

PHASE I HISTORICAL AND ARCHAEOLOGICAL RESOURCES STUDY

LUDINGTON PUMPED STORAGE PROJECT
MASON AND OTTAWA COUNTIES, MICHIGAN

DECEMBER 2015
(PUBLIC DRAFT VERSION)

PREPARED FOR:
CONSUMERS ENERGY
330 CHESTNUT ST.
CADILLAC, MI



Results of a Phase I Historical and Archaeological Resources Study of the Ludington Pumped Storage Project,
Including the Ludington Pumped Storage Hydroelectric Facility in Pere Marquette and Summit Townships, Mason
County, and the Pigeon Lake North Pier in Port Sheldon Township, Ottawa County, Michigan

Submitted by:

Dr. Robert C. Chidester, RPA
Project Manager / Principal Investigator

Prepared by:

Robert C. Chidester, Ph.D.
Maura Johnson, M.A.
Phillip R. Bauschard, B.A.
Daniel Hershberger, B.A.
Kate J. Hayfield, B.S.

The Mannik & Smith Group, Inc.
1800 Indian Wood Circle
Maumee, OH 43537

Submitted to:

Consumers Energy
330 Chestnut St.
Cadillac, Michigan 49601

Lead Federal Agency:
Federal Energy Regulatory Commission

December 2015

EXECUTIVE SUMMARY

In May 2015, Consumers Energy (Consumers) contracted The Mannik & Smith Group, Inc. (MSG) to perform a cultural resources survey for the Ludington Pumped Storage Project (LPSP). The LPSP includes the approximately 1,500-acre hydroelectric facility in Mason County, and a 1.8-acre satellite recreation site in Ottawa County.¹ The LPS facility (LPSF) was constructed between 1969 and 1972 and is jointly owned and operated by Consumers and Detroit Edison (DTE). Its current operating license from the Federal Energy Regulatory Commission (FERC) expires on June 30, 2019. The project Owners (Consumers and DTE) are using FERC's Integrated Licensing Process (ILP) to prepare a re-licensing application. The Owners have already filed the Pre-Application Document and Notice of Intent to see a new license for the facility, as well as a Revised Study Plan for Cultural Resources. FERC issued a Study Plan Determination for the Project on December 1, 2014. Consumers expects to file the final application for the new license in June 2017.

Due to FERC's involvement, the re-licensing process is considered a federal undertaking subject to review under Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended. The primary object of the current LPS project is to complete all cultural resource studies and consultation activities needed to satisfy the current requirements of FERC's Study Plan Determination and ILP. Essential components of the LPSP include defining the project's Area of Potential Effects (APE) and identifying historical and archaeological resources within the APE that are listed in or eligible for the National Register of Historic Places (NRHP). The project is being conducted as part of the consultation process between FERC, DTE, Consumers, and the Michigan State Historic Preservation Office (MISHPO).

For the current LPSP, the undertaking is the FERC license renewal. No change in operation or addition of facilities is proposed as part of the re-licensing, nor is there any change in the capacity of the facility. Likewise, no impacts from continued hydroelectric pumped storage operations are anticipated as a result of the relicensing, and no physical, visual or auditory effects will result outside the permit boundaries. Because the effects of the current proposed project will be confined exclusively to the LPSF, the recommended APE therefore corresponds to the current property boundaries of the licensed project, which includes both the LPSF and the Pigeon Lake North Pier (PLNP) site.

In July 2015, MSG completed a literature review within a 2.0-km (1.2-mi) study area around the LPSF. Using the MISHPO's data system, we determined there are no cultural resources within the study area that are listed in or eligible for the NRHP or the Michigan State Register of Historic Places. Seventeen previously recorded archaeological sites are located in the study area, including 13 prehistoric sites and 4 historic-period sites. Of these, six sites have been determined not eligible for the NRHP, while the remaining sites have not been formally evaluated. Two of the prehistoric archaeological sites, 20MN48 and 20MN49, are located directly within the LPSF project boundary. However, both were destroyed during the initial construction of the facility from 1969-1972 and are among those determined not eligible for the NRHP. A literature review encompassing a 2.0-km (1.2-mi) buffer around the Pigeon Lake North Pier project area similarly revealed that no known archaeological sites are located within this study area.

The historic resources survey was completed from August 10-11, 2015. Field reconnaissance included all aboveground properties within the project APE, including those previously surveyed. Our goal was to document the current condition and integrity of those resources. The survey included the upper reservoir, penstocks, powerhouse and ancillary structures at the LPSF (including a guardhouse and four recreational sites), as well as the PLNP site. All but two of these properties were previously recorded by CCRG in 2011. Based on survey results and analysis, the LPSF retains integrity of location, design, setting, materials, workmanship, feeling and association and is recommended as eligible for listing in the NRHP under Criteria A, C, D and Criteria Consideration D. The

¹ The recreation site was established as part of a Settlement Agreement approved by Commission Order on January 23, 1996 (74 FERC Part 61,055).

recommended boundary for the eligible property include only the 1,500-acre facility in Mason County, as the property most directly associated with construction, operation and maintenance of the hydroelectric project. It does not include the PLNP site, which is a mitigation site that has no individual significance and no direct association with the history or development of the LPSF. Given the scale and nature of the proposed project, it is the opinion of MSG that the effects of the re-licensing do not meet the Criteria of Adverse Effect (36 CFR Part 800.5[a][1]) and the project will have no adverse effect on the LPSF, which is eligible for NRHP listing.

The archaeological survey was completed from August 10-21, 2015. Survey methods included a combination of visual inspection of areas that were likely disturbed during the construction of the LPSF from 1969-1972, and shovel testing of undisturbed areas at 15-meter (50-foot) intervals. The survey confirmed the destruction of previously recorded sites 20MN48 and 20MN49. The survey resulted in the identification of 15 previously unrecorded archaeological sites, which have been assigned state trinomial site numbers 20MN324-20MN338. Site types include four lithic isolates, one small lithic scatter, nine historic homestead / farmstead sites, and one historic site related to the construction of the LPSF. All five of the prehistoric archaeological sites appear to represent ephemeral uses of the landscape at undetermined times during prehistory, and are recommended not eligible for the NRHP due to a lack of research potential (criterion D). Eight of the ten historic archaeological sites have been heavily disturbed and/or represent ephemeral fragments of 20th-century activity and are also not recommended eligible for the NRHP.

Two of the historic-period sites, however, are recommended as potentially eligible for the NRHP under Criterion D for an ability to yield significant information relevant to important research questions in regional farmstead archaeology. These are sites 20MN324 and 20MN329, both located in Section 11 of Summit Township. However, as no changes in the operation of the LPSF are currently planned and no new construction is under consideration, these two sites are not in imminent danger of disturbance or destruction. Therefore, no additional investigation of these sites is recommended at this time. Should new construction or changes in plant operations be considered in the future, formal evaluation of these two sites in the form of Phase II archaeological testing will be necessary.

In addition to the archaeological sites identified during the archaeological survey, the LPSF Project Area contains both eroding bluff faces and stabilized dune formations that may have the potential for deeply buried prehistoric archaeological sites. Typical Phase I survey methods such as shovel testing are not designed to identify such deeply buried sites. Therefore, any future development or changes in plant operations will require an evaluation of the potential for deeply buried archaeological resources that may be affected.

TABLE OF CONTENTS

SECTION:

PAGE NO.:

EXECUTIVE SUMMARY	ES-1
1.0 INTRODUCTION	1
1.1 PROJECT DESCRIPTION	1
1.2 AREA OF POTENTIAL EFFECTS	1
1.3 REPORT AND PROJECT PERSONNEL	2
2.0 BACKGROUND RESEARCH	7
2.1 ENVIRONMENTAL CONTEXTS	7
2.2 PREHISTORIC CONTEXTS.....	13
2.2.1 PALEOINDIAN PERIOD (CA. 12,000-10,000 B.P.).....	13
2.2.2 ARCHAIC PERIOD (CA. 10,000-3,000 B.P.)	13
2.2.3 WOODLAND PERIOD (CA. 3,000-350 B.P.)	14
2.3 HISTORIC CONTEXTS.....	17
2.3.1 MASON COUNTY	17
2.4 LITERATURE REVIEW	25
2.4.1 LPSF STUDY AREA.....	28
2.4.2 PIGEON LAKE NORTH PIER STUDY AREA	33
3.0 HISTORIC RESOURCES SURVEY	36
3.1 RESEARCH DESIGN	36
3.2 SURVEY METHODS.....	36
3.3 SURVEY RESULTS	36
3.3.1 UPPER RESERVOIR	37
3.3.2 PENSTOCKS.....	37
3.3.3 POWERHOUSE	37
3.3.4 ANCILLARY STRUCTURES.....	38
3.3.5 PIGEON LAKE NORTH PIER (PLNP)	39
4.0 ARCHAEOLOGICAL SURVEY	40
4.1 RESEARCH DESIGN	40
4.2 METHODS.....	40
4.2.1 FIELD METHODS	40
4.2.2 LABORATORY METHODS.....	41
4.2.3 ARTIFACT CURATION.....	47
4.3 SURVEY RESULTS – LPSF PROJECT AREA	47
4.3.2 SURVEY AREA A	ERROR! BOOKMARK NOT DEFINED.
4.3.3 SURVEY AREA B	ERROR! BOOKMARK NOT DEFINED.
4.3.4 SURVEY AREA C	ERROR! BOOKMARK NOT DEFINED.
4.3.5 SURVEY AREA D.....	ERROR! BOOKMARK NOT DEFINED.
4.3.6 SURVEY AREA E	ERROR! BOOKMARK NOT DEFINED.
4.3.7 SURVEY AREA F	ERROR! BOOKMARK NOT DEFINED.
4.3.8 SURVEY AREA G.....	ERROR! BOOKMARK NOT DEFINED.
4.3.9 SURVEY AREA H.....	ERROR! BOOKMARK NOT DEFINED.
4.3.10 SURVEY AREA I.....	ERROR! BOOKMARK NOT DEFINED.
4.3.11 SURVEY AREA J.....	ERROR! BOOKMARK NOT DEFINED.
4.3.12 SURVEY AREA K	ERROR! BOOKMARK NOT DEFINED.
4.3.13 SURVEY AREA L.....	ERROR! BOOKMARK NOT DEFINED.
4.3.14 SURVEY AREA M.....	ERROR! BOOKMARK NOT DEFINED.
4.3.15 SURVEY AREA N.....	ERROR! BOOKMARK NOT DEFINED.
4.3.16 SURVEY AREA O.....	ERROR! BOOKMARK NOT DEFINED.

TABLE OF CONTENTS

<u>SECTION:</u>	<u>PAGE NO.:</u>
4.3.17 SURVEY AREA P	ERROR! BOOKMARK NOT DEFINED.
4.3.18 SURVEY AREA Q	ERROR! BOOKMARK NOT DEFINED.
4.3.19 SURVEY AREA R	ERROR! BOOKMARK NOT DEFINED.
4.4 SURVEY RESULTS – PIGEON LAKE NORTH PIER PROJECT AREA	ERROR! BOOKMARK NOT DEFINED.
5.0 NRHP EVALUATIONS AND ASSESSMENT OF EFFECTS	49
5.1 HISTORIC/ARCHITECTURAL RESOURCES	49
5.2 ARCHAEOLOGICAL RESOURCES	50
5.2.2 PREHISTORIC LITHIC ISOLATES	51
5.2.3 PREHISTORIC LITHIC SCATTERS	52
5.2.4 FARM/ORCHARD-ASSOCIATED HISTORIC ARTIFACT SCATTERS	52
5.2.5 FARMSTEAD/ORCHARD SITES	54
5.2.6 LPSF-ASSOCIATED ARTIFACT SCATTERS	57
6.0 SUMMARY AND RECOMMENDATIONS	58
7.0 REFERENCES CITED	60

FIGURES

FIGURE 1.1 PROJECT LOCATION, LPSF PROJECT AREA	3
FIGURE 1.2 PROJECT LOCATION, PIGEON LAKE NORTH PIER PROJECT AREA	4
FIGURE 1.3 PROJECT BOUNDARY AND APE, LPSF PROJECT AREA	5
FIGURE 1.4 PROJECT BOUNDARY AND APE, PIGEON LAKE NORTH PIER PROJECT AREA	6
FIGURE 2.1 SOIL TYPES WITHIN THE LPSF PROJECT AREA	11
FIGURE 2.2 SOIL TYPES WITHIN THE PIGEON LAKE NORTH PIER PROJECT AREA	12
FIGURE 2.3 LITERATURE REVIEW RESULTS, LPSF PROJECT AREA	26
FIGURE 2.4 LITERATURE REVIEW RESULTS, PIGEON LAKE NORTH PIER PROJECT AREA	27
FIGURE 4.2 ARCHAEOLOGICAL SITES FOUND	ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.3 ARCHAEOLOGICAL SURVEY RESULTS, SURVEY AREA A	ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.4 20MN324 SITE SKETCH MAP	ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.6 ARCHAEOLOGICAL SURVEY RESULTS, SURVEY AREA B	ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.7 ARCHAEOLOGICAL SURVEY RESULTS, SURVEY AREA C	ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.8 FIELD SITE C1 SITE SKETCH MAP	ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.9 ARCHAEOLOGICAL SURVEY RESULTS, SURVEY AREA D	ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.11 20MN327 SITE SKETCH MAP	ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.12 ARCHAEOLOGICAL SURVEY RESULTS, SURVEY AREA E	ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.13 20MN328 SITE SKETCH MAP	ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.14 20MN329 SITE SKETCH MAP	ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.15 ARCHAEOLOGICAL SURVEY RESULTS, SURVEY AREA F	ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.16 ARCHAEOLOGICAL SURVEY RESULTS, SURVEY AREA G	ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.17 20MN330 SITE SKETCH MAP	ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.18 ARCHAEOLOGICAL SURVEY RESULTS, SURVEY AREA H	ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.19 20MN331 SITE SKETCH MAP	ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.20 20MN332 SITE SKETCH MAP	ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.21 ARCHAEOLOGICAL SURVEY RESULTS, SURVEY AREA I	ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.22 FIELD SITE I1 SITE SKETCH MAP	ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.23 20MN333 SITE SKETCH MAP	ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.24 20MN334 SITE SKETCH MAP	ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.25 ARCHAEOLOGICAL SURVEY RESULTS, SURVEY AREA J	ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.26 20MN335 SITE SKETCH MAP	ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.27 ARCHAEOLOGICAL SURVEY RESULTS, SURVEY AREA K	ERROR! BOOKMARK NOT DEFINED.

TABLE OF CONTENTS

<u>SECTION:</u>	<u>PAGE NO.:</u>
FIGURE 4.28	20MN336 SITE SKETCH MAP ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.29	20MN337 SITE SKETCH MAP ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.30	ARCHAEOLOGICAL SURVEY RESULTS, SURVEY AREA L ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.31	FIELD SITE L1 SITE SKETCH MAP ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.32	ARCHAEOLOGICAL SURVEY RESULTS, SURVEY AREA M ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.33	ARCHAEOLOGICAL SURVEY RESULTS, SURVEY AREA N ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.34	ARCHAEOLOGICAL SURVEY RESULTS, SURVEY AREA O ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.35	ARCHAEOLOGICAL SURVEY RESULTS, SURVEY AREA P ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.36	20MN338 SITE SKETCH MAP ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.37	ARCHAEOLOGICAL SURVEY RESULTS, SURVEY AREA Q ERROR! BOOKMARK NOT DEFINED.
FIGURE 4.38	ARCHAEOLOGICAL SURVEY RESULTS, SURVEY AREA R ERROR! BOOKMARK NOT DEFINED.

TABLES

TABLE 2.1	SOIL TYPES WITHIN THE LPSF PROJECT AREA 9
TABLE 2.2	SOIL TYPES WITHIN THE PIGEON LAKE NORTH PIER PROJECT AREA 10
TABLE 4.1	FEATURES RECORDED WITHIN 20MN324 ERROR! BOOKMARK NOT DEFINED.
TABLE 4.2	ARTIFACTS RECOVERED BY PROVENIENCE, 20MN324 ERROR! BOOKMARK NOT DEFINED.
TABLE 4.3	FUNCTIONAL PATTERNING OF ARTIFACTS BY FIELD SITE, 20MN324 .. ERROR! BOOKMARK NOT DEFINED.
TABLE 4.4	ARTIFACTS RECOVERED BY PROVENIENCE, 20MN325 ERROR! BOOKMARK NOT DEFINED.
TABLE 4.5	ARTIFACTS RECOVERED BY PROVENIENCE, 20MN326 ERROR! BOOKMARK NOT DEFINED.
TABLE 4.6	ARTIFACTS RECOVERED BY PROVENIENCE, 20MN327 ERROR! BOOKMARK NOT DEFINED.
TABLE 4.7	ARTIFACTS RECOVERED BY PROVENIENCE, 20MN328 ERROR! BOOKMARK NOT DEFINED.
TABLE 4.8	ARTIFACTS RECOVERED BY PROVENIENCE, 20MN329 ERROR! BOOKMARK NOT DEFINED.
TABLE 4.9	ARTIFACTS RECOVERED BY PROVENIENCE, 20MN331 ERROR! BOOKMARK NOT DEFINED.
TABLE 4.10	ARTIFACTS RECOVERED BY PROVENIENCE, 20MN332 ERROR! BOOKMARK NOT DEFINED.
TABLE 4.11	ARTIFACTS RECOVERED BY PROVENIENCE, 20MN333 ERROR! BOOKMARK NOT DEFINED.
TABLE 4.12	ARTIFACTS RECOVERED BY PROVENIENCE, 20MN334 ERROR! BOOKMARK NOT DEFINED.
TABLE 4.13	ARTIFACTS RECOVERED BY PROVENIENCE, 20MN335 ERROR! BOOKMARK NOT DEFINED.
TABLE 4.14	ARTIFACTS RECOVERED BY PROVENIENCE, 20MN336 ERROR! BOOKMARK NOT DEFINED.
TABLE 4.15	ARTIFACTS RECOVERED BY PROVENIENCE, 20MN337 ERROR! BOOKMARK NOT DEFINED.
TABLE 4.16	ARTIFACTS RECOVERED BY PROVENIENCE, 20MN338 ERROR! BOOKMARK NOT DEFINED.
TABLE 5.1	NRHP ELIGIBILITY AND RECOMMENDATIONS FOR ARCHAEOLOGICAL SITES 51

APPENDICES

APPENDIX A	HISTORIC MAPS AND AERIAL PHOTOGRAPHS
APPENDIX B	LITERATURE REVIEW RESULTS
APPENDIX C	HISTORIC RESOURCES SURVEY PHOTOGRAPH LOG
APPENDIX D	ARCHAEOLOGICAL SURVEY PHOTOGRAPH LOG
APPENDIX E	PIGEON LAKE NORTH PIER PHOTOGRAPH LOG
APPENDIX F	ARTIFACT CATALOG

1.0 INTRODUCTION

In May 2015, Consumers Energy Company (Consumers) contracted The Mannik & Smith Group, Inc. (MSG) to conduct a Phase I archaeological and historical resources survey of the Ludington Pumped Storage Facility (LPSF) in Pere Marquette and Summit townships, Mason County, Michigan. The LPSF was constructed from 1969-1972 and is jointly owned and operated by Consumers and Detroit Edison (DTE). It is currently operating on a 50-year license from the Federal Energy Regulatory Commission (FERC). This license will expire in 2019; therefore, Consumers and DTE are engaged in a five-year re-licensing application process. Due to FERC's involvement, the re-licensing process is considered a federal undertaking subject to review under Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended. The archaeological and historical resources survey is being conducted as part of the consultation process between FERC, DTE, Consumers, and the Michigan State Historic Preservation Office (MISHPO). The purpose of the survey is to identify cultural resources located within the project area that are or may be eligible for listing on the National Register of Historic Places. The current report describes the results of both the historical and archaeological resource surveys.

1.1 Project Description

The LPSF is located on the eastern shore of Lake Michigan, approximately 4 miles (6.4 km) south of the City of Ludington in Pere Marquette and Summit townships, Mason County, Michigan. The plant was constructed between 1969 and 1973 and is jointly owned by Consumers and DTE. At the time of its construction the facility was the largest pumped storage hydroelectric generating plant in the world. It is now the world's third largest pumped storage facility (in terms of generating capacity), and the only one of its kind in Michigan.

The LPSF is composed of two primary features – the upper reservoir and the powerhouse – connected by the penstocks. The area within the tailrace and breakwall in Lake Michigan serve as the lower reservoir. A guardhouse is located at the facility entrance on Lakeshore Drive, and there are four recreational sites within the 1,500-acre LPS project boundary. Also under the FERC license is an off-site facility in Ottawa County, approximately 70 miles south of the LPSF. Pigeon Lake North Pier (PLNP), a 1.8 acre satellite recreation site, was created by Consumers/DTE as a condition of an environmental damage settlement in 1996. Figures 1.1 and 1.2 show the location of these sites.

1.2 Area of Potential Effects

In 2011, Consumers contracted with Commonwealth Cultural Resources Group, Inc. (CCRG) to perform a historic assessment of the approximately 1,630-acre LPSF. The survey area encompassed the entire project boundary, which is defined by FERC as “a complete unit of improvement or development” that consists of all dams, reservoirs, other engineered structures, as well as property rights in lands and waters that are necessary for the construction, operation, and maintenance of a project. The survey did not include the PLNP site. As a result of their investigations, CCRG recommended that the LPS facility is eligible for listing in the National Register of Historic Places (NRHP) under Criteria A, C and D, and Criteria Consideration G. In a letter dated February 21, 2012, the Deputy State Historic Preservation Officer concurred with CCRG's recommendation of eligibility. The area surveyed by CCRG in 2011 is shown in Figure 1.3 (identified as “historic project boundary”).

Under a license amendment filed by Consumers, approximately 130 acres of land have since been removed from the licensed project boundary by FERC, including one 35-acre parcel at the northwest corner of the property and one 95-acre parcel at the southeast corner of the property. Preliminary design plans indicated that the parcels may be needed for staging or construction activities; in fact, neither parcel has been used for any project purpose. As part of the amendment process, field investigations and research within those tracts were conducted (Dunham 2103; Dunham and Espenshade 2013) to determine if historic properties

are present within those boundaries. The surveys identified no archaeological sites or aboveground resources that are eligible for or listed in the NRHP, and no significant functional or historical association with the LPS's operations. The application to remove the 35-acre parcel was approved by FERC in October 2013; the larger parcel was removed in May 2015. The current LPSF boundary is shown in Figure 1.3, with the two removed parcels notated as such.

According to 36 CFR 800.16(d), the area of potential effects (APE) is defined as the geographic area within which an undertaking may alter the character or use of historic properties, if present. The APE is influenced by the scale and nature of the undertaking, and may be different for different kinds of effects that may result from it. In defining the APE, the potential direct, indirect, and cumulative effects to historic properties should be considered, in terms of the aspects of integrity from which the property derives its significance. Under FERC regulations, the APE specifically includes "the lands enclosed by the project's boundary and lands or properties outside of the project's boundary where project construction and operation or project-related recreational development or other enhancements may cause changes in the character or use of historic properties, if any historic properties exist."

For the current LPSP, the undertaking is the FERC license renewal. Project activities are entirely limited to the LPSP boundaries. No change in operation or addition of facilities is proposed as part of the re-licensing at the LPSP, nor is there any change in the capacity of the facility. Likewise, no impacts from continued hydroelectric pumped storage operations are anticipated as a result of the relicensing, and no physical, visual or auditory effects will result outside the permit boundaries. Because the effects of the current proposed project will be confined exclusively to the LPSF, the recommended APE therefore corresponds to the current boundaries of the licensed project, which includes both the LPSF and the PLNP site. Figures 1.3 and 1.4 show the current project APE.

1.3 Report and Project Personnel

This report contains sections detailing the results of background research on the environmental, prehistoric and historic contexts of the project areas; the research designs, methods and results of the historical resources survey; the research design, methods and results of the archaeological survey; NRHP eligibility evaluations of all historical and archaeological resources identified during the survey, including determinations of effect; and recommendations regarding cultural resource management planning measures that Consumers and DTE may choose to implement as environmental commitments for the FERC relicensure process.

Numerous key personnel contributed to the completion of the historical and archaeological surveys as well as this report. Dr. Robert Chidester, RPA, served as MSG's Project Manager as well as the Principal Investigator and Field Director for the archaeological survey. Dr. Chidester was assisted during the archaeological survey by Crew Chief Phillip Bauschard and archaeological technicians Jay Baril, Lars Boyd, C. Lorin Brace VI, Samuel Burns, Adam Darkow, Elizabeth Hickle, Douglas Lewis, Michael Millman, Katrina Newburn, Kathryn Peliska, Kaitlyn Roberts, Emily Powell, and Hannelore Willeck. Mr. Bauschard completed laboratory processing of artifacts recovered during the survey as well as identification, cataloging, and analysis of prehistoric artifacts; Dr. Chidester completed the identification, cataloging, and analysis of historic artifacts. Maura Johnson, M.A., served as the Principal Investigator for the historical resources survey. She conducted background research on local historic contexts as well as the history of the LPSF, and she conducted the survey of historic properties in and around the project areas. She was assisted in these tasks by Mr. Daniel Hershberger. Dr. Chidester and Ms. Johnson are the primary authors of this report, with assistance from Mr. Bauschard and Mr. Hershberger. Bryan Agosti, M.S., served as MSG's GIS specialist and created a GIS database for this project. Mr. Agosti, Kate Hayfield, B.A., and Mr. Bauschard created the graphics for this report. William Rutter, M.A., M.S., served as MSG's senior Quality Assurance / Quality Control reviewer for the project. Report formatting and production were completed by Ms. Victoria Rodriguez.

Figure 1.1 Project Location, LPSF Project Area

Figure 1.2 Project Location, Pigeon Lake North Pier Project Area

Figure 1.3 Project Boundary and APE, LPSF Project Area

Figure 1.4 Project Boundary and APE, Pigeon Lake North Pier Project Area

2.0 BACKGROUND RESEARCH

2.1 Environmental Contexts

Before proceeding to a discussion of cultural contexts and the literature review of previously recorded archaeological and historic sites in the vicinity of the project areas, this section will discuss the environmental contexts of Mason and Ottawa counties. This discussion includes physiography and glacial geology, climate, biotic zones, and soil types located within the project areas.

At its fullest extent, the Laurentide Ice Sheet of the Wisconsin Glaciation covered all of Michigan and the Great Lakes Area (Dorr and Eschman 1970; Farrand and Eschman 1974; Flint 1971:477-478). The glacier finally retreated from Michigan around 12,000 to 10,000 years ago (Flint 1971:492). As the glaciers retreated, melting runoff water formed outwash and till plains as well as Tundra and Park Tundra biotic zones. Spruce forest eventually replaced the Tundra and then ultimately yielded to coniferous and hardwood forests (Fitting 1975; Flint 1971). With the return of animals such as barren-ground caribou and mammoth to the grasslands at the boundary of the glacier, Paleo-Indians began to enter the region from the south to exploit the migrating herds (Kapp 1999; Shott and Wright 1999).

The Lake Michigan lobe of the Wisconsin glacial ice sheet is responsible for much of the modern physiography of Mason County. Five primary land features are present – moraines, till plains, outwash plains, lake plains, and drainageways. The rolling to steep Lake Border morainic system begins in the southwestern corner of the county and runs northeast, and is bordered by gently rolling till plains. Sandy lake plains dominate the western part of the county, where winds coming off of Lake Michigan have resulted in numerous rolling dune formations. The east-central portion of the county, in contrast, is characterized by nearly level to gently rolling outwash plains. Numerous streams have dissected the landscape throughout the county, resulting in steep ravines in some places. Today, Mason County is characterized by a moderate climate with localized variations due to the proximity of Lake Michigan and changes in topography. The average temperature in winter is 24.2 °F, while in the summer it is 68.5 °F. Total annual precipitation averages 31.86 inches, with the majority (17.52 inches) falling between April and September. The average winter snowfall is 82.8 inches (Johnson 1995:2-3, 252).

Similar to Mason County, the modern physiography of Ottawa County is primarily the result of the Wisconsin glacialiation. A layer of glacial drift that ranges from less than 100 feet to over 300 feet in thickness covers the entire county. Three primary topographic divisions are present: a low-lying sandy plain that occupies the western half of the county (representing the bed of glacial Lake Chicago), gently sloping to hilly upland in the southeastern quarter of the county, and gently sloping to rolling upland plain in the northeastern quarter of the county. Today, Ottawa County is characterized by a moderate climate that is heavily influenced by Lake Michigan. Extreme temperatures are rare. Spring often comes late due to a chilling effect on the air caused by the cold lake water, and at the same time, the warming of the lake during the summer results in a later on-set of cold weather in the fall. Average temperatures range from 19.5 °F – 31.6 °F in January to 61.2 °F – 80.1 °F in July. More than half (57%) of annual precipitation falls from April – September, with total annual precipitation averaging 31.58 inches. The average annual snowfall is 66 inches, although this number varies widely from year to year (Pregitzer 1972:135-136).

The current project areas are located in the transition zone between the Carolinian and Canadian biotic provinces. Mammalian populations native to the Carolinian province at the time of European contact included opossum, raccoon, striped skunk, gray fox, bobcat, gray squirrel, southern flying squirrel, pine mole, cottontail rabbit, and white-tailed deer (Mason 1981). Avian groups native to the Carolinian biotic province included the wild turkey, red-shouldered hawk, barred owl, vulture, redheaded woodpecker, passenger pigeon, woodthrush, and cardinal (Cleland 1966). The Carolinian biotic province is also characterized by mixed deciduous forest, including oak, hickory, basswood, walnut, ash and similar species (Shane 1994).

Mammalian species common in the Canadian biotic province include the star-nosed mole, multiple species of shrew, multiple bat species, black bear, raccoon, marten, fisher, mink, short- and long-tailed weasels, wolverine, otter, striped skunk, red fox, timber wolf, Canada lynx, woodchuck, chipmunk, chickaree, flying squirrel, beaver, deer-mouse, bog-lemming, two species of vole, two species of jumping mouse, muskrat, porcupine, snowshoe hare, white-tailed deer, and moose. Many of these species that range over the entire Canadian biotic province also range into the Hudsonian biotic province to the north and/or the Carolinian biotic province to the south; however, the particular assemblage of mammalian species in the Canadian biotic province is distinct from the Hudsonian and Carolinian mammalian assemblages. A northern hardwood climax characterizes the vegetation of the Canadian biotic province, with common tree species including the sugar maple, yellow birch, eastern white pine, eastern hemlock, and beech (Dice 1938).

The project areas are characterized by a variety of soils with differing compositions, textures, and drainage properties (Figures 2.1-2.2; Tables 2.1-2.2). These properties can generally be correlated with the likely presence of archaeological resources. Poorly drained soils, for instance, generally retain a low probability for archaeological resources since they are frequently inundated with water and are otherwise uninhabitable. Well-drained soils generally retain a higher probability for archaeological resources since they would have proffered a relatively dry habitation space. Different combinations of soil types within an area can also be useful for predicting the likely existence of archaeological resources. Well-drained hummocks, for instance, often contain archaeological resources when in proximity to poorly-drained soils, and may have been preferred locations for prehistoric hunter-gatherers due to the diversity in faunal and floral taxa that are characteristic of wetland or estuarine environments.

One environmental aspect of the LPSF Project Area bears particular mention. The eastern shoreline of Lake Michigan is well known for its sand dune formations, and indeed some particularly impressive dunes are located in Ludington State Park, approximately 11 km (7 mi) north of the LPSF. Both eroding bluff faces and stabilized dune formations are present within the LPSF project boundary. Typical of dune landscapes south of the so-called isostatic "hinge line," dunes within the project area appear primarily as closely spaced, overlapping ridges. Natural processes associated with dune formation have the ability to bury archaeological sites quite deeply within dunes. The likelihood that buried archaeological strata are present within any given dune formation, however, is dependent on a number of interrelated factors, including fluctuations in the water level in Lake Michigan, concomitant changes in resource variability and abundance, post-formation processes that contribute to dune erosion and/or deflation (e.g., post-glacial isostatic rebound), etc. The first major period of dune formation in the Lake Michigan basin began ca. 3500 B.P., meaning that buried archaeological sites are most likely to date to the Woodland period (see Section 2.2 below). One recent study identified just one buried dune site older than the Late Woodland in the entire region from Petoskey in the north to Muskegon in the south. This same study suggested that south of Petoskey, "Rather than being buried and stratified by sheet sand deposition, [archaeological sites] are found either as constrained pockets in swales behind foredunes ... or as remnants on the slip faces or backslopes of larger dunes at highly variable elevations" (Lovis et al. 2012:109).

Table 2.1 Soil Types within the LPSF Project Area

Soil Name	Map Symbol	Slope (%)	Drainage	Landform(s)	Acres	% of Project Area
Beaches	1	0-3	Poorly to Moderately Well Drained	Broad, flat areas adjacent to Lake Michigan	24.08	1.54%
Udorthents and Udipsamments	5F	Very steep	N/A	Escarpments or Lake Bluffs adjacent to Lake Michigan	7.39	0.47%
Remus fine sandy loam	16B	1-6	Well Drained	Moraines	0.95	0.06%
Remus fine sandy loam	16C	6-12	Well Drained	Moraines	13.59	0.87%
Remus fine sandy loam	16D	12-18	Well Drained	Moraines	4.38	0.28%
Boyer loamy sand	31C	6-12	Well Drained	Outwash Plains, Moraines	3.65	0.23%
Remus-Spinks complex	38C	6-12	Well Drained	Moraines	14.69	0.94%
Spinks-Coloma sands	47B	0-6	Well to Excessively Drained	Outwash Plains, Moraines	4.04	0.26%
Spinks-Coloma sands	47C	6-12	Well to Excessively Drained	Outwash Plains, Moraines	55.30	3.54%
Spinks-Coloma sands	47D	12-18	Well to Excessively Drained	Outwash Plains, Moraines	41.85	2.68%
Spinks-Coloma sands	47E	18-40	Well to Excessively Drained	Moraines	28.82	1.85%
Grattan sand	57E	18-35	Excessively Drained	Moraines	12.70	0.81%
Nordhouse fine sand	62D	3-18	Excessively Drained	Dunes	0.03	0.00%
Udipsamments, nearly level and gently sloping	88B	0-6	Excessively Drained	Lake Plains, Outwash Plains	3.55	0.23%
Udorthents, loamy, nearly level to rolling	89D	0-18	Somewhat Poorly to Well Drained	Till Plains	151.83	9.73%
Udorthents, loamy, very steep	89F	35-50	Well Drained	Manmade Escarpments	414.00	26.54%
Water	W	N/A	N/A	N/A	779.20	49.95%

Table 2.2 Soil Types within the Pigeon Lake North Pier Project Area

Soil Name	Map Symbol	Slope (%)	Drainage	Landform(s)	Acres	% of Project Area
Blown-out land	BoF	6-50	N/A	Open Sandy Areas, Sand Dunes adjacent to Lake Michigan	0.42	28.21%
Deer Park sand	DpF	18-45	Well Drained	Dunes, Beach Ridges	0.39	26.44%
Kalkaska sand	KaC	0-12	Well Drained	Outwash Plains, Lake Plains	0.01	0.93%
Lake beaches	Lb	N/A	N/A	Adjacent to Lake Michigan, Inland Bodies of Water	0.64	43.49%
Water	W	N/A	N/A	N/A	0.01	0.94%

Figure 2.1 Soil Types within the LPSF Project Area

Figure 2.2 Soil Types within the Pigeon Lake North Pier Project Area

2.2 Prehistoric Contexts

The prehistoric occupation of Michigan is generally divided into three broad periods: Paleo-Indian, Archaic and Woodland. The Paleo-Indian period encompasses the cultural remains of the earliest recorded occupations of the region, after about 12,000 B. P., during early postglacial times. The Archaic is identified by archaeologists as the period where more localized seasonal settlement and subsistence patterns replaced the broad seasonal migration patterns of the Paleo-Indian period. The innovation of ceramic technology and the emergence of cultigens generally identify the transition to the Woodland time period.

2.2.1 Paleoindian Period (ca. 12,000-10,000 B.P.)

Early occupants of the region would have encountered a boreal grassland/spruce parkland environment that harbored migratory barren-ground caribou and bison as well as larger Pleistocene mega-fauna species such as mastodon, mammoth and musk oxen (Fitting 1975; Ogden 1977). These early human inhabitants, referred to as Paleo-Indians, were nomadic groups comprised of small kin-based bands that primarily practiced a focalized subsistence strategy. Current research suggests that these Paleo-Indian bands repetitively moved within a circumscribed geographic range to intercept large herd animals during their migratory cycles (Gramly 1988; Stothers 1996). Over time, the focus likely shifted from large-scale hunting expeditions to a more regular procurement of game accompanied by a decrease in the overall size of territory exploited by these groups (Shott and Wright 1999).

Paleo-Indian sites are most easily recognized in the archaeological record by the presence of fluted spear-points. Five types of Paleo-Indian fluted biface have been identified in Michigan: Enterline, Gainey, Barnes, Crowfield, and Holcombe (Shott and Wright 1999).

2.2.2 Archaic Period (ca. 10,000-3,000 B.P.)

Environmental changes marked the beginning of the Archaic period. The Great Lakes began to retreat and approach modern day levels and the mega-fauna population was continuing to decrease. In response, populations developed new subsistence regimens in order to adapt to the changing environments created by the shifting lake levels. The wide seasonal migration routes of Paleo-Indian 'founder' populations were gradually replaced by an increasingly more localized seasonal subsistence strategy during the Archaic time period (Stothers 1996; Fitting 1975). The Archaic time period is roughly placed between 10,000 B.P. and 3,000 B.P. (Fitting 1975:61; Shott 1999:72). The Archaic is further divided into the Early Archaic (10,000-8000 B.P.), Middle Archaic (8000-5000 B.P.), and Late Archaic (5000-3000 B.P.).

The Early Archaic time period (10,000-8000 B.P.) is often identified in the archaeological record by the transformation from large, lanceolate bifaces of Paleo-Indian assemblages to smaller, notched and bifurcated bifaces. These bifaces are temporally distinctive and have consequently been interpreted in terms of various biface style-horizons. In the northern lower peninsula, the Early Archaic is divided into the Plano Horizon and the Kirk Horizon.

The Plano Horizon (10,000-9500 B.P.) is represented by two biface types, Agate Basin and Eden-Scottsbluff (Shott 1989). While only a few Agate Basin sites are known in Michigan, the Samels Field site located on Skegemog Point (Cleland and Ruggles 1996) near Traverse City has yielded Agate Basin bifaces among other Early Archaic biface types. The Kirk Horizon (10,000 to 8000 B.P.) is represented by several stemmed and notched biface types, including Kirk Corner Notched, Kirk Stemmed, St. Albans, Le Croy and Kanawha (Shott 1999).

This transformation in tool technology (lanceolate to stemmed/notched) has been interpreted as an adaptive response in subsistence strategies, which had been altered as a result of the extinction of most megafauna. Populations were still highly mobile, but were exploiting a greater number of resources such as small animals, nuts and fish (Munson 1988; Neusius 1986). A great deal remains unknown about the Early Archaic period in Michigan. Certainly, the changing environment played an important role in both the settlement and subsistence systems of the inhabitants. Although few Early Archaic sites have been investigated in Michigan, this is likely due to the fact that lake levels were lower at that time than they are today. Therefore, it is probable that many Early Archaic sites exist on the old shorelines, but are currently underneath the Great Lakes (Shott 1999).

Like the Early Archaic, the Middle Archaic period (8000-5000 B.P.) in Michigan is not well defined (Lovis 1999). However, this period is generally considered to have been characterized by intensified procurement of seasonally available resources, visible in the archaeological record by a variety of ground and polished stone tools and artifacts suited to harvesting resources. Settlements also appear to have been more focused toward the exploitation of seasonal resources such as nuts, wild grains, fish and deer (Ellis et al. 1990; Stothers et al. 2001). In the Great Lakes region, the Middle Archaic time period is represented by several side-notched variants of Matanzas, Raddatz and Otter Creek projectile points (Robertson 1989).

The Late Archaic period (5000-3000 B.P.) represents the first period during which populations relied on modern vegetative communities in Michigan (Roberston et al. 1999). Although the increased number of Late Archaic sites over previous periods has been interpreted as a substantial population increase, it is likely that the high levels of the Great Lakes may be partially responsible for the disparity. During the Early and Middle Archaic, lake levels were low compared to present-day levels, and therefore, it is likely that these sites are now submerged. During the Late Archaic, lake levels were higher than current levels and therefore the sites are not submerged. The Late Archaic is also characterized as the initial period of intensive interaction and trade with widespread regions of North America. The settlement system indicates larger and more permanent occupations, at which exploitation of resources used in earlier times was supplemented by the emergence of the first cultigens (Ford 1977). The Late Archaic settlement patterns also included large seasonal band aggregation for activities such as harvesting the spring fish runs. This seasonal aggregation also facilitated group ceremonial and mortuary activities for Late Archaic and Early Woodland populations.

2.2.3 Woodland Period (ca. 3,000-350 B.P.)

The Woodland period in Michigan prehistory is noteworthy for the cultural efflorescence that occurred. It was during the Woodland period that Native Americans in this region made the shifts from a seasonal aggregation-dispersal mode of settlement and a foraging mode of subsistence to a sedentary, agricultural lifeway. Cultural complexity exploded, as illustrated by the appearance of the Hopewellian and Mississippian cultures (both migrating from the south) as well as the further development of local cultural traditions. Technology also changed considerably, as the first ceramic technology was developed and stemmed (rather than notched) projectile points appeared. By the end of the Woodland Period, Michigan was home to a mosaic of cultural traditions.

The Early Woodland period in Michigan dates to approximately 3000-2000 B.P. Archaeologists have generally identified the division between Late Archaic and Early Woodland material culture by the advent of distinctive, cordmarked ceramics. Some theories suggest that the initial purpose of pottery was to boil and process nuts, thus altering the basic subsistence regimen of the Late Archaic period even further (Ozker 1977). However, it is important to note that the introduction of ceramics into Michigan did not occur simultaneously in all areas. Ceramics appear in southern Michigan earlier than in the northern part of the state. Certain stemmed and side-notched projectile point styles also carry over from the Late Archaic. Research suggests that innovations that are typically associated with the Archaic/Woodland transition do not appear simultaneously across Michigan, nor are they derived from a single source (Garland and Beld 1999). Although a transition between periods cannot simply be defined by one attribute characteristic, ceramic vessels remain a useful marker for the Early Woodland period.

The settlement pattern during the Early Woodland period appears to have been a seasonal pattern of aggregation during the warmer months with dispersal to small camps in the colder months. Other aspects of material culture include stemmed projectile points, chert scrapers and drills, bone harpoons, and various copper implements reminiscent of the "Old Copper Culture." Early Woodland pottery has been discovered at sites in central and western Michigan, including types such as Marion Thick (Helman 1950) and Schultz Thick (Fischer 1972).

The Middle Woodland period (2000-1600 B.P.) in Michigan is dynamic in that groups associated with the Hopewellian cultural system existed alongside various "non-Hopewellian" groups. Research suggests that the development of the Norton Tradition of west-central Michigan was due to an influx of Hopewellian peoples into the area. Evidence suggesting a gradual shift from Early Woodland to Hopewellian attributes is limited. Kingsley (1999) argues that Middle Woodland Hopewell appears abruptly and fully developed at 10 B.C. at the Norton Mounds Site. This is contrary to the Saginaw Tradition in the eastern part of the state, where Hopewellian attributes tend to appear inconsistently and incompletely, reflecting a diffusion of Hopewellian ideas rather than a migration of Hopewellian peoples.

Although the distribution of sites and population of the Norton Tradition groups is not entirely clear, some patterns are evident. There appear to be relatively few Middle Woodland Hopewell sites in Michigan. When present, Norton Tradition sites tend to focus around riverine environments. Population numbers also appear to be lower when compared to Illinois Hopewell. Kingsley (1981) argues that the relative lack of sites suggests a settlement pattern focused on reoccupation of the same sites over a long period of time. This may be supported by the fact that while Hopewell mound groups are more rare in Michigan, they tend to be more extensive than Hopewell mound groups in Illinois (Kingsley 1999). Also, the scarcity of Norton Tradition sites in Michigan may be explained by the nature of resource availability along the western Michigan river valleys. When compared to the more extensive, mature drainage systems of Illinois, resource availability along the Muskegon River valley is irregularly distributed (Kingsley 1999).

Norton Tradition mortuary practices reflect typical Hopewellian characteristics. Burial mounds were built, and the individuals were typically buried with various types of grave goods. Prestige goods such as decorated Hopewell pottery, copper goods, beads and turtle carapace bowls and utilitarian materials such as bone awls and chipped stone are some example of these funerary items. The presence of prestige goods in funerary contexts suggests some level of social organization and status; however, evidence for a complex ranking system is not present (Kingsley 1999).

In contrast with the Middle Woodland Hopewellian groups in this part of Michigan, archaeologists understand relatively little about the non-Hopewellian groups. Although the non-Hopewellian Western Basin Tradition of southeastern Michigan has been subject to study (Stothers 1975), archaeologists understand less about non-Hopewellian groups in the northern half of the Lower Peninsula. Generally, many of these groups are described as living an as yet unrecognized lifestyle that is essentially a continuation of the Late Archaic-Early Woodland (Kingsley 1999).

The Late Woodland period (1600-350 B.P.) in Michigan was characterized by substantial cultural change. In western Michigan, the Late Woodland is characterized by the Spring Creek Tradition. The local ceramic tradition during this period is known as Spring Creek Ware, which was made in the Muskegon and Grand River Valleys. Similarities between this ware and other southern lower peninsula wares (i.e., Allegan Ware in the Kalamazoo Valley and Western Basin Tradition ceramics of southeastern Michigan) indicate that populations interacted with each other in these areas (Holman and Brashler 1999).

The Late Woodland in the extreme northeastern Lower Peninsula reflects variation in ceramic traditions. In the Straits of Mackinac archaeologists have recorded sequential regional ceramic sequences such as Mackinac Phase (1150-950 B.P.), Bois Blanc Phase (950-650 B.P.), and Juntunen Phase (650-350 B.P.) (Fitting 1975; McPherron 1967). The Upper Buff Creek Site (20AA128) in Alcona County reflects evidence for groups from Saginaw Valley in this part of the state (Holman and Brashler 1999).

Mortuary treatment at this time generally lacked the elaborate grave goods that were the hallmark of the Late Archaic through Middle Woodland periods. The construction of conical mounds and extensive ossuary pits are still evident, however, at some sites in the northern portion of the lower peninsula. One example of this elaborate mortuary practice is the Juntunen site, which exhibited five ossuary pits with several examples of dismemberment and skull plaque removal (McPherron 1967).

Late Woodland groups tended to utilize a broad spectrum food procurement strategy, relying on foods such as fish, deer, mussels, turtles, berries and other riverine resources. Previous research suggests that Spring Creek Tradition peoples participated in a seasonal round which involved summer encampments at the mouth of the Muskegon River and hunting camps in the interior headwater regions during the winter season (Hambacher and Holman 1995). The summer aggregation was used to exchange goods and to maintain social relationships to secure against times of scarce resources. This exchange was represented in the trade of Norwood and Bayport cherts (Brashler et al. 2000; Holman and Brashler 1999). Another aspect of this seasonal round in west-central Michigan was the use of subterranean cache pits. Assuming an analog with recorded early historic Native American use of such features, these pits were likely used to store surplus foodstuffs, hides, and equipment. Cache pits are sometimes found in association with seasonal residential sites, but are often located independently along seasonal travel routes, in areas where seasonal resources were abundant and faunal and floral habitat zones overlapped. Some cache pit sites have been recorded that contain dozens of emptied pits (Holman and Krist 2001).

In the later part of the Late Woodland period (after A. D. 1000) a greater heterogeneity of ceramic styles indicates that intergroup interaction decreased. There is also little evidence for the exchange of Norwood and Bayport chert types (Holman and Brashler 1999). It has been suggested that the Late Woodland sequence along the Muskegon River was disturbed either ca. A.D. 1200 by groups from the east or later, ca. A.D. 1400, by Upper Mississippian peoples from the southwest (Brashler et al. 2000). This disturbance is supported by the appearance of "Iroquois-like" pottery attributes in the ceramic assemblage (Holman and Brashler 1999).

2.3 Historic Contexts

Since formal archaeological survey was not conducted within the Pigeon Lake North Pier project area in Ottawa County, the discussion below focuses exclusively on historic contexts relevant to the LPSF project area in Mason County.

2.3.1 Mason County

The area of western Michigan was originally ceded to the newly independent United States by the British after their defeat in the Revolutionary War. The area was considered part of the larger Northwest Territories until it became part of the Indiana Territory in 1800. Five years later, the Michigan Territory was formed. In 1837, when Michigan became the nation's 26th state, the lands to the north of Grand Haven were collectively called Ottawa County, owing to the native population (Dunbar and May 1995).

Prior to the establishment of the Territories, the area around present-day Ludington was known as Nin-de-be-ka-tun-ning, an Ottawa name meaning the "place of skulls," and the Pere Marquette River was named Not-a-pe-ka-gon, which translates to, "the river with head on sticks." The origin of these names can be traced back to an Indian battle in which a band of Pottawatomies traveling up the eastern shore of Lake Michigan came upon an encampment of Ottawas. In the battle that ensued, the Ottawas were wiped out. To commemorate their victory, the invading Pottawatomies placed the severed heads of their victims on poles which were then stuck in the sand along the river banks and lake shore (Strohpaal n.d.).

These descriptive but gruesome names would be used until replaced by ones with a more positive association to Father Jacques Marquette (also known as James Marquette and Père Marquette). Marquette, a French Jesuit missionary, was sent to the New World in 1666. In 1668, he built a church at Sault Ste. Marie, thus establishing the first permanent European settlement in the lands that would eventually become the Upper Peninsula of Michigan. By 1671 he had established a mission in St. Ignace, on the southern shores of the same peninsula (Biography.com Editors 2015). In 1673, Marquette embarked on an expedition to explore the great trading route the natives called Messipi, or "the Great Water." While the expedition's main purpose was to further trade for New France (now Canada), Marquette's purpose was one of "a voyage of discovery" to spread the word of God among the native peoples (Mason County Business Guide [MCBG] 1933). Within the first year the expedition made it to and traveled down the Mississippi River as far as the mouth of the Arkansas River (Biography.com Editors 2015).

Upon returning to Lake Michigan via the Illinois, Des Plaines and Chicago rivers, Marquette travelled up the western shore to stay at Green Bay in an effort to restore his health, which had been significantly compromised during the expedition. By the fall of the following year, Marquette began a trek south again, intending to reach the Kaskasia Indian settlement located along the banks of the Illinois River near present-day Utica, Illinois. This journey was cut short due to his poor health, and he and two other Frenchmen rode out a severe winter in a cabin on the banks of the Chicago River. In the spring of 1675, Marquette finally reached the Kaskasia, where he would deliver what was to be his final sermon (Sawyers 1989).

As his health was continuing to deteriorate and he wished to see his mission at St. Ignace one last time, Marquette set out on a journey to return to his home in northern Michigan. En route, his illness grew and as the party reached the area where Not-a-pe-ka-gon (the river with heads on sticks) flowed into Lake Michigan, Marquette asked to go ashore. After a day or two there, he passed away on May 18, 1675, and was buried on the bank of the river. The following year, a group of Ottawa Indians moved the remains to finally be buried at the mission in St. Ignace (MCBG 1933).

An important historical figure and a beloved missionary, Père Marquette has been memorialized throughout the region. Many towns and parks have been named Marquette in his honor, and a Jesuit university in Milwaukee bears his name. Perhaps one of the more significant memorials, though, was the renaming of the river which empties into Lake Michigan where he died. In addition to the river, there is still a lake and township called Pere Marquette in the immediate area. The settlement that would eventually become the city of Ludington was also originally called Père Marquette, but it was renamed after the successful 19th-century industrialist James Ludington, who was instrumental in developing the city itself as well as the early lumber industry in the area (MCBG 1933).

The first appearance of white settlers in Mason County dates to 1840, when Joseph L. Wheeler entered a portion of the lakefront of Pere Marquette Lake. In 1844, John H. Harris entered a 37-acre tract in the area of Free Soil Mills. Three years later, Joseph Boyden entered another tract on Pere Marquette Lake, this one comprised of 72 acres. Also in 1847, Charles Mears established ownership of land in the area that would become known as Lincoln, located north of the lake (Page 1882:7).

While various white men had visited the Pere Marquette area to hunt, fish and trade with the Indians, and there was one mill established for a brief period of time at Free Soil Mills, the first permanent white settlement was established in Mason County in 1847. Burr Caswell first traveled to the area from Illinois in 1845 to engage in fishing and trapping. Two years later, he and his family of a wife and two boys and two girls settled in the Pere Marquette area and in 1849, Caswell constructed the first frame house in the county on his farm. Caswell lived on the farm until the death of his wife in 1870. He then moved into Pere Marquette, where he supervised a shingle mill for a time and eventually was the lighthouse keeper at Big Sable Point from 1874-1882 (Page 1882:9).

The area's primary attraction was the abundance of white pine timber standing in northern Michigan and the economic potential it represented. As forests in the eastern states were becoming depleted, lumbermen turned their attention to this region. Charles Mears investigated possible mill sites along the shores of Lake Michigan as early as 1838. George Farnsworth did the same in 1844, and in the same year Lt. John W. Gunnison conducted an official shoreline survey in the area. Sawmills were soon established in the area. On the northern end of Pere Marquette Lake, a new sawmill was constructed by the firm of Baird and Bean in 1849. George Farnsworth acquired Baird's interest in the enterprise in 1851 and in 1854 the mill was owned by George W. Ford. Funds to purchase the mill were loaned to Ford by Milwaukee businessman and entrepreneur James Ludington. When Ford defaulted on the loan in 1859, Ludington took over the mill's operation. Thus began his development of the town that would eventually bear his name. Additionally, mills were constructed by Charles Mears at Little Sable in 1851 and Big Sable in 1854. These two settlements were renamed Lincoln and Hamlin in 1861, a patriotic gesture in honor of the newly elected President and Vice President of the United States. As the timber was so plentiful, the lumber trade continued to develop. By 1873, when the city of Ludington was incorporated, there were seven mills in operation (Cabot 2005).

Mason County was organized by an act of the Michigan Legislature in 1855. On April 2 of that year, the first county election was held. Mason County's first judge was also its first settler, as Burr Caswell was elected Judge of Probate and Fish Inspector. The first board of supervisors met in October, 1855 at Little Sable and a decision was made to locate the county seat on the "northwest quarter of the southeast quarter of Section 27, Town 18, north of Range 18 west." This location was on the Caswell farm, and a frame building there served as the courthouse (Page 1882:10).

The county was originally organized with just three townships: Freesoil, Au Sauble (or Lincoln) and Pere Marquette. In the ensuing years spanning from 1859 to 1909, thirteen additional townships were organized in the county. As previously noted, the County Seat was located at the Caswell farm from 1855-1861. It was then moved to Lincoln Village, a move precipitated by the power of the voting block formed by the men who worked at Charles Mears' sawmill there. This arrangement proved to be unsatisfactory and in 1873 the Mason County Seat was finally established at Ludington (Mason County Historical Society [MCHS] 1978-1979).

As Mason County was formed, its primary industries were lumbering, fishing and farming. The competitive nature of the lumbering industry in Mason County, particularly around Pere Marquette, set the stage for a "clash of the titans" in the 1860s. Eber Brock Ward, then considered the richest man in Michigan, had vast industrial holdings throughout Michigan, northern Ohio and in some western states, including interests in mining, steel mills, timberland and shipbuilding. He also owned 70,000 acres of timberland adjacent to the Pere Marquette River. As president of the Flint and Pere Marquette Railroad, in 1868 he opened negotiations to acquire property for a rail terminal with frontage on Pere Marquette Lake. James Ludington, suspecting that Ward would also use a portion of the property to construct a sawmill in competition with Ludington's own mill, refused to sell any property to Ward. Ludington's refusal also cloaked a tactic to force Ward to sell off some of his timber, as he had no easy way to ship it out of the area. Ward also refused to sell any property to Ludington (Cabot 2005:16).

The following year, Ward received word that his rival, Ludington, had illegally cut pine from portions of his timberland near Pere Marquette. Ward took no immediate action, instead waiting to have Ludington arrested once he had traveled to Detroit on other business. The charges were timber theft and trespassing, and the surprised Ludington landed in the Wayne County jail. In the subsequent hearing, Ward won a court judgement of \$650,000 against Ludington, who then suffered a stroke. Later that year, Ward was able to reach an amicable settlement with the Pere Marquette Lumber Company, Ludington's successor in the business (Cabot 2005:17).

Even though James Ludington experienced this apparent lapse of judgement and suffered major consequences, both monetary and health-related, his legacy lives on in the city which bears his name. After George W. Ford defaulted on the loan, James Ludington took over the mill whose purchase he had financed in 1859 and assumed a leading role in the development of the village of Pere Marquette. The first post office for the village was established in 1864 within the store at the sawmill. In 1866, in order to provide housing for the growing workforce at the mill, the Filer House was constructed. The following year, Ludington constructed a large commercial building to house his general store, called "The Big Store," supplying a variety of goods to his mill hands and other village residents. One of the first newspapers in the area, the *Mason County Record*, was founded by Ludington in 1867. Also in 1867, Ludington platted the village of Pere Marquette (MCHS 1980).

The original sawmill operation which brought James Ludington to Pere Marquette developed into the Pere Marquette Lumber Company. In 1869, around the same time as his legal struggle with E. B. Ward, Ludington sold his Pere Marquette properties (including 25,000 acres of pine forest, unsold village lots, and the mills) to the company for a total sum of \$ 500,000, making him a very wealthy man. While it appeared that he may have been finished with the lumbering industry in Pere Marquette, he was not finished with his work on behalf of the village. James Ludington continued to contribute a portion of his wealth to the development of the village. He brought in a railroad and funded road and bridge building projects, and proved to be instrumental in securing government support for improvements to the harbor. James Street and Ludington Avenue were named for him, while many other streets have been named for his sisters and other family members, though Ludington himself never married. In 1873, the village of Pere Marquette became the incorporated City of Ludington (Advantage Marketing & Publications [AMP] 2014).

In the 1870s, the city of Ludington continued to see mill construction, only to witness their closures by the last years of the 19th century. The first mill constructed on Pere Marquette Lake (in 1849) passed into the hands of the Pere Marquette Lumber Company as James Ludington sold his area properties. That mill burned in 1874, to be replaced by a larger operation which was in operation until 1897. The second mill constructed within Ludington was built in 1869-1870 by Danaher and Melendy, with James Ludington as a silent partner. That enterprise closed in 1902. E.B. Ward, though originally blocked by the tactics of James Ludington, finally was able to extend his industrial empire into the Ludington area in the 1870s. In 1870, Ward constructed his North Mill, which would come to be Ludington's last operating mill when it closed in 1917. In 1872 he constructed his South Mill, which fell victim to the economic depression of 1893. The mill was about to be dismantled in 1895 when it was destroyed by fire (Cabot 2005:22-23).

Industrial development continued, with several other mills being constructed. In 1872 the firm of George W. Roby and Company constructed a new mill near the Danaher and Melandy site, with the mill operation built well out into the lake using deposits of sawdust and other scrap to fill the area between the mill and the banks of the lake. The south side of the lake also saw new construction as two more mills were established there in 1872. Additionally, shingle mills were established around the lake, and The Pere Marquette Boom Company was formed to facilitate moving the cut logs from the river to the various mills (Page 1882:52). As the supply of standing lumber nearer the mills and the waterways was depleted, logging railroads were soon established (Cabot 2005:31).

In addition to lumbering interests and operations, the Ludington area would also see the related industry of useful objects made of wood established in the late 19th and early 20th centuries. The Ludington Woodenware Company made everything from wooden bowls to clothespins to butter molds; The Pierce Manufacturing Company produced wood-handled brooms and brushes; and the firm of Cartier, Chapman, and Company originally manufactured wagons and sleighs, later producing wood lawn and porch furniture (Cabot 2005:25-27). As an adjunct to the lumber industry, the Ludington area also saw the development of the salt manufacturing industry. In 1881, oil drillers working in Manistee County, located immediately north of Mason County, failed to locate oil but instead discovered a substantial underground salt bed (Schaetzl and McWain n.d.). Eventually other brine (saltwater) wells were drilled in the region and salt manufacture became a byproduct of the lumber industry in Ludington. In fact, many of the larger lumber concerns also engaged in the manufacture of salt. The Pere Marquette Lumber Company erected its own salt manufacturing plant (sometimes commonly known as a "salt block") in 1885, the city's first (Cabot 2005:22). The main reason the manufacture of salt was tied directly to the lumber industry is that the early process of kettle evaporation used the waste products of the sawmills; the sawdust, edgings and other scrap were the cheap and plentiful fuel used to provide the heat to evaporate the water, leaving only the salt behind (Schaetzl and McWain n.d.).

Owing to its location on Lake Michigan, Ludington also developed as a major Great Lakes shipping and transportation center. As the lumber industry grew in the second half of the 19th century, the means to get the product to market also developed. In December 1874, the Flint and Pere Marquette Railroad finally was completed into Ludington. Founded in 1857, over the next seven years, the line was extended section by section across central Michigan. Under the direction of its president, E.B. Ward, the Ludington terminal was completed, even though initial negotiations between Ward and James Ludington broke down in 1868, followed by legal entanglements in 1869 (see above). Unfortunately, Ward only oversaw the operation of the Ludington terminal for about one month, as he suddenly died on January 2, 1875 (Ivey 1919).

The Flint and Pere Marquette Railroad would then be led by Jesse Hoyt of New York, who had extensive lumber and salt holdings on the eastern side of Michigan. By May 1875, the Great Lakes shipping extension of the railroad began with a leased sidewheel steamer running from the docks at Ludington to Sheboygan, Wisconsin. The route was then shifted to Milwaukee, and was run under contract with the Goodrich Transportation Company. That contract ended in 1883, as the Flint and Pere Marquette Railroad began operating their own ships from Ludington to Milwaukee in 1882, to Manistee in 1884, and later to Manitowoc, Wisconsin in 1890. Even with the decline of lumbering in the region in the late 19th century and the subsequent decline in the rail shipment of logs, the shipping operations' earnings continued to grow, as the ships transported wood products, flour and grain (Ivey 1919).

In 1897, the Flint and Pere Marquette Railroad established their Great Lakes railway car ferry line running from Ludington to Manitowoc. The world's first all-steel car ferry, the *Pere Marquette*, allowed fully loaded railcars to be brought into the ship's hold, using tracks running up to the edge of the dock and meeting up with tracks permanently installed on the ship (Ivey 1919). The success of this car ferry led to the creation of a fleet of ferries, essentially establishing a continuous rail line across the lake. Eventually, the ferries would carry passengers, cars and trucks; Ludington grew to be the largest car ferry port in the world by the mid-1950s. As transportation patterns changed, the highway system improved, and freight movement shifted from railroads to over-the-road trucks, however, the fleet dwindled. Today, the last remnant of this historic line is still operating a vehicle and passenger service using the *SS Badger*, a coal-fired ferry listed on the National Register of Historic Places in 2009 (AMP 2015a).

As the lumbering era boom years wound down in the first decades of the 20th century, agriculture would gain prominence in Mason County. In particular, the Mason County area became known for its fruit production. A 1918 publication, *Western Michigan – "The Land of Fruit and Fortune,"* in its "Statistical View of Western Michigan" noted that Mason County possessed 315,526.87 acres, of which 171,295 acres of land were in farms. It went on to say, "All kinds of farming are carried on successfully. In several townships some of the best fruit farms in the state are to be found." Elsewhere in the publication, a photograph depicted an orchard in Summit Township with towering peach trees, the caption noting that the trees were 20 years old (thus planted in 1898) (Western Michigan Development Bureau [WMDB] 1918:30-36).

The favorable conditions for agriculture, especially fruit trees, are tied to the county's proximity to Lake Michigan. The lake offers protection from harsh winter blizzards and moderates the temperature a few degrees warmer than the areas across the lake in Wisconsin. Additionally, a heavy blanket of snow (offering an insulating layer to growing crops and young fruit trees) arrives early in December and stays until late March, when the danger of a hard frost has passed. The cold water of Lake Michigan also protects the crops from any early April warm-up and spring budding (WMDB 1918:28).

Mason County's growth in the 20th century can also be attributed to its location along major corridors of transportation. As noted earlier, the Flint and Pere Market Railroad's western terminus was in Mason County, at the docks in Ludington. That line was extended across Lake Michigan by the car ferries operated by the railroad. A major north-south trunk line highway also ran through the county, as the West Michigan Pike (which was also a branch of the Dixie Highway) hugged the shoreline (WMDB 1918:11). A later highway development, U.S. Route 31, is now the major north-south corridor in the region, following roughly the same route but further inland. Another major highway, U.S. Route 10 (designated in 1926), connects Ludington to the state's largest city, Detroit. In fact, U.S. Route 10 does not end in Ludington; the route continues on to Manitowoc, Wisconsin using the car ferry as a designated route/link across Lake Michigan (Bessert 2015).

The Ludington Harbor continues to be a viable and very active shipping link on the Great Lakes. First established under the authority of the Federal Rivers and Harbors Act of 1867, it is still a significant receiving port for such commodities as limestone, sand, gravel, slag and salts, averaging 567,792 tons of cargo per year in the period 2004-2008 (U.S. Army Corp of Engineers n.d.). It also serves as the home port of the S.S. Badger (NRHP 2009), and the Ludington Station of the United States Coast Guard is found within the harbor. Mason County is also in relative proximity to several major Midwestern population centers: 240 miles to Chicago; 251 miles to Detroit; 325 miles to Indianapolis; and 396 miles to Cleveland. Access to these markets, along with a developed transportation network, contributed to the growth of the area in the 19th and 20th centuries.

All these factors led to the transformation of Mason County from its 19th-century origins as a lumber capital, to an agricultural region and shipping center in the 20th century, to popular recreation area in the decades following the 1980s. Where there were once numerous sawmills surrounding Pere Marquette Lake, there are now upscale condominium developments, the city's municipal marina, another private marina, and a waterfront park complete with playground equipment, a picnic pavilion, and an amphitheater. The marinas attract numerous pleasure craft boaters throughout the season and one of the condominium complexes operates its own marina for its residents. Year-round recreational opportunities abound throughout the county, including hunting, fishing and camping. While Mason County still has a strong agricultural component, especially in the townships, a significant portion of its economic activity is now tied to tourism (AMP 2015b).

2.3.1.1 Pere Marquette Township

One of the three original townships when Mason County was organized in 1855, Pere Marquette possesses a majority of the early, important historic sites of the county. It was on the banks of the Pere Marquette River, which runs through the northern portion of the township, where the beloved missionary Father Père Marquette died and was first buried. The first permanent white settlement was made by Burr Caswell on the lands immediately south of the Pere Marquette Lake and River. The first county seat was on the Caswell farm. It was in this township that the first farms of Mason County were located (Page 1882:70).

Early residents included Richard Hatfield, who first arrived at Pere Marquette in 1850, working the winter at the mill. In 1854 he married Mary Caswell, daughter of the original settler. Hatfield had boarded at the Caswell homestead and worked on that farm until he purchased his own land, totaling 80 acres, in 1855. The land was originally covered with an Indian "sugar bush." In October of 1855 he constructed a log house on the property, which in turn would be replaced by a frame structure, completed in 1872. He continued to develop his farm, planting fruit trees. Soon he was known for both the quality and quantity of fruit he produced and his farm was considered to be one of the best in the entire county (Page 1882:70).

Some of the earliest burial grounds in the area are located within the boundaries of Pere Marquette Township. In addition to the Indian burial grounds that were located within the township, the Phillips Cemetery was established in 1866 along South Lakeshore Drive, on a portion of land that was part of the original Jeremiah Phillips farm. Phillips was one of the area's earliest settlers, coming in 1849. Even though the cemetery had not been used for a number of years, the last burial took place when Dora (Phillips) Hull was laid to rest in 1935. Dora, daughter of Jeremiah, was a nine year old child when the Phillips family settled in the township, and it was at her special request that she was buried in the pioneer cemetery (MCHS 1982:9).

Originally, the channel which allowed the waters of Pere Marquette Lake to flow into Lake Michigan was located in the southern portion of the peninsula that separates the two bodies of water. In 1860, Charles Mears and his men relocated the channel to the northern end of the peninsula. It was reported that 18 feet of sunken timbers had to be removed to make the channel deep enough to be a navigable waterway (MCHS 1980:336). South Lakeshore Drive, which now extends the length of the peninsula, is an extension of the oldest road in Mason County. Early maps show a plank road running south from the location of the old channel through the area first settled in the county, leading to this span of road being called The Historic Mile by some. Other roads in the area also follow historic paths; Iris Road, which today connects South Lakeshore Drive with the U.S. 31 Business Route, was originally an Indian Trail (MCHS 1978-79).

In the vicinity of the original channel, four small villages were established: Seatonville, Taylorsville, Finn Town and Buttersville, this last being the most substantial. Founded by Horace Butters in 1884, it had about 1,000 inhabitants at its peak and approximately 50 houses lined its two streets (MCHS 1980:336-337). A review of the 1904 township map clearly shows the village of Buttersville along with two tracts south of it, one owned by the Butters Lumber Company and the other the property of Horace Butters. On the peninsula to the north of the village, except for an intermediate tract which was owned by the Pere Marquette Lumber Company, the rest was shown as belonging to the Butters Salt and Lumber Company (Geo. A. Ogle & Co. 1904). The complex included a sawmill, shingle mill, cooper shop and a salt block (MCHS 1980:337). While the village no longer exists, the name lives on as there is a Buttersville Park and Campground located in the area. In addition, the Butters family owned and operated the Mason and Oceana Railroad, a relatively short (35 miles), narrow-gauge line running from the peninsula through the two counties out to Walkerville, where they ran a lumber camp. According to the 1904 map, the areas north of Pere Marquette Lake and River were serviced primarily by the Pere Marquette Railroad, while the Mason and Oceana line ran from the Butters property on the peninsula on into the township south of the river, then turning southeast into the neighboring county (Geo. A. Ogle & Co. 1904).

Ultimately, the importance of farming in this area would become overshadowed by the lumber industry built up in and around Ludington. As the abundant pine forests were depleted in the area, there would be a shift in the industry to hardwood production. Even so, as the lumber industry dominated the latter half of the 19th century, it would experience a sharp decline as the 20th century began and once again farming gained importance. In the 20th century, West Michigan became widely known for its agricultural products, particularly its fruit production (WMDB 1918).

In more recent years, Pere Marquette Township, like Mason County, has become a year-round recreational area offering hunting, fishing, boating, and camping among its numerous inland lakes, its two main rivers (the Pere Marquette River in the southern portion of the township and the Lincoln River, which serves as the northern border of the township), as well as many smaller creeks and tributaries found throughout the township. At the western edge of the township is the Lake Michigan shoreline, also an area of great recreational opportunities. Today, along with its agricultural production and a small industrial base, Pere Marquette Township counts tourism as one of its primary industries (AMP 2015b).

2.3.1.2 *Summit Township*

Summit Township is the southernmost township of Mason County. Erected in 1859, it was the first township after the original three to be organized in Mason County. Primarily an agricultural area from its inception, its earliest pioneers could develop their farms and orchards during the growing season, but could find work in the lumber mills to the north during the winters (MCHS 1978-79). The township possessed good soil and a number of small streams provided fresh water to the farms (Page 1882:71).

Early settlers included William Quevillon, Washington Weldon, and Peter LaBelle along the west shore of the township. Another early farmer was W.H. Foster, who recorded a very large 500-acre tract. Foster was the first farmer in the county to use a reaper and mower. The first settlement that occurred in Summit Township was at LaBelle's Landing which was located at the southern end of the very first Mason County Road, South Lakeshore Drive, in an area known today as Summit Park (Summit Township 2013). Originally founded by Theodore LaBelle (who came to the area in 1858), it later became known as Bortell's Landing. The Bortell family was engaged in commercial fishing as early as 1898, and today, the sixth generation of the family still operates a fish market and eatery along South Lakeshore Drive (TripAdvisor LLC 2015).

Another early pioneer who was successful in fruit production was Jerimiah Phillips. Although the Phillips name is later associated with Pere Marquette Township, the Phillips farmstead was originally located in Summit Township. Due to a boundary change in which a one-mile strip of the original Summit Township was returned to the township to the north, the Phillips land (and thus the Phillips cemetery and school) appear on Pere Marquette Township maps. Phillips first came to the area in 1849 and quickly established himself a successful fruit producer. It has been noted that when giving fruit to his neighbors, he would say, "Eat the fruit, but plant the pits and seeds" (MCHS 1978-79).

Along with farming, Summit Township also witnessed some early lumbering operations, primarily in hardwood production. The first lumber camps were established at LaBelle's Landing and on Bass Lake. In 1867, a steam driven sawmill was operated by Charles Sawyer at LaBelle's Landing. Jacob Meisenheimer and Francis Shapee also established a saw mill and basket factory, and another sawmill at Kistler's Corners was owned and operated by Jacob Houk and Sons. Another small settlement in the township was Meisenheimerville. While not a fully developed village, it was a small collection of buildings at a crossroads anchored by a store operated by Jacob Meisenheimer, who arrived in the area in 1852. There was also a church, a blacksmith shop operated by Gilbert Broder, and the fine residence of a local physician, Dr. Abott (MCHS 1980:462).

Today, Summit Township is still home to numerous fruit orchards and other farming operations. When the Consumers Power Ludington Pumped Storage Project was constructed in the late 1960s, approximately 750 acres of township farmland was taken, including the closing of three rural east-west roads (Demeter 2011:4-1). U.S. Route 31, now a modern limited-access highway, bisects the township and occupies the strip of land that separates Hopkins Lake and the Pumped Storage Project's reservoir at the township's northern border.

2.3.1.3 History and Development of the LPSF

A full history of the construction and subsequent development is contained in Demeter 2011, and only a summary will be offered here.

Consumers Power Co. began land acquisitions for the planned LPSF in the early 1960s. Approximately 1,500 acres of farmland and orchards were cleared from March-October 1969; construction began in July of that year. This first stage of construction included excavation for the penstocks, construction of the powerhouse access road, and construction of the unloading dock in Ludington Harbor and a 3.5-mile long haul road from the harbor to the LPSF. In January 1970 construction of the cofferdam began, and the powerhouse was begun in June of that year. The first section of the reservoir embankment was completed in May 1971, and major electrical construction began in June. The tailrace was flooded for the first time during the summer of 1972. The facility's six power generating units were gradually placed online over the course of 1973, and the plant was fully operational by the end of September. Restoration of the area impacted by construction was completed by the summer of 1974 (Demeter 2011:4-1 – 4-3).

Since the completion of the LPSF in 1973, only incremental changes have been made to the facility. One of the most important was the installation of a barrier net in Lake Michigan around the cofferdam/jetties and breakwall in 1996. The barrier net was installed as a result of a settlement agreement necessitated by environmental groups' concern that the LPSF was causing harm to local fish populations (Demeter 2011:4-21). In addition, Consumers facilitated the creation of several recreational facilities on Consumers-owned land, including a park and disc golf course on the northwest side of the LPSF reservoir, a remote-control model airplane flying field (Hull Field) and an RV campground on the north side of the reservoir, scenic overlooks that provide views of the LPSF reservoir and Lake Michigan, and the Pigeon Lake North Pier trail in Ottawa County.

2.4 Literature Review

For the purposes of the cultural resources literature review, two study areas were utilized – one for the LPSF Project Area and one for the PLNP Project Area. In both cases, the study area was defined as a 2.0-km (1.2-mi) buffer around the project area. The literature and data review were directed toward identifying previously recorded cultural resources and general information about the historic development of the project areas in Mason and Ottawa counties. Research was conducted at the MISHPO offices and the Library of Michigan in Lansing; at local libraries and archives in Mason County; at the Bentley Historical Library at the University of Michigan; and online. The following sources were consulted:

- National Register of Historic Places (NRHP) files
- Michigan State Register of Historic Sites (SRHS) files
- State Archaeological Site files
- Hinsdale's (1931) *Archaeological Atlas of Michigan* and the W.B. Hinsdale Papers
- Cultural Resource Management reports
- County atlases
- Historic high-altitude aerial photographs

Results of the literature review for the two study areas are described separately below and are presented graphically in Figures 2.3 and 2.4. Details about previously recorded cultural resources within the study areas are presented in tabular form in Appendix B.

Figure 2.3 Literature Review Results, LPSF Project Area

Figure 2.4 Literature Review Results, Pigeon Lake North Pier Project Area

2.4.1 LPSF Study Area

National Register of Historic Places

According to the MISHPO files, no individual properties or districts listed on or eligible for the NRHP are present within the LPSF study area. However, Consumers contracted with CCRG to perform a historic assessment of the LPSF (Demeter: 2011). As a result of their investigations, CCRG recommended that the LPS facility is eligible for listing in the National Register of Historic Places (NRHP) under Criteria A, C and D, and Criteria Consideration G. In a letter dated February 21, 2012, the Deputy State Historic Preservation Officer concurred with CCRG's recommendation of eligibility. These documents were provided to MSG by Consumers at the project outset.

Michigan State Register of Historic Sites

No properties listed on the Michigan SRHS are present within the LPSF study area.

State Archaeological Site Files

A total of 17 archaeological sites have been recorded within the LPSF study area. These include 13 prehistoric sites (including short-term camp and habitation sites, cache pits sites, a burial mound, a village, and several sites of unknown function) and four historic-period sites (including a historic Native American site of unknown function and three sites associated with Euro-American farmsteads / homesteads). Among the prehistoric sites, Late Archaic and Woodland components have been identified but the majority of the sites are undated. Six of the 17 total sites have been determined by the MISHPO to be ineligible for the NRHP; the remaining 11 sites have not been formally evaluated for eligibility.

Of particular interest are two sites (20MN48 [a prehistoric camp] and 20MN49 [a prehistoric habitation]) that are shown in the MISHPO records to be located within the current LPSF survey area. These sites are depicted adjacent to each other within the area now occupied by the penstocks, and the state site files note that both sites are ineligible for the NRHP because they have been destroyed (see Appendix D, Photo 70). The site files also note that the site locations are based on the University of Michigan Museum of Anthropology (UMMA) site files (both sites) and the Hinsdale (1931) atlas (20MN49 only). As discussed below, the recorded locations of these two sites may be erroneous.

Hinsdale's (1931) Archaeological Atlas of Michigan

Hinsdale's (1931) *Archaeological Atlas of Michigan* represents a compilation of sites throughout Michigan which had been, or currently are, associated with prehistoric mounds, earthwork enclosures, petroglyphs, burials, or villages. The atlas only references location, however, and does not provide much detail about the archaeological components themselves. Furthermore, these sites were largely reported by local informants and most have never been field-verified by professional archaeologists, and therefore their exact locations are often unknown.

The Hinsdale atlas does not depict any sites within the LPSF study area (Appendix A, Figure A1). The nearest site shown on the map for Mason County is a mound located at the intersection of modern-day Pere Marquette Highway and Iris Road, nearly 2 km to the north. However, as mentioned above, the state archaeological site record for 20MN49 indicates that the recorded location of this site (within the penstock area of the LPSF facility) is based on the Hinsdale atlas. In an attempt to figure out why this erroneous reference is listed on the site record, the Principal Investigator contacted Dr. John O'Shea, Curator of the Great Lakes Range at the UMMA, to ask if the UMMA had any records of either 20MN48 or 20MN49. His response was that the UMMA's site files also referenced Hinsdale's atlas, with no further elaboration on either site (O'Shea, pers. com. 2015).

A further attempt to solve this mystery was made by viewing the W.B. Hinsdale Papers, curated at the Bentley Historical Library at the University of Michigan in Ann Arbor. Several references to Mason County were located in these files. The first consists of an entry in a handwritten, undated notebook in which Hinsdale briefly recorded that Mr. F. B. Olney of Ludington had showed him the sand bluffs at Buttersville. The subsequent entry in the notebook discusses several possible mounds, although the ambiguous notes appear to refer to sites in Eden Township ("Archaeology Notebooks – Undated," Box 4, W. B. Hinsdale Papers [WBHP], Bentley Historical Library [BHL], University of Michigan, Ann Arbor [UM]). The second reference consists of a typed letter from Hinsdale to Mr. C. E. Kistler of Ludington dated October 14, 1926. In this letter, Hinsdale mentioned having visited Ludington a few months prior (most likely the visit mentioned in the undated notebook) and thanking Kistler for his assistance. Hinsdale then requested that Kistler mark up a county map that Hinsdale had sent him with site locations, "because we are about to commence mapping that section of the state for our archaeological (sic) reports" ("Topical Files: Michigan – Sites, 1924-31 and Undated," Box 4, WBHP, BHL, UM). A third reference consists of a series of typed letters dated during the late spring and summer of 1927, between Hinsdale and Mason County Probate Judge Clark Jagger. The original topic had been Hinsdale's questionnaire to county officials requesting information about the modern Native American population in each of Michigan's counties. However, in his response Jagger mentioned that he was a close friend of Clarence Kistler's and hoped that Hinsdale would visit Mason County again that summer. Although several letters between the two men discuss their plans for the visit, no documentation of the visit itself could be found in Hinsdale's papers ("Writing: Distribution of the Aboriginal Population in Michigan – Questionnaire Responses, 1927-1935," Box 2-A, WBHP, BHL, UM).

Finally, Hinsdale's original site "forms" for Mason County – typed on 3" x 5" note cards – were examined. Hinsdale recorded a total of 10 sites in Mason County in this way, including one enclosure, four habitation sites, and five mounds/cemeteries. One site was originally recorded as being located in Summit Township, although this location is marked out in pencil and replaced by Riverton Township. One site is recorded in Section 25 of Summit Township, and is specifically noted as being located at the northern tip of Bass Lake. The remaining sites are recorded in Custer, Eden, Hamlin, Pere Marquette, and Riverton townships ("Michigan Site Files – Mason County," Box 5, WBHP, BHL, UM). All 10 site cards contain specific locational information that rule out the possibility that a later UMMA employee misinterpreted the locations of these sites, instead placing them in the locations of 20MN48 and 20MN49.

Given the lack of information on 20MN48 and 20MN49 despite extensive research, these sites must be considered "ghost" sites. It is certainly possible that Hinsdale had additional site cards for Mason County that failed to be preserved, and it is likewise possible (although seemingly unlikely) that two of the ten sites whose original records have been preserved were accidentally mapped in the wrong location, either by a UMMA staffer or by the former Office of the State Archaeologist. Regardless, if these sites did exist in the currently mapped locations, they were obliterated by the construction of the LPSF from 1969-1972.

Cultural Resource Management Reports

Six previous cultural resource investigations have been conducted within the LPSF study area. These include five Phase I archaeological surveys and one Phase II archaeological site evaluation. These surveys are summarized here in annotated form.

- Andrews, Wesley. 2006. *Phase I Archaeological Investigations of Verizon Wireless Site No. 731/Pentwater North, 5211 Meisenheimer Road, Summit Township, Mason County.* Report submitted to TES Consultants, P.C. by Andrews Cultural Resources.

In 2006 Wesley Andrews of Andrews Cultural Resources submitted to TES Consultants, P.C., a Phase I archaeological investigation on behalf of Verizon Wireless for the proposed placement of a cellular tower at 5211 Meisenheimer Road, Summit Township, Mason County, Michigan. The 100-ft by 100-ft tower pad location was shovel tested at 10-m intervals and yielded one historic ceramic sherd. This isolated artifact was not designated as a site.

- Day, Grant L. 2014. *Phase I Archaeological Survey of Approximately 0.19 Acres, for New Cabin Sites in the Mason County Campground Located within the Ludington Pumped Storage Plant Area, Pere Marquette Township, Mason County, Michigan*. Report submitted to Consumers Energy Company by Commonwealth Cultural Resources Group, Inc.

In 2014 Grant Day of CCRG submitted to Consumers Energy the results of a Phase I archaeological investigation of a proposed cabin development area within the Mason County Campground, located in the NW ¼ NE ¼ SW ¼ SE ¼ of Section 35 in Township 18N, Range 18W, Pere Marquette Township, Mason County, Michigan. The literature review did not identify any cultural resources previously reported within the project area, and the survey failed to identify any archaeological sites. No further work was recommended as a result of the investigation.

- Dunham, Sean B. 2013. *Phase I Archaeological Survey of Approximately 35 Acres, Ludington Pumped Storage Plant, Pere Marquette Township, Mason County, Michigan*. Report submitted to Consumers Energy Company by Commonwealth Cultural Resources Group, Inc.

In 2013 Sean B. Dunham of CCRG submitted to Consumers Energy the results of a Phase I investigation of a 35-acre area slated to be removed from the Ludington Pumped Storage Plant federally-permitted project area. The area, located within the SW ¼ SW ¼ of Section 35 in Township 18N, Range 18W, Pere Marquette Township, Mason County, Michigan, was found to have no previously reported cultural resources within it. The Phase I investigation did not identify any new cultural resources within the project area. No further work was recommended as a result of the investigation.

- Dunham, Sean B. and Christopher T. Espenshade. 2013. *Phase I Archaeological Survey of Approximately 95 Acres, Ludington Pumped Storage Plant, Summit Township, Mason County, Michigan*. Report submitted to Consumers Energy Company by Commonwealth Cultural Resources Group, Inc.

In 2013, Sean B. Dunham and Christopher T. Espenshade submitted to Consumers Energy the results of a Phase I archaeological investigation of a 95-acre area within the boundaries of the Ludington Pumped Storage Plant federally permitted project area. The 95-acre parcel was slated to be removed from the federally-permitted project area. The project area is located within the NW ¼ SW ¼ SW ¼ NW ¼ and the NW ¼ NW ¼ of Section 13 as well as the SE ¼ NE ¼ of Section 14 of Township 17N, Range 18W in Summit Township, Mason County, Michigan. The survey resulted in the identification of two archaeological sites, namely 20MN308 and 20MN309. Site 20MN308 was identified within [text removed] consists of a roughly 30-ft by 30-ft foundation and two associated small depressions as well as a small surface scatter of historic materials. The authors suggest that this foundation was of a structure likely utilitarian in nature, and is most likely associated with 20MN98. The site appears to be associated with the Marshall family and

dates between 1900 and the 1920s. Because the site no longer retains the associated residential structure, is poorly preserved, and the scatter of associated cultural materials is sparse, the site was found to be ineligible for the NRHP and therefore no further work was recommended by the investigators. Site 20MN309 consists of two depressions [text removed] It was determined that it was unlikely that these depressions represent residential structures. Their location proximal to an apple orchard lead the investigators to believe that the presumed structures were used for storage associated with orchard farming. However, the site could not be linked to a specific residential or agricultural structure(s) and was therefore found not to be eligible for the NRHP. For both cultural resource sites identified in this study, the authors recommended no further work.

- Flanders, Richard E. and William Szten. 1981. *Phase II Site Examination of 20MN98 in Summit Township (T17N R18W), Mason County, Michigan*. Report submitted to the Michigan Department of Transportation by Grand Valley State Colleges.

In 1981 Richard E. Flanders and William Szten conducted a Phase II investigation of a historic site in Summit Township of Mason County, Michigan, located within Township 17N, Range 18W [text removed]. The site was originally recorded by MSU during a survey of the then-proposed U.S. Highway 31. The site is visible in aerial photography as a rectangular depression located in an apple orchard. The depression itself measured 40 ft by 25 ft in dimension and was reported as 5 ft deep at its center. Shovel testing revealed patches of decaying concrete. Artifacts recovered from these tests included a section of a stove pipe and canning supplies. There was no evidence reported for structural debris or outbuildings in the vicinity of the depression. The site is reported to have a date following 1930 and may have been used as a storage building associated with the apple orchard or nearby gravel operations. The investigators recommended no further investigation of the site.

- Lovis, William A. 1978. *An Archaeological Survey of the Proposed US-31 Freeway, Mason County, Michigan: Washington Road to US-10*. Michigan State University Museum Archaeological Survey Report No. 29. Report submitted to the Michigan State Highway Commission by the Michigan State University Museum.

In 1978 William A. Lovis of Michigan State University conducted an archaeological survey of the then-proposed U.S. Route 31 highway for the Michigan State Highway Commission. The survey was conducted within the proposed right-of-way of what would be U.S. Highway 31 from the Mason County line northward to the then-existing U.S. Highway 10. No previous archaeological finds were reported within the right-of-way. However, seven isolated finds and two areas of potential cultural sensitivity were identified within and adjacent to the right-of-way as a result of Lovis's survey. The author reports that six of the seven isolated find locations were pre-contact lithic debitage finds that were determined not to warrant additional investigation or protection. The seventh isolated find was determined to date to the early 20th century and was also deemed ineligible for the NRHP. Of the two sensitive zones, the first could not be relocated and the second area was recommended for avoidance, although the specific locations of these zones were not provided in the report.

County Atlases and Historic Topographic Maps

City and county atlases, plat maps, local histories, and historic topographic maps were examined during the literature and records review. Such documents disclose early patterns of land use for a given area, helping to shed light on previous geographical distributions of farmsteads, industries,

cemeteries, and other structural elements of human occupation. These documents are key to understanding the historical landscape of the survey area and, to some degree, allow for the prediction of the locations of archaeological or historical remains within it.

The 1904 (Geo. A. Ogle & Co.) atlas maps of Pere Marquette and Summit townships (Appendix A, Figures A2-A3) depict a largely rural landscape, with the exception of the town of Ludington and several resort communities around the Lake Michigan shoreline and inland lakes. Outside of these areas, most rural parcels ranged from 30-80 acres in size, with a few larger parcels (up to 280 acres) scattered throughout. The modern road grid had already been established, and several rail lines ran into Ludington from the east and north. Structures (primarily farm houses and schools) were located along the major thoroughfares. Few changes are visible on the 1915 (Standard Map Co.) atlas maps (Appendix A, Figures A4-A5). Several modern paved roads had been constructed, and the largest parcels had been subdivided, but otherwise the area retained its rural character. The trend toward the subdivision of land continued to be evident on the 1930 plat maps of Pere Marquette and Summit townships (Hixson 1930a), as few parcels then exceeded 40 acres in size (Appendix A, Figures A6-A7).

By 1961 numerous areas immediately surrounding Ludington, along the Lake Michigan shoreline, and around Bass Lake in southern Summit Township had been platted into small tracts (Rockford Map Publishers 1961). The 1966 plat maps of the townships show that large tracts of land had already been purchased by Consumers Power Company (the predecessor to Consumers Energy) in the area that would become the LPSF (Rockford Map Publishers 1966). The plat maps from 1961 and 1966 as well as plat maps from 1969 and 1975 (Rockford Map Publishers 1969, 1975) depict continuing subdivision of rural parcels and the growth of areas platted into small tracts, as large-scale agriculture ceded some of its dominance to other economic activities (Appendix A, Figures A9-A16).

Aerial Photographs

Similar to historic maps, high-altitude aerial photographs (which are generally available for periods after ca. 1935) can provide valuable information on more recent landscape changes and modern disturbances within a given area. For this project, aerial photographs dating from 1953, 1977, 1984, 1993, 1998, 2005, 2009, and 2014 (HIG 2015a) were examined (Appendix A, Figures A17-A24).

The aerial photograph from 1953 shows numerous large, cultivated tracts of land throughout the vicinity of the LPSF project area, interspersed with sizable woodlots. Small orchards are visible primarily between the LPSF reservoir and Hopkins Lake to the east, as well as in the Summit Township portion of the current project area. The next oldest aerial photograph that could be obtained is from 1977, by which time the LPSF had been constructed. The cultivated fields had largely disappeared by this time, although orchard agriculture appears to have increased slightly around the margins of the LPSF. The construction of U.S. Highway 31 between the LPSF reservoir and Hopkins Lake in the 1980s also significantly impacted the local landscape (HIG 2015a).

2.4.2 Pigeon Lake North Pier Study Area

National Register of Historic Places

No individual properties or districts listed in or eligible for the NRHP are present within the Pigeon Lake North Pier study area.

Michigan State Register of Historic Sites

No properties listed on the Michigan SRHS are present within the Pigeon Lake North Pier study area.

State Archaeological Site Files

No archaeological sites have been recorded within the Pigeon Lake North Pier study area.

Hinsdale's (1931) Archaeological Atlas of Michigan

The Hinsdale atlas does not depict any sites within the Pigeon Lake North Pier study area (Appendix A, Figure A25).

Cultural Resource Management Reports

Three previous cultural resource investigations have been conducted within the Pigeon Lake North Pier study area, all of them being Phase I archaeological surveys. These surveys are summarized here in annotated form.

- Stillwell, Larry N. 2005. *An Archaeological Field Reconnaissance of a Proposed Cellular Phone Tower (Project #050661) in Port Sheldon, Ottawa County, Michigan*. Report submitted to G2 Consulting Group by Archaeological Consultants of Ossian.

In 2005 Larry N. Stillwell of Archaeological Consultants of Ossian submitted to G2 Consulting Group an archaeological field reconnaissance of a proposed cellular tower to be located in Port Sheldon, Ottawa County, Michigan. The survey covered a total of .06 acres, which included the 50-ft by 50-ft tower pad. No cultural resources were identified as a result of this survey.

- Weir, Donald J., Wesley L. Andrews, C. Stephan Demeter, and Mary L. Jeakle. 1993. *Phase I Archaeological Survey of the Proposed Campbell Ash Pond Expansion and 345 kV Line Relocation, Holland, Michigan*. Report submitted to Consumers Power Company by Commonwealth Cultural Resources Group, Inc.

In 1993 Donald J. Weir, Wesley L. Andrews, C. Stephan Demeter, and Mary L. Jeakle submitted to Consumers Energy a Phase I archaeological survey of the proposed Campbell Ash Pond Expansion, located in [text removed], Ottawa County, Michigan. No previously recorded sites were identified in initial research for this study. A single site, a prehistoric lithic scatter, was identified during the survey, and therefore rerouting of the project's powerline was recommended. A second site, originally recorded by Commonwealth Cultural Resources in 1980, was located within the project area but could not be relocated during the 1993 investigation.

- Weir, Donald J., C. Stephan Demeter, and Curtis E. Larsen. 1980. *Cultural Resource Management Assessment Study of Eight Candidate Power Plant Sites*. Commonwealth Cultural Resources Group, Inc.

In 1980, Donald J. Weir, C. Stephan Demeter, and Curtis E. Larson conducted a cultural resource management assessment study of multiple potential power plant sites in Michigan. The Campbell plant site study produced only one site, a sparse scatter of blocky lithic debris.

County Atlases and Historic Topographic Maps

City and county atlases, plat maps, local histories, and historic topographic maps were examined during the literature and records review. Such documents disclose early patterns of land use for a given area, helping to shed light on previous geographical distributions of farmsteads, industries, cemeteries, and other structural elements of human occupation. These documents are key to understanding the historical landscape of the survey area and, to some degree, allow for the prediction of the locations of archaeological or historical remains within it.

Prior to 1924, the area that is now Port Sheldon Township was a part of Olive Township (Port Sheldon Township 2015). The 1864 (Gross) atlas map of Olive Township (Appendix A, Figure A26) indicates that the area was sparsely settled at that time, with large, apparently empty areas. A road passing northwest-southeast through township sections 4, 10, 15, 22, 26 and 35 is visible; this road does not correspond to any modern roads. The 1876 (H. Belden & Co.) township atlas depicts a modern road grid along with increased population. Agricultural parcels ranging from 40 to 320 acres in size were common, with numerous quarter-section parcels still uninhabited. Structures (farm houses and schools) were primarily located along major thoroughfares (Appendix A, Figure A27). By 1912 (Geo. A. Ogle & Co.) the township had filled in considerably and a noticeable trend toward land subdivision had begun. No unclaimed parcels remained, and the majority of parcels ranged from 40-80 acres in size. Numerous smaller parcels lined the Lake Michigan shoreline, including small platted tracts around the western end of Pigeon Lake (Appendix A, Figure A28). The 1930 plat map, the first published after Port Sheldon Township's separation from Olive Township, depicts a landscape similar to that of 1912 (Hixson 1930b; Appendix A, Figure A29).

By 1955 two major changes were apparent in Port Sheldon Township. First, Lakeshore Drive and Butternut Drive had been incorporated into the state highway system, and second, a reverse trend of land consolidation is visible as numerous parcels are shown as belonging to the federal government (Rockford Map Publishers 1955). By 1976 (Rockford Map Publishers) these parcels had been sold off to various entities, including the Kiwanis Club, Ottawa County, and Consumers Power Company. In addition, many of the former 40- and 80-acre parcels in Port Sheldon Township had been further subdivided into 20-30-acre parcels (Appendix A, Figure A31).

Aerial Photographs

Similar to historic maps, high-altitude aerial photographs (which are generally available for periods after ca. 1935) can provide valuable information on more recent landscape changes and modern disturbances within a given area. For this project, aerial photographs dating from 1956, 1969, 1992, 1997, 2005, 2009, and 2014 (HIG 2015b) were examined (Appendix A, Figures A32-A38).

The 1956 aerial photograph depicts a lightly developed area, with lakefront cottages to the north of the PLNP Project Area and dense woods surrounding Pigeon Lake. By 1969, marina development had begun along the southern shore of Pigeon Lake and Consumers Power Company had begun construction of its J.H. Campbell Generating Complex, including the north and south piers extending far out into Lake Michigan. Extensive residential development along the Lake Michigan shoreline and marina development around the Pigeon Lake shoreline was visible by 1992, including the Pigeon Lake North Pier boardwalk and trail (HIG 2015b).

3.0 HISTORIC RESOURCES SURVEY

This section of the report describes the research design and methodology used to identify historic/architectural resources within the recommended project APE, and the results of the survey. All work was performed by a professionally qualified architectural historian (36 CFR Part 61) according to the Secretary of the Interior's *Standards and Guidelines for Archaeology and Historic Preservation* (48 FR 44716-44740) and related professional standards.

3.1 Research Design

The background research and historic context prepared by MSG provided a general framework for understanding what types of cultural resources might be present in the study area. Consumers also provided us with copies of all correspondence associated with the current LPSP, previous determinations of NRHP eligibility, and reports on previous surveys in the project area. For historic/architectural investigations, the most relevant of these was an historic assessment of the LPSF that was prepared by CCRG in June 2011 (Demeter 2011) as part of a proposed license amendment for equipment upgrades to the LPSP. CCRG's report was submitted to the MISHPO in August 2011, with a recommendation for eligibility under Criteria A, C, D and Criteria Consideration G. In February 2012, the Michigan SHPO concurred with CCRG's recommendation of eligibility, which constitutes a formal determination at the state level.

3.2 Survey Methods

The field survey was conducted by Maura Johnson and Daniel Hershberger on August 10-11, 2015. Field reconnaissance included all aboveground properties within the project APE, including those previously surveyed. David McIntosh, Senior Licensing Engineer for Consumers, provided the survey team access to secure areas within the facility. The focus of these investigations was primarily structural; no mechanical, electrical or generating equipment/controls were included in the survey. With that exception, all buildings and structures in or adjoining the APE were photographed, clearly depicting the appearance and distinguishing attributes of the resource, along with views of the surrounding area sufficient to provide a visual context. Photos were located on field maps and relevant attributes of the survey properties were recorded.

The recommended APE shown in Figures 1.3 and 1.4 was used as the basis for historic/architectural investigations. The APE encompasses the entire project boundary, which is defined by FERC as "a complete unit of improvement or development" that consists of all dams, reservoirs, other engineered structures, as well as property rights in lands and waters that are necessary for the construction, operation, and maintenance of a project. In this case, the project boundary includes the 1,500-acre LPSF property as well as the 1.8-acre Pigeon Lake North Pier site, which are both part of the LPSP re-licensing.

3.3 Survey Results

The history/architecture survey documented all aboveground properties within the project APE. All but two of those properties – the Mason County Campground (including Hull Airfield) and Pigeon Lake North Pier – were included in the 2011 CCRG report. Rather than duplicate the extensive historical and descriptive data about previously recorded features/sites that was presented in that report, our goal was to document the current condition and integrity of those features/sites, and to document any other historic/architectural resources not previously recorded that may be affected by the current LPSP. Photographs of the survey properties are included in Appendix C and E, and a brief description of each feature is presented below. For purposes of comparison, the descriptions follow the sequence used in Section 4.2 (Physical Plant Description) of the CCRG report.

3.3.1 Upper reservoir

The upper reservoir has a surface area of 842 acres, and is contained within clay lined earthen walls that are an average height of 109 feet above the original ground level. The embankment measures approximately 5.7 miles in perimeter and is topped by a 20-foot-wide paved road. Materials for the embankment foundation were taken from the penstock excavation, which began in July 1969. To eliminate seepage, the clay and asphalt liners in the reservoir have been routinely and substantially repaired. These repairs are not visible above water level, and do not negatively impact any aspect of the structure's historic integrity.

At the northwest end of the reservoir is a six-bay concrete intake structure, topped by intake gate hoist buildings (for dewatering), two mechanical/electrical buildings, a gantry crane, and a metal through-truss bridge, which provides access from the perimeter walls to the intake structure. Construction of the intake bridge structure began September 1972. All work necessary for the initial pumping into the reservoir was completed by October 1972 (Demeter 2011:4-3). Aside from the addition and replacement of monitoring equipment (not observable), the intake structure appears to be otherwise unaltered since 2011, according to facility records.

3.3.2 Penstocks

Between the upper reservoir and powerhouse are six steel penstocks. The penstocks are enclosed pipes whose function is to carry water to and from the reservoir. The penstocks are encased in concrete beneath the reservoir embankment. Excavation for the penstocks began in July 1969 and by September 1972 they were in partial operation. The penstocks are enclosed structures and were therefore not directly observed for this survey. According to Consumer records, no major alterations to the penstocks have occurred since 2011.

3.3.3 Powerhouse

At the base of the embankment along the Lake Michigan shoreline is the powerhouse and pump-generating equipment. The powerhouse is a six-bay concrete structure that is 105 feet tall at maximum height, standing about 20 feet above water level. Construction of the powerhouse began in October 1970, after cofferdams were constructed at the lakefront and unwatering was completed. No major alterations to the powerhouse have occurred since 2011.

From the west face of the powerhouse, the tailrace apron extends 193 feet into the lake, with concrete and riprap cofferdam/jetties on the north and south sides of the apron. A 1,700-foot rubble breakwall parallels the powerhouse face to the west. Completed in 1972, the tailrace area is enclosed by a 2.5-mile long seasonal barrier net that is anchored to the lake bottom, one of the largest of its kind in the world. The barrier net is required as a condition of a 1996 settlement agreement for fish protection purposes. For this survey, the tailrace features were observed at a distance, from the powerhouse yard or Vista Point. Since 2011, metal pilings were added to the seawalls and an existing boat dock at the base of the southern jetty was rebuilt to facilitate barge landing to receive the new runners and stator parts for the starter motors (scheduled for refurbishing). In 2012 the MISHPO determined that the boat dock alterations – one of 19 work items itemized under a Project Plan for upgrades to the LPSF – would have no adverse effect on the NRHP-eligible hydroelectric facility.

On the downstream side of the powerhouse there are three levels below grade, including the operating floor (which contains the control room), the cooling water gallery, and the compressor gallery. On the upstream side is the electrical gallery. Six pump-turbine/motor-generator units in the powerhouse operate in three modes, and are controlled semi-automatically. Testing of the first generating unit started in October 1972 (Demeter 2011:4-2). Commercial operation of the last unit

began in October 1973. Each unit has been overhauled once since construction (between 1987 and 1996); all are scheduled for upgrade by 2019.

On the powerhouse yard are several buildings/structures: three reinforced concrete structures along the west edge containing HVAC equipment and elevator/stair access to the galleries below; two gantry cranes; three transformers; a diesel generator; a poured concrete service (administration) building; a steel-framed erection bay building; two large steel fabrication shops; a two-bay garage; and a variety of temporary trailers, including an office/conference building adjacent to the service building. Since 2011, the 360-ton station gantry crane recorded by CCRG has been replaced with two new 410-ton gantry cranes; the original crane was used during construction to hoist and install generating equipment. With this change, the gantry crane rails have been extended north to meet the face of a new fabrication shop. This north fabrication shop was constructed on the site of a warehouse and two-bay garage, which dated to the initial construction of the facility. At the south end of the yard a second fabrication shop has also been added since 2011. In February 2012 the MISHPO determined that these proposed changes – the new cranes, crane rail extension, and new fabrication buildings -- would not adversely affect the integrity of the LPS plant, which appears to meet the NRHP criteria.

3.3.4 Ancillary structures

There are several non-operational ancillary structures within the project boundary. Plans for these facilities were developed by MacKenzie, Knuth, and Klein Architects, Inc. of Flint, Michigan (Demeter 2011:4-32). Elzinga & Volkers was the contractor (Demeter 2011:4-39). A modular, metal-sided guardhouse is located at the LPSF entrance on Lakeshore Drive. This building was constructed in 2011 to replace the original guardhouse, which was documented by CCRG in October 2010 and subsequently demolished. The original guardhouse was a flat-roofed brick building. Along with the new guard house, the traffic pattern in this location was changed from a single-lane entrance/exit to a double-lane entrance/exit. In 2012 the MISHPO determined that upgrading the plant entrance and guardhouse would have no adverse effect on historic properties.

Four recreational areas also fall within the project APE. On the west side of Lakeshore Drive is Vista Point, which was established during the early project construction phase to provide a safe vantage point for public viewing. A four-panel covered display is located at this site. The viewing area is surrounded by chain link fencing and is accessed via an overpass from the east side of the road, where parking is available. Also accessible from the parking lot is a Scenic Overlook on the northwest lip of the reservoir. This Japanese-inspired building has a raised poured concrete foundation and a wood frame viewing level that offers a panoramic view of the reservoir and Lake Michigan through unglazed shoji-like window frames (Demeter 2011:4-32). Vista Point and the Scenic Overlook are managed by Consumers/DTE.

At the base of the northwest embankment is the Mason County Picnic Area. The picnic area contains a shelter house that is similar in design to the Scenic Overlook pavilion, with the same pyramidal roof covered with wood shakes. In this case, the shelter house roof is supported by large textured concrete slabs. A popular disk golf course is located in the picnic area. Not included in the CCRG survey is the Mason County Campground on the north side of the APE. The campground has a new (2013) gatehouse at the entrance, and a picnic shelter, playground, and 56 lots for primitive and RV camping. At the center of the camp is a bath house with the same pyramidal shake roof with textured concrete supports seen in the picnic area shelter house and overlook pavilion. Adjoining the campground is Hull Field, an airfield managed by Twisted Stix (a remote control model aircraft club). There are no structures associated with the airfield. The picnic area and campground are owned by Consumers/DTE but managed by Mason County.

3.3.5 Pigeon Lake North Pier (PLNP)

Also under the FERC license is an off-site facility in Ottawa County, approximately 70 miles south of the LPSF. The PLNP, a 1.8 acre satellite recreation site, was created by Consumers/DTE as a condition of an environmental damage settlement in 1996. The trail is located in Port Sheldon, next to the coal-fired J.H. Campbell Generating Complex, which draws water from Pigeon Lake for cooling purposes. The trail is a 4,600-foot boardwalk and gravel path that is 56 inches wide and features a 42-inch high fence on both sides. From a 30-vehicle parking lot, it follows the northern shore of the Pigeon River and ends at the channel pier. A warm water discharge pipe runs along the pier, which helps keep the channel open from the Pigeon River to Lake Michigan. The channel piers were constructed between 1956 and 1959, and thus pre-date the recreational development. The trail and parking lot were improved in the mid-1990s. Aside from the boardwalk and fencing, no structural features associated with this site were observed or recorded. Photos of the PLNP site are in Appendix E.

4.0 ARCHAEOLOGICAL SURVEY

This section of the report includes a description of the research design and field methods employed during the archaeological reconnaissance survey to identify archaeological resources for subsequent evaluation; the laboratory methods used to analyze the material culture that was recovered; a detailed description of the results of fieldwork; and individual descriptions of each archaeological site identified during the survey.

4.1 Research Design

The research design for the archaeological survey was based on the results of the literature review and background research on environmental and cultural contexts. Prehistoric populations in Michigan can generally be characterized as practicing some combination of hunting, gathering and/or horticulture. Consequently, populations were intimately tethered to elements in the natural environment, most notably the distribution of plant and animal species, raw material sources, water resources, soil types, and landform features. Since these resources were unevenly distributed across the landscape during the prehistoric period, it is logical to assume that aboriginal subsistence and settlement systems articulated with these distributions (Cavallo and Mounier 1980:59).

Based on the known prehistory of the region and the environmental setting of the project area, the prehistoric archaeological site types most likely to be present within the survey area are short-term, single-component sites related to subsistence resource procurement or tool manufacture and/or maintenance. Since the current project area lies adjacent to Lake Michigan and since all of the non-udorthent soil types within the project area are well to excessively drained (see Table 2.1), slope takes on a greater importance in determining which areas are more likely to contain prehistoric archaeological sites. In particular, areas of less than 15% slope have the highest probability of yielding such sites.

Based on the known history of the region and the environmental setting of the project area, the historic archaeological site types most likely to be present within the survey area are sites related to agricultural activity, such as the historic farmsteads that dot the county and township roads in Pere Marquette and Summit townships. While farmstead sites in general are common throughout the Midwest, intact farmstead sites are rare. However, farmstead sites in Michigan and adjacent regions have been shown to have enormous research potential in relation to important themes in American social and economic history (i.e., Adams 1990; Baugher and Klein 2001-2002; Bedell et al. 1994; Beedle 1996; Cabak et al. 1999; Friedlander 1991; Genheimer 2003; Groover 1992, 2003, 2008; Kooiman et al. 1998; Mascia 1994; McCorvie 1987; Moffat et al. 2009; Nassaney et al. 2001; Rafferty 2000; Rogers et al. 1988; Schweikart and Coleman 2003; Stewart-Abernathy 1986; Stine 1990; Wilson 1990). Furthermore, while individual farmstead sites may not appear to have much information potential on their own, a landscape approach that considers evolving patterns of agrarian land use on a macro scale could prove to be a fruitful avenue of investigation for such sites.

4.2 Methods

4.2.1 Field Methods

The archaeological reconnaissance survey was conducted in accordance with professionally accepted standards. In areas where ground surface visibility was less than 50% (such as grassy yard areas or woodlots), 30 cm (11.8-in) diameter shovel test pits (STPs) were excavated at 15-m (49.2-ft) intervals. These STPs were excavated until culturally sterile subsoil was encountered or to a depth of 50 cm (19.7 in), whichever came first. Excavated soil was screened through ¼-in wire mesh, and recovered artifacts were bagged and labeled with the provenience. When surface artifacts or features were not present to indicate site boundaries, radial STPs were excavated at a

distance of 7.5 m (24.6 ft) in cardinal directions from positive STPs in order to delineate the size of the archaeological site. In areas where ground surface visibility was greater than 50% (such as recently plowed agricultural fields), systematic pedestrian surface survey was conducted at 10-m (32.8-ft) intervals. Locations of surface artifact concentrations were recorded using a hand-held Trimble GPS unit with sub-meter accuracy.

In addition, the entire project area was visually inspected and photographically documented. Members of the field crew took detailed notes about soil colors, textures, inclusions, stratigraphy, and other relevant information. When cultural material was identified, site boundaries were delineated and field site numbers were assigned. Not including areas that exhibit visible signs of disturbance or for which photographic evidence of disturbance during the construction of the hydropower facility exists, the project area was divided into 17 survey areas (Survey Areas A through R) in order to facilitate accurate record keeping.

4.2.2 Laboratory Methods

All cultural materials collected in the field were washed, sorted and catalogued in MSG's laboratory facility in Maumee. MSG utilizes a two-step method for washing artifacts. Artifacts are first soaked in a 40 gallon/liter aqueous Calgon solution for a minimum of 4 hours, then rinsed with clean water (Neumann and Sanford 1998). Fragile artifacts or those not suited to wet cleaning (e.g., wood or charcoal fragments, heavily rusted metal items) were dry-brushed to remove dirt. After artifacts were cleaned, they were re-bagged in 4-mil plastic ziplock bags, and the bags were labeled according to provenience.

The following is a description of the methods used by MSG to analyze the cultural materials collected from each site encountered during the Phase I survey.

4.2.2.1 Prehistoric Artifact Analysis

Lithic Artifacts

In many ways, lithic assemblages are ideal for the study of prehistoric cultures. Chert was almost universally utilized by prehistoric cultures in North America. Because the tool manufacturing process creates large amounts of lithic detritus, chert has a nearly ubiquitous presence on prehistoric sites (Meyers 1970:5). In the general vicinity of the sites, chert would have likely been gathered from either of two possible source types: primary bedded outcrops or glacial till and other secondary deposits. Several non-geological factors may also affect the availability of chert resources. These factors include seasonal differences in the accessibility of source locations and the depletion of available chert resources through continued exploitation.

Determination of chert types is based upon a macroscopic investigation of the overall properties of the chert and descriptions taken from relevant literature (e.g., DeRegnaucourt and Georgiady 1998; Justice 1987; Ritchie 1961). In cases where difficulty is encountered in identifying these varieties of chert, microscopic investigation can be used to note signature mineral or fossil inclusions present in the lithic samples. As much as possible, all lithic artifacts were identified by chert type. In cases where it was not possible to identify the type of chert, artifacts are generally assumed to have been manufactured from local pebble cherts from glacial deposits.

The classification scheme presented here seeks to order all prehistoric artifacts into groups based upon shared attributes (e.g., bifaces). These classes are broken down further into morphological classifications that seek to place artifacts in descriptive categories with a focus on the similarity of objects, if not their specific usage (e.g., projectile points). When possible, these descriptive categories are assigned to tertiary groups, which are types that have been shown to have chronological or cultural significance (e.g., Kirk Corner-Notched projectile points, which are diagnostic of the Early Archaic period). The primary artifact classes utilized here are cores, lithic debitage (which includes flakes, shatter and remnant core fragments) and tools (including projectile points, bifaces, graters, scrapers, drills, grinding stones, etc.).

Cores may be used to identify tool production (reduction) strategies employed at a site. Reduction strategies may then help to identify the mobility strategies or the distances involved (local or long-distance) in raw material procurement for lithic toolmakers (Bamforth 1986; Beck et al. 2002; Binford 1979, 1980; Nelson 1991). Cores can be identified as blade cores or flake cores based on fracture scar directionality and shape across the core surface. Blade cores are here defined as cores with a prepared platform from which long, thin, prismatic blades have been removed in a uniform direction across the core. A prismatic blade is a relatively flat flake that is at least twice as long as it is wide, with parallel sides, generally one or two dorsal ridges (creating a prismatic cross-section), and a prepared flat platform. Flake cores are defined here as cores that may or may not have prepared platforms and exhibit flake removal from multiple directions across the core. The objective pieces removed from blade cores are considered to have a high utility and are preferable in situations of gearing up in anticipation of future needs (Rasic and Andrefsky 2001), as opposed to the objective pieces removed from flake cores which are more commonly associated with production as a result of more immediate needs. Thus, analysis of core types can tell us what type(s) of objective pieces were leaving the site and, by extension, which mobility strategies were likely employed by the site's occupants: Blade cores are more likely to be associated with a long-distance mobility strategy while flake cores are more likely to be associated with a more localized, short-distance mobility strategy.

Based on specific attributes, lithic debitage can be identified as being associated with a biface reduction event or another reductive strategy. Debitage was sorted into four primary categories based upon the individual attributes of the detritus. These categories included simple flakes (including decortication flakes), complex flakes (flakes having two or more dorsal scars and/or two or more platform facets), shatter, and remnant core fragments. Additionally, statistical characterization and evaluation of the data was expressed using frequencies of characteristics (e.g., platform facet counts and preparation evidence, flake dimensions, weight, and presence of cortex). Modified flakes demonstrate specific evidence of deliberate modification or use-wear and include both retouched and utilized flakes. All flakes were both macroscopically and microscopically analyzed for evidence of lithic retouch or use-wear along the edges. Lithic debitage was then used to characterize likely manufacturing (reduction) processes at the site in terms of expedience versus preparation for anticipated future needs (e.g., expediently removed and utilized flakes or flakes produced as a byproduct of the creation of an objective piece) and, when possible, tool form(s) produced or worked on at the site as evidenced by flake debitage characteristics (e.g., biface manufacture identified through a predominance of thinning flakes) (following Odell [2003] and Andrefsky [2005]). When a tool form is inferred as the objective piece at such a site, a statement can be made regarding the intended use of the objective piece and the relationship between that function and mobility. For

example, one is more likely to associate bifacial tools with a gearing up process which is commonly associated with long distance travel, whereas simple flakes, possibly utilized, are associated with an expedient strategy wherein use of that particular material is in response to an immediate need of the manufacturer (Binford 1979; Bamforth 1986).

Analysis of lithic tools included the identification of the type of tool (e.g., projectile point, graver, scraper, drill, ground stone, etc.) and the lithic material from which the tool was fashioned. Projectile points were analyzed utilizing a synthesis of point type descriptions developed for the midwestern and northeastern United States by Ritchie (1961) and Justice (1987). By considering the intentions of the tool manufacturer, a statement can be made regarding the relationship between the manufacturer, the material type, the material source, and mobility strategy. In this way a better understanding can be gained of the manufacturer's relationship to the landscape and the surrounding environment.

Bifacial tools are defined here as lithic material with reduction scars occurring on both faces, exhibiting a thinning of parallel sides and profile shape. Note that this definition allows for the inclusion of bifacial cores as unfinished bifacial tools. Unifacial tools are defined here as lithic material with reduction scars occurring on only one face and thinning of either one or both parallel sides evidenced by relatively uniform flaking of the uniface edge or a portion of the edge. Reworking or re-sharpening of edges is identified by the presence of regularly spaced flakes superimposed on the original flake scars for either or both faces of an edge. A predominance of broken rather than whole bifacial tools may indicate that the material was part of a long-distance mobility strategy, based on the assumption that under circumstances that warrant higher curation rates (in this example, greater distance from the quarry) whole tools would be unlikely to have been discarded (Bamforth 1986). Thus, if we know roughly where the material was acquired, we can elucidate the relationship between the site location, the lithic material, and the intentions of the manufacturer. The presence of re-sharpened biface edges may be another method of determining whether a tool was part of a predominantly local or long distance strategy (Kelly 1988). Analysis of the sharpened edges of bifacial tools can be beneficial considering that a greater proportion of reworked edges has been associated with long distance, long use-life, curated strategies (Bamforth and Becker 2000).

Prehistoric Ceramics

The analysis of prehistoric ceramics is concerned with reconstructing overall vessel morphology, as well as understanding cultural or chronological markers sometimes provided by decorative motif, technique and design. MSG's analysis of ceramics utilized a type-variety analytical approach. A standard attribute analysis was conducted using attributes such as vessel or sherd size, shape, paste, interior surface treatment, exterior surface treatment and decoration. If possible, these clustered attributes were then fitted into an existing ceramic taxonomic model.

Prior to handling, all ceramics were carefully examined for residual carbon from food preparation and cooking fires. These residues, when present, are an excellent source for datable carbon for which contexts are clear. All ceramics were then examined for broken edges to check for possible refits. Attributes recorded for rimsherds included temper, rim thickness, collar height, collar thickness, interior surface treatment, exterior surface treatment, and rim and lip decoration. Body sherds were studied for surface treatment, thickness and temper.

Archaeofaunal Analysis

The study of faunal remains can shed light on prehistoric subsistence as well as the nature of the prehistoric environment. Animal bones, fish scales, mussel shells, and other faunal materials can help to determine the seasons during which a site was occupied or the functionality of a specific site. All faunal remains are analyzed using standard identification guides. These references include *Mammal Remains from Archaeological Sites* (Olsen 1964), *Mammalian Osteology* (Gilbert 1990), *Avian Osteology* (Gilbert et al. 1996), and *Fish, Amphibian and Reptile Remains from Archaeological Sites* (Olsen 1968).

4.2.2.2 *Historic Artifact Analysis*

Following the completion of initial processing, historic materials were identified according to material, method of manufacture, and function. MSG's laboratory staff first separated historic artifacts into seven broad material categories: ceramics, glass, masonry, metal, plastic, faunal, and other. Next, artifacts were sorted into subcategories within each of the material categories. They were also grouped into functional categories, which can serve as analytical tools in examining patterns such as activity areas, consumption and intensity of site use. These functional categories have been adapted by MSG from previous studies (e.g., Mansberger 1988; Rogers et al. 1988; South 1977). Both material and functional categories are discussed in this section.

Ceramics

Ceramics are one of the most temporally diagnostic artifact classes on historic-period sites. Ceramic analysis can illustrate the socio-economic status of site occupants (Miller 1980, 1991), consumption preferences (Wall 1994), and the range of some site-specific activities (such as cooking, hosting visitors, or gardening), among other things. During laboratory analysis, ceramics will initially be sorted into the following ware types: stoneware, unrefined earthenware, refined earthenware, and porcelain. Ware types are distinguished on the basis of paste color, paste texture, glaze, and decoration. The classifications and chronologies formulated by standard collectors' identification guides (e.g., Cushion 1980; Debolt 1994; Greer 2005; Ketchum 1983, 1987, and 2000; Lehner 1988; Raycraft and Raycraft 1990), as well as the academic literature (e.g., Claney 2004; Gibson 2011; Lofstrom et al. 1982; Miller 1980, 1991; Miller and Hunter 2001; Miller et al. 2000; Noël Hume 1969; Samford 1997; South 1977; Sussman 1977, 1997), will be among the sources used to identify and date ceramic artifacts for the current project.

Glass

Prior to 1860, the glass industry was primarily unchanged and almost every piece was handmade. Glassmaking underwent a "revolution" during the second half of the 19th century, resulting in numerous identifiable temporal markers. These manufacturing characteristics and their respective temporal ranges were identified for bottle-jar, tableware, window, and miscellaneous glass. For example, a bottle or jar with a pontil scar predates 1857, while one with side seams that continue to the base of the lip postdates 1881. A piece with a seam on the lip, indicating fully automated manufacture, would postdate 1903. Color and function are other major characteristics used to identify glass artifacts. While color is not always a reliable diagnostic tool, it often illustrates function and can sometimes provide dates. For instance, glass with magnesium added as a clarifying agent (a technique used from about 1870 to 1914) can often become solarized, and turns purple when exposed to the sun (Lockhart 2006). Applied color labeling, which is still commonly used on glass soda-pop bottles, was first introduced in the 1930s (Miller et al. 2000:8). MSG's procedures for glass identification and temporal

affiliation followed studies by Deiss (1981), Ketchum (1975), Lorrain (1968), Madden and Hardison (2004), Miller and Sullivan (1984), Putnam (1965), and Toulouse (1971). Bottle glass in particular was analyzed according to Deiss's (1981) classifications, terminology, and definitions.

Metal

Metal artifacts were identified by material (aluminum, brass, copper, iron, lead, steel, etc.) and function (hardware, tools, roofing, buttons, etc.). The mode of manufacture may be used to identify and date the artifact (e.g., Busch 1981), and spatial analysis can provide important clues as to the layout of a site; this has proven especially successful in the analysis of historic nails (i.e., Wells 1998; Young 1994). Metal artifacts are commonly found in severely deteriorated states that prevent successful identification. When good preservation exists, metal artifacts can be useful not only in dating an assemblage, but also in establishing construction dates for architectural and mechanical features.

Masonry

This category includes material types that do not fit into any of the above categories but that share a general similarity of function such that it is practical to create a category for them rather than simply including them in the broad category of "Other" (see below). Material types that fall under the masonry category include brick, mortar, and dressed stone.

Plastic

Although long ignored by archaeologists, plastic is increasingly becoming a focus of research as more and more 20th-century sites pass the 50-year threshold for NRHP eligibility. The very first plastics, including materials known as gutta percha, vulcanite, and hard rubber, were made of natural materials and were produced as early as the 1840s. Modern plastics are made from mostly synthetic materials and can be divided into thermosetting plastics (those that are formed into a fixed shape by heating and stay in that shape even if re-heated) and thermoplastic plastics (those that are heated for shaping, become firm when cooled, but soften again if re-heated) (Young 2004:113). The first modern plastic, trademarked as Bakelite, was introduced in 1907. Bakelite is a very hard plastic that was used for electrical and telephone parts. Pyralin plastic was invented in 1915 and was used for items such as combs, tooth brushes, pens, toys, and kitchen tools. Melmac plastic was trademarked in 1940 and used in the production of tableware; just five years later Tupperware was invented (Miller et al. 2000:16-17).

Faunal

On historic archaeological sites, faunal remains can indicate the degree to which a site's occupants were self-sufficient or participated in the broader local economy; the financial and social status of the residents; and even their ethnicity (based on generalized ethnic preferences for different types and cuts of meat). Faunal remains on historic sites can also include the remains of domesticated animals such as pets, livestock, and draft animals. Faunal remains were identified using standard identification guides (Gilbert 1990; Gilbert et al. 1996; Olsen 1964, 1968).

Other

This category encompasses all material types that cannot be classified as ceramic, glass, metal, masonry, plastic, or faunal. Examples of such material include textiles (e.g., clothing), floral remains (e.g., wood, charcoal), and paper products. The *Other* category also includes composite artifacts, or those that are made of multiple material types or composite materials. Some examples include asphalt; glass jars with metal lids still attached; porcelain electrical insulators with metal pins; and flashlights with metal, plastic and/or glass parts.

Functional Categories

Artifacts were also separated into functional categories in order to determine the function of features and sites. The functional categories used in the present study include:

1. *Kitchen*, which is divided into food preparation, food service, food storage, and dietary remains (including floral and faunal remains);
2. *Architecture*, which is divided into construction materials, architectural hardware, fixtures (including plumbing-related artifacts), electrical, and landscaping (including ornamental plants and related artifacts such as flower pots);
3. *Furnishings*, which are divided into lighting and electrical, housewares (furniture, decorative tableware, knick-knacks, etc.), domestic labor supplies, and appliances/appliance parts;
4. *Personal*, which is divided into clothing (fasteners [such as buttons], footwear, and miscellaneous), domestic labor supplies (e.g., sewing needles, shoe polish bottles, etc.), indulgence (pipes, etc.), personal adornment (jewelry, cosmetics, etc.), coins, communication (writing supplies, etc.), toys (dolls, miniature tea sets, games, figurines, etc.), pets (faunal remains of domesticated pets, pet toys, license/vaccination tags, etc.), recreation (sports, hobbies, etc.) and health and hygiene (toothbrushes, hair supplies, pharmaceutical, etc.);
5. *Transportation*, which includes non-automotive vehicular parts, automotive parts, aeronautical equipment and parts, etc.;
6. *Agriculture*, which includes agricultural tools, storage, agricultural machinery, transportation equipment, infrastructure (e.g., drainage tiles), livestock/domesticated work animals (i.e., faunal remains), livestock artifacts (e.g., horse shoes, bridal buckles, other livestock-related equipment and tools, etc.), and miscellaneous agricultural items (i.e., artifacts related to ancillary activities, such as kiln bricks);
7. *Industry*, which includes machinery and machinery parts, transportation equipment, raw materials, infrastructure, industrial hardware, and industrial by-products or waste (i.e., slag);
8. *Arms*, which includes weapons and weapon parts, ammunition, military buttons and other clothing items, and decorative hardware such as medals;
9. *Miscellaneous*, which includes fuel (including coal and charcoal), fuel storage, storage, miscellaneous hardware, tools, power generation (e.g., batteries), and infrastructure (e.g., sewer or drainage pipes, electrical insulators);
10. *Indeterminate*, which includes indeterminate ceramic items, items that may be either pharmaceutical or kitchen, indeterminate storage items, etc.;
11. *Non-Cultural*, which consists of unmodified natural objects (i.e., natural rocks) and non-cultural faunal and floral remains. (Non-cultural objects that were collected during fieldwork were cataloged but not included in functional analyses of individual sites.)

4.2.3 Artifact Curation

In order to comply with Section 106 of the NHPA, the federal agency whose involvement has triggered the Section 106 process is responsible for making a good-faith effort to ensure that artifacts are curated at a federally recognized curation facility. However, all cultural materials collected during professional archaeological investigations are the property of the landowner. In the case of this project, the landowner for all areas surveyed is Consumers Energy. Consumers has expressed a desire to donate all artifacts recovered during the survey to the MISHPO, a federally recognized curation facility (36 CFR 79). Therefore, following the completion of the project, MSG will formally apply to the MISHPO for curation of the collection. Should the MISHPO accept the collection, MSG will prepare the artifacts for curation in accordance with the standards and guidelines contained published by the MISHPO. MSG will then deliver all donated collections to the MISHPO curation facility in Lansing.

4.3 Survey Results – LPSF Project Area

The archaeological survey of the LPSF Project Area was conducted from August 10-21, 2015. The weather during this time period was generally temperate and conducive to archaeological survey, with little precipitation and temperatures ranging from the mid-60s – high 70s °F. As mentioned in Section 3.3.1, those areas within the project boundary for which prior disturbance could not be established were divided into 17 different survey areas, designated Survey Areas A-R. These survey areas are shown in Figure 4.1, and will be described individually below. A total of 15 previously unrecorded archaeological sites were identified during the survey, and have been assigned state site numbers 20MN324 – 20MN338. Three additional locations of historic artifact deposits were identified, but due to various factors, have not been assigned state site numbers. Both types of sites are described in detail below. The locations of sites 20MN324 – 20MN338 are shown on Figure 4.2.

ARCHAEOLOGICAL RESULTS REMOVED

5.0 NRHP EVALUATIONS AND ASSESSMENT OF EFFECTS

After resources were identified through documentary research and fieldwork, significance evaluations of those resources were made in terms of their eligibility for listing in the NRHP. According to 36 CFR 60.4 of the National Historic Preservation Act (NHPA), properties may be eligible for listing in the NRHP if they meet one or more of the following criteria:

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in the districts, sites, buildings, structures and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

- A. *Association with events that have made a significant contribution to the broad patterns of American history;*
- B. *Association with the lives of historically significant persons;*
- C. *Embodiment of distinctive characteristics of a type, period, or method of construction; representative of the work of a master; possession of high artistic values; or representation of a significant and distinguishable entity whose components may lack individual distinction (for archaeological sites associated with standing architecture, or yielding related architectural evidence); or*
- D. *Ability to yield information important to the study of North American prehistory or history.*

Archaeological properties are most often determined to be eligible for the NRHP under Criterion D. Therefore, it is important to note that in order for archaeological remains to satisfy the criteria and to yield information important to the study of North American prehistory or history, the materials should be within the depositional environment in which they were originally interred or accumulated (i.e., undisturbed contexts). An isolated find site may be considered any site that produces a single material object indicative of past human life or activity; such sites are not generally eligible for the NRHP.

Historic/architectural resources include buildings, structures, sites, objects and districts that are typically over 50 years of age, although properties of exceptional importance that are less than 50 years old may be eligible for NRHP listing under Criteria Consideration G.

5.1 **Historic/Architectural Resources**

In 2011, an historic assessment of the LPS facility was completed by CCRG. The survey area for that study included only the LPS site, an area then encompassing approximately 1,630 acres (including the 842-acre reservoir). From the time it began commercial operation in 1973 until 2011, when the LPSF was surveyed by CCRG, the facility saw only minor changes, such as the construction of a new guard house, addition and removal of temporary structures, an addition to the service building, equipment overhauls, and reservoir repairs (Demeter 2011:6-3). In their assessment of eligibility, CCRG concluded that the integrity of location, design, setting, materials, workmanship, feeling and association has nevertheless been retained at the plant site, and that the LPSF is eligible for listing in the NRHP under Criteria A, C, D and Criteria Consideration G. These recommendations were submitted to the MISHPO by Consumers/DTE in August 2011.

In addition to the eligibility determination, Consumers/DTE requested the MISHPO's review of a plan for upgrades and modifications to the LPSF, as part of a non-capacity amendment to the project's license (which is not part of the current re-licensing process). Of the nineteen work items identified in the project plan, most were maintenance or repair activities. More substantial infrastructure improvements included:

- Reconstruction of an existing boat dock to facilitate a barge landing for parts delivery;
- Construction of a new steel framed fabrication building (North Fabrication Shop) on the site of an original warehouse and two-bay garage;
- Extension of the existing gantry crane rail to meet the face of the new North Fabrication Shop;

- Construction of a new fabrication building at the south end of the powerhouse yard (South Fabrication Shop); and
- Replacement of the original 360-ton gantry crane with two new 410-ton gantry cranes.

In February 2012 the MISHPO concurred with the recommendation of eligibility for the Ludington Pumped Storage Hydroelectric Plant and determined that the proposed changes – the new cranes, crane rail extension, and new fabrication buildings – would not adversely affect the integrity of the historic site.

Since the time of that determination, approximately 130 acres of land have been removed from the licensed project boundary by FERC, including one 35-acre parcel at the northwest corner of the property and one 95-acre parcel at the southeast corner of the property. Field investigations and research within those tracts by CCRG identified no archaeological sites or aboveground resources that are eligible for or listed in the NRHP, and no significant functional or historical association with the LPS's operations. The MISHPO concurred with this assessment in November 2013 and the application to remove both parcels from the project boundary was approved by FERC by May 2015. The current project boundary shown in Figures 1.3 and 1.4 – including both the current 1,500-acre LPS facility and the 1.8-acre Pigeon Lake North Pier site – also represents the APE for this project, and is the area in which the current historic/architectural survey was completed.

The history/architecture survey documented all aboveground properties within the current project boundary, which also represents the APE. The survey included the upper reservoir, penstocks, powerhouse and ancillary structures at the LPSF (including a guardhouse and four recreational sites), as well as the PLNP site. While there have been some physical changes to the facility infrastructure, the changes were coordinated with the MISHPO through the Section 106 process and have not diminished the historic integrity of the property, and the integrity of location, design, setting, materials, workmanship, feeling and association has been retained at the LPSF site.

It is therefore our opinion that *the LPSF is eligible for listing in the NRHP under Criteria A, C, D and Criteria Consideration D*, as justified by CCRG, on the following basis:

- *Criterion A* for its contributions to Michigan's hydroelectric generating and transmitting capabilities;
- *Criterion C* for its significant design and engineering features;
- *Criterion D* for its ability to provide answers to research questions beyond those posed for construction and engineering; and
- *Criteria Consideration D* for an exceptionally significant resource less than 50 years old.

In this case, the recommended boundaries for the eligible property include only the 1,500-acre facility in Mason County, as the property most directly associated with construction, operation and maintenance of the hydroelectric project. It does not include the PLNP site, which is a mitigation site that has no individual significance and no direct association with the history or development of the LPSF.

5.2 Archaeological Resources

A total of 15 archaeological sites were identified within the LPSF Project Area; no archaeological sites were identified within the PLNP Project Area. The sites identified within the LPSF Project Area have been assigned state trinomial site numbers 20MN324 – 20MN338. Three additional field sites consisting of historic-period remains (Field Sites C1, I1 and L1) have not been assigned trinomial site numbers for reasons described in Section 4 above, and will not be considered in this section. The 15 formally designated sites can be divided into five basic types: prehistoric lithic isolates, prehistoric lithic scatters, historic artifact scatters associated with known farm/orchard parcels, farmstead/orchard sites, and a historic artifact scatter

associated with the construction of the LPSF. Individual sites will be discussed and evaluated by site type below. This information is also summarized in Table 5.1.

Table 5.1 NRHP Eligibility and Recommendations for Archaeological Sites

Trinomial Site #	Site Type	NRHP Eligibility	Recommendations
20MN324	Farmstead/Orchard	Potentially Eligible (Criterion D)	Phase II evaluation <i>only if future development is planned in this location</i>
20MN325	Farm/Orchard-Associated Artifact Scatter	Not Eligible	No further investigation
20MN326	Farm/Orchard-Associated Artifact Scatter	Not Eligible	No further investigation
20MN327	Prehistoric Lithic Scatter	Not Eligible	No further investigation
20MN328	Farm/Orchard-Associated Artifact Scatter	Not Eligible	No further investigation
20MN329	Farmstead/Orchard	Potentially Eligible (Criterion D) – <i>historic component only</i>	Phase II evaluation <i>only if future development is planned in this location</i>
20MN330	Farmstead/Orchard	Not Eligible	No further investigation
20MN331	LPSF-Associated Artifact Scatter	Not Eligible	No further investigation
20MN332	Farm/Orchard-Associated Artifact Scatter	Not Eligible	No further investigation
20MN333	Prehistoric Lithic Isolate	Not Eligible	No further investigation
20MN334	Prehistoric Lithic Isolate	Not Eligible	No further investigation
20MN335	Prehistoric Lithic Scatter	Not Eligible	No further investigation
20MN336	Farmstead/Orchard	Not Eligible	No further investigation
20MN337	Prehistoric Lithic Scatter	Not Eligible	No further investigation
20MN338	Farm/Orchard-Associated Artifact Scatter	Not Eligible	No further investigation

5.2.2 Prehistoric Lithic Isolates

Two prehistoric lithic isolated finds were identified within the LPSF Project Area, both in Survey Area I. These sites have been assigned state trinomial numbers 20MN333 and 20MN334. As mentioned above, isolated find sites are generally not eligible for the NRHP due to a lack of potential to yield significant information regarding prehistory. All that can usually be said about such sites is that they represent ephemeral, transient occupations of the locale by an unknown person or persons at some time during the prehistoric period for the purpose of tool manufacture and/or maintenance. 20MN333 and 20MN334 are not exceptions to this general rule. While it is important to record isolated find sites as part of a much broader, regional perspective on prehistoric landscape use, **20MN333 and 20MN334 are not eligible for the NRHP under Criterion D. No further investigation of these sites is recommended.**

In addition, a third prehistoric isolated find has been incorporated into site 20MN329, a multicomponent site that includes a 20th-century farmstead remnant. For the same reasons stated above, the prehistoric component of 20MN329 is not eligible for the NRHP under Criterion D and no further investigation of this component of the site is recommended.

5.2.3 Prehistoric Lithic Scatters

Three prehistoric lithic scatters were identified within the LPSF Project Area, in Survey Areas D (20MN327), Survey Area J (20MN335), and Survey Area K (20MN337). All three of these sites consist of fewer than five pieces of non-diagnostic lithic debitage. The scatter was spread among three positive shovel tests at 20MN327, but both 20MN335 and 20MN337 consist of single shovel tests that yielded multiple pieces of debitage. Furthermore, 20MN337 is located within the boundaries of a larger historic site (20MN336), and is in a location that appears to have been extensively disturbed by historic-period activity, including the construction of the LPSF and the creation of the current disc golf course. As with the prehistoric isolated finds, all that can be said about sites 20MN327, 20MN335 and 20MN337 is that they represent ephemeral, transient occupations of the locale by an unknown person or persons at some unknown time during the prehistoric period for the purpose of tool manufacture and/or maintenance. No evidence for subsurface features was identified at any of these three sites. It is highly unlikely that additional investigation would yield significant information relevant to important research questions in regional prehistoric archaeology. *Therefore, 20MN327, 20MN335 and 20MN337 are not eligible for the NRHP under Criterion D and no further investigations are recommended at these three sites.*

5.2.4 Farm/Orchard-Associated Historic Artifact Scatters

Five historic-period artifact scatters associated with former farm/orchard parcels were identified within the LPSF Project Area: 20MN325 (Survey Area A), 20MN326 (Survey Area D), 20MN328 (Survey Area E), 20MN332 (Survey Area H), and 20MN338 (Survey Area P). What distinguishes these sites from the farmstead/orchard sites discussed below is the lack of any observed surface or subsurface features associated with farmstead or orchard activity. However, these five also vary in the amount of artefactual material identified within the sites as well as the degree of apparent modern disturbance.

Both 20MN325 and 20MN326 are relatively dense, discrete surface refuse dumps that date to the mid-20th-century and can therefore be directly associated with documented occupations based on cadastral atlas and plat maps. Both sites are likely components of larger sites that extend outside the current project area boundary. 20MN326, in particular, demonstrates one potential pitfall of the piecemeal nature of much archaeological survey work conducted pursuant to Section 106 of the NHPA. This site appears to be associated with previously recorded sites 20MN98 and 20MN308. The former was recorded during a 1978 survey conducted in advance of the construction of modern U.S. Route 31, and the latter was identified during a 2013 survey of 95-acres conducted for the purpose of removing unused land from the FERC-licensed LPSF boundary. The authors of the 1978 survey report and a subsequent Phase II investigation of the site (Lovis 1978; Flanders and Szten 1981) could only consider the archaeological remains within the original survey area. While the authors of the 2013 survey report explored the apparent connection between 20MN98 and 20MN308, they could not re-locate 20MN98 in the field (it was likely destroyed by the construction of U.S. Route 31) and ultimately determined that 20MN308 is not eligible for the NRHP in part because it was an apparently isolated farmstead remnant (Dunham and Espenshade 2013). A consideration of 20MN98, 20MN308 and 20MN326 as components of a single, larger site associated with a 20th-century farm tenancy occupation might have allowed for a more complete analysis of the farmstead landscape as well as changes in economic behavior and the use of space over time.

It is not the intention of this report's authors, however, to suggest that the previous evaluations of 20MN98 and 20MN308 were incorrect and should be reversed, only that these previous evaluations were the victims of necessarily incomplete information. Even with the identification of 20MN326, it would be difficult to argue for the potential eligibility of a larger, combined site. Taylor et al. (2006:6-4) have suggested seven factors that should be taken into account when evaluating farmstead sites in Michigan for potential NRHP eligibility: (1) site condition and extent of disturbance; (2) the presence or absence of yard scatters that can provide information about the socioeconomic status of site inhabitants; (3) the presence or absence of concentrated refuse areas that can provide information about site organization and changing refuse disposal practices; (4) the presence or absence of diagnostic artifacts; (5) length of occupation; (6) association with historically known settlements; and (7) the ratio of domestic or household materials to architectural or structural materials. In the case of sites 20MN98, 20MN308 and 20MN326, extensive disturbance to the site is apparent from the construction of U.S. Route 31 as well as two power transmission corridors that cut through the former farmstead. No significant yard scatters were identified at either 20MN98 or 20MN326. While 20MN326 appears to represent a concentrated refuse disposal area, the artifact assemblage can be tightly dated to the 1940s and does not coincide with the known tenant occupation of the property (ca. 1900-1935). Tightly diagnostic artifacts were only recovered from one of the three sites (20MN326). When considered together the three sites appear to compare favorably to factors 5 and 6 (length of occupation and association with historically known settlements). However, despite the predominance of domestic artifacts at 20MN326, the extremely sparse artifact assemblages from 20MN98 and 20MN308 (one of which likely represents the original domestic core of the farmstead) does not appear to satisfy factor 7. For these reasons, it appears unlikely that additional investigation of 20MN326 (either individually or as part of a broader investigation including 20MN98 and 20MN308) would yield significant information that could be used to address important questions in regional farmstead archaeology. *Therefore, 20MN326 is not eligible for the NRHP under Criterion D. Furthermore, it does not appear to be associated with important persons or events in Mason County history (Criteria A and B). No further investigation of this site is recommended.*

The evaluation of 20MN325 suffers from the same problem as sites 20MN98 and 20MN308: necessarily incomplete information due to current survey boundaries. 20MN325 consists of two closely-spaced surface refuse dumping locales, both dating to the 1940s. It is currently unclear who the property owner at that time was, although the larger parcel on which the site was located appears to have been a working orchard. It is possible, indeed likely, that 20MN325 is part of a larger site that includes farmstead remnants located outside of the current project area boundary. However, the current evaluation can only be based on what is known about 20MN325. Based on the seven factors for farmstead evaluation listed above, this site only appears to satisfy factors 3 (presence of concentrated refuse areas that can provide information on diachronic patterns of consumption and refuse disposal) and 7 (ratio of domestic to architectural artifacts), and even then only partially due to the uncertain relationship of this site with as-yet unidentified components outside the survey area. No subsurface component of 20MN325 was identified, and no surface or subsurface features appear to be present. For these reasons, it is unlikely that further investigation of 20MN325 would yield significant information that could be used to address important questions in regional farmstead archaeology. *Therefore, 20MN325 is not eligible for the NRHP under Criterion D. Furthermore, it does not appear to be associated with important persons or events in Mason County history (Criteria A and B). No further investigation of this site is recommended.*

Unlike sites 20MN325 and 20MN326, sites 20MN328, 20MN332 and 20MN338 are low-density scatters of historic-period artifacts that do not represent intensive refuse dumping activity and that are likely located in disturbed contexts. 20MN328 consists of three subsurface artifact findspots dating to the late 19th or early 20th centuries and spread out over nearly half a kilometer, connected only in their location on two former parcels owned by the Seymour family. This site has been heavily disturbed by the construction of the LPSF and the consequent re-alignment of Brunson Road. 20MN332 consists of a very sparse 19th-century surface artifact assemblage located on a small bench in an otherwise sloped and eroded backdune setting. While the 20th-century occupants of the parcel are known, it is not currently known who the 19th-century occupants of the parcel were. 20MN338 also consists of a low-density, subsurface artifact scatter dating to the 19th-century and located in an area that has been heavily disturbed by the construction of the LPSF and an electrical substation on the west side of Lakeshore Drive. No surface or subsurface features were encountered at any of these sites. Due to the apparent disturbance, the lack of cultural features, and the low artifact density at these sites, it is unlikely that additional investigation of 20MN328, 20MN332 or 20MN338 would yield significant information that could be used to address important questions in regional farmstead archaeology. *Therefore, 20MN328, 20MN332 and 20MN338 are not eligible for the NRHP under Criterion D. Furthermore, it does not appear that any of them are associated with important persons or events in Mason County history (Criteria A and B). No further investigations of these sites are recommended.*

5.2.5 Farmstead/Orchard Sites

Four farmstead/orchard sites were identified during the current survey: 20MN324 (Survey Area A), 20MN329 (Survey Area E), 20MN330 (Survey Area G), and 20MN336 (Survey Areas J and K). These four sites are distinguished from the sites in the Farm/Orchard-Associated Historic Artifact Scatter category in that each of these sites include features associated with farm/orchard activity. These four sites will be evaluated against the seven factors for farmstead significance identified by Taylor et al. (2006).

20MN324 is the most complex site identified during the current survey. Located on the [text removed]. Although the domestic core of this former parcel appears to have been located within the modern overhead power transmission corridor to the east of the site, a significant portion of the site remains in a wooded, stabilized dune setting. A total of 21 features were identified within 20MN324. Although only one of these features (a collapsed shed) appears to represent *in situ* structural remains, a variety of feature types are present. Combined with the extensive artifact assemblage, it appears that multiple activity areas are present. The site dates to the 1940s-1950s, at which time the parcel was owned by either William Long or Ronald Van Dyke. As regards the seven factors of farmstead significance, 20MN324 appears to have a high degree of potential significance. While a portion of the site has been disturbed by the adjacent transmission corridor, that part of the site that remains appears to have experienced little if any disturbance since its creation (Factor 1). The site does not appear to match Factor 2 (presence of yard scatters that could shed light on socioeconomic status of site inhabitants), but in this case the lack of a yard scatter does not mean that no socioeconomic information can be obtained – several extensive refuse dumps within the site can provide similar information. These refuse dumps also satisfy Factor 3 (concentrated refuse areas that can provide information about site organization and changing refuse disposal practices) and Factor 4 (presence of diagnostic artifacts). While the artifact assemblage dates primarily to the 1940s and 1950s, the parcel was occupied from at least 1900 to the time it was sold to Consumers Power Co. in the late 1960s. Furthermore, the majority of the 21 features within the site cannot be firmly dated and may represent older, different uses of the area than do the refuse dumps (Factor 5 [length of occupation] and Factor 6 [association with historically known settlements]). The site also matches Factor 7 (ratio of domestic to architectural

artifacts), as described in the artifact analysis (Section 4.3.1.1). In addition to these seven factors, it appears likely that 20MN324 contains several different, distinct activity areas, possibly including a maple sugaring locale.

While there are still many unanswered questions regarding 20MN324, it clearly has a high potential to yield significant information that could address important questions in regional farmstead archaeology. *Therefore, 20MN324 is recommended potentially eligible for the NRHP under Criterion D.* The site does not, however, appear to be associated with important persons or events in local or regional history (Criteria A and B). The site does not currently appear to be threatened by either natural or cultural agents, and since no changes to the operations or physical plant of the LPSF are proposed as part of the re-licensing process, *the undertaking will have no adverse effects on 20MN324.* Therefore, no additional investigations are recommended at this time. *Should future development of the LPSF facility be planned in this location, however, a Phase II archaeological evaluation of the site should be conducted.*

20MN329 is also a 20th-century farmstead/orchard remnant. This site straddles the current project area boundary, and it is highly likely that additional components of the site are present outside of the survey area and as yet unrecorded. Recorded components include a house foundation with an extensive refuse scatter adjacent to it as well as a cistern (both outside of the LPSF Project Area), a concrete stock tank, the remnant of a brick wall, and a sparse subsurface artifact scatter (all within the project area). The artifact assemblage (including both artifacts that were collected and those that were not) appears to represent a broad 20th-century date range, and historic atlas and plat maps indicate that the original property was owned by the Cole family from at least ca. 1900 to the late 1960s, when it was sold to Consumers Power Co. As with sites 20MN325 and 20MN326, however, the evaluation of 20MN329 is limited by the fact that the entire original property was not included within the survey boundaries. Nevertheless, some preliminary observations can be made. While a portion of the original property was destroyed by the construction of the LPSF reservoir, that portion of the property that remains does not appear to have been much disturbed (Factor 1). Subsurface testing was not conducted in the area around the house foundation, so it is currently unknown whether a yard scatter exists (Factor 2). Similarly, while the extensive refuse scatter adjacent to the house foundation is likely associated with the abandonment of the property, it is not currently known whether other refuse deposits exist outside of the LPSF Project Area (Factor 3). However, diagnostic artifacts were observed in the scatter adjacent to the house foundation (Factor 4), and the occupation of the parcel has been traced back to at least ca. 1900 (Factors 5 and 6). Unfortunately, the paucity of artifacts recovered from that portion of the site within the current project area boundary does not provide enough data to address Factor 7 (ratio of domestic to architectural artifacts).

Given that 20MN329 appears to match four of the seven factors of farmstead significance, along with the possibility that as-yet unrecorded elements of the site may exist outside of the LPSF Project Area that could address the remaining three factors, *20MN329 should be considered to be potentially eligible for the NRHP under Criterion D.* The site does not appear to be associated with important persons or events in local or regional history, and thus is not eligible under Criteria A and B. As with site 20MN324, 20MN329 does not currently appear to be threatened by either natural or cultural agents. Since no changes to the operations or physical plant of the LPSF are proposed as part of the re-licensing process, *the undertaking will have no adverse effects on 20MN329.* Therefore, no additional investigations are recommended at this time. *Should future development of the LPSF facility be planned in this location, however, a Phase II archaeological evaluation of the site should be conducted.*

20MN330 is located in a wooded area within a stabilized backdune setting on the east side of the LPSF reservoir. This site consists of two features – a depression of unknown origin and the remnant of a barbed-wire fence. Two large chunks of concrete with embedded cobbles were observed near the depression, suggesting the former presence of a structure in this location. However, no artifacts were recovered from the site. While it is possible that additional elements of this site exist outside of the current project area, the only such area is immediately to the south of Survey Area G, an area that appears to have been extensively disturbed during the construction of the LPSF reservoir (Ebasco Engineering Corporation 1974). Thus, a large portion of the original farm parcel appears to have been heavily disturbed (Factor 1). No domestic component of the site was identified, and shovel testing throughout the area failed to identify any subsurface deposits (Factor 2). Similarly, shovel testing and visual inspection failed to identify any concentrated refuse disposal areas (Factor 3). No diagnostic artifacts were recovered from the site (Factor 4). While the property history was traced back to ca. 1900, multiple property owners/occupants were identified and it is unknown which of them the site may be associated with (Factors 5 and 6). Since no artifacts were recovered, the site also does not present a match with Factor 7 (ratio of domestic to architectural artifacts). For these reasons, it does not appear that additional investigation of 20MN330 would be likely to yield significant information that could be used to address important research questions in regional farmstead archaeology. *Site 20MN330 is therefore not eligible for the NRHP under Criterion D; it also does not appear to be associated with important persons or events in local or regional history (Criteria A and B). No further investigations are recommended.*

Site 20MN336 is located within a stabilized dune setting [text removed]. Three surface features were identified at the site, all of them unidentified depressions (one with an associated concrete foundation remnant). Four loci discrete subsurface artifact scatters were also identified, although three of these are quite small and almost certainly located within disturbed contexts. The fourth locus, Field Site K4, is associated with two of the three depressions and is located in an area near the documented location of a former farm house on the east side of Lakeshore Drive. The artifact assemblage from the site generally dates to the late 19th or early 20th century. However, even Field Site K4 has been disturbed by an underground brine line. Thus, a majority of 20MN336 has been subject to extensive disturbance during the second half of the 20th century (Factor 1). Field Site K4 does appear to represent a yard scatter (Factor 2), but no concentrated refuse disposal areas were identified within the site (Factor 3). No tightly diagnostic artifacts were recovered from the site (Factor 4). While the 20th-century history of the original property has been traced, it is unknown whether the identified components of 20MN336 are associated with the early 20th-century Cowell family occupation of the property, an unknown, earlier occupation, or both (Factors 5 and 6). As discussed in Section 4.3.11.1, 20MN336 yielded an approximately equal number of architectural and domestic artifacts (Factor 7). Therefore, this site demonstrates a lack of fit with the seven factors of farmstead significance. It is unlikely that additional investigation of this site would be likely to yield significant information that could be used to address important research questions in regional farmstead archaeology. *Site 20MN336 is therefore not eligible for the NRHP under Criterion D; it also does not appear to be associated with important persons or events in local or regional history (Criteria A and B). No further investigations are recommended.*

5.2.6 LPSF-Associated Artifact Scatters

One archaeological site that appears to be associated with the construction of the LPSF (1969-1972) was identified during the survey: 20MN331. This site consists of a low-density but discrete surface refuse deposit in Survey Area H, on the [text removed]. A number of glass beer and soft drink bottles bearing date codes from the early 1970s were recovered from this site. However, no surface or subsurface features were encountered during the survey. Despite the fact that this site has not yet reached 50 years of age, it was recorded and assigned a state trinomial site number due to its association with the NRHP-eligible LPSF. Although its association with the LPSF suggests that it could be considered eligible for the NRHP under Criterion A, MSG does not recommend that 20MN331 should be considered a contributing element to the NRHP-eligible facility. The ephemeral nature of the site indicates that it is unlikely that additional investigation would yield significant data beyond that already collected. *For this reason, 20MN331 does not appear to be eligible for the NRHP under Criterion D, either individually or as a component of the LPSF facility. No further investigation of this site is recommended.*

6.0 SUMMARY AND RECOMMENDATIONS

In May 2015, Consumers contracted MSG to conduct a Phase I archaeological and historical resources survey of the LPSF in Pere Marquette and Summit townships, Mason County, Michigan as well as the Pigeon Lake North Pier recreational facility in Port Sheldon Township, Ottawa County, Michigan. The LPSF was constructed from 1969-1972 and is jointly owned and operated by Consumers and DTE; Consumers and DTE are currently engaged in a five-year FERC re-licensing application process. Due to FERC's involvement, the re-licensing process is considered a federal undertaking subject to review under Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended. The archaeological and historical resources survey is being conducted as part of the consultation process between FERC, DTE, Consumers, and the MISHPO. Since both the LPSF and the PLNP are included within the re-licensing effort, they are collectively referred to as the Ludington Pumped Storage Project (LPSP)

For the current LPSP, the undertaking is the FERC license renewal. No change in operation or addition of facilities is proposed as part of the re-licensing, nor is there any change in the capacity of the facility. Likewise, no impacts from continued hydroelectric pumped storage operations are anticipated as a result of the relicensing, and no physical, visual or auditory effects will result outside the permit boundaries. Because the effects of the current proposed project will be confined exclusively to the LPSF, the recommended APE therefore corresponds to the project boundary, which is defined by FERC as "a complete unit of improvement or development" that consists of all dams, reservoirs, other engineered structures, as well as property rights in lands and waters that are necessary for the construction, operation, and maintenance of a project. The APE includes both the 1,500-acre LPSF and the 1.8-acre PLNP site.

In July 2015 MSG completed a literature review within a study area encompassing a 2-km (1.2 mi) buffer around both the LPSF and PLNP project areas. No historic/architectural sites (including sites listed on or eligible for the national or state registers) have been recorded within either study area. A total of 17 previously recorded archaeological sites are present within the LPSF study area, including two prehistoric archaeological sites (20MN48 and 20MN49) located directly within the LPSF Project Area. No previously recorded archaeological sites are present within the PLNP Project Area. In addition to the literature review, general background research was conducted on the environmental, prehistoric and historic contexts of Mason County. (Since the PLNP Project Area is limited to the current boundaries of the existing recreational facility, no additional background research was conducted for this area beyond the literature review.) Based on the results of the literature review and background research, the cultural resource types most likely to be present within the LPSF Project Area were identified as prehistoric archaeological sites representing short-term occupations related to subsistence resource procurement or tool manufacture and/or maintenance (including sites that may be deeply buried within sand dunes), and historic structures and archaeological sites related to the 19th- and 20th-century agricultural settlement of Pere Marquette and Summit townships (including cash crop farmsteads and orchards).

The historic resources survey was completed from August 10-11, 2015. Field reconnaissance included all aboveground properties within the project APE, including those previously surveyed. Our goal was to document the current condition and integrity of those resources. The survey included the upper reservoir, penstocks, powerhouse and ancillary structures at the LPSF (including a guardhouse and four recreational sites), as well as the PLNP site. All but two of these properties were previously recorded by CCRG in 2011. Based on survey results and analysis, the LPSF retains integrity of location, design, setting, materials, workmanship, feeling and association and is recommended as eligible for listing in the NRHP under Criteria A, C, D and Criteria Consideration D. The recommended boundary for the eligible property include only the 1,500-acre facility in Mason County, as the property most directly associated with construction, operation and maintenance of the hydroelectric project. It does not include the PLNP site, which is a mitigation site that has no individual significance and no direct association with the history or development of the LPSF. Given the scale and nature of the proposed project, it is the opinion of MSG that the effects of the re-licensing do not meet the Criteria of Adverse Effect (36 CFR Part 800.5[a][1]) and the project will have no adverse effect on historic properties.

The archaeological portion of the survey was completed from August 10-21, 2015. The survey boundaries for archaeological investigations were limited to the areas encompassed by the re-licensing application for both the LPSF and PLNP project areas. The LPSF Project Area encompasses 1,696 acres, although approximately 1,390 acres are either offshore in Lake Michigan or were extensively disturbed during the construction of the LPSF. While these areas were visually inspected, only approximately 306 acres were subjected to formal archaeological survey in the form of shovel testing (at 15-m [49-ft] intervals) or systematic pedestrian surface survey (at 10-m [33-ft] intervals). The PLNP Project Area encompasses approximately 1.8 acres. Since the PLNP Project Area boundary is limited to the existing recreational facility, this project area was visually inspected but not subjected to formal archaeological survey.

The survey of the LPSF Project Area resulted in the identification of 15 previously unrecorded archaeological sites (designated as 20MN324 – 20MN338) as well as three additional locations of historic artifact deposition that were determined not to represent *in situ* archaeological sites. Visual inspection confirmed that previously recorded sites 20MN48 and 20MN49 were destroyed by the construction of the LPSF from 1969-1972. Newly recorded site types include two prehistoric lithic isolates, three small prehistoric lithic scatters, five farm/orchard-associated historic artifact scatters, four farmstead/orchard sites (including one with an isolated prehistoric component), and one historic artifact scatter associated with the construction of the LPSF. None of the prehistoric sites or components (20MN327, 20MN329, 20MN333-20MN335, and 20MN337) yielded any diagnostic artifacts. They all appear to represent ephemeral uses of the landscape during prehistory, and do not appear to be eligible for the NRHP due to a lack of research potential (criterion D). No further archaeological investigations of these sites are recommended.

Due to various factors including small artifact assemblages, lack of identified surface or subsurface features, evidence for modern disturbance, and a lack of apparent associations with important persons or events, historic sites 20MN325, 20MN326, 20MN328, 20MN330-20MN332, 20MN336 and 20MN338 do not meet criteria A, B or D, and therefore do not appear to be eligible for the NRHP. No further archaeological investigations of these sites are recommended. However, historic sites 20MN324 and 20MN329 are farmstead/orchard sites that exhibit many factors associated with significant farmstead archaeological sites in Michigan as identified by Taylor et al. 2006. These two sites are potentially eligible for the NRHP under Criterion D. Neither site is currently threatened by either natural or man-made forces, and Consumers does not propose any changes to LPSF operations or expansion of the physical plant as part of the re-licensing process. Therefore, no additional investigation of these two sites is recommended at this time. However, should future operational changes or physical plant expansion occur, the impact of such development on these two sites will need to be considered and Phase II archaeological investigations may be required.

In addition to the sites that were recorded during the archaeological survey, prehistoric archaeological sites may exist buried deeply within sand dune formations in the LPSF Project Area. Typical Phase I archaeological survey methods are clearly unlikely to encounter archaeological sites buried within sand dunes, as illustrated by the Camp Miniwanca site in Oceana County (just south of Mason County), which was found over 20 m (66 ft) beneath the top surface of a deflated dune (Lovis et al. 2012:102-107). While relatively level surfaces (<20% slope) within the dune formations in the current project area were shovel tested, it is not currently known how likely it is that deeply buried sites may be present within these dunes. Therefore, any future operational changes or physical plant expansion at the LPSF that may impact dune areas should be preceded by an assessment of the potential for these dunes to contain buried prehistoric sites. This assessment should be conducted by a qualified geoarchaeologist.

No undisturbed areas were observed within the extremely limited PLNP Project Area in Ottawa County, although at least one level, apparently undisturbed area was observed to the north of the walking path. However, this area was within the boundaries of the cultural resources survey of the Campbell Plant location conducted in 1980 (Weir et al. 1980). Therefore, no further archaeological investigations are recommended within the PLNP Project Area.

7.0 REFERENCES CITED

- Adams, W. H.
1990 Landscape Archaeology, Landscape History, and the American Farmstead. *Historical Archaeology* 24(4):92-101.
- Advantage Marketing & Publications
2014 "Ludington, Michigan History – James Ludington, City Founder." *Visit Ludington: Your Complete Guide to the Ludington, Michigan Area*. Electronic document available at http://www.visitludington.com/stories/ludington_michigan_history_city_founder_james_ludington. Last accessed November 23, 2015.
2015a "History of the Lake Michigan Carferry, the S.S. Badger." *Visit Ludington: Your Complete Guide to the Ludington, Michigan Area*. Electronic document available at http://www.visitludington.com/stories/historic_lake_michigan_carferry_ss_badger_history_ludington_manitowoc. Last accessed November 24, 2015.
2015b *Visit Ludington: Your Complete Guide to the Ludington, Michigan Area*. Electronic document available at <http://www.visitludington.com/>. Last accessed November 24, 2015.
- Andrefsky, W., Jr.
2005 *Lithics: Macroscopic Approaches to Analysis*. Cambridge University Press, Cambridge.
- Andrews, W.
2006 *Phase I Archaeological Investigations of Verizon Wireless Site No. 731/Pentwater North, 5211 Meisenheimer Road, Summit Township, Mason County*. Report submitted to TES Consultants, P.C. by Andrews Cultural Resources.
- Anonymous
1995 "The J.M. Smucker Company History." *International Directory of Company Histories*, Vol. 11. St. James Press, Ann Arbor. Reprinted electronically at <http://www.fundinguniverse.com/company-histories/the-j-m-smucker-company-history>. Last accessed October 1, 2015.
- Armor All/STP Products Company
2015 "STP® History." Electronic document available at <http://www.stp.com/about-stp/stp-history>. Last accessed September 15, 2015.
- Bamforth, D. B.
1986 Technological Efficiency and Tool Curation. *American Antiquity* 51(1):38-50.
- Bamforth, D. B. and M. S. Becker
2000 Core/Biface Ratios, Mobility, Refitting, and Artifact Use-Lives: A Paleoindian Example. *Plains Anthropologist* 45(173):273-290.
- Baugher, S. and T. H. Klein (editors)
2001-2002 Historic Preservation and the Archaeology of Nineteenth-Century Farmsteads in the Northeast. *Northeast Historical Archaeology* 30-31.
- Beck, C., A. K. Taylor, G. T. Jones, C. M. Fadem, C. R. Cook, and S. A. Millward
2002 Rocks Are Heavy: Transport Costs and Paleoarchaic Quarry Behavior in the Great Basin. *Journal of Anthropological Archaeology* 21:481-507.

- Bedell, J., M. Petraglia, and T. Plummer
 1994 Status, Technology, and Rural Tradition in Western Pennsylvania: Excavations at the Shaeffer Farm Site. *Northeast Historical Archaeology* 23:29-58.
- Beedle, P. L.
 1996 *The Farm Landscape*. State Historical Society of Wisconsin, Madison.
- Bellis, M.
 2015 "Invention of Polystyrene and Styrofoam." *About Money: Inventors*. Electronic document available at <http://inventors.about.com/od/pstartinventions/a/styrofoam.htm>. Last accessed September 10, 2015.
- Bessert, C. J.
 2015 "US-10." *Michigan Highways*. Electronic resource available at <http://www.michiganhighways.org/listings/US-010.html>. Last accessed November 24, 2015.
- Binford, L. R.
 1979 Organization and Formation Processes: Looking at Curated Technologies. *Journal of Anthropological Research* 35(3):255-273.
 1980 Willow Smoke and Dogs' Tails: Hunter-Gatherer Settlement Systems and Archaeological Site Formation. *American Antiquities* 45(1):4-20.
- Biography.com Editors
 2015 "Jacques Marquette Biography." *Biography.com*. Electronic document available at <http://www.biography.com/people/jacques-marquette-20984755>. Last accessed November 23, 2015.
- Brashler, J. G., E. B. Garland, M. B. Holman, W. A. Lovis, and S. R. Martin
 2000 Adaptive Strategies and Socioeconomic Systems in Northern Great Lakes Riverine Environments: The Late Woodland of Michigan. In *Late Woodland Societies: Tradition and Transformation across the Midcontinent*, edited by T. E. Emerson, D. L. McElrath and A. C. Fortier, pp 543-579. University of Nebraska Press, Lincoln.
- BrSpiritus
 2012 "Pabst-ett Cheese." *The Vintage Recipe Blog: A Collection of Vintage Ads, Recipes, and Recipe Reviews for the Modern Chef ...* Electronic document available at <http://www.vintagerecipeblog.com/2012/05/pabst-ett-cheese.html>. Last accessed September 25, 2015.
- Busch, J.
 1981 An Introduction to the Tin Can. *Historical Archaeology* 15(1):95-104.
- Cabak, M. A., M. D. Groover, and M. M. Inkrot
 1999 Rural Modernization during the Recent Past: Farmstead Archaeology in the Aiken Plateau. *Historical Archaeology* 33(4):19-43.
- Cabot, J. L.
 2005 *Ludington, 1830-1930*. Arcadia Publishing, Chicago.
- Cavallo, J. and R. A. Mounier
 1980 *An Inventory and Assessment of Prehistoric Archaeological Resources in the New Jersey Pinelands: Phase I of a Regional Predictive Survey*. Report submitted to the New Jersey Pinelands Commission by the Archaeological Research Laboratory, Department of Anthropology, Monmouth College, West Long Branch, NJ.

Chidester, R. C., K. J. Hayfield, R. M. Schumaker, B. P. Agosti, B. M. Zsigmond, D. Boling, S. Slater, and C. E. Knaub

2015 *Report of a Phase I Archaeological Reconnaissance Survey of 18 Selected Training Areas at Camp Ravenna Joint Military Training Center, Charlestown, Freedom, Paris and Windham Townships, Portage County, Ohio.* Report submitted to the Ohio Army National Guard, Columbus by BB&E, LLC, Northville, MI and The Mannik & Smith Group, Inc., Maumee, OH.

CITGO Petroleum Corporation

2015 "Company History." *CITGO.* Electronic document available at <https://www.citgo.com/AboutCITGO/CompanyHistory.jsp>. Last accessed October 2, 2015.

Cleland, C. E.

1966 *The Prehistoric Animal Ecology and Ethnozoology of the Upper Great Lakes Region.* Anthropological Papers No. 29, Museum of Anthropology, University of Michigan, Ann Arbor.

Claney, J. P.

2004 *Rockingham Ware in American Culture, 1830-1930: Reading Historical Artifacts.* University Press of New England, Lebanon, NH.

Cleland, C. E. and D. L. Ruggles

1996 The Samels Field Site: An Early Archaic Base Camp in Grand Traverse County. In *Investigating the Archaeological Record of the Great Lakes State: Essays in Honor of Elizabeth Baldwin Garland*, edited by M. B. Holman, J. G. Brashler, and K. E. Parker, pp. 55-99. New Issues Press, Western Michigan University, Kalamazoo.

Clorox Company

2015 "Bottle Guide." *The Clorox Company.* Electronic document available at <https://www.thecloroxcompany.com/company/heritage/bottle-guide/>. Last accessed September 4, 2015.

Covington, E. J.

n.d. *Early Incandescent Lamps.* Electronic document available at <http://home.frognet.net/~ejcov/index40.html>. Last accessed October 1, 2015.

Cushion, J. P.

1980 *Handbook of Pottery and Porcelain Marks.* Faber and Faber, London and Boston.

Day, G. L.

2014 *Phase I Archaeological Survey of Approximately 0.19 Acres, for New Cabin Sites in the Mason County Campground Located within the Ludington Pumped Storage Plant Area, Pere Marquette Township, Mason County, Michigan.* Report submitted to Consumers Energy Company by Commonwealth Cultural Resources Group, Inc.

Debolt, G. C.

1994 *Debolt's Dictionary of American Pottery Marks.* Collector Books, Paducah, KY.

Deiss, R. W.

1981 *The Development and Application of a Chronology for American Glass.* Midwestern Archaeological Center, Illinois State University, Normal.

Demeter, N. F.

2011 *Historic Assessment of the Ludington Pumped Storage Plant (FERC Project No. 2680), Ludington, Mason County, Michigan*. Report submitted to Consumers Energy, Cadillac, MI by Commonwealth Cultural Resources Group, Jackson, MI.

Department of Hydropower Administration & Compliance (HDAC)

2015 *Compliance Handbook*. Electronic document available at http://www.ferc.gov/industries/hydropower/gen-info/handbooks/compliance_handbook.pdf. Last accessed December 12, 2015.

DeRegnaucourt, T. and J. Georgiady

1998 *Prehistoric Chert Types of the Midwest*. Occasional Monograph No. 7, Upper Miami Valley Archaeological Research Museum, Arcanum, OH.

Dice, L. R.

1938 The Canadian Biotic Province with Special Reference to the Mammals. *Ecology* 19(4):503-514.

Dorr, J. A. and D. F. Eschman

1970 *The Geology of Michigan*. The University of Michigan Press, Ann Arbor.

Doug & Linda's Dairy Antique Site

2015 "Other Dairy Antiques." *Doug & Linda's Dairy Antique Site*. Electronic document available at http://dairyantiques.com/Other_Dairy_Antiques.html. Last accessed September 11, 2015.

Drewrys Brewing Company

n.d. "Drewrys History." *Drewrys: Have a Taste of History*. Electronic document available at http://www.drewrysbrewing.com/Drewrys_History.html. Last accessed October 2, 2015.

Dunbar, W. F. and G. S. May

1995 *Michigan: A History of the Wolverine State*. Wm. B. Eerdmans Publishing, Grand Rapids, MI.

Dunham, S. B.

2013 *Phase I Archaeological Survey of Approximately 35 Acres, Ludington Pumped Storage Plant, Pere Marquette Township, Mason County, Michigan*. Report submitted to Consumers Energy Company by Commonwealth Cultural Resources Group, Inc.

Dunham, S. B. and C. T. Espenshade

2013 *Phase I Archaeological Survey of Approximately 95 Acres, Ludington Pumped Storage Plant, Summit Township, Mason County, Michigan*. Report submitted to Consumers Energy Company by Commonwealth Cultural Resources Group, Inc.

Ebasco Engineering Corporation

1974 *Ludington Pumped Storage Project: Construction Plant – General Plan*. Map. Unpublished document on file at Consumers Energy, Jackson, MI.

Eckart, B.

2009 "The National Refining Company: It's Story 1882-1950." *History of the National Refining Company*. Electronic document available at <http://www.enarco.com/home.htm>. Last accessed September 4, 2015.

Editors of Encyclopaedia Britannica, The

2015 "Pennzoil Company." *Encyclopaedia Britannica Online*. Electronic document available at <http://www.britannica.com/topic/Pennzoil-Company>. Last accessed October 1, 2015.

- Ellis, C. J., I. T. Kenyon, and M. W. Spence
 1990 The Archaic. In *The Archaeology of Southern Ontario to A.D. 1650*, edited by C. J. Ellis and N. Ferris, pp. 65-124. Occasional Publication No. 5, The London Chapter, Ontario Archaeological Society, London.
- Farrand, W. R. and D. F. Eschman
 1974 Glaciation of the Southern Peninsula of Michigan: A Review. *Michigan Academician* 7.
- Fischer, F. W.
 1972 Schultz Site Ceramics. In *The Schultz Site at Green Point: A Stratified Occupation Area in the Saginaw Valley of Michigan*, edited by J. E. Fitting, pp. 137-190. Memoirs No. 4, Museum of Anthropology, University of Michigan, Ann Arbor.
- Fitting, J. E.
 1975 *The Archaeology of Michigan: A Guide to the Prehistory of the Great Lakes Region*. Cranbrook Institute of Science, Bloomfield Hills, MI.
- Flanders, R. E. and W. Szten
 1981 *Phase II Site Examination of 20MN98 in Summit Township (T17N R18W), Mason County, Michigan*. Report submitted to the Michigan Department of Transportation by Grand Valley State Colleges.
- Flint, R. F.
 1971 *Glacial and Quaternary Geology*. John Wiley & Sons, New York.
- Ford, R. I.
 1977 Evolutionary Ecology and the Evolution of Human Ecosystems: A Case Study from the Midwestern U.S.A. In *Explanation of Prehistoric Change*, edited by J. N. Hill, pp. 153-184. University of New Mexico Press, Albuquerque.
- Freudenrich, C.
 2015 "How Plastics Work." *How Stuff Works: Science*. Electronic document available at <http://science.howstuffworks.com/plastic.htm>. Last accessed September 30, 2015.
- Friedlander, A.
 1991 House and Barn: The Wealth of Farmers, 1795-1815. *Historical Archaeology* 25(2):15-30.
- Garland, E. B. and S. G. Beld
 1999 The Early Woodland: Ceramics, Domesticated Plants, and Burial Mounds Foretell the Shape of the Future. In *Retrieving Michigan's Buried Past: The Archaeology of the Great Lakes State*, edited by J. R. Halsey, pp. 125-146. Bulletin No. 64, Cranbrook Institute of Science, Bloomfield Hills, MI.
- Gartrell, E.
 n.d. "More About the Lever Bros. Lux (laundry flakes) Collection." *Emergence of Advertising in America: 1850 - 1920*. Electronic document available online at <http://library.duke.edu/digitalcollections/eaaguide/lever/>. Last accessed September 29, 2015.
- Genheimer, R. A.
 2003 Excavations at Chrisholm: A Nineteenth-Century Amish-Mennonite Farmstead Comes to Life. *Ohio Valley Historical Archaeology* 18:120-134.

- Geo. A. Ogle & Co.
 1904 *Standard Atlas of Mason County, Michigan*. Geo. A. Ogle & Co., Chicago.
 1912 *Standard Atlas of Ottawa County, Michigan*. Geo. A. Ogle & Co., Chicago.
- Gibson, E.
 2011 *Ceramic Makers' Marks*. Left Coast Press, Walnut Creek, CA.
- Gilbert, B. M.
 1990 *Mammalian Osteology*. Missouri Archaeological Society, Columbia.
- Gilbert, B. M., L. D. Martin, and H. G. Savage
 1996 *Avian Osteology*. Missouri Archaeological Society, Columbia.
- Gramly, R. M.
 1988 Paleo-Indian Sites South of Lake Ontario, Western and Central New York State. In *Late Pleistocene and Early Holocene Paleoecology and Archaeology of the Eastern Great Lakes Region*, edited by R. S. Laub, N. Miller and D. Steadman, pp. 265-280. Bulletin No. 33., Buffalo Society of Natural Sciences, Buffalo, NY.
- Greer, G. H.
 2005 *American Stonewares: The Art and Craft of Utilitarian Potters*. 4th edition. Schiffer Publishing, Atglen, PA.
- Groover, M. D.
 1992 *Illinois Farmstead Archaeology: Past Issues, Future Goals*. Report submitted to the Illinois Department of Transportation, Springfield, by the Midwestern Archaeological Research Center, Illinois State University, Normal.
 2003 *An Archaeological Study of Rural Capitalism and Material Life: The Gibbs Farmstead in Southern Appalachia, 1790-1920*. Springer, New York.
 2008 *The Archaeology of North American Farmsteads*. University Press of Florida, Gainesville.
- Gross, I. M.
 1864 *Map of the Counties of Ottawa and Muskegon and Part of Allegan, Michigan*. Samuel Geil, Philadelphia.
- Hambacher, M. J. and M. B. Holman
 1995 Camp, Cache, and Carry: The Porter Creek South Site (20MN100) and Cache Pits at 20MN31 in the Manistee National Forest. *The Michigan Archaeologist* 41:47-94.
- H. Belden & Co.
 1876 *Illustrated Historical Atlas of the Counties of Ottawa and Kent, Michigan*. H. Belden & Co., Chicago.
- Helman V. R.
 1950 *The Cultural Affiliations and Relationships of the Oliver Farm Site, Marion County, Indiana*. Master's Thesis, Department of Anthropology, Indiana University, Bloomington.
- Hinsdale, W. B.
 1931 *Archaeological Atlas of Michigan*. Michigan Handbook Series No. 4. The University of Michigan Press, Ann Arbor.

Historical Information Gatherers

- 2015a *Ludington Pumped Storage Hydroelectric Project, Mason County, 3321 Lakeshore Dr., Ludington, MI: Aerial Photographs, 1956-2014*. Historical Information Gatherers, Hopkins, MN.
- 2015b *Ludington Pumped Storage Hydroelectric Project, Ottawa [County], 17300 Lake Ave., West Olive, MI: Aerial Photographs, 1956-2014*. Historical Information Gatherers, Hopkins, MN.

Hixson, W. W.

- 1930a *Plat Book of Mason County, Michigan*. W. W. Hixson & Company, Rockford, IL.
- 1930b *Plat Book of Ottawa County, Michigan*. W. W. Hixson & Company, Rockford, IL.

Hizone Brands

- 2015 "About Us." *Hizone Brands Ltd*. Electronic document available at <http://www.hizonebrands.com/about-us/>. Last accessed September 30, 2015.

Holman, M. B. and J. G. Brashler

- 1999 Economics, Material Culture, and Trade in the Late Woodland Lower Peninsula of Michigan. In *Retrieving Michigan's Buried Past: The Archaeology of the Great Lakes State*, edited by J. R. Halsey, pp. 212-220. Bulletin No. 64, Cranbrook Institute of Science, Bloomfield Hills, MI.

Holman, M. B. and F. J. Krist, Jr.

- 2001 Late Woodland Storage and Mobility in Western Lower Michigan. In "Papers in Honor of Carol I. Mason," ed. T. C. Pleger, R. A. Birmingham, and C. I. Mason, pp. 7-32. *The Wisconsin Archaeologist* 82(1-2).

Ifert, B.

- 1994 *Made in Japan Ceramics, 1921-1941: With Price Guide*. Schiffer Publishing, Atglen, PA.

Italian Tribune, The (La Tribuna del Popolo)

- 2009 Roman Cleanser: First Bleach in the United States. *The Italian Tribune* July 24-August 6, page 6. Electronic document available online at http://www.italian-tribune.com/IT_07_24_09_06.pdf. Last accessed September 15, 2015.

Ivey, P.

- 1919 *The Pere Marquette Railroad Company*. Michigan Historical Commission, Lansing.

Johnson, E. P.

- 1995 *Soil Survey of Mason County, Michigan*. United States Department of Agriculture, Soil Conservation Service, Washington, D.C.

Justice, N. D.

- 1987 *Stone Age Spear and Arrowpoints of the Midcontinental and Eastern United States*. Indiana University Press, Bloomington.

Kapp, R. O.

- 1999 Michigan Late Pleistocene, Holocene, and Presettlement Vegetation and Climate. In *Retrieving Michigan's Buried Past: The Archaeology of the Great Lakes State*, edited by J. R. Halsey, pp. 31-58. Bulletin No. 64, Cranbrook Institute of Science, Bloomfield Hills, MI.

Kelly, R. L.

- 1988 The Three Sides of a Biface. *American Antiquity* 53(4):717-734.

- Ketchum, Jr., W. C.
 1975 *A Treasury of American Bottles*. Rutledge Books, New York.
 1983 *Pottery and Porcelain*. Alfred A. Knopf, New York.
 1987 *American Country Pottery: Yellowware and Spongeware*. Alfred A. Knopf, New York.
 2000 *The Antique Hunter's Guide: American Pottery and Porcelain*. Black Dog and Leventhal Publishers, New York.
- Kingsley, R. G.
 1981 Hopewell Middle Woodland Settlement Systems and Cultural Dynamics in Southern Michigan. *Midcontinental Journal of Archaeology* 6:131-178.
 1999 The Middle Woodland Period in Southern Michigan. In *Retrieving Michigan's Buried Past: The Archaeology of the Great Lakes State*, edited by J. R. Halsey, pp.148-172. Bulletin No. 64, Cranbrook Institute of Science, Bloomfield Hills, MI.
- Kooiman, B., C. Moffat and B. Bielefeldt
 1998 *MnDOT Historic Farmstead Study: Research Design – History and Archaeology – Focal/Cash Crop Area*. Draft report prepared for the Minnesota Department of Transportation by the Mississippi Valley Archaeology Center.
- Kovel, R. and T. Kovel
 1986 *Kovels' New Dictionary of Marks: Pottery & Porcelain, 1850 to the Present*. Crown Publishers, New York.
- Lehner, L.
 1988 *Lehner's Encyclopedia of U.S. Marks on Pottery, Porcelain and Clay*. Collector Books, Paducah, KY.
- Lindsey, B.
 2015a "Bottle Bases." *Historic Glass Bottle Identification & Information Website*. Electronic document available at <http://www.sha.org/bottle/bases.htm>. Last accessed June 1, 2015.
 2015b "Bottle Dating." *Historic Glass Bottle Identification & Information Website*. Electronic document available at <http://www.sha.org/bottle/dating.htm>. Last accessed September 28, 2015.
 2015c "Bottle Finishes & Closures." *Historic Glass Bottle Identification & Information Website*. Electronic document available at <http://www.sha.org/bottle/closures.htm>. Last accessed September 21, 2015.
 2015d "Bottle / Glass Colors." *Historic Glass Bottle Identification & Information Website*. Electronic document available at <http://www.sha.org/bottle/colors.htm>. Last accessed February 24, 2015.
 2015e "Bottle Typing (Typology) & Diagnostic Shapes." *Historic Glass Bottle Identification & Information Website*. Electronic document available at <http://www.sha.org/bottle/typing.htm>. Last accessed September 25, 2015.
 2015f "Glassmaking & Glassmakers: Bottle & Glass Makers Markings." *Historic Glass Bottle Identification & Information Website*. Electronic document available at <http://www.sha.org/bottle/makersmarks.htm>. Last accessed September 10, 2015.
- Lockhart, B.
 2004 The Dating Game: Owens-Illinois Glass Co. *Bottles and Extras* Summer:2-5.
 2006 The Color Purple: Dating Solarized Amethyst Container Glass. *Historical Archaeology* 40(2):45-56.
- Lockhart, B. and R. Hoenig
 2015 "The Bewildering Array of Owens-Illinois Glass Co. Logos and Codes." Electronic document available at <http://www.sha.org/bottle/pdf/OwensIllinois2015.pdf>. Last accessed September 10, 2015.
- Lockhart, B., B. Lindsey, D. Whitten and C. Serr
 2005 The Dating Game: The Illinois Glass Company. *Bottles and Extras* Winter:2-9.

- Lockhart, B., B. Schriever and B. Lindsey
 2015 The Dominion Glass Companies of Montreal, Canada. In *Encyclopedia of Manufacturer's Marks on Glass Containers: Volume D*, edited by The Bottle Research Group, pp. 141-172. Electronic document available online at <http://www.sha.org/bottle/pdf/ DominionGlass.pdf>. Last accessed September 15, 2015.
- Lockhart, B., B. Schriever, B. Lindsey, and C. Serr
 2013 Anchor Hocking Glass Corp. In *Encyclopedia of Manufacturers Marks: Volume A* by the Bottle Research Group, pp. 423-443. Electronic document available at <http://www.sha.org/bottle/pdf/ AnchorHocking.pdf>. Last accessed September 10, 2015.
- 2015a Fairmount Glass Works. In *Encyclopedia of Manufacturer's Marks on Glass Containers: Volume F*, edited by The Bottle Research Group, pp. 65-96. Electronic document available online at <http://www.sha.org/bottle/pdf/ FairmountGlass.pdf>. Last accessed September 25, 2015.
- 2015b Foster-Forbes Glass Co. In *Encyclopedia of Manufacturer's Marks on Glass Containers: Volume F*, edited by The Bottle Research Group, pp. 235-244. Electronic document available online at <http://www.sha.org/bottle/pdf/ FosterForbes.pdf>. Last accessed September 20, 2015.
- Lockhart, B., B. Schriever, C. Serr, B. Lindsey, and J. Sears
 2013 Ball Brothers Glass Mfg. Co. In *Encyclopedia of Manufacturer's Marks on Glass Containers: Volume B*, edited by The Bottle Research Group, pp. 51-80. Electronic document available online at <http://www.sha.org/bottle/pdf/ BallBros.pdf>. Last accessed September 15, 2015.
- Lockhart, B., P. Schulz, B. Schriever, B. Lindsey, C. Serr, and D. Whitten
 2013 Armstrong Cork Co. In *Encyclopedia of Manufacturer's Marks on Glass Containers, Volume A*, edited by The Bottle Research Group, pp. 445-454. Electronic document available at <http://www.sha.org/bottle/pdf/ ArmstrongCork.pdf>. Last accessed June 2, 2015.
- Lockhart, B., P. Schulz, B. Schriever, C. Serr and B. Lindsey
 2013 Brockway Machine Bottle Co. and Brockway Glass Co. In *Encyclopedia of Manufacturers Marks: Volume B* by the Bottle Research Group, pp. 311-338. Electronic document available at <http://www.sha.org/bottle/pdf/ Brockway.pdf>. Last accessed September 15, 2015.
- Lockhart, B., P. Schulz, C. Serr and B. Lindsey
 2007 The Dating Game: Thatcher Glass Mfg. Co. *Bottles and Extras* July-August:2-14.
 2008 The Knox Glass Bottle Co. *Bottles and Extras* May-June:2-11.
- Lofstrom, E. U., J. P. Tordoff, and D. C. George
 1982 A Seriation of Historic Earthenwares in the Midwest, 1780-1870. *The Minnesota Archaeologist* 41(1):3-29.
- Lorrain, D.
 1968 An Archaeologist's Guide to Nineteenth-Century American Glass. *Historical Archaeology* 2:35-44.
- Lovis, W. A.
 1978 *An Archaeological Survey of the Proposed US-31 Freeway, Mason County, Michigan: Washington Road to US-10*. Michigan State University Museum Archaeological Survey Report No. 29. Report submitted to the Michigan State Highway Commission by the Michigan State University Museum.
 1999 The Middle Archaic: Learning to Live in the Woodlands. In *Retrieving Michigan's Buried Past: The Archaeology of the Great Lakes State*, edited by J. R. Halsey, pp. 83-94. Bulletin No. 64, Cranbrook Institute of Science, Bloomfield Hills, MI.

- Lovis, W. A., A. F. Arbogast, and G. W. Monaghan
 2012 *The Geoarchaeology of Lake Michigan Coastal Dunes*. Michigan Department of Transportation Environmental Research Series, Vol. 2. Michigan State University Press, East Lansing.
- Madden, M. J. and J. C. Hardison
 2004 *An Easy Identification Guide and Typology for Eighteenth, Nineteenth and Twentieth Century Bottles*. Special Publication No. 42, Archeological Society of Virginia, Richmond. 2nd edition.
- Mansberger, F.
 1988 *The Archaeology of Historic Galena, Illinois*. Cultural Resources Study No. 7, Illinois Historic Preservation Agency, Springfield.
- Mascia, S. F.
 1994 *Climbing the Agricultural Ladder: An Archaeological and Documentary Case Study of the Transition from Tenant to Owner on a New England Farmstead*. Ph.D. dissertation, Department of Archaeology, Boston University. University Microfilms International, Ann Arbor.
- Mason, R. J.
 1981 *Great Lakes Archaeology*. Academic Press, New York.
- Mason County Business Guide
 1933 *History of Mason County*. Commercial Printing Company, Ludington, MI.
- Mason County Historical Society
 1978-1979 *Mason Memories* Vol. VI, No. 4.
 1980 *Historic Mason County*. Taylor Publishing Company, Dallas.
 1982 *Mason Memories* Vol. X, No. 4.
- Mason County Road Commission
 1949 *[Road Map of Mason County]*. Mason County Road Commission, Ludington, MI.
- Maxwell, D. B. S.
 1993 Beer Cans: A Guide for the Archaeologist. *Historical Archaeology* 27(1):95-113.
- McComsey, D. W.
 2002 Zinc-Carbon Batteries (Leclanché and Zinc Chloride Cell Systems). In *Handbook of Batteries*, 3rd edition, D. Linden and T. B. Reddy, eds., pp. 8.1-8.45. McGraw-Hill, New York.
- McCorvie, M. R.
 1987 *The Davis, Baldrige, and Huggins Sites: Three Nineteenth Century Upland South Farmsteads in Perry County, Illinois*. Preservation Series 4. American Resources Group, Ltd., Carbondale, IL.
- McPherron, A.
 1967 *The Juntunen Site and the Late Woodland Prehistory of the Upper Great Lakes Area*. Anthropological Papers No. 30, Museum of Anthropology, University of Michigan, Ann Arbor.
- Meyers, J. T.
 1970 *Chert Resources of the Lower Illinois Valley*. Illinois State Museum Reports of Investigation No. 18, Research Papers Vol. 2, Illinois Valley Archaeological Program, Springfield.

- Miller, G. L.
 1980 Classification and Economic Scaling of 19th-Century Ceramics. *Historical Archaeology* 14:1-40.
 1991 A Revised Set of CC Index Values for Classification and Economic Scaling of English Ceramics from 1787 to 1880. *Historical Archaeology* 25(1):1-25.
- Miller, G. L. and R. Hunter
 2001 How Creamware Got the Blues: The Origins of China Glaze and Pearlware. In *Ceramics in America 2001*, edited by R. Hunter, pp. 135-161. University Press of New England, Lebanon, NH.
- Miller, G. L., with contributions by P. Samford, E. Shlasko, and A. Madsen
 2000 Telling Time for Archaeologists. *Northeast Historical Archaeology* 29:1-22.
- Miller, G. L. and C. Sullivan
 1984 Machine-Made Glass Containers and the End of Production for Mouth-Blown Bottles. *Historical Archaeology* 18(2):83-96.
- Moffat, C. R., K. M. Hagenmaier, J. Lillis-Warwick, R. C. Chidester, M. L. Kagelmacher, M. R. Mock, and E. M. Tidlow
 2009 *Phase I Archaeological Survey, Garrison Creek Project, Boone County, Kentucky*. Two volumes. Report submitted to BBC&M Engineering, Dublin, OH, and the U.S. Army Corps of Engineers, Louisville District, by Commonwealth Cultural Resources Group, Inc., Jackson, MI.
- Munson, P. J.
 1988 Late Woodland Settlement and Subsistence in Temporal Perspective. In *Interpretations of Culture Change in the Eastern Woodlands during the Late Woodland Period*, edited by R. Yerkes, pp. 7-16. Occasional Papers in Anthropology No. 3, Ohio State University, Columbus.
- Nassaney, M. S., D. L. Rotman, D. O. Sayers, and C. A. Nickolai
 2001 The Southwest Michigan Historical Landscape Project: Exploring Class, Gender, and Ethnicity from the Ground Up. *International Journal of Historical Archaeology* 5(3):219-261.
- Nelson, B. and G. Nelson
 2008 "The Mazda Lamp Story ..." *Old Christmas Tree Lights: A History*. Electronic document available at http://www.oldchristmastreelights.com/the_mazda_lamp_story.htm. Last accessed October 1, 2015.
- Nelson, M. C.
 1991 The Study of Technological Organization. In *Archaeological Method and Theory*, vol. 3, edited by M.B. Schiffer, pp. 57-100. University of Arizona Press, Tuscon.
- Neumann, T. W. and R. M. Sanford
 1998 Cleaning Artifacts with Calgon. *American Antiquity* 63(1):157-160.
- Neusius, S. W.
 1986 Generalized and Specialized Resource Utilization During the Archaic Period: Implications of the Koster Site Faunal Record. In *Foraging, Collecting, and Harvesting: Archaic Period Subsistence and Settlement in the Eastern Woodlands*, edited by S. Neusius, pp. 117-143. Occasional Paper No. 6, Center for Archaeological Investigations, Southern Illinois University-Carbondale.
- Nilsson, J.-E.
 2012 "Japanese Porcelain Marks." *Antique Chinese and Japanese Porcelain Collectors' Help and Info Page*. Electronic document available at <http://www.gotheborg.com/marks/20thcenturyjapan.shtml>. Last accessed September 30, 2015.

- Noël Hume, I.
1969 *A Guide to Artifacts of Colonial North America*. Alfred A. Knopf, New York.
- Odell, G. H.
2003 *Lithic Analysis*. Springer Science + Business Media, New York.
- Ogden, J. G., III
1977 The Late Quaternary Paleoenvironmental Record of Northeastern North America. In "Amerinds and Their Paleoenvironments in Northeastern North America," edited by W. S. Newman and B. Salwen, pp. 16-34. *Annals of the New York Academy of Sciences* 288.
- Old Spice Collectibles
2012 *Old Spice Collectibles*. Electronic document available at <http://www.oldspicecollectibles.com/>. Last accessed October 1, 2015.
- Olsen, S. J.
1964 *Mammal Remains from Archaeological Sites, Part I: Southeastern and Southwestern United States*. Papers of the Peabody Museum of Archaeology and Ethnology 51(1), The Peabody Museum, Cambridge, MA.
1968 *Fish, Amphibian and Reptile Remains from Archaeological Sites, Part 1: Southeastern and Southwestern United States*. Papers of the Peabody Museum of Archaeology and Ethnology 56(2), The Peabody Museum, Cambridge, MA.
- Ozker, D.
1977 The Naugle Site, 20MD30, Midland County, Michigan: Early Late Woodland and Late Archaic Components on a Pine River Site. *The Michigan Archaeologist* 22:315-355.
- Page, H. R.
1882 *History of Mason County, Michigan*. H. R. Page, Chicago.
- Page, W. C.
2011 F. W. Fitch Company Historic District – National Register of Historic Places Nomination Form. Unpublished document available electronically at <http://www.nps.gov/nr/feature/places/pdfs/13000147.pdf>. Last accessed September 10, 2015.
- Peter Henderson & Co.
2002 [1898] *Turn-of-the-Century Farm Tools and Implements*. Dover Publications, Inc., Mineola, NY.
- Port Sheldon Township
2015 *Port Sheldon Township: Official Government Website for Port Sheldon Township, Michigan*. Electronic document available at <http://www.portsheldontwp.org/>. Last accessed November 5, 2015.
- Pregitzer, K. E.
1972 *Soil Survey of Ottawa County, Michigan*. United States Department of Agriculture, Soil Conservation Service, Washington, D.C.
- Procter & Gamble
2015 "History of Old Spice." *Old Spice Newsroom*. Electronic document available at http://news.oldspice.com/about/history_timeline. Last accessed October 1, 2015.
- Putnam, H. E.
1965 *Bottle Identification*. OTB Worldwide Publishers, Salem, OR.

- Rafferty, S. M.
 2000 A Farmhouse View: The Porter Site. In *Nineteenth- and Early Twentieth-Century Domestic Site Archaeology in New York State*, edited by J. P. Hart and C. I. Fisher, pp. 125-147. New York State Museum Bulletin 495. University of the State of New York and the State Education Department, Albany.
- Rasic, J. and W. Andrefsky, Jr.
 2001 Alaskan Blade Cores as Specialized Components of Mobile Toolkits: Assessing Design Parameters and Toolkit Organization through Debitage Analysis. In *Lithic Debitage: Context, Form and Meaning*, ed. W. Andrefsky, Jr., pp. 61-78. University of Utah Press, Salt Lake City.
- Raycraft, D. and C. Raycraft
 1990 *Collector's Guide to Country Stoneware and Pottery*. Collector Books, Paducah, KY.
- Ritchie, W. A.
 1961 *A Typology and Nomenclature of New York Projectile Points*. Bulletin No. 384, New York State Museum and Science Service, Albany.
- Robertson, J. A.
 1989 The Lithic Assemblage of 20SA581: Description and Analysis. In *Archaeological Investigations at the Weber I (20SA581) and Weber II (20SA582) Sites, Frankenmuth Township, Saginaw County, Michigan*, edited by W. A. Lovis, pp. 51-137. Michigan Cultural Resource Investigation Series Vol. 1, Michigan Department of the State and Michigan Department of Transportation, Lansing.
- Robertson, J. A., W. A. Lovis, and J. R. Halsey
 1999 The Late Archaic: Hunter-Gatherers in an Uncertain Environment. In *Retrieving Michigan's Buried Past: The Archaeology of the Great Lakes State*, edited by J. R. Halsey, pp. 95-124. Bulletin No. 64, Cranbrook Institute of Science, Bloomfield Hills, MI.
- Rockford Map Publishers
 1955 *Farm Plat Book, Ottawa County, Michigan*. Rockford Map Publishers, Rockford, IL.
 1961 *Farm Plat Book with Index to Owners, Mason County, Michigan*. Rockford Map Publishers, Rockford, IL.
 1966 *Tri-Annual Atlas & Plat Book, Mason County, Michigan*. Rockford Map Publishers, Rockford, IL.
 1969 *Triennial Atlas & Plat Book, Mason County, Michigan*. Rockford Map Publishers, Rockford, IL.
 1975 *Atlas & Plat Book, Mason County, Michigan*. Rockford Map Publishers, Inc., Rockford, IL.
 1976 *Ottawa County Plat Book, Centennial Edition*. Rockford Map Publishers, Inc., Rockford, IL.
- Rogers, L. D., C. J. Lutzow, and T. J. Martin
 1988 *The Ratchff (13MA400) and Storted/Crookham (13MA262) Sites: Data Recovery at Two Historic Farmsteads, Lake Red Rock, Iowa*. Cultural Resources Management Report No. 129, American Resources Group, Ltd., Carbondale, IL.
- Samford, P.
 1997 Response to a Market: Dating English Underglaze Transfer-Printed Wares. *Historical Archaeology* 31(2):1-30.
- Sawyers, J.
 1989 "Pere Marquette Makes a Tough Chicago 'First.'" *Chicago Tribune*, April 2.

- Schaetzl, R. J. and K. McWain
n.d. "Salt Brines." *GEO 333: Geography of Michigan and the Great Lakes Region*, edited by R. Schaetzl. Electronic document available at http://geo.msu.edu/extra/geogmich/salt_brines.html. Last accessed November 23, 2015.
- Schweikart, J. F. and K. Coleman
2003 After the Thaw: Investigation Results from a Nineteenth- to Mid-Twentieth Century Rural Upland South Community at a Cold War-Era Nuclear Facility in Pike County, Ohio. *Ohio Valley Historical Archaeology* 18:175-186.
- Shane, L. C. K.
1994 Intensity and Rate of Vegetation and Climatic Change in the Ohio Region between 14,000 and 9,000 ¹⁴C YR B.P. In *The First Discovery of America: Archaeological Evidence of the Early Inhabitants of the Ohio Area*, edited by W. S. Dancy, pp. 7-21. The Ohio Archaeological Council, Columbus.
- Shott, M. J.
1989 Technological Organization in Great Lakes Paleoindian Assemblages. In *Eastern Paleoindian Lithic Resource Use*, edited by C. J. Ellis and J. C. Lothrop, pp. 221-237. Westview Press, Boulder, CO.
1999 The Early Archaic: Life After the Glaciers. In *Retrieving Michigan's Buried Past: The Archaeology of the Great Lakes State*, edited by J. R. Halsey, pp. 71-82. Bulletin No. 64, Cranbrook Institute of Science, Bloomfield Hills, MI.
- Shott, M. J. and H. T. Wright
1999 The Paleo-Indians: Michigan's First People. In *Retrieving Michigan's Buried Past: The Archaeology of the Great Lakes State*, edited by J. R. Halsey, pp. 59-70. Bulletin No. 64, Cranbrook Institute of Science, Bloomfield Hills, MI.
- South, S. A.
1977 *Method and Theory in Historical Archeology*. Academic Press, New York.
- Standard Map Company
1915 *Atlas and Farm Directory of Mason County, Michigan*. Standard Map Company, Chicago.
- Steinhauer, C.
n.d. "Centerfire Shot Shells Page 1: Shot Shell Headstamp Identification." *Cartridge Corner*. Electronic document available at <http://members.shaw.ca/cartridge-corner/shotgun.htm>. Last accessed September 22, 2015.
- Stewart-Abernathy, L. C.
1986 *The Moser Farmstead, Independent but Not Isolated: The Archaeology of a Late Nineteenth Century Ozark Farmstead*. Arkansas Archaeological Survey Research Series No. 26. University of Arkansas, Fayetteville.
- Stillwell, L. N.
2005 *An Archaeological Field Reconnaissance of a Proposed Cellular Phone Tower (Project #050661) in Port Sheldon, Ottawa County, Michigan*. Report submitted to G2 Consulting Group by Archaeological Consultants of Ossian.
- Stine, L. F.
1990 Social Inequality and Turn-of-the-Century Farmsteads: Issues of Class, Status, Ethnicity, and Race. *Historical Archaeology* 24(4):37-49.

- Stothers, D. M.
1975 The Emergence and Development of the Younger and Ontario Iroquois Traditions. *Ontario Archaeology* 25:21-30.
1996 Resource Procurement and Band Territories: A Model for the Lower Great Lakes PaleoIndian and Early Archaic Settlement System. *Archaeology of Eastern North America* 24:173-216.

- Stothers, D. M., T. J. Abel, and A. M. Schneider
2001 Archaic Perspectives in the Western Lake Erie Basin. In *Archaic Transitions in Ohio and Kentucky Prehistory*, edited by O. H. Prufer, S. E. Pedde, and R. S. Meindl, pp. 233-289. The Kent State University Press, Kent, OH.

- Strohpaal, A. D.
n.d. "Indian Massacre Provided Ludington With First Name." Undated newspaper clipping, Local History Collection, Mason County District Library, Ludington, MI.

- Summit Township
2013 "History." *Summit Township*. Electronic document available at <http://summittownship.org/township-information/history/>. Last accessed November 24, 2015.

- Sussman, L.
1977 Changes in Pearlware Dinnerware, 1780-1830. *Historical Archaeology* 11:105-111.
1997 *Mocha, Banded, Cat's Eye, and Other Factory-Made Slipware*. Studies in Northeast Historical Archaeology No. 1, Council for Northeast Historical Archaeology, Boston.

- Taylor, K. C., E. Janulis, D. Seltz and S. B. Dunham
2006 *Phase I Archaeological Survey, Fort Custer Army National Guard Training Center, Kalamazoo and Calhoun Counties, Michigan*. Report submitted to the Potawatomi Resource Conservation & Development Area Council, Inc. by Commonwealth Cultural Resources Group, Inc., Jackson, MI.

- Toulouse, J. H.
1971 *Bottle Makers and Their Marks*. Thomas Nelson, Inc., New York.

- TripAdvisor LLC
2015 "Bortell's Fisheries, Ludington." *TripAdvisor*. Electronic document available at http://www.tripadvisor.com/Restaurant_Review-g42416-d1522973-Reviews-Bortell_s_Fisheries-Ludington_Michigan.html#photos. Last accessed November 24, 2015.

- U.S. Army Corps of Engineers
n.d. *Harbor Infrastructure Inventories: Ludington Harbor, Michigan*. Electronic document available at <http://www.lre.usace.army.mil/Portals/69/docs/Navigation/RiskCommunication/Ludington%20Harbor.pdf>. Last accessed November 24, 2015.

- U.S. Geological Survey
2015 *topoView*. Electronic database available at <http://ngmdb.usgs.gov/maps/topoview/>. Last accessed November 4, 2015.

- U.S. Patent and Trademark Office
2015 "Patent Full-Text and Image Database (PatFT)." Electronic database available at <http://www.uspto.gov/patents-application-process/search-patents#heading-1>. Last accessed September 4, 2015.

- Vajen and New
2004 [1884] *Collector's Encyclopedia of 19th Century Hardware with Price Guide on Cutlery Tools, Kitchen, Small Farm Equipment, and Miscellaneous Items*. Reprinted by L-W Book Sales, Gas City, IN.
- Wall, D. diZ.
1994 *The Archaeology of Gender: Separating the Spheres in Urban America*. Plenum Press, New York.
- Weir, D. J., W. L. Andrews, C. S. Demeter, and M. L. Jeakle
1993 *Phase I Archaeological Survey of the Proposed Campbell Ash Pond Expansion and 345 kV Line Relocation, Holland, Michigan*. Report submitted to Consumers Power Company by Commonwealth Cultural Resources Group, Inc.
- Weir, D. J., C. S. Demeter, and C. E. Larsen
1980 *Cultural Resource Management Assessment Study of Eight Candidate Power Plant Sites*. Commonwealth Cultural Resources Group, Inc., Jackson, MI.
- Wells, T.
1998 Nail Chronology: The Use of Technologically Derived Features. *Historical Archaeology* 32(2):78-99.
- Western Michigan Development Bureau
1918 *Western Michigan – The Land of Fruit and Fortune*. 1918 edition. Western Michigan Development Bureau, Grand Rapids, MI.
- Whitten, D.
2015a "Glass Manufacturer's Marks on Bottles." *Glass Bottle Marks*. Electronic document available at <http://www.glassbottlemarks.com/bottlemarks/>. Last accessed September 10, 2015.
2015b "Hazel-Atlas Glass Company (1902-1964)." *Glass Bottle Marks*. Electronic document available at <http://www.glassbottlemarks.com/hazel-atlas-glass-company/>. Last accessed September 10, 2015.
2015c "Kerr Glass Manufacturing Company ("Corporation" after 1927)." *Glass Bottle Marks*. Electronic document available at <http://www.glassbottlemarks.com/kerr-glass-manufacturing-corporation/>. Last accessed September 25, 2015.
- Wilson, J. S.
1990 We've Got Thousands of These! What Makes an Historic Farmstead Significant? *Historical Archaeology* 24(2):23-33.
- www.fruitjar.org
n.d. "How to Identify Hazel-Atlas..." Electronic document available at http://www.fruitjar.org/PlantCodes/Hazel%20Atlas_files/image002.jpg. Last accessed September 10, 2015.
- Young, A. L.
1994 Spatial Patterning on a 19th-Century Appalachian Houselot: Evidence from Nail Analysis. *Southeastern Archaeology* 13(1):56-63.
- Young, L.
2004 Plastics – The Good, the Bad and the Really Bad. *Journal of Middle Atlantic Archaeology* 20:113-118.

APPENDIX A
HISTORIC MAPS AND AERIAL PHOTOGRAPHS



APPENDIX B
LITERATURE REVIEW RESULTS



APPENDIX C
HISTORIC RESOURCES SURVEY PHOTOGRAPH LOG



APPENDIX D
ARCHAEOLOGICAL SURVEY PHOTOGRAPH LOG



APPENDIX E
PIGEON LAKE NORTH PIER PHOTOGRAPH LOG



APPENDIX F
ARTIFACT CATALOG

