

# **GUIDELINES FOR APPLYING ORGANIC SOIL AMENDMENTS IN THE CITY OF LOS ANGELES**

LA SANITATION & ENVIRONMENT  
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On July 27, 2021, LA Sanitation & Environment held a Soil Amendment Roundtable Discussion to determine guidelines on where, when, and how organic soil amendments, specifically compost and mulch, should be applied in the City of Los Angeles. The goal of the roundtable was to develop easy to use guidelines to share with various City Departments, especially Recreation & Parks, and community groups. The guidelines will be referenced in the City's Healthy Soils Strategy Document. This guidance document is the result of the roundtable and subsequent discussion. The City is grateful to all participants and collaborators for their time and expertise.

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## Introduction

The [RegenerateLA Motion](#), adopted by the LA City Council on June 15, 2021, directs the City to restore and improve soil health and promote regenerative urban agriculture. Focusing efforts on addressing soil health is paramount as healthy soils provide a multitude of environmental benefits, including soil carbon sequestration, risk mitigation, enhanced urban agriculture, increased water infiltration, decreased runoff, and support of biodiversity, among others.

A key aspect of healthy soils management involves the application of soil amendments. Soil amendments are defined as any material added to a soil for the purpose of improving the soil's biological and physical properties (e.g., water retention, water infiltration, and aeration) (Davis & Whiting, 2017). Soil amendments typically consist of organic or inorganic materials used to enhance plant growth. For the purposes of these guidelines, we will focus on organic matter amendments such as compost and mulch. Compost and mulch naturally recycle organic waste (e.g., tree branches, food waste, dead leaves, cardboard, livestock manure (“zoo doo”), and other green waste) and turn it into a soil amendment. Applying compost and mulch to soil can add nutrients as a slow-release fertilizer, benefit soil microorganisms, increase organic matter, and enhance soil carbon sequestration (Ryals and Silver 2013; Silver et al. 2018). Adding mulch to managed landscapes has been shown to increase soil organic matter formation, which can help restore and enhance degraded urban soils (Vourlitis et al., Manuscript Submitted for Publication). Additionally, the creation of mulch and compost diverts organic waste from landfills, which reduces greenhouse gas emissions (DeLonge et al. 2013). While there are many benefits to applying soil amendments in the built environment, improper application of compost and mulch could potentially have adverse impacts on intact native soils and native biodiversity, including native microbiota. However, more information is needed to better understand the impacts of organic soil amendment on native habitat restoration projects.

This document is intended to provide a set of guidelines and recommendations regarding where, when, and how soil amendments should be applied in the City of Los Angeles in order to enhance urban soils while protecting native ecosystems and biodiversity.



Areas and land use types not appropriate for soil amendments: natural ecosystems.

# Healthy Soils & Biodiversity: Determining a Site's Suitability for Soil Amendment Application

Ensuring proper application of soil amendments is crucial as the benefits of amendments can only be harnessed when they are applied to appropriate areas. Similarly, avoiding the application of soil amendments in areas not suited for amendments will help prevent potentially adverse impacts on the ecosystem and biodiversity. The table below indicates which areas and land use types are, and are not, appropriate for the application of soil amendments.

<b><i>Areas and Land Use Types Appropriate for Soil Amendments</i></b>	<ul style="list-style-type: none"><li>• Urban areas (e.g., residential, commercial, industrial),</li><li>• Suburban areas (e.g., residential, commercial),</li><li>• Bare ground within urban areas that has been physically modified or disturbed,</li><li>• Urban farms, agriculture, community gardens, orchards, school gardens, etc.,</li><li>• Brownfields and contaminated sites,</li><li>• Landscaped urban parks &amp; recreational areas, including school grounds,</li><li>• Built areas (e.g., parking lots, street medians), and</li><li>• Urban forestry sites (e.g., tree wells and parkways).</li></ul>
<b><i>Areas and Land Use Types NOT Appropriate for Soil Amendments</i></b>	<ul style="list-style-type: none"><li>• Native/natural ecosystems, and</li><li>• Protected areas/lands.</li></ul>



Areas and land use types appropriate for soil amendments: community gardens and urban residential areas.

In general, soil amendments, such as compost and mulch, are well suited for sites intended to provide human benefits. This includes sites used for food production (i.e., agricultural sites, urban farms, community gardens, and orchards), recreation (i.e., gardens and landscaped urban parks), and land remediation (i.e., brownfields and contaminated sites).

Soil amendments are not recommended in areas where the primary goal is to support native plants and ecosystems (i.e., sage scrub, chaparral, or urban areas where the goal is to establish native plants). Naturally occurring soils are often low in organic matter or nutrients, and many California native plants thrive in soils that are naturally low in organic matter and nutrients. Amending these soils could artificially increase the organic matter and nutrient content present at the site, potentially favoring non-native plant species that thrive in high nutrient conditions. Furthermore, adding mulch increases moisture at the soil surface, allowing for increased establishment and abundance of non-native plant species at the expense of native plants. While there are no data as yet documenting adverse effects, a conservative approach is warranted when dealing with rare or endangered species or ecosystems.

In order to protect native biodiversity, soils in ecosystems supporting rare or endangered species or critical habitats within Los Angeles should be protected as they are and not be subject to the addition of soil amendments. Adding organic soil amendments increases moisture at the soil surface and creates favorable conditions to support non-native invertebrates (Staubus et al., 2019). Mulching can eliminate critical habitats (i.e., bare ground and cryptobiotic crusts such as mosses and lichens) that are essential for native ground-nesting bees, lizards, and annual plants. It could also change the biodiversity of the soil fauna, which could cause a trophic cascade and impact native biodiversity. Therefore, soil amendments should be kept away from native habitats, as well as wildlands containing naturally-occurring native vegetation, in order to protect native biodiversity.

In sites where organic soil has been removed, outplanting has occurred, or the soil has been heavily impacted, soil amendments may generate a better medium for native plant growth. However, the potential adverse effects on native biodiversity must be carefully considered and locations should be assessed on a site-by-site basis. When and where possible, test plots should be used to see how a particular soil/habitat will respond to soil amendments. Monitoring sites pre- and post-amendment to assess plant and soil microbial diversity and general plant health is

critical. This is especially true if work is occurring in an area/land use type not recommended for soil amendments (see table above) as there can be adverse consequences to the soil itself and to soil biota.

More research is needed to understand the impacts of compost and mulch on native species. Until there is scientific consensus, the precautionary principle should be used. Therefore, we recommend a conservative approach to soil amendment application in native systems.

With this information in mind, the following criteria can be referenced as a preliminary guide to determine a given site's suitability for soil amendments:

<i>Conditions for Soil Amendments</i>		
<i>Metric</i>	<i>Appropriate</i>	<i>Inappropriate</i>
<b><i>Development Status</i></b>	Developed lands used for human benefits (i.e., food production, recreation, remediation).	Undeveloped lands with naturally-occurring vegetation and native soils.
<b><i>Plant Population</i></b>	Food crops or decorative plants are present (i.e., plants established for human use/consumption or aesthetics).	Naturally-occurring native plants (i.e., native plants not planted as part of a landscaping project) are present.
<b><i>Soil Integrity</i></b>	Soil is degraded (e.g., compacted or friable) and unable to fulfill ecosystem functions (i.e., soil is inhospitable to plant growth, unable to retain water, etc.).	Areas with native (undisturbed) soils. Soil is able to fulfill ecosystem functions (i.e., soil is conducive to plant growth, able to store nutrients, and capable of retaining water).



Mulch amendments

# Soil Amendment Application Considerations: Understanding the Benefits and Consequences

It is important to understand the potential environmental and ecosystem benefits and consequences that can arise from the use of organic soil amendments.

## Soil amendments can:

- Improve soil cover to reduce erosion and soil temperature.
- Enhance soil carbon sequestration.
- Improve water infiltration and soil water holding capacity.
- Increase net primary productivity.
- Improve the medium for plant and tree establishment and growth.
- Rehabilitate degraded soils.
- Amendment applications may increase organic matter and nutrient content.
- Benefit microbial diversity and function
- Improve soil fertility.
- Amendment applications may increase levels of carbon, beneficial bacteria, and fungi present in the soil.
- Increase below-ground biodiversity.
- Suppress plant diseases.
- Reduce erosion.

## Improper amendment applications may:

- **Disrupt soil microbial diversity.**  
Since many plants have a specific microbiome, the soil ecosystem can be greatly affected by the improper addition of amendments and fertilizers.
- **Disrupt habitats and ecosystems.**  
Soil amendments can damage surface habitats for native arthropods in native scrubland and grassland habitats (Staubus et al., 2019). Soil amendments may also kill trees or other plants if not applied properly. In particular, poor quality compost can contribute to phytotoxicity and damage plants. Although there is currently not enough data to support this idea, there is concern that soil amendments may increase the abundance of unintended and/or non-native plant species and suppress the germination of native plant species (if a native seed bank is present).
- **Alter soil texture and/or soil pH.**  
Soil texture and pH impact plant growth and the subsequent release of root exudates. Typically, a system with diverse microbiota and plant hosts leads to the presence of more varied root exudates.

While it makes sense to avoid the use of soil amendments when dealing with native soils, there are many potential benefits to amending impacted, degraded urban soils.

# Soil Application Guidelines: How Soil Amendments Should Be Used

Below is a straightforward framework for appropriate soil amendment applications:

<b>Quality</b>	Compost should be certified ( <a href="https://www.calrecycle.ca.gov/organics/processors">https://www.calrecycle.ca.gov/organics/processors</a> ) meaning it does not contain heavy metals, toxins, or other contaminants that may damage or kill plants and microbes. Compost should also be fully mature at the time of application. Poor quality and immature compost can have negative effects on plants and soils. Poor quality compost can reduce germination rates, stunt plant growth, cause mineral deficiencies, and can increase greenhouse gas emissions.
<b>Quantity/Depth</b>	In landscaped areas, a thin layer of compost (e.g., 1/2" deep) provides a sufficient soil amendment. In urban gardens, applying a 1/2" layer of compost is sufficient to enhance soil fertility each growing season. Vacant lots with poor quality soil and contaminated sites can benefit from greater quantities of mulch and compost (e.g., 3-6" deep).
<b>Application</b>	Compost and mulch should be layered directly on top of the soil surface. The amended soil should be lightly watered after application. There is no need to turn or incorporate amendments into soil manually as microbial activity will integrate the compost into the soil.
<b>Frequency</b>	Compost should be applied occasionally (e.g., annually or every couple of years) in urban gardens or at sites with polluted soils.

## Public Education and Community Engagement

It is important to raise public awareness about soil health and how soil amendments should be used so they may achieve the greatest benefit and so untrained or mis-informed individuals don't apply compost or mulch to inappropriate sites (i.e., native ecosystems) or in harmful ways. It is recommended that outreach efforts encourage the general public to confine the use of organic soil amendments to the recommendations outlined above.

This guidance document is intended to be accessible to the general public and should be distributed widely to raise public awareness about soil health and soil amendments. In addition to these guidelines, useful tools and resources on composting and soil testing should be disseminated, such as [LA Compost's Compost Guide](#), [Tree-People's Composting Guide](#), and the [National Resource Conservation Service's Soil Quality Test Kit Guide](#).



Volunteers help plant, mulch, and water new trees at a community tree planting event (Image: City Plants).

## Conclusion

These guidelines are the outcome of the Soil Amendment Roundtable Discussion held in July 2021 and reflect the current state of knowledge on how, when, and where to beneficially apply organic soil amendments. However, as mentioned above, more research is needed to understand the impacts of compost and mulch on native plants and to California ecosystems. While this document is currently focused on mulch and compost, it may make sense for future iterations of these guidelines to include information about the use of mycorrhizal inoculations, the use of bio-char, or other emerging amendment techniques. As more research is performed and more data become available, the recommendations in this guidance document will evolve.

## Literature Cited

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