

City of San José Integrated Pest Management

Fall (November)

2017

This document provides guidance on the City of San José's Integrated Pest Management (IPM) Policy. It highlights Best Management Practices and Standard Operating Procedures for structural and landscape maintenance municipal groups and contractors.

Best
Management
Practices and
Standard
Operating
Procedures

TABLE OF CONTENTS

I. INTRODUCTION	3
II. DEFINITIONS	4
III. INTEGRATED PEST MANAGEMENT OVERVIEW	10
IV. STANDARD OPERATING PROCEDURES	12
1. Maintenance of Public Buildings and Facilities (for Public Works)	
2. Maintenance of Civic Grounds, Libraries, Parks, and Trails (for Parks, Recreation and Neighborhood Services)	
V. BEST MANAGEMENT PRACTICES	20
1. Aquatic Weeds	
2. Fungal Disease	
3. Grubs	
4. Insects	
5. Mice (Deer Mice)	
6. Pigeons	
7. Rats (Norway)	
8. Vertebrates in Landscapes (Gophers and Squirrels)	
9. Weed Control	

I. INTRODUCTION

This document assists personnel and City approved contractors to perform Integrated Pest Management on City property.

The Environmental Services Department meets with partner City Departments (i.e., municipal chemical applicators) annually to review the Integrated Pest Management (IPM) Policy and Standard Operating Procedures (SOPs) and Best Management Practices (BMPs). This process helps meet the Stormwater NPDES permit requirements and ensures that maintenance efforts reduce pollutants in stormwater runoff. This engagement is held in conjunction with the Department of Parks, Recreation and Neighborhood Services' Annual Workers Safety Training, and in individual work group meetings with Department of Transportation, and the Public Works Department.

The City's IPM Policy, SOPS, BMPS, and related information are available on the City's intranet site. Go to the Watershed Protection Division, Stormwater Management site at: http://inside.sjcity.net/esd/watershed_protection/Group%20Sites/Pesticide_Management for these IPM resources:

- Barn Owl Boxes in Neighborhood Parks
- IPM Case Study in the Guadalupe River Park and Gardens, Courtyard Garden
- IPM Municipal Training Module
- IPM PMD 3 Pilot Project (Lessons Learned)
- List of Active Ingredients (in Pesticides) for the Stormwater NPDES Permit
- Pesticide Use Report (template) for Approved Contractors
- Soils Score Card
- Thresholds Chart (for PRNS)

II. DEFINITIONS

Action Threshold Level	See “Threshold Level” and Appendix for examples.
Best Management Practice (BMP)	Activities, practices, facilities, and/or procedures that when implemented to their maximum efficiency will prevent or reduce pollutants in discharges. Examples of BMPs may include public education and outreach efforts, proper planning of development projects, proper clean out of catch basin inlets, and proper waste handling and disposal, among others.
City Department	Any department of the City of San José and includes any pesticide applicator hired by a City department to apply pesticides on City property.
Contract	A binding written agreement, including but not limited to a contract, lease, permit, license, or easement between a person, firm, corporation or other entity, and a City department, which grants a right to use or occupy property of the City of San José for a specified purpose or purposes.
Contractor	A person, firm, corporation or other entity that enters into a contract with the City of San José.
Contract Manager	City personnel that manages a landscape contract which includes the City’s Integrated Pest Management SOPs and BMPs.
Defoliating	Includes killing or artificially accelerating the drying of plant tissues, with or without causing abscission.
DOT	Department of Transportation – City of San José
Equipment Operator	City personnel driving truck or other vehicle, or using City equipment or tools.
ESD	Environmental Services Department – City of San José

Field Staff	Non-supervisory personnel in the DOT, PRNS, and PW.
Fungi	A fungus (fungi) is any member of the group of eukaryotic organisms that includes unicellular microorganisms such as yeasts and molds, as well as multicellular fungi that produce familiar forms known as mushrooms.
Fungicide	Any substance that kills fungi or inhibits the growth or reproduction of spores.
Insects	A class of invertebrates within the arthropod phylum that have a chitinous exoskeleton, a three-part body (head, thorax and abdomen), three pairs of jointed legs, compound eyes and one pair of antennae. They are among the most diverse groups of animals on the planet, including more than a million described species and representing more than half of all known living organisms. ¹
Integrated Pest Management (IPM)	An ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and the use of resistant varieties. Pesticides are used only after monitoring indicates that they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risk to human health, beneficial and non-target organisms, and the environment.
IPM Coordinator	Primary contact for all matters related to pest control for their Department. Represents their department in ensuring contractors supplying pest management services. They will also serve as a contact for others

	<p>seeking information about pesticide use or other pest management practices. Responsibilities include:</p> <ul style="list-style-type: none"> • Maintains records of all pest sightings by municipal staff and contractors • Serves as the primary contact for coordination with ESD • Communicates pest problems • Communicates the pest manager's recommendations related to maintenance and sanitation to municipal staff and contractors • Assures that pest management practices are consistent with the City's IPM Policy • Maintains written and electronic records of all pesticide applications • Serves as a contact person to for community inquiry • Evaluates the IPM program on a regular basis
Least-Toxic Alternatives	<p>Pesticides are ranked by toxicity level to humans, mammals, and beneficial organisms. The least-toxic alternative pesticide(s) is a chemical that is non-toxic to humans or non-target organism. It is used as a last resort after non-chemical effort(s).</p>
Pest Maintenance Personnel	<p>Any person monitoring threshold levels, taking preventative or corrective actions, or applying a pesticide.</p>
Maximum Extent Practicable (MEP)	<p>The standard for implementation of stormwater management programs to reduce pollutants in stormwater. The implementation of MEP takes into account equitable consideration and competing facts, including, but not limited to the gravity of the problem, potential or actual public health risk, environmental benefits, pollutant removal effectiveness, regulatory compliance, public acceptance, implementability, cost and technical feasibility.</p>

National Pollutant Discharge Elimination System (NPDES) Permit	A permit issued by the United States Environmental Protection Agency, State Water Resources Control Board of San Francisco Bay Regional Water Quality Control Board pursuant to Clean Water Act section 402(p) that authorizes discharges to waters of the United States and requires the reduction of pollutants in the discharge.
Pest	Organisms that damage or interfere with desirable plants in our fields and orchards, landscapes, or wild lands, or damage homes or other structures. Pests also include organisms that impact human or animal health. Pests may transmit disease or may be just a nuisance. A pest can be an unwanted plant (weed), vertebrate (bird, rodent, or other mammal), invertebrate (insect, tick, mite, or snail), nematode, pathogen (bacteria, virus, or fungus) that causes or contributes to disease, or other unwanted organisms that may harm water quality, animal life, or other parts of the ecosystem.
Pest Manager	Department staff who tracks monthly pesticide data for certified City applicators and contractors.
Pest Management Plan	
Pesticides	Spray adjuvant. See "Spray Adjuvant". Any substance or mixture intended to be used for defoliating plants, regulating plant growth, or for preventing, destroying, repelling or mitigating any pest which may infest or be detrimental to vegetation, humans, animals, households, buildings, or be present in any agricultural or nonagricultural environment.
Personal Protective Equipment (PPE)	Apparel and devices worn or used to minimize human contact with pesticides or pesticide residues that must be provided by an employer and are separate from, or in addition to work clothing. May include chemical resistant suits, gloves, aprons, headgear, and footwear,

	respiratory protection devices, protective eyewear, hearing protection, or a coverall.
--	--

PRNS	Department of Parks, Recreation and Neighborhood Services – City of San José
PW	Department of Public Works – City of San José
Rodent	The largest group of non-flying mammals which include: mice, rats, hamsters, and guinea pigs, which are commonly kept as pets. The Rodentia also includes beavers, muskrats, porcupines, woodchucks, chipmunks, squirrels, prairie dogs, marmots, chinchillas, voles, moles, gophers, lemmings, and many others.
SDS	Safety Data Sheet
Spray Adjuvant	Any wetting agent, spreading agent, deposit builder, adhesive, emulsifying agent, deflocculating agent, water modifier, or similar agent, with or without toxic properties of its own, intended to be used with a pesticide as an aid to application or effectiveness, and sold separately from the pesticide with which it is to be used.
Standard Operating Procedure (SOP)	Detailed, written instructions to achieve uniformity of the performance of a specific function.
Supervisory Staff	Management staff in ESD, DOT, PRNS, and PW.
Stormwater Treatment System	An engineered system designed to remove pollutants from stormwater runoff by infiltration, evapotranspiration, settling, filtration, biological degradation, plant uptake, media absorption/adsorption or other physical, biological, or chemical process. This includes landscape-based systems such as bioretention areas, as well as proprietary systems. Stormwater

	treatment systems can also be referred to as a treatment control, treatment measure, or treatment BMP.
Threshold Level	The maximum pest population tolerated before additional pest control measures are implemented.
Urban Runoff/Stormwater	<p>Urban runoff is the water that flows over impervious surfaces (surfaces that don't absorb water such as paved surfaces) or landscaping during or after rain, irrigation, or other outdoor water use, enters local storm drains, creeks, and other waterways.</p> <p>Runoff can pick up and transport pollutants such as litter, pesticides, fertilizers, pet waste and motor oil to storm drains that flow into local creeks and the San Francisco Bay without any cleaning or filtering.</p>
Weed	<p>Any plant in an unwanted place.</p> <p>(a) Broadleaf weed is a dicot plant (two or more leaves).</p> <p>(b) Grassy weed is a monocot plant (one leaf or more from a central source).</p>

III. INTEGRATED PEST MANAGEMENT OVERVIEW

Integrated Pest Management (IPM) is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of control methods or techniques. Pesticides are only used after monitoring indicates they are needed, according to established guidelines and pest threshold levels are exceeded. Pest control materials and methods are selected and applied in a manner that minimizes risk to human health, beneficial and non-target organisms, and the environment.

Understanding pest characteristics and needs is essential to implementing IPM effectively. Pests seek habitats that provide basic needs such as air, moisture, food, and shelter. They often can be prevented or controlled by creating inhospitable environments, by removing basic survival elements, or by simply blocking their access. An effective, long-term approach to managing pests uses a combination of non-chemical methods or techniques that work well together. Chemical control methods are used only when implementation of non-chemical control methods have not been successful at reducing pest threshold levels below the established guideline for the pest. Approaches for managing pests are often grouped in the following categories:

- **BIOLOGICAL CONTROLS:** Biological control is the use of natural enemies – predators, parasites, pathogens, and competitors – to control pests and their damage. Invertebrates, plant pathogens, nematodes, weeds, and vertebrates often have natural enemies that can serve this function.
- **CULTURAL CONTROLS:** Cultural controls are practices that reduce pest establishment, reproduction, dispersal, and survival. For example, plant resistance to pests can often be maximized by paying close attention to soil conditions and irrigation, and changing irrigation practices can reduce pest problems, since too much water can increase root disease and weeds.
- **MECHANICAL AND PHYSICAL CONTROLS:** Mechanical and physical controls can make the environment unsuitable for pest survival. Traps for rodents are examples of mechanical control. Physical controls include mulches for weed management or barriers such as screens to keep birds or insects out.
- **CHEMICAL TREATMENTS:** The use of pesticides can be necessary if established threshold levels have been so severely exceeded that other methods are ineffective. Precise recommendations or actions to achieve specific results (i.e., controlling the pest

population to a manageable level) is an essential part of an IPM Program. Specific pesticide recommendations are provided by a Pest Control Advisor (PCA). Before being approved to apply pesticides, staff must complete an annual safety training on all pesticide recommendations including Personal Protective Equipment (PPE), Safety Data Sheets (SDS), Pesticide Safety Information Series (PSIS) N. Series, and an update on laws and regulations pertaining to the application of pesticides. *Only designated and qualified personnel may apply pesticides on public property, including those purchased at a retail store.*

See your IPM coordinator for a list of approved pesticides. Least-toxic alternatives are strongly recommended.

IV. STANDARD OPERATING PROCEDURES

INSPECTION, IDENTIFYING, AND MONITORING

An IPM program consists of inspection, identification, and monitoring, to establish the appropriate method of control. Inspection and accurate identification of pests are vital steps in order for control methods to be effective. Once the pest has been identified and the source of activity pinpointed, habitat modifications – primarily exclusion, repair, and sanitation efforts – may greatly reduce the prevalence of the pest. Monitoring includes inspecting areas for pest evidence, entry points, food, water, and harborage sites, and estimating pest population levels. The information gained through monitoring is evaluated to determine whether the action threshold has been exceeded and what can be done in the way of prevention.

ACTION THRESHOLD LEVEL

The level of a pest population or site environment condition that requires action. The IPM Coordinator of a structure or a landscape manages the action threshold. It is determined by deciding what severity of damage and what pest(s) can be tolerated. The number of a few pests or limited damage does not, in itself, necessarily require action.

Reference the Thresholds Chart for weeds. This document makes recommendations for treatment. The IPM Coordinator may designate a higher or lower threshold.

TRAINING FOR CERTIFIED PESTICIDE APPLICATORS

Education and ongoing training are a vital component of pest management. Qualified Pesticide Applicators (i.e., working in libraries, parks, community centers, trails, etc.) must understand the basic concepts of IPM, review the Pesticide Safety Information Series (PSIS) N. Series, Respirator Protection, and who to contact with questions or problems. See Appendix f for the PSIS N. Series and Voluntary Respirator Use Posting (Subsection R) that summarizes respiratory protection.

Applicators holding a Qualified Applicators Certificate (QAC) must retain verification of attendance records from their continuing education (CE) course sponsors. These records are a requirement of CCR chapter 3, section 6513, which states that license and certificate holders must keep copies of their CE records for 3 years. DPR may request copies of your CE course verification at any time. For a list of IPM training opportunities and CE confirmation, contact ESD's IPM Coordinator at (408) 945-3000.

APPLYING PESTICIDES

Approved pest control contractors and certified chemical applicators should work with the IPM Coordinator and the responsible building/landscape manager to control pests. Contracts are

provided with the City's IPM requirement language, which includes reference to the City's IPM policy. Pest management objectives specific to the site should be jointly developed, agreed upon, and written into the contract. Less-toxic alternatives should be utilized. Contractors are required to report chemical use to the Pest Manager. Pesticides used in the United States must be registered through the Environmental Protection Agency (EPA), and the registration number must be listed on the label. Read and follow the pesticide label directions. City applicators are encouraged to understand, ask questions and expand their knowledge of pesticide application by scheduling trainings with their chemical vendor, including an IPM SOP and BMP Training with ESD. Contact ESD for more information at (408) 945-3000.

City and contracted pesticide applicators are required to log chemical applications monthly by completing a Pesticide Use Report. Staff submittals are due on the first (1st) business day of each month. Contractors' submittals are due on the tenth (10th) of each month.

The following requirements minimize exposure to people, wildlife, and the environment when applying pesticides. They should be closely followed.

GENERAL

- Read and follow label instructions.
- Notify public (i.e. within 25' of a school) of a pesticide application. Post flyers 48 hours in advance. (Applies to PRNS Staff who may apply pesticide(s) in a neighboring park.)
- Choose a pesticide that is pest-specific, rather than broad spectrum.
- Determine the right amount of pesticide to purchase and use. Consult your Department's IPM Coordinator for any pesticide that is not listed on the PUR (i.e., Chemical Use Report Form, CURF) and for any questions regarding pesticide application(s).
- Use a spot- application when pesticide treatments are required. Treat only the obviously infested areas.
- Use proper protective clothing or equipment when applying pesticides, per the pesticide label and all regulations.
- Record and report pesticide(s) within 24 hours of application. See your Department's IPM Coordinator for a field form and/or how to access the online PUR. Complete all sections on the field form, transfer the data to the online PUR, and file field form(s) in a binder.

- After applying a pesticide, store it or dispose of any unused chemical properly. See your Department's IPM Coordination for more information.
- Keep hard copies of current pesticide labels, consumer information sheets, Safety Data Sheets (SDS), and pesticide use records in a binder (in the office). See *Record Keeping* section below.

STRUCTURAL

- Read and follow label instructions.
- Notify building occupants of pesticide application.
- Limit the use of sprays, foggers, or volatile formulations. Instead use bait in cracks and crevices when possible. Look for crack and crevice label instructions on how to properly apply the pesticide (bait).
- Where sprays, foggers or volatile formulations are required, apply when occupants are not present or in areas where they will not be exposed to the material applied. Note any re-entry time limits listed on the label, and be aware that some residues can remain long after application.
- Properly ventilate areas after pesticide application per label requirements.

EVALUATION

After corrective action or pesticide application, pest levels should be monitored to determine the effectiveness of the pest control action. For pesticides, additional applications should only occur after monitoring indicates that pests have exceeded threshold levels.

RECORD KEEPING

Monthly Pesticide Use Reports should be kept in a logbook in the office of the IPM Coordinator or Contract Manager. Pesticide use records must also be maintained to meet State, County, and local regulatory requirements. The logbook should contain the following items:

- A copy of the Pest Management Plan and service schedule for the property.
- A copy of the current EPA-registered label and the current Materials Safety Data Sheets (MSDS) for each pesticide product used on City property.
- Pest monitoring data sheets, which record, in a systematic fashion, the type and number of pests or other indicators of pest population levels revealed by the monitoring program for the site in comparison to the designated threshold. Examples

include date, number, location, and rodent species trapped or carcasses removed as well as a date, number, and location of new rat burrows observed.

- A diagram noting the location of pest activity, including the location of all traps, trapping devices, and bait stations in or around the site.

MAINTENANCE OF PUBLIC BUILDINGS AND FACILITIES (FOR PUBLIC WORKS)

Follow these procedures before considering pesticide application:

- Establish threshold level of acceptance. Reference Appendix to identify pests and how to correct the underlying problem.
- Create safe play areas and sports fields, medians and right of way areas.
- Examine areas of concern carefully for one to two weeks before applying a pesticide. Describe severity of problem by recording information in a journal or on a “Site Evaluation Form”.
- Use pesticides only if the population exceeds threshold levels, or at discretion of Supervisor.
- Obtain and apply the least toxic control/correction method(s). See UC Davis IPM Website for recommendations.

TYPICAL PESTS:

Mice, rats, cockroaches, ants, flies, wasps, hornets, yellow jackets, spiders, , termites, carpenter ants, and other wood-destroying insects.

ENTRYWAYS:

Doorways, overhead doors, windows, holes in exterior walls, openings around pipes, electrical fixtures, or ducts.

- Keep doors shut when not in use.
- Place weather stripping on doors.
- Caulk and seal openings in walls.
- Install or repair screens.
- Keep vegetation, shrubs, and wood mulch at least one (1) foot away from structures.

OFFICES:

Offices, cubicles, hallways, and conference rooms.

- Allow food and beverages only in designated areas.
- If indoor plants are present, keep them healthy. When small insect infestations appear, remove them manually. Do not overwater.
- Keep areas as dry as possible by removing standing water or wet materials.
- Routinely clean areas, removing dust and debris, and emptying waste receptacles daily.
- Frequently vacuum carpeted areas.

FOOD PREPARATION AND SERVING AREAS:

Dining rooms, kitchens, break rooms, snack areas, vending machines, and food storage rooms.

- Store food and waste in containers that are inaccessible to pests. Containers must have lids and be made of plastic, glass, or metal. Waste should be removed daily.
- Place screens on vents, windows, and floor drains to exclude cockroaches and other pests.
- Create inhospitable living conditions for pests by reducing the availability of food and water – remove food debris, sweep up all crumbs, fix dripping faucets and leaks, and dry wet areas.
- Improve cleaning practices. Promptly clean food preparation equipment after use and remove grease accumulation from vents, ovens, and stoves. Use caulk or paint to seal cracks and crevices.
- Capture rodents using mechanical or glue traps. (Note: Mechanical traps, including glue boards, used in rodent control must be checked daily. Dispose of trapped rodents within 24 hours).

ROOMS AND AREAS WITH EXTENSIVE PLUMBING:

Bathrooms, rooms with sinks, locker rooms, dishwasher rooms, swimming pools, and greenhouses.

- Promptly repair leaks and correct plumbing problems to deny pests access to water.
- Routinely clean floor drains, strainers, and grates. Seal pipe chases.

- Keep areas dry. Avoid conditions that allow formation of condensation. Areas that never dry out are conducive to mold and fungi. Increasing ventilation may be necessary.
- Store paper products or cardboard boxes on shelves, away from moist areas and direct contact with the floor or the walls.

MAINTENANCE AREAS:

Boiler rooms, mechanical rooms, janitorial-housekeeping and pipe chase areas.

- After use, promptly clean and dry mops, mop buckets; and hang mops vertically on rack above the floor drain.
- Allow eating only in designated areas.
- Clean trash cans daily, use plastic liners in trashcans, and use secure lids.
- Keep areas clean and dry as possible, and remove debris daily.

MAINTENANCE OF CIVIC GROUNDS, LIBRARIES, PARKS, AND PARKING LOTS, AND TRAILS (FOR PARKS, RECREATION, AND NEIGHBORHOOD SERVICES AND AIRPORT)

Typical Pests: Ants, black widow spiders, gophers, squirrels, wasps, and weeds.

Follow these procedures before considering pesticide application:

- Establish threshold level of acceptance. Reference Appendix to identify pests and how to correct the underlying problem.
- Create safe play areas (i.e., removing wasp nest from sand boxes) and sports fields (i.e., repairing/filling in gopher holes/removing trip hazards), medians and right of way areas.
- Examine areas of concern carefully for one to two weeks before applying a pesticide. Describe severity of problem by recording information in a journal or on a “Site Evaluation Form”.
- Use pesticides only if the population exceeds threshold levels, or at discretion of Supervisor.
- Obtain and apply the least-toxic control/correction method(s). See UC Davis IPM Website for recommendations.

BOCCE BALL COURTS

- Pull weeds along court perimeter and inside court(s).

DOG PARKS

- No spraying.
- Hand pull weeds. Close for maintenance.
- Pick up dog waste, bag it, and place it in a trash can.
- Empty trash cans regularly.
- Empty water bowls to avoid mosquito larvae.

PARKING LOTS

- Keep trash and recycling areas clean. This helps prevent litter from spreading.
- Increase service if there is trash overflow.
- Regularly check the parking lot perimeter for litter. Place any litter in the garbage can.
- Clean up spills and leaks immediately using a spill kit with dry absorbent.
- Place ant bait stakes around the perimeter of the parking lot and frequently replace them before the influx occurs. This is also a preventative measure to minimize infestations.
- If applicable, reduce the outdoor water schedule in neighboring landscaped areas. This will help eliminate standing water in low spots.

PLANT BEDS

- Select plants with natural resistance to pests.
- Mulch planting beds to reduce establishment of weeds.
- Release natural biological control insects to control invasive weed infestations.

PLAYGROUNDS

- Pull weeds by hand.
- Check sand boxes for wasp nests and any other hazardous materials.

RESTROOMS

- Pull trash can liners as needed.
- Look for leaks that can potentially develop into mold.

SHRUBS

- Remove any dead/diseased growth.
- Consider transplanting or replacing diseased shrub.

SIDEWALKS/PATHWAYS

- Routinely look for lifted sidewalks; these areas are homes to ants, weeds, and tree roots. Level lifted areas. (These are potential tripping hazardous.)
- Pull weeds.

TREES

- Pull weeds inside tree basins.
- Do not remove leaf debris. Leave on site for mulch.

TURF

- Mow and irrigate park turf properly to increase vigor and reduce weed populations.

REFERENCES:

- University of California Statewide Integrated Pest Management Project Website
- EPA, Office of Pesticide Programs – Pest Control in the School Environment: Adopting Integrated Pest Management. August 1993.
- Department of Pesticide Regulations.

V. BEST MANAGEMENT PRACTICES (BMPs) FOR SPECIFIC PESTS

This section provides pest management advice for common pest infestations in landscape and structural settings. Please share daily ongoing lessons learned (new practices) which will be added to this section. (This is a living document. It will be updated twice a year.) *This document is not a substitute for UC IPM Website.*

ADDITIONAL RESOURCES

The University of California Agriculture and Natural Resources Statewide Integrated Pest Management Program provides prevention and monitoring guidance for pest management. Visit http://inside.sjcity.net/esd/watershed_protection/Group%20Sites/Pesticide_Management.aspx for thorough IPM assistance.

AQUATIC WEEDS

PURPOSE:

Control aquatic weeds in fountains and water features and minimize the use of pesticides on City property. This applies to all certified City chemical applicators (maintenance workers) and contract personnel.

METHODOLOGY:

- Consult ESD Biologist at (408) 945-3000 on the algae species and toxicity levels.
- Hand pull or rake plants. Most aquatic plants are perennial, with underground portions that can re-sprout new shoots. It is essential that below-ground growth be harvested. Use hand-held devices to cut or pull larger plants. (Some states require permits for harvesting on natural lakes; check with the appropriate State regulatory agency to determine if a permit is required.)
- Swans keep small ponds weed-free, but they require husbandry and protection from predators (they are extremely aggressive during and following the breeding season).
- Use herbivorous fish, the grass carp (*Ctenopharyngodon idella*, also known as the white amur). This fish consumes some filamentous algae and most submersed plants. Because it has the potential to denude a body of water of its underwater vegetation, it must not be released in natural lakes and wetland areas where vegetation is critical to fish and wildlife.
- For more information, visit:
<https://www.cdph.ca.gov/HealthInfo/environhealth/water/Pages/Bluegreenalgae.aspx>

LIST OF PESTICIDES COMMONLY USED:

Use pesticides only if population exceeds the specific pest threshold level. Consult the IPM Coordinator to make a chemical recommendation.

Recommended pesticides: Aquashade (Apply in March or April before plants reach the water surface. Midsummer reapplication is usually necessary.)

FUNGAL DISEASE IN TURF

PURPOSE:

Control fungal disease and minimize the use of pesticides on City property. This applies to all certified City chemical applicators (maintenance workers) and contract personnel.

METHODOLOGY:

Follow sound irrigation practices – whether watering by hand or using an automated system.

- Obtain a soil sample(s) and seek professional services on a diagnostic report. Send sample to a commercial laboratory. (A soil test is essential to determine soil fertility levels and make good nutrient management decisions. Appropriate nutrient application can increase yields, reduce production costs, and prevent surface and groundwater pollution.)
- Determine the correct amount (if any) of fertilizer to maintain a healthy landscape.
- Maintain a lawn at the recommended mowing height to improve its ability to resist diseases and give it greater aesthetic appeal.
- Soil cultivation, such as coring or aeration, will improve shoot and root growth and recuperative ability while decreasing the likelihood of disease and insect damage. Cultivation should be conducted during times when the grass is growing vigorously in order to take advantage of the reduction in soil compaction (spring and fall for cool-season turf and early summer for warm-season grass).

LIST OF PESTICIDES COMMONLY USED:

Use pesticides only if population exceeds threshold level. Consult the IPM Coordinator to make a chemical recommendation.

GRUBS IN TURF

PURPOSE:

Control insects and minimize the use of pesticides on City property. This applies to all certified City chemical applicators (maintenance workers) and contract personnel.

METHODOLOGY:

- Brown spots in lawns also can be caused by over or under-watering, plant disease, a fertilizer/herbicide spill or over-application, or dog urine.
- Confirm that insects are present beyond the acceptable pest threshold level to cause damage before applying an insecticide (6 or more per square foot). If you do not find live pest insects at high levels, do not treat with pesticides.
- Dig around roots to look for grubs. For other insects, perform a drench test. For guidance on drench testing, visit:
<http://www.ipm.ucdavis.edu/TOOLS/TURF/PESTS/indrench.html>.
- For more information, visit: <http://www.ipm.ucdavis.edu/QT/lawninsectscard.html>.

LIST OF PESTICIDES COMMONLY USED:

Use pesticides only if population exceeds threshold level. Consult the IPM Coordinator to make a chemical recommendation.

INSECTS

PURPOSE:

Control insects and minimize the use of pesticides on City property. This applies to all certified City chemical applicators (maintenance workers) and contract personnel.

METHODOLOGY:

Structural Pest Control

Insect	Method
<p>Ants (Carpenter)</p>	<p>Trim tree branches and shrubs away from structures to prevent access.</p> <p>Seal off potential entry points such as where utility lines enter a structure and around window and door seals</p> <p>Reduce mulch around building perimeters to a depth of 2 to 3 inches to discourage nesting.</p> <p>Eliminate any earth-to-wood contact of structural elements that might promote wood decay.</p> <p>Replace decayed or damaged wood and correct problems that cause decay such as clogged rain gutters or leaky pipes.</p> <p>Increase ventilation to damp areas such as attic or subfloor spaces.</p> <p>Store firewood off the ground and several feet away from structures.</p> <p>Remove potential food sources inside a structure and store them in tightly sealed containers.</p>
<p>Cockroaches</p>	<p>Identify the cockroach species first. For help with identification visit: http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7467.html</p>

	<p>Remove food and water sources.</p> <p>Remove hiding places.</p> <p>Use traps to identify and track cockroach populations.</p>
Spiders	<p>Seal foundation cracks and other access holes.</p> <p>Inspect window and door screens for good seals to keep out spiders and the insects they prey on.</p> <p>Keep areas around structure foundations free of clutter.</p> <p>Indoors, regular housecleaning provides adequate spider control.</p> <p>Vacuum up the spider and its web.</p> <p>Alternatively, squash spiders or capture them in a jar and release them outside.</p> <p>Prevent clutter buildup that can provide spider hiding places both indoors and out.</p> <p>Remove spider webs from the exterior of the structure with a broom. When removing spiders, consider the benefit that spiders provide by preying on a large number and variety of nuisance and pest insects. Spiders also have natural enemies — wasps, other spiders, birds, reptiles, and others — that sometimes keep them from becoming too numerous.</p>
Wasps	<p>If a wasp lands on you, don't swat it or run. Wait for it to leave, or gently brush it away.</p> <p>Don't disturb nests. Wasps flying frequently to and from a hole in the ground or a building indicate a probable nest.</p> <p>Keep food, including pet food, covered or indoors.</p>

	<p>Outdoors, cover soda cans so wasps don't crawl in.</p> <p>Keep garbage in sealed cans and empty regularly.</p> <p>Pick up and dispose of ripe fruit.</p> <p>Yellow lure traps hung along the perimeter of a structure can reduce foraging of some species around patios or picnic areas.</p> <p>Homemade traps using meat bait hung on a string just above soapy water may also be used.</p> <p>Place traps away from areas where people gather, such as picnic tables.</p> <p>Ask your Mosquito and Vector Control District if they treat nests, or locate a licensed pest management provider.</p> <p>If you choose to treat nests yourself, wear protective clothing on your body, hands, and head. Use an insecticide that shoots a long stream into the nest entrance and is labeled for treating nests.</p> <p>Paper wasp nests shouldn't require treatment unless they are near human passageways.</p>
--	--

Landscape Pest Control

LIST OF PESTICIDES COMMONLY USED:

Use pesticides only if population exceeds threshold level. Consult the IPM Coordinator to make a chemical recommendation.

MICE (DEER MICE)

PURPOSE:

Control mice (deer mouse) infestations by minimizing the use of pesticides on City property. This applies to all certified City chemical applicators (maintenance workers) and contract personnel.

METHODOLOGY:

EXCLUSION

Rodent-proof construction is the most effective and permanent method to ensure the absence of deer mice and other rodent infestations in structures.

HABITAT MODIFICATION

Simple habitat modification can make landscapes less hospitable for deer mice. Clearing overgrown shrubs, hedges, and weeds can dramatically reduce cover and potential refuges for deer mice. Wood and brush piles, along with fallen trees, should be kept away from structures, as these are prime nesting areas that could harbor deer mice. While habitat modification can reduce numbers of deer mice in an area, it won't completely eliminate them, as a deer mouse's home range is 1/3 acre to 4 or more acres.

FRIGHTENING DEVICES AND REPELLENTS

Commercially sold ultrasonic devices and other frightening devices aren't effective at repelling deer mice. Chemical repellents, also commercially available for outdoor use, aren't sufficiently effective to justify their expense.

TRAPPING AND GLUE BOARDS

Snap traps and electrocution traps can be used to remove deer mice that are found in or around structures. Peanut butter or peanut butter mixed with cereal or rolled oats is usually an effective attractant. A dozen or more traps may be needed to effectively control a large population in a timely manner. It is important to keep some traps set after the initial control period to prevent reinvasion or resurgence of the deer mouse population.

Trap placement is important. To maximize capture success, space traps no more than about 10 feet apart in areas where there is evidence of activity. Mice tend to run along walls, so if traps are placed at the juncture of a wall and the floor with the trigger pointed toward the wall, then the mouse will run directly across the trigger and very likely be caught.

When trapping, take precautions to prevent possible exposure to Hantavirus. Wear rubber, latex, vinyl, or nitrile gloves when removing traps, resetting used and older traps, and disposing of dead mice. Thoroughly wet contaminated areas including trapped deer mice, droppings, and nests with an appropriate disinfectant solution; see Hantavirus and Precautions above. While deer mice can be captured in several commercially available multiple-catch mouse traps, use of these traps isn't recommended because of the greater potential for exposure to Hantavirus. Live-capture traps quickly become contaminated with mouse feces and urine, and they also present the added problem of needing to humanely euthanize the trapped mice.

BIOLOGICAL CONTROL

Deer mice and other members of the genus *Peromyscus* are popular prey for many reptiles, birds, and predatory mammals. Collectively, snakes, owls, weasels, skunks, badgers, foxes, coyotes, and bobcats can consume large numbers of deer mice. However, such natural predation isn't generally enough to control deer mouse populations to a low enough level to prevent damage or risk of exposure to Hantavirus.

Dogs and cats can catch and kill deer mice. However, it is unlikely they will effectively control deer mouse populations, and other control methods will be required. Cats may be able to control the re-infestation of deer mice once populations have been reduced or eliminated. However, in urban settings, mice often live in close association with cats and dogs. Dog houses, sheds, and other shelter available within residential areas also provide refuge for some rodents, and food left out for pets as well as spillage from bird feeders often encourage rodent infestations.

LIST OF PESTICIDES COMMONLY USED:

Use pesticides only if population exceeds threshold level. Consult the IPM Coordinator to make a chemical recommendation.

PIGEONS

PURPOSE:

Control pigeons and minimize the use of pesticides on City property. This applies to all certified City chemical applicators (maintenance workers) and contract personnel.

METHODOLOGY:

- Limit food and water availability.
 - Reduce the number of temporary water sources such as puddles, leaks, or any open container of water.
 - Properly discard garbage and food items in and around the infested area; place in a container which inhibits bird access.
- Limit shelter/harborage availability.
 - Seal gaps that allow pigeon(s) access to roosting and nesting sites.
 - Change ledge angels to 45 degrees so pigeons cannot load, roost, or nest on them.
 - Install plastic bird netting to prevent access to nesting or roosting sites.
 - Use repellants such as plastic or metal spines, monofilament or steel lines, or gels or pastes.
- Trapping and releasing pigeons elsewhere is not an option due to their homing abilities. Pigeons will usually return to the same place where they were trapped and continue to cause problems.

LIST OF PESTICIDES COMMONLY USED:

Not applicable.

RATS (NORWAY)

PURPOSE:

Control rats and minimize the use of pesticides on City property. This applies to all certified City chemical applicators (maintenance workers) and contract personnel.

METHODOLOGY:

SANITATION

Sanitation is fundamental to rat control and must be continuous. If sanitation measures aren't properly maintained, the benefits of other measures will be lost and rats will quickly return.

BUILDING CONSTRUCTION AND RODENT PROOFING

The most successful and long-lasting form of rat control in structures is exclusion, or "building them out." (See Rodent-proofing your home.)

POPULATION CONTROL

When food, water, and shelter are available, rat populations can increase quickly. While the most permanent form of control is to limit food, water, shelter, and access to buildings, direct population control often is necessary.

TRAPPING

Trapping is the safest and most effective method for controlling rats in and around homes, garages, and other structures.

Set traps close to walls, behind objects, in dark corners, and in places where rat signs, such as droppings, have been seen. Position traps along a wall so that they extend from the wall at right angles, with the trigger end nearly touching the wall. If traps are set parallel to the wall, they should be set in pairs to intercept rodents traveling from either direction.

OTHER CONTROL METHODS

Rats are wary animals, easily frightened by unfamiliar or strange noises. However, they quickly become accustomed to repeated sounds, making the use of frightening devices—including high frequency and ultrasonic sounds—ineffective for controlling rats in homes and gardens.

Rats have an initial aversion to some odors and tastes, but no repellents have been found to solve a rat problem for more than a very short time. There are no truly effective rat repellents registered for use in California.

Smoke or gas cartridges are registered and sold for controlling burrowing rodents. When placed into the burrows and ignited, these cartridges produce toxic and suffocating smoke and gases. Because Norway rat burrows can extend beneath a residence and have several open entrances, toxic gases can permeate the dwelling. For this reason and because some fire hazard is associated with their use, smoke and gas cartridges aren't recommended for rat control around homes.

Norway rats can be drowned or flushed from their burrows by flooding them with water from a garden hose and then closing the holes with soil.

Predators, especially cats and owls, eat rats and mice. Some house cats don't have the ability or inclination to prey on adult Norway rats. Often, predators aren't able to keep rodent numbers below levels that are acceptable to most people. Further, pet food can serve as an attractant and provide a continuous food supply to rats and mice in suburban environments.

LIST OF PESTICIDES COMMONLY USED:

Use pesticides only if population exceeds threshold level. Consult the IPM Coordinator to make a chemical recommendation and to process an "Exemption Form".

Recommended pesticides: Consult with your Department's IPM Coordinator.

VERTEBRATES CONTROL IN LANDSCAPES

PUROSE:

Control vertebrates and minimize the use of pesticides on City property. This applies to all certified City chemical applicators (maintenance workers) and contract personnel.

METHODOLOGY:

GOPHERS

- Look for gopher mounds.
- Protect plants (roots) with underground fencing.
- Use traps to reduce gopher population.
- Avoid products and methods that are not proven.

GROUND SQUIRRELS

The control procedure you select depends heavily upon the unique life cycle and behavior of the ground squirrel.

TRAPPING

- Traps are practical for control when squirrel numbers are low to moderate. Live-catch traps aren't recommended, because disposal of the carcass is problematic. Because ground squirrels carry diseases and are agricultural pests, the California Fish and Game Code specifies that it is illegal to release them elsewhere without a written permit. (UC Davis, IPM website.)

HABITAT MODIFICATION

- You'll generally find ground squirrels in open areas, although they sometimes use available cover. Remove brush piles and debris to make an area less desirable. This also aids in detecting squirrels and their burrows and improves access during control operations.
- Ground squirrels can reinvade a site by moving into vacant burrows. Destroy old burrows by deep ripping them to a depth of at least 20 inches using a tractor and ripping bar(s). Simply filling in the burrows with soil does not prevent reinvasion, as ground squirrels easily find and reopen old burrows.

NATURAL CONTROL

- Many predators, including hawks, eagles, rattlesnakes, and coyotes, eat ground squirrels. In most cases, predators aren't able to keep ground squirrel populations below the level at which they become pests. Dogs might prevent squirrels from entering small areas, but they can't control established squirrel populations.

LIST OF PESTICIDES COMMONLY USED:

Use pesticides only if population exceeds threshold level. Consult the IPM Coordinator to make a chemical recommendation and to process an "Exemption Form".

Recommended pesticides: None. The City does not use poisonous baits outdoors.

WEEDS

PURPOSE:

Control weeds and minimize the use of pesticides on City property. This applies to all certified City chemical applicators (maintenance workers) and contract personnel.

METHODOLOGY:

- Hand weed and cultivate.
- Use a small flaming unit to control young weeds. Flaming is most effective on broadleaf weeds than grasses. Avoid dry vegetation, wood chip, or near buildings and other flammable materials, and don't get the flame near desired plants.
- Mow to prevent the formation and spread of weed seeds.
- Use a string trimmer to control the growth of older weeds.
- Use mulch to cover and protect soil.
- For more information, visit:

LIST OF PESTICIDES COMMONLY USED:

Use pesticides only if population exceeds threshold level. Consult the IPM Coordinator to make a chemical recommendation and to process an "Exemption Form". See Appendix for a list of recommendations.

Recommended pesticides: See Appendix, "Pesticide Recommendations for Weeds".

This is page is intentionally left blank.