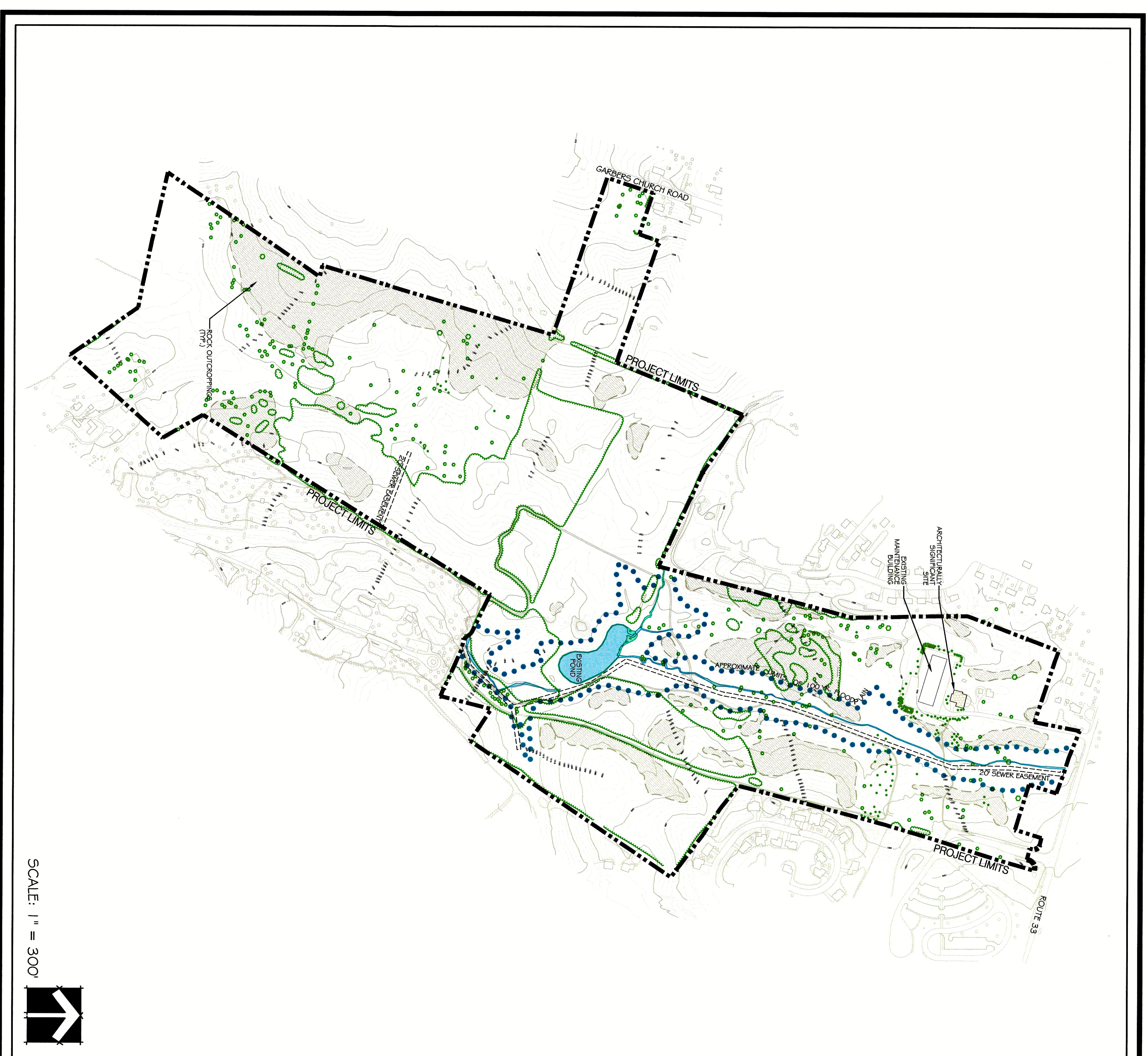


# ENVIRONMENTAL MANAGEMENT PROGRAM

## CITY OF HARRISONBURG GOLF COURSE

### CITY OF HARRISONBURG, VIRGINIA

OWNER/DEVELOPER



## PROJECT NARRATIVE

This plan represents the collaborative efforts of Williamsburg Environmental Group, Inc. (WEG), golf course architect W.R. Love, and City of Harrisonburg staff to create an environmental management program for the proposed golf course. The approximate 178-acre site is situated within the Harrisonburg city limits and is known locally as the Lineweaver/Strait property. More specifically, the northern property boundary fronts along Route 33 (Market Street) while a portion of the western boundary is situated along Garbers Church Road. The property contains a mixture of land uses that include both forested and pasture land. An unnamed intermittent tributary, which flows from north to south, bisects the northern portion of the property and eventually drains offsite into Cooks Creek.

As part of the overall Environmental Management Program, a Resource Inventory Plan was completed in which existing environmental conditions were identified and investigated in order to better characterize the physical resources for the site. Information specific to the site was gathered through site visits and coordination with City staff. Topics relevant to the environmental resources within the project included: topography, soil characteristics, vegetation, water resources, wetlands, historical resources, threatened and endangered species habitat, wildlife habitat, and floodplain issues. Four distinct habitat communities were also identified within the subject property as part of the overall program. These include 1) Mature Woodland, 2) Riparian Corridor, 3) Grassland, and 4) Pastureland. The Habitat Communities Plan displays the limits of these areas along with a description of the characteristics for each community. The objective of the Environmental Planning Guide is to provide a framework for addressing environmentally sensitive areas within the boundaries of the project during the development phase. Such techniques as restoration, enhancement, preservation, protection, and creation will be used to integrate the golf course development into the environmental setting. Four areas in which these techniques can be implemented were identified and include the following communities: 1) Fankland, 2) Woodland, 3) Riparian, and 4) Pastureland.

The Environmental Resource Inventory Plan, Habitat Communities Plan, and the Environmental Planning Guide were studied and utilized as design tools in the creation of the Golf Course Master Plan. By understanding the distinct communities identified in the Habitat Plan, the golf course has been designed to lay lightly on the land and minimize disturbance to environmentally sensitive areas. The natural characteristics of the site were considered valuable and will be protected and/or enhanced with indigenous plant material to the greatest extent practicable. Finally, an Environmental Management Plan was developed to respond to the identified environmental issues and incorporate the concepts from the Environmental Planning guide.

The Environmental Management Plan outlines specific measures that will be utilized throughout the golf course development. Due to the dynamic nature of this plan, it will continue to evolve and develop over time as new and better management techniques are developed. In the end, this will allow the golf course to function within its dynamic environmental setting.

## SHEET INDEX

1. COVER SHEET
2. RESOURCE INVENTORY
3. HABITAT COMMUNITIES
4. ENVIRONMENTAL PLANNING GUIDE
5. GOLF COURSE MASTER PLAN
6. ENVIRONMENTAL MANAGEMENT PLAN

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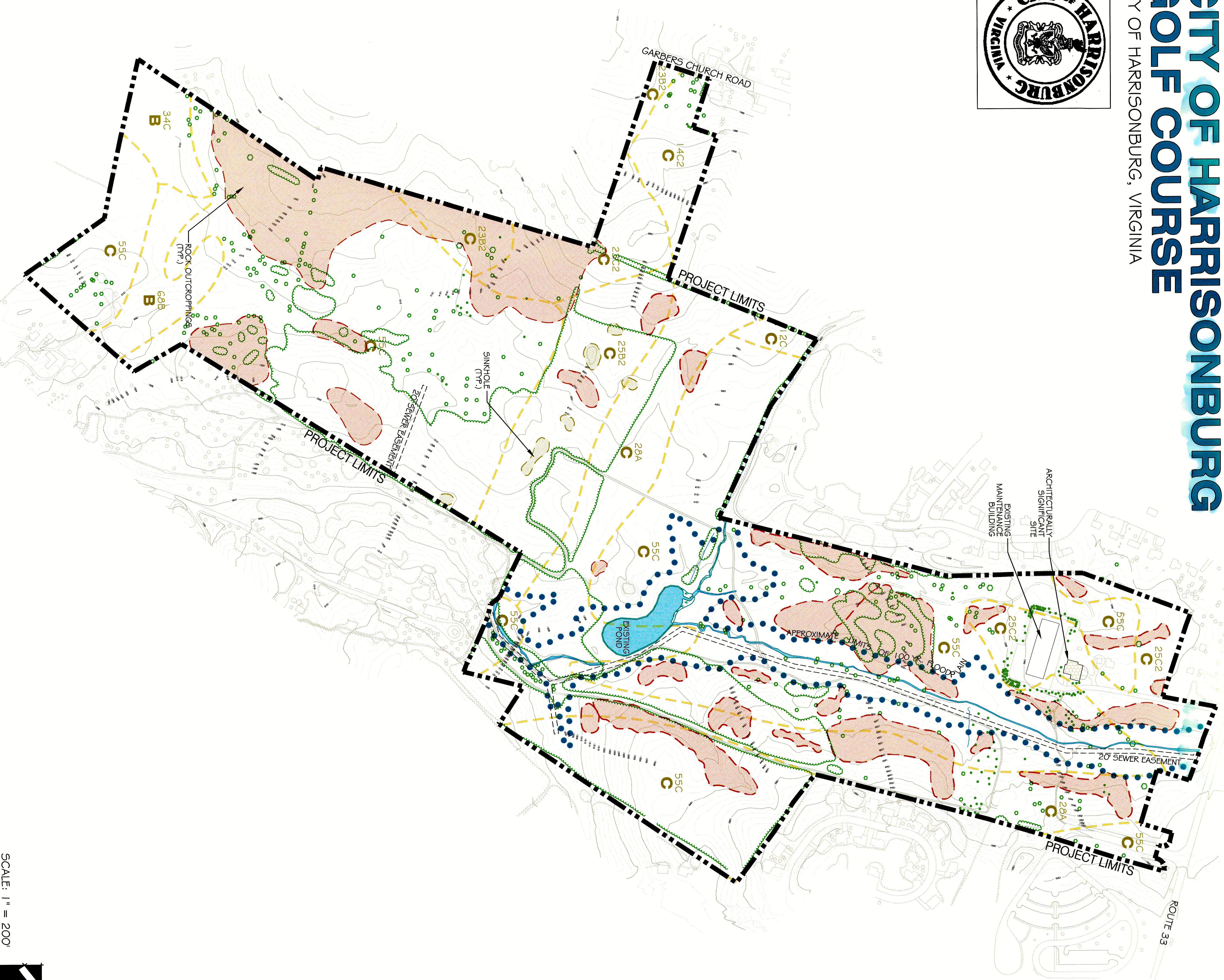
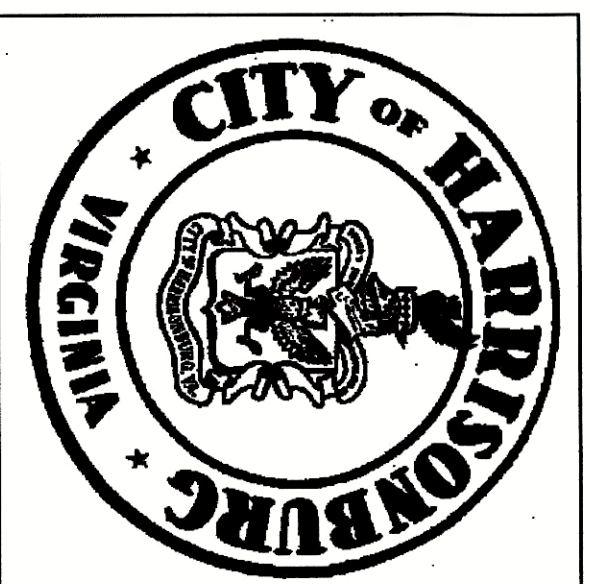
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# CITY OF HARRISONBURG

## GOLF COURSE

CITY OF HARRISONBURG, VIRGINIA



# RESOURCE INVENTORY

## ENVIRONMENTAL MANAGEMENT PROGRAM

### WETLANDS

The majority of jurisdictional waters of the United States, including wetlands found onsite are associated with the main intermittent channel that bisects the northern portion of the property. This unnamed intermittent tributary collects drainage from the northern portion of the site and conveys it to the 1.4-acre pond. A narrow fringe of emergent type wetlands surrounds much of the existing pond.

### WATER RESOURCES

The project site is situated within the headwaters of an intermittent tributary of Cooks Creek, which flows into the North River near the town of Bridgewater, Virginia. An approximately 1.4 acre pond exists within the project limits. Based on its location, approximately 726 acres naturally drains into the pond. The surrounding watershed contains a mixture of residential developments and urbanizing agricultural lands. The downstream watershed contains significant commercial, industrial, livestock and agricultural land uses. The on-site pond also receives backwash and sample tap waters discharged by the City of Harrisonburg Water Treatment Plant. These water supplies augment natural stream flows by an average of six million gallons each month. Previous groundwater investigations completed within the property have indicated that groundwater yields of up to 500,000 gallons per day are viable within the underlying fractured limestone bedrock. Municipal water mains also currently exist along Market Street, Garbers Church Road, and Dogwood Street, which borders the subject property.

### SOILS

Soils information within the project site was collected from onsite soil borings and test pits and data provided within the Soil Survey of Rockingham County, Virginia. Based on these surveys, soils range from silty clay loams to silt loams. The site is predominantly underlain by Hydrologic Soil Group (HSG) type "C" soils, which typically exhibit slower infiltration rates. Group "D" type soils, which typically exhibit slow infiltration rates and high runoff potentials, are confined along intermittent stream channel and drainage ways.

### BEDROCK / SINKHOLES

The potential for shallow bedrock exists for the Carbo, Edom, Endcav and Carbo-Endcav soil series units. These soils comprise approximately 90 percent of the project site and have a depth to bedrock varying from 20 to 60 inches. Additionally, since the site lies within a limestone bedrock region, there is also the potential for sinkholes. Based on site investigations, both rock outcroppings and sinkholes were observed throughout the site.

### VEGETATION

The site consists of a variety of vegetative communities including: mature woodlands, open grassland, and pastureland. Mature woodland sections contain a variety of hardwood species including hickory (*Carya spp.*), red oak (*Quercus spp.*), maple (*Acer spp.*) and walnut (*Juglans nigra*). Much of the northern section of the property is maintained grassland with scattered and isolated occurrences of hardwood species. Much of the southern section of the property contains pastureland, which is currently used for livestock grazing.

### TOPOGRAPHY

The site lies almost entirely within the Valley and Ridge Physiographic Province of the eastern United States and is located within an area known as the Great Limestone Valley. This area is underlain by sedimentary shale, limestone, and dolomitic rock that supports a gently rolling terrain. Elevations range from 1,354 feet above mean sea level (ft msl) along the northeastern property boundary to 1,282 ft msl along the stream channel near the southern property boundary.

### FLOODPLAIN

The floodplain boundary is the greatest flood height or still-water elevation estimated to occur during a 100-year storm event. The extent of the 100-year floodplain boundary was determined from Federal Emergency Management Agency (FEMA) maps and was shown to parallel the headwater intermittent stream channel and existing pond found onsite. Overall, the limits of the floodplain boundary are predominantly confined to the northern portion of the property.

### UTILITIES

The most feasible 3-phase power source appears to be located off the site to the southeast of the property within Hillendale Park. Power can also be connected from Garbers Church Road and Route 33. Municipal water and sewer lines are located along the entrance road to the park as well as along Garbers Church Road and Route 33. An existing sewer easement runs along the intermittent stream channel and continues on below the existing pond. A high pressure gas main also bisects a portion of the site.

### THREATENED AND ENDANGERED SPECIES

According to information obtained from the Virginia Department of Conservation and Recreation's Division of Natural Heritage (DCR-DNR) database, there are no documented occurrences of federally threatened or endangered species on the project site.

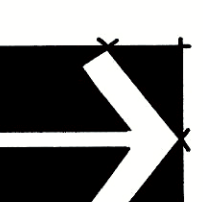
### HISTORICAL RESOURCES

According to information obtained from the Virginia Department of Historic Resources (VDHR), there has been one standing structure documented within the project limits, and is listed as architecturally significant.

### WILDLIFE HABITAT

A variety of habitats exist within the project limits. In particular, the intermittent stream channel provides a habitat and refuge corridor for humming birds. The woodland areas also provide habitat for urban and migratory bird species.

SCALE: 1" = 200'



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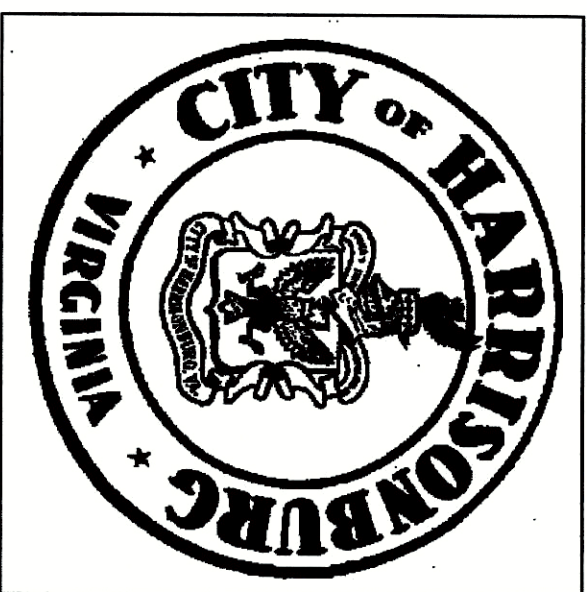
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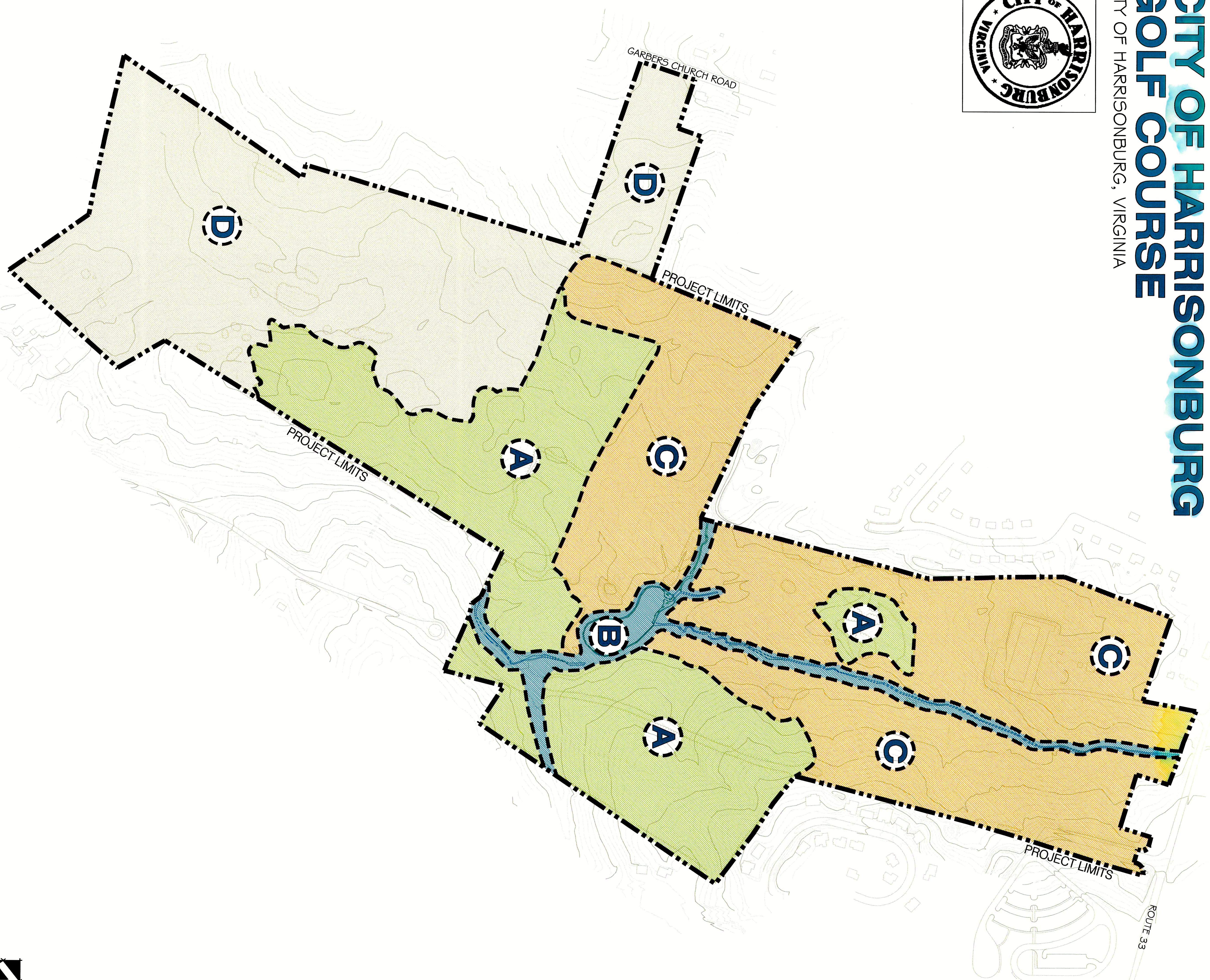


# CITY OF HARRISONBURG GOLF COURSE

CITY OF HARRISONBURG, VIRGINIA



## HABITAT COMMUNITIES ENVIRONMENTAL MANAGEMENT PROGRAM



### A. MATURE WOODLAND COMMUNITY

- Diverse wildlife habitat
- Moderate levels of exposed bedrock
- Understory less dense containing a variety of shrub and herbaceous species
- Mixed hardwood community containing some large specimen trees
- Gently rolling terrain with subtle swales and drainageways leading to the intermittent stream channel
- Silty clay to silt loam soils

### B. RIPARIAN COMMUNITY

- Narrow floodplain associated with intermittent stream channel
- Existing pond with wetland fringe
- Hydric soils
- Non-tidal wetlands fed by surface drainage
- Herbaceous and shrub species provide wildlife refuge and corridor

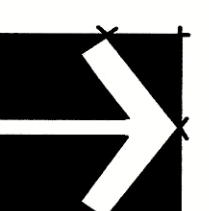
### C. OPEN GRASSLAND / MAINTAINED PARKLAND COMMUNITY

- Monotypic plant stand with limited wildlife habitat
- Maintained pockets of grassland with individual and isolated plant stands
- Scattered pockets of unmaintained grassland with moderate to high levels of exposed bedrock
- Narrow floodplain associated with the intermittent stream channel

### D. PASTURE

- Moderate levels of exposed bedrock located along gentle side slopes
- Gently rolling terrain with subtle swales and drainageways
- Unmaintained grassland used for livestock grazing
- Scattered monotypic plant stand with less diverse wildlife habitat

SCALE: 1" = 200'



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# CITY OF HARRISONBURG GOLF COURSE

CITY OF HARRISONBURG, VIRGINIA



## ENVIRONMENTAL PLANNING GUIDE

ENVIRONMENTAL MANAGEMENT PROGRAM

### GOALS

- Minimize impact to environmental resources
- Enhance environmental experience for golfers
- Improve biodiversity on the site

### OBJECTIVES

#### A. PARKLAND COMMUNITY

- Minimize disturbance to natural terrain resulting from golf course grading
- Maintain and enhance native grassland
- Preserve rock outcroppings to the maximum extent feasible.
- Enhance transition zone between open grassland and forested communities with landscaping
- Create wildlife corridors with plants that have habitat value
- Plant specimen accent trees in strategic locations for habitat and aesthetic value

#### B. WOODLAND COMMUNITY

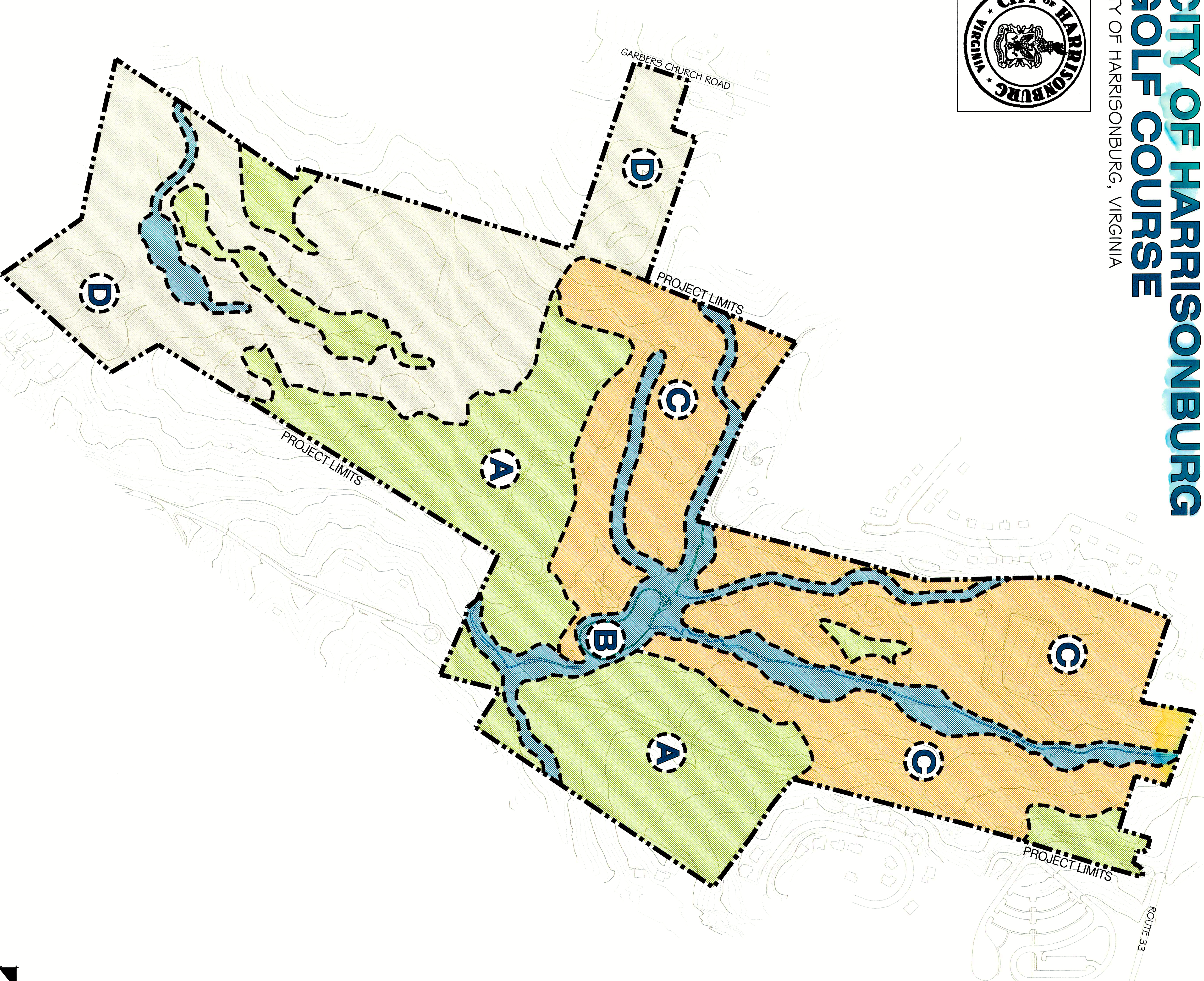
- Minimize width of golf hole corridors
- Preserve trees of special aesthetic character or habitat value along clearing limits
- Maintain and enhance any apparent wildlife corridors
- Increase habitat shelter and foraging potential
- Minimize fragmentation of woodland areas

#### C. RIPARIAN COMMUNITY

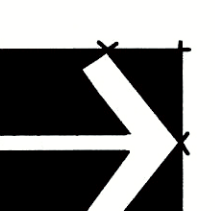
- Implement water quality control measures during construction and operation of the golf course
- Expand limits and maximize effectiveness of existing riparian buffers for water quality and habitat value
- Provide additional riparian corridors with new stream channels
- Create emergent wetland communities
- Enhance the transition zone between riparian and other communities with landscaping

#### D. PASTURELAND COMMUNITY

- Improve water quality with elimination of livestock grazing
- Enhance the native grassland character of the community.
- Preserve rock outcroppings to the maximum extent feasible
- Enhance transition zone between open grassland and forested communities with landscaping
- Plant specimen accent trees in strategic locations for habitat and aesthetic value



SCALE: 1" = 200'



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# CITY OF HARRISONBURG

## GOLF COURSE

CITY OF HARRISONBURG, VIRGINIA

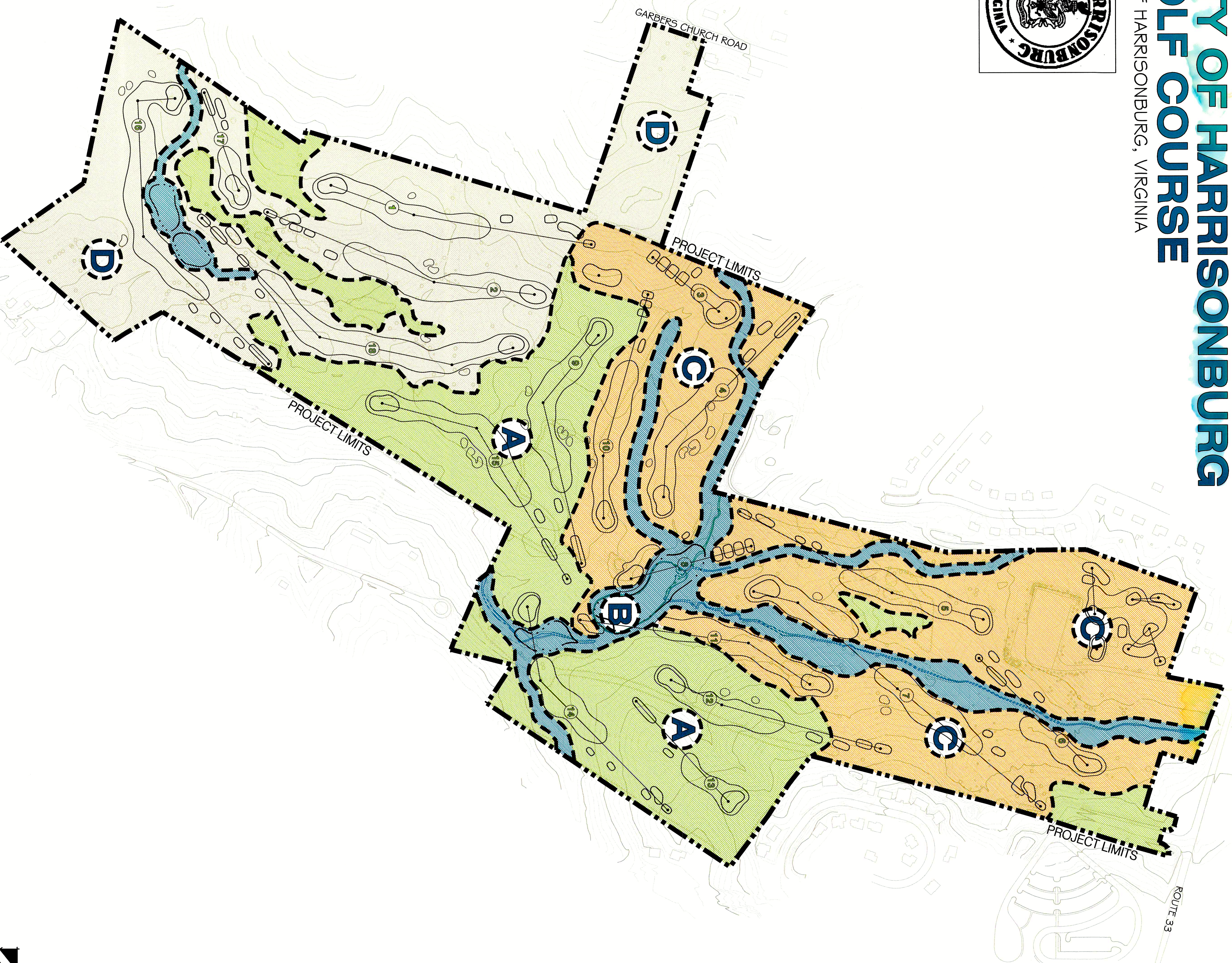


# GOLF COURSE MASTER PLAN

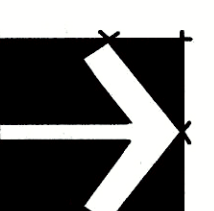
## ENVIRONMENTAL MANAGEMENT PROGRAM

### GOLF COURSE GOALS AND OBJECTIVES

- Provide recreational amenity for the public, both locally and regionally
- Serve as an enhancement for the adjacent community
- Provide an exceptional golf experience for all players
- Create a golf course sensitive to the characteristics of the site and environmental areas
- Provide economic and site responsive construction
- Develop an efficient operation and maintenance program
  - a. Proper management and control for limited staff
  - b. Condition the golf course in order to facilitate pace of play
  - c. Establish low maintenance areas and reduce maintenance requirements
  - d. Lower maintenance and operation costs to provide for more affordable play
- Accommodate players of all skill levels
- Provide an opportunity to walk while playing
- Incorporate the inherent and unique natural characteristics of the site as features of the golf course
- Incorporate sensitive areas compatibly into the design of the golf course
- Design the golf course to be compatible with the topography to lay lightly on the land
- Provide the golf course with a character and aesthetics that are appropriate to the region
- Landscape the golf course with indigenous plant material



SCALE: 1" = 200'



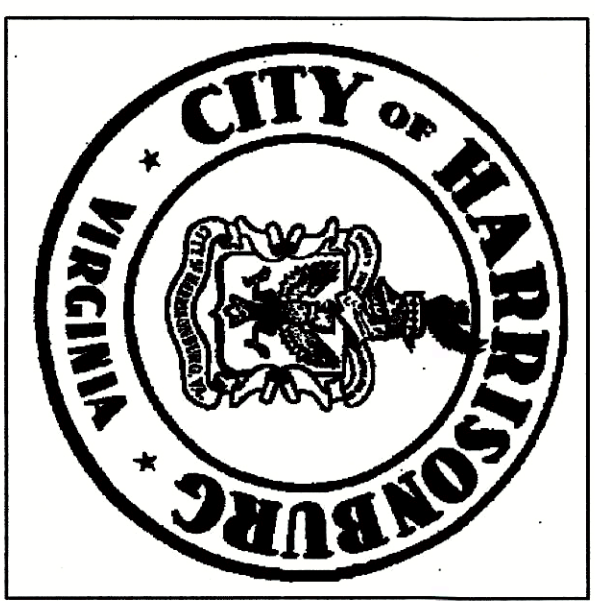
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# CITY OF HARRISONBURG GOLF COURSE

CITY OF HARRISONBURG, VIRGINIA



## ENVIRONMENTAL MANAGEMENT PLAN ENVIRONMENTAL MANAGEMENT PROGRAM

### DESIGN GOLF COURSE

- Avoid and minimize impacts to jurisdictional waters of the U.S., including wetlands
- Minimize clearing and grading to greatest extent practical within sensitive areas
- Create natural buffers around streams and ponds using indigenous plant material to protect water quality and to improve biodiversity
- Select drought tolerant turfgrass species and limit the quantity of maintained turfgrass to reduce irrigation demands, save electricity, reduce fertilizer and pesticide usage, and save labor and fuel
- Construct and install nestboxes for various wildlife
- Accumulate brush piles for wildlife habitat in buffer zones and out-of-play areas
- Landscape transition zones between communities with indigenous shrubs in graduated layers to visually enhance the site and provide wildlife habitat
- Maximize capture of onsite stormwater runoff with BMPs
- Develop an erosion and sediment control plan that respects the riparian corridor
- Design and construct as aesthetically pleasing outfall from the irrigation pond

### FACILITIES

- Treat all runoff of impervious cover with onsite BMPs
- Install properly designed chemical storage buildings
- Use secondary BMPs for spill containment in chemical mixing areas
- Include oil and grease separators in mechanic areas
- Implement a recycling plan

### CONSTRUCTION

- Hand clear sensitive areas within the golf course corridor
- Insure that erosion and sediment control measures are properly installed and maintained
- Phase construction to minimize areas of disturbance
- Recycle rock from the golf course construction and place along the pond edges and in select locations along streams in a natural manner

### OPERATION AND MANAGEMENT GOLF COURSE

#### Integrated Pest Management

- Create natural buffers around streams and ponds to protect water quality
- Monitor traffic patterns on the golf course to eliminate stress areas on the turf
- Institute daily scouting routine to identify pest infestation and threshold levels
- Use of alternative spikes and tee to green cart paths to reduce turfgrass stress
- Implement cultural practices including topdressing, aeration, vertical mowing, lightweight mowers to eliminate soil compaction
- Establish no spray zones throughout the property, including borders of waterways and residential areas
- Apply pesticides on a curative basis rather than a preventative basis
- Use organic fertilizers to reduce pesticide use

#### Water Quality and Conservation

- Develop a site specific irrigation system to improve control and reduce irrigation demands
- Use available weather data along with daily soil moisture content levels and evapotranspiration rates to determine irrigation needs
- Maintain turfgrass at the highest acceptable cutting height
- Minimize the use of herbicides during periods of drought
- Develop a water quality monitoring program

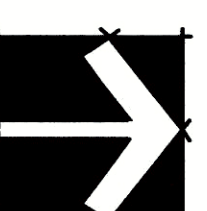
#### Educational Opportunities

- Arrange demonstrations and informational sessions for the public
- Educate golfers on Water Conservation and Integrated Pest Management (IPM) Practices
- Work with local organizations and schools
- Develop seminars and research opportunities for educational institutions
- Join the Audubon Cooperative Sanctuary Program
- Participate in the Golf Course Superintendents Environmental Stewardship Program

### FACILITIES

- Assemble emergency spill kits which are ready to use by application technicians
- Install self-contained mixing and loading pad for all spray tank preparation and cleanup

SCALE: 1" = 200'



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