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**AIRVAC response to Draft Environmental Impact Report**

Mr. Hutchinson

The guiding philosophy behind the Los Osos wastewater project is to evaluate and develop the most environmentally sustainable and cost effective system of wastewater collection and treatment that meets the needs and concerns of the citizens of Los Osos.

Although, many alternatives were researched and evaluated in the various screening reports that were performed, many residents have expressed their concerns with the methods being proposed for the collections system and feel that a vacuum system is a viable and environmentally superior system for their collection needs.

Based upon numerous applications worldwide, many years of experience in the field, and a long list of satisfied clients; it is our belief that an AIRVAC system presents enormous environmental and ecological benefits to the community of Los Osos.

With that being said, AIRVAC would like to provide the Board of Supervisors and staff with a response to the Draft EIR report along with supporting information and documentation for the further review and evaluation of vacuum sewers

Sincerely,

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# Los Osos Wastewater Project

## AIRVAC VACUUM SEWER ALTERNATIVE

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The following is a response to Draft Environmental Impact Report by Michael Brandman Associates Dated, 2008. The response follows the same evaluation path as described in the Draft Environmental Impact Report as well as the Fine screening report (by Carollo, 2007). Please see attachments for support documentation to the following.

### CORE COMMUNITY VALUES

- 1. Affordability:** ( capital & construction cost, O&M cost, Financing factors, grant eligibility and engineering and project management costs) vacuum systems are typically cost 10% more than pressure systems and sometimes 60% less than gravity systems with similar pipe sizes. In the 1970's the EPA supported many grant programs for the implementation of innovative technologies which is how many early vacuum projects were funded. Engineering and project management costs are typically in-line with other technology design fees and management costs.
- 2. Environmental Stewardship:** (environmental impacts, potential risks due to system failure, carbon footprint) Vacuum systems pose the least amount of environmental impacts of all technologies evaluated, shallower narrower trenches (smaller installation equipment) minimize groundwater impacts as well as surface impacts. Risk of failure in vacuum system is very low; every vacuum station is equipped with back-up generators to provide uninterrupted service during any power outage or significant storm event. The elimination of infiltration and inflow as well as no opportunities for ex-filtration and smaller installation equipment further reduce the carbon footprint of a vacuum system.

- 4. Flexibility:** (flexibility for future: expansion, higher regulations and potential alternative energy opportunities) If future service area build-out is considered at the design phase, vacuum systems can be easily expanded and constructed in various phases. Vacuum systems currently exceed most standards regulatory requirements in regards to environmental impacts.
- 5. Sustainability:** (restoring and protecting groundwater, mitigating sea water intrusion, minimizing energy usage and sludge production) Vacuum systems are totally closed and eliminate any opportunities to ex-filtrate raw sewage directly into the environment protecting groundwater resources from pollution. Vacuum sewers also provide substantial energy savings as well; no power required at the home connection eliminates need to upgrade homeowner service, with the 3 pumping stations (4 vacuum pumps and 2 sewage pumps per station) containing a total of 18 pumps versus a grinder pump at each home (4,769 grinders) or the 19 pumping stations (minimum 2 pumps per station) for a total of 38 pumps as required for the gravity system. As a result Vacuum systems present a significant savings and reduction in overall power consumption. In regards to sludge production; due to the operating flow velocities of 15-18fps within the piping network sludge production is reduced and sludge hauling is eliminated with a vacuum system.
- 6. Community:** (impacts to homeowners, residents and businesses, stakeholder support and community acceptance) Vacuum presents the least impact to the homeowners (no upgrade to individual homeowners electrical service), on-lot impacts are directly comparable to gravity. Vacuum is currently strongly supported by a growing number of the residents of Los Osos.
- 7. Controllability:** (Risks of third party decisions and policies, design for maximum system control and financial risks associated with wastewater projects) all technologies are susceptible to the same & similar risks in design and system control both politically and financially.

## SCREENING CRITERIA

During the comparison of system alternatives in the fine screening report (Carollo engineers 2007), vacuum sewers were rated or classified as a Level "C", which clearly states that the project components do not meet one or more of the project objectives or are non-viable due to a "fatal flaw" therefore dropped from consideration. The report provides no specific data to support this classification. The evaluation again is further described later in the Baseline criteria, shown in table 7-5: Screening of Collection System Alternatives (Final Draft EIR 2008) as follows.

1. **Groundwater Quality & RWQCB Waste discharge requirements:** The report indicates that vacuum meets requirements for elimination of pollution to groundwater.
  - a. Meets RWQCB requirements for elimination of pollution to groundwater
  - b. No opportunity for ex-filtration of raw sewage into the environment
  - c. Septic tank effluent that currently recharges aquifer is removed.

(See WEF manual chapter 3, vacuum sewer systems)

2. **Water resources:** Vacuum not evaluated.

A vacuum system is totally sealed system that eliminates infiltration and inflow as well as opportunities for ex-filtration within the piping network.

- a. Inflow: As any system ages, inflow can occur at the house lateral, inflow within the piping network would result in a vacuum loss and would be immediately detected.
- b. Infiltration: Infiltration is minimized; any leak within the piping network would result in a vacuum loss and would be immediately detected.
- c. Septic tank effluent that currently recharges aquifer is removed.

(See WEF Manual chapter 3, vacuum sewer systems)

**3. Energy/Air Quality:** Highest energy required.

AIRVAC interface valves are completely pneumatic and no power is required at the home connection, the only power requirements are at the vacuum stations and comparable to that of a standard tri-plex lift station.

- a. Three proposed vacuum stations (18 total pumps) as compared to 19 gravity pumping stations (38 total pumps) and 4,769 individual grinder pumps.
- b. Vacuum pump daily run-time average is 2-3hrs a day.
- c. 200-400 KW/hr/yr/per connection
- d. Odor is minimized and controlled by bio-filtration bed.

(See WEF Manual chapter 3, page 191 Table 3.32)

**4. Costs:** Highest maintenance cost

- a. O&M costs are comparable to other technologies.
- b. Pump stations: Three vacuum stations (4 vacuum pumps and 2 sewage pumps per station) as well as 1,589 interface valves (1-4 homes per valve) to serve the 4,769 connections as compared to the 4,769 grinder pumps for the LPS system and the 19 pump stations for the gravity system.
- c. Vacuum is the least invasive of all technologies (smaller installation equipment). Trunk lines are located within the R/W outside the edge of pavement in shallow narrow trenches (averaging 3'-5' in depth). Valve pits are located within the R/W on a common lot line to serve up to 4 homes, dramatically reducing the on lot disruption.
- d. Vacuum can incorporate other technologies (hybrid systems), to best utilize the most appropriate technology for the service area.
- e. No sewage hauling required.
- f. Same staff requirements as other technologies.
- g. No permanent public easement required.

(See WEF Manual chapter 3, pages 184-187)

**5. Permit ability:** Vacuum not evaluated.

- a. Noise: Less noise disruption during construction due to smaller installation equipment and comparable to gravity during operation.
- b. Cultural resources: Lowest environmental impacts and lowest on lot impact.
- c. Aesthetics: Vacuum stations are housed in building that is designed to match the architecture of the existing community making them very difficult to identify. All other system equipment is below grade.
- d. Traffic is not an issue during construction due to trunk lines being located outside the edge of pavement. Temporary open-cuts may be required. Equipment will not be within close proximity to sensitive areas.
- e. Existing systems currently in operation in California. (Big Bear Lake, Oyster Point Ca.)

(See WEF Manual chapter 3)

## **CONSTRUCTION BENEFITS**

While it can be agreed that a more conventional gravity system or STEP/STEG system is a possibility, that does not necessarily mean it is the best solution or choice. With an AIRVAC vacuum system main trunk lines are located within the R/W outside the edge of pavement averaging 3'-5' in depth, resulting in less costly street restoration as well as simplified maintenance of traffic. Valve pits are located within the R/W on a common lot line to serve up to 4 homes, dramatically reducing the on lot disruption resulting in less overall surface disruption and less costly restoration. Vacuum mains are also very flexible both horizontally and vertically giving vacuum system the ability to avoid existing utilities and obstacles with-out sacrificing efficiency or incurring troublesome change-orders.

## **ECONOMIC BENEFITS**

The construction estimate is currently 32.2 million which is based on component cost and on the estimated lineal feet of pipe with an associated per lineal foot cost. The cost represented in the Draft EIR report versus the cost represented in the estimate is not a cost comparison and does not include such items as the 15% contractor mark-up and

profit, the 8% sales tax and nor does it include the 10% contingency. Vacuum main installed costs will be dictated by the market for pipe installation at the time that a design build team has been selected and a design has been finalized and approved.

Another major economic benefit to a vacuum system is the elimination of infiltration and inflow (I/I). Unlike a gravity sewer, the AIRVAC sewer is a completely closed system. This results in less of a burden on the downstream collections systems and treatment facility as well as an increase in plant capacity. It also results in a more consistent effluent, which is not impacted during a storm event. In particular if an AIRVAC system is implemented in Los Osos, a total flow of 300,000gpd or 0.30mgd would be eliminated (per flows and loads technical memorandum Nov. 2008). By providing this reduction in infiltration and inflow, treatment costs would be reduced resulting in an overall cost savings for the community.

### **LONG TERM VIABILITY & USEFUL LIFE**

As of December 31, 2006, AIRVAC had 244 vacuum stations and 45,030-3" valves (typically serving 1-4 homes) throughout the united states, with an additional 514 vacuum stations and 46,914-3" valves installed in 33 other countries. These systems have been in operation for a number of years, most over 10 years old and some over 30 years old. While AIRVAC has nearly 100,000 valves in operation around the world, less than 100 valve rebuild kits were sold in 2008. How significant is this? Considering that on average every 2 homes are served by 1 valve, an average daily flow rate of 150gpd/home, and that every 10 gallons causes a valve to cycle, each valve would cycle 30 times per day. With 91,300 operating vacuum valves, this equates to 2.74 million valve cycles each and every day. Stated another way, on average, there are nearly 2,000 AIRVAC valves cycling every minute of every day somewhere in the world.

The components of an AIRVAC vacuum system are not all that different than that of the traditional gravity sewer/lift station design, vacuum systems are better thought of as vacuum assisted gravity. Vacuum sewer mains utilize PVC pipe (same as gravity), valve pits are made of either corrosion resistant fiberglass or polyethylene (longer useful life than a concrete manhole or tank), the wet-well instead of being open and exposed is a completely closed tank made of epoxy coated steel (no tanks have failed in 35+ years), and the sewage pumps are the same as typically used in conventional lift stations. The only other components of the system are the vacuum pumps (same useful life as the sewage pumps) and the vacuum valves (valves installed in the early 1970's are still in operation today).

Furthermore, one of the biggest misconceptions regarding vacuum systems is in regards to the useful life of a vacuum valve. While it is perceived to that the valves only have a useful life of 10 years, this is simply not the case. In fact, in the 35 years AIRVAC has been in operation, AIRVAC has never performed a wholesale replacement of the valves on any project. Instead AIRVAC recommends performing preventative maintenance by rebuilding the vacuum valve controller every 5 years and rebuilding the vacuum valve every 10 years. These both can be done very inexpensively and with minimal manpower.

## OPERATIONS & MAINTENANCE

Another misconception relates to the amount effort required for operations and maintenance (O&M) of the system, while maintenance of the system is required for optimal performance, AIRVAC systems are easily and inexpensively maintained. AIRVAC provides a week long training course (in Rochester In.) free of charge. The operations personnel will learn the proper techniques for operating an AIRVAC system, including "hands-on" experience performing the maintenance procedures.

While emergency situations can occur (as they can with any system) the majority of the recommended O&M involves daily operation of the vacuum station and completion of valve pit preventative maintenance procedures. As mentioned previously, the preventative maintenance can be done inexpensively and with ease. The table lists the recommended valve pit maintenance.

AIRVAC recommended Valve Pit Maintenance

Maintenance	Interval	Persons req'd	Labor (hours)	2007 Cost
Physical inspection	1 year	1 person	0.50	-
Controller rebuild	5 years	1 person	1.00	\$31/kit
Valve rebuild	10 years	1 person	1.75	\$31/kit



In situations where the owner is uncomfortable or is unable to perform the operations of the system, AIRVAC can be contracted to perform complete system operations and maintenance. This would include routine (day to day) maintenance, inspection of home connections/installations, emergency maintenance and preventative maintenance. Additionally, by contracting with AIRVAC, the vacuum station warranty is extended from 1 year to 2 years and the vacuum valve, controller, and pit warranties are extended to match the length of the service contract.

## **CONCLUSION**

AIRVAC is the World leader in vacuum sewer technology and would very much the opportunity to have vacuum sewer systems reinstated as a viable collection alternative and would also like the opportunity to participate in the design build process. AIRVAC believes the implementation of a vacuum sewer system would result in substantial savings for the community residents of Los Osos and for San Luis Obispo County as well. Additionally, the impact of construction and the on-lot impact would be greatly reduced when compared to the gravity and STEP options. Also, while maintenance of the system is required for optimal performance, it is rather inexpensive and not labor intensive. It is the professional opinion of AIRVAC that a vacuum sewer system is a long term solution that presents significant benefits to all entities involved in the Los Osos waste water project.