An Urgent Need for a Long-Term Biosolids Management Plan in Maine

Prepared by the Maine Water Environment Association

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Executive Summary

Maine's wastewater utilities are operating within an increasingly constrained biosolids management system characterized by shrinking disposal capacity, rising costs, regulatory uncertainty, and limited redundancy. Over several decades, biosolids management in Maine evolved in alignment with federal Clean Water Act requirements and EPA's Part 503 standards, relying heavily on beneficial use pathways such as land application and composting. These pathways provided environmental benefits, cost stability, and operational flexibility for utilities statewide.

Beginning in the mid-2010s, emerging concerns related to per- and polyfluoroalkyl substances (PFAS) led to heightened scrutiny of biosolids use practices. In the early 2020s, long-standing beneficial use pathways were eliminated without equivalent replacement capacity. As a result, most Maine utilities now rely almost exclusively on landfill disposal and long-haul transportation to manage biosolids— an approach that is more costly, less flexible, and increasingly vulnerable to regional market constraints. At the same time, Maine's solid

waste and landfill infrastructure faces well-documented capacity limitations. Juniper Ridge Landfill, which currently receives the majority of Maine's biosolids, is projected to reach capacity in 2028 without expansion, or in approximately 2040 if they are granted approval for expansion. Other in-state landfills have limited remaining life or are not positioned to accept significant volumes of wet organic waste. Regional disposal options have also narrowed as neighboring states adopt similar restrictions. Utilities, regulators, private developers, and policymakers have pursued a range of individual responses, including proposed drying facilities, anaerobic digestion projects, and emerging technologies. However, many of these efforts have stalled or failed due to location challenges, policy uncertainty, market risk, and the absence of a coordinated statewide framework.

This white paper documents how Maine arrived at its current biosolids management conditions, describes the present landfill-dependent reality, and outlines the risks associated with continuing without a long-term plan. It does not advocate for a specific management strategy or regulatory outcome. Rather, it demonstrates the need for a structured, inclusive stakeholder process—bringing together utilities, regulators, legislators, facility operators, technology providers, NGOs, and affected communities—to develop a durable, statewide biosolids management strategy.

Part 1 – Historical Framework: The Road So Far

Maine's current biosolids management challenges did not emerge suddenly. They are the result of more than five decades of regulatory evolution, infrastructure investment, and changing scientific understanding. The modern biosolids management system in Maine originates with the federal Clean Water Act of 1972, which drove widespread construction and expansion of publicly owned treatment works. From the outset, sewage sludge generation was recognized as an unavoidable byproduct of wastewater treatment necessary to protect public health and improve water quality.

During the 1980s and 1990s, EPA's Standards for the Use or Disposal of Sewage Sludge (40 CFR Part 503) established national requirements governing pollutant limits, pathogen reduction, vector attraction-reduction, and management practices. Under this national framework, land application and composting became regulated, beneficial use pathways allowing utilities to manage biosolids in ways that reduced landfill reliance, stabilized costs, and returned nutrients to soil. Land application in Maine predated federal rules; however, Maine incorporated federal practices into DEP permitting programs as appropriate and, in many cases, the Maine rules were more stringent than federal rules, such as establishing siting criteria.

Through the early 2000s and into the early 2010s, biosolids management in Maine remained relatively stable. Utilities relied on a mix of land application, composting, and landfill disposal. Generally, landfills functioned as contingency outlets rather than the primary management

pathway. Beginning in the mid-2010s, PFAS emerged as an environmental and public health concern nationwide. Initial regulatory focus centered on drinking water and industrial sources, but over time biosolids were identified as one potential pathway of concern. Scientific understanding evolved rapidly, and regulatory responses varied across jurisdictions.

In 2018, the DEP added PFOA, PFOS, and PFBS to the screening levels for beneficial use of solid wastes in Chapter 418, Appendix A. In 2019, the DEP notified generators of biosolids licensed to conduct land application that they were required to test their biosolids for PFAS and apply those screening levels to continue land application. Approximately 80% of municipal wastewater biosolids that had been land applied before screening for PFAS were subsequently sent for landfill disposal.

In the early 2020s, Maine eliminated long-standing beneficial use pathways. These actions occurred over a relatively short period compared to the decades during which use had functioned as a core element of biosolids management. As use options narrowed, utilities redirected increasing volumes of biosolids to landfills and long-haul disposal, increasing costs, transportation distances, and reliance on limited regional infrastructure. This historical sequence explains how Maine arrived at its present biosolids management conditions. It does not assess the appropriateness of past or current decisions. Rather, it provides necessary context for understanding why long-term planning is now critical.

Part 2 – The Current Reality: Landfills, Capacity, and System Risk

2.1 Statewide Biosolids Generation and Management According to the Brown & Caldwell state funded study "An Evaluation of Biosolids Management in Maine and Recommendations for the Future", Maine produces roughly 88,500 wet tons per year at an average solids concentration of 22 percent (meaning 78% of the volume is water). Most of this material is generated in southern Maine, while disposal and management infrastructure is increasingly concentrated in a small number of facilities located elsewhere in the state or region. With the loss of beneficial use pathways, landfill disposal has become the predominant biosolids management option for Maine utilities. This shift has fundamentally altered the cost structure, logistics, and risk profile of wastewater treatment operations.

2.2 Landfill Capacity and Constraints Juniper Ridge Landfill currently receives approximately 80 percent of Maine's biosolids. Under existing conditions, the landfill is expected to reach capacity around 2028. If remaining cells are permitted and constructed, operations could potentially extend to approximately 2040. However, permitting and cell construction timelines, ongoing litigation, and the need for long-term operating agreements introduce significant uncertainty. Other in-state landfills provide limited relief. Hartland Landfill accepts biosolids from a small number of facilities but has approximately three years of remaining capacity and no plans for expansion. Its continued operation is subject to local

concerns and closure planning. The former Jay mill landfill has been discussed as a potential emergency option, but no commitments have been made regarding its use for biosolids or liquid waste.

Maine's moratorium on new commercial landfills, combined with the land application ban that effectively require biosolids disposal at existing facilities, has resulted in a system with minimal redundancy. Current reliance on Juniper Ridge Landfill (JRL) is a fragile, short-term fix. A single operational disruption or regional trucking shortage could trigger an immediate public health crisis. With JRL's expansion tied up in litigation and no long-term operating agreement in place, capacity beyond 2028 is highly uncertain. Given the statutory moratorium on new landfills and the lack of viable alternatives like Dolby or Carpenter Ridge, the State must plan for the post-JRL era immediately rather than waiting for a capacity cliff.

2.3 Wet Waste Challenges and Bulking Agents Landfills and incinerators in Maine generally prefer to limit acceptance of wet organic waste due to operational challenges, including leachate generation, greenhouse gas production, and the need for large quantities of bulking agents to stabilize the landfill structure. For biosolids landfilling, an estimated 4:1 ratio of bulking agent to wet biosolids is often required, equating to more than 350,000 tons of bulking material annually needed to properly and safely construct stability within the landfill.

A State funded study completed and presented to the Legislature indicated that insufficient bulky waste exists to sustain long-term reliance on this approach. Landfills remain reluctant to enter into long-term agreements due to uncertainty about future bulking material availability. Emergency legislation (LD 718) in 2025 temporarily expanded access to construction and demolition debris (CD&D) as a bulking agent through September 1, 2027.

2.4 Leachate Management and Circular Impacts At an average solids concentration of 22 percent, the current volume of landfilled biosolids results in approximately 17 million gallons per year of water being transported to landfills as part of the waste stream. This water is subsequently collected as leachate, pumped, transported again, and treated at publicly owned treatment works—often without advanced treatment for all contaminants of concern. This cycle introduces substantial energy use, cost, and environmental risk. While some water is reabsorbed by dried solids, improved dewatering, digestion, and drying could significantly reduce leachate volumes and associated impacts.

2.5 Greenhouse Gas Implications Landfilling biosolids contributes to methane emissions, a potent greenhouse gas with a significantly higher heat-trapping potential than carbon dioxide, due to this material breaking down faster than landfill gas collection systems can be constructed. Maine Climate Council materials management recommendations emphasize diverting organic materials, such as biosolids, from landfills through anaerobic digestion and other alternatives to reduce greenhouse gas emissions. Despite this, current biosolids management practices remain largely misaligned with climate objectives. While drying

reduces landfill volume and leachate, it does not address methane generation if the dried material is ultimately landfilled.

2.6 Operational Risks: Bulking Agents and Monofils Landfilling biosolids creates secondary operational crises. Mixtures of biosolids and Construction and Demolition Debris (CDD) increase the risk of landfill fires. Furthermore, a Bureau of General Services (BGS) report warns that using gravel and fill for bulking wastes valuable construction resources and consumes finite landfill space with non-waste materials. While biosolids monofils could reduce the need for bulking agents, they require larger footprints, higher capital costs, and complex leachate management, underscoring that landfilling is a complex engineering challenge, not a simple disposal solution.

Part 3 – Projects and Pathways: Attempts, Constraints, and Uncertainty

3.1 Abandoned and Shutdown Infrastructure Several large-scale biosolids management projects have been proposed in Maine over the past decade but ultimately either did not proceed or were not successful over the long term. The Brunswick Landing digester and dryer project, acquired by Viridi Energy in 2024, was designed to manage approximately 85,000 wet tons per year of biosolids—nearly the entire volume generated statewide. Despite existing infrastructure and private sector backing, the project was unable to secure sufficient local support and is no longer moving forward. Agreements were in place between Viridi and Casella to process and significantly reduce the volume of biosolids at this facility that were destined for Juniper Ridge Landfill.

Similarly, Hawk Ridge Compost Facility in Unity—formerly Maine's largest Class A biosolids composting operation—ceased operations due to PFAS-related contamination and loss of marketability, eliminating a major beneficial use outlet, and creating a significant transportation burden due to longer haul distances and less backhaul opportunities. Hawk Ridge was also a significant disposal outlet for neighboring states, primarily Massachusetts. The closure of Hawk Ridge will have a regional impact as available disposal outlets decrease. The Hawk Ridge compost operation was not the only one impacted due to LD 1911. Similar composting infrastructure at the Town of Kennebunkport WWTF, Town of Yarmouth WWTF, Lewiston Auburn Clean Water Authority, and Sanford Sewerage District, has since been shut down and abandoned.

3.2 Projects Under Development Waste Management is constructing a biosolids drying facility projected to process up to 73,000 wet tons per year, starting in 2026. While the project may address landfill volume, leachate concerns, and some greenhouse gas impacts as they have an on-site gas-to-energy facility, Waste Management's drying facility may ultimately serve primarily out-of-state generators due to economics and contract constraints.

3.3 Future Opportunities Aries Pine Tree LLC has applied for a 400 wet ton per day biosolids drying and gasification facility in Sanford. The site offers logistical advantages, including access to utilities and proximity to Interstate 95, and could significantly reduce transportation costs for southern Maine utilities. However, the project application is under review by MDEP and will be subject to local, regulatory, and economic considerations. Existing digesters in Maine, including facilities in Exeter, Clinton, and those planned by MRC/MWS, generally do not accept municipal biosolids due to regulatory, economic, or operational constraints. Where digestion capacity exists, lack of market certainty and policy directing or incentivizing material to these facilities, has limited expansion to include biosolids.

Several utilities, including the Lewiston Auburn Clean Water Authority and Portland Water District, are evaluating on-site or regional digestion and drying concepts. These efforts reflect recognition that biosolids management challenges are too large to be addressed by individual utilities acting independently. These projects will require regulatory certainty and local support, as well as permitting and funding assistance before being able to move forward with such large infrastructure investments. The LACWA dryer project is estimated at $15M and is proposed to serve just LACWA. The PWD digestion and dryer project is estimated at $200M and is proposed to serve much of southern Maine.

3.4 The Scale of Investment and the Risk of Stranded Assets While various technological opportunities exist, capitalizing on them requires a realistic understanding of the financial and operational scale involved. Discussions regarding a potential $50 million bond for biosolids infrastructure, while a welcome acknowledgment of the problem, must be contextualized as a starting point rather than a complete solution. Given the high capital costs of modern drying, digestion, and gasification technologies, this level of funding would likely support only a fraction of the infrastructure required to manage Maine's statewide volume of 88,500 wet tons annually. Furthermore, capital investment alone does not guarantee long-term operational success, as demonstrated by the current state of infrastructure in Maine. The Brunswick Landing Digester facility stands as a cautionary example of "wasted infrastructure". Despite significant private investment and existing steel-in-the-ground capable of processing nearly the entire state's biosolids volume, the facility sits idle due to community support challenges. This illustrates a critical investment risk: without a coordinated State plan that aligns regulatory certainty, community acceptance, and economic viability, even fully funded projects can become stranded assets.

Consequently, the state is currently narrowing toward a single viable large-scale solution: the drying facility under construction by Waste Management in Norridgewock. While this project adds necessary processing capacity, relying on a single commercial entity for statewide management creates a monopoly-like dynamic with questionable redundancy. It leaves utilities vulnerable to price dictation and operational bottlenecks. These are some of the

reasons why many facilities have elected to not enter into an agreement to send material to this facility. For utilities and private developers alike, the current lack of a long-term strategy makes infrastructure investment a high-risk gamble, paralyzing the development of diversified, competitive solutions.

Part 4 – Strategic Considerations: Receivers, Risk, and Reality

4.1 The Future of Beneficial Use and Regulatory Standards A durable long-term plan must evaluate whether science-based standards for "safe" beneficial use can be re-established. The State's Materials Management Plan (MMMP) explicitly notes that as treatment technologies evolve, the door may reopen for a "cautious return to agronomic utilization" in alignment with Maine's Solid Waste Management Hierarchy. To provide regulatory certainty, the State could assess frameworks such as NACWA guidance or structured pilot programs like those in Arizona to determine if safe return to soil-based solutions is viable. Consideration could be given to non-agricultural beneficial reuse, such as highway corridors or land reclamation, within the context of low or background level PFAS contamination.

4.2 Agricultural and Environmental Tradeoffs The elimination of beneficial use has shifted environmental burdens rather than eliminating them. Farmers who previously relied on biosolids are now forced to purchase expensive chemical fertilizers, increasing their costs and reliance on manufactured nutrients such as phosphorus, which is mined in only a couple of places in the world with reserves quickly dwindling, and nitrogen, which is synthesized with a significant carbon footprint. Beyond the economic hit to local agriculture, the cessation of land application negatively impacts soil health, carbon sequestration, and crop yields. A comprehensive strategy should weigh the risks of background PFAS levels (i.e. the levels in human blood serum, or rainwater) against these tangible agricultural deficits and the loss of a circular economy.

4.3 Publicly Owned Treatment Works as Passive Receivers Wastewater utilities do not manufacture or use PFAS; they are generally passive receivers of these chemicals from households, businesses, and industries. Consequently, some portions of the PFAS received end up in biosolids. The vast majority of biosolids produced in Maine are not industrially contaminated but instead contain "background" levels of PFAS from residential sources that reflect the ubiquitous societal use of these chemicals in consumer products.

4.4 The "Hot Spot" Reality Data suggests that the "PFAS crisis" in Maine is driven by specific industrial anomalies rather than a systemic failure of the beneficial reuse model. While records indicate that over 900 sites in Maine have utilized Class A or B biosolids, data shows that only a small percentage have exhibited contaminated groundwater. This significant disparity indicates that the most severe contamination is localized to industrial "hot spots".

4.5 The Limits of PFAS Treatment and the Priority of Source Control There is currently no proven, cost-effective technology available to treat PFAS in wastewater or biosolids at the scale required for municipal operations. Given this technological reality, MEWEA advocates for a strategy focused on source control and societal shifts to reduce PFAS input before they enter the waste stream. We believe this approach should be given proper time to demonstrate efficacy before the State mandates expensive and unproven treatment requirements. Without a comprehensive risk management discussion and a rigorous cost-benefit evaluation, moving toward treatment mandates would be premature and fiscally reckless.

Conclusion – The Need for a Stakeholder-Based Biosolids Management Plan

Maine's biosolids management system now functions on a just-in-time basis with minimal redundancy and limited flexibility. Over 80% of the material produced in the State is destined for a single facility with as little as two (2) years remaining. Utilities increasingly rely on a small number of disposal outlets, long-haul transportation, and short-term contractual arrangements to maintain regulatory compliance. While these measures allow wastewater treatment systems to continue operating, they do not constitute a long-term plan. Several systemic characteristics define the current landscape:

- **Constrained Infrastructure:** Landfill capacity is finite and uncertain. Alternative processing facilities are limited, stalled, or not yet operational.
- **Policy–Infrastructure Mismatch:** Regulatory and legislative actions have reduced management pathways without corresponding investment in replacement capacity.
- **Market Exposure:** Utilities are increasingly subject to regional market conditions, transportation availability, and vendor concentration beyond their control.
- **Environmental Tradeoffs:** Current practices often conflict with stated climate, materials management, and sustainability objectives.
- **Ratepayer Burden:** Over the past 5 years, biosolids costs have risen between 50%-200% for nearly all facilities and are anticipated to reach 300% for some facilities within a year. This impact equates to nearly $10,000,000 of increased costs that are recovered through wastewater rates.

Individually, utilities, regulators, and private-sector entities have taken rational actions within their respective authorities. Collectively, however, these actions have not produced a coordinated or resilient system. The absence of a shared planning framework makes it difficult to evaluate tradeoffs, align timelines, or prioritize investments. Without intervention,

future decisions are likely to be driven by crisis—such as sudden loss of disposal capacity or rapid cost escalation—rather than informed analysis. This increases the risk of outcomes that are more costly, less environmentally beneficial, and more disruptive to wastewater operations.

This white paper demonstrates that Maine's biosolids management challenges are systemic in nature. They stem from the interaction of regulatory requirements, infrastructure limitations, market dynamics, and evolving scientific understanding rather than from any single policy decision or operational failure. Addressing these challenges will require a structured, inclusive stakeholder process that brings together wastewater utilities, the Department of Environmental Protection, legislators, landfill and facility operators, technology providers, agricultural interests, and affected communities. Such a process is necessary to establish shared objectives, evaluate risks, and develop a coordinated long-term strategy. The purpose of a stakeholder-based plan would not be to select a predetermined technology or policy outcome. Instead, it would provide a forum for:

- Establishing a common factual baseline
- Evaluating short-, medium-, and long-term management pathways
- Aligning legislative policy with regulatory, infrastructure, and funding timelines
- Identifying transition strategies that avoid crisis-driven decisions

Without such a plan considering all the complex variables, Maine risks continuing along a path of increasing costs, diminishing flexibility, and growing vulnerability to external constraints. Proactive collaborative planning offers an opportunity to manage biosolids in a manner that protects public health, the environment, and wastewater ratepayers while providing decision-makers with the clarity needed to act responsibly. This document is intended to support that process by framing the discussion, clarifying the challenges, and demonstrating why long-term planning can no longer be deferred.

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