**ENVIRONMENTAL IMPACT ASSESSMENT**
**SOMERSET COUNTY**
**GREEN KNOLL GOLF COURSE HYDRO-RAKING PROJECT**

## 1. DESCRIPTION OF PROPOSED PROJECT

a. **Briefly describe the project:**
The Somerset County Park Commission (SCPC) has devised a project to improve the irrigation system and restore ecological balance by hydro-raking the pond at Green Knoll Golf Course. The purpose of hydro-raking is to remove aquatic weeds and debris from the water's surface in order to improve overall water quality. As ponds age and organic material collects at the bottom, water capacity significantly decreases. As a result, ponds can eventually dry up and transform into meadows. Utilizing these preventative measures will ensure the stability and irrigational efficiency of the pond.

b. **State objectives of the project:**
Project objectives include:
1. Remove aquatic weeds and debris from the water to improve overall water quality.
2. Improve the quality of reservoir systems within the Green Knoll Golf Course.
3. Prolong the lifespan of the pond while preventing the need for future dredging and the growth of nuisance algae blooms.

## 2. DESCRIPTION OF THE ENVIORNMENT AND EXISTING CONDITIONS

**Describe existing environmental features:**

a. **Vegetation:** The Green Knoll Golf Course is located in Bridgewater, NJ in Somerset County. This part of central New Jersey has a wide array of vegetation. The region's forests are mixed deciduous forests, primarily hosting oak, hickory, and maple species. Some forests also have pine trees dispersed in the area. This region is also home to a variety of rivers and streams. Along these bodies of water, one can find shrubs and grasses that are adapted to wetter conditions, as well as other species of trees such as willows and cottonwoods. In addition to these ecological attributes, open grasslands and meadows are also common in this region. These types of vegetation are remnants of past agricultural use and often host wildflowers and grasses.

b. **Wildlife, including State and federal threatened and endangered species and critical habitats:** This specific area of the state is home to a multitude of wildlife, including mammals such as red foxes, raccoons, squirrels, groundhogs, and white-tailed deer; and various bird species such as robins, sparrows, and red-tailed hawks. As for reptiles and amphibians, this region hosts snapping turtles, frogs, and painted turtles near water bodies, and garter snakes in the wooded, grassy areas. Specifically regarding aquatic life, the streams and ponds of the region are home to fish species such as sunfish and bass, and invertebrates like dragonflies and crayfish.

c. **Geology, topography, and soils:** Bridgewater lies on sedimentary rock formations which feature shale, sandstone, and conglomerate rock types. Shale formations in the area occasionally produce fossils of prehistoric animals and plants. The general topography of the region is gently rolling, with elevations ranging from about 70 to 500 feet above sea level. There are also many low ridges formed by sandstone, and valleys formed in softer shale. The region is also intersected by the Raritan River, which has carved out low-lying terraces and floodplains. The area's soil is mainly silty and loamy, as well as some areas obtaining clay and sandy soils.

d. **Water resources/hydrology:** The Raritan River is the most prominent water source in the region. It provides water for residential, industrial, and agricultural use. It also hosts opportunities for recreation and wildlife habitats. This area also has a variety of streams and creeks, all of which are connected to or feed into the Raritan River. As for groundwater resources, the region lies within the Newark Basin. This geologic formation encompasses many aquifer systems, which supplies groundwater for local wells and municipal water systems.
e. **Historic/archeological resources:** There are no known historic or archeological resources within the project site.
f. **transportation/access to site:** The Green Knolls Golf Course is mainly accessed by car and can be reached by local roads within the town. This area is also adjacent to three prominent NJ Highways; Route 287, Route 202, and Route 22. With that, many travelers can easily exit one of these main roads to enter the town of Bridgewater, and from there conveniently locate the golf course.
g. **Adjacent land uses/description of the surrounding neighborhood:** Green Knoll Golf Course sits in the center of residential neighborhoods and the town center of Bridgewater. The aforementioned environmental attributes of the region are seamlessly intertwined in the region's developed areas.

## 3. ENVIRONMENTAL IMPACT AND ANALYSIS OF PROPOSED ACTION

a. **Discuss all affected resources and the significance of each impact:** The proposed project will result in a variety of positive environmental impacts. The primary goal of this project is to improve the ecological balance and water irrigation of the pond. Hydro-raking will elevate the pond's water flow and oxygen levels. Moreover, when organic material continues to resonate on a water surface, the process of eutrophication (increase in nitrogen and phosphorus levels), significantly affects oxygen levels and the quality of life for aquatic species. Hydro-raking will prevent this process from the beginning. Considering hydro-raking's preventative abilities, this process will ultimately aid in restoring the overall habitat balance of the pond, allowing native species to thrive. The process of hydro-raking does impose minor short-term negative environmental impacts. The specific act of hydro-raking temporarily disrupts aquatic life and has the potential to significantly disturb species when in sensitive breeding or spawning seasons. Additionally, this process can cause sediment resuspension, which can in turn release pollutants and nutrients that were otherwise trapped in the sediment. Hydro-raking can also introduce the spread of invasive species if not properly managed. Moreover, while this process is taking place, there could be temporary noise and physical disruptions caused by the equipment, which can stress wildlife in and around the water body.
b. **Discuss short-term and long-term project impacts:** The project's positive impacts align with a long-term timeline. Inversely, the potential negative impacts

will be temporary and short-term and include potential temporary habitat disruption and nose pollution. These negative impacts, however, will only occur during the duration of the project.

c. **Discuss anticipated increase in recreation and overall use of site over time:** We expect that the proposed improvements will result in improvements to the quality of the golf course and resulting increased use of and appreciation of the area. We anticipate that the numbers of golfers and walkers who frequent the area will increase due to the resulting improvements in the area's environmental standards.
d. **Identify adjacent environmental features that may be affected by the proposal:** The proposed project will not affect any adjacent environmental features.
e. **List any permits required for project and brief status (i.e., waterfront development):** The only permit required for hydro-raking is for Soil Erosion and Sediment Control. We will apply to the Somerset-Union Soil Conservation district during design.
f. **For development that would impact an undisturbed portion of the project site, the local government must submit a Natural Heritage Data Request Form to the DEP's Office of Natural Lands Management (form available at the website or by writing to Natural Heritage Program, PO Box 404, Trenton, New Jersey 08625-0404). Please attach and discuss the results of the search.** This project will not impact any undisturbed portion of the project site.
g. **Discuss if/how the project may be impacted by sea level rise and any related design considerations:** Because the golf course is not located near a shoreline, sea level rise will not impact the project.

**4. ALTERNATIVES TO THE PROPOSED ACTION**

a. **Identify alternate sites:** Because the specific purpose of this project is to improve the ecological balance and irrigation at the Green Knoll Golf Course, there are no alternate sites.
b. **Discuss alternate levels and types of development:** Since there are no alternative sites for the proposed project, there are no devised development ideas for any alternative site.
c. **Compare environmental impacts of each alternative:** The County researched other methods to achieve the desired goal, including introducing grazing species to help control aquatic vegetation, weed harvesting, hand pulling, and utilizing EPA-approved herbicides to control invasive plants. All of these processes have the same positive environmental impacts of hydro-raking. Minorly invasive methods, such as introducing native species or removing organic debris by hand, may slightly limit any temporary habitat disruption or noise pollution. However, those processes have a longer time allotment. Regarding the utilization of chemicals to control organic matter, one of the objectives of this project was to minimally invade the ecological system of the pond. Using chemicals in a water body has the potential for both short-term and long-term negative effects on the ecosystem and overall water quality. With that, it was determined that hydro-

raking would host the most positive impacts, a limited amount of negative impacts, and be the most time and cost effective.

5. **MITIGATING MEASURES**
    a. **Describe the measures that will be undertaken to mitigate adverse impacts:** In order to mitigate potential negative outcomes of this project, the County will ensure that those operating the equipment are knowledgeable of the area and well versed in the process of hydro-raking. Many of the negative effects, such as disrupting habitats, arise from misuse of the machine utilized in hydro-raking. To ensure this does not occur, the County will designate a team that is experienced with hydro-raking and educated in upholding environmental standards. In addition, The County Parks Commission will ensure this project does not take place during any sensitive breeding or mating seasons for the wildlife that reside in and around the pond. To mitigate any potential noise pollution, the Commission will plan the project work schedules around the busier times on the golf course.

6. **MONITORING, EVALUATION, AND LONG-TERM MAINTENANCE (FOR RESTORATION/ENHANCEMENT PROJECTS)**
    a. **Identify specific and measurable on-the-ground outcomes:** The County will demonstrate the project's effectiveness through concrete, on the ground measurements. This includes the volume or weight of vegetation and sediment removal, water quality improvements, the health of the ecosystem, and hydrological effects. A variety of specific measurement tools will be utilized to record these outcomes, such as pre and post treatment surveys (imaging, mapping, field surveys), water testing, and ecological monitoring through surveying plants and animals and tracking changings in the ecosystem's health.
    b. **Briefly describe the applicant's monitoring plan, including long-term maintenance of the project site. The applicant must monitor the project site for a minimum of three years to ensure project viability and success. For example, if the project includes tree planting, the applicant must be able to replace any lost trees or take other measures to achieve the desired outcome. Please note that monitoring expenses are not an eligible cost:** The hydro-raked material will be stockpiled, seeded, and monitored on site as it dewaters. County and Park staff will continuously monitor the location. Depending on depth of fill, the stockpile will be fenced to prevent wildlife from entering the soft material. When sufficiently dewatered, the material can be left in place or repurposed as topsoil/clean fill.

7. **AUTHOR(S) AND QUALIFICATIONS**
    a. Preparation of Environmental Assessment:
        i. Adam Bloom, PE, Deputy Director of Engineering, County of Somerset