WILLIAM KENNY
ASSOCIATES LLC

SOIL SCIENCE
ECOLOGICAL SERVICES
LAND USE PLANNING
LANDSCAPE ARCHITECTURE

March 11, 2004

Mr. Leonard D'Andrea
Rocco V. D'Andrea, Inc.
PO Box 549
Riverside, CT 06878

Re: Wetland and Watercourse Delineation
Innis Arden Golf Club
Greenwich and Stamford, Connecticut

Dear Mr. D'Andrea:

As requested, I visited Innis Arden Golf Club to determine the presence or absence of wetlands and/or watercourses, to demarcate (flag) the boundaries of wetlands and watercourses identified, and to identify onsite soil types. This letter includes the methods and results of my investigation, which I completed in December 2003. In summary, wetland and watercourse systems were identified and delineated in a variety of locations throughout the Golf Club. Many of the wetlands are lawn and have been drained for nearly a century.

Regulatory Definitions

The Inland Wetlands and Watercourses Act (Connecticut General Statutes §22a-38) defines inland wetlands as "land, including submerged land...which consists of any soil types designated as poorly drained, very poorly drained, alluvial, and floodplain." Watercourses are defined in the act as "rivers, streams, brooks, waterways, lakes, ponds, marshes, swamps, bogs and all other bodies of water, natural or artificial, vernal or intermittent, public or private, which are contained within, flow through or border upon the state or any portion thereof." The Act defines Intermittent Watercourses as having a defined permanent channel and bank and the occurrence of the following characteristics: A) evidence of scour or deposits of recent alluvium or detritus, B) the presence of standing or flowing water for a duration longer than a particular storm incident, and C) the presence of hydrophytic vegetation.

The Tidal Wetlands Act (Connecticut General Statutes §22a-28) defines wetlands as "those areas which border on or lie beneath tidal waters, such as, but not limited to banks, bogs, salt marsh, swamps, meadows, flats, or other low lands subject to tidal action..."

Methodology

A second order soil survey in accordance with the principles and practices noted in the USDA publication *Soil Survey Manual* (1993) was completed at the subject site. The classification system of

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the National Cooperative Soil Survey was used in this investigation. Soil map units identified at the project site generally correspond to those included in the *Soil Survey of Fairfield County, Connecticut* (USDA 1981).

Wetland determinations were completed based on the presence of poorly drained, very poorly drained, alluvial, or floodplain soils and submerged land (e.g. a pond). Soil types were identified by observation of soil morphology (soil texture, color, structure, etc.). To observe the morphology of the property's soils, test pits and/or borings (maximum depth of two feet) were completed at the site.

Tidal wetland determinations were completed based on the presence of a predominance of tidal wetland vegetation and physical markings or water laid deposits resulting from tidal action.

Intermittent watercourse determinations were made based on the presence of a defined permanent channel and bank and two of the following characteristics: A) evidence of scour or deposits of recent alluvium or detritus, B) the presence of standing or flowing water for a duration longer than a particular storm incident, and C) the presence of hydrophytic vegetation.

Wetland and watercourse boundaries were demarcated (flagged) with pink surveyor's tape (hung from vegetation) or small flags (on wire stakes) labeled "William Kenny Associates" that are generally spaced a maximum of every 50 feet. Complete boundaries are located along the lines that connect these sequentially numbered flags. The wetland and watercourse boundaries are subject to change until adopted by local, state, or federal regulatory agencies.

The weather during the investigation was mostly sunny with temperatures in the low 30's ^{0}F. There was little to no soil frost and no snow cover. The upland and wetland soils were moist to saturated.

Results

The approximate 110-acre golf club is located in Greenwich and Stamford, Connecticut immediately south of the Metro North Commuter Railroad. The golf club was established in 1899. The 18-hole golf club includes a club house, tennis courts, paddle courts, a cart barn, a maintenance facility, an in-ground pool and a driving range. The majority of the golf club property is maintained as lawn with shade and ornamental trees. Pockets of wooded areas exist along the edge of the property and in some interior locations.

Areas of inland wetlands and watercourses were identified and delineated in various portions of the property. Most of the wetlands are lawn areas that have been drained for about a century. Intermixed with the flagged drained wetland soils is a substantial area of disturbed soils that were altered over the years for the installation of drainage piping, irrigation piping and electrical lines, tree and shrub plantings and cart paths. Mapping of these non-wetland disturbed soils was not practical. As such, they are included within flagged wetland areas. The drained soils appear to be somewhat poorly to moderately well-drained. The non-drained wetland soils are primarily poorly drained.

Seven soil map units were identified on the property (four wetland and three upland). Each map unit represents a specific area on the landscape and consists of one or more soils for which the unit is named. Other soils (inclusions that are generally too small to be delineated separately) may account

for 10 to 15 percent of each map unit. The mapped units are identified in the following table by name and symbol and typical characteristics (parent material, drainage class, high water table, depth to bedrock, and slope). These characteristics are generally the primary characteristics to be considered in land use planning and management. A description of each characteristic and their land use implications follows the table. A complete description of each soil map unit can be found in the *Soil Survey of Fairfield County, Connecticut* (USDA 1981), and at http://www.statlab.iastate.edu/soils/osd/. The approximate location of the mapped wetlands and soil map units at the project site are shown on the attached wetland map.

Sym.	Map Unit Name	Parent Material	Slope (%)	Drainage Class	High Water Table Depth (ft)	High Water Table Kind	High Water Table Mos.	Depth To Bedrock (in)
	Upland Soil							
Cr	Charlton	Loose glacial Till	3-25	Well Drained	>6.0	--	--	>60
	Hollis fine sandy loam, very rocky	Loose glacial Till	3-25	Somewhat Excessively Drained	>6.0	--	--	10-20
UD	Udorthents	Excavated or Filled Soil (>2 feet)	0-45	Well Drained to Somewhat Poorly Drained	1.5->6.0	Apparent	Nov-May	>60
Ur	Urban Land	Pavement & structures account for 85% or more of the area. Additional investigations required to determine subsurface characteristics						
	Wetland Soil							
Aq	Aquents	Variable	Variable	Variable	0.0-1.5	Variable	Variable	Variable
Rb	Raypol silt loam	Glacial Outwash	0-3	Poorly Drained	0.0-1.0	Apparent	Nov-May	>60
Rn	Ridgebury	Compact Glacial Till	0-8	Poorly Drained	0.0-1.5	Perched	Nov-May	>60
	Leicester	Loose glacial Till	0-3	Poorly Drained	0.0-1.5	Apparent Perched	Nov-May	>60
	Whitman extremely stony fine sandy loam	Compact Glacial Till	0-3	Very Poorly Drained	0.0-1.5		Sep-Jun	>60
Wd	Walpole fine sandy loam	Glacial Outwash	0-3	Poorly Drained	0.0-1.5	Apparent	Nov-May	>60

Parent material is the unconsolidated organic and mineral material in which soil forms. Soil inherits characteristics, such as mineralogy and texture, from its parent material. Glacial till is unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice. Glacial outwash consists of gravel, sand, and silt, which is commonly stratified, deposited by glacial melt water. Alluvium is material such as sand, silt, or clay, deposited on land by streams. Organic deposits consist of decomposed plant and animal parts.

A soil's texture affects the ease of digging, filling, and compacting and the permeability of a soil. Generally sand and gravel soils, such as outwash soils, have higher permeability rates than most glacial till soils. Soil permeability affects the cost to design and construct subsurface sanitary disposal facilities and, if too slow or too fast, may preclude their use. Outwash soils are generally excellent

sources of natural aggregates (sand and gravel) suitable for commercial use, such as construction sub base material. Organic layers in soils can cause movement of structural footings. Compacted glacial till layers make excavating more difficult and may preclude the use of subsurface sanitary disposal systems or increase their design and construction costs if fill material is required.

Generally, soils with steeper slopes increase construction costs, increase the potential for erosion and sedimentation impacts, and reduce the feasibility of locating subsurface sanitary disposal facilities.

Drainage class refers to the frequency and duration of periods of soil saturation or partial saturation during soil formation. Seven classes of natural drainage classes exist. They range from excessively drained, where water is removed from the soil very rapidly, to very poorly drained, where water is removed so slowly that free water remains at or near the soil surface during most of the growing season. Soil drainage affects the type and growth of plants found in an area. When landscaping or gardening, drainage class information can be used to assure that proposed plants are adapted to existing drainage conditions or that necessary alterations to drainage conditions (irrigation or drainage systems) are provided to assure plant survival.

High water table is the highest level of a saturated zone in the soil in most years. The water table can affect the timing of excavations; the ease of excavating, constructing, and grading; and the supporting capacity of the soil. Shallow water tables may preclude the use of subsurface sanitary disposal systems or increase design and construction costs if fill material is required.

The depth to bedrock refers to the depth to fixed rock. Bedrock depth affects the ease and cost of construction, such as digging, filling, compacting, and planting. Shallow depth bedrock may preclude the use of subsurface sanitary disposal systems or increase design and construction costs if fill material is required.

Conclusions

In December of 2003, I investigated the property at Innis Arden Golf Club in Greenwich and Stamford, Connecticut and identified and delineated inland wetlands and watercourses. Thank you for the opportunity to assist you. If you should have any questions or comments, please do not hesitate to contact me.

Sincerely,

William L. Kenny, CPWS, ASLA
Soil Scientist

Enclosure

Ref. No. 100177L02

UPLAND SOIL MAP UNITS

SYM.	NAME
Cr	CHARLTON-HOLLIS FINE SANDY LOAMS, VERY ROCKY, 3 TO 15 PERCENT SLOPES
UD	UDORTHENTS, SMOOTHED
Ur	URBAN LAND

WETLAND SOIL MAP UNITS

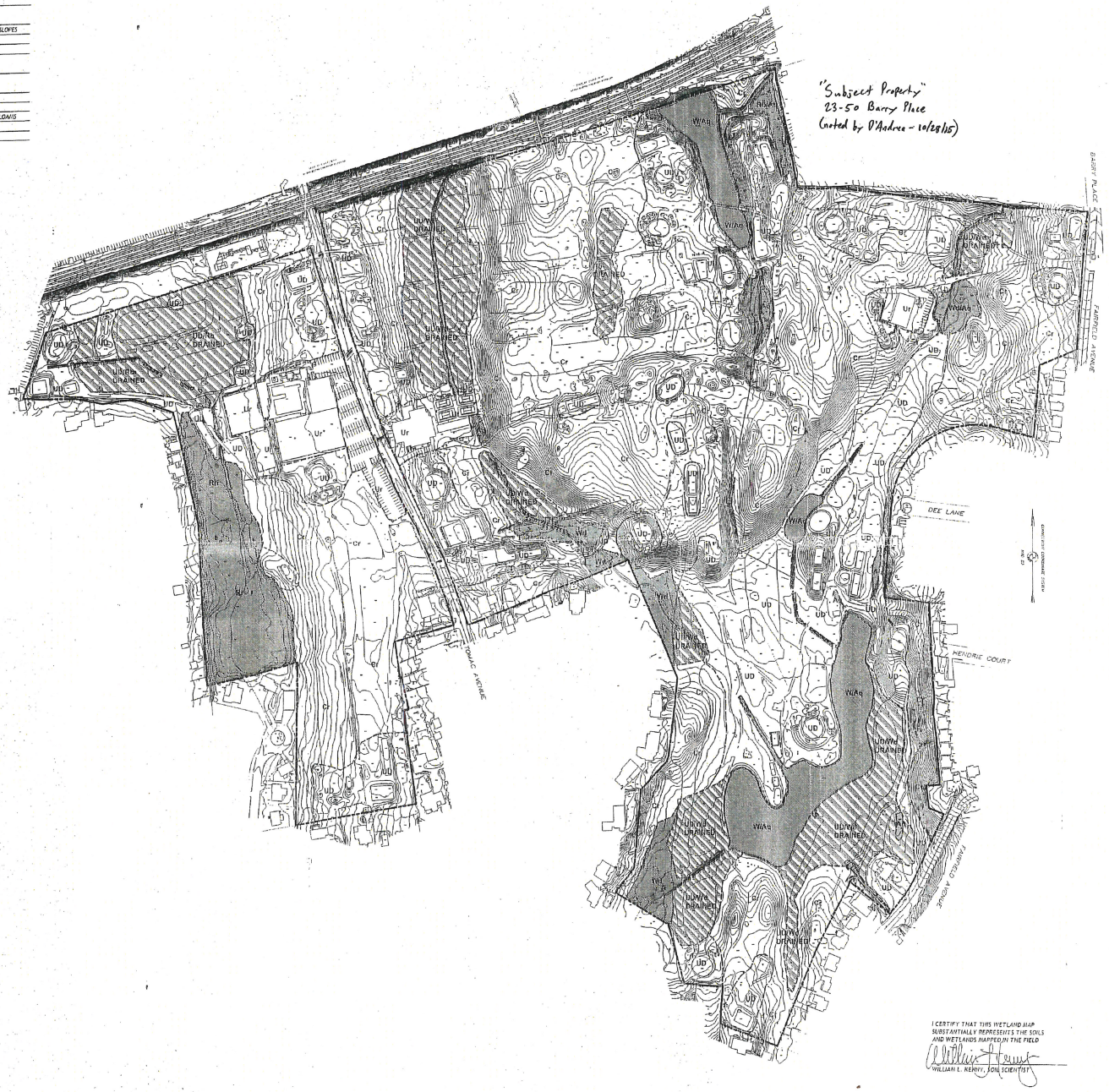
SYM.	NAME
Aq	AQUENTS
Rb	RAYPOL SILT LOAM
Rn	RIDGEBURY, LEICESTER, AND WHITMAN EXTREMELY STONY FINE SANDY LOAMS
W	WATERCOURSE
Wd	WALPOLE FINE SANDY LOAM

NOTES:

INFORMATION SHOWN ON THIS DRAWING IS APPROXIMATE.

WETLAND AND SOIL INFORMATION PROVIDED BY WILLIAM KENNY ASSOC. OTHER INFORMATION TAKEN FROM A DRAWING PREPARED BY ROCCO V. D'ANDREA, INC.

THIS DRAWING IS NOT FOR CONSTRUCTION USE.



I CERTIFY THAT THIS WETLAND MAP SUBSTANTIALLY REPRESENTS THE SOILS AND WETLANDS MAPPED IN THE FIELD

WILLIAM L. KENNY, SOIL SCIENTIST

WILLIAM KENNY ASSOCIATES LLC

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WETLAND MAP

INNIS ARDEN GOLF CLUB
GREENWICH & STAMFORD, CT

DATE: MARCH 11, 2004
SCALE: 1" = 150'

0' 75' 150' 300'

NORTH

WKA REF. NO. 100177D01