Project #15-0320

ASSESSMENT AND MANAGEMENT RECOMMENDATIONS FOR THE SLOUGH AND HILLCREST LAKE

PROSPECT HEIGHTS, COOK COUNTY, ILLINOIS

PREPARED FOR:

City of Prospect Heights
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OCTOBER 2015

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INTRODUCTION

The study site encompasses two bodies of water divided by Willow Road in Prospect Heights, Illinois (Exhibit 1). Hillcrest Lake is an approximate 14-acre lake or pond located north of Willow Road. The area south of Willow Road is commonly known at The Slough, and was historically known as Hillcrest Slough or South Slough. Based on historic aerial photographs and the typical landscape ecology of the region, both The Slough and Hillcrest Lake were once a single large wetland "slough." Sometime in the 1950s it appears that these areas may have been excavated or dredged to create more open water features that are apparent by the 1962 aerial photograph (Exhibit 2). A July 1970 Lake Survey report from the then Illinois Department of Conservation (IDOC) indicated that it was a "dammed marsh, also supposedly deepened about 1955 for home fill."

Due to recent citizen concerns about water levels in both Hillcrest Lake and The Slough, along with concerns about aquatic "weed" growth, the City of Prospect Heights retained Hey and Associates, Inc. (Hey) to complete an ecological assessment of The Slough and Hillcrest Lake and provide management options and recommendations at the urging of the Prospect Heights Natural Resources Commission (NRC). The NRC has also provided historical information and data for these areas. In addition, Globetrotters Engineering Corporation (GEC) was hired by the City of Prospect Heights to examine the history of the outlet on Hillcrest Lake and conduct an analysis of possible options for increasing the depth of the lake by installation of a riser board weir structure on the outlet pipe. GEC has also completed a feasibility study and preliminary design report for the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) that focused on flooding of local roads around Hillcrest Lake.

Resident Concerns and Involvement

Recent City Council meetings have had very high attendance by members of the community concerned with Hillcrest Lake and The Slough. Citizens expressed a variety of concerns that are reflected in the considerations and options presented in this Plan. Much input has been received from Tim Kupczyk, President of the Hillcrest Lake Homeowners Association and Agnes Wojnarski, President of the Prospect Heights NRC. Management concerns included the water levels, aquatic plant growth, water quality and invasive species in both The Slough and Hillcrest Lake. The NRC also coordinates a group of volunteer stewards that have been controlling invasive species and planting native species around parts of The Slough.

LAKE and SLOUGH OVERVIEW

Hillcrest Lake is a man-made lake with a surface area of approximately 14 acres and is surrounded by residential development. The Slough is approximately 12.5 acres in size and has emergent wetland vegetation around a long narrow body of open water. The open water portion is approximately 6.9 acres based on estimates from April 2015 aerial imagery. Water levels in the Lake and the Slough are controlled by an existing 24-inch Polyvinyl Chloride (PVC) outlet pipe which carries the water under Hillcrest Avenue, through residential yards and to an open channel that in turn flows into McDonald Creek. At least 3 concrete culverts connect The Slough to Hillcrest Lake under Willow Road. These 3 concrete pipes are partially submerged and appear to be in poor condition (clogged and spalling concrete). Water flows into The Slough at the south end via McDonald Creek Tributary A from under Elmhurst Road/Illinois Route 83.

Based on a survey performed by GEC for the MWRDGC study in 2014, the invert elevation (bottom of pipe) of the outlet pipe from Hillcrest Lake is 647.1 at the upstream (lake) end and 646.3 at the downstream end. The pipe is approximately 350 feet long. Water flows from the lake into the culvert and discharges into a ditch which leads to McDonald Creek. The normal lake water level during dry weather is typically about 2 to 6 inches above the invert of the culvert. The inlet to the culvert is protected by several metal fence posts driven into the lake bed. These serve to prevent large debris from entering the culvert. Prospect Heights periodically inspects and removes debris accumulations. Based on GEC's report to Prospect Heights, as-built record construction drawings of the outlet culvert were destroyed in a fire, so the exact date of the installation of the culvert is unknown. Based on the Prospect Heights storm sewer utility atlas examined by GEC, a 24-inch pipe existed at this location since at least 1980. The atlas indicates a 24-inch diameter reinforced concrete pipe (RCP) at that location with a note that it is to be replaced by a 24-inch diameter PVC pipe. No information regarding elevation of the pipe is shown on the drawings.

Overall both the Slough and Hillcrest Lake are currently very shallow (maximum depth of 3.2 feet). The area around Hillcrest Lake is 100% developed with residential homes. The Slough shoreline is approximately 88% developed (residential) and 12% undeveloped or open space (park). Most of the surrounding

residential development was built in the 1950s and 1960s. A small park (Isaac Walton Park) with a picnic shelter and interpretive signs exists at the southwest end of The Slough along Illinois Route 83/Elmhurst Road.

Both Hillcrest Lake and The Slough appear as blue open water bodies on the U.S. Geological Survey (USGS) Quadragle map for the area (Exhibit 3). The National Wetland Inventory (NWI) mapping for the area depicts Hillcrest Lake as a single Palustrine, Unconsolidated Bottom, intermittently exposed, excavated (PUBGx) wetland (Exhibit 4). The NWI shows the northeastern part of The Slough (primarily the open water part) as the same designation while the southwest end includes areas of Palustrine Emergent Semipermanently Flooded (PEMF), and Palustrine Forested, Broad-leaved Deciduous, Seasonally Flooded (PFO1C) wetlands (Exhibit 4). The NWI mapping for this area was completed in 1981. The Flood Insurance Rate Map (FIRM) shows the entirety of Hillcrest Lake and The Slough as Zone AE floodplain (Exhibit 5). The floodplain mapping also includes surrounding streets and yards. The USGS Hydrologic Atlas depicts the flood of record as of 1963, which includes all of The Slough, Hillcrest Lake and extends north to McDonald Creek (Exhibit 6). The Soil Survey mapping for Cook County shows The Slough and Hillcrest Lake as "water" and does not provide information on the soils that may have been present (Exhibit 7).

Watershed

Hillcrest Lake/The Slough receives its water from its approximate 1.7 square-mile watershed (Exhibit 8). Approximately 1.10 square miles is tributary to The Slough, south of Willow Road. The majority of this watershed is in residential development built in the 1950s and 1960s. Commercial landuse exists along US Route 12/Rand Road, with lesser amounts along Elmhurst Road/Route 83. Two golf courses lie southwest of the Slough near the headwaters of McDonald Creek Tributary A. The Slough receives stormwater from culverts along the east side at School Street, East Olive Avenue, and East Marion Avenue and drainage from Hillside Avenue. Drainage from Maple Street and the south side of Willow Road also enter the west side of The Slough. These residential streets all have a rural cross-section without curb and gutter and drainage is via open ditch and culverts under driveways and roads. There are also multiple stormwater inlets to Hillcrest Lake carrying drainage from Hill Court, Owen Street, and Owen Court. The Hillcrest Lake and Slough immediate shoreline are within open space parcels held by the City of Prospect Heights and the Prospect Heights Park District.

ASSESSMENT RESULTS – THE SLOUGH & HILLCREST LAKE

Aesthetic Features & Shoreline Condition

The protection and restoration of aesthetic qualities on the slough and lake's shoreline not only provide more natural views from the water but may also improve the quality of the lake. For example, native, deep-rooted vegetation rather than manicured, fertilized lawns are a natural deterrent to geese from loitering as the taller vegetation is less attractive to the geese. A reduction in the goose population on and near the lake can reduce bacteria and nutrient levels in the lake which in turn can limit the excess growth of vegetation and algae. Native, perennial vegetation also provides refuge for fish and wildlife and can reduce the potential for shoreline erosion.

Approximately 95% of the shoreline of The Slough is vegetated by woody and emergent vegetation, providing good habitat, erosion control, and a natural aesthetic. Only one private lot on the northwest corner has mowed turf to the water's edge, and has likely contributed to a severely eroded shoreline condition (Exhibit 10). The shoreline along the south side of Willow Road is partially vegetated, littered with old concrete rubble and blocks, and the gravel shoulder/informal parking area.

Hillcrest Lake has 53% of its shoreline vegetated with woody or emergent vegetation and moderate erosion (Exhibit 9). In some areas, it appears that small plantings of native prairie species were installed. An estimated 1404 feet of shoreline have significant to severe erosion characterized by mowed turf or gravel up to eroded vertical banks (Exhibit 10).

Much of the aesthetic concern for residents has to do with the appearance of the open water. During September 2015 assessment for this study, an estimated 45% of the water surface of The Slough appeared solid bright green. Many people assume this is due to algae and is undesirable. However, the green appearance on the Slough was solely from a floating plant called duckweed (*Lemna minor*), not algae. This will be discussed further in the section on aquatic plants below.

Hillcrest Lake has dense beds of submerged growth of aquatic plants. In many areas, depending on the water depth, these plants reach the surface and are covered with filamentous algae. This gives the lake an aesthetic that is undesirable to most people.

Fishery

The fishery of Hillcrest Lake was assessed by the IDOC (now the Illinois Department of Natural Resources or IDNR) in July 1970. Both Hillcrest Lake and The Slough were assessed by IDOC in August 1972. And more recently the IDNR provided a quick assessment of the fishery of Hillcrest Lake in August 2015. These 3 assessments all included electroshocking by state fisheries personnel and provide an assessment of the fishery over time.

The 1970 Lake Survey report noted that Hillcrest Lake had an average depth of only 2.7 feet with a maximum depth of 7 feet based on echo soundings. The IDOC noted that the bottom was mucky and that the lake likely had water quality impairments. Filamentous algae was observed around the perimeter of the lake, along with some native emergent and submergent plants. IDOC indicated that the lake was very shallow and prone to winter fish kills and was not likely to support a sport fishery. In 1970, the observed fishery was dominated by common carp, a non-native fish species.

Similar observations were noted in the 1972 report from IDOC which assessed both The Slough and Hillcrest Lake. Again it was noted that the fishery was dominated by carp and other rough species and that the lake was very shallow and prone to winter and summer kills. They commented again that it would not likely support any kind of sport fishery due to shallow depths and water quality issues.

Finally, in 2015 the reassessment by IDNR confirmed that conditions had not changed substantially from the 1970 survey. Electrofishing was only possible for 15 minutes due to the depths being too shallow for the boat. IDNR recommended annual stocking if a sport fishery was desired, to overcome annual fish kills.

Table 1. Summary of fish surveys by IDOC/IDNR.

Fish Species	**1970**[1]	**1972**[2]	**2015**[3]
Largemouth Bass	5		4
Bluegill	5	7	1
Green Sunfish	33	5	
Black Crappie	8	2	
Black Bullhead	26	3	3
Common Carp	76	25	26
Goldfish		33	23
White Sucker			2

1= 1970 survey for 40 minutes with AC electroshocking.
2= 1972 survey for 35 minutes with AC electroshocking.
3= 2015 survey for 15 minutes with DC electroshocking.

Wildlife

The Slough and Hillcrest Lake together appear to provide significant wildlife habitat within the urban-suburban landscape. Fall observations for avian species in this study are during post-breeding dispersal (after birds leave their nests), and hence do not represent nesting observations. These observations provide a glimpse of the diversity of bird life that use the habitat in and around The Slough and Hillcrest Lake for foraging, loafing and migration support. Species in the table below marked with an asterisk are observed species that are associated with marsh or open water habitat. The remainder of the species listed are common terrestrial species that were observed in the trees and shrubs surrounding The Slough.

Table 2. Avian species observed in and immediately around Hillcrest Lake and The Slough in September 2015.

American Bittern (*Botaurus lentiginosus)**
American Coot (*Fulica americana)**
American Robin (*Turdus migratorius)*
Belted Kingfisher (*Megaceryle alcyon)**
Blue Jay (*Cyanocitta cristata)*
Blue-winged Teal (*Anas discors)**
Canada Goose (*Branta canadensis)**
Common Grackle (*Quiscalus quiscula)*
Common Merganser (*Mergus merganser)**
Double-crested Cormorant (*Phalacrocorax auritus)**
Downy Woodpecker (*Picoides pubescens)*
Great Blue Heron (*Ardea herodias)**
Great Egret (*Ardea alba)**
Green Heron (*Butorides virescens)**
Mallard (*Anas platyrhynchos)**
Marsh Wren (*Cistothorus palustris)**
Pied-billed Grebe (*Podilymbus podiceps)**
Red-bellied Woodpecker (*Melanerpes carolinus)*
Ring-billed Gull (*Larus delawarensis)*
Solitary Sandpiper (*Tringa solitaria)**
Song Sparrow (*Melospiza melodia)*
Wood Duck (A*ix sponsa)**

Visual observations were also made during all field inspections for any reptile and amphibian species using the area. The fall season of this study is not ideal for confirming the presence of many amphibian and reptile species. However, multiple individuals of the following species were observed: Green Frog (*Lithobates clamitans*), American Toad (*Anaxyrus americanus*), and Painted Turtle (*Chrysemys picta*). Many other species are likely present and would likely be confirmed in spring surveys.

Similarly, visual surveys of dragonflies and damselflies is also not ideal during the fall. Most species are relatively short-lived as aerial adults, living more of their lives as aquatic nymph larvae. Species that were observed and positively identified include widow skimmer (*Libellula luctuosa*), common white tail (*Libellula lydia*) along with several species of small damselflies including the familiar bluet (*Enallagma civile*). Damselflies are usually smaller and more slender than dragonflies, exhibit a weaker flight, and forage and perch low in shoreline vegetation. Positive identifications of other species present were not made.

Water Quality

In general, the water quality of Hillcrest Lake and The Slough is within the expected range for similar water bodies within the suburban context of Cook County. Single water quality grab samples were collected in each water body by Hey on October 1, 2015 and submitted to McHenry Analytical Water Laboratory Inc. for analysis of constituents for analytes including total phosphorus, ammonia nitrogen, chlorides, and total suspended solids/volatile total suspended solids. Field parameters measured included pH and conductivity.

The pH of Hillcrest Lake was measured as 8.22 while the pH of The Slough was measured at 8.18. The water's pH is a measure of its hydrogen ion (H+) concentration and reflects the water's acid/base characteristics. The lower the pH the more acidic it is (more H ions in the water) and the higher the pH the more basic or alkaline the water is. A pH of 7 is neutral and Illinois lakes are typically circum-neutral or 6.5 to 9.0. In northeastern Illinois, the underlying geology is generally calcareous (containing calcium) and alkaline. Thus these values of around 8.2 are within a normal, healthy range. It should also be noted that a lake's pH will fluctuate somewhat each day and from season to season in response to photosynthesis by algae and plants, watershed runoff, and other factors. And like dissolved oxygen, pH values may change with depth as well.

Conductivity is a measure of the water's ability to conduct an electric current. It is useful for estimating the concentration of dissolved solids (TDS) in the water – TDS generally equals about 60% of the conductivity reading. Lakes with high alkalinity often have high conductivity. Illinois' standard of 1000 mg/l TDS equates to a 1700 conductivity reading. Hillcrest Lake was measured at 840 while The Slough was at 1151.

Surface water samples were collected that were analyzed for total phosphorus, ammonia-nitrogen, chlorides, and total suspended solids/volatile total suspended solids (TSS/VTSS). Total phosphorus and ammonia are general measures of the nutrients in the water. It is these nutrients that can fuel excessive growth of aquatic plants or cause nuisance algae blooms. Chlorides present in the water in this region are generally residual from

de-icing salts applied to area roadways during the winter. The TSS/VTSS give an indication of the nature of the solids in the water from the contributing watershed and any agitation of bottom sediments.

While secchi disk readings were not taken, the water in both Hillcrest Lake and The Slough appeared relatively clear and the bottom or submergent vegetation was generally fully visible.

Lab results indicate total phosphorus measurements in The Slough as 0.140 mg/L while Hillcrest Lake was at 0.103 mg/L. If either water body were greater than 20 acres in size, it would be considered impaired for phosphorus by the Illinois Environmental Protection Agency (IEPA) as their water quality standard for total phosphorus standard is 0.05 mg/L that is applied to lakes whose surface area is greater than 20 acres. There are many potential sources of phosphorus available in The Slough and Hillcrest Lake. Internal cycling of phosphorus occurs when DO concentrations become low, ≤2.0 mg/L near the lake bottom allowing for the release of phosphorus from anoxic sediments. Eroding shorelines can also introduce phosphorus rich sediments into the water column, which may be particularly possible for Hillcrest Lake (see section on shoreline condition). Activities taking place in the watershed such as turf fertilization and usage of the marsh by waterfowl can additionally cause increased TP concentrations. Reminding residents and golf course maintenance personnel to use phosphorus-free fertilizers and to take actions to minimize goose populations can go a long way in reducing phosphorus inputs into Hillcrest Lake and The Slough. There were filamentous algal blooms observed in both bodies during the fall 2015 assessment. Elevated phosphorus promotes algal growth, and high chloride levels are known to shift algal populations towards blue green algae.

The chloride concentration was 139 mg/L in Hillcrest Lake and 211 mg/L for The Slough which is below the critical concentration defined by the U.S. Environmental Protection Agency for general use of 230 mg/L, and well below the IEPA state water quality standard of 500 mg/L. The main contributing factor of increased chlorides has been linked to deicing products such as rock salt; however, water softener system discharges have also been identified as another source of chlorides and may have contributed to the elevated chloride concentrations measured. It only requires 1 teaspoon of salt to pollute 5 gallons of water to the critical concentration, and the ecosystem within a lake can be impacted if concentrations remain at the critical level 230 mg/L for extended periods of time.

Ammonia or ammonia nitrogen (N) is a nutrient that contains nitrogen and hydrogen. Its chemical formula is NH3 in the un-ionized state and NH4 + in the ionized form. Total ammonia is the sum of both NH3 and NH4 + and is what is measured analytically in water. Ammonia is the preferred nitrogen-containing nutrient

for plant growth. Ammonia can be converted to nitrite (NO_2) and nitrate (NO_3) by bacteria, and then used by plants. Nitrate and ammonia are the most common forms of nitrogen in aquatic systems. Nitrate predominates in unpolluted waters. Nitrogen can be an important factor controlling algal growth when other nutrients, such as phosphate, are abundant. Ammonia is excreted by animals and produced during decomposition of plants and animals, thus returning nitrogen to the aquatic system. Ammonia is also one of the most important pollutants because it is relatively common but can be toxic, causing lower reproduction and growth, or death of aquatic organisms. The neutral, unionized form (NH_3) is highly toxic to fish and other aquatic life. The total ammonia nitrogen in a water body in Illinois must in no case exceed 15 mg/L. The ammonia nitrogen acute toxicity limits for Illinois surface waters is pH dependant. For Hillcrest Lake and The Slough the acute toxicity limit is 5.73 mg/L. The lab results indicate ammonia nitrogen concentrations of 0.07 mg/L in Hillcrest Lake and 0.22 mg/L in The Slough. This indicates that there is not an excess of ammonia nitrogen in this system. A more detailed analysis of the nitrogen to phosphorus ratios, and the various forms of nitrogen discussed above could be conducted to more completely understand the nutrient balance in Hillcrest Lake and The Slough.

Total Suspended Solids (TSS) are made up of both volatile solids (VTSS), which come from organic sources such as plankton and algae; and nonvolatile solids or sediments. Both adversely affect water clarity. The TSS in The Slough was 7.0 mg/L and 40 mg/L in Hillcrest Lake. The TSS concentration in The Slough was low during our sampling in fall 2015 and supports out observations of good water clarity. Hillcrest Lake had higher TSS concentrations likely due to eroding shoreline, wave action, and perhaps planktonic algae in the water column. Similarly, VTSS was low in The Slough with a concentration of 3.0 mg/L and a higher level in Hillcrest Lake with a concentration of 11.0 mg/L. Overall, these values are relatively low compared with other small lakes in the region and reflect the water clarity which is enhanced by the amount of emergent and submergent vegetation that serves to keep sediments stabilized.

Aquatic Plants

Aquatic plants can be very important to the ecosystem health of an area such as The Slough. Aquatic plants provide food and habitat for fish and wildlife. Invertebrates which fish depend on for food spend most of their life in or near aquatic plants. Young fish and wildlife use the plants for shelter and protection from predators. Plants are spawning areas for fish and amphibians. Plants also stabilize sediments and reduce the potential for shoreline and bottom erosion. Without nutrient uptake by plants, nutrients are readily available in the water column and can lead to harmful and unsightly algal blooms.

Exotic (non-native) aquatic plants do not provide all of these fish and wildlife benefits as well as the native plant species. Invasive plants tend to grow more densely and often grow to the surface where they also can interfere with recreational activities. Some non-native or invasive plant species will also create "canopies" that prevent light from reaching the native plants underneath causing stress to the native plants. Protection of native species is an important consideration in the management of invasive species.

The area in which plants grow within a lake or pond is referred to as the littoral zone. There are four types of aquatic plants: emergent, floating-leaved, submergents, and freely-floating.

Emergent: Emergent plants are rooted in the lakebed or shoreline with the tops of the plant potentially extending out of the water. The roots of the emergent plants are submersed or partially inundated with water. Common emergent species include bulrushes, cattails, and reeds.

Floating-leaved: Floating-leaved plants are rooted in the lakebed and their leaves float on the water surface. These plants usually have larger rhizomes (rootstalks) than the emergent plants. The floating-leaved plants are typically found in quieter, protected areas of the lake. Common floating-leaved species include waterlilies.

Submergent: Submergent plants grow completely under the water, although, flowering or seed portions may extend just above the water surface. The growth of these plants is related to the amount/depth of light penetration in the lake. Common submergent plants include pondweeds, Eurasian watermilfoil, coontail, and Elodea.

Freely floating: Freely floating plants are entirely dependent on the water movements in the lake. These plants are found wherever the wind and water takes them. Common freely floating species include duckweed and water meal.

Observed Aquatic Plant Descriptions

Sago Pondweed

Sago Pondweed (*Potamogeton pectinatus*) was observed in The Slough in several places and is a native aquatic plant that is generally a submergent except for its reproductive stalks that peak above the water. These stalks flower in June to September. Sago pondweed has narrow leaves that create an open structure which reduces their potential to become a nuisance plant. The plant is used extensively as a food source for various waterfowl and can also help reduce the potential for algae blooms through its uptake of phosphorus.

Coontail

Coontail or hornwort (*Ceratophyllum demersum*) is a submerged, native, bushy plant that lacks true roots. It is often anchored to the bottom by modified leaves, but sometimes forms large, tangled masses that float freely in the water. Both the seeds and foliage of the coontail are used by waterfowl and fish as a source of food and also provides good spawning habitat and cover for juvenile fish. Coontail can also help reduce the potential for algae blooms through its uptake of nutrients. Coontail was observed in both Hillcrest Lake and The Slough.

Elodea

Elodea or American waterweed (*Elodea canadensis*) is a submergent, aquatic plant, native to North America that has spread rapidly and easily throughout the world. Particularly in Europe, this species is very invasive and is considered a weed due to its ability to grow and multiply fairly rapidly in many diverse habitats and conditions. This species produces flowers, either white or pale purple, that appear at the surface of the water. This plant has been reported from sites in lakes of a very wide range of depths, and it is generally considered relatively highly tolerant to low light conditions. In the fall leafy stalks will detach from the parent plant, float away, root, and start new plants. This is American waterweed's most important method of spreading, with seed production playing a relatively minor role. Elodea was observed to form dense submergent beds over 95% of Hillcrest Lake, but was not observed in The Slough. Careful examination of the plant material in Hillcrest Lake was used to confirm that it was not the look-alike invasive species Hydrilla or Brazilian Elodea. Elodea is a native plant, but in Hillcrest Lake is behaving more like an invasive species.

Duckweed

Common duckweed is a free-floating plant that has tiny roots that hang down from floating leaves into the water. The duckweeds (genus *Lemna*) and related genera of the duckweed family are the smallest flowering plants known. Individual plants consist of a single, flat oval leaf (technically a modified stem) no more than ¼ of an inch long that floats on the surface of still-moving ponds, lakes, and sloughs. Despite their diminutive size, the flowers of duckweeds can attract flies, mites, small spiders, and even bees that can spread the plant's pollen after being attracted by sticky secretions from the stigma. Duckweeds grow quickly and produce new offshoots rapidly.

Dense populations are an important food source for aquatic waterfowl and fish, but can become a nuisance to humans.

Shoreline/Emergent Plants

The shorelines of both The Slough and Hillcrest Lake were assessed in terms of vegetation and bank erosion.

The Slough is a long-narrow feature that has a central open water body surrounded by wetland of varying width. Most of the shoreline is not mowed which allows more native vegetation, better erosion control and provided good wildlife habitat. In the fall 2015 vegetation survey, 113 species of plants were identified in and around The Slough; 81 species or 72 % of them were native to the Chicago region. This also means that 32 species observed are non-native species – or introduced to the region from other parts of the world.

Overall, The Slough is less dominated by invasive species than many wetlands across the region and showed good signs of the active management by the volunteer stewards. Table 3 provides the full list of species observed with information about their nativity and form. It also provides floristic quality information based on the Floristic Quality Assessment (FQA) method of Swink and Wilhelm (1994 – *Plants of the Chicago Region*) that is widely used in the Chicago region.

The FQA method assigns a numeric rating to each plant species that reflects the fundamental conservatism that the species exhibits for a particular natural habitat. A native species that exhibits specific adaptations to a narrow spectrum of the environment is given a high rating. Conversely, a ubiquitous species that exhibits adaptations to a broad spectrum of environmental variables is given a low rating. This value for each species is called its coefficient of conservatism and is shown in the "C" column in Table 3. The Mean C value indicates the average coefficient of conservatism and is another value used to assess and compare the quality of the vegetation. A mean C value of greater than 3.5 generally indicates that high quality, conservative native species are present. This value does not include, however, any measure of the quantity of the conservative species versus weedy or invasive species. The FQI is derived by multiplying the Mean C by the square root of the number of species. Thus, the FQI is an indication of the relative, native floristic quality for an area: generally 1-19 indicates low vegetative quality, 20-35 indicates high vegetative quality and above 35 indicates "Natural Area" quality or a High Quality area. Other metrics above the species list provides additional analysis of the vegetation. Table 3 provides the total number of species present (species richness), the mean coefficient of conservatism (Mean C), the floristic quality index (FQI), and mean wetness; calculated

separately for native species only and then including the non-native species. The wet indicator value indicates the mean or average national wetland plant indicator category for all species present, natives only and then with adventives – numbers less than 0 indicate hydrophytic or wetland vegetation, while numbers greater than 0 correspond to the upland vegetation categories. The table also provides the number of species in each physiognomic or habit class, native versus adventive along with their percentage of the total inventory.

This data shows that the vegetation in and around The Slough from a single fall assessment is of moderate floristic quality. It was also evident that there were a few areas along the east side of The Slough that had been planted with native prairie and wetland species by the NRC and it volunteer stewards. The presence of these native species was included in the floristic analysis and undoubtedly increased the FQA scores. The volunteer stewards have also been working on control of selected invasive species such as buckthorn and this has also served to improve the quality of the vegetation.

Hillcrest Lake has a significant area of the shoreline that is mowed turf. Other areas have been left more natural, and in a few places appeared to have been planted with native prairie and wetland species. The inventory of the unmowed shoreline areas around Hillcrest Lake revealed 52 total species, 33 of which are considered native (Table 4). The floristic quality analysis showed that the vegetation around Hillcrest Lake is of lower quality.

Table 3. Floristic Quality Information and Plant Species List for Perimeter of The Slough.
SITE: The Slough
DATE: September 15 & 22, 2015
LOCALITY: Prospect Heights, Cook County, Illinois
Practitioner: J Mengler

Conservatism-Based Metrics:
Total Mean C: 2.3
Native Mean C: 3.2
Total FQI: 24.4
Native FQI: 28.8

Species Richness:

Total Species: 113	
Native Species: 81	71.70%
Non-native Species: 32	28.30%

Species Wetness:
Mean Wetness: -0.3
Native Mean Wetness: -1.2

Physiognomy Metrics:

Tree:	6.20%
Shrub:	6.20%
Vine:	3.50%
Forb:	69.90%
Grass:	9.70%
Sedge:	4.40%
Rush:	0%
Fern:	0%
Bryophyte:	0%

Duration Metrics:

Annual:	21.20%
Perennial:	71.70%
Biennial:	7.10%
Native Annual:	12.40%
Native Perennial:	57.50%
Native Biennial:	1.80%

Scientific Name	Acronym	Nativity	C	W	Physiognomy	Duration	Common Name
Abutilon theophrasti	ABUTHE	non-native	0	4	forb	annual	velvetleaf
Acalypha rhomboidea	ACARHO	native	0	3	forb	annual	three-seeded mercury
Acer saccharinum	ACESAI	native	0	-3	tree	perennial	silver maple
Amaranthus retroflexus	AMARET	non-native	0	2	forb	annual	rough amaranth
Ambrosia artemisiifolia elatior	AMBARE	native	0	3	forb	annual	common ragweed
Ambrosia trifida	AMBTRI	native	0	-1	forb	annual	giant ragweed
Apocynum sibiricum	APOSIB	native	2	-1	forb	perennial	prairie indian hemp
Arctium minus	ARCMIN	non-native	0	5	forb	biennial	common burdock
Asclepias incarnata	ASCINC	native	4	-5	forb	perennial	swamp milkweed
Asclepias sullivantii	ASCSUL	native	8	5	forb	perennial	prairie milkweed
Asclepias syriaca	ASCSYR	native	0	5	forb	perennial	common milkweed
Aster ericoides	ASTERI	native	5	4	forb	perennial	heath aster
Aster novae-angliae	ASTNOV	native	4	-3	forb	perennial	new england aster
Aster pilosus	ASTPIL	native	0	2	forb	perennial	hairy aster
Aster sagittifolius drummondii	ASTSAD	native	2	3	forb	perennial	drummonds aster
Aster simplex	ASTSIS	native	3	-5	forb	perennial	panicled aster
Aster subulatus	ASTSUB	non-native	0	3	forb	annual	expressway aster
Atriplex patula	ATRPAT	non-native	0	-2	forb	annual	common orach
Bidens cernua	BIDCER	native	5	-5	forb	annual	nodding bur marigold
Bidens frondosa	BIDFRO	native	1	-3	forb	annual	common beggars ticks
Boehmeria cylindrica	BOECYC	native	2	-5	forb	perennial	false nettle
Boltonia latisquama recognita	BOLLAR	native	9	-5	forb	perennial	false aster
Carex lacustris	CXLACU	native	6	-5	sedge	perennial	common lake sedge
Chenopodium album	CHEALB	non-native	0	1	forb	annual	lambs quarters
Cichorium intybus	CICINT	non-native	0	5	forb	perennial	chicory
Cirsium arvense	CIRARV	non-native	0	5	forb	perennial	field thistle
Cirsium vulgare	CIRVUL	non-native	0	4	forb	biennial	bull thistle
Convolvulus sepium	CONSEP	native	1	0	forb	perennial	hedge bindweed
Cornus stolonifera	CORSTO	native	6	-3	shrub	perennial	red-osier dogwood
Cuscuta gronovii	CUSGRO	native	4	-5	forb	annual	common dodder
Cyperus esculentus	CYPESC	native	0	-1	sedge	perennial	field nut sedge
Daucus carota	DAUCAR	non-native	0	5	forb	biennial	queen annes lace
Dipsacus laciniatus	DIPLAC	non-native	0	5	forb	biennial	cut-leaved teasel
Echinacea pallida	ECHPAL	native	8	5	forb	perennial	purple coneflower
Echinochloa crusgalli	ECHCRU	native	0	-3	grass	annual	barnyard grass
Eleocharis acicularis	ELEACI	native	2	-5	sedge	perennial	needle spike rush
Epilobium coloratum	EPICOL	native	3	-5	forb	perennial	cinnamon willow herb

Scientific Name	Acronym	Nativity	C	W	Physiognomy	Duration	Common Name
Erigeron canadensis	ERICAN	native	0	1	forb	annual	horseweed
Eupatorium altissimum	EUPALT	native	0	3	forb	perennial	tall boneset
Eupatorium perfoliatum	EUPPER	native	4	-4	forb	perennial	common boneset
Fraxinus pennsylvanica subintegerrima	FRAPES	native	1	0	tree	perennial	green ash
Geranium maculatum	GERMAC	native	4	5	forb	perennial	wild geranium
Geum laciniatum trichocarpum	GEULAT	native	2	-3	forb	perennial	rough avens
Glechoma hederacea	GLEHED	non-native	0	3	forb	perennial	creeping charlie
Hackelia virginiana	HACVIR	native	0	1	forb	biennial	stickseed
Helenium autumnale	HELAUT	native	5	-4	forb	perennial	sneezeweed
Hordeum jubatum	HORJUB	non-native	0	-1	grass	perennial	squirrel-tail grass
Hystrix patula	HYSPAT	native	5	5	grass	perennial	bottlebrush grass
Iris virginica shrevei	IRIVIS	native	5	-5	forb	perennial	blue flag
Juniperus virginiana crebra	JUNVIC	native	2	3	tree	perennial	red cedar
Leersia oryzoides	LEEORY	native	4	-5	grass	perennial	rice cut grass
Lemna minor	LEMMIO	native	5	-5	forb	annual	small duckweed
Liatris aspera	LIAASP	native	6	5	forb	perennial	rough blazing star
Lippia lanceolata	LIPLAN	native	6	-5	forb	perennial	fog fruit
Lobelia cardinalis	LOBCAR	native	7	-5	forb	perennial	cardinal flower
Lobelia siphilitica	LOBSIP	native	6	-4	forb	perennial	great blue lobelia
Lysimachia nummularia	LYSNUM	non-native	0	-4	forb	perennial	moneywort
Medicago lupulina	MEDLUP	non-native	0	1	forb	annual	black medick
Melilotus alba	MELALB	non-native	0	3	forb	biennial	white sweet clover
Melilotus officinalis	MELLOF	non-native	0	3	forb	biennial	yellow sweet clover
Mentha arvensis villosa	MENARV	native	5	-5	forb	perennial	wild mint
Mimulus ringens	MIMRIN	native	6	-5	forb	perennial	monkey flower
Morus alba	MORALB	non-native	0	0	tree	perennial	white mulberry
Oenothera biennis	OENBIE	native	0	3	forb	biennial	common evening primrose
Oxalis europaea	OXAEUR	native	0	3	forb	perennial	tall wood sorrel
Panicum dichotomiflorum	PANDII	native	0	-2	grass	annual	knee grass
Parthenium integrifolium	PARINT	native	8	5	forb	perennial	wild quinine
Parthenocissus quinquefolia	PARQUI	native	2	1	vine	perennial	virginia creeper
Peltandra virginica	PELVIR	native	10	-5	forb	perennial	arrow arum
Petalostemum purpureum	PETPUR	native	9	5	forb	perennial	purple prairie clover
Phalaris arundinacea	PHAARU	non-native	0	-4	grass	perennial	reed canary grass
Phragmites australis	PHRAUS	native	1	-4	grass	perennial	common reed
Physostegia virginiana	PHYVIV	native	6	-5	forb	perennial	obedient plant
Phytolacca americana	PHYAME	native	1	1	forb	perennial	pokeweed
Plantago lanceolata	PLALAN	non-native	0	0	forb	perennial	english plantain

Scientific Name	Acronym	Nativity	C	W	Physiognomy	Duration	Common Name
Plantago rugelii	PLARUG	native	0	0	forb	annual	red-stalked plantain
Polygonum coccineum	POLCOC	native	4	-5	forb	perennial	water heartsease
Polygonum hydropiper	POLHYR	native	2	-3	forb	annual	water pepper
Polygonum lapathifolium	POLLAP	native	0	-4	forb	annual	heartsease
Polygonum pensylvanicum	POLPEN	native	0	-4	forb	annual	pinkweed
Polygonum persicaria	POLPER	non-native	0	1	forb	annual	ladys thumb
Populus deltoides	POPDEL	native	2	-1	tree	perennial	eastern cottonwood
Rhamnus cathartica	RHACAT	non-native	0	3	shrub	perennial	common buckthorn
Rhus radicans	RHURAD	native	2	-1	vine	perennial	poison ivy
Rosa multiflora	ROSMUL	non-native	0	3	shrub	perennial	multiflora rose
Rubus occidentalis	RUBOCC	native	2	5	shrub	perennial	black raspberry
Rudbeckia hirta	RUDHIR	native	1	3	forb	perennial	black-eyed susan
Sagittaria latifolia	SAGLAT	native	4	-5	forb	perennial	common arrowhead
Salix interior	SALINT	native	1	-5	shrub	perennial	sandbar willow
Scirpus fluviatilis	SCIFLU	native	4	-5	sedge	perennial	river bulrush
Scirpus validus creber	SCIVAC	native	5	-5	sedge	perennial	great bulrush
Setaria faberi	SETFAB	non-native	0	2	grass	annual	giant foxtail
Setaria glauca	SETGLA	non-native	0	0	grass	annual	yellow foxtail
Smilacina racemosa	SMIRAC	native	3	3	forb	perennial	feathery false solomons seal
Solanum dulcamara	SOLDUL	non-native	0	0	vine	perennial	bittersweet nightshade
Solidago altissima	SOLALT	native	1	3	forb	perennial	tall goldenrod
Solidago speciosa	SOLSPE	native	7	5	forb	perennial	showy goldenrod
Sonchus oleraceus	SONOLE	non-native	0	5	forb	annual	store-front sow thistle
Sonchus uliginosus	SONULI	non-native	0	1	forb	perennial	common sow thistle
Spartina pectinata	SPAPEC	native	4	-4	grass	perennial	prairie cord grass
Sporobolus heterolepis	SPOHET	native	10	4	grass	perennial	prairie dropseed
Taraxacum officinale	TAROFF	non-native	0	3	forb	perennial	common dandelion
Typha angustifolia	TYPANG	native	1	-5	forb	perennial	narrow-leaved cattail
Typha latifolia	TYPLAT	native	1	-5	forb	perennial	broad-leaved cattail
Typha x glauca	TYPGLA	native	1	-5	forb	perennial	hybrid cattail
Ulmus americana	ULMAME	native	3	-2	tree	perennial	american elm
Ulmus pumila	ULMPUM	non-native	0	5	tree	perennial	siberian elm
Verbena hastata	VERHAS	native	4	-4	forb	perennial	blue vervain
Viburnum dentatum	VIBDEN	non-native	0	5	shrub	perennial	arrow-wood
Viburnum opulus	VIBOPU	non-native	0	3	shrub	perennial	european highbush cranberry
Viola sororia	VIOSOR	native	3	1	forb	perennial	common blue violet
Vitis riparia	VITRIP	native	2	-2	vine	perennial	riverbank grape
Zizia aurea	ZIZAUR	native	7	-1	forb	perennial	golden alexanders

Table 4. Floristic Quality Information and Plant Species List for Perimeter of Hillcrest Lake.
SITE: Hillcrest Lake
DATE: September 15 & 22, 2015
LOCALITY: Prospect Heights, Cook County, Illinois
Practitioner: J Mengler

Conservatism-Based Metrics:
Total Mean C: 1.8
Native Mean C: 2.8
Total FQI: 13
Native FQI: 16.1

Species Richness:

Total Species: 52	
Native Species: 33	63.50%
Non-native Species: 19	36.50%

Species Wetness:
Mean Wetness: 0.1
Native Mean Wetness: -0.8

Physiognomy Metrics:

Tree:	21.20%
Shrub:	7.70%
Vine:	3.80%
Forb:	51.90%
Grass:	11.50%
Sedge:	1.90%
Rush:	1.90%
Fern:	0%
Bryophyte:	0%

Duration Metrics:

Annual:	7.70%
Perennial:	84.60%
Biennial:	7.70%
Native Annual:	5.80%
Native Perennial:	55.80%
Native Biennial:	1.90%

Scientific Name	Acronym	Nativity	C	W	Physiognomy	Duration	Common Name
Acer negundo	ACENEG	native	0	-2	tree	perennial	box elder
Acer saccharinum	ACESAI	native	0	-3	tree	perennial	silver maple
Ailanthus altissima	AILALT	non-native	0	5	tree	perennial	tree of heaven
Ambrosia artemisiifolia elatior	AMBARE	native	0	3	forb	annual	common ragweed
Ambrosia trifida	AMBTRI	native	0	-1	forb	annual	giant ragweed
Andropogon gerardii	ANDGER	native	5	1	grass	perennial	big bluestem grass
Apocynum sibiricum	APOSIB	native	2	-1	forb	perennial	prairie indian hemp
Asclepias incarnata	ASCINC	native	4	-5	forb	perennial	swamp milkweed
Asclepias syriaca	ASCSYR	native	0	5	forb	perennial	common milkweed
Aster pilosus	ASTPIL	native	0	2	forb	perennial	hairy aster
Aster simplex	ASTSIS	native	3	-5	forb	perennial	panicled aster
Cirsium arvense	CIRARV	non-native	0	5	forb	perennial	field thistle
Cirsium vulgare	CIRVUL	non-native	0	4	forb	biennial	bull thistle
Convolvulus sepium	CONSEP	native	1	0	forb	perennial	hedge bindweed
Daucus carota	DAUCAR	non-native	0	5	forb	biennial	queen annes lace
Eupatorium rugosum	EUPRUG	native	4	5	forb	perennial	white snakeroot
Fraxinus pennsylvanica subintegerrima	FRAPES	native	1	0	tree	perennial	green ash
Geum laciniatum trichocarpum	GEULAT	native	2	-3	forb	perennial	rough avens
Glechoma hederacea	GLEHED	non-native	0	3	forb	perennial	creeping charlie
Hemerocallis fulva	HEMFUL	non-native	0	5	forb	perennial	orange day lily
Iris virginica shrevei	IRIVIS	native	5	-5	forb	perennial	blue flag
Juncus dudleyi	JUNDUD	native	4	0	rush	perennial	dudleys rush
Juniperus communis	JUNCON	native	10	5	shrub	perennial	common juniper
Juniperus virginiana crebra	JUNVIC	native	2	3	tree	perennial	red cedar
Lippia lanceolata	LIPLAN	native	6	-5	forb	perennial	fog fruit
Lythrum salicaria	LYTSAL	non-native	0	-5	forb	perennial	purple loosestrife
Melilotus alba	MELALB	non-native	0	3	forb	biennial	white sweet clover
Morus alba	MORALB	non-native	0	0	tree	perennial	white mulberry
Oenothera biennis	OENBIE	native	0	3	forb	biennial	common evening primrose
Panicum virgatum	PANVIR	native	5	-1	grass	perennial	switch grass
Phalaris arundinacea	PHAARU	non-native	0	-4	grass	perennial	reed canary grass
Plantago lanceolata	PLALAN	non-native	0	0	forb	perennial	english plantain
Plantago rugelii	PLARUG	native	0	0	forb	annual	red-stalked plantain
Poa pratensis	POAPRA	non-native	0	1	grass	perennial	kentucky blue grass
Polygonum coccineum	POLCOC	native	4	-5	forb	perennial	water heartsease
Populus deltoides	POPDEL	native	2	-1	tree	perennial	eastern cottonwood
Rhamnus cathartica	RHACAT	non-native	0	3	shrub	perennial	common buckthorn

Scientific Name	Acronym	Nativity	C	W	Physiognomy	Duration	Common Name
Rhus aromatica arenaria	RHUAAR	native	9	5	shrub	perennial	dwarf fragrant sumac
Robinia pseudoacacia	ROBPSE	non-native	0	4	tree	perennial	black locust
Rumex crispus	RUMCRI	non-native	0	-1	forb	perennial	curly dock
Salix babylonica	SALBAB	non-native	0	-3	tree	perennial	weeping willow
Salix interior	SALINT	native	1	-5	shrub	perennial	sandbar willow
Scirpus validus creber	SCIVAC	native	5	-5	sedge	perennial	great bulrush
Setaria faberi	SETFAB	non-native	0	2	grass	annual	giant foxtail
Silphium perfoliatum	SILPER	native	5	-2	forb	perennial	cup plant
Solanum dulcamara	SOLDUL	non-native	0	0	vine	perennial	bittersweet nightshade
Solidago altissima	SOLALT	native	1	3	forb	perennial	tall goldenrod
Spartina pectinata	SPAPEC	native	4	-4	grass	perennial	prairie cord grass
Typha angustifolia	TYPANG	native	1	-5	forb	perennial	narrow-leaved cattail
Ulmus americana	ULMAME	native	3	-2	tree	perennial	american elm
Ulmus pumila	ULMPUM	non-native	0	5	tree	perennial	siberian elm
Vitis riparia	VITRIP	native	2	-2	vine	perennial	riverbank grape

Invasive Species

Non-native or exotic species are those organisms introduced into habitats from other parts of the world by humans. Invasive species are organisms that are not native to a region and which cause ecological harm. In their natural habitats, these species are part of stable population and form complex relationships with other species. When they are removed from predators, parasites, diseases, and other competitors that have kept the populations in check, species introduced into new habitats can overrun their new home and crowd out native species. Once established, these species can be very hard to control and eradicate. Natural areas managers such as the local Forest Preserve Districts spend a very large part of their resources controlling invasive species. Not all non-native or exotic species are considered invasive.

Invasive species can be spread in a number of ways, but further spread by humans is one method that can easily be prevented. Ways to reduce the potential for the spread of invasive species include:

- Learn to identify invasive species.
- Know who should be contacted if an invasive species is observed.
- Control invasive species on your property.
- Do not release plants or animals into the environment.
- Inspect and wash all boat surfaces including the boat, motor, and trailer with hot water after use in other bodies of water.

Organizations such as the Northeastern Illinois Invasive Plant Partnership (NIIPP) can provide further information and resources regarding invasive species identification, new invaders to be aware of, and control methods (see www.niipp.net)

Reed canary grass (*Phalaris arundinacea*) is an exotic species that is already present throughout the McDonald Creek watershed. Reed canary grass is a highly aggressive plant that forms dense stands with thick thatch, crowding out more valuable native plants. Reed canary grass should be controlled with appropriate herbicides whenever it is found. It was observed mainly at the south or inlet end of The Slough and in a few small areas around Hillcrest Lake.

Common Reed (*Phragmites australis*) is a highly invasive species that grows to 12 feet tall. It spreads by vegetative runners and forms dense stands that crowd out all native vegetation. It is generally recognized as an invasive species throughout the Great Lakes, except that there is a native strain of the species known to occur in the

Midwest. The invasive common reed is the tall grass with feather-like flowers on top that is seen along road and expressway ditches throughout the region. It should be controlled wherever it is found. It was observed only in a small clump on the north end of The Slough along Willow Road. This should be eradicated with herbicide before it spreads.

Purple Loosestrife (*Lythrum salicaria*) is another very common and widespread invasive species found in marshes. It has attractive pink flowers that are sometimes difficult to tell from valuable native species from a distance. It spreads both by seed and vegetatively. Each plant can produce over a million seeds each year. It is very difficult to control once established, except where it occurs in small localized stands that can be intensively managed. In such isolated areas, it can be controlled by herbicide application, though most chemicals that are effective in controlling it also damage other desirable plants that may be growing with it. Careful hand-spraying can reduce this "collateral" damage. Biocontol is a method of using natural enemies, as well as competition with other plants, to reduce and control the growth and spread of an invasive species. Four host-specific insect species approved by USDA-APHIS have been released in the US to control purple loosestrife including a root-mining weevil, two leaf-eating beetles, and a flower-feeding weevil. The two leaf-eating beetles have been widely released in the Midwest to control purple loosestrife and where large populations of the loosestrife is present, using beetles for control has been effective. Unfortunately, where populations of purple loosestrife are smaller, it isn't enough to sustain the population of the beetles and control is incomplete. Purple loosestrife has not reached a level at The Slough or Hillcrest lake that would warrant introduction of the beetles. The smaller infestations around the shorelines of both bodies of water should be chemically controlled.

Buckthorn (*Rhamnus cathartica*) is an invasive shrub species that infests woodlands and other habitats throughout the region. It often forms a very dense shrub layer under the canopy of larger trees and can be easily distinguished in the fall when it remains green after the native trees and shrubs have turned or dropped their leaves. Buckthorn shades out other native vegetation and its leaves ultimately lead to changes in the soil chemistry and microorganisms, causing a collapse of the natural ecosystem. It occurs in several places around both The Slough and Hillcrest Lake. It is best controlled by cutting flush with the ground and then treating all cut stumps with appropriate herbicide. The volunteer stewards have already been managing the buckthorn at the south end of The Slough in this manner, and this should continue and progress to all areas infested with this invasive shrub. In areas such as the southeast shoreline of Hillcrest Lake where buckthorn is providing visual screening, it can be replaced with other native, more desirable shrubs that will provide better wildlife habitat.

Thistles (*Cirsium* spp) include some native and some non-native species. Some are common agricultural weeds and some are invasive species. None of the desirable native thistle species were observed around The Slough or Hillcrest Lake, but the non-native, weedy field or Canada thistle and bull thistle were noted. While these are not generally as aggressive as other invasive species described in this report, especially in wet ground, they should be controlled where possible. Bull thistle is a biennial while field thistle is a perennial spreading by underground stems (rhizomes).

Teasel (*Dipsacus* spp) is an invasive species becoming very common along the roadsides of our region. There are two species known as cut-leaved teasel and common teasel in the region. In both species, the plant grows as a basal rosette for a minimum of one year (this rosette period frequently is longer) then sends up a tall flowering stalk and dies after flowering. The period of time in the rosette stage apparently varies depending on the amount of time needed to acquire enough resources for flowering to occur. During the rosette stage leaves vary from somewhat ovoid in young plants to large and oblong leaves that are quite hairy in older rosettes. During the rosette phase teasel develops a large tap root. The tap root may be over 2 feet in length and 1 inch in diameter at the crown (top). Cut-leaved teasel blooms from July through September and has white flowers while common teasel blooms from June through October and has light purple flowers. Flowering stems may reach 6-7 feet in height. A single teasel plant can produce over 2,000 seeds. Depending on conditions, up to 30-80% of the seeds will germinate, so each plant can produce many offspring. Seeds also can remain viable for at least 2 years. Seeds typically don't disperse far; most seedlings will be located around the parent plant. Teasel is an aggressive invasive species that has the capacity to take over prairies and savannas if it is allowed to become established. Lack of natural enemies allows teasel to proliferate. Cut-leaved teasel was observed around The Slough and should be controlled with herbicide.

Cattails (*Typha* spp) are very common in marshes throughout the region. There are two species of cattails locally: broad-leaved cattail (*Typha latifolia*) and narrow-leaved cattail (*Typha angustifolia*). Broad-leaved cattail is a native species and is not aggressive or invasive. Narrow-leaved cattail is somewhat in dispute as to whether it is native to the Chicago region or not. The problem is that the narrow-leaved and broad-leaved cattails naturally hybridize or cross. The hybrid cattail (*Typha* X *glauca*) is very aggressive and is recognized as a major invasive species throughout the Great Lakes. It forms dense monotypic stands (only one species present) that crowd out all other native marsh plants. It is very difficult to determine whether a given stand of cattails in the field is the hybrid, narrow-leaved, or even broad-leaved since the hybrid displays a range of intermediate characteristics. Cattails also provide essential habitat and water quality benefits in many of our marshes and thus is considered more desirable in certain circumstances than other invasive species. Cattails are obviously present along the

shores of both The Slough and Hillcrest Lake, most notably along the western side of The Slough. Long-term management measures might be considered to keep the cattails from filling in across The Slough over time by thinning with selectively applied herbicide. Hand-wicking a glyphosate-based herbicide is often used by managers to thin and reduce cattail cover without affecting other desirable native marsh vegetation.

Bathymetry and Sediment

Depth of water and depth of soft sediment were measured in 7 transects across The Slough to provide a basic understanding of the current condition based on quantitative data. The water surface elevation was established using survey-grade GPS, and then a surveyor's rod was used to measure the water and sediment depth across The Slough. Exhibits 12, 14, and 16 show the results of these measurements graphically. Exhibit 12 provides the elevation of the top of the soft sediment, while Exhibit 14 depicts this data as water depth. Exhibit 16 represents the thickness of the soft sediment. The average depth of water in The Slough at the time of the measurements was 0.93 feet (about 11 inches) with a maximum depth measured of 1.4 feet and a minimum depth near the shoreline measured of 0.30 feet (3.5 inches). Soft sediment was present on the bottom throughout The Slough. Pushing the rod until it hit a firm bottom allowed measurement of the relative depth of the soft sediments. The average depth of the soft material was 0.88 feet with a maximum of 2.2 feet and a minimum of 0.10 feet (near the shore). All of the soft sediment appeared to be a natural muck material. Muck is defined in this usage as unconsolidated soil material consisting primarily of highly decomposed organic material in which the original plant parts are not recognizable (*i.e.* "sapric" in Soil Taxonomy). It generally contains more mineral matter and is usually darker in color than peat. Muck is a naturally occurring type of organic soil often found in large marshy areas. Unfortunately, both The Slough and Hillcrest Lake were mapped as "water" on the Cook County Soil Survey (see Exhibit 7) and they did not determine what soil type was present in The Slough.

Similarly, 5 east-west transects were evaluated across Hillcrest Lake for water depth and soft sediment depth (Exhibits 11, 13, and 15). Similar to the exhibits for The Slough, these exhibits for Hillcrest Lake depict the elevation of the soft bottom, the water depth, and the soft sediment thickness respectively. The submergent vegetation present was also noted at each measurement point. The average water depth of Hillcrest Lake at the time of the measurements was 1.76 feet with a maximum depth of 3.20 feet and a minimum depth near the shore of 0.30 feet. The soft sediment averaged 1.06 feet deep with a maximum of 4.30 feet thick and a minimum of 0 feet thick near the western shoreline where there was hard substrate including concrete

rubble. As in The Slough all of the soft sediment was mucky material as described above. Near the western shore there were places with firm sandy material, along with the concrete rubble mentioned.

The water level in Hillcrest Lake is determined by the outlet pipe along the north shore of the lake. The outlet is a 24-inch PVC pipe that connects to an open ditch farther north which eventually flows into McDonald Creek. At the time of the measurements and observations there was a small amount of rock in front of the pipe effectively creating a small weir. The elevation of any material in front of or inside the outlet pipe controls the normal water elevation of Hillcrest Lake. Flow from The Slough to Hillcrest Lake is via 3 concrete culvert pipes beneath Willow Road. All three of these pipes appeared partially submerged during field observations and were partially filled with sediment.

Shoreline Condition

The shoreline condition of Hillcrest Lake and The Slough were assessed in terms of erosion and stability. Eroding shorelines can contribute significantly to sediment issues in a body of water degrading water quality and available habitat. The following categories were used to rate each reach of shoreline.

- Minimal erosion – 0-6 inch bank height, good stabilizing vegetation.
- Moderate erosion – 6-24 inch bank height, good stabilizing vegetation.
- Significant erosion – 18-30 inch bank height, minimal stabilizing vegetation or mowed turf.
- Severe erosion – 30-42 inch bank height, no stabilizing vegetation.
- Extreme erosion - >42 inch bank height, no stabilizing vegetation.

Related shoreline attributes were also noted including dominant vegetation and general soil conditions. Representative photographs were taken and are provided in Appendix A.

The shoreline of The Slough is generally well vegetated and thus fairly stable. Only one shoreline reach at the northwest end is mowed turf to the water's edge, and then the shoreline condition along Willow Road is in fairly poor condition (328 feet) (Exhibit 10). Approximately 91 % was rated as minimal or moderate erosion. Shoreline vegetation was mostly cattails and willows, with some more diverse wetland plantings along the eastern edge. The shoreline also includes many trees, mostly eastern cottonwood. Soils appeared stable and no areas of significant erosion or seepage were noted.

The shoreline of Hillcrest Lake is in a more eroded condition, primarily due to the many reaches where it is mowed turf to the water's edge. Approximately 53 % of the shoreline was rated as moderate erosion, 28 % was rated as significant erosion, and 18 % was rated as severe erosion (Exhibit 9). The moderate erosion reaches corresponded with the presence of un-mowed vegetation above the waterline, and some emergent vegetation below the waterline. The significant and severe erosion reaches were characterized by mowed turf to the water's edge and then a vertical eroded bank of 18-36 inches. Soils in the most severely eroded sections appeared gravelly, compared to the other more silty soils.

LAKE AND SLOUGH MANAGEMENT ALTERNATIVES AND RECOMMENDATIONS

Water Levels

There has been much speculation about the water levels in both The Slough and Hillcrest Lake. The water levels in both bodies can affect the aesthetic, fish survival, and local flooding. Review of historic aerial photographs (see Exhibit 2) indicates that the general extent of open water in both The Slough and Hillcrest Lake have not changed significantly since 1967. In 1967 and earlier photographs The Slough appeared to be more vegetated and less open water. In 1955 and earlier Hillcrest Lake was also vegetated and much less open water. The settlement era federal plat maps from 1840 depict a large "slough" or marsh in the vicinity of Hillcrest Lake and The Slough (Exhibit 15). It is likely that prior to European settlement of the area, both bodies were one large wetland slough with no defined creek channel and no significant open water. The historic aerial photographs show that there were already some houses in the area in 1938, with much of the surrounding residential development occurring in the 1950s and 1960s.

The July 1970 fishery report from the IDOC indicated that Hillcrest Lake was a "dammed marsh" that was "supposedly deepened about 1955 for home fill." That same report notes the average water depth as only 2.7 feet with a maximum depth of 7 feet. Similarly, the 1972 fishery report from IDOC also notes an average depth of 2.5 feet, but with a maximum depth of 3 feet in The Slough.

Thus it is clear that neither of these bodies were ever a deep, open water feature. Despite local perceptions, depths were never much more than 3 feet save a few deep pockets that may have been present.

The water level in both areas is currently controlled by the outlet pipe at the north end of Hillcrest Lake, assuming the connecting culverts under Willow Road remain functional. The condition of the outlet pipe, and the downstream channel it discharges to will have an effect on the water levels.

From conversations with the City staff, the President of the Hillcrest Lake Homeowners Association, and President of the Prospect Heights Natural Resource Commission, it appears that the issue may be less the water depths *per se*, than it is the overall aesthetic of the water bodies. Hillcrest Lake currently supports dense growth of the submergent Elodea across most of the lake. The Elodea plants generally reach just below the water surface, but the flowers and fruits break the surface. In addition, in places filamentous algal mats have grown and float on top of the Elodea giving the water surface an undesirable appearance. Thus, the management goal may be to maintain an open water aesthetic on Hillcrest Lake that is not impaired by surface growth of algae and aquatic plants (see also the discussion on aquatic plants).

As noted above, GEC was retained to investigate raising the water level in Hillcrest Lake, by adding a riser board weir structure to the outlet pipe. The primary obstacle to this approach is the compensatory flood storage requirements under state regulations, Cook County ordinance requirements, and local ordinance requirements. Raising the normal water elevation reduces the total amount of flood storage available in these water bodies, and hence that lost volume must be replaced within the local watershed. The GEC reports provided to the City of Prospect Heights contains further information on this subject.

Dredging

Dredging has also been discussed as an approach to deepen Hillcrest Lake, which may increase fish survival and reduce the aquatic plant and algae growth visible on the surface. It would also potentially reduce low water time periods where the bottom sediments are visible. Dredging would require, however, extensive permitting, dewatering, and disposal of the dredged material. Space limitations around Hillcrest Lake would make dewatering the sediments very challenging, whether it is done by mechanical or hydraulic dredging. Hauling and disposal is also very expensive. Rough cost estimates from an area contractor specializing in lake and river work put the dredging at approximately $675,000 with the dredge spoil material adding another $900,000.

Recommendation: Dredging of Hillcrest Lake is not recommended as it would be very cost-prohibitive primarily due to a lack of ability/place to dewater the dredge spoil before disposal.

Oxidation and Digestion

There are products available for purchase that claim to use bacteria or other micro-organisms often in combination with oxidation to "digest" the accumulated muck or organic sediment. Based in part on input from the Lake County Health Department Lakes Management Unit professional staff, instances where this has

been successfully implemented could not be verified with documented positive results, or any scientific literature to corroborate product claims.

Recommendation: Oxidation or microbes are not recommended for Hillcrest Lake unless scientifically verifiable examples of success can be demonstrated locally.

Water Level Summary

Water levels in The Slough have always been very shallow as noted above, though the central body of open water has been maintained for decades. The extent of emergent vegetation has remained fairly constant over the decades as it appears on the historic aerial photographs. Floating vegetation, such as the duckweed currently present, is not affected by water level changes.

The water levels in The Slough are essentially controlled by the condition of the 3 culverts under Willow Road and at high water levels by the flow overtopping Willow Road. The 3 concrete culvert pipes appear to be partially filled with gravel and sediment, and the pipes are often partially submerged. If the flood control project to raise Willow Road and replace those culverts moves forward, very careful consideration will need to be given to the new connecting structures that would carry flow from The Slough into Hillcrest Lake. If the elevation or capacity is changed, it could change the water levels in The Slough and would likely change the vegetation dynamics.

Fish and Wildlife

As noted above, Hillcrest Lake has supported "rough" fish and has been dominated by the non-native common carp since the 1970 assessment. At that time, the IDOC noted that the lake was highly prone to summer and/or winter kill due to the shallow depths, and thus the lake was not conducive to management of a sport fishery. Nothing has changed in that regard. The lake will continue to support rough fish species with frequent winter and summer kills. If a sport fishery is desired, it would require annual stocking of sport fish such as bass. As noted in their 2015 report, the IDNR can assist in this regard.

For other wildlife, particularly birds, The Slough is currently providing excellent foraging and loafing habitat for many marsh and water birds. Maintaining the habitat structure that includes floating, submergent, and emergent vegetation along with the surrounding trees, shrubs, and wetland/prairie plantings will continue to provide good habitat. A more thorough spring survey would be required to determine what species are nesting at The Slough. The Slough likely provides habitat for more species of reptiles and amphibians than were

observed during this fall survey and maintaining the vegetated shorelines and diversity of vegetation will continue to support frogs, turtles, and snakes. Allowing downed trees to remain protruding from the water will provide good basking sites for turtles and snakes.

Hillcrest Lake appears to provide good open water habitat for waterfowl. Hundreds of mallards were observed during the study timeframe which corresponds with early fall migration. Other duck and water bird species were also observed. Geese can become problematic since they congregate in large numbers and are no longer migratory, remaining in our suburban landscape all year. If the surrounding land and shorelines around the lake are kept un-mowed and in prairie and wetland vegetation this make will it much less attractive for the geese to congregate and leave their droppings in the lawn areas. The lake is large enough that there are not any reasonable measures to exclude geese, while allowing other water fowl to use the habitat.

Shoreline

As described, the vast majority of the shoreline of The Slough is adequately vegetated and exhibiting minimal erosion. A single residential lot at the northwest corner maintains mowed turf to the water's edge and hence has significant erosion. The shoreline along Willow Road is also in poor condition though gravel and concrete rubble provide some hard surface to reduce erosion. If the Willow Road flood reduction project provides an opportunity, it is recommended that a shoreline with as gentle slope as possible be established that can be vegetated with emergent species to dissipate wave energy, stabilize the shoreline, and reduce erosion. If fishing access is desired along this shoreline, rock or concrete outcrops could be installed to provide fishing access points while reducing erosion. In general, it is recommended that all shoreline be unmowed and maintained in taller prairie and wetland vegetation.

Invasive Species – Aquatic/Submergent

The control of invasive aquatic plants can be an uphill battle. In order to survive, it is the nature of aquatic plants to spread. And for invasive aquatic plants, this spreading and growth is more prolific. As such, realistic expectations are very important to the management of both native and invasive plants. It is impractical to think

that all aquatic plants can be completely removed from a lake. A properly designed aquatic management plan will use a variety of lake management techniques, along with public education, to minimize the long-term impacts of invasive plants and encourage a growth of healthy native plants.

A dense growth of Elodea or American waterweed is present in Hillcrest Lake. While this is actually a native species and is not typically invasive, reduction of its dense growth across most of the lake may be a desirable goal for aesthetic purposes. Fortunately, none of the more insidious invasive aquatic plants were observed in Hillcrest Lake.

The Slough was partially covered with a green "scum" that may appear as undesirable to many people. But in this case it was not algae, but a floating aquatic plant called duckweed. Duckweed is a native species that is very beneficial for fish and wildlife. So from a purely ecological point of view, the presence of the duckweed across the open water is not problematic and is even considered desirable. If the aesthetic it creates is untenable for the community, limited control of the duckweed could be used to reduce its cover of the open water area.

A discussion on various plant management alternatives follows. Most are focused on the control of the dense Elodea growth in Hillcrest Lake, and the associated algae growth.

No Management

The "no management" alternative is just as it sounds: the aquatic plants will be left alone to do what they will naturally do with no active management from people. Using this technique, it should be expected that Elodea populations will continue grow and flourish within Hillcrest Lake.

Recommendation: Although no management is a feasible option for Hillcrest Lake, it is not likely to be seriously considered given citizen interest in the lake's aesthetic. Aggressively keeping any invasive species under control will protect the native plants, water quality, recreational uses, and aesthetics within the lake. It is also likely desirable to control the dense growth of Elodea and any algal blooms.

Drawdown

Drawdown of the lake's water level can sometimes be used to control some plant growth. Drawdown includes dropping the lake level a certain number of feet for a period of time. The exposure of the plants to extreme temperatures and dry and freezing conditions causes plant death. Drawdown may also kill native and desirable

plants, fish, and wildlife and negatively impact the use of the lake for recreation and its appearance during the drawdown.

Costs associated with drawdown depend on the outlet control structure. For example, pumping to lower the lake can be expensive as it requires the cost of equipment, electricity and labor. The current outlet structure does not have any capacity to lower the lake levels by gravity. It does not appear that another gravity outlet to lower lake levels is possible given the surrounding topography.

Recommendation: Because of the desired aesthetic of Hillcrest Lake and the physical limitations of the control structure, a drawdown is not recommended for Hillcrest Lake for the purposes of aquatic plant management.

Nutrient Inactivation

Nutrient inactivation is the use of a substance to control the release of nutrients, primarily phosphorus, from bottom sediments. The substance commonly used for nutrient inactivation is aluminum sulfate or alum. The alum treatment creates a flocculent that covers the bottom sediments and prevents them from releasing phosphorus. It is important to note that upstream sources of phosphorus in the watershed need to be controlled prior to the placement of the flocculent.

The use of nutrient inactivation will not prevent plant growth but will reduce the potential for algae blooms. In fact, the improved water quality and clarity from the control of algae could potentially increase the growth of both desirable and nuisance plants.

Cost of an alum treatment would be approximately $3,000-$4,000 per acre of treatment area.

Recommendation: Nutrient inactivation is not a desired option for controlling aquatic plants in Hillcrest Lake but may help with occasional problematic algal blooms, if nutrient inputs are also addressed.

Dredging for Aquatic Plant Control

Dredging is typically utilized in rivers and streams to increase the depth for navigation in shallow waters. It can also be used in detention basins and lakes to increase storage volumes. The use of dredging to control nuisance aquatic plants has historically resulted in mix success. For dredging to be used successfully to control aquatic plants, the lake would need to be dredged to depths of greater than 10 feet and to a hard layer of bottom

sediments. Dredging causes a significant impact to the aquatic ecosystem and will negatively impact wildlife and fish habitat.

Dredging is the most expensive of the aquatic plant management options and can range from $15-$30 per cubic yard of removed material or higher, depending on sediment quality and disposal options.

Recommendation: Dredging is not a viable option for controlling aquatic plants on Hillcrest Lake. See also the consideration of dredging for addressing water depths.

Screens

Screens are similar to window screens that are placed on the lake bottom to limit aquatic plant growth. Screens are beneficial for controlling aquatic plants in small areas that are not important to fish or wildlife habitat such as near individual homeowners shorelines or piers to create swimming areas. Screen are typically installed in the spring and removed in the fall. As the screens will prohibit the growth of both beneficial and nuisance plant species, they are not typically recommended for installation throughout a lake.

Screens cost approximately $350 for a 700 square foot roll. Any installation and removal costs would be additional.

Recommendation: As screens will limit the growth of beneficial aquatic species and would be limited to relatively small areas, screens are not a viable option for controlling aquatic plants in Hillcrest Lake. Screens would have no effect on floating duckweed in The Slough, since duckweed floats and is very susceptible to wind.

Aeration

Aeration includes the installation, operation, and maintenance of a system that will artificially pump oxygen into the lake. Historically, aeration has been successful in correcting oxygen deficiency problems in lakes that have numerous algae blooms and fish kills due to elevated in-lake nutrient levels. There is limited research available on the success of aeration on invasive aquatic plant growth.

Initial costs for an aeration unit for Hillcrest Lake would be approximately $26,000.00 plus annual maintenance and operations costs. This assumes electrical power is available nearby and that one aeration unit is sufficient.

Recommendation: Aeration on Hillcrest Lake should not be considered at this time as it will not address aquatic plant growth problems.

Biomanipulation

Biomanipulation or the use of biological controls for aquatic plant management is currently limited to grass carp and a few insects. While the use of biomanipulation is theoretically possible, it has very limited applications and limited success in many situations. Non-native biological control agents are risky as they introduce a species into an new environment where predators many not be present, which can in turn easily create a new problem rather than a solution. They also often produce slower, less reliable, and less complete control of aquatic plants that other established control methods.

Grass carp is an exotic species originally imported from Malaysia and is considered a voracious eater of aquatic plants. Grass carp can reduce or eliminate all vegetation at low densities. However, the grass carp will also eat beneficial plants. In addition, Hillcrest Lake is too shallow to allow overwintering of grass carp and hence there would be an annual cost for stocking them. As such, the use of grass carp is not recommended in Hillcrest Lake.

Recommendation: The use of grass carp is not a viable alternative and is not recommended for Hillcrest Lake at this time.

Weed Rollers

Weed rollers are a mechanical device that can control weed growth in small, shallow areas. A weed roller includes a post that is attached to a dock. At the end of the post is a roller than moves in a slow arc detaching existing weeds and agitating the lake bed. . This prevents continued weed growth, for a clean lake bottom and a pleasant swimming area. However, since the bottom sediments consist primarily of soft muck in Hillcrest Lake, and swimming and boating are not contemplated for Hillcrest Lake, this does not represent a useful option.

Recommendation: The weed roller is not recommended for Hillcrest Lake at this time.

Hand Controls

Hand controls are methods of aquatic plant removal on a small-scale. Typically, hand controls include the hand pulling and/or raking of plants. A rake with a rope attached is thrown into the water and dragged back to the shore or boat. The collected plants are removed and disposed of properly. Skimmers or nets are also hand control methods used to scrape algae and duckweed off of a lake surface. As these methods are labor intensive, they are commonly utilized by residents to control aquatic weeds in small, localized areas such as around piers and swimming areas.

Hand controls can be cost effective as many rakes can be purchased for less than $100. Labor costs would be an additional cost or the work could be done with volunteers. Since the aquatic vegetation would regrow after each raking or pulling event, however, this would need to be done at least annually in areas where control is desired.

Recommendation: Hand controls may be utilized to clear selected areas of Elodea in Hillcrest Lake and of duckweed in The Slough if desired. The clearing should be selective focusing on areas of dense growth. Landowners should also be encouraged to maintain an area of native vegetation along the shoreline both on land and in the water.

Chemical Treatment

The effective use of chemical treatments for aquatic management has greatly improved in the recent years. Instead of broadcast spraying, treatments now target specific areas or species. The half-life of the herbicides has also decreased from months and years to days and weeks. Additionally, the herbicides used for chemical treatments have been tested extensively to confirm that the herbicides are not toxic to humans, animals and fish, that the chemicals do not bioaccumulate in fish or other organism and that their persistence in the environment is low. The Illinois Environmental Protection Agency (IEPA) governs the application of herbicide in lakes and requires a permit for all herbicide application over waters. The herbicide permit requires that all herbicides to be used are approved by the IEPA, applied within the concentrations and applications included on the label, and applied by a licensed applicator.

The selection of the proper herbicide and the timing of the herbicide application are extremely important in the management of aquatic vegetation. For example, when plants are treated, the decaying process of the plants uses oxygen. If the plants are treated when oxygen levels in the lake are already low, such as during the warm

summer months, the additional oxygen depletion by the decaying plants can lead to stress on fish and other aquatic life. Another concern is that if the herbicide kills all of the plants in the lake, the lake can shift from being dominated by aquatic plants to a lake that is dominated by algae. The killing of both native and invasive vegetation could also give opportunities for new invaders to establish and cause additional problems. As such, it is important for the target species for treatment to be identified and the proper dosage for the selected herbicide be utilized for treatment. Care should also be taken to alternate the chemicals used whenever possible. This will help minimize the chance of a nuisance species from developing a resistance to the chemical.

Typically shoreline treatments for aquatic vegetation need to be repeated annually. Shoreline treatments will also likely not eliminate the nuisance species completely, especially when deep water areas are left untreated. Shoreline treatments are typically viewed as "spot" treatments to alleviate a small nuisance condition. In order for comprehensive management of the nuisance species, a shoreline treatment program must be combined with a large area (deep water) or whole lake treatment. Large area or deep water treatments can be an effective management tool for the reduction of nuisance aquatic vegetation. These treatments should be conducted early in the season, just as the plants begin to grow, usually in late-April through late June.

Types of Herbicide

Systemic Herbicides – Systemic herbicides are translocated through the entire plant, including the roots. These include 2,4-D, Fluridone, and trichlopyr. Fluridone is known to be effective to control Elodea in whole-lake or large area applications.

Contact Herbicides – Contact herbicides kill the exposed portions of the plant they come in contact with. They are not translocated into the roots and will only rarely kill the entire plant. These typically provide short-term nuisance relief. Herbicides with the active ingredients of diquat and endothall are contact herbicides.

Copper Compounds – Copper sulfate is used for the control of algae, most commonly filamentous green and blue-green algae. It is also documented to provide some control of Elodea.

Commercially Available Herbicides

Aquathol – Super K is a formulation containing the active ingredient endothall. This is a contact herbicide that prevents certain plants from producing the needed proteins for growth. This herbicide can be used to control the growth of certain pondweeds, coontail, and Eurasian watermilfoil. The timing of its application will greatly

affect what plants are affected. The restrictions for treatment with Aquathol are as follows: 1 day for swimming; 3 days for fish consumption; and 7 to 25 days for irrigation and potable use.

Reward – Reward, previously known as Diquat, is a non-selective contact herbicide that is used to control a wide variety of plants. It is absorbed by plants and damages cell tissues. Reward will kill all the parts of the plant that it comes in direct contact with and works very quickly with results typically seen within 6 to 10 days. The restrictions for treatment with Reward are as follows: 1 day for swimming and 14 days for irrigation and potable use.

2,4-D (2,4-dichlorophenoxyacetic acid) – 2,4-D is a systemic herbicide which interferes with normal cell growth and division in broad-leaved plants and not grasses. Plants will begin to die within a few days of being treated with the liquid form and within 7 to 10 days from treatment with a granular form. The aquatic formulations of 2,4-D are only effective on certain species of aquatic plants and is most commonly used for the treatment of Eurasian watermilfoil. The timing and application rate of 2,4-D is extremely important so that the native plants are not negatively impacted by the herbicide. Because 2,4-D will also impact desirable native species such as bladderwort, water lilies and watershield, care should be taken to ensure that only the targeted nuisance species are present before the application or that the dosage is low enough to protect native species. The restrictions for treatment with 2,4-D are as follows: 1 day for swimming; no restriction for fish consumption; and concentrations must reach 1 part per million (ppm) before use for irrigation and drinking.

Fluridone – Fluridone is an herbicide that inhibits the plant's ability to make food (sugar) for itself. Without that ability, the plant dies. It takes approximately 30 to 45 days for Fluridone to kill the plant. The herbicide is rapidly diluted and is best used for whole lake or large treatment areas, greater than 5 acres in size. Fluridone can be used to control a variety of plants as the timing of the application and the dosage rate will help select which plants are impacted by the application. The restrictions for treatment with Fluridone are as follows: no restriction for swimming and fish consumption; and 7 to 30 days for irrigation.

Trichlopyr – Trichlopyr is a newly-approved herbicide which kills the entire plant. The restrictions for treatment with Trichlopyr are as follows: 120 days for irrigation.

Recommendation: Herbicide application is a recommended treatment for Hillcrest Lake to reduce the dense growth of Elodea. Treatments should be conducted in accordance with the requirements of the IEPA. Chemical applications can be utilized to treat nuisance aquatic beds of the native Elodea in Hillcrest Lake to

reduce the dense growth, improve the aesthetic, provide better fish habitat, and fishing opportunities. Areas could be selected in consultation with community stakeholders based on water depth information.

Similarly, if desired limited control of duckweed in The Slough could be done through manual (hand) controls and herbicide application.

Any herbicide treatments should be planned early enough in the season to eliminate the nuisance with the least amount of herbicide and before the native plants have been negatively impacted by dense growths of nuisance plants. Large scale, open water treatments may be considered to treat larger areas of Elodea in the spring only. However, the level of control and results should be realistic given the current and expected future condition of Hillcrest Lake.

Harvesting

Harvesting is another lake management tool that is frequently used to control aquatic plants. With harvesting the vegetation is cut off about 5 feet below the water surface and is conveyed to the shore where they are then trucked to a disposal site. The remaining plant materials below the cutting depth will continue its normal life cycle. Harvesting should only be conducted in waters that are deeper than 3 feet as harvesting in shallower areas can increase the damage to equipment, will disrupt bottom sediments and plants, and will open the lake bottom up to the invasion of other exotic species. Skimming may be conducted in shallower areas if care is taken to minimize the disturbance. Skimming is a variation of harvesting where the plant is removed at the surface, leaving the bulk of the submerged material in place. Obviously, Hillcrest Lake is generally much shallower than 5 feet, and hence this is not a viable option.

Recommendation: Harvesting has been shown to be effective at improving recreational use and aquatic plant diversity by controlling nuisance species, however, it is not recommended or practical in such a shallow water body.

Invasive Species – Emergent

Invasive species in the emergent zone along the shoreline of Hillcrest Lake and The Slough should also be controlled. In its current condition, there is minimal colonization by invasives around these areas, which should at a minimum be maintained. Purple loosestrife, common reed, buckthorn, thistles, teasel, and cattails should be addressed as described above. Selective herbicide control is recommended for all of these species.

Species	Recommended Herbicide
Purple Loosestrife	Aquatic-approved glyphosate, triclopyr
Reed Canary Grass	Aquatic-approved glyphosate Grass-specific sethoxydim/clethodim
Common Reed	Aquatic-approved glyphosate for small patches
Common Buckthorn	Triclopyr
Thistles	Clopyralid or aminopyralid
Teasel	Clopyralid
Cattails	Aquatic-approved glyphosate

It should also be noted that some, such as the larger stands of reed canary grass at the south end of The Slough will require repeated applications over 3-5 years to get complete control.

Water Quality

Somewhat elevated nutrient levels and chlorides are to be expected in any suburban/urban water body in this region. Nutrient sources are from lawn fertilizer runoff and leaky septic systems. These are best addressed at a watershed level by reduced and judicious use of fertilizers, and conversion of septics to municipal sewer systems. At the site, nutrient impacts to the slough and lake can be reduced by including more un-mowed, vegetated buffers that will help filter nutrients from runoff.

Chlorides are more difficult to address as the chloride ion from de-icing salt remains in solution, and does not adsorb to sediment and settle out. Throughout the Chicago region, elevated chloride levels are being detected in surface waters and groundwater throughout the year now, in addition to the spikes in later winter and early spring when the salt gets washed off the hardscape and into receiving waters. Thus chloride inputs can really only be reduced by reducing the amount of road salt used through more judicious application and use of other additives and substitute compounds.

Overall Aesthetic

The overall aesthetic or appearance of a water body is often very important for the community. Everyone's idea of a good aesthetic is somewhat unique. A good education and outreach program can help with perceptions, once people have a better understanding of a particular body of water or natural feature. In this case, it seems best to keep a separate aesthetic goal for Hillcrest Lake versus The Slough. As their names imply, Hillcrest Lake is perceived as a lake – an open water body, as it has been for decades. The Slough is aptly named as it is a remnant of the marsh or wetland slough that was historically present. Given the community input that we have been made aware of, the current and historic condition of both – we recommend that

Hillcrest Lake be managed as a small lake, while The Slough be managed as a wetland ecosystem. This also provides contrasting management and recreational activities for differing interests within the local community. At least partial control of the dense Elodea beds with herbicides in Hillcrest Lake will help maintain a more open water lake appearance. Whereas, The Slough can be expected to have areas of aquatic and emergent plants. If a reduction in the cover by duckweed is desired, limited control of that free-floating species can be achieved with chemical control or hand removal.

SUMMARY AND RECOMMENDATIONS

In summary, neither Hillcrest Lake nor The Slough appear to have any significant issues or impairments given their suburban landscape context, and have not substantially changed in size or water depth in recent years. Wet years and dry years may affect local perceptions of water levels. Changes in the condition of the outlet pipe may also have changed local conditions slightly in recent years. Water quality appears typical for such an urban setting. Wildlife usage, especially birds, is very good and reflective of moderate to good habitat quality. The fishery has always been poor since first measured in 1970 and a "put and take" sport fishery would be possible only through annual stocking due to the shallow depths. Fortunately, neither water body is infested with Eurasian watermilfoil or curly-leaf pondweed. No non-native invasive aquatic plant species were detected. A few of the widespread emergent invasive species are present around the perimeter but not in major infestations yet.

The bottom sediments of both bodies appears to be natural muck soils probably from the original marsh slough, from the contributing watershed, and from decaying plant material within the system. It does not appear likely that there has been recent, significant deposition of new sediments based on the sediment depths, the historic aerial photographs, and the built-out condition of the watershed other than gradual accumulations from shoreline erosion on Hillcrest Lake. The sediments present in The Slough are natural and typical of a marsh or slough habitat in northeastern Illinois. For Hillcrest Lake the same sediments are generally present, except where historic deposition of sandy material and concrete chunks were observed. If it is desired to increase the water depths in Hillcrest Lake, without raising normal water level due to compensatory storage requirements, the sediments could be removed by dredging, though this would be very costly.

The dense beds of the submerged aquatic plant Elodea in Hillcrest Lake are interesting in that Elodea is a native species and not typically considered invasive in North America (it has been introduced to Europe and is highly invasive there). However, dense beds are known for this aquatic plant species and it can impact fish habitat due

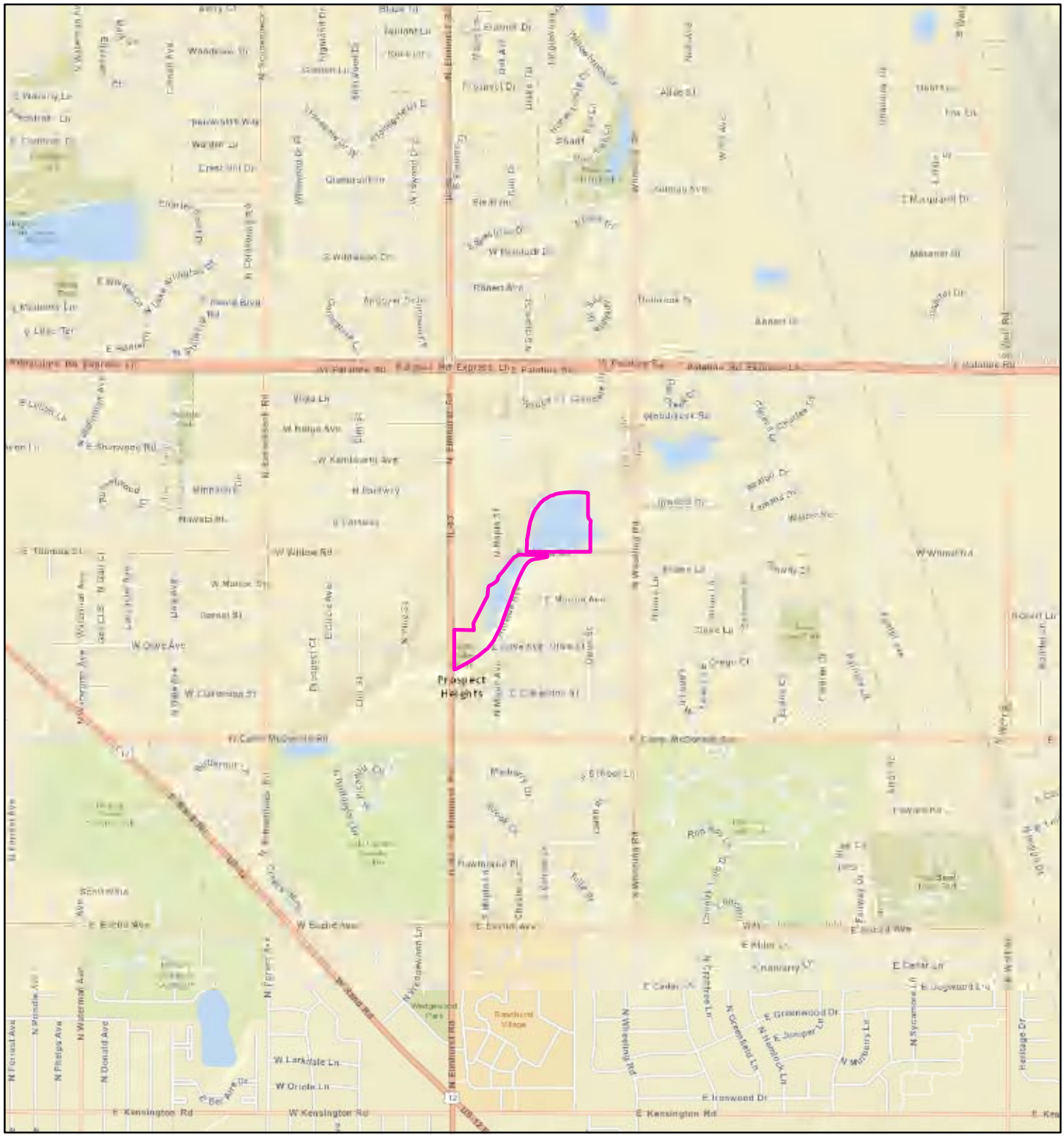
to its dense bushy nature. It can also impair any small boat or paddlecraft recreational options. It is contributing to negative aesthetics by reaching the surface and providing a platform for filamentous algae growth. Thus, it is recommended that some targeted chemical and/or hand control of the Elodea be carried out. This can be used to reduce the coverage of the Elodea on an annual basis and maintain a better aesthetic for the lake, which may alleviate the need for increased water depths.

The duckweed covering a portion of The Slough is perceived by some as a negative aesthetic. Duckweed is very beneficial for fish and wildlife and is a native species. From an ecological perspective it is considered desirable. However, if a reduction in cover by duckweed is desired from an aesthetic perspective, limited hand or chemical control is recommended. Targeted applications of an appropriate aquatic herbicide such as Flouridone is recommended for limited control of both the duckweed and Elodea.

As much un-mowed buffer with native vegetation around the perimeter of both The Slough and Hillcrest Lake as possible is recommended for shoreline stabilization, improved habitat and water quality, and reducing nuisance Canada geese. There are many existing shoreline areas with appropriate un-mowed vegetation as examples. Controlled burns or annual mowing could then be used to maintain these native plant communities around the perimeter. Floating leaved aquatic plants such as water lilies could also be introduced to either The Slough or Hillcrest Lake for aquatic plant diversity and an improved aesthetic. Maintaining submergent and floating-leaved aquatic vegetation helps keep sediments down and limits the turbidity that carp can cause.

The watershed condition is the other factor affecting The Slough and Hillcrest Lake where actions can be taken to improve conditions. It appears that the watershed contributing to these water bodies extends into other communities such as Arlington Heights. But enforcing good soil erosion and sediment control practices on any soil disturbing projects within the watershed will reduce the amount of sediment reaching The Slough or Hillcrest Lake. In addition, using only no phosphorus and slow-release nitrogen fertilizers in the watershed will reduce nutrients entering the ecosystem. Generally, following good watershed stewardship and best management practices will help with the management of both The Slough and Hillcrest Lake.

The continued stewardship by the volunteers of the NRC is also very valuable in reducing the cover by invasive emergent and terrestrial species and improving the general habitat conditions. It also helps to educate community members and enhance local "ownership" of Hillcrest Lake and The Slough.



Scale:

0 2,000 Feet

Orientation:

Legend:

Project Boundary

Project Name:

Hillcrest Lake and Slough Assessment

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Hey and Associates, Inc.
Engineering, Ecology and Landscape Architecture

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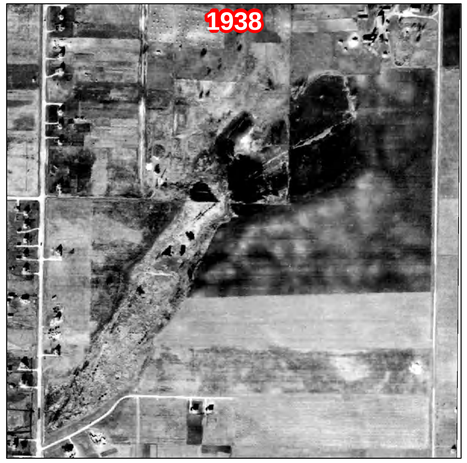
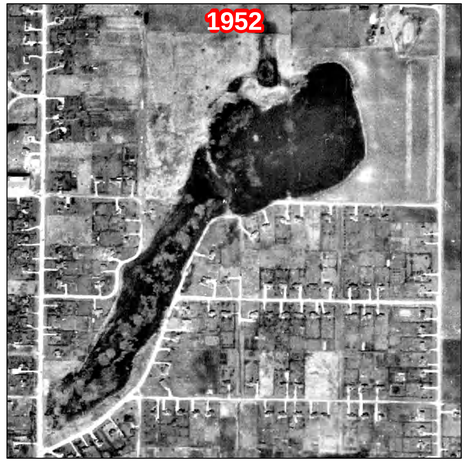
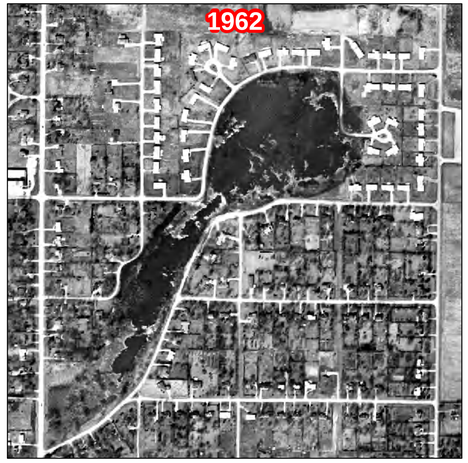
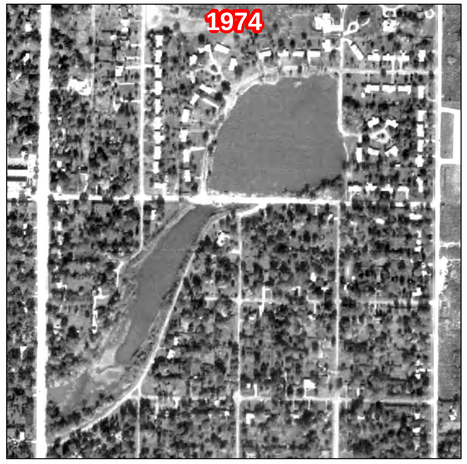
Exhibit:

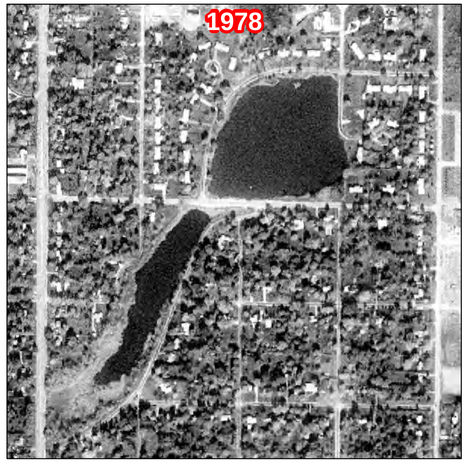
1

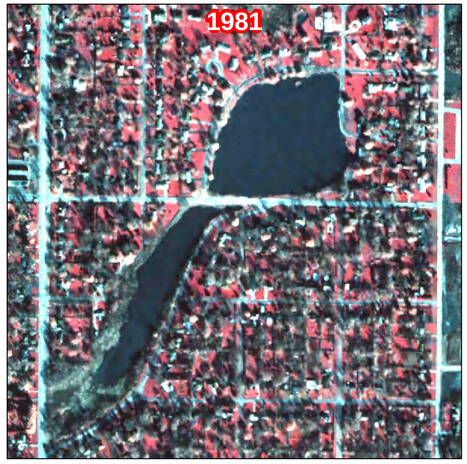


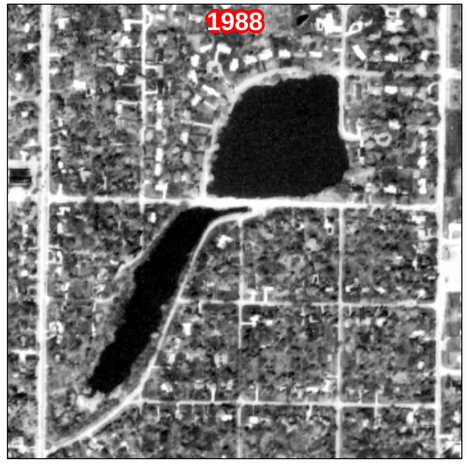


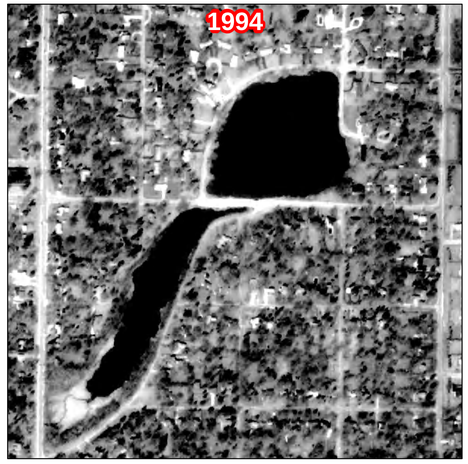












Prepared by:

Hey and Associates, Inc.

Engineering, Ecology and Landscape Architecture

Scale:

0 500 Feet

Project Number: 15-0320

Orientation:

Latest Revision: 10/9/2015

Project Name:

Hillcrest Lake and Slough Assessment

Prepared For:

City of Prospect Heights

Image Sources:

Historical Information Gatherers

Exhibit Title:

Aerial Time Series

Exhibit:

2

Scale:

0 1,000 Feet

Orientation:

Legend:

Project Number: 15-0320

Latest Revision: 10/8/2015

Prepared by:

Hey and Associates, Inc.

Engineering, Ecology and Landscape Architecture

Project Name:

Hillcrest Lake and Slough Assessment

Prepared for:

City of Prospect Heights

Location Information:

Arlington Heights Quadrangle

Exhibit Title:

U.S.G.S. Topographic Map

Exhibit:

3

NWI Code	Description
PEMF	Freshwater Emergent Wetland
PF01C	Freshwater Forested/Shrub Wetland
PUBGx	Freshwater Pond

Scale:

0 400 Feet

Orientation:

Legend:

National Wetland Inventory

Project Name:

Hillcrest Lake and Slough Assessment

Prepared for:

City of Prospect Heights

Project Number: 15-0320

Latest Revision: 10/8/2015

NWI Date:

1981

Prepared by:

Hey and Associates, Inc.
Engineering, Ecology and Landscape Architecture

Exhibit Title:

National Wetland Inventory

Exhibit:

4

Scale:

0 400 Feet

Orientation:

Legend:

100 Year Flood Zone

Project Name:

Hillcrest Lake and Slough Assessment

Prepared for:

City of Prospect Heights

Project Number: 15-0320

Latest Revision: 10/8/2015

Panel #:

17031C0206J

Prepared by:

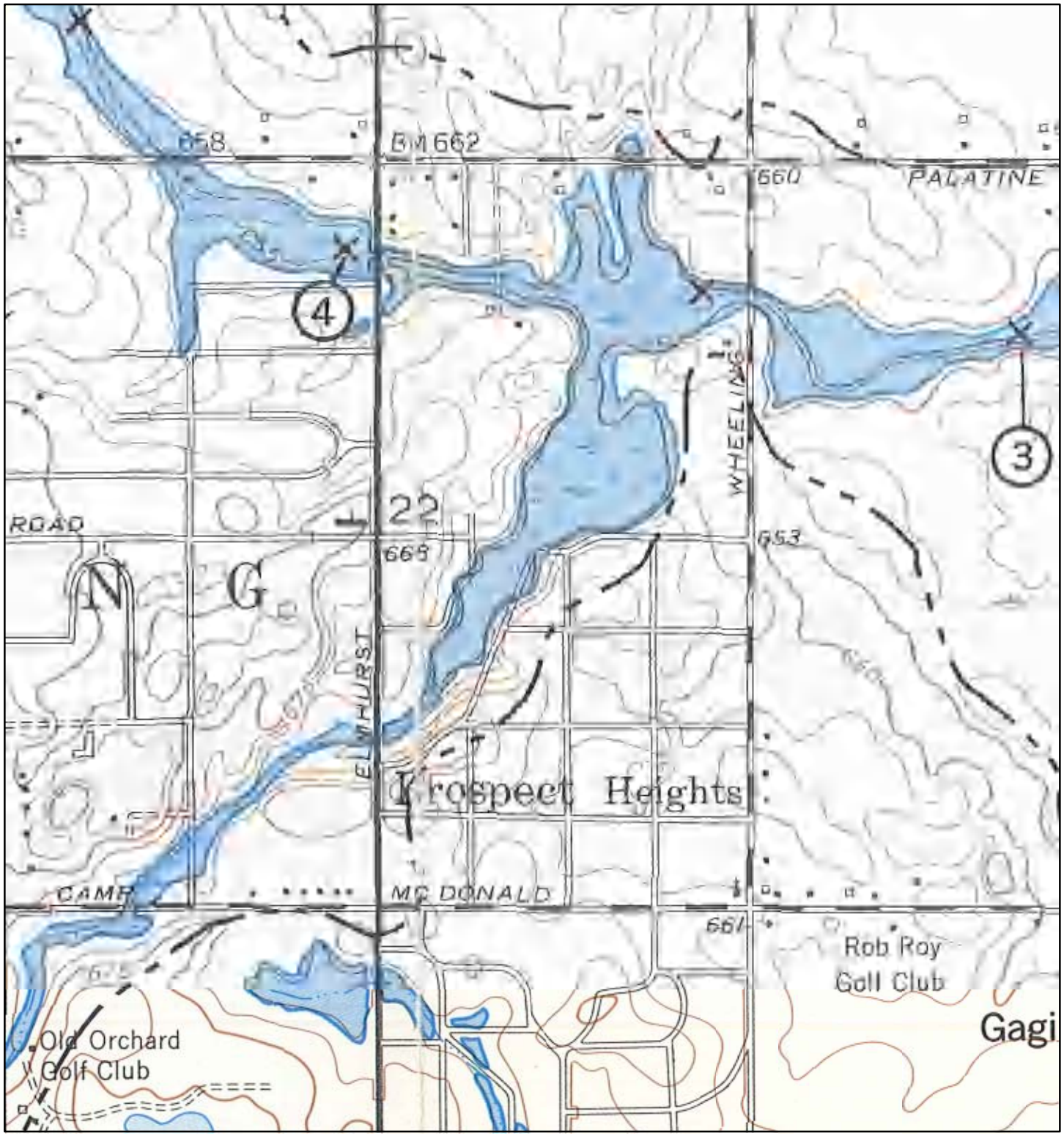
Hey and Associates, Inc.
Engineering, Ecology and Landscape Architecture

Exhibit Title:

Flood Insurance Rate Map

Exhibit:

5



Scale:

0 1,000 Feet

Orientation:

Legend:

Project Name:

Hillcrest Lake and Slough Assessment

Prepared for:

City of Prospect Heights

Project Number: 15-0320

Latest Revision: 10/8/2015

Hydro Atlas Date:

1963

Prepared by:

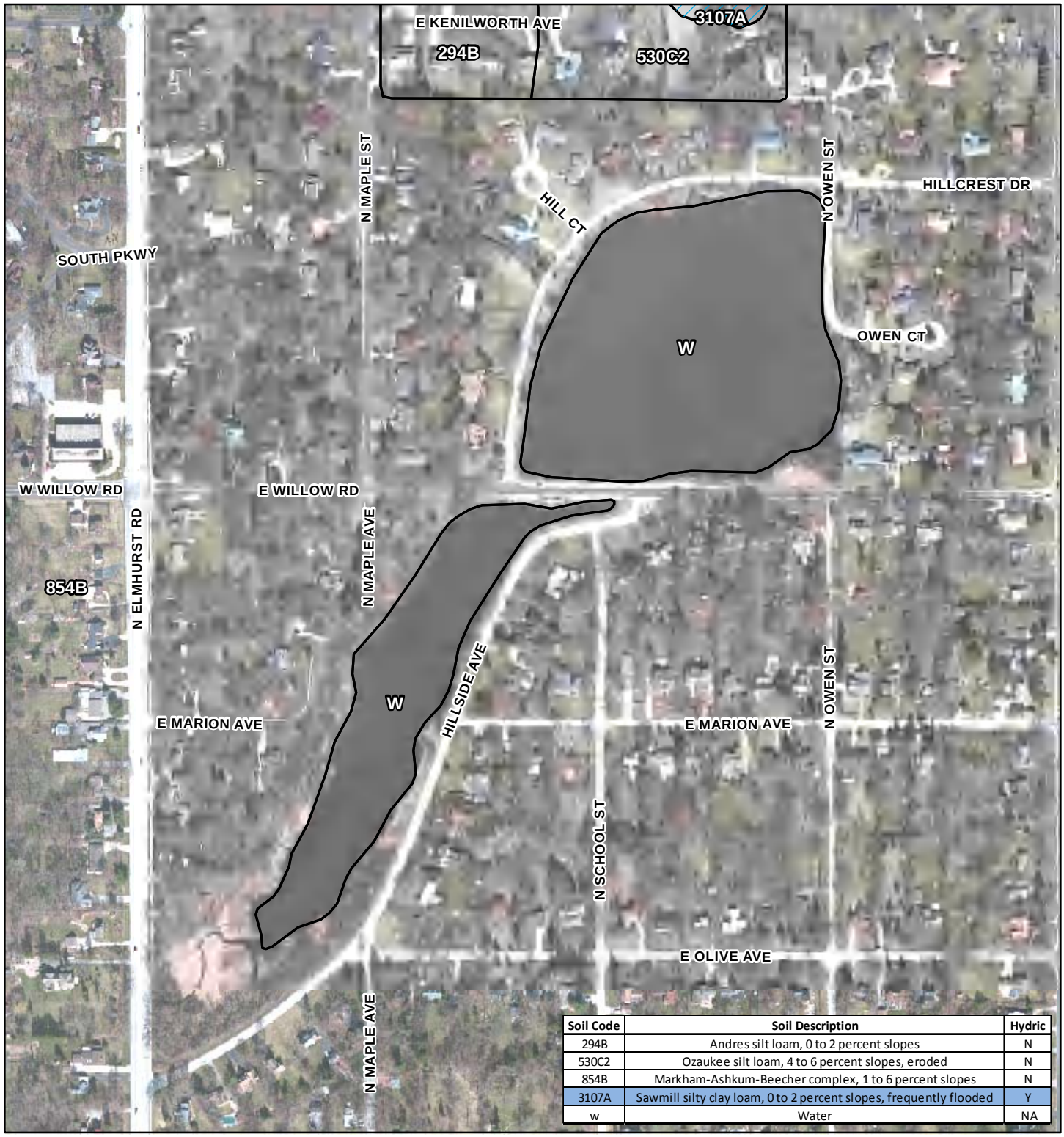
Hey and Associates, Inc.
Engineering, Ecology and Landscape Architecture

Exhibit Title:

U.S.G.S. Hydrologic Atlas

Exhibit:

6



Soil Code	Soil Description	Hydric
294B	Andres silt loam, 0 to 2 percent slopes	N
530C2	Ozaukee silt loam, 4 to 6 percent slopes, eroded	N
854B	Markham-Ashkum-Beecher complex, 1 to 6 percent slopes	N
3107A	Sawmill silty clay loam, 0 to 2 percent slopes, frequently flooded	Y
w	Water	NA

Scale:

0 400 Feet

Orientation:

Legend:

Hydric Soils

Soil Units

Project Number: 15-0320

Latest Revision: 10/8/2015

Prepared by:

Hey and Associates, Inc.

Engineering, Ecology and Landscape Architecture

Project Name:

Hillcrest Lake and Slough Assessment

Prepared for:

City of Prospect Heights

Soil Survey Date:

2012

Exhibit Title:

NRCS Soil Survey

Exhibit:

7

Scale:

0 2,000 Feet

Orientation:

Legend:

FEMA Water Line

Watershed Boundary

Project Name:

Hillcrest Lake and Slough Assessment

Prepared for:

City of Prospect Heights

Project Number: 15-0320

Latest Revision: 10/8/2015

Data Sources: Globetrotters & FluidClarity, Ltd.

Aerial Date:

2014

Prepared by:

Hey and Associates, Inc.

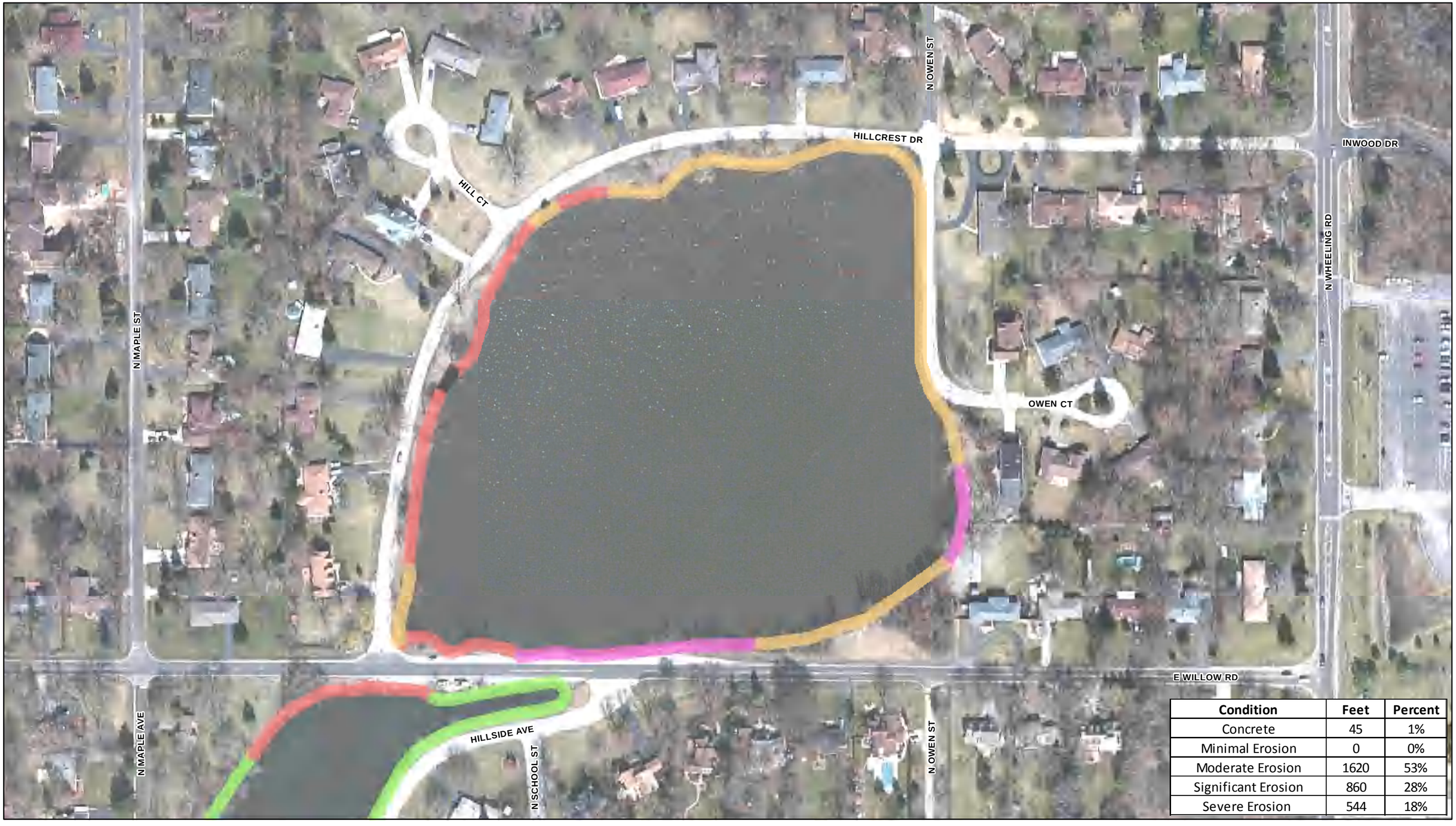
Engineering, Ecology and Landscape Architecture

Exhibit Title:

Watershed Boundary

Exhibit:

8



Condition	Feet	Percent
Concrete	45	1%
Minimal Erosion	0	0%
Moderate Erosion	1620	53%
Significant Erosion	860	28%
Severe Erosion	544	18%

Prepared by:

Hey and Associates, Inc.
Engineering, Ecology and Landscape Architecture

Scale:
0 150 Feet

Project Number: 15-0320

Orientation:

Latest Revision: 10/9/2015

Legend:
- Concrete
- Minimal Erosion
- Moderate Erosion
- Significant Erosion
- Severe Erosion

Project Name:
Hillcrest Lake and Slough Assessment

Survey Date:
Sept. 23, 2015

Prepared For:
City of Prospect Heights

Exhibit Title:
Hillcrest Lake Shoreline Condition

Exhibit:
9

Condition	Feet	Percent
Concrete	0	0%
Minimal Erosion	3455	91%
Moderate Erosion	0	0%
Significant Erosion	328	9%
Severe Erosion	0	0%

Prepared by:

Hey and Associates, Inc.
Engineering, Ecology and Landscape Architecture

Scale:
0 150 Feet
Project Number: 15-0320

Orientation:

Latest Revision: 10/9/2015

Legend:
- Concrete
- Minimal Erosion
- Moderate Erosion
- Significant Erosion
- Severe Erosion

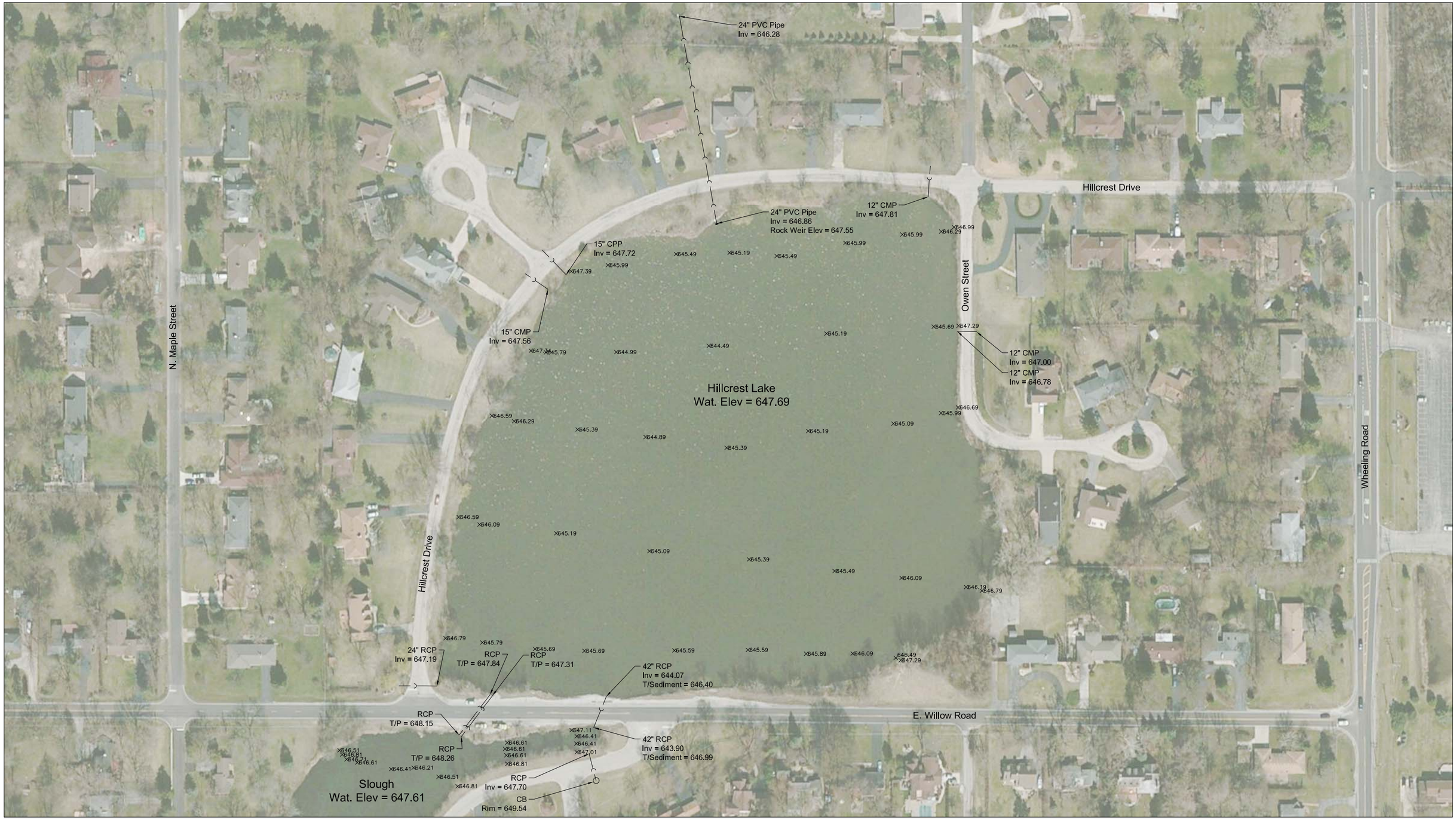
Project Name:
Hillcrest Lake and Slough Assessment

Survey Date:
Sept. 23, 2015

Prepared For:
City of Prospect Heights

Exhibit Title:
Slough Shoreline Condition

Exhibit:
10



Prepared by:

Hey and Associates, Inc.
Engineering, Ecology and Landscape Architecture

Scale: 0 150 Feet

Project Number: 15-0320

Orientation:

Last Revision: 10/09/2015

Legend:
Storm Sewer
647.70 Top of Sediment Elevation

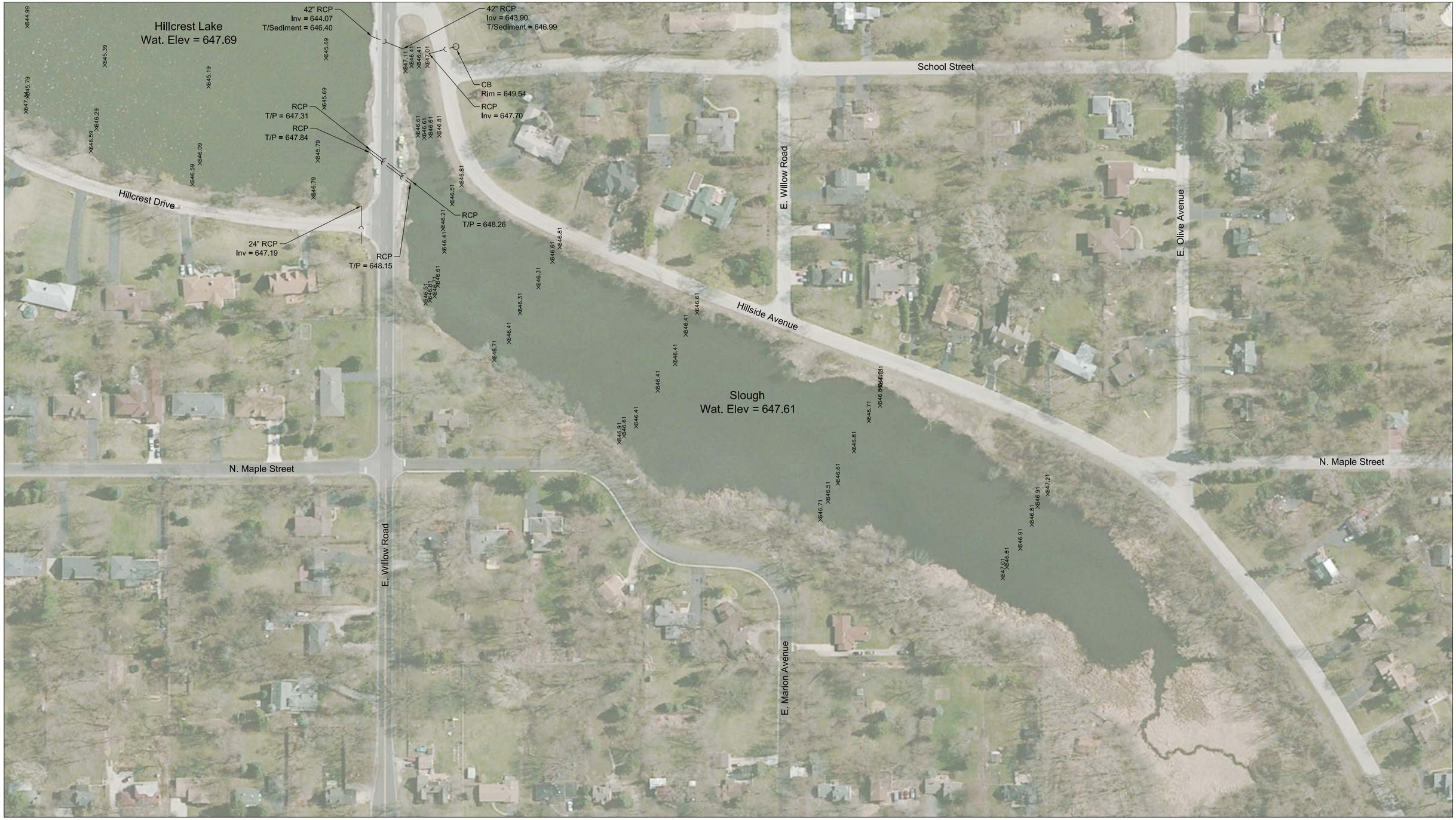
Project Name:
Hillcrest Lake & Slough Assessment

Prepared for:
City of Prospect Heights

Survey Date:
Sept. 23, 2015

Exhibit Title:
Hillcrest Lake
Bathymetric Survey
Top of Sediment

Exhibit:
11



Prepared by:

Hey and Associates, Inc.
Engineering, Ecology and Landscape Architecture

Scale:
0 150 Feet

Project Number: 15-0320

Orientation:

Last Revision: 10/09/2015

Legend:
Storm Sewer
×647.70 Top of Sediment Elevation

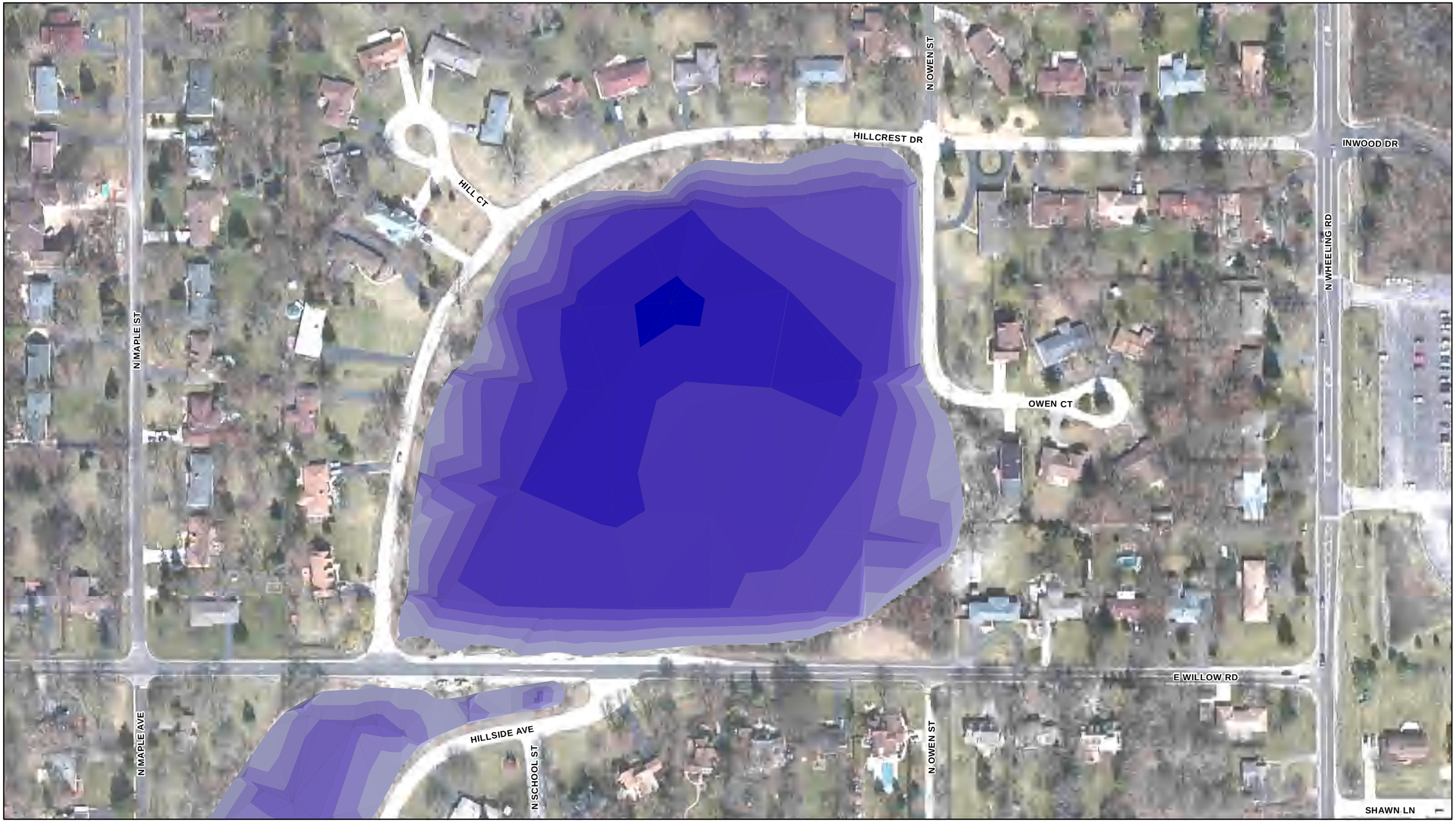
Project Name:
Hillcrest Lake & Slough Assessment

Survey Date:
Sept. 23, 2015

Prepared for:
City of Prospect Heights

Exhibit Title:
Slough
Bathymetric Survey
Top of Sediment

Exhibit:
12



Prepared by:

Hey and Associates, Inc.
Engineering, Ecology and Landscape Architecture

Scale:
0 150 Feet

Project Number: 15-0320

Orientation:

Latest Revision: 10/9/2015

Legend:
0 to 0.5 Feet
0.5 to 1 Feet
1 to 1.5 Feet
1.5 to 2 Feet
2 to 2.5 Feet
2.5 to 3 Feet
3 to 3.2 Feet

Project Name:
Hillcrest Lake and Slough Assessment

Survey Date:
Sept. 23, 2015

Prepared For:
City of Prospect Heights

Exhibit Title:
Hillcrest Lake - Depth to Top of Sediment

Exhibit:
13

Prepared by:

Hey and Associates, Inc.
Engineering, Ecology and Landscape Architecture

Scale:
0 150 Feet

Project Number: 15-0320

Orientation:

Latest Revision: 10/9/2015

Legend:
0 to 0.5 Feet
0.5 to 1 Feet
1 to 1.5 Feet
1.5 to 2 Feet
2 to 2.5 Feet
2.5 to 3 Feet
3 to 3.2 Feet

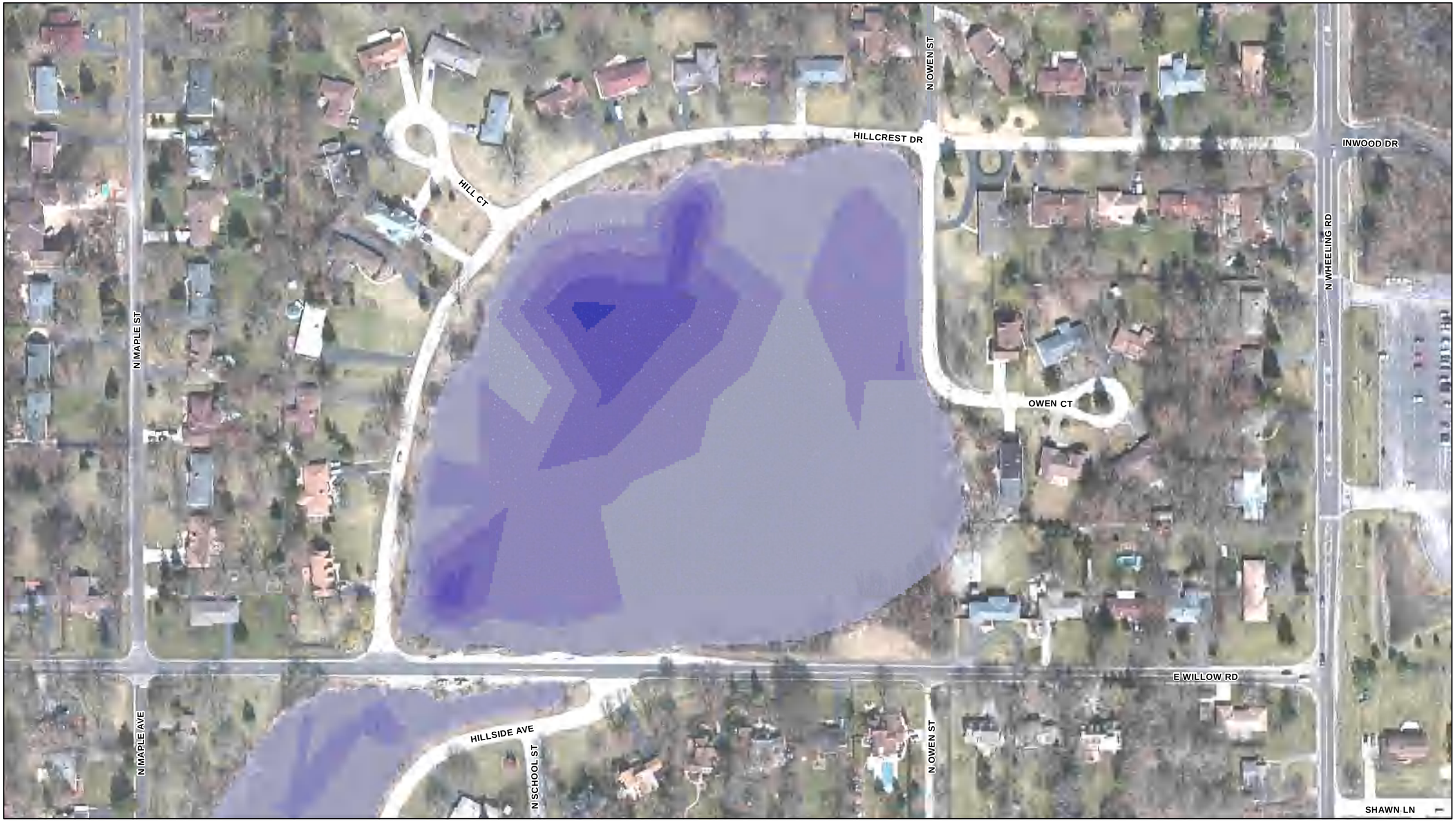
Project Name:
Hillcrest Lake and Slough Assessment

Survey Date:
Sept. 23, 2015

Prepared For:
City of Prospect Heights

Exhibit Title:
Slough - Depth to Top of Sediment

Exhibit:
14



Prepared by:

Hey and Associates, Inc.
Engineering, Ecology and Landscape Architecture

Scale:
0 150 Feet

Project Number: 15-0320

Orientation:

Latest Revision: 10/9/2015

Legend:
0 to 1 Feet
1 to 2 Feet
2 to 3 Feet
3 to 4 Feet
4 to 4.3 Feet

Note: The above symbology represents the depth of sediment from the top of sediment elevation to the top of hard bottom elevation.

Project Name:
Hillcrest Lake and Slough Assessment

Survey Date:
Sept. 23, 2015

Prepared For:
City of Prospect Heights

Exhibit Title:
Hillcrest Lake Sediment Depth

Exhibit:
15

Prepared by:

Hey and Associates, Inc.
Engineering, Ecology and Landscape Architecture

Scale:
0 150 Feet

Project Number: 15-0320

Orientation:

Latest Revision: 10/9/2015

Legend:
0 to 1 Feet
1 to 2 Feet
2 to 3 Feet
3 to 4 Feet
4 to 4.3 Feet

Note: The above symbology represents the depth of sediment from the top of sediment elevation to the top of hard bottom elevation.

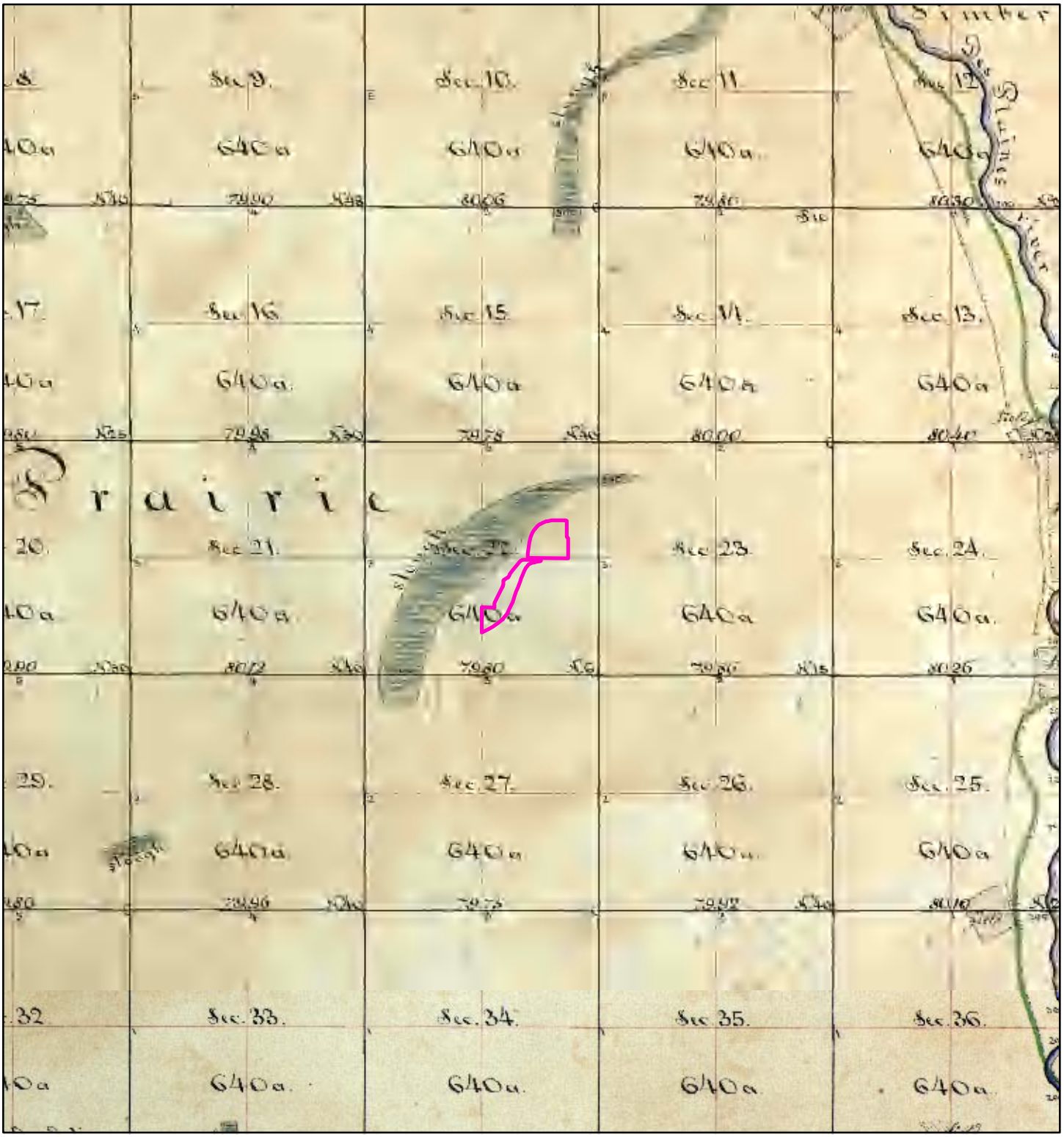
Project Name:
Hillcrest Lake and Slough Assessment

Survey Date:
Sept. 23, 2015

Prepared For:
City of Prospect Heights

Exhibit Title:
Slough Sediment Depth

Exhibit:
16



Scale:

0 3,000 Feet

Orientation:

Legend:

Project Boundary

Project Name:

Hillcrest Lake and Slough Assessment

Prepared for:

City of Prospect Heights

Project Number: 15-0320

Latest Revision: 10/8/2015

Location Information:

T.42N.-R.11E., Section 22

Prepared by:

Hey and Associates, Inc.

Engineering, Ecology and Landscape Architecture

Exhibit Title:

Federal Township Plats of Illinois (1840)

Exhibit:

17

Photograph 1:

Overview of The Slough with duckweed cover and great egret foraging.

Photograph 2:

Looking across The Slough to vegetated east shoreline.

Photograph 3:

Northeast shoreline of The Slough vegetated with willows.

Photograph 4:

East shoreline of The Slough with wetland/prairie plantings.

Photograph 5:

Emergent vegetation along east shoreline of The Slough.

Photograph 6:

Reed canary grass and cattail marsh at south end of The Slough.

Photograph 7:

In-flow channel at south end of The Slough.

Photograph 8:

Headwall with submerged culvert at upstream end of The Slough (Elmhurst Road).

Photograph 9:

Dense duckweed matt on water at north end of The Slough.

Photograph 10:

View across Hillcrest Lake looking east.

Photograph 11:

Mowed turf to water's edge with significantly eroded shoreline on west side of Hillcrest Lake with double-crested cormorant in tree.

Photograph 12:

West shoreline with severe erosion Hillcrest Lake.

Photograph 13:

Mowed shoreline with significant erosion contrasted with vegetated shoreline with minimal to moderate erosion – northwest side Hillcrest Lake.

Photograph 14:

Well-vegetated shoreline with minimal erosion – northwest side Hillcrest Lake.

Photograph 15:

CMP culvert inlet from Hill Court – west side Hillcrest lake.

Photograph 16:

Plastic culvert inlet at Hill Court with vegetated shoreline – unmowed with prairie plants.

Photograph 17:

Vegetation shoreline with moderate erosion northwest side of Hillcrest Lake.

Photograph 18:

Vegetated shoreline with minimal to moderate erosion along Owen Court – Hillcrest Lake.

Photograph 19:

Gravel shoreline of Hillcrest Lake along Willow Road looking east.

Photograph 20:

Wooded shoreline along southeast side of Hillcrest Lake.

DEPARTMENT OF NATURAL RESOURCES Division of Fisheries SUPPLEMENTAL SURVEY	**County:** Cook		
	T 42N	**R** 11E	**S** 22
	Directions from nearest town: East of Rt 83 on Willow Road		
	Date of Inspection: 7/22/2015		

Water (Name): Hillcrest Lake	**Owner:** Village of Prospect Heights
Address of Owner:	**Phone of Owner:**
Lessee: ---	
Person(s) Contacted: --- Agnes Wojnarski	**Identification:** Prospect Heights Conservation Committee
Address of Contact: ---	**Phone of Contact:** ---
Water Classification: Public Other	

1. Survey initiated by: Frank Jakubicek

2. Water Size: 13 acres

3. Date of last inspection or work on water: 1971

4. Purpose of Survey: Evaluate the fishery present

5. Observation, comment, recommendations: On 7/22/2015 a 15 minute DC electrofishing survey was conducted in the deeper parts of Hillcrest Lake. Most of the lake was too shallow to motor our boat. We collected 39 fish from 6 species during our 15 minutes. Those data are shown in Table 1, minimum, maximum and average sizes are shown along with the number of fish collected per species. Fish species that can tolerate poor water quality dominated the catch suggesting the conditions within the lake regularly drop to a point where fish requiring good water quality die off. Difficult conditions for fish occur in winter when thick ice and/or snow cover reduce light penetration so oxygen levels drop because plankton cannot produce enough oxygen to offset respiration needs of the decaying organic material and animals living in the lake. Ice also acts as a cap which doesn't allow "bad" gases to escape and fish can die from high concentrations of some of those "bad"gases. In summer, warm water and high nutrient levels create conditions where algae grows quickly. When algae dies off quickly (running through a normal lifecycle), oxygen levels can drop low enough (usually just before sunrise) to impact sportfish (especially the larger ones) from the stress associated with low oxygen (not necessarily- no oxygen).

This brings us to the point of lake volume. The State recommends that a lake be at least 10 foot deep over at least 25% of it's surface area so the lake has enough volume to "store" enough water (and thus oxygen) so fish can survive the difficult times of the year. Shallow lakes often experience period die-offs associated with low oxygen levels from natural events (temperatures, water levels, snow/ice, etc) and when these events are underway and taking place, there's no way of quickly reversing the cycle; it has to run it's course which is usually a short term event but the effects often significantly impact the lakes fishery. Removing fish carcuses can help reduce recycling of the nutrients tied up in fish flesh, this will help reduce algae problems several weeks following ice out or the die-off event. Die-offs are a good time to stock predators so they can contain any reproduction surviving fish have and would help balance the fishery.

6. Biologist: Frank Jakubicek	**Date of Report:** 8/21/2015

Distribution: If classification of State, Public, or Stream: District, Area, Central
All others: District

FM 5.0

Hillcrest Lake essentially has the same fishery in 2015 that was present in 1970. Table 2 shows the species present during that survey along with their minimum, maximum and average sizes.

Table 1. Catch Summary Hillcrest Lake in Prospect Heights, 7/22/2015

(15 minutes DC electrofishing)

Species	Number	Relative Abundance (%)	Minimum (inches)	Average (inches)	Maximum (inches)
LARGEMOUTH BASS	4	10.3	7.2	9.9	11.2
BLUEGILL	1	2.6	2.7	2.7	2.7
BLACK BULLHEAD	3	7.7	4.4	4.6	4.6
CARP*	6	15.4	15.2	18.3	21.4
GOLDFISH	23	59.0	4.3	5.9	11.3
WHITE SUCKER	2	5.1	5.5	7.1	8.7
SPECIES= 6 TOTAL=	**39**	**100.0**			

* plus 20 other carp observed while electrofishing

The difference between the two surveys are the presence or absence of green sunfish and white suckers. Both are native species that are found throughout the region and common to wetlands, marshes and sloughs. White suckers in particular are common in flowing wetland situations.

Table 2. Catch Summary Hillcrest Lake in Prospect Heights, 7/7/1970

(40 minutes AC electrofishing)

Species	Number	Relative Abundance (%)	Minimum (inches)	Average (inches)	Maximum (inches)
LARGEMOUTH BASS	5	3.2	6	7.9	11
BLUEGILL	5	3.2	4	4.5	5
BLACK BULLHEAD	22	13.9	2	3.9	9.5
CARP*	76	48.1	2	4.3	15
GOLDFISH	17	10.8	12	12.7	13.5
WHITE SUCKER	0				
GREEN SUNFISH	33	20.9	1.5	3.1	6
SPECIES= 6 TOTAL=	**158**	**100.0**			

The original reason for our survey was to evaluate the abundance of common carp with the thinking that an abundant common carp presence was creating turbid water conditions and inhibiting some shoreline and near shore plants from growing. The direction of early discussions was geared toward there being too many carp in the system and the options to reduce abundance. When we arrived at Hillcrest Lake, discussions with local resident's indicated a severe winter kill in 2014 that significantly reduced the carp population so while some resident's believed common carp were "common", the reality was that common carp were significantly reduced from their "typical" levels. At their typical levels, turbid water kept aquatic vegetation in check because plants need light to grow and if light cannot penetrate the water column, plants cannot grow. This new, lower abundance of carp means that fewer fish are rooting around in the soft sediments, stirring up the bottom so more light is penetrating the water column and plants grew. As a rough gauge of how deep plants can grow, its roughly twice as deep as you can see into it. If you can see down 2 feet, plants can grow in 4 feet deep (this is a rough guide and not an official statement).

From our files, the fishery history of Hillcrest Lake indicates the system periodically experiences poor water quality due to it's shallow bathymetry and organic bottom. Poor water quality kills off sportfish first (largemouth bass and bluegill) yet some fish are capable of surviving poor water quality because it where they normally live and thrive. Fish tolerant of poor water quality include goldfish, common carp, green sunfish and black bullheads. Now review the catch data from 1970 and 2015. There are times when water quality stays high enough for sportfish to survive and thrive but history has shown that every 3 or 4 or 10 or 20 years a tough winter comes along and re-structures the fishery so that only the "tolerant" survive!

.

A common recommendation with lakes similar to Hillcrest is to annually stock largemouth bass (in spring) so that if a tough winter comes along, a new batch of predators are added to help contain species like goldfish, black bullhead, carp, frogs, etc. so they don't become too over abundant. If several years go by and no tough winters occur, fish will survive and bass fishermen will be very happy because they'll be "catching" and everything will appear to be going well.

Stocking rates:

Largemouth bass – 25 fingerlings per acre - annually (4" to 6" long)
Northern pike – 2 per acre (these fish tend to move downstream so if a barrier is installed to keep fish from moving during high water events, northern pike would be a good choice) – 10" long

No need to stock crappie, minnows to feed bass, or bluegills, at present there are a lot of smaller, forage size fish in the system.

ILLINOIS DEPARTMENT OF CONSERVATION
DIVISION OF FISHERIES

LAKE SURVEY

County Cook

Twp. 42N R 11E S 22 SE¼

Directions from nearest town:

in Prospect Hts on Maple and Willow Sts.

Date of inspection: August 24, 1972

Water (Name) Hillcrest Slough (known locally as South Slough)

Owner in 1973 Prospect Hts Park Dist Address Prospect Heights Park District 9B N. Elmhurst Rd., Prospect Heights, Ill. 60070

Lessee Address

Person Contacted Ron Greenburg Identification Park Dist. Supervisor

Address of person contacted see above Phone 312-394-2848

Classification of ownership: State Public XXX Organization Private

1. Survey initiated by: Ron Greenburg

2. Type of water area natural slough

(All figures should be adjusted to spillway level):

3. Area (Acres) 6.3 Source USGS topo 1963 Max depth (ft.) 3 Source 1972 soundings
Avr. depth (ft.) 2.5 Source 1972 soundings Acre feet 15.8 Gallons 5,148,400
Shoreline Length: Feet 3168 Miles 0.6

4. Watershed size: (Acres) approx. 450 Source 1963 USGS topo estimate
Topography and soils flat to gently rolling, silty clay loam
Other waters in watershed (list) Hillcrest Lake, trib. to McDonald Creek, 2-Old Orchard Golf Club ponds
Ownership of watershed 90% private, 10% public (streets)

5. Type of dam none Height (ft.) Year constructed
Condition of dam

6. Type and size of drain unknown number of tubes under Willow Rd. Condition good
Type and size of spillway none Condition
Present water level: 1 ft. above normal due to recent rains

7. Primary usage aesthetics, kid fishing

8. History of past water levels acts as natural water retention reservior, fluctuates up to 3 ft.

9. Use of shoreline: No. Boat liveries none No. Resorts none No. ~~Cottages~~ Homes approx. 10
Swimming permitted: Yes No XX Waterfowl hunting permitted: Yes No XX
Resident boats (Number none) Motors allowed: Yes No XX Size Speed.

10. Fish stocking record:

Species	Number	Size	Date	Source (list agency or as private)
unknown-probably none				

(Draw Imponndment Map on Reverse Side)

(30173—5M Sets—6-66)

F.M. 3.0 - 1/66

11. Pollution (type and kind) normal street runoff, lawn fertilizer, septic outfalls (urban watershed)

12. Erosion (extent) little except near Willow Road (moderate)

13. Biological characteristics: Winter and/or summer kill winter and summerkill very probable, at least partail winterkill must likely annually

Common species of aquatic plants (list) no submerged observed, algae, cattails (both T. latifolia and T. augustifolia present)

Extent and coverage of aquatic plants cattails almost completely ring this water area

14. Fish spawning conditions good for species present, extremely mucky

15. Species composition now known present (list) carp, goldfish, black bullhead, green sunfish, bluegill

16. Natural reproduction and survival success of major species good for goldfish and carp, although no large ones collected (recontamination after winterkill is probable)

17. History of past management recommendations unknown

18. Special conditions and problems too shallow to support game fish, contamination from McDonald Creek and Hillcrest Lake

19. Angling success carp fishing good

20. REMARKS AND RECOMMENDATIONS:

This water area is too shallow to support game fish over the winter. Dredging would probably be too expensive for the benefits derived, since much material would KK have to be removed. Connection to Hillcrest Lake would probably be no benefit for the water quality of the lake.

Area should remain as is for natural water retention and nature study.

(Continue Remarks on Reverse Side)

21. Inspecting Biologist Harry Wight Date of Report September 1, 1972
Man hours involved 2.5 Weather warm, overcast Temp: Air 78 F Water 71 F
Secchi = 5 in.

ILLINOIS DEPARTMENT OF CONSERVATION
DIVISION OF FISHERIES

FISH POPULATION ANALYSIS

(Condition Factor & Length-Frequency Summary)

COUNTY Cook

WATER (NAME) Hillcrest Slough

DATE OF COLLECTION August 24, 1972

Species	½" Group	Number	Percent of Total	Weight	Condition Factor	Rating
Bluegill	4.5	2		0.08	8.64	Good
	5.0	1		0.09	6.63	Ave
	5.5	4		0.11	6.62	Ave
Black Crappie	4.0	1		0.03	4.81	Ave
	4.5	1		0.05	3.28	Ave
Green Sunfish	3.0	2		---	---	---
	3.5	1		0.03	7.13	Ave
	4.0	2		0.05	7.72	Ave
Black Bullhead	4.0	2		0.035	5.50	Ave
	4.5	1		0.05	5.42	Ave
Carp	6.0	1		0.12	5.60	Ave
	6.5	2		0.17	6.15	"
	7.0	6		0.18	5.23	Poor
	7.5	6		0.22	5.21	"
	8.0	5		0.26	5.13	"
	8.5	3		0.32	5.15	"
	10.0	1		0.54	5.37	Ave
	12.5	1		0.90	4.56	"
Goldfish	5.5	4		0.14	8.42	No
	6.0	10		0.16	7.41	Available
	6.5	10		0.17	6.19	Data As To
	7.0	4		0.25	7.32	IE Illinois
	7.5	3		0.29	6.73	verages
	8.0	2		0.32	6.21	

Total Time Involved: 35 minutes Method of Collection: 230V-AC, 3 phase electrofishing

Biologist Harry Wight Date of Report September 1, 1972

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ILLINOIS DEPARTMENT OF CONSERVATION
DIVISION OF FISHERIES

WATER PHYSICS AND CHEMISTRY

COUNTY Cook

WATER (NAME) Hillcrest Lake & Slough

DATE OF TESTS August 24, December 8, 1972

Station Number -- Location along Willow Road Time 9/24-12 noon, 12/8-2PM

Depth (Ft.)	Water Temp. Degrees F.	Diss. Oxygen PPM	pH	Total Alkalinity PPM	CO_2 PPM	Remarks
August 24:	Slough					
surface	71	--	7.4	85?		total sulfides= no trace total hardness= 182 ppm
August 24:	Lake					
surface	71	--	7.4	85?		
December 8:	Slough					
surface	34	15.6	7.4	257		total hardness= 667 ppm; H_2S= 0
December 8:	Lake					
surface	33	23.2	7.8	257		total hardness= 564 ppm; H_2S= 0

Maximum Depth at Stations all 2.0 ft. Preseut Weather Aug: sunny Dec: oold Air Temp. 78 F 29 F

Wiud calm Preceding weather (past 24 hrs.) same as days of water tests

Secchi disc --- Cause of turhidity silt

Color of water brown Odor none Limits of Thermocline unknown

Remarks: Water tests taken through 3-4 inches of ice (clear) with a little snow cover. D.O. levels at saturation or above in December.

Biologist Harry Wight Date of Report Deccember 13, 1972

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FM 16.0 2/67 (33240—5M—3-67)2-0

STATE OF ILLINOIS
RICHARD B. OGILVIE, GOVERNOR

DEPARTMENT OF CONSERVATION
102 STATE OFFICE BUILDING
400 SOUTH SPRING ST.
SPRINGFIELD 62706

CHICAGO OFFICE — 1227 S. MICHIGAN AVE. 60605

December 13, 1972

Mr. Ron Greenburg
Prospect Heights Park District
9B N. Elmhurst Road
Prospect Heights, Illinois 60070

Dear Mr. Greenburg:

I am very sorry for the delay in this report, however, the loss of our secretary and the large work load associated with monitoring the salmon return have kept from the office and correspondence.

As you can see from the report copies enclosed, the slough is too shallow to support game fish and the cost of dredging to achieve adequate depth to prevent winterkill would probably out weigh benefits due to the large amount of fill that would have to be removed.

I can see no advantages to more completely connecting the slough to Hillcrest Lake. The water chemistries are quite similiar, as far as I could determine from tests with my field kit. This water area should probably be left as it is for wildlife study and some limited fishing for small sunfish and carp.

If you have any questions concerning this report, do not hesitate to contact this office.

Very truly yours,

Harry R. Wight

Harry Wight, Fishery Biologist

Encl: Lake Survey
Fish Population Analysis
Water Physics and Chemistry

ILLINOIS DEPARTMENT OF CONSERVATION
DIVISION OF FISHERIES

County Cook

Twp. 42N. R 11E. S NE¼ 22

Directions from nearest town:
in Prospect Heights, Ill. at Willow Rd. and Hillcrest Dr.

Date of inspection: July 7,70

LAKE SURVEY

Water (Name) Hillcrest Lake

Owner Hillcrest Lake Homeowners Assoc. Address c/o Richard Michels

Lessee n Address

Person Contacted Richard Michels Identification Pres.

Address of person contacted 412 Hillcrest Dr. Prospect, Heights, Ill. Phone

Classification of ownership: State Public Organization x Private about a 48 ac. sub. with 48 homes about 25 facing lake, but only 11 homes around lake are in assoc.

1. Survey initiated by: P. Vidal

2. Type of water area dammed marsh, also supposedly deepened about 1955 for home fill

(All figures should be adjusted to spillway level):

3. Area (Acres) 13.0 Source 67 aerial Max depth (ft.) 7.0 Source echo soundings
Avr. depth (ft.) 2.7 Source avg. 88 soundings Acre feet 35.1 Gallons 11,437,370
Shoreline Length: Feet 3,100 Miles 0.58

4. Watershed size: (Acres) 500 Source topo estimate
Topography and soils flat to moderately rolling silty clay loam
Other waters iu watershed (list) 6-7 ac. marsh across Willow Rd., Old Orchard Golf Club, 1.7,1.7
Ownership of watershed 90% private, 10% public(streets acs.

5. Type of dam 2-3 road fill Height (ft.) 2-3' Year constructed 1955?
Condition of dam part of Hillcrest Drive with 24" spill pipe under

6. Type and size of drain none Condition
Type and size of spillway 24" concrete horz. pipe Condition good, screened
Present water level: 4" spill

7. Primary usage aesthetics, fishing, ice skating

8. History of past water levels has been 3' higher, flooded by McDonald Creek in 1957 and 1967

9. Use of shoreline: No. Boat liveries none No. Resorts n No. Cottages 25 face lake homes
Swimming permitted: Yes No x Waterfowl hunting permitted: Yes No x
Resident boats (Number none seen, discouraged) Motors allowed: Yes No Size Speed

10. Fish stocking record:

Species	Number	Size	Date	Sonrce (list agency or as private)
unknown				

(Draw Impoundment Map on Reverse Side)

(30173—5M Sets—6-66)

F.M. 3.0 - 1/66

11. Pollution (type and kind) extensive urban, mostly residential watershed type chemicals; periodic back-flow(flooding) by McDonald Creek

12. Erosion (extent) insignificnat except along Willow Rd. where sewer is being installed

13. Biological characteristics: Winter and/or summer kill highly prone to summer and/or winter kill; severe winter kill evident March,1970, mostly carp

Common species of aquatic plants (list) fil. algae, cattail, bulrush, sedges, burreed, smartweed, sago and leafy pondweeds,

Extent and coverage of aquatic plants fil. algae rings most of shore, stump areas; cattail along 10% of shore mostly E.shore; other aquatics scarce; 30% of shore in willow trees and brush

14. Fish spawning conditions extensive shallow muck type areas suitable for bass, panfish, but easily distrubed

15. Species composition now known present (list) lm bass, bluegill, green sunfish, bl. crapoie, carp, goldfish, bl. bullhead sampled, n. pike reported

16. Natural reproduction and survival success of major species carp and green sunfish, bl. bullhead show various size groups indicating annual recruitment

17. History of past management recommendations ?

18. Special conditions and problems very shallow, highly organic bottom marsh type lake with extensive urbanized watershed subject to undesirable fish contamination during high water from watershed ponds, McDonald Creek when it floods; prone to winter kill, high turbidity

19. Angling success good for small sunfish and rough fish

20. REMARKS AND RECOMMENDATIONS: Overabundance of rough fish(carp, bullheads,goldfish) with a limited population of game fish of desirable siz

Lake not condusive to management of desirable fish population on a sustained basis because of inadequate depth(periodic winter kill), flooding and fish contamination by McDonald Creek and large watershed runoff involving ponds and adjacent marsh, and probable predominance of rough fish population.

Drastic management recommendations include isolation of lake spillway from creek(flapper gate drop box, raise water 1') with fish barrier, deepening of lake to 10-12 ft. in 50% of area with 3:1 shoreline slopes followed by rehabilitation of lake and marsh(approx. 75 gals 5% emul. rotenone) in fall with restocking of fingerling lm bass and bluegill and yearling n. pike. Recommend partial snow removal during severe winters and aquatic weed control as needed using approved chemicals. (Continue Remarks on Reverse Side)

21. Inspecting Biologist P.Vidal Date of Report 12/28/71

Man hours involved 6 Weather p. cl. warm Temp: Air 85 Water 77

Seechi disc= 6"(greenish brown)

ILLINOIS DEPARTMENT OF CONSERVATION
DIVISION OF FISHERIES

FISH POPULATION ANALYSIS

(Condition Factor & Length - Frequency Summary)

COUNTY Cook

WATER (NAME) Hillcrest Lake

DATE OF COLLECTION July 7,1970

Species	½" Group	Number	Percent of Total	Weight	Condition Factor	Rating
lm bass	6.0	1				
	7.5	3				
	11.0	1				
		5				
bluegill	4.0	3				
	5.0	2				
		5				
green sunfish	1.5	10				
	2.0	6				
	3.0	5				
	3.5	5				
	4.0	8				
	4.5	6				
	5.0	2				
	6.0	1				
		33				
bl. crappie	7.0	6				
	10.5	1				
		7				
bl. bullhead	2.0	8				
	2.5	3				
	3.0	5				
	4.0	1				
	4.5	3				
	5.0	1				
	8.0	3				
	9.0	1				
	9.5	1				
		26				
carp	2.0	18				
	2.5	13				
	3.0	16				
	3.5	8				
	4.0	5				
	4.5	2				
	5.5	1				
	8.0	5				
	9.0	1				
	12.0	2				
	14.0	2				
	15.0	3				
		76				

Sampling Time Involved: 40 minutes Method of Collection: 230 V AC 3PH generator

Biologist P. Vidal, G. Cima Date of Report 12/28/71

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F.M. 12.0 (8-70)

(26664—10M—12-70) 2-o

cont.

ILLINOIS DEPARTMENT OF CONSERVATION
DIVISION OF FISHERIES

FISH POPULATION ANALYSIS

(Condition Factor & Length-Frequency Summary)

COUNTY Cook

WATER (NAME) Hillcrest Lake

DATE OF COLLECTION July 7,70

Species	½" Group	Number	Percent of Total	Weight	Condition Factor	Rating
goldfish	12.0	6				
	12.5	1				
	~~13.0~~	6				
	13.5	4				
		17				

Sampling Time Involved: 40 min. Method of Collection: 230 V AC 3PH gen.

Biologist p.Vidal. G. Cima Date of Report 12/28/71

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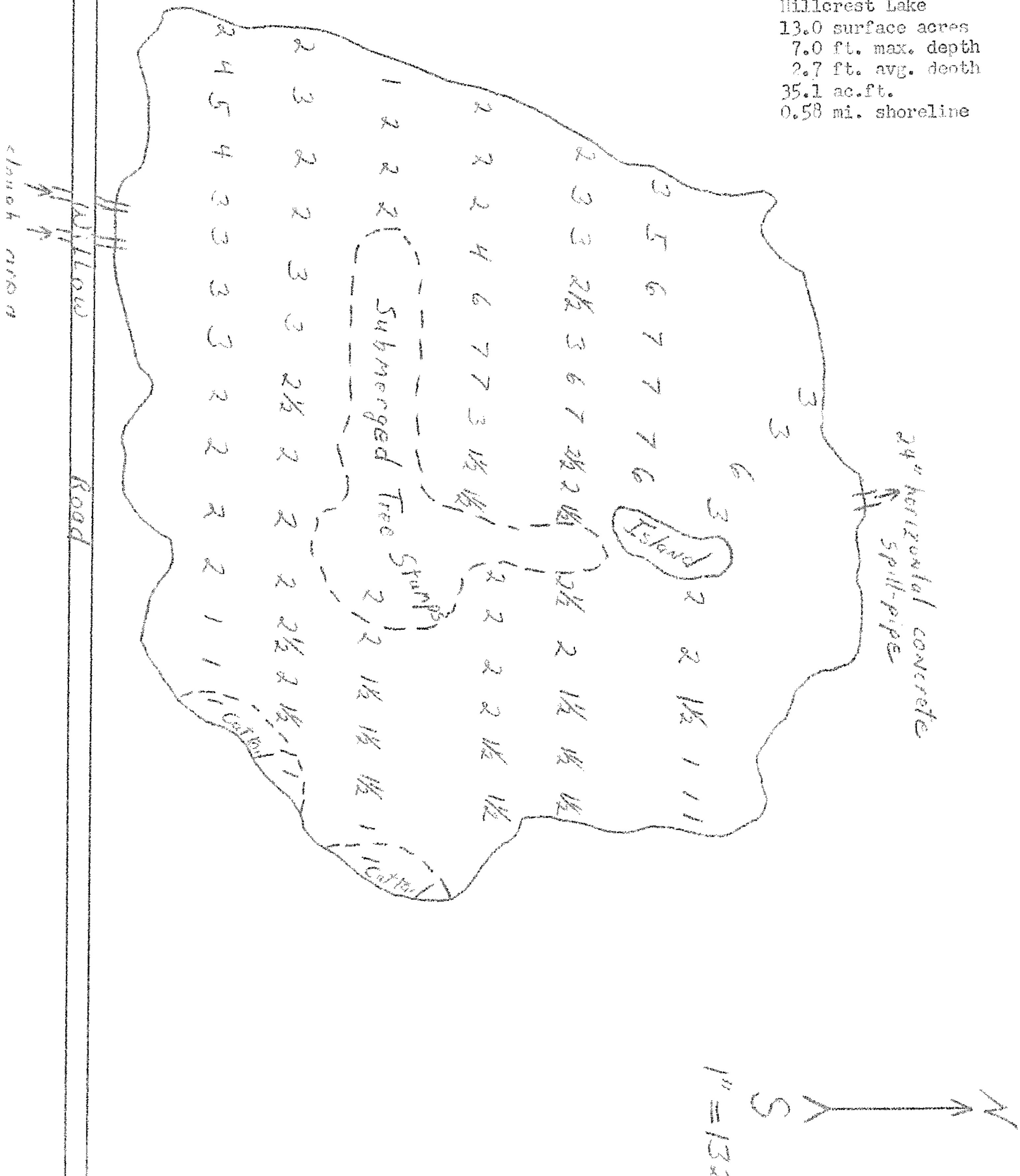
(26664—10M—12-70) 2-o

Impoundment Map

Cook County
T 42N. R 11E. Sec. NE¼ 22
Prospect Heights, Illinois

Hillcrest Lake
13.0 surface acres
7.0 ft. max. depth
2.7 ft. avg. depth
35.1 ac.ft.
0.58 mi. shoreline



P. Vidal

City of Prospect Heights

Hillcrest Lake Outlet Investigations

September 9, 2015

Globetrotters® Engineering Corporation

Prospect Heights

Prospect Heights – Hillcrest Lake Outlet Investigations

Task 1 Summary Memo - Hillcrest Lake Outlet Investigation and Permitting Summary

Background

Hillcrest Lake is a 14-acre lake located in Prospect Heights, Illinois. The lake outlets to McDonald Creek via an existing 24-inch diameter PVC stormwater culvert under Hillcrest Avenue. The lake is connected to a narrower body of water known as the Slough located south of Willow Road via several culverts under the road. The lake is typically shallow with water depths ranging from a few inches at the upstream end of the slough to approximately 3 feet in the deepest part of the lake based on a lake survey performed in 2014. Roads in the vicinity of the lake (Hillcrest Avenue, Owen Court and Willow Road) flood frequently. Globetrotters Engineering Corporation (GEC) performed a Feasibility Study in 2014 and Preliminary Design Report in 2015 under contract to MWRDGC. The study was focused on reducing the frequency of flooding of local roads.

The Prospect Heights Natural Resources Commission has raised concerns regarding the depth of the lake and has requested a study of the history of the outlet culvert and an analysis of possible options for increasing the depth in the lake by raising the normal water level. The analysis would build upon, but be separate from the MWRDGC study.

The assessment is limited to a weir type overflow structure set at an elevation above the existing outlet sewer elevation. Task 1 of this study includes investigating the current outlet from Hillcrest Lake to McDonald Creek and summarizing the permitting requirements for modifying the outlet.

Hillcrest Lake Area

Existing Outlet History

The history of the existing outlet from Hillcrest Lake to McDonald Creek was investigated. Data sources reviewed included available sewer atlases, drawings, survey and historical aerial photographs.

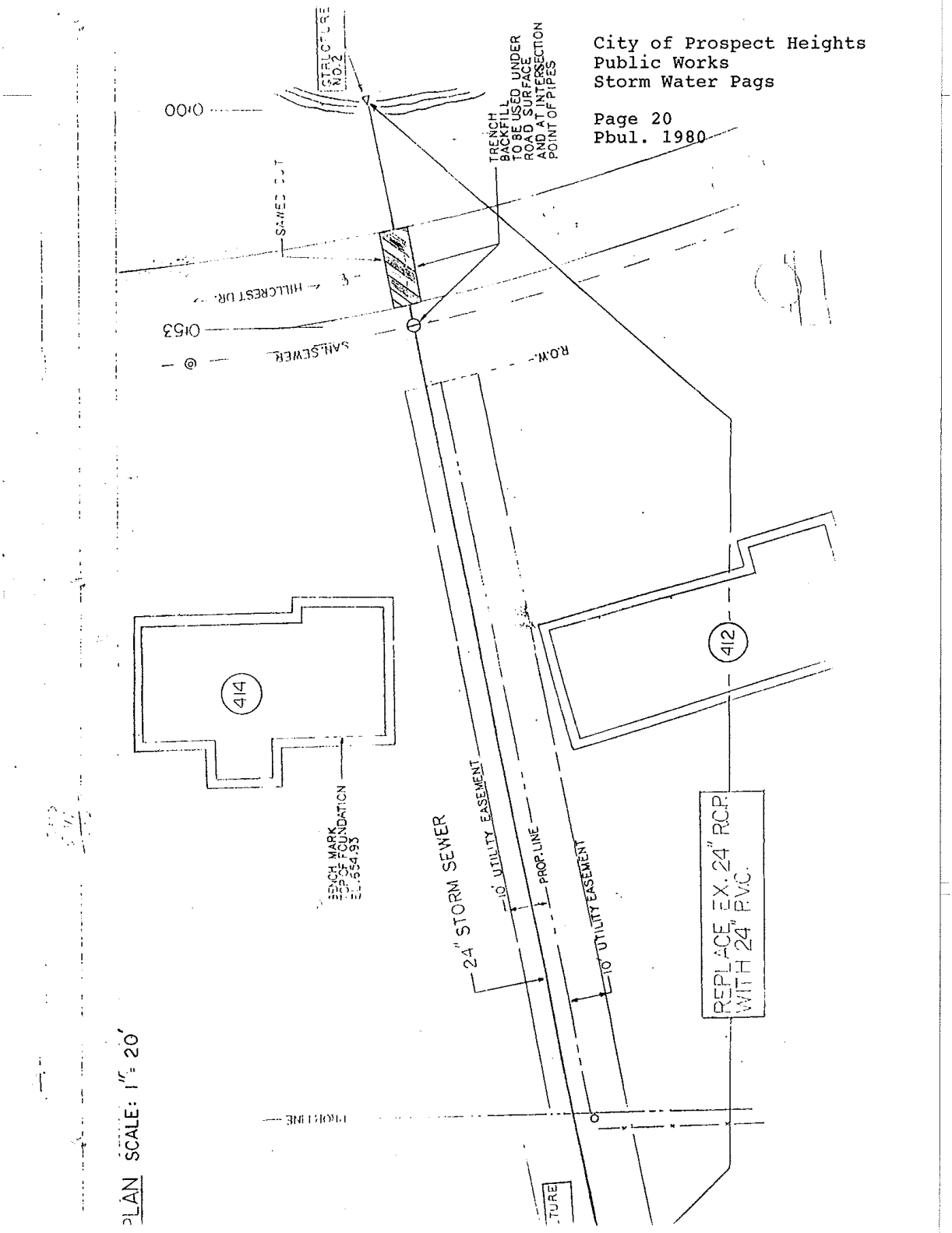
The existing outlet pipe is a 24-inch diameter PVC culvert. Based on survey performed by GEC for the MWRDGC study in 2014, the invert elevation (bottom of pipe) is 647.1 at the upstream (lake) end and 646.3 at the downstream end. The pipe is approximately 350 feet long. Water flows from the lake into the culvert and discharges into a ditch which leads to McDonald Creek.

The normal lake water level during dry weather is typically about 2 to 6 inches above the invert of the culvert. The inlet to the culvert is protected by several metal fence posts driven into the lake bed. These serve to prevent large debris from entering the culvert. Prospect Heights periodically inspects and removes debris accumulations.

Hillcrest Lake Outlet Photos

Based on discussions with Prospect Heights'staff during the MWRDGC study, as-built construction drawings of the outlet culvert were destroyed in a fire, so the exact date of the installation of the culvert is unknown.

Based on the Prospect Heights storm sewer utility atlas (see excerpt on the next page), a 24-inch pipe existed at this location since at least 1980. The atlas indicates a 24-inch diameter reinforced concrete pipe (RCP) at that location with a note that it is to be replaced by a 24-inch diameter PVC pipe. No information regarding elevation of the pipe is shown on the drawings.



Excerpt from Prospect Heights Storm Sewer Atlas

Historic aerial photographs were reviewed to attempt to identify the outlet pipe and / or significant lake level changes that would indicate a change in outlet conditions. As part of the MWRDGC study, an environmental report was prepared focused on the wetland and environmental conditions of soils that may be disturbed by construction. This environmental report included the assembly of historic aerial photographs of the lake and surrounding area. These are included in Appendix A. Aerial photos were obtained and reviewed for the years 2012, 2009, 2005, 1998, 1993, 1988, 1981, 1978, 1974, 1967, 1962, 1955, 1951, and 1938.

Based on a review of these drawings, the area was originally farmed. The earliest photographs appear to indicate a poorly drained wetland type area with no definitive outlet for the aerials from 1955 and earlier. It is likely that there were drain tiles in the farmed areas that may have conveyed some flow from the low area to McDonald Creek.

Hillcrest Drive first appears in the 1962 photograph. This photograph also appears to show a ditch line in its current location south of McDonald Creek. Although the photo quality is not sufficient to identify a portion of a pipe, it is likely that an outlet pipe existed in its present location under Hillcrest Drive. The lake and surrounding roads appear in their current configurations in the 1967 photographs. The lake edge outline appears relatively unchanged from 1967 to present. **This would support the concept that the lake level and outlet pipe elevation are relatively unchanged since 1967.**

Google Earth Pro images were also consulted. The white PVC outlet pipe is clearly visible in the June 2015 and October 2008 photos (see below). Earlier photography back to 1998 were reviewed, but the image quality and / or tree cover prevented clear identification of the outlet pipe.

Conclusions

Based on all the information reviewed, an outlet pipe from the lake under Hillcrest Drive appears to have been installed since at least 1967. The earliest pipe was likely a 24 inch diameter reinforced concrete pipe. The existing PVC outlet pipe was likely installed in the 1980s as a replacement to the original RCP pipe. There is clear evidence from the aerial photography that it existed in its current location in 2008. It is unlikely that the elevation of the PVC pipe has changed significantly since its installation.

Globetrotters® Engineering Corporation

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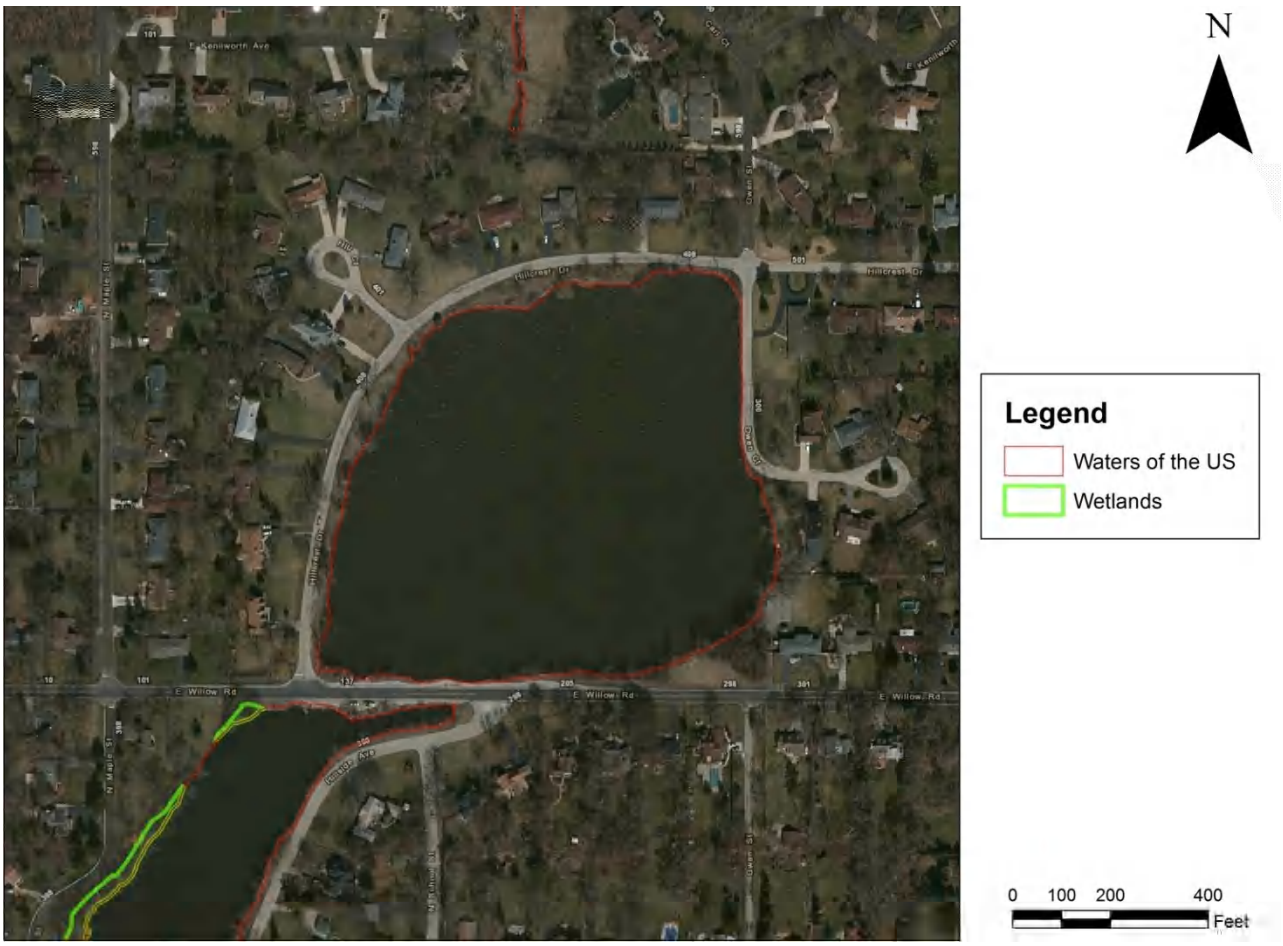
Permitting Requirements

Modifications to the Hillcrest Lake outlet would fall under the regulatory jurisdiction of two primary agencies – the Illinois Department of Natural Resources Office of Water Resources (IDNR) and the U.S. Army Corps of Engineers.

Corps of Engineers Permitting – The Corps of Engineers regulates activities related to wetlands and Waters of the U.S. under Section 10 of the River and Harbors Act of 1899 and Section 404 of the Clean Water Act. A wetlands and Waters of the U.S. Delineation was performed as part of the MWRDGC study. Hillcrest Lake is classified as Waters of the United States by the Corps of Engineers. Wetlands are present on the Slough, primarily on the west and south banks. No jurisdictional wetlands were identified on the lake.



Wetlands and Waters of the U.S. Delineation Map

For this type of project, the Corps of Engineers is primarily concerned with filling of Waters of the U.S. and impacts on wetlands. Modification of the outlet is a somewhat atypical project from a Corps of Engineers permitting perspective. Based on discussions with Corps of Engineers regulatory staff, the

project would likely not require a permit provided that it could be demonstrated that impacts to wetlands would be minimal. Considering the small change in lake level, it is expected that this would be the case. The largest concern would likely be potential impacts on wetlands upstream in the southern end of the slough. The Corps regulatory staff recommended that a request for a Letter of No Objection be submitted to the Corps of Engineers once a plan is developed. A copy of the Request for Letter of No Objection form is included as an attachment to this memo.

IDNR Permitting - IDNR regulates construction in the floodway (17 IAC 3708) and dam safety (17 IAC 3702). The primary focus of the IDNR regulations is to prevent adverse impacts to water levels upstream and downstream of projects and protect life and safety in the vicinity of dams. The summary below is based on review of the pertinent IDNR regulations and a telephone conversation with IDNR regulatory staff.

Floodway Construction Permitting - The outlet to Hillcrest Lake is within the regulatory floodway (see figure below). The upstream drainage area is greater than 1 square mile, therefore the lake falls under IDNR jurisdiction. Modifications for water quality of habitat for fish and wildlife is considered an appropriate use of the floodway (Section 3708.70.c.1 of the IDNR Regulations).

The Floodway Construction regulations generally require that any modifications to waterways not result in increases more than 0.1 feet for flood stages. In the case of culvert modification, all flood frequencies up to and including the 100-year event must be analyzed (Section 3708.70.d.2). Section 3708.70.d.4 addresses "... on-stream structure build for the purpose of backing up water in the stream during normal or flood flows, but not permitted as a dam…". This section would require no increase in flood stages for all flood events up to and including the 100-year frequency event. This requirement will tend to be more difficult to meet for smaller flood events (2- and 5-year frequency events) due to the limited head above the top of the weir. This may require increasing the length of the weir to pass more water.

Compensatory storage is required for any floodway storage impacts from the project per Section 3708.70.6 which states:

> "For all appropriate uses, compensatory storage shall be provided for any regulatory floodway storage lost due to the proposed work from the volume of fill or structures placed and the impact of any related flood control projects."

Preliminary discussions with IDNR staff confirmed that raising the normal water level will require that the project provide compensatory storage for floodway volume lost due to increase in normal water level. Since Hillcrest Lake and the Slough are both completely within the floodway and the surface area of the floodway is approximately 21 acres, compensatory storage volume would be at least 10.5 acre-feet for the six-inch rise. 10.5 acre-feet of compensatory storage will be on the order of 17,000 cubic yards of excavation. Volumes would be double for a 12-inch normal water level raise. This volume must be provided between the normal water level and the 100-year flood level. It is typically required to be provided within the watershed, preferable in the immediate vicinity of the project.

During the course of the MWRDGC flood study, compensatory storage was a significant challenge. The compensatory storage volume required for the road raise alternative was approximately 7,500 cubic yards of excavation. Due to the built out condition of the watershed, general topography and presence of wetlands in some areas, viable, cost effective locations for this volume were very limited. **This issue will likely present the greatest challenge to implementation of a normal water level increase from a regulatory perspective.**

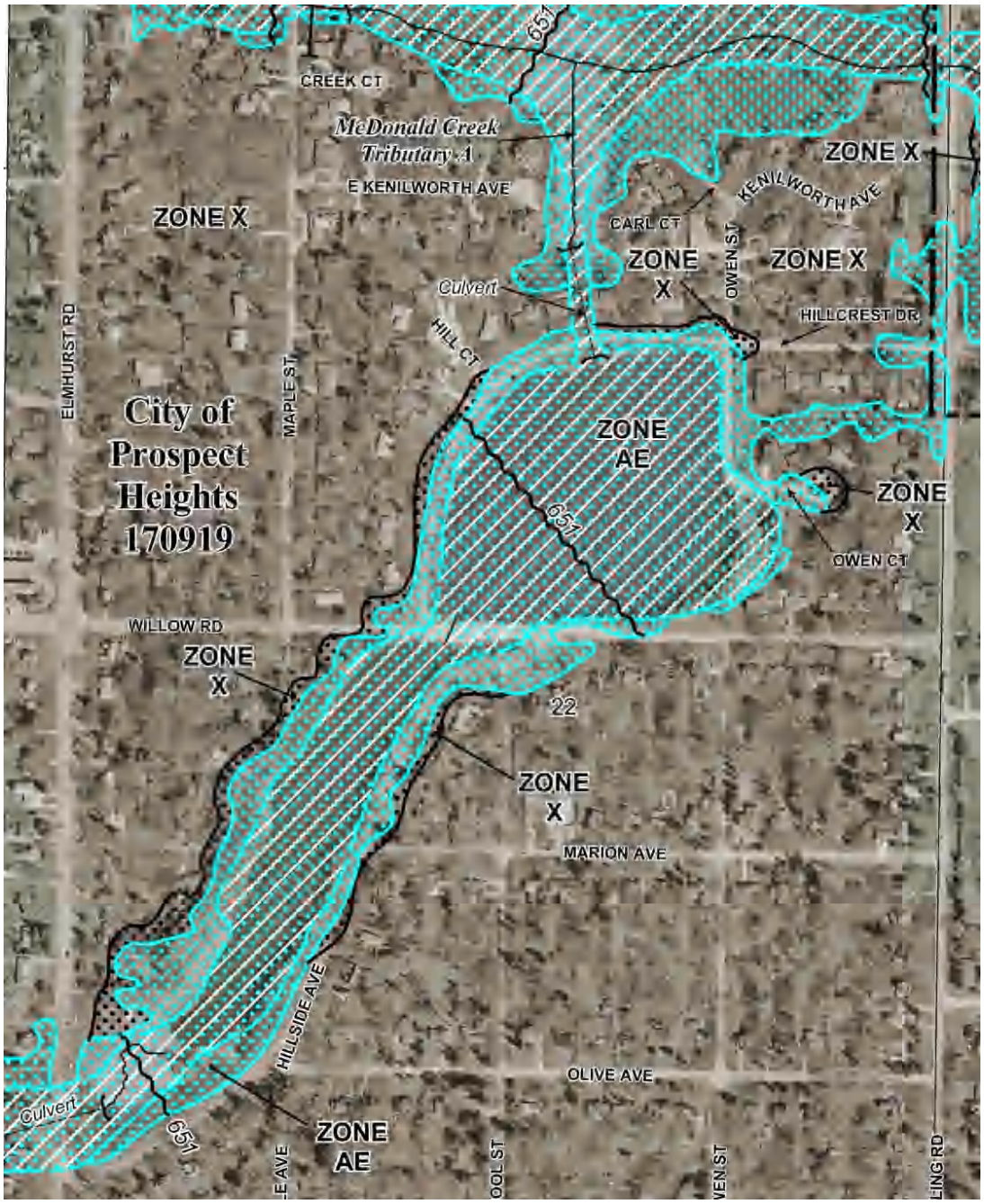
IDNR does not typically have a mechanism for granting permits for temporary measures outside of the normal permitting process for non-emergency measures.

Dam Safety Permitting - 17 IAC 3702 (Construction and Maintenance of Dams), defines a dam as:

> "All obstructions, walls, embankments, or barriers, together with their abutments and appurtenant works, if any, constructed for the purpose of storing or diverting water or creating a pool."

Under a strict interpretation of this regulation the proposed modification could be construed as meeting the definition of a dam. It would likely be classified as a Class III low hazard dam.

Initial discussion with IDNR regulatory staff indicated that a dam safety permit may be required depending on the details of the proposed structure. A structure that is directly connected to the existing culvert would be more likely to require a dam safety permit than a long weir structure built into the lake around the existing culvert. If it is connected directly to the culvert, then the structure, culvert and roadway might be all considered as a single integral dam structure. A final determination as to the need for a dam safety permit would require submittal of a Preliminary Design Report or more formal request including additional data that is beyond the current scope of work.



Hillcrest Lake Floodplain and Floodway Map

Other Potential Permit Requirements

MWRDGC – MWRDGC has regulatory authority regarding floodplains within Cook County. The MWRDGC Watershed Management Ordinance (WMO), although geared more towards regulating development may apply in this instance. An inquiry has been made to MWRDGC regarding the applicability of the WMO for this project. This memo will be updated once a response is received.

Many of the IDNR requirements regarding flood stages are identical, however, Section 602.9 of the WMO would require additional compensatory storage. This section states:

> "Compensatory storage shall be required for any fill, structure, or other material above grade in the regulatory floodplain that temporarily or permanently displaces floodplain storage volume. In addition, compensatory storage shall:
>
> A. Equal at least 1.1 times the volume of flood storage lost below the BFE;"

If the WMO is applied in a manner similar to the IDNR regulations, the compensatory storage required would increase due to the inclusion of the entire floodplain (as opposed to the IDNR floodway requirement) as well as the increased storage replacement ratio required.

City of Prospect Heights – Title 7, Chapter 1 (Flood Control Regulations) of the Prospect Heights City Code regulates floodway development. Many of the regulations mirror the requirements of IDNR. Again, the regulations are more usually applied to more typical land development type projects within the floodplain. However, if the regulations are applied to this project, additional compensatory storage may be required under Section 7-1-8-2: Paragraph L.b. which states in part:

> "Preservation Of Floodway Storage So As Not To Increase Downstream Flooding: Compensatory storage shall be provided for any regulatory floodway storage lost due to the proposed work from the volume of fill or structures placed and the impact of any related flood control projects. Compensatory storage for fill or structures shall be equal to at least one and five-tenths (1.5) times the volume of flood plain storage lost."

If this section is applicable to the proposed increase in normal water elevation, it would increase the volume of compensatory storage required by IDNR by 50%.

Other Considerations

For the proposed structure, the most difficult aspect of meeting a zero stage increase requirement will be for the lower, more frequent flood events (2-year, 5-year frequency events). Below is some of the pertinent elevation information related to the project:

Item	Elevation
Typical lake bottom	644.5 – 645.5 (varies with location
Outlet Culvert Invert	647.1
Normal Lake Level (dry weather)	647.5 (varies with precipitation)
Owen Court Road Pavement	648.5 – 649 (varies with location)
Willow Road Pavement	649.6 (low point, varies with location)
Lake Flood Elevations (Design H&H Model)	
2-year	650.0
5-year	650.6
10-year	651.1
50-year	651.7
100-year	651.9

The flood stage elevations are based on the hydraulic design models from the MWRDGC study. The design model is an unsteady state HECRAS model. Other elevations are based on surveys performed in 2014 and 2015 for the MWRDGC study.

Based on this data, one can see that the normal lake level is approximately 12 inches above the low pavement elevation of Owen Court. This roadway floods for relatively minor flood events. Willow Road overtops for events slightly less than the 2-year event.

In order to prevent increases in flood stages, the length of the overflow weir at the outlet structure must convey sufficient flow to the culvert without increasing water levels. With overflow weirs set at elevation 647.6 and 648.1 (6 and 12 inches above the existing culvert respectively), one would expect to raise the normal water surface elevation to approximately 648.0 and 648.5. The 12-inch rise would increase the normal dry weather water surface to approximately the elevation of Owen Court. This highlights the potential concern for increased flooding of roadways with increases in normal water elevation.

The primary approach to minimizing flood stage increase will be to provide a sufficiently long weir to convey the same or greater flow over the top of the weir as is currently conveyed through the culvert. Hydraulic modeling will be performed and summarized in a separate document.

GEC - MWRD Willow Road n/a Prospect Heights, IL		2012 HIG Project # 148709 Client Project # 20141010061 Approximate Scale 1:6000 (1"=500')	

GEC - MWRD Willow Road n/a Prospect Heights, IL		2009 HIG Project # 148709 Client Project # 20141010061 Approximate Scale 1:6000 (1"=500')	

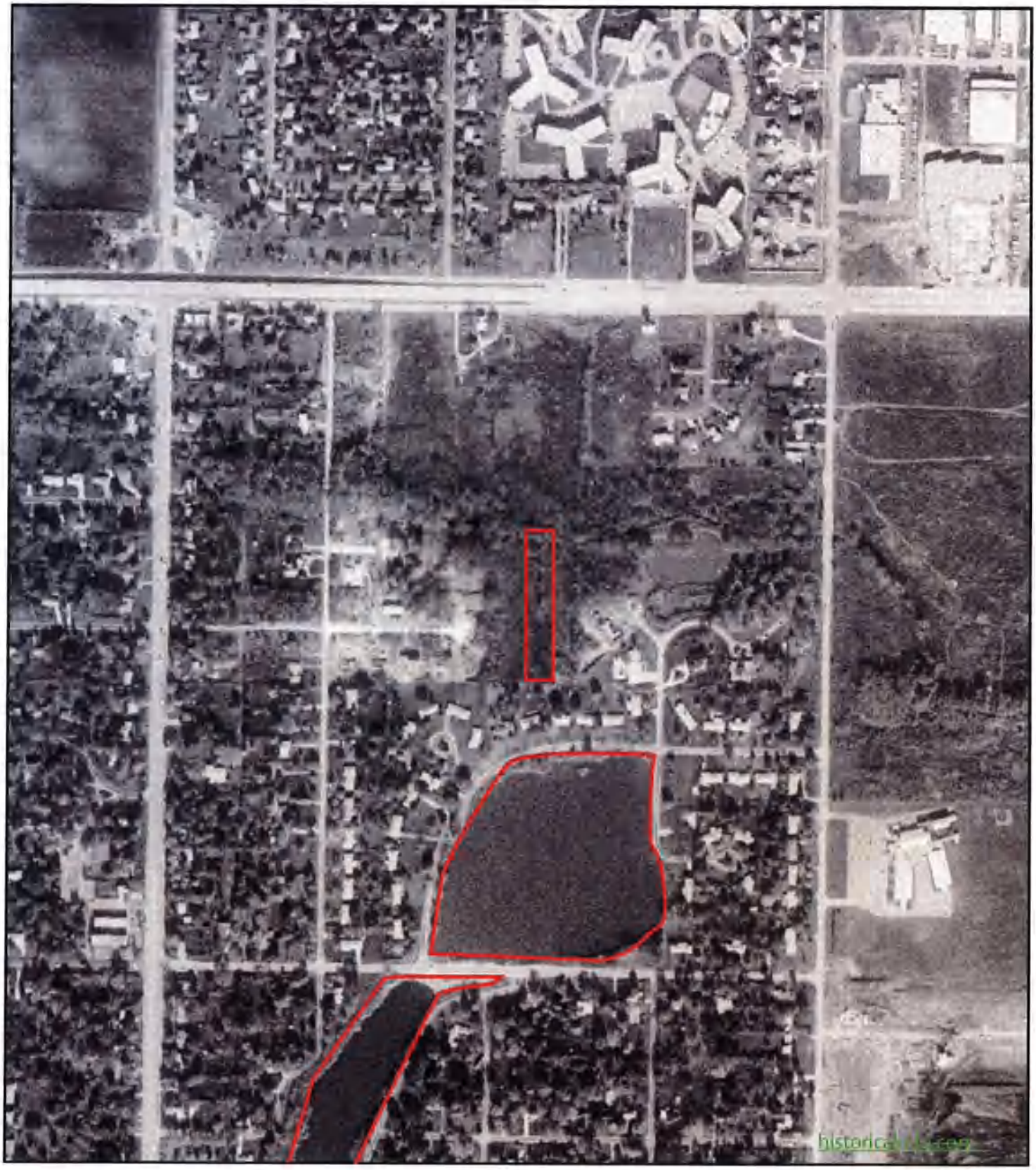
GEC - MWRD Willow Road n/a Prospect Heights, IL		2005 HIG Project # 148709 Client Project # 20141010061 Approximate Scale 1:6000 (1"=500')	

GEC - MWRD Willow Road n/a Prospect Heights, IL		1998 HIG Project # 148709 Client Project # 20141010061 Approximate Scale 1:6000 (1"=500')	HIG

GEC - MWRD Willow Road n/a Prospect Heights, IL		1993 HIG Project # 148709 Client Project # 20141010061 Approximate Scale 1:6000 (1"=500')	HIG

GEC - MWRD Willow Road n/a Prospect Heights, IL		1988 HIG Project # 148709 Client Project # 20141010061 Approximate Scale 1:6000 (1"=500')	

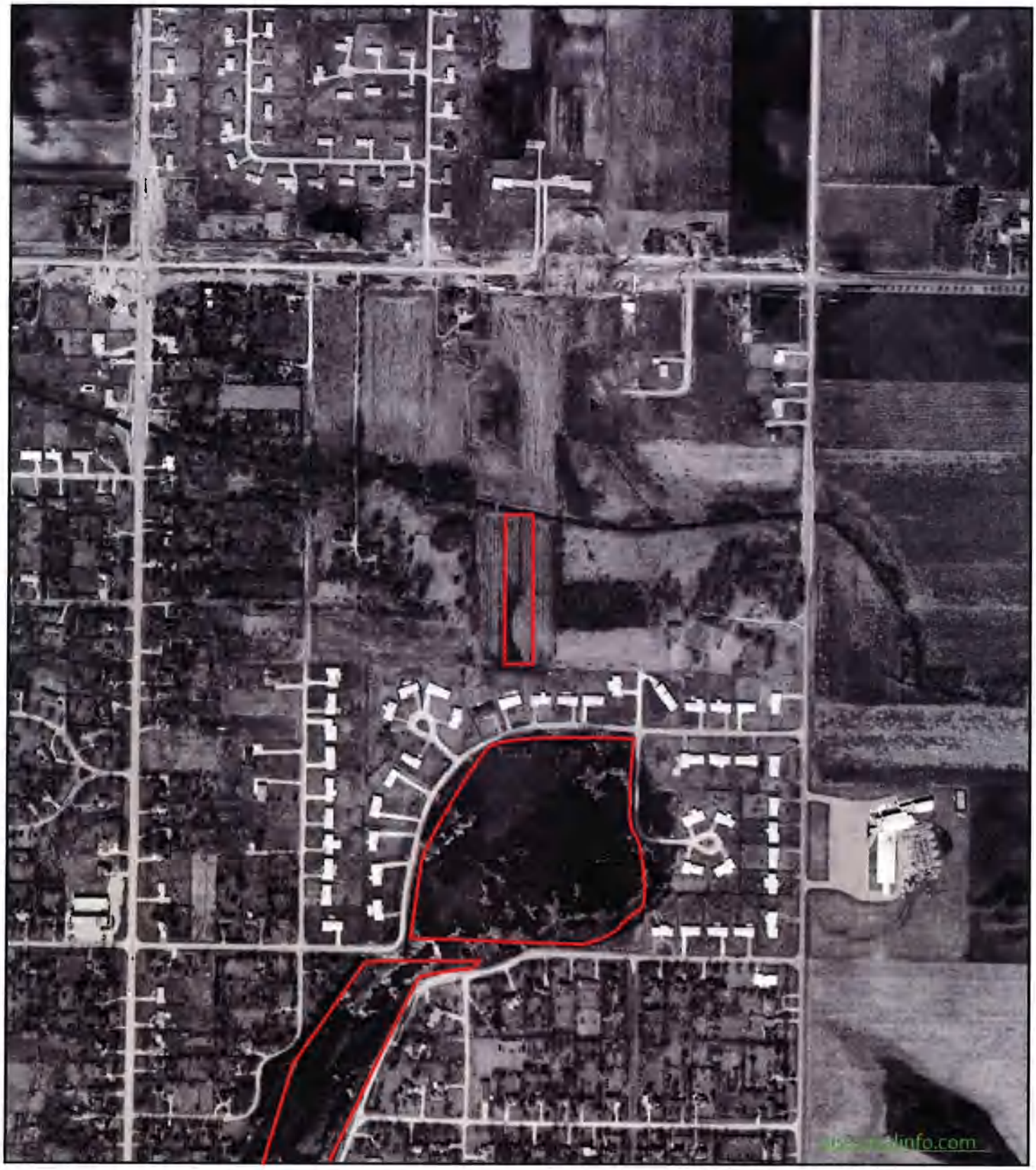
GEC - MWRD Willow Road n/a Prospect Heights, IL		1981 HIG Project # 148709 Client Project # 20141010061 Approximate Scale 1:6000 (1"=500')	HIG



GEC - MWRD Willow Road n/a Prospect Heights, IL		1978 HIG Project # 148709 Client Project # 20141010061 Approximate Scale 1:6000 (1"=500')	HIG

GEC - MWRD Willow Road n/a Prospect Heights, IL		1974 HIG Project # 148709 Client Project # 20141010061 Approximate Scale 1:6000 (1"=500')	

GEC - MWRD Willow Road n/a Prospect Heights, IL		1967 HIG Project # 148709 Client Project # 20141010061 Approximate Scale 1:6000 (1"=500')	HIG



GEC - MWRD Willow Road n/a Prospect Heights, IL		1962 HIG Project # 148709 Client Project # 20141010061 Approximate Scale 1:6000 (1"=500')	HIG

GEC - MWRD Willow Road n/a Prospect Heights, IL		1955 HIG Project # 148709 Client Project # 20141010061 Approximate Scale 1:6000 (1"=500')	HIG

GEC - MWRD Willow Road n/a Prospect Heights, IL		1951 HIG Project # 148709 Client Project # 20141010061 Approximate Scale 1:6000 (1"=500')	HIG

GEC - MWRD Willow Road n/a Prospect Heights, IL		1938 West HIG Project # 148709 Client Project # 20141010061 Approximate Scale 1:6000 (1"=500')	HIG

US Army Corps of Engineers ®
Chicago District

US ARMY CORPS OF ENGINEERS, CHICAGO DISTRICT
REQUEST FOR A LETTER OF NO OBJECTION
The proponent agency is CELRC-TS-R.

THIS FORM CAN BE USED WHEN YOU WANT CONFIRMATION THAT A PROJECT ON YOUR PROPERTY DOES NOT FALL UNDER THE REGULATORY REQUIREMENTS OF THE U.S. ARMY CORPS OF ENGINEERS *(USACE)*. PLEASE SUPPLY THE FOLLOWING INFORMATION AND SUPPORTING DOCUMENTS DESCRIBED BELOW. THIS FORM CAN BE FILLED OUT ONLINE AND THEN PRINTED. IT **MUST BE SIGNED BY THE PROPERTY OWNER** TO BE CONSIDERED A FORMAL REQUEST. SUBMITTING THIS REQUEST AUTHORIZES THE US ARMY CORPS OF ENGINEERS TO FIELD INSPECT THE PROPERTY SITE, IF NECESSARY, TO HELP IN THE DETERMINATION PROCESS. THE PRINTED FORM AND SUPPORTING DOCUMENTS SHOULD BE MAILED TO:

US ARMY CORPS OF ENGINEERS, CHICAGO DISTRICT REGULATORY BRANCH 231 SOUTH LASALLE STREET, SUITE 1500 CHICAGO, ILLINOIS 60604 PHONE: 312.846.5530 FAX: 312.353.4110	ADDITIONALLY, YOU MAY EITHER CALL OUR BRANCH TELEPHONE AT 312.846.5530 OR VIEW OUR WEBSITE AT http://www.lrc.usace.army.mil/Portals/36/docs/Regulatory/newapps.pdf TO DETERMINE WHICH NUMBER AND PROJECT MANAGER HAS BEEN ASSIGNED TO YOUR REQUEST. PROJECT MANAGER CONTACT INFORMATION CAN BE FOUND HERE: http://www.lrc.usace.army.mil/Missions/Regulatory/ContactInfo.aspx. PLEASE CONTACT US IF YOU NEED ANY ASSISTANCE WITH FILLING OUT THIS FORM.

SECTION I - LOCATION AND INFORMATION ABOUT PROPERTY TO BE SUBJECT TO A LETTER OF NO OBJECTION

1. PROPERTY ADDRESS LOCATION				
2. CITY OR UNINCORPORATED NAME			3. STATE	4. ZIP CODE
5. COUNTY			6. TOWNSHIP NAME	
7. QUARTER	8. SECTION	9. TOWNSHIP	10. RANGE	11. PM
12a. LATITUDE IN DECIMAL DEGREES °NORTH			b. LONGITUDE IN DECIMAL DEGREES °WEST	
13. SIZE OF PROPERTY IN ACRES			14. TAX PIN	
15. PRIOR OR RELATED USACE PROJECT NUMBER			16. OTHER DESCRIPTIVE INFORMATION	

17. IS THE PROPERTY SUBJECT TO A CONSERVATION EASEMENT OR DEED RESTRICTION? ☐ YES *(specify below)* ☐ NO

IF YES, PLEASE EXPLAIN AND SUBMIT DETAILS OF THE PROJECT AREA.

18. WAS THE PROPERTY A SITE FOR MITIGATION PURSUANT TO A PROJECT PREVIOUSLY PERMITTED BY USACE? ☐ YES *(specify below)* ☐ NO

IF YES, PLEASE EXPLAIN AND SUBMIT DETAILS OF THE PROJECT AREA.

19. IS THE PROPERTY NEIGHBORING / ADJACENT TO / BORDERING A PROJECT PREVIOUSLY PERMITTED BY USACE?
☐ YES *(specify below)* ☐ NO

IF YES, PLEASE EXPLAIN AND SUBMIT THE NAME OF THE PROJECT, THE PERMITTEE'S NAME AND / OR ADDRESS, AND CORPS PERMIT NUMBER, IF AVAILABLE.

SECTION II - PROPERTY OWNER / REQUESTOR'S CONTACT INFORMATION		
1. PROPERTY OWNER NAME *(Last, First MI) (must be an individual)*		
2. PROPERTY OWNER COMPANY *(if applicable)*		
3. MAILING ADDRESS *(Street, Post Office Box, City, State and Zip Code)*		
4. DAYTIME TELEPHONE NUMBER	5. FAX NUMBER	6. E-MAIL ADDRESS
IF THE PERSON REQUESTING THE LETTER OF NO OBJECTION IS NOT THE PROPERTY OWNER, PLEASE ALSO SUPPLY THE REQUESTOR'S CONTACT INFORMATION HERE.		
7. REQUESTOR'S NAME *(Last, First MI)*		
8. COMPANY *(if applicable)*		
9. MAILING ADDRESS *(Street, Post Office Box, City, State and Zip Code)*		
10. DAYTIME TELEPHONE NUMBER	11. FAX NUMBER	12. E-MAIL ADDRESS
IF YOU HAVE ANY OF THE FOLLOWING INFORMATION, PLEASE INCLUDE IT WITH YOUR REQUEST: WETLAND DELINEATION, GRADING PLANS, RELEVANT MAPS, TOPOGRAPHIC SURVEY, AND SITE PHOTOGRAPHS. PLEASE IDENTIFY ON THE REQUIRED SITE MAP, PLAT OF SURVEY, OR IN A SEPARATE DRAWING: THE FOOTPRINT, LOCATION, AND TYPE OF POTENTIAL WORK. IT WILL ASSIST US IN DETERMINING IF NO PERMIT IS NECESSARY, AND WILL BE REFERENCED IN OUR RESPONSE LETTER.		
13. PLEASE DESCRIBE THE PROPOSED WORK ON THE PROPERTY		
SECTION III - SIGNATURE CERTIFICATION		
I HEREBY CERTIFY THAT THE INFORMATION CONTAINED IN THIS REQUEST FOR A LETTER OF NO OBJECTION IS ACCURATE AND COMPLETE.		
1a. DATE *(YYYYMMDD)*	b. SIGNATURE OF PROPERTY OWNER	

City of Prospect Heights

Hillcrest Lake Outlet Hydraulic Analysis

September 11, 2015

Globetrotters® Engineering Corporation

Prospect Heights

Prospect Heights – Hillcrest Lake Outlet Investigations

Task 2 Summary Memo - Hydraulic Analysis

As part of the MWRDGC flood control study for Willow Road, Globetrotters Engineering Corporation (GEC) developed hydraulic and hydrologic models of McDonald Creek, focusing on Tributary A (including Hillcrest Lake and the Slough). These models were based on unsteady state HECRAS models that were developed by MWRDGC as part of the larger Des Plaines River watershed Detailed Watershed Plan (DWP). The updated model incorporated more detailed survey data and other modifications that are summarized in the MWRDGC Feasibility Study.

Note that the updated DWP models are different than the hydraulic models that would be used for IDNR regulatory purposes. Although the DWP models present a more current modeling approach, IDNR relies on the older models that were used for developing FEMA flood insurance studies for their permitting. IDNR does not currently accept unsteady state models for floodway permitting.

To assess the effects of the weir structures on flood elevations, the MWRDGC models were modified to include weirs at the Hillcrest Lake outlet. Weirs were set at elevation 647.6 and 648.1 (approximately a 0.5 and 1.0 foot raise above the existing outlet respectively) and included in the model. The 2, 10, 50 and 100-year events were simulated with the weirs in place and comparisons of flood stages with and without the weir were made to evaluate the impacts on flood stages upstream.

Below is some of the pertinent elevation information related to the analysis:

Item	**Elevation**
Typical lake bottom	644.5 – 645.5 (varies with location
Outlet Culvert Invert	647.1
Normal Lake Level (dry weather)	647.5 (varies with precipitation)
Owen Court Road Pavement	648.5 – 649 (varies with location)
Willow Road Pavement	649.6 (low point, varies with location)

Based on this data, one can see that the normal lake level is approximately 12 inches above the low pavement elevation of Owen Court. This roadway floods for relatively minor flood events.

Per IDNR Floodway regulations, the proposed weir must result in no increase in water levels during flood events. In order to not increase stages, the length of the overflow weir at the outlet structure must convey sufficient flow to the culvert without increasing water levels. With overflow weirs set at elevation 647.6 and 648.1(6 and 12 inches above the existing culvert respectively), one would expect to raise the normal water surface elevation to approximately 648.0 and 648.5. The 12-inch rise would increase the normal dry weather water surface to approximately the elevation of Owen Court. This highlights the potential concern for increased flooding of roadways with increases in normal water elevation.

The initial modeling assumed the use of a flashboard riser type system (see below). These commercially available systems attach directly to the end of the existing culvert. Flashboards are placed in slots in front of the culvert to allow for adjustment of water levels. This is a relatively simple, inexpensive approach to raising normal water levels. The primary drawback of this system is the limited width of the overflow section. This limits the volume of water that can flow over the flashboard weir, resulting in increased potential for flood stage increases. Debris and ice accumulation can also be a concern.

Flashboard Riser System (Approximately 3-foot weir length, Osceola Machine Works)

This approach was found to raise flood stages for all events and would not be permitted by IDNR. The results of the analysis are shown below.

Lake Flood Elevations – Flashboard Riser Type System

Event	Existing	With 6” High Weir	With 12” High Weir
2-year	650.0	650.4	651.6
5-year	650.6	651.0	651.6
10-year	651.1	651.3	651.6
50-year	651.7	651.8	651.9
100-year	651.9	651.9	652.1

The primary approach to minimizing flood stage increase was to provide a sufficiently long weir to convey the same or greater flow over the top of the weir as is currently conveyed through the culvert. This would require constructing a relatively long weir in the lake. These type structures are typically steel sheet pile or concrete wall type structures. Preliminary analysis was performed for both a 6-inch and 12-inch weirs for the critical 2-year flood event. For a 6-inch high weir (elevation 647.6), a weir length of 10 feet was required to maintain existing flood elevations. For a 12-inch high weir (elevation 648.1) a 16 foot long weir was required. Order of magnitude cost for this type of system would likely be in the $10 – $20,000 range.

If this option is selected, additional hydraulic modeling using the IDNR regulatory hydraulic model would be required. Note that this would only satisfy the permit requirement to not increase flood stages. Compensatory storage would continue to be required (where a typical flashboard riser system would have a width of 30 to 36 inches).

Conclusions and Recommendations

Based on the modeling conducted, a flashboard riser type system appears to provide inadequate weir length to avoid raising flood elevations. A 10 foot long weir would be required for a 6-inch high weir and a 16 foot long weir would be required for a 12-inch high weir. Since the work would be in the regulatory floodway, an IDNR permit will be required. This will require evaluation of the selected weir design using the IDNR / FEMA steady state model and providing the analysis to IDNR as part of the overall permit application. This may result in changes to the weir length.

McHenry Analytical Water Laboratory, Inc.
A Crystal Lake Rd. McHenry, IL 60050-4314

Phone: (815) 344 4044 Fax: (815) 344 2208
Email: www.mchenrylab.com

LABORATORY RESULTS

Hey and Associates
Attn: Jeremy Husnik
26575 W. Commerce Drive, Suite 601
Volo IL, 60073

Date Received: 10/01/15 15:32
Report Date: 10/15/2015
NPDES/SI Permit Number:
Facility Number:
Facility Name:

Sample No: **15J0143-01** Collect Date: **10/01/15 11:00**
Client ID: **Hey and Associates** Site: **Hillcrest Lake**

Parameter	Results	Units	Analysis Date & Time		Qualifier	Analyst
Residue, Non-Filterable SM2540D - 1997						
Total Suspended Solids	48	mg/L	10/02/15	15:26		BA
Residue, Total Ignition at 550C by SM2540 E						
Total Volatile Suspended Solids	11.0	mg/L	10/02/15	15:26		BA
Total-P as P, by SM4500 F - 1999						
Phosphate, Total as P	0.103	mg/L	10/06/15	13:46		PJ
Chloride by LACHAT 10-117-07-1-A						
Chloride	139	mg/L	10/07/15	14:22		PJ
Nitrogen Ammonia, SM4500-NH3 G - 1997						
Nitrogen Ammonia by SM4500NH3	0.07	mg/L	10/09/15	15:49		PJ

Sample No: **15J0143-02** Collect Date: **10/01/15 11:00**
Client ID: **Hey and Associates** Site: **Slough**

Parameter	Results	Units	Analysis Date & Time		Qualifier	Analyst
Residue, Non-Filterable SM2540D - 1997						
Total Suspended Solids	7.0	mg/L	10/02/15	15:26		BA
Residue, Total Ignition at 550C by SM2540 E						
Total Volatile Suspended Solids	3.0	mg/L	10/02/15	15:26		BA
Total-P as P, by SM4500 F - 1999						
Phosphate, Total as P	0.140	mg/L	10/06/15	13:49		PJ
Chloride by LACHAT 10-117-07-1-A						
Chloride	211	mg/L	10/07/15	14:24		PJ

McHenry Analytical Laboratories participates in the following accreditation /certification and proficiency programs.
Endorsment by the Federal or State Government or their agencies is not implied.
State of Wisconsin Bacteriological Analysis in Drinking Water Certified Lab DNR No . 105-10102
State of Illinois Accreditation of Environmental Laboratories , **NELAP/TNI accredited Laboratory No. 100279**
State of Illinois Bacteriological Analysis in Drinking Water Certified Lab Registry No . 17556
McHenry Analytical Laboratories, 4314-A Crystal Lake Road, McHenry, IL 60050.

Certified by:

Mark Mueller, Project Manager

McHenry Analytical Water Laboratory, Inc.
A Crystal Lake Rd. McHenry, IL 60050-4314

Phone: (815) 344 4044 Fax: (815) 344 2208
Email: www.mchenrylab.com

Sample No: **15J0143-02** Collect Date: **10/01/15 11:00**
Client ID: **Hey and Associates** Site: **Slough**

Parameter	Results	Units	Analysis Date & Time		Qualifier	Analyst
Nitrogen Ammonia, SM4500-NH3 G - 1997						
Nitrogen Ammonia by SM4500NH3	0.22	mg/L	10/09/15	15:52		PJ

QUALIFIERS

E MS and or MSD associated with analytical batch failed to meet acceptance criteria due to matrix effects.

McHenry Analytical Laboratories participates in the following accreditation /certification and proficiency programs.
Endorsment by the Federal or State Government or their agencies is not implied.
State of Wisconsin Bacteriological Analysis in Drinking Water Certified Lab DNR No . 105-10102
State of Illinois Accreditation of Environmental Laboratories , **NELAP/TNI accredited Laboratory No. 100279**
State of Illinois Bacteriological Analysis in Drinking Water Certified Lab Registry No . 17556
McHenry Analytical Laboratories, 4314-A Crystal Lake Road, McHenry, IL 60050.

Certified by:

Mark Mueller, Project Manager

McHenry
Analytical Water Laboratory, Inc.

ALL HIGHLIGHTED AREAS MUST BE COMPLETED BY CLIENT (PLEASE PRINT)

4314-A CRYSTAL LAKE ROAD
McHENRY ILLINOIS 60050
815-344-4044 • Fax 815-344-2208
www.mchenrylab.com

(1) CLIENT: HEY & ASSOCIATES, INC.

ADDRESS:

CITY STATE ZIP: Volo IL 60073

CONTACT PERSON: Jeremy Husnik

PROJECT NUMBER: 15-0320

P.O. NUMBER: 15-0320

PH NUMBER: 847-740-0888

FAX NUMBER: 847-740-2888

BY RELINQUISHING SAMPLES TO THE LAB THE CLIENT ACCEPTS THE TERMS OF THE POLICY PRINTED ON THE BACKSIDE OF THIS FORM

SAMPLER (PLEASE PRINT): NICK SPITHEMBERGER

SAMPLER'S SIGNATURE:

MEANS SHIPPED: Delivered

DATE SHIPPED: 10/1/15

Preservation Key:
(1) H_2SO_4 (2) HCL (3) HNO_3
(4) NaOH (5) $Na_2S_2O_3$ (6) None Required

MATRIX TYPES
SW- SURFACE WATER
WW- WASTEWATER
DW-DRINKING WATER
GW-GROUND WATER
WWSL-SLUDGE
NAS-SOLID / SOIL
OTHER:

(3) ANALYSIS REQUESTED

(2) SAMPLING LOCATION	PRESERV TYPE ADDED	PRESERV UPON RECEIPT YES / NO	LAB TEMP	DATE COLLECTED	TIME COLLECTED	SAMPLE TYPE GRAB	SAMPLE TYPE COMP	MATRIX TYPE	TOTAL # OF CONT	Total P	Ammonia	Chlorides	TSS, TVSS	LABORATORY LOG NUMBER
Hillcrest Lake	6/1	N/Y	3.8	10/1/15	11:00AM	X		SW	2	X	X	X	X	15J0143-01
Slough	6/1	N/Y	4.8	10/1/15	11 PM	X		SW	2	X	X	X	X	15J0143-02

(4) TURNAROUND TIME REQUESTED (PLEASE CIRCLE) NORMAL RUSH
RUSH IS SUBJECT TO MCHENRY ANALYTICAL LABS APPROVAL AND SURCHARGE)

RUSH RESULTS VIA (PLEASE CIRCLE) FAX PHONE

EMAIL ADDRESS:

DATE RESULTS NEEDED

(5) RELINQUISHED BY (SIGNATURE) DATE 10/1 TIME 3:30PM

RELINQUISHED BY (SIGNATURE) DATE 10/1/15 TIME 5:32

This sample temperature will be measured upon receipt at the lab. By initialing this area you request that the lab notify you, before proceeding with analysis if the sample temperature is outside of the range of 0.1-6.0°C. By not initialing this area you allow the lab to proceed with analytical testing regardless of the sample temperature.

RECEIVED BY (SIGNATURE): C. Rasmussen DATE 10/1/15 TIME 1532

(6a) FOR MCHENRY ANALYTICAL

INCOMPLETE DOCUMENTATION	Y OR (N)
SAMPLES RECIEVED IN PROPER CONTAINERS	(Y) OR N
CHILL PROCESS STARTED PRIOR TO RECEIPT	(Y) OR N
SAMPLE(S) RECEIVED ON ICE (WET) (BLUE)	(Y) OR N
BOTTLES RECEIVED IN GOOD CONDITION	(Y) OR N
BOTTLES FILLED WITH ADEQUATE VOLUME	(Y) OR N
SAMPLES RECEIVED WITHIN HOLD TIME(S)	(Y) OR N

(6b) FOR SUBCONTRACTORS

INCOMPLETE DOCUMENTATION	Y OR N
SAMPLES RECIEVED IN PROPER CONTAINERS	Y OR N
CHILL PROCESS STARTED PRIOR TO RECEIPT	Y OR N
SAMPLE(S) RECEIVED ON ICE (WET) (BLUE)	Y OR N
BOTTLES RECEIVED IN GOOD CONDITION	Y OR N
BOTTLES FILLED WITH ADEQUATE VOLUME	Y OR N
SAMPLES RECEIVED WITHIN HOLD TIME(S)	Y OR N

ww landscape 1-08