



Land Application of Biosolids in Michigan: Management Recommendations

This document is not intended to replace or supersede regulations for permitting or land application of biosolids in Michigan. It is intended as a reference guide for practice recommendations for land application. Biosolids generators and appliers who land apply biosolids should contact the Michigan Department of Environmental Quality (DEQ) for more information on specific practices needed under each permit.

More information about requirements for biosolids generators and land appliers can be found at:

Michigan Water Environment Association Biosolids Facts, Supplement 1 and Supplement 2

[Part 31 of the Natural Resources and Environmental Protection Act \(NREPA\), at Sec. 324.3131 et. seq.](#)

[Part 24 Rules of the Michigan Administrative Code](#)

[Title 40 of the Code of Federal Regulations \(CFR\), Part 503](#)

RECOMMENDATIONS:

Generators and land appliers of biosolids should consider practices to reduce the potential for odor, dust, or potential leaching of material away from the application site. Generally Accepted Agriculture and Management Practices (GAAMPs) for Manure Management and Utilization, Site Selection and Odor Control for New and Expanding Livestock Facilities, and Nutrient Utilization (available from the [Michigan Department of Agriculture and Rural Development](#)) are a useful resource for recommended practices, as they are written to minimize many of the same concerns.

Site Selection:

Strategic planning can assist generators and land appliers of biosolids, particularly Exceptional Quality (EQ) material which has fewer regulatory restrictions on application but which may still cause concern for nearby residents. The Site Selection and Odor Control for New and Expanding Livestock Facilities GAAMP identifies four categories of potential sites for new or expanding livestock and poultry facilities, which may be adapted similar to the example below for land application of biosolids:

Category 1. These are sites normally acceptable for land application of biosolids and generally defined as areas that are highly agricultural with few non-farm residences or high use public areas such as hospitals, churches, licensed commercial elder care facilities, licensed commercial childcare facilities, school buildings, or others (0-7 within ¼ mile of the nearest edge of the application area). These sites are generally appropriate for the generator or applier to follow their permit for land application, though if the generator or applier receives complaints, he or she should adopt recommended practices to reduce the potential for odor, runoff, or dust as outlined in the section "Land Application" below. These sites may be more appropriate than the other categories for land application during times and conditions under which management practices such as incorporation are not feasible because of the presence of growing crops or frozen ground.

Category 2. These are sites where technologies and/or management practices may be needed to make land application of biosolids acceptable. These areas are predominantly agricultural but also have an increased number of non-farm residences or high use public areas (8-20 within ¼ mile of the nearest edge of the application area). At these sites, practices listed below in the section "Land Application" will reduce the potential for odor, dust, runoff, or leaching.

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Category 3. These are sites that may not be acceptable for land application of biosolids without specific management practices due to environmental concerns or other neighboring land uses (more than 20 residences or high use public areas within ¼ mile of the nearest edge of the application area). These sites should only be used for land application if the biosolids can be incorporated within 48 hours and implementing the recommendations under the section “Land Application” below.

Category 4. These are sites that are not acceptable for land application of biosolids due to regulatory requirements under NREPA and the Part 24 Rules.

Onsite Storage:

When biosolids are permitted to be stacked or stored before application, stacking on vegetated areas will reduce the potential for nutrients to leach from the stack into ground or surface water. Locate the stack where it will not run off into neighboring properties or surface water, avoiding runoff pathways, roadsides, ditches, or other sites which may convey runoff or allow odors or dust to travel away from the stack. Spread as soon as possible. If the biosolids must be stacked or stored before application, covering the stored biosolids with straw, sawdust, a fleece blanket or other materials may help reduce odors and pests until it can be land applied. When land applied, stacked or stored biosolids should be removed as completely as possible from the storage site to minimize the potential for leaching, odors, or other nuisances.

Land Application:

Michigan’s biosolids application restrictions include testing for phosphorus in addition to nitrogen, which is stricter than the federal standard. This is a key consideration for determining the agronomic rate of application, which is required for all types of biosolids.

Under the Part 24 Rules, “agronomic rate” means: “the calculated biosolids application rate (dry weight basis) which provides the amount of plant-available nitrogen needed by the crop or vegetation grown on the land; which minimizes the amount of nitrogen that passes below the root zone of the crop or vegetation grown; and which considers the amounts of phosphate (P₂O₅) and potash (K₂O) added by the biosolids as part of the total nutrient management plan.”

Biosolids cannot be applied to agricultural land if the Bray P1 soil test level exceeds 300 lbs P/acre (150 ppm) or if the Mehlich 3 soil test is greater than 340 lbs P/acre (170 ppm). For forestland and tree farms, biosolids cannot be applied if the Bray P1 soil test level exceeds 200 lb P/acre (100 ppm) or the Mehlich 3 soil test level exceeds 220 lb P/acre (110 ppm). See the Michigan Water Environment Association Biosolids Facts – Supplement 2 for more information on phosphorus.

Soil samples should be taken for every 10-15 acres of a farm field, to ensure representation of field conditions. MSU Extension Bulletins E-498 (Warncke, 1998), E-1616 (Meints and Robertson, 1983), and E-498S (Warncke and Gehl, 2006) give instructions on how to obtain a good representative soil sample and how often soils should be re-sampled. Once the capability of the soil to supply nutrients has been assessed, the appropriate amount of supplemental nutrients can be determined. Soil test results will change with time depending on fertilizer, biosolids and manure additions, precipitation, runoff, leaching, soil erosion, and nutrient removal by crops.

Since soil tests are required to be conducted every two years as part of the agronomic rate determination, land applicators should carefully manage application to lands for phosphorus concentration. This can prevent lands from becoming unavailable for biosolids application due to phosphorus concentrations reaching Part 24 limits.

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Land appliers should consult with landowners' written contract terms and applicable generator Residuals Management Programs (RMPs) for further guidance on nutrient management (more information on RMPs is available from the [Michigan Department of Environmental Quality](#)).

The following list of practices, adapted from the Manure Management and Utilization GAAMP, will help to reduce the amount and impact of odors during the land application of biosolids and may reduce complaints of odor, or assist in the selection of sites to include in the generator's permit application:

- Avoid spreading when the wind is blowing toward populated areas.
- Avoid spreading on weekends/holidays when people are likely to be engaged in nearby outdoor and recreational activities.
- Spread in the morning when air begins to warm and is rising, rather than in late afternoon.
- Wind will dissipate and dilute odors, while hot and humid weather tends to concentrate and intensify odors, particularly in the absence of breezes.
- Take advantage of natural vegetation barriers, such as woodlots, vegetated fencerows, or windbreaks, to help filter and dissipate odors.
- Establish vegetated air filters by planting conifers and shrubs as windbreaks and visual screens between cropland and residential developments. This may help not only with odor management but may also reduce concern about the potential of odor by nearby residents who may see land application activities.
- Mark required (or recommended in the "Site Selection" section above) setbacks with flags or other visible indicators to ensure the generator or applier does not apply biosolids within an unacceptable distance of waterways, residences, wells, or commercial buildings. This will also help non-farm residents understand that the generator or applier is following permit requirements.
- When biosolids are allowed to be surface applied, avoid high-speed spinning spreaders to broadcast material, as this may increase dust. Use spreaders at low speed or alternative application equipment.

While soil incorporation of biosolids is not required for Exceptional Quality material, incorporation as soon as possible after application will reduce odors and the potential for runoff from application sites. Incorporation may be done with a variety of injection, tillage or aeration tools. Biosolids should be applied uniformly according to soil test requirements, to maximize crop uptake and minimize nutrient leaching.

Part 24 Rules include requirements for winter application depending on the class of biosolids. Land appliers may wish to use the Manure Application Risk Index (MARI) (Gangwer, 2008; Grigar, 2013), EnviroImpact (<http://www.enviroimpact.iwr.msu.edu/>), or similar tools to identify sites with the least potential for runoff when applying biosolids on frozen or snow covered soils.

If liquids are applied, land appliers should observe tile line outlets after application for indications of leaching or runoff. Additionally, biosolids should not be applied to saturated soils, areas subject to flooding, or areas likely to runoff onto neighboring properties, to minimize the potential for loss of nutrients.

Landowner Assistance:

Landowners receiving biosolids should follow recommendations in the Nutrient Utilization GAAMP, including consideration of all nutrient sources for crops including biosolids, manures, organic materials and byproducts, as well as applied fertilizer. Written nutrient management plans (NMPs) will help to ensure proper agronomic rate of application for all nutrient sources based on crop variety, plant uptake, soil test results, and yield. Implementation of NMPs will minimize the potential for offsite runoff and nutrient leaching to groundwater, while enhancing nutrient utilization by growing crops.

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Landowners receiving biosolids can help to reduce complaints by communicating with neighbors to learn about possible concerns, including planned outdoor events and crops grown for fresh consumption which may be held to strict food safety standards. Landowners may wish to make arrangements with neighbors for dates to avoid spreading or mutually agreed upon setbacks from property lines. Any such arrangements should be communicated to the biosolids generator or applier and if applicable be included in the contract for application to maintain good neighbor relations.

In summary, biosolids generators and appliers should work with landowners, nearby non-farm residents, and DEQ staff to ensure that permit requirements are met, and that the potential for odors, dust, runoff or other concerns are addressed. This partnership will assist generators and appliers with good relationships and continued ability to land apply biosolids for the benefit of both agricultural crops and public health.

Contacts for Further Information

Questions or concerns can be directed to the Biosolids generator, or to DEQ or MDARD:

Michigan Department of Environmental Quality Biosolids Program, www.michigan.gov/biosolids:
Statewide Program Coordinator, Mike Person: 989-297-0779
Saginaw Bay District Office
401 Ketchum Street, Suite B
Bay City 48708

Cindy Sneller: 616-401-2471
Grand Rapids District Office
5th Floor 350 Ottawa Ave NW
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Sarah Campbell: 517-243-9939
Lansing District Office
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1504 West Washington Street
Marquette 49855

Xiaowei Zhang: 586-243-8508
Southeast Michigan District Office
27700 Donald Court
Warren 48092

Michigan Department of Agriculture and Rural Development (MDARD) Right to Farm Program,
(517) 284-5619, www.michigan.gov/righttofarm