UNITED STATES BOTANIC GARDEN

USBG Bartholdi Park Accessibility, Infrastructure and Sustainability Upgrades

January 2017

Plant Health Care Plan
USBG Bartholdi Park Accessibility, Infrastructure and Sustainability Upgrades
January 2017

Table of Contents .....**Error! Bookmark not defined.**
.....**Error! Bookmark not defined.**
1 - Overview of Plant Health Care Plan.....3
2 - Site Planting Plan with Buffer Zones 4
3 - Plant species schedule.....4
4 - Monitoring schedule 5
5 - List of known and suspected plants that require special attention 5
6 - Plant Care Policies 8
a. Safety and Storage 8
b. Accident Procedures 11
c. Notification Protocol.....11
d. Plant Care Product and Application Requirements: 12
e. Certified Fertilizer Professionals Policy 12
f. Third Party Certified IPM Professionals 13
g. Communication Policies 13

7 - Templates for tracking and recording application of pesticides and fertilizers 13
8 - IPM, Arborist, or other expert professional recommendations report.....16
9 - Copies of current certifications for contacted service providers .. **Error! Bookmark not defined.**19
10 - Training Program For USBG Maintenance Personnel.....16
11 - Key Contacts.....16
12 - Addenda.....17
Refer to Addenda Folder for the following files: 17
Supporting File 1. [name].....17
Supporting File 2. [name].....17

1 - Overview of Plant Health Care Plan

This USBG Plant Health Care Plan (PHCP) is intended to serve as the protocol for caring for plants within the collection and those that are displayed by the USBG, including those that fall within the SITES project boundary Bartholdi Park. More specifically the PHCP describes protocol for application of fertilizers and pesticides and qualification for staff and/or contracted plant care providers. This PHCP will be reviewed and updated on an annualized basis and overseen by the USBG Plant Health Care (IPM) Specialist and Gardens and Grounds Supervisor.

The intent of the PHCP is to proactively prevent plant stress while limiting negative impacts to human health and the environment. This will be achieved through the implementation of comprehensive or holistic strategies that minimize the use and risks of pesticides and fertilizers.

The PHCP guides the use of “least-toxic” maintenance measures for ecologically sensitive areas and human use areas that exist within or in proximity to the SITES project boundary. The PHCP will cover all components of plant care within the SITES project boundary and will be implemented 100% of the time.

Landscape management for Bartholdi Park was developed in a manner to ensure that all maintenance activities are performed as necessary. All activities are performed on a per occurrence basis which allows the flexibility to skip tasks such as mowing areas when summer heat or drought slows the turf growth. This same idea applies to all other

activities such as hand watering and irrigation, so there are no wasted energies performed on items that will bring little or no benefit to the property.

The pest management program [i] shall consist of the following: establishing action thresholds for key pests; monitoring to detect, quantify and delineate of pest populations within the management unit (Bartholdi Park). Pest management strategies will include multiple tactics that focus on plant health and pests. Maximizing plant health by remediation of cultural and/or site deficiencies will serve as the foundation to limit pest damage. While efforts to select and establish plant species with few or no reported pest problems were a key element in the original plant design, we anticipate the need to replace specimens from time to time. Those chosen as replacements must have few or no pest problems and also be compatible with the site. In situations where pest damage continues to cause damage above thresholds, efforts to reduce numbers will be implemented. These may include: promoting indigenous natural enemies by providing necessary habitat resources; introducing commercially available natural enemies or application of low risk, OMRI certified pesticides. Synthetic pesticides will be avoided unless there is no alternative(s Results will be monitored, evaluated and adjusted, if necessary, to further suppress pest populations below thresholds.

The following pages more specifically detail the site, pest risks, plant care procedures and protocol, plant care schedules and tracking tools, identifies integrated pest management measures, and list key contributors and responsible parties needed to effectively carrying out the PHCP.

2 - Site Planting Plan with Buffer Zones

Please refer to SITE map in the Addenda. This file shows planting plan, SITES project boundary. Due to the size and urban location of Bartholdi Park, there are no designated Buffer Zones.

3 - Plant species schedule

Please refer to planting plan in the Addenda. This file lists all plantings on site. Future plantings are typically purchased and/or grown by the US Botanic Garden staff although there are times when salvaged plant material is moved from another garden area into Bartholdi Park.

4 - Monitoring schedule

Monitoring will be ongoing and will continuously occur by the two horticulturist assigned to Bartholdi Park and under the oversight of the Gardens and Grounds Supervisor and the Plant Health Care Coordinator.

Monitoring by USBG horticulture staff will occur at intervals throughout the growing season as follows:

- Early Spring - biweekly
- Mid-Spring - weekly
- Late-Spring - weekly
- Early Summer - weekly
- Mid Summer - biweekly
- Late Summer-biweekly
- Fall- monthly

During each formal monitoring date a report (written or verbal) will be provided to the Gardens and Grounds Supervisor and the Plant Health Care Coordinator of findings and associated Integrative Pest Management (IPM) maintenance action(s) or proposals for maintenance action(s).

5 - List of known and suspected plants that require special attention

USBG staff has managed the horticulture services throughout the USBG gardens, conservatory, and production facility using IPM practices for over the 10 years. During this time very few pesticide applications have been made in the outdoor gardens, e.g. Bartholdi Park. Below is a recap of recent pests found within USBG display gardens:

- Flowers -- Downy Mildews have been found on coleus and basil. Downy mildew (DM) can be introduced to the landscape from infected plants or wind currents carrying aerial spores from neighboring plants. These spores, will germinate and infect coleus and basil under cool, moist conditions. Spores can survive over winter to USDA hardiness zone 5 (-15° F). Once a plant has DM it should be removed and remaining plants monitored for disease development. Fungicides for downy mildew are available but were not applied
- Downy mildew of Sunflower has not been detected but it has within the Region on Echinacea. The causal pathogen, *Plasmopara halstedii*, is highly destructive and has a wider host range than most DM pathogens in attacking many species of the Asteraceae.

- USBG plantings are designed to maximize species diversity to avoid extensive losses for which monocultures are prone. Selecting flower varieties and planting locations is part of the IPM program.

- Flower Care Recommendations: Each season the flowers and all other plants received from various sources are inspected by USBG staff to exclude pathogens and other pests.

- Shrubs -- The shrubs throughout Bartholdi Park and USBG have rarely been treated for pests or fungal disease in the last 6 years. Treatments with biorational pesticides will be necessary for preventing damage from boxwood leafminer and black spot of rose in other areas of USBG display gardens.

- Tree and Shrub Care Recommendations: IPM, using natural enemy conservation and targeted releases, proper fertilizer, pruning, and water application rates has and will continue to be practiced to enhanced plant health keep plants self sustaining and in good health. Key pests will be monitored. Only when populations exceed aesthetic damage thresholds will intervention occur. If pesticides are needed, only the lowest risk products will be applied to preserve indigenous natural enemies and to protect health of staff, visitors and the environment.

Monitoring Schedule and Treatment Recommendations:

Use University of Maryland's Pest Predictive Calendar to focus monitoring efforts:
https://extension.umd.edu/ipm/pest-predictive-calendar-landscapenursery

Timing	Treatment
Early Spring	• Sample soil for nutrient and pH levels especially if deficiency symptoms are evident. • Assess winter injury and plan for management • Inspect all plant material prior to planting to exclude key pest problems including pathogens[ii] • • Apply fertilizers and soil treatments to adjust pH as needed based on soil test results. • Apply horticultural oil for mites, aphids, scale and other susceptible pests. • Plant habitat plants for natural enemies. • Apply compost and mulch where needed.
Mid Spring	• Inspect all plant material prior to planting to exclude key local pests, including pathogens. [iii]

	High vigilance will be directed at potential hosts of emerging and exotic pests such as *Phytophthora ramorum*, *Plasmopara halstedii, Raffaelea lauricola*, spotted lanternfly, ambrosia beetles, • Monitor developing foliage for pests including aphids, Olignonychus mites, leafminers and symptoms of foliar disease such as anthracnose. • Spot treat infested plants with horticultural oil. • Recommend tree injection or predatory bugs.
Late Spring	• Inspect all plant material prior to planting to exclude key pest problems including pathogens[iv] • Inspect plants, including habitat plants, for developing natural enemy populations. • Monitor and treat for Oligonychus and two-spotted spider mite. • Apply *Phytoseiulus persimilis* (predatory mites) to plants plants infested with Tetranychus mites. • Monitor for arthropods pests including hard and soft scales, aphids, thrips, leafminers and caterpillars. . • Inspect soil moisture levels to reduce moisture stress and prevent root disease.
Early Summer	• Monitor for Twospotted spider mite, lacebugs, leafhoppers, caterpillars and symptoms of weevil and borer damage. • Inspect soil moisture levels to reduce moisture stress and prevent root disease.
Mid Summer	• Monitor for weevil and borer damage. • Inspect soil moisture levels to reduce moisture stress and prevent root disease.
Late Summer	• Monitor for Oriental beetle and root feeding weevil grubs. Apply *Steinernema carpocapse* where populations exceed 3 grubs per ft^2 Inspect soil moisture levels to reduce moisture stress and prevent root disease. • **Avoid pruning woody species** to limit infections by canker pathogens. • Monitor trees and shrubs for bacterial scorch symptoms (*Xylella fastidiosa*). Perform ELISA tests to confirm infection. Infected plants must be removed.
Fall	• Apply natural organic fertilizers according to results for soil tests where needed. No water insoluble-synthetic nitrogen sources should be applied now or anytime! • Ensure adequate soil moisture levels prior to onset of winter to minimize injury. •

Winter	• Prune out any injured or cankered branches. Species with excessive sap bleeding may be pruned in mid-late spring.

6 - Plant Care Policies

All pesticide applications at USBG to trees, shrubs and/or herbaceous ornamental plant species are made by USBG staff. All applicators are certified in pesticide applications. Sheridan is the current USBG contractor responsible for any turf pesticide and fertilization applications. Sheridan is fully licensed and applies organic fertilizers as needed when approved by the USBG.

Pesticides and fertilizers are stored off-site in secured facilities Notification will be provided to site users prior to application using protocol below. Application of fertilizers will occur on days with limited precipitation and low wind speeds. The infrequent applications of fertilizers and pesticides will occur during periods the garden can be closed to the public.

a. Safety and Storage

CHEMICAL STORAGE PRACTICES	
Storage Areas	▪ No Pest Control Chemicals are stored on project site, but in USBG secured pesticide storage room.
Labels	▪ On pesticide containers and available on USBG internal site for staff. SDS sheets are also available within storage areas as well as on the internal web site.
Product Information	▪ On pesticide labels within storage areas.
Signage	▪ Storage sites are clearly marked to insure staff and emergency worker safety.

CHEMICAL PREPARATION & HANDLING PRACTICES	
Choosing Chemicals	▪ Pesticide choices will be made either by the Gardens and Grounds Supervisor or the Plant Health Coordinator. ▪ Pesticides are prepared and handled by approved licensed staff or certified/licensed contractor.

CHEMICAL APPLICATION PRACTICES	
Mixing Chemicals User Qualifications	▪ Accurate measurements must be made during both mixing and application phases. Use the most suitable chemical, in the minimum necessary amount, to achieve the desired results. ▪ USBG has a safe area available for mixing pesticides and an approved disposal contractor. Mixing will be done on a concrete pad, with a separate sump or tank to contain any leakage. ▪ Chemicals are prepared and handled by approved licensed staff and certified/licensed contractor. ▪ Pesticide applications are by approved licensed staff and certified/licensed contractor. ▪ Operators are trained and certified in the use of chemicals and the necessary PPE or equipment and protective clothing. ▪ Respirators are checked and fitted annually to prevent exposure.
Species Considerations Health Precautions	▪ USBG Gardens and Grounds Supervisor and Plant Health Coordinator create customized integrated pest management solutions that require detailed knowledge of the biology and ecology of a target pest species. ▪ Decisions for plant health management practices, including pesticide selection, will be made by either the Gardens and Grounds Supervisor or the Plant Health (IPM) Coordinator and either oversees the preparation and use. ▪ Time the treatment to prevent populations from exceeding aesthetic thresholds. Use a selective chemical that has the least effect on non-target species and treat only the area affected. ▪ Pest monitoring and treatment timing is guided by the University of Maryland's Pest Predictive Calendar which is based on accumulated growing degree days and plant phenological indicators. ▪ Applicators prepare a Spray Application Record Sheet and post entrances to treated areas to inform of reentry requirements. Staff and users are notified of applications and sprays in advance of and during applications. ▪ USBG ensures that anyone handling toxic chemicals ▪ Never works alone and that the work area is well-ventilated. ▪ Applicators must wear required PPE according to pesticide labels. ▪ Eating, drinking and smoking must is prohibited when using or handling chemicals ▪ Users are trained to recognize the routes and symptoms of exposure. ▪ Users are required to stop work if they are feeling ill, to seek medical advice and to report incidents to their direct supervisor.
User Safety Chemical Transport	▪ Proper health surveillance, through on site medical clinic is available to all those working with pesticides and herbicides. ▪ Users must wear personal protective equipment) and follow all safety requirements as specified on pesticide label(s). ▪ Chemicals are prepared and handled by approved staff or certified contractor only. ▪ Only the appropriate quantity of pesticide and herbicide must be removed from the pesticide store for immediate use. ▪ Do not transport chemicals in vehicles used for carrying people or food. ▪ Chemicals are transported by approved licensed staff or certified/licensed contractor.

Limited Access	▪ The area of application is always clearly marked, and unnecessary access prevented while spraying is in progress. ▪ Building occupants are always informed of any pending pesticide applicators and entry into treated areas before expirations of the restricted entry interval (REI) are prohibited unless required PPE is worn. ▪ USBG staff controls the reentry of people into the treated area based on label. ▪
Equipment	▪ Equipment is checked prior to applications and necessary repairs are made. . ▪ Gardens and Grounds applications are typically made with backpack sprayers or high pressure hydraulic sprayers. ▪
Weather/Time Restrictions	▪ Spraying must not be carried out in unsuitable weather. To avoid drift applications are made only when wind speed is negligible. ▪ Applications are made prior to or after public access. ▪
CHEMICAL DISPOSAL PRACTICES	
Conditions of Disposal	As some pesticides and herbicides are toxic, proper disposal of unused chemicals is always followed by USBG staff to maintaining the health of building occupants and the safety of the environment. Disposal methods will depend on: ▪ Quantity of waste for disposal ▪ Chemical and biological degradability of the active ingredients ▪ Toxic properties ▪ Concentration ▪ Physical form of the waste ▪ Disposal options available ▪ Chemicals are disposed of by contracted hazardous waste disposal company or pest control contractor, and landscape turf contractor.

General Guidelines	▪ Always follow the manufacturer's and/or supplier's instructions even when disposing of empty containers. ▪ Landfilling or incinerating pesticides and herbicides is not an environmentally sound option. ▪ Segregate pesticide/herbicide wastes from general building wastes. ▪ Chemicals are disposed of by contracted pest control provider only and are not disposed on site
Containers/Labels	▪ USBG staff never transfers pesticides to unlabeled or mislabeled containers. Keep the chemicals in clearly labeled containers even when disposing of them. ▪ USBG does not reuse pesticide/herbicide containers. ▪ After use, staff punctures containers after they have been used to prevent reuse and disposes of them properly. ▪ Chemicals are disposed of by contracted provider only and are not disposed on site
Authorization	▪ USBG uses an authorized waste-disposal contractor. ▪ Chemicals are disposed of by contracted provider only and are not disposed on site

b. Accident Procedures

Contacts:

Internal: Direct USBG Supervisor

Local Medical Assistance:
Medstar Washington Hospital Center
110 Irving Street NW
Washington, DC 20010
202-877-7000
Capitol Police
202-225-0911

National Poisoning Hotline: 1-800-222-1222

c. Notification Protocol

United States Botanic Garden and contractors have adopted a notification system (e.g. posting signs) if a pesticide, other than a least-toxic fertilizer or pesticide is to be applied on site. USBG and contractors will place signage at least 48 hours in advance of application. Also an organization-wide email notification is sent. This notification system enables occupants and staff, and especially high-risk site users such as children, pregnant women and the elderly, to modify their plans based on fertilizer and pesticide use on site. Notification includes the following information:

- Fertilizer or Pesticide product name
- Active ingredient
- Product label signal word (e.g., “caution”, “danger”)
- Time and location of application
- Contact information for persons seeking more information

d. Plant Care Product and Application Requirements:

Product Category	Sustainable Criteria
Herbicides	Avenger is a least toxic nonselective product derived from citrus oils.
Fertilizers	Natural organic nitrogen products are used: Such as Hollytone, Planttone, Rosetone fertilizers.
Pesticides	If any pesticides are used in 2017 a list will be provided. It is uncertain at this time if any pesticides will be used. Priority will be placed on selection of biorational products containing: neem, horticultural oils and soaps potassium bicarbonate (MilStop) and biologicals such as BotaniGard WP, Cease, Triathalon BA, RootShield WP, NemaForce SC.

e. Certified Fertilizer Professionals Policy

The USBG has a Plant Health Care (IPM) Specialist that oversees all fertilizer application and determination of need.

f. Third Party Certified IPM Professionals

USBG has certified and licensed professionals and a Plant Health Care IPM Specialist on staff. Turf care is contracted. The contract statement of work includes the use of organic fertilizers and proper application time, but it should be more specific in IPM practices that the contractor must follow. This should be done when and if a new contract is prepared for bidding.

g. Communication Policies

The Horticulture Manager, Gardens and Grounds Supervisor and Plant Health Care (IPM) Specialist shall periodically evaluate the success of the Plan. This evaluation may include producing and providing a report on an annual basis to senior management. Whenever possible, the annual reports shall include an evaluation of the performance, safety, cost and environmental/public health benefits achieved as a result of its implementation.

Prior to implementation, service providers shall submit all proposed pest and plant health care management activities to the responsible parties. Upon reviewing proposed activities, the responsible parties shall determine if they meet the criteria of the Plan and approve or deny action.

The responsible parties, shall regularly communicate with all service providers, and conduct regular site inspections and evaluations to ensure that the Plan is in place and functioning as intended.

7 - Templates for tracking and recording application of pesticides and fertilizers

All record keeping for pesticides and fertilizers are done by the Plant Health Care Specialist and Gardens and Grounds Supervisor.
Record keeping is required by USBG to demonstrate ongoing compliance with the IPM plan. All applications of fertilizer and pesticides (include least-toxic options) shall be logged. The fertilizer and pesticide application logs shall include the following information:

- Universal Notification to Occupants
    - Date
    - Time

    - Method
- Fertilizer/Pesticide Application Date and Time
- Application Manager
- Location
- Target Pest, nutrient deficiency
- Fertilizer or Pesticide Trade Name
- Fertilizer or Pesticide Active Ingredient(s)
- EPA Registration Number
- Least-toxic status (Y/N)

Do Not Enter!

PESTICIDE APPLICATION (SPRAY)

For Pesticide Exposure and Poisoning Call: 1-800-222-1222

APPLICATION DATE: _____, 2017 **TIME:** _____AM or PM

TARGET PEST(S): _____

_____

LOCATION (S) (BAY, ZN, NURSERY, GARDEN, CSV DISPLAY): _____

RESTRICTED ENTRY INTERVAL: **REI =** _____ **HOURS**

TOTAL AREA TREATED: _____Sq. Ft. (approximately 2,500 Sq. Ft. per bay)

DO NOT ENTER, WITHOUT PERSONAL PROTECTIVE EQUIPMENT, BEFORE REI EXPIRES AT**:** ___ : _____ **AM OR PM** (circle which) _____, 2015

REQUIRED PPE FOR EARLY ENTRY: REQUIRES LONG-SLEEVED SHIRT AND LONG PANTS; PARTICULATE RESPIRATOR (N95); CHEMICAL-RESISTANT, WATERPROOF GLOVES – CATEGORY A SUCH AS NITRILE RUBBER OR BUTYL RUBBER; SHOES PLUS SOCKS

REQUIRED PPE FOR APPLICATORS: MUST WEAR TYVEK SPRAY SUIT WITH HOOD (NO HOOD WITH KASCO HELMET) AND A RESPIRATOR MEETING NIOSH STANDARDS FOR ORGANIC VAPORS; GOGGLES (UNLESS USING FULL FACE RESPIRATOR); CHEMICAL-RESISTANT WATERPROOF GLOVES, - CATEGORY A SUCH AS NITRILE OR BUTYL RUBBER; AND WATERPROOF RUBBER BOOTS.

PESTICIDE(S)	ACTIVE INGREDIENT (S)	EPA REGISTRATION #
_____	_____	_____
_____	_____	_____

PESTICIDE/SURFACTANT BRAND NAME	AMOUNT MIXED	TOTAL VOLUME OF SOLUTION APPLIED	EQUIPMENT USED

8 - IPM, Arborist, or other expert professional recommendations report N/A

9 Copies of Current Certifications and licensing - See attached

10. Training Program for United States Botanic - Training Program for United States Botanic Garden Gardens Staff will take place annually as part of pesticide recertification. United States Botanic Garden Gardens Staff will receive a copy of the PHCP. All new staff will receive an educational introduction to the PHCP. All employees will need to be notified when changes are made to the PHCP.

11 - Key Contacts

United States Botanic Garden
Dr. Ari Novy, Executive Director
anovy@aoc.gov
202.225.6670

Dr. Susan Pell, Deputy Director and Science Public Programs Manager
spell@aoc.gov
202.225.1269

Jim Willmott, Plant Health Care (IPM) Specialists
jwillmot@aoc.gov
202.266.0301

John Walsh, Gardens and Grounds Supervisor
jwalsh@aoc.gov
202.809.4376

Ray Mims, Conservation and Sustainability
rmims@aoc.gov
202.409.1659

12 - Addenda

Refer to Addenda Folder for the following files:

Supporting File 1. USBG Staff Pesticide License Summary
Supporting File 2. USBG Application Record Media and Spray
Supporting File 3. Instruction for Staff Licensing
Supporting File 4. Outdoor pesticide signage
Supporting File 5.USBG Gardens and Grounds Staff's Licenses
Supporting File 6. Signage

---

[i] Pests include not only insects and mites, but also pathogens and weeds.
[ii] Key pests listed in
[iii] Key pests listed in
[iv] Key pests listed in