THE CITY OF DUBUQUE
*Masterpiece on the Mississippi*

# INTEGRATED PEST MANAGEMENT (IPM) PROGRAM

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**June 21, 2016**

# CITY OF DUBUQUE

# INTEGRATED PEST MANAGEMENT (IPM) PROGRAM

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## A. IPM PROGRAM MISSION STATEMENT

The mission of the City of Dubuque's Integrated Pest Management (IPM) program is to manage pests that are harmful to the health, function or aesthetic value of City owned and/or managed landscapes, buildings and facilities in an efficient, effective, and environmentally responsible manner. In doing so, City departments will consider the impact to the environment, and the health of the public and city staff, and operate in a transparent way in an effort to educate the public regarding these efforts.

## B. GOALS

1. Reduce use of pesticides, using a non-chemical method whenever possible.
2. Minimize risk of pesticides to human health and/or environmental risk.
3. Establish City of Dubuque IPM program that applies to all City land and facilities with prioritized, phased in action steps, timeline for implementation, and measurable goals and outcomes.
4. Educate and engage staff
    a. As part of IPM program implementation, identify opportunities to explore alternative controls that will lessen the use of chemical treatments.
    b. Promote responsible application to reduce non-target adverse effects on organisms.
5. Develop improved notification system for the use of chemicals in all City of Dubuque public indoor and outdoor spaces.
6. Identify initial pesticide-free parks list, to be implemented in Spring 2016, with future consideration for additional parks.
7. Influence public perception regarding the "required" maintenance level of open spaces and aesthetic value; educate the public on the benefits of reducing and eliminating the use of chemical means of pest control. (aesthetic value).
8. Partner with resident groups and businesses to complete public education regarding City of Dubuque IPM program and benefits and opportunities for the public.
9. Review and report annually on current practices, data and necessary amendments of the IPM program.
10. Support the improvement of air and water quality, biodiversity, native plants, pollinators and the health and resilience of soils and ecosystems.

## C. DEFINITIONS

1. Pest: Any plant, animal, insect, virus, bacteria or other microorganism that occurs where it is not wanted or that causes damage to vegetation or humans or other animals. Pests may include but are not limited to insects, weeds, rodents and fungi.
2. Pesticide: Any substance primarily intended to control, destroy, repel, or mitigate a pest. Pesticides include, but are not limited to, herbicides, fungicides, insecticides, rodenticides and any other compounds and organisms, naturally occurring or otherwise.
3. Herbicide: A substance that is primarily intended to destroy unwanted vegetation.
4. Insecticide: A substance primarily intended to kill insects.
5. Integrated Pest Management Program: A pest management technique that gives preference to the safest pest control methods and uses conventional chemical pesticides only when no other feasible, reasonable alternative exists. It addresses the underlying causes of pest problems, and seeks to find effective long-term solutions that emphasize prevention.
6. Glyphosate: Non-selective herbicide applied to the leaves of plants to kill both broadleaf plants and grasses.
7. Weed / (Common Weed) / Class 2 Weed: A weed is a plant growing in an undesired place, and is considered by the user of the term to be a nuisance. The term weed can be applied to plants growing in many different settings, including gardens, lawns, agricultural areas, developed parks, and natural areas. In some settings even native plants can be considered undesirable, such as prairie restoration projects where woody shrubs and trees would conflict with the desired site characteristics. Poison ivy is a native plant, but in some locations where the likelihood of public exposure is high, staff may elect to control it in the interest of public safety. Weeds may be unwanted for a number of reasons: they might be unsightly, degrade water quality, negatively affect ecosystem functionality, crowd out or restrict light to more desirable plants, or use limited nutrients from the soil. They can harbor and spread plant pathogens that infect and degrade the quality of crop or horticultural plants. Some weeds are a nuisance because they have thorns or prickles, some have chemicals that cause skin irritation (e.g., poison ivy) or are hazardous if eaten, or have parts that come off and attach to fur or clothes.
8. Noxious Weed / Class 1 Weed: A noxious weed is an invasive species of a plant which is designated as harmful to agricultural crops, ecosystems, or humans or livestock. In accordance with the Federal Noxious Weed Act of 1974, as amended (7 U.S.C. 2801 et seq.), the U.S. government has designated certain plants as noxious weeds. (See Appendix 3 for Iowa Noxious Weeds)

9. Best Management Practice (BMP): Methods or techniques found to be the most effective and practical means in achieving an objective while making optimum use of resources.

10. Aesthetic value: Value of a property based on its capacity to elicit pleasure or displeasure when appreciated or experienced.

11. Environment: The surroundings (natural or built) in which a plant or animal lives, which tend to influence its development or behavior.

12. Prairie: herbaceous-dominated habitats identified primarily by the presence and number of trees in a grassland setting.

## D. RESPONSIBILITY FOR IMPLEMENTATION

The IPM Coordinator and Committee are appointed by the City Manager and are responsible for implementation of the IPM Program.

## E. IPM PROGRAM PROTOCOL

1. Monitor and Identify

   Monitoring and identification reduces the probability that pesticides will be used when they are not really needed, or that the wrong kind of pesticide will be used. An accurate evaluation must be completed to determine if a pest problem exists. Pest control efforts shall not begin until it is determined that a pest problem exists, which if not controlled will have a negative impact on the management of the City of Dubuque's lands, waters, buildings, and facilities.

   Monitoring of site conditions, plant, and pest information will help determine the best control option to use for current and ongoing maintenance situations. This will also allow staff to detect a potential pest problem prior to its becoming a major problem.

2. Action Threshold

   An action threshold will help the staff determine when a pest population, or the injury it causes, exceeds a tolerable level. A high action threshold level means pests will be tolerated longer vs. a low action threshold level where pests will be tolerated for a shorter period of time before action is taken. The threshold level will vary depending upon the location of the site and the amount of use by the public. Determining the appropriate threshold requires knowledge, experience, and foresight and can be revised based on continued observations and experience. Several aspects go into determining the action threshold for a site including the pest's potential to cause injury to health, environmental aesthetics, purpose and safety of the site, and value of plants.

To determine if treatment is warranted, an acceptable threshold level of treatment for each target pest and site should be established. In some instances, treatment may be required by federal or state law. The assessment will be based on the following:

a. The tolerable level of environmental, aesthetic and economic damage as a result of the pest population(s) and the tolerable level of risk to human health as a result of the pest population(s); OR

b. The size or density of the pest population that must be present to cause unacceptable environmental, aesthetic and/or economic damage; and the size, density and type of pest population that must be present to create a human health risk.

3. Prevention

As a first line of pest control, work to manage the land to prevent pests from becoming a threat. For example, using mulch in planting beds to suppress weeds, planting desired plants at densities that preclude weeds, selecting pest-resistant varieties, proper site preparation prior to development, and planting pest-free rootstock are examples of prevention techniques. These control methods can be very effective and present little to no risk for people or the environment. Prevention may also include managing weeds at small population densities before the weed becomes established, thereby reducing the input of resources. Catching a weed population while it is small is a way of preventing a large problem in the future. For example, a single Canada thistle plant in a landscape bed can produce over a million seeds. For these reasons, controlling invasive plants at low densities may be identified as a prevention tool.

When managing indoor facilities and buildings for insect pest control, the best prevention is addressing general housekeeping. Examples include, timely removal of waste products, designated food areas, and limiting access points for pests to enter the building.

4. Control

a. Cultural Controls draw upon elements common to the existing ecosystem such as planting pest-resistant varieties or a diverse plant palette, as well as companion planting, crop rotation, selecting native plants, and attracting beneficial insects to reduce pest problems in gardens.

b. Mechanical Controls are the use of mechanical procedures to eliminate or reduce pest populations, such as mowing, manual weeding, aeration, and controlled burning.

c. Physical Controls physically inhibit the pest's ability to inhabit an area. Examples include using screens, traps, barriers, and caulking.

d. Structural Controls modify existing conditions of habitats that attract or harbor pest populations, such as addressing low spots that cause

standing water where mosquitoes may breed, improving sanitation, and building repairs to remove places where pests may breed.

e. Biological Controls involve the introduction of control organisms and natural enemies. Example include pathogens that cause disease in the pest, natural components such as pheromones to disrupt pest mating, or the use of a pest's natural predators or parasites to eliminate or reduce the pest population.

f. Chemical controls should be used only when other pest prevention and non-chemical control measures have failed to reduce pests below tolerance thresholds. When a pesticide must be used, the smallest amount of the least-toxic product that will meet pest management goals will be used. Chemical measures should begin with spot treatment and broadcast spraying to large surface areas will be a last resort.

5. Evaluate

After a control method is implemented, the efficacy of the treatment (including evaluating the benefits and adverse consequences of the method) shall be evaluated. Based on this evaluation, methods will be modified in an effort to continually improve outcomes and refine best management practices (BMPs).

## F. ALTERNATIVE MANAGEMENT METHODS

1. Prevention. Prevention is the most effective pest management program. By reducing the capacity of the ecosystem to support target pest populations through design and appropriate management, the opportunities for pest establishment can be reduced or eliminated.

   a. Use strategies that reduce the preferred environment or other essential requirements of pests.
   b. Use weed-free materials for road and trail construction and maintenance.
   c. Use landscape and structural design appropriate to specific habitat, climate, and maintenance the area will receive.
   d. When designing projects, consider potential impacts of pests and mitigate through the use of appropriate landscape design (water requirements, weed barriers, etc.), construction design (garbage collection areas) or other designs which limit pests.

2. Cultural. Cultural control is the use of management activities that prevent pests from developing. Specific examples are the following:

   a. Mulching: The main advantages of applying and maintaining mulch are to reduce soil temperature fluctuations, reduce water evaporation, inhibit weed growth, and reduce the need for pesticide use.

   b. Irrigation and Surface Water Management: This practice targets water distribution only to those plants needing water to sustain life. Excess water

can possibly lead to increased disease and weed problems in turf and landscape beds.

c. Sanitation: Removal of diseased, infested, damaged, or dead plant material.

3. Mechanical**.** Mechanical control is accomplished by using physical methods or mechanical equipment to control pest infestations.

   a. Mowing or line-trimming

   b. Burning: controlled burning of native areas or use of a propane torch on hard surfaces to scorch weeds.

   c. Hand-pulling of weeds.

   d. Hand-removal of insect egg masses.

4**.** Biological. Biological controls include the introduction or enhancement of natural enemy populations to target pests.

   a. Landscape Design: Preserve and create biological diversity in landscape areas by planting diverse populations of plants. Using non-sustainable techniques and materials in landscapes may destroy natural pest control organisms.

   b. Biological / Organic Product Trials: Use Organic products that are environmentally friendly.

   c. Introducing insect or disease parasitoids, predators, and microbial products to control pests.

5**.** Chemical. Chemical control of pests is accomplished by using chemical compounds registered as pesticides. All pesticides shall be assumed to be *potentially* hazardous to human and environmental health. Non-chemical control strategies shall be considered first. Chemical approaches should be used only as a last resort, when other pest prevention and non-chemical control measures have failed to reduce pests below tolerance thresholds. When a pesticide must be used, the smallest amount of the least-toxic product that will meet pest management goals will be used. Chemical measures should begin with spot treatment and broadcast spraying to large surface areas will be a last resort.

   In selecting a treatment approach, the following criteria shall be considered:

   - Least-hazardous to human health
   - Least disruptive to natural controls
   - Least-toxic to non-target organisms
   - Least-damaging to the environment
   - Most likely to produce a permanent reduction in habitat for pest populations to thrive
   - Cost effectiveness over a reasonable term (i.e. annually)

## G. PESTICIDE INFORMATION

The focus of an IPM program is not the use of pesticides but to encourage plant health care practices and building care and maintenance practices, which limit the need for pesticides. If a pesticide application is warranted the use of materials with the least environmental impact should be emphasized. Prior to making any application, the location of the pest problem and host should be evaluated and then an appropriate alternative management method chosen.

Before applying any pesticide it is important to read and follow the label directions and only apply that product in a manner which is consistent with the label and the law. Mixed product pesticide applications may be made only under the supervision of a licensed commercial applicator. After the application of a pesticide, accurate record keeping will help determine success and cost of the program. The record keeping form (Appendix 5) will include the following information:

- Licensee/applicator name
- The target pest
- The type and quantity of pesticide used
- EPA registration number
- The specific location of the pesticide application
- The date and time of application
- Weather conditions at time of application
- Record keeping will ensure that ineffective methods are not duplicated.

City staff will make pesticide records readily available to the public and to interested institutions upon request. These records will be posted annually to the City of Dubuque website relevant to the IPM program.

**1.** Allowed pesticide list

The IPM Program Coordinator and IPM Program Committee will develop a list of pesticides allowed for use by the City of Dubuque. This list can be located in *Appendix* 8. The purpose of the list will be to:

a. Review current pesticides used to maintain city owned properties and public right of way.
b. Reduce the number of pesticide products being used by the City.
c. Provide staff and managers with a selection of pesticides to meet specific pest control needs when alternative methods are not effective.
d. Evaluate, identify, and inform staff about environmental impact of pesticides.
e. Identify pesticide products to remove, add, or to remain on the list.

The Allowed Pesticide List will include the following:

a. Product/Trade Name
b. Common Name/Active Ingredient
c. Category/Signal word

d. Type of Pesticide – herbicide, insecticide etc.

**2.** Pesticide selection

The selection of the products will begin with staff submitting a request for a pesticide to be placed on the Allowed Pesticide List for the upcoming year. Whether a product will be used will be the decision of the staff responsible for maintaining that area.

The IPM Program Coordinator and IPM Program Committee shall review each of the products and determine if it is to be placed on the Allowed Pesticide List. The purpose of this list will be to provide staff with a resource of products available to use during the current year. The list will be reviewed annually and be included as an attachment to the IPM Program manual. During the annual review process products may be identified for removal, recommended for addition or allowed to remain on the Allowed Pesticide List. In addition, an amendment may be requested throughout the year to add/remove a pesticide from the Allowed Pesticide List. Any and all amendments will be reviewed by the IPM program Coordinator and IPM Program Committee.

Criteria for selection and inclusion on the Allowed Pesticide List will be based on the following:

a. The City of Dubuque will not use any pesticide classified as highly or acutely toxic by the U.S. EPA. This includes Hazard Category I and Category II, signal words DANGER and WARNING. Exemptions may be made for Golf Course maintenance as needed.

b. Signal Word on the pesticide label is required for all registered products, indicating the acute toxicity. The Signal Words and associated toxicity categories are as follows:

| Toxicity | Signal Word |
|---|---|
| Category I | DANGER (Most Toxic) |
| Category II | WARNING |
| Category III | CAUTION |
| Category IV | None required/CAUTION if used (Least Toxic) |

Appendix 1 explains signal words in greater detail.

## H. SAFETY

When choosing a pest management method or pesticide material from the approved lists, all personnel should consider the following and any additional factors relevant to the safety of the selection.

1. Nature of the site

   a. Erosion susceptibility and potential movement of soil through runoff.

b. The intended use and function of the landscape.
c. The feasibility of the method given the area and scope of the problem.
d. The relative importance and public expectation of a site or plantings.
e. Site conditions such as soil type, grade, drainage patterns, and presence of surface water.

2. Possible health and safety effects
   a. Consider both short and long term toxicological properties and any other related potential health effects of the materials or methods, to the applicator, public, wildlife, and/or water quality.
   b. Equipment operation safety issues for both the operator and the public.
   c. Worker safety and worker injury issues involved with carrying out the method.
3. Possible environmental effects
   a. Consider both acute and chronic toxicity and any other related potential effects of the material or method to non-target organisms including mammals, birds, amphibians, fish, invertebrates, pollinators, and other organisms.
   b. Potential bioaccumulation from materials used.
   c. Potential impacts to non-target plants, forage, and nesting habitat, from materials or methods.
   d. Potential impacts to federally listed threatened or endangered species.
   e. Possible introduction or establishment of invasive plants.
   f. Nesting birds: For natural area invasive plant removal, the presence of nesting birds in area to be treated.
   g. Pollinator protection: See Appendix 6, “Pesticide/Bee Rule” of the Iowa Administrative Code 21-Chapter 45.31(206)
4. Financial costs (short and long term)
   a. Costs of the material or method.
   b. Application and labor costs.
   c. Length and quality of pest control.
   d. Feasibility of using a particular method or product.
5. Characteristics of the product
   a. Target pests and target sites of the product being used.
   b. Possible residual effects, decomposition pathways, rates, and breakdown of products.
   c. Volatility and flammability.

d. Product formulation and package size.
e. Leachability, solubility, and surface and soil bonding characteristics of the product.
f. Ease of cleaning equipment after use.
g. Positive and negative synergistic effects of pesticide combinations.
h. Presence of “inert” constituents of the product formulation and their potential effects.

6. Other special considerations
   a. Application equipment availability.
   b. Method of delivery.
   c. Current and anticipated weather conditions.
   d. Previous pesticide applications to the site and the interval between treatments.
   e. Possible development of pest resistance to a particular management method or material.

## I. NOTIFICATION

All Certified City applicators and Contractors hired by the City who apply pesticides within City public property shall post or affix notification signs at the start of the application and for at least 24 hours following the application or longer if required by the reentry directions on the pesticide label(s).

As part of this IPM program, additional public notification will occur before any pesticide application. The City of Dubuque shall electronically post a “Notify Me” message (or the City’s current citizen notification system) to those citizens that have subscribed to the opt-in alert. This notification will be sent out approximately one week in advance of an application time frame (two- week period) provided from the Department/Contractor. The message will contain the information of treatment location, type of treatment, and the timeframe of the application.

1. Signage
   For all indoor and outdoor City public property, the notification signs shall be posted immediately adjacent to areas within the property where pesticides have been applied and at or near all entrances to the property where pesticides have been applied. The notification signs shall be placed in a conspicuous manner to provide a reasonable notification to the public.

The notification sign (Appendix 4) shall consist/contain the following:

- The notification signs shall be of a material that is rain-resistant for at least a 24-hour period and shall not be removed by the applicator for at least 24 hours from the time pesticides are applied or longer if required by the label of the pesticide applied. After the required posting period has elapsed, all notification signs should be removed.
- The name and telephone number of the business, organization, entity or person applying the pesticide.
- The words: “This area chemically treated. Keep off. Do not remove sign for twenty-four hours.” When the labeling of the pesticide(s) applied requires a longer reentry restriction it shall be so stated on the notification sign.
- The “product name/type”, “date/time applied”, and” area applied to” will be a part of the signage.

2. Application Record Keeping
   All Certified City Applicators shall maintain records with respect to application of pesticides. Each set of records shall include the following:
   - The name and license number of the licensee.
   - The name and address of the property owner.
   - The place of application.
   - Date of pesticide application.
   - Time application begins and ends.
   - Target pest.
   - EPA registration number.
   - Trade name of pesticide product used.
   - Quantity of pesticide product and the concentration or rate of application.
   - Temperature, humidity, wind direction, and velocity.

   These records shall be kept on file for a period of three years and made available to the State for review and the public upon request and a summary shall be included in a required annual report to the City Manager and Environmental Stewardship Advisory Commission, which will also be posted on the City of Dubuque IPM website.

## J. LICENSING AND EDUCATION

Pesticide use in Iowa is regulated under the “Pesticide Act of Iowa,” Chapter 206 of the Code of Iowa. The rules governing pesticide use, application, registration,

and certification are contained in 21-Chapter 44 and 21-Chapter 45 of the Iowa Administration Code. The IDALS Pesticide Bureau administers the pesticide code and rules.

1. Certification

   The City of Dubuque Leisure Services Department is the holder of a Pesticide License from the Department of Agriculture and Land Stewardship (IDALS). In order for department employees to be able to apply pesticides for the City of Dubuque, they are required to be certified and listed as an applicator under the pesticide license. There is a 21- day grace period from the day of initial employment to meet certification requirements. During the 21 days, the employee must operate under direct supervision of a certified applicator who is within sight and hearing distance.

   Leisure Services Department employees are required to carry certification in either category 3T (Turf), 3OT (ornamental and turf), 3G (Greenhouse) or 6 (Right of Way).

2. Public Education

   Education is a critical component of a successful IPM program. The City of Dubuque is committed to providing ongoing training for employees and assisting in developing educational programs for the public in partnership with other organizations and groups. The public will play an integral role in the success of the IPM program. The IPM Program Coordinator shall be responsible for keeping the public informed of the City's IPM program. Information requests from the public about the program will be directed to an appropriate member of the IPM Program Committee who will answer it promptly. The City welcomes interested groups in assisting to promote the IPM Program; these groups should work with the IPM Program Coordinator to determine program goals, timeline for implementation, and most beneficial opportunities for partnership.

3. Staff Training

   Staff in all departments will be made aware of the IPM program. Training of employees involved in implementing this IPM, including providing regular updates on progress to department managers and frontline staff, is essential and will be ongoing. Specific management strategies vary from one situation to another, location to location, and year to year, based on changes in pest populations. Training will focus on developing an understanding of and an ability to monitor an ecosystem, best practices in pest management in landscape and facility design, and maintenance that is beneficial for implementing this program. Ongoing opportunities for training will be considered a high priority.

   Education and training goals will be established and evaluated based on the employees understanding and outcomes of the training, along with their ability to implement the City's IPM.

## K. IPM PROGRAM AMENDMENTS

Any and all IPM program amendments shall be discussed and decided upon by the IPM Coordinator and the IPM Committee. Program amendments will typically be completed once per year; however, they may be done at any time of year. Program amendments are presented to the City Manager for approval. Amendments will be included in a yearly report of the IPM program which will be shared with the City Manager, and then presented as a report to the Environmental Stewardship Advisory Commission.

## L. CONTRACTORS

1. Any pesticide application done on City of Dubuque property by commercial pesticide applicators will be performed under contract with the City of Dubuque. All contractors working for the City are required to abide by the City's IPM Program and carry any certifications required by the Code of Iowa. The contractor will return a signed statement to the IPM Coordinator or departmental contact certifying they have read and understand the program prior to any work being done for the City.
2. All City departments bidding out contractual work for pest management must inform all bidders that the City has an IPM Program and include its guidelines in bid specifics. Contractors are encouraged to submit bids that include nonchemical pest control methods. Bids with non-chemical approaches may be given preference.
3. Pesticide use in Iowa is regulated under the "Pesticide Act of Iowa," Chapter 206 of the Code of Iowa. The rules governing pesticide use, application, registration, and certification are contained in 21-Chapter 44 and 21-Chapter 45 of the Iowa Administration Code. The IDALS Pesticide Bureau administers the pesticide code and rules. Any commercial pesticide applicator contracted to apply to city owned properties shall follow this code.

## M. IPM PROGRAM OPERATIONS GUIDELINES

### 1. Hard Surface Areas

a. **Description**

Hard surface areas include all paved surfaces within developed parkland or natural areas, and any surfaces in the rights-of-way adjacent to the parkland for which City of Dubuque staff has maintenance responsibility, including trails, ball courts, sidewalks, skate parks, and street medians. Hard surfaces are typically constructed of cement, brick, or asphalt.

b. **Monitoring**

Monitoring frequencies for hard surfaces are consistent throughout the park system and are not determined by the maintenance mode of the parkland in which the surface is located. This is primarily due to the need to maintain accessibility, preserve surface integrity, and protect public safety. Monitoring of hard surfaces will be performed on a quarterly basis, coinciding with the lifecycles of the targeted weeds.

c. **Action Threshold**

Vegetation management is performed on hard surfaces for a variety of reasons, including preserving the surface's overall integrity, maintain ADA code compliance, maintain aesthetic value, and eliminate tripping hazards. Control action may be taken when any weeds are observed growing in any hard surface.

d. **Prevention**

The primary preventative practice for weed encroachment on hard surfaces is surface cleaning and crack sealing. Keeping the surfaces as clean as possible and systematically cleaning and sealing cracks in hard surfaces is the most effective technique to keep hard surfaces below action thresholds. Where time and budget allow, preventative surface cleaning and systematic crack sealing should be utilized.

e. **Control**

If the preventative practices described above do not achieve control at or below set thresholds, then mechanical controls (e.g., hand removal, or crack cleaning and crack sealing) should be used. Given the runoff potential of hard surfaces, it is important to focus on preventative actions and mechanical controls. If it is deemed necessary to use an herbicide, then the least toxic and most effective herbicide will be used. A list of BMP methods and weed classifications for specific weed species may be found in *Appendix* 2.

f. **Evaluation**

Before any control action is taken, past control strategies will be reviewed to evaluate effectiveness and other options will be considered if necessary.

2. **Landscape Beds**

a. **Description**

Landscape beds, such as shrub and flower beds, include all non-turf plantings in developed parks, high profile public spaces, and other public facilities.

b. **Monitoring**

The maintenance mode of each landscape area will determine which classes of weeds are monitored in that area.

**Mode 1 Landscapes**

Mode 1 landscapes will be monitored weekly for the presence of all weed classes throughout the calendar year.

**Mode 2 Landscapes**

Mode 2 landscapes will be monitored monthly for the presence of all weed classes.

c. **Action Thresholds**

Weed management is performed in landscapes to preserve the landscape's overall design integrity and function. The second reason is preserving public safety, which includes providing accessible facilities, eliminating tripping hazards, and preserving the function of pathways and driveways. Landscape management is also performed to prevent the spread of invasive species to other parts of the park system.

The action threshold level for each landscape area is directly correlated to the mode designation set for each landscape bed in a park. The mode is determined by the design, location of the landscape beds and the visibility/complexity of the plant communities. Management and control of grass and broadleaf weeds are the primary activities associated with these sites. The thresholds triggering control actions are based on the percent cover of weeds present in the landscape beds. If weeds of any class are discovered and occupy a small area (< 2% cover), a control action may be taken in the interest of preventing a larger infestation and the need for more resource intensive actions in the future. If the weed population rises above the action threshold, a control action may be taken. Staff reserves the right to delay management actions for weeds that are above the action threshold due to resource constraints. The current mode classifications are listed in Table 1 below.

Ocular estimation tools are provided in *Appendix* 7 and can be used by staff as a reference for estimating the percent cover of weeds in landscape beds prior to deciding on a control method.

**Mode 1 Landscapes**

Class 1 weeds: Control action may be taken when any Class 1 weeds are observed.

Class 2 weeds: Control action may be taken when 5% or more of weeds are observed.

**Mode 2 Landscapes**

Class 1 weeds: Control action may be taken when any Class 1 weeds are observed.
Class 2 weeds: Control action may be taken when 10% or more of weeds are observed.

## Table 1.

| Landscape Beds in Park/Public space | Mode |
|---|---|
| A.Y McDonald Park | 2 |
| Pyatigorsk Park | 2 |
| Hawthorne Detention Basin | 2 |
| Ham House | 1 |
| Eagle Point Park | 2 |
| Lower Bee Branch | 2 |
| Orange Park | 2 |
| City Hall Annex | 1 |
| City Hall | 1 |
| Harvest View Park | 2 |
| Bergfeld Recreation Area | 2 |
| Flora Park | 2 |
| Murphy Park | 2 |
| Riverwalk | 1 |
| Port of Dubuque public areas | 1 |
| Municipal Services Center | 1 |
| Dubuque Pack Memorial site | 1 |
| Grandview/Rockdale Entryway | 1 |
| Chaplain Schmitt Memorial | 1 |
| Vietnam Veterans Memorial | 1 |
| Veterans Park | 2 |
| Valentine Park | 2 |
| Usha Park | 2 |
| Washington Park | 1 |
| Historic Federal Building | 1 |
| Grand River Center | 1 |
| Cathedral Square | 2 |
| Water, Resource & Recovery Center | 1 |
| Intermodal Center & Ramp | 1 |
| Comiskey Park | 2 |
| Jackson Park | 2 |
| All Veterans Memorial | 1 |
| Bunker Hill Park Office | 1 |
| Town Clock Plaza | 1 |
| Heritage Trail | 2 |
| 5th- 7th St. Trail | 1 |
| Jaycee Trail | 2 |
| 10th St. Ramp | 2 |
| Riverview Campground | 2 |
| Grant Park | 2 |

d. **Prevention**

**Mode 1, 2 Landscapes**

The following weed prevention methods will be used in all landscape sites and considered best management practices (BMPs): Planting dense communities of plants in landscape beds to reduce open soil; planting or replanting landscape beds to encourage the growth of native species to crowd out unwanted plants; using appropriate mulch types and application rates; and monitoring irrigation to ensure proper plant health; using mechanical and/or controlled burning.

e. **Control**

**Mode 1, 2 landscapes**

A list of best management practices for controlling weed species in landscape areas of all modes is located in *Appendix* 2.

f. **Evaluation**

**Class 1 and 2 weed control actions**

When a new BMP is being developed or being trialed in a new situation, the standard for recording information will be higher in order to enable staff to reproduce successes and understand failures. When staff implements an existing BMP in a typical situation, the standard for recording information will be lower in order to balance the costs and benefits of record keeping activities. Information recorded about control actions may include such specifics as control method, repetition, weather, and anything else deemed important for the specific action. Staff will seek information on management of pests, and that information will influence future management actions.

Prior to initiating a control action, staff will review the best management practices and the effectiveness of previous actions for control of that pest. All pesticide applicators will get the concurrence of their lead worker before making a chemical application.

Following control actions, and at the appropriate interval for the biology of the specific pest, staff will evaluate the effectiveness of the control action. For chemical applications staff will document the results during the monitoring cycle for the site. Staff will review and update *Appendix* 2, as necessary.

3. **Medians and Other Right of Way Plantings**

a. **Description**

Right-of-way plantings include medians, which are located between travel lanes, and other landscaped areas in the right-of-way such as curbside plantings, bridge approach plantings and landscaping around overpasses.

**b. Monitoring**

The maintenance mode of each median will determine which classes of weeds are monitored in that area.

**Mode 1 Medians or Right-of-Way Areas**

Mode 1 landscapes will be monitored biweekly for the presence of all weed classes throughout the calendar year.

**Mode 2 Medians or Right-of-Way Areas**

Mode 2 landscapes will be monitored monthly for the presence of all weed classes.

c. **Action Thresholds**

The action threshold level of a median or other right-of-way (ROW) area is directly correlated to the mode designation, which is determined by the location of the median/ROW and the visibility/complexity of the landscaping. Weed management is performed in landscaped right-of way

areas to preserve the function and integrity of the landscape, to preserve Visual Clear Zones for public safety, and to preserve the intended design and aesthetic value of the landscape.

Management and control of grass and broadleaf weeds are the primary activities associated with these sites. The thresholds triggering control actions are based on the percent cover of weeds present in the landscape beds. If weeds of any class are discovered and occupy a small area (< 2% cover), a control action may be taken in the interest of preventing a larger infestation and the need for more resource intensive actions in the future. If the weed population rises above the action threshold, a control action may be taken. City of Dubuque staff reserves the right to delay management actions for weeds that are above the action threshold due to resource constraints. The current mode classifications are listed in Table 2 below.

**Table 2.**

| Median/Right of Way | Mode |
|---|---|
| Highway 20 Corridor | 1 |
| Locust St/151/61 Connector | 1 |
| Iowa St. 4th to 10th | 2 |
| 9th and Hill St. | 2 |
| 5th and White | 2 |
| Kerper Blvd. | 2 |
| Grandview Ave. median | 1 |
| Wacker Dr. | 2 |
| JFK Rd. | 2 |
| Asbury Rd. | 2 |
| Rosedale/N. Grandview | 2 |
| Dubuque Industrial Center West | 1 |
| Technology Park | 1 |
| 5th and Bluff | 2 |
| Washington St. Diverters | 1 |
| Historic Millwork District | 1 |
| S. Locust/Southern Ave | 2 |

Ocular estimation tools are provided in *Appendix* 7 and can be used by staff as a reference for estimating the percent cover of weeds in medians and rights of way prior to deciding on a control method.

**Mode 1 Medians or Right-of-Way Areas**

Class 1 weeds: Control action may be taken when any Class 1 weeds are observed.

Class 2 weeds (5% weeds)

**Mode 2 Medians or Right-of-Way Areas**

Class 1 weeds: Control action may be taken when any Class 1 weeds are observed.

Class 2 weeds (10% weeds)

d. **Prevention**

**Mode 1 and 2 Medians/Right of Ways**

The following best management practices will be employed in all median and ROW areas: Selecting appropriate and healthy plant stock and seeds; establishing dense plant communities to reduce vacant soil; establishing

appropriate mulch rates and type; using pruning techniques to enhance plant structure and growth.

e. **Control**
A list of best management practices for controlling weed species in all median and ROW areas is located in *Appendix* 2.

**f. Evaluation**
When a new BMP is being developed or being trialed in a new situation, the standard for recording information will be higher in order to enable staff to reproduce successes and understand failures. When staff implements an existing BMP in a typical situation, the standard for recording information will be lower in order to balance the costs and benefits of record keeping activities. Information recorded about control actions may include such specifics as control method, repetition, weather, and anything else deemed important for the specific action. Staff will seek information on management of pests, and that information will influence future management actions.
Prior to initiating a control action, staff will review the best management practices and the effectiveness of previous actions for control of that pest. All pesticide applicators will get the concurrence of their lead worker before making a chemical application.
Following control actions, and at the appropriate interval for the biology of the specific pest, staff will evaluate the effectiveness of the control action. For chemical applications staff will document the results during the monitoring cycle for the site. Staff will review and update *Appendix* 2, as necessary.

4. **Turf Areas**
   a. **Description**
   The goal of the turf management operations is to establish and maintain safe turf grass surfaces that are appropriate for the areas intended use or aesthetic goals. Managed turf grass areas include sports fields, memorials, and some public buildings.
   b. **Monitoring**
   Monitoring on all turf areas is on-going and performed throughout the year. Although the focus of this program is weed management, it is also very important to monitor for over-all turf health and vigor. Weed monitoring will primarily be performed in the spring (late April or early May), early summer (mid to late June), and again in late summer or fall (late August to late September).
   c. **Action Threshold**

Weeds are controlled in turf areas for a variety of reasons. Public safety is a primary concern. Examples of safety issues that require action are: Uneven sports fields, clover that has attracted bees, and weeds with thorns. Action modes are used to maintain the aesthetic appearance of the original design; protect public health and safety, and to ensure the overall health and quality of turf areas. If weeds of any class are discovered and occupy a small area (< 2% cover), a control action may be taken in the interest of preventing a larger infestation and the need for more resource intensive actions in the future. If the weed population rises above the action threshold, a control action may be taken. City of Dubuque staff reserves the right to delay management actions for weeds that are above the action threshold due to resource constraints. The current mode 1 classifications are listed in Table 3 below. Mode 2 turf areas will apply to all other City of Dubuque maintained turf properties.

**Table 3.**

| Turf | Mode |
|---|---|
| Port of Dubuque public areas | 1 |
| Federal Building | 1 |
| All Veterans Memorial | 1 |
| Chaplain Schmitt Memorial | 1 |
| Dubuque Pack Memorial | 1 |
| Vietnam Veterans Memorial | 1 |
| Municipal Services Center | 1 |
| Washington Park | 1 |
| McAleece Ball fields | 1 |

**Mode 1 Turf areas**

The target for these areas is a high-quality turf, which is considered aesthetically pleasing in highly visible sites or athletic fields that demand a smooth/dense playing surface. These areas include sports fields, some public buildings/grounds, and memorials sites.

**Mode 2 Turf areas**

These areas are generally parks, most public buildings/grounds, rights-of-way, and low priority maintenance areas. The target for these areas is a good-quality ground cover. The City generally does not chemically treat these turf areas.

### c. Monitoring

Monitoring on all turf areas is on-going and performed throughout the year. Although the focus of this program is weed management, it is also very important to monitor for over-all turf health and vigor. Weed monitoring will primarily be performed in the spring (late April or early May), early summer (mid to late June), and again in late summer or fall (late August to late September).

d. **Prevention**

Prevention is the first tactic to maintain weed levels below the set action threshold in turf areas. For Mode 1 turf areas nutrient levels will be monitored and adjusted to achieve a healthy vigorous stand of grass. Soil compaction will be addressed in areas that are showing signs of compaction, optimum mowing heights and frequencies will be practiced, and appropriate soil moisture will be maintained throughout the summer months.

Additional prevention practices for turf areas include:

- **Adequate fertility levels**: As a general guideline, mode1 turf areas will receive between 1 and 4 pounds of nitrogen per growing season (May - October). This will promote active growing dense vigorous turf that can out-compete weed infestation. Typical fertilizing products will have slow release characteristics. Highly soluble materials will be avoided when significant rainfall is forecast.
- **Mowing height and frequency**: Mode 1 and 2 turfs will be maintained at the optimum mowing height to encourage a high-density turf canopy and optimum root growth. Mowing height will be maintained between 3 ½ and 4 inches with a mowing frequency of once a week (April – October).
- **Over-seeding**: Weak or thin turf areas will be over-seeded to maintain a dense stand of grass that will out-compete invasive weed establishment.
- **Water management**: Proper water management is crucial in maintaining dense and vigorous turf stands. Too much irrigation is just as detrimental to turf quality and health as too little irrigation, and supplemental watering must be monitored so that optimum soil moisture is maintained. Drainage issues will be addressed so as not to have extended periods of soil saturation.

e. **Control**

Control methods for weeds in turf areas vary by weed class, and maintenance mode. All weeds, regardless of class, will be controlled using the most effective and least toxic method available. Chemical control methods will utilize the least toxic and most effective herbicides available.

f. **Evaluation**

When a new BMP is being developed or being trialed in a new situation, the standard for recording information will be higher in order to enable staff to reproduce successes and understand failures. When staff implements an existing BMP in a typical situation, the standard for recording information will be lower in order to balance the costs and benefits of record keeping activities. Information recorded about control actions may include such specifics as control method, repetition, weather, and anything else deemed important for the specific action. Staff will seek information on management of pests, and that information will influence future management actions.

Prior to initiating a control action, staff will review the best management practices and the effectiveness of previous actions for control of that pest. All pesticide applicators will get the concurrence of their lead worker before making a chemical application.

Following control actions, and at the appropriate interval for the biology of the specific pest, staff will evaluate the effectiveness of the control action. For chemical applications staff will document the results during the monitoring cycle for the site. Staff will review and update *Appendix* 2, as necessary.

**5. Tree Grates/Rings**

a. **Description**

Grated or mulched tree wells are managed in developed areas primarily to protect the tree's health and the public's safety.

b. **Monitoring**

Monitoring tree grates/rings is on-going and will be performed primarily in the spring (late April or early May), early summer (mid to late June), and again in late summer or fall (late August to late September) These general monitoring times coincide with plant lifecycles and the easiest control periods.

c. **Action Thresholds**

If weeds of any class are discovered and occupy a small area (< 2% cover), a control action may be taken in the interest of preventing a larger infestation and the need for more resource intensive actions in the future. Staff may delay management actions for weeds that are above the action threshold due to resource constraints. The mode of tree grates/rings is dictated by the mode of the surrounding area.

**Mode 1 Tree grates/rings**

Class 1 weeds: Control action may be taken when any Class 1 weeds are observed.
Class 2 weeds (5% weeds)

**Mode 2 Tree grates/rings**

Class 1 weeds: Control action may be taken when any Class 1 weeds are observed.
Class 2 weeds (10% weeds)

d. **Prevention**
   - Mulching around tree wells will help in maintaining weed populations below action thresholds. Thick layers of coarse mulching materials are the most effective in controlling weed infestations.
   - The use of pre-emergent herbicides from the allowed pesticides list is effective in assisting the prevention of weeds for maintaining weed populations below the action threshold. The City will pursue means of reducing reliance on chemical controls in the future, but may use this form of prevention given limited staffing and budgetary constraints.

e. **Control**
   When threshold pest levels have been reached, control strategies will primarily focus on mechanical action. If necessary, Chemical control methods will utilize the least toxic and most effective herbicides available. A list of BMP methods and weed classifications may be found in *Appendix* 2.

f. **Evaluation**
   When a new BMP is being developed or being trialed in a new situation, the standard for recording information will be higher in order to enable staff to reproduce successes and understand failures. When staff implements an existing BMP in a typical situation, the standard for recording information will be lower in order to balance the costs and benefits of record keeping activities. Information recorded about control actions may include such specifics as control method, repetition, weather, and anything else deemed important for the specific action. Staff will seek information on management of pests, and that information will influence future management actions.
   Prior to initiating a control action, staff will review the best management practices and the effectiveness of previous actions for control of that pest. All pesticide applicators will get the concurrence of their lead worker before making a chemical application.
   Following control actions, and at the appropriate interval for the biology of the specific pest, staff will evaluate the effectiveness of the control action. For chemical applications staff will document the results during the

monitoring cycle for the site. Staff will review and update *Appendix* 2, as necessary.

6. **Fence Lines**
   a. **Description**
      Throughout the City of Dubuque's public areas fences delineate and separate public from private property. Fences are also used to separate and contain pets at area pet parks. Additionally, most sports fields have a system of fencing that delineates the boundaries of the field and many have other fencing that protects other park users from foul balls. In each case, vegetation along these fences must be managed to protect the integrity of the fences and to prevent the intrusion of invasive weeds.
   b. **Monitoring**
      Monitoring fence lines is ongoing throughout the year.
   c. **Action Thresholds**
      Action thresholds for fence lines are established for desired vegetation height rather than for a percent of coverage or number of weeds in an area. All classes of weeds, except for Class 1, are allowed to grow at the base of fences. The key in managing weeds along fence lines is to maintain all vegetation at or below a set height based on the maintenance mode for the park. If weeds of any class are discovered and occupy a small area (< 2% cover), a control action may be taken in the interest of preventing a larger infestation and the need for more resource intensive actions in the future. If the weed population rises above the action threshold, a control action may be taken. City of Dubuque staff reserves the right to delay management actions for weeds that are above the action threshold due to resource constraints.
      **Mode 1 and 2 Fence Lines**
      Class 1 weeds: Control action may be taken when any Class 1 weeds are observed.
      Class 2 weeds (threshold at 3 inches in height)
   d. **Prevention**
      - Manage weed height to prevent weeds from setting seed.
      - String trim along fence lines after spring flush.
      - Install concrete, mulch or rubber mow strips where appropriate, and resources allow.
   e. **Control**
      When thresholds have been reached, control strategies will primarily focus on mechanical control actions (e.g., string trimming). If necessary,

chemical control methods will utilize the least toxic and most effective herbicides available.

f. **Evaluation**

When a new BMP is being developed or being trialed in a new situation, the standard for recording information will be higher in order to enable staff to reproduce successes and understand failures. When staff implements an existing BMP in a typical situation, the standard for recording information will be lower in order to balance the costs and benefits of record keeping activities. Information recorded about control actions may include such specifics as control method, repetition, weather, and anything else deemed important for the specific action. Staff will seek information on management of pests, and that information will influence future management actions.

Prior to initiating a control action, staff will review the best management practices and the effectiveness of previous actions for control of that pest. All pesticide applicators will get the concurrence of their lead worker before making a chemical application.

Following control actions, and at the appropriate interval for the biology of the specific pest, staff will evaluate the effectiveness of the control action. For chemical applications staff will document the results during the monitoring cycle for the site. Staff will review and update *Appendix* 2, as necessary.

**7. Poles and Other Fixtures within Turf Areas**

a. **Description**

Throughout City of Dubuque, numerous infrastructure components are located in turf area. These components range from park lighting poles or utility boxes on parklands to traffic signs in ROW medians. The vegetation around these intrusions is managed in order to protect the infrastructure from damage during mowing, and to preserve public safety.

b. **Monitoring**

Monitoring vegetation around posts and other fixtures is ongoing throughout the year.

c. **Action Thresholds**

Action thresholds for the areas around poles and other fixtures are established for desired vegetation height rather than for a percent of coverage or number of weeds in the area. All classes of weeds, except for Class 1, are allowed to grow at the base of poles and other fixtures. The key in managing weeds in these areas is to maintain all vegetation at, or below, a set height based on the maintenance mode for the area. If weeds

of any class are discovered and occupy a small area (< 2% cover), a control action may be taken in the interest of preventing a larger infestation and the need for more resource intensive actions in the future. If the weed population rises above the action threshold, a control action may be taken. City of Dubuque staff reserves the right to delay management actions for weeds that are above the action threshold due to resource constraints. The mode of poles and other fixtures in turf are dictated by the mode of the turf area in which the fixture is placed.

**Mode 1 and 2 Poles and Other Fixtures**

Class 1 weeds: Control action may be taken when any Class 1 weeds are observed.

Class 2 weeds (maintain below 3 inches in height)

d. **Prevention**
   - Manage weed height frequently to not prevent seeding.
   - String trim around poles and other fixtures after spring flush.
   - Install concrete or mulched mow strips where appropriate and resources allow.

e. **Control**

When thresholds have been reached, control strategies will primarily focus on mechanical control actions (e.g., string trimming). If necessary, chemical control methods will utilize the least toxic and most effective herbicides available.

f. **Evaluation**

When a new BMP is being developed or being trialed in a new situation, the standard for recording information will be higher in order to enable staff to reproduce successes and understand failures. When staff implements an existing BMP in a typical situation, the standard for recording information will be lower in order to balance the costs and benefits of record keeping activities. Information recorded about control actions may include such specifics as control method, repetition, weather, and anything else deemed important for the specific action. Staff will seek information on management of pests, and that information will influence future management actions.

Prior to initiating a control action, staff will review the best management practices and the effectiveness of previous actions for control of that pest. All certified pesticide applicators will get the concurrence of their lead worker before making a chemical application.

Following control actions, and at the appropriate interval for the biology of the specific pest, staff will evaluate the effectiveness of the control action. For chemical applications staff will document the results during the

monitoring cycle for the site. Staff will review and update *Appendix* 2, as necessary.

8. **Dog Park**
   a. **Description**
      The City of Dubuque has one off-leash dog park. This area is clearly posted as a dog off-leash area and it is separated from the rest of the area by a perimeter fence. The dog park is heavily used throughout the year, and providing adequate turf coverage throughout the year is a maintenance challenge. The dog park has cross fencing that helps facilitate the closure of one side for rest and renovation.
   b. **Monitoring**
      Weed monitoring in dog park is on-going and performed throughout the year. Unlike the monitoring goals for other landscape management areas in the city, the goal of weed monitoring in the dog park is chiefly to maintain adequate vegetative ground cover, and keep Class 1 weeds to a minimum. Monitoring efforts may determine that certain areas within the dog park need to be closed (outside of typical renovation times) in order to prevent irreversible damage to the remaining ground cover.
   c. **Action Thresholds**
      Only Class 1 weeds will be actively managed in the dog park. All other weeds classes will be allowed, and will be accepted as a component of a viable turf ground cover.
      Class 1 weeds: Control action may be taken when any Class 1 weeds are observed.
   d. **Prevention**
      - Spring mowing to increase shoot density
      - Use drought tolerant grass species
      - Use grass species that can tolerate heavy foot traffic
      - Relieve compaction by either pulling cores or spiking as often as possible
      - Identify and correct winter drainage problems
      - Close the dog park in extremely wet conditions
      - Close damaged areas for renovation
   e. **Control**
      Control actions will be limited to mechanical methods. As specified in Section N of this IPM program, the dog park turf area is designated as a “Pesticide-Free Zone”.

f. **Evaluation**

When a new BMP is being developed or being trialed in a new situation, the standard for recording information will be higher in order to enable staff to reproduce successes and understand failures. When staff implements an existing BMP in a typical situation, the standard for recording information will be lower in order to balance the costs and benefits of record keeping activities. Information recorded about control actions may include such specifics as control method, repetition, weather, and anything else deemed important for the specific action. Staff will seek information on management of pests, and that information will influence future management actions.

Prior to initiating a control action, staff will review the best management practices and the effectiveness of previous actions for control of that pest. Following control actions, and at the appropriate interval for the biology of the specific pest, staff will evaluate the effectiveness of the control action.

**9. Prairies**

a. **Description**

Prairies are herbaceous-dominated habitats identified primarily by the presence and number of trees in a grassland setting. Prairies are found in both wetland and upland settings and contain very few to no trees. Prairie habitats may contain remnant rare plant populations, and the conservation and expansion of rare plants within these areas are a high priority for management. Unmanaged prairies may succeed to forested ecotypes over time, and management of these habitat types may include the practices of mowing or ecological burns or other management actions to maintain prairie structure as well as the control of weeds or woody vegetation to provide or expand suitable habitat for diverse herbaceous plant communities.

b. **Monitoring**

The maintenance mode of each prairie will determine what classes of weeds are monitored in that area.

**Mode A Prairies**

Mode A prairies will be monitored for the presence of all weed classes during the season in which they are to be managed.

**Mode B Prairies**

Mode B prairies will be monitored for the presence of class 1 weeds only. All other weeds will be monitored as time and resources allow.

c. **Action Thresholds**

Mode A prairies are generally defined as large or contiguous high quality prairie habitats. Mode A areas may be remnant plant communities, may have been significantly enhanced through the implementation of a capital improvement project, may contain rare plants or may be managed to facilitate the expansion of rare plant communities or plant communities with high native species abundance and diversity. Mode B prairies are medium quality habitats, have had a significant natural resource enhancement, and may be dominated by non-native species. Management actions to achieve or maintain habitat structure and diversity described above and basic stewardship activities are the primary management activities associated with these assets. Action thresholds for pest management in City-owned prairies are derived from the natural resource quality of the prairies, in combination with the associated habitat structure and the percent cover of the weed and threat the weed poses to the area. If the habitat structure is not of the desired type or weed populations rise above the action threshold, a control action may be taken. Due to resource constraints or other management issues, City of Dubuque staff may delay management actions for weeds that are above the action threshold. If poison ivy or other poisonous plants are present in areas where the public is likely to come into contact with them then control action may be taken at any time in the interest of public safety.

**Mode A Prairies**

All weed classes: Control action may be taken when any listed weed is < 2% weed cover to provide rapid response to invasions of new exotic species.

Class 1 weeds: Control action may be taken when any Class 1 weeds are observed.

Class 2 weeds (2% combined weed cover)

**Mode B Prairies**

All weed classes: Control action may be taken when any listed weed is < 2% weed cover to provide rapid response to invasions of new exotic species.

Class 1 weeds: Control action may be taken when any Class 1 weeds are observed.

Class 2 weeds (10% combined weed cover)

d. **Prevention**

**Mode A and B Prairies**

The following weed prevention methods will be employed in all prairies and savannas: dense post-disturbance reseeding and replanting with

species appropriate for the specific habitat, equipment cleaning prior to site entrance, monitoring for new weed introductions, and selection of appropriate locally adapted and healthy plant stock and seeds.

**f. Control**

**Mode A and B Prairies**

Best management practice methods for weeds in prairies may vary by weed class, weed species, density of cover, and maintenance mode. In some cases invasive plant species may be controlled in areas immediately adjacent to restoration and enhancement areas or areas of the highest quality to prevent the spread of undesirable species to areas where they are currently absent. All weeds, regardless of class, will be controlled using the most effective and least toxic method available. If past experience, further monitoring, identification, and/or action thresholds indicate that low risk BMP's (annual controlled burns, etc.) may not be effective, alternate pest control methods may be employed. Chemical control methods will utilize the least toxic and most effective herbicides and adjuvants available.

A list of BMP methods and weed classifications for specific weed species may be found in *Appendix* 2.

**b. Evaluation**

When a new BMP is being developed or trialed in a new situation, the standard for recording information will be higher in order to enable staff to reproduce successes and understand failures. When staff implements an existing BMP in a typical situation, the standard for recording information will be lower in order to balance the costs and benefits of record keeping activities. Information recorded about control actions may include such specifics as control method, repetition, weather, and anything else deemed important for the specific action. Staff will seek information on management of pests, and that information will influence future management actions.

Prior to initiating a control action, staff will review the best management practices and the effectiveness of previous actions for control of that pest. All pesticide applicators will get the concurrence of their lead worker before making a chemical application.

Following control actions, and at the appropriate interval for the biology of the specific pest, staff will evaluate the effectiveness of the control action. For chemical applications staff will document the results during the monitoring cycle for the site. Staff will review and update *Appendix* 2 as necessary.

## 12. Buildings and Facilities

### a. Description

The City of Dubuque plans to implement an IPM program on all City of Dubuque managed buildings and facilities which emphasizes the reduction of pests without impacting the daily operations and activities of the buildings and facilities, and compromising the health and safety of city personnel and visitors in these areas by unnecessarily exposing them to pesticides.

### b. Monitoring

Monitoring provides recent and accurate information to make effective pest management decisions. It can be defined as the regular and ongoing inspection of areas where pest problems do or might occur. Information gathered from monitoring should be recorded in writing. As much as possible, monitoring should be incorporated into the daily activities of City staff. Staff training on monitoring should include what to look for and how to report the information.

### c. Action Threshold

A threshold level is the level of pest infestation that can be tolerated by the occupants. It varies depending on the site, the pest, and the occupants of the facility. A few ants in a boiler room would be tolerated more easily than the same number of ants in a kitchen area. Similarly, a few ants might receive less attention than a few cockroaches would. The pest control contractor must understand this concept and be able to communicate it to the facility manager. When a pest population exceeds the threshold level, then actions should be taken to control the pests. Each facility may have a different action threshold level, which can change from facility to facility, and even from month to month. Under the threshold level concept, the applicator should be able to decide when to take action and what method will be employed, or whether they should just continue to monitor the pest level. Different levels of pests may require different IPM pest control methods.

### d. Prevention

The pest prevention method includes two major methods, which includes habitat modification and sanitation, and the practice of behavior modification. Each method is discussed below:

- Habitat Modification and Sanitation. Habitat modification and sanitation involves changing the environment of the pest so that they cannot live or reproduce there. This practice helps to prevent and suppress some pests by removing the pest themselves or their shelter, food, and water

sources. Pests in facilities can be greatly reduced by improving cleanliness, eliminating pest hiding places, increasing the frequency of garbage pickup, and by pest proofing the structure.

- Behavior Modification. Behavior modification addresses the human actions that create conditions conducive to pest activity and reproduction. This can be difficult to implement because it involves trying to change people's behaviors. A strong educational program explaining policy and environmental change creates conditions conducive to behavior change. Policy and/or environmental change examples could cover food storage and clean up, clutter, waste disposal, and storage or posting of a bulletin or flyer addressing behaviors/practices that attract pests. If unacceptable behaviors continue or policies are not adhered to, actions will be taken to reduce or eliminate conditions conducive to pests.

e. **Control**

**Population Reduction Method**: The population reduction method includes mechanical, biological, and chemical control. Each is discussed below:

- Mechanical control includes the use of traps, devices, and machines to control pests or alter their environment. Traps, screens, barriers, fences, and nets can be used to prevent the spread of pests from an area.
- Biological control is a pest management method that reduces or mitigates pests and the adverse effects of those pests through use of natural enemies. Use of parasitoids, predators, and pathogens, combined with habitat management strategies have proven to be State of Michigan IPM Training Manual 12 Ver. 2/2013 successful in suppressing some pests. Biological control, in general, is man's use of a select living organism to control a particular pest.
- Chemical control uses naturally derived or synthetic chemicals called pesticides that kill, control, mitigate, attract, or otherwise interfere with the normal behavior of a pest. The pest control industry has expanded their pesticide application products to deliver safer systems to the end users that will minimize exposure. Baits and gel formulations have become major tools in the war against roaches.

f. **Evaluation**

Program evaluation is a regular and periodic review of inspection reports, sanitation reports, logbook records, application records, and cleanliness and housekeeping and other records to determine how the program is working, and identify any changes in pest activity (increase or decrease).

The review should note the correlation between actions taken and changes in pest populations. The result should be compared with goals and objectives. The following is a list of questions to consider in measuring success:

- Are all pest populations below action thresholds?
- Have all objectives been met?
- Is the monitoring program adequate?
- Should other action be taken?
- Can time and effort be reduced?
- What problems have been identified?
- What changes are necessary?

## N. SPECIAL SITUATIONS

1. Floodwall Policy. The City will abide by the Floodwall Policy approved by the U.S. Army Corps of Engineers. The City will implement practices, where possible, to achieve the goals of this IPM Program, but must conform to the requirements of the Floodwall Policy.
2. Airport. The Federal Aviation Administration dictates strict guidance on management of airport landscape and facilities. The City will implement practices, where possible, to achieve the goals of this IPM, but must conform to the requirements of the FAA.
3. Emerald Ash Borer Plan. Actions required as part of the Emerald Ash Borer Readiness Plan shall be exempt from this IPM program. The invasiveness of this pest may cause hazardous conditions for public health and safety.

4. Bunker Hill Golf Course. The Bunker Hill Golf Course has adopted its own IPM Program that addresses the specific goals and needs of the golf course. That IPM Program will supersede this citywide IPM Program at the golf course and can be found in Appendix 10.
5. Library. The Carnegie Stout Public Library has adopted its own IPM Program that addresses the specific goals and needs of the library, and is part of their LEED (Leadership in Energy and Environmental Design) certification. That IPM Program will supersede this citywide IPM Program at the library and can be found in Appendix 11.
6. City owned and rented farmland. All city owned property that is leased out by bid for agriculture use shall be exempted from this IPM program, but shall be managed in accordance with any applicable state laws concerning pesticide use.

7. Grand River Center. This city owned facility is under private management by Platinum Hospitality. The Platinum Hospitality manager shall be given a copy of the City of Dubuque's IPM program. The private management will be encouraged to implement the City of Dubuque IPM program.
8. Five Flags Civic Center. This city owned facility is under private management by SMG. The SMG manager shall be given a copy of the City of Dubuque's IPM program. The private management will be encouraged to implement the City of Dubuque IPM program.

## O. PESTICIDE FREE ZONES

Due to the nature of their use and/or their users, some parkland areas have been designated "Pesticide Free Zones". The following requirements for pesticide applications will apply to all City parklands*:

1. **Playgrounds** - No pesticides will be applied within the landscape borders of a playset in all city owned parks.
2. **Swimming pools and wading pool** - Treatment of pests within the fenced border of these types of water features is subject to the same requirements, outlined in this IPM program, as all other properties. In addition, no pesticides will be applied within those borders during the season that it is open to the public.
3. **Pavilions** - Treatment of pests within the picnic table area of a pavilion is subject to the same requirements, outlined in this IPM program, as all other properties. In addition, no pesticides will be applied within these areas during the season that they are open to the public, May 1-October 31.
4. **Dog Park** - No pesticides will be applied to the lawn area inside the fence of the dog park.
5. **Designated Pollinator Gardens** - No pesticides will be applied to the two designated pollinator gardens at AY McDonald Park.
6. **Multi-zone Parks** - Under this IPM program, The City of Dubuque Parks division will pilot a program at Usha Park. The purpose of this program is to manage the park acreage as both Pesticide Free and reserving the right to use pesticides when alternative methods have been unsuccessful. The parking lot and bioswale section of the park will be zoned for pesticide approval. The entire lawn area of the park including the playset will be a Pesticide free zone.

At the end of the park season, the pilot program will be evaluated by Park staff to gauge the success of the program and recommend continuation or termination. The Park division will engage citizen volunteers to help with

weeding maintenance during the growing season. The volunteer efforts will be of great value to aid in the success of the program.

*****_The IPM Coordinator may authorize the application of a pesticide in Pesticide Free Zone when there is a threat to public health or safety (e.g., a population of hornets, wasps, yellow jackets, poison ivy, etc.) or in cases where a pest poses a substantial risk to the intended function of parkland or an asset, after reasonable non-pesticide approaches have been considered. Advanced notice will be given, per the notification standards established in this IPM Program, when such action is warranted._

## P. PESTICIDE FREE PARKS PROGRAM

### What is a pesticide-free park or natural area?

A pesticide-free park (PFP) or natural area is one that is maintained without the use of registered pesticides. No registered pesticides will be used in a City of Dubuque pesticide-free park or natural area *during the calendar year of designation* unless there is a threat to public health or safety. If it becomes necessary to apply pesticides at a pesticide-free park or natural area, prior to any application made, notifications will be sent out before any applications can occur, and signage will be placed on site. At the end of each calendar year, parks and natural areas that were designated as pesticide-free are reviewed to determine if the site is being managed effectively.

### Goals

1. Reduce the use of pesticides in City of Dubuque Parks by testing an alternative methodology in nine parks.
2. Provide a pesticide-free alternative to park users, while still supporting normal use of the park.
3. Continue to search for opportunities to reduce pesticide use wherever feasible.
4. Increase awareness and engagement in the program.
5. Determine the financial impact of the program related to program costs and benefits and city priorities.
6. Determine which, if any, specific park maintenance methodologies used in this program are applicable to maintenance in other Dubuque parks.
7. In PFPs, continue to have a functional and standard appearance comparable to other similar Dubuque developed parks.

### Volunteers

Volunteer participation is crucial to the success of the PFPs. A continued presence of committed volunteers at a level high enough to sustain the PFP management style is necessary to carry out the weed control duties. The City will seek volunteer support and work in coordination with civic groups and organizations interested in taking an active role in stewarding of public spaces. Moreover, the City recognizes the value of civic groups and organizations in

educating the public about the benefits and responsibilities of non-chemical stewardship. If volunteer engagement cannot be secured, City staff may reevaluate the feasibility of maintaining all PFPs.

**Parks**

The nine parks chosen for the program represent diverse locations throughout the city. Of the nine, only one park does not have a playground.

| | | |
|---|---|---|
| 1. | Allison Henderson Park | 1500 Loras Boulevard |
| 2. | Cleveland Park | 625 Cleveland Avenue |
| 3. | Falk Park | 1701 Earl Drive |
| 4. | Riley Park | 3556 Lunar Drive |
| 5. | Pinard Park | 2819 Pinard Street |
| 6. | Southern Park | 200 Southern Avenue |
| 7. | Teddy Bear Park | Gabriel Drive and High Cloud Drive |
| 8. | Welu Park | 3655 Welu Drive |
| 9. | Maus Park | Huff Street |

** The IPM Coordinator may authorize the application of a pesticide in a PFP when there is a threat to public health or safety (e.g., a population of hornets, wasps, yellow jackets, poison ivy, etc.) or in cases where a pest poses a substantial risk to the intended function of parkland or an asset, after reasonable non-pesticide approaches have been considered. Advanced notice will be given, per the notification standards established in this IPM Program, when such action is warranted.*

## PESTICIDE TOXICITY CATEGORIES

# SIGNAL WORDS
## TOPIC FACT SHEET

npic
NATIONAL PESTICIDE INFORMATION CENTER
1.800.858.7378

**NPIC fact sheets are designed to answer questions that are commonly asked by the general public about pesticides that are regulated by the U.S. Environmental Protection Agency (US EPA). This document is intended to be educational in nature and helpful to consumers for making decisions about pesticide use.**

### What are Signal Words?


Signal words are found on pesticide product labels, and they describe the acute (short-term) toxicity of the formulated pesticide product. The signal word can be either: DANGER, WARNING or CAUTION. Products with the DANGER signal word are the most toxic. Products with the signal word CAUTION are lower in toxicity.[1] The U.S. Environmental Protection Agency (EPA) requires a signal word on most pesticide product labels. They also require it to be printed on the front panel, in all capital letters to make it easy for users to find. The only pesticide products that are not required to display a signal word are those that fall into the lowest toxicity category by all routes of exposure (oral, dermal, inhalation, and other effects like eye and skin irritation).[2,3] See the table below titled "Toxicity Category."

**CAUTION** means the pesticide product is slightly toxic if eaten, absorbed through the skin, inhaled, or it causes slight eye or skin irritation.[2,4]

**WARNING** indicates the pesticide product is moderately toxic if eaten, absorbed through the skin, inhaled, or it causes moderate eye or skin irritation.[2,4]

**DANGER** means that the pesticide product is highly toxic by at least one route of exposure. It may be corrosive, causing irreversible damage to the skin or eyes. Alternatively, it may be highly toxic if eaten, absorbed through the skin, or inhaled. If this is the case, then the word "POISON" must also be included in red letters on the front panel of the product label.[2,4]

| | TOXICITY CATEGORY (Signal Word)[1] | | | |
|---|---|---|---|---|
| | High Toxicity (DANGER/Danger-Poison) Category I | Moderate Toxicity (WARNING) Category II | Low Toxicity (CAUTION) Category III | Very Low Toxicity (Optional Signal Word – CAUTION) Category IV |
| Acute Oral $LD_{50}$ | Up to and including 50 mg/kg (≤ 50 mg/kg) | Greater than 50 through 500 mg/kg (> 50 – 500 mg/kg) | Greater than 500 through 5000 mg/kg (> 500 – 5000 mg/kg) | Greater than 5000 mg/kg (> 5000 mg/kg) |
| Inhalation $LC_{50}$ | Up to and including 0.05 mg/L (≤ 0.05 mg/L) | Greater than 0.05 through 0.5 mg/L (>0.05 – 0.5 mg/L) | Greater than 0.5 through 2.0 mg/L (> 0.5 – 2.0 mg/L) | Greater than 2.0 mg/L (> 2.0 mg/L) |
| Dermal $LD_{50}$ | Up to and including 200 mg/kg (≤ 200 mg/kg) | Greater than 200 through 2000 mg/kg (> 200 - 2000 mg/kg) | Greater than 2000 through 5000 mg/kg (>2000 – 5000 mg/kg) | Greater than 5000 mg/kg (> 5000 mg/kg) |
| Primary Eye Irritation | Corrosive (irreversible destruction of ocular tissue) or corneal involvement or irritation persisting for more than 21 days | Corneal involvement or other eye irritation clearing in 8 – 21 days | Corneal involvement or other eye irritation clearing in 7 days or less | Minimal effects clearing in less than 24 hours |
| Primary Skin Irritation | Corrosive (tissue destruction into the dermis and/or scarring) | Severe irritation at 72 hours (severe erythema or edema) | Moderate irritation at 72 hours (moderate erythema) | Mild or slight irritation at 72 hours (no irritation or erythema) |

NPIC is a cooperative agreement between Oregon State University and the U.S. Environmental Protection Agency (U.S. EPA, cooperative agreement # X8-83458501). The information in this publication does not in any way replace or supercede the restrictions, precautions, directions, or other information on the pesticide label or any other regulatory requirements, nor does it necessarily reflect the position of the U.S. EPA.

OSU Oregon State University

## BEST MANAGEMENT PRACTICES/WEED CLASSIFICATIONS

Weed classifications are subject to change in response to new information from the Iowa Department of Agriculture and Land Stewardship and the observations of City field staff. These classifications provide the types of weeds that the City is actively managing within developed parks, right of way areas, and City features such as Landscape Beds, Medians, Turf Areas, Tree Grates/rings, Fence Lines, and Hard Surface Areas. This is not intended to be an exhaustive or exclusive classification.

**There are two classifications of weeds for the purpose of this IPM program**:

1. "Class 1" / "Noxious Weeds": Highly invasive; has potential for eradication from all City landscape and median areas. These weeds exist in populations of limited size and distribution, and have the potential to expand rapidly without intervention. See *Appendix 3* for the list.
2. "Class 2" / (Common) Weed: Populations can be controlled or contained where they occur, or they can be excluded from individual City areas. Refer to the definition of "Weed" in the *Definitions* section of this IPM program.

**Best Management Practices**

1. Remove by hand or use handheld weed removal tools. Pull by hand, dig or uproot and remove plants including roots or rhizomes using a variety of hand tools including weed knives, weed poppers, shovels, hoes, weed wrenches and weed diggers. This treatment is widely used to control isolated invasions or weed occurrences of lower densities. In areas where this treatment causes significant soil disturbance this treatment may be followed with reseeding or replanting.

2. Clipping, cutting, or mowing. Clipping means to cut or remove seed heads and/or fruiting bodies to prevent germination. Mowing may be performed using power trimmers with line or metal brush cutting heads or other mechanized mowing equipment. This treatment is often combined with another treatment for more effective control. Removal of seed heads or biomass may be required.

3. Smothering or solarization. Placing a clear plastic over the soil surface to trap solar radiation to kill plants, roots and seeds. Pretreatment may tilling. Woven fabric can also be used to smother plants and deprive them of available light, but must be kept in place for one to three years. This is a non-selective weed control method, typically used on a small scale on isolated patches of weeds. In areas where this treatment causes significant soil disturbance this treatment may be followed with reseeding or replanting.

4. Non-selective herbicide application. Includes both spot and boom spray application to target species using broad spectrum herbicide such as glyphosate. In areas where this treatment causes significant disturbance this treatment may be followed by reseeding or replanting. This method may also be used as a stump treatment to prevent re-sprouting.

5. Selective herbicide application (e.g., grass specific or broadleaf specific). Includes both spot and boom spray application methods to control target species as required. In areas where this treatment causes significant disturbance this treatment may be followed with reseeding of native species. This method may also be used as a stump treatment to prevent re-sprouting.

6. Other practices will be evaluated for effectiveness as they are identified. The IPM Program Committee may conduct first-hand pilots or programs and analyze for effectiveness, or rely on research or programs conducted by other qualified institutions.

**APPENDIX 3**

## IOWA NOXIOUS WEEDS AND THE IOWA WEED LAW
## Chapter 317, Code of Iowa, 1997

### 317.1 Noxious weeds.

The following weeds are hereby declared to be noxious and shall be divided into two classes, namely:

1. Primary noxious weeds, which shall include quack grass (Agropyron repens), perennial sow thistle (Sonchus arvensis), Canada thistle (Cirsium arvense), bull thistle (Cirsium lanceolatum), European morning glory or field bindweed (Convolvulus arvensis), horse nettle (Solanum carolinense), leafy spurge (Euphorbia esula), perennial pepper-grass (Lepidium draba), Russian knapweed (Centaurea repens), buckthorn (Rhamnus, not to include Rhamnus frangula), and all other species of thistles belonging in genera of Cirsium and Carduus.

2. Secondary noxious weeds, which shall include butterprint (Abutilon theophrasti) annual, cocklebur (Xanthium commune) annual, wild mustard (Brassica arvensis) annual, wild carrot (Daucus carota) biennial, buckhorn (Plantago lanceolata) perennial, sheep sorrel (Rumex acetosella) perennial, sour dock (Rumex crispus) perennial, smooth dock (Rumex altissimus) perennial, poison hemlock (Conium maculatum), multiflora rose (Rosa multiflora), wild sunflower (wild strain of Helianthus annus L.) annual, puncture vine (Tribulus terrestris) annual, teasel (Dipsacus) biennial, and shattercane (Sorghum bicolor) annual.

   The multiflora rose (Rosa multiflora) shall not be considered a secondary noxious weed when cultivated for or used as understock for cultivated roses or as ornamental shrubs in gardens, or in any county whose board of supervisors has by resolution declared it not to be a noxious weed. Shattercane (Sorghum bicolor) shall not be considered a secondary noxious weed when cultivated or in any county whose board of supervisors has by resolution declared it not to be a noxious weed.

**APPENDIX 4**

**NOTIFICATION SIGNAGE EXAMPLE**

**APPENDIX 5**

**RECORD KEEPING FORM**

## PESTICIDE APPLICATION RECORD

DATE_____ START TIME_____END TIME_____

LICENSEE NAME/NUMBER_____

COMPANY_____ADDRESS_____PHONE_____

AREA_____APPLIED TO_____

TARGET PEST_____

TEMPERATURE_____HUMIDITY_____WIND SPEED/DIRECTION_____

| PESTICIDE USED | RATE/100 SQ FT | TOTAL AMT. USED | ACTIVE INGREDIENTS | EPA REG. # |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

APPLICATION EQUIPMENT USED_____

ADDITONAL COMMENTS_____

_____

_____

**APPENDIX 6**

## PESTICIDES' IMPACT ON POLLINATORS BEE RULE

Bee keeping within the city limits of Dubuque is considered an agricultural activity, and, as such, is only permitted in the city's AG Agriculturally zoned districts.

This rule is intended to implement Iowa Code sections 206.6(5) "a" (3) and 206.19(2).

21—45.31(206) Application of pesticides toxic to bees.

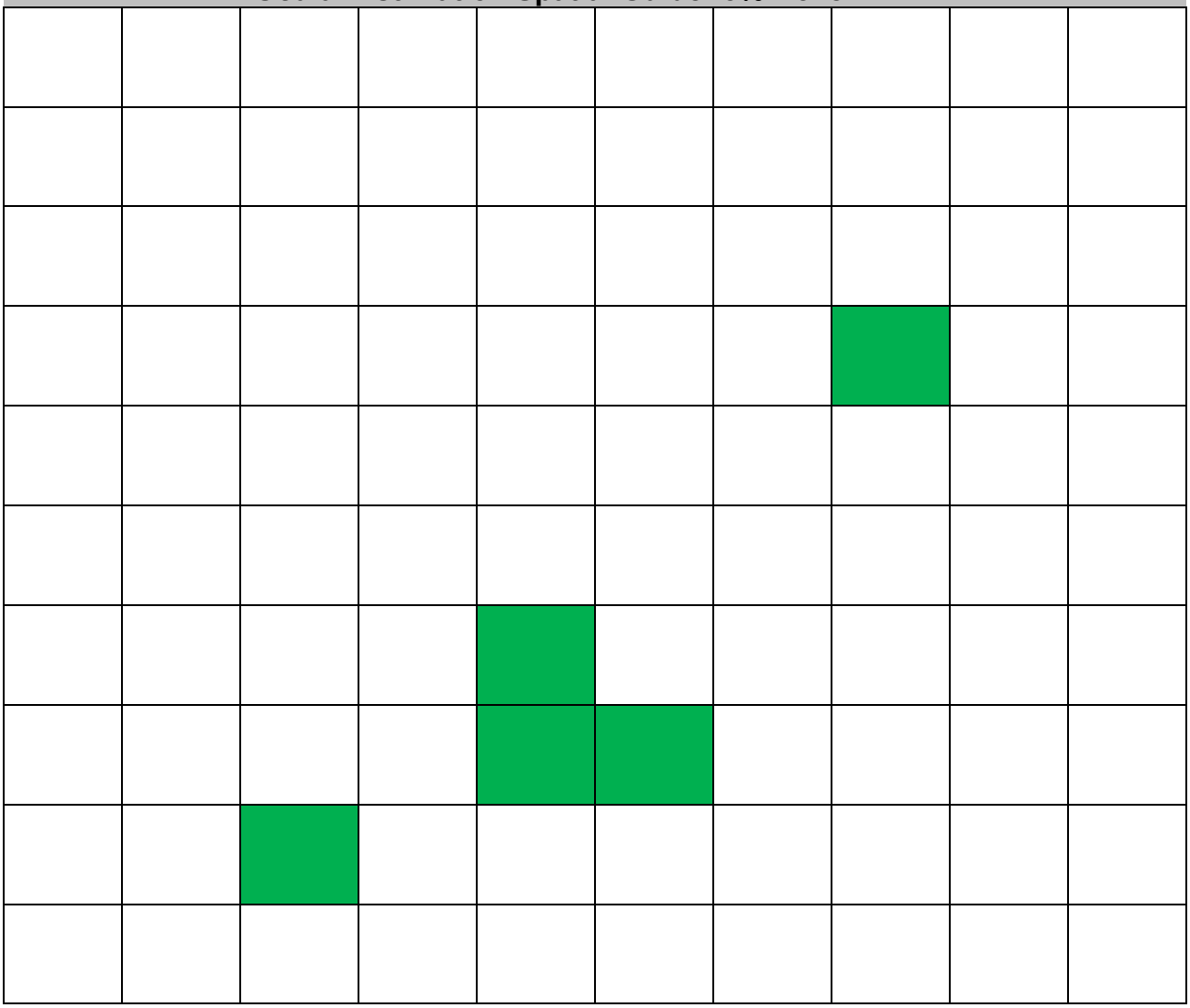
45.31(1) Owners of apiaries, in order to protect their bees from pesticide applications, shall register the location of their apiaries with the state apiarist. Registration shall be on forms provided by the department. The registration expires December 31 each year and may be renewed the following year.

45.31(2) Between 8 a.m. and 6 p.m., a commercial applicator shall not apply to blooming crops pesticides labeled as toxic to bees when the commercial applicator is located within one mile of a registered apiary. A commercial applicator shall be responsible for maintaining the one-mile distance from apiaries that are registered and listed on the sensitive crop registry on the first day of each month.

**APPENDIX 7**

## OCULAR ESTIMATION GUIDES

**Ocular Estimation Spatial Guide- 5% Cover**



| Ocular Estimation Spatial Guide- 10% Cover | | | | | | | | | |
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# APPENDIX 8. ALLOWED PESTICIDE LIST

| SIGNAL WORD | TRADE/PRODUCT NAME | ACTIVE INGREDIENT | TYPE | TYPICAL USE |
|---|---|---|---|---|
| Caution | Round up Pro max | Glyphosate | Herbicide | Post emergent non selective weed control |
| Caution | Surflan A.S. | Oryzalin | Herbicide | Pre emergent of annual and perennial weeds |
| Caution | Pennant Magnum | S-Metolachlor | Herbicide | Pre emergent control of yellow nutsedge, annual and perennial weeds |
| Caution | Sucker Stopper | ethyl 1-napthalenacetate | Herbicide | reduce sucker growth at base of crabapple trees |
| Caution | 5% Treflan | trifluralin | Herbicide | pre emergent control of annual weeds in flower beds |
| Caution | Sedge Hammer | Halosufuron-methyl | Herbicide | post emergent control of yellow nutsedge |
| Danger | Millennium Ultra | 2,4D Clopyralid | Herbicide | post emergent control of clover on ball fields ONLY |
| Caution | Round up Poison ivy Plus | Glyphosate, triclopyr | Herbicide | cut stump treatment- sponge or drip applied |
| Caution | Rodeo | Glyphosate | Herbicide | Post emergent non selective weed control for aquatic sites |
| Caution | Pathfinder II | Triclopyr | Herbicide | cut stump treatment-sponge or drip applied |
| Caution | Stinger | Clopyralid | Herbicide | Post emergent selective weed control for Thistles |
| Caution | Milestone | Aminopyralid triisopropanolamine salt | Herbicide | Post emergent of annual and perennial weeds |
| Caution | Esplanade 200 SC | Indaziflam | Herbicide | Pre emergent of annual and perennial weeds for roadsides |
| Caution | Perspective | Aminocyclopyrachlor | Herbicide | Post emergent of annual and perennial broadleaf weeds |
| Caution | Raid Wasp and Hornet | Prallethrin,Cypermethrin | Insecticide | Stinging insect killer |
| Caution | C.I.A. | Permethrin | Insecticide | Crawling and flying insect control |
| Caution | Ortho Home Defense Max | Bifenthrin, Zeta-cypermethrin | Insecticide | insect control for structures and buildings |
| Warning | TREE-age | Emamectin Bezoate | Insecticide | insect control for Emerald Ash Borer-closed system injection |
| | | | | |
| | **Products to be Phased out** | | | |
| Danger | Aquaneat | Glyphosate | Herbicide | Post emergent non selective weed control for aquatic sites |
| Caution | Sureguard | Flumioxazin | Herbicide | Pre emergent for annual and perennial weeds on hard surfaces |
| Danger | Cornbelt 2,4D | 2,4D | Herbicide | post emergent broadleaf control |
| Caution | Tordon RTU | Picloram, 2,4D | Herbicide | cut stump treatment |
| Caution | Drop Dead | Pyrthrin,permethrin | Insecticide | Crawling and flying insect control |
| | | | | |

**APPENDIX 9**

## BENEFICIAL PLANTS

The native plants of the Midwest support a diverse range of pollinators including thousands of species of native bees, butterflies, flower-visiting beetles, flies, wasps, and moths. The Midwest region is an important breeding area for the monarch butterfly and is also home to several important species of bumble bees and butterflies. Pollinators in the Midwest maintain healthy, productive native plant communities, provide food that sustains wildlife, and play an essential role in crop production, helping to achieve the Sustainable Dubuque principle of Native Plants & Animals. Choosing a variety of plants with overlapping and sequential bloom periods will provide food for pollinators throughout the seasons. Reduced used of pesticides on City lands may decrease the threats to these pollinator species. Additional care should be taken, when possible, to plant native species that support biodiversity and pollinators.

# INTEGRATED PEST MANAGEMENT PROGRAM

**Bunker Hill Golf Course**

**City of Dubuque, Iowa**

BUNKER HILL
GOLF COURSE

**MAY 2016**

# Table of Contents

# A. Introduction

Bunker Hill Golf Course (BHGC) recognizes the importance of sound environmental stewardship and is committed to optimizing its golf course management practice to protect the environment within and surrounding the golf course.

The cornerstone of environmental stewardship at BHCG is the philosophy of **Integrated Pest Management** (IPM). IPM is a management system that utilizes systematic, disciplined and documented cultural practices as a first- line of defense for pest control. Many pest management practices do not involve the use of pesticides. Mechanical strategies, such as proper mowing and aerification, also contribute to turfgrass health and will be implemented. Biological control options will be considered and utilized whenever feasible. On occasion, when cultural practices are not fully effective at controlling pests, the use of pesticides to manage pest damage will be necessary. The staff at BHGC will routinely scout the golf course and monitor for evidence of pest infestation.

BHCG will consider all IPM strategies that will protect the environment and maximize the quality of turfgrass by using a combination of tactics to control pests. This includes cultural, biological, and chemical controls. The Bunker Hill Golf Course IPM Program provides a sound working framework for selection and implementation of the most environmentally sound solutions to golf course pest problems.

The IPM Program describes detailed and specific practices at BHGC and serves as an operational reference that directs golf course management practice. BHGC is dedicated to the philosophy and the practicality of Integrated Pest Management and remains vigilant to incorporate emerging and useful golf course management practices into the IPM Program. Accordingly, this document is viewed to be a functional document that will evolve over time and one that will be revised to incorporate industry developments that will bolster and optimize the effectiveness of the program.

# B. Integrated Pest Management Definition

IPM is a coordinated decision-making and action process that uses the most appropriate pest control methods and strategy in an environmentally and economically sound manner to meet pest management objectives. IPM includes optimizing turfgrass health through cultural practices to enhance natural plant

resistance to pest infestation, optimizing habits for beneficial species and minimizing plant damage resulting from routine golf course operations.

In certain instances the use of pesticides to control some pests and diseases may be necessary. An essential component of the IPM Program is the coordination of the ongoing use of cultural methods with the selective use of pesticides as a means of minimizing pesticide application. The elements of IPM include:

- Preventing pest problems.
- Scouting and monitoring for the presence of pests and pest damage.
- Establishing the density of the pest population, which may be set as low as zero that can be tolerated or correlated with a damage level sufficient to warrant treatment of the problem based on health, public safety, economic or aesthetic thresholds. This density is the action threshold for a specific pest.
- Treating pest problems to reduce populations below those levels established by action thresholds using strategies that may include biological, cultural, mechanical and chemical control methods and also shall consider human health, ecological impact, feasibility and cost effectiveness.
- Evaluating the effects and efficacy of pest treatments.

The broad objective of the Bunker Hill Golf Course IPM Program is to maximize the use of natural methods to control pests through optimized, disciplined and documented golf course management practice. To meet this objective, the Bunker Hill Golf Course IPM Program defines turfgrass, non-turfgrass, natural and aquatic management areas; pests of concern within these areas; methods to monitor pest populations; pest action threshold levels that when exceeded require action; and the actions to be taken once threshold levels have been reached.

Several examples of natural methods to control pests include optimizing turfgrass health through cultural practice to optimize natural plant resistance to pest infestation, optimizing habits for beneficial species and minimizing turfgrass damage resulting from routine golf course operations. However, in spite of the use of natural methods, in certain instances the use of chemicals such as pesticides to control some pests is unavoidable. An essential component of the IPM Program is the coordination of the ongoing use of natural methods with the selective use of these agents to wisely make pesticide applications.

# C. IPM Objectives

The most important part of a successful program is monitoring. The turfgrass conditions need to be observed regularly. Results of the monitoring will be documented including patterns of pest activity and successes and failures. The following are the basic objectives for the Bunker Hill Golf Course IPM Program.

- Minimize potential hazards and reduce risk of exposure to people, animals and the environment.
- Optimize playing conditions of the golf course.
- Utilize effective monitoring to enable selective and targeted control on pest populations.
- Minimize pesticide use through tactical and targeted application while optimizing pesticide efficacy.
- Optimize turfgrass quality.
- Reduce pest management expenses.
- Maintain health of landscape elements such as trees, shrubs, flowers beds and natural areas
- Conserve energy.

# D. IPM Structure

The structure of the IPM Program is based on the selective targeting of plant pathogens, weeds and insects that threaten the agronomic health of the golf course. In addition, the IPM Program includes provisions to optimize the quality of aquatic areas of the golf course. The strategy of the IPM Program is as follows:

- Define areas requiring management and the relative maintenance intensity associated with each area.
- Identify pests likely to be encountered.
- Determine the pest's life cycle and know which life state to target.
- Establish action threshold levels for each pest that when exceeded, trigger corrective action.
- Scout and monitor for the presence of pests.
- Maintain vigorous turfgrass health through maintenance practices to optimize pest tolerance.
- Implement sequential corrective action when threshold levels have been exceeded.
    - Adjust cultural practice.
    - Utilize mechanical and biological controls when appropriate.
    - Determine is pesticide intervention is necessary or appropriate and apply minimum amounts of selective chemical agents in a highly targeted fashion. Chemical agents will be selected based on minimal toxicity and optimal efficacy.
- Document all scouting and monitoring observations, treatments and treatment results.
- Determine if the "corrective actions" actually reduced or prevented pest populations, were economical and minimized risks.

# E. Area Definition

Bunker Hill Golf Course is located on 138 acres with 18 holes in Dubuque, IA (Dubuque County, USA). It was established as a 9-Hole private course in 1937 by Louis B. Estabrooks. Bunker Hill Golf Course is now a public 18-Hole course redesigned by Gordon Cunningham in the 1960's. The course is located in Dubuque, Iowa which is part of the Tri-State area. This is where the boarders of Iowa, Wisconsin and Illinois meet. This course was donated to the City of Dubuque from a group of business men who purchased the original 9-Hole course from the Estabrooks family in the 1950's. Bunker Hill is home to 100 year old oak trees and features rolling hills and two ponds. The hilly terrain can provide a challenge but a variety of teeing options make Bunker Hill playable for golfers on any caliber.

**The grass types currently established at Bunker Hill Golf Course include:**

| Grass Types | Greens | Tees | Fairway | Rough |
|---|---|---|---|---|
| Creeping Bentgrass | x | - | - | - |
| Fine Fescues | - | x | - | x |
| Kentucky Bluegrass | - | x | x | x |
| Perennial Ryegrass | - | x | x | x |
| Poa Annua | x | x | x | x |
| Tall Fescue | - | x | - | x |

## 1. Management Areas

The managed areas of the golf course include turfgrass areas, non-turfgrass areas, environmentally sensitive areas and/or aquatic areas. A description of each specific area is provide below.

The turfgrass, ornamental areas and their respective management requirements are defined in **TABLE 1.**

**Table 1**

| Area | Acres Maintained | Irrigation Requirements | Mowing Frequency | Typical Height | Fertilizer Requirments | Cultural Practice Frequency |
|---|---|---|---|---|---|---|
| Greens | 4 | High | High | .135" | Medium | High |
| Tees | 2 | Med-High | Med-High | .75" | Medium | Medium |
| Fairways | 21 | Medium | Med-High | .75" | Medium | Medium |
| Rough | 78 | Low | Medium | 2" | Low | Low-Med |
| Ornamentals | 0.1 | Low-Med | N/A | N/A | Low | Med-High |
| Natural Areas | 30.5 | N/A | N/A | N/A | N/A | Low |

## 2. Other Non-Turfgrass Areas

Non-turfgrass areas consist of bunkers, aquatic areas, ornamental plantings and natural and/or environmentally sensitive areas.

### a. Lake and Aquatic Plant Management

A pond management program exists at Bunker Hill Golf Course. Some of the challenges in maintaining the water quality include:

- Low dissolved oxygen
- Sedimentation
- Excess nutrients
- Nuisance vegetation
- Aquatic life
- Erosion control
- Depth

### b. Aquatic Plant Control

Two man made ponds exist on holes # 9 green and # 16. The ponds are filled by rain run-off, irrigation overlap and supplemented by the City's water supply.

In order to control the aquatic plants appropriately, the intended use of the water body must be known as well as whether there are any invasive or weedy species present, the aesthetic purposes of the ponds and any other environmental conditions. The pond management program should include strategies to control the growth of nuisance vegetation that can negatively Impact the water quality and treatment capacity of the ponds.

The general IPM principles applied as part of the aquatic plant control at Bunker Hill Golf Course include:

- Proper turfgrass fertilization practices
- Hand removal of plants or mechanical harvesting
- Use of lake dyes and biological controls
- Aeration where possible
- Aquatic herbicides

If herbicide applications are to be used then they are used according to the level and aquatic herbicides are chosen according to: target plant, water body type and uses; wind, temperature, water depth, efficiency and cost effectiveness.

## c. Bunkers

Fairway and greenside bunkers are located throughout the course. Bunkers are maintained with a mechanical bunker rake three days per week. Edges are maintained with shovels, weed eater as well as powered bunker edger. After rainstorms, a plow blade on the bunker machine and manual shoveling pushes sand back onto thin and washed out areas.

## d. Ornamental Plantings

Ornamental plantings are around the clubhouse / office entry-way as well as several areas out on the course. These plantings consist of mostly perennial plants and a few annuals.

## e. Natural and Environmentally Sensitive Areas

Bunker has 30.5 acres of natural areas, mostly consisting of timber. Bunker Hill Golf Course does have several small “no mow” areas that act as “buffer strips” near storm water run-off and catch basins.

# F. Turfgrass Cultural Practice

Turfgrass area maintenance is an element of the IPM program. As stated repeatedly throughout this document, the primary intent of the IPM program is to optimize turfgrass vigor utilizing sound cultural practices as a means of preventing and/or minimizing pest infestation. The primary practice of turfgrass maintenance at Bunker Hill Golf Course include mowing, fertilization and irrigation. Cultural practices also include aerification, verticutting, topdressing, thatch removal and over-seeding to promote a healthy turfgrass environment. Pesticide applications may be used as part of IPM strategies.

## 1. Cultural Practice

Cultural practices include aerification, verticutting, topdressing, thatch removal and over-seeding to promote a healthy turfgrass environment.

### a. Mowing

Mowing will be done on an as-needed basis depending on weather and growing conditions. A general outline is listed below:

Tees will be mowed on Monday, Wednesday and Fridays. Greens will be mowed or rolled daily during the growing season. Rough will be mowed Monday through Friday. Approaches and collars will be mowed on Tuesday and Fridays.

Mowing heights include:

- .135 inch(s) for greens
- .750 inch(s) for tees
- .750 inch(s) for fairways
- .600 inch(s) for collars and approaches
- 2 or more inch(s) for rough

### b. Aerification

Aerification is the practice of removing soil cores from turfgrass or utilizing solid tines to minimize turfgrass compaction. This practice also enhances the movement of air, water and nutrients in the soil and is a useful technique to managing the thatch layer.

The aerification frequency will be adjusted as appropriate for turfgrass location and conditions. Aerification frequency is greatest for greens and tees and to a lesser extent for fairways and cart traffic areas. Aerification is typically performed during periods of active turfgrass growth in the early spring, early summer and fall. At BHGC we use a "mini" tining process monthly throughout the season. If core aeration has taken place on greens, topdressing sand is sometimes applied to fill the core holes resulting from the aerification treatment.

## c. Thatch Management

Thatch is the layer of dead turfgrass tissue between the turfgrass canopy and the soil surface that may need removal. In the absence of cultural management, this layer becomes thicker over time. This results in sub-optimal turfgrass growth. Management of thatch is particularly important on greens. This consists primarily of aerification, verticutting and topdressing practices. The thatch layer on greens will be maintained at a depth of ½ inch or less.

## d. Topdressing

The practice of topdressing consists of the application of a layer of sand to the green. The sand is used to assist in thatch layer management and to provide a smooth and firm playing surface. Topdressing applications typically follow the aerification or verticutting of greens but can also be made in the absence of aerification (light topdressing). The application of sand is then carefully brushed into the turfgrass surface.

## e. Verticutting

The practice of verticutting is the application of specialized cutting unit heads that have the ability to cut into the turf much like that of a circular saw blade. This procedure "thins out" turf which aids in thatch removal and enhances green speed. It also adds to nutrient accessability. If set deep enough it can severe bentgrass stolons promoting new "upshoots".

## f. Overseeding

Overseeding is the implementation of turfgrass seed to improve areas of turfgrass depletion and to enhance turfgrass density. Over-seeding is performed in the late fall, early spring or early summer. At BHGC our

over-seeding program usually runs in conjunction with the aeration process.

## 2. Plant Nutrition

The goal of the nutrient management program is to improve turfgrass quality, protect water resources and reduce fertilizer costs. The application of fertilizers is essential for development of turfgrass vigor. Management of turfgrass fertility involves the understanding of soil composition, fertility management history and the use of soil test information. The objective of the fertilizer program is to provide maximum nutrient availability to turfgrass, while simultaneously avoiding the application of excess nutrients to avoid weed infestation, disease development and nutrient runoff. The nutrient management program described below is a **guide** for managing the amount, sources, placement, form and timing of the application of nutrients and other soil amendments. It is a guide for adjusting management practices to address variability throughout the golf course.

### a. Soil Nutrient Testing

Soil testing for nutrient composition provides valuable information that allows for the development of strategic fertilization plan development and also provides insight into the effects of preceding management practices. Soil testing will be performed on areas of the golf course selected by the superintendent to generate information that will provide technical support during the development of the fertilization programs.

Because nutrient management has a significant impact on plant health, soils and the environment over time, the nutrient application rate, nutrient form, nutrient application method and nutrient timing will be closely monitored.

### b. Turfgrass Nutrient Requirements

The major nutrients required for turfgrass health are **NITROGEN** (N), **PHOSPHORUS** (P) and **POTASSIUM** (K). Calcium, magnesium and sulfur also contribute significantly to turfgrass health. Micronutrients including iron, boron, copper, manganese and zinc do as well. The availability of nutrients to turfgrass is influenced by the pH of the soil. Consequently, management of the appropriate pH is an important component of the

fertilization program. Controlled release fertilizers will be used whenever possible, with adjustments being made for special need and conditions.

- **Nitrogen**
  - The management of nitrogen levels is critical due to the turfgrass's high demand for this nutrient and the potential for excess nitrogen to enter into surface water and groundwater. As a result, the amount of nitrogen delivered to turfgrass will be the minimum amount necessary to promote turrfgrass vigor. In general, nitrogen will be applied based on known rates to be effective for this area. In certain instances where turfgrass condition and/or climate conditions dictate, rates of application will be adjusted (either higher or lower) at the discretion of the superintendent. Soil factors, temperatures and rainfall also important considerations.
  - Nitrogen formulations consist of water insoluble (slow release) and water soluble (quick release) types. Slow release nitrogen coatings, and their longevities are included in the following: PCU (2 – 6 months), SCU (9 – 12 weeks), PSCU (10 – 14 weeks), UMAXX and UFLEXX (up to 16 weeks), IBDU (up to 4 months), MU (up to 4 months and UF (up to 1 year). Examples of quick release nitrogen sources include ammonium sulfate, ammonium nitrate, potassium nitrate and urea. To maximize plant uptake and minimize nitrogen runoff, slow release nitrogen sources and/or light applications of soluble nitrogen ("spoon feeding") will be used whenever possible.
  - Determination of the appropriate nitrogen source will be at the discretion of the superintendent and will be based on the season and relative growth rate of the turfgrass at the time of application.
- **Phosphorus**
  - Turfgrass requirements for phosphorus are relatively low and phosphorus does not generally leach from soil quickly. As a result, application rates tend to be correspondingly low, which minimizes the possibility of storm water runoff carrying residual phosphorus into water systems. It is a very important factor turfgrass development
- **Potassium**
  - Potassium is an essential component needed in plant growth. Turfgrass requirements for potassium are intermediate in relation to nitrogen and phosphorus levels. Although applied to

maximize efficiency of uptake, potassium does not pose the extent of environmental risk that excess nitrogen and phosphorus levels represent. Proper levels of potassium are an important component of plant disease resistance and contribute to the ability of turfgrass to withstand wear and traffic.

- **Additional Nutrients**
  - In general, turfgrass requirements for sulfur, calcium, iron and micronutrients are lower than for nitrogen, phosphorus and potassium. These nutrients are available in a variety of formulations and applications of these nutrients will be at the discretion of the superintendent.
- **pH**
  - Maintenance of the proper soil pH is essential in optimizing the availability of nutrients and also is important in minimizing overall turfgrass stress. When the soil pH requires adjustment to a more alkaline pH, gypsum (Calcium) will be added until the targeted pH is obtained. When soil requires adjustments to a more acidic pH, ammonium sulfate will be added until the targeted pH is obtained. Ferrous sulfate may also be used to adjust pH and provide iron to turfgrass.

## c. Fertilizer Treatment Areas

The rate and frequency of fertilizer application is area and situation dependent. Typical fertilizer application frequencies are shown in **TABLE 2.** Fertilizer application is most frequent on the greens with less frequent applications being made to tees and fairways and the least frequent applications being made to the rough.

## Typical Annual Fertilizer Applications

**Table 2**

| AREAS | Acres Maintained | Number of Treatments | Total Nitrogen (Lbs. per 1000 sq. ft.) |
|---|---|---|---|
| Greens | 4 | 9 to 12 | 1 to 3 |
| Tees | 2 | 2 to 4 | 2 to 4 |
| Fairways | 21 | 2 to 4 | 2 to 4 |
| Rough | 78 | 0 | 0 |
| Ornamentals | 0.1 | 0 to 1 | .1 to .5 |
| Ponds | 0.16 | n/a | n/a |

### d. Fertilization Storage

All fertilizers will be maintained in a dedicated moisture free, well-ventilated storage area and stored on a pallet, not directly on the floor or ground. All liquid nutrients will be stored in our on-site chemical storage building.

### e. Fertilizer Documentation

Records of all fertilizer purchases will be maintained in a fertilizer logbook. All fertilizer applications will be documented on a fertilizer application form. Information recorded will include date of application, location of application, type of fertilizer(s) applied, rate of application, equipment used to apply and the identity of the applicator(s).

### f. Buffer Zones

Application of fertilizer to turfgrass located in designated buffer zones will be limited to the extent of practical.

## 3. Irrigation

Turfgrass is irrigated to maintain plant health and optimize playing conditions. Our water sources, irrigation system, irrigation water quality and water conservation measures are described in this section.

## a. Water Source

Irrigation for the golf course comes from the City of Dubuque's water distribution system via City water main.

## b. Irrigation System

A new pumping station and control boxes (satellites) were installed in 2011. The irrigation control system is Toro Lynx that was upgraded in 2014. Lynx software is user friendly and capable of precise watering due to the many advanced features in the programming. Currently the irrigation piping and sprinkler heads are in an upgrading phase.

## c. Irrigation Water Quality

The City of Dubuque's water supply is maintained near a 9.3 pH level.

## d. Water Conservation

Irrigation is monitored to prevent over-application while still optimizing turfgrass vigor and water conservation. The areas requiring the most frequent irrigation are tees, fairways and greens. Because it represents a substantial percentage of the overall turfgrass area, the rough is irrigated as sparingly as possible to conserve water. In addition to other methods, turfgrass irrigation requirements are checked by daily observations of the superintendent and staff by means of taking core samples. Hand watering dry areas also reduces over-all usage.

## e. Hydrophobicity or Water Repellency

Hydrophobic soils are soils that repel water as opposed to wetting easily under irrigation or rainfall conditions. Soil hydrophobicity commonly referred to as soil water repellency or Localized Dry Spot (LDS). Water repellency can lead to run off, non-uniform wetting of soils, poor delivery of fertilizers and pesticides, plant stress and reduced quality, increased need for irrigation and water use. To counteract hydrophobicity in the soil, soil surfactants A.K.A. (soil wetting agents) may be used. Wetting agents reduce the surface tension and in many cases restore the

wettability of the soil. When applied to water-repellent (hydrophobic) soils at rates recommend by manufactures, surfactants can improve the ability of the water and solutes to penetrate the soil surface and more uniformly wet and retain moisture in the root zone.

### f. Plant Growth Regulators

Plant growth regulators (PGRs) are chemicals that regulate plant growth. The objective of plant growth regulators is to increase turfgrass quality and reduce maintenance costs. Plant growth regulators provide economic growth regulation of turfgrass. Because the vertical growth of the turfgrass is reduced, the frequency of mowing may also be reduced. The use of plant growth regulators may also limit seedhead development of poa annua, an undesirable plant species that competes with bentgrass.

## G. Tree Management

General tree planting, management and removal practices are described below.

### 1. Tree Selection

Trees that are considered for planting are selected based on ultimate size and type of growth appropriate for the planting location, compatibility with soil conditions, climate and pest resistance properties. Native species are selected as appropriate. If non-native tree species are selected, they are trees that are not invasive in nature.

### 2. Planting Locations

Tree planting locations are carefully evaluated prior to planting to anticipate the effect of mature trees on surrounding turfgrass and ornamental areas. Architectural features, engineering, aesthetics and influence on playing characteristics of the golf course are important landscape functional considerations. Water requirements, shading and influence on air circulation are the primary determinants of planting locations.

#### a. Tree planting

Trees are planted in planting holes appropriate for the root ball/root mass. The holes are backfilled with native material, except in certain

situations, where the existing soil is contaminated or filled with rubble. The planting area is mulched and receives irrigation as required through the first three growing seasons. Whenever possible, planting occurs during the fall.

### b. Tree Maintenance

Trees are routinely monitored for overall health, influence on playing characteristics, the presence of insects and diseases, influence on surrounding turfgrass and ornamentals and hazard potential. In general, insect and disease pests are tolerated. High-value specimen trees may require more consideration for IPM strategies. Established trees do not require supplemental watering except in situations of extreme drought. Trees will be pruned to optimize health, allow passage of light and wind, minimize hazard and manage pests. The City of Dubuque's Forester will be consulted regarding trees that have disease and/or pest problems beyond the normal scope of golf course management practices.

### c. Tree Removal

Tree removal may be required because of disease, age, wind or lightning damage and hazard potential. At other times, trees may be removed to increase sunlight and air circulation to specific turfgrass areas creating better growing conditions for healthier turfgrass. Impacts to wildlife habitat and shading properties are considered before trees are removed. The Golf Course Supervisor will be responsible for determining if tree removal is necessary and will consult with the City of Dubuque's Forester regarding tree removal that is beyond the scope of routine golf course management practices.

Trees considered for removal will be evaluated for their potential to provide wildlife habitat or forage. Snags may be left in place if they are compatible with the playability objective and are not a hazard to golfers or golf course maintenance staff.

## H. Compositing and Organic Materials Management

Sustainability practices conducted at Bunker Hill Golf Course include composting and recycling or organic materials from the golf course are described below.

### 1. Grass Clippings and Aerification Cores

Clippings from greens are scattered into the golf course rough. Aerification cores are collected when feasible and stored as high quality "fill". They are then used in depressions in outlying areas of turf course-wide.

### 2. Leaves

Leaf blowers and vacuums are used to remove leaves from turfgrass areas. The collected leaves are deposited in one of several composting piles. Excess wash pad clippings are composted as well. During heavy leaf drop in the fall, rotary mowers are used to mulch leaves in the deep rough areas whenever feasible.

### 3. Woody Brush

Tree limbs and other woody brush are also composted. Tree stumps are removed with a stump grinder and the chips are deposited in out-of-play areas on the golf course. Small debris from trees and landscape maintenance are collected and composted appropriately. Larger logs are sometimes hauled out by the City of Dubuque's Tree Crew.

## I. Pest Population Definition

A summary of the pest population at Bunker Hill Golf Course is shown in the following **TABLE 3.**

**Table 3**

| Common Name | Turfgrass | Ornamentals | Natural Areas | Ponds |
|---|---|---|---|---|
| **Fungal Diseases** | | | | |
| Algae | x | | | |
| Anthracnose | x | | | |
| Brown Patch | x | | | |
| Dollar Spot | x | | | |
| Fairy Ring | x | | | |
| Fusarium Patch | x | | | |
| Leaf Spot | x | | | |
| Pink Snow Mold | x | | | |
| Powdery Mildew | x | x | | |
| Pythium Blight | x | | | |
| Red Thread | x | | | |
| Summer Patch | x | | | |
| Take-All Patch | x | | | |
| Waitea Patch | x | | | |
| Yellow Patch | x | | | |
| **Broadleaf Weeds** | | | | |
| Broadleaf Plantain | x | | | |
| Buckhorn Plantain | x | | | |
| Chickweed | x | x | | |
| Dandelion | x | x | x | |
| Field Violet | x | x | | |
| Ground Ivy | x | x | x | |
| Spurge | x | x | | |
| Spreading Dayflower | x | x | | |
| White Clover | x | x | x | |
| **Moss** | x | | | |
| **Algae** | x | | | x |

| Common Name | Turfgrass | Ornamentals | Natural Areas | Ponds |
|---|---|---|---|---|
| **Grassy Weeds** | | | | |
| Annual Bluegrass | x | x | | |
| Field Sandbur | x | x | x | |
| Foxtail | x | x | x | |
| Goosegrass | x | x | | |
| Crab Grasses | x | x | | |
| Sedges | x | x | x | x |
| **Noxious Weeds** | | | | |
| Bull Thistle | x | x | x | |
| Cocklebur | x | | x | |
| Canada Thistle | x | x | x | |
| **Aquatic Pests** | | | | |
| Pondweed | | | | x |
| Milfoil | | | | x |
| Duckweed | | | | x |

# J. Pest Action Threshold Levels

Action threshold level is defined as the number of pests detected within a specified area that leads to corrective action to reduce the density of the pest below the threshold level. The action threshold levels for specific pest types are shown in TABLE 4.

## Action Threshold Limits for Specific Pest Categories

**Table 4**

| Name | Greens | Tees | Fairways | Rough | Ornamentals | Buffer Zones | Ponds |
|---|---|---|---|---|---|---|---|
| **Fungal Diseases** | 1% | 10% | 20% | * | * | * | * |
| **Broadleaf Weeds** | 1/1000 sq. ft. | 20/1000 sq. ft. | 50/1000 sq. ft. | 5-10% | 2/sq. yd. | 30% | * |
| **Grassy Weeds** | 0% | 5% | 5% | * | 2/sq. yd. | * | * |
| **Aquadic Pests** | * | * | * | * | * | * | AS NEEDED |
| **Insects** | | | | | | | |
| **Cutworm** | * At first sign of worm or bird activity | | * | * | * | * | * |
| **Wasp or Hornet** | * | *At first detection | Same | Same | Same | Same | |
| **Masked Chafer Grub** | * | Preventatively | Same | * | * | * | * |
| **Other** | | | | | | | |
| Rodent | * When damage occurs | | Same | Same | Same | Same | * |

# K. Pest Monitoring and Pest Control

The pest control strategy is sequential and consists of using cultural practices as the first line of defense followed by biological/chemical control where appropriate. The decision to implement chemical pest control measures beyond cultural, biological or mechanical practices is based on the review of relevant safety, scientific, economic and environmental information. All products used for pest control are those approved for use by the Environmental Protection Agency for the specific indication.

## 1. Pest Scouting

All golf course maintenance staff will be trained to routinely scout the golf course and monitor for evidence of pest infestation appropriate for their

individual job descriptions. The intensity and frequency of monitoring will be adjusted based on the likelihood of pest infestation (i.e., seasonal) or in situational site-specific instances. All monitoring observations of potential pest infestation will be reported directly to the superintendent on the same day of the observation. Reported observations will include the area observed and a description of the pest(s). No action will be taken until the threshold for a specific pest has been exceeded. If the threshold for a given pest is exceeded, the resulting corrective action and the corresponding results will be recorded.

## 2. Pest Control

The pest control strategy will be developed on a case-by-case basis with all potential control options given consideration.

The following are means by which pests can be controlled:

- **Cultural Control:**
  - The use of sound horticultural practices to optimize plant health and to suppress insects, disease and weed growth. Other cultural controls include site-appropriate design and the use of disease or drought-resistant plants.
- **Mechanical Control:**
  - The use of variety of tools and equipment for the purpose of eliminating pests.
- **Biological Control:**
  - The use of biological control agents that act as predators or parasites of pest species. The use of other beneficial organisms that improve plant health by enhancing soil quality.
- **Chemical Control:**
  - The application of various agricultural products such as herbicides, insecticides, fungicides or other chemical compounds to target a pest as a means of control.

The decision to implement appropriate pest control measures beyond maintenance practices will be based on the review of relevant safety, scientific, economic, environmental, and feasibility information. The products listed in this section are **examples** of pesticide controls that could be used. These may not be the only products used to control a particular pest.

## 3. Fungal Disease

Within the overall spectrum of pest management, fungal disease represents the most serious and consistent threat to turfgrass health and is of concern primarily on greens and tees. Greens and tees are inspected regularly for symptoms of fungal disease. The primary means of identifying fungal disease is diagnosis by the superintendent. However, in some instances symptoms consistent with fungal disease may have alternative causes (nutrient deficiency, insects, etc.). When uncertainty regarding potential fungal disease is encountered, samples are sent to a plant pathology lab for confirmation of the presence of fungal pathogens. Heightened monitoring of greens and tees will take place when conditions known to favor the development of these pathogens occur.

An essential aspect of preventing the development of fungal disease is the optimization of turfgrass vigor through routine cultural practice. In addition, fungal disease control is dependent on the correct identification of the disease, understanding the disease cycle, symptoms and conditions that promote disease development and the selective use of the appropriate fungicide agents. Specific cultural practices can be employed to minimize the potential for fungal disease, which are described below. In general, if conditions favoring disease development are present or if cultural measures fail to suppress fungal infestation below damage thresholds, fungicide applications may be necessary to control the disease. The superintendent considers numerous factors including season, weather and turfgrass health/vigor before determining whether fungicide treatment may or may not be necessary. When the superintendent does determine that the use of a fungicide is necessary for disease control, the product applied is that specifically labeled for the disease and is applied according to label. Annual review of improved products and rotational application strategies are implemented to reduce resistance of fungal pathogens to specific products.

Pesticides can be applied as preventative maintenance or as a curative measure. Whether the pesticide application should occur prior to the pest becoming apparent, or after the pest has begun to establish itself, may depend on the type of pest/disease and its characteristics.

### a. Fungicide Resistance Action Committee (FRAC)

Fungicide resistance guidance is available from sources such as the Fungicide Resistance Action Committee (FRAC), and the Insecticide

Resistance Action Committee (IRAC), which are specialists training groups of Croplife International.

The purpose of FRAC is “to provide fungicide resistance management guidelines to prolong the effectiveness of “at risk” fungicides and to limit crop losses should resistance occur.” This does include turfgrasses. As stated on the FRAC & IRAC websites.

The main aims of both FRAC and IRAC are to:

- Identify existing and potential resistance problems.
- Collect Information and distribute it to those involved with fungicide and insecticide research, distribution, registration and use.
- Provide strategies, guidelines and advice on the use of pesticides to reduce the risk of resistance developing and to manage it should it occur.
- Recommend procedures for use in pesticide resistance.
- Facilitate communication and education on pesticide resistance.
- Stimulate open discussions and collaboration with universities, government agencies, advisors, extension workers, distributors and farmers.

### b. Disease and Control Measures

A description of conditions favoring disease development, symptoms of disease and specific control measures for types of turf diseases and other problematic issues are as follows:

## 4. Broadleaf Weeds

The broadleaf weeds that are potential turfgrass pests and that require monitoring and control by golf course personnel are listed in **TABLE 3**. In addition to managing turfgrass weeds, weed management is required for ornamental shrubs and plants. All areas are monitored regularly for the presence of weeds problematic for their respective areas.

- Other miscellaneous broadleaf weeds that are found mostly in the rough can be treated with application of a 3-way selective herbicide, or herbicides containing triclopyr and/or clorpyralid.
  A description of the individual areas and measures used to control weeds located in these areas follows:

### a. Turfgrass

The standard means of controlling broadleaf infestation will be to optimize turfgrass health through standard maintenance practices. Selection of well-adapted turfgrass cultivates in combination with proper cultural practice, fertilization, irrigation, insect and disease control produces a dense vigorous turfgrass that optimizes resistance to colonization by broadleaf weeds. If maintenance practices are not completely effective, the first approach to broadleaf control will be mechanical removal (i.e., hand pulling).

### b. Ornamentals

Broadleaf and grass weeds in ornamental areas will be controlled primarily by mechanical means when feasable (hand pulling). In addition, mulches will be used to control weed populations. Herbicides that may be used are pre-emergent, selective post-emergent and non-selective post-emergent.

### c. Trees

Weed and grass control around the trunks of trees in turfgrass areas is essential to protect trees from damage resulting from mowing, trimming equipment and rodents.

- **Cultural Control:**
    - Weeds around the bases of trees are controlled primarily by using string trimmers. Caution is used when operating trimmers to prevent damage to the bark of trees. Mulch material is used around newly planted trees.
- **Herbicide Control:**
    - Periodic spot-treatments with herbicides during the spring and fall are occasionally necessary to control growth of weeds around the bases of trees.

## 5. Insects

Turfgrass areas are most vulnerable to damage from insect infestation and the two insects more commonly known to cause turfgrass damage on golf courses in our area include Black Cutworms and the Masked Chafer. Monitoring for insects will consist of routine visual inspection of susceptible areas on a weekly basis. General turfgrass cultural practices leading to optimal turfgrass vigor are the primary means of minimizing the potential for insect infestation. If cultural practices are ineffective at preventing damage thresholds for a specific pest from

being exceeded, the selective use of biological agents and/or insecticides will be employed. Rotational strategies will be used as necessary to reduce insect resistance to specific products.

## 6. Aquatic

Monitoring the ponds on the golf course will consist of visual inspection of these areas on a regular basis. The optimal condition is to have zero aquatic pests. Without some sort of aeration, this is extremely difficult. As a result, early detection of aquatic pests is very important and corrective action will be engaged as soon as evidence of these pests is recognized. Application of aquatic pesticides should be done only after review of currently applicable regulations.

## 7. Algae

Algae growth (black algae) is of concern primarily fur turfgrass located on greens and tees. A description of conditions favoring algae growth and specific control measures follows:

- Growth Conditions and Symptoms:
  - Preventative cultural and fertility practices are the primary means of controlling algae on turfgrass. Techniques include improvement of soil drainage, maintenance of balanced turfgrass fertility, the loosening of compacted soil from verticutting or aeration and providing more light to turfgrass via pruning of trees etc.
- Chemical Control:
  - Temporary chemical control can be realized by the application of chlorothalonil fungicide.

## 8. Moss

Maintenance practices on greens can create an environment that can be favorable for the infestation of various moss species, including silvery thread moss, which is the species most commonly detected. Moss species in greens may require different control methods that species commonly found in other turfgrass areas. A description of conditions favoring moss growth and specific control measures follows:

- **Growth Conditions and Symptoms:**
  - Conditions favoring moss growth include low mowing heights, frequent irrigation and low nitrogen fertility.

- **Cultural Control:**
  - Control measures include raising mowing heights when possible, improvement of turfgrass fertility and adjusting irrigation to optimize drainage and prevent over-watering.
- **Chemical Control:**
  - Products showing varying levels of moss control include carfentrazone. BHCG has yet to have large outbreaks of moss on our greens thus implementing a spot treatment only.

### 9. Noxious and Invasive Weeds

Noxious weeds represents a serious environmental problem. While typically not a management problem for turfgrass, a wide variety of noxious weeds have the potential to colonize peripheral and out of play areas. As a result, scouting and monitoring for the presence of noxious weeds does occur as a matter of routine management activity.

In the event that a noxious weed is identified, the following control measures are engaged.

- Cultural/Mechanical Control:
  - Weeds are removed by hand pulling or string trimming.
- Herbicide Control:
  - Chemical spot-treatment may be required to eradicate noxious weeds. Treatment options may include: 2, 4-d, clopyralid, triclopyr or glyphosate.

## L. Pesticides Specifications

After cultural, mechanical and biological options have been exhausted or when thresholds have been exceeded, pesticides will be used as described in this section.

A pesticide is any substance that is used to control pests including insects (insecticides), weeds (herbicides) and fungi (fungicides). The mechanism of action of most pesticides is to eliminate the pest by suppressing, weakening or eradicating the target pests.

### 1. Pesticide Use Determination

The ideal pesticide is highly potent (requires minimal application), is target-specific (is safe for non-targeted species), and is compatible with the environment. While these properties are ideal and pursued by pesticide manufacturers, the degree of cross-toxicity and environmental compatibility in pesticides approved for use by the Environmental Protection Agency (EPA) can vary considerably. In the event that pesticide application is necessary, pesticides will be applied according to label.

The primary strategy for pest management is to optimize turfgrass vigor through maintenance practices to optimize turfgrass resistance to, or tolerance of pests. In the event that maintenance practices do not maintain pest populations below damage thresholds, biological/chemical controls will be considered when necessary. Pesticides applied to control pests will be selected by the superintendent based on their safety, efficacy, economic impact, toxicology and environmental compatibility. In addition, the superintendent will monitor developments in pesticide research and incorporate the use of newly developed, tested and improved pesticides approved by the EPA where appropriate.

## 2. Current Practices

In certain instances the use of pesticides for pest management is unavoidable. The pesticides that have potential for use at Bunker Hill golf Course are shown in **TABLE 5**. To minimize the development of disease resistance pesticides with different mechanisms of action will be rotated as frequently as practical and necessary. In addition, if pest resistance to these agents does develop, or if unanticipated circumstances arise, the superintendent may use alternative EPA approved pesticides as required.

The table includes pesticides currently being used at BHGC. Other registered pesticides may be rotated into the program as well as newly developed products.

## Pesticide Selection for Possible Application

**Table 5**

| | Greens | Tees | Fairways | Rough | Buffer Zones | Ornamentals | Natural Areas | Ponds |
|---|---|---|---|---|---|---|---|---|
| **Fungicides** | | | | | | | | |
| Chlorothalonil | x | x | x | | | | | |
| Fludioxonil | x | | | | | | | |
| Iprodione | x | | | | | | | |
| Mefenoxam | x | | | | | | | |
| Fluazinam | x | | | | | | | |
| Propamocarb Hyrochorider | x | | | | | | | |
| Azoxystrobin | x | | | | | | | |
| Triticonazole | x | | | | | | | |
| **Plant Growth Regulators** | | | | | | | | |
| Ethephon | x | | | | | | | |
| Trinexapac-ethyl | x | | | | | | | |
| **Insecticides** | | | | | | | | |
| Lambda-cyhalothrin | x | | | | | | | |
| Imidacloprid | | x | x | x | | | | |
| **Herbicides** | | | | | | | | |
| 2,4-D + Dicamba + MCPP | | x | x | x | x | x | x | x |
| Glyphosate | | | | | | x | | |
| Triclopyr | | x | x | x | | | | x |
| Clopyralid | | x | x | x | | | | |
| Oryzalin | | | | | | x | | |
| Flumioxazin | | | | | | | | x |

## 3. Formulation

Pesticide formulations will be determined by the Superintendent based on local weather conditions that are suitable for pesticide application. All pesticides will be mixed according to manufacturer's labeling instructions by properly trained personnel. Personnel will wear personal protective equipment (PPE) appropriate for the pesticide being mixed during the entire process.

## 4. Notification

Per Iowa Code 45.50(2) Signs including posters or placards shall be posted in a conspicuous manner near the first tee of each nine-hole course. The sign shall read “Pesticides are periodically applied to the golf course. If desired, you may contact your golf course superintendent or person in charge for further information.” The sign shall be displayed prior to the application of any pesticide on the golf course and left in place for at least 24 hours following any pesticide application. Where pesticide labeling requires specific notification or reentry restrictions, the applicator shall comply with the label instructions. Due to the various applications used at Bunker Hill, there is a permanent sign posted near the first tee box as well as a temporary sign which is posted by the tenth tee when pesticides are applied to the back nine of the course.

## 5. Application

All pesticide applicators at BHGC will be “Certified” by the State of Iowa and properly trained in the safe application of these agents. Applicators will wear appropriate personal protective equipment (PPE) appropriate for the pesticide being applied. All pesticide application equipment will be properly calibrated prior to the addition of the pesticide formulation and the actual application to the golf course. A mobile spill kit is on inventory in the maintenance facility.

The areas of the golf course requiring pesticide application will be specifically defined by the superintendent. Whenever possible, applications will be selective and limited to localized targeted areas to minimize the amount of pesticide being applied.

If necessary, pesticide delivery in buffer zones will be carried out by hand with directed, low volume, single wand sprayers or top drop spreaders. No pesticide spray applications will occur if wind speed is above eight miles per hour.

## 6. Clean Up and Disposal

Pesticide containers will be triple rinsed and mixing tanks and equipment will be rinsed in accordance with recommended procedures. Rinse water will distributed by spraying diluted formulations onto the golf course turf at varying locations.

### 7. Pesticide Documentation

All Pesticide documentation will be in accordance with Federal and State of Iowa regulations. All pesticide usage will be documented in a pesticide logbook for regulatory and transparency needs. Pesticide application information will be recorded and will comply with the State of Iowa Pesticide Applicators Record Keeping laws (Please see attached copy at the end of this document). Safety Data Sheets (SDS) are always accessible to all employees either by a complied catalog or an electronic version.

## M. Facilities Description

Descriptions of the buildings, storage areas and other pertinent areas at the BHGC is described below:

### 1. Maintenance Building

The maintenance facility is comprised of a rectangular building made of wood with asphalt shingles. Its design includes a full "walk out" basement. The shop contains approximately 1700 square feet of floor space. There are two overhead doors for equipment storage and two service doors. There is one office, a break-room / work bench area, restroom, equipment storage area, and a grinding room upstairs.

### 2. Mechanical Shop

The mechanical section of the building is upstairs and heated with two natural gas overhead furnaces. This area is where most of the equipment servicing is completed. All fluids and solvents are kept in this area. Used fluids are disposed of according to federal, state and local guidelines.

### 3. Equipment Storage

The basement of the building is used for dry storage and contains most of the golf course equipment such as mowers, utility vehicles and tractors. We do use the upstairs of the maintenance building for equipment storage as well.

## 4. Fertilizer Storage

Fertilizer is kept in a locked pole barn located on the west side of the main customer parking lot. This area is dedicated to storage and is a well-ventilated building. The liquid nutrients inventory is kept in a self-contained storage building located behind the main shop.

## 5. Pesticide Storage

All liquid pesticides will be kept in a "Securall" AG600 Chemical Storage Locker. It is a self-contained building that has ventilation, a sump capacity of 113 gallons and a two hour fire rating.

## 6. Petroleum Fluid Storage and Disposal

- All oils, solvents, lubricants and antifreeze are stored in dedicated areas.
- All fuel containers are stored in a flammable liquids locker.
- Used fluids are stored in separate containers appropriate for that fluid type.
- Used fluids are disposed of according to state and federal regulations.

## 7. Fuel Depot

The fuel tanks are located on the NW side of the building, approximately 20 feet from the maintenance building. The tanks are double walled and located below ground. Individual electric pumps are used for dispensing both the gasoline and diesel fuels.

## 8. Equipment Washing Area

Most daily washing of equipment occurs at a dedicated equipment wash location on the back side of the "nursery green". The wash pad consists of a concrete pad with water supplied by the irrigation system. Solids will be hauled away as needed by golf course staff to be composted.

## 9. Pesticide Mixing Area

Pesticide mixing occurs on the equipment wash pad or at the maintenance facility.

Carnegie-Stout Public Library

360 West 11th Street

Dubuque, Iowa 52001-4697

# Carnegie-Stout Public Library
# Integrated Pest Control Management Plan

July 28, 2011

## Section 1: Scope

This Integrated Pest Management (IPM) plan provides guidelines for protecting and enhancing the natural diversity of the Carnegie-Stout Public Library located at 360 W. 11 Street in Dubuque, Iowa. The IPM plan covers the entire building and grounds.

## Section 2: Goals

Integrated Pest Management (IPM) is a proactive program, utilizing techniques that minimize or even eliminate the use of chemicals, that is designed to determine whether there is a pest problem that needs to be addressed or whether there are buildings maintenance or operation issues that need to be improved to reduce the likelihood of an infestation in the future.[1]

IPM is preferred to chemical spraying for several reasons. First and foremost, researchers are discovering that a wide variety of chemicals found in pesticides can have a disruptive effect on a person's neurological, respiratory, immune, and endocrine systems, even at relatively low dosages. Decreased use of chemical application will reduce risks to the health of staff members and library visitors.[2]

This plan will discuss best practices for indoor and outdoor integrated pest management.

## Section 3: Responsible Parties

[1] University Library, University of Illinois at Urbana Champaign. http://www.library.illinois.edu/prescons/services/ipm/index.html

2 Ibid

The Maintenance Supervisor, of the Carnegie-Stout Public Library with support of the Library Director, Maintenance Worker, and Administrative Assistant, is responsible for developing and managing the IPM plan. Library Administration will provide support to assist the Maintenance Supervisor who is also the IPM Coordinator in maintaining an IPM program that relies on minimal pesticide use. Such support will include efforts to promptly address any structural, horticultural, or sanitation changes recommended by the Coordinator to reduce or prevent pest problems.[3] Furthermore, the Administration of Carnegie-Stout Public Library will assist the Maintenance Supervisor in developing and delivering materials and programs for staff, and the public to educate them about the importance of good sanitation and pest control.[4]

Contracts with any pest management vendors shall include extensive language describing their role in the building's Plan. Contractors involved with various elements of the Plan shall carry out their tasks according to their contracts, and report all relevant activities to the aforementioned parties. On occasion, several contractors may be engaged simultaneously in various elements of the Plan at the building and grounds. To ensure an effective and coordinated effort, the building staff responsible for overseeing the Plan shall review all proposed activities before implementation.

The Library has not had issues with insects or rodents in the past, thus; there is no precedent for using pesticides on Library property and to date the services of a contractor have not been required. No pesticides or pest control chemicals are stored in the Library.

Section 4: IPM Strategies and Practices

To date proactive procedures have been effective. These procedures include:

- Twice daily inspection for exterior trash, which when found is immediately cleared to prevent a source of food or fermentation that attracts pests.
- Outdoor evening lighting utilizes a sodium vapor bulb which is has a yellow color and detracts pests from gathering around the facility and one of these bulbs is also located in a non-public area behind the building where trash is stored.
- Trash is collected from office space in the library once a day.
- Trash is collected from public areas and outdoors twice a day.
- The City of Dubuque collects trash twice weekly and pick up is available more frequently if needed.
- The library has a food and beverage policy. Beverages are limited to those in covered containers. Food is limited for the public to a small area with café-style seating and hardwood floors. Food is limited for staff to a Staff Lounge that includes a trash receptacle, recycling receptacle, and a food scrap bin. The Staff Lounge is checked twice daily, and unless otherwise necessary, is cleaned once daily.
- Inspection of the building is conducted once weekly to identify areas of vulnerability that might attract pests such as the exterior structure to identify holes or cracks and to evaluate growth of plants and trees near the building. Doors and windows are examined

[3] Ibid
[4] Ibid

for tight seals. Identifying areas of potential entrance to the facility can prevent a pest infestation. These regular inspections include specifically looking for pests.

If a pest was seen inside the facility a glue board that is non-toxic would be placed in strategic areas to capture and identify the pest. As a last resort, if it is determined that a pesticide must be used in order to meet pest management objectives, the least-hazardous, least-toxic material, adequate for the job, will be chosen and done so at the targeted area – as and where needed, not facility wide. Least toxic pesticides, as defined by the City of San Francisco's Reduced-Risk Pesticide List. http://www.up3project.org/documents/2007rpplbyaicomplete.pdf

All pesticide storage, transportation, and application will be conducted in accordance with the requirement of the Federal Insecticide, Fungicide, and Rodenticide Act (7 United States Code136 et seq.), Environmental Protection Agency regulations in 40 CFR, Occupational Safety and Health Administration regulations, Carnegie-Stout Public Library policies and procedures, and local ordinances.[5] Least toxic pesticides, as defined by the City of San Francisco's Reduced-Risk Pesticide List. http://www.up3project.org/documents/2007rpplbyaicomplete.pdf

The Carnegie-Stout Public Library would follow recommendations offered by the U.S. Green Building Council as written in *LEED for Existing Buildings v. 2.0 Reference Guide*

Section 5: Universal Notification

Regardless of the vendor and strategy used, the library will provide ample notification if pesticides are needed. Employees will be notified by e-mail and posted signs at least 72 hours before a pesticide application. Patrons would receive notice via posted signs in the entrances. In the case of an emergency application the same notification methods above would be used at least 24 hours before the application.

Notification would include:

- 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

In the event that a pesticide would have to be used detailed records will be kept to demonstrate ongoing compliance with the IPM plan and all applications will be logged including the following information:

Universal Notification to Occupants

  - Date
  - Time
  - Method
- Pesticide Application Date and Time
- Application Manager
- Location
- Target Pest
- Pesticide Trade Name
- Pesticide Active Ingredient

[5] Integrated Pest Control Management Institute. www.ipminstitute.org/

- EPA Registration Number

In the event of an emergency, such as an overnight infestation of cockroaches, or rats, pesticides may be applied on the grounds without complying with the earlier stipulations for use of integrated and least-toxic methods. An emergency would be described as an infestation which is very sudden. Other signs of pests would be dealt with through consultation with a pest control management vendor who utilizes least-toxic methods to control the problem.

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Paula Connors, President, Library Board of Trustees