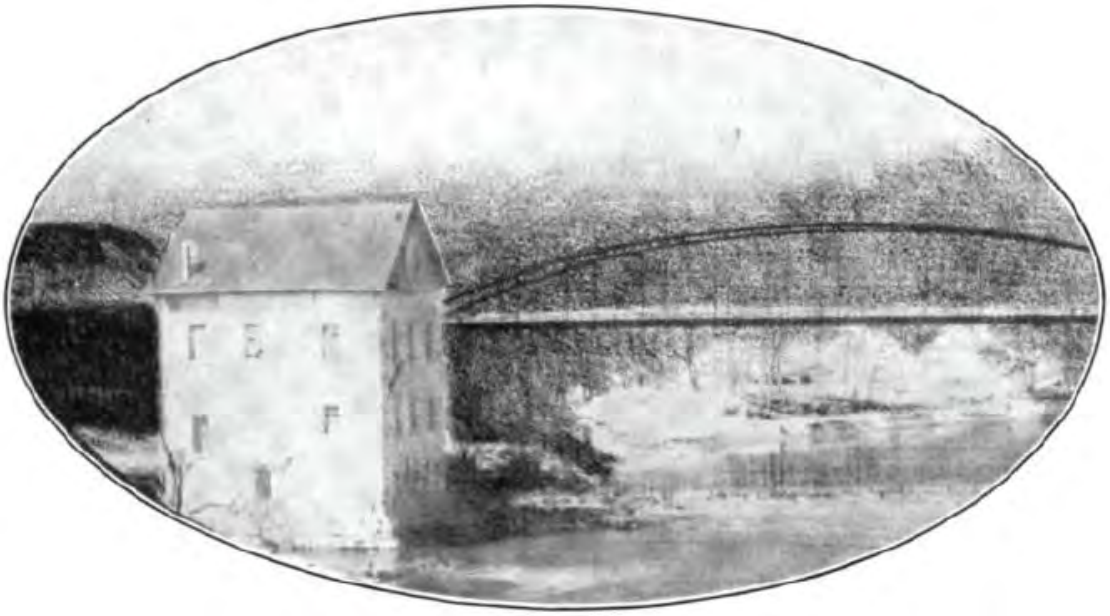
Appendix E

Archaeological Reconnaissance Report

ARCHAEOLOGICAL RECONNAISSANCE SURVEY OF LAKE DELHI

DELAWARE COUNTY, IOWA



Prepared for:

Lake Delhi Combined Recreation Facility
and Water Quality District

Prepared by:

THE Louis Berger Group, INC.

November 2011

ARCHAEOLOGICAL RECONNAISSANCE SURVEY OF LAKE DELHI

DELAWARE COUNTY, IOWA

Prepared for:

Lake Delhi Combined Recreation Facility and Water Quality District

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ABSTRACT

In September 2011, The Louis Berger Group, Inc. (LBG) completed an archaeological reconnaissance survey for the Lake Delhi portion of the Maquoketa River valley in Delaware County, Iowa. This study was prepared on behalf of the Lake Delhi Combined Recreation Facility and Water Quality District (District) as part of the District's ongoing effort to rebuild the Lake Delhi Dam and restore the lake to its previous level. The Lake Delhi Dam was breached during a flood event that occurred on July 23-24, 2010.

This report presents the findings of an archaeological study that included a records review to identify potential resources within the former impoundment area followed by a field reconnaissance survey to investigate areas considered to have high potential for unreported archaeological sites. The study area included the Lake Delhi dam and all exposed land areas within the former impoundment area located at or below the former lake elevation level of 897 feet above mean sea level. The study area encompasses an estimated 448 acres.

No archaeological sites had been reported within the project area prior to the July 2010 dam failure. Four sites were recorded within the previous impoundment area during the fall of 2010 by Wapsi Valley Archaeology, Inc. during archaeological monitoring for the installation of emergency erosion control structures at the Delhi dam location and upstream at Hartwick bridge. The four sites included two historic building foundations and two historic artifact scatters associated with the 19th century townsite of Hartwick. Prehistoric artifacts with evidence for Early to Middle Archaic, Late Archaic, Middle Woodland and late prehistoric components were also collected from the four sites.

The present study includes a comprehensive records review, a condition assessment of the study area's Quaternary and Holocene valley landforms, and results of a reconnaissance level survey of those landforms. LBG identified seven additional sites within the study area and redefined one of the sites first identified by WVA to segment one of the historic building foundations at Hartwick as a separate site. As a result, there are a total of 12 archaeological site reported for the study area. These include ten sites with evidence for prehistoric Native American occupations ranging from 8000 to 300 years before present (BP). Most of these sites (7 of 10) appear to be open habitation areas or settlements (13DW123, 13DW124, 13DW133, 13DW134, 13DW137, 13DW138, 13DW139) while one is a smaller habitation site situated within a natural rock shelter (13DW141). Other prehistoric sites include an apparent fish weir structure (13DW140) and a lithic resource procurement site (13DW126). Mid-19th century building foundations are represented at two separate locations near the former townsite of Hartwick (13DW125, 13DW136) and are believed to be associated with the historic settlement that once existed at that location. One of these is believed to be the Hartwick saw mill (13DW136) which was the first building erected in Hartwick (by John Clark in 1849). Fragments of contemporary historic artifacts were identified at two sites that also produced prehistoric artifacts (13DW123, 13DW126).

No burial sites were identified within the study area, but potential for unreported human burials is considered possible at the eight prehistoric habitation sites. None of the 12 sites has been evaluated for National Register eligibility. Additional reconnaissance survey is recommended for selected portions of the study area based on the results presented in this report. Additional site investigations are also recommended at all 12 sites as necessary for the purpose of gathering information about the nature, extent, and condition of the archaeological deposits present pursuant to an evaluation of National Register eligibility.

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I. INTRODUCTION

A. PURPOSE OF THE INVESTIGATION

The Louis Berger Group, Inc. (LBG) has completed an archaeological reconnaissance survey for the Lake Delhi portion of the Maquoketa River valley in Delaware County, Iowa. This archaeological review was performed on behalf of the Lake Delhi Combined Recreation Facility and Water Quality District (District) as part of the District's ongoing effort to rebuild the Lake Delhi Dam.

The Lake Delhi Dam was breached during a flood event that occurred on July 23-24, 2010. A portion of the southern earthen embankment failed and was subsequently washed away by flood waters. The concrete spillway's gates were damaged and water also infiltrated and seeped through the dam's north embankment. The District is planning to rebuild and repair the dam and restore the Lake Delhi impoundment to its former elevation of 897 feet above mean sea level (amsl). Completion of the project is expected to require a permit from the United States Army Corps of Engineers. The District may also seek funding from other federal and state agencies.

The present study was conducted to help fulfill state and federal historic preservation compliance requirements including Iowa's state burial protection laws (Iowa Code Chapters 716.5, 523I, 263B; Iowa Administrative Code 685-11) and the requirements of Section 106 of the National Historic Preservation Act of 1966 (as amended) and its implementing regulations at 36 CFR § 800 which state that federal agencies and/or designated applicants must take into account the potential effects of federally funded or regulated undertakings on historic properties (i.e., buildings, structures, sites, districts, or objects) listed in or eligible for listing in the National Register of Historic Places (NRHP). The results presented in this report are intended to provide the project sponsors and other review agencies with information necessary to determine the proposed project's effect on significant cultural resources and potential mitigation alternatives.

B. PROJECT LOCATION AND AREA OF POTENTIAL EFFECT

The project area is located in the central portion of Delaware County, Iowa approximately 1.5 miles southwest of Delhi, Iowa (Figure 1). The Lake Delhi Dam is located in the NE quarter of Section 30 in Delhi Township (T88N-R4W). The Lake Delhi impoundment, which is federally recognized as Hartwick Lake, includes portions of Sections 19 and 30 in Delhi Township (T88N-R4W) and portions of Sections 14, 23, 24, 25 and 26 of Milo Township (T88N-R5W). The impoundment area behind the dam occupies a nine-mile segment of the Maquoketa River valley and encompasses approximately 448 acres.

For purposes of this investigation, the study area or area of potential effect (APE) included the area occupied by the Lake Delhi Dam plus all exposed land areas upstream within the former impoundment area that are located at or below the former lake elevation level of 897 feet above mean sea level. A more detailed description of planned improvements is provided in Chapter II.

C. PROJECT AUTHORIZATION AND PERSONNEL

The field investigations and the information presented in this technical report are designed to meet the standards specified in the Secretary of the Interior's *Standards and Guidelines for Archaeology and Historic Preservation* (Federal Register 48:190:44716-44742), and the *Guidelines for Archaeological Investigations in Iowa* (Kaufmann 1999). Assistant Director Randall M. Withrow served as Project

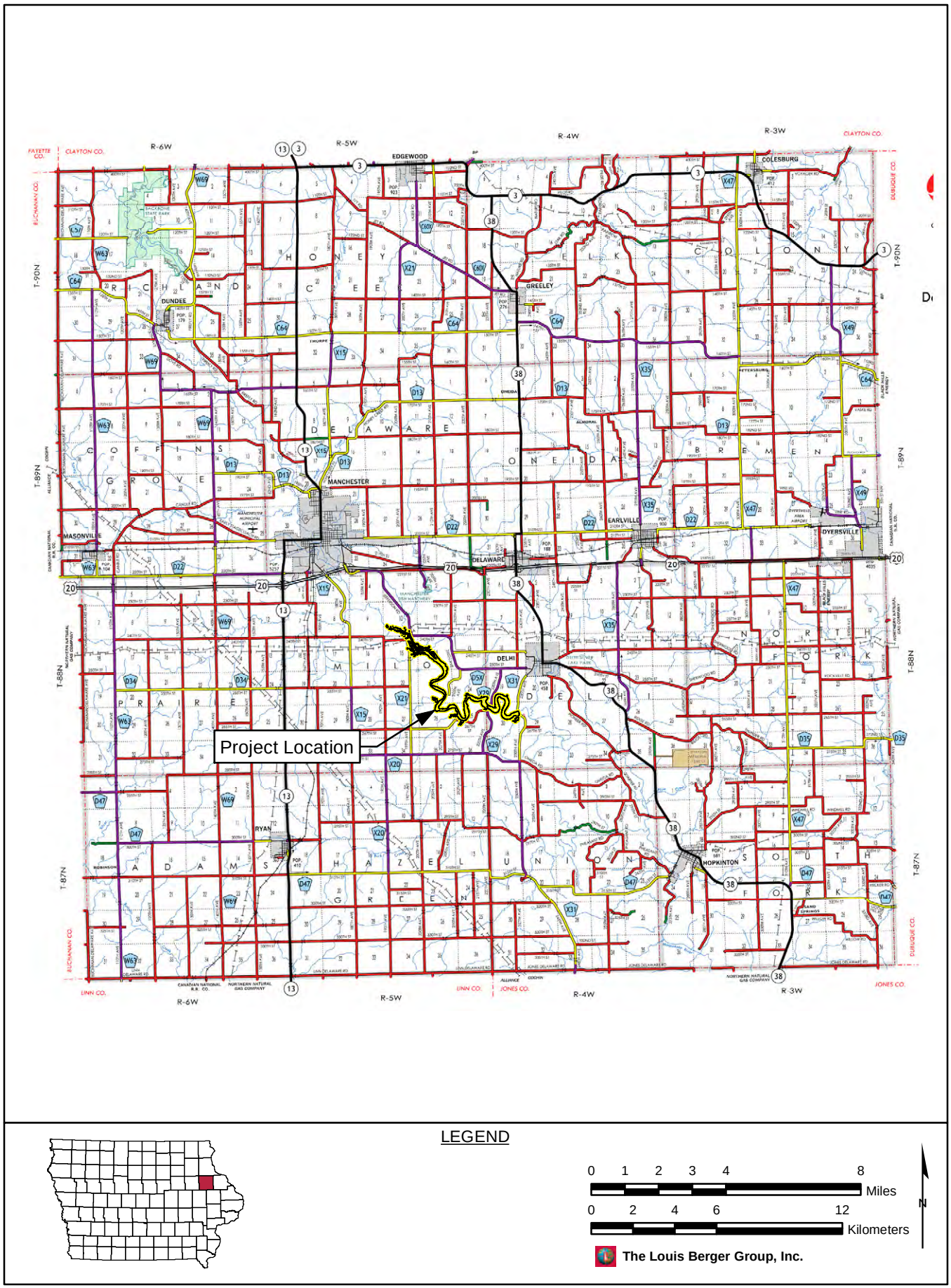


FIGURE 1: Project Location

SOURCE: IADOT 2010

Manager and Principal Investigator. Field investigations were directed and performed by Mr. Withrow with the assistance of Field Archaeologist Samuel Williams. Mr. Withrow is a Registered Professional Archaeologist (R.P.A.) and has qualifications that meet or exceed the Secretary of the Interior's Professional Qualification Standards (Federal Register 48:190:44738-9). The Phase I reconnaissance survey was conducted from September 28-30, 2011. This report was prepared by Mr. Withrow. The maps and other graphic illustrations included in this report were prepared by GIS Specialist Jackie Horsford. A completed National Archaeological Database Form for this report is provided in Appendix A.

II. PROJECT DESCRIPTION

A. LAKE DELHI DAM RESTORATION

The Lake Delhi Dam was breached on July 24, 2010 following several days of heavy rain within the catchment basin above the dam. According to a report filed by an independent review panel in December 2010 (Fieldler et al. 2010), the breach was caused by seepage in the south earth embankment combined with overtopping flow caused by the rising floodwaters behind the dam. A portion of the southern earthen embankment failed and was subsequently washed away by flood waters. The concrete spillway's gates were damaged and water also infiltrated and seeped through the dam's north embankment.

The review panel's final report includes a detailed description of the dam which includes a powerhouse for generating hydroelectric power. Their description is quoted at length here as it appeared in the report:

> *Delhi Dam, also known as Hartwick Dam, was designed as a concrete dam and earthen embankment. The 704-foot long structure consists of (from left to right looking downstream): a 60-foot long concrete reinforced earthfill section abutting the left limestone abutment; a 61-foot long conventional reinforced concrete powerhouse containing two S. Morgan Smith turbines with two Westinghouse generators (each rated at 750 kW); an 86-foot long gated concrete ogee spillway, with three 25-foot x 17-foot vertical lift gates; and, a 495-foot long embankment section that was originally constructed with 1V:3H upstream slopes and 1V:2H downstream slopes, that extends to the right abutment of the dam (in this report when right and left is used in reference to the dam, the convention is that this is while looking downstream; also the right abutment of the dam is the south abutment and the left abutment is the north abutment). The crest of the south embankment section of the dam is 25 ft wide and the dam crest is at elevation 904.8 ft NGVD29. A general plan of the site is shown on Figure II-2.*
>
> *The maximum section of the concrete portion of the dam has a height of about 59 ft and the embankment section has an estimated maximum height of 43 ft. Lake Delhi, the reservoir behind Delhi Dam has an area of approximately 440 acres and a storage volume of 3790 acre-ft at normal reservoir (elevation 896 ft) and a reservoir volume of about 9920 acre-ft at the crest of the dam (elevation 904.8 ft) [Allen, 2009]. The spillway crest is at elevation 879.8 and the hollow inside of the spillway crest structure is filled with rock.*
>
> *The concrete reinforced earthfill section of the dam at the left abutment was originally constructed with two parallel concrete retaining walls, founded on rock and spaced 20 ft apart. Rock fill was placed between the walls. In 1967, a concrete crib wall and additional fill was placed upstream of the original walls. The area downstream of this section serves as a parking and staging area for performing maintenance in the powerhouse [FERC 2002 Prelicense Inspection] (*Fieldler et al. 2010:6-7)

The District is planning to rebuild and repair the dam and restore the Lake Delhi impoundment to its former elevation of 896 to 897 feet above mean sea level (amsl). Engineering studies are currently underway to consider alternatives for reconstructing the dam's embankment, repairing the gated concrete spillway portion of the dam, and bringing the embankment, spillway and adjoining powerhouse structures into compliance with current dam safety standards.

Plate 1. Lake Delhi Dam Spillway and Powerhouse. Photo by LDRA reproduced from Fiedler et al. 2010.

Plate 2. Aerial View of Breached Embankment. Photo by Iowa Wing Civil Air Patrol.

B. CURRENT LAND USE

Lake Delhi has approximately 18 miles of shoreline. Land use along the shoreline is primarily private and residential although some commercial properties such as the Hartwick Marina are also sited near the shoreline. Public access is provided near the center of the lake at the Turtle Creek Recreation Area administered by the Delaware County Conservation Board and several parcels owned by the Lake Delhi Recreation Association (LDRA) have been improved to accommodate recreational use by non-residents (e.g., Lost Beach). Most of the privately owned lakeshore properties are occupied by permanent residences and seasonal homes and most lakeshore areas suitable for home construction have been landscaped to afford access to the lake. Properties with gentle slopes to the lakeshore typically support lawns with little or no modification of the shoreline, while properties with more steeply sloped shorelines are typically reinforced with rip rap materials or engineered retaining walls designed to both retain the slope and provide safe access to the lake.

With the release of Lake Delhi, there are now vast areas of exposed land that have remained submerged for more than 80 years. At the time of our survey in late September 2011, most of these areas had lain exposed for a period of about 14 months. Point bars formed on inside meanders between Maples and Hickory Hollow tended to be covered with thick deposits of coarse sand and thickly matted patches of weedy vegetation. Floodplain surfaces located upstream from Maples and downstream from Hickory Hollow seemed to support an extensive and more or less continuous mat of tall weedy vegetation.

Several landowners whose parcels extend onto the former lake bottom have proceeded to adapt newly exposed land areas for other forms of light recreational use. We observed a number of areas that were being used for picnicking or evening campfires and one area that had been graded as a track for dirt bikes or other all-terrain recreational vehicles. For the most part however the exposed lake bottom appears to receive little use, recreational or otherwise. The river itself continues to be used for fishing and boating although the class of pleasure craft suitable for use on the river is now limited to canoes or kayaks.

III. RESEARCH DESIGN

A. RESEARCH OBJECTIVES

Prior to initiating this study, the author contacted staff archaeologists at the Iowa State Historic Preservation Office (SHPO – Dan Higginbottom) and the U.S. Army Corps of Engineers (USACE – Brant Vollman) to determine if either agency had specific concerns about the area's potential for unreported archaeological resources and to seek their advice regarding appropriate investigation methods.

The Iowa SHPO archaeologist noted that their office had already provided some guidance to the Governor's Task Force on Rebuilding Lake Delhi in a letter to the Iowa Department of Natural Resources dated November 2, 2010 (Appendix B). This letter cites the project's potential to require federal funding, permits or licensing and advises that participants initiate compliance with Section 106 of the National Historic Preservation Act (NHPA) at an early stage in the planning process. The letter cites the Maquoketa River valley's potential to include a variety of both prehistoric and historic archaeological sites including human burials and remains of a 19th century townsite at Hartwick. The SHPO also called attention to the presence of non-archaeological resources that are likely to be affected by the planned reconstruction, most notably the dam itself, which is part of the Lake Delhi Dam and Powerhouse Historic District. The latter has already been evaluated as eligible for listing in the NRHP. In consideration of the large area that could be affected by the project and the fact that no archaeological surveys had ever been completed within the Lake Delhi impoundment, Mr. Higginbottom advised a reconnaissance-level investigation designed to collect baseline information throughout the area of potential effect.

The USACE archaeologist also advised beginning with a reconnaissance-level investigation. He indicated that a formal area of potential effect had not yet been defined with regard to reconstruction of the Lake Delhi dam, but that initial records review and field reconnaissance should minimally include the area directly affected by dam reconstruction as well as the proposed impoundment area. The USACE archaeologist also cited the area's high potential to include unreported prehistoric and historic archaeological resources.

The present study was therefore designed to gather and compile baseline information regarding the project area's potential to include unreported archaeological resources that may be subject to further investigation or review in compliance with state and/or federal historic preservation laws. The most common among these are the following:

- National Historic Preservation Act of 1966, as amended (16 USC 470-470t, 110). Section 106 of the NHPA requires federal agencies to take into account the effects of federal undertakings on historic properties listed on or eligible for listing on the NRHP. If the current project will require federal funding, permitting, licensing or approval, then it may be subject to review under this portion of the NHPA.
- Iowa Statutes Protecting Human Remains and Burial Sites. All burial sites in Iowa are protected by state law (Iowa Code Chapter 716.5). Those less than 150 years old are governed by the Iowa Cemetery Act (Iowa Code 523I) while those greater than 150 years old are protected by the Office of the State Archaeologist (Iowa Code 263B).

The primary objectives of this study were defined as follows: (1) determine whether any burial sites or other resources listed on or considered eligible for listing on the NRHP are known to exist within the current project area; (2) determine which portions of the project area have already been surveyed for archaeological sites; (3) conduct initial survey work to locate previously unreported archaeological resources identifiable on the ground surface within the project area; and (4) determine what if any

additional archaeological resource inventory or evaluation work may be needed within the project boundary prior to project construction in order to establish the project sponsor's compliance with applicable state and/or federal statutes.

In accordance with state *Guidelines for Archaeological Investigations in Iowa* (Kaufmann 1999) our investigation included: (1) a review of current site location and cultural resource survey information on file at the Office of the State Archaeologist, University of Iowa (OSA), and the Iowa State Historic Preservation Office (SHPO) to identify the location of *known* archaeological resources; (2) a review of historic and archival documents (local histories, historic maps and plats, aerial photographs, etc.) and environmental information (topography, surface geology, soils, vegetation, hydrology, etc.) to assess the project area's potential for *unreported* archaeological sites, historic cemeteries, prehistoric burials, or other historic resources; and (3) a field reconnaissance survey designed to investigate areas with high potential for known or unreported sites with the purpose of confirming their presence or absence and/or evaluating the need for additional field investigations.

B. RESEARCH METHODS

The information used to address the research objectives for a Phase I reconnaissance survey is drawn from two sources: written records and on-site field observations. The research methods used in each case are outlined below.

1. Literature Search

Prior to beginning the Phase I field survey, the author reviewed site records on file at the Office of the State Archaeologist at the University of Iowa using the OSA's on-line GIS database: I-Sites (OSA 2011) at http://www.uiowa.edu/~osa/gisatosa/ and the Iowa Department of Transportation GIS project portal (IDOT 2011) at http://www.environmental.iowadot.gov. Available information includes locational data and site forms for previously identified archaeological sites and surveys in and near the project area. Also prior to present fieldwork, pertinent archaeological, environmental, and historical reference materials were consulted, including: regional archaeological overviews, state and county histories, soil surveys, historic plats and aerial photographs on file at the University of Iowa library and the State Historical Society of Iowa in Iowa City, and documents on file at the Louis Berger Group, Inc., Marion, Iowa.

2. Field Investigations

The field investigation consisted of visual inspection of exposed ground surfaces throughout the study area. LBG had access to all private land parcels, but only those portions at or below the former lake elevation. The former lakebed was usually accessed from adjacent public roads or public boat access locations. In some instances, surveyors accessed isolated lakebed areas from private property with landowner consent. The field investigation was limited to pedestrian survey or visual inspection of the ground surface and shoreline. No subsurface testing was performed. When a site was identified, the survey team used a GPS unit equipped with a sub-meter correction beacon to document its location. Surface finds were not collected and no features were tested or excavated, but photographs were take to document representative site materials and site conditions. Representative photographs were also taken to document survey conditions throughout the survey area.

IV. LITERATURE SEARCH

A. SOURCES CONSULTED

Prior to beginning the Phase I field investigation LBG conducted background research for the project by accessing site files on-line via I-Sites (OSA 2011), a statewide database of archaeological site information maintained by the Office of the State Archaeologist, Iowa City, and the Iowa Department of Transportation's GIS Project Portal (IADOT 2011) which is a spatial database that depicts the location of recorded archaeological sites as well as the locations of archaeological investigations that have taken place within the state. A variety of historic documents, maps, and aerial photographs were also researched using a combination of on-line and library sources. Digital copies of various historic plats, atlases, and other maps were accessed and reviewed on line at digital map library websites maintained by the University of Iowa (UIA 2011) and the University of Texas (UTX 2011). Historic maps reviewed for this project included documents prepared in 1838 (GLO 1837-1838), 1875 (Andreas 1875); 1894 (Davis 1894); 1896 (USGS 1896); 1904 (Huebinger 1904); 1930 (Hixson 1930); 1936 (Lovell 1936), and 1973 (USGS 1973a, 1973b). Other historical and environmental information was obtained from the soil survey for Delaware County (Wisner 1986), geological references (Anderson 1998, Prior 1991, Witzke 1995), local and regional histories (Andreas 1875, Merry 1914, Sage 1974; Western Historical Society 1878) and regional archaeological overviews (Alex 2000).

B. NATIONAL REGISTER LISTED PROPERTIES

As of November 1, 2011, the National Park Service database (http://nrhp.focus.nps.gov) identifies 15 properties in Delaware County that are listed on the National Register of Historic Places. These include the Backbone State Park Historic District (91001842) and the Delaware County Courthouse (81000234) in Manchester. None of these listed properties are located within or near the Lake Delhi project area. The nearest listed property is the Bay Settlement Church and Monument (77000506) which is located approximately one mile south of Lake Delhi near the Turtle Creek Recreation Area.

In 2009, Alexa McDowell, AKAY Consulting completed an intensive historic and architectural survey and evaluation of the Lake Delhi Dam and Powerhouse as part of an application by the facility's owner, the LDRA, to the Federal Emergency Management Agency (FEMA) to repair elements of the facility damaged by flooding in 2008. McDowell recommended that the Lake Delhi Dam and Powerhouse be considered eligible for listing on the NRHP under Criterion A (important events) for its association with "the history of the hydroelectric industry in the state of Iowa and in its association with the development of electric service in the state of Iowa (McDowell 2009:1)." She also recommended that the dam/powerhouse facility be considered part of a historic district along with the bridge and roadway (County Road X31) that traversed the dam and the dam operator's house located south of the dam. The present National Register status of the property is obviously in question pending an assessment of its current condition and the potential for further loss of its historic integrity as needed repairs are made.

C. PREVIOUS ARCHAEOLOGICAL INVESTIGATIONS

On September 9, 2011, LBG accessed the Iowa Department of Transportation's GIS Project Portal website (IADOT 2011) to request GIS shapefile information regarding the location of previous archaeological surveys completed within or near the study area. This website, hosted by the Iowa DOT's Office of Location and Environment, is a GIS database with geo-referenced environmental, historical, and cultural information for the state of Iowa. Approved users may also access confidential information

regarding the location of recorded archaeological sites, archaeological surveys, historic building locations, and historic map information.

LBG's review of this database indicated that only five professional archaeological surveys had been conducted in the project vicinity (Table 1). Subsequent review of survey reports completed for the project area revealed that the results of two more recent archaeological studies had not yet been included in the Iowa DOT's database. All seven studies were completed within the past 25 years and all but one was performed for purposes of federal agency compliance with Section 106 regulations. The most recent archaeological work was performed on behalf of the Iowa Department of Natural Resources in response to an emergency proclamation by the Governor of Iowa to address erosion and sedimentation concerns following the July 2010 breach event. Three of these studies have included survey work within the limits of the current study area (Figure 2).

In 1990, Bear Creek Archaeology, Inc. completed a Phase I archaeological survey for proposed boat ramp and public access area immediately below the Delhi Dam (Roberts and Stanley 1990). The proposed project included new boat ramp, access road and parking area and encompassed a four-acre parcel situated on the left (north) bank of the Maquoketa River. No sites were reported within the survey area as a result of the investigation.

In 2000, Cultural Resources Management Services completed a Phase I archaeological survey for replacement of the Maquoketa River bridge along 220th Avenue at Hartwick for the Delaware County Secondary Roads Department (Marcucci 2000). The survey examined a 1.8-acre area that included the existing north approach to the Hartwick bridge and a portion of the upland slope at the south side of the valley. No archaeological sites were reported as a result of the survey.

In 2007, the Office of the State Archaeologist completed a Phase I archaeological survey for a proposed communications tower near the 220th Avenue/225th Avenue intersection located approximately one-quarter mile south of Lake Delhi (Peterson 2007). The survey examined approximately three acres on the upland summit to accommodate the tower platform, guy anchors and access road. Two previously unreported sites were discovered within the survey area (13DW99, 13DW100). Both sites were recorded as prehistoric artifact scatters or lithic workshops based on the presence of manufacturing debris associated with chipped-stone tool production. Both sites were recommended as potentially eligible for listing in the National Register and both were avoided by project construction.

In 2008 and 2009, Wapsi Valley Archaeology, Inc. (WVA) completed two Phase I archaeological surveys for expansion of the City of Delhi's wastewater treatment facility situated on the uplands northeast of Lake Delhi. A survey completed in 2008 examined a five-acre parcel adjacent to the existing sewage disposal ponds (Morrow 2008) and recorded two small prehistoric lithic scatters (13DW104, 13DW105). A supplemental Phase I survey in 2009 examined an additional 13 acres north of the facility and recorded one additional prehistoric habitation site (13DW106; Finn 2009). All three sites were evaluated not eligible for listing in the NRHP.

In 2010, WVA completed two archaeological investigations within and around Lake Delhi. One of these was completed prior to the breach event in July 2010 while the second was completed in response to the event. In February 2010, Michael Finn completed a cultural resources assessment for the entire Lake Delhi area as part of a broader study that was being conducted by the LDRA to investigate the feasibility of restoring the Lake Delhi Dam and Powerhouse as a functioning hydroelectric facility. The WVA study included a review of existing site records, historical information, and environmental data along with limited field reconnaissance to determine the proposed project's potential effects on known or unreported archaeological deposits. The study area included the entire Lake Delhi impoundment but field inspections were necessarily limited to exposed shoreline with potential to be affected by minor fluctuations in the

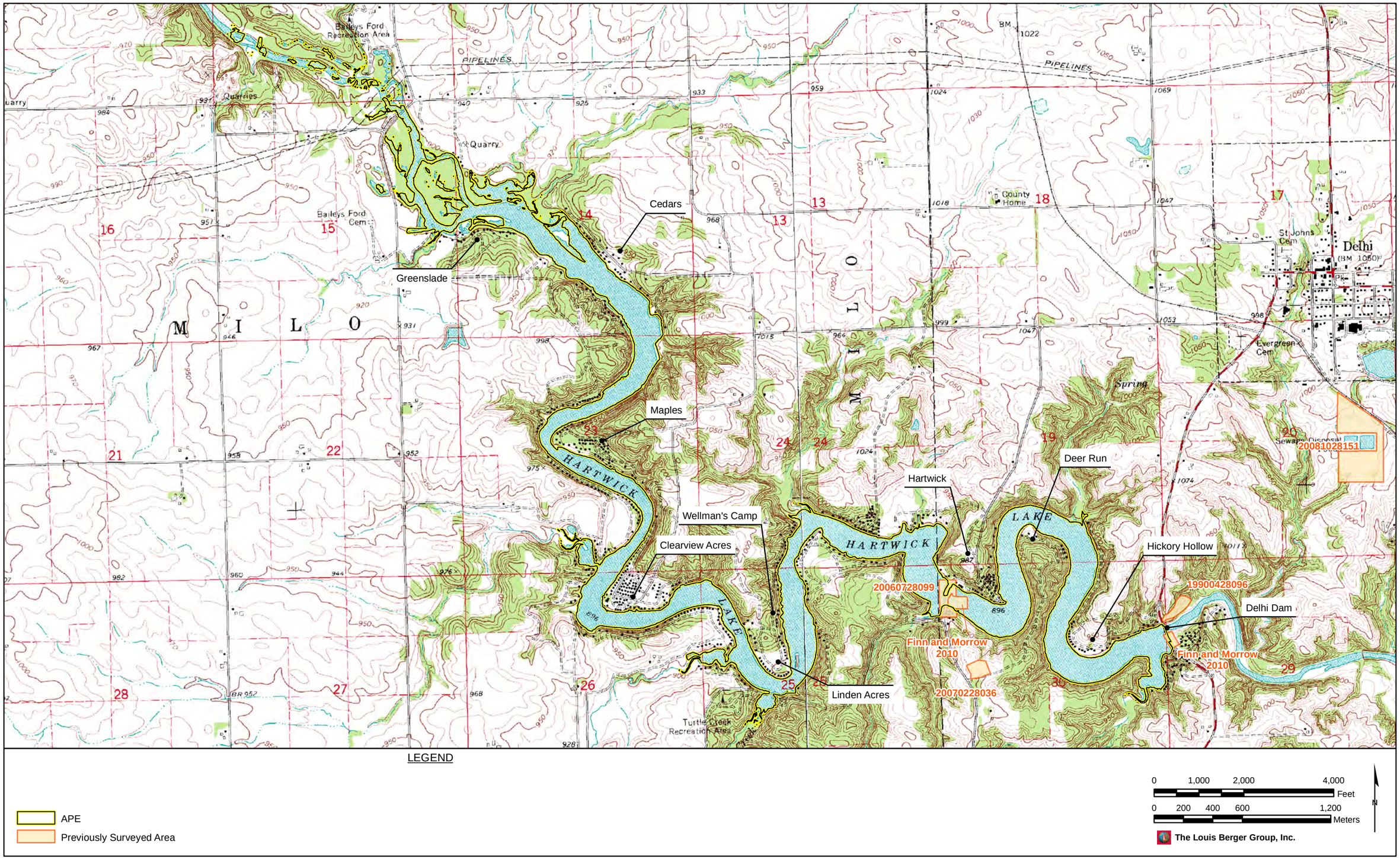


FIGURE 2: Study Area and Location of Previous Surveys

SOURCE: USGS 1973a, 1973b

Table 1. Previous Archaeological Investigations

SHPO R&C Number	Year	Township & Section	Type of Investigation	Result of Investigation	Reference	Survey Coverage Within Current Project Area
19900428096	1990	T88N-R4W Section 29	Phase I Survey for Boat Ramp Below the Delhi Dam (4 acres)	No sites reported	Roberts & Stanley 1990	-
20060728099	2000	T88N-R4W Section 30	Phase I Survey for Replacement of Hartwick Bridge (2 acres)	No sites reported	Marcucci 2000	< 1 acre
20070228036	2007	T88N-R4W Section 30	Phase I Survey for US Cellular Communications Tower (3 acres)	13DW99, 13DW100	Peterson 2007	-
20081028151	2008	T88N-R4W Section 20	Phase I Survey for Delhi Wastewater Treatment Facility (5 acres)	13DW104, 13DW105	Morrow 2008	-
20081028151	2009	T88N-R4W Section 20	Phase I Survey for Delhi Wastewater Treatment Facility (13 acres)	13DW106	Finn 2009	-
20080928021	2010	T88N-R5W Secs 14, 15, 23, 24, 25, 26 T88N-R4W Secs 19, 29, 30	Phase IA Assessment for Lake Delhi Dam Hydroelectric Facility Restoration (1100 acres)	No sites reported	Finn 2010	limited shoreline reconnaissance only
	2010	T88N-R5W Section 25 T88N-R4W Sections 29, 30	Archaeological Monitoring for Installation of Emergency Headcut Structures on the Maquoketa River (12 acres)	13DW123, 13DW124 13DW125, 13DW126	Finn & Morrow 2010	12 acres

level of the reservoir. No new sites were identified as a result of the study; however, Finn's (2010:19-21) review of historic maps and other local references called attention to the potential for the archaeological remains of several 19th century historic sites within the impoundment area that had likely been submerged by creation of the lake in 1927. These included part of the historic village of Hartwick, for which the lake itself is named. The townsite was settled during the 1850s and was formerly home to a sawmill/gristmill/dam complex, general store, tavern, blacksmith shop, brickyard, a cobbler/shoe shop, a paint shop and a wagon shop. Finn also noted that a second sawmill/gristmill/dam complex was once located in the immediate vicinity of the present day dam and powerhouse facility based on information recorded on historic maps and published county histories. The WVA report concluded that stream terraces carried potential for prehistoric sites but that most of these shoreline areas were obscured by riprap and retaining walls that prevented easy detection. Potential for undisturbed prehistoric site deposits within the impoundment area was judged to have been further diminished as a result of extensive dredging operations performed throughout the lake in 2004-2006.

In November 2010, WVA staff performed archaeological monitoring for the installation of erosion control structures at two locations within the newly exposed lake basin. The work was initiated in response to concerns about the rapid erosion of silt deposits from the former lakebed and the effects that accelerated sedimentation were having on the Maquoketa River basin farther downstream. The Iowa Department of Natural Resources (DNR) designed a series of rock riffle structures to be installed at two locations within the former lake to help slow the rate of stream erosion. The two areas selected by the DNR happened to correspond precisely with the two locations identified by Finn (2010) as having highest potential for submerged 19th century historic archaeological sites, i.e, the historic valley crossings at Delhi Dam and Hartwick. Due to the emergency nature of the situation, the DNR retained WVA to monitor the installation of the riffle barriers for potential impacts to unreported archaeological features that might be encountered during construction. No archaeological features or materials were identified within the work zone; however, WVA noticed exposed historic and prehistoric archaeological materials in several places on the nearby river terraces. Four new archaeological sites were reported. Three sites include both prehistoric and historic period features and artifacts (13DW123, 13DW124, 13DW126) while a fourth site marks the location of a former brick and limestone building (13DW125). Site 13DW123 includes a scatter of eroded prehistoric and historic artifacts that include diagnostic materials associated with Middle Woodland (2200-1600 years BP), late prehistoric (800-300 years BP), and mid-19th century occupations. Site 13DW124 includes a light scatter of prehistoric chipped-stone artifacts and what appeared to be a late 19th century limestone and brick building foundation. Site 13DW126 appears to include the remains of a prehistoric stone procurement and stone tool manufacturing site with evidence of use during the Archaic period (10,000-2,800 years BP) along with a comparatively light scatter of mid-19th century and modern domestic items.

D. KNOWN ARCHAEOLOGICAL SITES

The Iowa Site Inventory for Delaware County lists 30 known archaeological sites located within an approximate one mile radius of Lake Delhi (Table 2). Only four of these sites are located within the current study area. Ten sites were recorded by professional archaeologists; the other 20 sites were reported by a local artifact collector and avocational archaeologist who lives in the area.

All but one of the 30 known archaeological sites are associated with prehistoric Native American use of the region and the vast majority of these sites (25 of 29) are located on upland landforms outside the current study area. Most of these prehistoric sites (19 of 29) consist of small artifact scatters ranging in estimated size from 12 to 100 square meters (13DW55, 13DW56, 13DW57, 13DW58, 13DW61, 13DW62, 13DW63, 13DW64, 13DW65, 13DW67, 13DW68, 13DW69, 13DW71, 13DW72, 13DW73, 13DW74, 13DW100, 13DW104, 13DW105). The small size of these sites suggests very short-term and limited use, perhaps most likely associated with procurement of upland resources rather than living sites.

Table 2. Known Archaeological Sites Located Within or Near the Study Area

Site Number	Landscape Position	Cultural Affiliation	Site Type	Work Effort/ NRHP Evaluation	Reference
13DW34	High Terrace Maquoketa River	Prehistoric (Woodland)	Burial Mounds	Not Evaluated	Schermer 1986
13DW55	Upland Summit	Prehistoric	Artifact Scatter	Not Evaluated	Martens 1994
13DW56	Upland Summit	Prehistoric	Artifact Scatter	Not Evaluated	Martens 1994
13DW57	Upland Summit	Prehistoric	Artifact Scatter	Not Evaluated	Martens 1994
13DW58	Upland Summit	Prehistoric	Artifact Scatter	Not Evaluated	Martens 1994
13DW59	Upland Summit	Prehistoric	Artifact Scatter	Not Evaluated	Martens 1991
13DW60	Upland Summit	Prehistoric	Artifact Scatter	Not Evaluated	Martens 1991
13DW61	Upland Summit	Prehistoric	Artifact Scatter	Not Evaluated	Martens 1993
13DW62	Upland Summit	Prehistoric	Artifact Scatter	Not Evaluated	Martens 1993
13DW63	Upland Summit	Prehistoric	Artifact Scatter	Not Evaluated	Martens 1993
13DW64	Upland Summit	Prehistoric	Artifact Scatter	Not Evaluated	Martens 1993
13DW65	Upland Summit	Prehistoric (Late Prehistoric)	Artifact Scatter	Not Evaluated	Martens 1993
13DW66	Upland Summit	Prehistoric	Artifact Scatter	Not Evaluated	Martens 1993
13DW67	Upland Summit	Prehistoric	Artifact Scatter	Not Evaluated	Martens 1993
13DW68	Upland Summit	Prehistoric	Artifact Scatter	Not Evaluated	Martens 1993
13DW69	Upland Summit	Prehistoric	Artifact Scatter	Not Evaluated	Martens 1993
13DW70	Upland Summit	Prehistoric	Artifact Scatter	Not Evaluated	Martens 1993
13DW71	Upland Summit	Prehistoric	Artifact Scatter	Not Evaluated	Martens 1993
13DW72	Upland Summit	Prehistoric	Artifact Scatter	Not Evaluated	Martens 1993
13DW73	Upland Summit	Prehistoric	Artifact Scatter	Not Evaluated	Martens 1993
13DW74	Upland Summit	Prehistoric	Artifact Scatter	Not Evaluated	Martens 1993
13DW99	Upland Summit	Prehistoric	Artifact Scatter	Not Evaluated	Peterson 2007
13DW100	Upland Summit	Prehistoric	Artifact Scatter	Not Evaluated	Peterson 2007
13DW104	Upland Summit	Prehistoric	Artifact Scatter	Not Eligible	Morrow 2008
13DW105	Upland Summit	Prehistoric	Artifact Scatter	Not Eligible	Morrow 2008
13DW106	Upland Summit	Prehistoric	Artifact Scatter	Not Eligible	Finn 2009
13DW123	**High Terrace**	**Prehistoric (Middle Woodland & possible late prehistoric); Historic**	**Artifact Scatter**	**Not Evaluated**	**Finn & Morrow 2010**
13DW124	**Early Holocene Terrace**	**Prehistoric & Historic**	**Artifact Scatter**	**Not Evaluated**	**Finn & Morrow 2010**
13DW125	**Early Holocene Terrace**	**Historic**	**Building Foundation**	**Not Evaluated**	**Finn & Morrow 2010**
13DW126	**High Terrace**	**Prehistoric (Archaic); Historic**	**Lithic Procurement; Artifact Scatter**	**Not Evaluated**	**Finn & Morrow 2010**

Sites listed in **bold font** represent resources located within the study area.

Nine larger artifact scatters have also been recorded (13DW59, 13DW60, 13DW66, 13DW70, 13DW99, 13DW106, 13DW123, 13DW124, 13DW126). Precise dimensions are not provided for every site, but they appear to range in size from 150 to perhaps as much as 9600 square meters in area. While some of these are still comparatively small sites, they are large enough to represent short-term campsites or other more intensively used resource procurement areas. The type and number of artifacts observed or collected from these sites is not always specified on the inventory forms, but most of the sites appear to include small numbers of stone tools such as projectile points or other bifaces and end scrapers along with other items associated with the manufacture and/or maintenance of chipped-stone tools, i.e., cores, flaking debris, hammerstones, etc. It appears that temporally diagnostic artifacts such as projectile points have been recovered from several of the upland sites by private landowners, but no information regarding their number, type, style or other physical attributes is included in the records. Those with documented temporally or culturally diagnostic artifacts include: Site 13DW65, which included a small triangular-shaped projectile point that indicates a late prehistoric temporal association (1200-300 years BP); Site 13DW123, which has produced fragments of Middle Woodland (2200-1600 years BP) pottery and what may be a late prehistoric agricultural implement (bone hoe); and 13DW126, which has produced a Late Archaic stemmed projectile point (3600-3000 years BP) and other unfinished items (i.e., biface preforms) that suggests potential for much earlier use.

One prehistoric mound cemetery (Site 13DW34) has been identified near Lake Delhi. Very little information about this site is known, but it is reported to include mounds constructed in both conical and linear shapes. Burial mounds built in these forms are most commonly associated with the Woodland cultural tradition in east-central Iowa and were constructed between 2800 to 1200 years ago. Burial mounds were also constructed and used by later cultural traditions continuing to the time of European contact in the late 17th century.

Four sites (13DW123, 13DW124, 13DW125, 13DW126) mark the location of mid-19th century European-American habitations and/or artifact scatters. Each is associated with early settlement of the Hartwick area and each site is situated within the impoundment area. Building foundations are present at two locations (13DW124, 13DW125) and light to moderate density scatters of contemporary artifacts (e.g., fragmented dinnerware, glassware, bottle glass, window glass, brick, nails, etc.) are present at all four sites.

Only three of these sites (13DW104, 13DW105, 13DW106) have been evaluated with regard to their eligibility for listing in the National Register of Historic Places (NRHP) and each of them was determined to be not eligible. Sites 13DW99 and 13DW100 are officially considered “potentially eligible” based on preliminary field investigations, but neither site has been fully evaluated. All other 25 sites remain unevaluated.

E. POTENTIAL FOR UNREPORTED ARCHAEOLOGICAL SITES

Information regarding the potential for additional, but unreported archaeological sites can be drawn from three principal sources: (1) local residents already knowledgeable about artifact collection spots or the location of other historic places; (2) historic documents that record the location of early settlements that no longer exist; and (3) observed patterns of site occurrence, especially with regard to the landform types preferred by prehistoric inhabitants. Archaeological sites that represent former trading posts, cabins, farmsteads, mills, schoolhouses, churches, or other buildings constructed after this part of Iowa was opened to Euro-American settlement (1832-1837) can often be identified using historic maps or historic aerial photographs. Predicting the specific location of unreported Native American sites is more difficult, although larger sites can sometimes be identified from aerial photographs. A more common approach involves using information about the location of known prehistoric sites and their patterns of occurrence on the landscape to help predict the locations of similar unreported sites. Both approaches, using historic

records research and predictive modeling based on the distribution of sensitive landforms, were used in this study.

Sources Consulted

Aerial photographs taken of the project corridor during the 1930s, 1950s, 1960s, 1980s, 1990s and 2000s were accessed on-line at the *Iowa Geographic Map Server* website developed by the Iowa State University Geographic Information Systems Support and Research Facility in cooperation with the USDA Natural Resources Conservation Service and the Massachusetts Institute of Technology (ISU 2010). These photographs provide a useful record of land development and land use history and reveal information about former building locations and previous land disturbance activities. Unfortunately, none of this aerial photography pre-dates construction of the Delhi Dam in 1927, but these photographs do document post-dam development of the study area including changes to the lakeshore and adjacent areas as a result of those developments and soil erosion.

A collection of historic maps spanning the period 1838 to 1936 was assembled from both on-line and library sources and reviewed for information about the location of potential historic period archaeological sites. Historic maps are available for portions of the project corridor for the following years: 1837 to 1838 (GLO 1837-1838); 1875 (Andreas 1875); 1894 (Davis 1894); 1904 (Huebinger 1904); 1930 (Hixson 1930); and 1936 (Lovell 1936). Other historical information was obtained from local and regional histories (Andreas 1875, Merry 1914, Sage 1974; Western Historical Society 1878) and regional archaeological overviews (Alex 2000).

Important environmental resources consulted for this portion of the study included the soil survey for Delaware County (Wisner 1986). No mapped soils information is available for newly exposed land areas within the study area, but this information provided a basis for interpreting adjacent landforms above the former lake level and was used to help interpret exposed soil and sediment packages observed during the field reconnaissance survey. Soils information was also obtained on-line via *Landmass* (*Landmass* 2007), a website maintained by the Iowa OSA in partnership with the United States Department of Agriculture. The latter provides information about more than 400 soil series mapped within the state of Iowa and includes information about each soil's landscape position, parent material, relative age, and other characteristics that can be used to help assess an area's geological potential to contain prehistoric archaeological resources and determine whether those deposits are likely to be buried by more recent sediment. The project sponsor, through its primary design consultant, also provided post-breach LiDAR coverage for the exposed valley which was used by LBG to generate elevation contours for valley landforms which was used to help interpret the relative ages of alluvial landforms within the valley and correlate them with terrace complexes located outside the study area for which comparative soils information was available.

Environmental Background

The study area is located within a physiographic region known as the Iowan Surface (Prior 1991:68-75). This part of Iowa is believed to have been last glaciated in Pre-Illinoian times or more than 500,000 years ago. Today it is characterized by a relatively open landscape with gently rolling hills, long slopes and low topographic relief and owes its present configuration to several hundred thousand years of intense surface erosion aided by frost action, downslope movement of saturated soil and sediment, and intense glacial winds. These forces had a general leveling effect on the regional landscape which has since been dissected by several prominent northwest to southeast trending drainage systems including the Maquoketa River and its tributaries.

The Maquoketa River valley has a broad low profile in much of Delaware County where it flows through these ancient glacial deposits, but in some places like Backbone State Park north of Manchester and south of Delhi where it encounters bedrock, the river valley has become deeply entrenched with a narrow valley lined by exposed bedrock. Silurian-age bedrock is exposed at the valley floor in several locations, most notably at the point now occupied by the Delhi Dam and also upstream at Hartwick. Local bedrock consists of the mineral dolomite which is a chemically modified form of limestone that is rich in magnesium carbonate. The local bedrock is part of the Hopkinton Formation, named for exposures along the Maquoketa River less than 10 miles downstream from Delhi. The upper portion of the Hopkinton Formation is exposed at the dam and at numerous locations throughout the study area. This includes the fossil rich Farmers Creek Member which is recognized for its cave formations and the overlying Picture Rock Member which is relatively more resistant to erosion and is recognized for its tendency to form overhanging cliffs or ledges (Anderson 1998:119-121; Witzke 1995, 2001).

The sediments found within the Maquoketa River valley itself are associated with geological events that span more than 20,000 years. The oldest deposits are believed to have accumulated as the result of upland erosion during the most recent glacial maximum that occurred between 21,000 and 16,000 years ago. Geologists cite the periglacial conditions of that time including sparse tundra vegetation, high winds and permafrost soil that prevented precipitation and meltwater from penetrating the earth as important factors that contributed to greater runoff and erosion during this period (Bettis 1995:21). A result was the accumulation along valley walls of large quantities of frost-broken rock, silt and sand derived from glacial till and bedrock sources. Large amounts of silt and sand were also washed into valleys from the adjacent uplands. In some places just above the Lake Delhi dam these glacial deposits (i.e., Hickory Hollow) filled the valley to a depth of about 40 feet (the current river channel is close to bedrock in this portion of the valley). The high glacial terrace has an elevation of approximately 920 to 910 feet amsl within the study area (higher elevations are located upstream and lower elevations are located near the dam). Typical soil profiles are characterized by well-developed A, E, and Bt horizons (e.g., Lilah, Tell soil series).

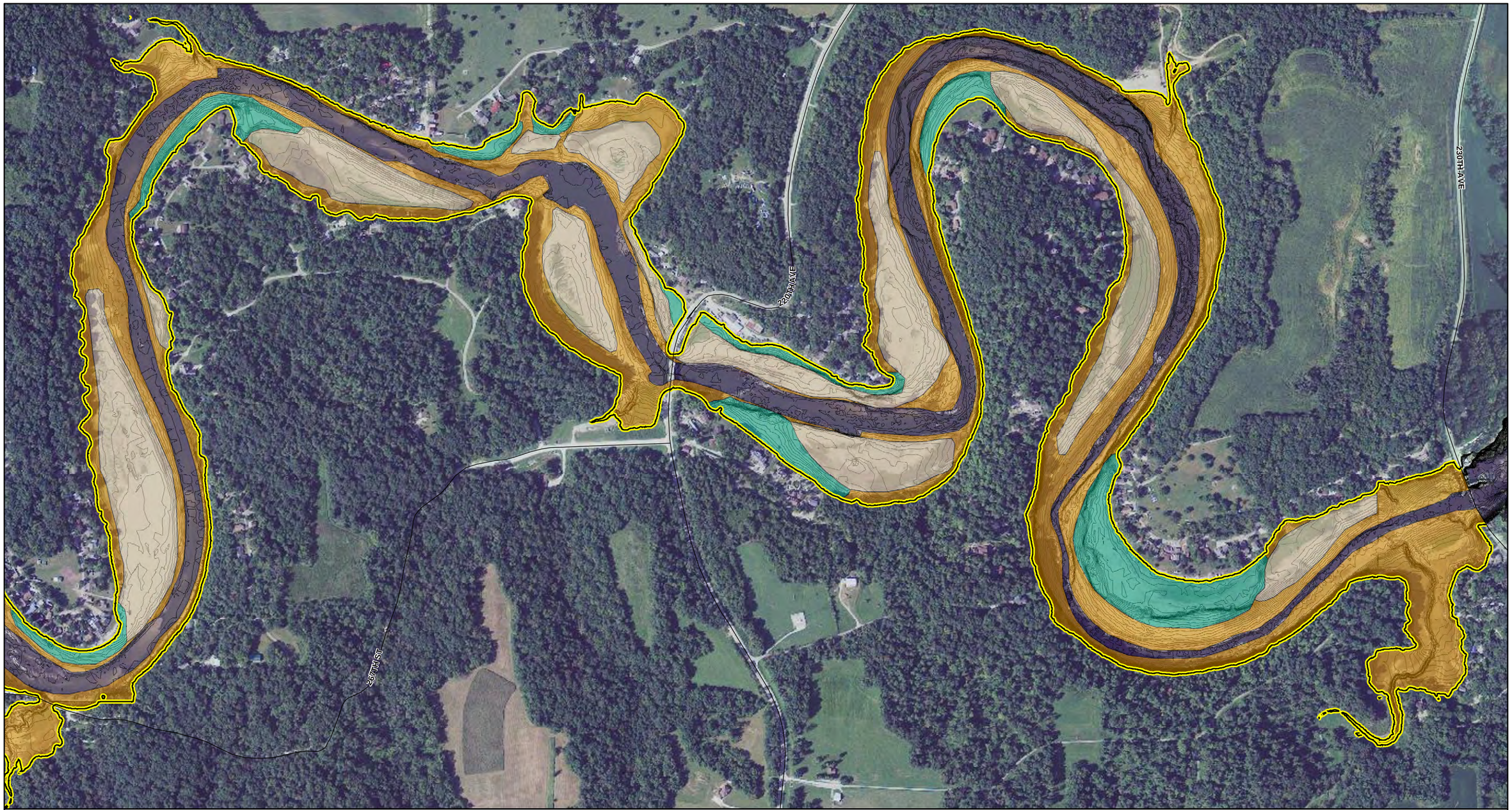
Subsequent downcutting of these full-glacial sediments by the Maquoketa River has removed much of this material from the valley, but substantial remnants remain throughout the study area in the form of high sandy and gravel-rich river terraces. Most of these high glacial terraces are now occupied by modern residential developments like those at Hickory Hollow, Deer Run, Linden Acres, Clear View, and Maples (see Figures 2 and 3).

More recent alluvial fills, deposited at various times over the past 10,000 years, are also present within the valley. These Holocene-age alluvial and colluvial deposits are of particular interest to archaeologists since this period captures more than 75 percent of the time period that humans are believed to have lived in Iowa (Alex 2000:37). As such, these deposits have potential to contain buried archaeological remains and understanding how they've accumulated and been altered over time not only helps us assess which landforms might contain evidence of past human occupation, but it also helps us determine what investigative methods may be required to locate those deposits. Figure 3 illustrates the estimated distribution of these principal fill deposits within the valley based on landform elevations and limited field reconnaissance.

As described above, new influxes of valley sediment during the glacial period appear to be correlated with changes in regional climate (i.e., increases and decreases in temperature and precipitation) that in turn fostered periods of increased erosion and sedimentation. These same patterns apply to the post-glacial Holocene period, but at a much reduced scale. Valley fill deposited during the early to middle Holocene (10,000 to 3,000 years ago), is inset about 20 to 25 feet below the high glacial terraces (approximately 895 to 885 feet amsl within the study area) and lacks the coarse sand, pebbles, and fractured rock material found in the full-glacial deposits. These early to middle Holocene-age sediments typically consist of silty or loamy alluvium overlying stratified sandy alluvium with a basal layer

Plate 3. High Terrace Remnant Above Hartwick. (Note quantities of heavy rock and gravel on the exposed terrace slope. Most of the overlying loamy topsoil has been washed away.)

Plate 4. Early Holocene Alluvium in Terrace Cut Near Hartwick. (Note banded layers of stratified modern alluvium on top of the buried soil.)



LEGEND

Study Area Boundary (897-ft contour)
Contour Interval (1-foot)
Glaciofluvial Deposit
Early Holocene Alluvial Fill
Late Holocene Alluvial Fill

0 200 400 600 1,200 Feet
0 100 200 400 Meters
N

The Louis Berger Group, Inc.

FIGURE 3a: Estimated Age and Distribution of Valley Fill Deposits

SOURCE: ISU 2010

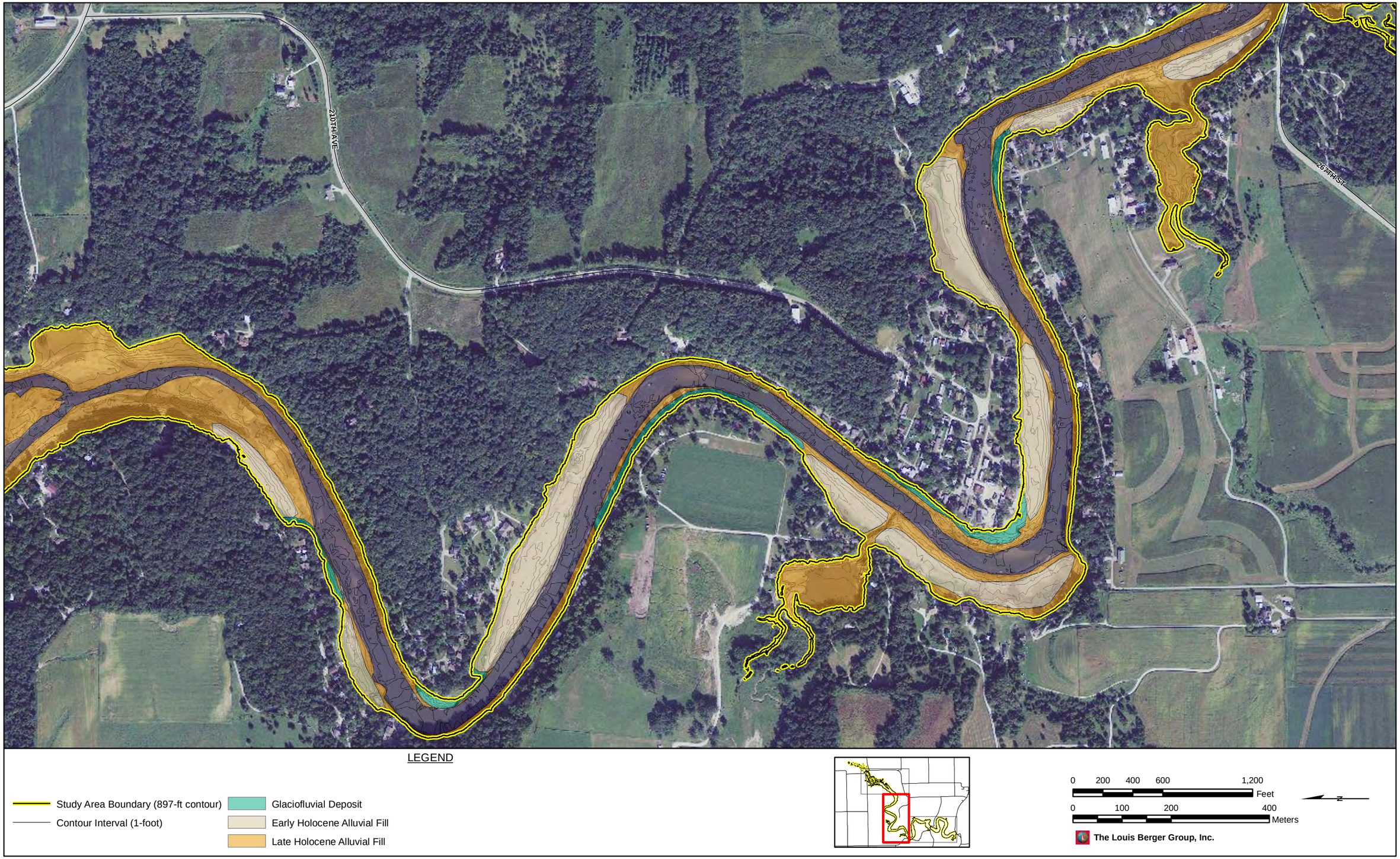
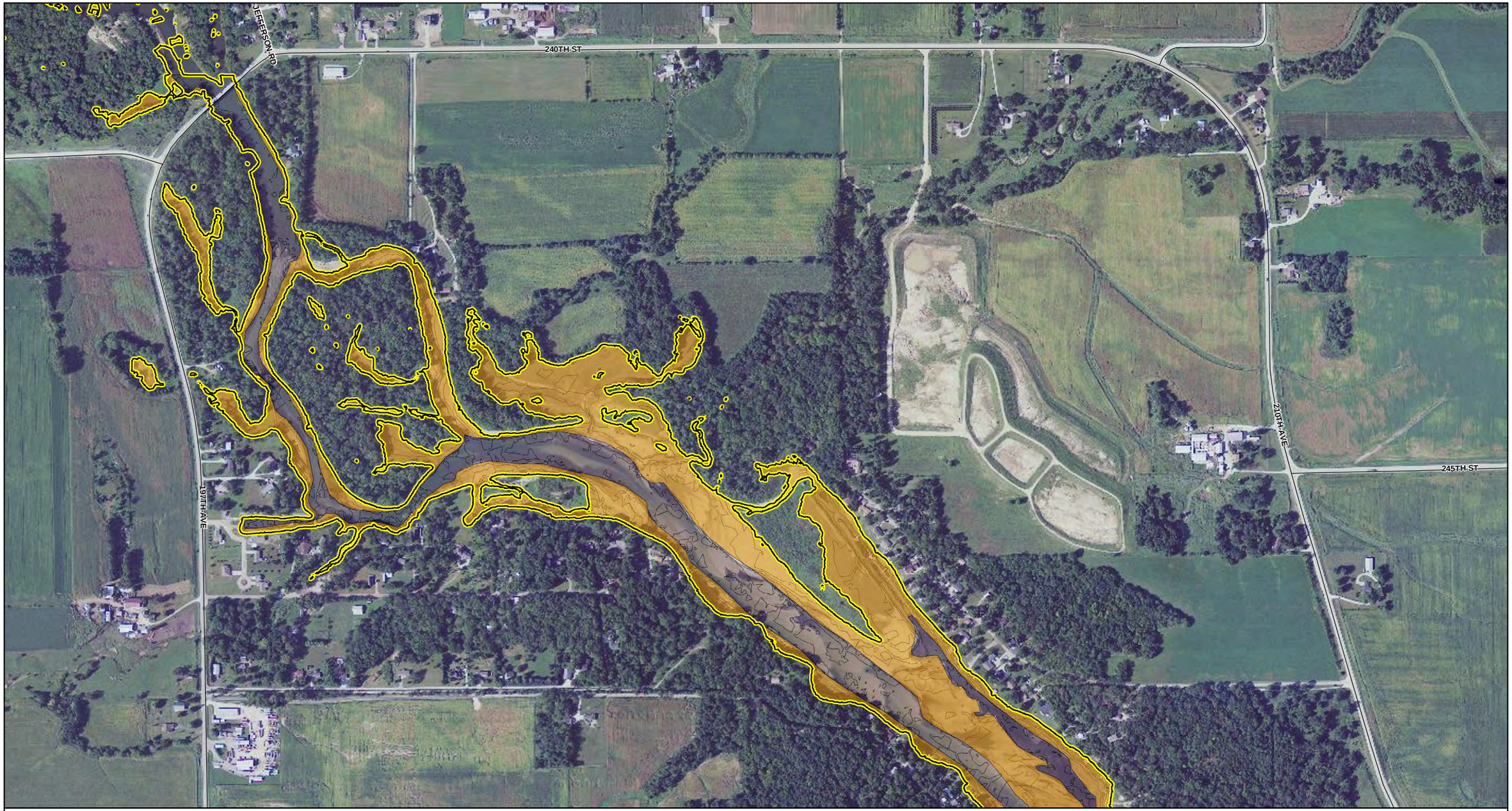


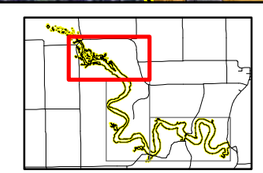
FIGURE 3b: Estimated Age and Distribution of Valley Fill Deposits

SOURCE: ISU 2010



LEGEND

- Study Area Boundary (897-ft contour)
- Contour Interval (1-foot)
- Glaciofluvial Deposit
- Early Holocene Alluvial Fill
- Late Holocene Alluvial Fill



0 200 400 600 1,200 Feet

0 100 200 400 Meters

N

The Louis Berger Group, Inc.

FIGURE 3c: Estimated Age and Distribution of Valley Fill Deposits

SOURCE: ISU 2010

consisting of chert gravel. Soils formed in these deposits typically have well-developed E and B subsoil horizons that extend to depths of five to six feet (e.g., Bertrand series).

Late Holocene-age alluvium deposited between 3,000 and 500 years ago is generally present at still lower elevations within the valley and closest to the active river channel although in some places late Holocene deposits may also overlie portions of older land surfaces. These late Holocene sediments typically consist of dark colored loamy alluvium grading to coarser sand or gravel. Soils formed in these deposits have A over C horizon profiles and may have "overthickened" A horizons measuring one meter or more that reflect relatively slow sedimentation rates compared with rates of pedogenic development (e.g., Spillville, Coland series).

Alluvial materials deposited within the past 400 to 500 years are also present as a distinctive sediment package throughout the study area. The influx of these materials is partially correlated with increases in human activity that introduced large amounts of sediment into drainage systems, particularly with the arrival of European-Americans and clearing of land for intensive agriculture. These sediments usually accumulate close to the modern stream channel and often bury older land surfaces close to the channel. They show very little evidence of soil development and frequently include modern artifacts and other modern debris items. As the site of an artificial lake, the Lake Delhi segment of the Maquoketa River valley is somewhat atypical in the sense that deposits of recent alluvium are found throughout the study area; however, deposits of this recent material are likely to be thickest at the upper end of the impoundment where the river slows as it enters the lake and drops much of its sediment load and at lower elevations as one moves downstream. Historic air photos from the 1930s to 1960s document significant changes in the shoreline of Lake Delhi as soil eroded from surrounding uplands filled the mouths of the many tributary streams feeding into the lake.

Potential for Unreported Prehistoric Sites

Generally speaking, most prehistoric habitation sites tend to be located on well-drained, level ground surfaces located near sources of water. As such, many of the river terraces found throughout the study area would therefore be considered to have potential for unreported prehistoric sites including open habitation sites as well as associated cemeteries or burial mounds. In addition to fresh water, these locations were often favorably situated near a variety of other important material and food resources. High quality stone resources suitable for the manufacture of stone tools are abundant throughout the study area. Layers of Hopkinton chert are exposed in bedrock outcrops along the valley margin and large quantities of this material are exposed in the reworked glacial deposits that fill the valley. Igneous and metamorphic rock derived from eroded glacial till would have provided suitable raw material for a variety of ground-stone tools such as axes, mauls, hammers, and milling stones. Timber for building material and fuel was often most abundant along drainageways where the rivers or streams provided barriers to prairie fires. Fish, mollusks and aquatic animals would also have been readily available nearby, and water sources were also an important attraction for game animals. Prominent landforms (bluff tops, ridge tops, and knolls) located adjacent to these habitation zones were often selected as a preferred location for associated cemeteries.

The local geology found in this part of Iowa also offers potential for additional living sites situated on the steep-sided valley walls. The Silurian bedrock that outcrops throughout the study area includes strata that are variably resistant to erosion. Some formations include caves or other cavities that may have been used by the region's prehistoric inhabitants. Another one of the region's unique features are natural rock ledges or overhangs along the valley margins created where more resistant layers outcrop above softer ones. Rock ledges and overhangs were sometimes used for shelter by the area's prehistoric inhabitants. These natural "rockshelters" may therefore contain prehistoric archaeological deposits and should be considered

as another potentially important landscape feature within the study area particularly where these overhangs occur in close proximity to the artificial lake shoreline.

Potential for Unreported Historic Sites

As described in Sections C and D of this chapter, previous researchers have identified two locations within the study area as having high potential for archaeological remains associated with the region's early settlement by European-Americans during the mid-19th century. One of these is located at the Lake Delhi dam which appears to have been constructed on the former site of the "Rockynook Mills", a sawmill/gristmill/dam complex owned and operated by Charles Fleming from 1861 to 1894 (Merry 1914:328-330; Western Historical Company 1878:601) and others after him. The second locale is represented by the former townsite at Hartwick which boasted its own sawmill/gristmill/dam complex plus a variety of other business interests including a general store, tavern, blacksmith, wheelwright or wagon shop, cobbler shop, paint shop, and brickyard.

Table 3. Potential Historic Archaeological Sites Located Within the Study Area

POTENTIAL HISTORIC SITE	LEGAL LOCATION	PERIOD OF OCCUPATION	NOTES
Rockynook Grist Mill (Charles Fleming)	**SE, NE of Section 30, T88N-R4W**	**1861-1894**	**North Side of River at Delhi Dam; Above Former Maquoketa River Bridge**
Rockynook Saw Mill (Charles Fleming)	**SW, NW of Section 29, T88N-R4W**	**1861-1894**	**South Side of River at Delhi Dam; Below Former Maquoketa River Bridge**
Hartwick Saw Mill (John Clark/Russell Furman)	**NW, NW of Section 30, T88N-R4W**	**1849-1907**	**North Side of River; Above Maquoketa River Bridge**
Hartwick Grist Mill (John Clark/Russell Furman)	**NW, NW of Section 30, T88N-R4W**	**1853-1907**	**South Side of River; Below Maquoketa River Bridge**
Hartwick Townsite	**NW, NW of Section 30, T88N-R4W**	**1858-1907**	**North Side of River; Below Maquoketa River Bridge; reported to include sawmill, gristmill, general store, tavern, blacksmith, wheelwright/wagon shop, cobbler/shoe shop, paint shop, brickyard and bridge**

The local geology and topography found in this portion of the Maquoketa River valley made these two locations particularly attractive for early milling operations. The exposed bedrock in the floor of the valley and the bedrock constrained valley walls offered ideal settings for creation of the lowhead dam and mill pond reservoir needed to power the mills.

Hartwick Mills and the Town of Hartwick

According to local histories (Merry 1914; Western Historical Company 1878), the town of Hartwick was founded in 1858 by John W. Clark and his wife Miriam Clark. The Clarks were the first settlers in Hartwick, having built a dam and sawmill on the north bank of the Maquoketa River at this location in 1849. The sawmill at Hartwick was built using materials originally intended for a mill on Spring Branch, farther upstream near Bailey's Ford. The would-be proprietor of the Spring Branch Mill, Leverett

Rexford, had reportedly completed most of the dam, water wheel and gear mechanism for his mill when he died in 1848. John Clark subsequently purchased the framing materials and machinery and used them to build the saw mill at Hartwick which was completed in the spring of 1849 (Western Historical Company 1878:375). Several years later in 1853, Clark began work on a gristmill situated on the south side of the river and had already opened a store and tavern. Clark was joined at Hartwick by a blacksmith named John Whitman in 1855, an unnamed wheelwright whom Clark helped sponsor in 1857, and a cobbler/shopkeeper, a brickmaker (Samuel Stansbury and brother), and a painter/shopkeeper named Jacob Williams by 1859. John Clark, along with John Whitman, are reported to have been the driving forces intent on placing the town of Hartwick on the map, but it appears that they each developed financial problems that led them to sell their interests and leave the area during the late 1850s. The Clark farmstead near Hartwick was leased to the county in 1861 and was used temporarily to house the indigent (Merry 1914:230; Western Historical Company 1878:552-553). Clark's milling operation was eventually purchased by Russell W. Furman in 1869. Furman and later on his sons, Charles and George Furman, appear to have operated and maintained the mill in operating condition until 1907 when the mill dam was washed away in a flood. Charles Furman relocated to Delhi where he became a storeowner and businessman (Merry 1914:327-328), while his brother George remained on the family farm at Hartwick. George Furman proceeded to demolish the vestige houses that remained at Hartwick and converted the abandoned townsite to farmland (Merry 1914:408-409).

The mills at Hartwick are not well recorded on historic maps of the project area. No mills are plotted at this location on the 1875 Andreas map or the 1894 Davis plat (Figures 4 & 5). A grist mill is depicted on the 1904 Huebinger map of Delaware County south of the Maquoketa River and downstream of the road/bridge that crosses the river at this location (Figure 6). This lack of specificity is frustrating but is probably best explained by the fact that mapmakers instead depict the Hartwick townsite at this location and therefore opted not to call out the location of individual buildings. Fortunately, several images of what appears to be the Hartwick gristmill have been preserved in the form of both hand-drawn illustrations and photographs (Plates 5 & 6). The images compare well with each other and details such as the pattern of sunlight and shadow on the buildings confirm that this is indeed the structure located on the south side of the Maquoketa River. The structure's position below the river bridge is consistent with the Huebinger map and the building's three-story construction suggests that it is more likely to be a gristmill as compared to sawmills of the period. Even though its location cannot be confirmed by reference to historic maps or other documents, it seems logical then to assume that the Hartwick sawmill was probably located on the opposite or north side of the river.

Rockynook Mills

Local histories report that Charles F. Fleming was the founder and proprietor the Rockynook Mills, which is apparently how the former milling operation sited at Delhi Dam was known (Merry 1914:328-331). Fleming is reported to have settled near Delhi in 1857 and operated a steam-powered gristmill at Silver Lake before eventually deciding in 1861 to either buy or perhaps build a sawmill on the Maquoketa River south of Delhi. Merry's 1914 *History of Delaware County* states that Fleming built the saw mill at the Rockynook Mills location in one passage (Merry 1914 [V2]:328), but elsewhere suggests that Fleming purchased an already existing mill (Merry 1914 [v1]: 218). Whichever is correct, it appears that Fleming successfully managed the milling operation for more than 30 years before finally selling it to an unnamed party in 1894. Historic photographs taken during dam construction in 1926 strongly suggest that any remains of the former grist mill were obliterated during dam construction. Newspaper accounts describing construction of the Delhi dam in 1926 reported that an eight-foot-high low-head dam was removed prior to construction of the new dam (McDowell 2009).

The location of the Rockynook Mills is better documented on historic maps. All available maps are consistent with regard to placing the gristmill on the north side of the river and the saw mill south of the

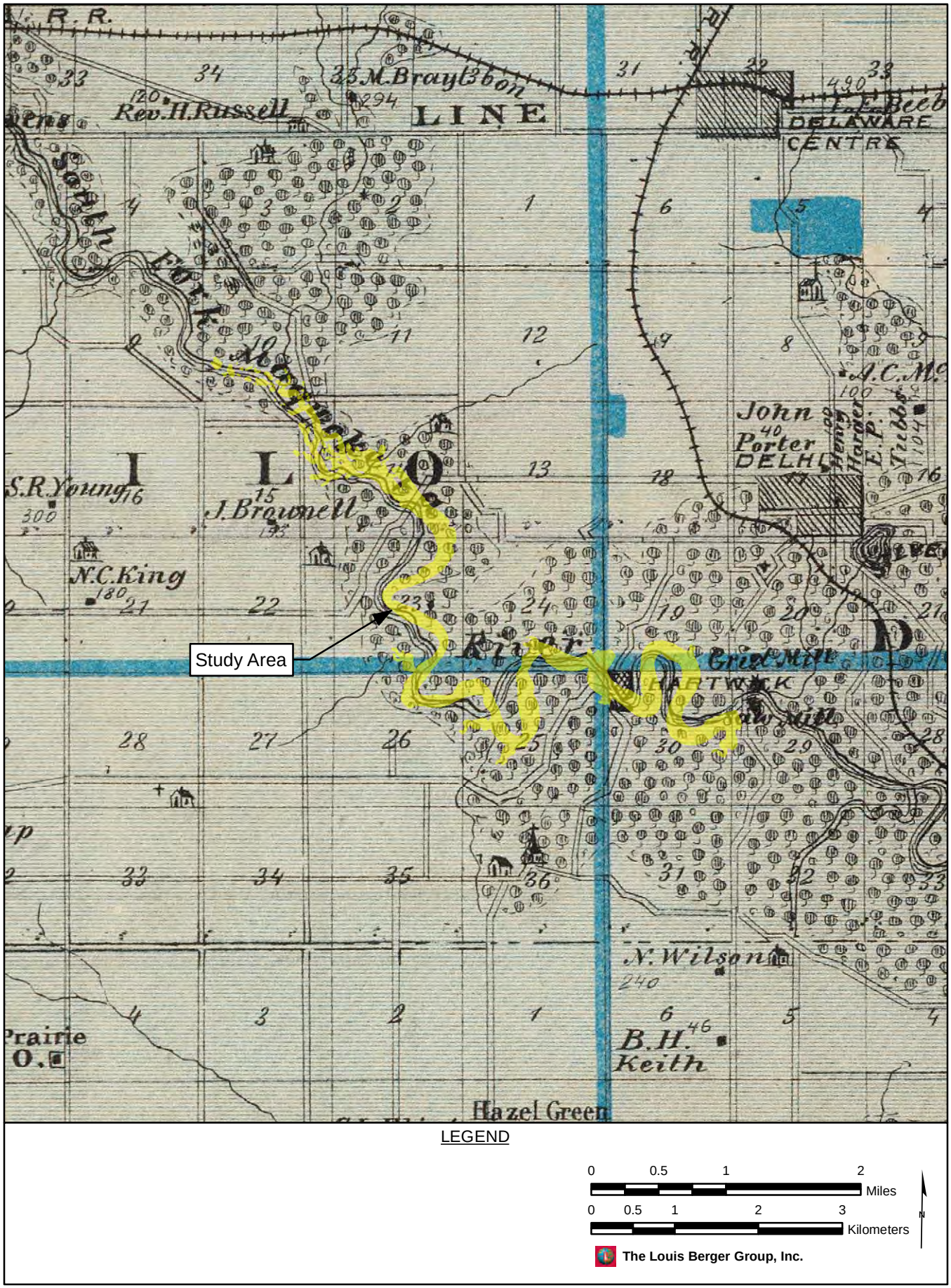


FIGURE 4: 1875 Map of the Study Area

SOURCE: Andreas 1875

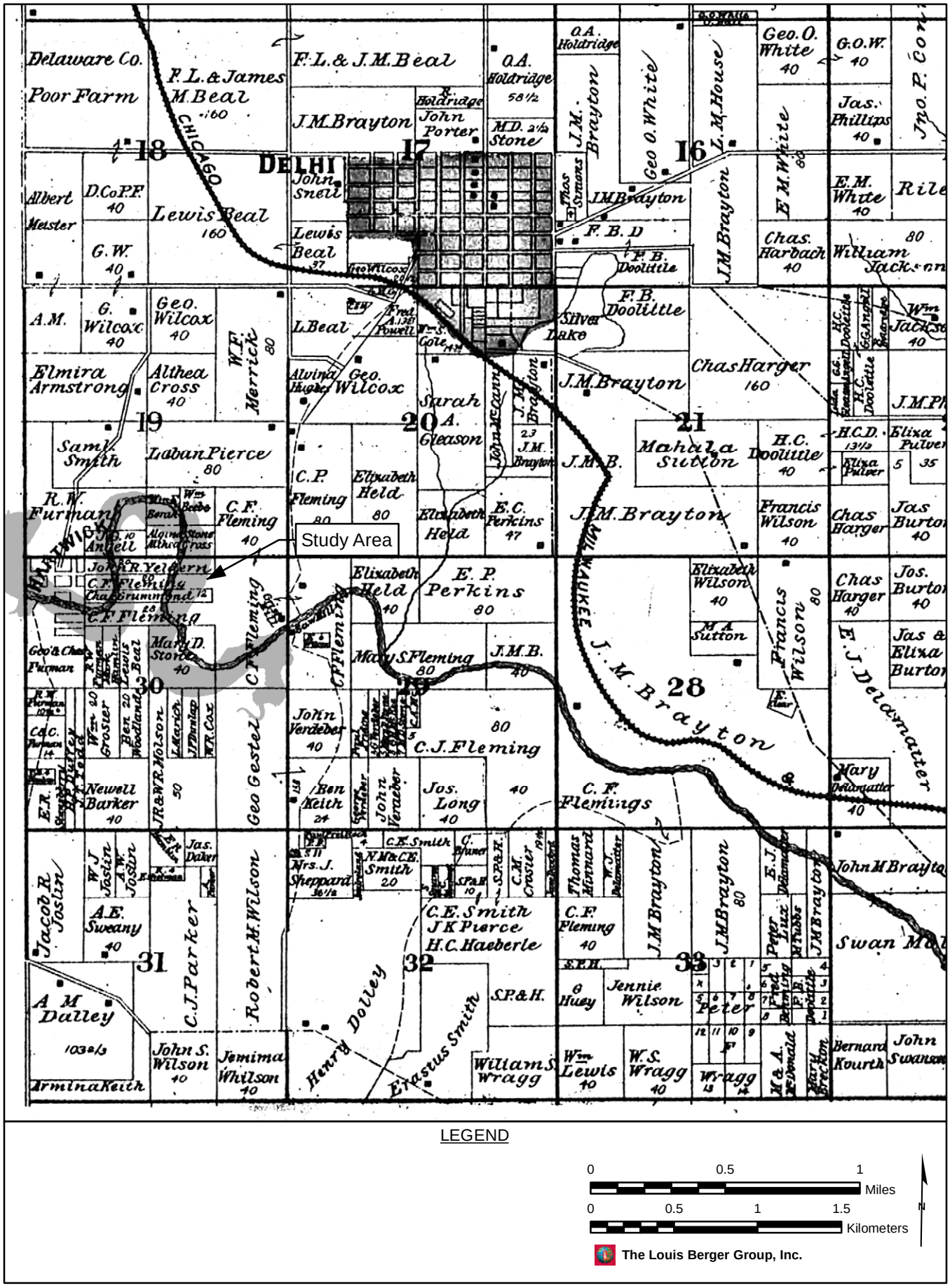


FIGURE 5: 1894 Map of the Study Area

SOURCE: Davis 1894

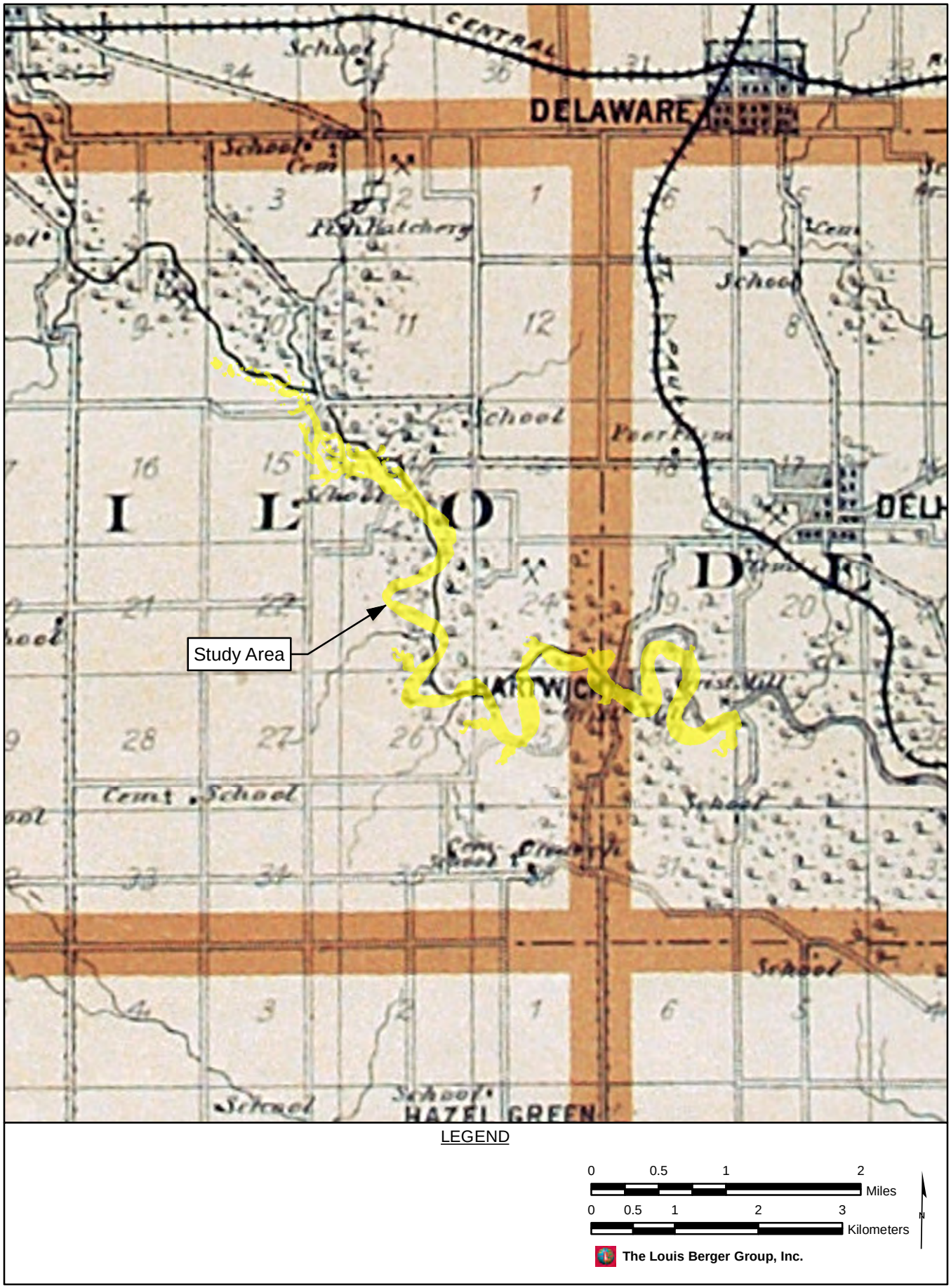


FIGURE 6: 1904 Map of the Study Area

SOURCE: Huebinger 1904

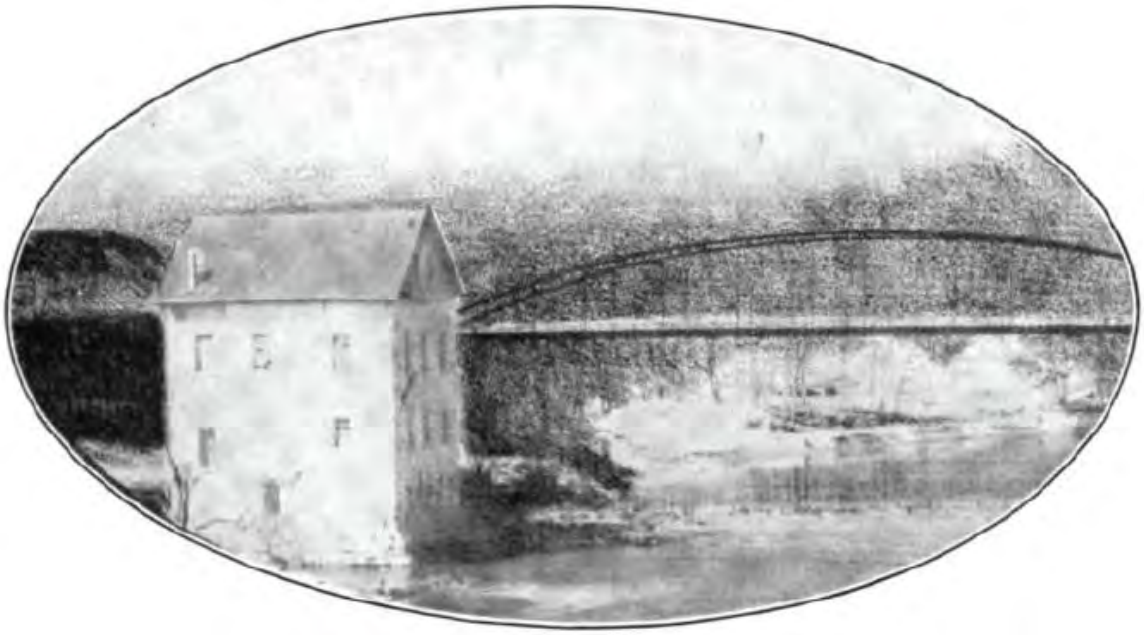


Figure 7. Illustration of Furman's Mill and Hartwick Bridge (Reproduced from Merry 1914:219).

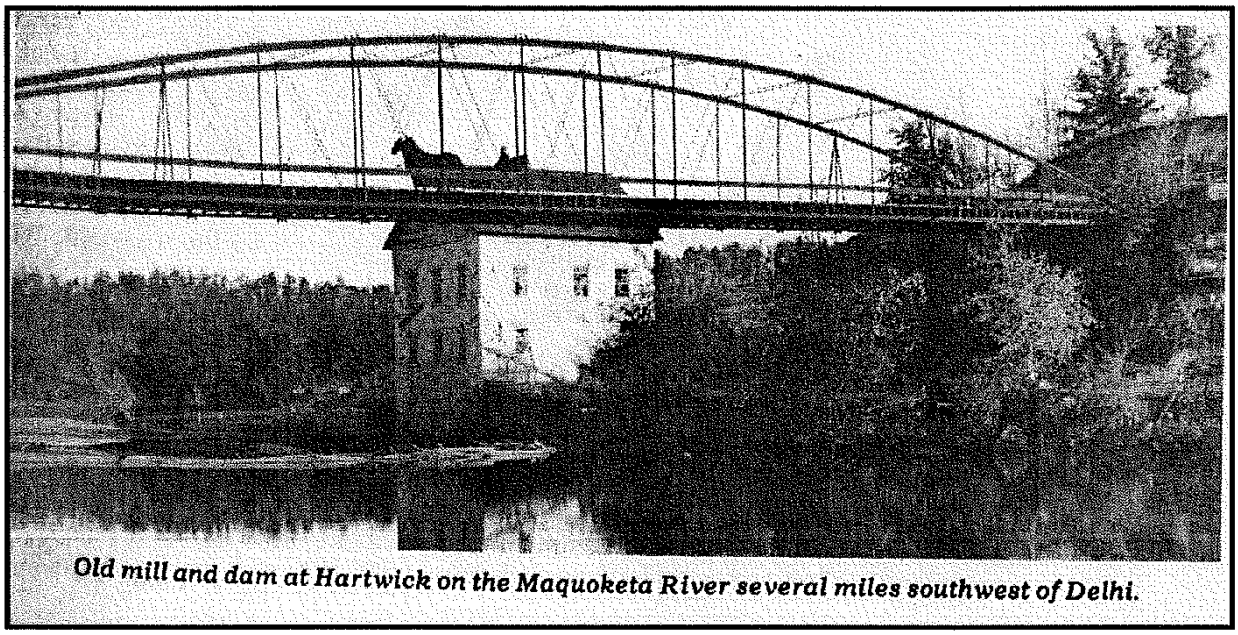


Plate 5. Photograph of Furman's Mill and Hartwick Bridge. (Reproduced from Finn 2010. Original source is Bailey nd.)

River (see Figures 4, 5, 6). There is however some apparent inconsistency with regard to the mill locations and spatial relationships to the road/bridge that crossed the river. The 1875 Andreas map, the 1894 Davis map, and the 1904 Huebinger map each show the Rockynook gristmill on the north side of the Maquoketa River. The 1875 map shows it east of the road that crosses the river while both the 1894 and 1904 maps clearly show the gristmill on the west side of the road/bridge. The Rockynook sawmill is shown south of the river on both the 1875 and 1894 maps, but is absent on the 1904 map suggesting that it may have been abandoned prior to that time. As with the gristmill, the saw mill is depicted east of the road/bridge in 1875 but west of the road/bridge in 1894. If this information is assumed accurate, it would indicate that the original river crossing passed upstream from the mills and behind the mill dam which seems unlikely. In any case, the more recent map information is consistent in showing both mills positioned west of the road/bridge.

One of the Rockynook Mills appears to be depicted in a hand-drawn illustration published in Merry's 1914 *History of Delaware County* (Merry 1914:219; Figure 7); however the sketch is much too generalized differentiate it as either the gristmill or saw mill or confirm its location.

Maquoketa River Bridges at the Hartwick and Rockynook Crossings

Bowstring Arch-Truss bridges were constructed across the Maquoketa River at both the Hartwick and Rockynook locations at an early date, most likely sometime during the 1860s, 1870s, or early 1880s. Images of the former bridges at these locations are preserved in both drawings and photographs (see Plates 5, 6, & 8). The bowstring arch-truss was patented in 1841 and was an especially popular design for this period. It was widely used in Iowa due to its use of inexpensive materials, relative ease of construction, and wide range of span lengths. The structures were apparently mounted on tall rock piers made from locally quarried cut limestone. Remnants of the south bridge pier at the Rockynook crossing was exposed by the 2010 floodwater along the south wall of the gated spillway. The north pier was most likely incorporated into the block retaining wall along the north bank of the river below the dam. The bridge at Hartwick was supported by piers of similar construction judging by the following description preserved in the 1878 county history:

> *"The Maquoketa is bridged at this place by a graceful iron structure, which springs from a high rocky bank on the south side of the stream, and the north side rests on a high pier built of massive magnesian rock* [Western Historical Company 1878:553]."

Figure 8. Illustration of the Fleming Rockynook Mill at the Delhi Dam Location. (Reproduced from Merry 1914:219).

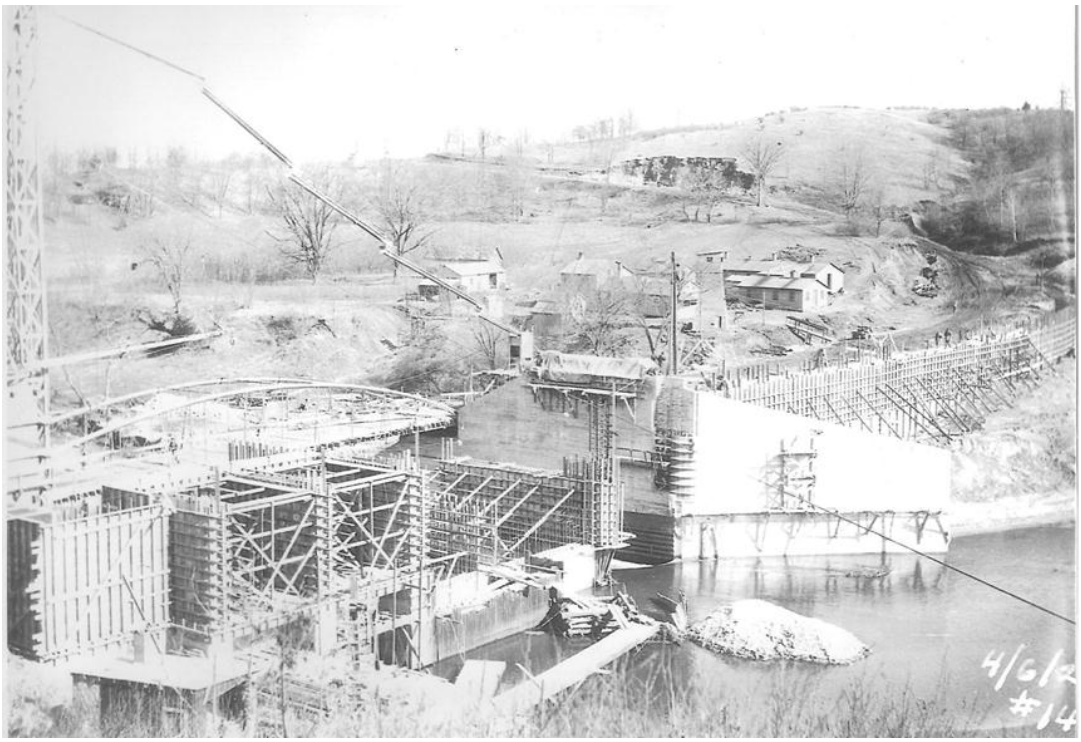


Plate 6. 1926 Photograph of Delhi Dam Under Construction (Reproduced from Fiedler et al. 2010). Note the location of the Bowstring Arch-Truss bridge below the dam in the background.

Plate 7. Photograph of the exposed south wall of the gated spillway at Delhi Dam (Reproduced from Fiedler et al. 2010; This limestone pier once supported the south end of the bowstring arch bridge.)