



# **RESCAPE CALIFORNIA MAINTENANCE MANUAL**

This Maintenance Manual is for informational purposes only. Nothing contained herein is intended to constitute legal advice. ReScape California makes no representations or warranties, either express or implied regarding the suitability or accuracy of the information contained herein.



# MAINTENANCE MANUAL

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**How to use this document:** This document provides information specific to the ReScapE California (formerly called Bay-Friendly) approach to landscape maintenance and can be utilized by a project owner to train and inform in-house City Maintenance Staff OR to hire a maintenance contractor. Items highlighted in yellow should be edited by the owner.

Items highlighted in green are specific to those utilizing this document to hire a maintenance contractor. These items in green should be deleted if in-house City Maintenance Staff intend to maintain the property.

This document is intentionally incomplete and is meant to inform existing language for contracts and requests for proposals.

## SECTION 1 PROJECT INFORMATION

### 1.1 Background: Bay-Friendly

- A. **Goals:** The goal of Bay-Friendly maintenance is to ensure optimal performance over the lifetime of the landscape. This project was designed and constructed to Bay-Friendly standards. Bay-Friendly is a sustainable, whole systems approach to the design, construction and maintenance of the landscape. To ensure the success of the landscape after construction, it is critical to maintain the site following Bay-Friendly principles and implementing Bay-Friendly practices.
- B. **Tools:**
1. The following Bay-Friendly trainings and publications are available at <https://rescapeca.org/>.
    - a. [Bay-Friendly Qualified Professional Trainings](#)
    - b. [Bay-Friendly Landscape Guidelines](#)
    - c. [Bay-Friendly Rating Manual for Civic, Commercial and Multifamily Landscapes](#)
    - d. [A Bay-Friendly Landscaping Guide to Grasscycling](#)
    - e. [A Bay-Friendly Guide to Mulch](#)
    - f. [A Bay-Friendly Guide to Recycled Content & Salvaged Materials](#)
    - g. Sheet Mulch Directory: [www.lawntogarden.org](http://www.lawntogarden.org)
  2. The following additional tools may be helpful in implementation of Bay-Friendly practices:
    - a. *A Guide to Estimating Irrigation of Water Needs of Landscape Plantings*, California Dept. of Water Resources, <http://cdec.water.ca.gov>.
    - b. *Irrigation water audits*, Irrigation Association, [www.irrigation.org](http://www.irrigation.org), and the Irrigation Technology Research Center, [www.itrc.org](http://www.itrc.org).
    - c. *California Irrigation Management Information System*, [www.cimis.water.ca.gov](http://www.cimis.water.ca.gov),
    - d. Waste management and recycling, <https://www.calrecycle.ca.gov/>.
    - e. *The Weed Worker's Handbook, A Guide to Techniques for Removing Bay Area Invasive Plants*, The Watershed Council (510) 231-5655 and the California, Invasive Plant Council (510) 843-3902
    - f. *The Gardener's Guide to Common Sense Pest Control*, Olkowsky et al., Taunton Press, 2013.
    - g. *Pests of Landscape Trees and Shrubs: An Integrated Pest Management Guide*, 2<sup>nd</sup> ed., UC Publication 3359, <http://www.ipm.ucdavis.edu>.
    - h. *A Field Guide to Compost Use*, The Composting Council, 114 South Pitt Street, Alexandria, Virginia 22314, (703) 739-2401, <https://www.compostingcouncil.org/>.
    - i. *IPM Practitioner's 2014 Directory of Least-Toxic Pest Control Products*, Bio-Integral Resource Center, <http://www.birc.org/Directory.htm>

- j. Stormwater Technical Guidance Manuals for various countywide programs:
  - 1) Alameda – <https://www.cleanwaterprogram.org/>
  - 2) Contra Costa - <https://www.ccleanwater.org/>
  - 3) San Mateo – <https://www.flowstobay.org/>
  - 4) Santa Clara - <https://scvurppp.org/>
  - 5) San Francisco - <https://www.sfwater.org/index.aspx?page=1000>

**1.2 Scope of Work**

This work includes [edit as necessary]: all supervision, labor, materials, equipment, tools, supplies and services to maintain in a superior condition all landscape areas, irrigation and drainage systems and other related work. Perform all work in a workman-like manner, using quality equipment, Bay-Friendly methods and materials.

This work does not include: Installation or replacement of plants, except for those damaged or allowed to decline or die by the Contractor; Repair and/or modification of the irrigation system, except for those specified in Water Management.

**1.3 Site Description**

- A. Project Location: [redacted]. See also enclosed maps and plans.
- B. Owner: [redacted]
- C. Owner’s Representative/ City Maintenance Manager [redacted]
- D. Contractor (if applicable) [redacted]
- E. Landscape inventory (if available):
 

Total Irrigated Area	[redacted] ft <sup>2</sup>
Turf	[redacted] ft <sup>2</sup>
Turf Alternatives	[redacted] ft <sup>2</sup>
Annual Color	[redacted] ft <sup>2</sup>
Shrubs	[redacted] ft <sup>2</sup>
Trees	[redacted] ea
Walkways/Plaza	[redacted] ft <sup>2</sup>
Roads/ Parking Lots	[redacted] ft <sup>2</sup>
Area Devoted to LID Measures	[redacted] ft <sup>2</sup>

**1.4 Supplemental Documents – Provided by Owner’s Representative/ City Maintenance Manager**

- A. **Site Plan:** Identifies plants, landscape features, utilities, building and parking footprints, streets and addresses.
- B. **Grading and Drainage Plan:** Identifies slopes, drain locations, drain elevations.
- C. **As-built Irrigation Plan:** Identifies final locations of meters, valves, controllers, and types of irrigation equipment installed.
- D. **Irrigation Hydrozone Map and Controller Chart**
- E. **Planting Plan:** Identifies plant species and locations; includes plant list indicating water use and mature width of each plant species. **Note: If Owner’s Representative does not provide Planting Plan, Contractor will document existing planting. See Section 6 – Plant Care for documentation requirements.**
- F. **Soil Analysis:** Results of soil analyses from samples collected at the project area.
- G. **Water Budget Calculations:** Calculations of Maximum Applied Water Allowance (MAWA) and Estimated Total Water Use (ETWU).

- H. **Final Bay-Friendly Scorecard** for project showing credits achieved.
- I. **Bay-Friendly Site Analysis** (attached at the end of this manual).

## SECTION 2 GENERAL REQUIREMENTS

### 2.1 Contractor Requirements

- A. Assign to the site at least one employee who is a Bay Friendly Qualified Professional. The professional must have graduated from the Bay-Friendly Training Program for Maintaining Existing Landscapes, and their qualification status must be current.

### 2.2 Work Requirements

#### A. Supplies and Equipment:

1. Fuel conservation and low emission equipment: Equipment should have sustainable features, such as:
  - a. Low decibel
  - b. Mulching mowers
  - c. Low emissions
2. Implement the following strategies in work operations to reduce fossil fuel consumption and emissions:
  - a. Use non-motorized equipment.
  - b. Do not use gas-powered blowers on planting beds.
  - c. Minimize use of gas-powered blowers on hardscape.
  - d. Select smallest, most fuel-efficient equipment to accomplish task.
  - e. Consider vehicles that operate on natural gas or biodiesel.
  - f. Maintain equipment properly and keep it well tuned.
  - g. Emphasize employee carpooling to property.
3. Use local products and suppliers (compost and mulch produced within 100 miles or hardscape materials produced within 200 miles from the project site) to the extent possible to minimize fuel consumption and emissions.
4. Use recycled-content, FSC and salvaged materials where possible. See Section 1.1.B – Tools for information on recycled and salvaged materials in California.
5. Refuel and repair equipment in a safe manner to protect against accidental spills. Limit refueling to specific areas on a site. Take measures to prevent, control, and clean-up spills. Clean-ups should be immediate, automatic and routine and performed by a trained staff member or a licensed cleaning company. Contact the local emergency response team agencies to report significant spills. Repair all oil leaks immediately off site.

#### B. Reporting and Inspecting:

1. Complete and submit the Bay-Friendly Site Analysis before beginning maintenance work <https://rescapeca.org/>.
2. The Owner's Representative may make periodic inspections to insure that complete and continuous maintenance is fulfilled. In addition, the Owner's Representative may obtain the services of an approved horticultural specialist to inspect plantings and make recommendations for improvements in the maintenance program.



## SECTION 3 SOIL FERTILITY MANAGEMENT

**Goal:** Create healthy, resilient soil by protecting soil from damage and compaction, minimizing soil erosion, increasing biological activity through the addition of compost and mulch, and avoiding the use of synthetic fertilizers and pesticides. Healthy, biologically diverse soil provides nutrients to sustain healthy, resilient plants without resulting in excessive growth that can compromise plant health, attract pests and require frequent pruning, edging or mowing. Other benefits include: improved water-holding capacity and resistance to disease, as well as reduced need for fertilizer and overall maintenance costs.

### 3.1 Protect Soil from Compaction

- A. **Goal:** Avoid maintenance practices that cause soil compaction.
- B. **Rationale:** Compaction creates anaerobic conditions, restricts rooting depth, decreases pore size and infiltration, kills soil biology, and increases runoff and erosion. Compaction increases the need to apply fertilizers, pesticides and water.
- C. **Schedule:** Do not work soil when wet or during rainy season (generally between October and April).
- D. **Materials:**
  - 1. Mulch (see 3.5: Mulch Regularly)
- E. **Execution:**
  - 1. Cultivate soil when it is moderately moist.
  - 2. Drive maintenance equipment over the soil only when the soil is dry or limit traffic to paved areas.
  - 3. Distribute the load over the non-paved areas using one of the following methods:
    - a. Apply 6-inch thick layer of coarse organic mulch to driving track
    - b. Place reusable planks or ¾-inch plywood in the driving track.
    - c. Establish driving routes for heavy equipment over non-paved areas to limit extent of soil compaction.
    - d. To the extent possible, vary mowing patterns to minimize the formation of wheel ruts and associated compaction.

### 3.2 Protect Soil from Erosion

- A. **Goal:** Maintain landscape to prevent erosion and avoid maintenance practices that cause erosion.
- B. **Rationale:** Erosion removes topsoil, reduces levels of soil organic matter, and contributes to the breakdown of soil structure, creating a less favorable environment for plant growth. Erosion removes surface soil, which often has the highest biological activity and greatest amount of soil organic matter. Nutrients removed by erosion can accumulate in water, causing problems such as algal blooms and eutrophication. Deposition of eroded materials can obstruct roadways and fill drainage channels. Sediment can damage fish habitat and degrade water quality in streams, rivers, and lakes. Blowing dust can affect human health and create public safety hazards.
- C. **Schedule:** Ongoing
- D. **Materials:**
  - 1. Mulch (see Section 3.5 – Mulch Regularly).
- E. **Execution:**
  - 1. Maintain vegetative cover over the soil to the extent possible.
  - 2. Use cobble or rock mulch at points of concentrated flow, such as drain inlets, downspouts, and curb cuts.

3. Slow water flow on slopes with compost berms, blankets, socks or tubes.
4. Maintain 3-inch layer of mulch minimum over bare soil (see Section 3.5 – Mulch Regularly).
5. Do not use blowers in planting areas.

### 3.3 Amend the Soil with Organic Compost

- A. **Goal:** Incorporate organic compost into soil before planting and top-dress as necessary to bring the soil organic matter to 5% by dry weight.
- B. **Rationale:** Compost improves soil structure and porosity, increases moisture infiltration and water holding capacity, controls soil-borne pathogens, supplies organic matter, nutrients, and microorganisms, improves nutrient-holding capacity, stabilizes pH, controls erosion, suppresses weed growth, binds and degrades pollutants, avoids greenhouse gas emissions, and increases soil carbon storage.
- C. **Schedule:**
  1. Collect and submit soil samples to an accredited and approved testing laboratory at time of planting or at signs of plant stress. Amend soil if recommended by soil analysis.  
Exceptions:
    - a. Many California native plants require soil organic matter content lower than 5%. Indicate the presence of native plants on soil report request and target organic matter content for soil.
    - b. For seasonal color (annuals) no soil test is necessary.
  2. Amend the soil with 1 inch of compost annually at seasonal color beds. Submit soil test for organic matter only.
  3. Topdress turf areas with a finely screened (1/4 inch) compost 1 time per year along with aeration and
  4. Topdress shrub areas with 3/8-inch compost one time per year (for bidding purposes).
- D. **Materials:**
  1. Required criteria for acceptable producers:
    - a. Producer accepts post-consumer source material.
    - b. OMRI (Organic Materials Review Institute) certified or CDFA (California Department of Food and Agriculture) listed for use in organic farming.
    - c. Recommended: Participation in the US Composting Council (USCC) Seal of Testing Assurance (STA) program.
  2. Compost used in this project must:
    - a. Be mature, well decomposed, stable and weed free.
    - b. Be derived from agricultural and/or food scraps and/or plant trimmings.
    - c. Contain no substances toxic to plants.
    - d. Acceptable color: dark brown to black.
    - e. Acceptable odors: Soil-like, forest-like, moldy.
    - f. Unacceptable odors: ammonia, rot, garbage, sourness.
    - g. Not resemble the feedstock (original materials form which it was derived).
    - h. Be listed by CDFA as an Organic Input Material (OIM) and/or be approved by OMRI.
    - i. Be produced by a participant of the US Composting Council's STA Program.
    - j. Be generated from feedstock/materials sourced within 100 miles or produced at a facility within 100 miles of the project site.
    - k. Acceptable compost suppliers include: [insert suppliers] or approved equal. Sources of local recycled compost can be found at [www.lawntogarden.org](http://www.lawntogarden.org).

3. The compost laboratory report **must** confirm the following compost parameters:

Property	Test Method	Unit of Measurement	Requirement
pH	TMECC 04.11-A Elastomeric pH 1:5 slurry method pH	units	6–8.5
Soluble salts	TMECC 04.10-A Electrical conductivity 1:5 slurry method	dS/m (mmhos/cm)	0– 5 or 10
Moisture content	TMECC 03.09-A Total solids & moisture at 70 ± 5 °C	% wet weight basis	30–60 or 35-55
Organic matter Content	TMECC 05.07-A Loss-on-ignition organic matter method (LOI)	% dry weight basis	30–60
Maturity	TMECC 05.05-A Germination and vigor	% relative to positive control	Seed emergence 80 or above Seedling vigor 80 or above
Stability	TMECC 05.08-B Carbon dioxide evolution rate	mg CO <sub>2</sub> -C/g OM per day	4 or below
Pathogen	TMECC 07.01-B Salmonella < 3 MPN per 4 grams, dry weight basis	Pass/ Fail	Pass
Pathogen	TMECC 07.01-B Fecal coliform bacteria < 1,000 MPN per gram, dry weight basis	Pass/ Fail	Pass
Physical contaminants	TMECC 02.02-C Man-made inert removal and classification: Plastic, glass, and metal % > 4 mm fraction	% dry weight basis	combined total: < 0.5%
Physical contaminants	TMECC 02.02-C Man-made inert removal and classification: Sharps (sewing needles, straight pins and hypodermic needles) % > 4mm fraction	% dry weight basis	none detected
Particle size fine for compost used as soil amendment	TMECC 02.02-B Sample sieving for aggregate Size classification	% dry weight basis	Pass 2”-inch sieve 98% min Pass 3/8-inch sieve 95% min
Arsenic		mg/kg (ppm)	EPA 503 pass < 10 OMRI
Cadmium		mg/kg (ppm)	EPA 503 pass < 20 OMRI
Chromium		mg/kg (ppm)	EPA 503 pass < 100
Copper		mg/kg (ppm)	EPA 503 pass <400
Lead		mg/kg (ppm)	EPA 503 pass < 90 OMRI
Mercury		mg/kg (ppm)	EPA 503 pass <4
Nickel		mg/kg (ppm)	EPA 503 pass <80
Selenium		mg/kg (ppm)	EPA 503 pass <5
Zinc		mg/kg (ppm)	EPA 503 pass <2800

Property	Test Method	Unit of Measurement	Requirement
Ammonium (N or NH4-N)		ppm or mg/kg dry weight	<450
Sodium (Na)		% dry weight	<0.5
Carbon:Nitrogen Ratio		Carbon : Nitrogen	≤20:1
Bulk Density		lbs/CY dry weight lbs/CF dry weight	>19 and <41 >500 and <1100

Note: TMECC refers to "Test Methods for the Examination of Composting and Compost," published by the United States Department of Agriculture and the United States Compost Council (USCC). (Table modified from the US Composting Council Landscape Architectural Specifications 2009.)

**E. Execution:**

1. Follow sample collection procedures recommended by soil testing laboratory.
2. Request an analysis that includes soil texture, infiltration rate, pH, total soluble salts, sodium, essential nutrients, heavy metals and percent organic matter.
3. Request recommendations for compost and organic fertilizers to bring the soil organic matter to a minimum of 5%.
4. For areas over 1000sf, submit soil lab report and any proposed soil amendments and cost adjustments to **Owner's Representative/ City Maintenance Manager** for written approval. After review and written approval by the **Owner's Representative/ City Maintenance Manager**, amend the soils according to said laboratory's recommendations. Exception: seasonal color beds.
5. Follow soil lab report recommendations for amending soil and backfill for any replacement planting necessary.

**3.4 Use Only Organic Fertilizers:**

- A. **Goal:** Manage fertilization to provide moderate, not excessive, growth. The intent is to avoid over- fertilization through regularly scheduled applications.
- B. **Rationale:** Synthetic quick release fertilizers frequently wash through the soil before they are even taken up by plants. Plant nutrient requirements can be met with compost and organic fertilizers.
- C. **Schedule:** For bidding purposes apply the following fertilizers: compost, compost tea, and organic fertilizers. The nitrogen content of compost varies; check with producer. **[Adjust quantities and schedule below based on soil report]:**
  1. Turf: For bidding purposes plan to apply up to 3.5-4.5 lbs/1000 sf of actual nitrogen to cool season grasses per year in three to four applications.
  2. Herbaceous Groundcover. For bidding purposes apply 3.5-4.5 lbs/1000 sf one time per year.
  3. Seasonal Color: For bidding purposes apply 3.5-4.5 lbs/1000 sf at time of replacement.
  4. Woody Shrubs and Groundcover: For bidding purposes apply recommended label rate one time per year.
  5. Tree: For bidding purposes apply one time per year at the dripline.
- D. **Materials:**
  1. Acceptable products are those allowed for use in crop production by at least one of the following:

- a. Organic Materials Review Institute’s Generic Materials List (OMRI)
- b. California Department of Food and Agriculture’s (CDFA) Organic Input Materials (OIM) Program
- c. U.S. Department of Agriculture’s National Organic Program

**E. Execution:**

1. Apply the appropriate amount of fertilizer to supply the specified quantity of nutrient as determined by soil analysis and/or plant tissue analysis. Include the available nitrogen from grasscycling and applying compost as a topdressing in the calculations of actual nitrogen. Grasscycling typically provides about 3.0 lbs actual nitrogen/1,000 square feet.
2. Supply fertilizer and soil amendment labels to **Owner’s Representative/ City Maintenance Manager** and include the guaranteed analysis identifying components of the material and the percent nutrient content.
3. Apply and manage fertilizers and amendments to prevent pollution of surface and groundwater.

**3.5 Mulch Regularly**

- A. **Goal:** Maintain a minimum of 3 inches of mulch on the surface of all non-turf planting areas.
- B. **Rationale:** Mulch conserves water, enhances plant growth and suppresses weeds.
- C. **Schedule:** Replenish mulch as necessary. Reapply mulch at least one time per year.
- D. **Materials:**

1. Mulch shall be:
  - a. Made from organic materials including tree trimmings, clean (unpainted and untreated) wood or wood and plant trimmings, including medium-coarse compost.
  - b. Free of physical contamination with zero visible contamination at time of final walk-through. If contamination is present when mulch is delivered, **Contractor/City Maintenance Staff** shall reject load or remove contamination.
  - c. Local and generated from feedstock/ materials sourced within 100 miles or produced at a facility within 100 miles of the project site.
  - d. Light in color. Black mulches or grape seed pumice mulch is not allowed
  - e. Acceptable mulch suppliers include: **[insert suppliers]** or approved equal. **Sources of local, recycled mulch can be found at [www.lawntogarden.org](http://www.lawntogarden.org).**
  - f. When using coarse compost as mulch, particle size shall conform to the following:

<b>Parameter</b>	<b>Minimum (% dry weight basis)</b>	<b>Maximum (% dry weight basis)</b>
Pass 2-inch sieve	90%	--
Pass 3/8-inch sieve (minimum 40% retained)	50%	75%

Note: Maximum particle length: 6 inches  
Source: CalTrans.

2. When available, use materials generated on-site.
3. Prohibited materials:
  - a. Forest industry product and byproducts such as redwood bark, peat moss, or gorilla hair, recycled tires or other inorganic materials.
  - b. Synthetic weed barriers.

**E. Execution:**

1. Keep mulch 6 inches away from tree trunks and away from shrub stems.
2. Apply mulch so that it is below grade (curb, edging, etc.) by half an inch. In cases where existing plant roots would be harmed, tapering mulch toward edge of walk is acceptable.

3. Use coarse, interlocking mulch (2-3 inches minimum) on slopes to avoid washing mulch into storm drains. On steep slopes, jute netting can be installed underneath mulch to stabilize mulch.

## SECTION 4 WATER MANAGEMENT

**Goal:** Maintain plant appearance and health, promote deep rooting zone, conserve water and avoid overspray and water damage to Owner's hardscape and property.

### 4.1 Water Audit

- A. **Goal:** Conduct irrigation audits to reduce water use in the landscape.
- B. **Rationale:** The California Water Efficient Landscape Ordinance requires water audits of all completed landscapes. Extending this practice into yearly maintenance will continue water reduction practices into the future.
- C. **Schedule:** Bi-annual irrigation audits shall be completed.
- D. **Materials:** None.
- E. **Execution:** A certified landscape irrigation auditor shall conduct an irrigation audit. The audit must be conducted in a manner consistent with the Irrigation Association's Landscape irrigation Auditor Certification program or other U.S. Environmental Protection Agency "Watersense" labeled auditing program.

### 4.2 Irrigation Scheduling

- A. **Goal:** Use the water budget approach to irrigation scheduling.
- B. **Rationale:** To match plant need with water application and avoid over-irrigation and overspray.
- C. **Schedule:** Ongoing.
- D. **Materials:** None.
- E. **Execution:**
  1. Determine irrigation intervals and frequency based on weather conditions, soil infiltration rates, and rooting depth and water requirements within each hydrozone. For calculation methods, see *A Guide to Estimating Irrigation Water Needs of Landscape Plantings in California*, available from the Dept. of Water Resources, Sacramento, CA.
  2. Base irrigation frequency on ET (evapotranspiration) data (available through CIMIS). Irrigation shall be applied at approximately 60% allowable depletion (AD) for turf and annuals, 70% for non-drought tolerant and 80% for drought tolerant plantings.
  3. Base irrigation duration within each hydrozone on the soil infiltration rate, species water requirement and rooting depth within the hydrozone, and the application rate and distribution uniformity of the irrigation system within that zone. Apply enough water at each irrigation cycle to wet through the depth of root zone. Where runoff occurs, divide the application time into shorter time intervals and repeat as needed.
  4. Adjust irrigation frequency for each hydrozone at least monthly to reflect ET expected in the next month. Unnecessary with ET-based controller.
  5. Program the weather-based controller (soil moisture-based or other self-adjusting) according to manufacturer specifications, and monitor to ensure that frequency is appropriate. Alert agency staff immediately if controller is not properly hooked up or data service is not available to weather based controller.
  6. Whenever possible, schedule landscape irrigation between 2:00 a.m. and 10:00 a.m. to avoid irrigating during times of high wind or high temperature.
  7. Turf: Irrigate to provide adequate water to maintain an attractive, green, healthy turf, and moderate growth rate during its growing season, without stimulating excessive growth rates. Irrigation frequency under normal conditions should not exceed three times per week.



8. Annual Color Irrigation: Maximum irrigation frequency under normal conditions should not exceed two times per week.
9. Tree Irrigation: Irrigate to encourage deep root growth and to provide adequate water to maintain attractive, healthy plants, and a moderate growth rate during their growing season.
10. For landscapes irrigated with recycled water and containing salt-sensitive plants, increase irrigation frequency and duration to allow for elevated salts in the water and reduce salt accumulation in the root zone.
  - a. Monitor salinity levels annually if there is evidence of salt damage to plants. Follow soil laboratory recommendations to reduce salinity.
  - b. Once a month during the summer, irrigation duration should be increased by 20% to leach salts below plant root zones.

#### 4.3 Irrigation Monitoring Maintenance and Repair

- A. **Goal:** Maintain the irrigation system for optimum performance, as per manufacturer specifications.
- B. **Rationale:** Every drop of water that is supplied to the landscape by irrigation should be protected from loss due to evaporation, overspray or runoff.
- C. **Schedule:**
  1. Determine irrigation run time demand monthly by recording [landscape water meter, submeter or controller] reading before and after irrigation. Report water use to the property Owner's Representative/ City Maintenance Manager at a minimum of once a month. Reconcile this data with run times and flow rates to determine if there is unusual consumption which may indicate stuck valves or leaks.
  2. Assess the irrigation system while it is in operation at every site visit during the watering season. Maintenance Contractor/ City Maintenance Staff to submit to the Owner's Representative/ City Maintenance Manager monthly documentation of irrigation checks and note any changes or adjustments to the system on the 'as built' irrigation plans.
  3. Perform the following weekly April through October and monthly November through March:
    - a. Clean and adjust all sprinkler and bubbler heads, drip emitters and valves for proper coverage.
    - b. Check and adjust irrigation system pressure.
  4. Perform the following systems check twice a year, at a minimum:
    - a. Ensure all flush valve/cap locations and valve boxes are visible and can be opened.
    - b. Inspect valves, filters, and pressure regulators for damage or leaks.
    - c. Check wire splices.
    - d. Clean valve boxes of dirt and debris.
    - e. Inspect, clean and flush filters and replace damaged or torn filters.
    - f. Flush laterals.
    - g. Make sure plants have adequate numbers of drip emitters for their size.
    - h. Test backflow preventers.
- D. **Materials:** All irrigation replacement parts shall be of the same manufacturer, type, and application rates as existing, or approved equals or upgrades.
- E. **Execution:**
  1. Monitor soil moisture within plant root zones using a soil probe or shovel and adjust irrigation schedules accordingly. [delete previous sentence if your project includes a soil probe]

2. Observe irrigation system in operation to identify and correct water runoff or standing water problems.
3. All malfunctioning equipment shall be repaired before the next scheduled irrigation. Submit for **Owner's Representative/ City Maintenance Manager** approval repairs over \$200.

#### 4.4 Hand Watering

[If an irrigation system does not exist, delete water auditing, irrigation scheduling, irrigation monitoring, maintenance and repair and recycled water above and include the following]:

- A. **Goal:** To encourage the development of healthy plants with vigorous root systems.
- B. **Rationale:** Every drop of water that is supplied to the landscape by irrigation should be protected from loss. Water efficient hand watering should be used when a permanent irrigation system is not available or appropriate to the site.
- C. **Schedule:** Whenever possible, hand water between sunrise and 10:00 a.m. to avoid watering during times of high wind or high temperature.
- D. **Execution:**
  1. Confirm monthly water needs of each plant based upon Reference Evapotranspiration (ET<sub>o</sub>) and plant factor (PF) using the following formula:  $ET_o \times PF = \text{watering need in inches}$ , adjusting for soil infiltration rate, species water requirement and rooting depth within the hydrozone.
  2. Before watering, evaluate soil moisture with plant root zones using a soil probe or by hand. Basins should be allowed to dry to the point where the soil surface is dry but soil within root zones has not reached permanent wilting point.
  3. Do not allow water runoff or excessive standing water.
  4. Record irrigation water use monthly. If yearly water demand exceeds project MAWA inform the **Owner's Representative/ City Maintenance Manager** as soon as possible to discuss reduction of water use.
  5. **Contractor/City Maintenance Staff** should reconstruct tree and shrub basins, as needed, for applying the necessary volume of water.
  6. Once plants are established limit watering to only when needed.

## SECTION 5 PEST MANAGEMENT

**Goal:** IPM (Integrated Pest Management) is a holistic approach to mitigating insects, plant diseases, weeds, and other pests. IPM utilizes regular monitoring to determine if and when treatments are needed and employs physical, mechanical, cultural, biological and educational tactics to keep pest numbers low enough to prevent intolerable damage or annoyance. Least-toxic chemical controls are used as a last resort. In IPM Programs, treatments are not made according to a predetermined schedule; they are made only when and where monitoring has indicated that the pest will cause unacceptable economic, medical or aesthetic damage. Treatments are chosen and timed to be most effective and least disruptive to natural pest controls. This definition of IPM was written in the early 1980s by the Bio-Integral Resource Center (BIRC), the group that essentially invented urban IPM.

Bay-Friendly Landscaping uses IPM to manage all pest species in a manner that maintains a healthy attractive landscape, maximizes resistance to pests, out-competes weeds and incorporates treatment actions that do not harm or negatively affect non-target organisms, air and water quality, or public health. IPM relies on a range of biological, cultural, mechanical, physical, and educational methods before using least-toxic pesticides. Chemical controls are applied only when monitoring indicates that preventative and non-chemical methods are not keeping pests below acceptable levels. When pesticides are required, OMRI (Organic Material Review Institute) listed pesticides that are the least toxic, most specific, and the least persistent that will provide adequate pest control may be used. Pesticides shall not be applied on a prescheduled basis.

### 5.1 Insects and Diseases

- A. **Goal:** Bay-Friendly Landscaping seeks to control insect infestations and diseases using the IPM goals outlined above. Acceptable levels of insect and disease will be determined in consultation with the **Owner's Representative/ City Maintenance Manager**. The complete elimination of a pest is neither economically or biologically feasible, nor desirable. Even if it were, the cost of eradication in terms of human health and environmental contamination would be prohibitive.
- B. **Rationale:** Utilizing IPM reduces pollution and protects the ecosystem.
- C. **Schedule:** Ongoing.
- D. **Materials:** See execution below.
- E. **Execution:**
  1. Cultural/Mechanical/Physical Methods: A number of maintenance practices or modifications of them can make the environment unfavorable for pest reproduction, movement, or survival. Other mechanical or physical practices may specifically combat plant pests or increase host resistance. The **Contractor/ City Maintenance Staff** shall consider the following controls first to lower insect and disease populations to the acceptable level:
    - a. Foster a healthy soil, fertilize only when needed (see Section 3.3 – Amend the Soil with Compost and Section 3.4 – Use Only Organic Fertilizers).
    - b. Manage irrigation appropriately (see Section 4 – Water Management).
    - c. Prune to remove infected or infested branches and shoots. Time pruning to avoid periods of insect infestation; consult with a local arborist for the best time to prune trees. For example, prune pines and eucalyptus in the winter (December-February) when bark beetles and borers are inactive.
    - d. Remove fallen twigs, leaves, and fruit that contain the disease-causing pathogen.
    - e. Remove dead plants.
    - f. Mulch soil surface to a minimum of 3 inches in non-turf planting areas to reduce splashing of spores and other infective parts of the pathogen from being deposited on plant surfaces.
    - g. Trap insects using sticky traps and monitor types of insects collected.

- h. Bring to attention of **Owner's Representative/ City Maintenance Manager** diseased or insect-prone plants and suggest resistant plant replacements or those better suited to the site and microclimate.
- 2. Biological Methods: Biological controls (beneficial organisms) are of natural origin and have limited or no adverse effects on the environment. Determining the effective biological control and proper timing of application are critical to success in pest control. Consider the following biological control methods when cultural/ mechanical/ physical methods are not adequate to lower pest populations to the target level:
  - a. Beneficial insect release and conservation
  - b. Parasitic nematodes
  - c. Microbial insecticides
  - d. Microbial fungicides
- 3. Pesticides: The term pesticide applies to insecticides, fungicides and other substances used to control pests. When cultural, mechanical, physical and biological controls have provided inadequate pest control, the **Contractor/ City Maintenance Staff** may select and apply an appropriate OMRI- or Our Water Our World-listed least-toxic pesticide as a last resort.
  - a. Least-Toxic Pesticides: Use organic or least toxic pesticides as a last resort and include chemicals that have a high LD-50, low residual and narrow range of toxicity. Time application to the appropriate life stage of the pest, when it is most vulnerable. Approved least toxic pesticide examples include:
    - 1) insecticidal soaps,
    - 2) horticultural oils,
    - 3) herbicidal soaps,
    - 4) neem,
    - 5) microbial fungicides and insecticides that are OMRI listed.
  - b. Pesticides including the following products are restricted:
    - 1) Organophosphate pesticides are prohibited. These chemicals have been found to persist in the environment and cause water quality impairment of creeks, streams, and arroyos throughout the San Francisco Bay Area. Examples include: acephate (trade name Orthene®), malathion and carbaryl (trade name Sevin®).
    - 2) Neonicotinoids are prohibited. The chemicals have been found toxic to bees and insects, and detrimental to birds and other insectivorous species. Examples include Merit, Marathon and ALoft.
    - 3) Pyrethrins containing piperonyl butoxide (PBO). Water quality agencies discourage use because of contamination issues.
    - 4) Pesticides that are toxic to birds, fish, and beneficial insects, should be used only as a last resort, and carefully applied to avoid runoff and contact with non-target plants. The San Francisco Reduced Risk Pesticides List, available online, uses toxicity to non-target species in their pesticide evaluation process.
    - 5) Toxicity Category I or II Pesticide Products.
    - 6) Pesticides on the "Proposition 65 List." These are pesticides and other chemicals identified and listed by the State of California as chemicals known to the State to cause cancer or reproductive toxicity pursuant to the California Safe Drinking Water and Toxic Enforcement Act of 1986.
    - 7) Pesticides classified as a human carcinogen, probable human carcinogen or possible human carcinogen by the United States Environmental Protection Agency, Office of Pesticide Programs.
  - c. Notice of Pesticide Use:
    - 1) Notify **Owner's Representative/ City Maintenance Manager** in writing and post signs at least three days before application of the pesticide product. Signs must remain posted for at least four days after application of the pesticide. If OMRI listed

- or equivalent approved by **Owner's Representative/ City Maintenance Manager**, notification is not necessary.
- 2) Post signs: (i) at every entry point where the pesticide is applied if the pesticide is applied in an enclosed area, and (ii) in highly visible locations around the perimeter of the area where the pesticide is applied if the pesticide is applied in an open area.
  - 3) Post signs of a standardized design that are easily recognizable to the public and workers. See the posting signs used by the City and County of San Francisco, which can be used as a template.
  - 4) The posting sign must include the brand name of the pesticide, the common name of the active ingredient, and the EPA Registration Number for the specific product. The posting must also include the name of the target pest, the date of pesticide use, any alternate "rain dates" for the application, the signal word indicating the toxicity category of the pesticide, the time and date for re-entry to the area treated, and the name and contact number for the person responsible for the supervision of the application.
  - 5) **Contractor/ City Maintenance Staff** shall not be required to post signs in right-of-way locations that the general public does not use for recreational purposes. These include medians and limited access roadsides. Notify **Owner's Representative/ City Maintenance Manager** in writing three days before pesticide applications in right-of-way areas.
  - 6) **Contractor/ City Maintenance Staff** may obtain authorization from the **Owner's Representative/ City Maintenance Manager** to apply a pesticide without providing a three-day advance notification in the event of a public health emergency or to comply with worker safety requirements. Signs shall be posted for at least four days after application of the pesticide, as described in Section 3.5.B.4.a – Notice of Pesticide Use, above.
  - 7) A licensed and trained technician will perform all chemical applications. **Contractor/ City Maintenance Staff** must be a licensed Pest Control Operator as required by the State of California, registered in the county where the application will be done, and strictly adhere to all laws. A "licensed technician" possesses either a California issued QAC (Qualified Applicator Certificate) or a QAL (Qualified Applicator License) with certification in the category appropriate to the operation. Relevant categories include: Landscape Maintenance, Right-of-Way, Aquatic, and Residential, Industrial and Institutional pest control.

**F. Monitoring and Reporting:**

Monitor landscape areas to identify presence of non-beneficial insects and pests, determine populations, life stage, and degree of damage to plants. Key plants: key pests will be monitored closely during normal periods of pest activity. Monitoring and the evaluation of the information gathered will be the basis on which pest control actions are initiated. Maintain records of all pest management activities. Submit the pest management record to **Owner's Representative/ City Maintenance Manager** on a monthly basis. Each record shall include the following information:

1. target pest;
2. cultural, mechanical, physical, biological, and educational methods used;
3. effectiveness of methods and tactics used;
4. if a pesticide is used, report the following information:
  - a. brand name and EPA Registration Number;
  - b. date the pesticide was used;
  - c. reason for pesticide use;
  - d. site of the pesticide application;
  - e. formulation and type of pesticide (e.g., spray fungicide, granular insecticide, etc.);
  - f. quantity of pesticide used;
  - g. application equipment used;

- h. name of the pesticide applicator.

## 5.2 Weed Management

- A. **Goal:** Bay-Friendly Landscaping seeks to manage weeds using the IPM goals outlined above. Keep landscape relatively weed free and free from all invasives found on the Don't Plant a Pest list at [www.cal-ipc.org](http://www.cal-ipc.org) and Plant Right's list of invasive plants ([www.plantright.org](http://www.plantright.org)). Identify any invasives that are currently in the landscape and notify the **Owner's Representative/ City Maintenance Manager** and propose a replacement plant option.
- B. **Rationale:** Utilizing IPM reduces pollution and protects the ecosystem.
- C. **Schedule:** Ongoing.
- D. **Materials:** See execution below.
- E. **Execution:**
  - 1. Cultural/Mechanical/Physical Methods: These controls shall be used as the first choice in weed management.
    - a. Monitor planting areas frequently to identify and eliminate weeds as early in the growth stage as possible, especially before they set seed.
    - b. Cut or pull weeds using hand operated equipment where possible. When removing weeds by hand, take special care to remove the entire weed, including the root ball.
    - c. Remove weeds in the expansion joints and cracks of paving, curb and gutter. Caulking of joints and cracks with an elastomeric caulk is a long term solution. Using a high-pressure hose to clean soil and seeds out of joints and cracks can give season-long weed control.
    - d. Mow large areas to reduce weed growth, and eliminate species that are not tolerant of mowing. Mowing is especially effective when done before seed set. Mowing also reduces fire hazard in open spaces.
    - e. Maintain a mulch cover of approximately 3 inches over soil surfaces that are not covered by vegetation, replenish mulch as needed. (See also Section 3.3 E – Incorporate Organic Soil Amendments and 3.5 Mulch Regularly.)
    - f. Employ sheet mulching, a layered system of organic (non-plastic, non-synthetic) weed barrier (preferably cardboard) overlain by mulch, where possible. Acceptable cardboard suppliers include [insert supplier] or approved equal. Sources of recycled cardboard can be found at [www.lawntogarden.org](http://www.lawntogarden.org)
    - g. Use propane-fueled flamers in winter and spring with required permits and approval by the Fire Marshall to kill early-season, non-grass weeds by heating the cells until they burst. The weed quickly wilts and dies. When finished flaming, a plant is should change color and wilt.
    - h. Goats, and certain other animals may be used to manage weed growth, where appropriate. Goats and other animals must be well managed and fenced in to avoid straying from the target area. Use fencing to protect non-target plants from the goats and other livestock.
  - 2. Herbicides: When cultural, mechanical, physical and biological controls have provided inadequate pest control; the **Contractor/ City Maintenance Staff** may select and apply an appropriate least-toxic herbicide as a last resort. Only OMRI- or Our Water Our World (OWOW)- listed herbicides may be used without written permission of the **Owner's Representative/ City Maintenance Manager**. Herbicides not on the OMRI or OWOW lists, including Roundup, may only be used with the written permission of the **Owner's Representative/ City Maintenance Manager**.
    - a. Approved Herbicides include:
      - 1) Herbicidal soaps (fatty acids of potassium salts).
      - 2) Acetic and citric acids.
      - 3) Clove, citrus, mint and thyme oil.



- 4) Corn gluten meal pre-emergent.
- b. Prohibited herbicides:
  - 1) Groundwater contaminants such as: Atrazine (Aatrex) – groundwater contaminant, Simazine (Princep), Bromacil (Hyvar, Krovar), Prometon (Pramitol), Bentazon (Basagran) and Norflurazon (Solicam, Predict, Zorial).
  - 2) Compost contaminants, such as Picloram and Clopyralid.
- c. Notice of herbicide use:
  - 1) Use the notification and posting requirements listed above in Section 5.1, E.3.c – Notice of Pesticide Use.

**F. Monitoring and Reporting:**

Monitor landscape areas to identify presence of key weeds and design a weed management program to target those weeds. Contractor/ City Maintenance Staff shall submit the weed management record to Owner's Representative/ City Maintenance Manager on a monthly basis as part of the overall IPM Monitoring Report. Include the following information:

- 1. target weed;
- 2. cultural, mechanical, physical, biological, and educational methods and tactics used;
- 3. if an herbicide is used, report the following information:
  - a. Brand name and EPA Registration Number;
  - b. Date the herbicide was used;
  - c. Reason for the herbicide use;
  - d. Location or site of the herbicide application;
  - e. Formulation of the herbicide (i.e., spray, granular, etc.);
  - f. Quantity of herbicide used;
  - g. Application equipment used;
  - h. Name of the herbicide applicator.

**5.3 Vertebrate Pest Management**

- A. **Goal:** Bay-Friendly Landscaping seeks to manage vertebrate pests using the IPM goals outlined above. A goal of Bay-Friendly Landscaping is to Create and Protect Wildlife Habitat. Sometimes wildlife can damage landscapes at an unacceptable level and management of the wildlife must be employed.
- B. **Rationale:** Utilizing IPM reduces pollution and protects the ecosystem.
- C. **Schedule:** Ongoing.
- D. **Materials:** See execution below.
- E. **Execution:**
  - 1. Mechanical, Physical and Cultural Methods: These methods shall be implemented as a first course of action. Preferred treatments include:
    - a. Exclusion: Protect plants from damage by grazing animals with fences or cages.
    - b. Habitat Modification: Reduce cover at the periphery of the project as needed to solve problem.
    - c. Application of repellents that are suitable for use in public areas.
    - d. Encouragement of Predators: Owl boxes and raptor perches and in some instances protection of coyotes that primarily prey on small animals.
    - e. When exclusionary tactics have not been effective or are impractical, traps may be used to control moles, voles, gophers, rats and mice.

2. Rodenticides are prohibited because of the known dangers of secondary poisoning of predators and scavengers and because of the dangers of primary poisoning of people, pets, and non-target wildlife.

**F. Monitoring and Reporting:**

Identify key pests that significantly affect plant health and appearance. Accurate identification is critical to appropriate control. Common vertebrate pests of the landscape include: rats, mice, voles, moles, gophers, deer and rabbits. Monitor landscape areas to identify presence of key vertebrate pests and design a pest management program to target those pests. Discuss acceptable level of pest damage with Owner's Representative and clarify expectations of pest management program. Submit the pest management record to the **Owner's Representative/ City Maintenance Manager** on a monthly basis as part of the overall IPM Monitoring Report. Include the following information:

1. target pest;
2. suggestions for use of one or more of the following methods and tactics:
  - a. Cultural: plant selection and replacement.
  - b. Mechanical: netting and scare mechanisms.
  - c. Physical: fencing and barriers.
  - d. Biological: dogs, owls, raptors, other predators.
  - e. Educational: living with wildlife and management methods.





- c. Dichondra, bermudagrass                      0.5-1.0 inches
- d. Native sod blends                                3-4 inches
- 4. Change mowing patterns regularly to avoid rutting and minimize compaction.
- 5. Edge turf areas adjacent to pavements on a vertical plane every other mowing.
- 6. Keep turf away from the base of features in the turf at the following distances:
  - a. Trees    24 inches
  - b. Signs and similar features                            4 inches
  - c. Buildings and other structures                      4 inches
- 7. Remove clippings from paved surfaces the day of the mowing and edging.
- 8. Avoid damaging plants, equipment, signs, buildings, vehicles, etc. during turf maintenance operations. Consider any trees which have more than 50% of the circumference of the trunk tissue removed or damaged by string trimmers or mowers destroyed and replace at the Contractor's expense with like species and size.

**6.2 Seasonal Color Bed Care**

- A. **Goal:** Maintain seasonal color beds to sustain an attractive, healthy, plants and uniform density with no bare spots.
- B. **Rationale:** Avoiding bare spots helps prevent soil moisture loss and erosion...
- C. **Schedule:**
  - 1. Pruning of Annual Plants. Prune annual plants monthly or more to remove spent flowers before seed is formed.
  - 2. Plant Replacement: Provide two installations per year maximum: one in the early spring, and one in the late fall. Do not remove perennials unless plants are dead, damaged, or diseased. Provide planting replacement proposals to Owner's Representative/ City Maintenance Manager that specify appropriate perennials.
- D. **Execution:**
  - 1. Plant seasonal color only in designated beds or pots and hydrozoned. Select species appropriate for the exposure and microsite conditions. Avoid species requiring excessive irrigation and fertilization.

**6.3 Tree Care**

- A. **Goal:** The purpose of pruning is to direct the tree into the appropriate form for the species and the site and to develop a strong branch structure.
- B. **Rationale:** Pruning trees to reinforce their natural structure helps prevent disease, avoiding the need for pesticides.
- C. **Schedule:** Ongoing.
- D. **Materials:** None.
- E. **Execution:**
  - 1. Check tree stakes, ties and guys regularly to ensure trees are not being damaged. Adjust ties and stakes as necessary to prevent girdling and wounding.
  - 2. Remove tree stakes within two years of planting. For trees unable to stand alone after two years, shorten stakes and lower the ties to 3 to 4 feet height. If after the third year the tree will not stand without a stake, inspect to determine cause of instability, and make recommendations to Owner's Representative/ City Maintenance Manager for corrective action. If new ties are needed to secure tree to stake, use ties composed of recycled materials. The tie must be broad, have a smooth surface where it contacts the trunk, and

provide some elasticity. Unacceptable materials: Wire covered with hose, tubing or other materials, and covered electrical wire.

3. Do not shear trees into formal shapes. Follow guidelines in Section 6.4 – Shrub and Groundcover Care.
4. Select only trained, experienced personnel to prune trees. An I.S.A. Certified Arborist or Tree Worker is to be present at all times during pruning. Arborist must have a State of Calif. Contractors License for Tree Service (C61-D49). All pruning shall be in accordance with the Best Management Practices for Pruning (International Society of Arboriculture, 2002) and adhere to the most recent editions of the American National Standard for Tree Care Operations (Z133.1) and Pruning (A300).
5. Prune young trees annually for up to five years after planting by personnel trained in pruning to develop tree structure. Trees with structural defects shall be pruned to correct those defects over a period of several years.
6. Prune trees as follows:
  - a. Clear the crown of diseased, crossing, weak and dead branches as necessary. Trees shall not be routinely thinned.
  - b. Provide 14 feet vertical clearance over roads, 8 feet over walkways.
  - c. Reduce end weight on heavy, horizontal branches.
  - d. Create a strong central trunk with lateral branches spaced vertically and horizontally.
  - e. Interior branches shall not be completely stripped out.
  - f. No more than 20% of live foliage shall be removed within the trees.
  - g. Do not climb trees with spurs.
  - h. Use branch removal or reduction cuts (thinning cuts) rather than heading cuts. Trees shall not be topped or headed back.
  - i. If cutting back to a lateral, the lateral should be at least one-third the diameter of the branch being cut.
  - j. No green palm fronds shall be removed above a horizontal line drawn across the base of the crown. A good rule of thumb is to remove all fronds with petioles at an angle less than 30 degrees from horizontal.
  - k. Schedule pruning to avoid time of bud break, flowering and leaf drop on live branches, and to avoid peak periods of insect and disease activity for pests to which the tree species is susceptible.
  - l. Conduct pruning operations in a manner that does not damage surrounding and understory plants and structures.

#### 6.4 Shrub and Groundcover Care

- A. **Goal:** Maintain shrubs and groundcover to sustain an attractive, healthy, normal color for the species, and uniform density with no bare spots.
- B. **Rationale:** Proper pruning and maintenance of shrubs and groundcovers can reduce risk of disease, avoiding use of pesticides and ultimately extend their lives, minimizing plant replacement.
- C. **Schedule:** Ongoing.
- D. **Materials:** None.
- E. **Execution:**
  1. Groundcover Pruning:
    - a. Woody groundcovers: Shearing is prohibited. Contractor/ City Maintenance Staff to prune selectively to control growth towards pavements. Prune groundcovers on a regular basis to maintain pavements and other features clear of vegetation by pruning individual branches or stems to interior lateral branches a minimum of 6 inches and

maximum of 12 inches from the edge of pavement. When groundcovers become excessively woody, prune the planting severely to rejuvenate it.

- b. Herbaceous groundcovers: The Contractor/ City Maintenance Staff may maintain the edge of herbaceous ground covers (e.g., hypericum) with turf edging equipment. Most herbaceous ground covers may be mowed. Look up each plant in a plant reference book to determine appropriate height. This treatment shall only be applied in the late winter/early spring when ET is low and re-growth will occur quickly.
2. Shrub Pruning:
- a. Do not shear plants into formal shapes as this destroys the natural form of the plant and generates excessive waste. Plants shall instead be selectively pruned on an as needed basis.
  - b. Prune when branches extend beyond the natural conformation of the plant OR if size must be minimally controlled because of inadequate plant spacing.
  - c. Cut individual branches or stems to interior lateral branches or at point of attachment.
  - d. Notify Owner's Representative/ City Maintenance Manager where existing hedges (those in place before a renovation) can be replaced with size-appropriate plants to eliminate need for shearing. If Owner's Representative/ City Maintenance Manager opts to retain hedges, prune as needed to maintain safety and plant health.

### 6.5 Open Space and Meadow Care

- A. **Goal:** Maintain open space area to sustain an attractive, healthy plant community that is capable of supporting wildlife.
- B. **Rationale:** A diverse and healthy landscape with native plants and meadow grasses supports a broad range of beneficial insects and provides habitat for wildlife, creating a balanced and healthy ecosystem that is largely self-sustaining.
- C. **Schedule:** Ongoing.
- D. **Materials:** None.
- E. **Execution:**
  - 1. Fire Management:
    - a. Maintain vegetation clearances and manage fuel loads as required by the Alameda County Fire Marshall. Where recommended clearances would negatively affect plant health, contact the Fire Marshall for a field inspection and recommendation.
    - b. Manage herbaceous growth to minimize fire hazard by mowing on a frequency to meet Alameda County Fire Marshall requirements.
    - c. Contractor/ City Maintenance Staff may use goats to manage growth, where appropriate. Fence plants that need protection and manage goats to prevent damage to non-target plants.
    - d. High mowing may be desirable after seeds have been set to help suppress fire danger depending on aridity.
    - e. Where possible wildflowers shall not be deadheaded until their seeds have been sown for future seasons.
  - 2. Invasive Species: Invasive plant species shall be eradicated from open space areas to the extent possible using methods described in Section 5.2 – Weed Management.
  - 3. Weed Reduction/Mitigation: Use multiple control strategies synergistically, including:
    - a. Minimize weeds by installing subsurface irrigation.
    - b. Monitor planting areas to identify and address weeds early before they set seed.
    - c. Cut or pull weeds using hand-operated equipment.
    - d. Take care to remove weeds from the root balls of plants.
    - e. Maintain mulch at all times and use sheet mulching where possible.

- f. Mowing.
  - g. Controlled burning if appropriate.
  - h. When cultural, physical, mechanical and biological controls have provided inadequate pest control, Contractor/ City Maintenance Staff may select and apply an appropriate least-toxic herbicide as a last resort. Herbicides specifically prohibited by OMRI in their prohibited materials list shall not be used.
4. Plant Replacement:
- a. Select perennial wildflowers and bunchgrasses instead of annual plants.
  - b. Mulch between plants.

## 6.6 Stormwater BMP Care

- A. **Goals:** Bioretention areas, rain gardens, flow through planters, bioswales, and other landscape-based stormwater best management practices (BMPs) remove pollutants from the stormwater by filtering runoff slowly through an active layer of soil. Maintain stormwater BMPs to ensure that flow is not overly obstructed, erosion is prevented and they do not cause flooding or harbor vectors. Maintain BMPs in accordance with the site's Stormwater Control Plan's Operation and Maintenance Plan, if available.
- B. **Rationale:** Ongoing inspection and maintenance of stormwater BMPs will ensure that these features continue to function effectively, do not become a vector hazard and provide acceptable growing conditions to support plant growth.
- C. **Schedule:** Ongoing.
- D. **Materials:** Biotreatment Mulch and Biotreatment Soil Mix.
- E. **Execution:**
1. Soil and Nutrition Management:
    - a. Check that the soil is at the appropriate depth to allow a reservoir of water above the soil surface and to function as a stormwater filter.
    - b. Confirm that water has drained through soil within 3-4 hours after a storm event has concluded. Alleviate compaction or replace soil as needed, with Biotreatment Soil Mix (a soil mix of 1 part compost and 2 parts sand). Projects complying with the Municipal Regional Stormwater Permit, should consult the Technical Guidance for their county for the appropriate Biotreatment Soil Mix specification and vendors. Replaced soil should be redistributed under mulch layer outside of stormwater treatment areas when possible.
    - c. Replenish Biotreatment Mulch annually to maintain three inches depth. See the Technical Guidance and Municipal Regional Stormwater Permit for Mulch specifications. Mulch from shredded or chipped and aged tree trimmings is recommended.
  2. Monitoring and Inspection:
    - a. Examine downspouts or inlets from paving. Check splash blocks, rock mulch or other energy dissipating areas. Inspect inlets for channels and exposure of soils and report to the Owner's Representative/ City Maintenance Manager if evidence of erosion is found. Report damaged pipes, downspouts, blocks or rock mulch that need replenishing.
    - b. Examine overflow pipe to make sure it can safely convey excess flows to a storm drain. Repair disconnected pipe or report damage to Owner's Representative/ City Maintenance Manager.
    - c. Check underdrain piping to make sure it is intact and unobstructed. Most systems should have a clean out pipe at the surface for accessing the underdrain. Report evidence of damage or malfunction to the Owner's Representative/ City Maintenance Manager.

- d. Check planter box for holes, cracks, rot or failure. Make minor repairs and report more significant damage to **Owner's Representative/ City Maintenance Manager**.
  - e. Observe soil at the bottom of the biotreatment area for uniform infiltration. Confirm that irrigation is adequate but not excessive. Report water that does not drain within 48 hours of a storm.
  - f. Confirm that check dams and flow spreaders are in place and level. Report problems to **Owner's Representative/ City Maintenance Manager**.
  - g. Remove any trash/litter from biotreatment areas.
  - h. Clear minor obstructions and inspect for accumulation of sediment. Remove accumulated sediment in biotreatment areas by hand and around inlets, splash blocks, catch basins and culverts as necessary to maintain adequate flow and redistribute under mulch outside of stormwater treatment areas.
3. Mosquito Abatement: Either fill with gravel areas of seasonal water collection that do not drain within 48 hours, replace existing soil with Biotreatment Soil Mix or treat monthly with bacterial biological control.

#### 6.7 "No-Mow" Care

- A. **Goal:** Keep no-mow turf alive. Most no-mow grasses respond well to annual hard-pruning to reduce clumping effect. If clumping is acceptable, grasses may be left without mowing.
- B. **Rationale:** Proper annual mowing of No-Mow turf will encourage healthy new growth, reduce the natural tendency of these grasses to clump and minimize exposed gaps of bare soil.
- C. **Schedule:** Mow "no-mow" turf once a year. Do not grasscycle clippings. See Section 7 – Waste Management for alternative options.
- D. **Execution:**
  1. Use high weed mower or stringline trimmer to mow grasses. Contact seed or sod supplier to determine appropriate mowing height for species.
  2. Rejuvenating grasses by hard pruning should only be done when vigorous new growth is imminent.
  3. Collect clippings and use elsewhere on site or transport to a plant debris recycling facility.

#### 6.8 Replacement Plants

Bring plants that are dead or in a state of decline to attention of the **Owner's Representative/ City Maintenance Manager**. Hydrate plants that are dry and stressed. Upon written authorization, install replacement plants meeting nursery standards. All replacement plants, labor and materials are billable to **Owner's Representative**. **Plants installed and cared for by Contractor are covered by a one-year replacement warranty, except for losses due to events beyond Contractor's control, including vandalism and acts of God.**

## SECTION 7 WASTE MANAGEMENT

**Goal:** Maintain landscape to prevent waste and use as much of the plant debris generated on site as possible with the exception of infected plant material.

### 7.1 Keep Plant Debris On-Site

[Choose all or some of the following options. All sites should be able to accomplish options A and D. Option B requires a chipper and option C requires a compost bin located on-site].

- A. Retain small plant debris for mulch.
  1. To conserve nutrients on-site and protect the soil surface, retain natural leaf drop and seed free plant trimmings less than 4 inches under trees or in shrub beds.
  2. Select only tree and shrub beds that will not allow leaf litter or mulch to wash out into storm drains.
- B. Chip large plant debris for mulch.
  1. Chip on-site and use all vegetative plant debris and unpainted and untreated wood greater than 4 inches on-site as mulch. Use rakes for leaf litter removal. Do not use power blowers in planting beds.
- C. Produce compost from plant debris: Compost plant debris that can not be used as mulch on-site. <http://www.stopwaste.org/home/index.asp?page=441>.
  1. Compost site is located XXX
  2. [Describe how to maintain aeration, moisture content, C:N ratio, protocols for adding and harvesting.]
  3. Composting manager is XXX.
- D. Separate Plant Debris: If lawn clippings, shrub and tree trimmings or pruning must be removed from the site, keep green debris free of other types of debris and transport to a local composting facility or transfer station that offers a separate processing of plant debris for composting to comply with the Alameda County Landfill Ban, or local waste management authority. Materials exempt include palm fronds, cactus and poison oak as defined by local regulations.
- E. Leaves may be raked or shredded by mower.

### 7.2 Landscape Areas

- A. Remove litter, broken glass, paper, cans, bottles and other small debris from the site weekly and recycle/compost where appropriate.

### 7.3 Turf Areas

- A. Mulch leaf litter with mowers as needed throughout the fall and winter months.
  1. Remove leaves from lawn areas to prevent heavy build-up and damage to turf by smothering. A single layer of leaves may be mulch-mowed into the turf. Thicker accumulations should be removed.
  2. Use rakes for leaf litter removal in planting areas.
  3. Do not use blowers in turf areas.
- B. Use grasscycling.

### 7.4 Hardscape Areas

- A. Keep all hardscapes free from trash, soil and plant debris. It is preferred that plant debris be cleaned up with brooms rather than blowers.

- B. Clean hard surfaces as needed to remove accumulation of sediment, dirt, or other materials that distracts from the visual impact of the area or creates a safety hazard. Cleaning methods must be consistent with the Bay Area Stormwater Management Agencies Association (BASMAA) criteria:
1. BASMAA encourages the use of dry cleaning methods over wet, such as the use of absorbing materials for oils and sweeping. It discourages the use of any soaps or solvents. It encourages directing wash water into the landscape or collection of waste water for disposal into a sanitary sewer instead of a storm drain. Refer to [www.basmaa.org](http://www.basmaa.org).
  2. BASMAA Certification: Pollution Prevention Training and Certification Program for Surface Cleaners issued by the Bay Area Stormwater Management Agencies Association (BASMAA) is required to perform surface cleaning work. BASMAA certification number: \_\_\_\_\_ . <http://www.basmaa.org/recognition/>
- C. Blowers and Vacuums: Blowers and vacuums meeting low decibel and emissions standards may be used on hardscape areas. Collected organic debris shall be used on-site.
- D. Root Interference: Potential root damage to hardscapes shall be reported to Owner. Corrective action will be determined and directed as an extra service.
- E. Pervious Paving: **Contractor** City Maintenance Staff shall clean the surface of pervious paving to remove fine debris and dirt as needed to maintain permeability (approximately four times per year). Pavement may be cleaned with street sweepers equipped with vacuums, water, and brushes, followed by high-pressure hosing of surface. If necessary, replace displaced aggregate fill with clean gravel. Cleaning methods must be (BASMAA) criteria.



## SECTION 8 DEFINITIONS

**Antimicrobial agent:** Any substance or mixture of substances intended for inhibiting the growth of or destroying any bacteria, fungi pathogenic to human and other animals, or viruses declared to be pests under Section 12754.5 of the California Food and Agricultural Code, except slime control agents. Antimicrobial agents include, but are not limited to, disinfectants, sanitizers, bacteriostats, sterilizers, fungicides and fungistats.

**Biodiesel:** A fuel produced through a process in which organically-derived oils such as soybean or vegetable oil are combined with alcohol.

**Bioretention areas,** or rain gardens, are shallow depressions in planting areas with well-draining, engineered soil. Bioretention areas help remove pollutants from stormwater as it filters through the soil. Where underlying soils are low in permeability, an underdrain may be required to prevent saturation and standing water in the bioretention area. Bioretention areas may be hydraulically sized using a volume-based criteria or flow-based criteria.

**Biotreatment** is a type of low impact development in which landscape-based treatment measures filter stormwater through a layer of soil that has a long-term permeability of at least 5 inches per hour and supports vigorous plant growth. Unless native soils are sufficiently fast-draining, an underdrain connected to the storm drain system is required. Bioretention areas and flow-through planters with underdrains are examples of biotreatment. Guidance for designing bioretention areas and flow-through planters is provided in Chapter 6 of the Alameda Countywide Clean Water Program C.3 Stormwater Technical Guidance.

**California Department of Food and Agriculture's Organic Input Material (OIM) Program** registers fertilizing materials to be used in organic crop and food production. The program is mandated by the Legislature and supported by the industry. Products claiming to be appropriate for use in organic production are verified to comply with the California Fertilizing Materials Law and Regulations and USDA National Organic Program Standards. OIM's are listed on the Fertilizer Product Database at [www.cdffa.gov/is/fldrs/fertilizer\\_OIM.html](http://www.cdffa.gov/is/fldrs/fertilizer_OIM.html)

**California Model Water Efficient Landscape Ordinance (CA WELO)** regulates the outdoor water use in new construction and major renovations by requiring that all projects triggering compliance meet a water budget. Find out more at <https://water.ca.gov/Programs/Water-Use-And-Efficiency/Urban-Water-Use-Efficiency/Model-Water-Efficient-Landscape-Ordinance>.

**Compost** is the product of controlled biological decomposition of organic materials, often including urban plant debris and food scraps. It is an organic matter resource that has the ability to improve the chemical, physical and biological characteristics of soils or growing media. It contains plant nutrients but is typically not characterized as a fertilizer. (Excerpted from U.S. Composting Council, Field Guide to Compost Use).

- **Quality compost** is mature, well decomposed, stable and weed-free, derived from agricultural and/or food scraps and/or plant trimmings, contains no substances toxic to plants, possesses no significant objectionable odors (such as ammonia or garbage), and meets specified stability/ maturity indicators. It does not resemble the feedstock (the original materials from which it was derived).
- **Local compost** is generated from feedstock/materials sourced within 100 miles or produced at a permitted facility within 100 miles of the project site.
- **Recycled compost** is generated from plant trimmings and/or food scraps

**Compost berms and socks** are U.S. EPA approved for perimeter sediment and pollutant control, and are increasingly used instead of silt fences and straw bales. Berms can be blown in place or

positioned with a front end loader. Socks can be filled in place by compost suppliers or filled and delivered on pallets. They do not need to be trenched in and are highly effective at filtering out sediments, oil, grease and metals. (Source: <http://buildingsoil.org/>)

**Compost blankets** are 1- to 3-inch layers of compost that are blown onto slopes. They can be used on up to a 1:1 slope, and sometimes include additional stabilization. They make excellent surface contact, preventing rilling underneath and thereby control erosion. Compost blankets can be less expensive than other erosion BMPs because they do not need to be removed, hauled and landfilled. Compost blankets are a U.S. EPA-approved BMP for construction sites and are used by Caltrans (adapted from <http://buildingsoil.org/>).

**Composting** is the controlled biological decomposition of organic materials. See Compost.

**Evapotranspiration** is the water lost from the soil through evaporation from the soil and transpiration from the plant. (Source: WUCOLS.)

**FSC-certified wood** is harvested from sustainably managed forests and certified in accordance with the Forest Stewardship Council's criteria.

**Grasscycling** means leaving the clippings on turf after mowing, so they decompose and release their nutrients in the soil.

**Green waste** consists of the plant debris from trees, shrubs, groundcover and turf that is generated during landscape demolition, installation or maintenance.

**Hardscape** includes pavements, gravels, stone and other surfacing materials used for sidewalks, patios, walkways, driveways, parking lots and other non-roof, non-landscape surfaces.

**Hydrozone area (HA)** means a portion of the landscaped area having plants with similar water needs and rooting depth. A hydrozone may be irrigated or non-irrigated. (Source: California Model Water Efficient Landscape Ordinance.)

**Integrated pest management (IPM)** is a holistic approach to mitigating insects, plant diseases, weeds and other pests. It involves the use of many strategies for managing, but not eliminating pests. IPM uses cultural, mechanical, physical and biological control methods before using pesticides to control pests and diseases in the landscape. Chemical controls are applied only when monitoring indicates that preventative and non-chemical methods are not keeping pests below acceptable levels. When pesticides are required, the least toxic and the least persistent pesticide that will provide adequate pest control is applied.

**Invasive plant species** means species of plants not historically found in California that spread outside cultivated areas and can damage environmental or economic resources. Invasive species may be regulated by county agricultural agencies as noxious species. (Source: California Model Water Efficient Landscape Ordinance.)

**Irrigation audit** is an in-depth evaluation of the performance of an irrigation system conducted by a Certified Landscape Irrigation Auditor. An irrigation audit includes, but is not limited to: inspection, system tune-up, system test with distribution uniformity or emission uniformity, reporting overspray or runoff that causes overland flow, and preparation of an irrigation schedule. The audit must be conducted in a manner consistent with the Irrigation Association's Landscape Irrigation Auditor Certification program or other U.S. Environmental Protection Agency "Watersense" labeled auditing program. (Source: California Model Water Efficient Landscape Ordinance.)

**I.S.A.:** International Society of Arboriculture, <https://www.isa-arbor.com/>.

**Landscape area** is equivalent to Irrigated area and is defined as all of the planting, turf areas and water features subject to the Maximum Applied Water Allowance (MAWA) calculation in a water

budget. The following are not included as part of the landscape area: footprints of buildings or structures, sidewalks, driveways, parking lots, decks, patios, gravel or stone walks, pervious and non-pervious hardscapes, open spaces and existing native vegetation. Temporarily irrigated areas of the landscape shall be included in the low water use hydrozone for the water budget calculation.

**Landscape water meter** means an inline device installed at the irrigation supply point that measures the flow of water into the irrigation system and is connected to a totalizer to record water use. (Source: California Model Water Efficient Landscape Ordinance.)

**Mulch** is any material spread evenly over the surface of the soil to enhance the growth of plants and the appearance of the landscape.

- **Local mulch** is generated from feedstock/materials sourced within 100 miles or produced at a facility within 100 miles of the project site.
- **Recycled mulch** is made from organic materials, including tree trimmings, clean (unpainted and untreated) wood, or wood and plant trimmings chipped on-site. It does not include forest industry products and byproducts (such as redwood bark whole or shredded, other bark mulches, or, peat moss), recycled tires or other inorganic mulch materials.

**Naturally occurring, non-synthetic fertilizers** come from plants, animals and mined minerals. Examples include sea kelp (seaweed), alfalfa meal, corn gluten meal, cottonseed meal, cover crop plants turned into the soil, blood meal, bone meal, fish meal, mined limestone, soft rock phosphate and gypsum. These materials feed soil organisms that then produce plant food in a plant-available form. These materials can be applied in pelleted, powdered or granulated form or as liquid fertilizer via irrigation or foliar sprays. (Source: Peaceful Valley Farm Supply, [www.groworganic.com](http://www.groworganic.com))

**Organic Materials Review Institute (OMRI)** is a national nonprofit organization that reviews products to determine their suitability for producing, processing and handling organic food and fiber under the USDA National Organic Program Rule.

**Pesticide** includes any of the following: (a) any spray adjuvant, (b) any substance, or mixture of substances which is 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, man, animals, or households, or be present in any agricultural or nonagricultural environment whatsoever. Antimicrobial agents are excluded from the definition of pesticide. (Defined in Section 12753 of the California food and Agricultural Code.)

**Plant Factor (PF)** is a factor, when multiplied by ETo, used to estimate the amount of water needed by plants. The plant factor range for very low water use plants is 0 to 0.1, low water use plants is 0 to 0.3, moderate water use plants is 0.4 to 0.6, and high water use plants is 0.7 to 1.0. Plant factors are derived from the California Department of Water Resources publication "Water Use Classification of Landscape Species." (Source: California Model Water Efficient Landscape Ordinance.)

**Postconsumer recycled content** is derived from products diverted from the waste stream at the end of their life; it may be generated by households or by commercial, industrial and institutional facilities.

**Pre-consumer recycled content** is material diverted from the waste stream during a manufacturing process.

**Recycled content products** are new products manufactured from materials that have been discarded and diverted from the waste stream.

**Recycled water**, also called reclaimed water, is defined in Title 22, Chapter 3 of the California Code of Regulations. It is tertiary-treated water produced from the three-stage treatment of municipal wastewater. Recycled water is virtually colorless and odorless, and is allowable for full-body human contact but not for direct human consumption. Properly managed, recycled water is safe to use for

nonpotable applications such as landscape irrigation. (Source: [https://www.waterboards.ca.gov/drinking\\_water/certlic/drinkingwater/documents/lawbook/RWregulations\\_20181001.pdf](https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/lawbook/RWregulations_20181001.pdf))

**Salvaged materials** are items that are repurposed or put to a new use after their initial use, without being remanufactured between uses.

**Shearing** is the practice of trimming a plant to create a smooth or geometric perimeter, rather than pruning selectively to reinforce the natural shape of the plant. Constant shearing cuts off sunlight from the interior of the plant, creating a dense outer surface which eventually cannot support the nutrient needs of the root system.

**Sheet mulching** uses a layering system of cardboard, compost and mulch to enhance weed suppression and provide soil building benefits. (Source: A Bay-Friendly Guide to Mulch.)

**Soil moisture-based controller or self-adjusting controller** uses a soil moisture sensor to remotely control irrigation valves. (Source: California Model Water Efficient Landscape Ordinance.)

**Stormwater** includes stormwater runoff, snow-melt runoff, surface runoff and drainage excluding infiltration and irrigation tail water. (Source: Alameda Countywide Clean Water Program C.3 Stormwater Technical Guidance.)

**Toxicity Category I Pesticide Product:** Any pesticide product that meets United States Environmental Protection Owner criteria for Toxicity Category I under Section 156.10 of Part 156 of Title 40 of the Code of Federal Regulations.

**Toxicity Category II Pesticide Product:** Any pesticide product that meets United States Environmental Protection Owner criteria for Toxicity Category II under Section 156.10 of Part 156 of Title 40 of the Code of Federal Regulations.

**Turf** is an area planted with spreading or stoloniferous grasses that require regular mowing to form a dense growth of leaf blades and roots. Areas planted with turf alternatives, such as *Carex pansa* and other tufted grass or sedge species, are not considered turf.

**U.S. Composting Council Seal of Testing Assurance (STA) program** is a compost testing, labeling and information disclosure program designed to provide the information necessary to get the maximum benefit from the use of compost. The testing program includes a suite of physical, chemical and biological tests intended to help both compost producer and purchaser to determine if the compost they are considering is suitable for the use that they are planning, and to help them compare various compost products using a testing program that can be performed by a group of independent, certified labs across the country and in Canada. (Adapted from U.S. Composting Council, [www.compostingcouncil.org](http://www.compostingcouncil.org))

**Weather-based (evapotranspiration) irrigation controllers** (also known as “smart controllers”) are devices that are able to self-adjust using evapotranspiration or weather data to remotely control irrigation valves. (Source: Modified from California Model Water Efficient Landscape Ordinance.)

