Open Space Assessment Report April 2017

Columbia
Association

This page is left intentionally blank

TABLE OF CONTENTS

MAP LIST

Note: All maps referenced within the Open Space Assessment are located in a separate map compilation document titled "Open Space Assessment Maps."

EXECUTIVE SUMMARY

Study Overview and Purpose

Open space is a fundamental development characteristic built into the fabric of Columbia, Maryland. All residential areas and most employment and mixed-use areas are in close proximity to open and natural areas. This development pattern — and the extent of the open space holdings — distinguish Columbia from other communities. These lands provide health, recreation, aesthetic, ecological and community cohesion benefits that contribute to Columbia's quality of life.

Columbia Association (CA) owns and manages open space lands and natural areas in Columbia. Plans, policies and management practices guide CA in its management of its open space resources today and into the future. However, there has been no recent assessment of these plans and protocols to evaluate what might need to be enhanced or changed in CA's stewardship efforts, nor is there a public understanding of the composition of the open space or the extent and location of CA programs and investments. For instance, while many know the mileage of CA's pathway system, not many will know the proportion of open space lands that are forested or the extent and distribution of landscaped areas or the location of the rain gardens implemented through a partnership with local residents.

The purpose of this report is to compile CA's open space-related plans, documents and protocols into one comprehensive document, which has not been done previously. It chronicles what CA has in place and what has been achieved in recent years, and it defines recommended implementation items to enhance management and stewardship of CA's open space resources. It also contains new maps that display the many features and assets of the open space system.

While CA owns and manages its open space lands, community members also have a strong attachment to these open spaces, particularly to those areas close to home and those used frequently. These deep connections can encourage community members to actively engage in stewardship activities and advocate for the places they cherish.

Open Space Components

CA owns 3,577 acres of land in Columbia, most of which is open space. The majority of these lands are located along 34 miles of stream valleys and their buffers, including floodplains and steep slopes.

Natural and environmental areas comprise the majority of CA's open space resources. In fact, 72 percent of CA's open space consists of waterbodies and overlapping forests, steep slopes

and floodplains — with almost 60 percent of CA's open space environmental resources consisting of forested lands. Other major uses of CA's open space include landscaped areas; parks and recreational uses; the nationally-recognized paved multi-use pathway system; and cultural and historic resources and civic spaces that provide places for community gatherings and celebrations.

Current Plans, Programs and Stewardship Strategies

In recent years, CA has made significant strides to better understand its open space holdings and to plan for their management today and into the future. These studies are extensive and include plans to manage and enhance Columbia's watersheds, pathway connectivity, forest stewardship, lakes and ponds, and to address stream erosion. In addition to plans, CA has numerous programs and strategies that improve water quality, reduce stormwater runoff, remove invasive species, increase recycling, provide recreation and places for play, engage with the community to enhance environmental stewardship, host community events in open space, address wildlife management and protection, and enhance the natural beauty of Columbia. This report highlights and provides details of how these plans, programs and protocols guide CA's open space stewardship efforts.

Identified Opportunities for Change and Enhancement

The final chapter of the Open Space Assessment Report identifies items for additional focus, analysis or guidance regarding CA's open space stewardship. Chapter 4 outlines these recommendations, defines anticipated timeframes and also aligns the recommendations with CA's strategic plan goals.

The recommendations are based on the analysis and review of existing practices and conditions and also draw upon interviews CA conducted with other park and land stewardship organizations to learn of their practices that may have practical application to CA. Organizational interviews included planned communities (Reston and The Woodlands), parks agencies of Maryland jurisdictions (Anne Arundel County, Howard County and Montgomery County) and two other organizations known for their focus on ecology and best practices (New York City Parks and the New York Botanical Gardens). A summary of these interviews is also included in Chapter 4.

1. INTRODUCTION

Purpose of this Report and its Organization

Columbia Association owns and manages open space lands and natural areas in Columbia, Maryland, one of the nation's most well-known planned communities. All residential areas and most employment and mixed-use areas are in close proximity to open and natural areas. This development pattern — and the extent of the open space holdings — distinguish Columbia from other communities. These lands provide health, recreation, aesthetic, ecological and community cohesion benefits that contribute to Columbia's quality of life.

As part of achieving one of CA's strategic goals to "maintain and enhance Columbia's facilities, open spaces, connectivity and environmental stewardship," CA convened an interdepartmental work group charged with the review of existing open space related plans, policies, programs and management protocols. In addition, the work team was responsible for identifying recommendations for how CA should update, enhance or change its open space planning and stewardship framework.

This report is the result of the work group's efforts. It documents what CA has in place, what has been achieved in recent years, and includes recommended implementation items related to the management and stewardship of CA's open space resources. This work group began its work in August 2016 and completed this report in April 2017.

While CA owns and manages its open space lands, community members also have a strong attachment to these open spaces. Many have a bond to a specific place or setting within Columbia's open space system. Community members feel a strong sense of place and an emotional connection to certain open space settings and places. This is especially true for areas they use and see frequently, including open space close to home. These deep connections to nature and open space encourage many community members to actively engage in pro-environmental and stewardship activities and advocate for the places they cherish. The report also includes open space community-engagement programs and activities.

Following this introduction, this report is organized in the following chapters:

- Chapter 2 provides an **overview of CA's open space** holdings and its various components.
- Chapter 3 documents **plans, programs and practices** that CA uses to manage its open space resources. It also highlights recent achievements and program changes for each of these components.
- Chapter 4 documents **recommended next steps for the enhancement** of CA's stewardship and management efforts. This section also draws upon the interviews CA

conducted with other stewardship and parks organizations that provide useful information about how they are approaching park and open space challenges that are similar to and have practical application to CA.

This report also includes a series of maps that display the many features and assets of the open space system. These can be found in the companion map compilation.

Open Space Today

A Brief Definition and Genesis of Open Space

In 1965, the Howard County Government approved the New Town zoning district. The county created this special zoning district for the new town of Columbia, and building began in 1967. The New Town regulations require that a minimum of 36 percent of New Town-zoned lands be designated for open space uses. Today, there are approximately 14,235 acres zoned New Town, of which 38 percent are open space lands.

CA owns 3,577 acres of land in Columbia and more than 99 percent of these lands are comprised of natural or open space areas. Open space is broadly defined as those lands that provide for protection of the environment, recreational or public use. While CA owns a large portion of the community's open space zoned New Town, there are other landowners who also own significant areas of open space, the largest being the 1,021 acres of the Middle Patuxent Environmental Area, located between the Columbia villages of Hickory Ridge and River Hill and managed by the Howard County Recreation and Parks Department in a cooperative partnership with the Middle Patuxent Environmental Foundation.

CA open space acreage: How does it compare?

New York's Central Park = 843 acres
Rock Creek Park = 2,820 acres
CA open space = 3,577 acres
Patuxent River State Park = 6,650 acres
Patuxent Wildlife National Refuge = 13,300 acres

---

2. OPEN SPACE COMPONENTS

Columbia Association's open space holdings include a wide array of land uses and landscapes. The majority of these lands are located along 34 miles of stream valleys and their buffers, including floodplains and steep slopes. CA open space lands weave through the community like green ribbons and are predominantly characterized by their riparian character, as opposed to large expanses of open or flat parkland. Map 1 illustrates this natural corridor character of CA's open space resources.

While the majority of CA's land holdings are kept as natural areas, there are a wide range of types and uses of CA open space. These include natural and environmental resources; lands designated for parks and recreation; landscape enhancement areas; connectivity facilities; and civic and cultural sites that foster social gatherings and honor historic and cultural places. These varied areas are explored and described below.

Natural and Environmental Areas

Natural and environmental areas comprise the vast majority of CA's open space resources. In fact, 72 percent of CA's open space consists of forest, steep slopes, floodplains and waterbodies. The overlapping features of the natural and environmental areas are highlighted below, as well as in Exhibit 1 and depicted on Maps 2 through 6.

- Forested areas (2,090 acres) comprise 59 percent of CA's open space lands
  - 75 percent of these forested lands are located in forest patches of 5 acres or greater
  - 27 percent of forested lands are located in the 100-year floodplain
  - 17 percent of forested lands are characterized by steep slopes of 15 percent of greater
- Floodplains include 967 acres (27 percent) of CA's open space lands
  - 59 percent of the floodplain areas are forested
  - 4 percent of floodplain areas contain steep slopes
- Steep slopes with grades of 15 percent or greater comprise 44 percent of CA's open space lands
  - 23 percent of steep slope areas are forested
  - 3 percent of steep slope areas are within floodplains
- Waterbodies comprise 115 acres (3 percent) of CA's open space lands and include three large lakes, 46 ponds and a number of streams.

Exhibit 1: CA Natural Areas, Documenting Overlaying Resources

Environmental Feature	Acres	Percent	Overlapping Resources
Forested	2,090	59	Forests within floodplains: 571 acres; 27 percent Forests on steep slopes: 356 acres; 17 percent
Steep slopes	1,549	44	Steep slopes within floodplains: 40 acres (3 percent) Steep slopes that are forested: 356 acres (23 percent)
Floodplain	967	27	Floodplain areas that are forested: 571 acres (59 percent) Floodplain areas that contain steep slopes: 40 acres (4 percent)
Waterbodies (ponds, lakes, streams)	115	3	Not applicable

Source: Columbia Association; Note: Percentages in the table above exceed 100 percent due to overlapping environmental features

Parks and Recreation

Park and recreational uses are another important component of CA's open space lands. These lands include 165 tot lots; 14 outdoor basketball courts and eight public tennis courts; lakefront parks including those at Lake Kittamaqundi, Lake Elkhorn, Wilde Lake; Merriweather Park at Symphony Woods, and other parks. CA also has two golf clubs located on open space as well as outdoor pools, which are managed as part of CA's Sport and Fitness program. CA also has a horse farm located on open space, which is part of CA's Community Services programming. All facilities are shown on Map 7, however this report focuses on open space resources, programming and facilities.

Landscape Enhancement Areas

In addition to naturally growing vegetation, CA installs and manages extensive landscaped areas that enhance the quality of life in Columbia. These areas include hundreds of planting beds designed for seasonal interest, shade trees and plantings that screen or buffer uses.

In addition, CA enhances the visual appearance and the effectiveness of bioretention facilities through design and selection of plant materials. As shown on Map 8, these areas are located throughout the community. CA also manages large areas of turf. These mowed areas consist of parks and fields, areas along CA's pathways and sidewalks, and around CA buildings.

Connectivity Facilities

One of the most well-used and valued components of CA's open space is the pathway system. The 95 miles of paved multi-use pathways are complemented by 20 additional miles of CA-owned and maintained sidewalks. The pathways traverse Columbia and include 273 footbridges that provide pedestrian and bicycle access to the stream valleys, lakes and other sensitive areas while protecting the landscape. They provide connections to residential neighborhoods, retail and business centers, schools and community facilities. CA has recently added wayfinding signage along key parts of the pathway network.

CA's extensive pathway system is complemented by miles of Howard County-owned pathways in Columbia, including the new Downtown Columbia Trail. Map 9 shows CA's pathway network and wayfinding sign locations.

Civic, Historic and Cultural Spaces and Sites

CA's open space includes a number of civic, historic and cultural resources. Historic resources include Oakland Manor, Wilde Lake Barn, Woodlawn Slave Quarters and numerous cemeteries and historic markers. Cultural resources include statues and public art. These are clustered near the lakefront of Lake Kittamaqundi and at the Wilde Lake, Oakland Mills and Long Reach village centers. CA's open space is also host to the Chrysalis, the new amphitheater in Merriweather Park at Symphony Woods. Civic spaces include outdoor community gathering places and plazas at each of the three lakes. In additional to informal use, CA sponsors and hosts community events and festivals at these locations. These are complemented by a number of informal gathering spaces and open spaces that are cherished by nearby neighbors.

In 2016, CA permitted approximately 160 different events on open space lands. These included community events, fundraising events for charitable causes, recreational events, neighborhood gatherings, village association events, and family celebrations.

3.   PLANS, PROGRAMS AND STEWARDSHIP PRACTICES

This chapter includes the plans, programs and management practices in place today that guide CA's work and activities in the open space system. Plans and studies are presented first, followed by an overview of existing open space programs and management practices. This is organized by the various open space program components: environmental and natural resources stewardship; recreational components; landscape areas and site furnishing; connectivity; safety and legal; and programming and engagement. Recent achievements are highlighted. Exhibit 2 shows these overlapping components.

Exhibit 2

Plans and Studies

In recent years, CA has made significant strides to better understand its open space holdings and to plan for their management. Some of the significant plans and studies that guide CA's natural resource management are highlighted below.

Watershed Management Plan (2009): The long-term goal of this plan is to protect and restore the waters of Columbia. The plan begins with an assessment of Columbia's watershed infrastructure that includes the identification of water quality and water quantity issues and then identifies and sets priorities for restoration projects. CA uses the plan to guide capital investments to improve the health of Columbia's watersheds and to slow the flow of stormwater. CA also uses the plan to increase education and resident engagement about the benefits of watershed stewardship.

> Recent Achievements: Since 2010, the year following the plan's approval, CA has built 19 capital projects based on the plan's project recommendations or related requests from CA's Board of Directors. These capital projects include 13 bioretention facilities, a vegetated swale and five stream restoration projects. CA has committed more than $3.4 million for these projects and has been fortunate to apply for and receive grants of just under $2 million to help defray the cost of these needed investments. Plan implementation has focused in the Lake Elkhorn watershed, and projects identified in the plan's restoration/retrofit inventory continue to be used to identify projects. Projects have also been initiated outside the Elkhorn watershed at the request of residents and CA's Board. CA has partnered with the Howard County Government on watershed restoration projects. In addition, the county recently completed assessments of the Little and Middle Patuxent watersheds and developed inventories of potential projects in each watershed.

Active Transportation Action Agenda (2012): The *Active Transportation Action Agenda*, approved by CA's Board of Directors in 2012 guides investments in CA's pathway system. Commonly known as "Connecting Columbia," the goals of this plan are to create a more interconnected, comprehensive and safe bicycling and walking circulation system for health, recreational and transportation purposes. The emphasis is on CA's pathways. The plan outlines recommendations and action steps, including the need for wider pathways along the pathway links with high usage; new connections and updated design standards; navigational signage along pathway routes to increase use and comfort of the pathways; the need to better understand pathway usage; and the need to increase advocacy with Howard County and others to improve county roads and streets for those who walk and bicycle.

Recent Achievements: Many of the recommendations in the *Active Transportation Action Agenda* have been implemented. Examples include new links such as the pathway loop around Lake Kittamaqundi. This loop route resulted in a 250 percent increase of pathway pedestrians compared to previous counts made prior to the loop completion. Other implementation successes include the pathway wayfinding signage CA implemented along miles of pathways. Users have enthusiastically endorsed the signs as both aesthetically pleasing and helpful. CA has also implemented new 10-foot wide bridges to prevent pinch points for pathway users where pathways have been widened up to 10 feet. In addition, since 2014, CA has also collected pathway user counts to understand usage along key pathway routes. This information is useful in understanding the impact of new or enhanced pathways, and where enhancements should be targeted in the future. Another important achievement is that the Howard County Government approved its first bicycle master plan in 2016, and that plan includes and integrates the recommendations from CA's *Active Transportation Action Agenda* related to needed pathway connections and changes to roadways and intersections to improve connectivity in Columbia. In 2016, Columbia was recognized as a Bicycle Friendly Community with a "Bronze" award. CA submitted this successful application in partnership with the Howard County Government and bicycling advocates. The designation brings with it cachet and will help position the community to secure grants for projects that improve bicycle and pedestrian connections. One grant has already been secured following the Bicycle Friendly Community award. It is funding for automated bicycle counters for use in Columbia and other areas of Howard County. This effort will build upon and complement CA's manual bike and pedestrian count program.

Stream Erosion Study (2012-2015): CA contracted with the US Fish and Wildlife Service to estimate and document the bank erosion rates for the majority of the stream miles in CA open space. The goal of the study was to obtain a comprehensive inventory of all stream bed banks and their erosion rates, which helps CA set priorities for streambank stabilization projects. CA is using the study results to analyze erosion rate data and determine areas where stream bank erosion is damaging pathways and other CA infrastructure. It is also useful to CA for identifying and establishing priorities for future stream bank stabilization investments.

Recent Achievements: Since 2010, CA has implemented five stream stabilization projects. CA built two projects in Harper's Choice in stream segments that drain to Wilde Lake; two projects in Owen Brown in streams that drain to Lake Elkhorn; and one in Long Reach in the stream that drains to Jackson Pond. In total, these projects have stabilized more than 3,400 feet of stream channel.

Use of Pervious Pavement White Paper (2014): CA commissioned Versar Inc. to review the evidence, research and associated protocols on the use of pervious pavement and to develop use criteria and recommendations or CA. The goal of the study was to gain technically sound criteria upon which to base decisions on the use of standard or pervious pavement at CA facilities and open space areas such as parking lots, sidewalks and pathways. The report defines the types of pervious surfaces; describes the relative merits of pervious surfaces compared to other runoff control options in different soil and landscape conditions; addresses costs of construction and maintenance; summarizes the pros and cons for each CA situation (park, stream valley and building site); and provides criteria and recommendations for use. For pathways, the study provides the following recommendations for the use of pervious pavement.

> "Use pervious pavement for new or repaved areas only where pathway runoff is concentrated into stream or storm drain system, or is expected to cause erosion because of concentrated flows. Do not use pervious pavement for pathways in stream valleys or other sensitive areas where runoff is not concentrated or construction impacts are expected to be high. Pervious pathways in parks may be beneficial if they are able to intercept runoff from adjacent impervious surfaces and can be constructed without significant environmental impact to receiving waterbodies. Most pathways evenly distribute their runoff into adjacent green space and do not produce enough runoff relative to the watershed to cause adverse effects. In the case of pathways, construction impacts related to pervious surface installation may outweigh the benefits. The costs of excavating for pervious pathways are significantly higher than traditional paving. Sediment loading from adjacent surfaces can easily compromise the function of pervious pathways."

> The report provides guidance for other CA paving situations, including parking lots, building sites, sidewalks and plazas.

> *Recent Achievements*: CA has pursued pervious paving opportunities, including at Columbia DogPark. However, many existing site conditions within open space preclude positive outcomes and cost-effective maintenance of pervious pavement. Site investigations have found highly compacted soils and poor permeability, among other impediments. As a result, CA is focusing on other stormwater best practices such as rain gardens and bioretention facilities.

Large Lake Sediment Management Plan (2015): CA has three engineered lakes: Lake Elkhorn, Lake Kittamaqundi and Wilde Lake. This plan includes an assessment of each lake and outlines how best to restore the lakes and revitalize their natural, recreational and aesthetic functions. The plan's stated goals are to establish and maintain a sediment loading monitoring program;

establish a sediment removal and management approach; and develop a cost estimate and timeline for plan implementation. Specific implementation steps include continued sediment monitoring; maintenance dredging; and the establishment of a dredge material placement site. This major implementation recommendation is important since the costs of transportation and placement of dredged material are high.

> *Recent Achievements*: Based on the plan, CA efforts have been focused on conserving and enhancing the lakes to minimize loss of natural function and to maximize recreational use and overall resident enjoyment of the lakes. While CA recently dredged the three lakes, sediment continues to enter the lakes from upstream sources. The management plan serves to guide monitoring and less intensive and more frequent dredging operations to manage sediment proactively before it impacts lakes' aesthetic and natural functions. CA is in the process of implementing the preferred location for the dredge material placement site, as identified in the plan. CA is working with the Howard County Government to obtain approval for an isolated, CA-owned, undeveloped, 33-acre site in the village of Kings Contrivance adjacent to Murray Hill Road. CA anticipates that the site will be approved, permitted and will be able to be used for CA's lake and pond dredge materials in the coming years.

Long-term Pond Management Plan (2016): This companion document to the lake management plan provides a comprehensive database of stormwater management facilities in Columbia. The goal of this plan is to understand the pond inventory and establish maintenance priorities and associated budgets and timeframes. In all, there are 55 wet ponds, 46 of which are on CA property. Maintenance responsibility for the 46 ponds varies by agreements currently in place and also pending discussions with Howard County. Nineteen of these wet ponds were selected for evaluation, because the remaining wet ponds were recently renovated. As a result of the plan, CA defined a priority list of needed pond repairs. For ponds requiring $200,000 or more for repairs, staff will provide two alternatives and cost estimates for consideration by CA's Board of Directors. One will be a repair/reconstruction conceptual design option and the other will be a conceptual design for the decommissioning of the wet pond or its conversion to some other type of stormwater facility.

> *Recent Achievements:* CA has begun discussions with the Howard County Government regarding structural maintenance of dams and sediment removal for ponds where CA believes maintenance should be the responsibility of Howard County, given the area and roads that drain into these specific ponds. These discussions are ongoing.

Forest Stewardship Plan (2016): Since forests comprise the majority of CA's open space lands (almost 60 percent), CA commissioned the Maryland Department of Natural Resources to complete a forest assessment and plan to provide guidance on management of woodlands

within CA's open space. While the focus was on forest management related to the health and conservation of this natural resource and heritage, the report also notes, where appropriate, general locations of rare and endangered species, wildlife observations and other resources.

The study process included the identification of forest stands of five acres or greater. Together, these larger stands comprise the vast majority of CA's forested lands. The assessment report describes CA's forest land areas and their size and the dominant species, among other variables.

Columbia's forest lands are located predominantly along and near rivers, stream and lakes and other water bodies. The interior portions of Columbia's forest are relatively undisturbed. These provide breeding habitat for a diverse group of birds, including colorful songbirds such as tanagers, warblers and vireos as well as woodpeckers, hawks and owls.

> *Recent Achievements:* This study was recently completed and provides useful assessment information and recommendations that CA can act upon. Three location-specific areas for removal of invasive plant materials are included in the recommendations section of this report.

Environmental and Natural Resources Stewardship Programs and Strategies

In addition to plans, CA's stewardship encompasses a wide range of programs and strategies, which are highlighted below.

Reforestation: CA plants trees in open space for a number of reasons: enhancing wooded buffers along streams; increasing woodland habitat; replacing trees removed for safety and other reasons; and providing for shade and visual enhancement. The Watershed Management Plan provides a list of candidate sites for reestablishing forests on unforested sites, since reforestation is an important stormwater management tool. Map 10 shows the location of recent reforestation efforts.

> *Recent Achievements:* In the last nine years, CA has sponsored tree planting projects that have added approximately 4,000 new trees.

Invasive Species Removal: CA participates in the Weed Warrior program, which is a cooperative program with Howard Community College, the University of Maryland Extension Service and the Middle Patuxent Environmental Area. CA and its partners train volunteers in invasive plant identification and removal and in the leadership skills required to lead future groups of volunteers. CA also supports these activities by planting native plants in areas where non-natives have been removed. In addition to supporting Weed Warriors, CA has begun a program to strategically remove bamboo groves from areas near some of CA's lakes and

ponds. Map 11 shows the various invasive species removal sites in and near CA's open space in recent years.

> *Recent Achievements:* Since the inception of CA's Weed Warrior program in 2014, 104 volunteers have participated in five training sessions and seven invasive, non-native weed pulls followed by replanting of native plants. In a new initiative, CA staff and its contractors have removed bamboo grooves at Wilde Lake and other areas. As part of community education efforts, CA has recently developed a brochure that highlights invasive plants that homeowners should avoid planting and suggests suitable alternatives.

Managing Forest Edges in Open Space: CA, Howard County and the University of Maryland partnered through the program Partnership for Action Learning in Sustainability (PALS) to develop solutions and educational material addressing forest edges. PALS incorporates community-based projects into existing relevant graduate and undergraduate courses, developing potential solutions for real world issues. The urban ecology class conferred with CA staff about management practices and resident and staff concerns about the appearance of the forest edges in open space, and it visited several sites. The class then worked on potential management practices and educational materials for CA. These were presented to CA staff in the spring of 2016.

> *Recent Achievements:* The student work was completed in 2016. CA plans to finalize these materials to create useable fact sheets and educational materials.

Lake/Pond Water Quality Management: In addition to water quality efforts guided by the Watershed Management Plan, CA has other management strategies that relate to water quality, including:

● **Floating Wetland Installations:** CA has installed floating wetlands in Columbia's lakes and ponds to help remove nutrients from the water.
● **Submerged Aquatic Plant Removal:** CA removes submerged aquatic plants from lakes to improve the aesthetic and recreational appeal. These plants are removed by specialized boats during the summer months when this aquatic growth is most plentiful. While many community members confuse this with the noxious and ecologically troublesome algae blooms, the two are not the same. The submerged growth is not ecologically harmful.

> *Recent Achievements:* CA has installed more than 60 floating wetlands in lakes and ponds.

Lake/Pond/Stream Nutrient Water Monitoring: CA has developed a comprehensive monitoring program to examine and monitor water flow, nutrients, sediment, bacteria and algae in CA lakes and ponds. The intent is to provide information on water quality and to make that information available to the public. This provides CA staff and the Columbia community with a better understanding of the quality of our waters.

CA is using several different methods for measuring various aspects of water quality and is also using other organizations' data, where available. Exhibit 3 presents the various types of data being collected, the organization collecting it, and whether they are under contract with CA.

Exhibit 3: Water Quality Monitoring

Table 1: Monitoring Program Components: Type of Monitoring	Location	Data Source
Stream Flow Volume	Above Wilde Lake and Lake Elkhorn	CA via contract with the US Geological Survey
In-stream Water Quality Monitoring	Above Wilde Lake	Howard County DPW
In-stream Benthic Macroinvertebrate Monitoring	Selected locations	MD DNR Stream Waders Program
Bacteria Monitoring	Wilde Lake, Lake Elkhorn and Lake Kittamaqundi	CA via contract with Versar Inc.
In-Lake/Pond Algae Monitoring	Wilde Lake, Lake Elkhorn and Lake Kittamaqundi, Jackson Pond and various small ponds	Analysis by CyanoLab
Sediment Monitoring	Wilde Lake, Lake Elkhorn and Lake Kittamaqundi	CA via contract with Bayland as part of the Large Lake Sediment Management Plan project
Lake/Pond Water Quality Monitoring	Main lakes and various stormwater ponds	CA staff collect data

Source: Columbia Association

> *Recent Achievements:* CA began the lake, pond and stream nutrient management program in 2013. In cases where any unhealthy levels of nutrients with potential health impacts are discovered, CA coordinates with the Howard County Government and posts the results adjacent to the impacted waterbody with guidance for users.

Engaging Residents to be Good Stewards on Private Property: CA manages two programs that strive to improve homeowner management practices that can provide water quality benefits for the greater community.

- **Rain Garden Cost Share Program**: This program provides incentives to encourage residents to install rain gardens on their property to reduce untreated stormwater runoff into nearby waterbodies. CA encourages residents throughout Columbia to install rain gardens. CA, via a grant from the Maryland Department of Natural Resources, pays 75 percent of the rain garden installation cost, with the remaining 25 percent paid by the resident. CA contracts with a landscape firm for installation, which reduces project costs.
- **Homeowner Soil Testing:** CA offers free soil testing to help residents understand what kind of fertilizer to use on their lawns and how much. This helps prevent homeowners from using too much fertilizer, which then washes into Columbia's streams, ponds and lakes. It also brings homeowners into compliance with state fertilizer regulations. Collected soil samples are sent to a lab for analysis and the results are provided to the resident, along with recommendations. Reducing the overuse of phosphorous in fertilizers is important because of the desire to reduce the amount of phosphorus that runs off private properties into streams. Too much phosphorus can lead to overnutrification, increased algal growth, depleted oxygen in the waterbody, and death of water-based organisms. Soil test bags are available from the offices of Columbia's 10 village community associations. This program is funded by a grant from the Keith Campbell Foundation.

> *Recent Achievements:* Since the program began, CA has facilitated the installation of 283 rain gardens for residential stormwater control. At first, CA offered the rain garden cost share program to residents living in the Little Patuxent Watershed. In 2015, the program was expanded to include all neighborhoods in Columbia. Grant funding to continue the program is in place through 2018. Map 12 shows rain garden locations and Map 13 shows where over 800 homeowners have voluntarily participated in the soil testing program since CA initiated this program in 2011.

Wildlife Management: CA is involved in the management of wildlife in a variety of ways. CA established monarch butterfly way stations in open space and altered mowing schedules to create and protect monarch habitat during larval growth. CA has also established several meadows to provide habitat for a number of butterfly and other species.

Nuisance wildlife are managed from a different perspective. The abundance of non-migratory geese in Columbia and the nuisance (waste) they create has generated many resident complaints. CA has contracted with Maryland Geese Control to manage non-migratory geese in open space to drive them away from CA lakes and ponds and nearby civic gathering places. CA has partnered with Howard County Recreation and Parks to help manage the

overabundance of deer in open space and the negative impacts on tree growth and neighboring private residential areas.

> *Recent Achievements:* CA and the Howard County Government have worked together on a number of programs and educational efforts to address the interface between deer, humans, and our environment. These include working directly with residents on deer complaints, and access to County property for programs, deer tick abatement, and ecological assessments. Most recently, CA and the Howard County Recreation and Parks Department identified CA property adjacent to county property that was included in the county Deer Management Program. Expanding the county's deer management program onto CA property is intended to help mitigate the deer issues, including public health concerns, forest and vegetation damage, overabundance and a desire to reduce the deer population. In 2017, CA will begin goose egg addling in another effort to reduce the non-migratory geese population.

Recycling/Trash/Pet Waste Removal: CA recycles and collects used, recyclable items through trash collection receptacles in CA facilities and open space. CA removes trash from facilities and high-use parks on a daily basis. CA removes trash in its natural areas on an as-needed basis on observations and requests for service. CA also sponsors a Columbia Cleanup program where volunteers remove trash from areas in participating villages. CA also recycles its own building materials and waste.

> *Recent Achievements*: CA has installed 100 recycling cans in open space since 2012 and has installed pet waste receptacles.

Recreation Components

CA's open space provides a wide range of opportunities and settings for recreation. These are highlighted below. *CA's multi-use pathways are addressed under the subheading below under "Connectivity."*

Fishing and Boating: CA has three lakes and approximately 46 wet ponds that residents and visitors use for recreation, particularly for fishing. Lakes are signed where fishing is specifically not permitted. Boating is permitted on the larger waterbodies. To monitor and manage these activities, CA requires annual boat registration and has other rules that apply for fishing and boating.

> *Recent Achievements:* CA has recently installed enhanced signage and increased staff time around the lakes to help enforce the rules and regulations for the CA property. With the increased presence at the lakes, compliance with the rules is improving and, in 2016, the number of boater registrations increased.

Courts, Tot Lots, Parks and Athletic Fields: The recreational facilities in CA's open space include 165 tot lots, eight public tennis courts, 14 outdoor basketball courts, five large parks, a wide range of smaller plazas and amenity areas, and a number of fields for athletic play. CA staff regularly inspect and renovate the tot lots, basketball courts and tennis courts and the other amenities to ensure they are safe for use and play. CA also upgrades or replaces recreational features from time to time to address changing recreational needs and desires of the community.

> *Recent Achievements:* Staff recently completed a rigorous system-wide analysis on the physical condition of CA's tot lots and supporting infrastructure, such as benches and retaining walls. To date, the majority of the tot lots have undergone improvements that extend their longevity, usability and safety.

Dog Park: CA developed and manages Columbia DogPark, an off-leash recreation and park setting for dogs and their owners to enjoy. The 2.7-acre park has two fenced-in areas: one for small dogs (less than 25 pounds) and one for large dogs (25 pounds and heavier).

> *Recent Achievements:* CA opened Columbia DogPark in 2014 in response to community requests. Approximately 30 percent of CA households have dogs, and the park helps to meet the need for a safe place for dogs to play off-leash.

Landscaped Areas and Site Furnishings

The beauty and high-level of maintenance of the landscaped areas in CA's open space are highly valued by community members and helps to define Columbia. CA staff manage and enhance these landscaped areas, which include planted flower beds, public plazas, meadows, mowed turf areas, and site furnishings. Details are provided below.

Planted, Landscaped Areas: Landscaped areas around CA buildings and in key open space areas enhance the quality of life for the community. These areas provide color, visual interest, shade, screening and wildlife habitat and are important elements of CA's open space landscape. CA provides periodic renovation and regular maintenance so that these areas will continue to be an asset. New areas are added as well. These efforts are guided by best practices and by CA's *Planting Replacement Policy for Landscaped Open Space* (2007).

CA strives to improve the sustainability and community value of these landscaped areas through careful plant selection and up-to-date management practices. CA uses a mixture of non-invasive, native and non-native plant materials. CA also provides guidance to the community to discourage the use of invasive species on private property.

Recent Achievements: In 2016, CA led an effort to plant 50,000 daffodil bulbs throughout the community as a beautiful, colorful display in honor of Columbia's 50th Birthday celebration in 2017. Scores of organizations participated in this effort. Another recent accomplishment is the renewal of Kennedy Gardens on the east side of Lake Kittamaqundi and the eastside lake banks with additional plantings, which provide year-round color and improve bank stabilization and water quality.

Site Furnishings: CA installs and maintains various site furnishings for the comfort and enjoyment of open space users, including benches, picnic tables, trash bins, bicycle racks, signage and lighting at CA outdoor amenity areas. CA also has a number of ways to honor community members, including the opportunity to purchase bench plaques in select locations and brick inscriptions on the lakefront plaza at Lake Kittamaqundi.

Recent Achievements: CA has replaced or installed additional benches at key points along the pathway system, at parks and playgrounds and at the lakes to provide resting areas and comfort for users. Many of these benches provide seating with beautiful views of the nearby landscape. In 2016 and 2017, CA moved forward to reinstall the bells from the former bell tower in a new structure at Lake Kittamaqundi, renewing an important community landmark. CA has also installed bike racks or lockers at all CA facilities.

Turf Management: CA mows acres of open space, which includes large fields and areas along pathways and sidewalks and around lakes and buildings. CA also maintains and mows some state- and county-owned roadway medians and community gateways.

Recent Achievements: CA has increased the mowing of county medians in the Downtown Columbia area and high-visibility Columbia entrances.

Connectivity

Multi-use Pathways and Sidewalks. Columbia's pathways are primarily located within open space areas that extend throughout the community. They provide access to beautiful hardwood forests, weave along the edges of Columbia's lakes and meander alongside streams and tributaries to the Middle Patuxent and Little Patuxent rivers. Columbia's pathways also connect to county-owned pathways, which extend the reach of CA's pathways within Columbia and also provide access to adjacent areas of Howard County. For a community of its size, Columbia has one of the most extensive pathway systems in the country. Nearly every person who lives or works in Columbia has access to a pathway within walking distance of their doorstep. With more than 95 miles of paved pathways and 20 miles of sidewalks, connectivity is an important function and benefit of CA's open space. Over the years, CA has surveyed

community members on various facilities and services. These surveys consistently document that residents value open space and, particularly, the pathway system.

> *Recent Achievements:* CA recently updated its pathway regulations to allow electric assist bicycles (e-bikes). Maryland law changed related to how it defines bicycle and electric assist bicycles, and the new Howard County Bikeshare bike fleet will be comprised of approximately 30 percent e-bikes. CA's rules are now in alignment with current laws and practices. E-bikes are a practical option to encourage more people to bicycle for exercise, health, and transportation. They make riding hills and longer distances less taxing for all people who bicycle, including occasional riders. The revised open space rule now states: "Motorized Vehicles. Operating any motorized conveyance (with the exception of electric bicycles as defined under Maryland law and personal mobility devices) within parklands, on pathways or in any other place not customarily used for motorized vehicular traffic is prohibited. Not all of CA's pathways are suited for the use of electric bicycles and personal mobility devices, and caution should be used in operating them." *For other recent achievements on connectivity and pathways, please see the discussion earlier in this report regarding implementation of CA's Active Transportation Action Agenda, under the "Plans and Studies" heading.* CA staff also recently completed a comprehensive physical assessment of all 273 pathway bridges. Overall, the bridges were found to be in good condition, but the current replacement cycle will need to be increased from 14 to 18 per year due to future anticipated repairs.

Safety and Legal Aspects

There are policies, protocols and rules that guide how CA manages — and how community members use — open space and its component facilities. These are summarized below.

- **Safety of Pathway Users**: Safety, security and comfort for all users of CA's pathways are important. According to the Howard County Police Department, the incidence of crimes such as assault or robbery are low, yet they do occur. CA coordinates with the Howard County Police Department to enhance safety patrols, community-watch strategies, and other methods to increase user security and safety.
- **Easements**: CA grants easements on its property to promote the social welfare of Columbia, provide civic or social improvements and produce benefits for the people of Columbia. All easements must be approved by CA's Board of Directors. Most easements granted are for public utilities, infrastructure and pathways.
- **Encroachments**: When encroachments on CA property are discovered or reported, CA staff investigates the circumstances to determine the nature and extent of the encroachment; establishes the property lines through surveys, if necessary; reaches out to the residential or commercial property owner to discuss the concern(s); and

establishes action(s) to be taken and a timeline for the encroachments to be resolved. If the neighboring property owner is not responsive, then certified letters are utilized to establish contact, and if necessary, legal action is initiated to resolve the matter.

- **General Open Space Rules and Regulations**: CA has a set of rules that cover a wide range of topics including hours of access; fishing, swimming, boating, parking, use of motorized vehicles in open space; and remote control aircrafts (drones), among others.
- **Americans with Disabilities Act (ADA) and CA's Open Space**: ADA was passed by Congress in 1991 and became effective in 1992. The Department of Justice promulgated new regulations in 2010, which required CA to make alterations to all of its assets as part of new construction or when it made significant alterations to its facilities. For existing facilities, CA is required to remove architectural barriers where it can be easily accomplished and carried out without much difficulty or expense.
- **Dead Tree and Wood Removal**: CA removes dead or compromised trees that are in close proximity to the pathways, park amenities and structures. Stumps around facilities or in high visibility areas are ground down, and debris is removed. In wooded or natural areas, CA leaves the larger logs on-site for wildlife habitat.
- **Snow Removal**: CA removes snow at its facilities including more than 40 parking lots, 95 miles of pathways and 20 miles of sidewalks. Snow is removed during and after snow events. Snow removal priorities include clearing those areas needed to ensure CA facilities can open and community members and employees can safely gain access. Other priorities include CA-owned sidewalks and the pathway system. CA snow removal efforts are well-regarded for how quickly and how well snow is cleared at the large number of facilities and park-like assets. CA has provided consultation to other park-like organizations, cities and counties around the country, the U.S. Department of Transportation and the private sector on the operational aspects of snow removal.
- **Pesticide Use**: CA uses pesticides carefully and sparingly to maximize the safety of team members and residents and to minimize unintended environmental impacts. Open Space staff use pesticides for weed control. Turf management standards for most of CA's managed open space acreage do not call for the use of insecticides, fungicides or other pesticides. For landscape plants, most issues are eliminated through careful plant selection, placement and good horticultural practices. Neonicotinoid pesticides are not used by Open Space staff.

Recent Achievements:
  - Pathway safety: As a result of consultation with CA and the community, the Howard County Police Department has expanded its patrol of the pathway system and in 2015, launched its new Pathway Patrol Section, with an increased police presence on the pathway system year-round. The patrol section, part of the county's community policing efforts, includes dedicated officers on bicycles

who provide a visible police presence to increase the safety and comfort of pathway users and provide another way for the officers to increase their interaction with community members. Crime is generally low on the pathway system, and the patrol provides another way to keep the pathways safe and to increase use of the pathway system.

○ ADA: CA created an *Accessibility Report and Plan (*2014) to outline CA's plans and investments to address new federal ADA guidelines. This comprehensive analysis established priority investments to retrofit CA facilities. Areas in open space that have been retrofitted to meet ADA guidelines include tot lots, fishing piers, sidewalks, pathways and parking lots near amenities such as lakes.

○ Pesticide Use: CA's recently adopted improved standards for the timing and quality of spring mulching, which will reduce the need for herbicides later in the growing season.

- CA's golf management team follows a higher standard of turf care on the golf courses in keeping with golf industry standards. The team is highly engaged in achieving high quality with minimal chemical inputs. Over the years a number of pesticide reduction strategies have been implemented, such as the conversion to Bermuda grass, which has fewer pest problems. Pesticides are only applied in keeping with Integrated Pest Management Standards. Chemical drift is eliminated by avoiding applications during high winds or prior to heavy rains. "No spray zones" and buffer areas have been established, particularly around water features and other environmentally sensitive areas.

Programming and Engagement

CA open space is used for a wide range of programs and formal and informal community engagement activities and events. Many of these activities are initiated by CA, including organized "Weed Warriors" invasive species removal with community volunteers; "Exploring Columbia on Foot," regular guided walks through open space; the annual Columbia Cleanup Day, with volunteers throughout the open space system; and summer concerts and movie nights. There are also community events and programs initiated by others who, through licensing agreements with CA, use CA's open space parks, lakefronts and pathways for events such as community festivals, family events, fundraising, walks and bicycle rides, and cultural and educational events.

In addition, CA has a resident Watershed Advisory Committee, which is tasked with advising CA on matters directly related to the implementation of the Watershed Management Plan.

The committee works with CA staff and the village community associations to promote public education and engagement on stormwater and watershed issues.

Recent Achievements: In 2015, CA expanded its open space staff to include a community liaison. This staff member walks and bicycles around CA's lakes to engage with open space users and provide guidance on permitted uses and conduct. The community liaison's role is similar to a park ranger.

CA continues to provide access to open space and support for community use and events. In 2016, CA hosted approximately 160 different events on CA's open space, several of which occurred multiple times throughout the year. One example of a new event is the 5K footrace in Downtown Columbia.

4. RECOMMENDED NEXT STEPS FOR CHANGE AND ENHANCEMENT

This chapter identifies items for additional focus, analysis or guidance regarding CA's open space management. These findings are based on the analysis and review of existing practices and conditions in CA open space. It also draws upon interviews CA conducted with other park and land stewardship organizations to learn of their practices that may have practical application to CA. Findings from these interviews are summarized below.

Relevant Best Practices with Practical Application to Columbia

CA interviewed different park and land stewardship organizations to learn about recent trends around the region and country related to open space management and environmental stewardship and enhancement. The organizations consulted included planned communities (Reston and The Woodlands), Maryland jurisdictions (Anne Arundel County, Howard County and Montgomery County) and two other organizations known for their focus on ecology and best practices (New York City Parks and the New York Botanical Gardens). CA staff asked these experts and community officials a series of questions. These answers are summarized here by topic.

- *Invasive Species Management:* Most of the organizations interviewed rely on a combination of staff and volunteer programs to help remove and manage invasive species. The volunteer programs are geared toward manual invasive species removal, while agency staff supplement this with pesticide treatment. The treatment and sequence of mowing/pulling and chemical treatments vary depending on the type of species targeted. Woodlands Township has a number of employees who are employed to remove invasive species and have found that the work needs follow-up and vigilance and is only successful after several years, including replanting with non-invasives. Reston Association has established a list of invasive species that can no longer be planted in Reston as a way of working with homeowners to reduce the amount of newly planted invasives. By 2020, Montgomery County will no longer use pesticides and has provided funding for additional staff needed to increase manual weed removal following the reduced amount and ultimate ban on pesticide use. Montgomery County is working on some pilot analysis to assess outcomes of how to manage school fields and ball fields without the use of pesticides. New York City Parks has detailed specifications and protocols for removal of invasives and their *Guide to Urban Forest Restoration* is an excellent resource and research-based guide. It outlines how to select sites for invasive plant removal and guidelines for replanting. It highlights that removing invasives is only a first step and that follow-up is important.
- *Tree Planting and Replacement:* All organizations interviewed had a tree replacement program with experts on staff. A number of the communities supported landowner and

community replanting of native species by providing seedlings or in partnership with other organizations. Most noteworthy is the Million Tree Program, which, via a public/private partnership, planted over one million trees throughout New York City's five boroughs in nine years (one year less than the original 10-year goal). New York City also uses a formula for how it replaces dead trees in its parks, which results in no loss in tree caliper.

● *Mowing Reduction:* Several communities have moved to reduce mowing in some capacity, such as mowing less frequently or engaging with the community to gain support for the value of unmowed meadows for wildlife and the environment.

● *Process for Open Space or Park Changes:* Unless it is part of a master planning process, the communities interviewed do not have formal protocols for how they manage change or engage with the public when they make or contemplate making changes to natural or built environmental land holdings. However, all involve the community/adjacent landowners in some capacity.

● *Replacement Schedules for Pathways or Other Outdoor Recreational Facilities*: In general, organizations interviewed do not have a formal replacement schedule that outlines the timeframe in years of when pathways should be repaved or replaced or a similar protocol for other recreational facilities. Some did assessments via observation and then identified capital projects to make the needed updates on a case-by-case basis. Montgomery County uses an asset management system that helps them manage the tracking and replacement of facilities. Howard County has a playground replacement program and uses that to develop budget requests. This is a separate line in the capital budget. Reston Association has a replacement schedule for open space facilities. Pathways are currently on a replacement schedule for every 30 years, tot lots are 25 years and pedestrian bridges are every 50 years. Reston Association hires a consultant to help determine the condition of all recreational facilities, replacement priority and anticipated replacement costs.

● *Management of Plaques and Other Ways to Honor or Memorialize Events or People:* All of the communities interviewed have a memorial/dedication program that includes benches and/or trees. A number of communities have established programs for memorial trees and plaques and have established separate "friends of" organizations to handle the requests and implementation. Several of these efforts include buy-a-bench programs, and the most effective ones also include required donations for upkeep for a 10-year period. CA staff also talked to Ocean City staff to learn about their bench program. It has been successful, perhaps overly successful, as Ocean City has run out of places to site memorial benches, given the small size of the city and the high number of donations. Another issue has been the high cost of maintenance. The New York Tree Trust handles donations and planting of trees in New York City but does not

generally allow associated plaques or on-site recognition, as their protocols call for a living landscape. Instead, the donation is acknowledged and documented online. In addition, some New York City parks have their own nonprofit conservancy organizations that manage tree donation programs.

● *Successful Recent Innovations and Investments:* Those interviewed gave a wide variety of responses related to CA's inquiries about their thoughts on recent innovations and investments. Several stated that they have or are thinking of doing an environmental assessment of their lands. The New York Botanical Gardens expressed pride in its current program of planting one million bulbs in fields. In addition to the beauty of the flowering bulbs, another benefit is the resulting mowing reduction, as mowing of these areas is postponed until early summer. This has been very successful and well-received by the public. The cost of the program is anticipated to be offset by increased (paid) visitation to the gardens, a major tourist site. Montgomery County recently hired a chief innovation officer and the recreation and parks organization has a net zero initiative and is constructing LEED buildings. New York City Parks is working with local and regional growers to expand the available types of native trees and plant seeds. This has been successful. Anne Arundel County is focusing on closing gaps in their trail and park pedestrian and bicycle networks. Howard County is undertaking new regional parks and has added unique amenities to existing parks. One example is a telescope and observatory at Alpha Ridge Park.

● *Monitoring Trends:* Those interviewed mentioned they are monitoring trends related to reduced pesticide use, increased connectivity for walking and biking, bicycle counts, environmental education related to birds and butterflies, composting, and stream restoration approaches.

The interviews provide both good and useful information, excellent contacts for future reference, and useful research and analysis sponsored by these other entities.

CA Open Space Stewardship: Identified Opportunities for Change and Enhancement

Based on the investigation and assessment of current practices and needs and the review of what other organizations are doing, CA has identified opportunities for change and enhancement in its management and stewardship practices. These are listed below.

1. **Enhance Management of Invasive Species:** Develop a protocol for selection of removal sites and guidelines for replanting and follow-up maintenance and monitoring. Certain invasive plant species grow and spread rapidly and can choke out native vegetation. This can reduce biodiversity and has impacts on wildlife and the ecological health of forests and other natural areas. Each species of invasive may require different methods

for control, removal and follow-up maintenance and/or planting. In fall 2017, CA has arranged to work with a University of Maryland urban ecology/forestry professor as part of her urban ecology course. Among other items, the professor will explore best management practices to address where to start with invasive species removal, the role of maintenance and how to establish priorities for action. The professor is an expert on invasive species management and has done research and consulted for a number of major park systems and organizations around the country to explore effective ways to manage invasives. It is anticipated that this information will be used to inform CA's invasive species removal efforts. More immediately, the recently completed Forest Stewardship Plan includes a few site-specific findings related to invasives that CA should address.

- The Forest Management Plan identifies a stand of ailanthus off the Wilde Lake pathway near the intersection of Green Mountain Circle and recommends that it be replaced and replanted with native species.
- It also identifies a significant amount of English ivy to the north of Jackson Pond that should be removed and replanted with native species.
- It identifies an area of wisteria near the end of Jerry's Drive (near Hickory Ridge) that should be removed before it spreads.

In addition, CA should continue to support the Watershed Advisory Committee's outreach work to integrate guidelines into the Columbia villages' architectural review process to address invasive species in the residential landscape, as is done in Reston.

CA should also continue to offer education to Columbia homeowners on the benefits of using non-invasives in the residential landscape. The newly created CA brochure on invasives to avoid and recommended substitutes will be helpful in these efforts.

2. **Expand Tree Replacement Strategy:** CA should develop a more comprehensive strategy for tree replacement, with a focus on updating guidance for trees in landscaped open space, addressing the impacts of emerald ash borer disease and enhancing trees in stream buffers.
   a. Update tree replacement protocols for landscaped open space. The existing guidance needs to be reviewed and updated to incorporate best management practices.
   b. Address tree replacement in CA's forested areas to target the impacts of the emerald ash borer as well as replacement standards for trees removed for other safety reasons. The Forest Stewardship Plan recommends that CA plan for the replacement of significant stands of ash trees. Ash tree stands throughout Columbia should be assessed for emerald ash borer infestation. CA should take

appropriate follow-up action — removal and replacement — for infested trees and stands and should use the tree replacement strategy for guidance on tree replacement.

   c. Enhance tree planting in stream buffer areas to preserve the environmental benefits, including the reduction of sediment runoff within these riparian corridors.

3. **Focus Master Planning on Key Civic Spaces**: There is a need to plan for the renewal of some of CA's key civic and community spaces. These are the identified areas in order of priority.

   a. Lakefront Plaza and other open space areas in Downtown Columbia. This will help maintain these areas as high quality focal points, as Downtown Columbia continues to redevelop and add new office and retail employees and residents. Lakefront Plaza should be a priority given that it is in Downtown Columbia's Lakefront Core area, given the central and important role it plays in Columbia and its importance to its quality of life.

   b. Lake Elkhorn dock and playground area

   c. Wilde Lake Park area

   d. Evaluate and plan for renovations of other existing civic outdoor spaces.

4. **Enhance Wildlife Habitats:** CA should enhance its work to retain and enhance additional food and shelter opportunities for a variety of wildlife species. To maintain wildlife habitat, the Forest Stewardship Plan recommends that CA continue to leave in place as many standing and fallen dead trees as possible in forested areas, as they provide habitat for a variety of birds and woodland wildlife species. They provide nesting areas as well as attract insects — food for a variety of birds. It is particularly important that CA continues to engage with the community on the ecological benefits of dead wood forested areas and to reinforce its importance.

5. **Enhance Community Education and Engagement Regarding the Ecological Value of Open Space:** Engage with the community on a wide range of short-term and long-range initiatives to increase individual and collective commitments to enhance Columbia's open space. Finalize and publish the Frequently Asked Questions (FAQs) and other fact sheets on ecology practices, education and resident engagement that were draft products from the recent University of Maryland course on management of CA's forest edges.

6. **Survey Users:** Survey users to better understand how community members use and enjoy open space and what they value and cherish.

7. **Undertake a Review of the Watershed Management Plan:** CA should assess implementation progress to date and also review the intentional focus on the Lake Elkhorn Watershed. The assessment should also propose, if appropriate, changes in approach for future projects and investments based on implementation and lessons learned to date.

8. **Enhance Pathway Safety**
   a. **Investigate Pathway Lighting:** CA should review its protocols related to pathway lighting for areas that experience high use or that connect to civic gathering places.
   b. **Undertake Pathway Stabilization:** As part of stream restoration and bank erosion reduction efforts, it is vital that CA identify and repair those pathways that have been undermined or otherwise negatively impacted by the effects of stream and bank erosion and the resultant increased velocity of stream water. CA's recent Stream Erosion Study, conducted by U.S. Fish and Wildlife, provided a comprehensive inventory of all stream bed banks and their erosion rates. The study will help CA set priorities for streambank stabilization projects.

9. **Expand Property Boundary Marking to Reduce Encroachment onto Open Space:** The Forest Stewardship Plan recommends that CA mark property boundaries to reduce discarding of landscape materials or other encroachments by adjacent landowners. CA does mark its property and there is a need to increase the amount of boundary marking in areas where there has been consistent or frequent inappropriate use of or incursion onto CA property.

10. **Update Commemoration Protocol:** CA should update its protocols on commemorative plaques and trees to reflect best practices. Lessons learned from the interviews with other organizations should be used to update and document CA's protocols on commemoratives.

11. **Update Open Space Capital Improvements Replacement Schedule:** Develop a schedule and associated funding to keep CA's much-used facilities such as pathways in good repair. There is a need to move away from replacement on a case-by-case basis to an asset management approach.

12. **Document Reduced Pesticide Use Protocol:** CA recently reduced how and when it uses chemicals in open space and now needs to formalize this in a written operational protocol.

Implementation Matrix

Exhibit 4: Implementation Matrix includes the anticipated timeframe and whether capital and operating dollars may be needed to implement the recommendation. Two timeframes are used: those recommended items that should be initiated in the short-term (0-3 years) and those that are recommended to begin in the mid-term (3-5 years). For some items that are dependent on funding, the timeframe may need to be adjusted given other organizational priorities and available funding. Several items will continue from one period to the other and thus are noted as ongoing.

Exhibit 4: Implementation Matrix

Recommendation (Short Title)	Anticipated Initiation	Funding Dependent
1. Enhance Management of Invasive Species	Short-term and then ongoing. Development of protocols to be completed in the short-term.	Operating dollars may be needed to implement additional removal efforts
2. Expand Tree Replacement Strategy	Short-term	N/A
3. Focus Master Planning on Key Civic Spaces	Downtown Columbia Lakefront Plaza - short-term Other lake park areas - mid-term	Planning and implementation will require operating and capital funding
4. Enhance Wildlife Habitats	Short-term and then ongoing	N/A
5. Enhance Community Education and Engagement on Ecological Value of Open Space	Short-term and then ongoing	N/A
6. Survey Users	Short-term	N/A
7. Undertake a Review of the Watershed Management Plan	Short-term	Operating funding may be needed to undertake plan review

8. Enhance Pathway Safety
   a. Investigate Pathway Lighting
   b. Undertake Pathway Stabilization
	Short-term
	Short-term and then ongoing
		N/A
		Operating funding may be needed to undertake larger pathway stabilization

9. Expand Property Boundary Marking	Short-term and then ongoing	N/A
10. Update Commemoration Protocol	Short-term	N/A
11. Update Open Space Capital Improvements Replacement Schedule	Mid-term	Capital funding may be needed depending on updated replacement schedule
12. Document Reduced Pesticide Use Protocol	Short-term	N/A

Relationship to Columbia Association's Strategic Plan

Exhibit 5 shows the relationship of the Open Space Assessment's recommendations to CA's Strategic Plan.

Exhibit 5: How Recommendations Relate to CA's Strategic Plan Goals

	Recommendation (*Short Title*)	Strategic Plan Goals				
		Quality of Life	Environmental Stewardship	Columbia Vision	Communications & Engagement	High-Performing Organization
1	Enhance Management of Invasive Species		X			
2	Expand Tree Replacement Strategy	X	X			
3	Focus Master Planning	X		X	X	
4	Enhance Wildlife Habitats		X			
5	Enhance Community Education & Engagement on Ecological Value of Open Space		X		X	
6	Survey Users	X			X	
7	Undertake a Review of the Watershed Management Plan	X	X		X	
8	Enhance Pathway Safety	X	X			
9	Expand Property Boundary Marking		X			
10	Update Commemoration Protocol			X	X	X
11	Update Open Space Capital Improvements Replacement Schedule		X			X
12	Document Reduced Pesticide Use Protocols		X			X

This page is left intentionally blank