APPENDIX I

Landscape Management Plans and Integrated Pest Management Plans

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Some pages in this document have been purposely skipped or blank pages inserted so that this document will copy correctly when duplexed.

I-1. Landscape Management Plans

A landscape management plan (LMP) is a plan for defining the layout and long-term maintenance of landscaping features to minimize the use of pesticides (including herbicides and fungicides) and fertilizers and reduce the discharge of suspended solids and other pollutants. Use of an LMP that has been approved by the City of Seattle (City) is allowed as an alternative to the requirement to formally treat (with a water quality treatment BMP) the runoff from pollution-generating pervious surfaces (PGPS) that are subject to water quality treatment. LMPs have the potential to significantly reduce the pollutant load washing off managed green spaces. The requirements for obtaining City approval of an LMP are summarized in this section.

LMPs must address the basic principles provided in *Volume 1, Section 7.8*, tailoring them to fit the specific site. Every LMP will not necessarily be able to apply each of the listed recommendations related to the basic principles. In addition, landscapes are managed for different purposes, some more formal than others. Some recommendations may not be appropriate for very formal sites; therefore, they will not be adopted, in favor of other management practices that better fit the intended uses of the site. In the end, the extent to which an LMP is successful depends on the ability of the applied practices to retain soil, fertilizers, and pesticides on the site and away from receiving waters throughout the entire year.

If an LMP is proposed, it must be submitted with the engineering plans for the proposed project. The following documentation is required for the evaluation of an LMP submittal:

- Site vicinity map showing topography.
- Site plan including topography, areas with saturated soils (if applicable), and high water tables (if applicable).
- Narrative describing how the basic principles in *Volume 1, Section 7.8,* will be achieved.
- Plant list (with both common and scientific names) that includes the following:
  - Drought-tolerant plants, disease-resistant varieties, species for attracting beneficial insects (if any), and native plants.
  - Proposed spacing for shrubs and groundcovers.
  - Grass mix or mixes planned for turf areas including their sun/shade tolerance, disease susceptibility, drought tolerance, and tolerance of wet soil conditions.
- Landscape plan indicating placement of landscape features, lawn areas, trees, and planting groups (e.g., forbs, herbs, and groundcovers) on the site.
- Signage plan including proposed locations of signs and content of signs.
  - Signage must be located to identify which areas are included in the LMP.
  - Signage must indicate how a copy of the approved LMP can be obtained.

  - Inclusion of the following information in the signage is also encouraged: basic educational information about the LMP for maintenance workers and the public.
- Information on soil preparation and fertility requirements.
- Information on the design of the irrigation method (e.g., installed sprinkler system, drip irrigation system, or manual watering).
- Landscape maintenance plan, including the following:
  - Physical care methods, such as thatch removal or aeration, and mowing height and frequency.
  - Type of fertilizer (including percentages of nitrogen, phosphorus, and potassium [N-P-K]) and fertilization schedule or criteria.
- Integrated Pest Management (IPM) plan (refer to *Section I-2*), including the following:
  - Type of chemicals to be used for common pests such as crane fly larvae and the criteria or schedule for application.
  - Any biocontrol methods to be used.
- Information about the storage of pesticides or other chemicals, and the measures that will be used to dispose of them, including the following:
  - How the chemicals will be stored on the site between applications to prevent contact with stormwater or spills into the drainage system (if applicable).
  - How excess quantities of fertilizers or chemicals will be handled for individual applications.
- Implementation plan, including the following:
  - The responsible party for ensuring that the LMP is implemented.
  - How the applicant will ensure that grounds crews have the training and/or resources required to implement the LMP and make adjustments based on advances in landscape care practices and products.
  - A fertilizer and pesticide application log, including rate of application, area treated, and disposal or storage of residue.

I-1.1. Integrated Pest Management Plans

An IPM plan is a natural, long-term, ecologically based systems approach to controlling pest populations. IPM uses techniques either to reduce pest populations or maintain them at levels below those causing economic injury, or to so manipulate the populations that they are prevented from causing injury.

The goals of IPM are the encouragement of optimal selective pesticide use (away from prophylactic, broad-spectrum use) and the maximization of natural controls to minimize environmental side effects by creating and maintaining healthy landscapes:

- **Design for a healthy landscape**. A landscape should be designed to maximize the intended uses of the land and minimize potential pest problems. Design considers such plant health factors as site usage, soils, topography, hydrology and drainage, proximity to sensitive or critical areas and existing vegetation as well as known pest sensitivity. Take drainage pathways into consideration when considering landscape management and the potential need for pest control.
- **Awareness of potential pest problems**. Certain plants have known pest problems. Likewise, certain cultural conditions or landscape situations can encourage the infestation of pests.
- **Maintenance for maximum landscape health**. A well-designed and maintained landscape dramatically reduces the need for pest control. Appropriate selection of plants, pruning, proper irrigation, applications of mulch and fertilizer, appropriate mowing techniques, and other practices all promote landscapes that resist pest pressures and support natural predators.
- **Minimize disturbance of naturally occurring biological controls**. Pests have natural predators and controls operating on them at all times. Disruption of these systems due to poor maintenance practices can result in the development of new pest problems.

The following step-by-step comprehensive IPM plan process is provided as a guide.

I-1.1.1. Step 1: Correctly Identify the Pest and Understand Its Life Cycle

Identify the pest (e.g., weed, insect, or disease). Learn more about the pest. Observe it and pay attention to any damage that may be occurring. Learn about the life cycle. Many pests are a problem only during certain seasons or can be treated effectively only during certain phases of the life cycle. Repeat this step if more than one pest is identified.

I-1.1.2. Step 2: Establish Tolerance/Action Thresholds

Every landscape has a population of some pest (insect, weed, or disease), which is good because it supports a population of beneficial species that keep pest numbers in check. Beneficial organisms may compete with, eat, or parasitize disease or pest organisms. Decide on the level of infestation that must be exceeded before treatment needs to be considered. Pest populations under this threshold should be monitored but do not need treatment. For instance, European crane flies usually do not cause serious damage to a lawn unless there are between 25 and 40 larvae per square foot feeding on the turf in February (in normal weather years). Also, most people consider a lawn healthy and well maintained even with up to

20 percent weed cover; therefore, treatment, other than continuing good maintenance practices, is generally unnecessary.

I-1.1.3. Step 3: Monitor Regularly to Detect Pest Problems

Regular monitoring is a key practice for anticipating and preventing major pest outbreaks. It begins with a visual evaluation of the lawn or landscape condition. Take a few minutes before mowing to walk around and look for problems. Keep a notebook, record when and where a problem occurs, then monitor for it at about the same time in future years. Specific monitoring techniques can be used in the appropriate season for some potential problem pests, such as the European crane fly.

I-1.1.4. Step 4: Modify Maintenance Program to Promote Plant Health and Discourage Pests

A healthy landscape is resistant to most pest problems. Lawn aeration and overseeding along with proper mowing height, fertilization, and irrigation will help the grass out-compete weeds. Correcting drainage problems and letting soil dry out between watering in the summer may reduce the number of surviving crane-fly larvae. Gradually replace pest-prone plants.

I-1.1.5. Step 5: If Pests Exceed the Tolerance Thresholds, Use Cultural, Physical, Mechanical, or Biological Controls Prior to Implementing Chemical Controls

When a pest outbreak occurs (or monitoring indicates that one is imminent), implement cultural, physical, mechanical, or biological controls. If these types of controls prove insufficient, then consider chemical control options that are the least toxic or have the least non-target impact.

Here are two examples of an IPM approach for damaged lawns:

- **Red thread disease** is most likely under low-nitrogen fertility conditions and most severe during slow growth conditions. Mow the lawn and bag the clippings to remove diseased blades. Fertilize lightly to help the grass recover, then begin grasscycling (e.g., leaving grass clippings on a mowed lawn) and change to fall fertilization with a slow release or natural organic fertilizer to provide an even supply of nutrients. Chemical fungicides are not recommended because red thread cannot kill the lawn.
- **Crane fly damage** is most prevalent on lawns that stay wet in the winter and are irrigated in the summer. Correct the winter drainage and/or allow the soil to dry between irrigation cycles; larvae are susceptible to drying out so these changes can reduce their numbers. It may also be possible to reduce the number of crane fly larvae by using a power dethatcher on a cool, cloudy day when they are feeding close to the surface. Current studies are investigating the use of beneficial nematodes that parasitize the crane fly larvae; this type of treatment may eventually be a reasonable alternative.

Only after trying suitable non-chemical control methods or determining that the pest outbreak is causing too much serious damage, should chemical controls be considered. Determine the available products and choose the one that is the least toxic and has the least non-target impact.

I-1.1.6. Step 6: Evaluate and Record Effectiveness of Control and Modify Maintenance or Plant Choices to Support Recovery and Prevent Recurrence

Keep records. Note when, where, and what symptoms occurred, or when monitoring revealed a potential pest problem. Note what controls were applied and when, and the effectiveness of the control. Monitor the following year for the same problems. Review your landscape maintenance and cultural practices to see if they can be modified to prevent or reduce the severity of the problem.

A comprehensive IPM program should also include the proper use of pesticides as a last resort and vegetation/fertilizer management to eliminate or minimize the contamination of stormwater.

I-1.2. References

Refer to the Seattle Public Utilities IPM web page for additional resources for developing an LMP or IPM plan: www.seattle.gov/utilities/protecting-our-environment/sustainability-tips/landscaping/for-professionals/integrated-pest-management.