EXECUTIVE SUMMARY:
The City is responsible for the landscape maintenance in parks, creek paths, public buildings, athletic fields, medians and streetscapes. Weed abatement is a significant portion of the maintenance responsibilities for the City. The City has an Integrated Pest Management (IPM) program that includes a policy and procedures outlining how City departments are to perform pest management (weeds and harmful bugs). The IPM program identifies a long term strategy to control and reduce the use of herbicides.

Glyphosate, the active ingredient in common weed killers such as Ranger Pro and Roundup, has been under scrutiny after the World Health Organization (WHO) issued a report in March 2015, claiming glyphosate was “probably carcinogenic in humans.” Under California’s Proposition 65, glyphosate was added to the list of chemicals known to cause cancer in July 2017.

Aware of growing public concern, City staff restricted their use of glyphosate. Staff has been incorporating more chemical free approaches to weed abatement, and tested new devices (weed control methods). Staff conducted a study to identify and test contact herbicide alternatives. Staff selected a vacant area with overgrown grasses and weeds for testing six glyphosate-free herbicide alternatives (Suppress, Scythe, Final-san-o, WeedZap, ADIOS and Lifeline), as well as two controlled products (Ranger Pro and Triclopyr) that are currently incorporated into the City’s IPM program. Effectiveness, cost, and safety were all considered when evaluating the different alternatives. Lifeline and Triclopyr received the top total scores and were categorized as Best. Suppress, Scythe, and WeedZap, had mid-range total scores and were categorized as Pass. Products that in the Best or Pass category are included in the City’s IPM. Final-san-o and ADIOS had the lowest total scores and were categorized as Eliminated. Ranger Pro, despite scoring well in the test, was also categorized as Eliminated because there were other alternatives available that were more effective at relatively similar price points. The three products categorized as Eliminated are not included in the City’s IPM.

Staff has updated the written IPM program and is now available on the City’s website. The City will use herbicide assessment methodology similar to the City of San Francisco’s Department of the Environment to create a list of reduced-risk pesticides. The City’s IPM Specialist will be
The City is primarily responsible for developing, reviewing, and implementing the City’s IPM Program across all departments. Also available on the City website is a new Anticipated Pesticide Application calendar.

RECOMMENDED ACTION:
Discussion and direction on City’s Integrated Pest Management (IPM) Program.

BACKGROUND:
The City is responsible for the landscape maintenance in parks, creek paths, public buildings, athletic fields, medians and streetscapes. These facilities include 12 parks and 22 mini-parks encompassing 34 athletic fields, 19 playgrounds, 25 tennis courts, and 20 basketball courts. The Parks Division also performs landscape maintenance for the entire City. The City is also responsible for seasonal mowing of all undeveloped City-owned property and along public right-of-ways.

Weed abatement is a significant portion of the maintenance responsibilities for City operations. High weeds are mowed to reduce fire danger, minimize obstruction of signs and cross-traffic, and enhance the appearance of roadsides and paths. Staff use a variety of strategies for weed abatement such as chemicals (herbicides); wood chips, mulch, compost, and fabric sheets; and cultural controls. The City has an Integrated Pest Management (IPM) program that identifies a long term strategy to control and reduce the use of herbicides.

Glyphosate, the active ingredient in common weed killers such as Ranger Pro and Roundup, has been under scrutiny after the World Health Organization (WHO) issued a report in March 2015, claiming glyphosate was “probably carcinogenic in humans.” Under California’s Proposition 65, glyphosate was added to the list of chemicals known to cause cancer in July 2017.

Bayer, which acquired Ranger Pro and Roundup-maker Monsanto in 2018, is facing lawsuits from approximately 18,000 people in the United States over alleged exposure to the weed killer. Cities such as Santa Rosa and Napa have barred their contractors from using glyphosate. Sonoma, Novato and Benicia have banned any application of glyphosate on their properties. Other cities, including Petaluma, Davis, Berkley, and Mill Valley have continued to allow the use and application of glyphosate under restricted conditions.

In late 2018, City Council directed staff to return with a presentation on Rohnert Park’s policies for herbicide use and control. The City Council approved the Strategic Plan in January 2019, which included the project of evaluating use of herbicides on City properties.

ANALYSIS:
The City has a National Pollutant Discharge Elimination System General Permit (NPDES) and a municipal separate storm sewer systems (MS4s) storm water permit, which requires the City to have an Integrated Pest Management (IPM) program. An IPM is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of control methods or techniques. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and nontarget organisms, and the environment (Flint, University of California, 2001).

The City’s IPM program includes a policy and procedures which outlines how City departments are to perform pest management (weeds and harmful bugs) and ensure compliance with the IPM program. The City does not perform bug spraying on a routine basis. The IPM components
include identifying the person responsible for implementation of the IPM program, education and training, herbicide application and guidelines, record keeping, and emergency exemption process.

Other activities that have been incorporated by staff into the pest management program. For example, signs are posted when applicators are spraying herbicides, reducing the potential exposure to public. Staff also incorporate best practices such as not spraying before a rain event or during a windy day to prevent drift. Staff are required to use personal protective equipment (PPE) according to product labels. The most common PPE for herbicide applicators cover exposed skin and eye protection like wearing long sleeves, pants, goggles, and shoes.

**Weed Control**

City staff evaluated and selected appropriate and effective treatments based on site-specific requirements. Commitment to the most environmentally sound approach is required by the IPM, with non-chemical methods considered first. Prevention, cultural control, mechanical control, biological control and chemical control are pest treatment strategies identified in the IPM. In general, a combination of treatments is more effective than a single approach. The following treatments are listed in the order in which they should be executed.

*Prevention*: 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. Specific examples include: window screens, wood chips and mulch, compost or fabric sheets in landscape areas or gardens, rodent and insect traps. Mulch has the added benefit of enhancing soil structure and the aesthetic value of the landscape and can be applied close to landscape plants without harming them. The challenge of mulch is that it is labor intensive. Currently staff applies mulch in our parks around shrubs and in the tree wells. The City receives wood chips from the Sonoma County Water Agency and are incorporating its use into the regular maintenance schedule, spreading as much as 20 cubic yards in a day.

*Cultural*: The use of management activities that prevent pests from developing due to enhancement of desired conditions. This includes practices that render the target pests preferred living conditions less favorable. For example, keeping trash areas clean can be effective for avoiding rodent infestation. Another approach is selection and placement of materials that encourages natural enemies and competitors of a pest.

*Mechanical*: Physical methods or mechanical equipment that keep pest populations below nuisance levels. For example, proper pruning and plant selection are examples of mechanical controls. A healthy lush lawn will out compete almost all weeds. Removal and replacement of dead plant material will sustain a defense against weed infiltration.

*Biological*: Includes the introduction or enhancement of natural predator populations to target pests. For example, utilizing beneficial insects to prey on a target pest species, or selected plantings to prevent crowding-out of desirable species by exotics or undesirable species. Competitive planting uses competition with the landscape plants to squelch out weeds. For instance, weeds rarely grow under shrubs or within healthy ground cover.

*Chemical*: Herbicides are used only when needed and in combination with other approaches for more effective, long-term control. The herbicides currently used by City staff for landscape management and weed abatement include pre-emergents Dimension, Gallery, and Pendulum. Additionally, staff use Triclopyr a broadleaf selective herbicide and fungicide, and Ranger Pro. Glyphosate, the active ingredient in common weed killers such as Ranger Pro and Roundup, is a non-selective, phosphonomethyl amino acid herbicide. The compound translocates in the plant,
moving down the plant to kill the roots. All herbicides used and applications by City staff are consistent with the City’s IPM program.

**Glyphosate**

Glyphosate is one of the most widely used herbicides in the United States, according to the National Pesticide Information Center (NPIC). Glyphosate based products are used by the agricultural industry, public sector institutions, commercial and industrial agencies, and is readily available for residential use.

The World Health Organization issued a report in March 2015, stating that glyphosate was “probably carcinogenic in humans.” The California Office of Environmental Health Hazard Assessment (OEHHA) placed glyphosate on the state’s list of chemicals known to the state to cause cancer in July of 2017. The United States Environmental Protection Agency (U.S. EPA), in contrast with the World Health Organization, continues to find that there are no risks to public health when glyphosate is used properly according to label instructions.

According to the NPIC, the U.S. EPA requires a signal word on herbicide product labels to describe the acute (short-term) toxicity of the formulated herbicide 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. The U.S. EPA also requires signal words to be printed on the front panel, in all capital letters, to make it easy for users to find. The only herbicide 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). Ranger Pro, with glyphosate as its active ingredient at 41% concentration, has a signal word of CAUTION.

The debate concerning if glyphosate is a carcinogen or not creates an environment of uncertainty. It is possible that there may be increased regulations governing the use and application of glyphosate. Three recent U.S. court decisions have awarded multimillion- and multibillion-dollar claims to individuals who argued glyphosate caused their cancers. Some large suppliers and retailers have started backing away from glyphosate products. Harrell's, a Florida-based turf, golf course and agricultural product supplier, stopped offering glyphosate products as of March 1, 2019. Costco Wholesale has stopped selling Roundup as of Spring 2019. Other retailers, including Amazon, Home Depot, Lowes, and Walmart continue to sell glyphosate products. Aware of growing public concern, City staff reduced their use of glyphosate. No glyphosate is used in parks or by playgrounds. Herbicide applicators diluted Ranger Pro with water, reducing the overall concentration of glyphosate to 0.41%. Roundup, in contrast, is not diluted with water and has a glyphosate concentration of 2%. The majority of glyphosate used by staff was at fenced, secured sites that are prohibited from public access such as wells, tanks, booster station, and abandon well sites. Twenty-seven gallons of Ranger Pro was sprayed in total at secured locations in April and July 2019. In contrast, less than seven gallons of Ranger Pro was applied in areas of no public contact since August 2018, such as street medians for weed abatement.

With the reduction in use of glyphosate, the City made additional changes to its landscaping and weed abatement program. Staff are using chemical-free approaches, including chipping, mulch, compost, and fabric sheets. In January 2019, staff tested a device that would use saturated steam to kill weeds. The devices heat water to almost 120° Celsius (148° Fahrenheit) and delivers it via pressure hoses in a superheated state to applicator heads that can be sprayed for vegetation control. Staff returned to the test location a week later and noted that the areas that were treated had brown, discolored plants that were killed. The steam cleaner device was more effective at killing weeds than some herbicides staff tested (more information below about the alternative study), but less
effective than others. The steam cleaning devices don’t require any chemicals for operation, so there are no restrictions on re-entry to areas that have been treated. Unfortunately, the process to apply the saturated steam means slowly moving the applicator head across the targeted area, hovering a few inches above the ground, making the tool time and labor intensive.

Figure 1: Saturated steam weed killing machine  Figure 2: Effectiveness after 1 week

In addition to the chemical free approaches and testing new devices, staff conducted a study to identify and test contact herbicide alternatives.

**Alternative Study**

In order to gain a better understanding of how glyphosate-free products would perform, staff conducted a contact herbicide alternative study.

**Alternative Options:** When staff were designing the alternative study, eight different chemical compounds were examined and researched for consideration. Seven of the eight alternative compounds were approved by Non-Toxic Neighborhoods. The last alternative herbicide was considered because it is not on California’s Proposition 65 list. The eight alternative options were Suppress, Scythe, Final-san-o, WeedZap, ADIOS, Lifeline, WeedPharm, and Fiesta.

**Alternative Analysis Criteria:** Chemical makeup, acute toxicity (the U.S. EPA Signal Word), and price were all considered as selection criteria when determining which alternative to select for testing.

**Alternative Analysis Results:** After applying the analysis criteria, staff selected six of the eight alternatives for testing: Suppress, Scythe, Final-san-o, WeedZap, ADIOS, and Lifeline. WeedPharm was eliminated as a possible alternative due to the corrosive nature of the active ingredient (acetic acid) and the “DANGER” label on the product, indicating high toxicity. Fiesta was eliminated from testing due to its very high cost. The table below summarizes the evaluation of herbicide alternatives.
### Table 1: Contact Herbicide Alternative Analysis Summary

<table>
<thead>
<tr>
<th>Brand Name</th>
<th>Active Ingredient</th>
<th>EPA Signal Word</th>
<th>Non-Toxic Neighborhoods</th>
<th>Prop 65 Listed</th>
<th>Cost</th>
<th>Analysis Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suppress</td>
<td>Caprylic Acid, Capric Acid</td>
<td>WARNING</td>
<td>Approved</td>
<td>No</td>
<td>Low</td>
<td>Test</td>
</tr>
<tr>
<td>Scythe</td>
<td>Pelargonic Acid</td>
<td>WARNING</td>
<td>Approved</td>
<td>No</td>
<td>High</td>
<td>Test</td>
</tr>
<tr>
<td>Final-san-o</td>
<td>Ammoniated soap of fatty acids</td>
<td>WARNING</td>
<td>Approved</td>
<td>No</td>
<td>Very High</td>
<td>Test</td>
</tr>
<tr>
<td>WeedZap</td>
<td>Clove Oil, Cinnamon Oil</td>
<td>CAUTION</td>
<td>Approved</td>
<td>No</td>
<td>Moderate</td>
<td>Test</td>
</tr>
<tr>
<td>ADIOS</td>
<td>Sodium chloride</td>
<td>CAUTION</td>
<td>Approved</td>
<td>No</td>
<td>Low</td>
<td>Test</td>
</tr>
<tr>
<td>Lifeline</td>
<td>Glufosinate-ammonium</td>
<td>CAUTION</td>
<td>n/a</td>
<td>No</td>
<td>Very Low</td>
<td>Test</td>
</tr>
<tr>
<td>WeedPharm</td>
<td>Acetic Acid</td>
<td>DANGER</td>
<td>Approved</td>
<td>No</td>
<td>Moderate</td>
<td>Eliminated</td>
</tr>
<tr>
<td>Fiesta</td>
<td>Iron HEDTA (FeHEDTA)</td>
<td>CAUTION</td>
<td>Approved</td>
<td>No</td>
<td>Very High</td>
<td>Eliminated</td>
</tr>
<tr>
<td>Ranger Pro</td>
<td>Glyphosate</td>
<td>CAUTION</td>
<td>No</td>
<td>Yes</td>
<td>Very Low</td>
<td>Control</td>
</tr>
<tr>
<td>Triclopyr</td>
<td>Tryiclopyr</td>
<td>CAUTION</td>
<td>No</td>
<td>Yes</td>
<td>Very Low</td>
<td>Control</td>
</tr>
</tbody>
</table>

*Final-san-o is about as costly as Fiesta, but was made available to staff by the vendor for testing purposes.

**Test Design:** Staff selected a vacant area with overgrown grasses and weeds for testing six glyphosate-free herbicide alternatives (Suppress, Scythe, Final-san-o, WeedZap, ADIOS and Lifeline), as well as two control products (Ranger Pro and Triclopyr) that are currently incorporated into the City’s IPM program. The goal of the herbicide alternative study was to see in a controlled area how weeds and vegetation responded to each of the eight different chemical compounds.

Testing occurred along the west side of Roberts Lake Road north of the park and ride hard scape. The area was divided up into eight equally sized rectangles. These eight test plots measured 8 feet by 50 feet (400 square feet), which is slightly less than 1% of an acre (43,560 square feet). This uniform size allowed staff to compare cost of applying the products and estimating staff time on a consistent, per acre basis.

**Figure 3:** Test Plot Location on the west side of Roberts Lake Road
**Test Evaluation Criteria:** Effectiveness, cost, and safety were all considered when evaluating the different alternatives. Effectiveness meant how well controlled were weeds after application of the chemical compound. Cost referred to the price of the product given the number of applications and quantity needed to achieve control of weeds. Also included in the cost criteria is staff time. The safety criteria covers the health and safety of community members and City employees based on the U.S. EPA Signal Word listed on product labels.

Each criteria component was scored on a 0 to 3 scale, 3 being the highest score and 0 the lowest score. The scores from all of the criteria are added and become a score total. Based on the test evaluation criteria score total, the alternatives and control were assigned a result of Best, Pass, or Eliminated. The products that were categorized as Best or Pass are included in the Preliminary Reduced-Risk Pesticide List identified in the City’s IPM.

**Test Evaluation Results:** Two weeks after the initial applications, staff returned to the test plot location and assessed the presence or reduction of weeds, and impact of the different treatments.

**Effectiveness.** ADIOS was determined to be ineffective at reducing or eliminating the weeds. Staff eliminated ADIOS from additional testing due to its poor performance. Final-san-o and WeedZap performed similarly to each other with medium effectiveness at reducing the presence of weeds. Suppress and Scythe were the most effective alternatives approved by the Non-Toxic Neighborhoods advocacy group. An alternative herbicide that does not contain glyphosate, and is not listed on the Proposition 65 List, Lifeline, also performed very well and was the most effective of all the alternatives. The current herbicides, Ranger Pro and Triclopyr, had very strong performances as well. The control area, as expected, had continued growth of weeds. The remaining alternatives Suppress, Scythe, Final-san-o, WeedZap, and Lifeline, along with the current herbicides Ranger Pro and Triclopyr, were given a second application in their respective test strips. Staff waited an additional two weeks to re-assess.

Four weeks into testing, and after two applications of chemical treatments, staff again compared the results of current herbicides and pre-emergents with the glyphosate-free alternatives and with the control strip. Lifeline and Suppress performed the best of all the alternatives, with the most consistent and even control of weeds across the strip. Scythe, Final-san-o, and WeedZap had similar levels of effectiveness to each other, and their performances were not as effective as Lifeline or Suppress. Ranger Pro and Triclopyr continued to provide excellent results of weed control effectiveness.

**Cost.** Ranger Pro and Triclopyr are very low in cost per acre, at $8.50 and $37.80, respectively. Lifeline is the most affordable of the alternatives tested, with costs of $53.90 per acre. The remaining alternatives that were tested and effective at pest control are very expensive and range in cost from $402 to $1,215 per acre.

**Safety.** Ranger Pro, Triclopyr, Lifeline, and WeedZap have the lowest (safest) U.S. EPA rating with the Signal Word of CAUTION. Suppress, Scythe, and Final-san-o have a U.S. EPA Signal Word of WARNING.

**Test Outcomes:** The criteria ratings and total scores are summarized in Table 2 below. Lifeline and Triclopyr received the top total scores and were categorized as Best. Suppress, Scythe, and WeedZap, had mid-range total scores and were categorized as Pass. Products that in the Best or Pass category are included in the City’s IPM. Final-san-o and ADIOS had the lowest total scores and were categorized as Eliminated. Ranger Pro, despite scoring well in the test, was also categorized as Eliminated because there were other alternatives available that were more effective.
at relatively similar price points. The three products categorized as Eliminated are not included in the City’s IPM.

Table 2: Contact Herbicide Alternative Study Testing Summary Matrix with Scoring Criteria

<table>
<thead>
<tr>
<th>Brand Name</th>
<th>Effectiveness</th>
<th>Cost</th>
<th>Safety</th>
<th>Results Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suppress</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Scythe</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Final-san-o</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>WeedZap</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>ADIOS</td>
<td>0</td>
<td>Did not proceed with testing due to poor effectiveness.</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Lifeline</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Ranger Pro</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Triclopyr</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>9</td>
</tr>
</tbody>
</table>

Ratings
3 = Controlled in 1 treatment
2 = Controlled in 2 treatments
1 = Controlled in over 2 treatments
0 = No impact
3 = Least Expensive
2 = Less Expensive
1 = Somewhat Expensive
0 = Most Expensive
3 = CAUTION
2 = WARNING
1 = DANGER
Eliminated

Revised Integrated Pest Management (IPM) Program

In January 2018, the City developed and implemented its IPM program. Our initial written IPM program document was largely influenced by the MS4 storm water permit, and did not fully reflect the strategies, techniques, and work already being performed by staff. Staff has updated the written IPM program so that it is representative of current practices. The City’s IPM Specialist will be primarily responsible for developing, reviewing, and implementing the City’s IPM Program across all departments.

The City will use herbicide assessment methodology similar to the City of San Francisco’s Department of the Environment to create a list of reduced-risk pesticides. This approval for use is based on herbicide hazard and public exposure risk, need, and availability of alternatives. Herbicides will only be used as a final option in situations where other methods, upon assessment of the IPM Specialist, have proven to be ineffective or cost prohibitive. When necessary, only those herbicides listed on the most recent annual Reduced-Risk Pesticide List may be considered for use.

In rare cases, such as those which address public health and safety concerns, the IPM may deem it necessary to use a herbicide that is not included on the Reduced-Risk Pesticide List; a herbicide that is included on the list but a variance in restrictions of application is required; and/ or a herbicide that is absent a recommendation from the IPM Specialist. In such cases, written documentation and justification must be provided to the IPM Specialist for review. Approved exemptions and associated justifications shall be submitted to the IPM Specialist for their records and will be available for public review on the City website.

The IPM Specialist will lead and coordinate an IPM Technical Advisory Committee (IPM-TAC). The IPM-TAC will be composed of four to five City staff members, and will help maintain a
Reduced-Risk Pesticide List, guide the transition of parks and other high public use areas to “green”/ least-toxic pest management; and maintain the Anticipated Pesticide Application calendar.

**IPM Webpage and Anticipated Pesticide Application Calendar:** The City has a poor history of communicating to residents about spraying herbicides. Other than the signage that herbicide applicators post immediately before and during spraying, community members had no idea for where or when staff would be performing weed abatement with chemical controls. At the recommendation of a concerned resident for how to improve transparency and build trust with the community, staff have created a new area on the City’s website to provide more detailed information about herbicide use, including where, when, and what products are being sprayed for weed abatement. Interested parties can now visit the City website’s Integrated Pest Management page to view the current IPM. Also available on the City website is a new Anticipated Pesticide Application calendar. This calendar will include notices of intent to spray, posted at least 48 hours ahead of planned application events. If an application event is canceled (for example, if it is too windy) then a cancelation notice will be posted to the calendar. There is an option available to sign-up for email notifications every time a new event is posted to the Anticipated Pesticide Application Calendar.

**Strategy Moving Forward:** City staff are implementing the revised Integrated Pest Management (IPM) program which identifies a long term strategy to control and reduce the use of herbicides. Staff will begin integrating new products into the IPM program and will investigate the impact of costs on operational budgets. Public communication tools will be developed to help explain which herbicides will be used in what specific areas of the City, following the Pesticide Hazard and Exposure Reduction (PHAER) Zones approach described in the City’s written IPM program.

**STRATEGIC PLAN ALIGNMENT:**
Evaluating the use of herbicides and pesticides on City properties was identified in the Strategic Plan as goal D-5-3.

**OPTIONS CONSIDERED:**

**Option 1:** Direct staff to continue following the recently revised Integrated Pest Management (IPM) program which eliminates the use of Ranger Pro. The updated IPM includes addition of alternatives to glyphosate approved by Non-Toxic Neighborhoods. **Staff recommend this option.**

**Option 2:** Direct staff to revise the IPM to reflect alternative weed control as directed by Council.

**FISCAL IMPACT/FUNDING SOURCE:**
The herbicides used by City staff can be grouped into two categories: pre-emergents that kill weeds before they have broken the ground surface, and contact herbicides which are applied once there has been some weed growth. Staff are using a combination of the pre-emergents Dimension, Gallery, and Pendalum. None of the pre-emergents are currently listed on California’s Proposition 65 List. There are no known, organic alternatives that are as effective as the pre-emergents currently used to maintain the current levels of weed abatement.

The alternative study conducted by staff looked at the performances of different contact herbicides. The following cost analyses consider three different scenarios: our current revised IPM that eliminates use of glyphosate based products, using only non-synthetic contact herbicides, or using only chemical-free weed abatement strategies.
Cost Analysis 1: Current Revised IPM – Eliminate Glyphosate

By eliminating Ranger Pro, with its active ingredient glyphosate, from the City’s IPM program, the City will utilize the equivalent of three full-time equivalent (FTE) Landscape Maintenance Workers and two part-time Seasonal Maintenance Assistants performing manual (hand work) weed maintenance and 0.5 FTE for herbicide application. The product costs for the glyphosate-free contact herbicides are $19,023 per year. The estimated per year cost of a glyphosate-free contact herbicide program is $448,333.

Table 3: Cost Analysis Summary of Current Revised IPM – Eliminate Glyphosate

<table>
<thead>
<tr>
<th>Maintenance Worker II*</th>
<th>Landscape Worker*</th>
<th>Seasonal Maintenance Assistant*</th>
<th>Labor Subtotal</th>
<th>Contact Herbicide Subtotal</th>
<th>Total ($/Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positions</td>
<td>0</td>
<td>3.5</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost</td>
<td>$0</td>
<td>$317,030</td>
<td>$112,280</td>
<td>$429,310</td>
<td>$448,333</td>
</tr>
</tbody>
</table>

*Includes top step salaries and benefits.

Cost Analysis 2: Non-Synthetic Contact Herbicides

If the City converted to using only non-synthetic contact herbicides, than the costs for labor and supplies will increase. Staff would need to apply the non-synthetic herbicides more often than synthetic products to continue current service levels. It would require an additional 2 FTE Maintenance Workers, 4 FTE Landscape Maintenance Workers, and 0.5 FTE herbicide applicator to meet in the increased demand in labor, or $1,044,164 in salaries and benefits per year. The costs of non-synthetic treatment products are significantly higher compared to alternatives. The increased number of applications required annually, and the higher unit costs of the products, results in a non-synthetic contact herbicide program being 10 times more costly compared to synthetic products. Staff estimate spending approximately $190,000 per year for non-synthetic contact herbicides. The estimated total per year cost of running a non-synthetic contact herbicide program is about $1.28 million, and would require an additional $830,000 in funding.

Table 4: Cost Analysis Summary of Non-Synthetic Contact Herbicides

<table>
<thead>
<tr>
<th>Maintenance Worker II*</th>
<th>Landscape Worker*</th>
<th>Seasonal Maintenance Assistant*</th>
<th>Labor Subtotal</th>
<th>Contact Herbicide Subtotal</th>
<th>Total ($/Year)</th>
<th>Additional Funds Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positions</td>
<td>2</td>
<td>8</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost</td>
<td>$252,534</td>
<td>$724,640</td>
<td>$112,280</td>
<td>$1,089,454</td>
<td>$1,279,454</td>
<td>$831,121</td>
</tr>
</tbody>
</table>

*Includes top step salaries and benefits.

Cost Analysis 3: Chemical Free Weed Abatement

A chemical free weed abatement program would eliminate the expenses for herbicide products, storage, and disposal. The labor needed to sustain the same service level of weed abatement includes adding 3 FTE Maintenance Workers and 7 FTE Landscape Maintenance Workers. The additional staffing would cost $1,396,881 in salaries and benefits per year. The increase in staffing would also mean adding more supplies and equipment, including 2 flatbed trucks, 1 tractor loader, and small equipment. The estimated total per year cost of a chemical free weed abatement program is about $1.4 million, and would require almost $950,000 in additional funding.

Table 5: Cost Analysis Summary of Chemical Free Weed Abatement
# ITEM NO. 8B

<table>
<thead>
<tr>
<th>Maintenance Worker II*</th>
<th>Landscape Maintenance Worker*</th>
<th>Seasonal Maintenance Assistant*</th>
<th>Labor Subtotal</th>
<th>Contact Herbicide Subtotal</th>
<th>Total ($) /Year</th>
<th>Additional Funds Needed</th>
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<tr>
<td>Positions</td>
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<td>Cost</td>
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</table>

*Includes top step salaries and benefits.

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Department Head Approval Date: August 8, 2019

Finance Director Approval Date: NA

City Attorney Approval Date: NA

City Manager Approval Date: August 20, 2019

Attachments (list in packet assembly order):

1. City of Rohnert Park Integrated Pest Management Policy and Procedures
City of Rohnert Park
Integrated Pest Management

Policy and Procedures

Purpose

The Integrated Pest Management (IPM) policy is intended to provide a basis for a pest management program that will protect public health, as well as water quality, and non-target plants and animals. The goal of the City of Rohnert Park (City) IPM policy is to utilize the most environmentally sound approaches to pest management, and to reduce the volume and toxicity of chemical pest control treatments.

Key objectives of the IPM policy are:

1. to require planning, development and coordination of the IPM program for all City departments; and
2. to provide procedural guidelines for implementation of a coordinated IPM program.

Scope and Application

The IPM Policy shall apply to all pest control activities by the City of Rohnert Park, including activities at public buildings and related facilities; grounds and open space; urban forestry, and other property owned or managed by the City of Rohnert Park and conducted by City staff and/or contractors. It is expected that all pest management on City property will adhere to industry best practices, reduce or eliminate pesticide applications to the maximum extent feasible, and include all reasonable measures to protect human and environmental health. It is further expected that all City employees monitoring or treating pest problems, or managing contractors who are conducting IPM activities on the City’s behalf, are familiar with the content and principles of the policy, receive on-going annual training, provide accurate, well-documented records and conduct annual evaluations of the IPM program and practices.

Policy

The City of Rohnert Park, in planning for and implementing its pest management operations, shall:

1. assume that all pesticides (organic and conventional) are potentially harmful to the health of humans and the environment (ex. water quality and non-target species);
2. adhere to the tenets of IPM including focusing on long-term pest prevention or suppression, giving preference to reasonable non-pesticide alternatives such as cultural, mechanical and/or biological control;

3. employ an IPM Specialist to monitor and assess pest populations, advise and oversee citywide IPM planning and pest management activities and contracts; and keep record of and report on city IPM activities;

4. pursue an organizational structure that allows the IPM Specialist to make recommendations on pest control that are independent of divisional operational constraints;

5. transition all parks to “green”/ least-toxic pest management;

6. ensure consistency and full compliance with federal, state and county regulatory requirements related to pest control;

7. contract with pest control contractors that utilize least-toxic pest control methodology and ensure contracts have language that upholds the IPM Policy and identifies damages for any violations of the Policy;

8. conduct Pesticide Hazard and Exposure Reduction (PHAER) analysis on all publicly accessible and heavily used areas such as parks, bike/ pedestrian paths, and sidewalks;

9. use pesticide risk assessment guidelines employed by the City and County of San Francisco to create and annually maintain a list of reduced-risk pesticides, and associated limitations for use, which may be applied as necessary within the City of Rohnert Park;

10. establish and coordinate a IPM Technical Advisory Committee to assist in creating and updating a Reduced-Risk Pesticide List, provide general guidance on the IPM Program, and ensure transitioning of all parks and other high use areas to “green”/ least-toxic pest management;

11. use a transparent pesticide use exemption process to justify variance from pesticide use restrictions and limitations. Exemptions shall only be considered when addressing health and safety issues, noxious pests, and/or to test new reduced-risk pesticide products;

12. promote public transparency and education via noticing of all pest management activities, engaging residents with outreach and education regarding less toxic pest control methodology, and annual reporting to advisory commissions.

The goals of this policy are to:

1. Create awareness among City staff, contractors and citizens of IPM techniques and environmental stewardship.
2. Provide a means of educating all City maintenance crews and contractors to practice the most appropriate approach to managing pests on City property.

3. Work toward transitioning all parks and other high use areas to “green”/least-toxic pest management.

4. Reduce and/or eliminate pesticides that pose known significant human or animal health, or environmental risks based on the best available scientific information.

5. Establish a program where pesticides categorized as having a reduced-risk to human and environmental health may be used within the City of Rohnert Park only after other alternatives have been attempted and are ineffective. If pesticides are used, provide guidelines on safe storage, handling, use, and application.

Procedures

Sec. 1 Definitions

I. Biological Control - Biological technologies to manage unwanted pests. Examples of this type of control include, but would not be limited to, the use of pheromone traps for management of Indian meal moth in food storage/preparation areas, or beneficial insect release for control of certain types of weeds or invasive insects in landscapes.

II. Chemical Control - The use or application of a chemical pesticide (green or conventional) to manage pests.

III. Contractor - A person, firm, corporation, or other entity, including a governmental entity, which enters into a contract with the City of Rohnert Park.

IV. Cultural Control - The practice of modifying the growing environment to reduce the prevalence of unwanted pests. Examples include: irrigation practices, improved and reduced fertilization applications, proper mowing practices that include mulching, and regular aeration to improve the soil.

V. Green Park – A park or high public use area where pest management is limited primarily to cultural, mechanical, and biological control methods. When chemical control methods are necessary, only “green”/least-toxic (i.e. Tier 1) pesticides may be used.

VI. Green Pesticide - A material that is generally considered to have minimal adverse environmental or chronic health and safety impacts. Such chemicals are synonymous with Tier 1 chemicals identified on the Reduced-Risk Pesticide List. Some materials in this category contain strong acids and are not necessarily safer for the applicator.
VII. **IPM** - A decision-making process that analyzes, selects, and implements pest control strategies to prevent or control pest populations. IPM uses a “whole systems” approach that employs monitoring and extensive knowledge about pests, such as infestation thresholds, life histories, environmental requirements, and natural enemies to compliment and facilitate biological, cultural, mechanical and other natural control of pests. Chemical control methods are considered only when necessary.

VIII. **Mechanical Control** - Utilizes hand labor or equipment such as mowers, graders, weed-eaters, and chainsaws. Crack and crevice sealants and closing small entryways (e.g., around pipes and conduits) into buildings for insect and rodent management would also be mechanical methods.

IX. **PCA** - Pest Control Advisor: an individual licensed by the California Department of Pesticide Regulations according to Title 3, Article 5 of the California Code of Regulations. Only a licensed PCA, who is registered with the County Agricultural Commissioner may provide written pest control recommendations for agricultural pest management, including parks, cemeteries, golf courses, and rights-of-way.

X. **Pest** - Fungus, insect, nematode, rodent, weed, or other form of terrestrial or aquatic life form that is injurious to human or farm animal health, or interferes with economic activities such as agriculture, public utilities and landscaping.

XI. **Pesticide** - Any substance, or mixture of substances, used for defoliating plants, regulating plant growth, or for preventing, destroying, repelling, or mitigating any pest, which may be detrimental to vegetation, humans, animals or structures.

XII. **PHAER Zone** - A strategy giving structure to the implementation process of the IPM policy in parks by allowing supervisors the needed flexibility in their management options and informing the citizens about the general level of pesticide hazard on a site-by-site basis. PHAER zones are designated as Green, Yellow and Special Circumstance Zones, with Green Zones providing the lowest potential for pesticide hazard and exposure. Each Zone has limitations based on the Reduced-Risk Pesticide List and associated product tiers.

XIII. **Precautionary Principle** - This states that in the absence of scientific consensus, if an action or policy has a suspected risk of causing harm to the public or environment, the burden of proving the action or policy harmless falls on those implementing the action or policy. The principle implies that there is a social responsibility to protect the public from exposure to harm, when scientific investigation has found a plausible risk. These protections can be relaxed only if further scientific findings emerge that provide sound evidence that no harm will result.
XIV. **Reasonable Alternative** - A feasible option for pest control that takes into account the environmental, economic, and social costs and benefits of the proposed choices.

XV. **Reduced-Risk Pesticide** - A material which has been assessed and identified as having a reduced hazard and exposure risk using a ranking system, best available science, and technical advisory body vetting.

XVI. **QAL** - Qualified Applicators License authorizes and individual to apply pesticides according to Title 3, Article 3 of the California Code of Regulations. Applications may include residential, industrial, institutional, landscape, and right-of-way sites.

**Sec. 2 Regulation**

The following regulations apply to the IPM program:

I. **Pesticide Advisor and Application Licensing and Categories**

Title 3, Article 3 of the California Code of Regulations requires that individuals who apply or supervise the application of pesticides possess a valid Qualified Applicators License (QAL), issued by the Department of Pesticide Regulation (DPR). QAL certification requires that applicants take training coursework on, and test proficiently in, pesticide laws and regulations, basic principles of pest control, and at least one of the following pest control categories:

1. Parks & Buildings
2. Right of Ways (islands, sidewalks, etc.)
3. Sewer Line Root Control
4. Water Tank and Well sites

A new license may be valid for up to two years, depending on when the employee or contractor became certified. Each renewed license is valid for two years unless the employee or contractor renews late, in which case the renewal is valid for one year.

Once the employee or contractor passes the examination(s) and receives a license, he/she must accumulate a designated amount of approved continuing education (CE) hours. DPR will inform the employee or contractor of the number of approved CE hours they are required to complete. After the first renewal, he/she is required to accumulate at least 20 hours of approved CE hours every two years before license renewal. Four of the 20 hours must cover the topic of pesticide laws and regulations.

Similarly, Title 3, Article 3 of the California Code of Regulations requires that individuals who provide pest control recommendations concerning any pesticide use must possess a valid Agricultural Pest Control Adviser (PCA)
License. PCAs must have a college degree with minimum coursework in Physical and Biological Sciences, Crop Health, Pest Management Systems and Methods, and Production Systems as well as journey level experience. PCA’s are authorized to make pest control recommendation in categories in which they have been found to be qualified through an examination process. Categories include:

1. Insects
2. Mites and Other Invertebrates
3. Plant Pathology
4. Nematodes
5. Vertebrate Pests
6. Weed Control

Before working as a licensed PCA in any county, that individual must register with the County Agricultural Commissioner.

Written recommendations for all pesticide use must be made in writing. Each written recommendation must be signed and dated, with a copy of each written recommendation provided to the QAL prior to the application.

II. Stormwater Pollution Prevention - NPDES MS4 Permit

The City’s Phase I MS4 Stormwater Discharge Permit requires that municipal operations include the following Best Management Practices (BMPs) in their pest management programs:

1. Evaluate pesticides, herbicides, and fertilizers used and application activities performed and identify pollution prevention and source control opportunities.

2. Implement practices that reduce the discharge of pesticides, herbicides and fertilizers. At a minimum the Permittee shall:
   - Implement educational activities for municipal applicators and distributors.
   - Implement landscape management measures that rely on non-chemical solutions, including:
     - Create drought-resistant soils by amending soils with compost;
     - Create soil microbial community through the use of compost, compost tea, or inoculation;
Use native and/or climate appropriate plants to reduce the amount of water, pesticides, herbicides and fertilizers used;

- Practice grass-cycling on decorative turf landscapes to reduce water use and the need for fertilizers;
- Keeping grass clippings and leaves away from waterways and out of the street using mulching, composting, or landfilling;
- Preventing application of pesticides, herbicides and fertilizers during irrigation or within 48 hours of predicted rainfall with greater than 50% probability as predicted by National Oceanic and Atmospheric Administration (NOAA);
- Limiting or replacing herbicide and pesticide use (e.g., conducting manual weed and insect removal);
- Prohibiting application of pesticides, herbicides and fertilizers as required by the regulations DPR 11-004 Prevention of Surface Water Contamination by Pesticides enacted by the Department of Pesticide Regulation;
- Reducing mowing of grass to allow for greater pollutant removal, but not jeopardizing public safety.

- Collect and properly dispose of unused pesticides, herbicides, and fertilizers.
- Minimize irrigation run-off by using an evapotranspiration-based irrigation schedule and rain sensors.

3. Record the types and amounts of pesticides, herbicides and fertilizers used in the permit area.

Sec. 3 IPM Coordination

I. **IPM Specialist**

The IPM Specialist’s primary function is to develop, review, and implement the City’s IPM Program across all departments. The IPM Specialist shall be trained in the principles of low-risk IPM, safe application of pesticides, and alternatives to pesticide use. Responsibilities of the IPM Specialist shall include, but are not limited to, the following:

- Coordinate with city departments on weed and pest control issues
- Ensure that all City IPM activities adhere to local, county, state and federal regulations
- Record keeping and regulatory reporting
City of Rohnert Park Integrated Pest Management: Policy and Procedures
Revised July 2019

- Development and coordination of the IPM
- Coordination of the review and maintenance of City IPM
- Research, evaluate and make recommendations on IPM methods and materials
- assist with post-treatment monitoring/ evaluation
- Assist city departments with staff and contractor training needs
- Outreach to citizens regarding IPM
- Coordinate volunteer weed management projects.
- Maintain applicable license(s) with state and county regulators

II. IPM Technical Advisory Committee (IPM-TAC)

This group, coordinated by the IPM Specialist, will be composed of four to five City staff, such as the IPM Specialist, Environmental Coordinator, Utilities Services Supervisor(s), and Management Analyst. This group will meet periodically and advise on the City’s IPM program. The primary functions of the IPM-TAC will be to help draft and annually maintain a Reduced-Risk Pesticide List; help guide the transition of parks and other high public use areas to “green”/ least-toxic pest management; and maintain the Anticipated Pesticide Application calendar.

Sec. 4 IPM Implementation

The City assumes that all pesticides are potentially hazardous to human and environmental health. Therefore, reasonable non-pesticide alternatives shall be given preference over chemical controls, by following this implementation process. City staff will evaluate alternatives to chemical treatment, including the cost-effectiveness of the treatments. The following process shall be followed for all pest control activities:

I. IPM Planning

1. ID, Map, Monitor - The IPM Specialist, in coordination with Parks and Landscape Division staff, shall collect baseline data on the pest ecosystem(s) to determine pest population(s) occurrence, size, density and presence of any natural enemy population(s); gather information on pest biology and different control techniques available; and document sensitive areas and conditions that may limit control options. Data shall be collected in a standardized manner that is repeatable.

Ranking, inventory, mapping, monitoring and evaluation are methods used for determining pest management priorities. Maps and inventories depict infestations in terms of pest species, size, location and threats to resources. IPM Specialist shall monitor infestations or pest populations
and evaluate treatments over time to assess the effectiveness of various treatment strategies and their effects on target and non-target organisms. GIS mapping software may be a useful tool to database pest occurrence and track problem areas.

2. **Establish Thresholds** - 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 or address the concerns of citizens. 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.

II. **Treatment**

   1. **Treatment Selection and Timing Criteria** - Upon determining that treatment is necessary, the following criteria should be used to help select the appropriate IPM treatment strategy:

      a. Consistent with PHAER analysis (see Section 6 PHAER Analysis below)

      b. Least-disruptive of existing biological controls

      c. Least-hazardous to human health, including applicator

      d. Least-toxic to non-target organisms

      e. Least-damaging to the general environment

      f. If pesticides are used, consistent with the Reduced-Risk Pesticide list

      g. Most likely to produce a permanent reduction in the environment’s ability to support target pests

      h. Cost-effectiveness in the short- and long-term

   2. **Treatment Strategies** - The IPM Specialist will evaluate and select appropriate and effective treatments based on site-specific requirements. Commitment to the most environmentally sound approach is expected, with non-chemical methods considered first.
Prevention, cultural control, mechanical control, biological control and chemical control are the techniques used in IPM. In general, a combination of treatments is more effective than a single approach. The following treatments are listed in the order in which they should be executed:

a. **Prevention** - This is the most effective pest management strategy. 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. Specific examples include the following:

   i. Use strategies that reduce the preferred harborage, food, water or other essential requirements of pests.

   ii. Use weed-free materials (ex. jute and coconut fiber mats, certified weed-free straw, low-no weed seed mixes, etc. for soil stabilization after construction projects or other soil disturbing activities.

   iii. Use landscape and structural design that is appropriate to the specific habitat, climate and maintenance the area will receive.

   iv. When designing projects, consider the potential impacts of pests and mitigate through the use of appropriate landscape design (water requirements, weed barriers, etc.).

b. **Cultural** - Cultural control is the use of management activities that prevent pests from developing due to enhancement of desired conditions. Specific examples are the following:

   i. Selection and placement of materials that encourages pest enemies and competitors.

   ii. Modification/ removal of pest habitat to reduce pest harborage, food supply and other life support requirements.

   iii. Vegetation management including irrigation, mulching, fertilization, aeration, seeding, pruning and thinning.

   iv. Waste management and proper food storage.

   v. Barriers and traps.

   vi. Heat, cold, humidity, desiccation or light applied to affected regions.
vii. Prescribed grazing.
c. Mechanical - Mechanical control is accomplished by using physical methods or mechanical equipment to control pest infestations.
   i. Mowing or weed-whacking
   ii. Burning
   iii. Hoeing or hand-pulling of weeds
   iv. Trapping
   v. Flooding
d. Biological - Biological controls include the introduction or enhancement of natural predator populations to target pests. Introduction of non-indigenous organisms has an associated risk factor and should be thoroughly evaluated prior to implementation and be consistent with county, state and federal regulation. Biological controls include:
   i. Conservation and augmentation of the pest's natural enemies
   ii. Introduction of host-specific enemy organisms
e. Chemical – Chemical control includes the application of reduced-risk pesticides to kill target pests.
   i. Herbicides kill, burn-down, or defoliate pest plant species
   ii. Insecticides kill or repel invertebrate pests

3. Post Treatment Monitoring/ Evaluation. The IPM Specialist will evaluate areas treated to determine if control practices were effective, and may recommend additional actions to improve control or maintain desired results.

III. Record Keeping

1. Work logs shall be kept to record treatment elements include, but are not limited to, staff name, type of treatment, date of treatment, location, product name (if applicable), US EPA registration number (if applicable), quantity used (if applicable), etc.

IV. Public Education

1. Post IPM on website.
2. Informational signs at pest management areas about management methods.
3. Provide IPM and pest management information at public events such as farmers market and community events as well as environmental programs put on by the city.

4. Foster participation in community volunteer weed management projects (ex. Adopt-a-Park)

V. Staff Training (see Section 5 Pesticide Use and Limitations, subsection III)

Sec. 5 Pesticide Use and Limitations

Pesticides will only be used as a final option in situations where other methods, upon assessment of the IPM Specialist, have proven to be ineffective or cost prohibitive (ex. does not work to control the pest or cannot be sustained due to budgetary or other constraints). The following general and specific practices shall be followed:

General

1. Precautionary Principal shall be applied whenever pesticides are considered for pest management.

2. When necessary, only those pesticides listed on the most recent annual Reduced-Risk Pesticide List may be considered for use. In rare cases, an exemption may be requested (see subsection II).

3. Applications shall be performed by or under the supervision of a qualified applicator and will avoid direct exposure to any person, animal or property on-site or adjacent areas.

4. Application(s) shall be made to time the treatment to the target species most susceptible stage.

5. Care shall be observed to prevent damage to non-target plants, especially when applying a non-selective herbicide.

Specific

1. No Tier 1 pesticides are to be applied in any City maintained playground, park or sidewalk unless conditions call for control of a hazardous condition or noxious pest. Such a decision may be made by the IPM Specialist, with written justification, and approved by the Public Works Department Director or designee (see subsection II below). In this case, the area would be closed until reentry is deemed safe. Tier 3 and 2 pesticides may be used in these locations as per specific use limitations indicated on the Reduced-Risk Pesticide List and PHAER zoning.

2. No products containing neonicotinoids may be used on City property.

3. No pesticides shall be sprayed when weather conditions are:
   a. Winds in excess of 10 mile per hour
b. Damp or foggy
c. Rainy or within 48 hours of 50% probability rainfall event.
d. Temperatures are below 40°F or above 95°F

I. **Reduced-Risk Pesticide Evaluation**

1. The City will use pesticide assessment methodology similar to the City of San Francisco’s Department of the Environment to create a list of reduced-risk pesticides that are approved for use in the City of Rohnert Park IPM program. This approval for use is based on pesticide hazard and public exposure risk, need, and availability of alternatives. The following steps will be implemented in creating this list:

   a. **Hazard Assessment** - The IPM Specialist will create a list of pesticides that may be needed for pest control. Based on toxicity of active and other ingredients (if identified), the IPM Specialist will place a pesticide product into a hazard tier. The process and criteria for the hazard tier assessment are listed in Attachment A.

   b. **Exposure Assessment** - The IPM TAC reviews the list of pesticides developed during the Hazard Assessment step and reviews/discusses:

      - The human and environmental exposure potential based on product type, application method and location.
      - Product effectiveness. How well does it work on target pest?
      - Product need. Are there equally effective alternatives? If not, is this product the least-hazardous option for the application?

   c. **Populating the Reduced-Risk Pesticide List** - Based on Hazard and Exposure Assessments, the IPM TAC adds or removes products from the Reduced-Risk List. Products recommended for placement on the list are categorized in one of three ways:

      - Least Restricted – Products that are generally the least hazardous pesticides on the list.
      - More Restricted – Products have specific restrictions on allowable applications.
      - Most Restricted – Pesticides that are considered the least-hazardous chemical alternative for a particular application, but pose the greatest concern to human or environmental health.
The IPM Specialist will maintain the Reduced-Risk Pesticide List. The current Reduced-Risk Pesticide list for the City of Rohnert Park is provided in Attachment B. It must be noted that the list is inclusive and is based on initial chemical hazard assessment and staff estimation of exposure assessment. The list is subject to periodic review, modification and updating by the IPM TAC.

II. Exemptions and Justification

1. In rare cases, such as those which address public health and safety concerns, noxious pests, or the need to test new products, the IPM Specialist or a division manager may deem it necessary to use a pesticide that is not included on the Reduced-Risk Pesticide List; a pesticide that is included on the list but a variance in restrictions of application is required; and/or a pesticide that is absent a recommendation from the IPM Specialist. In such cases, the following exemption process will be required:

   a. Contact the IPM Specialist to discuss pest issue, alternative control methods and desired exemption.

   b. Complete the Pesticide Exemption Request form (Attachment C) and submit to the Public Works Department Director or designee for approval at least 4 business days prior to desired treatment.

   c. Exemptions will only be granted in cases of:

      • Documented and justified need for the variance as it relates to public health and safety and/or noxious pest control, including alternative control measures implemented and deemed ineffective or impractical; or

      • Documented and justified need for trials/tests, by the IPM Specialist, of new reduced risk products.

   d. Approved exemptions and associated justifications shall be submitted to the IPM Specialist for their records and entry into an active exemptions list that is available for public review on the City website. This list shall be updated as soon as possible after exemption approval and prior to site posting and application.

   e. Exemptions will be for a one-time application and must be renewed for additional applications.

III. Training

1. Certified Applicator - Any person applying pesticides must have pesticide safety training prior to the use of each pesticide, regardless of toxicity. Training must be updated annually. A record must be made of each employee applying pesticides, and evidence of training certified by the
trainer/supervisor. Copies of the record form will be kept by the employee and the City in accordance with the Records Retention Policy.

2. **Training requirements** - Training must be performed by a qualified person and cover the following N Series (non-agricultural) for each pesticide handled:

   - Information on the pesticide label concerning human health effects
   - Safe Use

**IV. Application Documents**

1. Any person applying a pesticide on City of Rohnert Park property must have access to the following documents:
   - Pest control recommendation and/or exemption justification
   - Pesticide label
   - Pesticide SDS
   - Medical Emergency Contact Information (posted at worksite or in vehicle)

**V. Violation Remediation**

1. All employees of the City of Rohnert Park who have been trained to apply pesticides may be required to do so as part of their regular duties. Those who possess a QAL are subject to discipline by the DPR via the Sonoma County Agricultural Commissioner if they violate various DPR regulations such as improper safety gear, application inconsistent with labels, improper posting, etc. Those employees will also be subject to the City of Rohnert Park Personnel Rules and Regulations. Employees who do not possess a QAL will be reprimanded by City of Rohnert Park if they violate DPR regulations or City policy. Pest control contracts with the City will include penalties (up to contract termination) for contract or policy violation.

**VI. Pesticide Storage, Transportation and Disposal**

1. **Storage** - Pesticides used by the City shall be stored in a consolidated manner, where practical. Pesticide storage locations must be posted with visible warning notices legible from a distance of 25 feet from any direction.

2. **Transportation** - Pesticides shall not be transported in the same compartment with persons, food or feed. Containers shall be secured to the vehicle during transport in a manner that will prevent spillage into or out of the vehicle.
3. **Empty Containers** - Empty pesticide containers, other than bags, must be rinsed and drained into the spraying equipment on site by the applicator, at the time of use, using the triple rinse method. Rinse solution should be applied to the treated areas.

4. **Required Labels** - All pesticide containers (including secondary and service containers) shall be labeled with the following information:
   - Entity (i.e. City of Rohnert Park)
   - Name, brand, or trademark of pesticide
   - EPA registration number
   - Active ingredient
   - Signal word (assigned by US EPA describing acute toxicity)

5. **Spills** - Small spills of pesticides shall be cleaned up immediately, with absorbent material such as cat litter. For major toxic pesticide spills, contact Emergency Response Personnel (call 911 or Dispatch). Note what pesticide it is, signal word, if it is threatening to enter the storm drain system, and if it is at risk of effecting public health or safety. Plug storm drains to contain the spill whenever appropriate. Document conditions with photographs.

### Sec. 6 PHAER Analysis

The PHAER zone model will be tailored to all City of Rohnert Park parks and bike/pedestrian paths. This model is based on the Pesticide Hazard and Exposure Reduction (PHAER) zone system (Boise 2004, Attachment D). The objectives of the PHAER zone system are to identify concrete reduction goals (green zones), establish a measurable timeline for risk reduction activities (transition to green zones) and to communicate to the public the general level of pesticide hazard on a site-by-site basis through multi-colored zone maps.

- Only Tier 3 pesticides may be used in areas with high traffic and exposure to people and pets.
- Areas with less traffic and exposure can be treated with Tier 3 or 2 pesticides, if needed.
- Tier 1 pesticides are the most restricted and may only be used in areas with no to low public exposure.

In rare cases, the IPM Specialist may deem it necessary to use a pesticide that is not included on the Reduced-Risk Pesticide List; is included on the list, but a variance in restrictions of application is required; or is inconsistent with the IPM Specialist’s pest management recommendation. Such exemptions must be approved as detailed in the above Exemptions and Justifications section (II.1.c).
PHAER analysis will be conducted and implemented at all heavily used public areas such as parks and bike/pedestrian paths. Consideration for PHAER analysis should be given for other areas that have unique sensitivities or exposure concerns, as necessary.

Sec. 7 City Responsibilities

The following divisions and their contractors conduct pest control operations:

- Public Works and Community Services Department
  - Parks and Landscape Division:
    - Playfields
    - Sportfields
  - Streets Division:
    - Roadside weed abatement, bike lane maintenance, traffic islands and bulb outs weed control.
  - Facilities Division:
    - City facilities (i.e. fire stations, office and community buildings, pools)
  - Sewer Division:
    - Pump Station
  - Stormwater Division:
    - Channels, retention ponds, and drainage ditches.

1. Record Keeping and Reporting – The IPM Specialist shall keep accurate records of all IPM treatments used and the results. Information on all pest management shall include how, when, and where the treatment was applied and the name of the person(s) applying the treatment (see example report form in Attachment E). The following information shall be recorded:
   a. Target pest
   b. Pest population levels or injury thresholds for treatment
   c. Treatment selection criteria with final treatment decision (IPM hierarchy checklist)
   d. Area treated (including type of location and size of area)
   e. Personnel hours (including volunteer) and material costs for treatment
   f. If pesticides are used, record the following:
i. Pest control treatments applied prior to using pesticide (ex. prevention, mechanical, cultural, biological)

ii. Pesticide (including product trade name, active ingredient, EPA toxicity category and Reduce-Risk Pesticide List hazard tier)

iii. Quantity of product used

iv. Treatment method used (i.e. spray, injection)

v. Location of application

vi. Time and date of pesticide application

vii. Name(s) and license number(s) of Pesticide Applicator(s)

viii. Name of the department contact authorizing work

ix. Safety Data Sheets (SDS) and labels for all pesticides used

Application records shall be made available to the public upon request in accordance with all applicable state laws governing public access to information.

The above information will be maintained by the City IPM Specialist, and serve as the basis for the monthly pesticide use reports that are submitted to the County Agricultural Commissioner. The City IPM Specialist will review pest management treatments to evaluate the successes and failures of such treatments, and to plan more efficient and effective pest management strategies.

2. Public Notification

   a. Pesticide Noticing - To inform the public on applications in areas heavily visited by the public, the IPM Specialist shall ensure that a Notice of Intent to Spray is publicly available no less than 48 hours prior to the desired day of the proposed pesticide application. The information provided includes the pesticide to be applied, the location (i.e., park, median, intersection, etc.) of the proposed application, and the date of the proposed application. The IPM Specialist provides the information to the public via the city webpage, and other appropriate outreach media. If the application is cancelled for any reason, the notification must be completed again, prior to rescheduling the proposed application. Approved and active pesticide use exemptions shall be listed on the City IPM webpage.

   b. Site Posting – Consistent with applicable laws, pest management activity shall include site notification. When a decision is made for a pesticide application in a heavily visited area such as a park, a notice
of a pesticide application must be physically posted at the proposed site during the treatment and the REI (restricted entry interval).

3. **Contractor Notification**
   a. When bidding out contractual work for pest management, notify all bidders of the IPM Policy and include its guidelines in bid specifics. Contractors are encouraged to submit proposals that include nonchemical pest control methods. Proposal that include alternative control measures will receive higher ranking during the proposal review process. Contracts must include damages (up to contract termination) for any violation of the IPM Policy.

4. **Personal Protective Equipment**
   The City of Rohnert Park will provide personal protective clothing and equipment (PPE) and related training to City personnel engaged in pest management on City of Rohnert Park property, including PPE for pesticide use as stated on the chemical manufacturer’s label. Contractors are required to provide their own PPE.
Attachment A

Hazard Tier Review Process (Adopted from the City of San Francisco Department of the Environment’s guidelines)

Pesticide products are assigned a hazard tier ranking after evaluating the hazard indices listed in the following section. The product is assigned a ranking of High, Moderate, or Low for each characteristic based on the ranges or values shown in Table 3 below. If any of the criteria are in the High category, the product is placed in Tier 1. If the chemical does not have any criteria in the High category, but does have at least one criteria in the Moderate category, the product is placed in Tier 2. Products with criteria only in the Low category are placed in Tier 3. See Table 1 for a summary of rankings, and Table 2 for a summary of data sources.

Table 1: Tier Rankings Derived from Hazard Screening

<table>
<thead>
<tr>
<th>TIER</th>
<th>DEFINITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tier 1</td>
<td>Highest Concern. At least one criterion in Table 3 placed in highest hazard category</td>
</tr>
<tr>
<td>Tier 2</td>
<td>Moderate concern. At least one criterion in Table 3 placed in the moderate hazard category</td>
</tr>
<tr>
<td>Tier 3</td>
<td>Lowest concern. No criteria flagged for Tiers 1 or 2</td>
</tr>
</tbody>
</table>

Table 2: Hazards Evaluated and Data Sources Used

<table>
<thead>
<tr>
<th>HAZARD</th>
<th>SOURCE(S) OF DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute toxicity</td>
<td>Product label: Signal word (Caution, Warning or Danger)</td>
</tr>
<tr>
<td>Restricted use</td>
<td>Product label: Use restricted to professional applicators</td>
</tr>
<tr>
<td>Cancer</td>
<td>Cancer classification of ingredient by US EPA, State of California (Proposition 65 list),\textsuperscript{20} National Toxicology Program (Report on Carcinogens),\textsuperscript{21} or the International Agency for Research on Cancer (IARC Monographs)\textsuperscript{22}</td>
</tr>
<tr>
<td>Reproductive or Developmental toxicity</td>
<td>Designation of ingredient by the State of California (Proposition 65 list\textsuperscript{20}), US EPA on the Toxics Release Inventory list\textsuperscript{1}</td>
</tr>
<tr>
<td>Endocrine disruption</td>
<td>Designation of ingredient by the European Commission(^2) or included in the book <em>Environmental Endocrine Disruptors</em> by Lawrence H. Keith(^3)</td>
</tr>
<tr>
<td>----------------------</td>
<td>------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Water pollution potential</td>
<td>Ingredient listed under Clean Water Act Section 303(d)(^4)</td>
</tr>
<tr>
<td>Hazards to birds</td>
<td>Product label or MSDS: Presence and wording of bird hazard statement or LD(<em>{50}) or LC(</em>{50}) of product (if available)</td>
</tr>
<tr>
<td>Hazards to aquatic life</td>
<td>Product label or MSDS: Presence and wording of fish hazard statement or LC(_{50}) of product (if available)</td>
</tr>
<tr>
<td>Hazards to bees</td>
<td>Product label or MSDS: Presence and wording of bee hazard statement or LD(_{50}) of product (if available)</td>
</tr>
<tr>
<td>Hazards to other wildlife</td>
<td>Product label or MSDS: Presence and wording of wildlife hazard statement or LD(<em>{50}) or LC(</em>{50}) of product (if available)</td>
</tr>
<tr>
<td>Soil mobility</td>
<td>Soil mobility score (Groundwater Ubiquity Score or GUS) calculated from physical properties or CA DPR’s assessment of groundwater contamination potential using physical properties. Physical property data available in the OSU Pesticide Properties Database,(^5) CA DPR Pesticide Contamination Prevention Act Status Reports,(^6) or the EU Footprint Pesticide Properties database(^7)</td>
</tr>
<tr>
<td>Persistent, bioaccumulative, toxic substances (PBTs)</td>
<td>US EPA Waste Minimization priority chemical(^8) or listed by the European Union as fulfilling PBT or Persistent Organic Pollutant (POP) criteria.(^9)</td>
</tr>
</tbody>
</table>

**Table 3: Criteria for Pesticide Hazard Tier Ranking**

<table>
<thead>
<tr>
<th>HAZARD</th>
<th>HIGH</th>
<th>MODERATE</th>
<th>LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal word</td>
<td>Danger</td>
<td>Warning</td>
<td>Caution or none</td>
</tr>
<tr>
<td>Restricted use</td>
<td>Yes</td>
<td>-</td>
<td>No</td>
</tr>
<tr>
<td>Cancer (see Table 1)</td>
<td>Known or Probable</td>
<td>Possible</td>
<td>Unclassified, Not Likely, not listed</td>
</tr>
<tr>
<td>Reproductive or developmental toxicity</td>
<td>Listed</td>
<td>-</td>
<td>Not listed</td>
</tr>
<tr>
<td>Endocrine disruption</td>
<td>EC category I or II</td>
<td>-</td>
<td>EC category III, not listed</td>
</tr>
</tbody>
</table>
### Details on Hazard Indices Used in the Evaluation

**Acute Toxicity**

EPA assigns every pesticide product to a hazard category based on the results of acute toxicity testing of the full product including inert ingredients. The testing includes the single dose required to cause death in test animals via ingestion, inhalation, and skin absorption. The testing also considers the degree of skin and eye irritation or damage. Based on the results of these tests, EPA assigns the product to a hazard category and requires a signal word such as Caution, Warning, or Danger to be placed on the label. Danger indicates the highest hazard, Warning indicates moderate hazard, and Caution indicates a lower hazard.

<table>
<thead>
<tr>
<th>Water pollution</th>
<th>303(d) listed</th>
<th>-</th>
<th>Not listed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazard to birds</td>
<td>“Extremely toxic”, “highly toxic” or high product toxicity based on LD50 or LC50 (see below)</td>
<td>“Toxic” or moderate product toxicity based on LD50 or LC50 (see below)</td>
<td>No warning language or low product toxicity based on LD50 or LC50 (see below)</td>
</tr>
<tr>
<td>Hazard to aquatic life</td>
<td>“Extremely toxic”, “highly toxic” or high product toxicity based on LC50 (see below)</td>
<td>“Toxic” or moderate product toxicity based on LC50 (see below)</td>
<td>No warning language or low product toxicity based on LC50 (see below)</td>
</tr>
<tr>
<td>Hazard to bees</td>
<td>“Extremely toxic”, “highly toxic” or high product toxicity based on LD50 (see below)</td>
<td>“Toxic” or moderate product toxicity based on LD50 (see below)</td>
<td>No warning language or low product toxicity based on LD50 (see below)</td>
</tr>
<tr>
<td>Hazard to wildlife</td>
<td>“Extremely toxic”, “highly toxic” or high product toxicity based on LD50 or LC50 (see below)</td>
<td>“Toxic” or moderate product toxicity based on LD50 or LC50 (see below)</td>
<td>No warning language or low product toxicity based on LD50 or LC50 (see below)</td>
</tr>
<tr>
<td>Soil mobility</td>
<td>-</td>
<td>GUS ≥2 or DPR classifies AI and exceeding SNVs</td>
<td>GUS ≤2 and not listed by DPR as exceeding SNVs</td>
</tr>
<tr>
<td>PBT</td>
<td>Listed</td>
<td>-</td>
<td>Not listed</td>
</tr>
</tbody>
</table>
Restricted Use
Some pesticides are restricted to use only by certified pesticide applicators and are not available to the general public because of high toxicity, particularly hazardous ingredients, or environmental hazards. Pesticides designed as restricted use are so indicated on the product label.

Cancer (known ingredients only)
Various state, federal, and international organizations evaluate or list chemicals for carcinogenicity, their potential to cause cancer. Due to the expense and difficulty of such evaluations, not all agencies have reviewed the same chemicals and not all reach the same conclusions on a given chemical. For this reason, we use the ratings of several agencies whenever possible. These ratings indicate the strength of the scientific evidence that a particular chemical can cause cancer in humans, but they do not consider the potency of the chemical, i.e. the number of cancers that will result from a standard level of exposure to a population. The various agencies use different words to describe the strength of evidence, such as possible, probable, likely, known, etc. In order to simplify the rating, we have assigned the various phrases used by the different agencies to a standard phrase used in the Hazard Tier assessment (see Table 4). The tier rating is based on the highest likelihood assigned by any agency that has evaluated the chemical.

Table 4: Standardized Cancer Rankings Used in the Hazard Tier Assessment

<table>
<thead>
<tr>
<th>ORGANIZATION</th>
<th>ORGANIZATION RATING</th>
<th>STANDARDIZATION FOR HAZARD TIER</th>
</tr>
</thead>
<tbody>
<tr>
<td>US EPA (^{19})</td>
<td><strong>Group A</strong>: Known Carcinogen  &lt;br&gt; Known/ Likely  &lt;br&gt; Likely to be Carcinogenic to Humans  &lt;br&gt; <strong>Group B</strong>: Probable Human Carcinogen  &lt;br&gt; <strong>B1</strong>: Sufficient evidence of carcinogenicity from animal studies with limited evidence of carcinogenicity from epidemiologic studies in humans  &lt;br&gt; <strong>B2</strong>: Sufficient evidence of carcinogenicity from animal studies with inadequate or</td>
<td>Known or Probable  &lt;br&gt; Known or Probable  &lt;br&gt; Known or Probable  &lt;br&gt; Known or Probable</td>
</tr>
<tr>
<td></td>
<td>IARC&lt;sup&gt;22&lt;/sup&gt;</td>
<td>NIH/ NTP&lt;sup&gt;21&lt;/sup&gt;</td>
</tr>
<tr>
<td>----------------</td>
<td>------------------------------------------------------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td><strong>Group 1</strong>: Carcinogenic to Humans</td>
<td>Known to be a Human Carcinogen</td>
</tr>
<tr>
<td></td>
<td><strong>Group 2A</strong>: Probably Carcinogenic to Humans</td>
<td>Reasonably Anticipated to be a Human Carcinogen</td>
</tr>
<tr>
<td></td>
<td><strong>Group 2B</strong>: Possibly Carcinogenic to Humans</td>
<td>Reviewed but not listed</td>
</tr>
<tr>
<td></td>
<td><strong>Group 3</strong>: Unclassifiable as to Carcinogenicity to Humans</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Group 4</strong>: Probably not Carcinogenic to Humans</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Group C</strong>: Possible Human Carcinogen</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Likely to be Carcinogenic to Humans at High Doses, but Not Likely at Low doses</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Suggestive Evidence of Carcinogenicity to Humans</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Group D</strong>: Not classifiable as to human carcinogenicity</td>
<td>Data are inadequate for an assessment of human carcinogenic potential</td>
</tr>
<tr>
<td></td>
<td><strong>Group E</strong>: Not Likely to be Carcinogenetic to Humans</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Possible</td>
<td>Possible</td>
</tr>
<tr>
<td></td>
<td>Possible</td>
<td>Unclassifiable</td>
</tr>
<tr>
<td></td>
<td>Unclassifiable</td>
<td>Not Likely</td>
</tr>
<tr>
<td></td>
<td>Known or Probable</td>
<td>Known or Probable</td>
</tr>
<tr>
<td></td>
<td>Known or Probable</td>
<td>Known or Probable</td>
</tr>
<tr>
<td></td>
<td>Possible</td>
<td>Possible</td>
</tr>
<tr>
<td></td>
<td>Unclassifiable</td>
<td>Unclassifiable</td>
</tr>
<tr>
<td></td>
<td>Not Likely</td>
<td>Not Likely</td>
</tr>
</tbody>
</table>

**Reproductive/Developmental Toxicants (known ingredients only)**

Known ingredients in the products are screened against the State of California lists of known reproductive and developmental toxicants<sup>20</sup>, the US EPA Toxics Release Inventory (TRI) chemical hazard list<sup>32</sup>, or the list from the National Toxicology Program’s Health Assessment and Translation (formerly the Center for Evaluation of Risks to Human Reproduction).<sup>33</sup>
**Endocrine Disruptors (known ingredients only)**
Under the Food Quality Protection Act, the EPA is required to screen pesticide ingredients for endocrine system effects. Until that screening is done, a comprehensive list of endocrine disruptors will not be available. For purposes of this screening, we used the list of endocrine disruptors compiled by the European Commission and in the book Environmental Endocrine Disruptors by Lawrence Keith. Chemicals on the EU list are classified for both humans and wildlife as Category I: evidence for endocrine disruption in living organisms, Category II: evidence of potential to cause endocrine disruption, or Category III: low exposure concern, no scientific basis for inclusion, or insufficient information. The list of endocrine disruptors will likely be expanded at a later date, when US EPA publicizes the results of the Endocrine Disruptor Screening Program.

**Water Pollution (known ingredients only)**
Section 303(d) of the federal Clean Water Act requires states to compile a list of water bodies with excessive contamination. The list of impaired water bodies in the area where the product will be used (available from the US EPA 303(d) web site) is searched for pesticide active ingredients. Based on a site-specific analysis of the water bodies, products are assessed as to whether they contain priority 303(d) pollutants for that area.

**Hazards to Birds, Aquatic Life, Bees, and Other Wildlife**
The US EPA requires particular hazard warning statements on pesticide product labels depending on the toxicity of the active ingredients and the formulated product to particular off-target species, evidence that adverse effects have occurred, and the use for which the product is intended. The hazard assessment is based on whether such warnings appear on the specific product label or the acute toxicity of the product as described in the MSDS. This toxicity is expressed as an LC₅₀ (or LD₅₀) that is the lethal concentration (or dose) to 50% of the test organisms in a laboratory test. The criteria for defining toxicity for different species are shown in Table 5 below.

<table>
<thead>
<tr>
<th>Category</th>
<th>Mammal and Bird LD₅₀ (mg/kg)³⁵</th>
<th>Mammal and Bird LC₅₀ (mg/kg of food)³⁶</th>
<th>Aquatic LC₅₀ (mg/L)³⁶</th>
<th>Bee LD₅₀ (g/bee)³⁷</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Toxicity</td>
<td>&lt; 50</td>
<td>&lt; 500</td>
<td>&lt; 1</td>
<td>&lt; 2</td>
</tr>
<tr>
<td>Moderate Toxicity</td>
<td>50-500</td>
<td>500-1,000</td>
<td>1-10</td>
<td>2-11</td>
</tr>
<tr>
<td>Low Toxicity</td>
<td>&gt;500</td>
<td>&gt;1,000</td>
<td>&gt;10</td>
<td>&gt;11</td>
</tr>
</tbody>
</table>

**Mobility in Soil (known ingredients only)**
The potential for ground-water or surface-water pollution by pesticides is dependent on many factors, including persistence of the ingredients, water solubility, soil binding, amount of rainfall or irrigation, soil properties, amount and frequency of applications, soil slope, vegetation present, proximity to ground- or surface-water, etc. The hazard assessment only considers the properties that relate strictly to the pesticide itself. The potential for a pesticide moving to surface water or groundwater is thus assessed in one of three ways:

1. The Ground-water Ubiquity Score (GUS) is an empirically derived index that relates pesticide persistence and soil binding to mobility. The GUS index is defined mathematically as:

   \[ \text{GUS} = \log_{10}(\text{half-life}) \times [4 - \log_{10}(K_{oc})] \]

   where \( K_{oc} \) is the soil sorption coefficient and half-life is the soil half-life in days. Information on pesticide \( K_{oc} \) values can be found in the OSU Pesticide Properties database,\(^{27}\) the California Department of Pesticide Regulation groundwater Status Reports,\(^{28}\) or in the EU Footprint Pesticide Properties database.\(^{29}\)

   A pesticide movement rating ranging from “extremely low” to “very high” has been assigned to the numerical values by the researchers in the OSU Extension Pesticide Properties Database.\(^{27}\) The values are shown in Table 6.

   **Table 6: Pesticide Mobility in Soil as a Function of Groundwater Ubiquity Score**

<table>
<thead>
<tr>
<th>GUS VALUE</th>
<th>PESTICIDE MOVEMENT RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;2</td>
<td>Low</td>
</tr>
<tr>
<td>&gt;2.0-3.0</td>
<td>Moderate</td>
</tr>
<tr>
<td>&gt;3.0</td>
<td>High</td>
</tr>
</tbody>
</table>

2. The California Department of Pesticide Regulation (DPR) lists pesticide active ingredients as potential groundwater contaminants when physical properties exceed Specific Numeric Values (SNVs). In order for a chemical to be listed, one of the following must be true:

   Water solubility: > 3 ppm (mg/L), or
   Soil adsorption coefficient (Koc): < 1,900 cm³/g

   AND one of the following must be true

   Hydrolysis half-life: > 14 days, or
   Aerobic soil metabolism half-life: > 610 days, or
   Anaerobic soil metabolism half-life: > 9 days
The list of pesticides that exceed SNVs is available from DPR’s annual Groundwater Status Reports.  

3. In addition to the GUS index and DPR’s assessment, information on pesticide water contamination potential is noted from product label warnings. EPA requires two levels of warnings for products with characteristics that have been determined to result in likely contamination of groundwater from use as labeled. A lower level of warning is required if no actual detections have occurred or no field studies have been done. A higher level of warning is required if detections have occurred or field studies have shown that the chemical leaches. For purposes of the initial screening, the presence of either warning is considered an indication that the chemical has high mobility. In rare cases where a label ground-water advisory occurs but the GUS index or DPR assessment did not indicate high mobility, the label advisory is given priority.

Pesticides that have high soil mobility according to the criteria above, but are not otherwise toxic or bioaccumulative are classified as Tier 2.

**Persistent, Bioaccumulative, Toxic Chemicals (PBTs)**

In recent years much attention has been paid to toxic chemicals that persist in the environment and bioaccumulate. PBTs pose a serious threat because they can build up in ecosystems, wildlife, and humans even when deposited slowly. Many organizations including the United Nations, International Joint Commission on the Great Lakes, U.S. EPA, and Washington State Department of Ecology have proposed strategies to reduce or eliminate them. The list used for this evaluation is EPA’s Waste Minimization Priority Chemicals list or listed by the European Union as fulfilling PBT or Persistent Organic Pollutant (POP) criteria. New lists will be added as more information becomes available.

**References**


## Attachment B

### Preliminary* Reduced-Risk Pesticide List for City of Rohnert Park

<table>
<thead>
<tr>
<th>PRODUCT NAME</th>
<th>TYPE</th>
<th>INGREDIENT</th>
<th>HAZARD TIER</th>
<th>USE LIMITATION TYPE</th>
<th>POSSIBLE USE LIMITATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cayuse Plus</td>
<td>Adjuvant</td>
<td>Ammonium sulfate, Ethylene glycol</td>
<td>Most Hazardous</td>
<td>More limited</td>
<td>No use in green PHAER zones.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(Tier I)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Garlon 4 Ultra</td>
<td>Herbicide</td>
<td>Triclopyr, butoxyethyl ester 60.45%</td>
<td>Most hazardous</td>
<td>Most Limited</td>
<td>No use in green PHAER zones. Use only for targeted treatments of high profile or highly invasive exotics via dabbing or injection. May use for targeted spraying only when dabbing or injection are not feasible. <strong>HIGH PRIORITY TO FIND ALTERNATIVE.</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(Tier I)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Snap Shot</td>
<td>Pre Emergent herbicide</td>
<td>Trifluralin isoxaben</td>
<td>Most Hazardous</td>
<td>Most limited</td>
<td>No use in green PHAER zones. Limited to areas of low public access</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(Tier I)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turflon Ester</td>
<td>Herbicide</td>
<td>Triclopyr, butoxyethyl ester 61.6%</td>
<td>Most hazardous</td>
<td>Most Limited</td>
<td>No use in green PHAER zones. Targeted treatment of WWTP OLF process. <strong>HIGH PRIORITY TO FIND ALTERNATIVE.</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(Tier I)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activator 90</td>
<td>Adjuvant</td>
<td>Alkylphenol ethoxylate</td>
<td>More Hazardous</td>
<td>More limited</td>
<td>Ok for most applications. Avoid non-target exposure.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(Tier II)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capstone</td>
<td>Herbicide</td>
<td>Aminopyralid</td>
<td>More Hazardous</td>
<td>More limited</td>
<td>Ok for most applications. Avoid non-target exposure. <strong>No use over/near water.</strong></td>
</tr>
<tr>
<td></td>
<td>(Broadleaf selective)</td>
<td></td>
<td>(Tier II)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adjuvant</td>
<td>Propionic acid ammonium salt, Ammonium sulfate</td>
<td>More Hazardous</td>
<td>More limited</td>
<td>Ok for most applications. Avoid non-target exposure.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(Tier II)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRODUCT NAME</td>
<td>TYPE</td>
<td>INGREDIENT</td>
<td>HAZARD TIER</td>
<td>USE LIMITATION TYPE</td>
<td>POSSIBLE USE LIMITATIONS</td>
</tr>
<tr>
<td>--------------</td>
<td>--------</td>
<td>------------------------------------------------------</td>
<td>-----------------</td>
<td>---------------------</td>
<td>------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Dimensio</td>
<td>Herbicide</td>
<td>Dithiopyr</td>
<td>More Hazardous</td>
<td>More limited</td>
<td>Ok for most applications. Avoid non-target exposure.</td>
</tr>
<tr>
<td>Gallery</td>
<td>Herbicide</td>
<td>Isoxaben</td>
<td>More Hazardous</td>
<td>More limited</td>
<td>Ok for most applications. Avoid non-target exposure.</td>
</tr>
<tr>
<td>Liberate</td>
<td>Adjuvant</td>
<td>Lecinthin, methyl esters of fatty acids, alcohol ethoxylate</td>
<td>More Hazardous</td>
<td>More limited</td>
<td>Ok for most applications. Avoid non-target exposure.</td>
</tr>
<tr>
<td>Lifeline</td>
<td>Herbicide</td>
<td>Glufosinate-ammonium</td>
<td>More Hazardous</td>
<td>More limited</td>
<td>Ok for most applications. Avoid non-target exposure.</td>
</tr>
<tr>
<td>Milestone</td>
<td>Herbicide</td>
<td>Aminopyrali, trii-sopropanolamine salt (5928) 40.6%</td>
<td>More hazardous</td>
<td>More Limited</td>
<td>For invasive species in natural areas or parklands where other alternatives are ineffective, especially for invasive legumes and composites such as yellow star thistle and purple star thistle.</td>
</tr>
<tr>
<td>MSO</td>
<td>Adjuvant</td>
<td>Methylated vegetable oil, alcohol ethoxylate, phosphatidyl choline</td>
<td>More Hazardous</td>
<td>More limited</td>
<td>Ok for most applications. Avoid non-target exposure.</td>
</tr>
<tr>
<td>Pendulum</td>
<td>Herbicide</td>
<td>Pendimethaline</td>
<td>More Hazardous</td>
<td>More limited</td>
<td>Ok for most applications. Avoid non-target exposure.</td>
</tr>
<tr>
<td>R-11</td>
<td>Adjuvant</td>
<td>Alkylphenol ethoxylate, butyl alcohol, dimethylpoly siloxane</td>
<td>More Hazardous</td>
<td>More limited</td>
<td>Ok for most applications. Avoid non-target exposure.</td>
</tr>
<tr>
<td>Sapphire</td>
<td>Herbicide</td>
<td>Penoxsulam</td>
<td>More Hazardous</td>
<td>More Limited</td>
<td>Ok for most applications. Avoid non-target exposure. <strong>No use over/ near water.</strong></td>
</tr>
<tr>
<td>PRODUCT NAME</td>
<td>TYPE</td>
<td>INGREDIENT</td>
<td>HAZARD TIER</td>
<td>USE LIMITATION TYPE</td>
<td>POSSIBLE USE LIMITATIONS</td>
</tr>
<tr>
<td>--------------</td>
<td>------</td>
<td>------------</td>
<td>-------------</td>
<td>---------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Scythe</td>
<td>Herbicide</td>
<td>Pelargonic Acid</td>
<td>More Hazardous (Tier II)</td>
<td>More limited</td>
<td>Ok for most applications. Avoid non-target exposure.</td>
</tr>
<tr>
<td>Sedge-hammer</td>
<td>Herbicide (Nutsedge selective)</td>
<td>Halosulfuron methyl</td>
<td>More Hazardous (Tier II)</td>
<td>More limited</td>
<td>Ok for most applications. Avoid non-target exposure. <strong>No use over/near water.</strong></td>
</tr>
<tr>
<td>Suppress</td>
<td>Herbicide</td>
<td>Capric Caprylic Acids</td>
<td>More Hazardous (Tier II)</td>
<td>More limited</td>
<td>Ok for most applications. Avoid non-target exposure.</td>
</tr>
<tr>
<td>Telar</td>
<td>Herbicide</td>
<td>Chlorsulfuron</td>
<td>More Hazardous (Tier II)</td>
<td>More limited</td>
<td>For invasive species in natural areas or parklands where other alternatives are ineffective, especially for invasive pepperweed.</td>
</tr>
<tr>
<td>Transline</td>
<td>Herbicide</td>
<td>Clopyralid</td>
<td>More Hazardous (Tier II)</td>
<td>More limited</td>
<td>For invasive species in natural areas or parklands where other alternatives are ineffective, especially for invasive legumes and composites such as yellow star thistle and purple star thistle.</td>
</tr>
<tr>
<td>Triclopyr</td>
<td>Herbicide</td>
<td>Triclopyr</td>
<td>More Hazardous (Tier II)</td>
<td>More limited</td>
<td>Ok for most applications. Avoid non-target exposure.</td>
</tr>
<tr>
<td>WeedZap</td>
<td>Herbicide</td>
<td>Clove Oil, Cinnamon Oil</td>
<td>More Hazardous (Tier II)</td>
<td>More limited</td>
<td>Ok for most applications. Avoid non-target exposure.</td>
</tr>
</tbody>
</table>

* Inclusive list based on chemical hazard assessment of existing pesticide inventory with staff assumptions on human and environmental exposure risk. This list is subject to periodic review, modification and updating by the IPM TAC.
Attachment C

Pesticide Exemption Form

This form is to be used to request an exemption for use of a pesticide product that is: a) not included on the Reduced-Risk Pesticide List, b) included on the list but a variance in restrictions of application is desired, or c) absent a recommendation from the IPM Specialist. The form shall be submitted to the department director for approval at least 4 days in advance of desired application. The IPM Specialist will post the exemption data on the City’s website at least 48 hours prior to application.

Applicant Information

Name_________________________________________________________________________

Department/ Division________________________________________________________________________

Phone___________________________ Email_________________________________________________________

Pesticide

Date(s) of Proposed Use________________________________________________________

Product Name________________________________________________________________________

Active Ingredients________________________________________________________________________

EPA Registration #_______________________________________________________________

Pesticide Type
(Insecticide, Herbicide, Fungicide, etc.) _________________________________________________

Use Category
(Approved-least hazardous/ Limited Use-more hazardous/ Limited Use Special Concern-Most hazardous/ Not Listed) _________________________________________________
  ✓ Attach product Label and SDS Sheets

Use Location

Street Address________________________________________________________________________

Detailed location on site_________________________________________________________________
Justification

Target Pest

Date discussed with IPM Specialist

Justification for Use

Explanation of Alternative Controls Tried

Strategies to Prevent Future Exemptions

Additional Comments

Department Director Approval: _____________________________ Date: ________
Attachment D

Pesticide Hazard and Exposure Reduction Analysis

PESTICIDE HAZARD AND EXPOSURE REDUCTION (PHAER) ZONES IN THE LANDSCAPE

A guidebook for schools, parks, childcare providers, landscape professionals and environmental managers.

Phil Boise
Urban / Ag Ecology Consulting Services
Gaviota, CA

October 2004
v 1.2
PHAER Zones

Pesticide Hazard And Exposure Reduction (PHAER) Zone System for Landscapes
V 1.2

Author

Phil Boise
Urban / Ag Ecology Consulting Services

Editing and Formatting

Jana Carey
Masters of Environmental Science and Management
Bren School, University of California, Santa Barbara

Funded by

The National Foundation for IPM Education

October 2004

Temporary website: www.home.earthlink.net/~phaerzones

Contact Information:

Phil Boise
Urban/Ag Ecology Consulting Services
41 Hollister Ranch, Gaviota CA 93117
pboise.ipm@earthlink.net

cover: Maramonte Park, Santa Maria CA

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# Table of Contents

Acknowledgements ii  
Executive Summary iii  

**SECTION 1**  
Introduction 1  

**SECTION 2**  
Background 2  
Risk = Exposure x Hazard 2  
Who Benefits from PHAER? 3  
Why PHAER Was Developed 4  
Assumptions 4  
Benefits of the PHAER Method 5  

**SECTION 3**  
Assigning Zones 7  
Step 1: Characterize Exposure 7  
Step 2: Goal-Setting 8  
Step 3: Designate Zones 11  

**SECTION 4**  
Managing Your Site 12  
The Screening Process 12  
Managing Green Zones 13  
Managing Yellow Zones 15  
Managing Special Circumstance Zones 16  
Standing Exemptions 17  

**SECTION 5**  
Conclusions and Recommendations 18  

**SECTION 6** [NOT INCLUDED]  
Appendix A: FAQ 21  
Appendix B: Materials and Screening Protocol 26  
GREEN LIST G-1  
YELLOW LIST Y-1  
SPECIAL CIRCUMSTANCE LIST SC-1  
Appendix C: The Decision Tree 45  
Appendix D: Case Studies 59
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The input from these contributors has been vital to this project. This acknowledgement does not imply their endorsement nor current implementation of the PHAER Zone System.
Executive Summary

The Pesticide Hazard and Exposure Reduction (PHAER) Zone System arose out of a need for a standardized, results-based reduced-risk pest management strategy, and addresses several common challenges faced by many Integrated Pest Management (IPM) programs.

Decision and policy makers seek a way to measure progress towards risk reduction goals, grounds managers need flexibility in their management options, the community is entitled to information about the general level of pesticide hazard that could be present on a site-by-site basis, and children and the environment deserve the highest degree of safety possible.

The PHAER Zone System establishes management zones on each site based upon the unique risk reduction goals of individual jurisdictions. These zones are designated as Green, Yellow, and Special Circumstance Zones, with Green Zones providing the lowest potential for pesticide hazard and exposure. Each Zone has a corresponding pesticide list determined by existing toxicological data.

The objectives of the PHAER Zone System are to

- Identify concrete risk reduction goals (Green Zone management)
- Establish a measurable timeline for risk-reduction activities (transition to Green Zones or other management goals)
- Communicate to the public the general level of pesticide hazard on a site-by-site basis through colored zones maps
- Provide a platform for public education through a regional adoption of the PHAER Zone System

This guidebook has evolved through the efforts of many jurisdictions throughout California and is designed to allow self-implementation. However, a multiple jurisdiction, regional approach may simplify adoption and maximize the program benefits.
Introduction

Adoption of Integrated Pest Management (IPM) programs has increased in the past several years. We see schools and public parks striving to provide a safer environment for their users, and to prevent chemical contamination of public land and water. Each entity that creates an IPM program sets goals and creates a unique implementation plan to achieve them. Challenges arise, however, in meeting the needs of the many groups interested in the IPM process and outcome. These diverse stakeholders and jurisdictions, be they schools, childcare facilities, advocacy groups, policy makers, or park managers, have distinct interests and needs from the IPM process.

A parent with a child in a childcare facility might want to know what materials the facility is using to care for its landscaping and lawn. A park manager may need to determine her budget for the next year, and how she’ll allocate funding to manage pests in different areas. A school groundskeeper might need a specific list of what compounds are safe to use around children, and what protocols should be used in their application.

We saw a need to create a decision-making model that levels the playing field, a system that anyone interested in planning and implementing an IPM program can use. For the model to be effective there must be consistency in its use among managers, but equally important there must be a method to communicate the process, implementation, and outcome to end users (parents, park users, and the general public).

We designed the Pesticide Hazard and Exposure Reduction (PHAER) Zone System to fill this need. All jurisdictions that use the PHAER method will evaluate their sites by the same standards. They will have the flexibility to choose which areas justify immediately transition to reduced-risk management, and which areas to transition more slowly, depending upon resources, policy and social needs. Further, all participants will be able to utilize a common pesticide screening, language, and decision making process.

This system was first piloted at the Ventura Unified School District beginning in 2001. The application was broadened and refined with input from the Santa Barbara County Regional IPM Coalition, funded by the California Department of Pesticide Regulation in 2002. Finally, with funding from the National Foundation for IPM Education and support from stakeholders throughout the state, the program and handbook have been formalized.
Background

The Pesticide Hazard and Exposure Reduction (PHAER) Zone System is a tool that guides, prioritizes, and clearly communicates pesticide use decisions in the outdoor landscape setting. It is designed to minimize human and environmental exposure to pesticides that have elevated safety concerns. The method helps to achieve the following:

- Improve pesticide use communication to the public
- Provide flexibility to managers
- Shift limited resources to areas of greatest need
- Create measures of IPM improvement for budgeting purposes
- Prioritize risk-reduction activities
- Promote the good stewardship of public lands by the agencies that manage them

Risk = Exposure X Hazard

Phil Boise, the method’s designer, based this intuitive mapping system on the formula for ‘risk,’ which includes:

The potential for human and environmental exposure\(^1\) to pesticides

The hazard\(^2\) presented by a pesticide.

The higher the potential for exposure in an area, the more vital it is to use a very low-hazard pest management material. In areas where there is little or no potential for exposure, pest managers have more flexibility to use a higher-hazard compound to treat pests.

---

\(^1\) Exposure: When we speak of ‘exposure’ we mean contact with a pesticide or pesticide residue—this contact can be direct or indirect contact to humans or sensitive habitats or species. ‘Exposure’ may come through direct skin or clothing contact with pesticides or residues applied to surfaces, or through indirect contact from volatilization, drift, sub-soil movement, or run-off.

\(^2\) Hazard: The hazard is the level of harm that can come from a pesticide. Determined by existing data reflecting the potential for the material to cause neural, dermal, ocular or inhalation damage (‘signal word’), or to cause cancer, reproductive harm, endocrine (hormone) disruption, eco-toxicity, or water contamination. This evaluation process is described in Appendix B.
While ‘zero’ pesticide exposure is not the goal of this system, we believe that it is an achievable goal to limit exposure to pesticides that are carefully screened, and avoid exposure to pesticides that have documented health risks.

![Diagram showing risk as a relationship between exposure and hazard.](image)

Figure 1: Risk as a relationship between exposure and hazard.

### Who Benefits from PHAER Zones?

As mentioned in the introduction, diverse groups will use the PHAER System. There are three broad categories of users: grounds managers, citizens (including children), and decision-makers. The PHAER method provides a common platform for each group to achieve varied objectives.

**Grounds Managers.** Grounds managers work with various property types, uses, and needs, and require flexibility in their pest management planning. They must be able to shift resources as necessary to meet established priorities, and they must be able to communicate their actions and objectives to diverse stakeholders.

**Citizens.** Citizens seek information about the potential risks of materials used at a particular site; this information is most valuable if it is clear and consistent between jurisdictions.

**Children.** Children do not have a voice in the process, so we’ve factored their needs into the system. All children deserve a clean and healthy place to play and learn. The PHAER System builds extra precaution into the pesticide screening protocols, and clearly communicates the level of potential risk from pesticides used on each site to parents in advance of use.

**Decision-Makers.** Decision-makers need achievable, measurable risk-reduction objectives for time and budget planning. They often have difficulty responding effectively to public concerns and pressures because of a lack of common definitions and objectives. They might want to adopt IPM strategies, but do not want to compromise efficiency and safety. Decision-makers also recognize that a common, regional, and systematic approach will be the most efficient method of achieving environmental protection goals.
Why the PHAER Zone System Was Developed

The PHAER system was originally developed to help prioritize IPM activities and expenses at Ventura Unified School District while providing the highest level of protection.

A difficult issue with IPM implementation is the measure of compliance. The concept of Integrated Pest Management casts a wide net, and generally describes the process of pest management rather than final risk-reduction objectives. For example, most definitions of IPM encourage sanitation and sound cultural practices to reduce the presence of pests. Therefore, emptying trashcans and managing irrigation practices could be considered IPM implementation, regardless of whether or not the goals of risk-reduction are advanced.

*It could be said that if risk reduction is the destination, then IPM would be a vehicle used to move towards it. The PHAER Zone System would be the map providing guidance and gauging progress towards the goal.*

With the PHAER method, we provide a framework for setting measurable risk-reduction goals. The system provides clear measures of compliance combined with management flexibility. It should be simple enough to determine if ‘Green Zones’ have been managed with GREEN LIST materials. The method allows policy makers, advocates, and managers to clearly set and understand risk-reduction objectives, as well as to ascertain if these objectives have been met.

Assumptions

Five fundamental assumptions form the base of this method:

1. Jurisdictions with diverse sites will have a need for diverse materials, some of which may pose a greater health and environmental risk than others.

2. To reduce *risk* we must understand the *hazard* of the material, and the potential for *exposure* to the material from drift, run-off, volatilization, or contact with residues. In areas with a high potential for exposure (where children play, for example), we must strive to use only low hazard materials and methods.

3. Sustained risk reduction requires a shift in current management models and systems. Very few existing school or park settings have been designed, or are currently operating, with pest prevention as a primary design factor.

4. This shift in management models should allow for incremental steps towards risk reduction while alternative practices are tested and habitat modification practices are put into place to prevent future pest problems.

5. The most effective method of transition will be to prioritize areas of the greatest need based upon the highest potential exposure. Resources should be directed
towards these areas, while areas of low potential exposure could be conventionally managed.

**Benefits of the PHAER Zone System**

The benefits of the method are extensive and should offer positive incentives to diverse stakeholders.

**Flexibility of Implementation**

The system allows decision makers to designate management priorities based upon their own needs. For example, a school may choose to map a parking lot as a Yellow Zone if the risk of exposure to children is low. A pollution prevention officer, however, working on behalf of a city park regulated by the Clean Water Act might choose to map a parking lot as a Green Zone to prevent herbicides of concern from moving into a nearby creek system.

The people carrying out pest management (grounds managers and technicians) will be able to choose from a list of materials that is common between jurisdictions and has been carefully screened for hazards.

**Budgeting Flexibility**

Decision-makers have the opportunity to set their risk-reduction goals and use their pest management budgets to accomplish what they deem most important. If a decision- or policy-maker wishes to designate partial or entire sites as Green Zones, this system will provide measurable goals for long-term budgeting, as well as justification for budget requests.

**Highest Standard of Safety in Areas of Greatest Need**

When decision-makers map their site and choose which areas should become Green Zones, they are identifying areas with the highest potential for users to be exposed to pesticides. Every area that is transitioned to a Green Zone will offer the highest standard of safety for both its users and applicators.

**Communication Tool**

End-users of PHAER-managed sites will know what degree of pesticide hazard to expect in any location they visit, whether a school, a park, or playground. The transparency of full disclosure that will be available and posted on-site will allay concerns, answer questions, and potentially educate the public about reduced-risk practices.

Further, during the testing of this system in various settings we have discovered that many parks and schools are already using reduced-risk methods in a majority of their sites. This system has appeal to these entities as a tool to publicly demonstrate current good stewardship practices.
Guidance for Material Selection

The tiered pesticide list system allows applicators to clearly and simply evaluate the short and long term hazards of a material. This system helps applicators select safer materials that meet the same management goals (e.g. selecting a YELLOW LIST selective herbicide instead of a SPECIAL CIRCUMSTANCE material).

Incremental

The PHAER System allows for incremental movement towards reduced-risk practices at a pace established by the involved stakeholders. This provides a fair starting point for new IPM programs, and a manageable timeline for improvement.

Measurable

A significant disadvantage of current IPM systems is the lack of measurement standards that are essential to gauging progress towards risk-reduction objectives. The PHAER System provides these measures in the form of expansion of Green Zones. An increase in the total area of Green Zones means a decrease in exposure to hazardous pesticides for humans and the environment. These standards can be measured, budgeted, and evaluated for compliance.

Results-Based, Process Flexible

The PHAER System addresses the final objectives of IPM programs, reducing exposure to hazardous pesticides while providing flexibility in the implementation. Implementers would utilize IPM practices to achieve their measurable PHAER risk reduction goals.

Public Education through Demonstration / Clean Water Compliance

Many municipalities are obligated to provide outreach to the public about reducing impacts of pesticides on water quality. PHAER provides education through demonstration by showing the public attractive landscapes managed with reduced-risk materials. Regional municipalities would have a platform to jointly encourage utilization of the GREEN LIST materials, pre-screened for water quality impairment.
Assigning Zones

As mentioned earlier, any participant using the PHAER System will begin the process the same way: by characterizing the site. This entails obtaining a map, walking the property, and distinguishing between areas of high and lower exposure.

Step 1: Characterize Exposure

Obtain at least two copies of a map of the property. Walk the entire property with an individual who is knowledgeable about the uses of the area. For example, at a school, a groundskeeper or teacher would have first-hand information about areas that children use and don’t use.

During your walk, categorize areas as either “High Exposure” or “Low Exposure.” For ease, mark on a draft copy of the map areas of high exposure with a green highlighting pen, and areas of low exposure with a yellow highlighting pen. Use this draft map during Step 2.

Some examples of high exposure areas include, but are not limited to:

- Recreational turf
- Asphalt play surfaces
- Garden areas
- Bike racks and locker areas (frequent skin contact)
- Six-foot perimeter around opening doors, buildings with windows, air intakes, or HVAC (heating/ventilation/air conditioning) systems
- Slopes adjacent to playing fields where pesticides may migrate onto the field with soil or water movement
- Fence lines surrounding playing fields where ball contact is likely (backstops, down-slope fences)
- Curbs and landscapes around bus and vehicle loading areas
- Habitats containing EPA listed sensitive or endangered species
• Other sites as designated by IPM Coordinator (impervious surfaces that drain into regulated waterways, etc.)

Examples of lower exposure areas include, but are not limited to:

• Landscaped islands in parking areas not used for sitting or waiting
• Strips between two fences that are inaccessible to general use
• Tree basins for which GREEN LIST pesticides or alternative practices have not proven effective or are prohibitive and where the public is not likely to rest or recreate
• Storage or valve areas where gates are locked
• Parking lots where skin contact is unlikely
• Areas not adjacent to or draining into habitats containing EPA listed sensitive or endangered species

We have developed a Decision Tree (Appendix C) that helps walk you through each landscape feature to determine if it is a high or low exposure area.

**Step 2: Goal-Setting**

The second is the PHAER step that provides the greatest flexibility.

**Gather a Group of Core Decision-Makers**

During Step 2, core stakeholders will sit down with the draft colored map. The group should include those involved with budgeting, maintenance, and any other essential aspect of your jurisdiction. The sites will be evaluated for Green Zone transition based upon site specific conditions such as budget, current management practices, policy or regulatory mandates, and community concern.

**Determine Your Risk-Reduction Goals**

The most important issue to discuss is what your priorities are. Do you want to immediately manage your site as a reduced-risk area, or do you want to incrementally transition parts of your site over a period of a few years?

Sites of highest exposure and available resources may immediately be designated as Green. Areas not immediately identified as green may be designated as Yellow, with a transition priority of T1 – T5, NT (see Figure 2). Once they decide, they will color-code the map to indicate their risk-reduction plan. This will be the document they refer to over the years to reference their goals and gauge their progress toward achieving them.
Keep in mind whether your jurisdiction fits into one of the following two approaches to goalsetting.

**Figure 2: The Three-Step Zone Process**

**STEP 1: CHARACTERIZE EXPOSURE**

<table>
<thead>
<tr>
<th>High Exposure</th>
<th>Low Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turf</td>
<td>Parking islands</td>
</tr>
<tr>
<td>Asphalt playgrounds</td>
<td>Dense brush</td>
</tr>
<tr>
<td>Sandboxes</td>
<td>Slopes away from fields</td>
</tr>
<tr>
<td>Sensitive habitat</td>
<td></td>
</tr>
</tbody>
</table>

**Immediate Transition** | **Incremental Transition** | **Special Circumstance**

- **Immediate Transition**
  - Site may immediately be managed with **GREEN LIST** materials

- **Incremental Transition**
  - High exposure, high priority sites where resources or technology do not allow for immediate management with **GREEN LIST** materials (**high function sports turf, areas where expensive renovations are required**)
  - Low Exposure, low priority sites that may be transitioned at a later date, or may remain Yellow Zones

- **Special Circumstance**
  - Risk to applicator (**tarmac, steep slope**)
  - Asset dependent (**golf courses**)

**STEP 3: DESIGNATE ZONES**

- **Green Zone**
  - Yellow Zone
    - T1 (One-year transition to Green)
    - T2 (Two-year transition)
    - T3 (Three-year transition)
    - T4 (Four-year transition)
    - T5 (Five-year transition)
    - NT (No Transition)

- **Special Circumstance Zone**

**Figure 2: The Three-Step Zone Process**
The ‘Single Zone per Site’ Approach

In our sample school district, there are seven schools. At the beginning of the program, there is one school that can be immediately managed as a Green Zone. The decision makers assign conversion goals to the other six schools, choosing two T1, two T2, one T3, and one T4. The two T1 schools are the highest priority to the school district (perhaps elementary schools), and they want to manage them as Green Zones as quickly as possible. By the end of the fifth year of their plan, all of their schools would be Green.

The ‘Multiple Zones per Site’ Approach

In some jurisdictions, rather than convert an entire school to a Green Zone, managers will need to work incrementally within each school to transition individual areas. The example below illustrates this incremental approach. In the first year, this school was able to designate the playground and recreational turf as green, with a plan to transition the parking lot in Year 2 and the fenced yard in Year 3. They steadily convert individual areas (highest priority areas first) within the school until by Year 3, everything is Green.

The incremental approach allows limited resources (staff and budget) to be dedicated to the areas of greatest need (Green Zones, e.g. high use parks, elementary schools), while conventional management practices are continued on sites of lower potential exposure (Yellow Zones, e.g. middle/high schools, rural parks). As reduced-risk
practices are tested and staff is trained, the total area of Green Zones can be expanded.

**Step 3: Designate Zones**

The process of assigning zones within your site will reflect the priority level you give to each area. After your group has decided the priorities, color-code the map with green, yellow, or purple to represent Green Zones, Yellow Zones, or Special Circumstance Zones. For any Yellow Zone, please also include a label T1, T2, T3, etc. to express your timeline for conversion to Green.

**Green Zones**

Green Zones are areas that you will immediately convert to reduced-risk pest management. Only very low-hazard materials will be applied to that area.

**Yellow Zones**

Yellow Zones are areas that will be managed with higher-hazard materials for some length of time. The goal is to ultimately transition every Yellow Zone into a Green Zone; the variable is how long it takes to undergo that transition. Each Yellow Zone should have a label that indicates the proposed timeline to transition it to a Green Zone. For example, a T1 designation indicates that that Yellow Zone will be converted to Green within one year. A T2 designation indicates it will be converted to Green within two years, etc. An area labeled T1 is consequently a higher priority than an area labeled T4. If the area poses very little exposure potential to humans or wildlife, then the site may be designated as a Yellow Zone indefinitely, unless it is the goal of the jurisdiction to completely transition all areas to Green Zones.

Now that you have met with your core decision-makers and have decided upon your risk reduction strategy, you can assign a label to each area on your map. **Example:** An elementary school and playground might be targeted for immediate Green Zone designation, since young children have unpredictable behavior and may not use a site as intended (i.e. playing in a landscape bed while waiting for a bus). However, if resources do not allow immediate transition of all areas to Green, then the majority of the high exposure areas will be designated Green. Isolated parking islands, slopes draining away from playing fields, or exterior fence lines can be designated as Yellow Zones T-1 or T-2. High-use performance sports turf may require incremental transitions until resources and technology support management as Green Zones.

**Special Circumstance Zones**
In some cases, a particular area will be manageable as neither a Green nor Yellow Zone. A Special Circumstance Zone applies where the assets of the site are dependent upon pesticides that pose a high human or environmental hazard and for which no effective reduced-risk substitutes are available (golf greens, for example). A Special Circumstance Zone may also include sites where pest management activities pose a particular risk to the applicator, such as airport tarmacs or busy roadways. These sites require the fewest applications and the least disturbance of the site. Every effort should be made to reduce or eliminate SPECIAL CONSIDERATION materials in favor of YELLOW or GREEN materials.
Managing Your Site

After you have color-coded and labeled the map to show which areas will be Green, Yellow, or Special Circumstance Zones, consult the corresponding lists of materials and protocols.

For every type of zone, there are standing exemptions, situations where it would be periodically acceptable to use a material with a higher hazard to protect human health and the value of the asset. We’ve built the exemptions into the method to provide more flexibility to managers in the execution of their jobs.

The Screening Process

The GREEN, YELLOW, and SPECIAL CIRCUMSTANCE MATERIALS LISTS have been developed using common screening protocols adopted by many municipalities throughout the country. The lists are not intended to be adopted in whole, but rather to serve as a reference list for zone management. For example, if a YELLOW MATERIAL contact herbicide is currently being used, the list may identify a GREEN MATERIAL contact herbicide that may be substituted, thus reducing the risk of the pesticide application.

The justification for these lists is described in detail in Appendix B. However, a summary of the list resources is below:

**GREEN PESTICIDES:**
- San Francisco Tier 3, Tier 2 Allowed Use
- Seattle Tier 3
- EPA Registration Exempt

**YELLOW PESTICIDES:**
- San Francisco Tier 2 Limited Use
- Seattle Tier 2

**SPECIAL CIRCUMSTANCE PESTICIDES:**
- San Francisco Tier 1, Tier 2 Limited Use/Special Concern
- Seattle Tier 1

Efforts are on-going to standardize the hazard screening protocol across California, and the PHAER method will adopt whatever system emerges from these activities.
Managing Green Zones

Management of a Green Zone will rely upon materials from the GREEN LIST, which is included in Appendix B. GREEN LIST materials have been thoroughly screened for their safety. The list contains pesticides that have minimal environmental or human health concerns. If used according to the following Green protocols, GREEN LIST materials can be employed seamlessly without any disruption in use of an area.

Because GREEN LIST materials have been carefully screened for human and environmental health concerns, some exposure to them may be tolerated. These materials are mostly comprised of food- or household-grade materials (e.g. corn gluten meal, vinegar, clove oil), biologically based pesticides, or are applied in ways that minimize exposure (e.g. self-contained ant bait stations). As an incentive to encourage the use of GREEN LIST materials, posting requirements are minimal.

Pesticide Communication

A list and description of GREEN LIST pesticides will be posted with a colored zone map of the site at a central location (kiosk, activity board, school office, etc.) with a running list of application dates and materials. Community members who are concerned about pesticide exposure will recognize the reduced impact of Green Zones, and may check the list of applied GREEN materials periodically for more information.

No additional notification or posting will be required of GREEN LIST pesticides, except as required by standing agency policy. The minor posting requirements are an incentive to select reduced-risk materials.

Exemptions

Exemptions are situations where it would be acceptable to use a YELLOW LIST material in a Green Zone. They include:

1. Emergency applications to protect human health and against significant loss of assets.

2. A one-time exemption may be provided by the IPM Coordinator to use a YELLOW LIST pesticide in a Green Zone if ALL of the following conditions are met:

   • A plan must be developed prior to application describing activities that will prevent the need for further YELLOW LIST pesticide applications. (Field staff may be included in

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3 The California Healthy Schools Act of 2000 exempts from posting and notification EPA Registration Exempt pesticides, also included as GREEN LIST pesticides. This Act also exempts pesticides applied in self-contained bait stations and gels/pastes applied in cracks and crevices. Many of these common reduced-risk pesticides are classified by San Francisco as Allowed materials, also included as GREEN LIST pesticides.

4 There is no provision to use a SPECIAL CIRCUMSTANCE material in a Green Zone. If a SC material is necessary, the zone designation should be changed to Yellow.
this planning to maximize their experience and to invest them in long-term IPM strategies).

- Application is followed by a 14-day period during which no access is expected, or access to site is restricted by construction fencing, closed gates, etc.
- Site must be posted for 14-day period to the signage standards of the Healthy Schools Act 5.

3. Specific pest situations, as described in Figure 4.

These steps are established to allow management flexibility without compromising confidence in the high standard of safety provided by Green Zones. If the pest situation cannot be solved with a one-time YELLOW LIST material and habitat modification, the site zone designation should be changed from Green to Yellow.

<table>
<thead>
<tr>
<th>Managing Each Zone</th>
<th>Green Zone</th>
<th>Yellow Zone</th>
<th>Special Circumstance Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approved Materials</td>
<td>□ GREEN LIST</td>
<td>③ GREEN LIST ③ YELLOW LIST</td>
<td>③ GREEN LIST ③ YELLOW LIST ③ SPEC. CIRC. LIST</td>
</tr>
<tr>
<td>Posting Requirements</td>
<td>• List of applied GREEN pesticides posted onsite at a central location</td>
<td>• List of YELLOW and GREEN pesticides posted on-site at a central location • Sign announcing application posted 24 hrs prior until 72 hrs after application (or current policy if more stringent), with a preferred 7-day no-use/limited access window.</td>
<td>• List of YELLOW, GREEN, and SC pesticides posted onsite at a central location • Sign announcing application posted 24 hrs prior until 72 hrs after application (or current policy if more stringent), with a preferred 7-day no-use window.</td>
</tr>
</tbody>
</table>

Figure 3: Managing Each Zone

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5 Sites should be posted to the signage standards, not the timing standards (24/72 hours) of the H.S.A. Application warning sign template: [http://www.cdpr.ca.gov/cfdocs/apps/schoolipm/tools_templates/33_posting.pdf](http://www.cdpr.ca.gov/cfdocs/apps/schoolipm/tools_templates/33_posting.pdf)

Legislative text: “17612. (d) The…designee shall post each area of the…site where pesticides will be applied with a warning sign. The warning sign shall prominently display the term "Warning/Pesticide Treated Area" and shall include the product name, manufacturer's name, the United States Environmental Protection Agency's product registration number, intended date and areas of application, and reason for the pesticide application. The warning sign shall be visible to all persons entering the treated area and shall be posted 24 hours prior to the application and remain posted until 72 hours after the application. In case of a pest control emergency, the warning sign shall be posted immediately upon application and shall remain posted until 72 hours after the application.” [http://www.cdpr.ca.gov/cfdocs/apps/schoolipm/school_admin/main.cfm?crumbs_list=1,8,11#Posting](http://www.cdpr.ca.gov/cfdocs/apps/schoolipm/school_admin/main.cfm?crumbs_list=1,8,11#Posting)
Managing Yellow Zones

Yellow Zones will rely upon materials and protocols from either the GREEN LIST or the YELLOW LIST, which are included in Appendix B. YELLOW LIST materials have also been thoroughly screened. These materials, however, carry some elevated environmental or human health concerns and steps should be taken to reduce exposure to them.

Because YELLOW LIST materials have an elevated level of hazard, more information should be provided to site users. Signs should be posted in the immediate vicinity of the application to the standards of the Healthy Schools Act at least 24 hours in advance of an application and remain posted for 72 hours following the application, or in accordance with a standing agency policy if more stringent.

Further, every effort should be taken to make the YELLOW LIST materials applications when seven days of limited site access is expected following the application. This would allow school sites to apply YELLOW LIST materials during summer, fall, winter, and spring breaks of one week or longer. Such periods of limited use may vary more with public parks; however efforts to schedule during areas of limited activity (or to voluntarily increase signage posting to seven days following application) should still be undertaken.

A record of YELLOW LIST material applications should be kept on-site at a central location (kiosk, activity board, school office) along with a colored zone map of the site.

Pesticide Communication

Signs will be posted in the immediate vicinity of the application to the standards of the Healthy Schools Act 24 hours in advance of an application until 72 hours following the application, or in accordance with a standing agency policy if more stringent.

Exemptions

1. Emergency applications to protect human health and against significant loss of assets.

2. A one-time exemption may be provided by the IPM Coordinators to use a SPECIAL CIRCUMSTANCE pesticide if ALL of the following conditions are met:

   • A plan must be developed prior to application describing activities that will prevent the need for further applications. *(Field staff may be utilized in this planning to utilize their experience and invest them in long-term IPM strategies).*
   
   • Application is followed by a 14-day period during which no access is expected, or access to site is discouraged by construction fencing, closed gates, etc.
   
   • Site must be posted for 14-day period to the signage standards of the Healthy Schools Act.

6 Sites should be posted to the signage standards, not the timing standards (24/72 hours) of the H.S.A. Application warning sign template: [http://www.cdpr.ca.gov/cfdocs/apps/schoolipm/tools_templates/33_posting.pdf](http://www.cdpr.ca.gov/cfdocs/apps/schoolipm/tools_templates/33_posting.pdf)
Managing Special Circumstance Zones

Special Circumstance Zones may be managed with materials from the GREEN LIST, YELLOW LIST, or the SPECIAL CIRCUMSTANCE LIST.

Pesticide Communication

Applications of SPECIAL CIRCUMSTANCE LIST materials should abide by the same communication requirements as YELLOW LIST materials.

Exemptions

The only exemption necessary in the Special Circumstance Zone is in the case of an emergency pesticide application, the warning signs should be posted immediately following application, and should remain in place for 72 hours following the application.

Legislative text: “17612. (d) The...designee shall post each area of the...site where pesticides will be applied with a warning sign. The warning sign shall prominently display the term "Warning/Pesticide Treated Area" and shall include the product name, manufacturer's name, the United States Environmental Protection Agency's product registration number, intended date and areas of application, and reason for the pesticide application. The warning sign shall be visible to all persons entering the treated area and shall be posted 24 hours prior to the application and remain posted until 72 hours after the application. In case of a pest control emergency, the warning sign shall be posted immediately upon application and shall remain posted until 72 hours after the application.”
http://www.cdpr.ca.gov/cfdocs/apps/schoolipm/school_admin/main.cfm?crumbs_list=1,8,11#Posting
Standing Exemptions

The dynamic nature of a landscape system requires additional flexibility with materials. A number of standing exemptions are allowed under the PHAER method to make sure the function and value of a site are not compromised by good intentions.

<table>
<thead>
<tr>
<th>Standing Exemptions: Summary</th>
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<tbody>
<tr>
<td><strong>Situation</strong></td>
</tr>
<tr>
<td>Yellow material in Green Zone</td>
</tr>
<tr>
<td>Emergency</td>
</tr>
<tr>
<td>One time for habitat modification</td>
</tr>
<tr>
<td>Ground Vertebrates</td>
</tr>
<tr>
<td>Specimen Trees</td>
</tr>
<tr>
<td>Significant invasive weed</td>
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<tr>
<td>Special circumstance material in Yellow Zone</td>
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<tr>
<td>Emergency</td>
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<tr>
<td>1 time for habitat modification</td>
</tr>
<tr>
<td>Specimen Trees</td>
</tr>
<tr>
<td>Significant invasive weed</td>
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</tbody>
</table>

Figure 4: Standing Exemptions Summary
Conclusions and Recommendations

The development of the PHAER System came out of a need for a standardized, results-based reduced risk pest management strategy. A year of field-testing has confirmed that the method can be utilized by diverse users to accomplish their pest management goals.

Provided herein is a program that has been successfully tested and may be immediately put into use. This guidebook has evolved through the efforts of many jurisdictions throughout California and is designed to allow self-implementation. However, a multi-jurisdiction, regional approach may simplify adoption and maximize the program benefits.

It is recommended that several regional jurisdictions convene to discuss a coordinated implementation of the PHAER Zone System. The cooperative effort would make material screening, zone assignments, and Best Management Practices in Green Zones more efficient and consistent throughout the area, while also reducing the effort of individual jurisdictions.

This is a new and evolving method that will improve with each new implementation. Efforts are underway to develop a network of PHAER Zone programs to facilitate the common advancement of these risk reduction goals. Please contact the author for more information.
### Monthly IPM Reporting Form

**STATE OF CALIFORNIA**  
**MONTHLY SUMMARY PESTICIDE USE REPORT**

**REPORT PREPARED BY:** [Name]

**DATE:** [Date]

**Distribution:** CAC - Two copies; Report prepared - One copy

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#### Column Labels
- **MANUFACTURER AND NAME OF PRODUCT APPLIED**
- **EPICALIFORNIA REGISTRATION NUMBER FROM LABEL INCLUDE ALPHANUMERIC CODE**
- **TOTAL PRODUCT USED (TOTAL OR USE OF MATERIAL)**
- **NUMBER OF APPLICATIONS**
- **CONCERN OR SITE TREATED**
- **AGREEMENTS TREATED**

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<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
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**DEPARTMENT OF PESTICIDE REGULATION  
PEST MANAGEMENT AND LICENSING BRANCH**