



# Bay Area Clean Water Agencies 2024 Biosolids Trends Survey Report



Photo: Biosolids Digester Facilities Project construction underway at SFPUC's Southeast Treatment Plant. Source: [SFPUC](#).

September 10, 2024

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## Executive Summary

This 2024 Biosolids Trends Survey Report was completed by the Bay Area Clean Water Agencies (BACWA), a joint powers agency whose members own and operate municipal sanitary sewer systems and wastewater treatment facilities serving the nine-county San Francisco Bay Area. In spring 2024, BACWA conducted a survey of Bay Area wastewater agencies regarding biosolids treatment, disposal, and reuse during the time period 2021-2023. This report summarizes the results of the survey, including the following notable trends compared to past surveys:

- **Treatment.** The majority of Bay Area facilities treat biosolids using mesophilic and/or thermophilic digestion. Compared to the previous survey, an increasing number of agencies are sending their biosolids to another facility for additional treatment, such as composting or thermal hydrolysis.
- **Changes in Landfill Practices.** When BACWA began conducting biosolids surveys in 2015, the majority of agencies (21 of 31 surveyed) sent biosolids to be used as landfill Alternative Daily Cover (ADC). In the 2024 survey, only 5 of the 31 surveyed agencies sent biosolids to landfill ADC; an additional 7 agencies also sent biosolids to landfill disposal (not ADC). This change likely reflects efforts to divert organics from landfills to reduce methane emissions per SB 1383. Including both landfill disposal and landfill ADC, 57% of Bay Area biosolids were sent to landfills in 2023.
- **Cost Increases.** Between 2020 and 2023, region-wide total hauling and tipping costs for biosolids increased by more than 50%. This likely reflects increased unit costs for hauling and tipping, as well as changes in biosolids practices at each individual agency, such as hauling biosolids further or providing additional treatment.
- **Planned Changes.** Agencies are planning additional changes to their biosolids management practices. For example, major biosolids dewatering and treatment projects are currently in construction at both West County Wastewater and the City of San Jose. Agencies are also planning projects to accept diverted organic waste for co-digestion, improve onsite biosolids treatment, and send more biosolids offsite for additional treatment.

## 1. Introduction

Biosolids management programs at Publicly Owned Treatment Works (POTWs) in the San Francisco Bay Region continue to be challenged by rapidly rising costs and a complex regulatory environment. Biosolids programs are affected by changes to solid waste disposal, air quality, and water quality regulations. From the solid waste disposal side, legislation and regulation aimed at diverting organic material from landfills took effect in 2022 and are expected to lead to reduced capacity for landfill disposal and use of biosolids for Alternative Daily Cover (ADC). Diverting food waste and biosolids from landfills will require greater on-site production and use of biogas, increased land application of treated biosolids, and deployment of new technologies. Meanwhile, land application disposal locations and contracting practices are in flux. This survey tracks these long-term trends as they impact biosolids practices of Bay Area POTWs.

Bay Area Clean Water Agencies (BACWA) is a joint powers agency whose members own and operate POTWs and sanitary sewer systems that collectively provide sanitary services to over 7 million people in the nine-county San Francisco Bay Area (Bay Area). In spring 2024, BACWA distributed a survey<sup>1</sup> to its member agencies to better understand the state of the biosolids treatment, disposal, and reuse in the Bay Area. The survey is a repeat of previous surveys conducted in 2016<sup>2</sup>, 2018<sup>3</sup>, and 2021<sup>4</sup>. This report also includes biosolids information compiled from USEPA's ECHO Database<sup>5</sup>.

The intent of this survey was to quantify specific biosolids information and track industry trends for the following issues:

- *Biosolids production volumes*
- *Treatment and dewatering technologies*
- *End use and disposal options*
- *Biosolids management technologies and destination*
- *Hauling and tipping costs*
- *Agency challenges*
- *Strategies for SB 1383 compliance*
- *Public outreach*

The Survey includes responses from the following 31 agencies, representing more than 95 percent of the total flow of BACWA member agencies, plus the City of Santa Rosa (which is not a BACWA member):

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<sup>1</sup> BACWA Biosolids Survey 2024 for Calendar Years 2021 – 2023. Available at <https://bacwa.org/wp-content/uploads/2024/04/BACWA-2024-Biosolids-Survey-2024-04-01.pdf>

<sup>2</sup> BACWA 2016 Biosolids Trends Survey Report. Available at <https://bacwa.org/wp-content/uploads/2017/08/BACWA-2016-Biosolids-survey-report-1.pdf>

<sup>3</sup> BACWA 2018 Biosolids Trends Survey Report. Available at <https://bacwa.org/wp-content/uploads/2020/12/BACWA-2018-Biosolids-Survey-Report-Final-2020-12-10.pdf>

<sup>4</sup> BACWA 2021 Biosolids Trends Survey Report. Available at <https://bacwa.org/wp-content/uploads/2021/12/BACWA-2021-Biosolids-Trends-Survey-Report.pdf>

<sup>5</sup> Enforcement and Compliance History Online (ECHO). Available at <https://echo.epa.gov/>

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- Central Contra Costa Sanitary District
- Central Marin Sanitation Agency
- City of American Canyon
- City of Benicia
- City of Hayward
- City of Livermore
- City of Millbrae
- City of Palo Alto
- City of Petaluma
- City of San Jose
- City of San Leandro
- City of San Mateo
- City of Santa Rosa
- City of South San Francisco - San Bruno Water Quality Control Plant
- City of Sunnyvale
- Delta Diablo
- Dublin San Ramon Services District
- East Bay Municipal Utility District
- Fairfield-Suisun Sewer District
- Las Gallinas Valley Sanitary District
- Mt. View Sanitary District
- Napa Sanitation District
- Novato Sanitary District
- Oro Loma Sanitary District
- San Francisco Public Utilities Commission (Oceanside and Southeast facilities)
- Sewer Authority Mid-Coastside
- Sewerage Agency of Southern Marin
- Silicon Valley Clean Water
- Union Sanitary District
- Vallejo Flood & Wastewater District
- West County Wastewater District (including biosolids received from City of Richmond)

The list of respondents above is the same as a prior version of this survey conducted in 2016, 2018, and 2021. The body of the report summarizes the data provided by agencies, while data on reuse and disposal destinations is presented in full in **Appendix A**. It is BACWA's intention to conduct this survey approximately every 3 years. Agency responses will be used as part of a regional conversation about the future of biosolids management in Northern California, to identify regional needs, and to support efforts to identify and develop additional sustainable biosolids reuse alternatives. The survey is also intended to allow comparison with practices in other parts of the state, such as that described in the Biosolids Biennial Trends Survey<sup>6</sup> conducted by Clean Water SoCal (previously known as the Southern California Alliance of Publicly Owned Treatment Works or SCAP).

BACWA wishes to thank all agencies that took the time and effort to assist with the production of this survey and report.

## 2. Treatment Technology

Survey respondents reported the technology used to produce and treat biosolids at each facility. Most facilities (26 out of 32) use mesophilic and/or thermophilic anaerobic digestion, as shown below in **Figure 1**. Many facilities reported using more than one method of treatment, including both on-site treatment and treatment that occurs after hauling to another facility, as noted below:

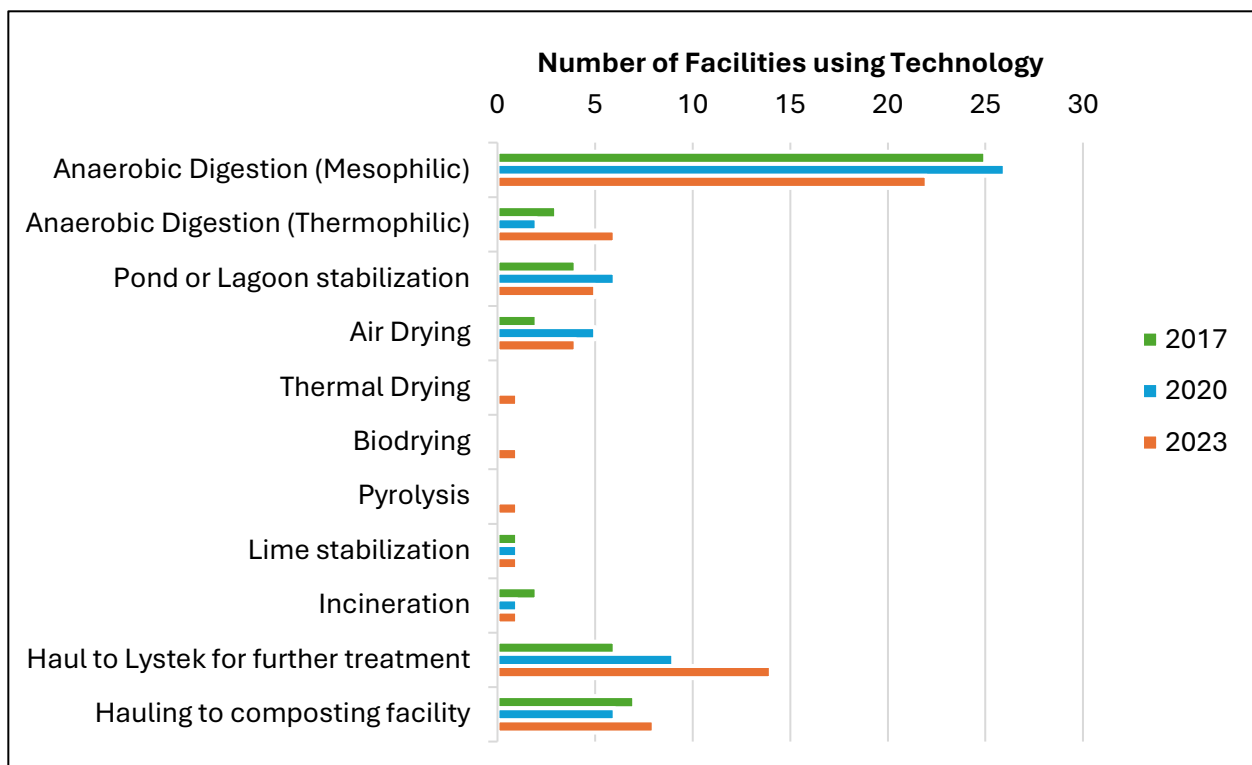
- City of Hayward and City of San Leandro reported use of anaerobic digestion followed by air drying.

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<sup>6</sup> SCAP Biosolids Biennial Trends Survey [https://cleanwatersocal.org/media/acfupload/reference/2019-2021\\_SCAP\\_Biosolids\\_Trends\\_Update.pdf](https://cleanwatersocal.org/media/acfupload/reference/2019-2021_SCAP_Biosolids_Trends_Update.pdf)

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- Sunnyvale and Dublin San Ramon Services District use anaerobic digestion followed by pond or lagoon stabilization.
- Silicon Valley Clean Water uses thermophilic anaerobic digestion, biodrying, and pyrolysis.
- West County Wastewater uses mesophilic anaerobic digestion, thermal drying, and pond or lagoon stabilization.
- City of San Jose uses mesophilic and thermophilic anaerobic digestion, pond lagoon stabilization, and air drying.
- 14 facilities reported hauling to another facility for further treatment by Thermal Hydrolysis (i.e., Lystek). This is an increase over the 9 facilities that reported hauling to Lystek in the 2021 survey.
- 8 facilities reported hauling to another facility for further treatment via composting, which is an increase over the 6 facilities that reported hauling to a compost facility in the 2021 survey.
- New technologies included in the 2024 survey but not tracked in previous surveys include thermal drying (West County Wastewater) and biodrying and pyrolysis (Silicon Valley Clean Water).



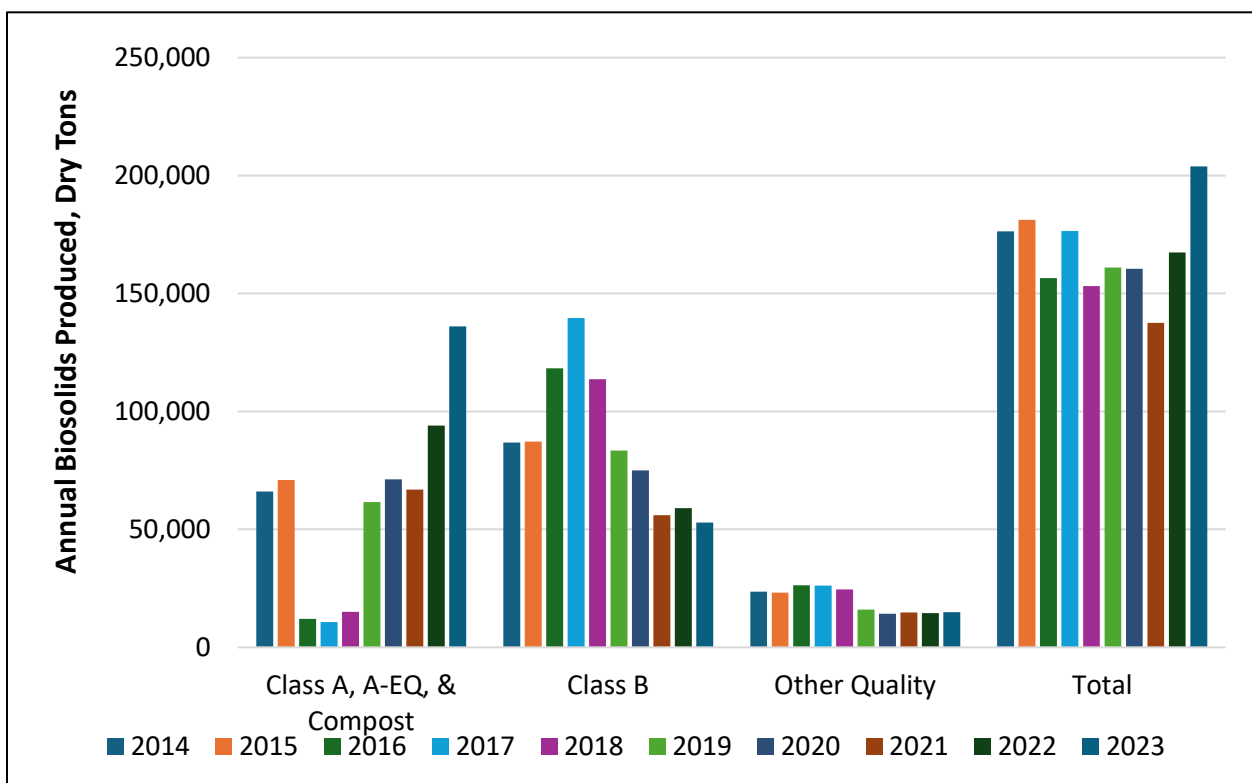
**Figure 1. Technology used for biosolids production and management by survey respondents.**

Compared to the 2021 survey, the 2024 survey showed slight changes in the number of agencies using mesophilic and thermophilic anaerobic digestion, pond and lagoon stabilization, and air drying. These adjustments appear to be related to changes in the survey responses, rather than being tied to actual facility changes.



### 3. Annual Biosolids Production

Biosolids production dry tonnage is reported to USEPA’s ECHO database as part of annual biosolids reporting required by 40 CFR Part 503<sup>7</sup>. Data from 2021, 2022, and 2023 was compiled for this survey, and is shown below in **Figure 2**. The type of biosolids produced by each agency are listed in **Table 1** based on the classifications defined by EPA Rule 503. Table 1 also notes the quality of biosolids resulting from offsite treatment. Offsite treatment is reflected in Figure 2; for example, biosolids that were sent to a compost facility are counted under the “Class A, A-EQ, and Compost” category in Figure 2, even if onsite treatment is Class B. Solids designated as EQ are “Exceptional Quality” biosolids, and “Other Quality” solids do not need to meet the 503 Rules, due to their final disposition (e.g., incinerated biosolids).



**Figure 2. Aggregate dry tons of biosolids of different classes produced by survey respondents.**

In 2023, about half of the biosolids produced in the San Francisco Bay Region were Class A on a dry tonnage basis (mostly from the City of San Jose), while Class B accounted for 37% of the total. The remaining 10% come from the City of Palo Alto and Central Contra Costa Sanitary District, which produced biosolids tracked as “other” in the survey, as detailed below in **Table 1**.

<sup>7</sup>See the “Plain English Guide to the EPA Part 503 Biosolids Rule” at <https://www.epa.gov/biosolids/plain-english-guide-epa-part-503-biosolids-rule>

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**Table 1. Classes of biosolids produced by respondents**

Agency	Biosolids Quality Produced at Facility	Biosolids Quality Notes
American Canyon, City of	B	-
Benicia, City of	B	All biosolids receive additional treatment to Class A-EQ
Central Contra Costa Sanitary District	Other	Incineration at Facility
Central Marin Sanitation Agency	B	A portion of biosolids receive additional treatment to Class A-EQ
Delta Diablo	B	A portion of biosolids receive additional treatment to Class A-EQ
Dublin San Ramon Services District	A	-
East Bay Municipal Utility District	B	A portion of biosolids receive additional treatment to Class A-EQ or via composting
Fairfield-Suisun Sewer District	B	A portion of biosolids receive additional treatment to Class A-EQ
Hayward, City of	A	-
Las Gallinas Valley Sanitary District	B	-
Livermore, City of	B	A portion of biosolids receive additional treatment to Class A-EQ
Millbrae, City of	B	-
Mt. View Sanitary District	B	A portion of biosolids receive additional treatment to Class A-EQ
Napa Sanitation District	B	-
Novato Sanitary District	B	-
Oro Loma Sanitary District	A	-
Palo Alto, City of	Other	All biosolids receive additional treatment to Class A-EQ or via composting
Petaluma, City of	B	A portion of biosolids receive additional treatment to Class A-EQ
San Francisco Public Utilities Commission - Oceanside	B	A portion of biosolids receive additional treatment to Class A-EQ or via composting
San Francisco Public Utilities Commission - Southeast	B	A portion of biosolids receive additional treatment to Class A-EQ or via composting
San Jose, City of	A	-
San Leandro, City of	B	-
San Mateo, City of	B	-
Santa Rosa, City of	B	A portion of biosolids receive additional treatment to Class A-EQ
Sewer Authority Mid-Coastside	B	-
Sewerage Agency of Southern Marin	B	-



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Agency	Biosolids Quality Produced at Facility	Biosolids Quality Notes
Silicon Valley Clean Water	B	A portion of biosolids receive additional treatment to Class A-EQ and via composting
South San Francisco - San Bruno, City of	B	All biosolids receive additional treatment to Class A-EQ
Sunnyvale, City of	B	-
Union Sanitary District	B	A portion of biosolids receive additional treatment via composting
Vallejo Flood & Wastewater District	B	A portion of biosolids receive additional treatment to Class A-EQ
West County Wastewater District	B	A portion of biosolids receive additional treatment via composting

### 4. Management Options, Management Costs and Dewatering Statistics

#### **Biosolids Reuse and Disposals Options**

The amount of biosolids sent to each type of reuse and disposal destination by each responding agency is reported in **Table 2** based on the wet tonnage survey data and in **Table 3** based on dry tonnage data from the ECHO database. In cases where the survey data did not match the ECHO database, the responses were modified to match the ECHO database for consistency (e.g., categorization as landfill disposal vs. ADC). The accompanying **Figure 3** and **Figure 4** illustrate the relative importance of each reuse and disposal method for wet and dry tons, respectively. The change in reuse and disposal methods over time is illustrated in **Figure 5** (wet tons), **Figure 6** (dry tons) (see page 15) and **Figure 7**. Notable trends include:

- Reuse via landfill ADC receives the largest amount of dry tonnage of biosolids in the region, followed by land application. 98% of the landfill ADC in the region is from the City of San Jose, which is planning to transition to other biosolids management options as soon as 2025 (see page 26). The growth in the dry tonnage used for landfill ADC from 2020 to 2023 is also due to a short-term increase from the City of San Jose.
- The use of biosolids for ADC from all other sources combined (except City of San Jose) actually *decreased* from 2020 to 2023 as a number of agencies employing ADC switched to landfilling or to other options. Central Marin Sanitation Agency, East Bay Municipal Utility District, City of Hayward, Mt. View Sanitary District, Petaluma, San Francisco Public Utilities Commission, City of San Mateo, City of Santa Rosa, Silicon Valley Clean Water, and City of Sunnyvale all reported using biosolids for ADC in 2020, but not in 2023.
- From 2020 to 2023, there was modest growth in the amount of biosolids sent to landfill disposal (31% increase in 3 years). Over this time period, four agencies switched from using ADC to landfill disposal. This may reflect agencies’ continued reliance on landfills for biosolids disposal capacity even in the absence of incentives to use biosolids for ADC.

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- Onsite disposal at Dublin San Ramon Services District, Las Gallinas Valley Sanitary District, and Novato Sanitary district accounts for a large amount of wet tonnage, but a small amount of dry tonnage because of the low solids content.
- From 2020 to 2023, there was significant growth in the amount of biosolids that received additional treatment by thermal hydrolysis at the Lystek facility (71% increase in dry tonnage over 3 years). Facilities that started sending biosolids to Lystek between 2020 and 2023 include Delta Diablo, East Bay Municipal Utility District, City of Livermore, and South San Francisco – San Bruno. As of 2023, 14 of the 32 surveyed facilities were sending biosolids to the Lystek Organic Materials Recovery Center (OMRC) located in Fairfield. The OMRC began processing biosolids to produce Class A-EQ liquid fertilizer in 2016, and in 2023 it accounted for 16% of total wet tonnage produced by survey respondents (9% of total dry tonnage).
- From 2020 to 2023, there was significant growth in the amount of biosolids that received additional treatment at a composting facility (99% increase in dry tonnage over 3 years). The growth was due to significant increases in the use of composting facilities by East Bay Municipal Utility District, San Francisco Public Utilities Commission, Silicon Valley Clean Water, and West County Wastewater.

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**Table 2. Wet tons of biosolids delivered by usage, 2023.**

	ADC	Landfill Disposal	Land Application	Compost	Lystek	Biochar	Incineration	Onsite Disposal	Storage	Total
American Canyon, City of	-	31	-	-	-	-	-	-	-	31
Benicia, City of	-	-	-	-	2,033	-	-	-	-	2,033
Central Contra Costa Sanitary District	-	-	-	-	1,361	-	68,886	-	-	70,247
Central Marin Sanitation Agency	-	3,290	323	-	1,640	-	-	-	-	5,253
Delta Diablo	-	-	12,396	618	876	-	-	-	-	13,890
Dublin San Ramon Services District	-	-	-	-	-	-	-	54,000	-	54,000
East Bay Municipal Utility District	-	-	32,553	23,106	10,722	-	-	-	-	66,381
Fairfield-Suisun Sewer District	776	-	-	-	18,765	-	-	-	-	19,541
Hayward, City of	-	5,440	-	-	-	-	-	-	-	5,440
Las Gallinas Valley Sanitary District	-	-	1,387	-	-	-	-	2,766	-	4,153
Livermore, City of	5,801	1,465	1,170	-	48	-	-	-	-	8,484
Millbrae, City of	-	-	1,887	-	-	-	-	-	-	1,887
Mt. View Sanitary District	-	937	-	-	-	-	-	-	-	937
Napa Sanitation District	-	-	6,744	-	-	-	-	-	-	6,744
Novato Sanitary District	-	-	-	-	-	-	-	13,390	-	13,390
Oro Loma Sanitary District	-	-	7,542	-	-	-	-	-	-	7,542
Palo Alto, City of	-	-	-	11,937	8,099	-	-	-	-	20,036
Petaluma, City of	-	-	5,305	-	664	-	-	-	-	5,969
San Francisco Public Utilities Commission - Oceanside	-	57	2,324	1,477	9,277	-	-	-	-	13,135
San Francisco Public Utilities Commission - Southeast	-	-	6,469	3,548	23,020	-	-	-	9,298	42,335
San Jose, City of	110,731	-	-	-	-	-	-	-	-	110,731
San Leandro, City of	-	698	924	-	-	-	-	-	-	1,622
San Mateo, City of	-	-	8,348	-	-	-	-	-	-	8,348
Santa Rosa, City of	-	1,067	23,749	-	11,618	-	-	-	2,788	39,221
Sewer Authority Mid-Coastside	1,967	-	-	-	-	-	-	-	-	1,967

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	ADC	Landfill Disposal	Land Application	Compost	Lystek	Biochar	Incineration	Onsite Disposal	Storage	Total
Sewerage Agency of Southern Marin	1,085	-	-	-	-	-	-	-	-	1,085
Silicon Valley Clean Water	-	-	6,358	2,235	-	500 <sup>a</sup>	-	-	-	9,093
South San Francisco - San Bruno, City of	-	-	-	-	8,000	-	-	-	-	8,000
Sunnyvale, City of	-	-	10,542	-	-	-	-	-	-	10,542
Union Sanitary District	-	-	13,670	6,285	-	-	-	-	-	19,955
Vallejo Flood & Wastewater District	-	-	13,899	-	127	-	-	-	-	14,026
West County Wastewater District	-	17,677	-	7,256	-	-	-	-	-	24,933
<b>Total</b>	<b>20,360</b>	<b>30,633</b>	<b>155,589</b>	<b>56,462</b>	<b>96,250</b>	<b>500</b>	<b>68,886</b>	<b>70,156</b>	<b>12,086</b>	<b>610,951</b>

<sup>a</sup>SVCW biochar wet tons estimated based on dry tons from ECHO database, assuming 20% solids.

**Table 3. Dry tons of biosolids delivered by usage, 2023.**

	ADC	Landfill Disposal	Land Application	Compost	Lystek	Biochar	Incineration	Onsite Disposal	Storage	Total
American Canyon, City of	-	6	-	-	-	-	-	-	-	6
Benicia, City of	-	-	-	-	325	-	-	-	-	325
Central Contra Costa Sanitary District	-	-	-	-	275	-	14,937	-	-	15,212
Central Marin Sanitation Agency	-	790	80	-	394	-	-	-	-	1,264
Delta Diablo	-	-	2,663	132	188	-	-	-	-	2,983
Dublin San Ramon Services District	-	-	-	-	-	-	-	1,643	-	1,643
East Bay Municipal Utility District	-	-	7,842	4,734	2,152	-	-	-	-	14,729
Fairfield-Suisun Sewer District	372	-	-	-	2,869	-	-	-	-	3,241
Hayward, City of	-	5,400	-	-	-	-	-	-	-	5,400
Las Gallinas Valley Sanitary District	-	-	239	-	-	-	-	78	-	317

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	ADC	Landfill Disposal	Land Application	Compost	Lystek	Biochar	Incineration	Onsite Disposal	Storage	Total
Livermore, City of	928	224	181	-	8	-	-	-	-	1,340
Millbrae, City of	-	-	316	-	-	-	-	-	-	316
Mt. View Sanitary District	-	249	-	-	-	-	-	-	-	249
Napa Sanitation District	-	-	979	-	-	-	-	-	-	979
Novato Sanitary District	-	-	-	-	-	-	-	720	-	720
Oro Loma Sanitary District	-	-	5,456	-	-	-	-	-	-	5,456
Palo Alto, City of	-	-	-	3,238	2,197	-	-	-	-	5,435
Petaluma, City of	-	-	939	-	116	-	-	-	-	1,055
San Francisco Public Utilities Commission - Oceanside	-	9	399	283	1,760	-	-	-	-	2,451
San Francisco Public Utilities Commission - Southeast	-	6,441	3,094	711	4,653	-	-	-	1,895	16,794
San Jose, City of	95,497	-	-	-	-	-	-	-	-	95,497
San Leandro, City of	-	-	261	-	-	-	-	-	-	261
San Mateo, City of	-	-	1,736	-	-	-	-	-	-	1,736
Santa Rosa, City of	-	129	2,415	-	1,450	-	-	-	325	4,318
Sewer Authority Mid-Coastside	264	-	-	-	-	-	-	-	-	264
Sewerage Agency of Southern Marin	215	-	-	-	-	-	-	-	-	215
Silicon Valley Clean Water	-	-	1,931	1,065	-	95	-	-	-	3,091
South San Francisco - San Bruno, City of	366	-	-	-	1,097	-	-	-	-	1,463
Sunnyvale, City of	-	-	2,069	-	-	-	-	-	-	2,069
Union Sanitary District	-	-	2,963	1,397	-	-	-	-	-	4,360
Vallejo Flood & Wastewater District	-	-	3,428	-	33	-	-	-	-	3,461
West County Wastewater District	-	6,544	-	1,400	-	-	-	-	-	7,956
<b>Total</b>	<b>97,642</b>	<b>19,801</b>	<b>36,992</b>	<b>12,960</b>	<b>17,516</b>	<b>95</b>	<b>14,937</b>	<b>2,441</b>	<b>2,220</b>	<b>204,605</b>

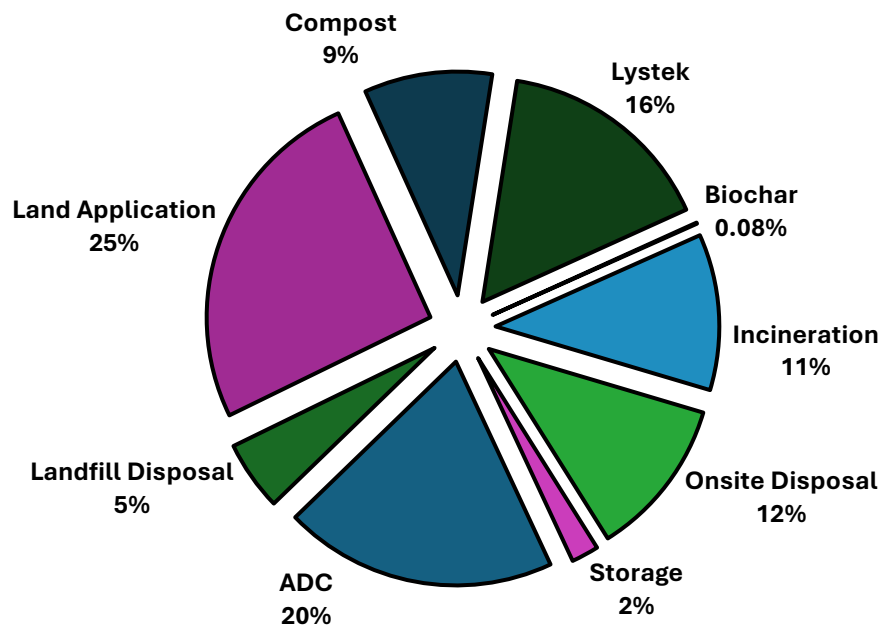


Figure 3. Relative wet tonnage of biosolids per reuse and disposal method in 2023.

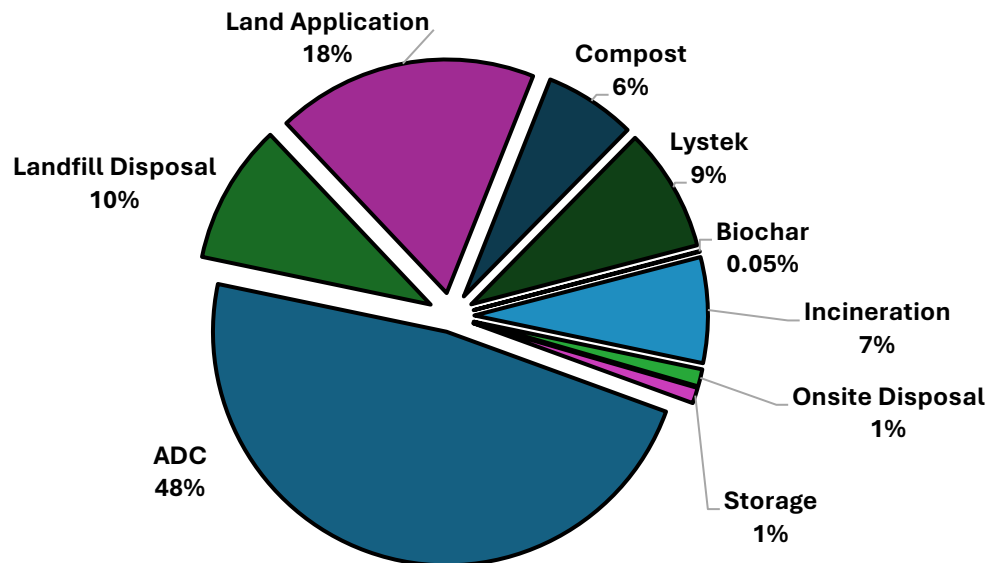
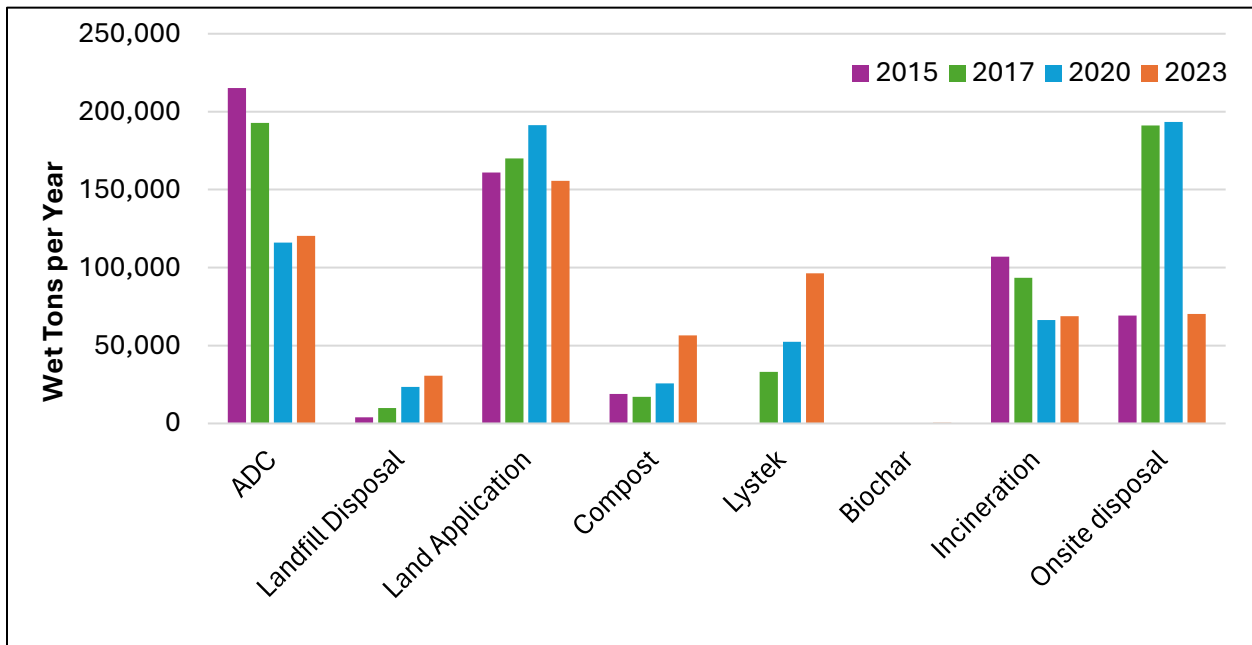


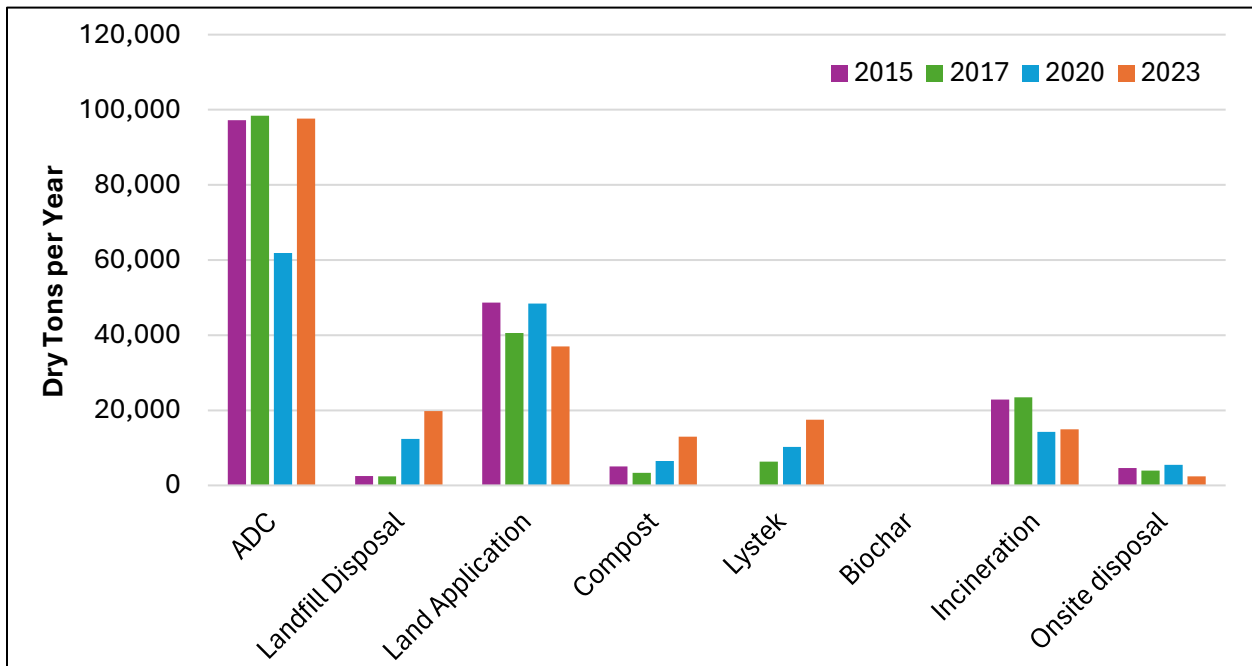
Figure 4. Relative dry tonnage of biosolids per reuse and disposal method in 2023.



## BACWA 2024 Biosolids Trends Survey



**Figure 5. Wet tonnage of biosolids per reuse and disposal method, 2015 to 2023.**

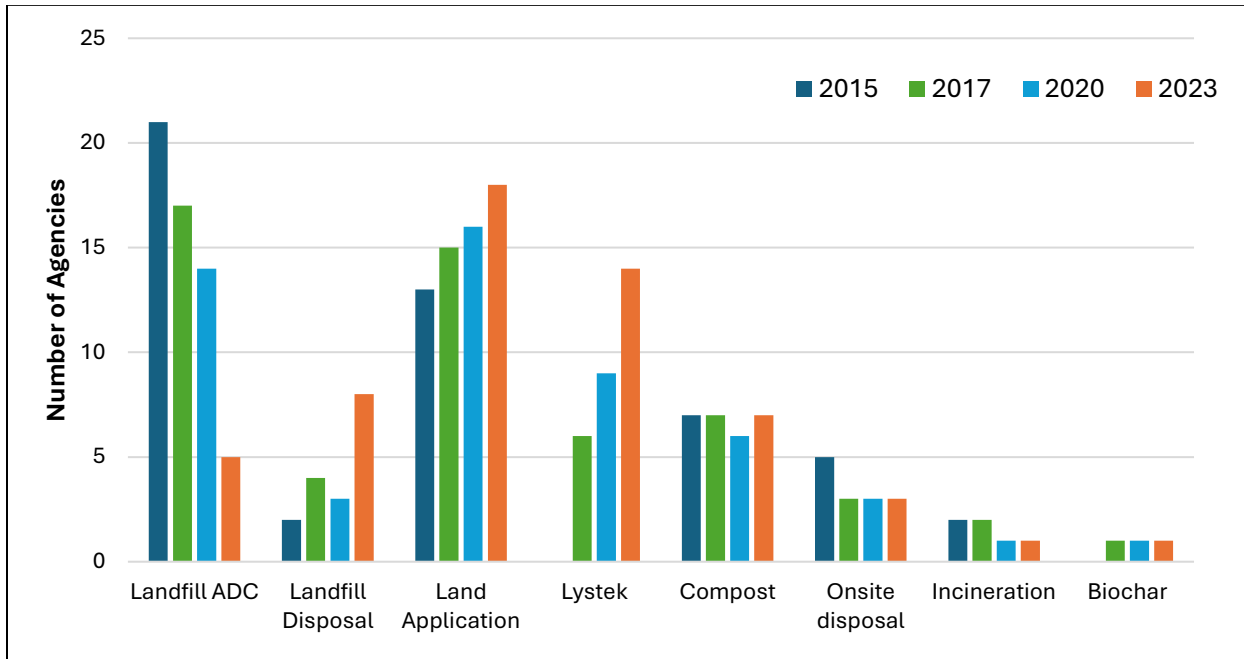


**Figure 6. Dry tonnage of biosolids per reuse and disposal method, 2015 to 2023.**

Another way to measure the relative importance of reuse and disposal methods is by counting the number of agencies that employ each, as illustrated in **Figure 7**. As can be seen in **Table 2** and **Table 3**, many agencies use more than one reuse or disposal management strategies. Out of the thirty-two responding facilities, 18 used land application, making it the most popular management strategy. Treatment at Lystek was the next most popular, followed by landfill disposal and

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composting. While Lystek grew in popularity as a biosolids reuse option, landfill ADC continued to become less popular: In 2015, 21 agencies sent biosolids to landfill ADC, while in 2023, just 5 agencies sent biosolids to landfill ADC. Landfill disposal is being used by more agencies to fill the gap as they transition away from landfill ADC. Onsite disposal is used at three agencies, while incineration and biochar production were used by one agency each.



**Figure 7. Biosolids management practices for 32 surveyed facilities, 2015 to 2023.**

### Management Costs

Agencies that send biosolids to multiple destinations report a range of costs per ton. Minimum and maximum reported hauling and tipping costs for each agency are reported in **Table 4**. Where costs were provided by the respondent as a range, the mean of the range was used for that destination. Total costs per agency are calculated by multiplying tons of solids by cost per ton for each destination and summing the destinations. Average costs for each agency are calculated by dividing total cost by tons of biosolids.

**Table 4. Hauling and tipping costs for agencies**

Agency Name	Minimum Cost (\$/Ton)	Maximum Cost (\$/Ton)	Average Cost (\$/Ton)	Approx. Total Cost (\$/Yr)
American Canyon, City of	Hauling included in City's waste disposal contract.			
Benicia, City of	\$104	\$104	\$104	\$211,000
Central Contra Costa Sanitary District	Not Avail.	\$135 (Lystek)	Onsite incineration. Cost information not provided.	
Central Marin Sanitation Agency	\$58	\$127	\$81	\$424,000
Delta Diablo	\$66	\$124	\$71	\$989,000
Dublin San Ramon Services Dist.	Onsite disposal costs \$130,000 per year			

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Agency Name	Minimum Cost (\$/Ton)	Maximum Cost (\$/Ton)	Average Cost (\$/Ton)	Approx. Total Cost (\$/Yr)
East Bay Municipal Utility District	\$49	\$121	\$78	\$5,171,000
Fairfield-Suisun Sewer District	Not provided. Lystek facility is located onsite.			
Hayward, City of	\$70	\$70	\$70	\$381,000
Las Gallinas Valley Sanitary Dist.	\$16	\$277	\$106	\$441,000
Livermore, City of	\$53	\$53	\$53	\$450,000
Millbrae, City of	\$80	\$80	\$80	\$151,000
Mt. View Sanitary District	\$78	\$161	\$99	\$93,000
Napa Sanitation District	Onsite land application. Approximately 2 FTE staff.			
Novato Sanitary District	Onsite disposal costs \$230,000 per year			
Oro Loma Sanitary District	\$66	\$66	\$66	\$498,000
Palo Alto, City of	\$73	\$129	\$96	\$1,918,000
Petaluma, City of	\$75	\$132	\$94	\$562,000
San Francisco Public Utilities Commission - Oceanside	\$81	\$149	\$137	\$1,796,000
San Francisco Public Utilities Commission - Southeast	\$76	\$145	\$126	\$5,348,000
San Jose, City of	\$28	\$28	\$28	\$3,139,000
San Leandro, City of	\$54	\$88	\$68	\$111,000
San Mateo, City of	\$74	\$76	\$75	\$622,000
Santa Rosa, City of	\$40	\$98	\$55	\$2,146,000
Sewer Authority Mid-Coastside	\$70	\$70	\$70	\$137,000
Sewerage Agency of So. Marin	\$73	\$73	\$74	\$80,000
Silicon Valley Clean Water	Not provided			
South San Francisco - San Bruno WQCP, City of	\$166	\$166	\$166	\$1,328,000
Sunnyvale, City of	\$184	\$184	\$184	\$1,940,000
Union Sanitary District	\$61	\$100	\$73	\$1,464,000
Vallejo Flood & Wastewater Dist. <sup>a</sup>	\$11	-	-	\$166,000
West County Wastewater Dist. <sup>b</sup>	\$101	\$131	\$120	\$2,359,000
<b>Subtotal (25 of 32 facilities reporting)</b>				<b>\$32,239,000</b>

<sup>a</sup> Costs shown for Vallejo Flood & Wastewater Dist. are for Tubbs Island land application only.

<sup>b</sup> Costs shown for West County Wastewater Dist. do not include costs for disposing of biosolids from City of Richmond.

For the 21 agencies that reported costs in both 2020 and 2023, total costs rose about 58%, from about \$18M in 2020 to \$29M in 2022. By comparison, the U.S. inflation rate was about 18% over the 3-year period from 2020 to 2022. Cost increases significantly higher than the rate of inflation were also reported in the 2017 biosolids survey report (12% increase in cost, vs. 3% inflation over 2 years) and the 2020 biosolids survey report (12% increase in cost, vs. 6% inflation over 3 years).

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Much of the increase is due to agencies moving away from lower-cost options towards higher-cost options that require longer hauling distances.

The range of hauling and tipping costs associated with each reuse and disposal alternative are plotted in **Figure 8**. In **Figure 9**, these unit costs are divided by distance hauled and presented in the units of \$/(ton-mile). Onsite disposal is not included in **Figure 9** because hauling distances for onsite disposal are extremely small or zero.

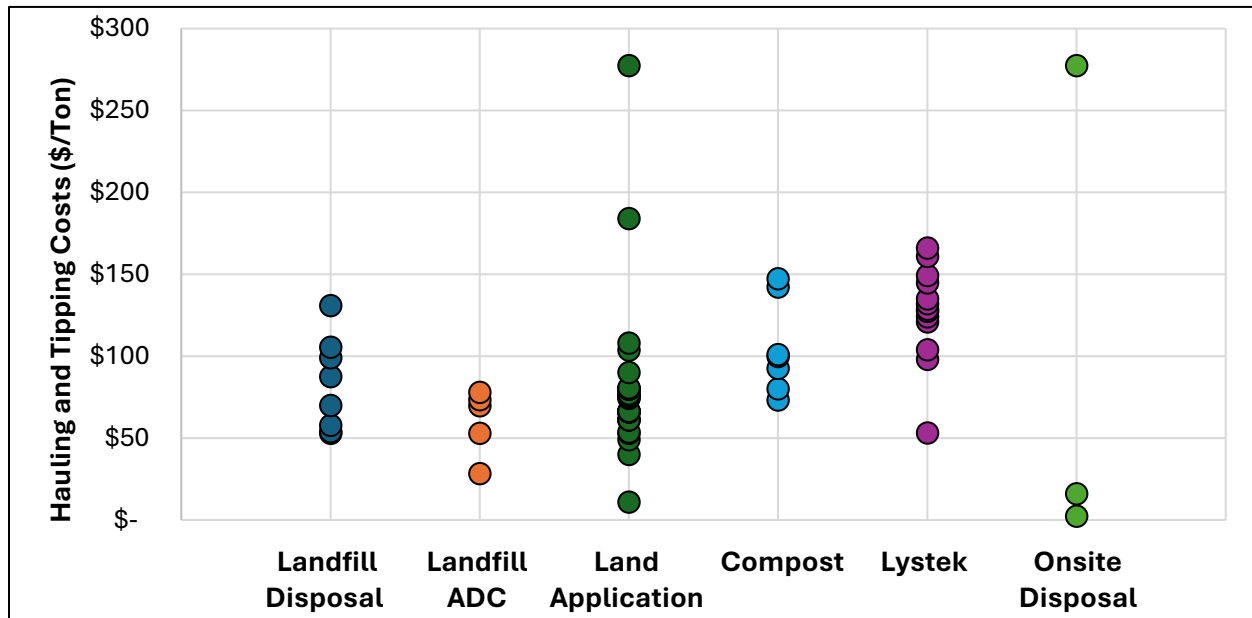


Figure 8. Tipping and Hauling Costs for each reuse/disposal alternative, \$/wet ton

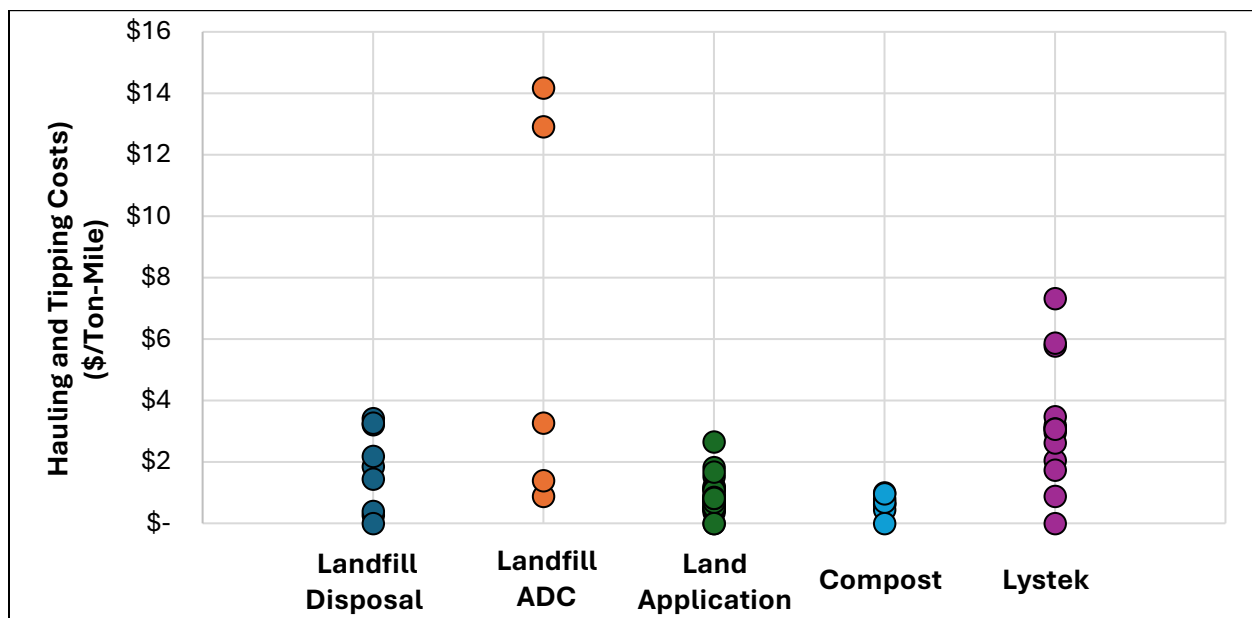


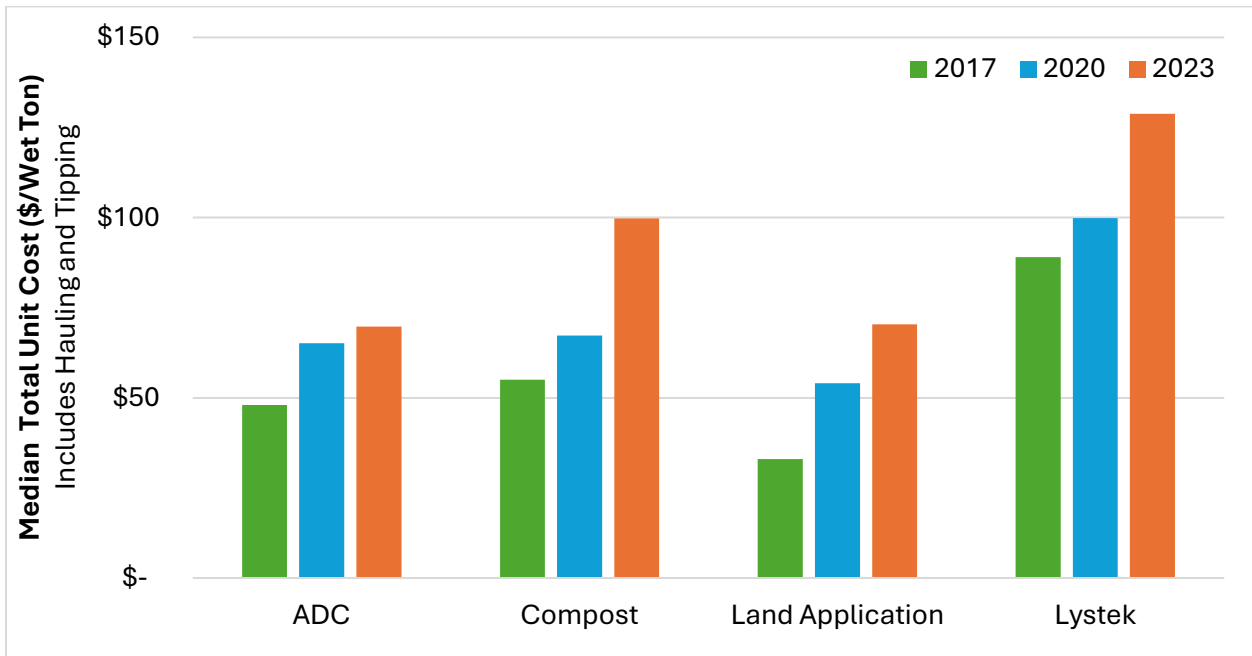
Figure 9. Tipping and Hauling Costs for each reuse/disposal alternative, \$/(wet ton-mile)

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Recent increases in total unit costs (including tipping and hauling) for each reuse and disposal alternative are shown below in **Table 5** and illustrated in **Figure 10**.

**Table 5. Median Costs for Reuse and Disposal Alternatives, \$/wet ton, 2017-2023**

	2018 Survey (2017 Data)	2021 Survey (2020 Data)	2024 Survey (2023 Data)
<b>Landfill Disposal</b>	-	-	\$ 79
<b>ADC</b>	\$ 48	\$ 65	\$ 70
<b>Compost</b>	\$ 55	\$ 67	\$ 100
<b>Land Application</b>	\$ 33	\$ 54	\$ 70
<b>Land Application not including Santa Rosa</b>	\$ 43	\$ 55	\$ 74
<b>Lystek</b>	\$ 89	\$ 100	\$ 129



**Figure 10. Median Costs for Reuse and Disposal Alternatives, \$/wet ton, 2017-2023**

### **Hauling Distance**

The range of round-trip hauling distances for each agency, as well as total ton-miles, are listed in **Table 6**. The ton-miles provides a metric for the total hauling burden for each agency. The combined hauling burden for all survey respondents (25.6 million ton-miles) is 13% higher than the equivalent value from the 2021 survey, even though the wet tonnage of biosolids was 11% lower.

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**Table 6. Round-trip Distance Hauled**

Agency	Minimum Distance Hauled (One way, miles)	Maximum Distance Hauled (One way, miles)	Total Ton-Miles
American Canyon, City of	31	31	953
Benicia, City of	18	18	36,598
Central Contra Costa Sanitary District	0	23	31,303
Central Marin Sanitation Agency	18	70	152,315
Delta Diablo	25	116	756,618
Dublin San Ramon Services District	0	0	0
East Bay Municipal Utility District	38	135	7,166,977
Fairfield-Suisun Sewer District	0	9	6,984
Hayward, City of	32	32	174,086
Las Gallinas Valley Sanitary District	0	1	1,940
Livermore, City of	60	200	749,253
Millbrae, City of	72	115	149,624
Mt. View Sanitary District	22	56	27,173
Napa Sanitation District	0	0	0
Novato Sanitary District	0	0	0
Oro Loma Sanitary District	96	143	932,990
Palo Alto, City of	74	114	1,960,147
Petaluma, City of	38	109	591,177
San Francisco Public Utilities Commission - Oceanside	57	153	934,575
San Francisco Public Utilities Commission - Southeast	27	142	2,255,506
San Jose, City of	2	2	221,461
San Leandro, City of	120	225	267,952
San Mateo, City of	100	100	834,816
Santa Rosa, City of	2	29	1,115,589
Sewer Authority Mid-Coastside	5	5	10,624
Sewerage Agency of Southern Marin	0	0	24,417
Silicon Valley Clean Water	120	130	1,053,738
South San Francisco - San Bruno WQCP	54	54	432,000
Sunnyvale, City of	110	110	1,159,620
Union Sanitary District	79	225	2,877,236
Vallejo Flood & Wastewater District	12	18	169,011
West County Wastewater	40	145	1,590,800
<b>Total (30 of 31 agencies reporting)</b>			<b>25,922,308</b>

### **Dewatering Statistics**

The on-site methods employed by agencies to dewater biosolids prior to final use included drying beds, centrifuges, presses, and dryers. Dewatering equipment employed by each agency, as well as the resulting percentage of solids, is listed in **Table 7**.



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**Table 7. Percentage Solids, Dewatering technology type and manufacturer for each agency**

<b>Agency Name</b>	<b>Percent Solids</b>	<b>Dewatering Technology</b>	<b>Equipment Details (if available)</b>
American Canyon, City of	18%	Screw Press	Or-Tec
Benicia, City of	18%	Belt Filter Press	Ashbrook
Central Contra Costa Sanitary District	23%	Centrifuge	Sharples centrifuges will be replaced by Andritz within 5 years
Central Marin Sanitation Agency	26%	Centrifuge	Centrisys
Delta Diablo	26%	Centrifuge	Flottweg
Dublin San Ramon Services District	3%	Sludge Lagoons	-
East Bay Municipal Utility District	23%	Centrifuge	Humboldt, Flottweg
Fairfield-Suisun Sewer District	17 - 48%	Screw Press	FKC
Hayward, City of	92%	Drying Bed, Gravity Belt Thickener	-
Las Gallinas Valley Sanitary District	19%	Belt Filter Press, Sludge Lagoons	-
Livermore, City of	16%	Belt Filter Press	Ashbrook
Millbrae, City of	18%	Belt Filter Press	Andritz
Mt. View Sanitary District	26%	Centrifuge	Alfa Laval
Napa Sanitation District	16%	Belt Filter Press	Ashbrook
Novato Sanitary District	6%	Sludge Lagoons	-
Oro Loma Sanitary District	71 - 84%	Belt Filter Press, Solar Drying	BDP Industries
Palo Alto, City of	30%	Belt Filter Press	Andritz
Petaluma, City of	20%	Screw Press	FKC
San Francisco Public Utilities Commission - Oceanside	21%	Screw Press	FKC
San Francisco Public Utilities Commission - Southeast	22%	Centrifuge	Alfa Laval, Humboldt
San Jose, City of	95%	Drying Bed	Flottweg (expected after 2025)
San Leandro, City of	24 - 31%	Belt Filter Press, Drying Bed	BDP Industries
San Mateo, City of	22%	Centrifuge	GEA Westfalia
Santa Rosa, City of	16%	Belt Filter Press	-
Sewer Authority Mid-Coastside	17%	Belt Filter Press	Ashbrook
Sewerage Agency of Southern Marin	22%	Belt Filter Press	BDP Industries
Silicon Valley Clean Water	17 - 80%	Rotary Press, Drying Beds, Biodryers	Fournier rotary presses; BioforceTech biodryer and pyrolysis units

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Agency Name	Percent Solids	Dewatering Technology	Equipment Details (if available)
South San Francisco - San Bruno, City of	19%	Belt Filter Press	Komline-Sanderson
Sunnyvale, City of	23%	Centrifuge, Belt Filter Press (operated by a contractor)	-
Union Sanitary District	24%	Centrifuge	Andritz
Vallejo Flood & Wastewater District	28%	Belt Filter Press	Ashbrook
West County Wastewater	19%	Belt Filter Press (operated by contractor, pre-2024) Centrifuge (expected 2024)	Alfa Laval (expected 2024)

## 5. Planning and Challenges

### Challenges

Agencies were asked to select up to three challenges facing their biosolids program. The challenges are listed below based on the number of selections amongst all agencies:

- Rising costs for off-site hauling (22 votes)
- Hauling distance (12 votes)
- Inadequate capacity at our preferred end use (e.g., landfill, land application, or additional treatment provider) (11 votes)
- Local or County restrictions on land application (9 votes)
- Regulatory Restrictions on using Biosolids for Alternative Daily Cover (SB 1383) (8 votes)
- Public health concerns regarding biosolids land application (PFAS, microplastics, pathogens, etc.) (7 votes)
- Wet weather impeding operations (5 votes)
- Administrative challenges with contracting (5 votes)
- Inadequate short-term storage capacity for biosolids (4 votes)

Additional challenges were provided in the open-ended part of the survey, including the following (answered paraphrased):

- Anticipated loss of land available for land application due to sea level rise
- Loss of land available for land application in Solano County due to land acquisition by Flannery Associates, a firm associated with the “California Forever” development project.
- The need for technological investment by small agencies that produce a small volume of biosolids.
- Air regulations associated with incinerator operation.
- Increases in the cost of polymer.
- Site constraints at the wastewater treatment facility.

The rising cost of off-site hauling was the top concern in the 2024 survey. This result is identical to the 2016 and 2018 surveys, when rising costs were also cited as the top concern. In the 2021

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survey, “securing sustainable use and disposal options” was the highest-ranking concern, followed by “rising costs.” The return of rising costs as the top regional concern likely reflects the rapid pace of cost increases in recent years, even compared to the 2021 survey.

### **Master Planning**

The survey asked whether agencies have recently completed a master plan for biosolids that they would be willing to share. The following agencies indicated that they have a recently completed master plan:

- Central Marin Sanitation Agency – Available on the [CMSA website](#) (see [Tech Memo No. 5](#))
- Dublin San Ramon Services District – Available on the [DSRSD website](#)
- City of San Jose – See the City’s 2013 [Plant Master Plan](#) and 2021 [Dewatered Biosolids Management Strategy](#). Contact [Nora Cibrian](#) for details.
- City of Santa Rosa – Available upon request from [Zach Kay](#)
- South San Francisco – San Bruno - Available upon request from [Brian Schumacker](#)

### **Future Biosolids Management Plans**

The survey asked respondents whether they plan to change biosolids management in the near future (2024-2025). Most of the 31 respondents selected the response “Same plan/strategy as 2023.” Five agencies had the following responses (edited for length and clarity):

- The **City of American Canyon** is investigating a plant upgrade to address high-strength waste and biosolids handling.
- **Mt. View Sanitary District** is hoping to transition this year to 50% land application and 50% other beneficial re-use. The agency plans to work with a 3<sup>rd</sup> party contractor on this transition, but has experienced difficulty engaging with the contractor because they are busy with larger operations.
- **San Francisco Public Utilities Commission** plans to continue seeking to diversify its biosolids management options. Due to recent land purchases by California Forever (Flannery Associates), there will be no direct land application of SFPUC biosolids in Solano County in 2024, although there may be opportunities in 2025. SFPUC also sends biosolids to Lystek, which continues to apply Class A material in Solano County as a California Department of Food and Agriculture licensed fertilizer.
- The **San Jose-Santa Clara Regional Wastewater Facility** is expected to produce mechanically dewatered biosolids starting in 2025, when construction of the Digested Sludge Dewatering Facility will be completed. The mechanically dewatered biosolids will be beneficially used. For at least four years after completion of the Digested Sludge Dewatering Facility project, biosolids from the Regional Wastewater Facility’s lagoons and drying beds will continue to be sent to an adjacent landfill for use as ADC until the lagoons and drying beds are emptied and retired.
- In 2024, **West County Wastewater** is converting from a long history of using sludge lagoons (followed by mechanical turning by dozer as the last drying step) to processes that include centrifuge for dewatering and thermal belt dryer to produce Class A. The intention is to produce a salable product.

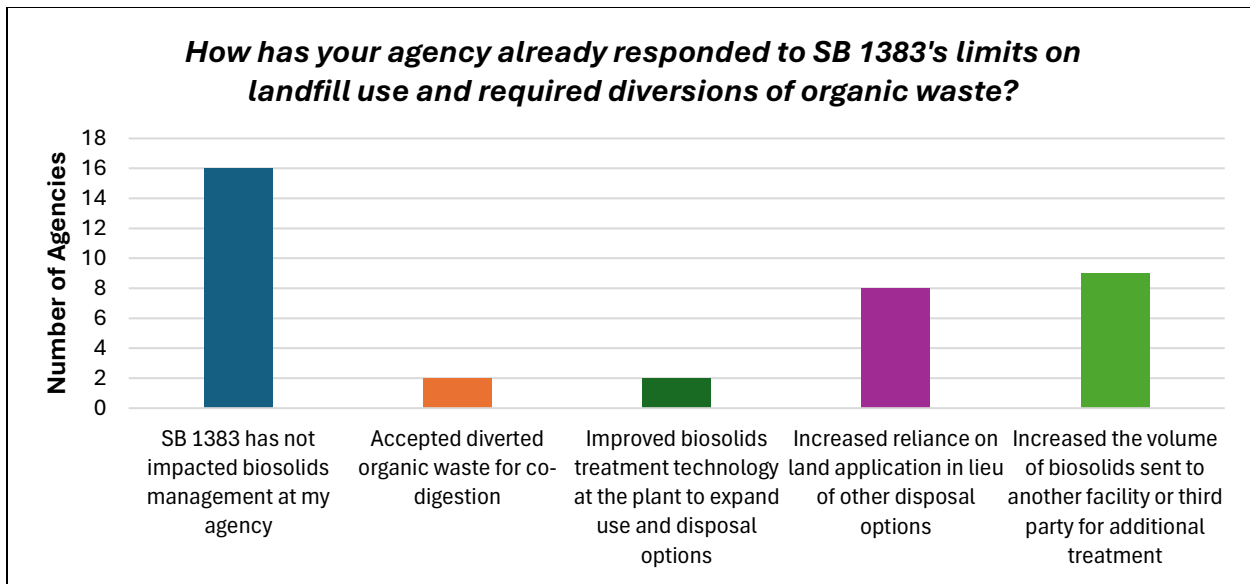
### **Response to SB 1383**

The survey also specifically asked about agency's responses to SB 1383, which mandates diversion of organics from landfills in order to reduce short-lived climate pollutants (i.e., methane). This legislation is expected to have two main impacts on biosolids disposal:

- Biosolids used as landfill ADC will be considered disposal instead of beneficial reuse, which could reduce landfills' acceptance of biosolids for ADC.
- Municipalities will need to divert organic materials (green waste, food waste, etc.) from landfills. If wastewater agencies provide opportunities for co-digestion of these diverted materials, there will be an increase in the production of digested biosolids and of biogas at POTWs.

Responses to the survey question about projects undertaken in response to SB 1383 are summarized below in **Figure 11**. 16 of 31 agencies reported that SB 1383 has not impacted biosolids management at their agency. The other 15 agencies reported that they have used the following strategies to respond to SB 1383:

- 2 agencies (Central Marin Sanitation Agency and Silicon Valley Clean Water) have **accepted diverted organic waste for co-digestion**.
- 2 agencies (San Jose and West County Wastewater) have **improved biosolids treatment technology at the plant to expand use and disposal options**.
- 7 agencies (East Bay Municipal Utility District, Livermore, Petaluma, San Francisco Public Utilities Commission, Silicon Valley Clean Water, and Union Sanitary District) have **Increased reliance on land application in lieu of other disposal options**.
- 8 agencies (Benicia, Central Marin Sanitation Agency, East Bay Municipal Utility District, Fairfield-Suisun Sewer District, San Francisco Public Utilities Commission, San Leandro, Santa Rosa, and West County Wastewater) reported that they have already **increased the volume of biosolids sent to another facility or third party for additional treatment** (e.g., thermal hydrolysis, composting, etc.).



**Figure 11. Agency Initiatives in Response to SB1383**

The survey also asked whether agencies have additional plans to respond to SB 1383. 15 of 31 agencies have no additional plans. Responses from the other 16 agencies are summarized in **Figure 12** and listed below:

- 6 agencies (Central Marin Sanitation Agency, San Leandro, San Mateo, Silicon Valley Clean Water, Sunnyvale, and Union Sanitary District) plan to **accept more diverted organic waste for co-digestion**.
- 6 agencies (American Canyon, Livermore, Novato Sanitary District, San Leandro, San Mateo, and Union Sanitary District) plan to **improve biosolids treatment technology at the plant to expand use and disposal options**.
- 4 agencies (East Bay Municipal Utility District, Livermore, San Jose, and San Mateo) plan to **increase reliance on land application in lieu of other disposal options**, such as landfilling.
- 4 agencies (Central Marin Sanitation Agency, East Bay Municipal Utility District, Petaluma, San Jose, and Union Sanitary District) plan to **increase the volume of biosolids sent to another facility or third party for additional treatment** (e.g., thermal hydrolysis, composting, etc.).

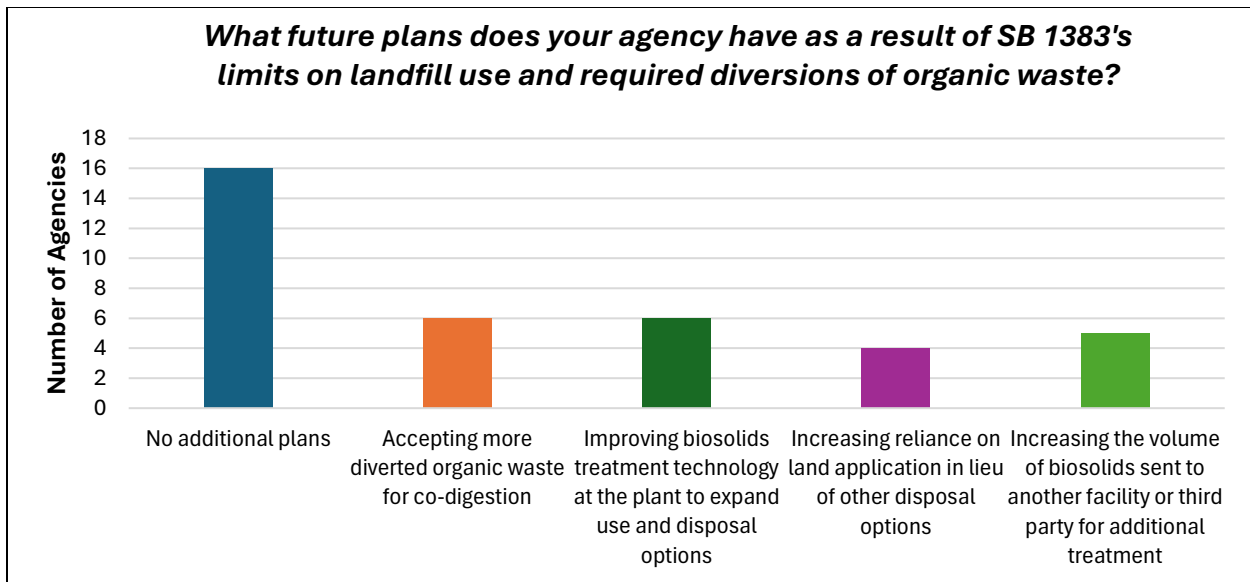


Figure 12. Agency Future Plans for Responding to SB 1383

Respondents also noted the following agency-specific details related to SB 1383:

- **American Canyon** is continuing to route biosolids for landfill disposal until a plan is put into place, because the City’s franchise hauler has capacity at the landfill for the City’s solids.
- **Benicia** is continuing to investigate logistics and costs for onsite alternatives.
- **Central Contra Costa Sanitary District** has received confirmation from CalRecycle that neither the agency’s biosolids nor its incinerator ash appear to meet the definition of organic waste pursuant to 14 CCR 18982(a)(46).
- **Dublin San Ramon Services District** would like to accept hauled organic waste in the future.
- **East Bay Municipal Utility District** eliminated the landfill option in biosolids handling contracts as of July 2022, even though the agency was not required to do so. This choice was based on the agency’s policy of beneficial use of biosolids and the determination by the State that landfill ADC was no longer considered beneficial use.
- **South San Francisco – San Bruno** made a similar choice to divert all biosolids from landfills, and is now sending all biosolids to Lystek for thermal hydrolysis.
- The **San Jose-Santa Clara Regional Wastewater Facility** is undergoing a major biosolids transition that includes the implementation of a mechanical dewatering facility, retirement of lagoons and drying beds, and procurement of service contracts for a variety of off-site beneficial use options. Contracts for the transportation and beneficial use of the mechanically dewatered biosolids were executed in December 2022, but services will not commence until early 2025 during the mechanical dewatering facility’s commissioning.
- **San Leandro** and **Sewerage Agency of Southern Marin** are both investigating technology that will result in drier biosolids to lower the number of tons that need to be hauled. **South San Francisco – San Bruno** is also planning to deploy new technology to produce drier biosolids.
- **Silicon Valley Clean Water** currently has a food waste receiving station and is in the design phase for a more advanced receiving and pumping station.



- **Sunnyvale** plans to begin accepting food waste for co-digestion in the next five years.
- At **West County Wastewater**, Synagro has been belt press dewatering blended primary sludge and TWAS for nearly four years. This process was necessitated by condition failure of the agency's original anaerobic digesters. West County Wastewater is reconstructing its sludge/biosolids handling and processing processes to meet updated standards. When complete, West County Wastewater will be producing Class A biosolids. The agency is in the process of determining how to reuse this product.
- **Vallejo Flood and Wastewater District** is investigating the possibility of intensifying land application.

### **Public Outreach and Education**

The survey asked whether agencies include biosolids in their outreach and education programs, such as customer bill inserts, agency website content, and social media posts.

- 22 of 31 agencies reported that they do **not** include biosolids in their outreach and education programs.
- Several agencies noted that they include occasional articles in their customer newsletters. For agencies that also have responsibility for solid waste collection, messaging related to organics diversion through green waste bins is also relevant.
- Several agencies, including those hyperlinked below, noted that they have information on their agency's website regarding biosolids.
  - Central Marin Sanitation Agency – [Virtual Tour](#)
  - East Bay Municipal Utility District – [Virtual Tour](#)
  - Fairfield-Suisun Sewer District – [Virtual Tour](#)
  - Napa Sanitation District – [Wastewater Treatment Plant](#)
  - San Francisco Public Utilities Commission – [Biosolids Page](#). A separate page includes detailed information about the [Biosolids Digester Facilities Project](#) under construction at the Southeast Treatment Plant, as shown on the cover of this report.

East Bay Municipal Utility District and Napa Sanitation District also noted that biosolids are featured in their in-person tours.

## 6. Biosolids Staffing

The survey asked respondents to describe how their agency manages biosolids staffing, including the number of Full Time Equivalent (FTE) positions. Three out of 31 agencies (Las Gallinas Valley Sanitary District, Sunnyvale and West County Wastewater) noted participation of contractors in onsite biosolids operations. Complete responses are shown below in **Table 8**. Adding up the estimated staffing level for all agencies, the total is about 75 Full Time Equivalent positions.

**Table 8. Agency Staffing for Biosolids**

Agency	Estimated FTEs	Please describe the roles of staff assisting with biosolids management.
American Canyon, City of	0.5	Plant operators manage the biosolids.
Benicia, City of	1	Management is responsible for regulatory tasks; O&M staff are responsible for dewatering/maintenance; Water Quality Supervisor & Lab are responsible for regulatory tasks and Lystek
Central Contra Costa Sanitary District	3.5	Staff roles include operating incinerators and solids handling equipment, hauling coordination, regulatory reporting
Central Marin Sanitation Agency	2.0	Staff breakdown: 0.5 FTE for contract management; 0.5FTE for co-digestion management; 0.5FTE for digester and dewater operations; 0.5FTE for equipment maintenance and repairs
Delta Diablo	2.5	Operators produce and process the biosolids; Ops Supervisor tracks digester data (temp, VSR, detention); Ops Manager oversees Synagro and Lystek contracts, performs reporting; Lab staff collects samples, analyzes biosolids; Engineering assists w/RFPs, contracts, regulatory issues
Dublin San Ramon Services District	4.5	We use about 6 temporary workers for about 1/2 of the year. An additional 1-2 FTEs are required for various compliance and operations tasks. The temps work on the operation to remove biosolids from the lagoons and land apply at the adjacent dedicated land disposal site.
East Bay Municipal Utility District	1	Approximately 4 people devote 10-25% of their time to biosolids. Civil Engineer for Program Coordinator, Wastewater Operations Coordinator for daily data management, Wastewater Control Inspector for site visits, Administrative Clerk for invoice reconciliation.
Fairfield-Suisun Sewer District	0.65	Operations (0.25 FTE), Maintenance (0.25 FTE), Laboratory (0.1 FTE), Regulatory (0.05 FTE)

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Agency	Estimated FTEs	Please describe the roles of staff assisting with biosolids management.
Hayward, City of	4	2 equipment operators, 1 maintenance supervisor, 1 lab supervisor. Equipment operators stir the drying beds and transfers biosolids to the ageing field. Then biosolids are hauled to landfill. Maintenance supervisor organizes hauling and lab supervisor sends samples for testing and submits reports to WM for approval. 1 operator on a 12-hour day shift, 1 operator on a 12-hour night shift, and 2 heavy equipment operators/laborers
Las Gallinas Valley Sanitary District	-	Contracted to a third party.
Livermore, City of	1	Belt Press Operator fills trailers to be hauled away by a contractor.
Millbrae, City of	2	1 chief operator, 1 regulatory compliance (source control supervisor), and superintendent (contract management)
Mt. View Sanitary District	1	Burden is shared by a staff of 7 operators, one lab tech, two contract haulers.
Napa Sanitation District	3	Supervisor (0.6 FTE), Reclamation Worker (2.0 FTE), Lab Analyst (0.15 FTE), Operator (0.20 FTE), Director/Regulatory (0.05 FTE)
Novato Sanitary District	1	Managing sludge transfer to lagoons and returning the decant to the wastewater treatment plant, laboratory analysis (solids and health of digesters), maintenance/ repair/ replacement of infrastructure (piping, pumps etc.) and regulatory reporting (EPA 503)
Oro Loma Sanitary District	2	One person at the belt filter press and another at the solar drying beds
Palo Alto, City of	2	Staff include operators, maintenance, plant manager, senior engineer, associate engineer, and administrative associates
Petaluma, City of	3.5	WWTP operators are responsible for managing solids treatment processes, including thickening, digestion, dewatering and loading trailers. Operations Supervisor is responsible for managing the biosolids hauling and management contract. Maintenance Supervisor and plant mechanics are responsible for servicing and maintaining equipment.
San Francisco Public Utilities Commission - Oceanside	1.5	There are currently 2 FTE staff that work on biosolids contract management and regulatory compliance, the remainder of the time is split working on recycled water, biogas, and wastewater surveillance.
San Jose, City of	13	1 Environmental Program Manager, 1 Residuals Solids Management Superintendent, 1 Operations Foreperson, 1 Senior Heavy Equipment Operator, 6 Heavy Equipment Operators, and 3 Attendants
San Leandro, City of	2	Procurement/contracting, lab analysis and data management, contractor coordination, mixing and drying biosolids.

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Agency	Estimated FTEs	Please describe the roles of staff assisting with biosolids management.
San Mateo, City of	3	O&M, Lab, Plant Management & Administrative Assistant
Santa Rosa, City of	7.25	Approximately 1 Biosolids Coordinator, 1.5 Senior Maintenance, 3.0 Operators and 1.0 senior operators for our solids section of the plant, 0.5 utility tech (admin) for contracts, and 0.25 for regulatory compliance.
Sewer Authority Mid-Coastside	7	Operations and Management / working with consultant
Sewerage Agency of Southern Marin	7	Operations, and laboratory. Operations responsible for dewatering /maintenance and subcontracting hauling. Laboratory runs in house analysis and subcontracts sludge annual testing and account profiles with Waste Management and annual biosolids reporting.
Silicon Valley Clean Water	-	All (13) Operators are trained to run the dewatering equipment, and (3) utility workers operate equipment in the drying beds loading.
South San Francisco - San Bruno WQCP, City of	1	O&M of Belt Presses, Digesters, Recirculation Pumps, Feed pumps, Biosolids Hopper, additional equipment. Running of Belt Presses, Ordering of Polymer, and Laboratory analysis for regulatory compliance of biosolids.
Sunnyvale, City of	1.5	Biosolids dewatering and hauling operations are managed by a contractor. There are no dedicated employees for biosolids management. Operations and Laboratory staff assist part-time in the collection and analysis of biosolids samples. Regulatory Division supports regulatory oversight and reporting of biosolids.
Union Sanitary District	2	1 Full Operator, 0.5 for Biosolids Program Management, 0.5 for maintenance. Tasks include Operations, field inspections and maintenance, engineering analysis, sampling, testing, invoice tracking, reporting and regulatory oversight.
Vallejo Flood & Wastewater District	2	O&M, regulatory compliance, transportation
West County Wastewater	2	Value is an estimate, as WCW is close to bringing new processes on line. Historically, digested sludge was pumped to the storage/drying lagoons and the process from that point was contracted to another party. As a result, the operations manager handled 90 or more % of the duties.

### 7. Future Surveys

BACWA intends to repeat this survey in 2027 (covering biosolids activities in 2024, 2025, and 2026), and every two to three years thereafter. This will give the region the ability to track biosolids trends that change due to factors such as:

- **Water Quality Regulations.** Bay Area wastewater agencies are subject to regulation by the San Francisco Bay Regional Water Quality Control Board, which indirectly affects biosolids management through its jurisdiction over impacts to groundwater and surface water from biosolids land application and land disposal. The Regional Water Board's jurisdiction also includes biosolids use within wetland restoration projects in the San Francisco Baylands<sup>8</sup>. Finally, at some agencies, effluent limitations for nitrogen in the 2024 Nutrient Watershed Permit<sup>9</sup> may affect biosolids co-digestion and treatment approaches.
- **Air Quality Regulations.** New regulations from the California Air Resources Board and the Bay Area Air Quality Management District regarding air toxics (e.g., from the combustion of biogas) and climate pollutants (e.g., methane) will continue to impact biosolids management. These new regulations will be targeted specifically at wastewater treatment plants, whereas SB 1383 is more targeted towards biosolids disposal options such as landfilling.
- **Cost structure.** Most Bay Area wastewater agencies are reliant on private contractors for hauling, additional treatment, and/or biosolids end uses. This market sector has seen recent innovation as well as consolidation, opening up new opportunities to use biosolids while also creating cost uncertainty.

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<sup>8</sup> For more information, see *Biosolids in the Baylands: Exploring compatibility of biosolids use with wetland restoration in the San Francisco Baylands*, a white paper prepared in 2022 and available at <https://bacwa.org/wp-content/uploads/2022/07/Biosolids-in-the-Baylands-White-Paper-March-2022.pdf>

<sup>9</sup> Nutrients Watershed Permit, Order R2-2024-0013. Available at [https://www.waterboards.ca.gov/sanfranciscobay/board\\_decisions/adopted\\_orders/2024/R2-2024-0013.pdf](https://www.waterboards.ca.gov/sanfranciscobay/board_decisions/adopted_orders/2024/R2-2024-0013.pdf)

**APPENDIX A – AGENCY DATA: 2023 Biosolids Management**

<b>American Canyon, City of</b>		<a href="#">Link to ECHO Data</a>
type	Landfill disposal	
location	Hay Road Landfill, Vacaville	
wet tons	31	
cost (\$/ton)	Solids disposal included in City’s franchise agreement.	
one-way distance (miles)	31	

<b>Benicia, City of</b>		<a href="#">Link to ECHO Data</a>
type	Lystek	
location	Lystek Organic Materials Recovery Center (OMRC) <sup>10</sup>	
wet tons	2,033	
cost (\$/ton)	\$104/ton	
cost details	\$611/load (average load 5-8 tons), 315 loads/year	
one-way distance (miles)	18	

<b>Central Contra Costa Sanitary District</b>			<a href="#">Link to ECHO Data</a>
	Destination 1	Destination 2	
type	Incineration	Lystek	
location	Onsite	Lystek. Only for emergency use and routine testing of facility; may be used exclusively during capital improvements to the incinerators.	
wet tons	68,886	1,361	
cost (\$/ton)	-	\$135	
one-way distance (miles)	0	23	

<b>Central Marin Sanitation Agency</b>				<a href="#">Link to ECHO Data</a>
	Destination 1	Destination 2	Destination 3	
type	Landfill Disposal	Land Application	Lystek	
location	Redwood Landfill, Novato	Synagro Solano County land application sites	Lystek	
wet tons	3,290	323	v1,775	
cost (\$/ton)	\$57.90	\$77.02	\$127.42	
cost details (\$/ton)	\$14.90 Transport \$42.99 Tipping & Mgmt	\$38.27 Transport \$38.75 Tipping & Mgmt	\$38.27 Transport \$89.15 Tipping & Mgmt	
one-way distance (miles)	18	70	42	

<sup>10</sup> All location references to Lystek in Appendix A are to the Lystek Organic Materials Recovery Center (OMRC) located in Fairfield, CA.

## BACWA 2024 Biosolids Trends Survey

<b>Delta Diablo</b>				<a href="#">Link to ECHO Data</a>
	<b>Destination 1</b>	<b>Destination 2</b>	<b>Destination 3</b>	<b>Destination 4</b>
<b>type</b>	Land application	Land application	Lystek	Compost
<b>location</b>	Sacramento County	Solano County	Lystek	Synagro Central Valley Compost Facility
<b>wet tons</b>	11,333	1,063	876	618
<b>cost (\$/ton)</b>	\$66.42	\$66.42	\$124.08	\$92.53
<b>one-way distance (miles)</b>	55	25	40	116

<b>Dublin San Ramon Services District</b>		<a href="#">Link to ECHO Data</a>
<b>type</b>	Onsite disposal	
<b>location</b>	DSRSD Dedicated Land Disposal (DLD) site	
<b>wet tons</b>	54,000	
<b>cost (\$/ton)</b>	Total cost of \$130,000/year	
<b>one-way distance (miles)</b>	0	

<b>East Bay Municipal Utility District</b>				<a href="#">Link to ECHO Data</a>
	<b>Destination 1</b>	<b>Destination 2</b>	<b>Destination 3</b>	<b>Destination 4</b>
<b>type</b>	Land Application	Compost	Lystek	Land Application
<b>location</b>	Silva Ranch, Sacramento County	Central Valley Compost Facility	Lystek	Merced County farms
<b>wet tons</b>	13,889	23,106	10,722	18,664
<b>cost (\$/ton)</b>	\$80	\$80	\$121	\$49
<b>cost details (\$/ton)</b>			\$26 Transport \$95 Tipping & Mgmt	
<b>one-way distance (miles)</b>	89	130	38	135

<b>Fairfield-Suisun Sewer District</b>		<a href="#">Link to ECHO Data</a>
	<b>Destination 1</b>	<b>Destination 2</b>
<b>type</b>	Lystek	ADC
<b>location</b>	Lystek	Landfill
<b>wet tons</b>	18,765	776
<b>cost (\$/ton)</b>	-	Included with larger fixed price contract
<b>one-way distance (miles)</b>	0	9

<b>Hayward, City of</b>		<a href="#">Link to ECHO Data</a>
<b>type</b>	Landfill disposal	
<b>location</b>	Altamont Landfill and Resource Recovery	
<b>wet tons</b>	5,440	
<b>cost (\$/ton)</b>	\$70	
<b>cost details (\$/ton)</b>	\$22 Transport, \$58 Tipping & Management Fees	
<b>one-way distance (miles)</b>	32	

## BACWA 2024 Biosolids Trends Survey

Las Gallinas Valley Sanitary District			<a href="#">Link to ECHO Data</a>
	Destination 1	Destination 2	Destination 3
type	Land application	Onsite Disposal	Onsite Disposal
location	Onsite	Onsite	Onsite
wet tons	1,387	44	2,722
cost (\$/ton)	Total cost \$385,000/year	Total cost \$12,000/year	Total cost \$44,000/year
one-way distance (miles)	0	0	0

Livermore, City of				<a href="#">Link to ECHO Data</a>
	Destination 1	Destination 2	Destination 3	Destination 4
Type	Land application	Landfill disposal	Lystek	ADC
Location	Merced County	Holloway Landfill	Lystek	Potrero Landfill
wet tons	1,170	1,465	48	5,801
cost (\$/ton)	\$53	\$53	\$53	\$53
one-way distance (miles)	90	200	60	60

Millbrae, City of			<a href="#">Link to ECHO Data</a>
	Destination 1	Destination 2	
Type	Land application	Land application	
Location	Merced County	Sacramento County	
wet tons	320	1,567	
cost (\$/ton)	\$79.80	\$79.80	
one-way distance (miles)	115	72	

Mt. View Sanitary District		<a href="#">Link to ECHO Data</a>
Type	Landfill Disposal	
Location	Potrero Hills Landfill	
wet tons	937	
cost (\$/ton)	\$99	
cost details (\$/ton)	\$42 Transport, \$57 Tipping & Management Fees	
one-way distance (miles)	29	

Napa Sanitation District		<a href="#">Link to ECHO Data</a>
Type	Land Application	
Location	Onsite	
wet tons	6,744	
cost (\$/ton)	Program cost is for onsite land application is approximately 2 FTE staff.	
one-way distance (miles)	0	



## BACWA 2024 Biosolids Trends Survey

Novato Sanitary District		<a href="#">Link to ECHO Data</a>
type	Onsite Disposal	
location	Onsite Designated Land Disposal site	
wet tons	13,390	
cost (\$/ton)	Flat fee for annual transfer of biosolids from sludge lagoons. 2023 fee was \$230,000.	
one-way distance (miles)	0	

Oro Loma Sanitary District				<a href="#">Link to ECHO Data</a>
	Destination 1	Destination 2	Destination 3	Destination 4
type	Land application	Land Application – Mine Reclamation	Land application	Land application
location	Silva Ranch	Argonaut Mine	Costa View Farms	Newhall Ranch
wet tons	2,552	921	2,878	1,189.6
cost (\$/ton)	\$66	\$66	\$66	\$66
one-way distance (miles)	96	143	142	124

Palo Alto, City of			<a href="#">Link to ECHO Data</a>
	Destination 1	Destination 2	
type	Lystek	Compost	
location	Lystek	Synagro Central Valley Composting Facility	
wet tons	8,099	11,937	
cost (\$/ton)	\$128.80	\$73.26	
cost details (\$/ton)	\$30.25 Transport \$98.55 Tipping & Mgmt	\$34 Transport \$39.26 Tipping & Mgmt	
one-way distance (miles)	74	114	

Petaluma, City of			<a href="#">Link to ECHO Data</a>
	Destination 1	Destination 2	Destination 3
type	Land application	Land Application	Lystek
location	Sacramento County	Solano County	Lystek
wet tons	5,100	205	664
cost (\$/ton)	\$90	\$75	\$132
cost details (\$/ton)	~\$45 Transport ~\$45 Tipping & Mgmt	~\$30 Transport ~\$45 Tipping & Mgmt	~\$22 Transport ~\$110 Tipping & Mgmt
one-way distance (miles)	109	49	38

## BACWA 2024 Biosolids Trends Survey

San Francisco Public Utilities Commission – Oceanside Plant					<a href="#">Link to ECHO Data</a>
	Destination 1	Destination 2	Destination 3	Destination 4	Destination 5
type	Land application	Land application	Lystek	Landfill disposal	Compost
location	Solano County	Sacramento County	Lystek	Hay Road Landfill, Vacaville	Merced County
wet tons	2,300	24	9,277	57	1,477
cost (\$/ton)	\$80.69	\$108.09	\$149.22	\$105.47	\$147.22
cost details (\$/ton) - transport	\$40.87	\$66.09	\$32.81	\$39.92	\$74.87
cost details (\$/ton) - tipping & management	\$39.82	\$42.00	\$116.41	\$65.55	\$72.53
one-way distance (miles)	75	131	57	73	153

San Francisco Public Utilities Commission – Southeast Plant					<a href="#">Link to ECHO Data</a>
	Destination 1	Destination 2	Destination 3	Destination 4	Destination 5
type	Land application	Land application	Lystek	Storage	Compost
location	Solano County	Sacramento County	Lystek	Oro Loma Sanitary District	Merced County
wet tons	6,451	18	23,020	57	3,548
cost (\$/ton)	\$76.23	\$103.63	\$144.76	\$105.47	\$142.27
cost details (\$/ton) - transport	\$26.41	\$61.63	\$28.35	\$39.92	\$69.92
cost details (\$/ton) - tipping & management	\$39.82	\$42.00	\$116.41	\$65.55	\$72.35
one-way distance (miles)	65	121	47	73	142

San Jose, City of		<a href="#">Link to ECHO Data</a>
type	ADC	
location	Newby Island Landfill	
wet tons	110,731	
cost (\$/ton)	\$28.35	
one-way distance (miles)	2	

San Leandro, City of		<a href="#">Link to ECHO Data</a>
	Destination 1	Destination 2
type	Land application	Landfill disposal
location	Merced County	Holloway Landfill, Kern County
wet tons	924	698
cost (\$/ton)	\$53.74	\$87.50
one-way distance (miles)	120	225

## BACWA 2024 Biosolids Trends Survey

San Mateo, City of		<a href="#">Link to ECHO Data</a>
	Destination 1	Destination 2
type	Land application	Land application
location	Silva Ranch, Sacramento County	Mullinax Ranch, Merced County
wet tons	7,154	1,194
cost (\$/ton)	\$74.28	\$75.90
one-way distance (miles)	100	100

Santa Rosa, City of			<a href="#">Link to ECHO Data</a>	
	Destination 1	Destination 2	Destination 3	Destination 4
type	Lystek	Land Application	Landfill disposal	Storage
location	Lystek	Sonoma County	Redwood Landfill	City of Santa Rosa Alpha Farm
wet tons	11,618	23,749	1,067	2,788
cost (\$/ton)	\$98	\$40	\$54	-
one-way distance (miles)	47.9	22	29.1	2

Sewer Authority Mid-Coastside		<a href="#">Link to ECHO Data</a>
type	ADC	
location	Ox Mountain Landfill	
wet tons	1,967	
cost (\$/ton)	\$69.75	
cost details	\$362.62 per load for transport, \$75.86 per load for tipping & management	
one-way distance (miles)	5	

Sewerage Agency of Southern Marin		<a href="#">Link to ECHO Data</a>
type	ADC	
location	Redwood Landfill	
wet tons	1,085	
cost (\$/ton)	\$44.46/ton + \$75-125 per load for fuel surcharges and environmental fees	
one-way distance (miles)	23	

Silicon Valley Clean Water			<a href="#">Link to ECHO Data</a>	
	Destination 1	Destination 2	Destination 3	Destination 4
type	Land application	Land application	Compost	Biochar
location	Sacramento County	Merced County	Merced County	-
wet tons	6,244	114	2,235	95 dry tons
one-way distance (miles)	120	130	130	-

## BACWA 2024 Biosolids Trends Survey

South San Francisco/San Bruno		<a href="#">Link to ECHO Data</a>
type	Lystek	
location	Lystek	
wet tons	8,000 – 10,000	
cost (\$/ton)	\$166	
one-way distance (miles)	54	

Sunnyvale, City of		<a href="#">Link to ECHO Data</a>
type	Land application	
location	Silva Ranch, Sacramento County	
wet tons	10,542	
cost (\$/ton)	\$800/dry ton, including dewatering services, hauling, and land application	
one-way distance (miles)	110	

Union Sanitary District				<a href="#">Link to ECHO Data</a>
	Destination 1	Destination 2	Destination 3	Destination 4
type	Land application	Land application	Land application	Compost
location	Merced County	Sacramento County	Solano County	Liberty Composting Facility (Synagro)
wet tons	4,740	8,583	347	6,285
cost (\$/ton)	\$61.24	\$61.24	\$61.24	\$99.79
one-way distance (miles)	120	101	79	225

Vallejo Flood and Wastewater District			<a href="#">Link to ECHO Data</a>
	Destination 1	Destination 2	
type	Land application	Lystek	
location	Tubbs Island	Lystek	
wet tons	13,899	127	
cost (\$/ton)	\$11	\$94.50 Tipping fees	
one-way distance (miles)	12	17.5	

West County Wastewater			<a href="#">Link to ECHO Data</a>
	Destination 1	Destination 2	Destination 3
type	Landfill Disposal	Compost	Landfill Disposal
location	Potrero Hills Landfill	Central Valley Compost Facility	Vasco Road Landfill
wet tons	12,412	7,256	5,265
cost (\$/ton)	\$130.95	\$101.06	-
one-way distance (miles)	40	145	53