GREEN KIRKLAND PARTNERSHIP

March 2008

# 20-year Forest Restoration Plan

RESOLUTION R-4689

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF KIRKLAND ADOPTING THE 20-YEAR FOREST RESTORATION PLAN.

WHEREAS, the City Council passed Resolution 4396 on August 5, 2003, adopting the 2003 Natural Resource Management Plan; and

WHEREAS, one of the Natural Resources guiding principles is Enhancement and Restoration of the City's Natural Areas; and

WHEREAS, a healthy sustainable forest provides a natural way to filter storm water runoff, remove carbon from the air and provide important recreation opportunities for city residents to connect with nature; and

WHEREAS, the City of Kirkland has 503 acres of publicly owned parklands that include 372 acres of forested natural areas in decline from invasion by non-native plant species; and

WHEREAS, the Department of Parks and Community Services, together with Cascade Land Conservancy developed a 20-Year Forest Restoration Plan to guide restoration of the City's forested natural areas; and

WHEREAS, the Park Board reviewed the 20-Year Forest Restoration Plan on January 9, 2008; and

WHEREAS, the City Council has received from the Park Board a written report and recommendation on the proposed 20-Year Forest Restoration Plan; and

WHEREAS, in regular public meeting, the City Council considered the written report and recommendation of the Park Board.

NOW, THEREFORE, be it resolved that the City Council of the City of Kirkland hereby approves the 20-Year Forest Restoration Plan.

Passed by majority vote of the Kirkland City Council in open meeting this 19th day of February, 2008.

Signed in authentication thereof this 19th day of February, 2008.

Mayor

ATTEST:

City Clerk

## ACKNOWLEDGEMENTS

In 2005, the Green Seattle Partnership established a new method of evaluating and managing urban forests. This effort set the stage for engaging the public in ongoing stewardship of public natural areas. We have modeled the Green Kirkland Partnership on the Seattle program, fine-tuning it to address the needs of our community.

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VISION

# "Conserving and sustaining natural areas for the benefit and enjoyment of current and future generations."

## EXECUTIVE SUMMARY

The City of Kirkland has a considerable wealth of open space, parks and greenbelts. These natural areas strengthen local neighborhoods, improve property values, and make communities more attractive and vibrant. Over half of Kirkland's open space is forested natural area. These urban forests provide numerous "GREEN SERVICES" such as cleaning our air, filtering our water, and preventing erosion.

Historically, development was seen as the biggest threat to natural areas. Public agencies, governments, land trusts and nonprofits have all worked steadily over the years to reduce this threat by purchasing and "preserving" these properties—setting them aside to allow nature to function on its own. However, we are quickly learning that the mindset of *leave nature to itself* does not work in the urban environment. Invasive plants, litter, changes in surrounding land use, pollution, and passive management are reducing nature's innate ability to function naturally. Our urban natural areas are disappearing and with them go critical services such as reduced storm water flows and lower greenhouse gases.

The City of Kirkland is fortunate to have 503 acres of publicly owned parklands that include 372 acres of natural areas. Natural areas are places that have native habitat—forests, streams and associated vegetation, and wetlands and their buffers. Natural areas, as defined by the City of Kirkland's Comprehensive Park, Open Space and Recreation Plan (2001), provide unique natural resources and critical urban wildlife habitat. They are part of offering our citizens a balanced park system through passive recreation such as non-motorized trails, bird watching and interpretive educational programs. Our focus for this plan are the forested natural areas.

### KIRKLAND'S FORESTED NATURAL AREAS

The people of Kirkland care about their forests. Kirkland's parks and natural areas make the city a great place for families and they revitalize neighborhoods. Research conducted by the University of Washington shows that homes adjacent to open space areas have property values 15% higher than other areas (WOLF 2007).

It is easy to see why parks and natural spaces are so valued. Trees sequester carbon—remove it from the atmosphere reducing greenhouse gases and purifying the air. Wetlands and streams naturally retain and filter water, preserving water quality for our drinking supply and for fish and wildlife. Forests throughout the city intercept rain water and slow the rate of stormwater flows. In fact, it has been estimated that if forested natural areas were removed from the Seattle area, roughly $1 billion of constructed infrastructure would have to be built (GREEN SEATTLE PARTNERSHIP 2006).

Our green spaces also have a less measurable, but no less important, impact on the well-being of the community. It is healthy and enjoyable for people to be able to walk in parks and connect with nature: a connection that research shows can improve both mental and physical health.

### WHY DO OUR FORESTED NATURAL AREAS NEED HELP?

Trees in our parks are dying. Many of Kirkland's forested natural areas are dominated by big-leaf maples that are 80 to 100 years old and reaching the end of their lifespans. Historically conifers (Douglas firs and Western red cedars) were removed by logging or development. The evergreens that remain are all about the same age. In addition, the understory in many forested natural areas are heavily infested with invasive plants species such as English and Atlantic ivy, blackberry, and bindweed. These invasives have blanketed the understory and prevented native trees, shrubs, and herbaceous plants from taking hold.

Research based on the Green Seattle Partnership and analyses conducted by Seattle Urban Nature (SUN) indicate that if we do nothing to help our forests, most trees will die within the next 20 years. After 100 years, we will be left with an "ivy desert." Parks will likely be devoid of other natural vegetation and covered only by invasive species. The result is what biologists call an ecological "dead zone." Dead trees and vegetation covered in ivy provide habitat unsuitable to most native wildlife , and valuable ecosystem functions are impared or reduced.

### WE MUST REVERSE THE TREND

*Results of the tremendous volunteer effort at Carillon Woods Park*
*Left is the site before volunteers work. Right is the site after volunteers pulled ivy and prepared the site for planting with native species.*

### THE SOLUTION: THE GREEN KIRKLAND PARTNERSHIP

The Green Kirkland Partnership was developed in response to the crisis in our urban forests. The partnership is a 20-year program that will draw on City of Kirkland resources, volunteers and partners such as the Cascade Land Conservancy to restore city and publicly-owned forests. Under the program, we will 1) restore and maintain our public forest; 2) educate and engage the community in ongoing forest stewardship and 3) ensure sustainability. Elevated by civic and community leadership and the vision and skill of our public agencies, we will in the next two decades restore all of Kirkland's forested natural areas.

An important element of livable, attractive communities is greenspace. The parks, trails, and greenways that give city residents recreation opportunities and a connection to nature help sustain a vibrant urban life. At the heart of the Cascade Land Conservancy's *Cascade Agenda*, a 100-year vision for conservation and economic growth in the Pacific Northwest, is building livable urban communities. With its focus on forested parkland, the Green Kirkland Partnership will play a key role in meeting that goal.

The Green Kirkland Partnership will first focus on forested natural areas. These areas prove easier in the near term to address with volunteer and staff resources. As the program develops, additional natural areas such as wetlands and shorelines will be addressed. In the mean time, these other natural areas will be part of other City of Kirkland programs such as the Shoreline Master Program, Capital Improvement projects, Surface Water Management projects, critical area regulations, and Vegetation Management Plans including the Juanita Bay Park and Forbes Creek Vegetation Management Plans.

### THE PARTNERS

Many groups contribute to the Green Kirkland Partnership, each important to the future of our green spaces. These groups include the citizens of Kirkland, the City of Kirkland, the Cascade Land Conservancy, park visitors, as well as business, youth, faith-based, and nonprofit organizations and the greater Kirkland community.

### THE PLAN

This 20-year strategic plan to restore Kirkland's forested natural areas uses the Green Seattle Partnership as a model. The Green Kirkland Partnership plan, which is presented in this document, outlines the steps necessary to create a sustainable forest restoration program in Kirkland. The plan includes the partnership's goals and objectives and defines the resources needed for implementation.

Planning for this document included an analysis of Kirkland's publicly-owned forested natural areas and the ability of our citizens to contribute as stewards to that effort. We held a public meeting and surveyed the community for input on where and how we should develop the program for restoration and acquisition, and for building volunteerism. The feedback was exceptional, and these ideas have been used throughout the document. These public comments will also further help determine goals and objectives for annual plans.

The document is divided into four basic sections:

1. The Problem: Invasive species–overviews of the threat to Kirkland's forested natural areas
2. The Solution: The Green Kirkland Partnership–description of partners and their roles
3. Implementation: Detailed description of the program
4. Adaptive Management: Brief overview of this concept

The Executive Summary and the appendices offer, respectively, a synopsis of the program and in-depth information on some of the work completed to prepare the plan.

### GREEN KIRKLAND PARTNERSHIP GOALS

The following are Green Kirkland Partnership's goals:

- Restore Kirkland's public forested natural areas by removing invasive plants and replanting native trees, shrubs, and ground covers for the sustainability of the forest and its habitat
- Build the community's capacity for long-term stewardship of the forested natural areas through increased public awareness of and engagement in, protecting, restoring, and helping to maintain healthy forests
- Implement an Environmental Education and Outreach program to educate and engage the community in stewardship projects
- Create a sustainable volunteer stewardship program for ongoing restoration and care of our forested natural areas
- Identify and protect additional forested natural areas that provide important ecological and public benefits
- Establish resources to sustain the program for the long-term
- In the future, extend the program to non-forested natural areas such as emergent wetlands and shorelines
- Educate citizens and landowners about the benefits and value trees provide and the importance of protecting and stewarding trees and forested natural areas

**IMPLEMENTATION**

To track the success of the Green Kirkland Partnership, a "balanced scorecard" (a commonly used business tool) will be used to outline key steps in reaching the desired outcomes of the program. By conducting fieldwork, engaging the community, and obtaining sufficient resources, the 20-year plan calls for restoring 372 acres of natural areas by 2028 and creating a long-term practice of community stewardship.

**WHERE TO ALLOCATE RESOURCES: USING THE TREE-IAGE METHOD**

Prioritizing where to devote resources is necessary to reach the Green Kirkland Partnership goals. In the first 5 years of the plan, restoration will focus on areas of high ecological value and high community interest, and equal distribution across neighborhoods. As community involvement grows and we develop a Natural Area Steward program, more resources will be available for acres that are not the highest priority.

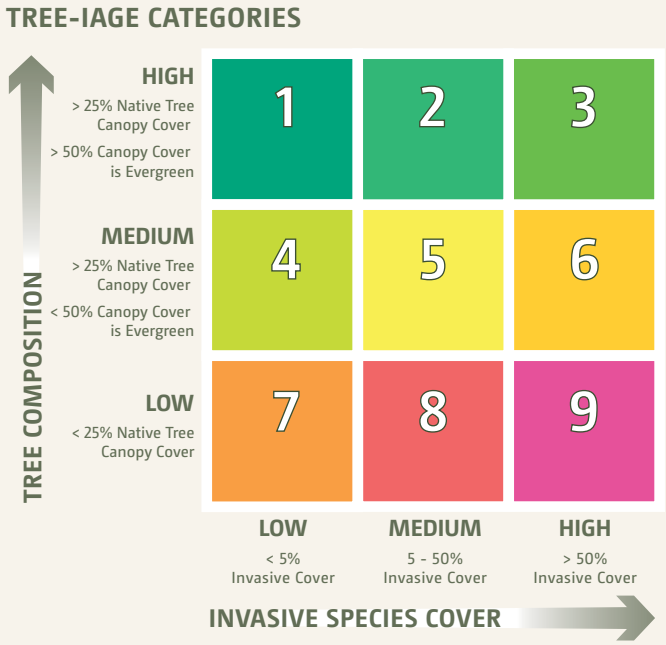
Urban forests are highly variable habitats not adequately managed with typical forestry practices. Given this variability, the Green Seattle Partnership developed an evaluation methodology known as the Tree-iage model.

The Tree-iage model evaluates forested natural areas in terms of forest composition and level of invasive species coverage. As part of the Natural Area Assessment, the Green Kirkland Partnership used the Tree-iage model to evaluate all 372 acres of forested natural areas in Kirkland.

Conifer forests are the target forest composition for restoration because they provide greater long-term benefits than do shorter-lived deciduous trees. Conifer forests were the typical Pacific Northwest forests in our parklands before development. In forest succession, as the pioneering deciduous trees die out at around 60 to 80 years, they are replaced with longer-living conifers that can survive 200 or more years. However, lack of conifer trees in the over- and understory has greatly impaired the forest's ability to move into the next stage of succession. Without a seed bank or a supply of growing conifers, the tree cover of the parks is drastically reduced as the alder and bigleaf maple reach the end of their natural lifespans.

According to the evaluation for the plan, less than 13% of Kirkland's forested natural areas fall under "high" invasive threat. While more than half (60%) of the city's forested natural areas fall within "low" invasive threat, only 10% is classified as "high" value conifer, which is the desired condition for forested natural areas. Most of Kirkland's forested natural areas (60%) are within the "medium" value forest (predominantly native deciduous canopy) categories.

*The Tree-iage model categories indicate forest condition.*



*The size of ivy vines makes it easy to see how this invasive plant brings down trees.*

### COMMUNITY ENGAGEMENT

In 2005 and 2006, the Green Kirkland Partnership logged 1,700 volunteer hours, with 584 participants. In 2007, events held between April and November in Watershed Park and Kiwanis Park included 933 volunteers and contributed nearly 3,000 hours to stewardship.

Community members, community-oriented groups, and corporate sponsors are coming together to rid our parks of invasive species and help sustain them for the future. Community engagement is one of the most rewarding steps in a successful restoration movement. There are many opportunities to engage the community in ivy removal, to raise awareness of the problem, to help neighbors meet each other, to train community members to take action in their own backyards and their local parks, and to develop overall stewardship of natural areas.

At Carillon Woods Park in 2006, volunteers spent 462 hours, an amount equal to a total capital improvement cost of $8,672 based on labor valued at $18.77 per hour (Corporation for National and Community Service 2006). Carillon Woods Park is nearly 9 acres — most of which is yet to be tackled.

It's easy to get overwhelmed by the numbers and the work ahead, but through community engagement we can tackle such a large project.

In the past 10 years, groups like Seattle Parks and Recreation, Cascade Land Conservancy, Washington Native Plant Society, EarthCorps and others have conducted more than 30 pilot projects. From these projects comes knowledge of the specific skills and timing necessary for success and development of best management practices (BMPs) for field work.

### PHASES OF RESTORATION

One of the unique BMPs developed by the Green Seattle Partnership is a 4-phase approach to restoration field work. The approach has been highly successful for several reasons. It recognizes that it takes several years to restore a site, and that restoration activities fall into four major categories: 1) removing invasive species, 2) replanting native plants and secondary invasive removal, 3) plant establishment and, 4) sustaining restoration through maintenance and monitoring. This approach is key for allowing a site to become fully restored for the long-term, not just for one growing season.

| Phase | Task(s) | Range of labor investment (hours/acre) | Average labor investment (hours/acre) |
|---|---|---|---|
| 1 | Invasive plant removal | 50 to 1400 | 700 |
| 2 | Planting and secondary invasive removal | 50 to 200 | 100 |
| 3 | Plant establishment | 25 to 100/year for up to 3 years | 40/year for up to 3 years |
| 4 | Long-term monitoring and maintenance | 0 to 20 annually | 5 annually |

*Field work under the Green Kirkland Partnership will be in phases.*

*Sharon Rodman educates Northwest University students about forest restoration at Watershed Park.*

In Phase 1, the focus is on hand weeding, with an average of 700 person hours needed per acre. Phase 2 requires hand weeding in the spring followed by fall planting (for an average of 100 hrs). By Phase 3, the required total hand weeding, watering, and mulching should average 40 hours for up to 3 years until plants are established. Phase 4 involves stewardship maintenance as necessary, which is an average of 5 hours per acre.

According to Green Seattle Partnership analysis, in 2005 average restoration costs (for crew time only) was $20,000 for a single acre, depending on site conditions and Tree-iage category.

The Green Kirkland Partnership has estimated restoration costs based on the Green Seattle analysis for field work, and included additional staff costs for volunteer coordinator, outreach specialist, field project manager, a six-member field crew, materials and some maintenance costs. It is projected that over the course of 20 years, this staff and field component will cost $5.2 million, which is far more affordable than the cost of simply hiring paid crews to complete the necessary restoration. The discount arises from community volunteers who will contribute one hour for every staff hour invested. Working side by side with volunteers the partnership will leverage an additional $4.4 million in volunteer value over the next 20 years.

Although $5.2 million may seem like a lot, it is an economical means for improving our park system. Purchasing new parklands within Kirkland is expensive—current land values are in the hundreds of thousands of dollars per acre, so $20,000 per acre is great value for the resource created and protected.

| Tree-iage category | Average restoration cost | Acres | Total cost / category |
|---|---|---|---|
| 1 | $2,800 | 13.16 | $36,848 |
| 2 | $9,500 | 22.32 | $212,040 |
| 3 | $15,400 | 1.73 | $26,642 |
| 4 | $9,500 | 139.86 | $1,328,670 |
| 5 | $16,100 | 76.95 | $1,238,895 |
| 6 | $22,000 | 6.84 | $150,480 |
| 7 | $15,400 | 70.56 | $1,086,624 |
| 8 | $22,000 | 4.2 | $92,400 |
| 9 | $27,900 | 36.48 | $1,017,792 |
| | | TOTAL | **$5,190,391** |

*The estimated cost of city staff and crew time for restoring Kirkland's forested natural areas is about $5,200,000.*

### ENSURE SUSTAINABILITY

Long-term sustainability requires thinking and planning for the future. To this end, the Green Kirkland Partnership's 20-year program involves clear annual goals and benchmarks, biodiversity assessment and evaluation, citizen stewardship, tracking and monitoring, and coordination among many partners. Sustained healthy parklands and greenspaces require an investment of our civic organizations and citizens to maintain these assets. The Green Kirkland Partnership envisions parks that are cared for by more stewards and require less formal parks maintenance and operations over time. A community-driven park project can convert an area from a nuisance to a city gem.

### GETTING INVOLVED: LEAVING A LEGACY

The implementation of this plan will require community education and training, volunteer coordination, city and staff resources, and funding. The City of Kirkland cannot restore the forested natural areas alone. Community assistance is needed to turn the current trend of forest decline.

Kirkland residents can do many things to help out:

- Volunteer for a work party
- Find new community partners
- Sponsor events
- Identify priority restoration sites at a nearby park
- Start a local work party group
- Join the Natural Area Steward Program
- Remove invasives from a backyard or right-of-way
- Tell a neighbor or school about the problem and how they can help

Our forested natural areas greatly benefit the people who live in Kirkland. They inspire community engagement and leadership through the opportunities they create for education, meeting neighbors, and training youth groups in how to become better stewards of the environment and natural resources. But above all, our forests create great neighborhoods.

*Kiwanis Park: Earth Day 2007*

# INTRODUCTION

Kirkland's wealth of open spaces, parks, and greenbelts make our neighborhoods active and vibrant and improve property values. More than half of these open spaces are forested natural areas. Our urban forests provide numerous "green" services—they clean the air, filter our water, and prevent erosion. Increasingly, they also involve us in the community. More than 1,000 volunteers have volunteered with Parks and Community Services in some capacity to restore our parks since 2005.

Historically, development has been the biggest threat to natural areas. Public agencies, land trusts and nonprofits like the Cascade Land Conservancy have worked over the years to reduce the threat by purchasing and preserving open space. Many of these properties have been set aside to allow nature to function on its own—free from human impacts. We're quickly learning, however, that the leave-nature-to-itself mindset doesn't work in cities. Invasive species, litter, changes in surrounding land use, pollution, and passive management all reduce nature's innate ability to function naturally. Urban natural areas are disappearing and with them the land's ability to reduce stormwater runoff and absorb greenhouse gases.

A major factor in the decline is the presence of non-native plant species like English ivy (*Hedera helix*) Himalayan, and evergreen blackberry (*Rubus armeniacus, R. laciniatus*), Scot's broom (*Cytisus scoparius)*, and bindweed (morning glory) (*Convolvulus arvensis*). These invasive weeds prevent native trees and shrubs from reseeding by blanketing the understory, where they outcompete native plants. Invasives like English ivy climb into treetops where their weight can topple trees. In the Puget Sound region, the problem is compounded by a forest canopy that is now mostly big-leaf maple (A*cer macrophylum*), and red alder (*Alnus rubra*) at the end of their lifespans. As these deciduous and other native trees succumb to age, no new seedlings are there to replace them, resulting in a net loss of forest.

Our city's natural areas require human intervention to prevent the magnitude of habitat loss forecasted for Kirkland. To promote the community participation needed to do this, the City of Kirkland has partnered with the Cascade Land Conservancy to develop a 20-year, citywide forest restoration and stewardship program known as the *Green Kirkland Partnership*.

## WHY WE NEED A GREEN KIRKLAND PARTNERSHIP

By 2030, an additional 27,430 people (a 13% increase) and 13,330 new households (20% increase) are expected in Kirkland (Puget Sound Regional Council 2006). One of the challenges facing our city is how to accommodate this growth while maintaining a strong economy and attractive community. Kirkland has used higher density housing as one way to handle growth. Yet increased condominium and multi-family development means less personal access to open spaces. In years to come, these residents will have an even greater need for parks than will residents of single-family homes.

Parks, trails, and greenways give people who live in cities recreational opportunities and a connection to nature that helps sustain a vibrant urban life. These greenspaces are an important element of livable, attractive communities. Urban developments like condos, townhouses, and office parks in Kirkland are considered more desirable when open spaces are conveniently located (bike or foot access). Still other studies show property values can be 15% higher for homes adjacent to greenbelts.

An important element of livable, attractive communities is greenspace. At the heart of the Cascade Land Conservancy's Cascade Agenda, a 100-year vision for conservation and economic growth in the Pacific Northwest, is building livable urban communities. With its focus on forested parkland, the Green Kirkland Partnership will play a key role in meeting that goal.

Research shows that trees are critical capital assets, just like roads, bridges and schools. Says , James R. Lyons, executive director of the Casey Trees Endowment Fund. "Trees are a significant investment that provide value to cities and residents...people don't think about them until they're gone."

In 2003, Kirkland set a goal to increase canopy cover by 40% (City of Kirkland 2003). Recognizing the importance of trees as public assets, the city identified the need for a comprehensive public tree management program. In 2006, The City of Kirkland joined the Cascade Land Conservancy to form the Green Kirkland Partnership. The partnership aims to restore Kirkland's publicly owned forested natural areas over the next 20 years. The strategies we offer to meet this goal are simple. With the help of Kirkland's volunteers, and the experiences of our sister program, the Green Seattle Partnership, we will create a model for forest restoration. In the process, the Green Kirkland Partnership will create a legacy of healthy forests, beautiful neighborhoods, and an engaged citizenry.

## BENEFITS OF A GREEN KIRKLAND PARTNERSHIP

The benefits of restoring Kirkland's forested natural areas are numerous. Forests give us a higher quality of life through a cleaner environment, reduced stormwater runoff and erosion, and the ability to enjoy nature close at hand.

*Benefits of a Sustainable Forest*

| Benefit | How Forests Work for the City |
|---|---|
| **Reduces Stormwater Runoff** | Tree canopies reduce the fast rate at which rain falls to the earth. Water enters the ground more slowly under trees and is better absorbed and filtered into groundwater than when it runs off surfaces. Conifers and other evergreen plants and trees grow year-round. This process moves water up from the ground, through plant tissues, and into the atmosphere as water vapor. The amount of water in the top 2 feet of the soil is reduced, leaving more room for additional rainwater to flow into the soil. |
| **Improves Water Quality** | Plant roots absorb soil water that contains both nutrients and pollutants. Some pollutants are transformed by plants through metabolism. Others are trapped in woody tissues and released only when a tree decomposes. |
| **Reduces Erosion** | As the canopy of trees slows the speed of rain falling on the earth, that rainwater has less energy to displace soil particles. Soils under a canopy and the thick layer of leaf litter are protected from the erosive energy of rainwater. |
| **Increases Property Values** | Homes that back up to greenbelts may be valued at up to 15% more than comparable homes not near a park. Forested natural areas provide residential properties an adjacent natural area for walking and passive recreation activities such as bird watching. |
| **Improves Air Quality** | Plant leaves absorb carbon dioxide and produce oxygen through photosynthesis. The surface of leaves traps airborne dust and soot. |
| **Makes Communities More Attractive** | Vegetation provides visual relief from the built environment. Trees and stretches of parkland can soften the angular edges of buildings, while the natural tones of bark and foliage are easy on the eyes. |
| **Reduces Global Warming** | Trees absorb greenhouse gases like carbon dioxide and store the carbon in woody tissues. Trees also modify "albedo," the reflectivity of sunlight on the earth's surface. The combination of the two effects can make the urban forest a remarkably cool spot in the urban heat island. |
| **Provides Wildlife Habitat** | Wild animals have unique requirements for food and shelter. Raccoons and crows adapt well to urban environments. Many native species do not. They require a variety of plants and multiple layers of canopy to forage and nest. |
| **Buffers Noise** | Tree canopies dampen sound by intercepting sound waves. |

## 1. THE PROBLEM: INVASIVE SPECIES

Kirkland's' forested natural areas are in decline. After decades of invasion by non-native species, many of the city's natural areas are overrun by aggressive non-native weeds. In many areas, the only thing left is an unsustainable condition that will not allow native species to grow back on their own. The result is what biologists call an ecological "dead zone" of dead trees and vegetation buried in ivy and other invasive plants.

*English ivy shown here and other invasive species are creating "dead zones" in our urban woods.*

*Figure 1. City of Kirkland open space and park ownership*

## KIRKLAND'S NATURAL AREAS

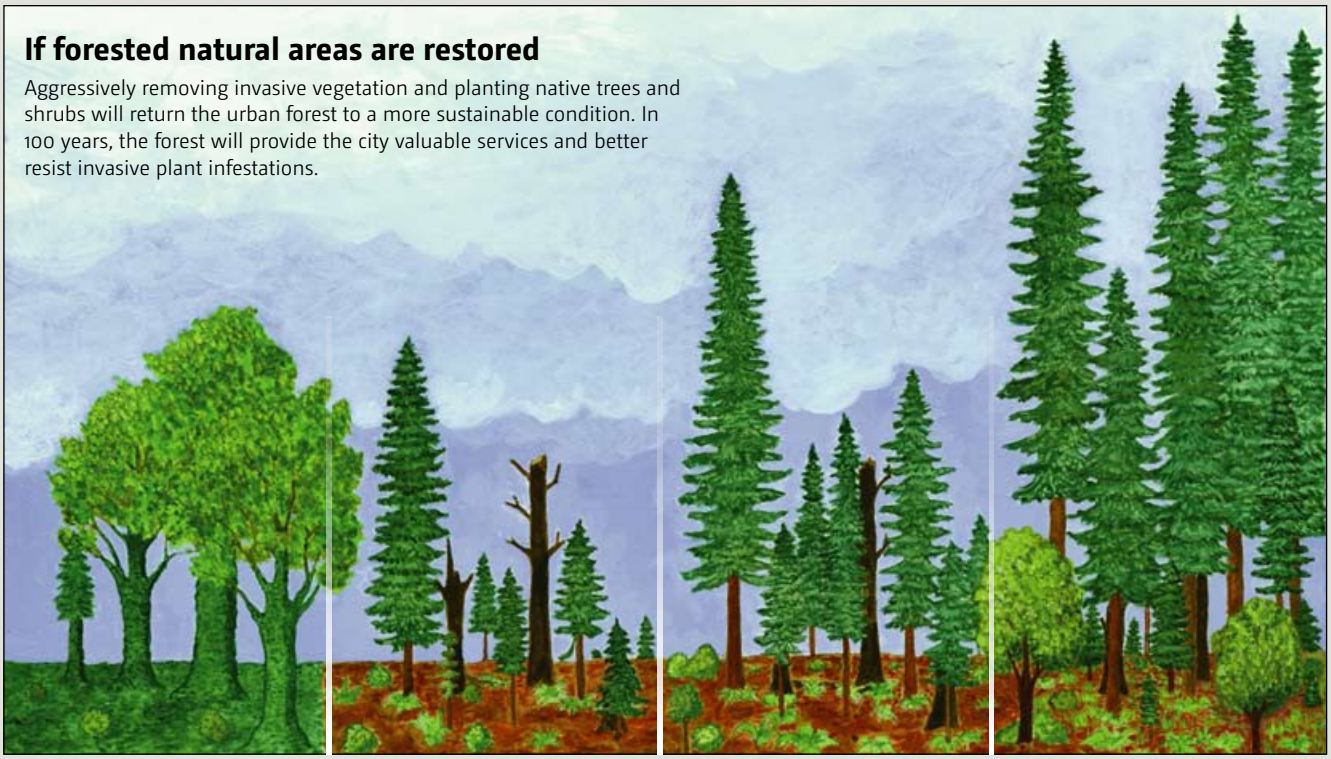
Natural areas include forests, lakes, shorelines, wetlands, streams and buffers. These undeveloped properties support habitat for aquatic and terrestrial plants and animals and maintain natural ecological processes such as water quality, air quality, and stormwater control. Natural areas maintain distinct ecological communities that are becoming increasingly rare in urban areas.

Where appropriate, natural areas give residents recreational opportunities including trails, wildlife viewing, interpretive educational and cultural programs, and signage to learn about the environment and local history.

Kirkland's publicly-owned forested natural areas cover 372 acres of the Park and Community Services department's 503-acre ownership. This forest is fragmented and broadly dispersed among small pocket parks such as Brookhaven (~1 acre) to large woodlands like Watershed Park (73 acres) Some of Kirkland's forests even lie outside of the city (Figure 1).

Forested natural areas include public parks with greater than 25% tree canopy and are not maintained, mowed or landscaped (Figure 2). Maintained parks such as ball fields, playgrounds, beaches, orchards or open fields provide important open space benefits, but are not considered appropriate for forest restoration.

*Figure 2. Two examples of forested natural areas in Kirkland*
*Left is Watershed Park, which is appropriate for forest restoration. Right is the highly-maintained Highlands Park, which is inappropriate for forest restoration.*




**PRESENT**
Forested natural areas are dominated by deciduous trees, such as big-leaf maples and alders, nearing the end of their life. After decades of neglect, non-native invasive plants such as English ivy are smothering native vegetation and weakening native trees.

**IN 20 YEARS**
Through restoration efforts and long-term maintenance, the non-native plants are removed. Native groundcovers, shrubs and evergreen trees such as Douglas firs and Western red cedars and hemlocks are planted.

**IN 50 YEARS**
As the evergreen trees grow, they shade out sun-loving invasive plants such as blackberry. Native understory plants thrive.

**IN 100 YEARS**
With continued stewardship, the maturing forest requires less care and provides greater benefits to the city.

## THE SUSTAINABLE FOREST

Historically, large, long-lived, conifer forests dominated the Pacific Northwest. These trees included Douglas fir, Western red cedar and ultimately Grand fir and Western hemlock.

Conifer forests covered much of the land base and often extended to the edge of Lake Washington. Early settlers first disturbed these natural areas when they cleared the land for development or views, channelized and piped streams and seeps, and drained or filled wetlands.

Today, some of these cleared areas have been re-colonized by short-lived, fast-growing native deciduous species like big-leaf maple, cottonwood, willow and red alder. Without further disturbance Douglas fir and Western red cedar will re-establish and move the forest back to a typical Pacific Northwest condition. This process, known as succession, typically takes about 100 to 150 years. In the Green Kirkland Partnership, we use this historical forest condition as a reference habitat type for restoring Kirkland's forested natural areas.

## WHY KIRKLAND'S FORESTED NATURAL AREAS ARE DECLINING

Five basic problems prevent the city's forested natural areas from sustaining themselves as native habitat:

1. Fragmentation
2. Declining canopy
3. Invasive-dominated understory
4. Native species struggle to regenerate
5. Inadequate funding for natural area management/ restoration

### *Fragmentation*

Kirkland's forested natural areas are widely dispersed throughout the city due to development. Many are isolated and lack connectivity to other natural areas. Fragmentation often results in habitat degradation and loss. It poses significant challenges to the diversity of native plants and wildlife species that use several habitat types throughout their life stages. Fragmentation also increases the exposure of forested natural areas to human impacts, pollution, and invasive species.

### *Declining Canopy*

Several factors contribute to the loss of Kirkland's forest canopy in parks and open spaces. Deciduous trees make up a disproportionate share of the forest canopy. Based on an assessment of Kirkland's forested natural areas by International Forestry, pioneering alder and big-leaf maples nearing the end of their lifespan now comprise more than **90%** of Kirkland's natural area forest canopy.

The high proportion of mature deciduous trees in the canopy will continue to rapidly decline. Most over-mature deciduous trees are either dead or dying, allowing sunlight to reach the ground surface. Because most invasive species are more aggressive in full sun, the loss of canopy has allowed invasive plants to become the dominant species in many areas of Kirkland's forested natural areas.

Removal of vegetation along many riparian areas including streams, wetlands, and their buffers has resulted in a complete loss of native species cover. Many streams are now buried under a canopy of invasive species such as blackberry, ivy, or reed canary grass. Loss of native vegetation along our aquatic habitats results in significant impacts on stream temperatures and water quality that influence aquatic species such as salmon.

### *Invasive-Dominated Understory*

In the understory, invasive plants now out-compete native Northwest plants. Invasive species cover the ground and block native species from sprouting. Especially alarming is English ivy. English ivy, through a combination of root and leaf competition and sheer mass, can kill deciduous trees within 20 years. Ivy and morning glory look green and harmless, but they quickly spread from an understory blanket into the tree canopies, covering leaves and blocking photosynthesis. Their weight alone is enough, over time, to break branches and stunt growth. Meanwhile, blackberries and Scot's broom work in the understory to crowd out ferns and other native species.

Currently, invasive plant growth outpaces the stewardship available to control it. Without intervention, the result is slowly dying forested natural areas with little or no chance of returning to a native ecosystem.

*English ivy destroys trees through sheer mass and competition for sunlight.*

## If forested natural areas are not restored

Aggressive non-native vegetation will dominate the urban forest unless removed. In 100 years, the trees will be gone. City officials estimate that potentially billions of dollars in services such as stormwater control will be lost.

**PRESENT**
Forested natural areas are dominated by deciduous trees, mainly big-leaf maples and alders, nearing the end of their life. After decades of neglect, non-native invasive plants, such as English ivy and wild clematis, cover the ground and grow up into the tree canopy.

**IN 20 YEARS**
Invasive plants outcompete and grow over existing native vegetation, blocking the sunlight plants and trees need to thrive. English ivy now dominates the tree canopy, making the trees weak, top heavy and susceptible to windfall. Eventually, trees die or fall over.

**IN 50 YEARS**
The trees are gone. Only a few native shrubs struggle to survive the stress of competition with invasive plants.

**IN 100 YEARS**
The forest is destroyed. Native trees can no longer establish on their own. We are left with a dense "ivy desert." Very few plant species can live, and forest biodiversity is gone. Such conditions provide homes for rats and scarce habitat for more desirable urban wildlife.

### *Native Species Struggle to Grow Back*

Native species regeneration—especially conifers—is greatly limited in Kirkland's parks. Several factors contribute to this problem. The loss of forested areas due to logging and development left a limited seed source for native trees. Invasive plants reduce native plant regeneration by out-competing or smothering seedlings. In addition, urban disturbances such as development, landscaping, and clearing for views, trails, and light have played a significant role.

### *Inadequate Resources for Natural Area Management*

In the past, resources for natural area management have been limited. Through benign neglect, natural areas were left to themselves under the mistaken assumption that they were self-sustaining. This passive management has directly led to the current problem. Until recently, the idea that natural areas take care of themselves meant that limited funds were budgeted for planting native species or removing invasive plants.

Natural succession cannot occur without a conifer seed base and healthy understory plants, which in Kirkland are currently missing or greatly impaired. The level of need far exceeds current staffing and funding.

## CURRENT STAFFING

The Parks and Community Service department has eight full-time employees (FTE) horticultural staff members. Together with seasonal workers and students, these eight staff do most of the on-the-ground parks maintenance—mowing, restroom cleaning, athletic field maintenance, litter and other general duties. Only one staff member, the Senior Grounds and Urban Forester, works to remove invasive plants and restore natural habitats. This FTE spends less than 1% of the position on this task.

The Park Operations Manager is the primary contact for environmental stewardship and restoration of Kirkland parks. This FTE oversees organization and guidance of volunteers.

In April 2007, Parks hired an Education and Outreach Specialist to help increase volunteer participation and investment in natural area restoration through the Green Kirkland Partnership. This staff member is a temporary (1 year) 0.5 FTE position.

From the Planning Department, the Urban Forester provides a broad range of city activities, but only about 5% of the 0.5 FTE position is for natural areas. Most of the Urban Forester's time is dedicated to permitting and private property matters.

The Public Works Department is responsible for habitat restoration along city streams and other significant water bodies, such as lakes. Most staff in the Public Works Department incorporate natural area issues in their work. However, currently no staff is entirely devoted to natural areas.

The Public Grounds Division is responsible for removing invasive plant species along city trails, paths, and rights-of-way. Staff currently consists of three FTE staff, one temporary FTE, a 0.5 FTE field arborist, and several seasonal workers. The arborist works with trees in rights-of-way and on public grounds (fire stations, City Hall, and turf medians).

The Public Grounds Supervisor is responsible for establishing stewardship practices in city rights-of-way and public grounds. Stewardship practices include removing invasive plants, limiting pesticide use and selecting the appropriate plants. There is no dedicated staff position to stewardship of forested natural areas.

## FUNDING

In addition to the City's general fund—which supports current staffing levels—funding has been dedicated through the 6-year capital improvement budget of $50,000 annually to Green Kirkland Partnership program management and restoration activities.

Additional funding for natural area restoration is derived from grants such as the King Conservation District, Conservation Futures, Washington Wildlife and Recreation Coalition (WWRC) and the King County Department of Natural Resources. While grant funding is adequate for specific projects, these sources are not stable, long-term funding sources that will allow Kirkland to carry out a long-term stewardship and restoration program.

## VOLUNTEERS

Since 2005, 1,500 volunteers have contributed 4,700 hours to natural area restoration. These volunteers have pulled invasives including ivy, holly, Scot's broom and blackberry, picked up litter, planted native species, and helped with other maintenance tasks. At the national volunteer rate of $18.77 per hour, volunteer hours account for $88,219 in labor over the last 3 years. However, with 372 acres of forested natural areas to restore, invasive species growth will quickly outpace these efforts. Volunteer hours must significantly increase if we are to reverse the decline of Kirkland's forests over the next 20 years. With long-term community investment, our forested natural areas can be restored and sustained long into the future as a high-quality capital asset.

# 2. THE SOLUTION: The Green Kirkland Partnership

"Conserving and sustaining natural areas for the benefit and enjoyment of current and future generations.

## OUR MISSION

The mission of the Green Kirkland Partnership is to restore all of Kirkland's forested natural areas to a sustainable—invasive free—urban forest condition and build an aware, energized community in which individuals, neighborhoods, nonprofits, businesses and city government work together to protect and maintain Kirkland's forested natural areas for current and future generations.

Inspired by the Green Seattle Partnership, the City of Kirkland asked Cascade Land Conservancy to partner with it to help make the city's vision of a sustainable, healthy forest a reality. In 2005, Kirkland began restoration in earnest by launching Green Kirkland Partnership volunteer events to attract residents to begin restoration and heighten community awareness of the problem. The city hosted work parties to remove ivy the first Saturday of each month through the spring and summer of that year. These volunteers contributed 1,100 hours.

Since then, the Green Kirkland Partnership has accomplished the following:

- Initiated restoration projects at Carillon Woods and Watershed Park
- Worked with Kiwanis Park neighbors and the Market Neighborhood Association to develop and conduct regular monthly work parties at Kiwanis Park
- Met with local nonprofit organizations, schools, and businesses to build community engagement
- Increased volunteer turn out at work parties from 1,700 hours in 2005/2006 combined to 3,000 hours in 2007
- Hired a Parks Environmental Education and Outreach Specialist to facilitate outreach, recruit and manage volunteers, coordinate a Green Kirkland Partnership staff team, liaise with other City of Kirkland departments, and arrange volunteer events
- Developed a summer youth program, Teens Assisting Sustainable Kirkland (TASK), to hire youth to work with parks ground crews. TASK worked to restore natural areas, particularly the removal of invasive plants at Juanita Bay Park. Five teens were employed in the summer of 2006

## OUR GOALS

To make our vision a reality, the Green Kirkland Partnership plans the following:

- Restore Kirkland's public forested natural areas by removal of invasive plants and replanting of native trees, shrubs, and ground covers for the sustainability of the forest and its habitat
- Build the community's capacity for long-term stewardship of the forested natural areas through increased public awareness of and engagement in protecting, restoring and helping to maintain healthy urban forests
- Implement an Environmental Education and Outreach program to educate and engage the community in stewardship projects
- Create a sustainable volunteer stewardship program for ongoing restoration and care of our forested natural areas
- Identify and protect additional forested natural areas that provide important ecological and public benefits
- Establish resources to sustain the program for the long-term
- In the future, extend the program to non-forested natural areas such as emergent wetlands and shorelines
- Educate citizens and landowners about the value trees provide and the importance of protecting and stewarding trees and forested natural areas

By 2028, the Green Kirkland Partnership will have restored all 372 acres of forested areas, increased annual volunteer hours to 14,000 at the program's peak, created a Natural Areas Steward program to support and recognize volunteers, protected additional natural areas through public ownership and private landowner stewardship, and increased funding and staff resources to sustain the program. Building on the great work the partnership has already done, our city will become a spectacular place to live, work and play for generations to come.

## MANAGEMENT

The Parks and Community Service department, with oversight by the Parks Board, will have primary responsibility for implementation of all Green Kirkland Partnership activities. Additional support and coordination may be provided by an interdepartmental Green Team and a potential Citizen Advisory Committee.

### *Parks Board*

The City of Kirkland Park Board is an advisory board appointed by the city council. It is made up of eight citizens and includes one youth member that is appointed by the City Council to the board. The Parks Board will serve as the main oversight committee for the Green Kirkland Partnership.

### *Green Team*

The City of Kirkland's Green Team (formerly known as the Natural Resource Management Team) is a coordinating committee that reviews and streamlines all environmental and restoration activities between City of Kirkland departments and programs. Green Team work includes environmental education projects, salmon protection, vegetation management guided by the city's Natural Resource Management plan (2003) and the Green Kirkland Partnership. Staff from Parks and Community Services, Planning and Community Development, Public Works, Finance, Information Technology and the City Manager's Office are all represented on the Green Team.

### *Advisory Committee*

The city is reviewing the possible formation of a Citizen Advisory Committee. This committee would provide guidance for sustainability and natural resource management for the Green Team. The committee would also be a complimentary advisory team to oversee and guide the work of the Green Kirkland Partnership through annual planning, budgeting, and implementation. The roles and responsibilities of the committee will be worked out in the future, but it is recommended that at least one Green Kirkland Partnership Natural Area Steward represent community volunteers on the committee.

## ROLES AND RESPONSIBILITIES

### *City of Kirkland*

#### PARKS AND COMMUNITY SERVICE

The Parks and Community Service department is ultimately responsible for maintaining and restoring the city's forested natural areas. Parks' staff and volunteer coordinators are directly involved in the Green Kirkland Partnership. Parks will provide the partnership with technical expertise and a skilled workforce. Parks also plans restoration work and sets annual restoration goals and site priorities. They will perform restoration and maintenance activities in forested natural areas and where appropriate fund commercial crews to supplement this work.

The Parks' Coordinator and Education and Outreach Specialist positions will promote the partnership throughout the community to recruit volunteers to volunteer events. Parks will support volunteers with education materials, training, field supplies and equipment, and will acknowledge volunteers for their contributions.

#### PUBLIC WORKS

##### SURFACE WATER UTILITY

Surface Water Utility (SWU) goals are to reduce flooding, improve water quality, and restore aquatic habitats in each watershed. The SWU is part of the Public Works Department. SWU interests intersect with Green Kirkland Partnership forest restoration efforts that directly contribute to water quality, stormwater management and habitat, especially near streams. Parks will collaborate with SWU when planning restoration events along streams. In return, SWU will provide guidance and support, continue public outreach and education on the importance of forested natural areas to water quality and other Public Works programs, engage volunteers in a water quality monitoring program for lakes and streams such as Forbes Lake, Totem Lake, and Forbes Creek, and conduct city-funded riparian and fish passage habitat improvements.

##### PUBLIC GROUNDS DIVISION

The Public Grounds Division (PGD) will remove invasive plants in city rights-of-way, and establish a proactive tree management program. PGD will work with the City of Kirkland's GIS

Department to manage the city's Tree Inventory, which is an inventory of every street tree in city rights-of-way, and includes tree species, tree condition and health, and a monetary value for each street tree. The 0.5 FTE Field Arborist will help evaluate and restore trees within public parks and within the city's rights of way.

### *Cascade Land Conservancy*

Cascade Land Conservancy will continue to work in partnership with the City of Kirkland and the community to advance the goals and vision of the partnership. To meet these goals, CLC will continue to serve as a resource for staff and volunteers. CLC will advise implementation of the 20-year plan and development of annual plans, offer technical training and support for staff and volunteers, recruit volunteers by advertising volunteer events, and provide networking opportunities for funding and resource support among other Green City partners. As needed, CLC will also provide assistance with open space acquisitions.

### *Volunteers*

Natural Area Steward groups and community volunteers are the core labor force for restoration and maintenance of natural areas. They bolster community interest and support for local parks and greenways through their advocacy. The Green Kirkland Partnership will work with community members to provide field leadership training and do site planning. Leaders trained for the program may be called "Natural Area Stewards."

### *Nonprofit Organizations*

Conservation work crews—EarthCorps, Washington Conservation Corps, and Volunteers for Outdoor Washington—have played a significant role in urban natural area restoration. These organizations provide service-learning and job-training opportunities for program participants. For the Green Kirkland Partnership, groups like these and other private landscape crews will work on a contract basis in three capacities:

1. Perform restoration work in areas that are not or cannot be served by volunteers, or for which the city does not have adequate staff capacity
2. Organize or lead volunteer restoration events
3. Facilitate outreach to engage other youth, civic, business, and community organizations

### *Commercial Crews*

Private landscape and habitat restoration crews will be hired as budget and need allow. The partnership is committed to developing a well-trained, effective "green-collared workforce" that will provide living wage employment for restoration practitioners. These crews will focus on difficult sites that require work that is more technical. Currently, only a limited number of contractors provide these services.

### *Funders*

Corporate sponsors, foundations, and private donors will play a critical role in the Green Kirkland Partnership. Corporate sponsors will have significant opportunity to support the partnership. Employees of our corporate sponsors may participate in large volunteer restoration events each year, providing a substantial additional labor pool. Sponsors will also be asked to make other contributions as appropriate. For example, they may be called upon to donate supplies or services that can be provided through their companies. In return, these corporations will have the opportunity to be stewards of their community. Companies can offer their employees both an outlet for community engagement and the chance to be associated with a leading urban natural area restoration effort.

### *Private Landowners*

Since private land accounts for more than half of the ownership within the city limits, private landowners are an important match to the efforts that occur on public lands. Efforts that educate landowners about the benefits of natural vegetation including trees, and the problems of invasive species like English Ivy are key to preventing continued spread of these invasives. Working with landowners through education programs or incentives will help the partnership generate a community that cares about the well being of natural areas on their own lands, and in our public spaces.

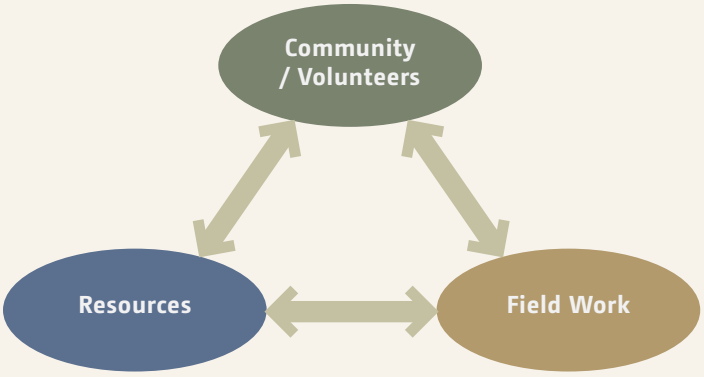
# 3. IMPLEMENTATION

Learning from the Green Seattle Partnership, Kirkland also uses a "**Balanced Scorecard**" approach. The Balanced Scorecard is a widely-used business tool that helps both develop a strategy and monitor progress as that strategy is carried out. The scorecard balances profits, customer satisfaction, and employee welfare by listing goals and quantifying measures that indicate if actions meet the goals. The Balanced Scorecard helps define and align the efforts of complex organizations to achieve targeted outcomes. With these metrics, management can track the success of many activities over the 20-year course of the project.

The traditional layers (perspectives) of the Balanced Scorecard focus on increasing shareholder value but have been modified to reflect the ultimate goal of **a healthy, sustainable forest.** We layered the key elements of the 20-year plan: field work, resources, and community. Our objectives within each layer are outlined in a **Balanced Scorecard Strategy Map**, which shows how activities can have reciprocal relationships. For example, volunteers are critical to field work and demonstrating progress in field work is essential to motivating volunteers. Similarly, the partnership needs community support to secure the financial and volunteer resources to restore and monitor sites over the long term. By mapping critical activities in layers that build on each other (field work, resources, community), we can coordinate efforts so that activities are mutually supportive.

The ability of managers to track progress over the next 20 years allows program challenges to be identified early. In response, managers can modify or adapt the program to address and resolve the challenges.

*Balanced Scorecard Strategy Map*




*Balanced Scorecard Elements*

| | |
|---|---|
| Outcomes | The desired outcomes of the 20-year program:<br>Increase canopy cover and native species communities by restoring 372 acres of Kirkland's natural areas by 2028<br>Build and maintain community capacity for long-term stewardship<br>Create and implement an environmental education and outreach program<br>Protect additional natural areas that provide ecological and public benefits<br>Establish resources to provide long-term maintenance and ensure sustainability |
| Field Work | How we will carry out an on-the-ground strategy to restore and maintain 372 acres of forested natural areas and acquire additional natural areas |
| Community | How we will maintain an engaged, educated community, and prepared volunteer workforce over the long term<br>How we will engage and educate private landowners to match public efforts on private lands |
| Resources | How we will garner sufficient financial, paid labor, and volunteer resources to implement the strategy |

## 3.1 FIELD WORK

Field work is at the heart of the Green Kirkland Partnership. Field restoration will target removing invasive plants and incorporating native vegetation where appropriate. To plan accordingly, we first evaluate a site, and then prioritize our restoration practices. This approach can be used at both the city and site levels. For this plan, the analysis has been conducted at the city scale.

### *Objective 1: Evaluate Forest Conditions at the City Scale*

The broad variation in forest habitat types in urban forests poses numerous challenges to forest management. To address such variation, the Green Seattle Partnership developed a new approach, the Tree-iage model, to assess habitat conditions in urban forests (Green Seattle Partnership 2006). The Tree-iage model was created for urban forest conditions. It can be used at multiple scales to assess forest stand condition: from citywide to individual parks. The model is based on the medical triage concept and uses forest stand condition and invasive species cover to prioritize restoration.

The Green Kirkland Partnership used the Tree-iage model to evaluate 372 acres of forested natural areas under City of Kirkland ownership. Forested natural areas include parks and open space with greater than 25% tree canopy and that are not maintained, mowed, or landscaped. Maintained parks such as ballfields, playgrounds, beaches, orchards or open fields provide important open space benefits, but are not considered appropriate for forest restoration. Areas not included in the partnership, such as rights-of-way, street trees, shorelines or properties with Parks and Community Services' maintenance contracts (Woodinville Water Tower Park and Totem Lake) are managed through other city or King County programs.

#### METHODOLOGY

Forest stands were initially typed within each public open space/park parcel using orthophoto interpretation. Each parcel was separated into the following types: Water, Hardscape, Native, Disturbed, or Landscaped. These preliminary types were digitally mapped using GIS. Each separate type within a parcel was given a unique number to be used for field verification and data tracking.

This data was then ground verified in the field and additional data collected for overstory dominant and secondary species and size, ground dominant and secondary species, primary and secondary invasive species, and notes describing each type. Each type was then given a rating in the Tree-iage matrix based on the field inspection.

#### TREE-IAGE MODEL: A NEW MANAGEMENT TOOL FOR EVALUATING URBAN FOREST CONDITION

Like forest conditions in Seattle, forest stands in Kirkland vary greatly. Some stands may contain mature conifers with a rich collection of Northwest native understory plants. Other stands contain mature alder and big-leaf maple with significant non-native blackberry and ivy patches in the understory. Given this wide variation, the **Tree-iage model** was developed to better assess broad conditions.

The Tree-iage model assessed forest stand condition, based on tree composition and invasive species cover. Without disturbance, the tree composition of Kirkland's parks should be dominated by mature conifers and lack any invasive species. These high-quality forest stands would represent a typical Pacific Northwest forest. Historically, these forests consisted of conifers with a medium-to high-density canopy, mixed age classes, and species diversity. These forests provide much greater ecological benefits than do shorter-lived pioneering forests of big-leaf maple and red alder. Some habitats—wetlands, riparian corridors, or steep slopes—may not be appropriate for conifers, and another species composition would be preferred. This is, however, a gross analysis based upon large-scale data. Site-by-site analysis will be done as work progresses to assure the most appropriate species composition are chosen for each site.

Forest stand condition was assessed by the extent of canopy cover per park ownership using aerial orthophoto interpretation in a GIS system. Three tree composition categories were used (Figure 3).

- High value forests are those where mature, native evergreen species dominate the canopy with more than 50% native conifers, madrone or forested wetlands canopy cover
- Medium value forests are those that have more than 25% native tree canopy cover, but less than 50% cover by conifers or other native evergreens
- Low value forests are those that are forested, but have less than 25% native tree canopy cover

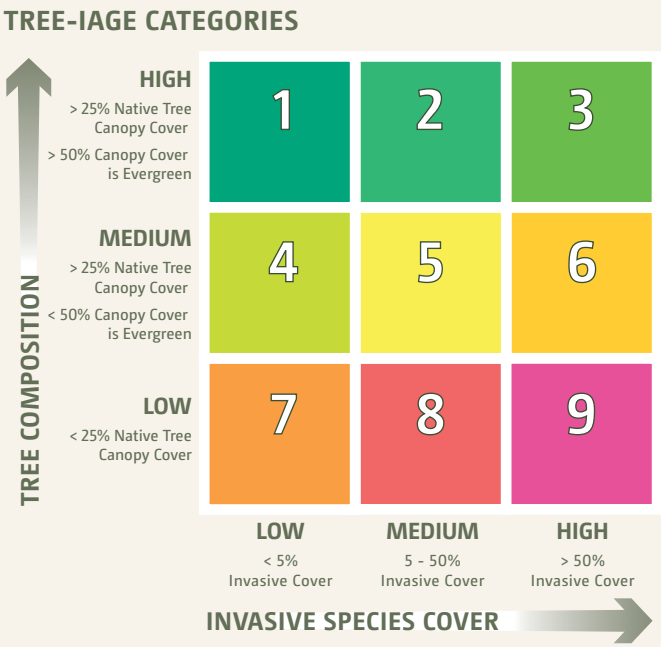
The second component of the Tree-iage analysis includes invasive species cover within these urban forests. Invasive species cover was surveyed in the field according to the following coverage levels:

- **High Threat:** more than 50% invasive cover
- **Medium Threat:** 50% invasive coverage
- **Low Threat:** less than 5% invasive coverage.

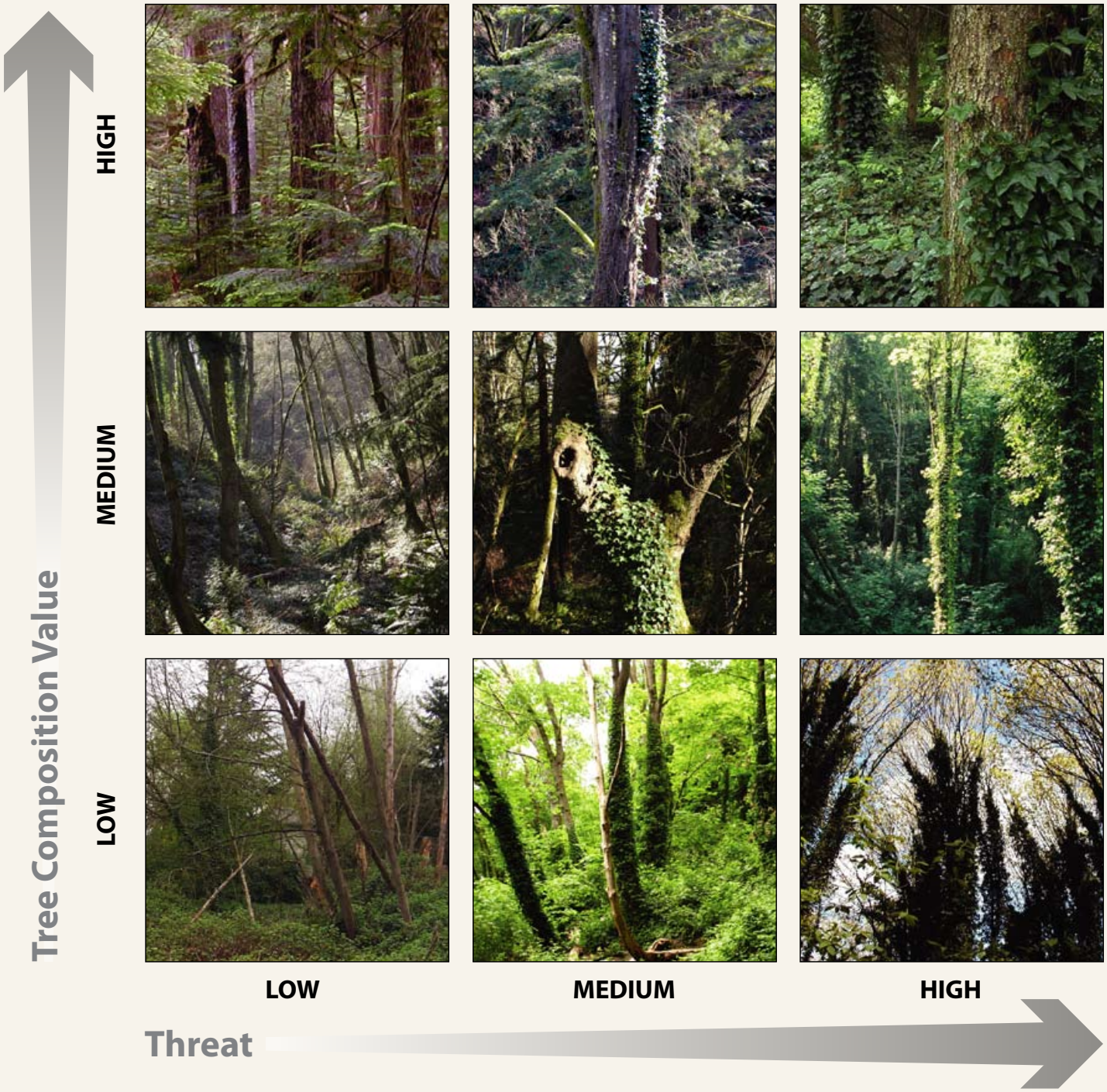
Using the two factors of **tree composition** and **invasive species cover**, each park was divided into smaller units and ranked based on one of nine possible Tree-iage categories. (More than one Tree-iage category may exist in each park.)

The upper tier of this matrix (categories 1 to 3) represents the highest-quality forest in terms of tree composition. These stands are dominated by mature conifers, madrones, or riparian forests. The lower tier of the matrix (categories 7 to 9) represent low-quality forests comprised of little to no conifers or native deciduous trees, and are dominated by invasive species.

*Figure 3. Tree-iage model categories for tree composition and invasive cover*



*Tree-iage categories as seen in the field. The amount of invasive plant presence increases from left to right. The lower right corner of the matrix identifies forest stands in the worst conditions: few to no evergreen trees and an understory of invasive plants.*



In Kirkland, less than 13% of the city's forested natural forested areas falls under high invasive threat (Tree-iage categories 3, 6, or 9) (Figure 4) While more than half (60%) of Kirkland's natural areas fall within low invasive threat (categories 1, 4, and 7) only 10% of the tree-iage acreage is classified as high value conifer stand (Tree-iage category 1, 2 and 3), which is the desired condition for forested natural areas. Most of Kirkland's forested natural areas (60%) are within the medium value forest (predominantly native deciduous canopy) categories. Figure 5 shows the distribution, location and extent of each Tree-iage category within each park throughout the city. At the citywide scale of this assessment, results are broad and will need to be fine-tuned according to site-specific needs. As parks become enrolled in the restoration process, we recommend that the tree-iage model be applied at the site scale to address local conditions.

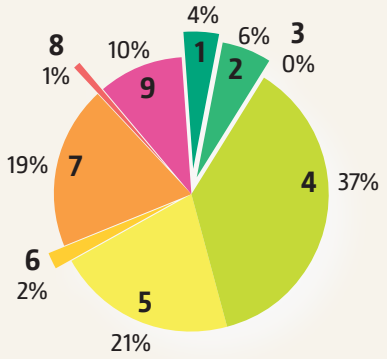
The Green Kirkland Partnership will monitor and collect data for restoration sites to evaluate changes in acreage among the Tree-iage categories over time. The Tree-iage model will evolve to incorporate other features of urban forest habitats or perhaps other natural areas such as streams and wetlands.

*Figure 4: Tree-iage category results for Kirkland's forested natural areas*

**Tree Composition Value**

| | Low | Medium | High |
|---|---|---|---|
| High | 1<br>13.16 | 2<br>22.32 | 3<br>1.73 |
| Medium | 4<br>139.86 | 5<br>76.95 | 6<br>6.84 |
| Low | 7<br>70.56 | 8<br>4.2 | 9<br>36.48 |

*Forest condition in Kirkland's forested natural areas in percent of overall acreage*



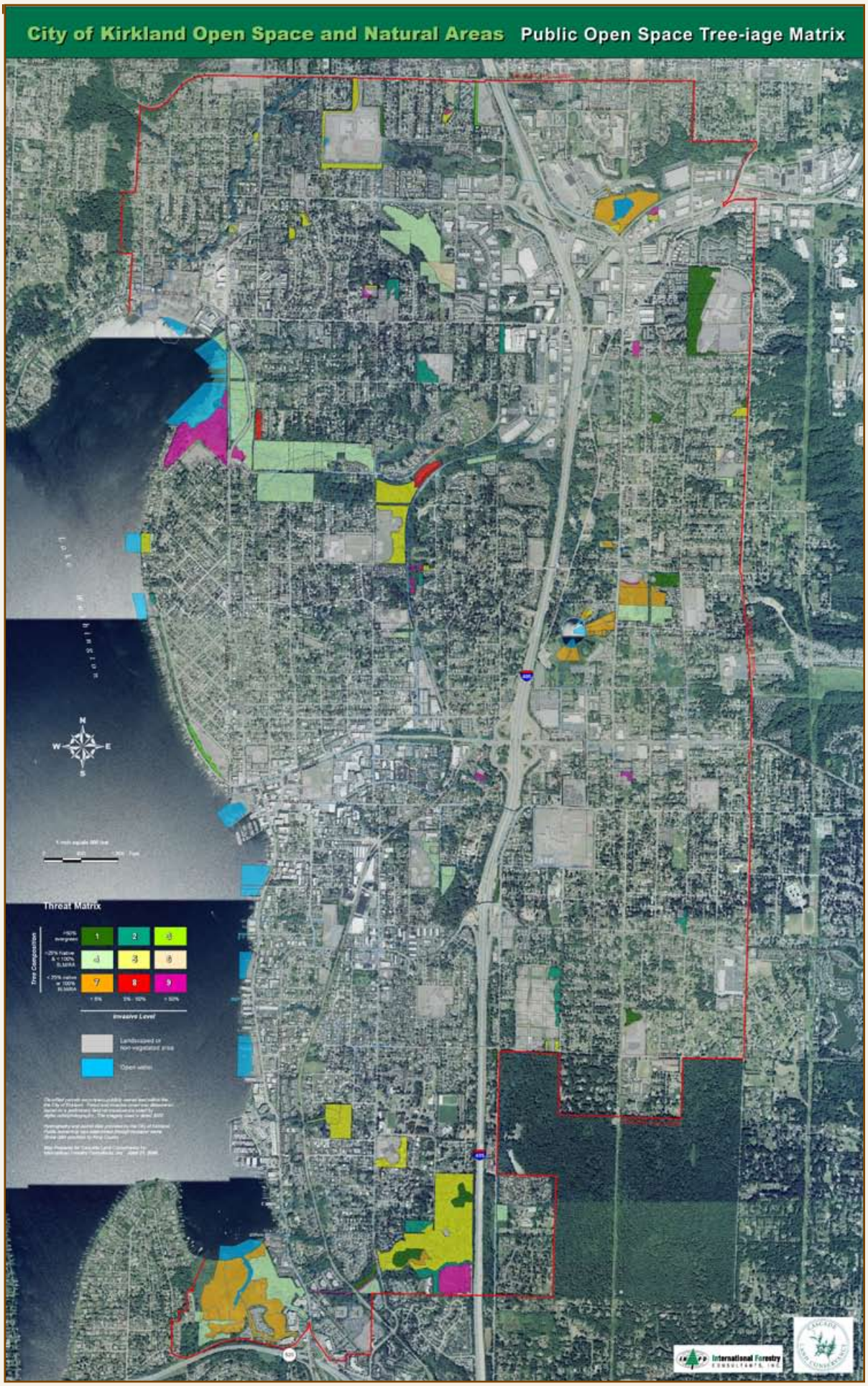



*Figure 5: Tree-iage results within Kirkland's forested natural areas*

## *Objective 2: Prioritize Parks*

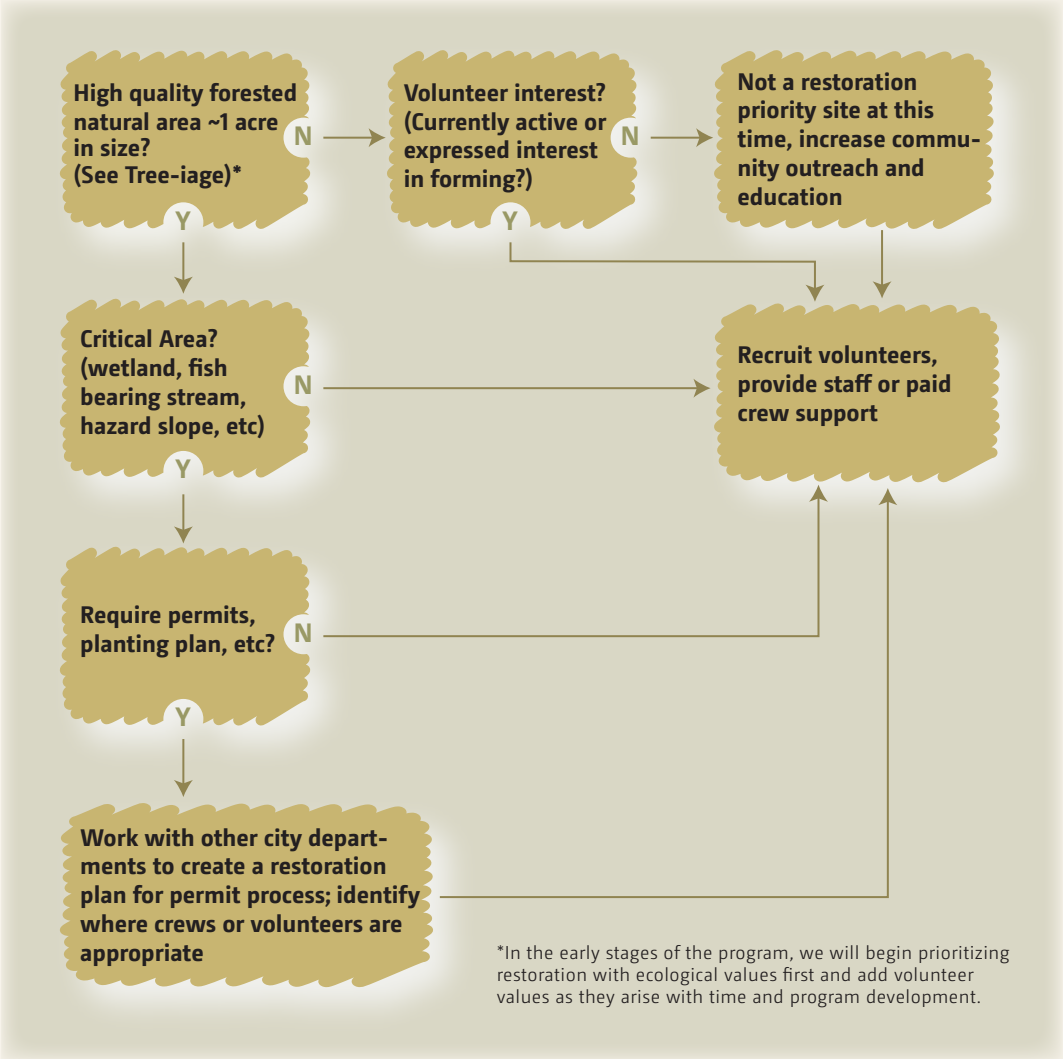
Tree-iage analysis reveals the dramatic need for forest restoration throughout Kirkland. More than 60% of the 372 acres will need some level of restoration. To maximize resources, we will need to prioritize our efforts to balance high-priority ecological sites and sites with volunteer support. We will also seek to distribute restoration efforts evenly across the city to incorporate all neighborhoods.

During the first 5 years of the partnership (2008 to 2012), most of our work will focus on parks with high-quality forest and/or interested community volunteers. Within those parks, we will concentrate resources on protecting and maintaining high-quality habitat units identified by Tree-iage analysis (Appendix A).

To help engage the public in ranking the restoration sites, we have mapped the tree-iage units by neighborhood association and by park. See Appendix B, Tree-iage Categories by Neighborhood Association. We also held a public meeting and surveyed the community for where and how to prioritize restoration. The feedback received was exceptional and these ideas have been inserted throughout the document. Many of these ideas will be used to determine goals and objectives for annual restoration plans. Public feedback indicates that parks that need immediate assistance include Watershed Park, Juanita Bay, Kiwanis Park, Crestwoods, Carillon Woods, Forbes Creek and Bridle Trails. These parks will be a priority for the next 5 years. See Appendix C for a summary of public comments.

In subsequent years, we will use the following decision tree to determine which parks will be a priority for restoration (Figure 6).

*Figure 6: Decision tree for prioritizing restoration work*



### *Objective 3: Prioritize Restoration Sites within Parks*

As individual parks are brought into the Green Kirkland Partnership program, forest stands within those parks must be prioritized for annual and 5-year restoration plans. The Tree-iage model can be applied within a park to help prioritize restoration sites. Conifer stands with few to no invasive plants, Tree-iage category 1, will be immediately given the protection of annual monitoring and maintenance. Other high-value forest stands, including conifer-dominated Tree-iage categories 2 and 3, will be considered high priorities for protection and restoration. Providing care for recently restored sites is also a priority. As more resources flow into the program, other Tree-iage categories will be worked to establish conifers or other desired canopy types.

Parks with active restoration in progress are considered current Green Kirkland Partnership sites and will continue to be supported and monitored by staff. To date these are Kiwanis, Watershed and Carillon Woods parks.

In 2012, we will revisit the park and site selection processes to ensure we are meeting project and community goals. We will then select parks for the next 5 years (2012 to 2016) of project implementation. See Appendix D, Green Kirkland Partnership Five-Year Strategic Plan and Benchmarks, for more detail.

### *Objective 4: Implement Restoration*

Best Management Practices (BMPs) are designed to guide restoration practices and maximize ecological benefits by creating a high-quality, high-functioning forest once restoration is complete. The Green Kirkland Partnership will use the same 4-phased approach to restoration that the Green Seattle Partnership has developed (see below).

#### FOLLOW BEST MANAGEMENT PRACTICES

As more restoration projects are completed in the urban environment, we learn more about what works and what doesn't work. Several groups have developed BMPs for restoration in cities.

We look to these previous experiences and the work Seattle Parks and Recreation has completed to compile and develop BMPs for forest restoration field work. These BMPs cover topics including site planning, invasive control methods, planting and plant establishment, and volunteer management. Field experience and best available science will help us improve our techniques over time and we will update the BMPs accordingly.

The Green Seattle Partnership created a field guide of BMPs suitable for volunteer activities. The *Draft Forest Steward Field Guide* (Cascade Land Conservancy and Seattle Parks and Recreation 2007) is available for training Green Kirkland Partnership volunteers and stewards. Appendix E outlines specific BMPs for invasive control.

Staff will be trained in the BMPs for forest restoration. Supplemental course work and training programs will be recommended for all staff involved in restoration and stewardship of Kirkland's forested natural areas.

#### USE 4-PHASE APPROACH TO RESTORATION FIELD WORK

One of the unique BMPs developed by Green Seattle Partnership is the 4-phase approach to restoration field work. This approach is a highly successful overall restoration technique (Table 1). It recognizes that it takes several years to restore a site, and that restoration activities fall into four major categories:

1. Invasive removal
2. Secondary invasive removal and planting
3. Plant establishment
4. Long-term maintenance

Because forest health varies from stand to stand and some work is ongoing, not every site will start at Phase 1.

*Table 1. The 4-phased approach to restoration field work*

| Phase | Tasks | Range of labor investment (hours/acre) | Average labor investment (hours/acre) |
|---|---|---|---|
| 1 | Invasive plant removal | 50 to 1400 | 700 |
| 2 | Planting and secondary invasive removal | 50 to 200 | 100 |
| 3 | Plant establishment | 25 to 100/year for up to 3 years | 40/year for up to 3 years |
| 4 | Long-term monitoring and maintenance | 0 to 20 annually | 5 annually |

#### PHASE 1. INVASIVE PLANT REMOVAL

Major invasive plant reduction will be required in sites with 50% or greater invasive cover (high threat from invasive species). Specific removal techniques will vary by species. In areas with high levels of invasive plant coverage, it may take more than a year to complete the initial removal. Many of these areas will require paid crews or special equipment. These sites will also require a large investment of both funding and community volunteers to ensure restoration.

Areas with 5 to 50% invasive cover (medium threat from invasive plants) still require invasive removal. Invasive growth in these spots is patchy. Generally, projects in the "invasive plant reduction" categories are appropriate for community volunteers.

#### PHASE 2. PLANTING AND SECONDARY INVASIVE REMOVAL

Before planting, a second round of invasive removal is conducted. Areas with more than 25% native tree cover but less than 50% cover by conifers will generally be in-filled with native conifer species. Areas estimated to have less than 25% native upper-tree canopy cover will require extensive planting with native conifers, trees, and shrubs. Most Phase 2 planting projects are appropriate for community volunteers. Staff will work with each site on a case-by-case basis to develop an appropriate plant palette and plan. The Green Seattle Partnership *Forest Steward Field Guide* provides volunteer appropriate BMPs once a planting plan is established.

#### PHASE 3. PLANT ESTABLISHMENT

This phase repeats invasive removal and includes plant establishment. As needed, sites are weeded, mulched and watered. Sites may stay in Phase 3 for up to 3 years.

#### PHASE 4. LONG-TERM MONITORING AND MAINTENANCE

The final phase is long-term site stewardship, including monitoring by commercial crews and volunteers to provide information for long-term site maintenance. Monitoring may be as simple as neighborhood volunteers patrolling park trails to find invasive plants and hosting small monthly or quarterly work parties. Forest stands that currently have less than 5% invasive cover and more than 50% native forest cover (Tree-iage Category 1) are already in Phase 4.

The 4-phase approach can be applied to the Tree-iage model as shown in Table 2. The partnership will evaluate areas of "low value" and "low threat" case by case to determine if it is appropriate to convert the sites to native forest. In areas where site conditions and timing are appropriate, we will do major plantings.

*Table 2. Tree-iage Restoration Categories*

| Tree-iage Category | Restoration Strategies |
|---|---|
| 1 | Monitoring and Stewardship |
| 2 | Invasive Plant Reduction |
| 3 | Major Invasive Plant Reduction |
| 4 | Planting |
| 5 | Invasive Plant Reduction and Planting |
| 6 | Major Invasive Plant Reduction and Planting |
| 7 | Evaluation and Major Planting |
| 8 | Invasive Plant Reduction and Major Planting |
| 9 | Major Invasive Plant Reduction and Major Planting |

## RESTORATION STRATEGIES

See Appendix A to locate parks according to their Tree-iage classification.

1 2 3
4 5 6
7 8 9

## *Category 1: High Value, Low Threat – 13 Acres*

**FOREST CONDITION**

This category contains the best forest areas in the park system. Typical stands have more than 50% conifer or evergreen broadleaf canopy. This category includes stands of mature western red cedar, Douglas fir, madrone, and forested wetlands. These stands are under low threat because the invasive cover is less than 5%.

**RESTORATION STRATEGY: MONITORING AND STEWARDSHIP**

In these areas, work will focus on protecting their existing high quality and making sure that invasive plants do not threaten these trees.

1 2 3
4 5 6
7 8 9

## *Category 2: High Value, Medium Threat – 22.3 Acres*

**FOREST CONDITION**

Similar to category 1, these forest stands contain more than 50% conifer or evergreen broadleaf canopy. Forests in this category are at risk because the invasive cover is greater than 5%. In these areas, invasive growth is expected to be patchy with diffuse edges.

A forest in otherwise good condition but subject to a number of moderate threats may degrade if left untreated. But that forest would persist if threats were mitigated in a timely manner. If unattended, this level of invasive coverage could prevent native seedlings from establishing and could compete with existing trees for water and nutrients.

**RESTORATION STRATEGY: INVASIVE PLANT REDUCTION AND PROMPT ACTION**

The main activity is removing invasive plants. Typically, these sites will also require site preparation (e.g. mulching) and in-fill planting. Projects in these areas are appropriate for volunteers. Removing invasive plants from these areas is a very high priority for the first 5 years.

## *Category 3: High Value, High Threat – 2 Acres*

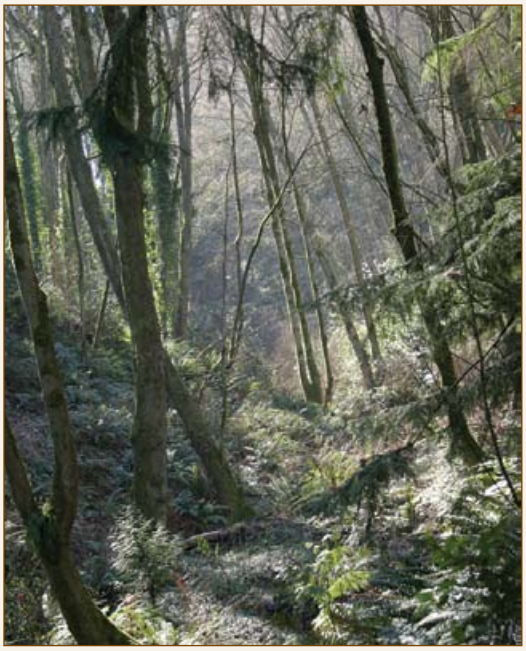
**FOREST CONDITION**

Like categories 1 and 2, forest stands in this category have mature conifers, madrones, or wetland forests. Category 3 areas have a high threat because they are estimated to have greater than 50% invasive cover.

A forest in this category is in a high-risk situation but still contains many desirable trees or highly valuable habitat or species. If restored, forests in this category can persist over the long-term or completely recover.

**RESTORATION STRATEGY: MAJOR INVASIVE PLANT REDUCTION**

Urgent restoration is needed. Major invasive reduction is the strategy here. Without prompt action, high-quality forest stands could be lost. Category 3 areas will require aggressive invasive reduction. Soil amendments and re-planting will be needed in most cases. Restoration efforts in this category are a top priority for the first 5 years.



## *Category 4: Medium Value, Low Threat – 140 Acres*

**FOREST CONDITION**

Forests assigned a medium value are typically dominated by native deciduous trees. They may have a small percent of native conifers. These areas are estimated to have greater than 25% native upper canopy cover but less than 50% upper canopy coniferous or broadleaf cover. (Or in the case of wetland forests, it is greater than 50% native tree canopy cover.) Category 4 forests have low levels of invasive plants.

**RESTORATION STRATEGY: PLANTING AND MONITORING**

We expect planting in these areas to be infilling with native species. Often these sites will also require invasive removal and site preparation (e.g. amending with woodchip mulch). Many of these sites may be converted to a conifer forest by the addition of appropriate conifer trees.

Restoring category 4 forests is a high priority during the first 5 years. They offer a high likelihood of success at a minimum investment. These sites are well suited to community-led restoration efforts.

## *Category 5: Medium Value, Medium Threat – 77 Acres*

**FOREST CONDITION**

Areas in this category have greater than 5% but less than 50% invasive cover. Invasive growth in these areas is expected to be patchy with diffuse edges. These areas are estimated to have greater than 25% native upper canopy cover but less than 50% upper canopy coniferous or broadleaf cover. (Or in the case of wetland forests, it is greater than 50% native tree canopy cover.)

These forest stands contain many desirable native trees that are under threat from invasive plants.

**RESTORATION STRATEGY: INVASIVE REDUCTION AND PLANTING**

These sites will require invasive removal and infill planting. While some restoration work is planned for this area in the first 5 years, aggressive efforts will be required throughout the life of the Green Kirkland Partnership.

## *Category 6: Medium Value, High Threat – 7 Acres*

**FOREST CONDITION**

These areas are estimated to have greater than 50% invasive cover and greater than 25% native upper canopy cover, but less than 50% upper canopy coniferous or broadleaf cover (or in the case of wetland forests, greater than 50% native tree canopy cover).

A forest that retains important plant elements but is already partially degraded by a high-level risk factor may still have the potential to recover if remediation is prompt. Because these stands are at greater risk than category 5 forests, they also require greater labor investments.

**RESTORATION STRATEGY**

Major invasive reduction and planting is the strategy for this category. Extensive invasive removal, site preparation (e.g. amending with woodchip mulch), and replanting will be required. Initial invasive removal may be done with the aid of mechanical tools and equipment. Planting in these areas will be infilling with native species.

## *Category 7: Low Value, Low Threat – 71 Acres*

**FOREST CONDITION**

These areas are estimated to have less than 25% native upper canopy cover. Levels of invasive plants are low in category 7 forests.

Parks in this category may include recent acquisitions, areas with large gaps in canopy (perhaps due to wind throw or die-off of mature deciduous trees), sites of recent landslides, unstable slopes, sites with large amounts of fill, and areas dominated by non-native trees.

**RESTORATION STRATEGY: EVALUATE AND POSSIBLY PLANT**

The reasons underlying the low value can differ greatly, and we will address the stands on a case-by-case basis. Because these sites have low levels of invasive plants, restoration may be quite cost effective in some of the category 7 forests. We will evaluate sites in this category to determine whether site conditions and timing are appropriate to move these wooded areas toward a more native forest. In some cases, it may be desirable to remove non-native trees, especially if they are aggressive.

Areas that are ready for conversion to a native forest would be a high priority during the first 5 years.

## *Category 8: Low Value, Medium Threat – 4 Acres*

**FOREST CONDITION**

Areas that are estimated to have less than 25% native upper tree canopy cover and greater than 5% but less than 50% invasive cover fall into this category. Invasive growth in these areas is likely to be patchy with diffuse edges.

A forest in this category might be chronically degraded by a variety of threatening processes, and might have lost much of its value in terms of habitat quality or species complement, with little probability of recovery.

**RESTORATION STRATEGY: INVASIVE REDUCTION AND MAJOR PLANTING**

Restoration efforts in category 8 forests provide little "bang for the buck." Although some work will be directed to category 8 forests, this is not a priority category for the first 5 years. The partnership will likely support efforts that contain the spread of invasive plants, try out new techniques, or help aggressive community-led efforts. These sites will require major invasive removal and site preparation, such as mulching and infill planting. Planting within these areas will be infilling with native species.

| | | |
|---|---|---|
| 1 | 2 | 3 |
| 4 | 5 | 6 |
| 7 | 8 | **9** |

## *Category 9: Low Value, High Threat – 36 Acres*

**FOREST CONDITION**

Areas estimated to have less than 25% native upper tree canopy cover and greater than 50% invasive cover fall into this category.

**RESTORATION STRATEGY: MAJOR INVASIVE REDUCTION AND MAJOR PLANTING**

Category 9 sites are not likely to get much worse over the next 5 years. These sites will require many years of major invasive removal and site preparation in the form of mulching and infill planting. Although some work will be directed to category 9 forests, this is not a priority category for the first 5 years. The partnership will likely support efforts that contain the spread of invasive plants, try out new techniques, or bolster aggressive community-led efforts.

## ESTIMATED RESTORATION COST

According to Green Seattle Partnership analysis, in 2005 average restoration costs for crew time and staff time ranged from $2,800 to $28,000 for a single acre, depending on site conditions. The estimated average cost per acre for restoration varies by Tree-iage category (Table 3). Each category has a different restoration strategy and level of effort associated with it. Each site has unique features that further define costs. We have estimated restoration costs based on the Green Seattle analysis for field work and added additional staff costs including: volunteer coordinator, outreach specialist, field project manager, six-member field crew, materials and some maintenance costs. This staff and field component is expected to cost $5.2 million over the next 20 years, which is far more affordable than the cost of simply hiring paid crews to complete the necessary restoration. The discount arises from community volunteers who will contribute one hour for every staff hour invested. Working side by side with volunteers the partnership will leverage an additional $4.4 million in volunteer value over the next 20 years (see page 43 for more details about volunteer contribution).

*Table 3. Estimated cost of city staff and crew time for restoration of Kirkland forested natural areas .This investment will leverage $4.4m in volunteer contributions*

| Tree-iage category | Average restoration cost | Acres | Total cost / category |
|---|---|---|---|
| 1 | $2,800 | 13.16 | $36,848 |
| 2 | $9,500 | 22.32 | $212,040 |
| 3 | $15,400 | 1.73 | $26,642 |
| 4 | $9,500 | 139.86 | $1,328,670 |
| 5 | $16,100 | 76.95 | $1,238,895 |
| 6 | $22,000 | 6.84 | $150,480 |
| 7 | $15,400 | 70.56 | $1,086,624 |
| 8 | $22,000 | 4.2 | $92,400 |
| 9 | $27,900 | 36.48 | $1,017,792 |
| | | TOTAL | $5,190,391 |

### *Objective 5: Monitor and Maintain Sites over the Long-Term*

To be sustainable, urban forests need ongoing maintenance. As each forest stand is restored (Phases 1 to 3), it enters the monitoring and maintenance phase. Every year, the acreage in this phase will grow, until at program maturity in 2027, all 372 acres will be at maintenance levels only.

Without ongoing, long-term volunteer investment in monitoring and maintenance of restored areas, Kirkland's forests will fall back into neglect. For that reason, the volunteer commitment will be paired with city resources. Each acre restored under the partnership will be monitored and maintained until 2028. We will continually check our work against the best available science to define optimal plant stock and sizes, watering regimes, soil preparation, and other forest management techniques.

We will document monitoring and maintenance events to describe locations, workers, and tasks, and we will test and evaluate how effectively various restoration techniques remove invasive plants and promote native plant survival. This information will inform the ongoing monitoring and maintenance conducted by volunteers and the city though 2028.

Monitoring will be conducted more frequently in the early phases of restoration as we learn how the sites respond to restoration.

### *Objective 6: Identify and Protect Additional Natural Areas*

#### EVALUATE PROPERTIES FOR ACQUISITION

The Cascade Agenda defines several goals with objectives for increasing and improving public open spaces in cities. By working with recreation enthusiasts, park managers, private landowners, elected officials, and developers,the Cascade Land Conservancy developed the following objectives when evaluating individual properties for acquisition:

1. Provide attractive and affordable dense communities with ample natural areas and parks to provide a quality of life that will reduce present housing demand, which drives residential sprawl into natural resource and agricultural lands
2. Use natural areas to buffer residential areas from incompatible land uses such as industrial or commercial areas and highways and to serve as urban separators
3. Provide trails and boulevards to encourage people to recreate in their neighborhoods day-to-day while also having the ability to visit neighboring communities and regional park network on longer outings
4. Establish parks within walking distance of every resident and provide sufficient parkland for residents to enjoy active, high-quality passive recreation in their own neighborhoods. To do so, we should accelerate the following current standards for park creation and management:
   - Secure all unused railroad rights-of-ways for new trail corridors or hold for future natural area use
   - Redefine and optimize public spaces to improve the quality of natural areas and open space experiences by doing the following:
     - Using street and utility rights-of-ways as pocket parks, linear natural areas and/or trail corridors. This approach could be advanced by converting low-volume street corridors, especially as the availability of mass transit increases in urban areas
     - Capping of water reservoirs or landfills, increasing security of our drinking supplies, while providing natural areas and open space facilities
   - Prioritize conversion to natural areas over asset disposal when publicly-owned properties are no longer useful for original public purpose. Develop "no-net-loss" policies for public parks and trails
   - Incentivize private landowners to create public courtyards in building or site design, especially in finding creative means to enhance the interface between public and private property. Focus on re-greening the areas between residences and streets by providing verdant buffers and canopies along the thoroughfares and parking lots
5. Invest in the reforestation of both public and private urban lands to establish the native plant communities and canopies that will create a connected and high-quality landscape for the next century
6. Provide a wide spectrum of recreational opportunities, active and passive, traditional and emerging, all linked with educational opportunities, to engage citizens in the landscape and park systems:
   - Ensure all children have opportunities to experience open spaces and natural areas; include conservation education and an outdoor experience in curriculum of every grade school
   - Develop parks in a manner that offers natural areas, experimental forests, community gardens, demonstration areas and interpretive trails within easy reach of school groups and individuals

### CRITERIA FOR EVALUATING PROPERTY FOR ACQUISITION

When considering acquiring additional open space, priority acquisitions should be defined by properties that (in no order):

1. Provide public and wildlife benefits
2. Protect unique habitat functions such as stormwater recharge areas
3. Protect unique habitat types such as forests, wetlands, salmon habitat or other listed, threatened or endangered species habitat
4. Link open spaces, provide trail and wildlife corridors
5. Abut adjacent open space/natural areas
6. Provide open space access within 0.5 mile (walking distance) of every resident
7. Provide environmental education opportunities, or are in close proximity to schools
8. Provide open space opportunities in underserved neighborhoods
9. Provide opportunities to partner with other agencies to expand or improve the regional open space system
10. Provide cultural opportunities
11. Serve as a buffer between incompatible land uses
12. Are vacant land
13. Have a willing landowner
14. Are advocated for by an active community group.

While strategic planning is important to establishing a well-planned open space system, some properties may end up in the open space portfolio opportunistically through a will or donation. Other properties may be championed by community advocates who do not want to see them developed. The City of Kirkland should be prepared to address these properties when they arise using the same criteria. Resources will need to be scrutinized to balance opportunistic acquisitions with those identified in a strategic plan or gap analysis. Some properties that do not meet the criteria, should be evaluated based on the shrinking land supply, and potential for future benefits. One small parcel may, in time, grow with the additional donations or acquisitions of adjacent parcels. Or a marginal land may become critical habitat through volunteer restoration. Bottom line, we must be strategic when looking to protect open spaces in cities.

## 3.2 RESOURCES

Funding, staff and volunteer resources will define the extent to which the Green Kirkland Partnership can restore all 372 acres of forested natural areas. As noted, about **$5.2 million** is needed to reach our goals, in addition to volunteer support. Currently, funding from the city through staff time and materials is matched by in-kind support from volunteers. As the partnership grows, a stable, long-term public funding source will be needed to ensure long-term forest restoration and maintenance. Corporate partners, foundations, and private donors will play an important role in funding.

We anticipate that volunteer hours will grow from 300 per year in 2005 to 14,000 at the peak of the program in 2013. Volunteer work may range from a single, dedicated individual to a neighborhood group to a large community group or a business volunteering for one day. Volunteerism is key to getting the work done and building citywide citizen support. By 2028, a growing volunteer contribution of time will be integral to monitoring and maintaining all 372 acres and will require additional staff support.

To support and maintain this level of volunteer and field needs, staff resources will be bolstered to accommodate volunteer recruitment, coordination, training and recognition, in addition to the field time needed to manage and plan restoration efforts.

### Financial Resources

#### *Objective 1: Continue Current City Funding*

During the first 5 years (2008-2012), in addition to staff support, the city will continue to direct existing funding streams to partnership efforts. City funding in the near term may come from the following:

- Parks and Community Services General Fund
- Maintenance Levy
- Forestry Account: uses may include acquiring, maintaining, and preserving wooded areas within the city; planting and maintaining trees within the city; identifying and maintaining landmark/notable trees; establishing a public tree nursery; and conducting urban forestry education, e.g. neighborhood tree stewardship projects ($20,000-30,000)
- Capital improvement program (CIP) funding at Juanita Bay ($75,000)

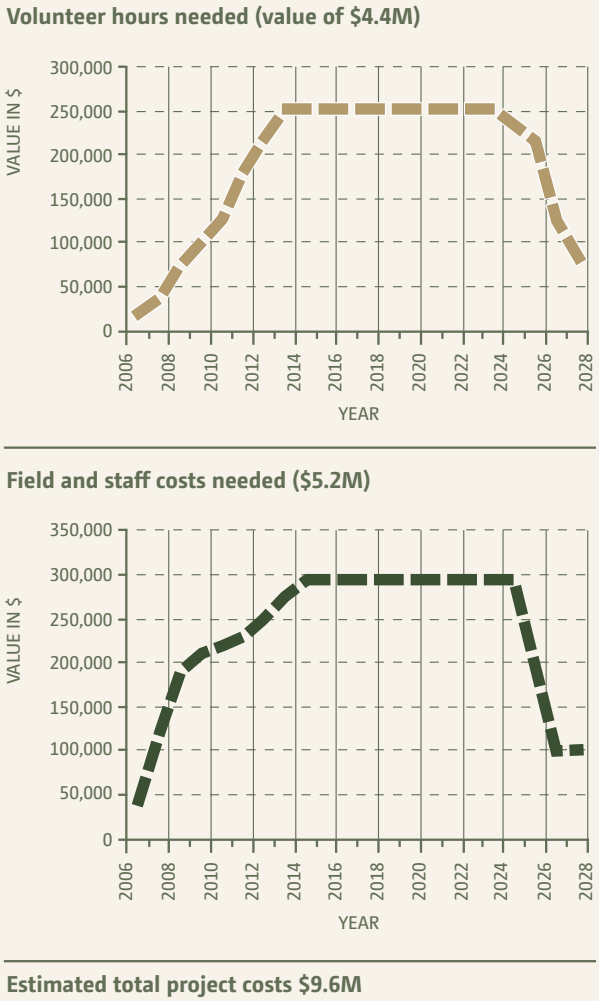
- WWRC grant to complete wetland and shoreline restoration at Juanita Beach ($500,000)
- Washington State Department of Community, Trade and Economic Development (CTED) appropriation for restoration of a portion of Juanita Beach Park ($500,000)
- King County Conservation District fee ($10 per parcel) collected from all Kirkland property owners (approximately $30,000 per year) as coordinated with other city departments and programs
- Surface Water Utility fees. A program or project that directly ties to surface water utility goals of flood reduction, water quality improvement, or aquatic habitat restoration may be funded using surface water utility fees. Examples of such projects could include purchase of property surrounding streams, planting of trees and vegetation near streams to capture pollutants, and community engagement programs to promote behaviors such as integrated pest management, which improves water quality

### *Objective 2: Develop Long-Term Stable Funding*

To meet our goals, public funding will need to increase from $50,000 per year (CIP) to $295,000 annually by 2015 for a total of $5.2 million (Figure 7). Over the next few years, we will lay the groundwork for establishing long-term public funding sources to meet that need. In 2025, the funding stream needs will begin to decrease as the Green Kirkland Partnership enters into the final phase of restoration and transitions into maintenance. Several possible mechanisms for generating this funding could be tapped either separately or in combination to meet the stable public funding goal:

1. Identify and apply for federal, state and local grants
2. Propose a Park Bond Initiative such as a natural area restoration, acquisition and companion maintenance levy package
3. Increase fees or rates for utility ratepayers for management of forested natural areas as stormwater management (and other ecosystem services) infrastructure
4. Increase the city's contribution of Real Estate Excise Tax (REET) funds to parks maintenance and stewardship
5. Include Green Kirkland Partnership funding in a countywide levy
6. Seek separate state and federal funding for forest restoration for urban areas, or cities throughout Washington
7. Set up an endowment that would generate enough annual interest to support the partnership
8. SWU fees that Parks pays to Surface Water Utility could be redirected to riparian restoration projects in natural areas
9. Assess the feasibility of market based mechanisms (carbon credits and stormwater mitigation)
10. Identify local corporations and businesses that could support the partnership
11. Offer opportunities for financial contributions when time to volunteer is not an option

*Figure 7. 20-year funding projections for the Green Kirkland Partnership*



### *Objective 3: Review and Update Current Programs and Policy to Improve Stewardship Opportunities*

- Native Growth Protection Easements (NGPEs) should allow for landowner stewardship rather than a hands-off approach. This will require training and educating the landowners in BMPs
- Coordinate restoration and stewardship efforts across departments to maximize volunteer, resource, media, communications, outreach and education and funding capacity
- Utilize Forestry Account funding to improve public forests that include parks
- Update Native Plant List in development codes to prohibit invasive species and promote native species
- Coordinate with the Shoreline Master Program, Surface Water Master Plan, IPM Plan

## Paid Staff And Crew Resources

### *Objective 4: Provide Sufficient Staff to Support Field Work, Volunteer Management, and Partnership Programs*

To carry out the goals of the partnership, staff are necessary to fill the following roles:

- **Volunteer Management**: As the program ramps up from 350 hours at the program's start to 14,000 hours in 2013 (96% increase), at least one FTE dedicated to managing and coordinating volunteers will be required. This position will also track volunteer time, recognize volunteer achievements and recruit additional volunteers. This position may be tied into the Natural Area Stewards program
- **Natural Area Steward Program Management and Training**: As the Green Kirkland Partnership program evolves and volunteers step forward to adopt a local park, an orientation and training program will be needed for interested volunteers. These stewards will allow the partnership to increase its leadership on the ground. Natural Area Stewards will lead volunteer events, track restoration progress, and apply for grants to carry out restoration on their sites. This program will also keep regular volunteers interested by providing more challenging work. The Green Seattle Partnership has created a successful Forest Steward Program that can be used as a model for Kirkland. Kirkland's Natural Area Steward Program will need to be managed and coordinated similarly for volunteer management
- **Outreach and Education**: Staff time for education and outreach will be instrumental to increasing volunteer capacity to 14,000 hours by 2013. Currently, there is one 0.5 FTE dedicated to this role in the Parks and Community Services department. Reaching the broader Kirkland public will require a full time FTE dedicated to outreach and education
- **Communications / Marketing**: This role is linked to the duties of the volunteer coordinator and the outreach/education specialist. Creating a communications and marketing plan will help identify the appropriate audiences for recruiting and increasing volunteers vs. increasing funding. This role will also help develop a common message that is clear among departments and to the public. Lastly, this duty is crucial to getting press releases, news events and other information to the media. The City of Kirkland's Communications Program Manager may also incorporate this role into current duties
- **Field restoration**: Currently not enough staff time is dedicated to restoration. Staff will need to be increased to reach the goal of restoring 372 acres. The city should consider hiring a year-round crew dedicated to forest natural area restoration with one FTE to manage this activity. We also recommend that the city's Urban Forester and Arborist play larger roles in evaluating and managing Kirkland's forested natural areas. Training in BMPs and the 4-phase approach will be necessary
- **Fund Development and Management**: Identifying and maintaining stable funding is a crucial role for supporting the efforts of the partnership. Once a mechanism is established for maintaining funding, it will need to be managed and tracked to ensure accountability. This can be a large role if many small funding sources are compiled, or less intensive if funding is derived from one or a few larger sources. This role may incorporate grant writing

### *Objective 5: Support Job-Training Programs and Deploy Paid Crews*

Paid crews will be needed for priority sites that lack sufficient volunteer support or sites with difficult conditions. Some sites will be inappropriate for volunteer groups. Extreme invasive plant infestations, steep slopes, riparian areas, and wetlands are better suited to Parks and Community Services' staff and crews or paid contract crews. The partnership will prioritize contracting with organizations that provide training and develop a "Green-Collar Workforce" with living wage, stable jobs focused on forest habitat restoration. The following activities will support this objective:

- Parks and Community Services' staff will continue to work on key restoration efforts, volunteer support, and Natural Area Steward training
- Continue Teens Assisting Sustainable Kirkland (TASK) program aimed at providing job training to Kirkland youth in restoration projects throughout Kirkland's parks
- Nonprofit employment-training crews (currently, Washington Conservation Corps, Volunteers for Outdoor Washington and EarthCorps) will be hired for work both in volunteer management and at difficult sites. The partnership will prioritize contracting with organizations that provide training
- Private landscape and habitat restoration companies (commercial crews) will be hired for highly technical projects as budget and need dictate

## Volunteer Resources

### *Objective 6: Increase Volunteer Capacity to 14,000 Hours per year by 2013*

The plan calls for volunteer hours to grow from 350 per year in 2005 to 14,000 per year in 2013. To put this number in perspective, if every Kirkland resident contributed 27 hours, we would achieve our restoration goals. The Corporation for National and Community Service values a volunteer hour at $18.77 per hour (2006). At this rate, volunteer engagement for the Green Kirkland Partnership has the potential of providing nearly a one-to-one, in-kind match (~$4.4M).

To meet the needs of all volunteers, the Green Kirkland Partnership will need to provide several ways in which volunteers can participate. We will hold a variety of large volunteer events in conjunction with business and community groups. Through the Natural Area Steward program, we will coordinate and develop regular work parties that volunteers can attend as often as they like. Restoration activities will range from large invasive removal projects to planting native plant species to monitoring restoration areas.

We will provide opportunities for individuals of varying physical ability and time commitment to get involved. We will encourage volunteers to try increasing levels of volunteerism. For example, people who participate in one-day events with a business or community group will be invited to participate in ongoing work parties. Frequent volunteers may be interested in increasing their involvement as Natural Area Stewards. To do this, we will need to keep existing volunteers motivated to help them by showing them how their efforts, in concert with those of many other volunteers, have a significant impact in restoring Kirkland's forested natural areas.

There are numerous other volunteer activities, including photography, database, work administration, publicity, fundraising, sponsor recruitment, writing, and marketing. In addition to encouraging current volunteers, the Green Kirkland Partnership will need to recruit new ones. We will do this largely through community outreach, and will emphasize the critical need for forested natural areas and the important role volunteers play in restoration. We will also use partnerships with community and business groups and schools to introduce new volunteers to the program.

An important component of outreach efforts will be to communicate with neighborhoods that have not traditionally participated in forest restoration or environmental stewardship. We will increase outreach to these neighborhoods by working with local community groups and youth organizations, schools,

If every Kirkland resident contributed 27 hours, we would achieve our restoration goals.

Green Kirkland Partnership has the potential of providing nearly a one-to-one, in-kind match (~$4.4M).

and businesses. We will post information signs at restoration sites, and send letters to neighbors describing the work underway and inviting them to participate. The Green Kirkland Partnership will build stronger ties with the Lake Washington School District and provide opportunities for students who want to complete community service requirements for graduation.

### *Objective 7: Increase Productivity by Providing Support and Materials to Volunteers*

Green Kirkland Partnership projects will involve groups such as community volunteers, staff from the City of Kirkland and the CLC, and paid crews. We can help volunteer groups with identifying restoration needs, obtaining materials and tools, developing site plans, large event coordination, and grant applications. We will increase field work efficiency by creating clear lines of communication, coordination, easy access to resources, and support.

The partnership will provide the following resources:

- Natural Area Steward training events and the *Green Seattle Partnership Forest Steward Field Guide*
- Project monitoring and documentation to assess and maximize restoration efforts
- Help recruiting volunteers
- Restoration materials such as plants, mulch, and tools
- Volunteer networking between Natural Area Steward groups
- Help with maintenance

## 3.3 COMMUNITY

Community volunteers are an essential component for establishing lasting success in any stewardship program. Volunteers are the loudspeaker, the newsletter, the fundraiser, and the motivators for restoration and stewardship. They are the advocates for resources and funding that would not be available without public demand. They do much of the heavy lifting and without them restoration would be greatly disadvantaged. The Green Kirkland Partnership will work to educate and engage the community to create an involved and motivated constituency throughout the city.

In creating this plan, we held a public meeting and sent out surveys to seek community feedback and guidance for where and how we should develop the program both for restoration and for building volunteerism in the Kirkland community. The feedback we received was exceptional and we have inserted these ideas throughout the document. Much of this thinking will be used to determine goals and objectives for annual plans. See Appendix C.

### *Objective 1: Develop an Environmental Outreach and Education Program*

#### DEVELOP AND DISTRIBUTE GREEN KIRKLAND OUTREACH MATERIALS

**PUBLIC**

Materials and handouts will help explain and spread the word about the mission and goals of the Green Kirkland Partnership. The materials should inform audiences about the potential loss of Kirkland's forests, and describe the Green Kirkland Partnership as the solution. Materials must inspire community participation. The starting point is to create a simple message that is appealing, motivating, and considers the needs of all partners (schools, businesses, or faith-based organizations). The partnership is relatively far along in this process: a logo, one-page information sheet, event banner, PowerPoint, and website are developed and actively in use. Additional materials may include a brochure, training and educational curriculum, or an outreach kit.

The City of Kirkland currently has several educational programs and brochures such as *Trees: the Nature of Kirkland* brochure from the Planning Department. Under the city's National Pollutant Discharge Elimination System (NPDES)

Phase II Municipal Stormwater Permit, there are requirements for public outreach and educational programs that could be evaluated and updated to increase exposure.

#### MEDIA

The Green Kirkland Partnership will continue to engage the media about the partnership's goals. With the recent news articles in the *Kirkland Reporter*, we will continue to seek media outlets, local community newspapers, and Kirkland's city channel to publish updates and new information on progress or volunteer events. On the Green Kirkland Partnership website, we will also provide additional information about restoration techniques, volunteer events, and invasive plants, why not to plant them, and good alternatives.

As people learn of the crisis in Kirkland's forests, we will also need to be clear in our message that the solution requires a significant investment. Increased public interest in forest restoration will help raise private dollars toward this cause. But that's not enough to sustain forested natural areas for the long term. We also need to secure substantial permanent public funding for ongoing restoration and maintenance.

### IDENTIFY AND ENGAGE DIVERSE COMMUNITY GROUPS

Several different groups have volunteered with Parks and Community Services in some capacity. Through Boy Scouts, business volunteer days, neighborhood associations, faith-based organizations community services, school service learning credits, or individual service hours, the partnership will work to continue to engage these groups in restoration. The Green Kirkland Partnership will also work to reach new groups of volunteers to expand the program. The partnership will:

- Meet with community groups, businesses, faith-based organizations, civic organizations, schools and nonprofits to educate about the partnership and seek volunteer support
- Work with teachers to incorporate a field trip or outdoor classroom curriculum designed around stewardship
- Inform schools about service learning potential for students
- Host outreach booths at public events
- Work with Earth Day events or United Way's annual Day of Caring to attract local employers and large groups of volunteers
- Provide summer job-training programs (such as TASK) for youth
- Post signs in local parks where restoration is occurring
- Work with court-appointed community service volunteers
- Work with businesses to develop employee community service day
- Create a Natural Area Stewards program that allows community members or groups to adopt a local natural area
- Organize and host work parties and advertise them

### *Objective 2: Demonstrate Appreciation for Volunteers and Seek Their Input into Program*

The Green Kirkland Partnership will work toward sustaining existing volunteers and recruit new ones through recognizing volunteers' accomplishments and tapping their expertise as we improve the program.

We will celebrate volunteers' achievements and emphasize the crucial role they play in restoring Kirkland's natural areas. Communication such as recognition of outstanding efforts and service rewards will be published on the Green Kirkland Partnership website and in neighborhood newspapers. Each person will become a Cascade Land Conservancy volunteer, which entitles them to:

- Invitations to special events, stewardship work parties, member hikes, and tours of conserved lands
- Subscription to CLC's newsletter, providing information on and conservation and stewardship projects throughout the region.

Volunteers are also a valuable source of on-the-ground expertise. Consistent with our adaptive management approach, we will ask volunteers to give their input into our annual work plan. We will track volunteer efforts and results in our Treeiage system, and we will seek their advice on which BMPs have worked and which may need reassessment.

### *Objective 3: Create Sustainable Volunteer Stewardship Program: Natural Area Stewards Program*

The intent of the Natural Area Steward program is to build a legacy of restoration, maintenance, and stewardship around natural areas. This program will provide regular volunteers with additional opportunities and challenges and keep them motivated. In the first 5 years, we expect to train and support eight volunteer Natural Area Stewards in BMPs, volunteer management and motivation, and reporting. The stewards will direct volunteers in the field and act as leaders in their communities. Stewards will garner support for their local forests and natural areas. We will support them with staff support and guidance in site planning and restoration work.

As resources allow, we will train new Natural Area Stewards to do the following:

- Serve as key contact for the Green Kirkland Partnership
- Organize and lead volunteer forest restoration events and activities in the steward's park(s)
- Coordinate with staff to develop site restoration plans
- Complete an annual report on restoration activities
- Attend an annual training event

Reaching out to our existing volunteer network will be a top priority. Many seasoned veterans of long-term restoration work have numerous years of restoration experience. While not all existing volunteer projects will be on the priority list for the first 5 years, we will work to integrate them and our valued partners into the program.

### *Objective 4: Encourage Businesses to Contribute to Program Goals*

Business contributions to the Green Kirkland Partnership goals will occur through five basic activities:

- Employee participation in Green Kirkland Partnership events
- Cash donations
- Opportunities to sponsor restoration efforts
- In-kind contributions (equipment and materials)
- Refraining from planting or selling invasive plants

We will seek business participation, including donations and in-kind contributions. We will recruit corporate sponsors to hold employee stewardship events at Green Kirkland Partnership sites and ask that businesses contribute the supplies and materials necessary for the event. In turn, we will offer incentives such as special recognition for supporting the Green Kirkland Partnership.

We will encourage landscape supply businesses to refrain from selling plants listed as "Weeds of Concern" by the King County Noxious Weed Control Board. These plants include butterfly bush, morning glory, yellow flag iris, and English ivy. While these plants may be as economically destructive as some Class A noxious weeds, they are not restricted in King County. The Green Kirkland Partnership will work with businesses directly—and through the outreach programs of King County and the state universities—to provide education on invasive plants and suitable alternatives for sale. We will also seek opportunities to convey our message on gardening shows on local television channels.

### *Objective 5: Work to Engage and Educate Private Landowners*

While stewardship on public lands is an important step for restoring canopy cover, protecting habitat for wildlife and improving water quality, private lands cover a greater extent of the city. Activities that occur on these private lands can greatly influence the condition of our public natural areas despite our best efforts to restore them. For instance, English ivy growing as a border plant in a landowner's backyard can quickly escape into a park either by spreading beyond the property line, or by birds dispersing seeds. Many invasive species also spread when yard waste is illegally dumped in parks. In fact, these are the common ways in which natural areas become infested with invasive species. Alternatively, landowners can also be a great resource for restoring their neighborhood park and engaging their neighbors, schools, clubs, and businesses to help the cause. In addition, private landowners will be the main source for retaining tree canopy and acquiring additional and expanding current natural areas. Potential ways for the Green Kirkland Partnership to educate and engage private landowners as an important constituency include:

- Develop mailings and handouts to inform residents about the problem facing our natural areas, the solution through the Green Kirkland Partnership, the benefits of removing invasive species from their properties (in addition to the parks) and replacing them with native species, and how they can get involved
- Provide information on the city and Green Kirkland Partnership websites, park kiosks, neighborhood newsletters, local papers
- Work with larger programs such as the National Wildlife Federation's Community Backyard Habitat Program or School Yard Project to develop a program for helping build a community program
- Work with landowners and the Planning and Community Development department to create Native Growth Protection Easements that involve appropriate management through community stewardship rather than a hands-off approach
- Train landowners in BMPs through Natural Area Stewardship program
- Create plant lists for developers and landowners that prohibit invasive species and promote native species and tree retention and establishment
- Provide incentives for landowners. Incentives include plant materials or a crew day to remove invasives in troublesome areas like steep slopes or to remove invasives that may need herbicide application

## BALANCED SCORECARD

In order to track our progress, we have developed the Green Kirkland Partnership balanced scorecard (Table 4). The scorecard captures our goals and objectives within each area of implementation: field work, resources, and community. We will use this scorecard to measure our progress and the effectiveness of our strategies. The next section, Adaptive Management, discusses how we will make adjustments and improve our strategies over time. Adaptive management ensures our activities continue to be effective.

*Table 4. The Green Kirkland Partnership Balanced Scorecard*

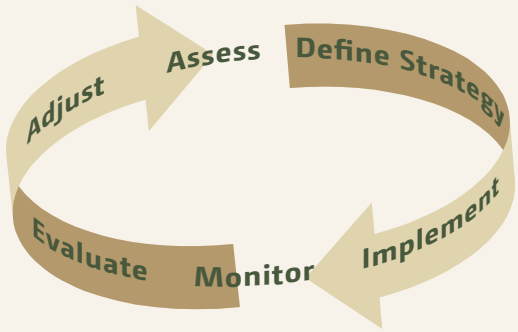
| | OBJECTIVE | | MEASURE |
|---|---|---|---|
| | Restore and Maintain 372 acres of Forested Parkland by 2027 | | # of acres restored to annual goal |
| **Field Work** — All 372 acres are restored by 2027 | | | |
| | Evaluate | Evaluate conditions and prioritize sites for restoration | # sites evaluated, prioritized |
| | Plan | Develop Annual Work Plan | Annual work plan identifying restoration sites |
| | Implement | Implement restoration projects optimizing ecological function | # of site restoration plans completed<br># of acres entered into restoration<br>Best practices updated annually |
| | Monitor | Monitor and maintain sites over the long term | Annual monitoring report<br>Maintenance is performed as indicated |
| **Resources** — Sufficient resources are available to complete restoration work and provide long-term maintenance. | | | |
| | Financial | Continue current funding | $ budgeted and source to meet restoration requirement |
| | | Develop long-term, stable public funding source | Mechanisms in place by 2013 sufficient to meet need |
| | Paid Staff & Labor | Provide sufficient staff to support field work, volunteer management, and partnership programs | # staff/crew dedicated, # acres entered into restoration by staff/crew |
| | | Hire paid crews for priority sites lacking volunteer support or sites with difficult conditions | % of priority sites in annual plan not being restored by volunteer efforts entered into restoration<br>% of contract crews trained in BMPs |
| | Volunteer Labor | Increase number of volunteer hours to 14,000 per year by 2013 | # of hours to annual goal, value contribution of volunteer (staff cost per volunteer hour) |
| | | Increase productivity by providing support and materials to volunteers | $ and hours/acre restored<br>Staff cost per volunteer hour |
| **Community** — An informed, involved and active civic community supports the partnership | | | |
| | Community | Educate and engage community about problem and solution through GKP | Outreach and education program materials developed |
| | | Community supports and demands restoration and maintenance of forested natural areas through widespread understanding of the issue and support of GKP as solution | Kirkland annual city survey - % of residents aware of problem and GKP, and<br>% of residents supporting acquisition, restoration and maintenance<br>% of residents interested in volunteering |
| | Volunteers | Engage youth and community organizations in restoration and monitoring | # of groups participating in events<br># of hours contributed |
| | | Encourage businesses to contribute to program goals | # of businesses supporting program through sponsorship, in-kind contributions, or volunteer events<br># of businesses that stop selling invasive plants |
| | | Train Natural Area Stewards in volunteer management and BMPs | # of Natural Area Stewards trained and actively holding events |
| | | Demonstrate appreciation for volunteers and seek input into program | # of volunteer suggestions implemented<br>Volunteer recognition activities |

# 4. ADAPTIVE MANAGEMENT

Urban habitat restoration is an evolving field in which each project is a new lesson in restoration and urban ecology. These lessons are not possible without continuous monitoring to collect information about the progress or effectiveness of restoration efforts. Monitoring can often detect early outbreaks of invasive species before they get out of control and can even inform land managers about the ecosystem health of the site. For instance, poor plant survival may be due to any number of factors, but these results will require additional data collection and perhaps modification of restoration plans to resolve the problem. Often we need this information to proceed with future phases. This process of monitoring, evaluating, and revising is known as adaptive management.

Adaptive management improves overall management because it ties together the initial planning effort, with implementation and results through active feedback. In a closed circuit process, adaptive management begins by thoroughly assessing the problem. This step was accomplished by analyzing Kirkland's forest canopy and invasive species cover in public forested natural areas with the Tree-iage model. Next, we define goals and develop a strategy (community stewardship) to resolve the problem of Kirkland's declining forested natural areas, then we implement the strategy (community stewardship/volunteer events), monitor the results (acres restored), and evaluate the results to determine if the goals were met and identify what worked and what did not work. This new information helps to re-evaluate the problem and revise our strategy, launching into the cycle once again.

Since urban forests are dynamic ecosystems facing numerous challenges, we will need to evaluate our restoration efforts and allow room for changes in our management plan. The Balanced Scorecard will help us review our goals and track our progress annually. By measuring the evolution toward each objective, we can assess the effectiveness of each strategy. For example, we can't wait until a lack of volunteer support points out the need to change community volunteer outreach strategy. Rather, we will track how effective our activities are throughout the life of the plan and, through adaptive management, make adjustments as necessary.




*Adaptive Management Framework (adapted from Murray and Jones 2002)*

## Appendices

Appendix A: Tree-iage Categories by Park

Appendix B: Tree-iage by Neighborhood Association

Appendix C: Summary of Public Comments

Appendix D: Green Kirkland Partnership Five-Year Strategic Plan and Benchmarks

Appendix E: Invasive Species Removal BMPs

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# APPENDIX A

## Tree-iage Categories by Park

*Table A-1. Tree-iage categories by park in Kirkland*

| Tree-iage Category | Park | Acreage |
|---|---|---|
| 1 | N Rose Hill Woodlands | 3.71 |
| | Open Space- N Rose Hill NA* | 0.89 |
| | Watershed Park | 8.56 |
| 2 | Cotton Hill | 0.59 |
| | McAuliffe Park | 2.07 |
| | Open Space- Totem Lake NA | 1.45 |
| | S Norway Hill | 9.77 |
| | S Rose Hill Park | 1.09 |
| | Watershed Park | 6.88 |
| | Waverly Beach | 0.47 |
| 3 | Heritage Park | 1.73 |
| 4 | Everest Park | 9.66 |
| | Heronfield Wetlands | 24.45 |
| | Juanita Bay Park | 69.99 |
| | Kiwanis | 0.59 |
| | Mark Twain Park | 1.04 |
| | N Rose Hill Woodlands | 9.06 |
| | Open Space- Highlands NA: 1.52 a, N Rose Hill NA: 0.29 a | 1.81 |
| | Watershed Park | 2.26 |
| | Yarrow Bay Wetlands | 21.00 |
| 5 | Brookhaven | 0.46 |
| | Carillon Woods | 9.11 |
| | Cotton Hill | 0.32 |
| | Crestwoods | 15.79 |
| | Forbes Lake Park | 0.37 |
| | Kiwanis | 1.76 |
| | McAuliffe Park | 0.28 |
| | Open Space- South Juanita NA | 1.94 |
| | Open Space- North Juanita NA | 0.76 |
| | Watershed Park | 46.16 |
| 6 | Heronfield Wetlands | 4.94 |
| | Mark Twain Park | 1.06 |
| | Watershed Park | 0.84 |
| 7 | Forbes Lake Park | 8.42 |
| | N Rose Hill Woodlands | 7.99 |
| | Open Space- N Rose Hill NA | 0.78 |
| | Snyder's Corner | 2.28 |
| | Watershed Park | 1.52 |
| | Yarrow Bay Wetlands | 49.57 |
| 8 | Juanita Bay Park | 1.83 |
| | Open Space- N Juanita NA | 0.07 |
| | Snyder's Corner | 2.30 |
| 9 | Cotton Hill | 1.01 |
| | Juanita Bay Park | 21.72 |
| | McAuliffe Park | 0.51 |
| | Ohde Ave Pea Patch | 0.55 |
| | Open Space- N Rose Hill | 1.08 |
| | Open Space- North Juanita NA | 0.27 |
| | Rose Hill Meadows | 0.74 |
| | Watershed Park | 10.60 |

**NA = Neighborhood Association*

*Table B-1: Tree-iage acres by neighborhood association in Kirkland*

| Tree-iage Category | Bridle Trails | Central Hough-ton | Everest | High-lands | Lake-view | Market | Moss Bay | Norkirk | North Juanita | North RoseHill | South Juanita | South RoseHill | Totem Lake | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | — | 8.56 | — | — | — | — | — | — | — | 4.60 | — | — | — | 13.16 |
| 2 | — | 6.88 | — | 0.59 | — | 0.47 | — | — | — | — | 2.07 | 1.09 | 11.22 | 22.32 |
| 3 | — | — | — | — | — | 1.73 | — | — | — | — | — | — | — | 1.73 |
| 4 | — | 2.26 | 9.66 | 1.52 | 21.00 | 13.28 | — | — | — | 10.39 | 59.61 | — | 22.14 | 139.86 |
| 5 | — | 55.27 | — | 0.32 | — | 1.76 | — | 7.84 | 1.22 | 0.37 | 10.17 | — | — | 76.95 |
| 6 | — | 0.84 | — | — | — | — | — | — | — | 1.06 | 0.32 | — | 4.62 | 6.84 |
| 7 | 2.28 | 1.52 | — | — | 49.57 | — | — | — | — | 17.19 | — | — | — | 70.56 |
| 8 | 2.30 | — | — | — | — | — | — | — | 0.07 | — | 1.83 | — | — | 4.2 |
| 9 | — | 9.95 | 0.55 | 1.01 | 0.65 | 20.44 | — | — | 0.27 | 1.08 | 1.79 | 0.74 | — | 36.48 |
| TOTAL | 4.58 | 85.28 | 10.21 | 3.44 | 71.22 | 37.68 | 0 | 7.84 | 1.56 | 34.69 | 75.79 | 1.83 | 37.98 | 372.1 |

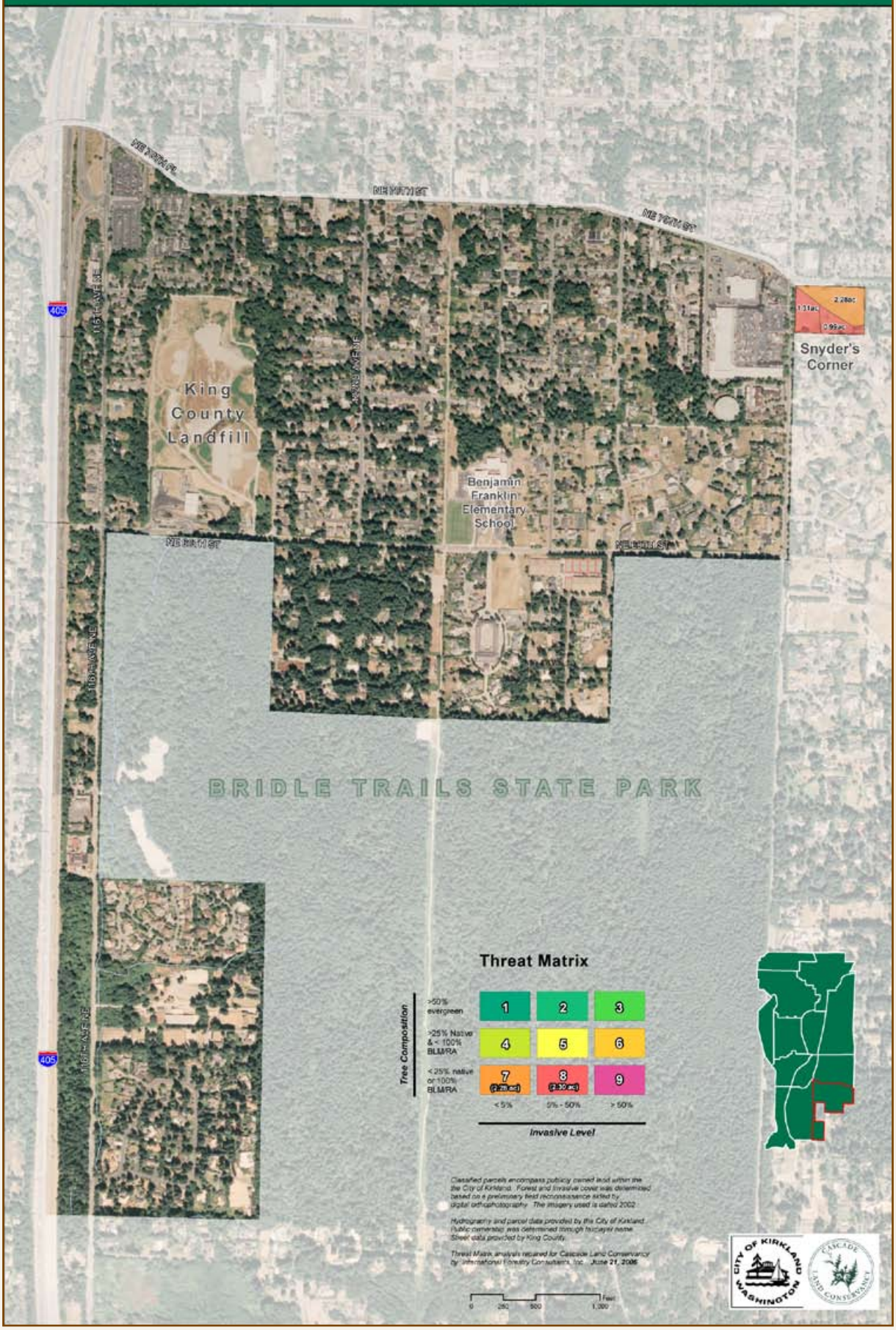
# APPENDIX B

## Tree-iage by Neighborhood Association

# Green Kirkland Partnership

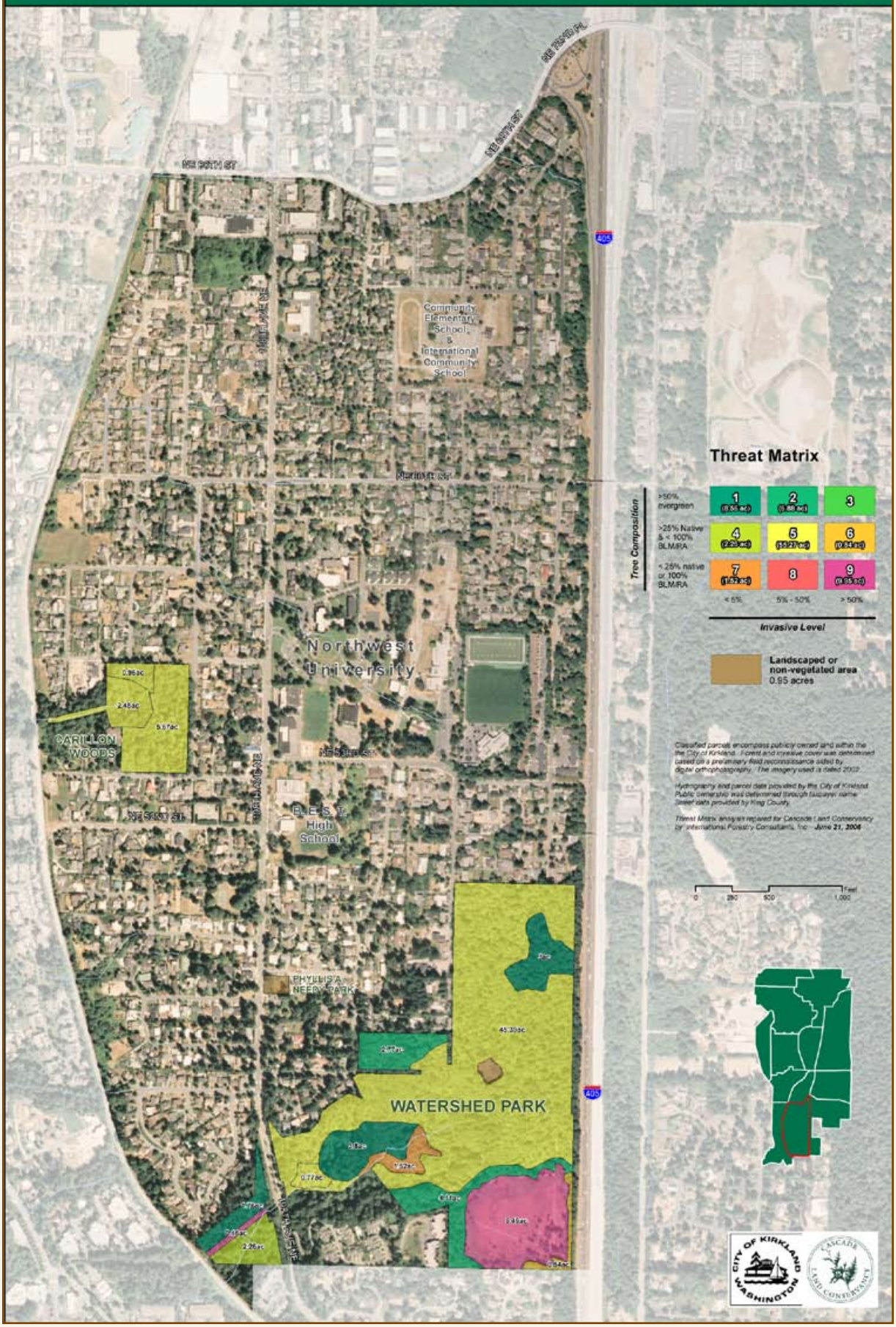
## Bridle Trails Neighborhood

## Public Open Space Tree-iage Matrix



# Green Kirkland Partnership
## Central Houghton Neighborhood

## Public Open Space Tree-iage Matrix

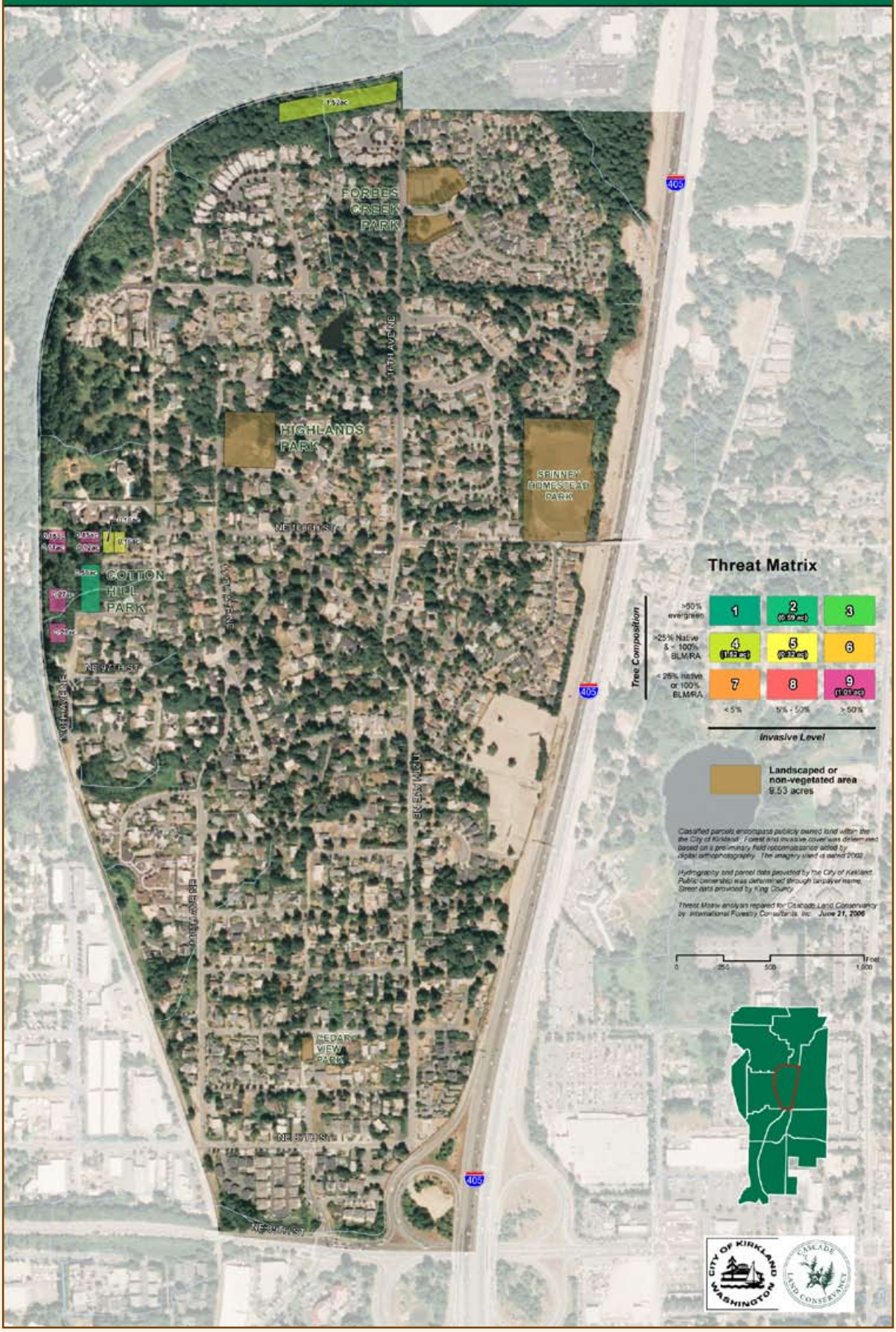


# Green Kirkland Partnership
## Everest Neighborhood

## Public Open Space Tree-iage Matrix

# Green Kirkland Partnership
## Highlands Neighborhood

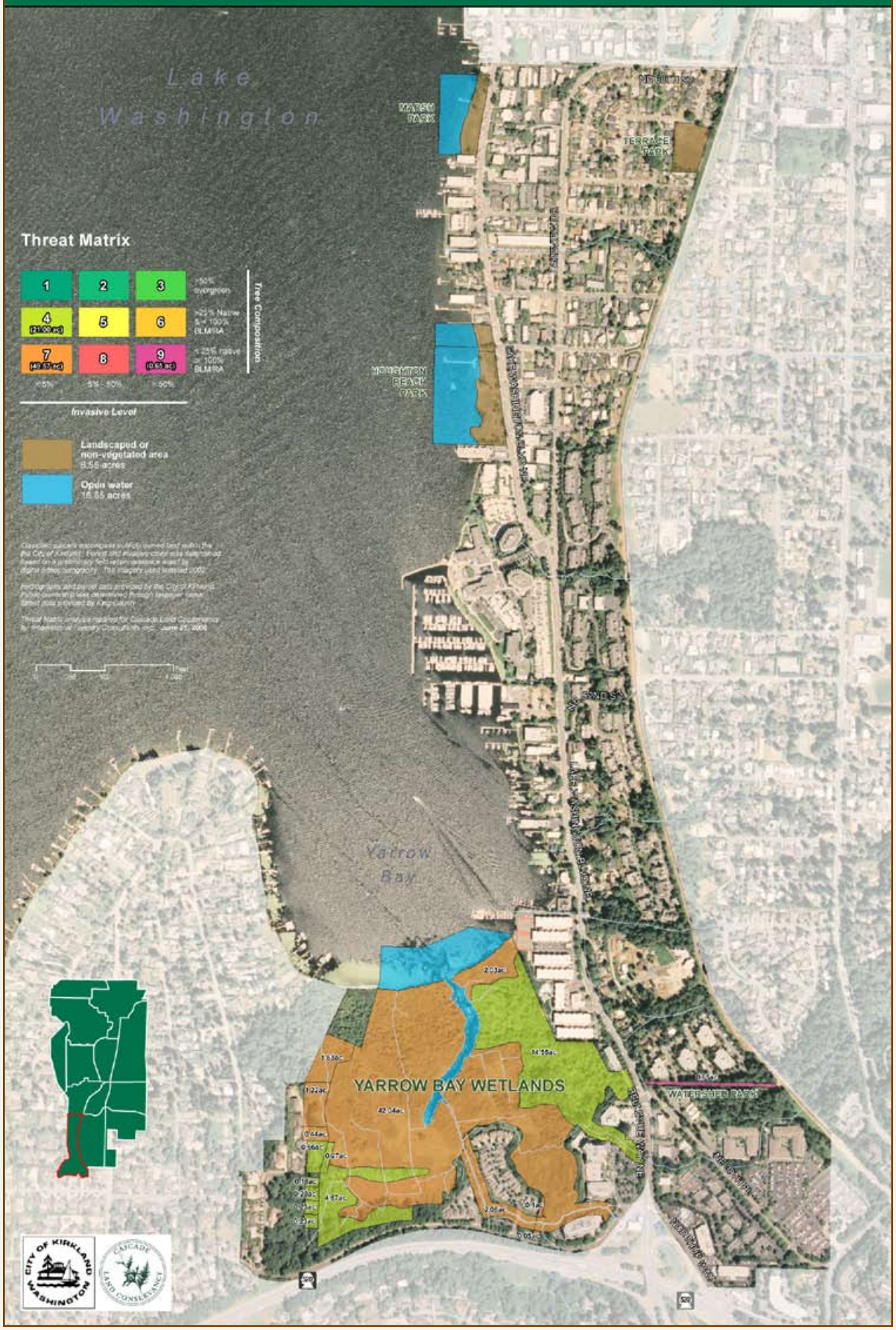
## Public Open Space Tree-iage Matrix



# Green Kirkland Partnership

## Lakeview Neighborhood

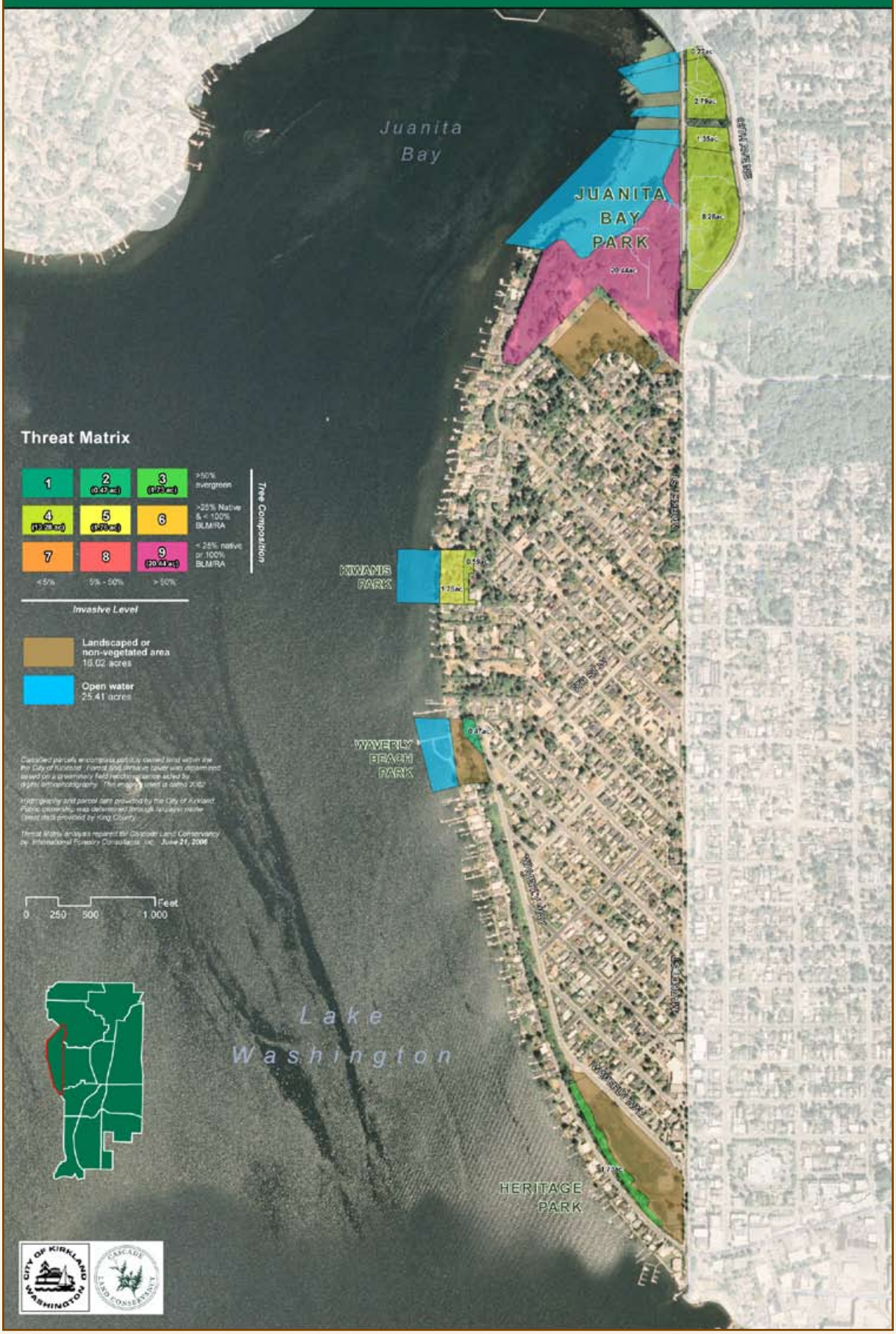
## Public Open Space Tree-iage Matrix



# Green Kirkland Partnership

## Market Neighborhood

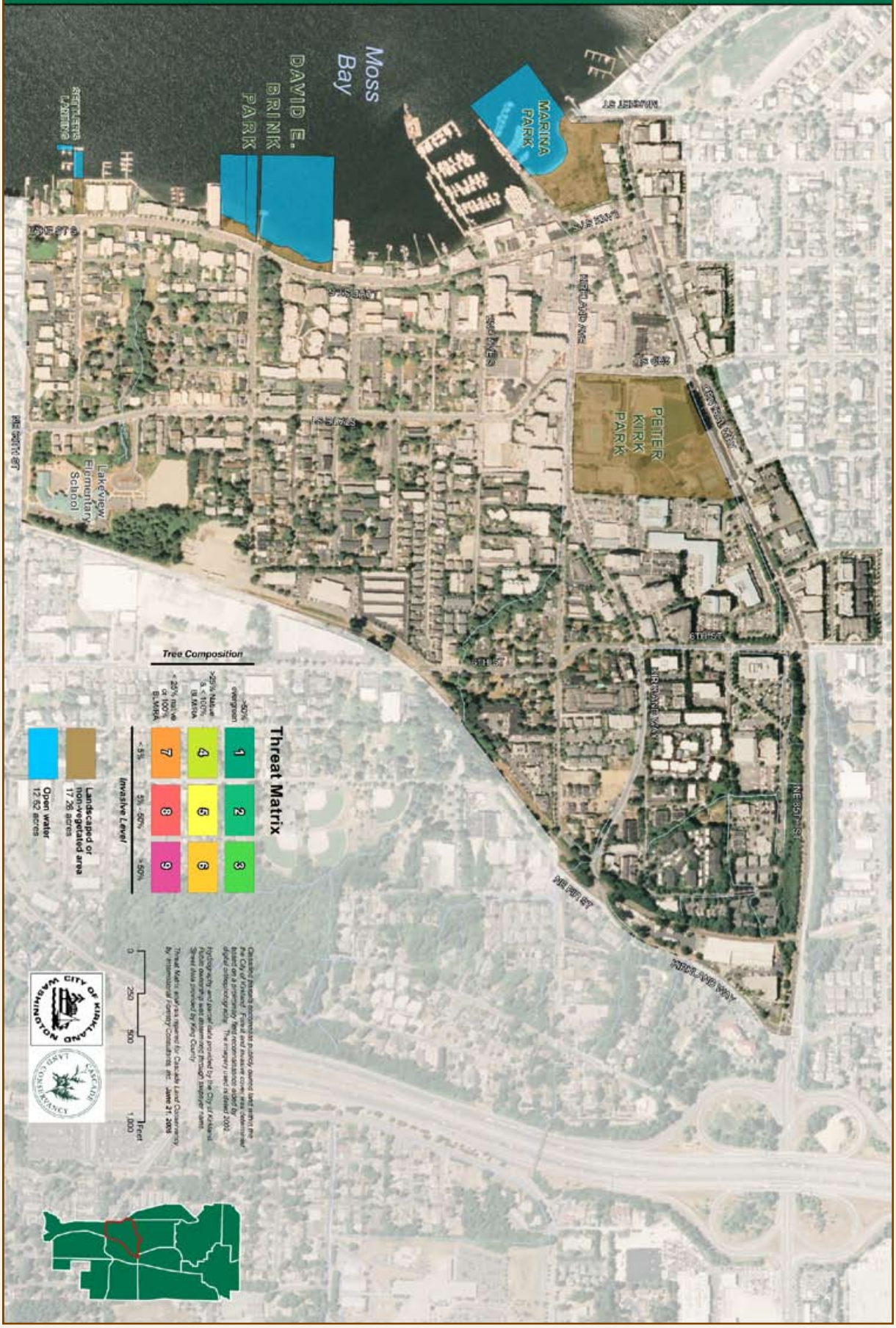
## Public Open Space Tree-iage Matrix



# Green Kirkland Partnership

## Moss Bay Neighborhood

## Public Open Space Tree-iage Matrix



# Green Kirkland Partnership

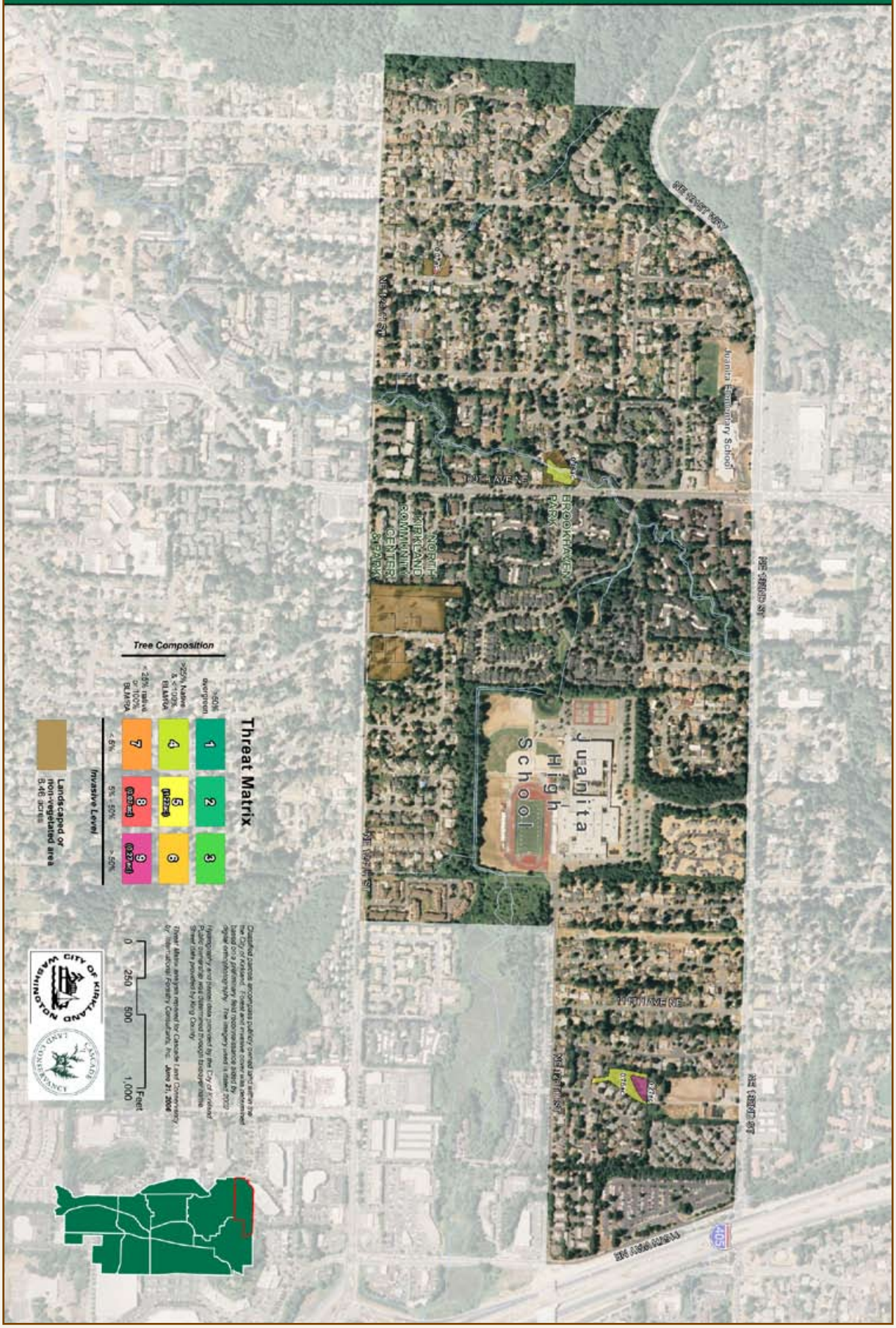
## Norkirk Neighborhood

## Public Open Space Tree-iage Matrix

# Green Kirkland Partnership

## North Juanita Neighborhood

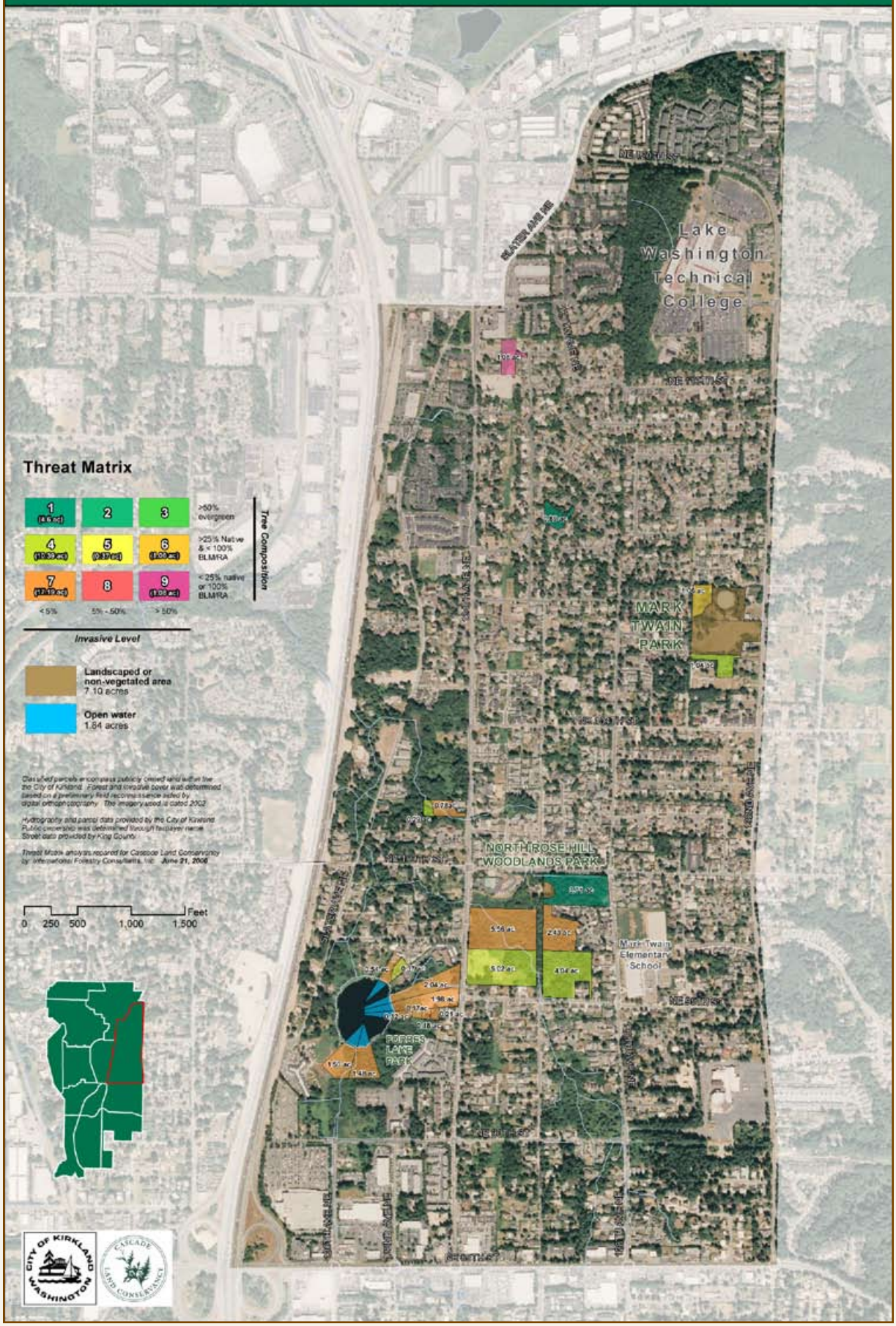
## Public Open Space Tree-iage Matrix



# Green Kirkland Partnership

## North Rose Hill Neighborhood

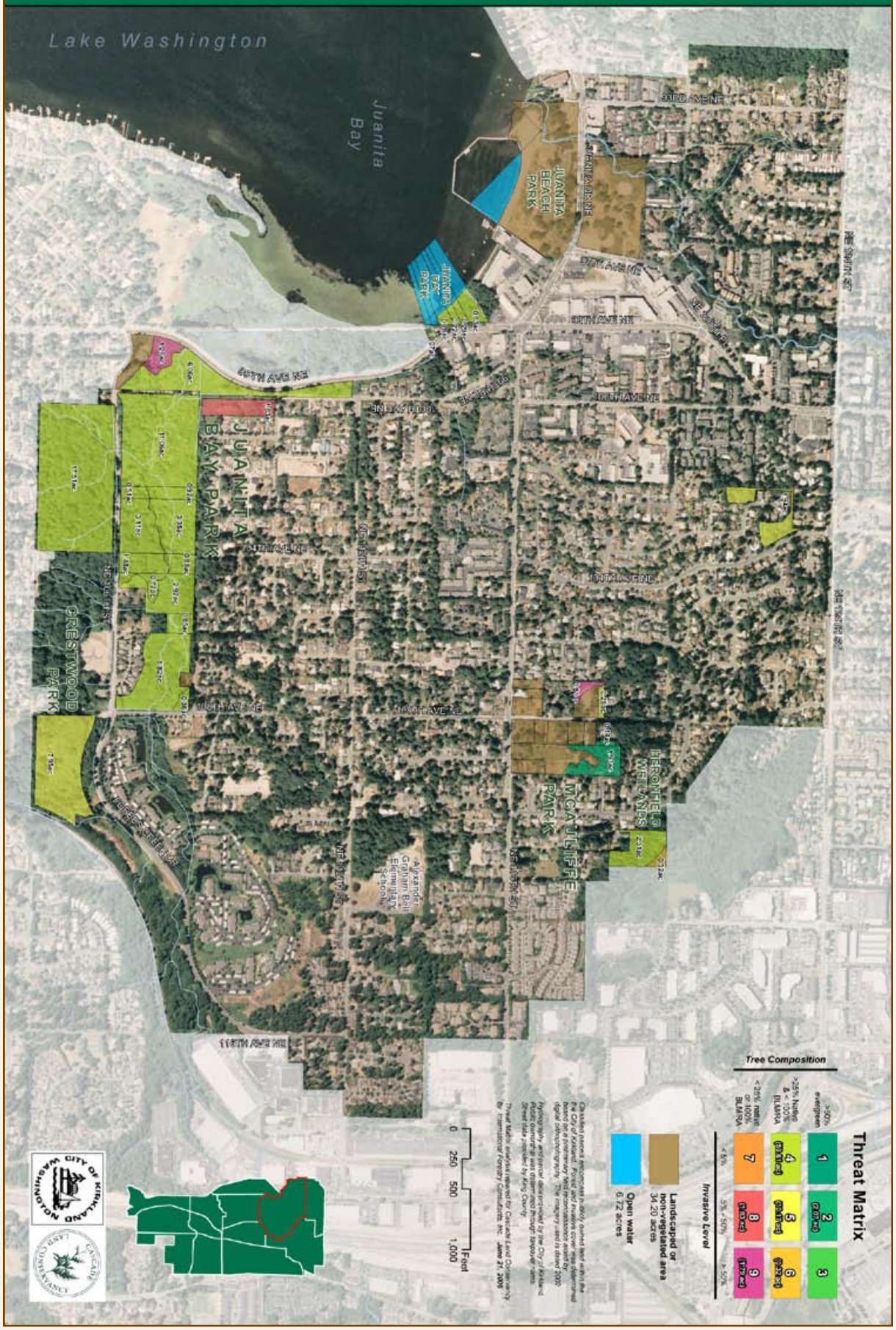
## Public Open Space Tree-iage Matrix



# Green Kirkland Partnership

## South Juanita Neighborhood

## Public Open Space Tree-iage Matrix



# Green Kirkland Partnership

## South Rose Hill Neighborhood

## Public Open Space Tree-iage Matrix

# Green Kirkland Partnership

## Totem Lake Neighborhood

## Public Open Space Tree-iage Matrix

# APPENDIX C

## Summary of Public Comments

The comments listed below were received from community participants at a focus group held at Heritage Hall on October 17, 2007. Participants broke out into three groups to answer the questions listed below.Additional responses were received through an online survey through November 2007. The responses and suggestions will be used in combination with site analysis and ecological evaluation to focus restoration, acquisition and volunteer recruitment activities for the Green Kirkland Partnership over the next 2-5 years.

*Table C-1. Summary of Public Comments on Green Kirkland Partnership*

**Zip Codes:** 98033, 98144, 98034

Four parks visited most frequently
(In order of most visited parks to least visited parks)

| No. votes | Park Name |
|---|---|
| 11 | Peter Kirk |
| 9 | Juanita Bay Park |
| 6 | Crestwoods Park |
| 6 | Marina |
| 5 | Watershed Park |
| 5 | Carillon Woods |
| 5 | Bridle Trails |
| 4 | Everest |
| 4 | Heritage Park |
| 4 | Kiwanis Park |
| 4 | Houghton Beach |
| 3 | North Rose Hill Woodlands |
| 2 | Marine View Park |
| 2 | McAulife Park |
| 2 | Cedar View |
| 2 | Spinney homestead |
| 1 | BEST High School |
| 1 | Mark Twain Park |
| 1 | Forbes Creek |
| 1 | North Kirkland community Center and Park |
| 1 | Ben Franklin School Park |
| 1 | S Rose Hill Neighborhood Park |
| 1 | Carillon Point |
| 1 | Snyder's Corner |
| 1 | Van Aalst |
| 1 | Picnic Point |

***Q1: Understanding the problem our natural areas are experiencing, what are three things you want to take action on immediately as a community member?***

**PRIORITIZE PARKS:**

- Size
- Potential for habitat
- Spatial relationship to other lands
- Diversity of habitats
- Public use—where appropriate
- Retain city-owned ROW's as green spaces, add walking trails
- RR ROW

**EDUCATION**

- Rigorous program to engage students, there are service learning opportunities and students that are desperate for projects—should approach all schools
- Provide volunteer training
- Educate neighbors around the park where work is occurring
- If I could myself increase my knowledge of native plants, preservation work, etc. that would be worthwhile as would further engaging my own family in Kirkland park use and preservation
- Publicity & Education
- Get People Involved
- Families, parents, kids, neighborhood associations—outreach speakers bureau
- Create neighborhood steward program "Adopt-A-Park" program

**PRIORITIZE INVASIVE REMOVAL**

1) Watershed Park
2) Kiwanis Park
3) Crestwoods forested area
4) Forbes Creek—corridor—between Juanita bay and I-405

- Tackle sites with moderate invasion because you can make more progress
- Other Ideas
- Consider Acquiring E Finn Hill (currently Uninc. King County)
- Protect any areas that aren't protected, if acquisition is possible
- More aggressive volunteer organizing—Power of volunteers
- Committee of neighborhood associations to take responsibility of volunteers and sustainability
- Recognize successful volunteers (in Kirkland paper)
- Sticker for businesses that support partnerships for business
- Safety of parks to people—older trees, etc.
- Yarrow Bay and the shoreline. I recently surveyed the Kirkland shoreline and was dismayed to see how much of our own public lands still have concrete breakwaters and solid bulkheads. We could go a long way towards setting a better example for private landowners if we "greened" those places
- It's exciting to see urban forest restoration expand from Seward Park to Seattle to other cities such as Kirkland
- Communicate
- Acquire Goat Hill
- Maintain existing trails. Add more hiking/walking trails

- Continue presence in local boards, educate volunteer community
- I see a lot of ivy growing on trees around our area now that I have been educated about it. It would be great to have work parties travel around and attack these things to help it from spreading further
- How do we get "ownership of parks" and work with that idea
- Hold a Green Fair—hold it with Redmond or Bellevue—offer discounted composting bins, worm bins, native plants, mulching mowers, — like other cities do. Get the word out about the work being done at the parks. Hold events there—historical walks?
- 1) Identify which parks are over-utilized and compensate with additional maintenance/funding. 2) Identify which parks are under-utilized and rectify any adoption barriers
- I would like to see the railroad co. stop spraying weed killer and tearing down the trees along the rail route. I live right above the rr tracks
- Continue and make a sustained effort with those already begun

***Q2. Which parks would you like to see the partnership begin to restore in the next 1-5 years? 5-10 years? 10-20 years?***

**1-5 years**

- Bridle Trails
- Watershed Park
- Continue at Kiwanis
- Juanita Bay
- Continue at Watershed
- Carillon woods
- Juanita Beach
- Cotton Hill
- Snyder's Corner
- Everest
- Waverly Beach Park
- Van Aalst
- Spinney homestead

*Other Comments*

- Tackle sites with moderate invasion because you can make more progress.
- Start with bigger sites first
- Continue and make a sustained effort with those already begun
- None, if it means more flowers and old buildings relocated

**5-10 years**

- Forbes Creek
- Juanita Beach
- Juanita Bay
- N Rose Hill Woodlands
- Crestwoods
- Rose Hill Meadows
- Yarrow- provide access to water
- Watershed Park
- Kiwanis Park
- Houghton Land Fill
- Snyder's Corner
- Totem Lake

*Other Comments*

- more energy to fragmented parks - new acquisition
- create activity opportunities on new purchases
- New Acquisitions

***Q3. If you have $5 million dollars to spend on restoration, how would you distribute this funding among the parks? (listed in order of higher priority for receiving funding to lower priority)***

| No. of stickers | Park name/site description |
|---|---|
| 22 | Watershed Park |
| 13 | Juanita Bay forested uplands |
| 11 | Forbes Creek |
| 11 | Juanita Bay |
| 9 | Kiwanis |
| 9 | Carillon woods |
| 6 | Yarrow Bay wetlands eastern portion |
| 6 | Forbes Creek |
| 6 | Heronsfield Wetlands |
| 5 | Juanita Beach |
| 4 | N Rose Hill Woodlands |
| 4 | Everest Park |
| 3 | Juanita Bay forested uplands |
| 3 | McAulife |
| 3 | Forbes Lake |
| 2 | Yarrow Bay wetlands |
| 2 | Watershed Park- I-405 Staging area |
| 2 | N side of Forbes Creek along NE 100th St |
| 2 | Marine View Park |
| 2 | Waverly Beach Park |
| 1 | Watershed Park uplands |
| 1 | North Rose Hill Woodlands |
| 1 | Crestwoods forested area |
| 1 | S side of Forbes Creek along Forbes Creek Drive |
| 1 | Everest Park |
| 1 | Heritage park, connect to waterfront park with stair access |
| 1 | NE 122nd - not City park - KC Housing Authority |
| 1 | Brookhaven |
| 1 | Peter Kirk Park |

***Q4. If you have $5 million dollars to spend on this program, how would you distribute this funding? (in %)***

| | Outreach | Education | Restoration |
|---|---|---|---|
| | 29% | 30% | 41% |
| | 44% | 22% | 34% |
| | 44% | 25% | 31% |
| | 10% | 30% | 45% |
| | 5% | 35% | 60% |
| | 0% | 0% | 100% |
| | 15% | 15% | 70% |
| | 20% | 0% | 80% |
| | 15% | 10% | 75% |
| | 15% | 15% | 70% |
| | 15% | 15% | 70% |
| | 2% | 8% | 90% |
| | 15% | 15% | 70% |
| | 20% | 20% | 60% |
| | 20% | 20% | 60% |
| **Average** | **18%** | **17%** | **64%** |

***Q5. Where and how would your prioritize acquisition? (Ranking from high priority for acquisition to low priority for acquisition)***

| Sticker # | Site description |
|---|---|
| 1 | East Slope Finn Hill - because imminent threat of development, relatively unbroken forested landscape |
| 1 | Forested DOT or County ROW on the I-405 across from Watershed Park |
| 1 | Forested slopes between Totem Lake and City line (132nd PL NE) |
| 1 | Lot along 116th Ave, adjacent to Bridle Trails |
| 1 | Private riparian areas of Forbes creek that extends east of the park into housing development (along Forbes Cr Dr) |
| 1 | Seahawks field |
| 1 | Undeveloped riparian slopes along northwest border of City |
| 2 | Fill gaps of private properties along Forbes Creek from Lake Washington to |
| 2 | Forbes Creek Wetland—because corridor, acquisitions fill the gaps in corridor, remaining parcels proposed for development |
| 2 | Lot along NE 60th St adjacent to Bridle Trails |
| 2 | Private properties between Forbes Lake city ownerships and connecting along Forbes Creek to NE 90th St |
| 2 | Private vacant lots between Forbes Creek and Crestwoods |
| 2 | Privately owned wetlands associated with off NE 128th ST |
| 2 | Steep slope owned by condo association south of Watershed Park |
| 2 | Wildlife Corridor over I-405 between watershed park and bridle trails, and connecting Forbes Creek riparian area |
| 2 | Yarrow Bay |
| 3 | Mark Twain Elementary |
| 3 | Private properties between Everest Park city ownerships |
| 3 | Property south of Forbes Lake Park along NE 90th St |
| 3 | Riparian lot off NE124th St |

*Comments with no ranking*

- Link water front between Juanita Bay and Juanita Beach
- Create one contiguous wildlife corridor between Juanita Bay, Forbes Creek, Crestwood forests, Cotton hill, to Forbes Lake RR ROW
- Vacant forest land south of Watershed Park between RR ROW and NE 38th Pl

***Q6. How can we engage more volunteers? Who should we contact or partner with?***

**Who**

- Neighborhood Associations
- Schools
- Colleges
- Prison
- Scout groups
- Stewardship groups
- Local companies
- United Way Day of Caring
- Church
- Schools adjacent to parks
- Neighbors adjacent to parks
- Businesses
- Lake Wa Vocational Tech
- Evergreen Hospital
- Gold's gym and other fitness shops
- Focus on organizations not individuals (scouts -girls and boys)
- Summer camps
- Senior citizen garden groups
- Juanita Bay Athletic club

**How**

- Education and stewardship
- Stipend
- Volunteer recognition and appreciation
- Friends-of Program or Adopt a Park program
- Allow networking between volunteer groups
- Training programs "Master" education efforts (master gardener/ birder, etc.)
- Adopt a stream turned adopt a forest
- Divide work into small pieces so volunteers feel accomplishment and ownership
- Offer team building for businesses,
- Recognition of businesses on a public board
- Jail/work release/court appointed community service time
- Ask businesses to sponsor parks, offer give-aways from businesses to volunteers
- T-shirts as a reward and marketing
- Bumper sticker—"I am a Green Kirkland Volunteer"
- Grade point/extra credit/ credit for volunteering/ community service credit
- Need fundraising program
- Replicate the Green Seattle model of Forest Stewards combined with volunteer events led by EarthCorps as well as crews doing work independently along with individual volunteers who choose to do this work on their

***Q7. Would you engage in Green Kirkland activities? If so, how and if not, why?***

| Activity | No. Responses |
|---|---|
| Volunteer Restoration Event | 8 |
| Natural Area Steward | 2 |
| Financial Donation | 2 |
| Volunteer Recruitment | 2 |
| Outreach/Education | 5 |
| Other: | |
| Acquisition Coordination | 1 |

***Q8. What are likely barriers to volunteering for Green Kirkland restoration events? Can you suggest any solutions to these barriers?***

**Barriers**

- I am already volunteering elsewhere and cannot do any more
- Do not know what to do or how to get started
- Fundraising
- Do not know there is a problem
- Lack of commitment
- Conflict with sports
- Live out of town (Even though they work here)
- Time
- Weather/rain
- Don't know anyone else coming
- Forgot date
- Don't know where event/park is located
- Nobody asked me
- Most communication is on the computer, I don't have one
- Sat morning event time conflicts with schedule
- Three hours is a LONG time for kids and seniors to be either focused on one task or bending and pulling
- Only offer ivy pulls
- Only have it on Sat mornings
- Barriers: time, understanding of the opportunity/need. (I once volunteered, and it turned out there were too many volunteers, so a bunch of us sat around waiting to be told what to do.)
- Lack of visibility
- Our busy lives
- Flyers don't work

**Solutions**

- Talk to others who are already doing this kind of work, leverage efforts, share resources
- Create ownership with volunteers
- Education
- Provide training
- Community rather than City-wide effort—at the Neighborhoods level
- enlist groups already working outdoors: Little leagues, scout groups
- Provide child care

- Timing—early or late, not middle of day, weekday vs. weekend
- Regular events—predictable
- Sports 1-2 hours—find time before or after
- Email communications reminders
- Optional/multiple dates
- Electronic reader boards to announce events
- Reward as a driver and motivator
- City declare certain dates Green Kirkland Partnership Days
- Banners on over passes or key intersections and roads
- Floats on 4th of July
- Parades (little league)
- shorter "shifts" with a "break" that included an educational/naturalist tour of the park would give people a stretch, provide an opportunity for "shift change" and serve as an educational purpose booster and reward for participants
- Maybe a mid-week morning or evening option?
- "Incentives" are always good, a metro pass to get there? a coupon for a discount at a local merchant for some "green" product like a shopping bag or garden gloves? I am not into promoting a lot of "stuff" giveaways but if there are re-usable replacements for other "throwaway" items that support the "green" theme, that is something that people like and others will see and ask about, thus spreading the word
- Taking a long-term view which preserves what could easily be lost. Innovate how natural spaces can be appealing for families and young people without putting in playgrounds everywhere
- The only Green Kirkland events that I recall are about removal of invasive species. I don't know if that is all that is organized to date but wonder if there are other opportunities which might appeal to those not inspired by invasive plant removal. Maybe even renaming to Native Plant Preservation work would be a little change to increase volunteering in this area
- Need point person—volunteer coordinator
- Ask volunteers to give 2 hours on the Saturday work projects and more if they want. Tough to commit to a half day if it's nice. Many will stay more than two hours anyway.
- Reader boards in neighborhoods, Internet, TV, Establish grass roots, phone/internet connections, Signs in parks Thru Parks Dept., flyers/seasonal catalogs
- We have contributed our time and will continue to do so. We are willing to contribute money if there were tight guidelines on what the funds would be used for and, ideally, if our gift was matched by the city or another donor
- The high school students are always looking for community service hours. (LWHS and ICS). Construct teams of vols., with prizes for most hours in, or work done
- The feeling that it is a futile job as once they leave that park the ivy will start to regrow without a maintenance program in place. Advertising more to alert volunteers that an event is planned to outside work in the parks. At these events a lot of apartment dwellers mentioned to me that these workshops gave them the opportunity to "garden"
- Hard work. Work through organizations: Sr. Ctr., church groups, student groups, etc.
- Make the events about more than just the restoration. Make them a little more social. Maybe go for more singles looking to meet people. Reach out to new Kirklanders, i.e., people who moved into the city in the last year
- Do projects that are on a different day, other than Saturday. Many parents are fully involved with children's activities, I play tennis. If you had people committed to ownership of a specific park, all could arrange together a work party coordinated by Park Department
- Put up signs at PCC market. Engage businesses to do the work in Kirkland and outside of it (REI, Green Car Company, PCC). Organize work parts with WTA or SeattleWorks
- If we can get more school groups involved, I think we might bring in more families. I think once the school kids work at an event, they would like to return. Can we use GPS "treasure hunts" to promote orienteering in our newly restored parks?
- Groups should be formed with goals and consistent work days (once monthly) as opposed to pop-up notices of requests for help
- Keep promoting as school community service hours. I didn't like showing up for ivy pulls and not getting to pull ivy for an hour while we got ecology lessons. Dang it I wanted to pull that nasty ivy! The events are the first to go when I have other commitments. Don't have any suggestions for that problem
- Set targets, assign challenges
- Get the word out—publicize! (call John Kurley)
- One day or weekend events may be more motivating than a general call for volunteers
- When I was in high school—LWHS they had us maintain 2 parks for our science project

***Q9. Best way to contact you?***

- Email
- Websites
- Kirkland Courier
- Seattle Times and PI

***Q10. Which days and times would you prefer for volunteer events?***

- Wed Evening
- Sat
- Sun
- Summer weekdays
- Summer Thursday's
- non-rainy days

***Q11. What would you like to see in the Green Kirkland Partnership 20-Yr Strategic Plan?***

- Taking a long-term view which preserves what could easily be lost. Innovate how natural spaces can be appealing for families and young people without putting in playgrounds everywhere
- It's exciting to see urban forest restoration expand from Seward Park to Seattle to other cities such as Kirkland
- I recently surveyed the Kirkland shoreline and was dismayed to see how much of our own public lands still have concrete breakwaters and solid bulkheads. We could go a long way towards setting a better example for private landowners if we "greened" those places

- Clear brush and non-significant trees to make Kiwanis Park's beach area usable. It was a nice little park in the early 60's and has been neglected ever since. A real shame
- Keep the parks clean and free of loitering and illegal activity. Clean up Kiwanis Park and include benches by the water—maybe a play structure—and make it more user-friendly for residents.
- Proper public tennis courts, off-leash dog areas, clean water areas for swimming (Waverly).... quit planting flowers, and give more space for people to do more activities!!
- A plan to maintain the clearing of English Ivy that so many volunteers have put hours in to do. Once it is cleared and workers move on the ivy just starts to grow again and it really needs a good maintenance plan to keep it from getting out of control again in our parks
- Greenways with bicycle paths that link to a network. The paths should be alternatives for getting around Kirkland, to the Park 'n Rides, and be pleasant enough to make people want to use them instead of struggling with traffic and parking
- More beaches with easy access
- Ownership of parks by neighbors. Replacement of natural habitat
- 1) preservation of waterfront parks for all citizens to enjoy 2) dog park (the issue isn't a hot one for me, but the article in this week's Kirkland Reporter sparked my interest)
- Totem lake area and Bridal Trails. Van Asselt. Parks for off-leash dog activities
- I'd like to see GK get involved with creative endeavors such as working to get the Houghton Landfill become a Botanical Garden similar to the South Coast Botanical Garden in So. Cal. with display gardens, the Rose Hill rose garden, Weyerhaeuser experimental forest, etc. I'd also like the City to either develop Snyder's Corner as a real park with real trees—OR SELL IT TO REDMOND and use the money (in SBH/BT)
- More sidewalks all over for safer walking to and from downtown, i.e., in the Highlands and the Everest neighborhoods
- Keep Houghton Beach restrooms open in winter. Prevent too much development and paving in parks, including statues (Peter Kirk keeps getting eaten up, historic buildings moving to Waverly)—parks are viewed as available-to-build spaces rather than open spaces. Keep acquiring land. Keep trying to get water walkways along Lake Washington
- Acquire strategic parcels for more non-dedicated parks (e.g. less baseball, more open spaces for free games).—native plantings—off-leach dog area—support for the bike trail if it goes through—humane way to get rid of moles
- Something wonderful along the Burlington Northern right of way... with the trail coming, having resting areas, picnic areas etc would be pretty cool
- To have open area for a dog park

***Other Comments***

- I am proud to live in a community that supports these efforts and look forward to continuing volunteering when I can
- As a region, urban forests are a shared resource. Volunteering is a great way to spend time in a neighborhood park as well as to learn about new parks in our region
- Look to build upon Green Seattle—replicate that effort and leverage resources/relationships/organizations already developed as part of Green Seattle
- I'd like to learn, increase my family's connection to and use of Kirkland's park space so if I think that volunteering would lead to that I would volunteer
- We like what's happening with the Ben Franklin school park. Thanks!
- You did a good job this Summer of getting the word out on helping clean up the parks
- Thank you!
- Thanks for doing this
- This survey was quite difficult to fill out

# APPENDIX D

## Green Kirkland Partnership Five-Year Strategic Plan and Benchmarks

| | 2008 | 2009 | 2010 | 2011 | 2012 | 2017 | 2023 | 2028 |
|---|---|---|---|---|---|---|---|---|
| FIELDWORK | Initiate restoration on 5 acres | Initiate restoration on 8 acres | Initiate restoration on 10 acres | Initiate restoration on 13 acres | Initiate restoration on 15 acres | Initiate restoration on 23 acres/year | Initiate restoration on 25 acres/year | Complete restoration |
| | Continue restoration on 3 acres | Continue restoration on 8 acres | Continue restoration on 16 acres | Continue restoration on 26 acres | Continue restoration on 39 acres | Continue restoration on 54 acres | Continue restoration on 169 acres | All 372 acres in restoration |
| | Fine tune monitoring protocols, link with GPS and database | Monitor progress, assess acquisition opportunities | Monitor progress, evaluate & update methodology | Monitor progress, assess acquisition opportunities | Monitor progress, evaluate & update methodology | Monitor progress, evaluate & update methodology, assess acquisition opportunities. Assess opportunities for other natural area restoration | Monitor progress, evaluate & update methodology | Report on 20-year Progress |
| COMMUNITY | Recruit and manage 4,000 volunteer hours. Create volunteer tracking database. | Recruit and manage 5,500 volunteer hours | Recruit and manage 7,000 volunteer hours | Recruit and manage 10,000 volunteer hours | Recruit and manage 12,000 volunteer hours | 14,000 Volunteer hours / year | 14,000 Volunteer hours / year | Average 7,000 Volunteer hours / year |
| | Create Natural Area Steward program, & volunteer recognition program | 4 Active Natural Area Stewards | 6 Active Natural Area Stewards | 8 Active Natural Area Stewards | 10 Active Natural Area Stewards. Volunteer appreciation event with progress celebrations | Active Natural Area Steward program working in 60% forested natural areas | Active Natural Area Steward program working in 100% forested natural areas | Active Natural Area Steward program directed to maintenance & monitoring |
| | Publicize in media, community papers | Develop business participation program | Develop marketing program | Launch community campaign focused on long-term funding | Celebrate 5 year accomplishments with major community event | Continued awareness throughout the community and region | Continued awareness throughout the community and region | Celebrate 20 year accomplishments |
| | Develop education materials | Develop Summer Youth Job Training program (TASK) | Work with schools to develop urban forest curriculum/ service learning program | Work with private landowners to increase awareness about the problem and how they can help in their own lands. Provide incentives for property owners who are weed free (includes city properties) | Raise awareness amongst landscape professionals, nurseries and other retailers of the problem and how they can help | Work to ban sales of noxious weed species in Kirkland | Work with local colleges and universities to evaluate | |
| RESOURCES | Identify & pursue stable funding sources | Identify & pursue stable funding sources | Identify & pursue stable funding sources | Identify & pursue stable funding sources | Long-term stable funding established | Long-term stable funding established | Long-term stable funding established | Identify funding for maintenance |
| | Train Staff in BMPs and 4-phased restoration approach | Partner with other City Departments to develop joint stewardship and restoration goals, share BMPs | Work with Planning Dept to develop stewardship protocals for NGPEs, development permits, and update the recommended plant lists | Hire Seasonal or year round Natural Area crew to support Green Kirkland Restoration events | Expand the Tree Inventory to include tree's in Open Spaces/ Natural Areas, City rights-of-way, riparian corridors, other public grounds | Reevaluate BMPs and training program | | |
| | Partner with Green Seattle Partnership to share and leverage resources | Partner with other stewardship organizations to leverage resources (KCD at Totem Lake) | Hire professional crews to support volunteer efforts, work towards developing a green collar work force | Evaluate ecological services of forested natural areas | Work with local colleges and universities to incorporate best available science in urban forestry | Re-evaluate canopy cover in Kirkland | Evaluate carbon sequestration programs and climate impacts | |
| ADMIN & GOVERNANCE | Establish Green Team as internal oversight committee | Write 2008 Annual report | Write 2009 Annual report | Write 2010 Annual report | Write 2011 Annual report | Write mid-term progress report | | |
| | Publish 20- year Forest Restoration Plan. Develop 2009 Work Plan | Develop 2010 Work Plan | Develop 2011 Work Plan | Develop 2012 Work Plan | Create five- year Strategic Plan | Create five- year Strategic Plan | Create five- year Strategic Plan | Complete work and create 20-year Progress Report |

# APPENDIX E

## Best management practices (BMPs) for Invasive Species Removal

*Derived from Watershed Park Vegetation Management Plan by Sheldon and Associates, not yet published.*

### ***English ivy*** *(Hedera helix)*

English ivy is a broad-leaved evergreen non-native invasive vine. It covers sections of the forest floor and wraps tree trunks throughout the forest. It is one of the biggest threats to forest health in park areas where it is abundant. Ivy has no natural predators or pests. It is shade-tolerant and forms dense mats on the ground where it smothers native plants. In addition, ivy climbs trees, weighing down the limbs, reducing air and nutrient flow. It creates a heavy sail in the canopy that increases the likelihood that the tree will be knocked over during wind storms. English ivy has no habitat benefit for native wildlife, and it significantly reduces native plant diversity. There are two ways that ivy makes its way into a park: by escaping from neighboring yards, and by birds who eat and then spread the ivy seeds. Ivy has two developmental stages: the familiar climbing vine which is the juvenile phase, and the flowering adult phase. Flowering is induced when vines grow up trees and reach bright sunlight. To stop the spread of ivy by bird-delivered seeds, killing the vines that are growing up trees is the top control priority. Educating the park's neighbors about the negative impacts of the ivy that has escaped from their yards is also a top priority.

Choice of ivy control method(s) should be based on the availability of labor and other resources; seasonal timing of the project; slope steepness; and density of neighboring native plants.

#### ENGLISH IVY ON TREES:

Although ivy can be removed from trees at any time of year, because most of the native plants are dormant in the winter (November through February), removing the ivy at that time minimizes damage to native plants.

- Using loppers or a pruning saw, cut through each vine at shoulder height and again at ankle height all around the circumference of the tree. Be careful not to wound the bark of the tree when cutting the ivy vines
- Strip the ivy away from the tree between the two cuts—some vines may be so big that you will need to pry them away from the tree
- DO NOT pull the cut vines out of trees—this will do much more harm than good to the tree. Leave the stranded vines in place to die and decompose
- Clear ivy by hand pulling (see below) in a radius of at least six feet around the base of the tree. This cleared area is called a tree "life-saver"
- Do not leave the pulled vines on the ground—they can continue to grow. Either properly dispose of the vines offsite, or leave them in tall narrow piles to dry and decompose. The piles must be monitored for any growth
- It is imperative that the trees and their "life-savers" be monitored regularly for any regrowth of the ivy. Pull any ivy whenever you find it

#### HAND-PULLING ENGLISH IVY IN FLAT AREAS:

Although ivy can be removed at any time of year, because most of the native plants are dormant in the winter (November through February), removing the ivy at that time minimizes damage to native plants.

- Pull ivy either by hand or by using a pair of pliers. Remove as much of the root system as possible by pulling the vine at the spot where it comes out of the ground
- As you work, protect native plants and minimize trampling and churning of the soil
- Thoroughly clear an area before moving on
- Do not leave the pulled vines on the ground—they can continue to grow. Either properly dispose of the vines offsite, or leave them in tall narrow piles to dry and decompose. To prevent spreading, the piles MUST be monitored for any growth
- It is imperative that the cleared area be monitored regularly for any ivy regrowth. Pull any ivy whenever you find it
- Removing dense ivy mats from areas that have a minimal number of native shrubs and herbs should only be done if subsequent replanting is planned. The new planting areas should have an additional 10'-wide cleared strip around the edges, and must be monitored. Removal of ivy where there is still a fairly intact native shrub layer can be done without replacement planting

**ENGLISH IVY ON STEEP SLOPES:**
Depending on the steepness of the slope, time of the year, density of native shrubs and herbs, and availability of labor and other resources, use either the herbicide control method or the hand-pulling method above.

***English holly*** *(Ilex aquifolium)*

***Cherry or Portuguese laurel*** *(Prunus laurocerasus or lusitanica)*

Holly and laurel are broad-leaved evergreen shrubs that are spread readily by birds due to their prolific fruit. They also sucker and re-sprout vigorously. They prefer at least partial shade and are generally found in upland forest in the understory, or along forest edges. They can be found as single, individual plants, or as thickets containing multiple stems.

When the soil is moist, young plants that are small enough can be hand-pulled with intact roots using a Weed Wrench™. The Weed Wrench™ is a helpful tool which grabs the crown between two jaws while providing great leverage for pulling out the entire root system. Using the Weed Wrench™ causes minimal soil disturbance—especially as compared to standard grubbing methods.

The most effective method to remove larger plants that cannot be extracted with intact roots is a combination of mechanical means and herbicide. In upland areas away from aquatic resources (e.g. shorelines, wetlands, and streams), using undiluted Garlon 3A® (triclopyr amine) or Roundup® (glyphosate with surfactant) to paint the cut surfaces (see below) is recommended. Within 100' of aquatic resources, using undiluted Rodeo® (glyphosate without surfactant) is recommended. Herbicide should be mixed with a water-soluble indicator dye. Generally speaking, herbicide should be applied between flowering and fruit set. Triclopyr amine is most effective when used during the early summer, while glyphosate is most effective when used from midsummer to late fall. Do not apply herbicide when the plant is under stress: extreme heat or cold, drought, waterlogging, or disease. Do not apply herbicide when wet weather is anticipated. Contact King County Noxious Weed program for information.

Several cut and paint methods can be used:

**CUT AND PAINT:**

- Clear the ground around the base of the stem
- Cut the stem as close to the ground as possible. If cutting at the base is impractical, cut higher to get rid of the bulk of the plant, then cut again at the base
- Make horizontal cuts to prevent herbicide from running off the stump
- Paint undiluted herbicide (with water-soluble indicator dye) around the perimeter of the cut stump surface immediately after cutting—within 20-30 seconds—before translocation of the herbicide ceases. Having one team member whose specific task is to apply the herbicide after another team member cuts the tree/shrub is recommended
- Approximately one tablespoon of herbicide is adequate for most stumps when uniformly applied around the perimeter of the live wood. More herbicide is required for stumps over 12 inches in diameter

**INJECTION METHOD FOR TREES AND SHRUBS GREATER THAN 4 INCHES IN DIAMETER AT THE BASE:**
This technique should be used before fruit production so that the standing dead plant does not have fruit on it.

- Using at least a ¼" bit, drill a hole at an angle of 45° through

the bark into the sapwood

- Using a syringe, within 20-30 seconds after drilling, fill the hole with undiluted herbicide (with water-soluble indicator dye). Having one team member whose specific task is to inject the herbicide after another team member drills the hole is recommended
- Repeat this process at 2 inch intervals around the trunk

**FRILLING OR CHIPPING METHOD FOR TREES AND SHRUBS GREATER THAN 4 INCHES IN DIAMETER AT THE BASE:**

This technique should be used before fruit production so that the standing dead plant does not have fruit on it.

- Use a sharp chisel or axe to make a deep downward cut at a 45° angle through the bark into the sapwood. Be sure to leave the chips (frills) attached to the trunk at the base of the cut
- Paint the inside base of the chip within 20-30 seconds of cutting with approximately ¼ to ½ teaspoon of undiluted herbicide (with water-soluble indicator dye). Having one team member whose specific task is to paint the herbicide after another team member cuts the chip is recommended
- Repeat these cuts around the tree
- Do not completely girdle the plant—leave at least ½ inch between the cuts

**FOR ALL METHODS:**

It is imperative that treated cut stumps and injected or frilled trees and shrubs be checked for re-sprouts every 2 to 6 months for a minimum of 2 years after treatment. If plants resprout, after sufficient regrowth has occurred cut the shoots and paint the stumps with herbicide (see above). If no herbicide is used for re-treating, repeated cutting will be required to weaken and eventually kill the plant over time. This is a more labor-intensive method and will require diligent follow-up visits over a period of at least several years to remove suckering growth resulting from the initial treatment.

### *Himalayan and Evergreen Blackberries*

*(Rubus armeniacus, R. laciniatus)*

Eradication and control methods for these two species are the same. Blackberry can be found in upland areas, as an understory species along forest edges, and in dense monotypic stands in more open areas. Removal methods include hand-pulling with root removal, repeated cutting or mowing, cutting and dabbing stubs with herbicide (cut and dab), or combinations of two or more of these techniques. Generally speaking, hand-pulling is reasonable only for isolated plants and small infestations, or for maintenance around trees or shrubs. If herbicide is used, a glyphosate or triclopyr amine herbicide is recommended: Roundup® (glyphosate with surfactant) or Garlon 3A® (triclopyr amine) for upland areas, and Rodeo® (glyphosate without surfactant) for areas within 100' of an aquatic resource. Generally speaking, herbicide should be applied between flowering and fruit set. Triclopyr amine is most effective when used during the early summer, while glyphosate is most effective when used from midsummer to late fall. Do not apply herbicide when the plant is under stress: extreme heat or cold, drought, waterlogging, or disease. Do not apply herbicide when wet weather is anticipated. Contact King County Noxious Weed program for information.

The method(s) chosen for blackberry removal depends mainly on the size and density of the patch, the steepness of the slope, time of year, existing native vegetation, and the availability of labor and other resources. Except for areas with sparse occurrences and a relatively intact healthy existing plant community, blackberry removal should not be done unless subsequent replacement planting is planned. For sparse occurrences, hand-pulling or cutting and dabbing the stumps with herbicide

is recommended. Because blackberry seeds are spread by birds, constant vigilance for new infestations is required.

#### BLACKBERRIES IN DENSE PATCHES (THICKETS) WITHOUT MUCH SLOPE

Removal of dense blackberry patches (thickets) may result in the displacement of wildlife that use these areas for cover and forage. Therefore, whenever possible removal work should occur after July 1st to accommodate wildlife. Depending on the removal method chosen, this may not always be possible, and maximum removal effectiveness may take precedence over wildlife impacts.

- Use appropriately sized mowers or brush mowers to cut the blackberry thicket to the ground several times during the most active growing season (May-September). Repeated mowing will reduce plant vigor
- Either properly dispose of the cut canes offsite, chip them with a chipper, or pile them on top of several sheet thickness of cardboard, in a dry place for wildlife use—monitor piles for re-sprouting
- In mid-September, either:
  Continue to mow until the first hard frost

  OR

  Cut re-sprouts and immediately (within 20to 30 seconds of cutting) dab the stumps with herbicide with water-soluble indicator dye:
  - For upland areas use a 50% solution Garlon 3A®, or 50% to 100% solution of Roundup® (glyphosate with surfactant)
  - For areas within 100' of an aquatic resource use a 50% to 100% solution of Rodeo® (glyphosate without surfactant)
  - Having one team member whose specific task is to dab on the herbicide after another team member cuts the blackberry cane is recommended. Use a Weed Wrench™ to hand-pull blackberries growing adjacent to wetlands, streams, or other aquatic resources

  OR

  Without cutting, using a backpack sprayer, spot spray the blackberry re-sprouts with herbicide with water-soluble indicator dye:
  - For upland areas use a 2 to 3% solution of Garlon 3A® with 1% non-ionic surfactant, or a 2% solution of Roundup®, or a solution with 2% of Roundup® plus 1% (or less) solution of Garlon 3A® plus less than 1% non-ionic surfactant
  - For areas within 100' of an aquatic resource use a 2% solution of Rodeo® (glyphosate without surfactant)
  - For areas adjacent to wetlands, streams, or other aquatic resources, spot spraying (even with Rodeo®) is not recommended. Hand-pull those blackberries with a Weed Wrench™
- In October, either after the last mowing or after treatment, apply a double layer of cardboard sheet mulch covered with 4 to 6" of arborist mulch
- It is imperative that the treated area be monitored for blackberry resprouts for at least 2 years. Either cut and dab the stumps with herbicide (see above) or hand-pull the resprouts with a Weed Wrench™
- Replant the area with native plants. Plants can be installed through the mulch and cardboard. In many cases, re-planting of an area may not be done for 2 to 3 years until control of re-sprouting is complete. In other instances, planting in the late fall immediately after removal work may be desirable. The planting schedule will depend on the area, and must be determined at the time of project planning

#### SCATTERED INDIVIDUAL BLACKBERRY PLANTS OR RELATIVELY SMALL BLACKBERRY PATCHES WITHIN A MATRIX OF NATIVE VEGETATION

Two methods are recommended for removing blackberries growing in a matrix of healthy native plants: either hand-pull the blackberries with a Weed Wrench™ (see below) when the soil is moist and loose (usually winter through spring), or cut the blackberry canes and dab the stumps with herbicide in late summer/early fall. The choice of method may depend on the density of native vegetation, season of project, and the availability of labor and other resources.

#### HAND-PULLING:

- When the soil is moist, cut the canes back to approximately 12 inches
- Either properly dispose of the cut canes offsite, chip them with a chipper, or pile them in a dry place for wildlife use—monitor piles for re-sprouting
- Using a Weed Wrench™ hand-pull the remaining crown and entire root system of each plant
- It is imperative that the area be monitored for blackberry resprouts for at least 2 years after pulling. If resprouts occur, when the soil is moist, either: use a Weed Wrench™ to pull the resprouts if they are large enough; or hand-pull the resprouts

by pushing a narrow trowel or long knife (hari-hari) deep into the ground beside the plant, loosening the soil around the resprout, and gently working the resprouts out of the ground

- If the number of blackberry plants removed is sufficient to leave a large gap in the vegetation, the area should be replanted with native plants. Planting in the late fall immediately after removal work may be desirable

**CUTTING AND DABBING:**

- Late summer to early fall (at least 3 weeks before any killing frost), cut the canes back to approximately 12 inches
- Immediately (within 20 to 30 seconds of cutting) dab the stumps with herbicide with water-soluble indicator dye:
    - For upland areas use a 50% solution Garlon 3A®, or a 50% to 100% solution of Roundup® (glyphosate with surfactant)
    - For areas within 100' of an aquatic resource use a 50% - 100% solution of Rodeo® (glyphosate without surfactant)
    - Having one team member whose specific task is to dab on the herbicide after another team member cuts the blackberry cane is recommended
    - Use a Weed Wrench™ to hand-pull (see above) blackberries adjacent to wetlands, streams, or other aquatic resources
- Either properly dispose of the cut canes offsite, chip them with a chipper, or pile them in a dry place for wildlife use—monitor piles for re-sprouting
- It is imperative that the treated area be monitored for blackberry resprouts for at least two years after cutting and dabbing. If resprouts occur, either: use a Weed Wrench™ (see above) to pull the resprouts when the soil is moist (winter through spring), or cut the resprouts and dab the stumps with herbicide (as above) in late summer/early fall
- If the number of blackberry plants removed is sufficient to leave a large gap in the vegetation, the area should be replanted with native plants. Planting in the late fall immediately after removal work may be desirable. The planting schedule will depend on the area, and must be determined at the time of project planning

**BLACKBERRIES ON STEEP SLOPES:**

Two methods are recommended for removing blackberries growing on steep slopes: either cut the blackberry canes and dab the stumps with herbicide in late summer/early fall, or hand-pull the blackberries with a Weed Wrench™ when the soil is moist and loose (usually spring) (see above). The choice of method will depend on the potential for erosion of the steep slope, the density of native vegetation, season of project, and the availability of labor and other resources. See *CUTTING AND DABBING* and *HAND-PULLING* sections above.

If the number of blackberry plants removed is sufficient to leave a large gap in the vegetation, the area should be replanted with native plants. Planting in the late fall immediately after removal work may be desirable. The planting schedule will depend on the area, and must be determined at the time of project planning. Removing the cane cover of blackberry on a slope should not require additional erosion control methods as long as the soils are not greatly disturbed. If use of a Weed Wrench results in extensive disturbed soils, then placing thick layer of arborist mulch around new plantings should suffice to hold the soils in place. No mechanical (grading, disking, etc) removal of blackberry crowns should be used on steep slopes.

## ***Scot's broom*** *(Cytisus scoparius)*

Scot's broom (also called Scotch broom) grows in open dry upland areas—in meadows and along forest edges. Scot's broom is shade-intolerant, so long-term control is linked to successful establishment of healthy native plant communities to shade it out. Scot's broom provides some cover and refuge for wildlife, but its habitat function is not high. It produces large quantities of self-dispersed (up to 13 feet) and long-lived seed. Removal of large plants is labor intensive, but is important to keep the

population from expanding, and to reduce the spread and accumulation of seeds. Removal and control of younger plants is easier because they can be hand-pulled or mowed.

#### HAND-PULLING:

- When the soil is moist and loose, use a Weed Wrench™ to hand-pull entire plants and root systems. The Weed Wrench™ is a marvelous tool which grabs the stem between two jaws while providing great leverage for pulling out the entire root system. It comes in several sizes depending on the diameter of the stem that you want to pull. Using the Weed Wrench™ causes minimal soil disturbance—especially as compared to standard grubbing methods
- Pulled plants can be chipped or piled for wildlife use
- It is imperative that the area be regularly monitored for Scot's broom for several years after pulling—expect resprouts and seedling emergence. New plants should be pulled as soon as they are large enough to grasp, but before they produce seeds. When the soil is moist, either: use a Weed Wrench™ to pull the plants if they are large enough; or hand-pull the smaller plants by pushing a narrow trowel or long knife (hari-hari) deep into the ground beside the plant, loosening the soil around it, and gently working the entire plant out of the ground
- If the number of Scot's broom plants removed is sufficient to leave a large gap in the native vegetation, the area should be replanted with native plants. Planting in the late fall immediately after removal work may be desirable. The planting schedule will depend on the area, and must be determined at the time of project planning

#### SCOT'S BROOM IN DENSE PATCHES (THICKETS)

Thicket removal can be done incrementally as resources are available, and should not be done unless subsequent replacement planting is planned. Because of the poor quality of the soil in the southeast corner of the park where the largest stand of Scot's broom is located, soil amendments are likely to be necessary.

Scot's broom thickets can be removed by mowing, grazing by goats, hand-cutting individual plants, or manual removal with Weed Wrenches™ or machinery. Methods involving grubbing may be the least desirable due to soil disturbance and the resultant increase in broom seed germination. Broom plants usually require several cuttings before the reserve food supply in the roots is exhausted. If only a single cutting can be made, the best time is in early summer when the plants are in full flower. At this stage the reserve food supply in the roots is low, and the seeds have not yet matured. There is some evidence that cutting alone is sufficient to kill plants with a stem diameter of 2 inches or greater. Because of expected re-sprouting and seed germination, mowing and cutting should be followed up by one or a combination of the following: continued subsequent annual (or more often) cutting; cutting and painting the stumps with herbicide; painting herbicide on trunks; and/or spraying dormant plants with herbicide. Choice of method(s) will depend largely on the availability of labor, machinery and other resources; seasonality; and slope steepness. Regular monitoring of areas where Scotch broom has been removed is imperative.

#### MOWING:

Scotch broom can be trimmed back by tractor-mounted mowers or brush hogs on even ground, or by brush cutters on rough or sloped ground. Scotch broom can be removed faster and more economically by mowing than by manual means. Cut plants can be chipped or piled for wildlife use.

#### CUTTING:

Scot's broom can be cut with manually operated tools such as brush cutters, chain saws, axes, machetes, and loppers. Cut plants can be chipped or piled for wildlife use.

#### HERBICIDES FOR SPOT SPRAYING IN UPLAND AREAS FURTHER THAN 100 FEET FROM AQUATIC RESOURCES:

Generally speaking, do not apply herbicide when the plant is under stress: extreme heat or cold, drought, waterlogging, or disease. Do not apply herbicide when wet weather is anticipated. Contact King County Noxious Weed program for information:

- Herbicide: emulsifiable esters of 2,4-D
- Concentration: 2 lb. acid equivalent per acre in water-oil emulsion; 5-10 gallons of spray per acre
- Time of application: late February—March during dormancy or early dormancy break
- Application method: backpack sprayer to spot spray plants
- Herbicide: Garlon 4® (triclopyr ester)
- Concentration: 1.5% solution or 4-8 lb. per acre in oil/water emulsion; 10 gallons of spray per acre
- Time of application: any time during active growth
- Application method: backpack sprayer to apply to basal trunk bark

#### HERBICIDE FOR SPOT SPRAYING FOR UPLAND AREAS WITHIN 100 FEET FROM AQUATIC RESOURCES:

Generally speaking, do not apply herbicide when the plant is

under stress: extreme heat or cold, drought, waterlogging, or disease. Do not apply herbicide when wet weather is anticipated. Contact King County Noxious Weed program for information. Spot spraying (even with Rodeo®) is not recommended for areas adjacent to wetlands, streams, or other aquatic resources. Hand-pull those Scot's broom plants with a Weed Wrench™:

- Herbicide: Rodeo® (glyphosate without surfactant)
- Concentration: 2% solution of Rodeo® (glyphosate without surfactant)
- Time of application: actively growing plants in the spring
- Application method: backpack sprayer to spot spray plants

#### CUTTING AND PAINTING WITH HERBICIDE:

In mid-summer, at the end of flowering when seed pods are still developing (green), cut Scot's broom and immediately (within 20 to 30 seconds of cutting) paint the stumps with herbicide with water-soluble indicator dye:

- For upland areas use a 50% solution Garlon 3A®, or 50% to 100% solution of Roundup® (glyphosate with surfactant)
- For areas within 100' of an aquatic resource, use a 50% to 100% solution of Rodeo® (glyphosate without surfactant)
- Having one team member whose specific task is to dab on the herbicide after another team member cuts the Scot's broom plant is recommended
- Use a Weed Wrench™ to hand-pull Scotch broom plants growing adjacent to wetlands, streams, or other aquatic resources. Cut plants can be chipped or piled for wildlife use

#### SCATTERED INDIVIDUAL SCOTCH BROOM PLANTS OR RELATIVELY SMALL SCOT'S BROOM PATCHES WITHIN A MATRIX OF NATIVE VEGETATION

Hand-pulling of individual plants or smaller patches of plants should be done when soil is moist and loose (winter through spring or after a heavy rain). Because of the expected re-sprouting and seedling emergence that will occur after hand-pulling, subsequent use of herbicide is likely to decrease the total amount of labor required to eliminate Scot's broom patches. See the section above for herbicide use information.

### *Yellow archangel*
*(Lamiastrum galeobdolon)*

This aggressive and invasive groundcover is a relative newcomer to the area. It is native to Europe and Asia, and was probably introduced to North America for ornamental use. The leaves of yellow archangel are opposite with smooth serrated edges, and silver/white markings with green trim on the upper surface. The stems are green, square, and hairy - especially at base of stem. Side shoots can develop as stolons. The flowers are yellow with a hooded upper petal and a lipped lower petal (helmet-shaped). The lower petal lip serves as a platform for large insects, and it has reddish-brown markings that act as nectar guides. Yellow archangel blooms in April and May for short periods (approximately 7 days) with clusters of small flowers at the ends of stems. There are many subspecies of yellow archangel, each of which can have variations. Seedlings of yellow archangel rapidly develop into erect young plants (initially), which root at the nodes. Roots of mature plants can exceed 12 inches long and grow more than 8 inches deep and also along the surface. Propagation occurs by both seeds and vegetatively from stolons (i.e., stems that grow along the surface of the ground). Unintentional dispersal of this plant often occurs through the process of home-owners or commercial nursery staff 'disposing' of yard/nursery waste by dumping: the active stolons of the plant allows ready spreading of viable segments of plants from weed or compost heaps that are not hot-composted. This weed is often mistaken for Lamium species, but has its own genus because it has yellow flowers and minor differences in floral structure from the Lamium species.

Yellow archangel is extremely vigorous and can grow in a variety of environmental conditions and habitats. Because it pre-

fers partial shade, yellow archangel has overtaken large areas of forest in the Pacific Northwest. As an evergreen vine, yellow archangel can swiftly displace local native groundcovers such as sword fern, trillium, and false-lily-of-the-valley. In most cases, it is a garden escapee, spreading to nearby parks and other wooded or open areas. This is the case in the Watershed Park. The large patches located near the northeast corner and along the southern boundary have come directly from gardens on neighboring properties.

Control of yellow archangel is a high priority. If left uncontrolled, yellow archangel will spread throughout the parks and dominate the forest floor. Fortunately, yellow archangel is relatively easy to pull out, and it responds to herbicide. However, unless the adjacent offsite sources are controlled, controlling yellow archangel in the park will be a constant battle. Educating the park's neighbors about the negative impacts of the yellow archangel that has escaped from their yards is also a top priority. Constant vigilance for new infestations is crucial.

#### HAND-PULLING YVELLOW ARCHANGEL:

Although yellow archangel can be removed at any time of year, because most of the native plants are dormant in the winter (November through February), removing it at that time minimizes damage to native plants. Although hand-pulling is safe and effective, it is labor intensive.

- Hand-pull yellow archangel. Remove as much of the root system as possible by pulling the vine at the spot where it comes out of the ground
- As you work, protect native plants and minimize trampling and churning of the soil
- Thoroughly clear an area before moving on
- Do not leave the pulled vines on the ground—they will continue to grow. Properly dispose of the vines offsite. Or, put the pulled vines on several sheet thickness of cardboard in tall narrow piles to dry-out completely before composting onsite. The piles MUST be monitored to prevent spreading. Hot composting will work only if all viable portions of the plants are thoroughly heated sufficiently to cause mortality. It must be monitored prior to re-use
- It is imperative that the cleared area be monitored regularly for any regrowth of yellow archangel. Pull any re-sprouting yellow archangel whenever you find it. Efforts must be long term until the patches are eradicated—this may take several years depending on the patch size and intensity of control efforts. Constant vigilance for new infestations is crucial
- Subsequent replanting should be planned when pulling dense patches of yellow archangel in areas that have a minimal number of existing native shrubs and herbs. The new planting areas must be monitored. Removal of yellow archangel where there is still a fairly intact native shrub layer can be done without replacement planting

#### HERBICIDE USE FOR YELLOW ARCHANGEL CONTROL:

Depending on the availability of labor and other resources, and the success of hand-pulling to control yellow archangel in the park, it may be necessary to use herbicide. Generally speaking, do not apply herbicide when the plant is under stress: extreme heat or cold, drought, waterlogging, or disease. Do not apply herbicide when wet weather is anticipated. Contact King County Noxious Weed program for information.

- Herbicide can be used from summer to fall, as long as temperatures are above 12° C. In areas where native plants are interspersed, it may be prudent to apply herbicide before emergence of these species, or delay application until they have died back or are dormant
- Using a back-pack sprayer, very carefully apply the herbicide. For upland areas, use a 2.5% solution of Garlon 3A® (triclopyr amine) with a water-soluble indicator dye. For areas within 100' of an aquatic resource use a 2.5% solution of Rodeo® (glyphosate without surfactant) with a water-soluble indicator dye. Spot spraying (even with Rodeo®) is not recommended for areas adjacent to wetlands, streams, or other aquatic resources. Hand-pull the yellow archangel in these areas
- It is imperative that the treated area be monitored regularly for any regrowth of the yellow archangel. It may be necessary to respray. If possible, hand-pull any growing yellow archangel whenever you find it and dispose of it properly
- Subsequent replanting should be planned when treating dense patches of yellow archangel in areas that have a minimal number of existing native shrubs and herbs. The new planting areas must be monitored

***Vinca or periwinkle*** *(Vinca minor or V. major)*

Vinca is a somewhat woody evergreen vine, which trails or scrambles to approximately 3 feet long and upright to 1 foot. Vinca grows best in partial to fairly deep shade where it forms dense mats and extensive infestations. Vinca spreads primarily by rooting at nodes—the viability of the seeds has yet to be reported. Vinca flowers from April to May (sporadically May to September) with five-petaled violet pinwheel-shaped flowers. The leaves are glossy, hairless, and opposite, with the margins slightly rolled under. The blades are dark green with whitish lateral and midveins on the upper side, and lighter green with whitish midveins on the lower side. Some varieties are variegated. Vinca was introduced from Europe in the 1700's, and it is now commonly sold as an ornamental ground cover. Vinca is often found around old homesites and scattered in open to dense canopied forests.

Control of vinca is a high priority. If left uncontrolled, vinca will spread throughout the forested areas of the parks. Fortunately, vinca does not grow as quickly as yellow archangel, it is relatively easy to pull out, and it responds to herbicide. However, unless yard waste dumping and potential adjacent off-site sources are controlled, controlling vinca in the parks will be a constant battle. Educating the park's neighbors about the negative impacts of yard waste dumping and the potential for spreading vinca is also a high priority. Constant vigilance for new infestations is crucial.

**HAND-PULLING VINCA:**

Although vinca can be removed at any time of year, because most of the native plants are dormant in the winter (November through February), removing it at that time minimizes damage to native plants. Although hand-pulling is safe and effective, it is labor intensive.

- Hand-pull vinca. Remove as much of the root system as possible by pulling the vine at the spot where it comes out of the ground
- As you work, protect native plants and minimize trampling and churning of the soil
- Thoroughly clear an area before moving on
- Do not leave the pulled vines on the ground—they can continue to grow. If possible, properly dispose of the vines offsite. OR, if necessary, put the pulled vines in tall narrow piles on double layered cardboard to completely dry and then decompose onsite. The piles MUST be monitored to prevent spreading
- It is imperative that the cleared area be monitored regularly for any regrowth of vinca. Pull any re-sprouting vinca whenever you find it. Efforts must be long term until patches are eradicated, and constant vigilance for new infestations is crucial
- Subsequent replanting should be planned when pulling dense patches of vinca in areas that have a minimal number of existing native shrubs and herbs. The new planting areas must be monitored. Removal of vinca where there is still a fairly intact native shrub layer can be done without replacement planting

**HERBICIDE USE FOR VINCA CONTROL:**

Depending on the availability of labor and other resources, and the success of hand-pulling to control vinca in the park, it may be necessary to use herbicide. Generally speaking, do not apply herbicide when the plant is under stress: extreme heat or cold, drought, waterlogging, or disease. Do not apply herbicide when wet weather is anticipated. Contact King County Noxious Weed program for information. Vinca leaves have a thick waxy cuticle which can prevent herbicide uptake. As a result, the most effective method for herbicide application is to wound the leaves by lightly cutting them with a weed whacker immediately before spraying.

- Herbicide can be used from spring to fall, as long as temperatures are above 50° F. However, the herbicide is most effective when day time temperatures are between 70° and 80° F. In areas where native plants are interspersed, it may be advisable to apply herbicide prior to emergence of these species, or to delay application until they have died back or are dormant
- Using a weed whacker, wound the vinca leaves. Do not completely mow the patch—the point is to wound the leaves sufficiently to improve herbicide uptake while maintaining intact vines and some intact leaves for herbicide translocation to the roots
- Within a maximum of 5 minutes after wounding, use a backpack sprayer to uniformly spray the patch with a medium to heavy treatment. Having one team member whose specific task is to apply the herbicide after another team member wounds the vinca leaves is recommended. For upland areas, use a 3% solution of Roundup® (glyphosate with surfactant) with a water-soluble indicator dye. For areas within 100' of an aquatic resource use a 3% solution of Rodeo® (glyphosate without surfactant) with a water-soluble indicator dye. Spot spraying (even with Rodeo®) is not recommended for areas adjacent to wetlands, streams, or other aquatic resources. Hand-pull the vinca in these areas
- It is imperative that the treated area be monitored regularly for any vinca regrowth. It may be necessary to respray. If possible, hand-pull any growing vinca whenever you find it and dispose of it properly
- Subsequent replanting should be planned when treating dense patches of vinca in areas that have a minimal number of existing native shrubs and herbs. The new planting areas must be monitored

**For a schedule and information on how you can help. . .**

**Please contact:**
**Parks and Community Services**
**Parks Coordinator**
**425-587-3342**
**www.greenkirkland.org**

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