Table 2.3, Page 2-6) the only conservation measures considered at Mitigation Levels 1&2?
4. Will anticipated retrofit programs use dual flush toilets.
5. Why aren't incentive-based conservation programs considered at Levels 1 & 2, such as progressive water rates or grey water reuse? (Note: The programs also avoid the need for purveyor infrastructure and production shifts, the definition you use, I believe, for "purveyor participation").

Submitted by
Keith Wimer
8/20/07

Chapter 3 and 7 (Combined gravity system with vacuum, exfiltration and overflows, road repairs)

1. Why do you not assume a combined gravity system using vacuum will be needed in Los Osos, basing cost estimates for VPA's on that assumption?
   (Note: You indicate (3.1.1.1, Page 3-1) that the Tri-W gravity design will "serve as the starting point" for the combined gravity system, saying "Additional vacuum and low pressure elements would be incorporated in locations where topography, groundwater, or other site-specific conditions dictate." You also say modifications in the Tri-W design, using various vacuum and low-pressure equipment will be employed "if appropriate" to reduce costs, but indicate a "detailed design analysis is beyond the scope of this report." As you know, the topography of Los Osos (elevation variation), proximity to a National Estuary, and high-ground water will more than likely require a combined system with all components, and the NWRI recommends consideration of "vacuum sewers in low lying areas along Morro Bay (NWRI Report, Section 3.2.3, Page 5).
2. Do gravity pipes have a potential for exfiltration? If so, why do you not mention the potential, especially since Los Osos residents are under a regulatory order to cease discharges in a "prohibition zone?"
3. Do pressurized systems allow operators to detect leaks and breaks more rapidly than gravity systems? If so, doesn't this fact add to the likelihood Los Osos will have to install a vacuum component for much of the system?
4. Do overflows of wastewater occasionally occur from manholes or other parts of a gravity system?
5. If overflows occur from gravity systems what are the conditions under which overflows occur and how are they avoided?
6. If overflows occur from gravity systems, can they be avoided with vacuum components added to the system?
7. With the possibility (or likelihood) of significant changes in design (i.e., addition of a vacuum component), why didn't you estimate system costs at a Class 2 or 3 level instead of a Class 1 estimate level (Table 1.2, Page 3). (Note: The potential for modifications in the design suggest it does not come from "very well-defined engineering data" as you describe—Appendix 3, Page 3).
8. Given the added complexity and related construction and O & M costs of a combined system with vacuum, what is your basis for claiming modification to the existing gravity design (e.g., adding a vacuum component) will "reduce costs?"(Note: Based on the case studies you cite in the Rough Screening, O & M costs for vacuum systems are high (Page 6-7 through 6-9). Albuquerque and Whitehouse reported many problems with the systems causing high O & M expenses. Furthermore, all of the utilities you interviewed using low pressure systems required more maintenance personnel per connection (i.e., 2 per 3000 in Horseshoe Bay, 4 per 3000 in Fairfield Blade, 4 per 4000 in Holiday Shores, and 2 per 1000 in Bloomingdale) than the most problematic STEP system you cited (1 per1700 in Olympia). The one STEP maintenance employee in Olympia also pumps the STEP tanks. Note that I submitted questions about your Rough Screening O & M data and conclusions on 4/20/07 (e.g., Why you claimed "O & M for STEP sewers is significantly more costly and work-intensive than for conventional sewers," when the case studies you cite don't support the statement.), but I received no response.
9. What is your conservative estimate of O & M costs for a combined system that uses a vacuum component?

Submitted by
Keith Wimer
8/20/07

10. What are industry standards e.g., costs per foot of pipe in the system, for a combined system with vacuum (or just vacuum) vs. STEP? (Note: Tables that compare typical systems side by side would be helpful. The most helpful gauge (as many people requested early in the process) would be a table or figures that show total typical capital and O & M costs (broken out) per gallon of treated water for complete systems.
11. Would you provide a cost-per-gallon of treated wastewater comparison for STEP vs. gravity, along with the source?
12. Do your O & M costs for the gravity systems include the requirement that the mains must be cleaned out every two years, as noted by the TAC? How much does this cost per year?
13. How is the cleanout done, and how is the waste and contaminated equipment cleaned or disposed of?
14. In the revised Fine Screening report, (Table 3-13, Page 3-19) you've moved the cost of grinder pumps to homeowner costs. For consistency, why didn't you provide a diagram and table of costs for a gravity situation that requires a grinder pump? (Note: You added a note to the most recent draft—Table 3.8—that the Tri-W gravity design requires about 200 grinder pumps but no table of costs is provided to show a direct comparison with STEP for on-lot costs.)
15. What are the costs for electrical connections for gravity grinder pumps, and do they require a separate panel?(Note: Table 3.18 shows that the electrical connections for STEP pumps are from $ 9.1 million to $14.3 million and Table 3.15 shows total costs for each connection to be $1900 to $3000 with a separate electrical panel. Would grinder pumps for gravity cost the same?)
16. Why do you assume a separate panel and underground line will be used for every STEP electrical connection?
17. How much would connecting to the existing panel, with an overhead connection reduce the costs, if it is allowed?
18. Why did you assume that every on-lot unit would be STEP? Wouldn't a large portion of them be STEG (gravity)?
19. What is a conservative estimate of how much the inclusion of STEG connections would reduce the on-lot and overall costs for effluent collection systems?
20. Why do you assume that road repairs will be half as much for STEP as gravity? (Note: This seems overly conservative with horizontal boring and only every-other lateral crossing the road. On the other hand, $5.2 million seems like it may be an underestimate.)
21. Do you consider $5.2 million to repair roads for a gravity system a conservative estimate given increased costs of asphalt since 2005?
22. Will gravity trenching result in more potential conflicts with existing utilities than STEP? (Paavo Ogren suggested this was the case at a supervisors' meeting 8/14).)
23. Did you assume the STEP mains would go down the middle of road? If so, why?
24. Why did you <u>not</u> consider the options of placing STEP tanks in the street easements and/or more than one home connected to each tank?
25. Would you provide the cost for a Photovotaic power source with battery back up for STEP systems? (See recommendation from SLO Greenbuild in the letter to the Project Team dated 7/23/07.)

Submitted by
Keith Wimer
8/20/07

Project

Treatment Plant Site:	Tri-W
Effluent Disposal:	Broderson Leach Field and Harvest Wells
BioSolids:	Sub-class B Disposal
Treatment:	Membrane BioReactor (MBR)
Collection:	Gravity

Pro:

The Tri-W site has the following advantages:

- Already owned by CSD
- Site of project already mitigated and tribal agreements in place, which may shorten construction time
- Central location reduces cost of collection system
- Proximity to potential Broderson leach fields.

Broderson Leach Field Disposal has the following advantages:

- Moderate SWI Mitigation factor.
- Purveyor participation required to operate harvest wells, with blending and/or treatment.
- Already owned by CSD.
- Directly recharges upper aquifer.

Subclass B Biosolids transportation and disposal has the following advantages:

- This has the lowest capital and operations & maintenance costs among all of the options identified.
- This options has the flexibility to be upgraded
- This option has low acreage requirements.

Treating wastewater with a Membrane Bioreactor System has the following advantages:

- Requires smallest footprint (4 acres)
- Higher quality of effluent, suitable for discharge at Broderson leach field.
- Enclosed facility controls odors

Collecting wastewater by a Gravity system has the following advantages:

- Lower annual O&M costs for collection
- Less on-lot disturbance.
- No easement or access required on private property
- No requirement to haul septage within the collection area.

Cons:

The Tri-W Site has the following disadvantages:

- Very high land value and mitigation requirements.
- Small acreage and location in center of town require most expensive treatment and higher costs overall.l
- Limited flexibility for future expansion, upgrades, or alternative energy.
- Greater risk associated with system failure due to proximity to Bay.
- Proximity to church, library, community center; high density population area.
- Traffic impacts in center of town.
- Greatest distance to spray fields and ag reuse.
- ESHA – sensitive dune habitat.
- Partial view obstruction of Morro Rock.
- Source of community divisiveness.

Broderson Leach Field Disposal the following disadvantages:

- High capital costs.
- Distance from out-of-town site increases piping costs.
- Higher treatment required - full denitrification.
- Construction impacts and costs from monitoring wells.
- Large footprint and high land value ($4.7M).
- High risk of more stringent DHS regulations in future.
- Capacity greater than 448 AF requires harvest wells, incurring additional capital costs, annual O&M, and purveyor participation.
- Grading impacts on habitat (initial construction and reconstruction every 10 years
- Liquefaction, water application rates, surface erosion and landslide risks are community concerns associated with the use of the Broderson site.

Subclass B Biosolids transportation and disposal has the following disadvantages:

- Produces the greatest volume of biosolids.
- Most restrictive disposal option and highly dependant on availability of receiver sites
- Largest carbon footprint; highest hauling costs and traffic nuisance.
- Produces the lowest quality of biosolids; may require additional treatment for disposal.
- Risk of substantially increase in hauling costs and more stringent regulations.

Treating wastewater with a Membrane Bioreactor system has the following disadvantages:

- Highest capital cost.
- Highest annual O&M.
- Highest energy usage (1.3M kWh/yr. EIR indicated 2.1M and expected to increase with time).
- High construction nuisance in center of town

Collecting wastewater by a Gravity system has the following disadvantages:

- Higher capital costs
- Longer time to construct
- Impact on treatment costs (higher capital costs, and annual O&M)
- Increases cost of solids treatment and disposal
- Increased risk of I/I over time; may require additional cost of monitoring/ repair program
- Requires deeper trenching and dewatering, resulting in need to protect water quality from disposal of collected water, significant soil erosion, traffic nuisance
- Higher risk of impacts on archeological resources may result in delays, additional cost
- 20 Pump stations have permanent impact, requiring additional footprint and odor control
- Greater road impacts resulting in longer closures and traffic nuisance
- Gravity collection pipes require cleaning every 2 years ("pigging out") with attendant odors.

Project

Treatment Plant Site:	East of Town
Effluent Disposal:	Level 2
BioSolids:	Sub-class B Disposal
Treatment:	Ponds
Collection:	STEP

Pro:

East-of-town sites have the following advantages:

- No traffic impacts and they are close to LOVR.
- Minimal site improvements are required, as they are level and suitable for construction.
- In-town community acceptance.
- Class III (non-prime) agricultural land
- Low population density
- Proximity to spray fields and ag reuse.
- The Branin and Giacomazzi properties are furthest away from and are not in an apparent up-wind position from the Falcon Ridge neighborhood, which is a low density residential neighborhood.

Level 2 Effluent Disposal Options have the following advantages:

- This level of effluent disposal provides for all of the infrastructure that is needed to advance to Levels 3 and 4, with no appreciable increase in cost as compared to Level 1 effluent disposal options.
- This level of effluent disposal provides multiple disposal options that may be utilized at different rates to respond to changing conditions.

Subclass B Biosolids transportation and disposal has the following advantages:

- This has the lowest capital and operations & maintenance costs among all of the options identified.
- This options has the flexibility to be upgraded
- This option has low acreage requirements.

Treating wastewater with an advanced ponding system has the following advantages:

- It has the lowest energy usage as compared to the other identified options.
- It eliminates the costs associated with constructing a solids treatment system.
- It greatly reduces solids production and disposal (dredging required once every 20 years).

Collecting wastewater by a STEP system has the following advantages:

- Lower capital costs than a gravity system.
- Shorter time to construct than gravity system.
- Provides primary treatment in septic tank, thereby reducing down-line costs for treatment system and solids treatment/disposal.

- Shallow trenching and horizontal directional drilling where feasible, results in less road impacts and traffic nuisance, less risk to archeological resources and associated delays.
- Requires no lift stations, reducing footprint requirements.
- Minimal risk of I/I and resulting lower flow rate as compared to a gravity system.

Cons:

East-of-town sites have the following disadvantages:

- Increased cost and impacts to pipe influent from collection area and return treated effluent to Broderson.
- Located in the vicinity of Falcon Ridge, a low density population area near LOVR in the Los Osos Creek Valley.

Level 2 Effluent Disposal Options have the following disadvantages:

- Liquefaction, water application rates, surface erosion and landslide risks are community concerns associated with the use of the Broderson site.
- The described spray field disposal option involves the exportation of water from the basin. Long term export of effluent from the basin will have a detrimental effect on the sustainable yield of the basin.

Subclass B Biosolids transportation and disposal has the following disadvantages:

- Results in the greatest volume of biosolids.
- Most restrictive disposal option and highly dependant on availability of receiver sites
- Largest carbon footprint; highest hauling costs and traffic nuisance.
- Produces the lowest quality of biosolids; may require additional treatment for disposal.
- Risk of substantial increase in hauling costs and more stringent regulations.

Treating wastewater with an advanced ponding system has the following disadvantages:

- Requires the largest footprint (16 – 20 acres)
- May require additional nitrification/denitrification treatment with STEP.
- Further investigation is required to determine if ponds release methane gas (a more powerful greenhouse gas than CO2).
- Greater construction impacts.

Collecting wastewater by a STEP system has the following disadvantages:

- Higher annual O&M costs for collection-
- May require additional nitrification/denitrification treatment for disposal options
- If SRF loan is used, may require separate electrical connection premium
- Construction and permanent impact on individual property, including footprint.
- Increased risk of impact on archeological resources due to new septic tanks.

- Nuisance and cost of regular pumping of septic tanks
- Potential odor issues of vents if not properly maintained (200-500 collection vents located throughout community)
- Higher total on-lot capital costs; unknown amount is homeowner responsibility; may be affected by funding.
- Individual properties have many active on-lot components including pumps, sensors, alarms that require periodic maintenance and have a greater risk of failure.

Project

Treatment Plant Site:	East of Town
Effluent Disposal:	Level 2
BioSolids:	Sub-class B Disposal
Treatment:	Biolac
Collection:	STEP

Pro:

East-of-town sites have the following advantages:

- No traffic impacts and are close to LOVR.
- Minimal site improvements are required, as they are level and suitable for construction.
- In-town community acceptance.
- Class III (non-prime) agricultural land
- Low population density
- Proximity to spray fields and ag reuse.
- The Branin and Giacomazzi properties are furthest away from and are not in an apparent up-wind position from the Falcon Ridge neighborhood, which is a low density residential neighborhood.

Level 2 Effluent Disposal Options have the following advantages:

- This level of effluent disposal provides for all of the infrastructure that is needed to advance to Levels 3 and 4, with no appreciable increase in cost as compared to Level 1 effluent disposal options.
- This level of effluent disposal provides multiple disposal options that may be utilized at different rates to respond to changing conditions.

Subclass B Biosolids transportation and disposal has the following advantages:

- This has the lowest capital and operations & maintenance costs among all of the options identified.
- This options has the flexibility to be upgraded
- This option has low acreage requirements.

Treating wastewater with a Biolac system has the following advantages:

- Lower capital costs than Oxidation Ditch-
- Small footprint (8-10 acres)
- Lower energy usage with STEP (800,000 kWh/yr)

Collecting wastewater by a STEP system has the following advantages:

- Lower capital costs
- Shorter time to construct
- Provides primary treatment in septic tank, thereby reducing down-line costs for treatment system and solids treatment/disposal.
- Shallow trenching and horizontal directional drilling where feasible, results in less road impacts and traffic nuisance, less risk to archeological resources and associated delays.

- Requires no lift stations, reducing footprint requirements.
- Minimal risk of I/I and resulting lower flow rate as compared to a gravity system.

Cons:

East-of-town sites have the following disadvantages:

- Increased cost and impacts to pipe influent from collection area and return treated effluent to Broderson.
- Located in the vicinity of Falcon Ridge, a low density population area near LOVR in the Los Osos Creek Valley.

Level 2 Effluent Disposal Options have the following disadvantages:

- Liquefaction, water application rates, surface erosion and landslide risks are community concerns associated with the use of the Broderson site.
- The described spray field disposal option involves the exportation of water from the basin. Long term export of effluent from the basin will have a detrimental effect on the sustainable yield of the basin.

Subclass B Biosolids transportation and disposal has the following disadvantages:

- Produces the greatest volume of biosolids.
- Most restrictive disposal option and highly dependant on availability of receiver sites
- Largest carbon footprint; highest hauling costs and traffic nuisance.
- Produces the lowest quality of biosolids; may require additional treatment for disposal.
- Risk of substantially increase in hauling costs and more stringent regulations.

Collecting wastewater by a STEP system has the following disadvantages:

- Higher annual O&M costs for collection-
- May require additional nitrification/denitrification treatment for disposal options
- If SRF loan is used, may require separate electrical connection premium.
- Construction and permanent impact on individual property, including footprint
- Increased risk of impact on archeological resources due to new septic tanks
- Nuisance and cost of regular pumping of septic tanks
- Potential odor issues of vents if not properly maintained (200-500 collection vents located throughout community)
- Higher total on-lot capital costs; unknown amount is homeowner responsibility; may be affected by funding
- Individual properties have many active on-lot components including pumps, sensors, alarms that require periodic maintenance and have a greater risk of failure.

Project

Treatment Plant Site:	East of Town
Effluent Disposal:	Level 2
BioSolids:	Sub-class B Disposal
Treatment:	Biolac
Collection:	Gravity

Pro:

East-of-town sites have the following advantages:

- No traffic impacts and they are close to LOVR.
- Minimal site improvements are required, as they are level and suitable for construction.
- In-town community acceptance.
- Class III (non-prime) agricultural land
- Low population density
- Proximity to spray fields and ag reuse.
- The Branin and Giacomazzi properties are furthest away from and are not in an apparent up-wind position from the Falcon Ridge neighborhood, which is a low density residential neighborhood.

Level 2 Effluent Disposal Options have the following advantages:

- This level of effluent disposal provides for all of the infrastructure that is needed to advance to Levels 3 and 4, with no appreciable increase in cost as compared to Level 1 effluent disposal options.
- This level of effluent disposal provides multiple disposal options that may be utilized at different rates to respond to changing conditions.

Subclass B Biosolids transportation and disposal has the following advantages:

- This has the lowest capital and operations & maintenance costs among all of the options identified.
- This options has the flexibility to be upgraded
- This option has low acreage requirements.

Treating wastewater with a Biolac system has the following advantages:

- Lower capital costs than Oxidation Ditch-
- Small footprint (8-10 acres)

Collecting wastewater by a Gravity system has the following advantages:

- Lower annual O&M costs for collection
- Less on-lot disturbance.
- No easement or access required on private property
- No requirement to haul septage within the collection area

Cons:

East-of-town sites have the following disadvantages:

- Increased cost and impacts to pipe influent from collection area and return treated effluent to Broderson.
- Located in the vicinity of Falcon Ridge, a low density population area near LOVR in the Los Osos Creek Valley.

Level 2 Effluent Disposal Options have the following disadvantages:

- Liquefaction, water application rates, surface erosion and landslide risks are community concerns associated with the use of the Broderson site.
- The described spray field disposal option involves the exportation of water from the basin. Long term export of effluent from the basin will have a detrimental effect on the sustainable yield of the basin.

Subclass B Biosolids transportation and disposal has the following disadvantages:

- Results in the greatest volume of biosolids.
- Most restrictive disposal option and highly dependant on availability of receiver sites
- Largest carbon footprint; highest hauling costs and traffic nuisance.
- Produces the lowest quality of biosolids; may require additional treatment for disposal.
- Risk of substantial increase in hauling costs and more stringent regulations.

Collecting wastewater by a Gravity system has the following disadvantages:

- Higher capital costs
- Longer time to construct
- Impact on treatment costs (higher capital costs, and annual O&M)
- Increases cost of solids treatment and disposal
- Increased risk of I/I over time; may require additional cost of monitoring/ repair program
- Requires deeper trenching and dewatering, resulting in need to protect water quality from disposal of collected water, significant soil erosion, traffic nuisance
- Higher risk of impacts on archeological resources may result in delays, additional cost
- 20 Pump stations have permanent impact, requiring additional footprint and odor control
- Greater road impacts resulting in longer closures and traffic nuisance
- Gravity collection pipes require cleaning every 2 years (“pigging out”) with attendant odors.

Project

Treatment Plant Site:	East of Town
Effluent Disposal:	Level 2
BioSolids:	Sub-class B Disposal
Treatment:	Oxidation Ditch
Collection:	Gravity

Pro:

East-of-town sites have the following advantages:

- No traffic impacts and they are close to LOVR.
- Minimal site improvements are required, as they are level and suitable for construction.
- In-town community acceptance.
- Class III (non-prime) agricultural land
- Low population density
- Proximity to spray fields and ag reuse.
- The Branin and Giacomazzi properties are furthest away from and are not in an apparent up-wind position from the Falcon Ridge neighborhood, which is a low density residential neighborhood.

Level 2 Effluent Disposal Options have the following advantages:

- This level of effluent disposal provides for all of the infrastructure that is needed to advance to Levels 3 and 4, with no appreciable increase in cost as compared to Level 1 effluent disposal options.
- This level of effluent disposal provides multiple disposal options that may be utilized at different rates to respond to changing conditions.

Subclass B Biosolids transportation and disposal has the following advantages:

- This has the lowest capital and operations & maintenance costs among all of the options identified.
- This options has the flexibility to be upgraded
- This option has low acreage requirements.

Treating wastewater with an Oxidation Ditch system has the following advantages:

- Small footprint (8 acres)
- Energy usage - STEP 800,000 kWh/yr; Gravity 900,000 kWh/yr

Collecting wastewater by a Gravity system has the following advantages:

- Lower annual O&M costs for collection
- Less on-lot disturbance.
- No easement or access required on private property
- No requirement to haul septage within the collection area

Cons:

East-of-town sites have the following disadvantages:

- Increased cost and impacts to pipe influent from collection area and return treated effluent to Broderson.
- Located in the vicinity of Falcon Ridge, a low density population area near LOVR in the Los Osos Creek Valley.

Level 2 Effluent Disposal Options have the following disadvantages:

- Liquefaction, water application rates, surface erosion and landslide risks are community concerns associated with the use of the Broderson site.
- The described spray field disposal option involves the exportation of water from the basin. Long term export of effluent from the basin will have a detrimental effect on the sustainable yield of the basin.

Subclass B Biosolids transportation and disposal has the following disadvantages:

- Results in the greatest volume of biosolids.
- Most restrictive disposal option and highly dependant on availability of receiver sites
- Largest carbon footprint; highest hauling costs and traffic nuisance.
- Produces the lowest quality of biosolids; may require additional treatment for disposal.
- Risk of substantial increase in hauling costs and more stringent regulations.

Treating wastewater with an Oxidation Ditch system has the following disadvantages:

- Higher capital costs than BIOLAC

Collecting wastewater by a Gravity system has the following disadvantages:

- Higher capital costs
- Longer time to construct
- Impact on treatment costs (higher capital costs, and annual O&M)
- Increases cost of solids treatment and disposal
- Increased risk of I/I over time; may require additional cost of monitoring/ repair program
- Requires deeper trenching and dewatering, resulting in need to protect water quality from disposal of collected water, significant soil erosion, traffic nuisance
- Higher risk of impacts on archeological resources may result in delays, additional cost
- 20 Pump stations have permanent impact, requiring additional footprint and odor control
- Greater road impacts resulting in longer closures and traffic nuisance
- Gravity collection pipes require cleaning every 2 years (“pigging out”) with attendant odors.

Project

Treatment Plant Site:	Branin and Giacomazzi
Effluent Disposal:	Level 2 – modify to eliminate spray fields in favor of purchasing in basin agricultural land.
BioSolids:	Aerobic Digester
Treatment:	Biolac/Oxidation Ditch – no preference
Collection:	Gravity/STEP – no preference

Pro:

Branin and Giacomazzi sites have the following advantages:

- They are adjacent to one another and when purchased together will provide greater flexibility of treatment system design.
- No traffic impacts and they are close to LOVR.
- Minimal site improvements are required, as they are level and suitable for construction.
- In-town community acceptance.
- Class III (non-prime) agricultural land
- Low population density
- Proximity to spray fields and ag reuse.
- The Branin and Giacomazzi properties are furthest away from and are not in an apparent up-wind position from the Falcon Ridge neighborhood, which is a low density residential neighborhood.

Level 2 Effluent Disposal Options have the following advantages:

- This level of effluent disposal provides for all of the infrastructure that is needed to advance to Levels 3 and 4, with no appreciable increase in cost as compared to Level 1 effluent disposal options.
- This level of effluent disposal provides multiple disposal options that may be utilized at different rates to respond to changing conditions.
- The substitution of spray fields for purchasing in-basin agricultural land may not necessarily increase project costs but would have a marked advantage in both keeping water within the basin and maximizing the level of control of effluent disposal operations.

Aerobic Digestion of Biosolids has the following advantages:

- This option produces biosolids at 3,103 tons/year for a gravity system or 776 tons/year for STEP/STEG system (23.5% less than the Sub-Class B option).
- A digester can be more easily fitted with odor control measures as opposed to hauling subclass B biosolids
- The produced Class B Biosolids can be hauled to a local composting or disposal facility, which will reduce the transportation costs as compared to the Sub-class B disposal option.
- This method is designed to reduce the potential pathogen content to very low levels so that any remaining pathogens in the biosolids will die-off in soil within short timeframe.

Treating wastewater with a Biolac/Oxidation Ditch systems has the following advantages:

- Small footprint (8-10 acres)
- Energy usage - STEP 800,000 kWh/yr; Gravity 900,000 to 1,100,000 kWh/yr

Cons:

East-of-town sites have the following disadvantages:

- Increased cost and impacts to pipe influent from collection area and return treated effluent to Broderson.
- Located in the vicinity of Falcon Ridge, a low density population area near LOVR in the Los Osos Creek Valley.

Level 2 Effluent Disposal Options have the following disadvantages:

- Liquefaction, water application rates, surface erosion and landslide risks are community concerns associated with the use of the Broderson site.

Aerobic Digestion of Biosolids has the following disadvantages:

- All biosolids would be shipped offsite for disposal.

Proposal Project

- Site: Branin and Giacomazzi
- Effluent Disposal:
    - Conservation Program. This program should be integrated as much as possible with the County's proposed conservation program dealing with the Resource Conservation Level III. Recharge programs should also be included and given appropriate weight of consideration.
        - Recharge projects may include (1) using old septic tanks and leach lines to receive storm water runoff from roof, and (2) constructing storm water detention basins in appropriate locations within the basin.
    - Cemetery reuse.
    - Purchase Eto Property instead of purchasing Tonini Property for spray fields.
        - Lease property to farmers with specification that recycled water is utilized for crop irrigation.
        - Proceeds from lease to be used to partially fund the wastewater operation.
        - Utilize Eto Wells for dilution of recycle water, if needed, to attract other potential agricultural users. However, only provide the opportunity to utilize recycled water to agricultural operations within the basin.
    - Utilize Broderson Leach Field at half capacity.
        - Add storm water retention basin down slope of the leach fields to facilitate recharge. Potentially direct all storm water flow from the slopes above highland to the retention basin. The percolation of storm water will assist with dilution of leach field operation. A retention basin down slope of the leach field would provide redundant protection from accidental releases from the leach field operation.
        - Add subsurface gravel pack columns that penetrate the clay layer at the bottom of horizon A for the purpose of facilitating drainage through the clay layer. The intent of this measure is to reduce or eliminate the thickness of saturated soils above the horizon A clay layer at the Broderson property boundary. The columns should be located down gradient of the leach field and storm water detention basin. The leach fields would continue to be utilized as the main system to introduce recycled water to the vadose zone because of the plugging potential and relative ease of leach field repair. Leach fields are more easily serviced and repaired as compared to vadose zone injection wells.
        - Add advanced oxidation treatment for all recycled water to be disposed of at the Broderson Leach Field.

Submitted by John Brady
8-20-07

- Take advantage of purple pipe opportunities resulting from pipeline to Broderson;
    - Potential customers include LOVR median, Sunnyside Elementary, South Bay Park, Community Center and Church.
    - Charge fee for use of recycled water with proceeds used to partially fund wastewater operations.
    - Approach School District to discuss potentially contributing towards partially funding a pipeline from LOVR to Baywood Elementary and Los Osos Middle Schools (in LOCSD territory). The School District is currently considering installing their own wells at each school site in response to high water bills ($90,000 billing from LOCSD and $28,000 from GSWC for essentially same volume of water). Perhaps a shared cost to construct a purple pipeline would be mutually beneficial. This measure would reduce the pumping demand on the upper zone.
- Winter storage. The storage facility should be integrated into the overall treatment scheme of the wastewater plant. All plant effluent should be directed into the winter storage facility to maximize hydraulic detention time. Tertiary treatment should occur at the outlet of the winter storage facility.

- Collection: Cluster STEP Collection System.
    - As economically feasible, utilize gravity flow collection from homes to neighborhood STEP Tanks (similar to the gravity flow to community septic tanks in Vista De Oro and Bay Ridge Estates).
    - Install STEP Tanks in public right-of-way with appropriate traffic loading protection. Potentially locate in roadways currently unimproved (such as portions of Pismo, El Moro, Santa Maria and others).
    - Individual STEP tanks systems should discharge to either a neighborhood STEP tank or STEP tank effluent force main.
    - Never have STEP effluent enter a gravity line.
- Treatment: Biolac or oxidation ditch.
    - Biolac produces less biosolids
    - Oxidation Ditch may provide potential opportunity for odor control, as compared to Biolac.
    - Include both denitrification and tertiary treatment, as required for the effluent disposal option.
- Biosolids: Aerobic digester with hauling of Class B Biosolids to local composting facility. A digester can be more easily fitted with odor control measures as opposed to hauling subclass B biosolids.

Submitted by John Brady
8-20-07