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

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SOLID DISPOSAL SYSTEMS

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Engineering and Water Resources Subcommittee — Biosolids

Criteria	Method	Pro	Con
Maintain control and flexibility of disposal process.	Sub-Class B Disposal	Only thickening and dewatering treatment is required. Since thickening and dewatering are required for all of the other biosolids management alternatives, this option can be developed into a Class A or B operation in the future without decommissioning any of the initial project improvements.	Sub-Class B Biosolids must receive further treatment for land application or must be disposed of at a landfill. Fine Screen report assumes disposal at composting facility.
			The acceptance criteria of disposal facilities may become more stringent with time, which may require additional future treatment of biosolids.
			The percent solids achieved in this alternative is estimated to be less than 20%. Therefore, the local landfill could not accept this waste stream.
			This option produces the greatest mass of biosolids at 4,056 tons/year for a gravity system or 1,014 tons/year for STEP/STEG system.
			All biosolids would be shipped offsite for disposal.
	Digested Class B	Due to achieving Class B quality, the range of disposal options is much greater than for Sub-Class B biosolids.	This option produces a large mass of 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).
		Produces biosolids with a 20% solids content and therefore meets the percent solids acceptance criteria at the local landfill.	All biosolids would be shipped offsite for disposal.
	Heat Dried Class B	Due to achieving Class B quality, the range of disposal options is much greater than for Sub-Class B Biosolids.	Operation of the system is relatively complex and would require a higher level of training for staff.
		This option produces the least amount of biosolids at 1,043 tons/year for gravity or 261 tons/year for STEP/STEG system.	
		Produces biosolids with a 90% solids content and therefore meets the percent solids acceptance criteria at the local landfill.	Heat Drying is typically utilized for producing Class A Biosolids.
		This process can potentially produce Class A Biosolids	
	Composted Class B	Due to achieving Class B quality, the range of disposal options is much greater than for Sub-Class B Biosolids.	Composting biosolids will require the addition of a bulking agent for a carbon source and to increase porosity. Therefore, the process will require a reliable source of bulking agent to be brought to the plant.
		This option produces a low mass of biosolids, very similar to the Heat Dried Class B option, at 1,460 tons/year for gravity or 365 tons/year for STEP/STEG system.	

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Criteria	Method	Pro	Con
		Produces biosolids with a 50% solids content and therefore meets the percent solids acceptance criteria at the local landfill.	All biosolids would be shipped offsite for disposal.
		This process can potentially produce Class A Biosolids, but would require increased process time and footprint at plant site.	
	Composted Class A	Due to achieving Class A quality, the range of disposal options is much greater than for Sub-Class B and Class B Biosolids.	Although there is the potential for local use of Class A Biosolids, the County currently has an Ordinance in place that limits biosolids application to land to no greater than 1500 cubic yards per year. In addition, the Ordinance allows only Class A – Exceptional Quality to be applied to land in the County.
		This option produces a low mass of biosolids, very similar to the Heat Dried Class B option, at 1,327 tons/year for gravity or 332 tons/year for STEP/STEG system.	Composting biosolids will require the addition of a bulking agent for a carbon source and to increase porosity. Therefore, the process will require a reliable source of bulking agent to be brought to the plant.
		Produces biosolids with a 55% solids content and therefore meets the percent solids acceptance criteria at the local landfill.	
	Digested/Composted Class A	Due to achieving Class A quality, the range of disposal options is much greater than for Sub-Class B and Class B Biosolids.	Although there is the potential for local use of Class A Biosolids, the County currently has an Ordinance in place that limits biosolids application to land to no greater than 1500 cubic yards per year. In addition, the Ordinance allows only Class A – Exceptional Quality to be applied to land in the County.
		This option produces a low mass of biosolids, very similar to the Heat Dried Class B option, at 1,128 tons/year for gravity or 282 tons/year for STEP/STEG system.	Composting biosolids will require the addition of a bulking agent for a carbon source and to increase porosity. Therefore, the process will require a reliable source of bulking agent to be brought to the plant.
		Produces biosolids with a 55% solids content and therefore meets the percent solids acceptance criteria at the local landfill.	The long term use of compost materials at one location has the potential to accumulate

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Criteria	Method	Pro	Con
Nuisance assessment of bio-solids process and disposal	Sub-Class B Disposal	If thickening is achieved by a Belt Filter Press, there will be a minimal footprint requirement, estimated at 0.1 acre.	If solar drying is used, the operation will require 5.7 acres of land for biosolids produced from a gravity systems and 1.4 acres of land for biosolids produced from a STEP/STEG system.
			Solar drying has a high potential to be odiferous and also has the potential to attract vectors.
			This option is not designed to reduce the potential pathogen content in the produced biosolids.
			This alternative would require 4 to 5 truck trips per week leaving the plant.
	Digested Class B	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.	If solar drying is used, the operation will require 4.4 acres of land for biosolids produced from a gravity systems and 1.1 acres of land for biosolids produced from a STEP/STEG system.
		If thickening is achieved by a Belt Filter Press, there will be a minimal footprint requirement, estimated at 0.1 acre	Solar drying has a high potential to be odiferous and also has the potential to attract vectors.
			This alternative would require 3 to 4 truck trips per week leaving the plant.
	Heat Dried Class B	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.	This alternative would require 1 to 2 truck trips per week leaving the plant.
			Process may generate dust, which may potentially be explosive or present exposure/health concern.
		There will be a minimal footprint requirement for this alternative, estimated at 0.1 acre.	Exhaust gas may be odiferous, but can likely be mitigated through controls.
			Process is typically used to produce Class A Biosolids.
	Composted Class B	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.	Composting will require approximately 2.1 acre footprint for biosolids produced from a gravity system and 0.7 acres for biosolids produced from a STEP/STEG system.
			Storage of compost presents a potential fire hazard due to large volumes of carbonaceous materials. Sufficient moisture content, aeration and limited storage time reduces fire hazard.
			If not properly aerated, the compost operation can generate odors.

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Criteria	Method	Pro	Con
			Storm water infiltration into the compost windrows has the potential to produce compost leachate, which may require control.
			This alternative would require 1 to 2 truck trips per week leaving the plant.
	Composted Class A	This option is designed to produce biosolids that are essentially pathogen free.	If not properly aerated, the compost operation can generate odors.
			Storm water infiltration into the compost windrows has the potential to produce compost leachate, which may require control.
			Storage of compost presents a potential fire hazard due to large volumes of carbonaceous materials. Sufficient moisture content, aeration and limited storage time reduces fire hazard.
			If Class A Biosolids are locally used, additional provisions may be needed for winter storage in order to prevent odor production and to mitigate fire hazard.
	Digested/Composted Class A	This option is designed to produce biosolids that are essentially pathogen free.	If not properly aerated, the compost operation can generate odors.
			Storm water infiltration into the compost windrows has the potential to produce compost leachate, which may require control.
			Storage of compost presents a potential fire hazard due to large volumes of carbonaceous materials. Sufficient moisture content, aeration and limited storage time reduces fire hazard.
			If Class A Biosolids are locally used, additional provisions may be needed for winter storage in order to prevent odor production and to mitigate fire hazard.

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Criteria	Method	Pro	Con
Cost of process facilities, operations and maintenance, and ultimate disposal	Sub-Class B Disposal	Construction constitutes between **0.9** and 1.0% of total project construction costs for STEP/STEG	O&M costs constitutes between 10.0 and 12.18% of total project O&M costs for STEP/STEG
		Construction constitutes between 1.32 and 1.48% of total project construction costs for Gravity	O&M costs constitutes between 16.03 and 28.86% of total project O&M costs for Gravity
	Digested Class B	Construction constitutes between 1.44 and 1.49% of total project construction costs for STEP/STEG	O&M costs constitutes between 10.45 and 12.74% of total project O&M costs for STEP/STEG
		Construction constitutes between 2.17 and 2.43% of total project construction costs for Gravity	
		Potential for revenue.	O&M costs constitutes between 15.82 and 28.38% of total project O&M costs for Gravity
	Heat Dried Class B	Construction constitutes between 1.74 and 1.94% of total project construction costs for STEP/STEG	O&M costs constitutes between 11.55 and 17.96% of total project O&M costs for STEP/STEG
		Construction constitutes between 2.81 and 3.03% of total project construction costs for Gravity	O&M costs constitutes between 15.82 and 33.33% of total project O&M costs for Gravity
		Potential for revenue.	Requires 1,400 to 1,700 BTU/ pound of water evaporated.
	Composted Class B	Construction constitutes between 1.24 and 1.64% of total project construction costs for STEP/STEG	O&M costs constitutes between **9.77** and 19.88% of total project O&M costs for STEP/STEG
		Construction constitutes between 2.0 and 2.37% of total project construction costs for Gravity	O&M costs constitutes between 16.24 and 34.57% of total project O&M costs for Gravity
		Potential for revenue	
	Composted Class A	Construction constitutes between 1.24 and 1.64% of total project construction costs for STEP/STEG	O&M costs constitutes between 10.22 and 20.81% of total project O&M costs for STEP/STEG
		Construction constitutes between 2.0 and 2.37% of total project construction costs for Gravity	29 and 36.14% of total project O&M costs for Gravity O&M costs constitutes between 17.
		Potential for revenue.	
	Digested/Composted Class A	Construction constitutes between 1.79 and 2.24% of total project construction costs for STEP/STEG	O&M costs constitutes between 15.29 and 25.54% of total project O&M costs for STEP/STEG
		Construction constitutes between 3.14 and **3.29**% of total project construction costs for Gravity	O&M costs constitutes between 25.00 and **41.76**% of total project O&M costs for Gravity
		Potential for revenue.	

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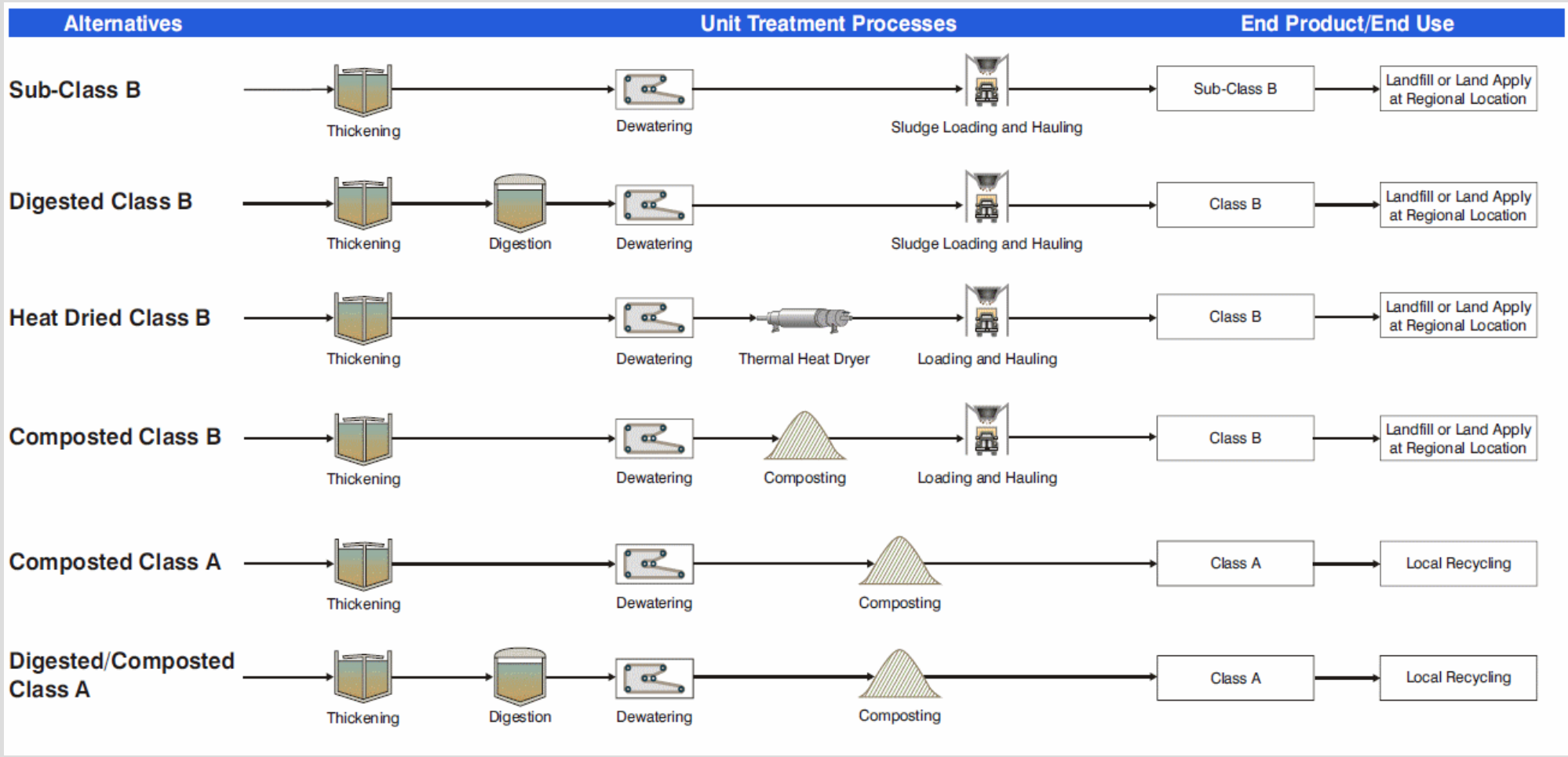

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BIO-SOLIDS TREATMENT & DISPOSAL

SUB-CLASS B BIO-SOLIDS

ENVIRONMENTAL

CRITERIA	PROS	CONS
Volume		- Largest volume - Most expensive hauling costs
Class		- Worst quality - Most restrictive disposal options (Dependant on outside parties for disposal*) - Odor problems (Especially if solar drying is used)
Community impact	+ Least expensive construction cost + Future flexibility + Relatively low annual O&M + Low acreage requirements	- Largest carbon footprint (High diesel consumption)
Traffic		- High wear and tear on road infrastructure from truck traffic

CLASS B BIO-SOLIDS

CRITERIA	PROS	CONS
Volume		- Largest volume - High hauling costs
Class		- Poor quality - Restrictive disposal options (Dependant on outside parties for disposal*) - Odor problems
Community impact	+ Moderate construction cost + Future flexibility ** + Moderate annual O&M + Low acreage requirements	- High carbon footprint (High diesel consumption)
Traffic		- High wear and tear on road infrastructure from truck traffic

* Regional Biosolid handling is the preferred long-term solution but is outside the scope of this analysis.

** Flexibility for off-site recycling and disposal increases from Digested through Heat Dried to Composted Class B Biosolids.

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COMPOSTED CLASS A BIO-SOLIDS
(All Treatment Alternatives)

ENVIRONMENTAL

CRITERIA	PROS	CONS
Volume	+ Minimal volume + Minimal hauling cost	
Class	+ Best quality	- Least restrictive disposal options (Not dependant on outside parties for disposal)
Community impact	+ Least expensive construction cost + Sustainability + Future flexibility + Minimal carbon footprint (Low diesel consumption) + Best regional solution	- Highest annual O&M - High acreage requirements
Traffic		

FACULATATIVE PONDS

CRITERIA	PROS	CONS
Volume	+ Reduced volume + Low hauling cost	
Class		- Unknown future disposal options (Dependant on outside parties for disposal*)
Community impact	+ Least expensive construction costs + Lowest annual O&M + Moderate sustainability + Reduced carbon footprint (Low diesel consumption) + Minimal odor	- High acreage requirements - Least flexibility for future water exchanges
Traffic		

* Regional Biosolid handling is the preferred long-term solution but is outside the scope of this analysis.

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SOLIDS TREATMENT AND DISPOSAL OPTIONS
TAC Financial Working Group

Draft 7/5/07

SOLIDS CLASS	PROS	CONS
Sub-Class B ▪ Capital Costs ▪ O&M ▪ Financial Risks	- Lowest construction costs: $1.9M - $2.4M for Gravity, $1.1M-$1.7M for STEP - O&M costs: $430,000-$470,000 for Gravity; $190,000-$270,000 for STEP - Flexibility to be upgraded	- Higher hauling costs - Most restrictive disposal option - Risk of third party cost escalations and future disposal restrictions
Composted A: **Assumes Gravity Belt Thickening, BFP, Windrow composting** ▪ Capital Costs ▪ O&M ▪ Financial Risks	- Construction costs: from $900,000 to $1,800,000 higher than Sub Class B - O&M costs: from $160,000 to $235,000 higher than Sub Class B - Greatest range of options for recycling/ disposal	- Requires willing compost users; risk of hauling - Composting requires larger amount of land
Ponds ▪ Capital Costs ▪ O&M ▪ Financial Risks	- Lowest O&M costs - Least amount of sludge handling, hauling, and least associated risks	- Land requirements are included in Treatment

* A complete table with all classes of solids is available. However, due to the relatively small cost differential between various levels of solids treatments, the Finance Working Group has chosen to compare Sub Class B and Composted A, thereby eliminating Digested Class B, Heat Dried Class B, and Composted B in the comparison above.