

May 29, 2026



Letter Report

Mary Baker
Mid-Atlantic Biosolids Association (MABA)
1179 Old Harrisburg Road
Gettysburg, PA, 17325

204593

Subject: Biosolids Capacity Challenges from Land Application Restrictions in Pennsylvania

Dear Ms. Baker

This report documents the current state of biosolids management in Pennsylvania and estimates the capacity and environmental implications of a potential statewide ban on land application or other significant disruption, such as incorporating the Phosphorous Index into the biosolids general permits. Based on an evaluation of data from the Pennsylvania Department of Environmental Protection (PA DEP), and the U.S. EPA's Enforcement and Compliance History Online (ECHO) Biosolids Annual Reports and Landfill Methane Outreach Program (LMOP), the Commonwealth currently relies on a diverse management strategy including landfilling, incineration, direct land application, and land application following lime stabilization, thermal drying, and composting. Installations of emerging technologies, such as gasification and hydrothermal carbonization, are in development or have come online in the past few years in Pennsylvania: Bethel (gasifier, 120 wet tons per day, operational); Hershey (gasifier, 60 wet tons per day, commissioning); Phoenixville (hydrothermal carbonization, 11.5 wet tons per day, commissioning); Ephrata (pyrolysis, 11 wet tons per day, commissioning). However, these installations provide marginal processing capacity compared with statewide needs.

Our analysis indicates that banning or significantly restricting the land application of biosolids and biosolids-based products in Pennsylvania would impact approximately **762,000 wet tons** of material annually. This shift would present immediate and significant challenges:

- **Insufficient Alternative In-State Capacity:** It is estimated that the available additional landfill capacity in Pennsylvania for managing this displaced tonnage falls short by just over 476,000 wet tons, meaning more than 60% of the previously land-applied biosolids would have no clear outlet in the state (details of methodology and analysis below). With surrounding states tightening biosolids regulations as well, this represents a significant risk to Pennsylvania wastewater treatment plants (WWTPs)—and ultimately ratepayers.
- **Increased Costs to Family Farmers:** Many farmers rely on the less expensive nutrients from biosolids to stay farming. Particularly at this time of rising costs and uncertain availability of synthetic fertilizers, disrupting access to a key input that helps increase yields would be a challenge for many farmers.

- **Further Affordability Challenges for Wastewater Ratepayers:** Biosolids management capacity is already constrained; further restrictions will escalate the cost burden. Current contract pricing for some utilities in eastern Pennsylvania is approximately \$50 per wet ton for land application and \$80 per wet ton for landfill disposal. According to a biosolids management company active in the area, landfill tip fees in eastern Pennsylvania have doubled (to \$135 per wet ton, not including hauling) in the past five years—a period without major changes in biosolids regulations in the state. If land application were removed as an outlet, it is reasonable to expect at least a 100% increase in costs, with examples from Maine and Florida showing increases ranging from 175% to 300% following the loss of land application outlets. For the more than seven hundred thousand tons of biosolids currently being land applied, wastewater utilities and ultimately ratepayers would be facing cost increases on the order of tens of millions of dollars annually.
- **Conflict with Other State Policies:** Pennsylvania state initiatives, including the 2021 Climate Action Plan, methane reduction objectives under the Regional Greenhouse Gas Initiative, and PA DEP's broader organics diversion efforts targeting food waste and other landfill bound organic matter, recognize that organic material in landfills generates methane, a potent greenhouse gas not fully captured by even modern landfill gas collection systems. While these initiatives do not specifically mandate biosolids diversion, increased reliance on landfills as a biosolids outlet would run counter to their stated objectives of reducing landfill methane emissions and conserving landfill capacity.
- **Negative Environmental Impact:** Land application of biosolids in the state currently sequesters an estimated 35,400 metric tonnes of CO₂e (MTCO₂e) annually, while landfilling this material instead would generate an estimated 224,900 MTCO₂e annually, a net increase of 260,400 MTCO₂e emissions. This increase results from the high emission intensity of landfilling combined with the loss of carbon sequestration benefits currently achieved with land application.
- **Interregional and Interstate Impacts:** Biosolids management in the Mid-Atlantic and Northeast is an interstate network, which makes the system more resilient for all. . If Pennsylvania enacts a land application ban, it could increase the odds that neighboring states do the same, leaving even more biosolids competing for already limited capacity. According to a 2025 report by Bluefield Research, despite accounting for only about 17% of the U.S. population, the Northeast is projected to represent more than one-third (37%) of total U.S. municipal biosolids management spending over the 2025 to 2035 forecast period. These higher costs are driven by dwindling landfill capacity, incinerator closures, and tightening land application requirements. Pennsylvania utilities are directly exposed to these regional cost pressures; diverting biosolids into constrained landfill and incineration outlets would compound these trends and impose significant additional costs on ratepayers across the Commonwealth.

If a biosolids land application ban due to concerns over per- and polyfluoroalkyl substances (PFAS) or other issues were enacted in Pennsylvania the disruption would be substantial, very likely leading to operational issues at WWTs and significant cost increases. Incorporating the Phosphorous Index into the biosolids beneficial use general permits with a source coefficient that does not accurately reflect bioavailability would lead to similar challenges. This report details the underlying dynamics impacting biosolids management in Pennsylvania. The approach undertaken in this analysis, while

Mary Baker
MABA
May 29, 2027
Page 3

specific to Pennsylvania, is likely to yield comparable results in states facing similar biosolids management issues.

Very truly yours,

Brown and Caldwell

Natalie Sierra, Project Manager
Boston, MA

cc: Bill Brower, Brown and Caldwell
Steve Lobo, Brown and Caldwell

In this document, “biosolids” is used to refer generally to the final solids residual generated at municipal wastewater treatment plants from treatment processes and products derived from this material.

Investigation Methodology

Biosolids data for this study were sourced from four primary datasets:

- **PA DEP Bureau of Waste Management Annual Disposal Records**

Facility-level reports for 2024 and 2025 covering Pennsylvania landfills, sewage sludge incinerators, and other facilities. These reports detail the quantities and composition received at each facility, including municipal waste and sewage sludge.

- **EPA Landfill Methane Outreach Program (LMOP)**

Facility-level data covering municipal solid waste (MSW) landfills from 2022 (the most recent data). This dataset was utilized to source operational metrics for the evaluated facilities, specifically annual waste acceptance rates and actual or projected landfill closure years.

- **PA DEP PAG-07/08/09 Annual Land Application Reports for 2024**

Aggregated tonnages by general permit type, source state, and category (given away/sold vs. land applied), with weighted-average percent solids derived from individual permittees reporting. Permits PAG-07, PAG-08, and PAG-09 govern different classes of treatment that subsequently allow land application. PAG-07 governs biosolids meeting Class A pathogen reduction standards, including those that also meet Exceptional Quality (EQ) criteria for metals and vector attraction reduction. PAG-08 governs Class B biosolids, which have lower pathogen reduction standards and additional site management restrictions. PAG-09 governs stabilized septage, which is excluded from the capacity-gap calculations.

- **EPA ECHO Biosolids Annual Reports for 2024**

Annual facility-level reports filed by all major Pennsylvania WWTs (defined under 40 CFR Part 503 as those with a design flow rate ≥ 1 MGD), as well as Class 1 sludge management facilities and other WWTs required to report by EPA or PA DEP. These reports cover biosolids generation and management practices, including incineration tonnages and pathogen class designations. Pennsylvania's nine sewage sludge incinerators (SSIs) at the ALCOSAN, DELCORA, Erie WWTP, Hatfield TMA, Wyoming Valley Sanitary Authority, Upper Moreland-Hatboro Joint Sewer Authority, Greater Hazleton JSA, Tinicum Township WTP, and Upper Saucon Township WWTP facilities, are documented through this data source.

Upon review of the PAG-07 and PAG-08 data provided by PA DEP, it was determined that the dataset does not adequately capture in-state biosolids generation and associated land application tonnages. This conclusion was based on a comparison between the PA DEP PAG-07/08 biosolids generation total and the total reported in EPA's ECHO

biosolids data, where the PAG-07/08 total was approximately an order of magnitude lower than the ECHO total.

However, the PA DEP PAG-07/08 records were more consistent, complete, and reasonable for out-of-state permit holders whose biosolids were land applied in Pennsylvania. Therefore, the selected analytical approach was to use EPA ECHO data to represent in-state biosolids production and land application tonnages, while using the PA DEP PAG-07/08 data to account for out-of-state generated biosolids land applied within Pennsylvania.

The following assumptions were made when recording and analyzing data:

- When the percent solids of received biosolids was not reported, weighted-average percent solids from across the PA DEP datasets were applied by categories given in the PA DEP data (PAG-07 Out-of-State, PAG-08 Out-of-State, given away/sold, direct land applied). When the quantity of received biosolids was recorded in volume units, a conversion factor of 0.8 wet tons per cubic yard was used.
- All biosolids products produced via additional processing at Pennsylvania facilities (i.e., lime stabilization, thermal drying, composting facilities at WWTPs or elsewhere) are assumed to be land applied or distributed (given away/sold) within the Commonwealth unless reporting indicates an out-of-state distribution.

Additionally, estimates of GHG emissions associated with end-use were calculated for two scenarios: 1) actual 2024 biosolids management via land application, and 2) if all of the biosolids that were land applied in 2024 were instead landfilled. (Emissions from incineration, thermal drying, and hauling and from out-of-state management were assumed to remain constant and so were not included in the analysis.)

Calculations were performed using the Biosolids Emissions Assessment Model (BEAM) version 3.1. Specifically, the “Alkaline Stabilization”, “Composting”, “Landfill Disposal Typical”, “Land Application”, and “Thermal Drying” calculation modules were used. The assumptions made for this analysis are listed for each module in the Appendix in Table A-1.

Biosolids Accepted at In-State Facilities

The following subsections summarize biosolids land application, incineration, and landfill disposal data reported in 2024 and 2025.

Biosolids Processing Facilities

Biosolids processing facilities perform additional treatment—composting, drying, or alkaline (lime) stabilization—at WWTPs or elsewhere to produce biosolids products meeting Class A or Class B standards for beneficial reuse.

Detailed facility-level reporting for individual processors is not consistently published by PA DEP. Table 1 lists Pennsylvania's largest known merchant biosolids processing facilities—i.e., those that accept biosolids from outside sources—identified from EPA ECHO Biosolids Annual Reports, NBDP records, and publicly available facility documentation. Tonnages shown are 2025 ECHO-reported amounts unless otherwise noted; for facilities not directly captured in ECHO, capacity figures are shown.

Table 1. Merchant Biosolids Processing Facilities Operating in Pennsylvania in 2025				
Facility Name	Location	Total Biosolids Received in 2025 (Wet Tons)	Permit Type	Notes/Biosolids Origin Restrictions
Liberty Biosolids Management Facility	Tremont (Schuylkill Co.)	128,000 ¹ (estimated)	PAG-07 / Alkaline stabilization	34,619 dry tons land applied per 2025 ECHO
Tully Environmental Inc. – Natural Soil Products	Good Spring (Schuylkill Co.)	104,000 ¹ (estimated)	PAG-07 / Alkaline stabilization	28,315 dry tons land applied per 2025 ECHO
McGill Environmental Systems – Fairless Hills ²	Fairless Hills (Bucks Co.)	Up to 130,000 (capacity)	PAG-07 / Composting	Operational since early 2024; accepts biosolids, food waste, and yard trimmings
A&M Composting	Manheim (Lancaster Co.)	Not publicly published	PAG-07 / Composting	Receives biosolids from regional WWTPs
Pike County Environmental Enterprises	Milford (Pike Co.)	1,400 (2023 ref.)	PAG-07 / Composting	Receives material from Pike County Environmental STP and other regional sources
SECCRA – Southeastern Chester County Refuse Authority	West Grove (Chester Co.)	2,080 (2025 PA DEP)	PAG-07 / Composting	Receives dewatered biosolids cake from regional WWTPs

¹ Liberty and Tully throughputs estimated from 2025 ECHO land-applied dry tons converted at ~27% solids feed.

² McGill capacity from BioCycle (2024) reporting; first-year ramp-up tonnage not yet published in PA DEP Bureau of Waste Management records.

Land Application

Table 2 summarizes land application of biosolids in Pennsylvania, aggregated by source. As mentioned in the Investigation Methodology section, EPA ECHO data was used for Pennsylvania-generated biosolids that are land applied (2025 data), while PA DEP PAG-07/08 permit records were used to account for non-Pennsylvania biosolids that were

land applied in Pennsylvania (2024 data). Based on these data, more than 762,000 wet tons of biosolids are land applied across the Commonwealth annually. Roughly 10 percent of biosolids land applied in Pennsylvania originated from out-of-state sources (Delaware, the District of Columbia, Maryland, Massachusetts, New Jersey, New York, Virginia, and Wisconsin).

Table 2. Pennsylvania 2024/2025 Land Application Totals			
Biosolids Source	Dry Tons	Wet Tons* (est.)	Data Source
Pennsylvania	139,004	695,019	EPA ECHO 2025 Annual Biosolids Reports
Out-Of-State	56,215	67,564	PA DEP 2024 PAG-07/08 Records
Total	195,219	762,583	

**Wet tonnages were determined for Pennsylvania-generated biosolids assuming 20% solids. For out-of-state biosolids, percent solids were reported by some producers in 2023 and/or 2024. Weighted-average percent solids for the two years were determined for specific producers where possible. For producers that did not report percent solids, a weighted-average across all reporting producers was used.*

Landfills

Based on publicly available data from PA DEP's Bureau of Waste Management (PABWM) and the EPA's Landfill Methane Outreach Program (LMOP), Table 3 shows Pennsylvania landfills that received biosolids in 2025 and have expected closure dates based on current permits after 2031. (Note: Expected closure dates can be extended based on permit renewals or facility expansions. This analysis is based on the dates currently listed.) Tonnage of total material received and biosolids received for each landfill are based on 2025 data, while annual waste acceptance rates and closure dates are based on 2022 LMOP data (the most recent data available). In 2025, these landfills accepted approximately 322,500 wet tons of biosolids.

Table 3. Biosolids Received at Pennsylvania Landfills With Expected Closure Dates Beyond 2031

Facility Name	City / Municipality	2022 Total Material Received (Wet Tons)	2025 Total Material Received (Wet Tons)	2025 Total Biosolids Received (Wet Tons)	2025 % Biosolids of Total Material	Expected Closure Date
Alliance Sanitary Landfill	Taylor Borough	688,566	636,649	1,145	0.2%	2046
Allied Waste Systems Imperial Landfill	Imperial	569,482	365,536	19,164	5.2%	2044
Arden Landfill Inc	Washington	451,866	410,012	10,632	2.6%	2097
Blue Ridge Landfill	Scotland	727,116	706,763	13,383	1.9%	2035
Chester County SWA Lanchester Landfill	Narvon	278,489	338,676	4,893	1.4%	2032
Chrin Brothers Sanitary Landfill	Easton	193,720	162,494	502	0.3%	2040
Clinton County SWA Wayne Township Landfill	McElhattan	243,553	339,968	49,461	14.5%	2048
Cumberland County Landfill	Shippensburg	282,880	513,403	2,484	0.5%	2032
Delaware County SWA - Rolling Hills Landfill	Boyertown	160,686	638,824	620	0.1%	2034
Greater Lebanon Refuse Authority	Lebanon	132,278	132,740	3,133	2.4%	2043
Greentree Landfill	Kersey	533,330	721,974	7,570	1.0%	2065
Keystone Sanitary Landfill	Dunmore	1,947,017	1,587,560	33,333	2.1%	2067
Lake View Landfill	Erie	297,661	308,554	7,924	2.6%	2071
Laurel Highlands Landfill	Johnstown	105,510	257,543	13,539	5.3%	2133
LCSWMA Frey Farm Landfill	Conestoga	393,985	426,186	16,669	3.9%	2038
Lycoming County Resource Management Services	Montgomery	297,329	343,953	32,548	9.5%	2035
McKean County Landfill	Kersey	82,841	118,234	7,788	6.6%	2071
Monroeville Landfill	Monroeville	405,144	447,994	3,040	0.7%	2044
Mountain View Reclamation Landfill	Greencastle	377,496	400,178	5,276	1.3%	2049
Sandy Run Landfill	Hopewell	162,867	173,434	17,033	9.8%	2130
Seneca Landfill	Evans City	724,065	739,692	29,135	3.9%	2052
South Hills Landfill	West Mifflin	140,144	130,432	2,130	1.6%	2056

Table 3. Biosolids Received at Pennsylvania Landfills With Expected Closure Dates Beyond 2031						
Facility Name	City / Municipality	2022 Total Material Received (Wet Tons)	2025 Total Material Received (Wet Tons)	2025 Total Biosolids Received (Wet Tons)	2025 % Biosolids of Total Material	Expected Closure Date
Southern Alleghenies Landfill	Martinsburg	55,391	141,901	17,089	12.0%	2084
Valley Landfill	Smithfield	227,623	271,099	3,996	1.5%	2070
Westmoreland Sanitary Landfill	Rostraver Township	322,002	458,326	20,025	4.4%	2055
Total		9,801,041	10,772,122	322,511		

As shown in Table 3, Pennsylvania landfills accept varying amounts of biosolids relative to their total material acceptance, ranging from 0.1 percent to 14.5 percent, with most larger landfills accepting less than 5 percent. Many factors influence the amount of biosolids a landfill is willing to accept annually, and acceptance rates can vary from year to year. For instance, some facilities accept large amounts of other sludges (e.g., paper-mill sludge) that reduce the biosolids capacity. In addition, six of the 25 landfills listed have closure dates within the next 15 years, signifying that an important portion of available landfill capacity will not be available over the long term.

Sewage Sludge Incinerators

Pennsylvania has nine WWTPs with active sewage sludge incinerators (SSIs), as reflected in 2025 EPA ECHO Biosolids Annual Reports. Combined, these facilities incinerated approximately 53,000 dry tons of biosolids in 2025, equivalent to 196,000 wet tons assuming 27 percent solids feed. Statewide incineration throughput is dominated by ALCOSAN (Allegheny County), DELCORA (Delaware County), and Erie WWTP, which together account for roughly three-quarters of statewide incineration throughput.

Table 4. Pennsylvania Sewage Sludge Incinerators		
Facility	City	Incinerated (Dry Tons)
ALCOSAN WWTP	Pittsburgh	14,592
DELCORA WWTP	Chester	16,431
Erie WWTP	Erie	7,422
Wyoming Valley Sanitary Authority	Wilkes Barre	6,376
Greater Hazleton WWTP	Hazleton	3,768
Hatfield Township Municipal Authority	Colmar	2,956
Upper Moreland-Hatboro Joint Sewer Authority	Willow Grove	1,143
Upper Saucon Township WWTP	Center Valley	217
Tinicum Township WTP	Lester	71
Total		52,977

Overall Distribution of Biosolids Generated in Pennsylvania

According to statewide Biosolids Annual Reports for 2025 sourced from the EPA's ECHO database, 314,248 dry tons of biosolids were generated in Pennsylvania. This is in line with the generation in 2018 reported in the National Biosolids Data Project (301,000 dry tons). Using the data from the same ECHO dataset on the end-use of biosolids, **Error! Reference source not found.** was developed to show how biosolids generated in Pennsylvania are distributed. The "Undetermined" field is the difference between the ECHO total amount generated and the total that were recorded for the end-use categories in the ECHO dataset (301,108 dry tons). The figure shows the importance of land application as a crucial end-use pathway for the management of Pennsylvania biosolids.

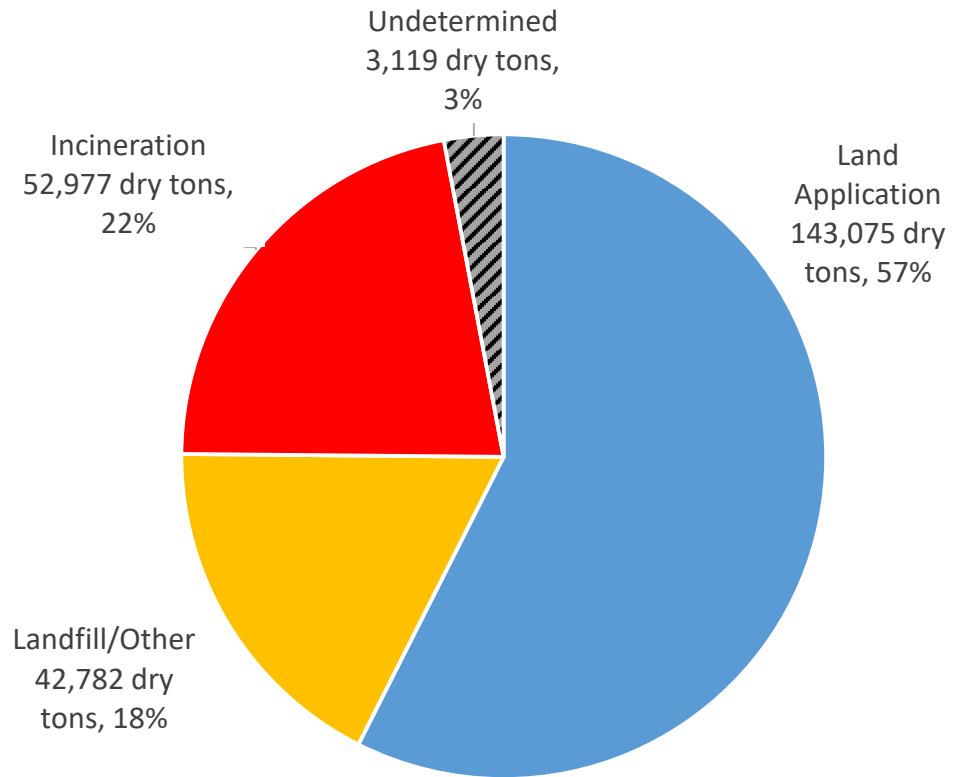


Figure 1. Biosolids Generated in Pennsylvania by End Use in 2025

Estimating Capacity at In-State Biosolids Outlets

Incineration

ALCOSAN historically reports available capacity for hauled-in sludge from other WRRFs at a meaningful scale (approximately 2.0 million gallons of outside sludge accepted in fiscal year 2024 per the Hatch Consulting Engineer's Annual Report, equivalent to around 170 dry tons at 2 percent solids). ALCOSAN has not publicly reported plans to increase acceptance of outside sludge. For the purposes of this analysis, it was assumed that no additional incineration capacity for hauled-in sludge is available at ALCOSAN.

The Greater Hazleton facility was designed with "room for expansion" and currently processes 11.5 dry tons per day with a 15 dry ton per day design capacity, suggesting modest available capacity, however; the facility does not have any cake receiving infrastructure in place and thus, for this analysis, it was assumed that there is no additional incineration capacity.

It was assumed that there is no additional incineration capacity for hauled-in sludge at DELCORA. The remaining facilities (Erie, Hatfield, WWSA, UMHJSA, Tinicum, Upper

Saucon) operate near capacity on their own biosolids and do not publicly report meaningful additional capacity for hauled-in material. Therefore, it is assumed that there is no available incineration capacity in Pennsylvania.

Landfills

The exact amount of additional available capacity for biosolids at Pennsylvania landfills is difficult to determine but can be estimated based on the proportion of biosolids currently accepted versus industry guidelines. Landfills will typically limit the amount of “high moisture content waste” or “wet waste”—typically defined as containing greater than 40 percent moisture (i.e., less than 60 percent total solids)—that is accepted as a percentage of the overall amount of material accepted. Wet wastes, such as biosolids, can contribute to stability, leachate management, and reheating issues at landfills. Landfill operators have varying internal guidelines for the amount of wet waste accepted. Georgia, following a series of failures, enacted state guidance setting 5 percent as the maximum amount of wet waste accepted at landfills without enacting mitigation measures (GADNR, 2021).

To estimate the additional available capacity at landfills in Pennsylvania, tonnages for the landfills listed in Table 3 were increased to at least a 5 percent biosolids acceptance rate. Some landfills already accept biosolids at greater than 5 percent (mostly smaller, local facilities); these landfills are assumed to have no additional capacity to accept biosolids. Landfills expected to close in the next five years were excluded. This potential additional landfill capacity amounts to 285,688 wet tons per year. Note that this does not account for other wet wastes that are accepted by these landfills that would also be counted toward the proportion of wet wastes, nor does this account for the dry waste, such as construction and demolition debris, needed to bulk biosolids (and assumes sufficient quantities are available). In addition, many landfills have restricted hours of acceptance on weekends and holidays, which would create episodic shortfalls of capacity for the many WWTPs that do not possess sufficient on site storage for biosolids. Additionally, as municipal solid waste and construction waste volumes received at landfills are typically seasonal (less in winter, more in summer), this analysis does not consider potential seasonal shortfalls in biosolids acceptance capacity.

Estimated Capacity Gap

If Pennsylvania enacted a ban on land application of biosolids and biosolids-containing products, the tonnage that is currently land applied in-state or distributed for land application (approximately 762,000 wet tons in 2024) would need to shift to alternative outlets. As shown in Figure 2, the estimated additional capacity at landfills (approximately 285,700 wet tons) is insufficient to meet this new demand by approximately 476,000 wet tons, more than 60 percent of the affected tonnage.

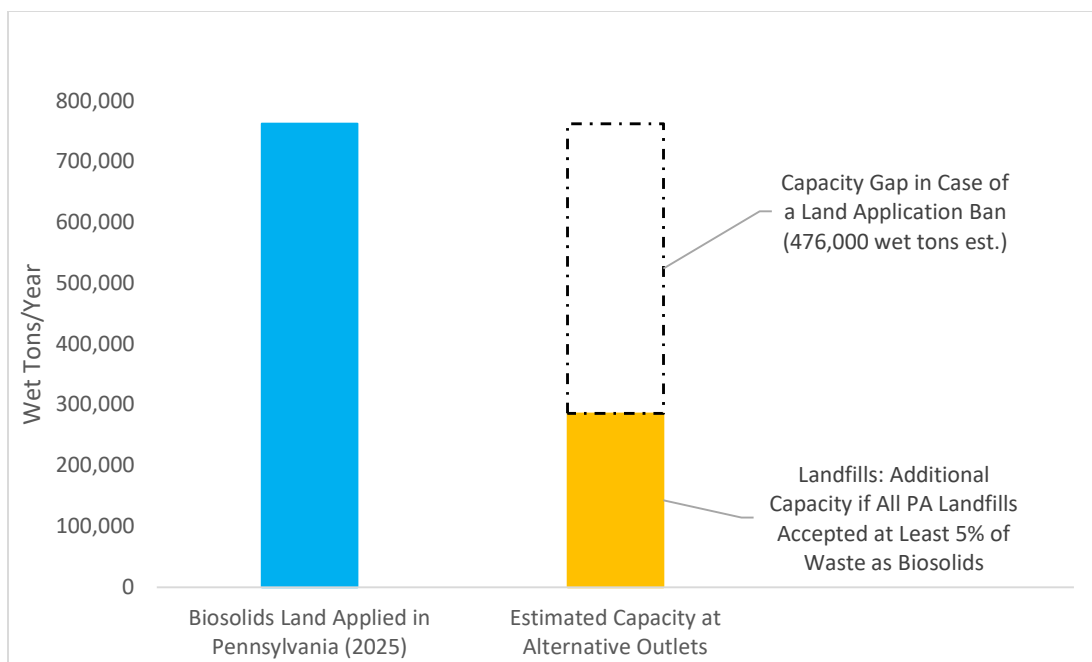


Figure 2. Biosolids Land Applied in Pennsylvania (2025) vs. Capacity at Alternative Outlets in Pennsylvania

This estimated available capacity could be impacted in the near-term. PA DEP is currently contemplating changes to the PAG-07 and PAG-08 general permit program, including implementation of a phosphorus index (P Index) that would evaluate phosphorus soil concentrations at proposed application sites and restrict or prohibit application in areas where thresholds have been reached. This change could displace a meaningful portion of the tonnage currently land applied, particularly in high-intensity agricultural areas, independent of any legislative ban.

Climate Impact of Diversion to Landfill

In addition to these challenges, if all biosolids in Pennsylvania that are currently land applied were landfilled instead, there would be significant increases in the amount of greenhouse gas (GHG) emissions associated with biosolids management. Estimates of GHG emissions associated with end-use were calculated for two scenarios: 1) actual 2024 biosolids management via land application, and 2) if all of the biosolids that were land applied were instead landfilled.

With the assumptions described in Table A-1 and the data from Tables 1-3, GHG emissions were calculated and are shown in Figure 3 below.

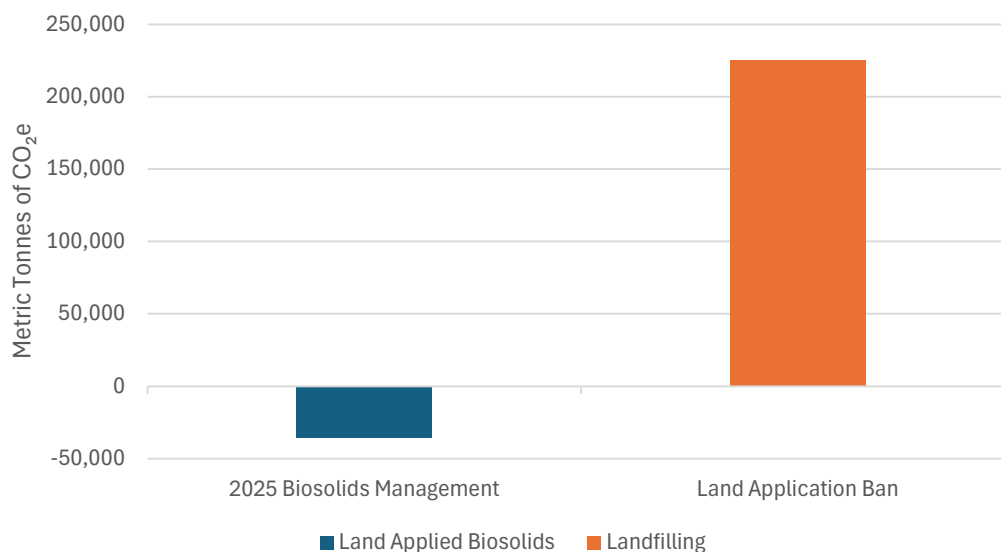


Figure 3. Estimated GHG Emissions from Land Application vs Emissions if All Land Applied Biosolids Had Been Landfilled (2025)

These results illustrate the high emission intensity of landfilling biosolids, and the sequestration benefits provided by land application. While, in 2025, land applied biosolids constituted a significant carbon sink, avoiding or sequestering an estimated 35,445 MTCO₂e emissions, if they were shifted to landfill (due to a land application ban or other major disruption), these displaced biosolids would generate an estimated 224,985 MTCO₂e emissions. Overall, when accounting for the loss of carbon sequestration and avoided emissions provided by land applying and the emissions generated by degradation at a landfill, a land application ban would generate a net total of 260,430 MTCO₂e emissions annually, or the equivalent of adding roughly 56,615 passenger cars to Pennsylvania roads (U.S. EPA, 2023). When comparing this net total to the baseline of 35,445 MTCO₂e sequestered, the result is a 735 percent increase in emissions if a land application ban were to go into effect in Pennsylvania.

Cost Impacts of Shifting Away from Land Application

If a biosolids land application ban were enacted in Pennsylvania, the disruption would be substantial, very likely leading to operational issues at WWTPs and significant cost increases (Maine DEP, 2023). When Maine, one of only two states to ban land application and the only one with significant amounts of land application, restricted and eventually banned land application, biosolids management prices for many utilities more than doubled (MeWEA, 2022). When subsequent legislation that impacted the ability of landfills to accept biosolids went into effect, many WWTPs were left with nowhere to go. The wastewater flows from homes, businesses, and industries do not stop, so solids built up on WWTPs during this “sludge crisis”. Eventually alternative outlets were identified hundreds of miles away in Canada and at a greatly increased overall price. The situation for WWTPs in Maine remains precarious now, years later.

The commissioner of Maine's Department of Environmental Protection, Melanie Loyzim, who experienced this firsthand, offered this advice to other states: "[A]ny state that is considering a prohibition [on the land-application of biosolids] should plan for where those materials are going to go first" (InsideEPA, 2025). That has not been done in Pennsylvania. Pennsylvania can learn from the experience in Maine and avoid the disruption and costs (that are ultimately paid by ratepayers) of enacting legislation without proper planning.

Biosolids management costs often comprise a significant portion (30% or greater) of a wastewater utility's annual operating budget, which in turn, impacts sewer rates across the utility's service area. Current contract pricing in Pennsylvania is approximately \$50 per wet ton for land application and \$80 per wet ton for landfill disposal, statewide, and management costs are already climbing independent of any ban: according to a biosolids management company active in the area, landfill tip fees in eastern Pennsylvania have doubled (to \$135 per wet ton, not including hauling) in the past five years—a period without major changes in biosolids regulations in the state. According to a 2025 report by Bluefield Research, despite accounting for only about 17% of the U.S. population, the Northeast is projected to represent more than one-third (37%) of total U.S. municipal biosolids management spending over the 2025 to 2035 forecast period. This concentration is driven by landfill capacity constraints, incinerator closures, and tightening land application requirements in the region. Pennsylvania utilities sit within this regional cost trajectory; the Commonwealth's current reliance on land application as a low-cost management option means that any restriction on that pathway would shift material into precisely the more constrained, and more expensive, outlets that are already driving cost escalation across the region. Utilities cannot easily pivot to or create new biosolids management outlets, and the costs of accessing landfilling or incineration capacity are likely to result in sustained increases in sewer rates borne by Pennsylvania ratepayers.

Conclusion

In summary, there is insufficient alternative in-state capacity at landfills or incineration facilities to accommodate the biosolids currently land applied in Pennsylvania in the event of a land application ban or other significant disruption. A land application ban is estimated to increase GHG emissions by 734 percent by eliminating the carbon sequestration benefits of beneficial reuse and increasing emissions from landfilling. A ban on biosolids land application in Pennsylvania would result in a significant economic and environmental cost. If the motivation for a biosolids land application ban is to reduce PFAS in the environment, forcing biosolids to landfills may not achieve that goal. According to the EPA, studies estimate that as much as 15% of mobile PFAS that enters a landfill is emitted via leachate and landfill gas (EPA,2026). PFAS treatment technologies are starting to be deployed at landfills, but the vast majority do not currently do any PFAS treatment.

PA DEP has proposed a regulatory approach for PFAS in biosolids (establishing tiers of PFAS concentration that prohibit land application of biosolids with the highest concentrations, with progressively fewer restrictions for biosolids with lower concentrations) that other states have proven to be effective at reducing PFAS

concentrations in biosolids over time. This approach would lead to far fewer disruptions and cost increases, while addressing concerns about PFAS.

Limitations:

This document was prepared solely for the Mid-Atlantic Biosolids Association (MABA) in accordance with professional standards at the time the services were performed and in accordance with the contract between MABA and Brown and Caldwell dated December 15, 2025. This document is governed by the specific scope of work authorized by MABA; it is not intended to be relied upon by any other party. We have relied on information or instructions provided by MABA and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

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Appendix

Table A 1. Assumptions for GHG Calculations

Composting	
Compost technology	In-Vessel
Biomass density (kg/m ³)	950
Has the biomass been digested prior to composting?	Yes
Level of aeration	Well Aerated
Total nitrogen (%-dry weight)	4.0%
Total phosphorus (%-dry weight)	1.5%
Total volatile solids - TVS (%-dry weight)	78.0%
Organic carbon (%-dry weight)	43.7%
Density of amendment (kg/m ³)	250
Material replacing commercial nitrogen fertilizer	Yes
Material replacing commercial phosphorus fertilizer	Yes
Carbon sequestration as result of land application	Mid-Range
Lime Stabilization	
Degree of stabilization	Class B
Liming source	Not derived from a waste product
Land Application	
Density of treated biosolids (kg/m ³)	950
Total nitrogen (%-dry weight)	4.0%
Total phosphorus (%-dry weight)	1.5%
Total volatile solids (TVS) (%-dry weight)	78.0%
Organic carbon (%-dry weight)	44.8%
CaCO ₃ equivalence (%-dry weight)	0.0%
Average number of days biosolids are stored prior to land application	14
Climate at land application sites	Humid
Is lime in biosolids derived from a waste product?	No
Will the lime in biosolids replace purchased lime where it is applied?	Yes
Material replacing commercial nitrogen fertilizer	Yes
Material replacing commercial phosphorus fertilizer	Yes
Fine-textured/Coarse-textured soil (% of land application area)	50%/50%
Carbon sequestration as result of land application	Mid-Range
Landfilling	
Total nitrogen (%-dry weight)	4.0%
Total volatile solids (TVS) of solids going to landfill (%-dry weight)	78.0%

Table A 1. Assumptions for GHG Calculations	
Organic carbon in solids going to landfill (%-dry weight)	43.7%
Methane correction factor for landfill (DOCf that will decompose in landfill)	1.0
Percent of captured methane used to generate electricity	50%
Level of Digestion/Processing	Partial Digestion
Landfill climate zone	Cool Wet