02170:052803

NATURAL RESOURCE INVENTORY

RIVERS EDGE SITE

WASHINGTON COUNTY, MINNESOTA

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May 2003

NATURAL RESOURCE INVENTORY
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WASHINGTON COUNTY, MINNESOTA

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NATURAL RESOURCE INVENTORY
RIVERS EDGE SITE

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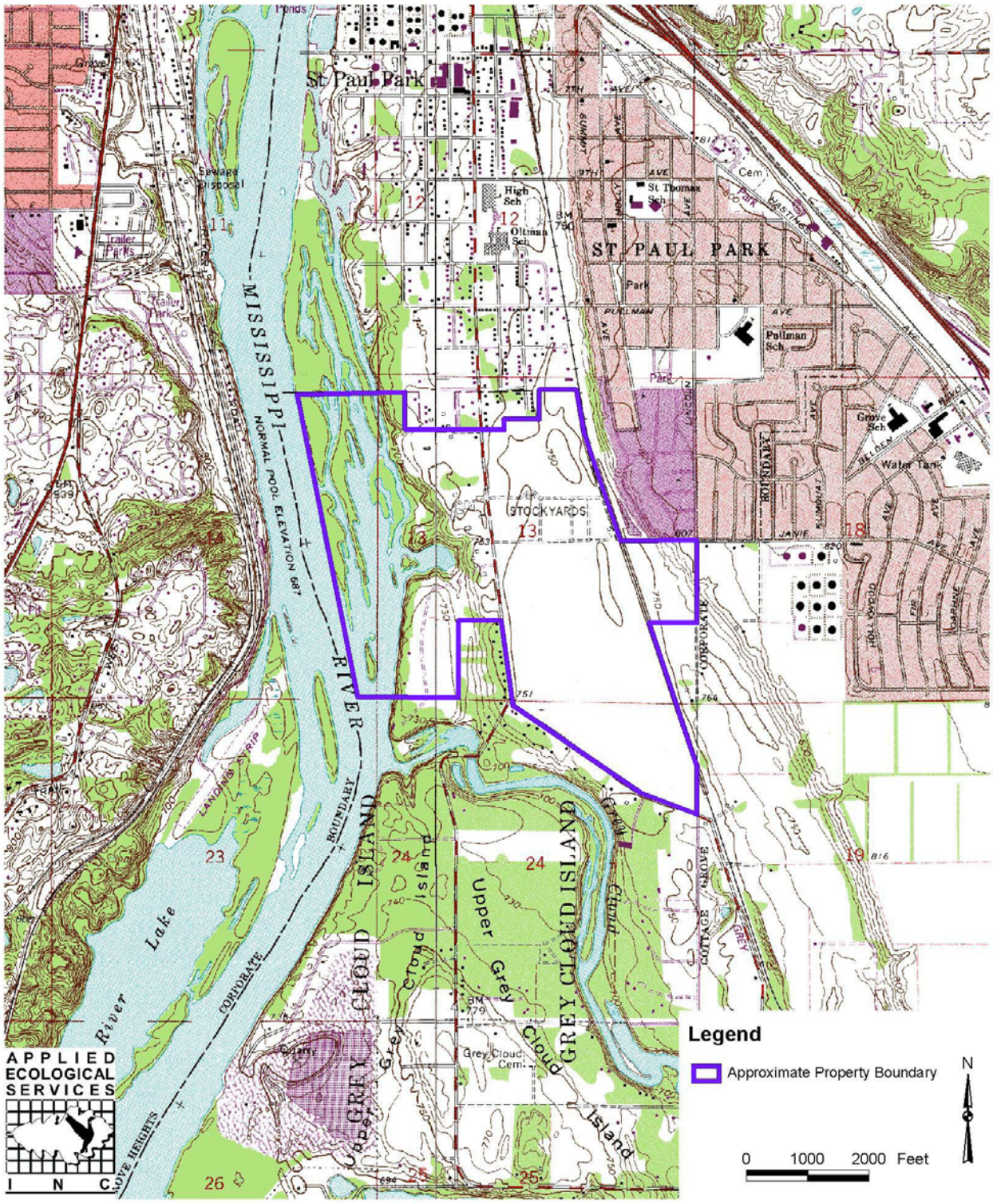
1.0 INTRODUCTION

In May 2002, Applied Ecological Services, Inc. (AES) was retained by DR Horton to provide natural resource inventory services for the Rivers Edge site (herein referred to as the "site"). The site consists of approximately 600 acres of both land and backwaters of the Mississippi River located in the northern portion of Grey Cloud Island Township in Washington County, Minnesota (Township 27N, Range 22W, portions of Sections 13, 14, and 24, Figure 1).

The site is located along the Mississippi River, south of St. Paul, Minnesota. A portion of the site west of Grey Cloud Island Trail is within the Mississippi Critical Habitat Corridor and the Mississippi National River and Recreation Area. Within a few miles up and down the river are established natural areas or parks: Grey Cloud Dunes Scientific and Natural Area, Ordway Natural History Area, city parks, etc.

In September and October 2002 and March and April 2003, AES conducted a Natural Resource Inventory of the site. The portion of the site that extends into the Mississippi River, including the isolated islands within the property, was not accessed as part of this project. The purpose of this investigation was to identify land use and cover features focusing on plant community structure and ecological health and also to conduct limited wildlife surveys. This inventory provides a summary of our findings for the site.

Figure 1. Site Location Map



Source: Figure adapted from USGS 7.5-minute topographic quadrangle maps (Inver Grove Heights and St. Paul Park, MN) acquired from MnDNR Data Deli.

2.0 METHODS

This inventory was based largely on existing data sources and four site investigations (September 30, 2002, October 1, 2002, March 31, 2003, and April 10, 2003). DR Horton also directed AES to provide greater resolution for the plant community work by completing a limited tree survey of large oaks and other ecologically valuable native species. This resulted in GPS documentation of oaks (*Quercus* spp.) greater than or equal to 8 inches diameter at breast height (dbh), all butternuts (*Juglans cinerea*), and all large specimens of other native species. AES surveyed and located the trees in March, 2003. During site investigations, published information was field reviewed and new information was documented regarding the site's natural resources. In addition, staff at the Minnesota Department of Natural Resources and other agencies were consulted.

Existing data reviewed for the site included:

- U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle maps (Inver Grove Heights and St. Paul Park, MN, Figure 1)
- Digital orthophotographs (1991 and 2000, Figure 2)
- Metropolitan Council 1997 regional land use mapping (Figure 3)
- Marshner's Presettlement Vegetation mapping (Figure 4)
- Historical aerial photographs (1936 and 1953, Figure 5)
- U.S. Department of Agriculture/Soil Conservation Service (USDA/SCS) Soil Survey of Washington and Ramsey Counties, Minnesota (Figure 6)
- U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) mapping (Figure 6)
- Federal Emergency Management Agency (FEMA) floodplain mapping (Figure 6)
- Minnesota Department of Natural Resources (MnDNR) Protected/Public Waters Inventory (PWI) mapping (Figure 7)
- MnDNR County Biological Survey data and mapping (Figure 8)

These data were reviewed for indications of site disturbance, potential drainages and wetlands, the presence of rare and noteworthy species, and other significant natural features

occurring on or in the vicinity of the property. Field-truthing of all mapped areas within and adjacent to this parcel was not conducted; however, visual observation of the majority of the site was completed.

In the field, the investigators reconnoitered the site, delineating land use and vegetative cover types on an aerial photograph (2000), characterizing plant community structure and species composition, and recording dominant or special interest plant species if present. Other observations included physiographic, biotic, and cultural features such as soil type, drainage and relief patterns, evidence of historic vegetation, indications of past disturbance (e.g., grazing, timber harvesting), habitat quality, wildlife sightings or signs, and current recreational uses. AES conducted limited wildlife survey work at the site totaling approximately 2.5 hours. Casual observations were made while doing other work. Readers should not take these survey results as evidence that a species is not present.

For each land cover type we provide a narrative description in the results section of this report (Section 3.0). These land cover types correspond with Minnesota Land Cover Classification System (MLCCS) codes for mapped land cover. Numerous site photographs were taken representing the land cover types found on the site (Appendix A).

In addition, AES evaluated the current condition of native plant communities (e.g., prairie, oak savanna) but not non-native communities (e.g., old field). Native plant communities visited for the inventory were assigned a condition rank using the MN Natural Heritage Program's Element Occurrence Ranking Guidelines. These guidelines require that each plant community be evaluated using the appropriate ranking considerations summarized below (Table 1). The limited tree survey aided in the condition ranking.

Table 1. Condition Ranks for Characterizing Native Plant Communities

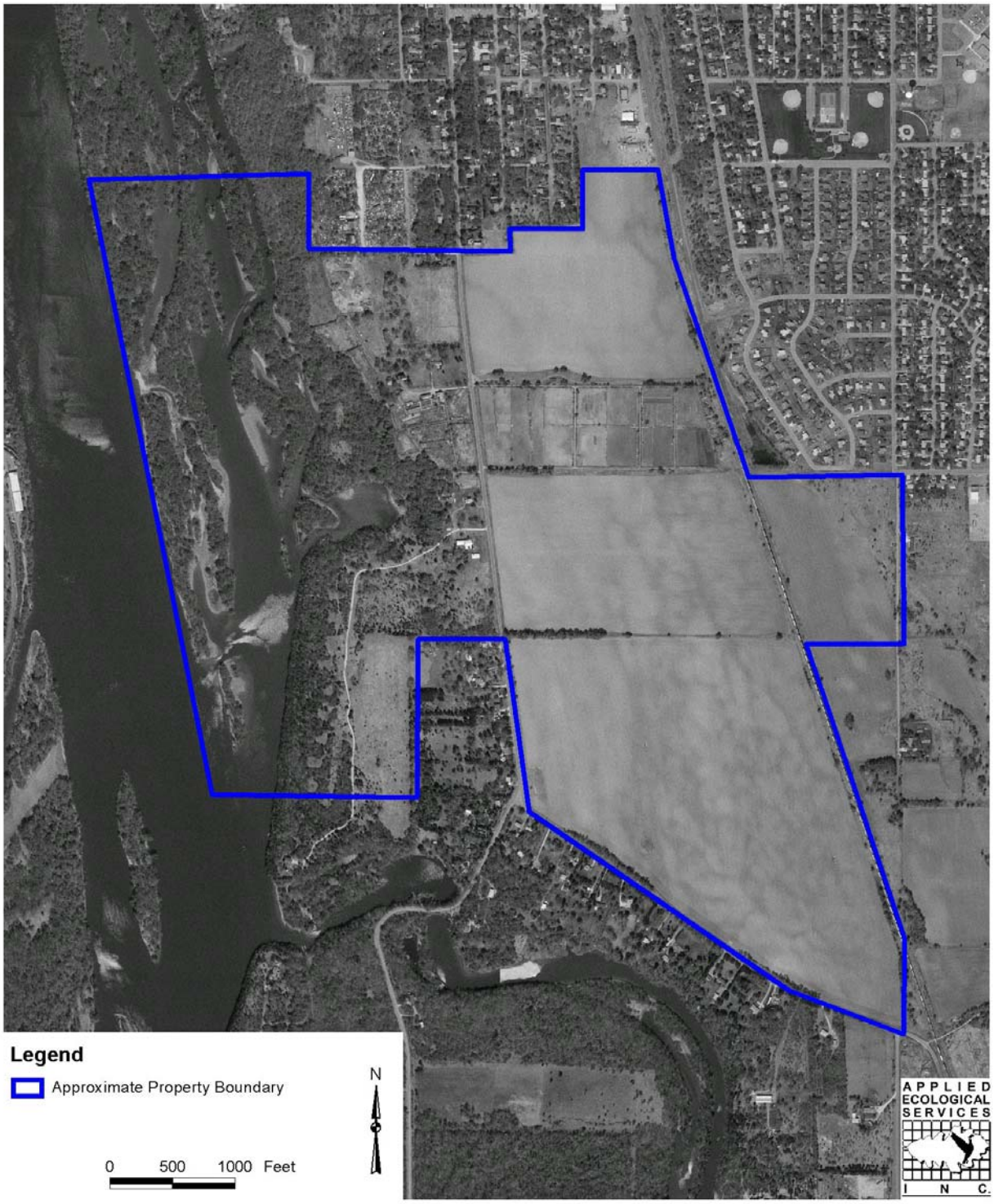
Condition	Rank	Description
Excellent	A	The plant community is intact and has existed on the site for decades. It has diversity typical of the type, no invasion by non-native species, and no significant adverse disturbances.
Good	B	The plant community was altered by adverse human intervention. It has native diversity that is slightly lower than typical for an excellent example of the type, little non-native species invasion, and slight evidence of past adverse disturbances.
Fair	C	The plant community has been significantly altered by adverse human intervention. Native diversity is noticeably lower and non-native species may be common and even abundant. There is much evidence of past adverse disturbances, including long-term fire suppression if the plant community is fire-maintained (i.e., it requires fire to maintain typical diversity and vegetation structure).
Poor	D	The plant community is dramatically altered by adverse human intervention. Native diversity is very low and one or more vegetation layers have few if any native species, or may be dominated by non-native species. There are abundant signs of recent adverse disturbances, including long-term fire suppression of fire-dependent plant communities.
Restored	R	The plant community is a restored example of a native plant community on a site that was formerly of human origin (e.g., cropland, lawn).

3.0 RESULTS

3.1 Site Setting and Overview

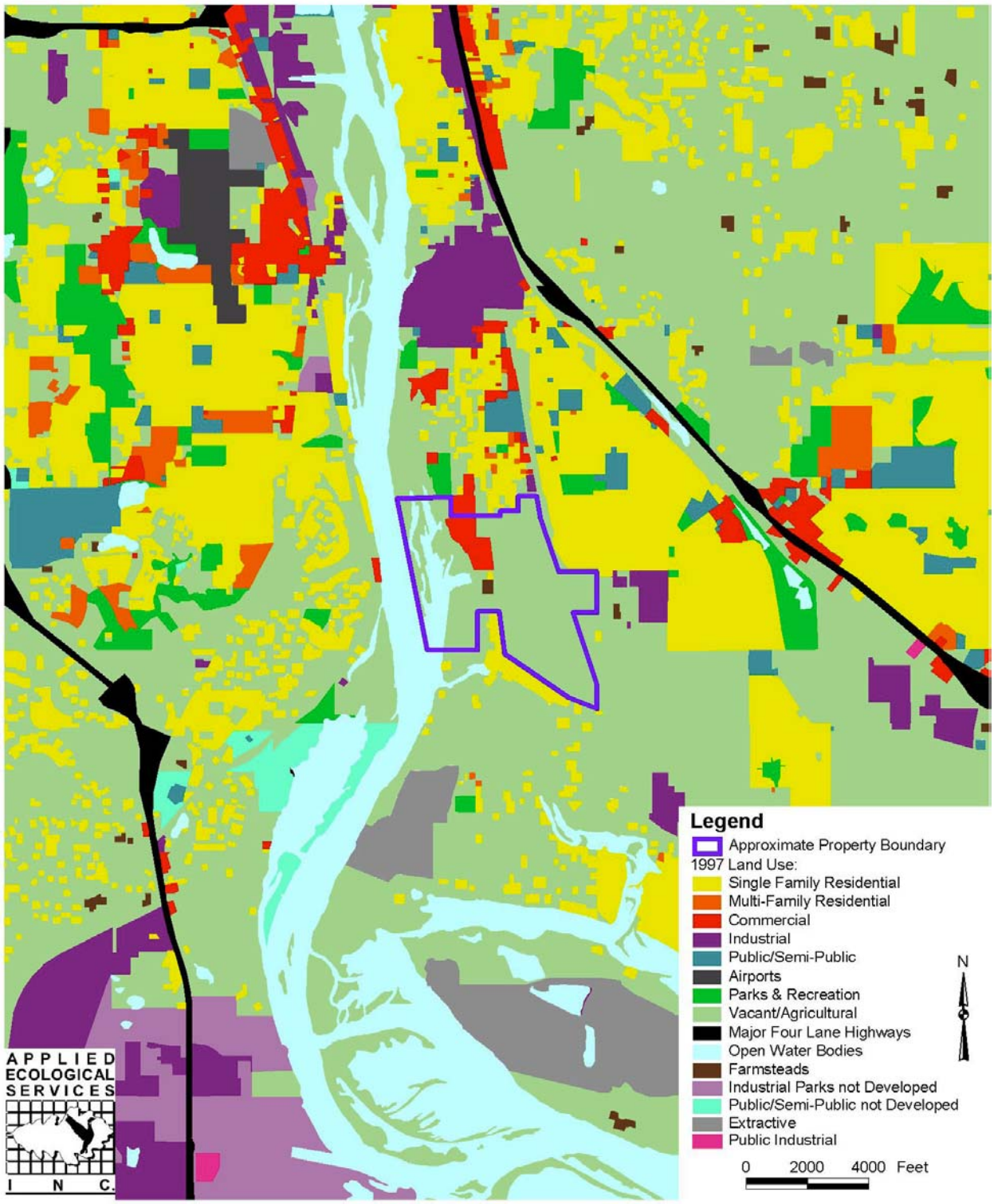
The site consists of approximately 600 acres of terrace landforms along the eastern side of the Mississippi River in the northern portion of Grey Cloud Island Township, Minnesota. Much of the site is relatively flat to rolling, with the majority of this area consisting of active agricultural fields, old pastures, and old fields (Figure 2). Two farmsteads and several outbuildings exist in the central portion of the site. The western portion of the site consists of forests, bluffs, floodplain forests, and the Mississippi River. A bay of the river is located near the center of the site's western land edge. The Burlington Northern railroad represents the eastern boundary of the site with the exception of a tract of land that extends further east in the central portion of the eastern property boundary (Figure 2). This tract is mostly active agricultural fields; however, the northeastern portion of this tract slopes uphill and is dominated by grassland vegetation. Grey Cloud Island Drive transects the northern two-thirds of the site and forms the southern boundary on the eastern half of the site. Land west of this road is included in the Mississippi River Critical Area Corridor. A dirt road extends from Grey Cloud Island Drive through the central and southwestern portions of the site. According to the landowner, a drainage pipe reportedly extends from the former stockyard area (indicated on the USGS topographic map, Figure 1) toward the Mississippi River. The area surrounding the site consists of roads, residential development (mostly to the north and northeast), agricultural land (mostly to the southeast), and an industrial facility to the east (Figure 3).

Figure 2. Aerial Photograph (2000)



Source: Figure adapted from Metropolitan Council digital orthophoto data (2000 aerial photo).

Figure 3. Regional Land Use Map (1997)



Source: Figure adapted from Metropolitan Council 1997 raster land use data acquired from Metropolitan Council.

3.2 Review of Existing Data

3.2.1 Presettlement Vegetation

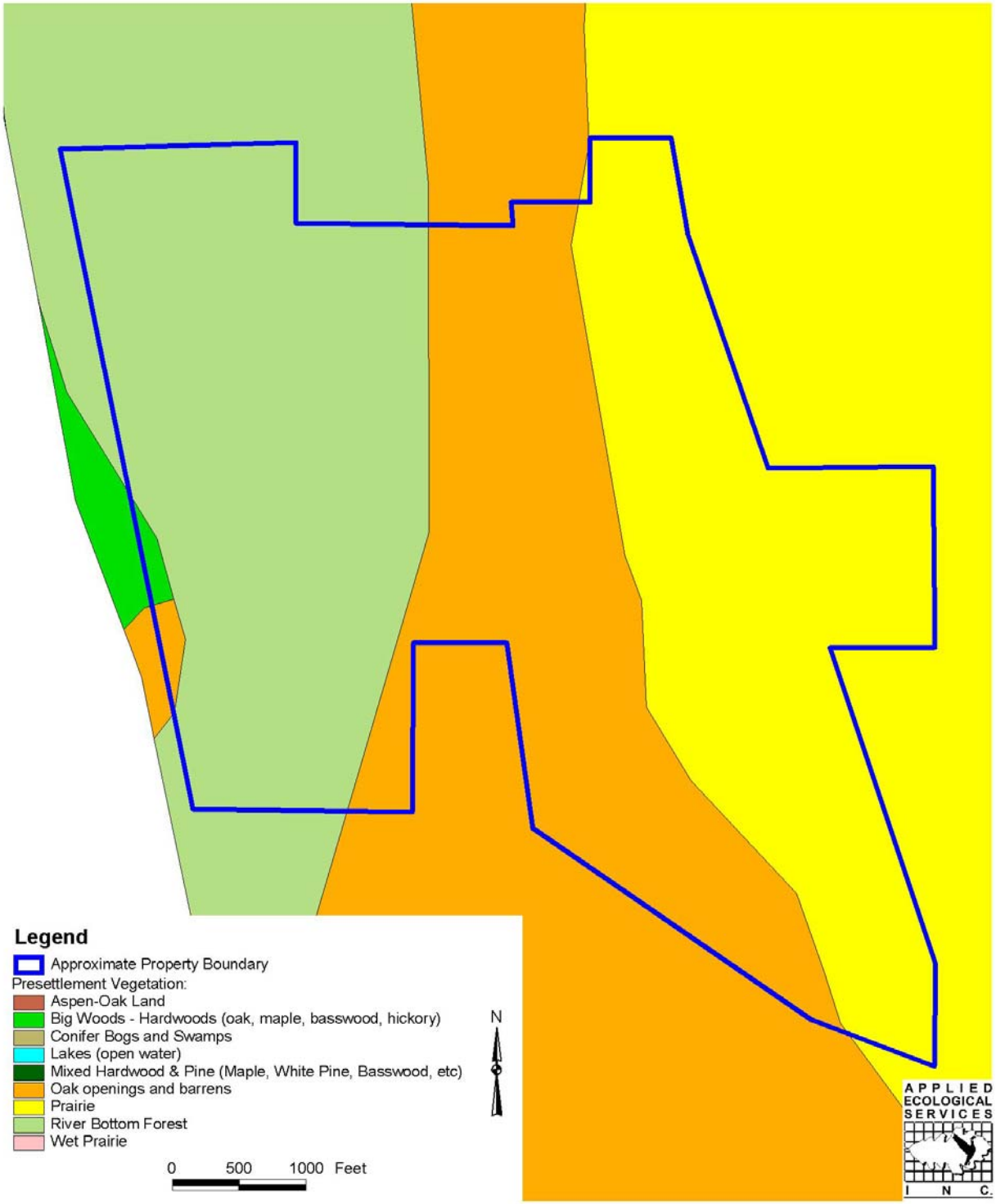
Generalized mapping of presettlement vegetation (Marschner 1974) identifies "River Bottom Forest" as previously occupying the approximate western third of the site, with "Prairie" occupying the approximate eastern third and "Oak Openings and Barrens" occupying the center of the site (Figure 4). Public Land Survey bearing trees along the site's western edge included elms (*Ulmus* spp.), basswood (*Tilia americana*), maple (*Acer* spp.), ash (*Fraxinus* spp.), and cottonwood (*Populus deltoides*). Bearing trees were not identified on the remainder of the site; however just southeast of the site, bur oaks (*Quercus macrocarpa*) and black oak (*Quercus velutina* or *Q. ellipsoidalis*) were identified as bearing trees (Almendinger 1997).

3.2.2 Historical Aerial Photographs

Historical aerial photographs from 1936 and 1953 were reviewed for the site. The 1936 photograph did not provide complete site coverage; therefore, only the 1953 photograph is provided (Figure 5). The 1936 photograph shows two farmsteads in the vicinity of the existing site structures, and the majority of the site is in agricultural production or pasture including the area identified as stockyards on the USGS topographic map (Figure 1). This photograph also shows a somewhat dense tree canopy forming a relatively thin band along the Mississippi River bluffs, bordered to the east in many areas by woodland that ranges from dense to sparse tree cover. The on-site Mississippi River bay area does not appear to be inundated in the 1936 photograph.

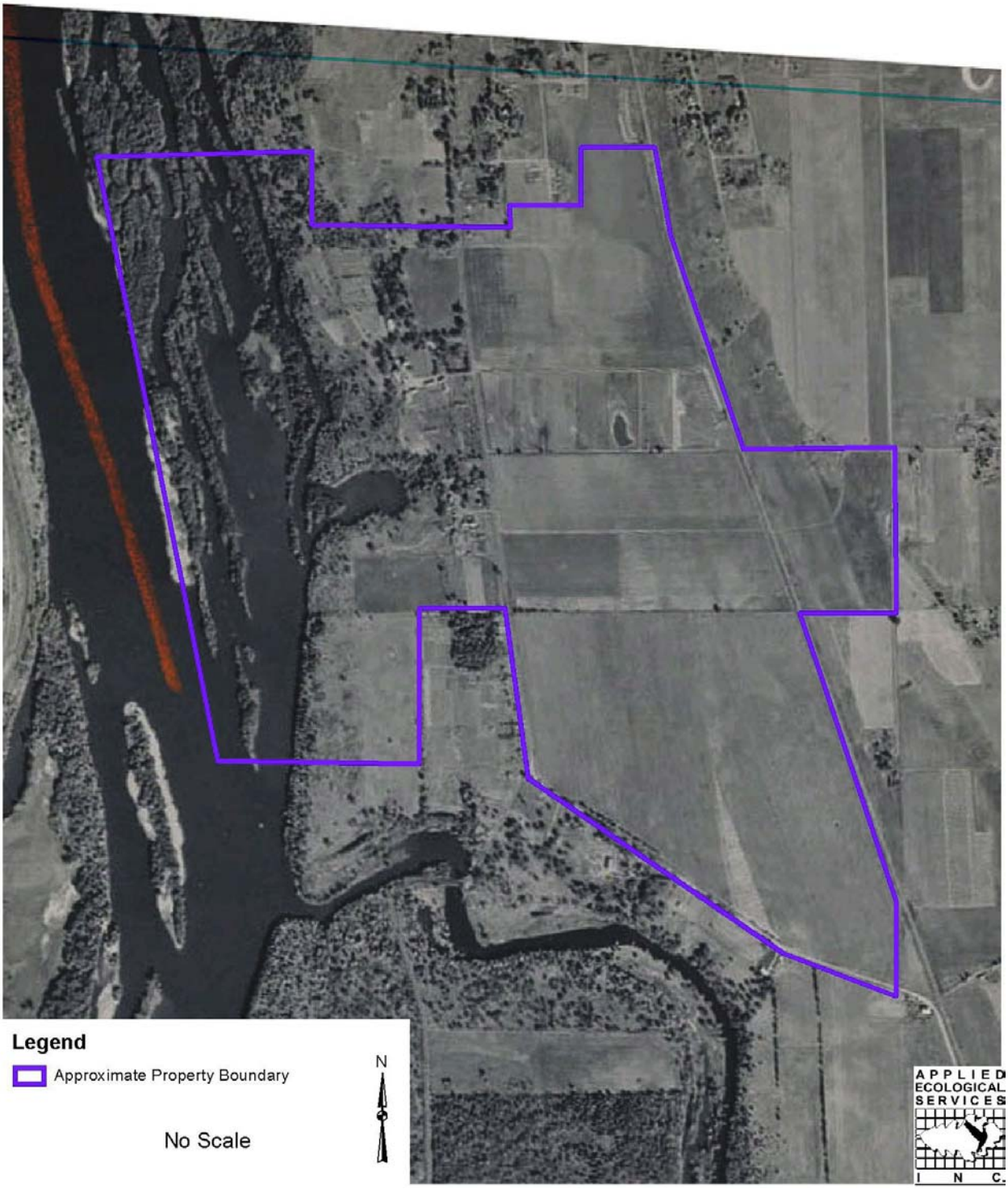
The 1953 photograph appears to show fenced paddocks in the stockyard area, which contains a relatively large body of open water. This photograph also shows that the majority of the site is in agricultural production or pasture, and it appears that the tree canopy east of the bluff vegetation has been thinned since the 1936 photograph.

Figure 4. Presettlement Vegetation



Source: Figure adapted from presettlement vegetation data (Marschner 1974) acquired from MnDNR Data Deli.

Figure 5. Historical Aerial Photograph (1953)



Source: Figure adapted from historical aerial photograph acquired from the University of Minnesota Borchert Map Library.

3.2.3 Soils

The Soil Survey of Washington and Ramsey Counties, Minnesota (Vinar 1980) identifies 13 soil map units on the site (Figure 6). None of these soils are identified as hydric units, but hydric inclusions are known to occur in all of these soils. The soil survey identifies two "Rock Outcrops" in the south-central portion of the site and a "Short Steep Slope" in the east-central portion of the site. Soil unit slopes, water erosion potential, wind erodibility, and hydrologic group for site soils, as described in the soil survey, are outlined in Table 2. Overall the soils of the site are sandy and/or shallow over bedrock, and are rated as highly erodible by wind and somewhat erodible by water.

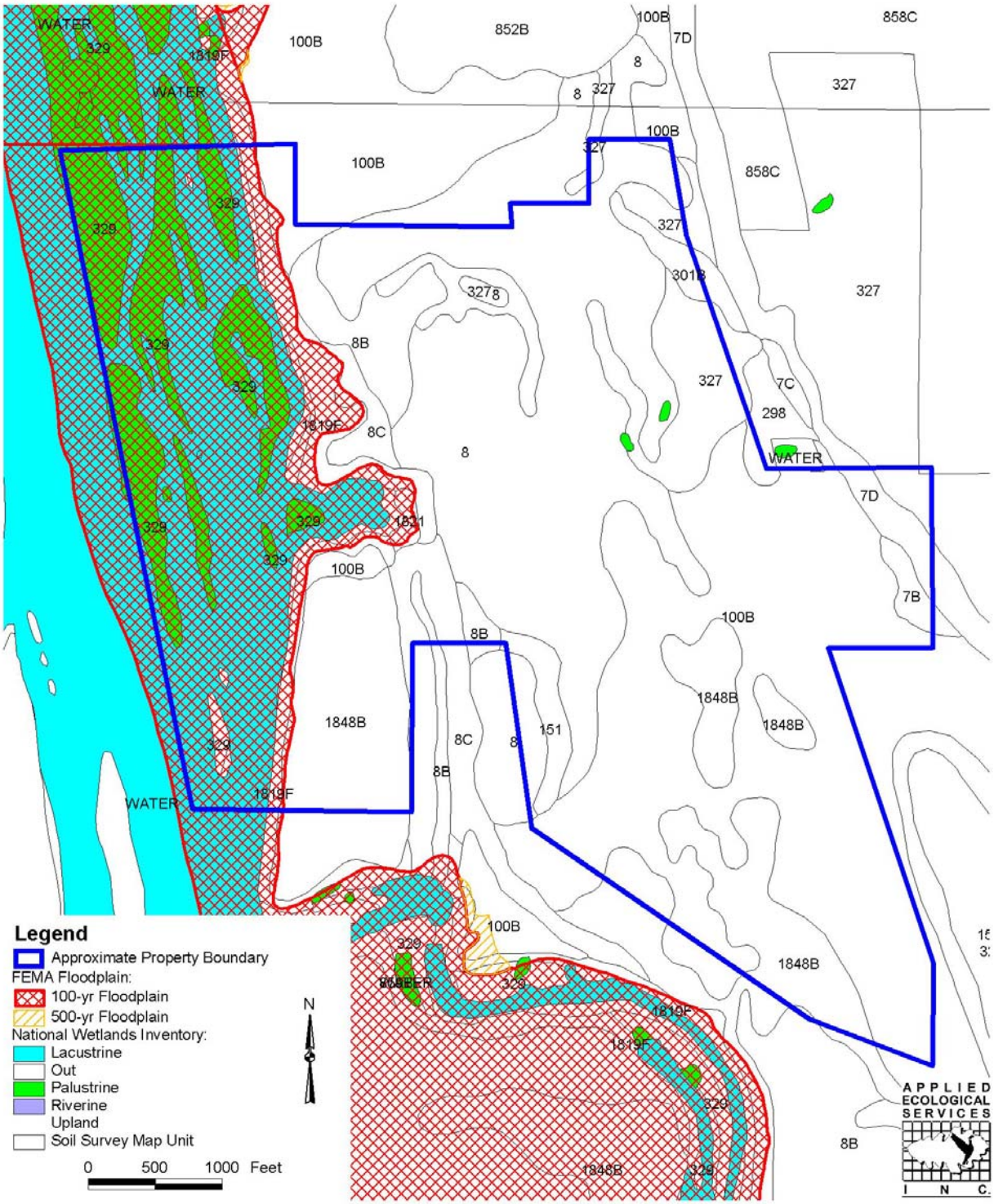
Table 2. Site Soil Characteristics

Soil Name Symbol	% Slope	Erosion Factor K*	Wind Erodibility	Hydrologic Group**
Hubbard loamy sand 7B	1-6	0.15	Very highly erodible	A
Hubbard loamy sand 7D	12-18	0.15	Very highly erodible	A
Sparta loamy sand 8	0-2	0.17	Very highly erodible	A
Sparta loamy sand 8B	2-6	0.17	Very highly erodible	A
Sparta loamy sand 8C	6-15	0.17	Very highly erodible	A
Copastone loam 100B	0-6	0.28	Very highly erodible	D
Burkhardt sandy loam 151	0-3	0.10-0.20	Highly erodible	B
Richwood silt loam 298	0-2	0.15-0.43	Slightly erodible	B
Lindstrom silt loam 301B	2-4	0.32-0.43	Slightly erodible	B
Dickman sandy loam 327	0-2	0.15-0.20	Highly erodible	A
Chaska silt loam 329	---	0.28	Slightly erodible	B/D
Dorerton-Rock outcrop complex 1819F	25-65	0.10-0.32	Very highly erodible	B
Algansee loamy sand 1821	---	0.17	Slightly erodible	B
Sparta loamy sand, bedrock substratum 1848B	0-6	0.17-0.32	Very highly erodible	A

*Erosion Factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Values of K range from 0.05 to 0.69; the higher the value, the more susceptible the soil is to such erosion.

**Hydrologic soil groups are used to estimate runoff from precipitation: A – high infiltration rate, low runoff potential; B – moderate infiltration rate; D – slow infiltration rate, high runoff potential.

Figure 6. Site Soils, NWI Wetlands, and Floodplain Mapping



Source: Figure adapted from digital county soil survey, USFWS National Wetlands Inventory, and FEMA floodplain mapping acquired from Metropolitan Council and MnDNR.

3.2.4 Wetlands and Floodplains

USFWS National Wetlands Inventory (NWI) mapping identifies two palustrine emergent wetlands with temporarily flooded water regimes and a history of ditching/draining (PEMAd) in the east-central portion of the site within the area identified as stockyards on the USGS topographic quadrangle map. Numerous additional palustrine wetlands (floodplain forest islands and the riverbank) were mapped within the Mississippi River corridor (Figure 6).

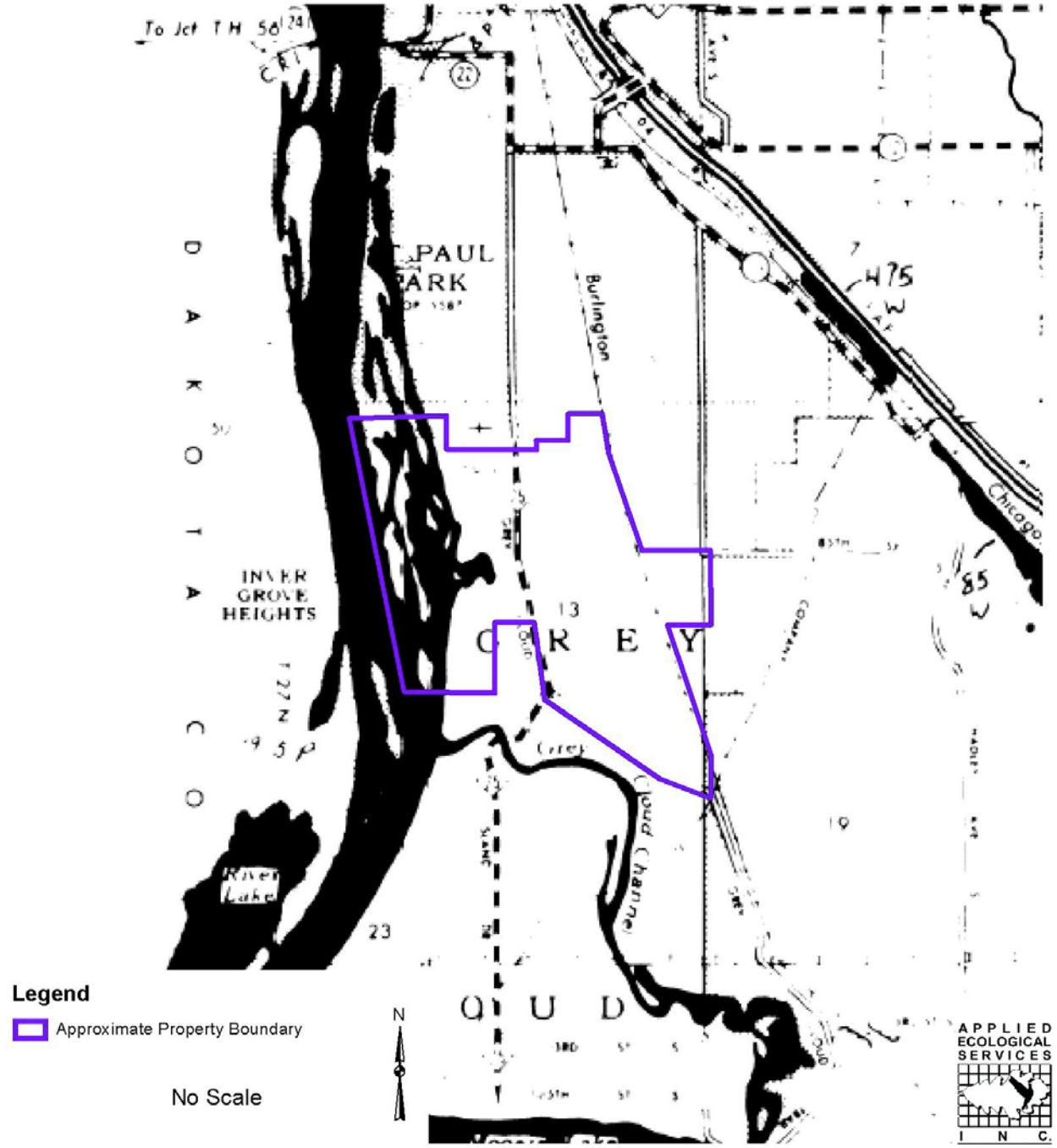
MnDNR Protected/Public Waters Inventory (PWI) mapping identifies one Protected/Public Water on the site: the Mississippi River's Pool 2 (19-5P, Figure 7). No other Protected/Public Waters are identified on or adjacent to the site. The Grey Cloud Channel of the Mississippi River flows west to east approximately 500 feet south of the site.

3.2.5 Rare Natural Features

A written request was made to the MnDNR Natural Heritage and Nongame Research Program regarding known occurrences of rare natural features on or near the site. The response letter (Appendix B) identifies 27 known occurrences of rare species or natural communities within an approximate one-mile radius from the site. Of these occurrences, the MnDNR identifies three elements for which they expressed concern. These elements are multiple "Sites of Biodiversity Significance," three bald eagle nesting sites along the Mississippi River corridor, and three rare mussel species within the Mississippi River. These elements are described further in Table 3.

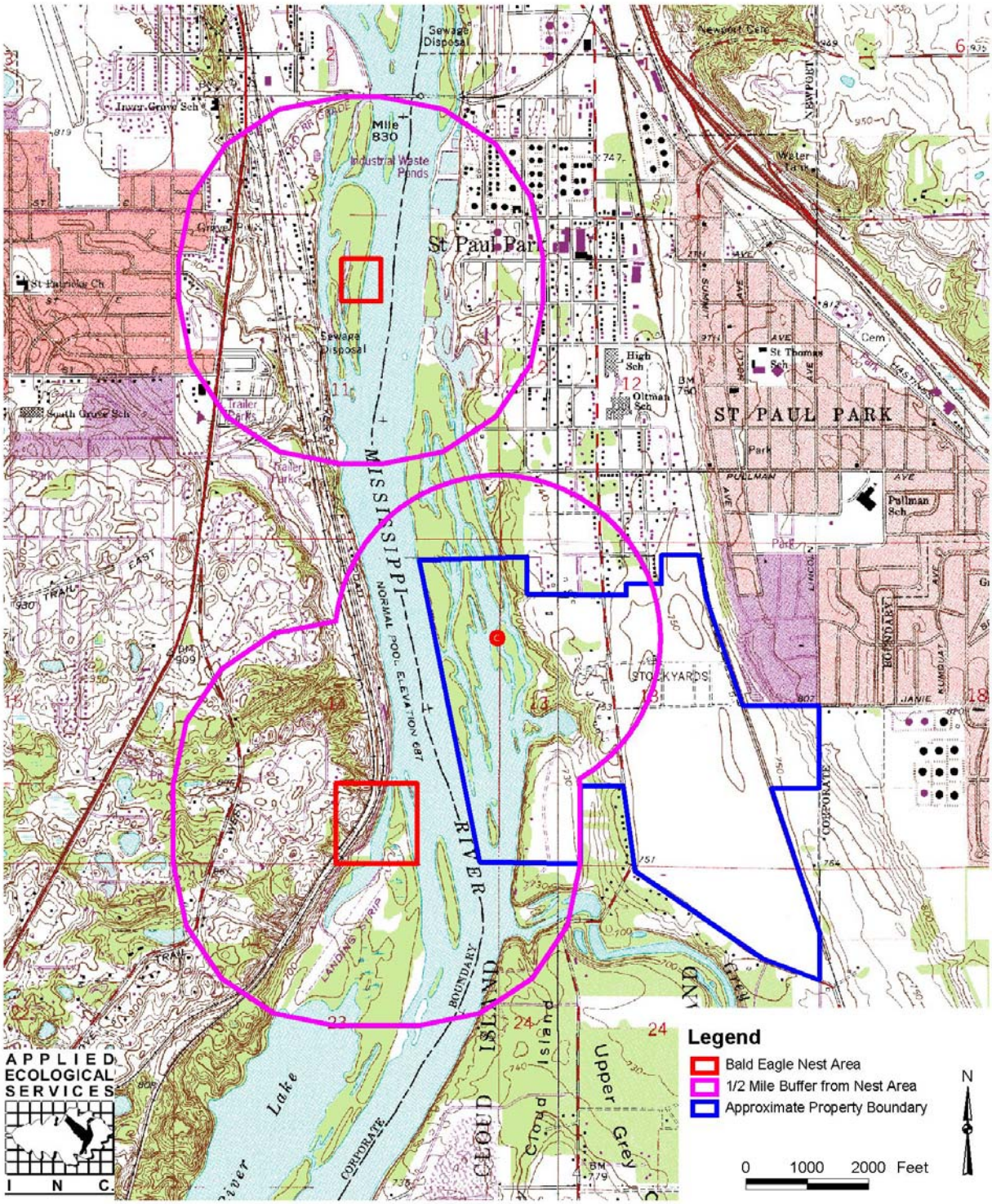
Figure 8 shows the bald eagle nesting areas with ½-mile buffers, a maximum buffer line inside of which the MnDNR recommends that planned activities be developed with consideration for bald eagles, if they are nesting. Federal-listed threatened and endangered species in Washington County include the threatened bald eagle (*Haliaeetus leucocephalus*) and endangered Higgin's eye pearly-mussel (*Lampsilis higginsi*). The typical habitat of the bald eagle is mature forest near water. The Higgin's eye pearly-mussel is found in the Mississippi River.

Figure 7. MnDNR Protected/Public Waters Inventory



Source: Figure adapted from MnDNR Protected/Public Waters Inventory mapping acquired from MnDNR.

Figure 8. Bald Eagle Nest Locations



Source: Figure adapted from USGS 7.5-minute topographic quadrangle maps (Inver Grove Heights and St. Paul Park, MN) acquired from MnDNR Data Deli, MnDNR Natural Heritage Information System records, and field observation by Dahlgren Shardlow & Uban and Applied Ecological Services, Inc.

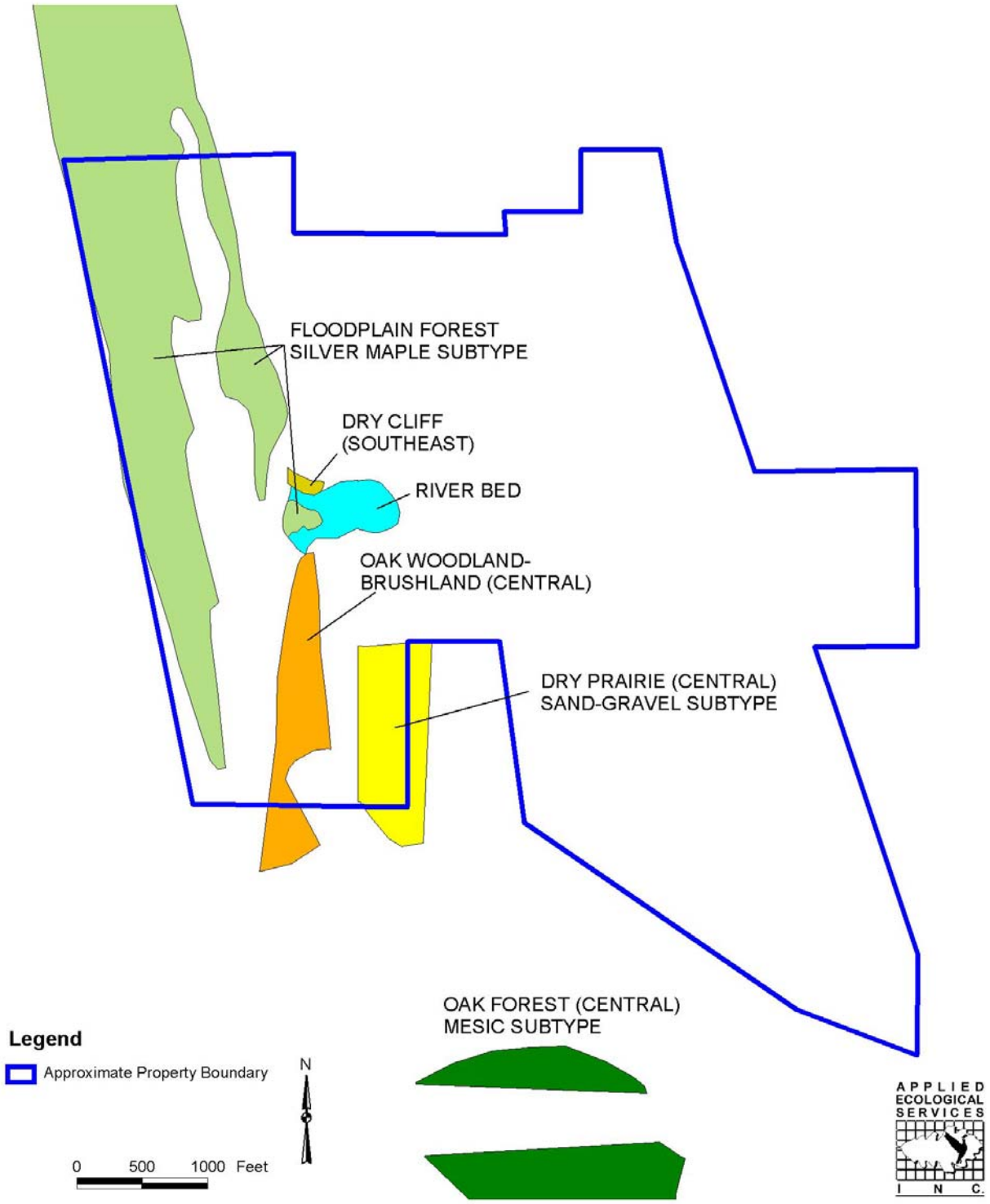
Table 3. State and Federal Listed Species Identified On or Near the Site

Status	Species/Natural Community	Description
Federal Threatened, State Special Concern	Bald eagle (*Haliaeetus leucocephalus*)	Three bald eagle nesting areas have been identified near the site. Of those, 1 is within the site and another is within 0.5 mile of the site
State Endangered	Wartyback mussel (*Quadrula nodulata*)	Documented in the Mississippi River within the vicinity of the site
State Endangered	Rock Pocketbook mussel (*Arcidens confragosus*)	Documented in the Mississippi River within the vicinity of the site
State Threatened	Monkeyface mussel (*Quadrula metanevra*)	Documented in the Mississippi River within the vicinity of the site
Sites of Moderate Biodiversity Significance	Floodplain Forest - Silver Maple Subtype, Dry Cliff (Southeast), and River Bed	These elements include the islands in the Mississippi River (some of which are within the site) and the bay area of the site
Sites Ranking Below Moderate Biodiversity Significance	Dry Prairie (Central) Sand-Gravel Subtype and Oak Woodland-Brushland (Central)	These areas are identified in the southwestern portion of the site

Three of Minnesota's threatened and endangered mussel species were recently found living in the Mississippi River near the site. In August 2001, the U.S. Army Corps of Engineers discovered a population of Wartyback (*Quadrula nodulata*, state endangered) within a quarter mile of the southern property boundary. AES does not have data on the other two species: the Rock-pocketbook (*Arcidens confragosus*, state endangered) and the Monkeyface (*Quadrula metanevra*, state threatened). The Wartyback and Monkeyface prefer sandy and gravelly river bottoms, while the Rock-pocketbook occurs in pool areas with slower flow and muddy or sandy bottoms.

MnDNR County Biological Survey (CBS) mapping identifies five natural plant communities within the site including Silver Maple Floodplain Forest, River Bed, Dry Cliff, Oak Woodland-Brushland, and Dry Prairie. These communities are all located in the western half of the site (Figure 9).

Figure 9. MnDNR County Biological Survey Mapping



Source: Figure adapted from MnDNR County Biological Survey mapping acquired from MnDNR Data Deli.

3.3 Field Findings

Figure 10 and the following narrative describe the condition of native plant communities and also the land cover types identified at the site. Potential MLCCS correlates for the land cover types are presented in Table 4. Faunal observations at the site are also described in a following section. Photos of the site are included in Appendix A, and Plant Species Lists for select areas are included in Appendix C.

3.3.1 Condition Ranking of Native Plant Communities

AES identified nine locations on the site where native plant communities were in fair condition. Two were in deciduous forest, two in deciduous woodland, one in the prairie, and four in the mesic oak savanna areas. The floodplain forest was not visited but is likely in fair condition given its remote location. The remaining native plant communities on the site were considered to be in poor condition. The limited tree survey, indicating concentrations of older trees, also aided in determining the condition rank of forest and woodland areas.

3.3.2 Site Land Cover Types

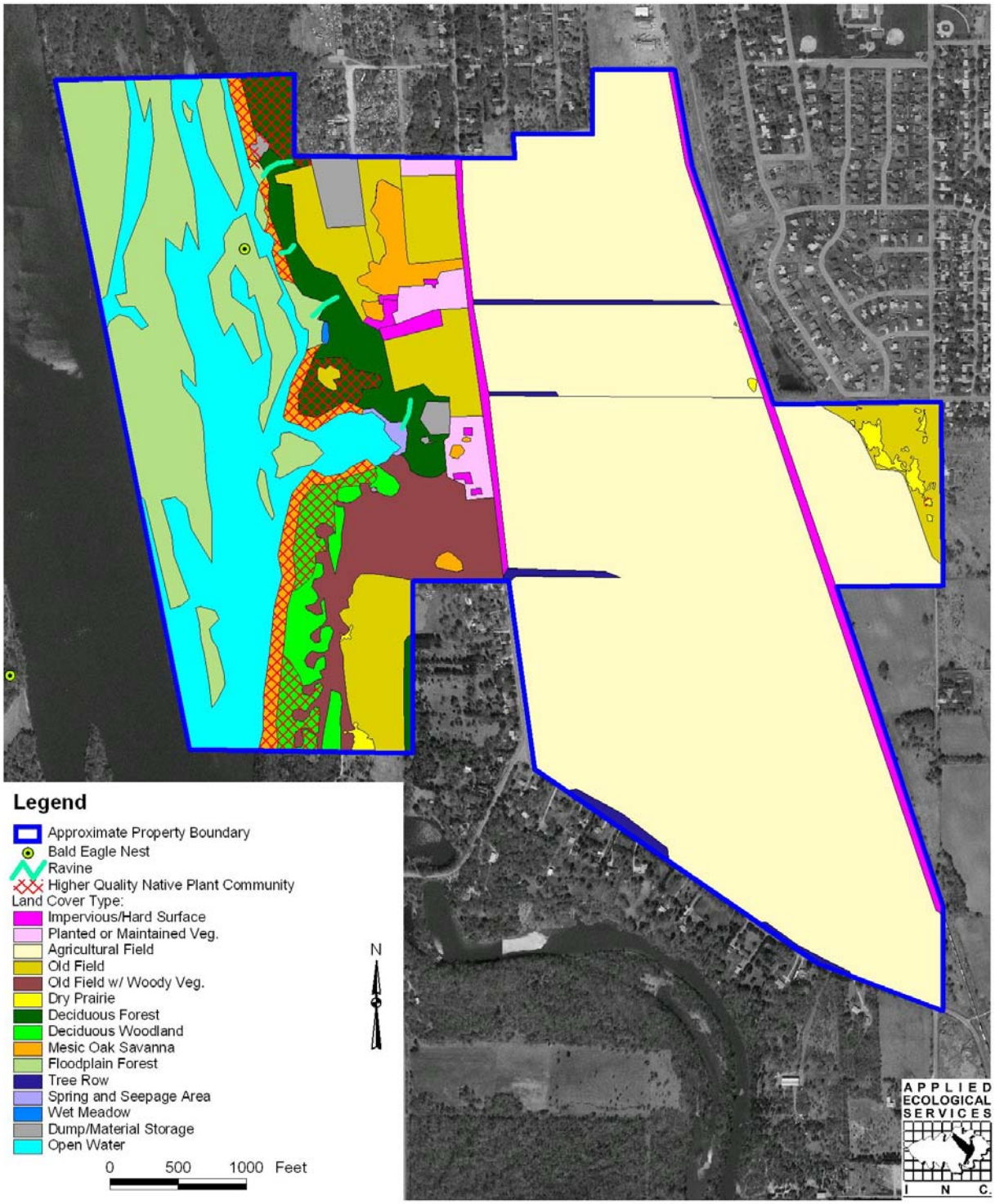
Impervious/Hard Surface

A very small proportion of the site was observed to consist of constructed impervious/hard surfaces. These surfaces included existing structures, roads, and railroad tracks. A barn on the site had been burned down shortly before our field reconnaissance; however, the foundation and portions of the structure remained. Many of the farmstead outbuildings appeared dilapidated and abandoned.

Planted or Maintained Vegetation

Areas of maintained vegetation were observed around some of the existing buildings. Much of the maintained turf area was dominated by Kentucky blue grass (*Poa pratensis*). Planted trees and shrubs were observed around some of the site structures.

Figure 10. Site Land Cover Map



Source: Figure adapted from Metropolitan Council digital orthophoto data (2000 photo) and AES field notes.

Table 4. Land Cover Types and MLCCS Correlates

Land Cover Type	MLCCS[1] Correlates[2]
Impervious/Hard Surface	14123 (91-100% Impervious Cover, Buildings and Pavement)
Planted or Maintained Vegetation	23100 (Planted or Maintained Grasses with Sparse Tree Layer)
Grasslands/Croplands:	
Agricultural Field	24114 (Upland Soils – Cultivated Row Cropland – Soybeans)
Old Field	61220 (Medium-Tall Non-Native Dominated Herbaceous Vegetation)
Old Field with Woody Vegetation	62140 (Non-Native Dominated Herbaceous Vegetation with Sparse Deciduous Trees)
Prairie	61210 (Dry Prairie); 61220 (Medium-Tall Non-Native Dominated Herbaceous Vegetation)
Forest/Woodland/Savanna:	
Deciduous Forest	32170 (Boxelder-Green Ash Disturbed Native Forest); 32110 (Oak Forest)
Deciduous Woodland	42130 (Disturbed Deciduous Woodland)
Mesic Oak Savanna	62130 (Mesic Oak Savanna)
Floodplain Forest	32211 (Floodplain Forest, Silver Maple Subtype)
Tree Row	21213 (Other Deciduous Trees)
Water Features:	
Spring and Seepage Area	63210 (Seepage Meadow)
Wet Meadow	61420 (Wet Meadow); 61480 (Saturated Non-Native Dominated Herbaceous Vegetation)
Dumps and Material Storage	14233 (Landfill); 14234 (Other Exposed/Transitional Land)
Open Water	91100 (Slow Moving Linear Open Water Habitat); 93300 (Palustrine Open Water)

[1] MLCCS = Minnesota Land Cover Classification System, developed by the Minnesota Department of Natural Resources

[2] Potential MLCCS correlates are incorporated into this document for general comparisons between classification systems. However, it should be noted that direct correlation between classification systems is not always possible.

Agricultural Field

Almost the entire eastern half of the site was in agricultural production. The majority of this area consisted of cultivated soybeans. A portion of the remaining agricultural land located in the east-central portion of the site is subdivided and leased by multiple individuals. This area is a community garden containing a variety of crops, including lettuce species, squash species, and others. This community garden is located in the area identified on the USGS topographic map as "Stockyards." Although the 1953 aerial photograph and NWI mapping suggest a wetland in this

community garden area, indications of wetland conditions were not observed during our site reconnaissance.

Old Field and Old Field with Woody Vegetation

Based on field observations and confirmation from the landowner, all of the old fields on the site have experienced grazing. The landowner stated that the old fields in the northern portion of the site were grazed until approximately 1987, whereas the old fields in the south were released from grazing in the 1940's or 1950's.

Two general types of old field plant communities were identified on the site. Most of the old fields in the north are mowed periodically and consist primarily of stinging nettle (*Urtica dioica*), hemp (*Cannabis sativa*), and other agronomic weeds. Most of the old fields in the south were typically dominated by smooth brome (*Bromus inermis*), with interspersed native and non-native plant species. Common buckthorn (*Rhamnus cathartica*), Siberian elm (*Ulmus pumila*), Tartarian honeysuckle (*Lonicera tatarica*), green ash (*Fraxinus pennsylvanica*), and eastern red cedar (*Juniperus virginiana*) were observed invading the old fields.

The old field in the southwestern portion of the site is identified by the MnDNR as "Dry Prairie." However, the AES field investigation revealed that this old field is dominated largely by smooth brome (*Bromus inermis*) and contains only two areas with native prairie species. A plant species list for the southwestern old field (including the prairie areas) is included in Appendix C.

Prairie

Several areas containing native prairie plants were identified within the site. Prairie areas (condition rank of poor) were identified within the old field in the southwestern portion of the site. According to the current landowner, this area has been grazed previously. Prairie species observed in these areas included stiff goldenrod (*Solidago rigida*), wild bergamot (*Monarda fistulosa*), side-oats grama (*Bouteloua curtipendula*), ironweed (*Vernonia fasciculata*), thimbleweed (*Anemone* sp.), and hoary vervain (*Verbena stricta*). Prairie areas (condition rank of poor) were also identified adjacent to the railroad tracks within the east-central portion of the site. Some of these areas were very small and only contained one or two native prairie species.

The prairie areas in the eastern-most portion of the site hold the most ecological value and promise given the native plant species diversity, proximity to each other, and the overall size and number of patches. While all but one of these patches had a condition rank of poor, the most diverse prairie patch on the site (condition rank of fair) was observed to contain blazing star (*Liatris* cf. *aspera*), little bluestem (*Schizachyrium scoparium*), gray-headed coneflower (*Ratibida pinnata*), dropseed (*Sporobolus* cf. *asper*), stiff goldenrod, aster (*Aster* sp.), thimbleweed, and whorled milkweed (*Asclepias verticillata*). For additional details see Appendix C. The old field containing these prairie patches is triangular in shape and bound by roads and residential development to the north and east, and agricultural land along its southwestern edge. The boundaries of this field were disturbed by human activities including mowing, dumping of yard waste, and farming practices.

Deciduous Forest and Deciduous Woodland

Deciduous forest was generally observed in the northern portion of the site between the old field/farmstead areas and the mesic oak savanna located along the Mississippi River bluffs. The deciduous forest contained areas of oak forest (in the northern-most and central portions of the site) and disturbed native forest (dominated by boxelder, *Acer negundo*). In lower topographic settings these forests contained some areas of lowland hardwood forest that transitioned to floodplain forest. A considerable concentration of oaks was observed in the northern-most portion of the site.

The ground vegetation in the deciduous forests overall were shade-suppressed due to thick woody vegetation, and significant sheet erosion was observed in some areas. Several ravines were also observed on the site. Particularly severe is the ravine erosion located near the bay, where a channel approximately 6 feet deep has developed.

Deciduous woodland was generally observed in the southern portion of the site between the old field areas and the mesic oak savanna located along the Mississippi River bluffs. The deciduous woodlands were similar to the deciduous forest areas with slightly less canopy cover, fewer boxelder trees, and many more invasive shrubs.

Much of the deciduous forest and woodland was dominated by early-successional native species including boxelder, green ash (*Fraxinus pennsylvanica*), eastern red cedar (*Juniperus virginiana*), American elm (*Ulmus americana*), and prickly ash (*Xanthoxylum americanum*).

Invasive, exotic species were also observed in these areas, including common buckthorn and Tartarian honeysuckle, particularly in the woodlands. Several desirable native species were scattered throughout the higher quality forests and woodlands, including mature bur oak (*Quercus macrocarpa*), red oak (*Quercus rubra*), basswood (*Tilia americana*), ironwood (*Ostrya virginiana*), butternut (*Juglans cinerea*), bitternut hickory (*Carya cordiformis*), and common hackberry (*Celtis occidentalis*). Ground cover vegetation, both native and non-native, was often sparse. A list of species observed in the deciduous forest and woodland is provided in Appendix C.

Mesic Oak Savanna

Mesic oak savanna was observed along the Mississippi River bluffs and at a few other locations in the site. Our review of historical photographs suggests that the trees along the bluff have been relatively undisturbed since 1936, but the south and central portions may have been in pasture during 1936 and 1953. Barbed-wire fencing was observed along the bluff in some areas, suggesting past grazing in this area. The size of many of the oaks near the farmsteads suggests that they are very old, with a mean diameter at breast height (dbh) of 30 inches and a range of 10 to 50 inches dbh. These trees have large crowns in the 1936 aerial photo. Several large black maples (*Acer nigrum*) and other large native trees were also observed near the homesteads.

The savannas along the river bluffs were dominated by native plant species and contained many mature bur oaks and ironwood. Mature red oak and possibly northern pin oak (*Quercus ellipsoidalis*) were also observed, primarily near the farmsteads. Native prairie and savanna species (e.g., big bluestem, Pennsylvania and other native sedges) were observed in several areas near the bluff, particularly where there were openings in the canopy. However, mesic savanna areas near the farmsteads contained mostly smooth brome grass and other weedy vegetation in the ground layer. Significant invasion by red cedar was observed in portions of the mesic oak savanna north of the bay and in the southern portion of the site. The MnDNR CBS map identifies "Oak Woodland-Brushland" that overlaps the southern portion of the mesic oak savanna. In addition, the CBS map identifies the area north of the bay as a "Dry Cliff." This area consisted of bare bedrock bluff/cliff interspersed with savanna vegetation. A list of species observed in the mesic oak savanna is provided in Appendix C.

Floodplain Forest

Floodplain forests were observed along the bank of the Mississippi River in areas where the shoreline sloped gradually upward from the waterline. Off shore islands consisted of floodplain forests as well; however, these areas were not assessed as part of this report. The visible portions of the floodplain forests were dominated by silver maple (*Acer saccharinum*); however, mature eastern cottonwood (*Populus deltoides*) likely exists in these forests as well. Floodplain forests are depicted as "Silver Maple Floodplain Forest" on the MnDNR CBS map.

Tree Row

Several tree rows were observed on the site. Most of these features were located at edges of agricultural fields and were dominated by boxelder, Siberian elm, and hackberry trees, with an understory of weedy vegetation.

Wet Meadow

One depressional wetland was identified approximately 500 feet north of the bay. This wetland was not delineated. It is located in the Mississippi River floodplain and characterized as a wet meadow (condition rank of poor) dominated by reed canary grass (*Phalaris arundinacea*) and stinging nettle (*Urtica dioica*). However, sweet flag (*Acorus calamus*) and a few other native species were also observed in the wetland.

Other jurisdictional wetlands observed on the site were associated with the Mississippi River floodplain below the toe of the bluff. These river-related wetland areas include the bay backwater of the river (characterized as a riverbed wetland, or submergent wetland), floodplain wetlands, and springs and seeps along the toe of the bluff.

Spring and Seepage Area

Springs and seeps were observed in the bay area of the Mississippi River in the west-central portion of the site at the toe of the bluff slope. Clear spring water was observed upwelling from sediment beneath the shallow water's surface and along portions of the bluff's toe slope. Some of the vegetation here is typical of groundwater discharge areas, including marsh marigold (*Caltha palustris*) and watercress (*Rorippa nasturtium-aquaticum*). Other native plant species observed adjacent to the springs included iris (*Iris* sp.), sedges (*Carex* spp.),

beggar-ticks (*Bidens* cf. *cernua*), river bulrush (*Scirpus fluviatilis*), clearweed (*Pilea pumila* or *P. fontana*), and Virginia wild rye (*Elymus virginicus*). Some areas of invasive Eurasian reed canary grass (*Phalaris arundinacea*) were also observed in this portion of the site. Trees in this area include silver maple, bur oak, and American elm.

In order to determine the source of the boiling sand spring in the bay, AES contacted Dr. E. Calvin Alexander, Jr., University of Minnesota, a state expert on springs, seeps, and groundwater behavior in limestone formations (karst features). After reviewing site information, Dr. Alexander believes the boiling spring originates in the Jordan Sandstone at an elevation of 600 feet. The spring rises 87 feet through river alluvium to emerge at the eastern edge of the bay. At historically lower water levels, the spring undercut the Oneota Dolomite, causing it to collapse and the bay to move eastward into the bluff. Other dead-end valleys on the property and in the vicinity were probably formed by springs and seeps that undercut and caused the Oneota Dolomite to collapse.

Another seepage area was observed just north of the wet meadow along the bluff toe slope. This seep was located in an area transitional between the floodplain forest and deciduous forest. Although not demonstrated, the seep may be fed by a combination of surface and deep groundwater. The property's shallow, sandy soils allow rapid infiltration of runoff, which quickly reaches the underlying Oneota Dolomite. Cracks and fissures in the dolomite transport the water. Seeps form where the Oneota Dolomite layer meets river deposits and broken dolomite at the base of the slope. The Oneota Dolomite is known to contain sinkholes and other direct connections between the surface and the groundwater. One sinkhole is known to exist on the site. The elevation of the seep suggests that it may receive water from the Jordan aquifer also.

Dumps and Material Storage Areas

Multiple farm dumps, a junkyard containing mainly old vehicles, and a wood material storage area were identified within the site (Figure 10). Materials identified in the farm dumps include glass, metal, tires, assorted construction materials, and miscellaneous residential wastes. The junkyard contained many dilapidated vehicles such as dump trucks, cars, buses, boats, and snowmobiles. Other materials including lawn mowers, a toilet, and various household debris

were identified within the junkyard. An area in the northern portion of the site contained piles of mulch, wooden pallets, and other wood materials that were being stored.

Open Water

The only open water observed at the site consisted of the Mississippi River, its backwaters, and the bay. The site is located in Pool 2 (MnDNR Protected/Public Water 19-5P, normal pool elevation 687 ft above mean sea level), which extends from Minnehaha Falls Park (along the Mississippi River) and the Interstate Highway 494 bridge (over the Minnesota River) downstream to Hastings, Minnesota. The on-site bay area represents a submergent wetland based on its relatively shallow water and submersed aquatic vegetation.

3.3.3 Wildlife

The most important wildlife features are: 1) Bald Eagle nesting sites on and near the property, 2) freshwater mussel species in the Mississippi River, and 3) non-game wildlife populations in different habitats of the property. Our discussion will focus on the Bald Eagle and non-game wildlife populations because we did not field investigate the mussels.

Bald Eagle

A Bald Eagle pair is currently (April 2003) using the nest in the northwest part of the site and also is possibly the same pair that used the nest in 2002. Bald eagles remain together for many years and usually return to the same territory each year (Coffin and Pfannmuller 1988). They occupy several nests in a territory covering a square mile or more and move to different nests depending on conditions at the nest site (Ontario Ministry of Natural Resources 1987).

The nest on the site is in a tall tree on an island in the river backwaters. A second nest near the southeast corner of the site was used in 2001. A third nest lies about 1 mile north of the site. Residents in the area reported to AES that in the summer of 2002, eagles ("two to four" and "a few") were regularly seen perching or flying along the Mississippi River between St. Paul Park and River Lake. According to residents, the eagles spend more time near the site and downstream of it than upstream of the site.

The eagles at Rivers Edge are habituated to the intermittent noise generated by the wood chipping and auto salvage sites located 600-700 feet away from the nest, and to passing boats on the river. The extent of their habituation to other activities by people is not known.

Non-Game Wildlife

Wildlife responds to a combination of vegetation structure and plant type, and species may require several different kinds of habitats to successfully live and breed during the year. The site is made up of a mixture of different wildlife habitat types, and although water is lacking over most of the area, it is accessible along the banks of the Mississippi River. From a wildlife standpoint, the mixture of habitats and close proximity to water increases the chances that species requiring these conditions will be able to fully complete their life cycles. In addition, the site is located on a sand terrace of the ancient Mississippi River, and the soils are predominantly sandy and well-drained; therefore, some animals using the site will be able to cope with dry conditions and occasional drought.

The following discussion focuses on the five major wildlife habitat types: short grassland, tall grassland, savanna, forest, and wetland (Table 5). Disturbed ground by itself rarely provides good habitat for most species of the area and will not be discussed. We also briefly discuss the site as a corridor during migration. Because the wildlife survey was brief and conducted outside the breeding season for birds, the following discussion is incomplete. It should not be taken to indicate that species not mentioned are not found on the site.

Short Grassland

Common Grackles and migrating Dark-eyed Juncos were seen in this habitat. Other species typical of maintained lawns near buildings would also be expected here.

Tall Grassland

Much of the tall grassland is dominated by smooth brome grass, which does not provide good structural diversity for wildlife. AES observed pocket gopher mounds, a Red-tailed Hawk, and a pair of Eastern Bluebirds in this habitat. Other grassland bird species might be expected during the breeding season. A racer snake (*Coluber constrictor*, state special concern) was

reported by the MnDNR to occur one mile southeast of the site near a native prairie at Grey Cloud Dunes Scientific and Natural Area.

Table 5. Wildlife Habitat Types Related to Land Cover Types Used in this Study

Wildlife Habitat	Land Cover Type	Comment
Short Grassland	1. Planted or Maintained Vegetation	*Short grassland vegetation.* Mowed grass sometimes with ornamental shrubs/trees, located near buildings and other impervious surfaces.
Tall Grassland	1. Old Field 2. Prairie 3. Agricultural Field	*Tall grassland vegetation.* Old field is mostly uniform stands of non-native smooth brome grass (*Bromus inermis*) or other non-native species. Prairie is a more diverse concentration of native prairie plants. Agricultural fields are mostly crop monocultures with herbaceous structure. Corn provides tall vegetation, soybeans shorter vegetation.
Savanna	1. Old Field with Woody Vegetation 2. Mesic Oak Savanna	*Grassland with scattered trees and shrubs.* Old field of mostly smooth brome grassland is being colonized by native and non-native trees and shrubs. Mesic oak savanna consists of large and small native trees (mostly oaks) with native or non-native groundcover, depending on the history of use.
Woodland/Forest	1. Deciduous Forest 2. Deciduous Woodland 3. Floodplain Forest 4. Tree Row	*Mostly closed canopy forest.* Deciduous woodland and forest are areas where oaks dominate or are common, as well as areas where light-seeded native trees (e.g., boxelder, green ash) have invaded historic savannas. Floodplain forest is located in the river floodplain. Tree rows represent a narrow woodland patch, mainly along agricultural fields.
Wetland	1. Spring and Seepage Area 2. Wet Meadow 3. Open Water (wetland)	*Wetlands with wetland vegetation, soils, and hydrology.* Small spring and seepage areas exist at the toe of the bluff. One wet meadow was identified on the property. The largest on-site wetland is the submergent aquatic river/lake bed in the bay of the Mississippi River.
Disturbed Ground	1. Impervious/Hard Surface 2. Dumps and Material Storage	These areas retain little or no trace of original conditions; vegetation is usually mostly removed or buried, and soils are altered.

Savanna

Savannas have more diverse vegetation structure and as a result a more diverse animal community than grasslands. AES observed White-tailed Deer, Fox Snake (juvenile), American Toad, Black-capped Chickadee, Eastern Phoebe, Great-horned Owl, Pileated Woodpecker (a pair), Blue Jay, American Crow, Song Sparrow, and Red-tailed Hawk. Other bird species of open woodland might be expected during the breeding season.

Woodland/Forest

Typical species of closed canopy settings were seen and are to be expected. In this habitat AES observed Bald Eagle (a pair), Broad-winged Hawk, American Robin, Cardinal, Red-bellied Woodpecker, Black-capped Chickadee, and White-tailed Deer.

Wetland

The only significant wetland habitat on the property was associated with the floodplain. The open water wetlands support waterfowl and herons. During the two spring visits, AES observed 60-100 individual waterfowl using the bay located on the site. These included teal (Blue-winged and Green-winged), Northern Shoveler, and other unidentified waterfowl. Waterfowl probably use this bay because of the submerged and floating vegetation (coontail, pondweed, duckweed, etc.) and its isolated location. During the rest of the year a pair of Canada Geese and of Wood Ducks (observed by AES) likely use the bay, along with Great Blue Heron (also observed). The backwaters of the Mississippi River provide similar habitat, though no concentrations of waterfowl were seen in the backwaters.

Migration

Bird species move through the site because it is adjacent to the largely vegetated corridor of the Mississippi River. AES observed Turkey Vultures, Great Egrets, Great Blue Herons, Bald Eagles, and hawks flying over the site near the bluffs and river. Smaller birds, such as Ruby-crowned Kinglets and Dark-eyed Juncoes (observed by AES), or vireos, flycatchers, thrushes and warblers (not observed, but expected later in the spring), use the forests and woodlands while migrating northward and southward. Waterfowl also use the open water portions of the property during migration.

4.0 SUMMARY

Based on pre-settlement vegetation data and existing native plant communities, the site once represented a gradation from prairie landscapes in the east, to oak savanna and barrens along the bluffs, and down into the floodplain forest and aquatic habitats of the Mississippi River. The vast majority of the site has been highly altered or disturbed by past agricultural use (cultivation and grazing) and by suppression of natural disturbance regimes, such as fire. However, several recognizable examples of native plant communities in poor to fair condition are dispersed across the site, including prairie, mesic oak savanna, and deciduous forest and woodland. In addition to native plant communities and wildlife habitat, the springs in the bay area represent an uncommon hydrologic feature. AES did not observe any rare species in these habitats, and did not conduct an extensive survey during the breeding season. The non-game species we observed represent the wildlife to be found in the semi-rural areas of the Twin Cities. The presence of hawks, owls, and Pileated Woodpeckers indicates that birds requiring larger territories are supported by this site and surrounding lands. The site also provides continuous vegetation along the Mississippi River that links nearby and adjacent natural areas, parks, and existing forests and woodlands, and aids the movement of some species up and down the river.

5.0 REFERENCES

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APPENDIX A. Site Photographs

1. Buildings and Maintained Vegetation
2. Agricultural Field - Soybeans
3. Agricultural Field – Community Garden
4. Old Field – North
5. Old Field – Southwest
6. Old Field with Woody Vegetation
7. Prairie – Along Railroad Tracks (condition rank of poor)
8. Prairie – Eastern Complex (foreground is condition rank of fair)
9. Deciduous Forest
10. Mesic Oak Savanna along Bluff
11. Floodplain Forest
12. Springs
13. Seepage Wetland
14. Material Storage Area – Wood Materials
15. Material Storage Area – Vehicle Junkyard
16. Bay of Mississippi River

Photograph 1. Buildings and Maintained Vegetation

Photograph 2. Agricultural Field - Soybeans

Photograph 3. Agricultural Field – Community Garden

Photograph 4. Old Field - North

Photograph 5. Old Field – Southwest

Photograph 6. Old Field with Woody Vegetation

Photograph 7. Prairie – Along Railroad Tracks (condition rank of poor)

Photograph 8. Prairie – Eastern Complex (foreground is condition rank of fair)

Photograph 9. Deciduous Forest

Photograph 10. Mesic Oak Savanna along Bluff

Photograph 11. Floodplain Forest

Photograph 12. Springs

Photograph 13. Seepage Wetland

Photograph 14. Material Storage Area – Wood Materials

Photograph 15. Material Storage Area – Vehicle Junkyard

Photograph 16. Bay of Mississippi River

APPENDIX B. MnDNR Natural Heritage Database Response Letter*

(Note: At the time of submittal of the request for Natural Heritage Database information for the site, the site was referred to as "Mississippi Mixed-Use Development")

* The letter is included in Appendix D of the Rivers Edge Final AUAR and is not duplicated in this NRI Appendix

APPENDIX C. Plant Species Lists

1. Old Field – Southwest (including Dry Prairie identified at the site by MnDNR)
2. Prairie – Eastern Complex (condition rank of poor to fair)
3. Deciduous Forest and Woodland
4. Mesic Oak Savanna

Plant Species List
Old Field – Southwest (including Dry Prairie identified at the site by MnDNR)

Native Species:

Herbaceous:
- Achillea millefolium
- Ambrosia artemisiifolia
- Anemone cf. cylindrica
- Artemisia ludoviciana
- Asclepias syriaca
- Aster ericoides
- Bouteloua curtipendula
- Equisetum hyemale
- Leptoloma cognatum
- Lespedeza capitata
- Lycopus americanus
- Monarda fistulosa
- Parthenocissus inserta
- Physalis heterophylla
- Potentilla arguta
- Solidago canadensis
- Solidago rigida
- cf. Stachys palustris
- Verbena hastata
- Verbena stricta
- Vernonia fasciculata
- Vitis riparia

Woody:
- Juniperus virginiana
- Quercus macrocarpa
- Prunus serotina
- Rubus occidentalis
- Xanthoxylum americanum

Non-Native Species

Herbaceous:
- Asparagus officinalis
- Bromus inermis
- Convolvulus arvensis
- Cirsium arvense
- Cirsium vulgare
- Hypericum perforatum
- Melilotus officinalis
- Nepeta cataria
- Poa pratensis
- Setaria glauca
- Tragopogon dubius
- Urtica dioica
- Verbascum thapsus

Woody:
- Ulmus pumila
- Lonicera tatarica
- Rhamnus cathartica

Unknowns

Herbaceous:
- Unknown Asteraceae
- Unknown forb 1
- Unknown forb 2
- Unknown forb 3

NOTE: Plant species lists were derived from field observations on September 30 and October 1, 2002. Other plant species may be present but were not observed due to the time of year during which the site visits were completed. Therefore, the lists are not comprehensive.

Plant Species List
Prairie – Eastern Complex (condition rank of poor to fair)

Native Species:

Herbaceous:

- Andropogon gerardii
- Ambrosia artemisiifolia
- Anemone cf. cylindrical
- Apocynum sp.
- Artemisia ludoviciana
- Asclepias verticillata
- Asclepias syriaca
- Aster ericoides
- Aster novae-angliae
- Aster cf. oolentangiensis
- Aster cf. pilosus
- Carex sp.
- Conyza canadensis
- Equisetum hyemale
- Helianthus cf. tuberosus
- Lespedeza capitata
- Liatris cf. aspera
- Monarda fistulosa
- Oenothera biennis
- Panicum cf. lanuginosum
- Physalis cf. heterophylla
- Potentilla arguta
- Ratibida pinnata
- Rosa arkansana
- Schizachyrium scoparium
- Solidago canadensis
- Solidago gigantea
- Solidago rigida
- Sporobolus cf. asper
- Verbena stricta

Woody:

- Acer negundo
- Fraxinus pennsylvanicum
- Juniperus virginiana
- Rhus glabra
- Toxicodendron radicans
- Ulmus americanum
- Viburnum sp.
- Xanthoxylum americanum

Non-Native Species:

Herbaceous:

- Bromus inermis
- Centaurea maculosa
- Cirsium vulgare
- Hypericum perforatum
- Linaria vulgaris
- Lychnis alba
- Melilotus alba
- Verbascum thapsus

Woody:

- Ulmus pumila
- Lonicera tatarica
- Rhamnus cathartica

Unknowns:

Herbaceous:

- Unknown forb 1
- Unknown forb 2
- Unknown forb 3

NOTE: Plant species lists were derived from field observations on September 30 and October 1, 2002. Other plant species may be present but were not observed due to the time of year during which the site visits were completed. Therefore, the lists are not comprehensive.

Plant Species List
Deciduous Forest and Woodland

Native Species:

Herbaceous:

- Aster cf. pilosus
- Aster sagittifolius
- Campanula americana
- Carex hystericina
- Carex sp.
- Circaea lutetiana
- Conyza canadensis
- Echinocystis lobata
- Eupatorium rugosum
- Geum canadense
- Leersia virginica
- Pilea pumila or P. fontana
- Solidago gigantea
- Vitis riparia

Woody:

- Acer negundo
- Acer nigrum
- Acer saccharinum
- Carya cordiformis
- Celtis occidentalis
- Fraxinus pennsylvanicum
- Juglans cinerea
- Juniperus virginiana
- Ostrya virginiana
- Parthenocissus vitacea
- Populus deltoides
- Prunus serotina
- Quercus ellipsoidalis
- Quercus macrocarpa
- Quercus rubra
- Ribes sp.
- Rubus occidentalis
- Sambucus racemosa
- Tilia americana
- Ulmus americana

Non-Native Species

Herbaceous:

- Arctium minus
- Bromus inermis
- Cannabis sativa
- Chenopodium album
- Galium mollugo
- Lepidium campestre
- Leonurus cardiaca
- Lychnis alba
- Lysimachia nummularia
- Melilotus sp.
- Nepeta cataria
- Phalaris arundinacea
- Setaria faberi
- Urtica dioica

Woody:

- Lonicera tatarica
- Rhamnus cathartica

Unknowns

Herbaceous:

- Unknown Bryales
- Unknown Poaceae
- Unknown forb 1
- Unknown forb 2

NOTE: Plant species lists were derived from field observations on September 30 and October 1, 2002. Other plant species may be present but were not observed due to the time of year during which the site visits were completed. Therefore, the lists are not comprehensive.

Plant Species List
Mesic Oak Savanna

Native Species:

Herbaceous:
- Actaea rubra
- Andropogon gerardii
- Anemone sp.
- Aster ciliolatus
- Aster oolentangiensis
- Aquilegia canadensis
- Carex pennsylvanica
- Carex sp. 1
- Carex sp. 2
- Eupatorium rugosum
- Galium asprellum
- Hepatica americana
- Hydrophyllum virginianum
- Solidago flexicaulis
- Viola sp.

Woody:
- Celtis occidentalis
- Fraxinus pennsylvanicum
- Juniperus virginiana
- Ostrya virginiana
- Populus deltoides
- Prunus serotina
- Prunus cf. virginiana
- Quercus macrocarpa
- Quercus rubra
- Smilax cf. hispida
- Tilia americana
- Taxus canadensis

Non-Native Species

Woody:
- Rhamnus cathartica

Unknowns

Herbaceous:
- Unknown Bryales 1
- Unknown Bryales 2
- Unknown forb 1

NOTE: Plant species lists were derived from field observations on September 30 and October 1, 2002. Other plant species may be present but were not observed due to the time of year during which the site visits were completed. Therefore, the lists are not comprehensive.