MASTER PLAN OF ARCHAEOLOGICAL RESOURCES
CITY OF SAULT STE. MARIE

TECHNICAL REPORT

FINAL

Prepared for:

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EXECUTIVE SUMMARY

An approach to archaeological planning employing a comprehensive potential model is an effective response to an old problem — how to deal with evidence of the past that is, for the most part, not visible because it is buried underground (or under water). The City of Sault Ste. Marie has a long cultural history that begins thousands of years ago and continues to the present. The archaeological sites that are the physical remains of this lengthy settlement history represent a fragile and non-renewable cultural heritage resource.

The common response of "out of sight, out of mind," however, is no longer possible in today's political and legal climate. Recent court cases involving Aboriginal land claims, not to mention stop-work orders issued when human remains are uncovered on a development site, are but two examples of the ways in which archaeological resources affect property owners and the municipalities in which they are located. Policy initiatives, such as those found in the report of the Ipperwash inquiry, recommending that every municipality in Ontario adopt a master plan for archaeological resources so as to identify their flashpoints and put in place a way of dealing with them before they happen, coupled with more stringent heritage resource conservation policies in the Provincial Policy Statement (Planning Act), the Ontario Cemeteries Act, and the Ontario Heritage Act, require municipalities to more wisely plan for the conservation of archaeological resources. In other words, cities such as Sault Ste. Marie have no choice but to address archaeology, preferably by preparing studies of this nature.

The good news is that such studies are an excellent tool for municipalities. First, they tell you what has been found by providing an inventory and evaluation of known archaeological resources. Second, they tell you where undiscovered archaeological resources are most likely to be found by identifying areas of archaeological resource potential. Both of these inventories are mapped onto the City's GIS database, making them very accessible to staff and the public alike. Third, they tell you what to do with both the known and probable places in which archaeological resources are likely to be encountered, by providing the step by step process for managing such resources. Fourth, they structure this advice within a clear, logical framework based on an historical analysis of the city and using international best practices for preparing cultural resource management plans. In this way, they are effective and robust, able to withstand challenges and suited to updating as new information emerges.

Once a study of this nature is in place, the risk of unfortunate surprises occurring (such as disturbing a burial site) is significantly reduced, and public awareness of archaeological resources considerably increased. Property owners, developers, and prospective buyers know beforehand whether they will have to conduct archaeological investigations if they want to develop or redevelop a site. Citizens will know their community's history better and, it is hoped, appreciate its heritage more fully. And with more cultural heritage resources identified and interpreted within Sault Ste. Marie, tourists will have a greater selection of places to visit. Indeed, careful planning for the conservation and interpretation of cultural heritage resources will promote economic growth and offer opportunities for improving local quality of life.

In recognition of these facts, the City of Sault Ste. Marie retained Archaeological Services Inc. (ASI) to undertake this study.

The Potential Model for the City of Sault Ste. Marie had three major goals:

1) the compilation of inventories of registered and unregistered archaeological sites within the City and the preparation of an overview of the area's settlement history as it may be expected to pertain to archaeological resources;

2) the development of an archaeological site potential model, based on known site locations, past and present land uses, and environmental and cultural-historical data; and

3) a review of the current federal, provincial, and municipal planning and management guidelines for archaeological resources, as well as the identification of a new recommended management strategy for known and potential archaeological resources within the City.

To date, 36 archaeological sites have been registered within the City, which date from 10,000 years ago through to the nineteenth and early twentieth centuries.

In order to understand the manner in which additional, as yet undocumented archaeological sites may be distributed within the City, an archaeological potential model was developed using the City's Geographic Information System (GIS) to map various sets of information as separate, but complementary, layers of spatial data on 1:10,000 scale digital base maps. The zones of pre-contact archaeological potential were determined only after a detailed consideration of the past natural and cultural environments in the City. The zones were then based on distance to various forms of potable water, the locations of glacial beach ridges and slope attributes. Examination of the early historic mapping of the City, together with consideration of the basic historical themes that have been most influential in the development of the historic core of the City and the former townships of the City, led to the identification of areas of early settlement, commercial, industrial and transportation development and the mapping of these zones as areas of historic archaeological potential.

The final task in the analysis was to eliminate areas where previous development has resulted in extensive landscape disturbance. The remaining lands falling within the zones of pre-contact and historic potential encompass approximately 51% of the total landmass of the City. The tool that the City currently uses to require assessments, provided by the Ministry of Tourism and Culture, currently captures over 90% of the City.

The role of the municipality in the conservation of these resources is crucial. Planning and land use control are predominantly municipal responsibilities and the impact of municipal land use decisions on archaeological resources is significant, especially since municipally-approved developments constitute the majority of land disturbing activities in the Province. The primary means by which these resources may be protected is through the planning application process. Furthermore, review of development applications for archaeological resource concerns are made directly by the City. In recognition of these facts, the final task of this study was the identification of a series of policies for incorporation in the Official Plan and of practices within the development applications process that will ensure the conservation of these valuable cultural heritage resources within the overall process of change and growth in the City.

The results of this work were compiled in two reports entitled *Archaeological Potential Model for the City of Sault Ste. Marie, Technical Report* and *Planning for the Conservation of Archaeological Resources in the City of Sault Ste. Marie*, both dated September 2010.

The major recommendations resulting from this study include:

- It is recommended that the archaeological potential mapping be used in determining requirements for archaeological assessments.

- It is recommended that the Engineering and Planning Department work with City departments to establish protocols that ensure that in all appropriate circumstances, construction projects undertaken by developers, ratepayers and the City of Sault Ste. Marie that may impact archaeological resources on public lands (e.g., trail, playground, playing field, public washroom, parking lot construction, road widening/extension, trunk sewer and watermain construction, stormwater management facility construction, municipal building and structure construction, etc.) and which are located in areas of archaeological potential, are subject to archaeological assessment prior to any land disturbing activity.

- It is recommended that when there are any new designations of heritage properties (which include constructions dating before 1920) under Part IV of the Ontario Heritage Act, that the property footprint be added to the final potential mapping (Appendix B). If the newly designated property is surrounded by greenfields, the newly designated property should be buffered by 100 metres for archaeological potential.

- No Stage 4 archaeological investigations on Aboriginal sites should be undertaken within the City of Sault Ste. Marie without first filing a First Nations consultation report with the Engineering and Planning Department.

- Archaeological assessment reports should contain advisories on the steps to be taken should unanticipated deeply buried archaeological remains or human remains be found on a property during construction activities.

- In order to ensure the long term viability of the Archaeological Potential Model, it should be subject to periodic comprehensive review and should be carried out by a licensed archaeologist in co-ordination with the periodic review of the City's Official Plan

- Procedures outlined in the Memorandum of Understanding between the Ministry of Tourism and Culture and the City of Sault Ste. Marie should be followed regarding the sharing of information concerning archaeological site locations.

- It is recommended that the City develop and adopt, in consultation with the Ministry of Tourism and Culture, relevant Aboriginal communities, other agencies, landowners, and the public, a "Contingency Plan for the Protection of Archaeological Resources in Urgent Situations."

- The City of Sault Ste. Marie should implement a public awareness initiative by which the general public might be made more knowledgeable of the wide range of archaeological resources present within the City.

The City of Sault Ste. Marie should consider preparing both an accurate and comprehensive inventory of the archaeological collections currently held by museums and consulting archaeologists and a guideline encouraging the curation of material from archaeological sites within Sault Ste. Marie at local museums. In summary, cities can no longer avoid dealing with archaeological resources especially since provincial planning policy has been strengthened in this regard. More importantly, there are clear precedents in law that demonstrate the severe financial and political costs of avoiding this responsibility. Sault Ste. Marie is

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making a wise choice in building on their past commitment and joining with other major municipalities in Ontario (e.g., Muskoka, Ottawa-Carleton, Howland Township on Manitoulin Island, London, Toronto, Kingston, Region of Waterloo, to name only a few) in adopting progressive policies for the wise use and conservation of their archaeological records.

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1.0 INTRODUCTION

The role of the municipality in the conservation of archaeological resources is crucial. Planning and land use control are predominantly municipal responsibilities and the impact of municipal land use decisions on archaeological resources is significant, especially since municipally-approved developments constitute the majority of land disturbing activities in the Province. The primary means by which these resources may be protected is through the planning application process. Moreover, the review of development applications for archaeological resource concerns is now made directly by the City. In recognition of these facts, the City of Sault Ste. Marie retained *Archaeological Services Inc.* to prepare an archaeological potential study for the City. The ultimate objective of the project was the preparation of a planning study which identifies, analyses, and establishes priorities concerning archaeological sites located within the boundaries of the City.

The City has no comprehensive mapping for the amalgamated City or database for identifying areas of archaeological potential and for rationalizing requirements for archaeological assessments in advance of development. Indeed, it now relies on the application of generic Ministry of Tourism and Culture criteria which covers more than 90% of the City's lands.

Change and growth within the City must be guided by sound planning and management policies, all of which must be consistent with recent changes to provincial archaeological resource conservation legislation and policy. In the case of pre-contact archaeological sites, any efforts undertaken by the City to identify and protect such sites will be viewed very positively by First Nations. Any attempt to avoid this responsibility would be viewed very dimly by First Nations.

The study was designed within a framework that comprised three phases of research, the results of each of which are presented in two separate reports. Phases 1 and 2 entailed the collection, assessment and synthesis of information from various public and private sources. The major goals of this research were:

1) the compilation of inventories of registered and unregistered archaeological sites and of lands that no longer have archaeological integrity due to previous development activity;

2) the preparation of an overview of the settlement history of the City, as it may be expected to pertain to archaeological resources; and

3) the development of an archaeological site potential model based on known site locations, past and present land uses, and environmental and cultural-historical data.

The final task of the research was the identification of a series of policies for incorporation in the Official Plan, and of practices within the development applications process that will ensure the conservation of these valuable cultural heritage resources within the overall process of change and growth in the City.

The results of the technical research and modeling are fully presented in the companion volume to this document, which is entitled *Master Plan of Archaeological Resources, City of Sault Ste. Marie, Technical Report*. This document presents a discussion of the implications of the archaeological potential modeling exercise and a review of the current planning and management guidelines for archaeological resources that have been developed by various jurisdictions. It further identifies a recommended management strategy for known and potential archaeological resources within the City.

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1.1 Defining Archaeological Resources

The 2005 Provincial Policy Statement defines archaeological resources (Section 6.0, Definitions) as including “artifacts, archaeological sites and marine archaeological sites.” Individual archaeological sites (that collectively form the archaeological resource-base) are distributed in a variety of locational settings across the landscape, being locations or places that are associated with past human activities, endeavours, or events. These sites may occur on or below the modern land surface, or may be submerged under water. The physical forms that these archaeological sites may take include: surface scatters of artifacts; subsurface strata which are of human origin, or incorporate cultural deposits; the remains of structural features; or a combination of these attributes. As such, archaeological sites are both highly fragile and non-renewable.

The Ontario Heritage Act (Ontario Regulation 170/04) defines "archaeological site" as “any property that contains an artifact or any other physical evidence of past human use or activity that is of cultural heritage value or interest’; "artifact" as “any object, material or substance that is made, modified, used, deposited or affected by human action and is of cultural heritage value or interest”; and "marine archaeological site" as “an archaeological site that is fully or partially submerged or that lies below or partially below the high-water mark of any body of water”. Archaeological fieldwork is defined as “any activity carried out on, above or under land or water for the purpose of obtaining and documenting data, recovering artifacts and remains or altering an archaeological site and includes monitoring, assessing, exploring, surveying, recovering and excavating.”

2.0 THE ARCHAEOLOGICAL RESOURCES OF THE CITY OF SAULT STE. MARIE: AN OVERVIEW

2.1 Pre-contact Cultural-Historical Outline for Sault Ste. Marie

For over ten millennia, temporary encampments and semi-permanent villages of various sizes were established along the river valleys and lake shores of northern Ontario. The Aboriginal occupants of these sites left no written record of their lives. However, their legacy includes the oral histories and traditions passed on to their descendants and the archaeological traces of their settlements. There tends to be little widespread awareness of the depth of this pre-contact settlement history or general knowledge of the societies that inhabited Ontario prior to the onset of Euro-Canadian settlement. The terms used to describe the temporal periods were developed during the last century to recognize key shifts in environmental adaptation, subsistence strategies or technologies.

The chronological ordering of this review of the study area's pre-contact history is made with respect to three temporal referents: B.C. - before Christ; A.D. - Anno Domini (in the year of our Lord); and B.P. - before present (1950).

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Table 1: Sault Ste. Marie Culture-History

Date	Period
A.D. 1,900 - Present	Recent Historic
A.D. 1,867 - A.D. 1,900	Post-Confederation
A.D. 1,820 - A.D. 1,867	Pre-Confederation
A.D. 1,760 - A.D. 1,820	Late Historic
A.D. 1,680 - A.D. 1,760	Middle Historic
A.D. 1,600 - A.D. 1,680	Early Historic
A.D. 900 - A.D. 1,650	Late Woodland
400 B.C. - A.D. 900	Middle Woodland
1,000 B.C. - 400 B.C.	Early Woodland
2,500 B.C. - 1,000 B.C.	Late Archaic
6,000 B.C. - 2,500 B.C.	Middle Archaic
7,000 B.C - 6,000 B.C	Early Archaic
9,000 B.C. - 7,000 B.C.	Paleo-Indian

To date, 38 pre-contact and historic sites have been registered within the City of Sault Ste. Marie. Most of these were registered by Thor Conway during his extensive research of the area during the 1970s (1980:1-28).

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Table 2: Registered Sites within Sault Ste. Marie

Borden	Name	Site type	Affiliation	Researcher
CcIc-1	Pointe aux Pins	Findspot	Unknown	J.V. Wright
CcIc-2	Furkey	Undetermined	Early Historic	T. Conway, 1975
CcIc-3	Black Thistle	Campsite	Middle Woodland Late Woodland; Middle Historic	T. Conway, 1975
CcIc-4	La Salamandre	Undetermined	Late Archaic	T. Conway, 1975
CcIc-5	Par Point	Undetermined	Late Archaic	T. Conway, 1975
CcIc-6	Money Musk	Undetermined	Late Archaic	T. Conway, 1975
CcIc-7	Boy's O' The Lough	Undetermined	Unknown	T. Conway
CcIc-8	Marks Bay	Undetermined	Late Archaic	T. Conway, 1975
CcIc-9	Swale	Undetermined	Late Archaic	T. Conway, 1975
CcIc-10	Harvest Home	Lithic scatter	Late Archaic	T. Conway, 1975
CcIc-11	Virene	Undetermined	Late Archaic	T. Conway, 1975
CcIc-12	Carolina Buzzbomb	Undetermined	Late Archaic	T. Conway, 1975
CcIc-13	Planxty	Undetermined	Unknown	T. Conway
CcIc-14	Pointe Louise	Campsite	Late Woodland; Middle Historic; Late Historic	T. Conway, 1975
CcIc-15	Maids O'Mull	Campsite	Late Woodland	T. Conway, 1975
CcIc-16	Eroded Burial	Undetermined	Unknown	T. Conway, 1975
CcIc-17	Point Underwater	Midden	Archaic; Historic	T. Conway, 1980
CcIc-19	Polli	Undetermined	Archaic	G. Rachnovich, 1990
CdIb-2	Ermatinger	Campsite	Early Historic; Post-Confederation	C.S.P. Reid, 1974
CdIb-3	Curran	Undetermined	Late Archaic	T. Conway, 1975
CdIb-4	Mystery Hand	House	Early Historic	T. Conway, 1975
CdIb-5	Falconer	Undetermined	Early Historic	T. Conway, 1975
CdIb-6	Soo College	Undetermined	Late Archaic	T. Conway, 1981
CdIb-7	Vet	Campsite	Archaic	T. Conway
CdIb-8	Moerman	Campsite	Archaic	T. Conway, 1983
CdIb-9	Crystal Creek	Findspot	Archaic	T. Conway, 1983
CdIc-1	Sault Hudson Bay Co. Post	Campsite	Pre-Confederation	T. Conway, 1975
CdIc-2	Whitefish Island	Campsite	Middle Woodland – Laurel complex; Late Woodland; Pre-Confederation; Post-Confederation	T. Conway, 1975
CdIc-3	Northwest Co. Lock	Canoe lock	Late Historic	T. Conway, 1975
CdIc-4	Tancred	Burial	Early Historic	T. Conway, 1975
CdIc-5	Base Line	Campsite	Late Archaic	T. Conway, 1975
CdIc-6	Korah	Campsite	Late Archaic	T. Conway, 1975
CdIc-7	Copper Cache	Cache	Late Archaic	T. Conway
CdIc-8	Korah School	School	Historic	K. Buchanan, 1984
CdId-3	Copper Serpent Site	Undetermined	Late Archaic	T. Conway, 1975
CdId-4	Nanabush Grandmother Rocks (Daigle Garden Site)	Religious station	Middle Archaic	T. Conway, 1975
CdId-5	Chene Island	Campsite	Archaic	T. Conway, 1983
CdId-6	McKiggan	Findspot	Woodland	T. Conway, 1981

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2.1.1 The Paleo-Indian Period (c. 11,000-8,000 B.P.)

In regions south of the Great Lakes, Early Paleo-Indian groups were present between 11,000 and 10,000 B.P. Evidence concerning these people is very limited since populations were not large and since little of the sparse material culture of these nomadic hunters has survived the millennia. Virtually all that remains are the tools and by-products of their sophisticated flaked stone tool industry. Characteristic Lakehead Complex tools include large lanceolate projectile points, bifacial leaf-shaped and semi-lunate knives, and a variety of unifacial scrapers and gravers. During this period, there was a marked preference for lithic raw materials derived directly from bedrock outcrops, rather than from secondary sources such as glacial till. Paleo-Indian populations in northwestern Ontario obtained jasper taconite tool stone from one of several sources located in the region. Jasper taconite is a very distinctive flint-like material that has a maroon colour with variegated bands of reddish brown (Figure 1).

Figure 1: Jasper Taconite

Given the tundra- or taiga-like environment which prevailed during this period, and the locations of their hunting camps, it has generally been postulated that the Paleo-Indian subsistence economy focused on the hunting of large Pleistocene mammals such as mastodon, moose, elk and especially caribou. Of particular interest in this regard is the frequent location of the larger Paleo-Indian sites adjacent to the strandlines of large pro- and post-glacial lakes. This settlement pattern has been attributed to the strategic placement of camps, representing larger population aggregates, in order to intercept migrating caribou herds. This traditional view of Paleo-Indian subsistence practices is currently being modified, as it is becoming more apparent that smaller game and fish were also important dietary contributors.

Whether the Paleo-Indians were dependent on the constantly moving herds or on less communal species, these subsistence strategies would have necessitated that social groups remain relatively small and egalitarian. These highly mobile bands probably moved in seasonal patterns throughout very large territories.

Hunter-gatherer bands occupied the Sault Ste. Marie area beginning about ten thousand years ago as suggested by the discovery of Late Paleo-Indian artifacts about one kilometre north of Leigh Bay (Dalla Bona, personal communication, April 2010). Paleo-Indian hunters would have been living on the receding shoreline of glacial Lake Algonquin.

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2.1.2 The Archaic Period (c. 8,000 - 3,000 B.P.)

Very few confirmed Early or Middle Archaic sites have been recorded in the Canadian Shield. However, in the area to the south there are numerous finds of projectile points which are diagnostic of this period. It was during this period that present day plant and animal communities were becoming established.

Archaeological data relevant to the Late Archaic period, however, are rather more abundant. By this stage, almost every lake and river system in northern Ontario had been occupied or traveled across (Figure 2).

Figure 2: Landscape during the Archaic period

The Late Archaic artifact assemblage and subsistence and settlement patterns were relatively uniform for a long period of time over a large area. Sites normally occur as small, thin scatters of flakes, and occasionally, include a hearth feature. Given the length of time encompassed by this cultural period and the typically small size and short term occupation of its sites, most Archaic sites manifest themselves as ephemeral lithic scatters which lack diagnostic artifacts.

During the Archaic period, people developed an adaptation to the environment that involved the use of many diverse animal and plant resources. Exploitation of these resources required being in specific places at certain times of the year (e.g., fish spawning areas, moose yards, berry patches, beaver ponds). This resulted in a set pattern of repetitive seasonal movements through a territory. Fishing became a more important part of the subsistence base, and the widespread use of canoes probably developed in this period. The annual subsistence cycle probably involved interior fall and winter microband hunting camps, which were situated in areas known to be frequented by large game, and larger spring and summer macroband settlements, which were located near river mouths and lakeshores in order to exploit rich aquatic resources (Figure 3).

Figure 3: Typical Hunter-Gatherer period settlement

Archaic artifact assemblages are characterized by the presence of biface and uniface blades, stemmed and side-notched projectile points, large and variable slate and greywacke choppers, a relatively high proportion of a variety of scrapers, knives, stone axes, as well as groundstone gouges and tetrahedral adzes. Large axes, socketed spear points, pendants and chisels cold-hammered from copper obtained from Lake Superior sources are also frequently reported on Archaic sites.

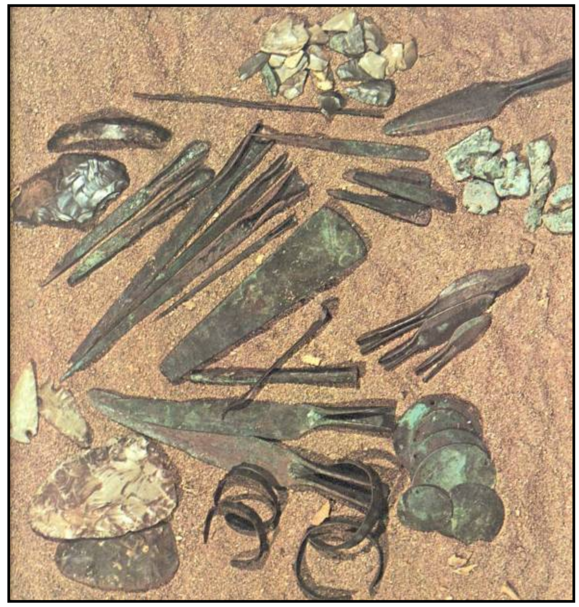

Figure 4: Native copper artifacts

These copper artifacts were manufactured from native copper that was either mined from massive deposits found in the Lake Superior basin or from pure nuggets or float copper found in glacial deposits and stream beds (Figure 4). The copper was heated to anneal or soften it and then cold hammered to the desired shape. There is no evidence that copper was smelted or poured into molds in pre-contact North America. Copper artifacts from the Lake Superior area are found throughout the Great Lakes area having been an important long distance trade item.

One of the earliest known sites in Sault Ste. Marie is the Nanabush Grandmother Rocks Site (also known as the Daigle Garden Site), CdId-4. Located on the reefs just west of Gros Cap, the site consists of a small artifact assemblage including a large flaked and pecked stone pick. The site is considered to have religious significance for the Ojibway and according to legend, the rocks represent the grandmother of Nanabush, a prominent figure in Ojibway mythology.

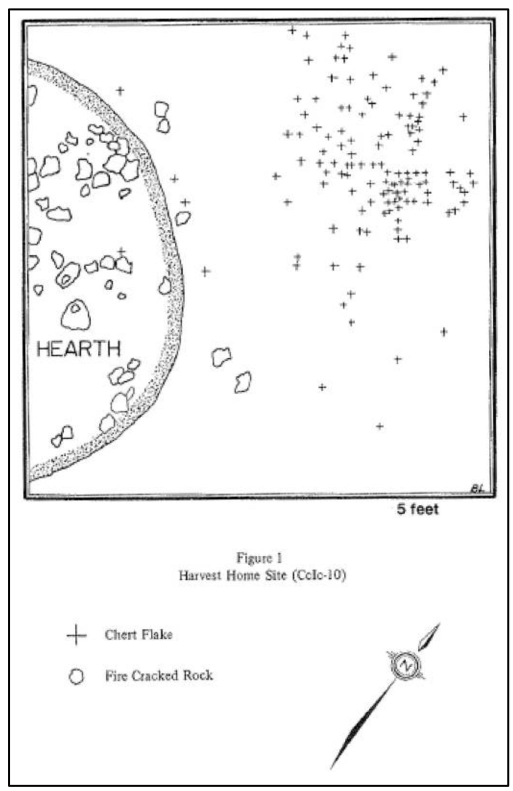

Figure 5: Site plan for the Harvest Home site (CcIc-10) (Conway 1979:5)

The Base Line Site (CdIc-5) is a Late Archaic Site consisting of four artifacts including stone adzes and bipointed bifaces and scrapers made of quartzite. Other Archaic sites found were the Curran Site (CdIb-3), consisting of a polished stone axe, and the Copper Serpent Site (CdId-3), consisting of a copper effigy of a serpent with a thin ovate head and sinuous body. The latter site was destroyed during activities related to road widening.

Small sized Late Archaic sites, known as the Mark's Bay complex, have been found along St. Mary's River. The Harvest Home site (CcIc-10) consists of a hearth and lithic scatter where as excavations at the Money Musk site (CcIc-6) resulted in the discovery of two hearths and a lithic scatter as well (Figure 5). The Money Musk site's artifact assemblage includes scrapers, side -notched projectile points and bifaces. The Par Point (CcIc-5) site yielded a triangular adze preform and the La Salamandre (CcIc-4) site yielded a finished gouge and an adze. The Mark's Bay (CcIc-8), Virene (CcIc-11), Korah (CdIc-6), Carolina Buzzbomb (CcIc-12) and Swale (CcIc-9) sites are other significant Late Archaic sites found in Sault Ste. Marie, all with a similar assortment of artifacts such as scrapers, notched projectile points and adzes.

The materials used to manufacture tools and artifacts in the Archaic period include copper, quartzite, quartz and various types of cherts including Gordon Lake and variegated cherts. Quartzite was used extensively at the beginning of the Archaic phase, however, the end of the era was marked by a reduced usage of the material, probably due to the discovery of new raw materials.

2.1.3 The Early Woodland Period (c. 3,000-1,500 B.P.)

The Early Woodland period is poorly represented in the Shield area and until recently was subsumed in Ontario under a "catch-all" referred to as Initial Woodland. However, it appears that artifacts related to the Meadowood Phase of the lower Great Lakes Early Woodland period do appear in the Shield area.

The Early Woodland period differed little from the previous Late Archaic period with respect to settlement-subsistence pursuits, with the exception of the introduction of ceramics into Ontario, it was also a period of increasing social or community identity. In southern Ontario, this latter attribute is especially evident in changes to, and elaboration of, mortuary ceremonialism.

Early Woodland cemeteries contain evidence of ritual behaviour such as the application of large quantities of symbolically important red ochre to human remains. In addition, they often contain grave offerings of art indicative of prevailing social and spiritual perspectives. Much of this art is fabricated from exotic raw materials such as native copper from the western end of Lake Superior, and as in the case of certain ground slate objects, it displays a considerable investment of time and artistic skill. Moreover, the nature and variety of these exotic grave goods suggests that members of the community outside of the immediate family of the deceased were contributing mortuary offerings. Thus, social integration during the Early Woodland period appears to have increased and expanded relative to earlier times.

No Early Woodland sites have been found in Sault Ste. Marie.

2.1.4 The Middle Woodland Period (c. 1,500 - 1,000 B.P.)

The Middle Woodland period is manifested across northern Ontario and in northern Minnesota by a set of sites with similar artifact assemblages. These sites extend from Quebec to Minnesota and, with regional variations, exhibit similar artifact inventories, subsistence, and settlement patterns.

Remains from these sites show a strong riverine and lake adaptation. The subsistence strategies during this period involved, like the Archaic period, a wide range of faunal and floral resources. Seasonal gatherings of people for subsistence and social purposes began to occur during this period, resulting in the appearance of large settlements at prime fishing locations. A burial mound, for example, occurs in the Killarney area northeast of Georgian Bay, and later mounds are known from the Rainey River area of northwestern Ontario, indicating a strongly developed mortuary practice influenced by the Hopewell groups of the Ohio valley (Figure 6). The grave offerings associated with these burials continued to place an emphasis upon the exotic origin of raw materials. These developments suggest that changes first evidenced in the preceding Early Woodland period continued to develop and be expanded upon.

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Figure 6: Construction of Burial Mound

In northern Ontario, this period saw the addition of pottery and net-sinkers to the artifact assemblage (Figures 7 and 8). The artifact assemblage is also characterized by distinctive side-notched projectile points, small blade knives, great numbers of scrapers, bone harpoons, and use of native copper. The pottery is finely made, thin, ware with numerous rows of a variety of stamped patterns decorating the shoulders, necks, and/or collars of the conically shaped vessels.

Figure 7: Middle Woodland ceramics

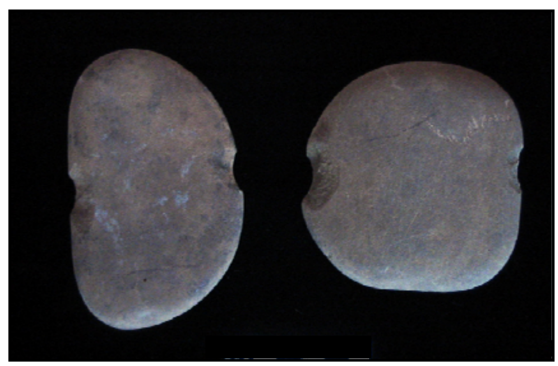

Figure 8: Examples of Net-sinkers

Many Middle Woodland groups passed through the Sault Ste. Marie area. The Black Thistle site (CcIc-3), located near Point Louise, consists of an artifact assemblage with decorated ceramics and lithic artifacts including projectile points, scrapers and preforms, as well as awls made from copper. Whitefish Island (CdIc-2) also consists of Middle Woodland components.

2.1.5 The Late Woodland Period (c. 1,000 B.P.- contact)

This is the period prior to the arrival of Europeans and their trade goods. Before the European arrival, however, extensive exchange systems had already developed between the Nipissing, Odawa, Ojibway and

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Cree of northcentral and northeastern Ontario and the Huron and other Iroquoian groups to the south. The Nipissing, in particular appear to have played an important role in this trade in the upper Great Lakes.

Sites from this period appear to be more numerous than the previous periods and the pattern of large seasonal settlements appears to have remained well established from the Middle Woodland period.

In northern Ontario, three ceramic traditions predominate during the Late Woodland period. Blackduck ceramics are generally characterized by a variety of cord-wrapped object impressions over the whole pot while Selkirk decorations consist of fabric impressions on the body of the vessel and a variety of decorations between the shoulder and the lip, consisting of cord-wrapped object impressions, incised impressions, punctates and bosses (Figure 9). In the southern Canadian Shield, castellations and distinctive decorative motifs on the vessel rims indicate Iroquoian influence.

Figure 9: Blackduck ceramics

In addition to these ceramics, the Late Woodland artifact assemblage is characterized by small triangular and side-notched projectile points, use of relatively unmodified greywacke flake or spall tools, flat slate knives, and, towards the end of the period, clay smoking pipes.

A variety of Late Woodland sites have been discovered in Sault Ste. Marie. These sites are either large multi-component sites or smaller sites with multi-component artifacts. The Black Thistle (CcIc-3), Maids O' Mull (CcIc-15) and Point Louise (CcIc-14) sites are representative of the smaller sites which are thought to be summer fishing campsites. The Whitefish Island site (CdIc-2) is a large multi-component site representing five different temporal periods. Artifacts include ceramics and stone tools and the settlement patterns indicate an Ojibway summer village, perhaps the focus of large seasonal gatherings in the area.

During the Late Woodland phase, Hudson Bay Lowland chert was commonly used to manufacture tools, especially scrapers. Typical artifact assemblages from this phase include chert knives, scrapers and ceramics. In fact, there have been fragments of over 2,000 vessels found in the Sault Ste. Marie area. These ceramics display similarities with styles from surrounding areas such as Michipicoten and Agawa Bay. Ceramic assemblages found at City sites from this time also consist of Iroquoian style of vessels including low and high collared vessels with typical Iroquoian designs.

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2.1.6 The Contact Period (c. A.D. 1600 - 1900)

The end of the Late Woodland period in northern Ontario is marked by the appearance of European trade goods c. A.D. 1600. In the fur trade, which was to subsequently develop, Anishnawbe people continued to play an important role, although this became increasingly difficult due to the disruption caused by the dispersal of the Ontario Iroquoian groups by the Five Nation Iroquois from New York State. Following the dispersal of the Ontario Iroquoians, the Five Nation Iroquois continued to exert pressure on northern Algonquian speaking peoples such as the Ojibway.

The eighteenth century is marked by a predominance of European derived trade goods on Aboriginal sites and the appearance of Euro-Canadian sites related to domestic and fur trade activities.

Several Early Historic sites have been encountered in Sault Ste. Marie. The Falconer site (CdIb-5) is an early historic site located in the downtown area of Sault Ste. Marie. Early historic artifacts, a burial and stone pipe bowl were found at the Tancred site (CdIc-4), located near the mouth of the Fort Creek. The Mystery Hand site (CdIb-4) is believed to be an unrecorded mission as artifacts including a brass crucifix were found in 1923. The Furkey site (CcIc-2) consists of interments and associated artifacts including trade beads and projectile points. Another historic Aboriginal burial ground was located on Point Louise.

Whitefish Island is known to have artifacts from the entire historic period. Pine forests located along the upper St. Mary's River is also an area associated with long-term usage as for shipbuilding activities as De la Ronde set up a shipbuilding yard to construct a schooner and Alexander Henry also built ships in the area. These two locations could be the Point Louise and Black Thistle sites as their artifact assemblages also included iron awl, hand-wrought nails and early brass buttons.

The Point Aux Pins area was used extensively by the North West Company and the Hudsons Bay Company to build boats and schooners as evidenced by the numerous findings from the middle and late historic time periods.

Excavations at the Ermatinger site (CdIb-2) were conducted in 1974 by C. S. Paddy Reid and artifacts representing several temporal periods were found. These were the early historic period, the late historic period and the post-confederacy period. The Hudson's Bay Company post (CdIc-1) is also a significant historic site although the vast majority of the site has been destroyed. Only the powder magazine remains extant as it was later converted to a house by Francis Clergue. Clergue was responsible for discovering and reconstructing the original lock (CdIc-3) which is still extant.

3.0 OVERVIEW OF THE ABORIGINAL TRADITIONAL LAND USE IN THE SAULT STE. MARIE AREA

3.1 Ojibway Communities

3.1.1 Garden River First Nations

The Sault Ste. Marie area was traditionally controlled by Ojibway-Chippewa-Algonquin nations, who are also known as the Anishnawbe. When the Robinson Huron Treaty was negotiated with the Government of Canada during the mid-nineteenth century, the Garden River Reserve was created for the Ojibway population.

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Very little information is known about the Band prior to European contact as the Ojibway relied on Elders to pass on oral history, rather than keeping a written account. As such, the written record of the Band starts with Chief Shingwaukonce and his two sons, Augustine and Buhgujjenene.

Under the leadership of Chief Shingwaukonce, warriors from the Sault Ste. Marie area joined forces with the British during the war of 1812 and Shingwaukonce was awarded a medal from the British government for his help to defend Canada. The Ojibway people were also involved in the Canadian Military during World War I and World War II. It is evident that the Garden River Band of Ojibways has been instrumental in the development of Canada and the Sault Ste. Marie area (Garden River 2001).

3.1.2 Batchewana First Nations

When the Chiefs and Warriors of Batchewananny and Goulais Bay Bands signed the Pennefather Treaty on June 9, 1859, they gave up the lands that were reserved for them per the Robinson Huron Treaty of 1850. The area they surrendered was described as "The tract of land extending from Wanabekinegunning, west of Gros Cap, to the boundary of the lands ceded by the chiefs of Lake Superior and inland ten miles throughout the whole distance including Batchawananny Bay." There were seven conditions to this surrender which included that they would retain rights to Whitefish Island, that the money from the sale of the tract would be given to the Band members, and that each family be given 40 acres of land on the Garden River Reserve. Most of the conditions were not honoured.

Since the Pennefather Treaty, the Batchewana First Nations have successfully acquired land in several areas including Goulais Bay Reserve which was among the surrendered lands. In 1939, they purchased Rankin Location which was established as a reserve in 1952. Whitefish Island was returned to the Batchewana First Nation in 1992 and it was officially designated as a reserve in 1997 (Batchewana First Nation 2010).

3.2 Ojibway Traditional Land Use in the Sault Ste. Marie Area

3.2.1 Preface

The Great Spirit once made a bird, and he sent it from the skies to make its abode on earth. The bird came, and when it reached halfway down, among the clouds, it sent forth a loud, far sounding cry, which was heard by all who resided on the earth, and even by the spirits who make their abode within its bosom. When the bird reached within sight of the earth, it circled slowly above the Great Fresh Water Lakes, and again uttered its echoing cry. Nearer and nearer it circled, looking for a resting place till it lit on a hill overlooking Boweting [Sault Ste. Marie]; here it chose its first resting place, pleased with the numerous whitefish that glanced and swam in the clear waters and sparkling foam of the rapids… A large town was congregated, and the bird whom the Great Spirit sent presided over all (Warren 1885: 51-52).

3.2.2 Sault Ste. Marie—The Centre of the Ojibway World

Most Ojibway across the upper Great Lakes and throughout the northern United States identify *Bawating*, the original name for the Sault Ste. Marie area, as the centre of the Ojibway world. History, legends and archaeological heritage have marked the landscape along the St. Mary's River. Sault Ste. Marie remains home to the Ojibway and many people with Ojibway ancestry. Over thousands of years, the ancestors of the local First Nations carefully used a series of traditional sites that ranged from settlements and campsites, to food sources such as fisheries and maple groves, and specialized mineral locations. Other aspects of traditional land use included winter and summer travel routes and plant medicine locations. A series of sacred sites unified the traditional lands and reinforced the bond between living people, their ancestors and the landscape.

3.2.3 Legends of the Midewewin Migration

The conservative religious institution known as the *Midewewin* or Grand Medicine Society preserved traditions about the long history of the Ojibway people. The Sault Ste. Marie area, *Bawating*, is identified in *Midewewin* texts and oral transmissions as a spiritual and settlement centre on the migration route (Dewdney 1975: 70). Modern Midewewin leaders identify *Bawating* as the location of the Fifth Fire—a cultural landmark (Benton-Banai 1988: 98-102).

In this setting, the Ojibway cultural heritage of the Sault Ste. Marie area occupies both a local level of significance and a continental level of significance. The other locations specified in the *Midewewin* migration accounts also have this status.

3.2.4 Historic Ojibway Land Use

The French explorer Nicholas Perrot provided insights into seasonal settlement patterns in the Sault Ste. Marie area:

> This [Saulteur] tribe is divided: part of them have remained at home to live on this delicious fish in autumn, and they seek their food in Lake Huron during the winter; the others have gone away to two localities on Lake Superior, in order to live on the game which is very abundant.

The “two localities” were located south into the forests of areas now covered by the states of Minnesota and Wisconsin where the Ojibway clashed with Siouan groups, and north along the shoreline and river valleys draining into Lake Superior such as the Batchewana and Michipicoten Rivers where Ojibway hunting grounds extended inland to the height of land.

The same land use patterns continued well into the nineteenth century. After the War of 1812 when a somewhat firm boundary divided the United States from Canada, the Sault Ste. Marie area Ojibway structured their world along the north shore of the St. Mary’s River from Gros Cap at the entrance of Lake Superior to St. Joseph Island at the entrance to Lake Huron.

3.2.5 Geographical Overview

According to tribal leaders interviewed in the nineteenth century, the Sault area Ojibway lands extended from the Agawa Bay area on the north shore of Lake Superior down the coast to Batchewana Bay, to the St. Mary’s River to St. Joseph Island and Drummond Island at the northwestern edge of Lake Huron. Numerous traditional settlement locations were used throughout this vast area by the Lake Superior Ojibway.

Prior to the War of 1812 and the firmer establishment of the international boundary between Ontario, Canada and Michigan in the United States, the Sault area Ojibway traditional territory included lands

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along the southern shore of Lake Superior on Whitefish Bay and the Tahquamenon River, across the eastern Upper Peninsula of Michigan and into the Straights of Mackinac area.

Their family hunting and trapping territories covered lands throughout the Batchewana River, Goulais River and Garden River watersheds (Chute 1998: 64-65). Tribal elders interviewed in the 1980s by Thor Conway re-confirmed the placement of these traditional lands.

The same traditional lands subsequently were covered by a series of treaties—notably the Robinson–Huron Treaty and the Robinson–Superior Treaty signed in 1850. The Pennefather Treaty of 1859 greatly reduced the lands and legal setting of Ojibway groups in the areas west and north of Sault Ste. Marie.

3.2.6 The Spiritual Landscape

All Anishnawbe tribal groups regard the land as their direct ancestor. Tribes and individuals maintain personal relationships with their lands through sacred sites. In the greater Sault Ste. Marie area, several sacred sites have been identified such as Grandmother Rock near Gros Cap, Whitefish Rapids, the home of the Crane Clan, Trap Rock on the Garden River First Nation lands and Nanabush Rock near St. Joseph Island. Since the spiritual landscape of the Ojibway influences all aspects of traditional land use, these sacred sites are described in their geographic locations along with other traditional sites.

3.2.7 St. Mary's River Corridor

Archaeological evidence demonstrates that the eastern Lake Superior Ojibway have been settled along the St. Mary's River corridor for several thousand years. Tribal elders interviewed by Thor Conway in the 1970s and 1980s maintained that their ancestors always lived in the area since the last Ice Age. The intensive concentrations of archaeological sites and traditional land use locations certainly support a long presence in the area. The traditional sites are described in this report starting at Gros Cap at the outlet of Lake Superior and moving east and southeast down the St. Mary's River to Lake Huron.

3.2.8 Gros Cap

The sheltered area behind the famous headland known as Gros Cap at the entrance to Lake Superior has been identified by local Ojibway elders as a traditional settlement site and a summer gathering spot where visiting members of other Ojibway groups would meet.

Archaeological evidence supports the great antiquity of the seasonal settlement and meeting place sites at Gros Cap. The archaeological site recorded as the Metal Toad site (CdId-1) received its unusual name from an Ojibway tale. The Metal Toad site (CdId-1) at Gros Cap contained a large variety of artifacts interpreted as items associated with local Ojibway families over the past 2,000 years and artifacts left by visiting native groups. The nearby Grand Cape site (CdId-2) probably relates to the same ancient settlement.

Not far from Gros Cap, a natural stone formation is known sometimes as *Mindemoya* or "Grandmother" (Purvis 2005). The lakeside shrine (CdId-4) also is called "Old Lady Frog Rock." Native fishermen continue to offer tobacco and other gifts to this ancestral shrine to give thanks for successful fishing on Lake Superior.

In the nineteenth century when written records are first available, the Gros Cap area including the area east of the headland had a small native community closely related to Ojibway settlements at Goulais Bay and Batchewana Bay on the north shore of Lake Superior. Birth records show the presence of several Ojibway families at Gros Cap. For example, John Shingwauk, son of the famous leader Shingwaukonce, was born at Gros Cap (Ontario Archives, Northern District Marriages 1881, Registration #1011-81). In 1882, the Ojibway settlement at Gros Cap was referred to as the "Gros Cap Reserve" (Ontario Archives, Northern District Marriages 1882, Registration #001093-82). Native families continued to live at Gros Cap into the 1930s (Devlin 2002: 308).

Interviews with Aleck "Sonny" Daigle of Gros Cap, a descendant of Ojibway and French-Canadian families confirmed the presence of the Ojibway community at Gros Cap (Conway 1974). A small cemetery and chapel at Gros Cap also relate to the native community at this traditional site.

The Chene Island site (CdId-5), which has not been fully studied, is a low sandy island situated southeast of Gros Cap. The presence of an Adena style projectile point at the site indicates contacts with lower Great Lakes aboriginals over two thousand years ago. The Adena culture was centred in the Ohio River Valley, but localized examples of Adena-like settlements occur in southern Ontario where the projectiles are known as Kramer points.

Overall, the Early Woodland people who used Adena-style points in southern Ontario were known to obtain native copper from the Lake Superior area in the era between 500 B.C. and 100 A.D. The Chene Island archaeological site can be interpreted in this context.

3.2.9 Point Louise

No specific references to traditional land use at Pointe Louise have been collected. However, archaeological evidence suggests that historic era Ojibway made seasonal use of the sheltered cove behind Pointe Louise. This same area was used at least from Middle Woodland (Laurel Tradition) times over two thousand years ago up until the seventeenth century as shown from cultural materials recovered from the Black Thistle site (CcIc-3) and the Pointe Louise site (CcIc-14).

3.2.10 Pointe Aux Pins

By the mid-nineteenth century when written sources began documenting local land use, the Pointe Aux Pins area saw more Euro-Canadian use for shipbuilding than Aboriginal use.

There are hints that local Ojibway groups continued to camp at traditional sites at Pointe Aux Pins. The American Indian Agent, Henry Schoolcraft, was stationed at Sault Ste. Marie, Michigan. He frequently interacted with Ojibway from the Canadian side of the St. Mary's River. Schoolcraft's journals contain the story of Sassaba, an Ojibway who greatly disliked Americans due to his experiences in the War of 1812 (Schoolcraft 1851: 119). Sassaba, who in later years wore only a wolf skin for clothing, camped with his family at Pointe Aux Pins (Capp 1904: 154).

Archaeological studies have been limited in the Pointe aux Pins area and historic era traditional Ojibway sites have not been located.

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3.2.11 Whitefish Rapids

The vast rapids located at downtown Sault Ste. Marie today are known as the Whitefish Rapids. To Ojibway people across Canada and the United States, these rapids are *Bawating*—the heartland of their ancestry. The actual rapids are identified in legends as the remnants of a giant beaver dam built by Misamik, the giant beavers that Nanabush and his grandmother tended. Legends collected from Garden River First Nation elders in the 1980s reinforced the importance of these landscape features to local identity.

3.2.12 Whitefish Island

The low, boulder-covered island known as *Atikameg Minis*, Whitefish Island, remains one of the most important traditional sites identified by Ojibway elders. It is not surprising that this island also contains the richest concentration of archaeological heritage discovered along the St. Mary's River. Artifacts and cultural features from seven cultural periods are preserved on Whitefish Island (Conway 1981: 41-42). For example, over 9,000 fragments of pottery vessels were recovered from test excavations. Cultural features included eight special artifact clusters, seven faunal concentrations of fish bones, three hearths, two post moulds, two rectangular areas cleared of boulders, a cleared canoe skid, a cabin foundation, three buried articulated black bear paws and eight dog burials (Conway 1977: 65-66, Table 15 & 1986: 63 & 69).

The archaeological site has been recorded as CdIc-2.

To all Ojibway, whether local groups or distant communities, Whitefish Island is a central part of their heritage. Whitefish Island forms the northern border of Bawating—Whitefish Rapids.

Several eastern Lake Superior elders, such as Dan Pine and Fred Pine, identified Whitefish Island as an ancient, seasonal gathering place for local Ojibway groups and as a gathering place where Ojibway and non-Ojibway groups could camp temporarily while participating in trade and religious observances. The dog burials and buried black bear paws were found with French glass trade beads and cut copper items and have been interpreted as evidence of *Midewewin* ceremonialism occurring between 1623 and 1669.

The archaeological heritage of Whitefish Island has been described by several researchers (Conway 1977, 1980, 1981 & 1986; Hinshelwood 1995; McHale Milner 1998; Pollock 1983; Smith 1996). The archaeological materials show continuous use of this traditional site for over 2,000 years. In the nineteenth century, use of Whitefish Island changed from exclusively Aboriginal to residents of Aboriginal, mixed descent and Euro-Canadian backgrounds as commercial fishing was developed at the rapids (Conway 1986; Macdonald 1981a & b).

Ojibway First Nation elders emphasized that Whitefish Island was a spiritual place where native people also fished, lived, hosted visitors and held public religious ceremonies. The archaeological evidence provides more details about these traditions. Unusual artifacts from areas well beyond the Ojibway world are found on Whitefish Island (Conway 1979 & 1984). Remarkably, archaeologists who sampled less than 2% of the island discovered rare evidence of religious activities.

The Lake Superior Ojibway retained Whitefish Island under treaty. But in effect, the island was not available to Ojibway people for many decades. In 1998, the Batchewana First Nation regained control of Whitefish Island and the extensive artifact collection from there. This action was the result of land claim litigation (Binnema and Neylan 2007:58; McNab 1999: 137).

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3.2.13 Other Islands

Several small islands located beside Whitefish Rapids were destroyed by canal construction on both sides of the river. One location, known as Chief's Island, was a traditional location used for birchbark canoe construction. One of the last bark canoes was made there around 1905.

3.2.14 The Lower St. Mary's River

From Whitefish Rapids in downtown Sault Ste. Marie to the outlet of the St. Mary's River into Lake Huron, the Ojibway intensively occupied the landscape.

3.2.15 Garden River Area

The river terraces along the St. Mary's River near the outlet of Garden River have been centres of Ojibway settlement for a very long time. Pre-contact artifacts have been found at a site at the mouth of the Garden River (CdIa-1). Since the nineteenth century, a large Ojibway community has existed continuously. This community followed traditional Ojibway land use patterns including seasonal movements to family hunting and trapping territories and to sugarbushes.

In addition to sites associated with subsistence activities, a number of spiritual locations are present in the Garden River area. The most public site is Trap Rock (CdIa-2), which is a cliff associated with a spring. Elders from the Garden River First Nation preserved extensive accounts of this cliff as home to the Little Wild Men. Trap Rock was used as a shrine where offering were placed.

A mountain located near the Garden River Valley was known as *Gay-Nun-Doh-Waaning Odjew* or the "Spirit's Voice Mountain." This religious location (CdIa-3) was used for vision questing and other activities.

3.2.16 Lake George

The widening of the St. Mary's River known as Lake George was identified by elders from the Garden River First Nation as a traditional fall fishery. Temporary camps were set up at the mouth of Bar River and other locations along the shoreline of Lake George. During the nineteenth century when many Garden River Ojibway families kept domestic stock, people would cut wild hay at various locations along Lake George. *Bahshing*, a large island nearly attached to the north shore of the St. Mary's River at Lake George was a favoured location for collecting a variety of herbal medicines.

3.2.17 Pumpkin Point

Oral traditions collected at the Garden River First Nation identified Pumpkin Point or *Ogwishman Neyashing* as a settlement used in the nineteenth and twentieth centuries. A permanent community existed along the shoreline and in the forest at Pumpkin Point. Cabins, gardens and a cemetery were part of the Ojibway settlement. Many of the Ojibway families at Pumpkin Point traced their ancestry to the St. Joseph Island area.

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Archaeological evidence has confirmed Ojibway use of the Pumpkin Point from Middle Woodland (Laurel Tradition) times to the present at the Pumpkin Point archaeological site (CcIa-1).

3.2.18 Kensington Point Area

The area around Kensington Point and the mouth of the Desbarats River on the lower St. Mary's River has a concentration of sacred sites. A rock with a natural impression is interpreted by the Ojibway as a place where the cultural hero Nanabush sat (Conway 1993: 148-149). This location is regarded as an ancestral shrine where tobacco and other gifts were left during communication with the spiritual world. The rock has been recorded as archaeological site CbHx-3.

Ojibway traditionalists viewed a rocky island cliff as a place of residence for spirits. In Ojibway the island is called *Manidoo Minis* or "Spirit Island." Today, the site appears as Devil Island on maps. Kensington Point was identified by elders from the Garden River First Nation as the location of a native settlement. A brief examination of the area determined that modern marina and cottage development may have destroyed the archaeological heritage. The traditional settlement has been recorded as site CbHx-5.

There is some documentary evidence that Kensington Point may have been the Ojibway settlement known as *Pekwabikong*. Archival records of the Imperial presents distributed to Ojibway bands at Manitouwaning between 1846 and 1852 include a group from "Pe,quaw,be,cong." One of the vouchers recorded by W.B. Robinson records a payment of $30 to "Naoquagaboa, Chief of Paquabecong and Band." This is Chief Nawquaigahbow, who did not sign the Robinson-Huron Treaty, headed the Ojibway who left St. Joseph Island after the Treaty of 1798 which enabled the British to build the Fort St. Joseph.

Although further research is required, it appears that the Pekwabikong settlement eventually moved to Pumpkin Point further upriver.

3.2.19 St. Joseph Island

The Ojibway surrendered St. Joseph Island to the Crown in 1798. The treaty established British presence with the construction of Fort St. Joseph. One Ojibway extended family, the Bamagheshik family, remained living on the northern end of the island. Most of the other families moved to *Pekwabikong* and Pumpkin Point. Certain traditional uses of St. Joseph Island remained intact into the early twentieth century. Milford Haven was a traveler's stop where families from the Sault Ste. Marie area camped en route to Drummond Island and the North Channel of Lake Huron.

Seasonal trapping continued at some locations on St. Joseph Island, especially springtime trapping of muskrats. Elders of the Garden River First Nation also recalled a tradition about a secret, native copper source on St. Joseph Island that was used by medicine people to obtain copper.

3.2.20 Drummond Island

The large island known to the Ojibway as *Potaganissing Minis* is now named Drummond Island. It is part of the State of Michigan. In Aboriginal times, Drummond Island was the eastern edge of the Sault Ste. Marie area Ojibway territory. A traditional village site is located there.

3.2.21 Other Traditional Land Use Categories

While the more easily identified traditional heritage sites relate to settlement along the St. Mary's River, Ojibway elders have identified other groups of traditional sites. These include travel routes, sugarbush camps, medicinal plant locations, fisheries and mineral sources.

3.2.22 Traditional Travel Routes

Summer travel routes included movement along the north and south shores of Lake Superior. Many Sault Ste. Marie area Ojibway are closely related to individuals in communities in northern Michigan, northern Wisconsin and northern Minnesota. Likewise, inter-marriage was common among north shore settlements as far as Michipicoten in the Wawa area.

Interior canoe routes often led from the Garden River or Echo Lake to family hunting and trapping territories used in the fall and winter months. According to oral history accounts, local Ojibway families used a variety of interior lakes such as Garden Lake and Boss Lake. River and lake canoe routes reached some of these seasonal family camps. Others were accessed by traditional snowshoe trails.

While local winter travel routes were very important, the Lake Superior Ojibway also maintained regional winter snowshoe trails. One route used to avoid the weak shoreline ice on the north shore of Lake Superior ran from the Garden River Valley north through lakes and frozen swamps to reach the Michipicoten area.

3.2.23 Sugarbushes

Sault Ste. Marie area Ojibway families often moved to maple groves in late winter and early spring to tap trees for maple sugar. Several elders from the Garden River First Nation recalled sugarbushes at numerous locations in the area.

One traditional sugarbush location used by Wabmaymay and his family has been identified. This island in the lower Garden River retains the Ojibway place name *Wabmaymay Gee-Tash-Kahn*, "Wabmaymay's Walkaround."

Other sugar camps used by families from Garden River were situated at Boss Lake, a small lake located near Echo Lake.

3.2.24 Medicinal Plant Locations

The Ojibway had mastered an understanding of herbal medicines through thousands of years of continuous occupation of the same lands. The Sault Ste. Marie area holds important biological diversity with plant communities associated with the Great Lakes forests as well as the boreal forest.

3.2.25 Mineral Locations

In traditional times, mineral sources were kept secret. Only shamans and medicine people could extract minerals such as native copper or lead in limited quantities. Based on folk legends about the first destruction of the earth, the Ojibway regarded mineral sources as guarded by underground and underwater spiritual creatures such as giant serpents and *Michi-Peshu*, the underwater lion.

During oral tradition interviews conducted in the 1980s, Garden River First Nation elders mentioned the Mamainse area north of Batchewana as the premiere source of native copper tools and ornaments. A more secret native copper source was located on St. Joseph Island.

Another mineral location has been described in more detail in oral traditions.

Within living memory, a member of the Wigwas family at Garden River obtained lead from a vein located somewhere up the Garden River. According to tribal elders, the original Wigwas used lead to make musket balls. He never disclosed the location of the mineral source.

3.2.26 Traditional Sites & Archaeological Sites

The large number of oral traditions of the eastern Lake Superior Ojibway provides an underutilized body of information for the interpretation of archaeological sites. Because Sault Ste. Marie retains a living tradition connecting the past with the present, many of the currently recorded archaeological sites can be identified and interpreted from the traditional land use site data base.

3.3 Métis Presence in Sault Ste. Marie

The Métis have been present in the Sault Ste. Marie area since the early 1600s, dating to the establishment of the first mission (Prefontaine 2003; Leffler 2006). The Métis typically settled in close proximity to rivers, "occupying strips of land perpendicular to and along the river" (Lytwyn 1998:1). This was the settlement pattern at Sault Ste. Marie in 1846 when Vidal surveyed the area, documenting each household, including its head. These included prominent Métis Charles Cadotte, Joseph Boissoneau and Joseph Boissoneau Jr. (Figure 10). At the time of Vidal's survey, amongst the 500 population of Sault Ste. Marie, there were Métis living near the mission (Osborne & Swainson1986:22). In 1761, the Métis community was comprised of one household which was owned by Jean Baptiste Cadotte and by 1826, it consisted of 80 buildings (Prefontaine 2003). In 1845, the Métis community was described as having a population of 250 people and 50 houses (Lytwyn 1998:1) (Figure 11).

During the seventeenth century, the Métis played an integral part in the fur trade as the mission also operated as a trading post. They would continue to thrive during the eighteenth and nineteenth centuries with the establishment of the North West Company, XY Company and the Hudson's Bay Company. Amongst other jobs held by the Métis, perhaps the most important was that of the "Coureur des Bois" – people who were responsible for transporting the furs over long distances (Prefontaine 2003; Leffler 2006). In addition to the fur trade, the Métis were heavily involved in hunting and fishing, which is evident by their involvement in the fishing industry that developed during the nineteenth century. Processing maple sugar and cultivating/harvesting crops were also important to the Métis way of life (Lytwyn 1998).

During the negotiations for the Robinson Treaty during the mid-nineteenth century, the Métis lost many of their rights, particularly regarding their land, despite having strong support from Chief Shingwaukonse from Garden River. However, regardless of the Crown's treatment of the Métis, the Ojibway continued to regard the Métis as having the same rights as them (Lytwyn 1998; Prefontaine 2003). It was also generally assumed that in spite of the Robinson Treaty, the Métis would continue to have the right to hunt

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and fish. This was evident in the nineteenth century census data that showed the occupation of many Métis as hunters, fishermen, trappers and traders. Although mostly removed from the core due to the inability to own land, the Métis continued to live on the outskirts of Sault Ste. Marie (Lytwyn 1998) (Figure 12)

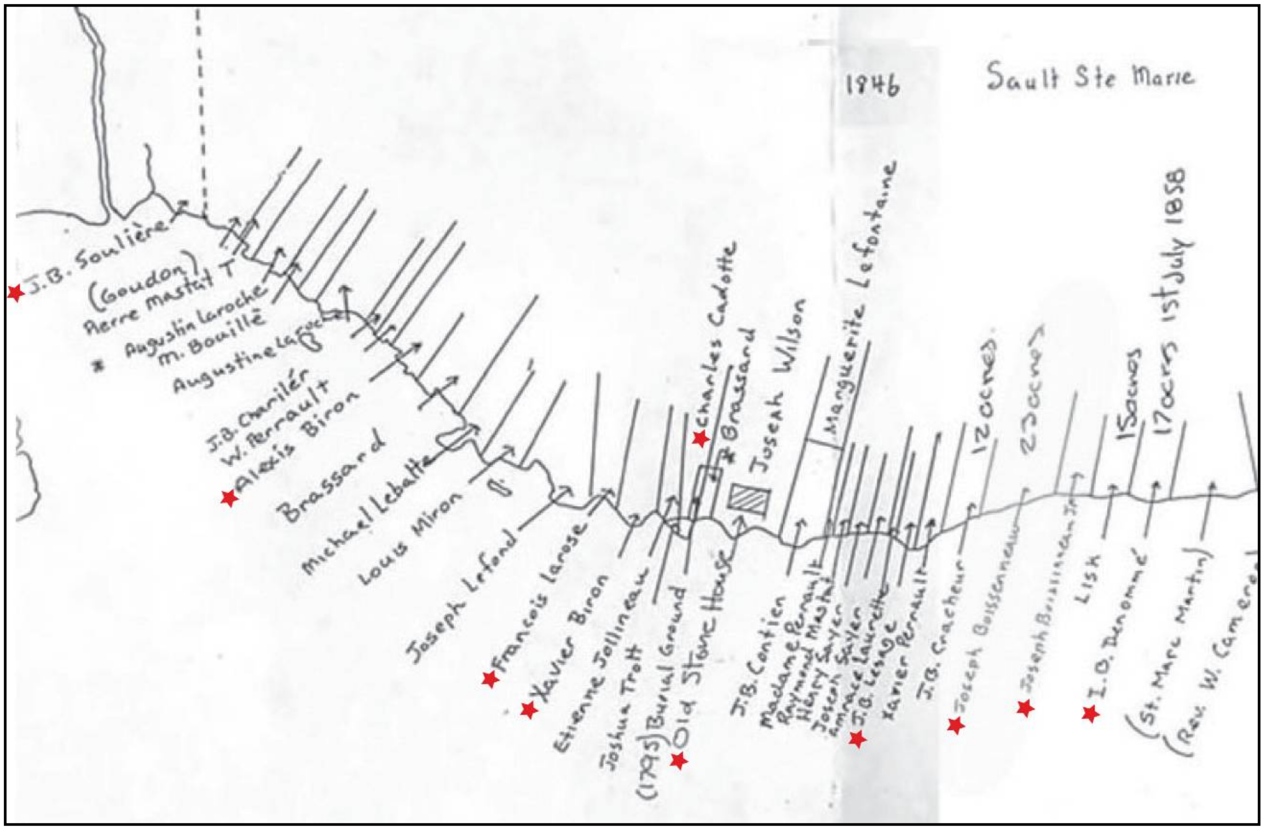

Figure 10: Some Métis heads of household identified on Vidal's survey of Sault Ste. Marie in 1846

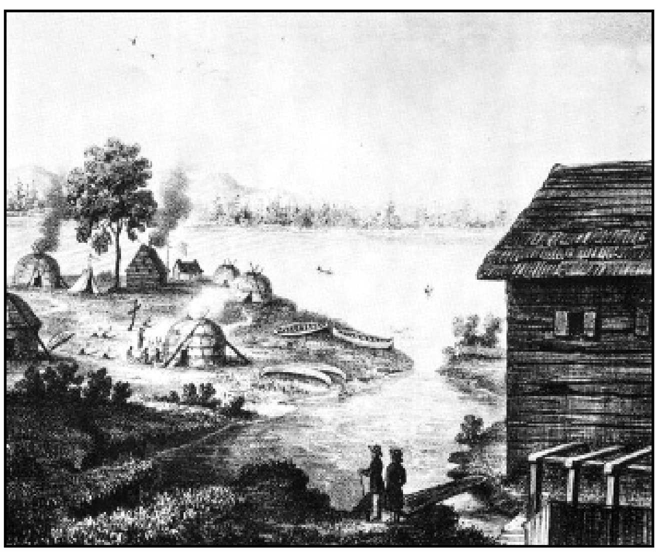

Figure 11: Early nineteenth century Metis community in Sault Ste. Marie (MNO 2011)

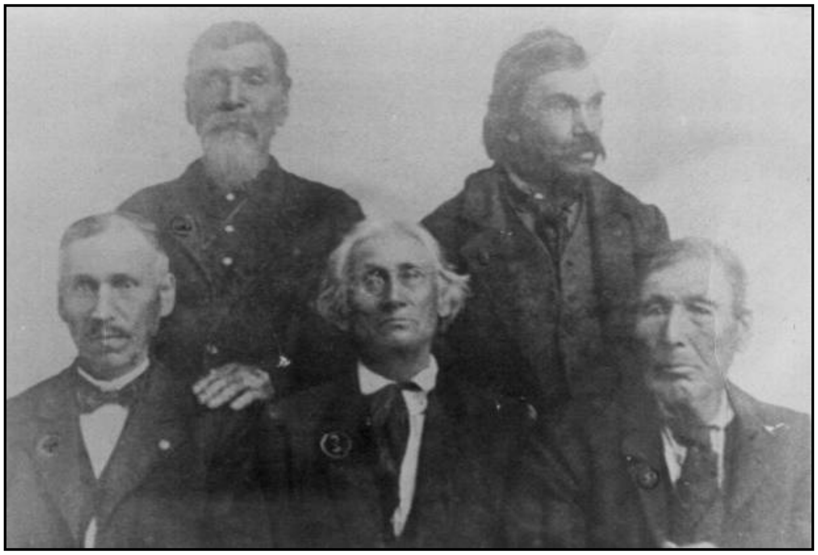

Figure 12: Metis from Sault Ste. Marie, circa 1855 (Canadian History Directory 2008)

The Métis of Sault Ste. Marie still play a significant role regionally and nationally. In 1993, Steve and Roddy Powley from Sault Ste. Marie were charged by the Ministry of Natural resources (MNR) with hunting off-season without a valid licence. This case, *R. v. Powley*, went to the Supreme Court of Canada, which confirmed that the Métis should have their hunting rights upheld under Section 35 of the Constitution Act, 1982, which provides constitutional protection to the Aboriginal and treaty rights of Aboriginal peoples in Canada. This was a defining moment in history for the Métis to be recognized as a distinct Aboriginal group in Canada (MNO 2011).

4.0 OVERVIEW OF THE SETTLEMENT HISTORY OF THE CITY OF SAULT STE. MARIE AS IT PERTAINS TO ARCHAEOLOGY

This document is not intended to be an exhaustive history of Sault Ste. Marie, although the main focus of the text is historical in nature. Rather, it serves to identify the extant or formerly present historical features.

4.1 First Contact: New France and the Jesuits

Sault Ste. Marie, or Bawating as known by the Ojibway, was first encountered by the French in the early seventeenth century. Étienne Brûlé, a protégé of the French explorer Samuel de Champlain, was the first European to reach the settlement of Bawating *ca.* 1607 (Figures 13 and 14). Fifteen years later in 1622, Brûlé returned to the settlement and gave it its first European name – Sault de Gaston, as homage to Gaston, the brother of King Louis of France (Hinsperger 1967:1-2; Heath 1988:21-22; Osborne & Swainson 1986:7-8). It was based on Brûlé's account that the settlement was first depicted on the map of New France produced by Champlain in 1632 (Heath 1988:22) (Figure 15).

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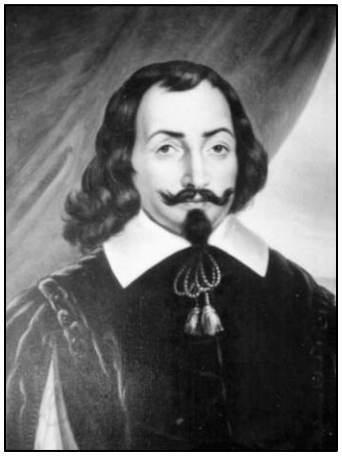

Figure 13: Portrait of Samuel Champlain. *Archives of Ontario, RG 65-35-1, 30-J-45*

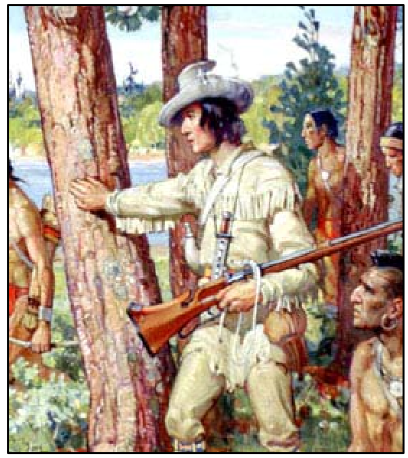

Figure 14: Étienne Brûlé, *Government of Ontario Art Collection, 619849*

Figure 15: Champlain's map of New France in 1632 depicting Sault Ste. Marie, *Library and Archives Canada, R11981-62-6-F*

French missionaries soon followed as the Roman Catholic Church in France was eager to spread Christianity amongst the Aboriginal population. The Jesuits were the dominant missionaries active at that time. As such, the first Jesuit priests to arrive to the area were Fathers Isaac Jogues and Charles Raymbault. At the time of their arrival, the population of the settlement consisted of about 2,000 Ojibways. However, this was a seasonal figure as Bawating was a seasonal gathering place utilized for its proximity to water and abundance of fish. During the off-season, the settlement consisted of about 200 residents (Heath 1988:23; Osborne & Swainson 1986:8). The Jesuits established their permanent mission in 1669 at which time Father Jacques Marquette changed the name of the settlement to Sault de Sainte Marie, as a way to honour the Virgin Mary (Hinsperger 1967:3; Heath 1988:24). The location of this mission is situated in the present day Sault Ste. Marie, Michigan.

The settlement was formally claimed by France on June 4, 1671 by Simon-Francois Daumont, Sieur de St. Lusson, during a pageant organized by the French. Sault de Sainte Marie was part of a larger land claim made by Louis XIV, King of France, for all lands west of Montreal (Heath 1988:25; Osborne & Swainson 1986:12). According to Father Claude Dablon, a representative of the Roman Catholic Church, the Aboriginal residents of the settlement accepted St. Lusson's assertions rather easily, thus encouraging the French exploration and expansion into the area (Heath 1988:25-26).

The mission, however, was not very successful as it was destroyed and re-built several times. It was eventually abandoned in 1689 as the Iroquois had advanced to the settlement and a war between them and the Ojibway ensued. As the mission closed down, so too did any immediate European exploration of the area or Christianization of the Aboriginal population (Heath 1988:26).

4.2 Fur Trade

When the Europeans resumed activity in the Sault Ste. Marie area, their religious activities were on a more subdued level as their interests were more commercially inclined. The Europeans were keen to participate in the lucrative fur trade in North America which lead them to form alliances with the Ojibway in Sault Ste. Marie. Although Sault Ste. Marie was a French territory, the British were able to trade freely in the area until 1750 when Louis de Bonne, Sieur de Miselle and Louis de Gardeur, Sieur de Repentigny, were granted land fronting St. Mary's River as well as the rights to control access to Lake Superior, to control the fur trade in the area. This was designed to sever the existing partnership between the British and the Aboriginal population. A post was set up with a palisaded fort which provided amenities to all those who lived in it as well as those passing through the area. However, the post came under British authority after the Treaty of Paris in 1763 when all French territories were surrendered to the British. The fort is no longer extant but was located within Sault Ste. Mary, Michigan. Alexander Henry, an independent British fur trader, became partners with Jean Baptiste Cadotte, a local resident, and they assumed ownership of the fort ca. 1765 (Osborne & Swainson 1986:8; Heath 1988:26-29).

The North West Company, a governing body of former independent fur traders, also established a post along St. Mary's River in 1788 (Heath 1988:29) (Figure 16). This post was comprised of numerous structures including a sawmill and out-buildings. Perhaps the most important achievement was the building of a lock in 1797 which allowed a much easier way of transporting cargo and passengers by going around the rapids instead of portaging them (Osborne & Swainson 1986:13, Hinsperger: 20-21; Heath 1988:29) (Figure 17).

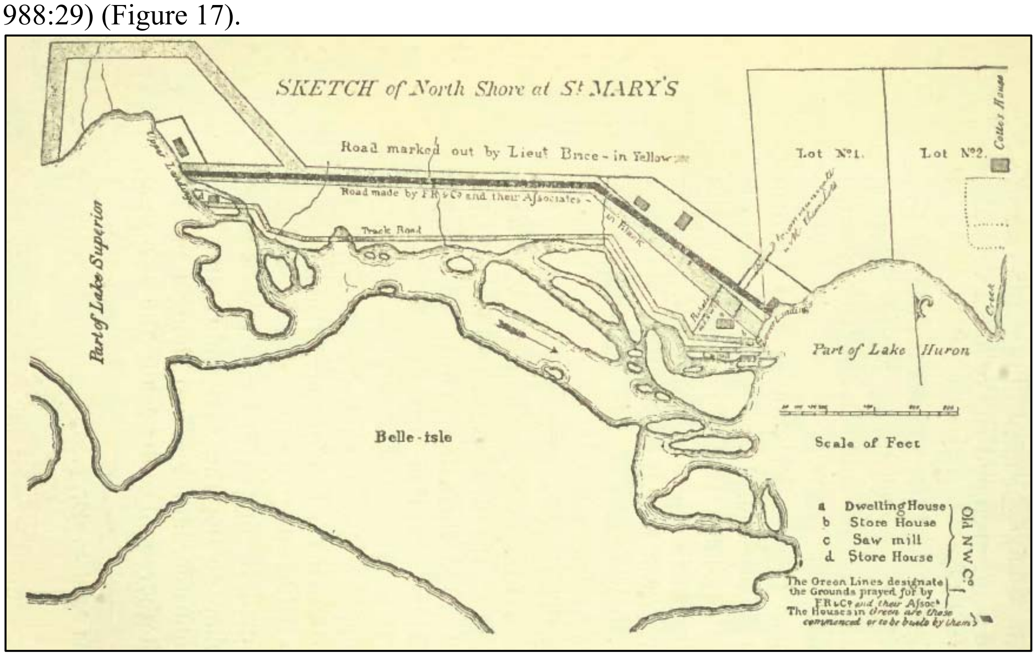

Figure 16: Location of the North West Company's Post (Capp 1904:144)

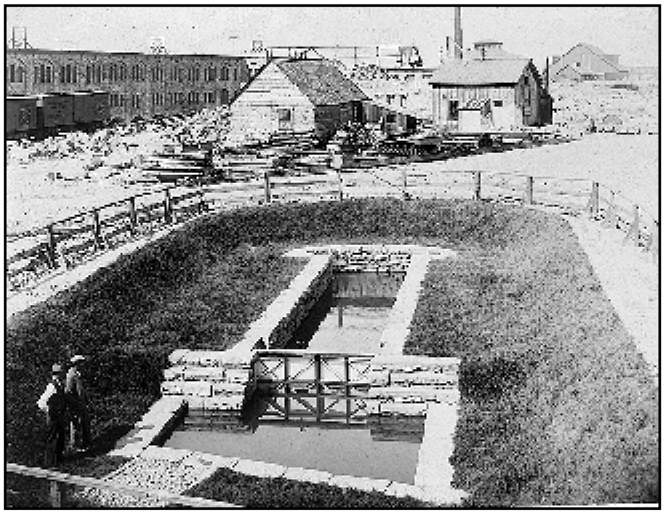

Figure 17: North West Company's Canoe Lock (SSMPL 2008)

The North West Company continued to dominate much of the waterways and the shore of St. Mary's River and even required a toll from those passing through the canal which they had built in a section of the river. This resulted in various conflicts with other traders, particularly the XY Company, much of which was resolved when the two companies merged in 1804 (Osborne & Swainson 1986:15). The post was occupied by Americans when the war of 1812 broke out and structures such as the mill and lock were destroyed in 1814 (Osborne & Swainson 1986:15; Heath 1988:32). However, within a year, the North West Company returned to the post and resumed trading activity in the area (Osborne & Swainson 1986:15).

Charles Oakes Ermatinger was one of the earliest influential fur traders in Sault Ste. Marie. He was an independent trader, albeit with brief stints at the XY Company and the North West Company (Heath 1988:30). Upon leaving the latter company in 1807, the Ermatinger family arrived at Sault Ste. Marie and once again began trading independently. Ermatinger, who participated in the capture of Fort Michilmackinac during the war of 1812, began constructing his permanent residence, a stone house, in 1814 (Osborne & Swainson 1986:14-15; Heath 1988:30-32; Hinsperger 1967:19-20) (Figure 18 and 19). This house, known popularly as the Old Stone House is now part of the Ermatinger Clergue Heritage Site (Figure 20).

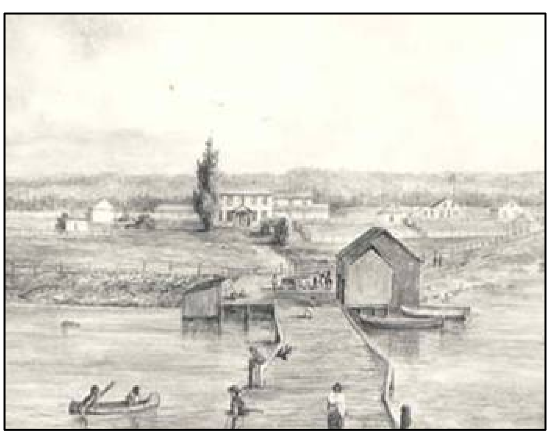

Figure 18: The Ermatinger Old Stone House depicted in the painting Wagon on Warf by William Armstrong (SSMPL 2008)

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Figure 19: The Ermatinger House is a national historic site listed in the Ontario Heritage Properties Database (MTC 2008)

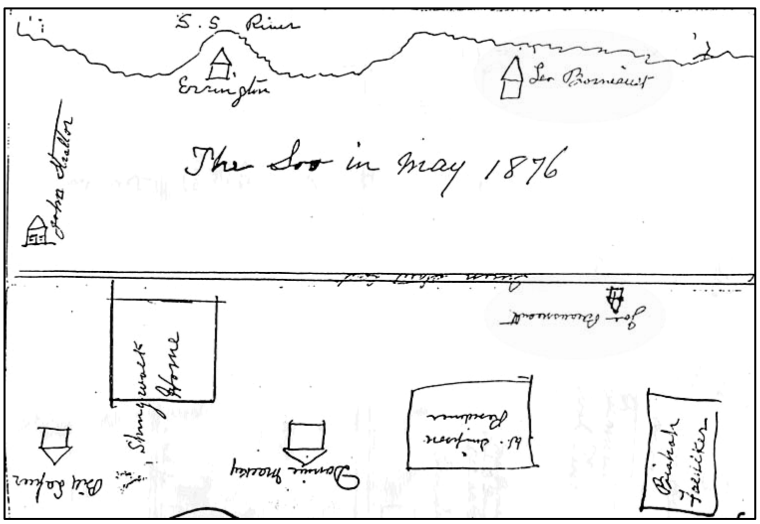

Figure 20: 1876 sketch of Sault Ste. Marie showing the Ermatinger Stone House (Wilson 1876)

Sault Ste. Marie's importance as a trading post was affected by the integration of the Hudson's Bay Company (HBC) and the North West Company in 1821 (Osborne & Swainson 1986:16; Heath 1988:32) (Figure 21). The unification of the two companies allowed access to HBC's posts and their Hudson Bay route which provided a more convenient way to move goods than through Sault Ste. Marie. This led to a drop in the fur trade in and around Sault Ste. Marie, but the HBC continued to maintain the trading post. This was deemed as an altruistic act as the post was not very profitable in the declining economy (Heath 1988:32-33). In fact, by 1828, fur trading through Sault Ste. Marie was resulting in a loss rather than profit for the HBC (Osborne & Swainson 1986:17). However, maintaining the post did serve to reinforce the good relations with the Ojibway and prevent competitive companies from moving into the area (Heath 1988:33). Eventually, the post progressed from focusing on fur trading to exporting salted fish and providing provisional goods to the local residents (Osborne & Swainson 1986:18). Commercial fishing of trout and whitefish also became a new focus by 1835 such that a vessel, the *Whitefish*, was built for the sole purpose of ferrying fish from local fisheries (Osborne & Swainson 1986:19). The prosperity of the post did not last very long and it was closed in 1869 (SSMPL 2008).

Figure 21: The second post of the North West Company which was later occupied by the Hudson's Bay Company (Capp 1904:152)

4.3 Settlement in the 1800s

Until the 1830s, Sault Ste. Marie was primarily a trading post with very few permanent settlers. After the decline of the fur trade and the economic deficit caused by it, however, there was a motion towards establishing a self-sufficient community. Anna Jameson, while travelling through the area in 1837, described the settlement as "a few miserable log huts occupied by some French Canadians and voyageurs" (Heath 1988:36) as well as a missionary church and a school for the converted Aboriginals. The Anglican church and the school were run by Reverend William MacMurray who had an amicable relationship with the Ojibway (Figure 22). It was through MacMurray that the government provided funding for building houses and providing amenities to the Aboriginal residents. When a new government formed in 1838 and the funding for such amenities was discontinued, it created a sense of resentment between the Aboriginals and MacMurray which led to his departure from Sault Ste. Marie (Heath 1988:36-38; Capp 1904:208-210).

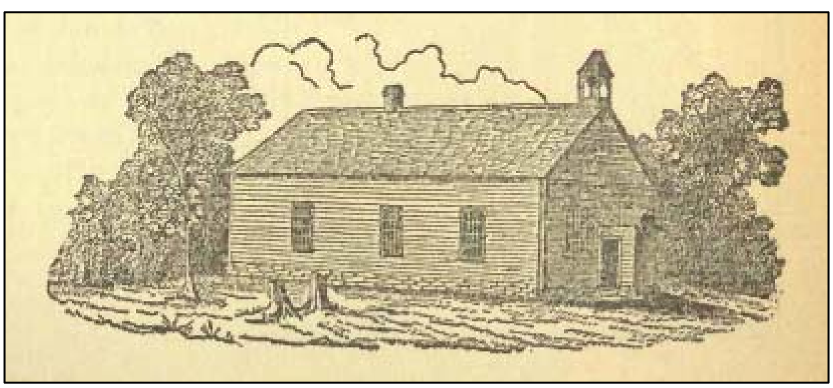

Figure 22: Reverend MacMurray's Anglican church (Capp 1904:209)

In the 1840s, Europeans were discovering copper through geological endeavours and the mining industry was taking off along the north shores of Lake Superior and Lake Huron. Settlements in the region, such as Bruce Mines, were flourishing albeit for a short time as the copper boom eventually waned. Similarly, the short-lived prosperity of the logging industry in the surrounding areas in the late nineteenth century did not have a long-term impact on Sault Ste. Marie. During these periods of growth, the population of the settlement increased as there was an influx of farmers who found employment with the industries during the winter months. This increase in population was transient as the new residents left when the industries declined (Heath 1988:39-41). Thus, even in the latter half of the nineteenth century, Sault Ste. Marie was not a fully developed community, although there were brief spurts of growth which were negated by subsequent emigration.

The settlement was surveyed by Alexander Vidal, the Deputy Provincial Surveyor, in 1846. In his survey, Vidal found the town consisting of 324 acres of town plot, 3130 acres of park lots, a post office and the British North American bank (Figure 23). The population of 500 was comprised of HBC staff, Métis living near the mission and the Aboriginal people residing on Whitefish Island (Osborne & Swainson 1986:22). The census of 1861 showed an increased population of 898, which declined to 879 in 1871 and 780 in 1881, all due to the failing economy.

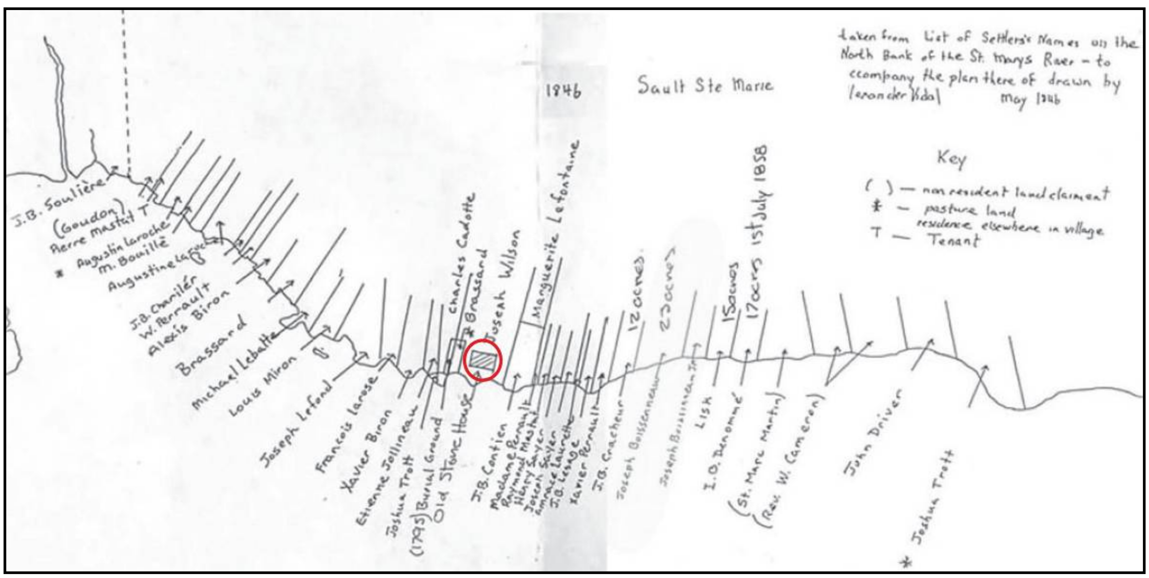

Figure 23: Part of Vidal's survey of 1846 showing residents and structures including the Ermatinger Old Stone House (Vidal 1846)

Joseph Wilson, a prominent figure who came to Sault Ste. Marie in 1843, felt that the inability to purchase lands was a major reason why people were reluctant to settle in Sault Ste. Marie (Heath 1988:43). The government had not negotiated land treaties with the Aboriginal residents. European residents or those wishing to settle in Sault Ste. Marie were unable to purchase land. Eventually, in 1850, an agreement was reached with the Aboriginal population. Known as the Robinson Treaty; this agreement reallocated the Aboriginal population to reserves and allowed the European settlers to purchase lands from the Crown. Surveys of the area soon followed.

Wilson also felt that the absence of a structured government was detrimental to the settlement of Sault Ste. Marie. Hence, the Judicial District of Algoma was created in 1858 with Colonel John Prince as its first judge, appointed in 1859 (Heath 1988:45; Osborne & Swainson 1986:24-25; SSMPL 2008) (Figure 24). Prince arrived in 1860 and served for the next ten years; his home, the Bellevue Lodge fronted on St.

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Mary's River until 1912 when it was demolished (Capp 1904:217; Heath 1988:47; Osborne & Swainson 1986:40; Hinsperger 1967:36) (Figure 25). Other legal and judicial roles such as constable, sheriff and crown attorney were also appointed. Subsequently, structures to facilitate the new system were also built in the latter half of the nineteenth century. These included a courthouse built from 1866 to 1868; the Ermatinger stone house was the first location where court was held in Sault Ste. Marie in 1860 (Heath 1988:46; Osborne & Swainson 1986:25)

Figure 24: Colonel John Prince (Trudeau 2003)

Figure 25: Home of Colonel John Prince, the Bellevue Lodge (Trudeau 2003)

In 1868, the government passed the Free Grants and Homestead Act which meant that areas of Algoma were available for settlement for free. As the agricultural lands in southern Ontario were mostly allocated, settlers looking for land were keen on moving north. Interested settlers were given up to 200 acres of land with the option of purchasing additional lands at a nominal price (LAC 1998). In exchange for the land, the settlers were expected to develop the property by clearing, cultivating and building structures as well as staying on site for a minimum of six months per year (LAC 1998).

The last decade of the nineteenth century is when the settlement expanded dramatically. As the government was starting to explore and expand west of Sault Ste. Marie, the settlement became an important gateway for east-west communication (Osborne & Swainson 1986:37). Although there were many initiatives to rebuild the canoe lock destroyed in 1814 by Americans throughout the nineteenth century, plans to do so were abandoned with the construction of a lock and canal on the American side of St. Mary's River. Canadian traffic was able to travel using the American lock system until 1870 when political tension between the Americans and the Canadians resulted in the re-emergence of the issue of building a lock and canal on the Canadian side of the river (Heath 1988:50-52). Construction of the lock and canal began in 1887 and was inaugurated in 1895, thereby providing a Canadian east-west waterway (Heath 1988:53-55; Osborne & Swainson 1986:37).

The construction of a railway in 1887, which connected the settlement to the Canadian Pacific Railway (C.P.R.) line in Sudbury, was another sign of development. The International Bridge over St. Mary's River was built that same year providing connections to the American railways, allowing Sault Ste. Marie

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to be a regional portal connecting Canada and America (Heath 1988:54-55; SSMPL 2008). New roads also provided over-land connections to other settlements. Albert Salter, for example, surveyed roads in 1859 which led to the conclusion that the Great Northern Road would be extended connecting the Spanish River to the Goulais River; construction began in 1860 (Heath 1988:55).

4.4 Francis H. Clergue's Industrialization of Sault Ste. Marie

The last decade of the nineteenth century saw the beginnings of the industrialization of Sault Ste. Marie. Although there had been attempts made to utilize the resources of the town for centuries, they were fraught with difficulties. The work of Francis H. Clergue, however, revolutionized the Town of Sault Ste. Marie (Figure 26).

The St. Mary's Falls Water Power Company was established in 1888 to build a hydroelectric facility on the St. Mary's Rapids, a task which was taken over by the Ontario and Sault Ste. Marie Water, Light and Power Company in 1889 (Osborne & Swainson 1986:112; SSMPL 2008). The latter company spent most of their finances on acquiring lands for the facility and fell into duress by the end of 1889. The Town intervened and took over the company and eventually completed the construction of a powerhouse and power canal at a cost of $260,000 (SSMPL 2008). In addition to this debt, the Town faced additional difficulties such as the destruction of a canal wall and reduced tax generation as a result of people moving away due to lack of employment. By 1894, the Town was facing serious difficulties in establishing its industrial base.

Francis H. Clergue and his associates arrived in Sault Ste. Marie in 1894 and on October 1, they made an offer to the Town to purchase the failing company (SSMPL 2008). Through this new deal, the Town was able to recover their investment and Clergue and associates were given the rights to be the sole supplier of electricity to the Town and that any future companies they form would be exempted from taxes for a period of ten years. The deal was finalized on October 3, 1894 and the company's name was changed to the Lake Superior Power Company in 1895 (Osborne & Swainson 1986:112; SSMPL 2008). Improvements and expansion of the existing canal soon followed (SSMPL 2008).

Clergue and colleagues also acquired the rights to 1,000 mi^2 of forested lands around the town and set up the Ontario Pulp and Paper Company. A ground pulpwood mill was constructed in 1895 and became the dominant supplier of pulp locally and to other communities and countries as well (SSMPL 2008).

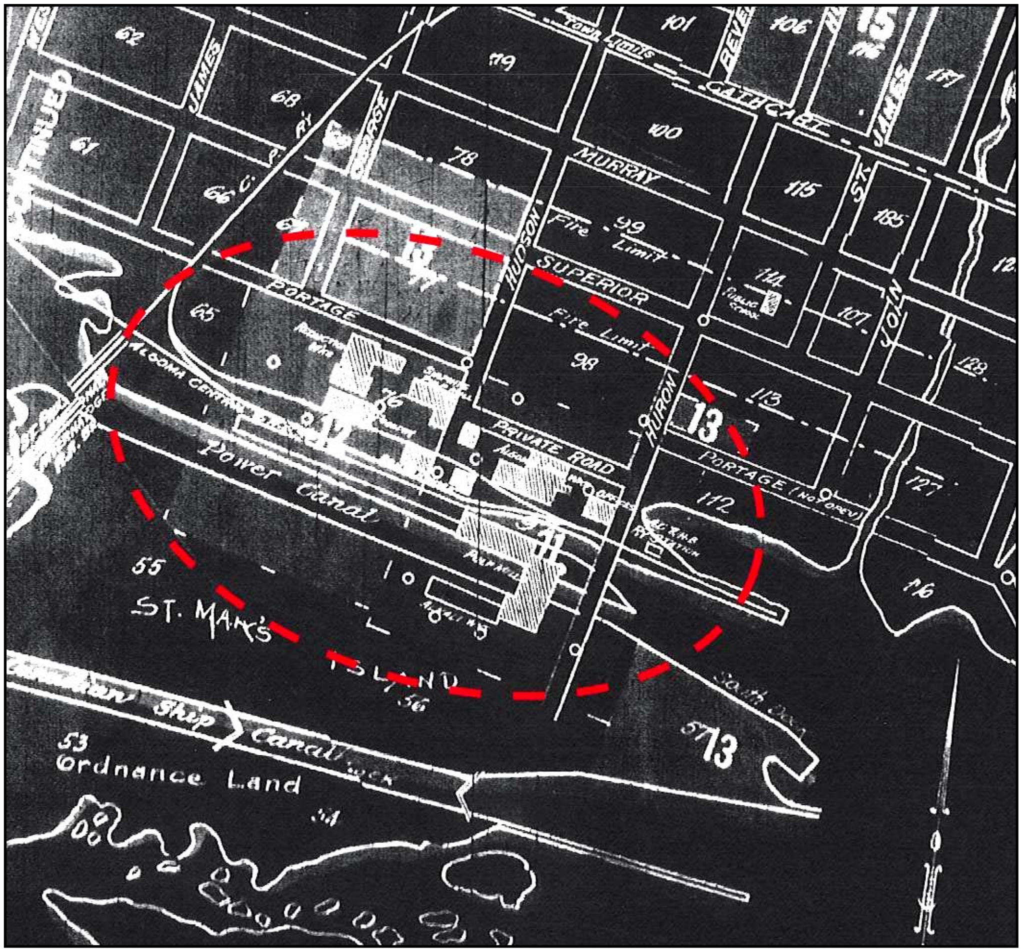

Figure 26: Clergue's industries along the north shore of St. Mary's River (Sauer 1899)

In 1894, the Town also gave Clergue the responsibility of supplying its water for 20 years. He established the Tagona Water & Light Company on October 9, 1894. Troubles plagued the new entity, however, as customers were unhappy with the service due to poor water quality and high electricity rates. Moreover, the typhoid outbreak of 1912 was attributed to the company. At the end of the 20 year contract, the company was purchased by the Town who continued to operate the company albeit with better standards. The Sault Ste. Marie Public Utilities Commission was formed in 1917 to oversee the water and light company (SSMPL 2008).

Clergue also built a sulphite mill. This was deemed necessary since sulphide was needed for processing pulp and Clergue was a strong believer in self-sufficiency. Clergue purchased a nickel mine and the sulphite mill began production in 1902 (SSMPL 2008). After getting the needed sulphurous acid gas, the mill moved on with the remains of nickel and iron which were combined to form a ferro-nickel alloy. This alloy was in high demand, especially from the German company Krupp, and triggered another area of production. Consequently, chlorine residue from the ferro-nickel plant was used to bleach pulp (SSMPL 2008).

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The Algoma Steel Company was established in 1901 by Clergue and colleagues. This was propelled by the discovery of iron mines in surrounding areas, some of which were already owned by Clergue. The steel company bought the iron from the mines as well as by-products such as coal from other companies. The steel produced was sold to external sources and most importantly, it helped in the building of the railway necessary to transport the products to other communities. The company began production in 1902 and in February of that year, steel was produced in Ontario for the first time (SSMPL 2008).

Clergue was also a key player in the railroad developments around Sault Ste. Marie during the turn of the twentieth century. The Algoma Central Railway, established in 1899, later merged with the Ontario, Hudson Bay & Western Railway and came to be known as the Algoma Central and Hudson's Bay Railway (SSMPL 2008). The plans consisted of building a line from Sault Ste. Marie northbound to meet up with the Central Pacific Railway at Missanabie. A branch line which connected the Clergue-owned Josephine and Helen mines to Michipicoten Harbour was also constructed (SSMPL 2008) (Figure 27).

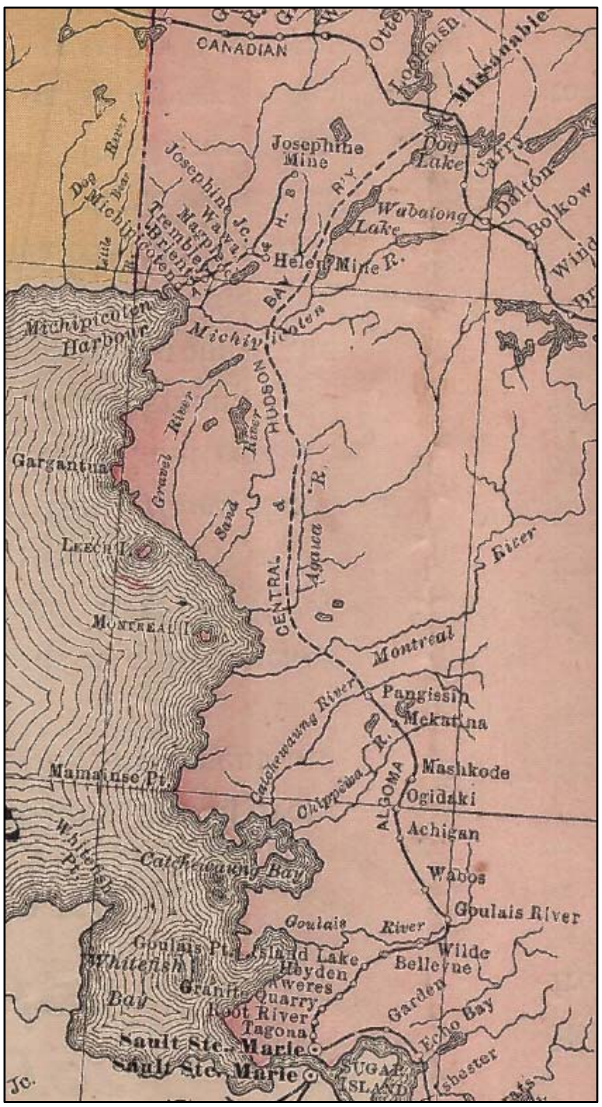

Figure 27: 1902 Map of New Ontario showing the Algoma Central & Hudson Bay Railway (Rand McNally and Company 1902)

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The Algoma Commercial Company Limited was established in 1899 by Clergue. The basic purpose of this company was to construct railways and be involved in many aspects of mining such as acquisitions and operations. This entity was also allowed to acquire shares of and own other companies as evidenced when it bought shares of the Ontario Lake Superior Company and the Algoma Central Railroad. The Commercial Company's involvement with the latter entity resulted in it building railroads on its behalf as well as acquiring lands which had been originally granted to the Algoma Central Railway (SSMPL 2008). The company was extensively involved in mining of gold, nickel, iron and also owned forested lands. As such, a sawmill at Goulais River, located north of Sault Ste Marie was also established, albeit for only a year when it closed down due to the inability to house a large quantity of logs until they could be milled. In the mean time, the International Lumber Company Ltd., a subsidiary of the Commercial Company established in Januray 1902, had built another sawmill near the Algoma Steel (SSMPL 2008). In addition to milling logs, the Lumber Company was also responsible for selling the various products of the Algoma Commercial Company (SSMPL 2008).

Another area of transportation with which Clergue was involved was the street railway system in Sault Ste. Marie. Clergue purchased the Sault Ste. Marie Electric Light and Transit Company, a subsidy of the Sault Ste. Marie Water, Light and Power Company, in 1894. The subsidy was later renamed as the International Transit Company and was given the rights to be the sole operator of the street railways for 25 years, to begin on July 1, 1901 (SSMPL 2008). The railway began service in 1902. Clergue also branched out from land transportation to running ferries on St. Mary's River between Sault Ste. Marie, Ontario to Sault Ste. Marie, Michigan (SSMPL 2008).

By 1902, most of Clergue's industries and mines were "consolidated" as the Consolidated Lake Superior Corporation (Osborne & Swainson 1986). The Sault Ste. Marie Pulp and Paper Company, the Tagona Water and Light Company, the Lake Superior Power Company, Algoma Steel Company and Algoma Central and Hudson Bay Railway were all part of this bigger entity. The Consolidated Company began showing signs of financial trouble as early as March of 1902 when drastic measures were taken to prevent disaster. All on-going work was stopped immediately and the company borrowed money to alleviate the financial problems. This loan was only a temporary resolution as the amount borrowed was not enough to sustain future endeavours (SSMPL 2008).

Speyer and Company, a firm in New York, lent an additional $3.5 million in December of 1902. This loan came with conditions which included Speyer's right to replace the board of directors of the Consolidated Company. However, even these drastic measures were not able to help the Consolidated Company and in April 1903, Clergue resigned from his position as the Vice President and General Manager (SSMPL 2008). A few months later, in September, virtually all operations of the Consolidated Company were ceased – only the Tagona Water and Light Company, the Algoma Central Railway and the street railway were in service. On September 27, a riot, instigated by unemployed employees, broke out and parts of the general office of the Consolidated Company were vandalized. Local militia and soldiers from Toronto were brought into the town. The riot was short-lived however, as Clergue paid the disgruntled employees shortly thereafter (SSMPL 2008). Speyer and Company took over the Consolidated Company on December 15, 1903. Despite another attempt to regain control of his company from Speyer by establishing the Canada Improvement Company in 1904 (SSMPL 2008), this was impossible. Clergue left Sault Ste. Marie in 1908 (SSMPL 2008)

During his time at Sault Ste. Marie, Clergue resided in two homes. The Block House, his first home, was originally a powder magazine, part of the original Hudson's Bay post (Figure 28). The magazine was a one story, one bedroom structure but Clergue renovated the interior and added a second story in 1895. Over the years, the house and the surrounding gardens fell into disuse and industrial buildings were built

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around it (Figure 29). In 1996, the Block House was threatened with demolition and it was relocated close to the Ermatinger stone house. The two homes now reside side by side and are known as the Ermatinger Clergue Heritage Site (SSMPL 2008) (Figure 30)

Figure 28: The Hudon's Bay Company post with the powder magazine in the right hand corner (SSMPL 2008)

Figure 29: The Block House in its original location (SSMPL 2008)

Figure 30: Ermatinger Clergue Heritage Site (SSMPL 2008)

Clergue's second home was a much larger two story structure named Montfermier located on Moffley Hill. The house was last resided by a member of the Clergue family in 1909 and burned down in 1934. The foundation and other remnants of the house were found in 1987 during construction work (SSMPL 2008) (Figure 31).

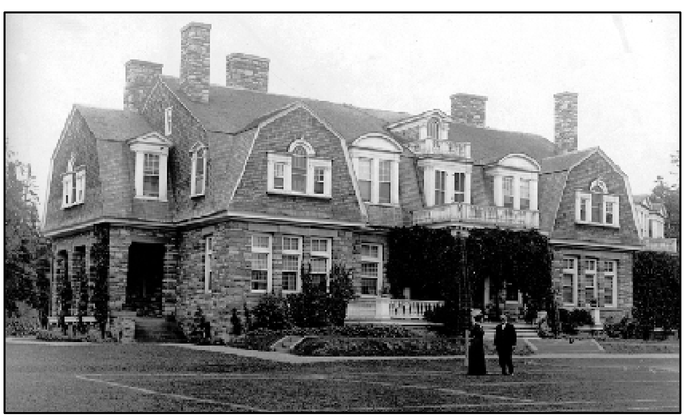

Figure 31: Clergue's home on Moffley Hill - Montfermier (SSMPL 2008)

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4.5 Other Developments in the 19th and 20th Century

The population of Sault Ste. Marie had grown to 7,169 by 1901, mostly due to Clergue's efforts to industrialize and develop the town (Osborne & Swainson 1986:110). Other factors were also responsible for the development and growth of the Town, for instance, the government was still focussed on bringing settlers to Sault Ste. Marie and the rest of northern Ontario as illustrated by the map of 1902 New Ontario, which advertizes the available land in northern Ontario, including Sault Ste. Marie. The map highlights the existing attractions including agricultural lands, mines, industries and free land (Rand McNally and Company 1902) (Figure 32).

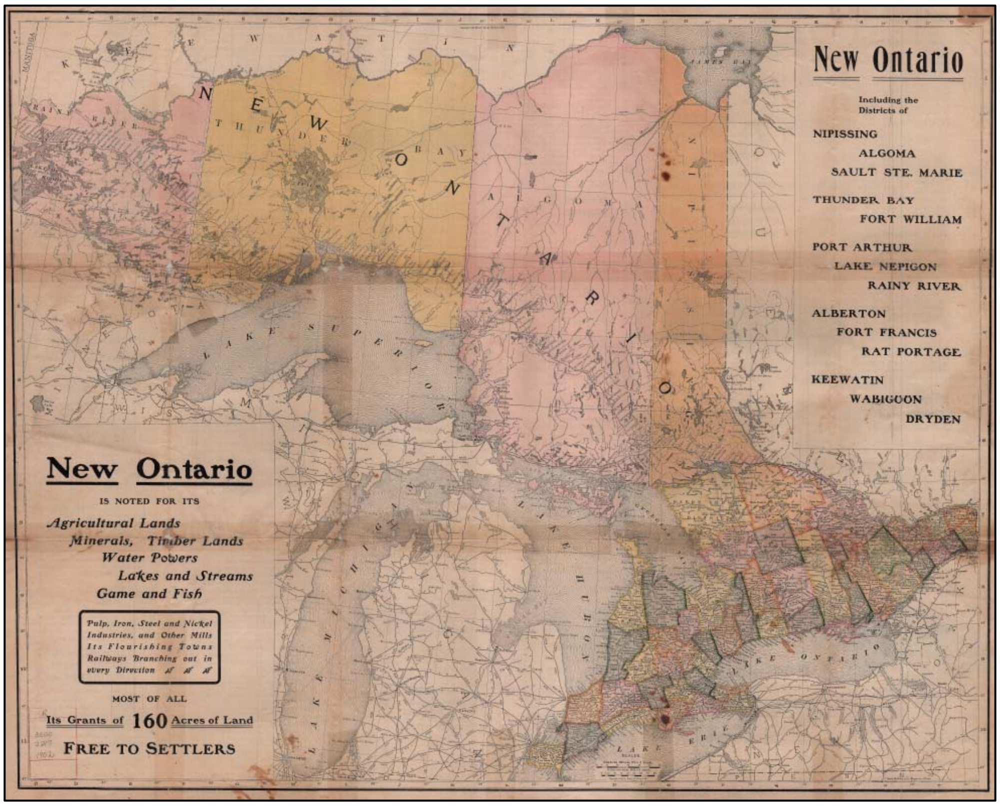

Figure 32: Map of New Ontario, 1902 (Rand McNally and Company 1902)

At the beginning of the twentieth century, commercial developments were also taking place in the town, particularly around Queen Street. The commercial core developed along the length of Queen Street from Gore Street to East Street. One of the main developments was the first Post Office building (Figure 33). Construction of the Post Office began in 1904 and officially opened on March 29, 1906. The building served as a Post Office until 1949 when the postal services moved to a different location and the building was used for other governmental services (LAC 1998). The building, referred to as the Old Post Office, now houses the Sault Ste. Marie Museum (Sault Museum 2003).

Figure 33: Old Post Office (Sault Museum 2003)

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Other notable developments include the Dawson Block – a two story building built in 1898 by John Dawson. This structure was used as a grocery store run by Dawson and his sons who eventually purchased the block from their father in 1902 (Figure 34). Although a fire in 1953 burned down parts of the structure and other alterations have been made to the original building, the Dawson Block is still extant and forms an important part of Queen Street today (LAC 1998) (Figure 35).

Figure 34: Grocery store owned by the Dawsons (LAC 1998)

Figure 35: Dawson Block as it stands now (LAC 1998)

Tourism was also a developing industry in Sault Ste. Marie which prospered when the Canadian lock was constructed. Tourists from the eastern parts of Canada and elsewhere would travel to the town by passenger ships which resulted in the construction of numerous piers along the river (LAC 1998). Accordingly, the town also developed entertainment and accommodation services to cater to the tourists. Although many hotels were built, the International Hotel and the Algonquin Hotel were two of the biggest and well-known hotels of the time.

The International Hotel was built in 1888 at the intersection of Queen Street and Bruce Street, with a capacity of up to 500 guests (LAC 1998) (Figure 36). As such, it was the biggest hotel catering to the tourists and attracted a significant number of people, between 1880 and 1890, contributing to the decision of defining the centre of the town. However, William H. Plummer, a business man with establishments further east around Queen and Pim street, wanted his area to be the centre of the Town. Although a smaller Pacific Hotel existed in the eastern area, it was unable to draw the same numbers as the International Hotel. In order to prevent the centre of town moving further west, Plummer decided to build the Algonquin Hotel in 1888 (LAC 1998) (Figure 37). This hotel would come to serve not only tourists but other significant personalities involved in the history of Sault Ste. Marie.

Figure 36: The International Hotel (SSMPL 2008)

Figure 37: The Algonquin Hotel (LAC 1998)

Queen Street was also chosen as the place to establish Shingwauk Hall, a residential school for Aboriginal children, in 1873. The school was named after Chief Shingwauk of Garden River who felt that an European education was necessary for the future generation of Ojibway as it would enable them to successfully adapt to the changing world (Shingwauk Project 2009; Capp 1904:216-220). Although the original school burnt down a mere six days after its inauguration in 1873, a second structure was constructed from 1874 to 1875 (Figure 38). This structure was demolished in 1935 and another structure was built to replace it. This third structure would serve as an Aboriginal school until 1970 and it is currently used as Algoma University College (Shingwauk Project 2009).

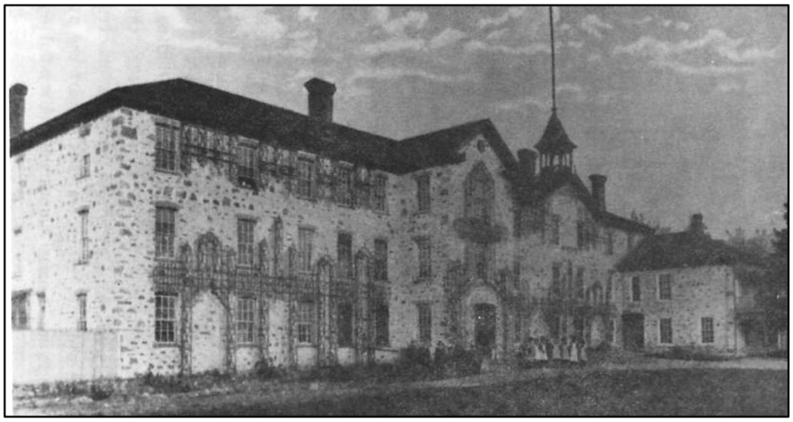

Figure 38: Shingwauk Hall (Shingwauk Project 2009)

4.6 The Evolution of Sault Ste. Marie

In 1871, the Municipality of Sault Ste. Marie was formed consisting of several townships: Township of Tarentorus, Township of St. Mary, Township of Awenge, Township of Parke and Township of Korah (Figure 39). Rankin was not a part of the municipality yet. In 1887, The Town of Sault Ste. Marie was formed consisting of part of section 1 of Awenge Township and sections 6, 4, 9 and 10 as well as concessions 1, 2 and 3 of the Township of St. Mary. Concession 4 of the Township of St. Mary went under Tarentorus Township's jurisdiction in 1902 when they formed their own municipality. A new settlement, located within sections of Korah, Tarentorus and Awenge, severed from the main Townships and formed the Town of Steelton. The remainder of Korah then amalgamated with Parke and Awenge Townships and was known as Korah Township (Moore 1998:42).

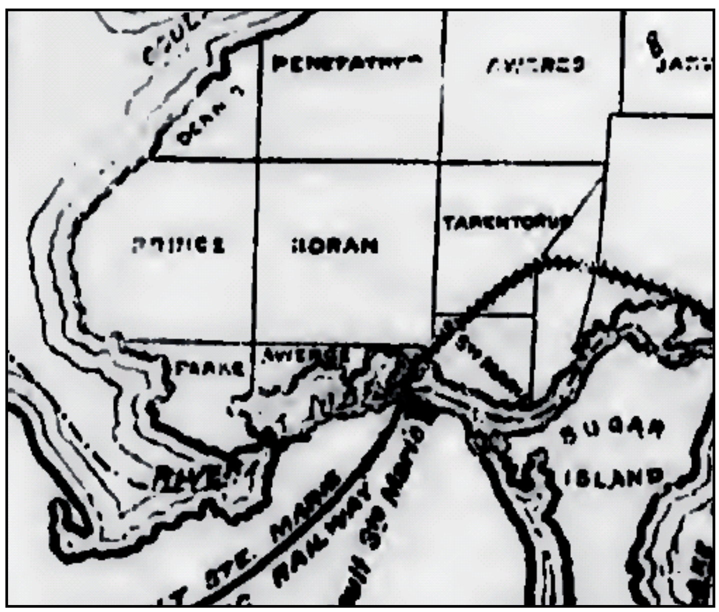

Figure 39: Map of Townships ([...] 1887:4)

The townships were all eventually united once again to form the City of Sault Ste. Marie as we know it today. Sault Ste. Marie,

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incorporated as a city in 1912, was amalgamated with the Town of Steelton in 1918. The Townships of Korah and Tarentorus also amalgamated with the city in 1965 (CSSM 2010).

4.6.1 Town of Sault Ste. Marie

Although there was settlement at Sault Ste. Marie for hundreds of years by the Ojibway, French and British, it was officially recognized as an entity when it was incorporated as a village in 1871. The village consisted of the Town Plot as laid out by Vidal in 1846 and was bounded by West Street to the west, East Street to the east, Welling and Cathcart Streets to the north and the St. Mary's River to the South (Figure 40). When the village was incorporated as a town in 1887, the limits were extended to include the greater portion of the Township of St. Mary - sections 6, 4, 9 and 10 as well as Concessions 1, 2 and 3 of Park Lots (Osborne & Swainson 1986:109; Hinsperger 1967:43; SSMPL 2008) (Figure 41).

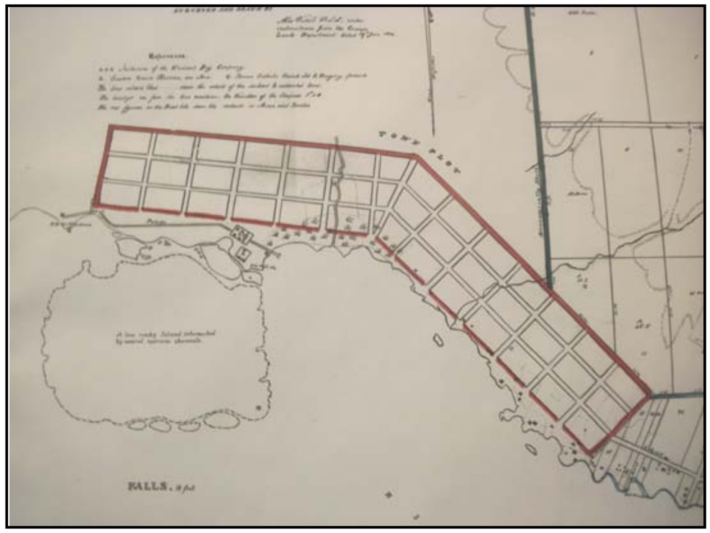

Figure 40: Town Plot of Sault Ste. Marie (Department of Crown Lands 1846)

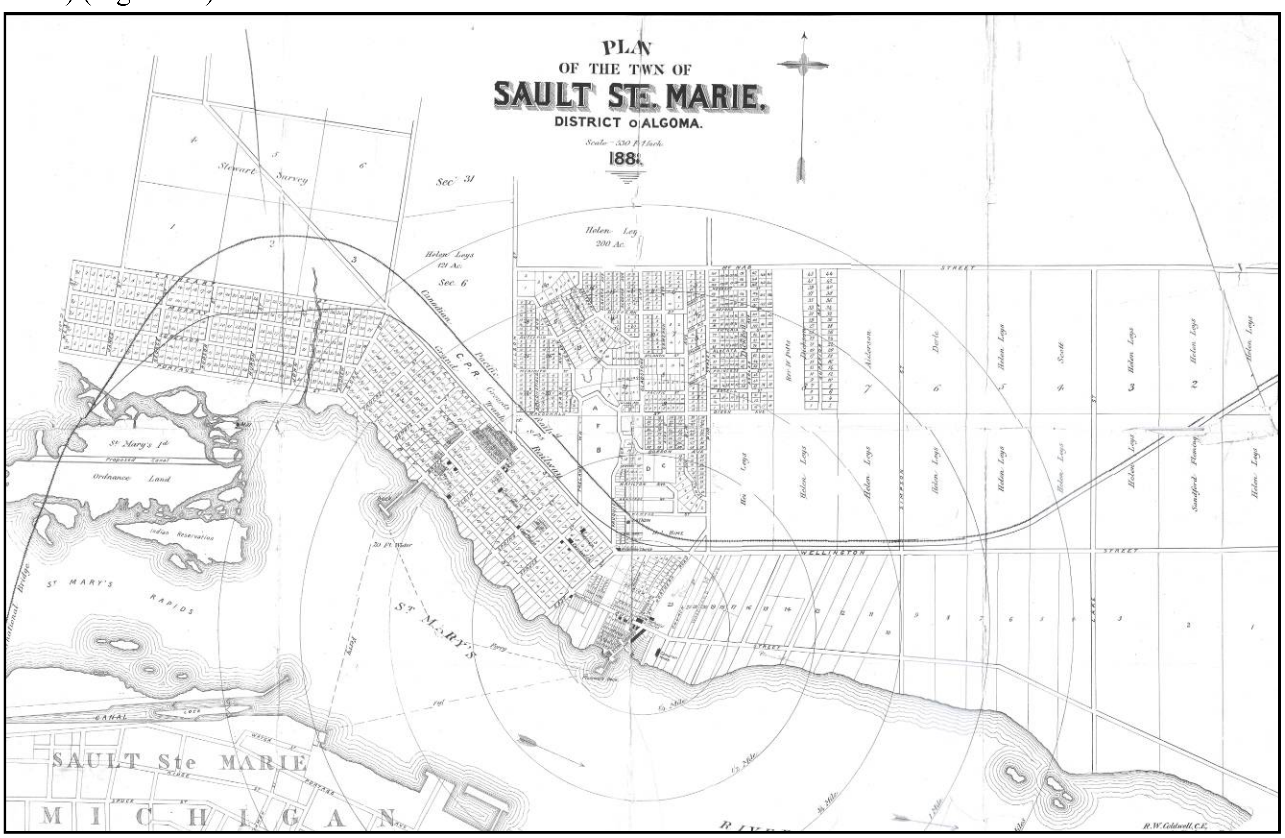

Figure 41: Town of Sault Ste. Marie in 1888 *(Archives of Ontario F004127)*

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4.6.2 Tarentorus Township

Tarentorus Township, formed its own municipality in 1902 after separating from the municipality of Sault Ste. Marie. At this time, Concession 4 of the Park Lots located in the Township of St. Mary was absorbed by the new Township (Moore 1998:42). The name of the Township is rooted in Mohawk, meaning “tree splitter” (Rayburn 1997:337). Figures 42 and 43 show the Township’s boundary in 1859 and after the separation in 1902, respectively.

Tarentorus Township, surveyed in 1859 by the Crown Lands Department had an area of 13,988 acres. The Provincial Land Surveyor A. P. Salter divided the land into sections and quarters whereby each quarter had an area of 160 acres. According to Salter, “with the exception of the northerly and north-easterly sections of Tarentorus, the whole township is fit for settlement” and that “a serious drawback to the settlement will … be found in the scarcity of timber, a very considerable portion of it having been overrun by fire, and in some sections the surface soil has been completely burned off, being of a peaty nature. This is to be regretted, as the soil is generally of good character, and affords a good opening to intending settlers” ([…] 1864:425).

By the 1870s, the town was settled by several people and a few roads had also been constructed. Records show that The Great Northern Road was constructed in phases throughout the decade and that by 1879, it had reached as far north as 5th Line. Old Goulais Bay Road, situated on the border of Tarentorus and Korah was also initiated during this decade and although the road was completed after the township separated from the Municipality of Sault Ste. Marie in 1902, by 1878, the road had been extended as far as the 6th Line. Other infrastructure projects included bridges built over Root River and Silver Creek (Moore 1998:39-42).

According to the 1911 Algoma West Census, there were 299 residents in the Township.

4.6.3 Township of St. Mary

The Township of St. Mary was surveyed and subdivided in 1859 by Provincial Land Surveyor A. P. Salter (Figure 44). The township consisted of 5 sections consisting of approximately 856 acres ([…] 1864:425; Moore 1998:42). According to the report of the survey, sections 3, 4, 6, 9 and 10 of the township were described as having good soil and that the presence of timber varied from being scarce and burned off to a thick growth found only in section 6 ([…] 1864:425). The township also consisted of approximately 3,330 acres of land designated as Park Lots. (Moore 1998:42)

The Township was divided and amalgamated with Tarentorus and Town of Sault St. Marie around the turn of century. In 1887, Concessions 1, 2 and 3 of Park Lots as well as sections 3, 4, 6, 9 and 10 were annexed to the Village of Ste. Marie to form the new Town of Sault Ste. Marie. In 1902, the remainder of the Township, Concession 4 of Park Lots, joined the new municipality of the Township of Tarentorus (Moore 1998:42, 53).

The Township, although no longer in existence, was mentioned in the 1911 Census with a population of 398.

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Figure 42: Figure: Tarentorus Township and St. Mary's Township in 1859 (*Archives of Ontario, F007428)*

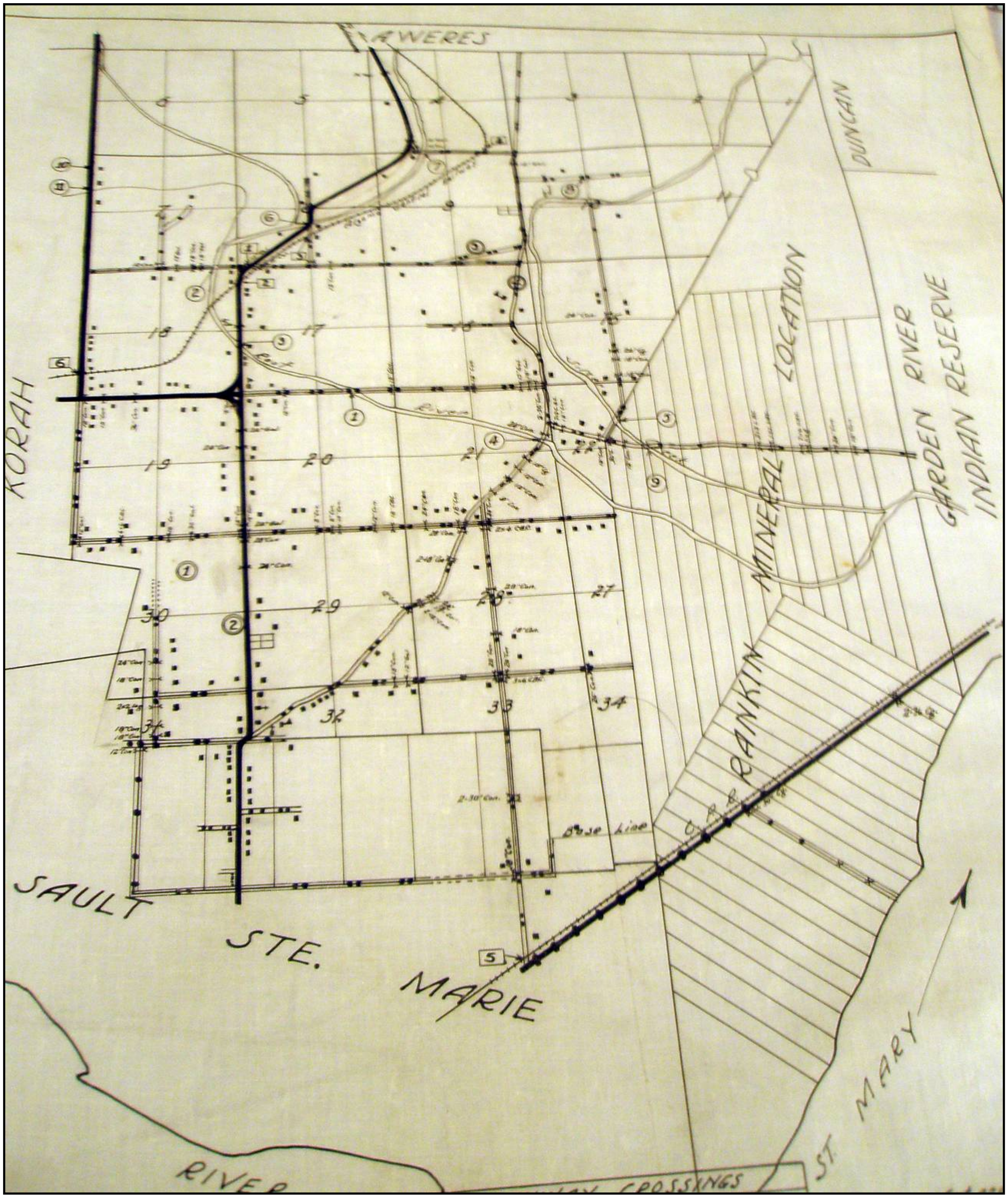

Figure 43: Limits of Tarentorus Township after separation from the Municipality of Sault Ste. Marie in 1902 *(Archives of Ontario D750834)*

Figure 44: Township of St. Mary in 1859, Department of Crown Lands (*Archives of Ontario, F007428*)

4.6.4 Korah, Parke and Awenge Townships

There is some debate about the naming of Korah Township. Moore's (1998:6) research provides evidence that the name was selected from the Book of Numbers in the Bible. However other sources mention that the term Korah means "King" in Mohawk (Rayburn 1997:185) or that it is "the Indian name for King Korah" (Mika and Mika 1981:473). Awenge Township's name is attributed to "an Indian word meaning 'in the water'" (Mika and Mika 1977:113). Parke Township was named after the Surveyor General of Canada, Thos. Parke (Mika and Mika 1983:166)

As mentioned previously, when the municipality of Sault Ste. Marie was established, it contained several entities including the Townships of Korah, Parke and Awenge. These three townships separated from the Sault Ste. Marie municipality and formed their own municipalities under the Township of Korah in 1904 (Moore 1998:42) (Figure 45). The following refers to this amalgamated Township of Korah.

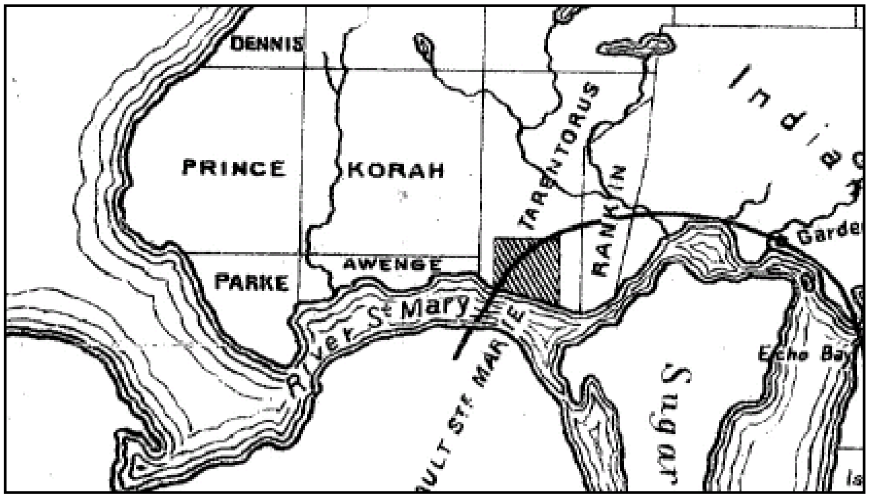

Figure 45: Historic Townships (Department of Crown Lands 1901)

The first noted activity in Korah Township was around the mid-nineteenth century when the earliest settlers arrived in the area. Records show that most of these settlers acquired their properties through the Crown Land Act. As such, some of the earliest homes in the Township were built by these settlers as the Crown Land Act required them to construct a house measuring 16 feet by 20 feet before they would be awarded the deed to the parcel of land (Moore 1998:7).

The Township was surveyed and subdivided in 1859 into sections and quarters with 160 acres each. Provincial Land Surveyor James Johnston reported that the "quality of the land in these townships is generally good" ([…] 1864:423) with maple trees and other hardwood trees. Also mentioned are "several sugar bushes, frequented in the spring by the inhabitants of the Sault village" ([…] 1864:423).

Korah Road - the oldest Road in the Township was constructed by the Hudson's Bay Company around the latter part of the 1840s. The road began at the Hudson's Bay Post and proceeded in a northwesterly direction towards Goulais Bay (Figure 46). Fragments of this road still exist today (Moore 1998:6-7, 28). As the Township was first surveyed in 1859, it may be concluded that the Base Line Road was not constructed prior to this survey (Moore 1998:28). Although the vast majority of the Township was covered by bush as late as 1870 to 1880, during this decade, residents of individual sections of the township constructed many roads around their properties. Other important roads constructed during this time include The People's Road, Goulais Bay Road, Brule Road, Leigh's Bay Road, 2nd line, 5th Line and Base Line Road. (Moore 1998:27, 29-39).

The first time Korah township is mentioned in the Census of Canada is in 1881 with a population of 339. in 1911, the recently amalgamated Township had a total population of 814 distributed as follows: 55 residents in Awenge, 104 in Parke and 655 in Korah. The population consisted of 166 families occupying 16,764 acres of land, 4,814 of which were improved (Moore 1998:129)

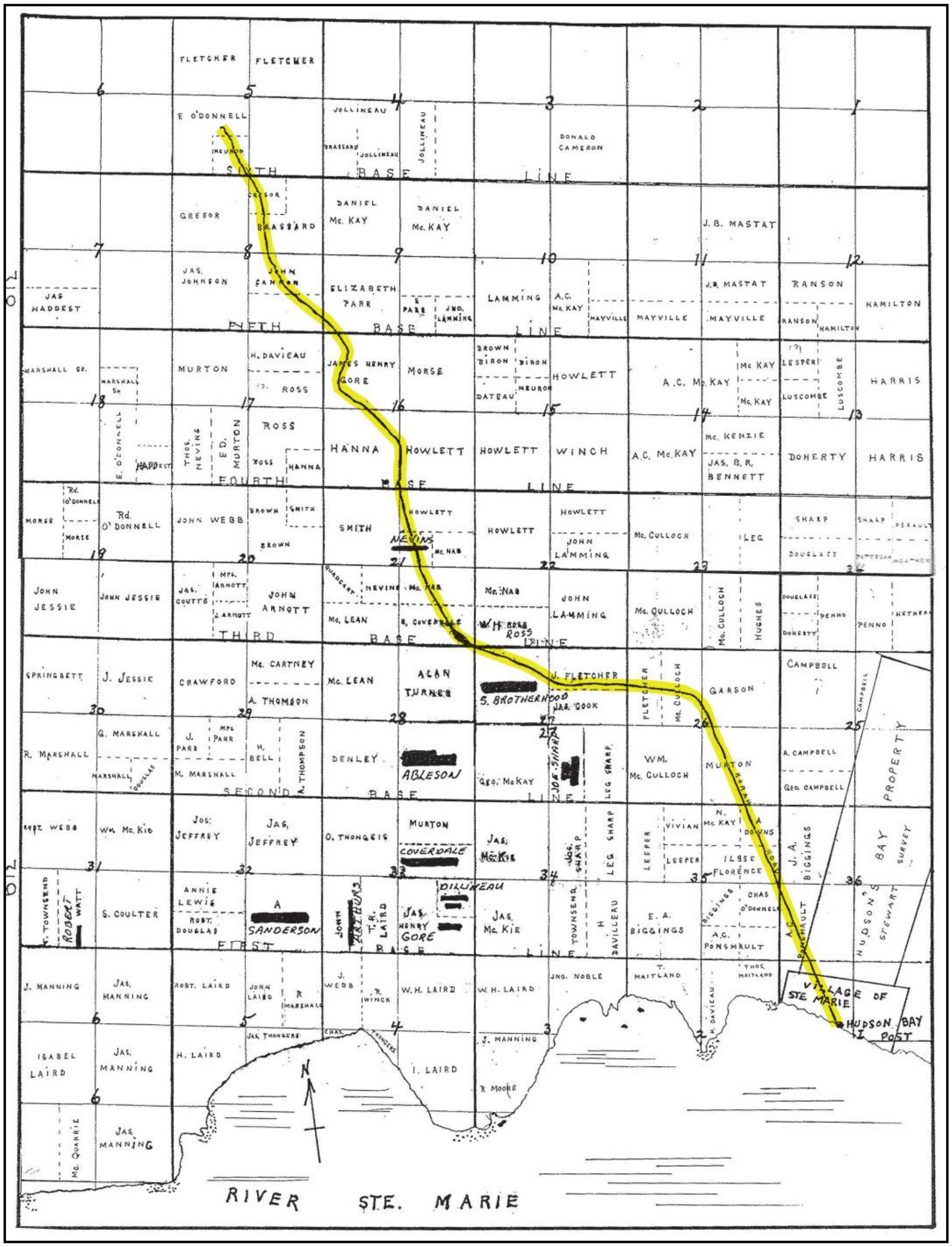

Figure 46: Korah Road highlighted on nineteenth century map of Korah and Awenge Townships (Moore 1998: 318-319)

4.6.5 Town of Steelton

The Town of Steelton, was located in an area that was originally part of the Hudson's Bay Property according to the 1859 survey of the Korah Township (Figure 47). The area also known as Stewarts Survey and the New Settlement was located in the southeast corner of Korah, comprised Sections 36 and 25 of Korah Township, Section 1 of Awenge Township and Sections 30 and 31 in Tarentorus Township (Figures 48 and 49).

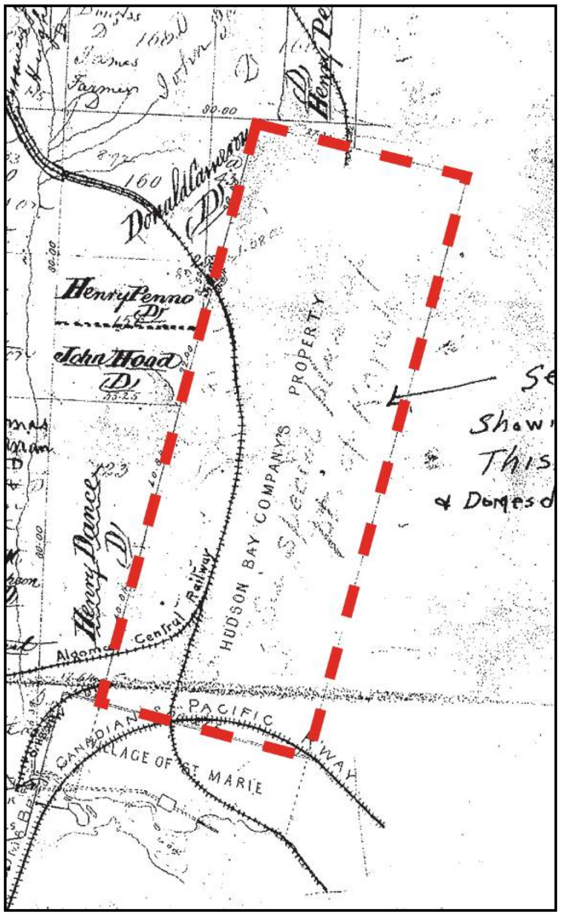

Figure 47: Stewart Survey, 1859 (*Archives of Ontario, D020787*)

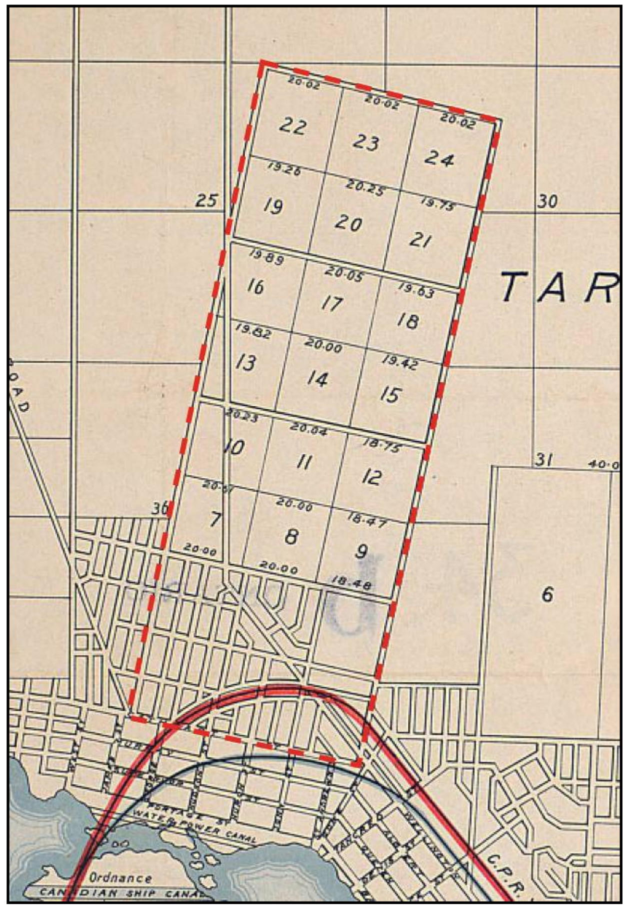

Figure 48: Steelton in 1892 (Rankin 1892)

The Town began developing during the turn of the twentieth century, from 1894 to 1903. Much of the development can be attributed to Clergue's expansion into the Sault Ste. Marie area. By 1887, the Town of Sault Ste. Marie had separated from the Municipality of Sault Ste. Marie. This separation meant that the Town of Sault Ste. Marie had a defined perimeter which was unable to accommodate Clergue's industries. As such, most of these industries were built within Korah's boundaries. Following these establishments, the surrounding area began to develop rapidly and encouraged the formation of new businesses. New roads were also being constructed including Comnee, Bloor, Bush and Charles streets (Moore 1998:71-74).

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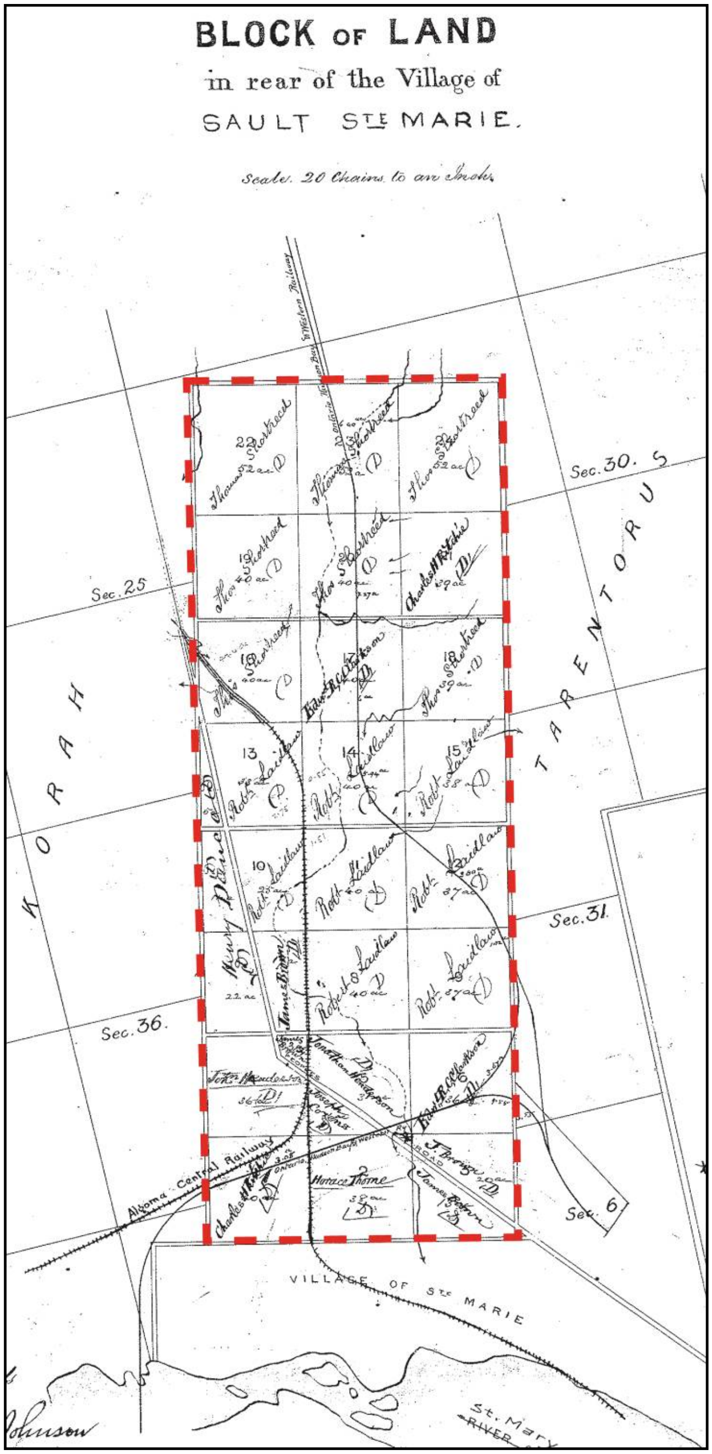

Figure 49: Steelton in 1882 (*Archives of Ontario, D020788*)

It was on December 16, 1901 when the separation of Steelton was first presented to Council and two weeks later on December 30th, the decision to separate was finalized based on a vote of 126 to 27. In

January of 1902, a committee, set up to oversee the separation process, initially wanted to amalgamate with the Town of Sault Ste. Marie. Following the Town's rejection of the offer, it was decided that the New Settlement should form their own Township (Moore 1998:109-110). While the exact date on which the separation took place is unclear, it was around the middle of 1904. The census of Steelton in 1902 was 1,561, 3,936 in 1911 and by the time the Town amalgamated with the Town of Sault Ste. Marie in 1918, the population had grown to 7,371 (Moore 1998:87,110,127; Algoma West Census 1911).

4.6.6 Rankin

Rankin Location is located east of Tarentorus Township (Figures 50 and 51). When the municipality of Sault Ste. Marie was formed in 1871, Rankin Location was not included. Records show that as late as 1891, the Township had not been settled. A report made by J.C. Bailey, an Engineer involved in railway construction, described the Township as follows: "As to the value of land in the whole Township, extending back five miles from the banks of the river to the mountain range, experienced and competent judges have estimated it to be worth on an average from twenty to twenty-five dollars per acre". He also mentioned that Purtorah tract in particular contains the best land given its "natural advantages, which make it adaptable to the establishment of grain elevators, factories, mills, wharves, etc". The Grand Trunk Railway and the Canada Pacific Railway both passed through the area, adding to the value of the tract. As such, he felt that land in this tract could be valued at $40 to $50 per acre. Based on the maps dated to 1859 and twentieth century, it may be inferred that the Township was rich in minerals while other reports mention that the area was also rich in timber such as elm, maple and ash (Rankin 1892).

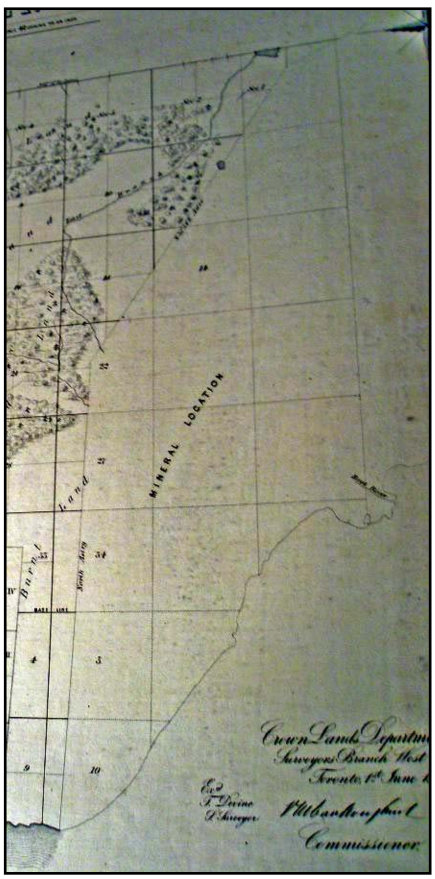

Figure 50: Rankin Township in 1859 (*Archives of Ontario, F007428*))

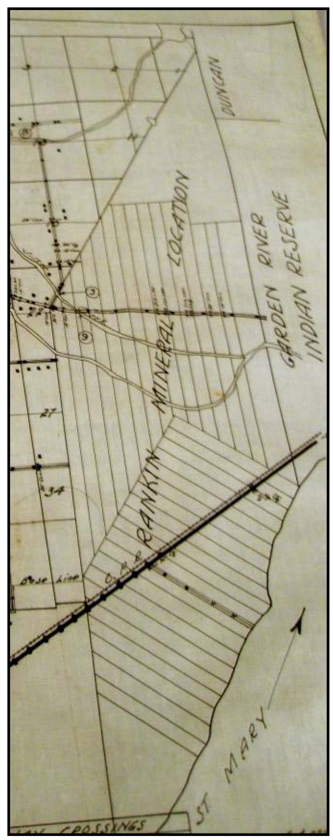

Figure 51: Twentieth Century Map of Rankin Township (Archives of Ontario D750834)

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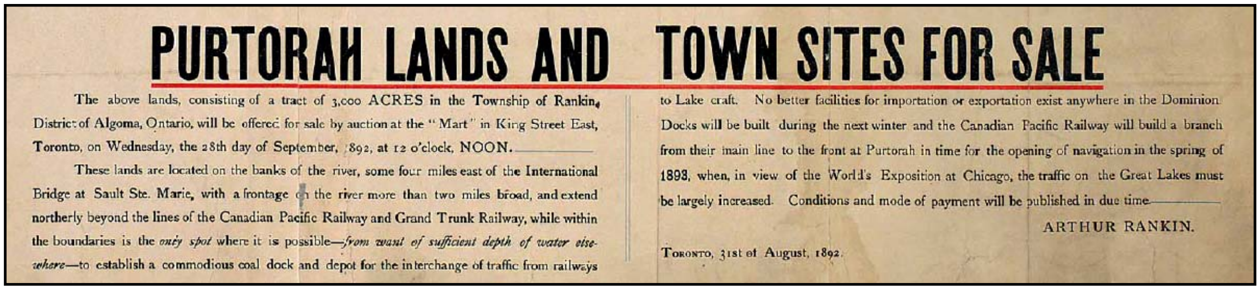
In 1892, the Purtorah tract, consisting of 3,000 acres of land, was put up for sale by Colonel Arthur Rankin (Figures 52 and 53).



PURTORAH LANDS AND TOWN SITES FOR SALE

The above lands, consisting of a tract of 3,000 ACRES in the Township of Rankin, District of Algoma, Ontario, will be offered for sale by auction at the "Mart" in King Street East, Toronto, on Wednesday, the 28th day of September, 1892, at 12 o'clock, NOON.

These lands are located on the banks of the river, some four miles east of the International Bridge at Sault Ste. Marie, with a frontage on the river more than two miles broad, and extend northerly beyond the lines of the Canadian Pacific Railway and Grand Trunk Railway, while within the boundaries is the *only spot* where it is possible—*from want of sufficient depth of water elsewhere*—to establish a commodious coal dock and depot for the interchange of traffic from railways to Lake craft. No better facilities for importation or exportation exist anywhere in the Dominion. Docks will be built during the next winter and the Canadian Pacific Railway will build a branch from their main line to the front at Purtorah in time for the opening of navigation in the spring of 1893, when, in view of the World's Exposition at Chicago, the traffic on the Great Lakes must be largely increased. Conditions and mode of payment will be published in due time.

ARTHUR RANKIN.

TORONTO, 31st of August, 1892.

Figure 52: 1892 notice of land for sale (Rankin 1892)

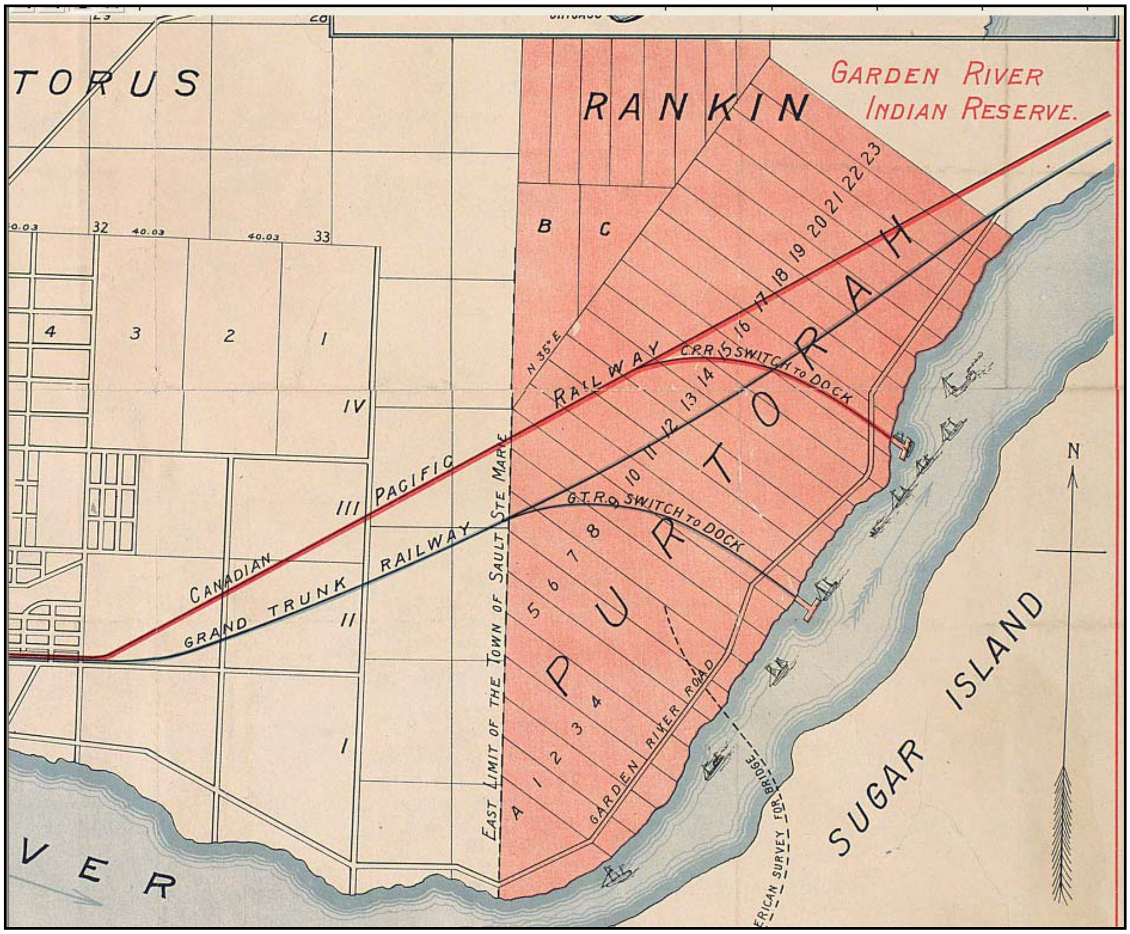


Figure 53: Purtorah Tract (Rankin 1892)

In 1895, it was suggested that Rankin Location should be included within the municipality of Sault Ste. Marie (Moore 1998:42, 52). Batchewana First Nation purchased the Township in 1939 and in 1952, it was allocated as a reserve (Batchewana First Nation 2010). The southern part of the Township is within the current limits of the City of Sault Ste. Marie.

Summary

Before the first European contact, Sault Ste. Marie, known as *Bawating* by the Ojibway, was a seasonal gathering place utilized for its proximity to water and abundance of fish. The first European to reach the settlement was in 1607 when Étienne Brûlé visited the area, soon followed by French Jesuit missionaries and further expansion into the area throughout the remainder of the seventeenth century. Fur trading flourished in the area during the eighteenth century as the British and the French were heavily invested in the trade. The Northwest Company and later the Hudsons Bay Company were the dominant forces as evidenced by the infrastructure built such as the canoe lock and the establishment of the post. Fur trading in the area began to decline after the amalgamation of the two companies and by the middle of the nineteenth century, the trading post was closed.

The settlement saw brief periods of transient growth when the mining industry was booming along the north shores of Lake Superior and Lake Huron. The signing of the Robinson Treaty and the establishment of the Judicial District of Algoma were some of the steps taken to aid the development of the area. Improvements to the transportation system, such as the building of the railway and the International Bridge, allowed Sault Ste. Marie to become a gateway of communication towards the end of the nineteenth century. The area was also heavily industrialized during the last decade of the nineteenth century, largely due to Francis H. Clergue. Clergue realized the potential of the resources available, mainly the St. Mary's River, and set up a series of industries to exploit them. His industries included the Tagona Water & Light Company, Algoma Central and Hudson's Bay Railway and the Sault Ste. Marie Pulp and Paper Company.

By the beginning of the twentieth century, Sault Ste. Marie was well on its way to becoming a successful community with flourishing industries and a commercial core along Queen Street. The settlement, incorporated as a village in 1871 and a town in 1887, became a city in 1912, with an increasing population. The current City of Sault Ste. Marie boundary encompasses several former townships, including the Townships of Tarentorus, Awenge, Parke and Korah.

5.0 ARCHAEOLOGICAL SITE POTENTIAL MODEL

5.1 Introduction

Pre-contact Aboriginal archaeological sites in the City of Sault Ste. Marie represent an important heritage resource for which only limited locational data exist. While access to such distributional information is imperative to land-use planners and heritage resource managers, the undertaking of a comprehensive archaeological survey of the city in order to compile a complete inventory is clearly not feasible. As an alternative, therefore, planners and managers must depend on a model which predicts how sites are likely to be distributed throughout the municipality. Such a model can take many forms depending on such factors as its desired function, the nature and availability of data used in its development, the geographic scope of the project, and the financial resources available. Ideally these constraints are balanced in order to produce a model of maximum validity and utility.

In the following sections, a model of pre-contact site potential is developed for the City of Sault Ste. Marie. It begins with a brief review of the method and theory associated with site potential modelling. A strategy has been selected which employs a descriptive reconstruction of pre-contact landscapes in Sault Ste. Marie together with a reconstruction of pre-contact land-use patterns informed by both known site locations as well as archaeological and ethnographic analogues. This information is brought together in

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the definition of a list of criteria which are used to define a zone of archaeological potential on GIS-based mapping of the city. The final section presents a series of recommendations for application of the model in a planning context.

5.2 Background and Theory

Archaeological site potential modelling can trace its origins to a variety of sources, including human geography, settlement archaeology, ecological archaeology, and paleoecology. The basic assumption is that pre-contact land use was constrained by ecological and socio-cultural parameters. If these parameters can be discovered, through archaeology and paleoecology, pre-contact land-use patterns can be reconstructed.

Two basic approaches to predictive modelling can be described. The first is an empirical or inductive approach, sometimes referred to as correlative (Sebastian and Judge 1988) or empiric correlative modelling (Kohler and Parker 1986). This method employs known site locations, derived from either extant inventories or through sample surveys, as a guide for predicting additional site locations. The second is a theoretical or deductive approach which predicts site locations on the basis of expected behavioural patterns as identified from suitable ethnographic, historical, geographical, ecological, and archaeological analogues. While data requirements or availability tend to influence the particular orientation of the study, every modelling exercise will incorporate both inductive and deductive elements. Foremost is the need to employ any and all available data effectively and expeditiously.

It is important to note that, while heritage planners and resource managers generally prefer to work with specific inventories of resource locations, predictive models do not provide this degree of resolution. Instead they classify the environment into zones of archaeological potential. Three major factors limit the resolution of our images of the past and hence our ability to predict pre-contact site locations with precision.

First, our knowledge of the structure of the socio-political environment in the past is limited by both the inadequacies of the existing archaeological database and the inherent difficulties in interpreting extinct socio-political systems. With respect to the database, the coverage of archaeological survey in Ontario remains spotty at best. Comprehensive survey, using officially sanctioned methods, has only recently been implemented in the context of various pre-development approval processes and archaeological master plans. Areas that have been the object of such comprehensive surveys are relatively few. Although coverage in some other areas may be adequate, through the cumulative efforts of both professional and avocational archaeologists over time, there is currently no quantification of this work that would permit analysis of the province-wide quality of coverage. It is known, however, that vast tracts, including most of the City of Sault Ste. Marie, have never been systematically surveyed.

Second, our knowledge of the pre-contact natural environment is limited by both the inadequacies of the existing paleoenvironmental database and the inherent difficulties in interpreting extinct ecosystems. Just as reconstruction of past social environments minimally requires a basic understanding of the structure of pre-contact social networks, so does reconstruction of past natural environments require some minimal direct evidence of the structure of extinct biotic communities. Although evidence from early historic land surveys, pollen cores, floral and faunal remains, and other sources is slowly accumulating, it remains difficult to carry paleoenvironmental reconstruction past a fairly general level. As in archaeology, stochasticity, or randomness, imposes interpretive limits on the data since the dynamic character of biotic systems makes them increasingly difficult to reconstruct at larger scales. More importantly, it is clear that the distribution of natural resources on the landscape merely constrained rather than strictly determined pre-contact land use.

Third, from a modern perspective it is probably not reasonable to assume that decisions made in pre-contact cultural contexts necessarily followed the same lines of economic logic that we might employ today. These people possessed a world view that was both structurally and substantively different than our own. Therefore, our own concepts of rational behaviour may not completely apply to the pre-contact case. Moreover, there are certain classes of sites, for example rock art sites or burial grounds, that were situated primarily for ideological or aesthetic reasons and are therefore impossible to assess using economically based methods of spatial analysis.

In spite of these limitations, predictive modelling efforts to date have proven successful to the extent that they can permit site potential assessments at a level of probability that is useful in the context of heritage resource assessment and planning.

5.2.1 Scale and Resolution

The portrayal of land use patterns, in either a modern or pre-contact context, must also address the limitations imposed by mapping scales. Specifically, one must consider the requirements of accuracy and resolution of the intended analysis. In southern Ontario, archaeological sites typically range between about 10 and 250 metres in diameter, although most are probably around 25 metres. It is therefore possible to place known sites on existing 1:50,000 topographic base maps, and in fact the Ontario Archaeological Sites Database (OASD) employed this format for many years. In recent years site locations have been increasingly determined through global positioning system (GPS) technology and the OASD is now maintained on a digital geographic information system (GIS) platform.

Whether working with analogue or digital maps for purposes of mapping archaeological sites, one must consider both the accuracy of the base map and the accuracy with which additional features can be added to it. For example, the accuracy ratings of Class A Standard 1:50,000 N.T.S. maps are as follows: horizontal—90% ± 25 m; vertical—90% ± 0.5 m of contour interval (Surveys and Mapping Branch 1976; Geomatics Canada 1996, 2003). In other words, a feature mapped at this scale has a 90% chance of being within 25 metres (0.5 mm on the map) of its actual location on the ground. Displacement of archaeological sites, due to inaccuracies of the base map alone, could therefore range from 250% of the site diameter for the smallest sites to 10% for the largest. Additional displacement, stemming from difficulties in accurately relating the site to existing features on the map, can be expected to be equally, if not more, severe. Such distortion may be entirely acceptable in the context of evaluating broad categories of archaeological site potential. In contrast, it would clearly be unacceptable as the basis for locating the majority of sites in the field (ASI 1990).

In addition to accuracy, one must consider the implications of generalization that pertain to various scales. Since maps are abstractions of reality, and given the constraints of accuracy noted above, maps at different scales exhibit different degrees of resolution. In other words, a feature visible on a 1:2,000 scale map may be too small to represent at 1:50,000. Resolution standards are arbitrary and subject to cartographic licence, however published guidelines are available. For example, N.T.S. 1:50,000 series maps employ the following minimum dimensions for topographic features: islands—15 m (width); eskers—500 m (length); lakes—60 m (width); marshes—150 m (width) (Surveys and Mapping Branch 1974). The ramifications of generalization apply primarily to the utility of various mapping scales as sources of physiographic data. For instance, at a scale of 1:50,000 one might have difficulty relating

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known sites to all parts of a drainage system since springs and smallest water courses might not be represented (ASI 1990).

For purposes of this study, custom digital base mapping compiled at a scale of 1:2,000 and based on Ontario Base Map (OBM) standards was employed. This provided very high resolution of all topographic and hydrographic features. Scaling of the soils data to the 1:2,000 base will have resulted in some distortion, since the original soils mapping was compiled at a scale of 1:63,360. Any such distortion was deemed to be acceptable for purposes of this study, given that the original soils mapping depicts relatively gross generalizations.

5.2.2 Modeling Criteria

A useful analogy can be drawn between the criteria used to construct predictive models and the optical filters used in photography: each is used to clarify an image by screening out nonessential information. In predictive modelling, we seek to improve our image of past land-use patterns by focusing on places with a positive attractive value to humans and filtering out places with a neutral or negative value. Some filters are designed to admit a very narrow spectrum while others are less discriminating. Since the efficacy of each filter is in part determined by what is being viewed, none are truly all-purpose. The best image is often achieved by selectively combining several filters. Proper use, therefore, requires knowledge of both the characteristics of the filters and the proposed context of application.

In Ontario, most criteria for predicting pre-contact site potential modelling can be considered narrow-spectrum filters. The best broad-spectrum filter to date, and by far the most methodologically developed, is the one implemented in the "Ontario Hydro Distance to Water Model," also known as simply "The Hydro Model." The success of this model can be attributed to its focus on a criterion that is arguably the most fundamental human resource: water. Regardless of a group's subsistence economy, whether based on hunting herds of caribou or growing corn, it will require access to water. The universality of the need for this resource makes its consideration a logical point-of-departure for most predictive modelling exercises.

Having considered proximity to water there are a variety of narrow-spectrum filters that can be considered. Selection of additional criteria will depend on consideration of the context of use as well as a cost-benefit analysis of their application. While the concatenation of various criteria will improve the filtering effect, there will always be residual sites that cannot be isolated by modelling. The objective, therefore, is to implement a logical series of criteria until one reaches a threshold of diminishing returns that is determined by the needs of the particular study (ASI 1990).

5.3 Reconstructing Paleoenviroment

Even before modelling criteria can be invoked, however, it must be recognized that the biotic landscape of southern Ontario has not been static during the span of human occupation. Since deglaciation, it has progressed through a sequence of stages in response to climatic warming. In addition to these broad paleoenvironmental trends, fluctuations in regional and local microenvironments have continued up to the present. Fluctuations in the water levels of the Great Lakes basins, for example, had profound effects upon early pre-contact settlement and subsistence patterns, alternately opening up and then covering vast land areas which, being at different stages of ecological development would have been the locale of alternative sets of resources (Lovis and MacDonald 1999; Monaghan and Lovis 2005). Therefore, when implementing site potential modelling criteria, it is necessary to reconstruct the pre-contact environment at time intervals and degrees of resolution appropriate to the study requirements.

The geological history and structure of the landscape, particularly with respect to the distribution of water, is perhaps the most fundamental aspect of site potential modelling since it not only influenced the distribution of sites in the past but also may have affected the survival or accessibility of those sites in the present. Related to geology is the distribution of soil types. Soil distribution affected the distribution of past floral communities and, in turn, faunal communities. Moreover, soils can be considered a resource which to some extent influenced the distribution of groups that practised horticulture (MacDonald and Pihl 1994).

Climate is another important determinant of the distribution of biotic communities. Ideally archaeologists would like to be able to resolve climatic changes in the past within the range of a century or even a few decades. Although such relatively fine-grained climatic change may have had few recognizable effects in terms of vegetative distributions, it may have caused significant changes in floral, faunal, and agricultural productivity. At present, however, the resolution of climatic change lies more in the range of centuries. In southern Ontario, paleoclimatic reconstruction is further complicated by the influences of the Great Lakes. Modern climatic data for Ontario are published, although detailed mapping of microclimatic variability, a potentially useful source of analogues for paleoclimatic reconstruction, is very limited (MacDonald and Pihl 1994).

The botanical features of the landscape are extremely difficult to retrodict in detail, while at the same time they may have most directly influenced settlement in the past. Various efforts have been directed at using early historical records, such as surveyor's notes, to reconstruct the distribution of botanical communities immediately prior to the onset of land clearance and logging by European settlers (e.g. Francescut 1980; Heidenreich 1971; 1973). Modelling of forest composition and dynamics in earlier periods has also been undertaken, largely through the compilation of fossil pollen profiles (e.g., McAndrews 1981). Yet in most cases the spatial and temporal resolution of these reconstructions is either coarser or more geographically restricted than archaeologists would hope for (MacDonald and Pihl 1994).

Zoological landscapes of the past may be the most difficult of all to reconstruct in detail given the constant flux of animal populations. Moreover, as Semken (1983:182) has noted, this difficulty is exacerbated by a general lack of interest in the Holocene among vertebrate paleontologists. Archaeologists have therefore depended on the reconstruction of pre-contact habitats and modern analogues from wildlife ecology to retrodict the availability of faunal resources. Unfortunately this evidence remains circumstantial and zooarchaeologists have yet to supersede paleontologists with a paleoecological programme of their own. Ironically, archaeological sites offer one of the best paleofauna data sources, albeit in a culturally selected form (MacDonald and Pihl 1994; Sadler and Savage 2003).

5.3.1 Research Design

Pre-contact land-use interpretation and modelling has traditionally been conducted on an intuitive and implicit level. This has been possible since it usually involved fairly localized contexts: a single site or a small constellation of regional sites. In recent decades, attempts been made to make these intuitive concepts explicit and to design predictive models for broader geographic and temporal contexts. Although the work to date has been encouraging, the extant models must still be considered as prototypes requiring field assessment and on-going development. Two basic approaches can be identified in these modelling exercises: a qualitative approach, wherein the paleoenviroment of the study area is characterized in as much detail as possible as a basis for presenting a narrative description of hypothesized Aboriginal land use; and a quantitative approach, which attempts to derive site potential probabilities from the statistical correlations between known sites and quantified environmental attributes. While the former approach may be primarily inductive or deductive in character, the reliance of the latter approach on known site locations results in a decidedly inductive character.

In southern Ontario, most modelling exercises have employed a qualitative approach which is predominantly deductive, although they have been informed by the reflection of pre-contact land use afforded by known site locations (e.g., MacDonald and Pihl 1994). Only in regions with robust inventories of registered archaeological sites have quantitative approaches been attempted, and these have been facilitated by the advent of GIS technology and digital environmental and archaeological data (e.g., ASI 1998).

In the case of the City of Sault Ste. Marie, the possibility of adopting a quantitative approach is denied by the extremely low inventory of known archaeological sites in the region. As a result, while GIS technology has been used to quantify and map environmental data, the modelling approach employed in this study was primarily deductive. This is not to say, however, that the known sites in the region did not inform the interpretive process, only that there were too few on which to extrapolate site potential throughout the study area.

The modelling process involved a deductive assessment of the paleoenvironmental constraints which may have affected pre-contact land use in the region. This assessment began with a review of the most fundamental determinants of the landscape, namely bedrock and Quaternary geology, and proceeded through considerations of soils, climate, flora, and fauna. Modelling criteria were established through the consideration of both paleoenvironmental and cultural data, and zones of archaeological potential were digitally mapped on the base mapping using Environmental Research System Institute's (ESRI) ArcGIS® software.

5.3.2 Paleoenvironmental Context

In the sections which follow, key aspects of Sault Ste. Marie's landscape and natural history are reviewed in order to provide a context for evaluating human land use through time and the associated archaeological site potential.

5.3.3 Physiography and Geology

In order to investigate regional landforms and how they may have influenced human land-use trends over time, Sault Ste. Marie has been subdivided into three physiographic regions (Table 3; Figure 54), which are described in the following discussion of regional geology.

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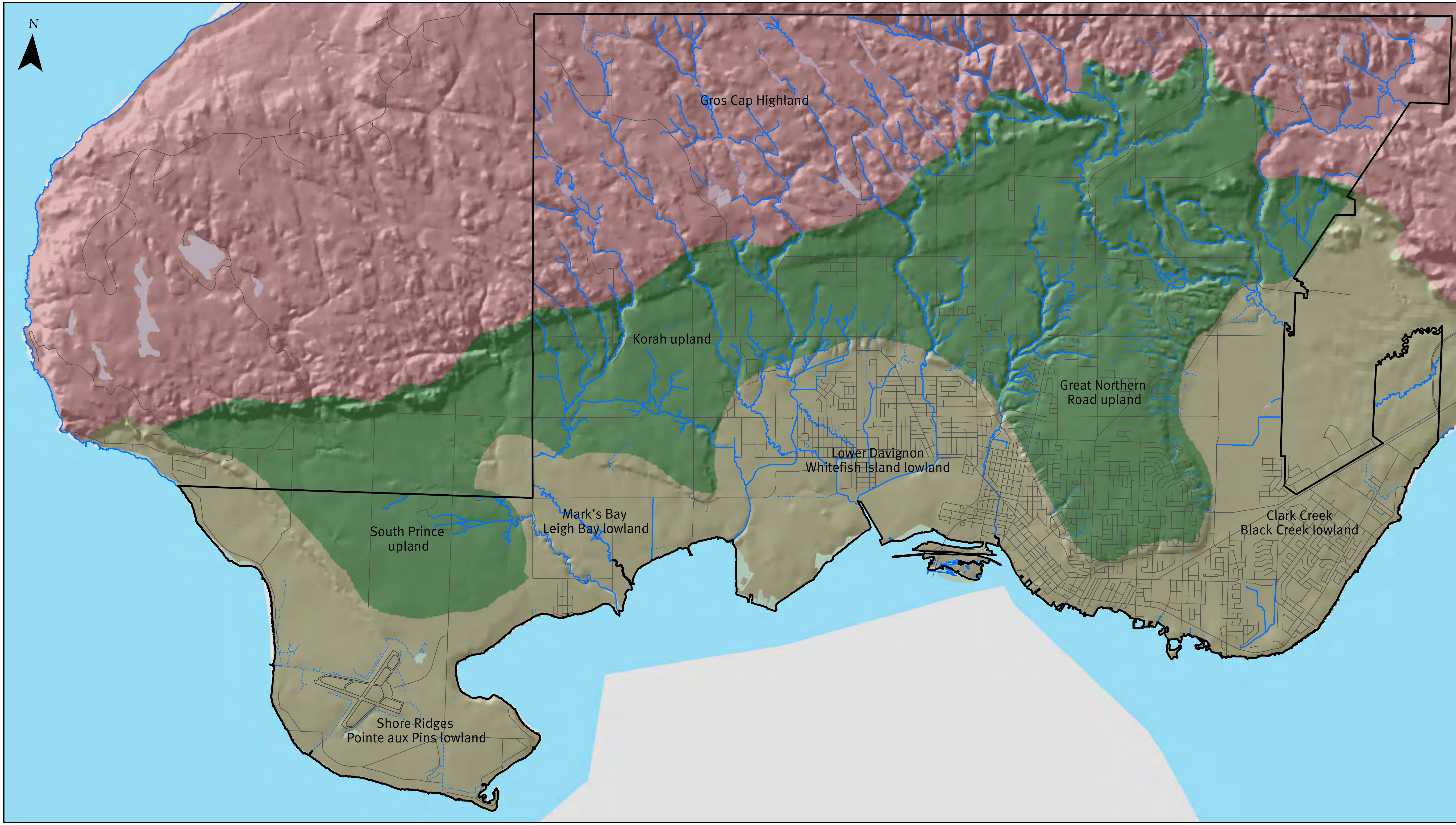

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LEGEND

Gros Cap Highland
Post-Algonquin Terraces
Post-Nipissing Terraces

BASE:

The Corporation of the City of Sault Ste. Marie
Engineering & Planning Division
Feb 8, 2010

0 3km
SCALE

ASI PROJECT NO.: 09SP-81
DATE: SEPT 28, 2010
DRAWN BY: S.F.
FILE: 09SP-81_Physiography

Figure 54: Physiographic Regions in Sault Ste. Marie

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Table 3: Physiographic Regions of the City of Sault Ste. Marie	
Physiographic Region	**Principal Components**
Gros Cap Highland	uplands – rock knobs and thin soil
	lowlands – stream valleys connecting lakes and wetlands
	Upper Algonquin Beaches
Post-Algonquin Terraces	Great Northern Road upland
	Korah upland
	South Prince upland
Post-Nipissing Terraces	Shore Ridges – Pointe aux Pins lowland
	Mark's Bay – Leigh Bay lowland
	Lower Davignon – Whitefish Island lowland
	Clark Creek – Black Creek lowland

5.3.3.1 Bedrock Geology

A basic knowledge of the geological context of Sault Ste. Marie is important as it not only helps to frame our understanding of landforms in the area, but also helps to evaluate the availability of critical resources such as siliceous toolstone (Figure 55).

The City of Sault Ste. Marie is situated at the interface of two major tectonic provinces or cratons: the Superior Province to the north, comprising rocks of Archean age[1] and the Southern Province to the south and east, comprising rocks of Proterozoic age. Informally, these all fall within the category of "Precambrian" rocks, meaning that they pre-date the beginning of the Cambrian Period at around 542 Ma.

To the north of Sault Ste. Marie and extending along and within its northern margin is the Gros Cap Highland, an upland of Archean-aged (ca. 2.7 Ga) plutonic, volcanic, and metavolcanic rocks of the Ramsey-Algoma Granitoid Complex, comprising a diorite-monzodiorite-granodiorite suite to the west, a gneissic tonalite suite in the central section, and a granite-granodiorite suite in the east (Jackson and Fyon 1992: 456; Johns *et al*. 2003). The southern roughly two-thirds of the City is a lowland underlain by horizontally bedded quartzose sandstone, shale, and conglomerate of the Jacobsville Group, a sedimentary formation of Mesoproterozoic age (ca. 1.1 Ga) (Johns *et al*. 2003). These rocks originated as fluvial deposits towards the end of a period of tectonic and magmatic events that produced the Midcontinental Rift, "one of the largest and deepest continental rift structures preserved on the earth" (Sutcliffe 1992: 627ff.). This rift is responsible for much of the scenic terrain around the Lake Superior basin, and indeed the lake itself. Locally, the Anderson Fault which separates the Archean rocks of the Gros Cap Highland from the Proterozoic rocks of the Jacobsville lowland is considered unique in the eastern Lake Superior region due to the existence of younger sedimentary rocks on its lower, down-thrown side (Cowan *et al*. 1998: 200).

The topography of the Gros Cap Highland is primarily controlled by the bedrock, which ranges in elevation from approximately 300 metres asl to over 370 metres asl. In the lowlands, the topography is influenced by the bedrock, but largely controlled by the overlying Quaternary deposits. The main bedrock feature influencing the topography of the lowlands is a large, broad upland (herein, the Great Northern Road upland), approximately 3.5 kilometres east-west by 6 kilometres north-south, with its main axis

[1] Geological Time Periods: Archean Eon – ca. 2.5 to 4 Ga, Proterozoic Eon – ca. 1.8 to 2.4 Ga, Cambrian Period, Paleozoic Era, Phanerozoic Eon – ca. 524 to 488 Ma Abbreviations: Ga=giga-annum, one billion years, Ma=mega-annum, one million years, Ka=kilo-annum, one thousand (uncalibrated radiocarbon) years

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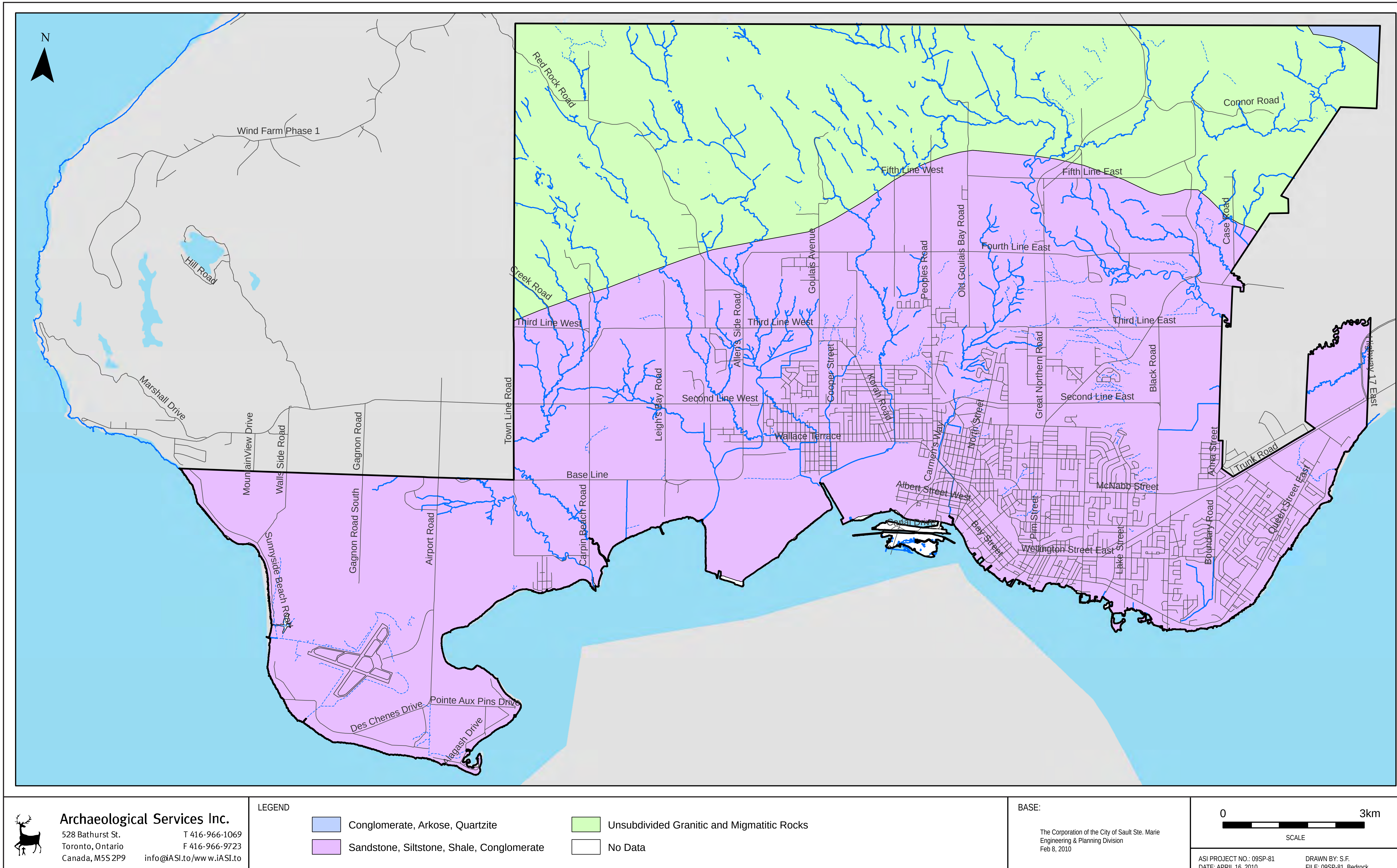

Figure 55: Bedrock Geology of Sault Ste. Marie

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roughly aligned along the Great Northern Road. A second, smaller upland (herein, the Korah upland), approximately 2.75 kilometres east-west by 3.5 kilometres north-south, occurs along Leigh Bay Road north of Baseline Road. The crests of these upland ridges stand at approximately 240 metres asl and 180 metres asl, respectively. To the east and west of these ridges, the underlying bedrock falls away to elevations as low as about 50 metres asl, which is approximately 133 metres below the current elevation of the St. Mary's River at 183 metres asl (Leahy and Giblin 1979; Dickie and Stubbert 2002).

There are no known outcrops of siliceous toolstone in Sault Ste. Marie. However, Gordon Lake Formation chert outcrops only about 17 kilometres north of Sault Ste. Marie at the north end of Goulais Bay in Fenwick Township and also about 39 kilometres east-southeast of Sault Ste. Marie on the west side of Gordon Lake (Bennett 1981: 31, 2006: 49). Quartzarenites of the Lorraine and Bar River Formations also occur in the rocks of the Huronian Supergroup, Southern Province, between Sault Ste. Marie and Thessalon (Bennett 1981; Johns *et al*. 2003) and easterly to Manitoulin Island (Long *et al*. 2002: 266-272).

5.3.3.2 Quaternary Geology

Throughout most of Sault Ste. Marie, the bedrock is overlain by an array of unconsolidated Quaternary deposits. On the Gros Cap Highland is a rock-drift complex with rock knob outcrops and shallow sub-crop under a discontinuous veneer of stony to bouldery, sandy to sandy silt glacial till that weathers from grey to a light brown, bouldery, fine sand. Drift thickness is highly variable, ranging from zero to only a few metres near rock outcrops up to 10 metres on sideslopes. On the lowland is a reddish brown, stony, sandy-silt till derived from the Jacobsville sandstone. The main deposit of the latter till is a patch of about 2.4 square kilometres on the central upland centred on Huckson Corners. The two till phases are considered to be contemporary facies of a single unit (Cowan and Broster 1988). There are no ice-contact deposits mapped within the city limits, although there are small, linear features thought to be recessional moraines in the Garden River valley to the east. Minor deposits of glacio-fluvial outwash occur as terraced valley fills in major watercourses, typically in the middle to upper reaches. On the Gros Cap Highland, outwash occurs as a fine sand wash. The most widespread Quaternary deposits are glaciolacustrine shallow-water sands which blanket most of the lowland area. These are replaced by glaciolacustrine deep-water deposits of clay, silt, and fine sand in the central area of Sault Ste. Marie. Near the airport, the fine glaciolacustrine sands have been re-worked by prevailing westerly winds to produce eolian dunes over an area of nearly 9 square kilometres (Cowan 1976, 1985; Cowan and Broster 1988).

Striations on bedrock indicate southerly advance of the Laurentide ice sheet across Sault Ste. Marie during the most recent (Late Wisconsinan) glaciation. Northeasterly retreat of the glacier is thought to have initially exposed the Gros Cap Highland as a peninsula, roughly 30 kilometres long by about 8 kilometres wide, projecting from the ice front and surrounded by the waters of pro-glacial Lake Algonquin (Figure 56) sometime between about 11 Ka and 10.5 Ka (Cowan 1976, 1985). Lake Algonquin built a substantial bar on outwash or deltaic sands and gravels laid down by southward flowing streams along the southern edge of the Gros Cap Highland (Cowan 1985; Cowan and Broster 1988). The high-level beach associated with this feature, mapped between roughly 309 and 312 metres above sea level (asl), has been interpreted by Cowan (1976, 1985; Cowan and Broster 1988) as the Main Algonquin strand. Flights of lower beaches, which have eroded into older lacustrine sediments, are interpreted as recessional strands representing falling Lake Algonquin water levels as the retreating Laurentide ice sheet exposed a series of outlets south of North Bay. These recessional beaches are believed to have formed between about 10.4 and 10 ka, and some strands may actually represent single storm events (Cowan *et al*. 1998: 202). For the sake of this study, these beaches have been divided into an early, upper series, which

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tends to hug the edge of the Gros Cap Highland, and a later, lower series, which defines an expanding lowland along the receding Algonquin waterfront.

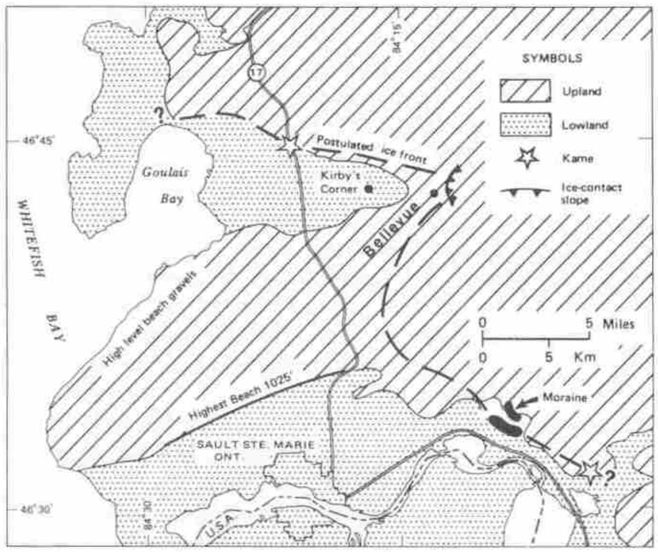

Figure 56: Postulated Ice Front during Main Lake Algonquin (from Cowan 1976)

After the opening of a very low-level outlet at North Bay after 10 Ka, water levels in the Huron-Michigan basin dropped to more than 100 metres below modern, creating two smaller water bodies: Lake Stanley in the main Huron basin and Lake Hough in Georgian Bay (Anderson and Lewis 2002; Cowan 1998: 202; Eschman and Karrow 1985: 89-90; Jackson *et al*. 2000: 419). Stream base levels throughout the Huron-Michigan watershed were reduced, contributing to down-cutting and stream entrenchment of their lower reaches wherever they traversed erodible sediments (Eschman and Karrow 1985: 90). The earliest St. Mary's River was also created at this time, draining waters from early glacial Lake Minong in the Superior basin (Farrand and Drexler 1985: 30). At that time, Lake Minong was only about twice the size of current Whitefish Bay, due to a climatic episode which caused the Marquette re-advance of the Laurentide ice sheet across the main Superior basin from around 10 ka (Farrand and Drexler 1985: 22, 30) until around 9.5 ka (Saarnisto 1974). At about 9.4 ka., it is believed that catastrophic inflows into Lake Minong from glacial Lake Agassiz overwhelmed the unconsolidated Nadoway Point-Gros Cap sill at the entrance to the St. Mary's River thereby draining the Superior basin to the low-level Lake Houghton phase at the elevation of the Sault Ste. Marie bedrock sill (Farrand and Drexler 1985: 22-30). Anderson and Lewis (1989, 2002) suggest that this influx of Lake Agassiz water created brief highstands in the Huron-Michigan basin around this time, although shorelines formed by these events have not yet been identified. Since Lake Minong stood at its maximum elevation of around 219 metres asl when this breach occurred, some flooding of Sault Ste. Marie would have been likely.

Over time, isostatic uplift continued to raise the North Bay outlet, and by about 7.5 ka, the Huron-Michigan and Superior basins became confluent again. The St. Mary's River thus became the St. Mary's Strait connecting the three upper Great Lakes. Ongoing uplift closed the North Bay outlet around 5.5 ka, restoring high-level outlets at Chicago and Port Huron and initiating the Nipissing phase in the upper Great Lakes. At Sault Ste. Marie, the Nipissing strand is demarcated by a well-defined bluff with its base at about 197 metres asl (Cowan 1976, 1978, 1985). This bluff traces the mid-Holocene waterfront of a lowland featuring three large points and three broad bays. The Nipissing transgression lasted until around

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4 ka, after which erosion of the unconsolidated sill at Port Huron began lowering the Huron-Michigan basin to modern levels. During retreat from the Nipissing levels, the receding Lake Huron waters paused long enough to create several unmapped recessional beaches at Sault Ste. Marie (Cowan 1998: 202) and by about 2.2 ka, the falling Lake Huron level fell below the rebounding bedrock sill at Sault Ste. Marie, at which time the St. Mary's Strait once again became the St. Mary's River (Farrand and Drexler 1985: 30-31). While some authors have sought correlation of these lower beaches with Lake Algoma, a widely identified post-Nipissing strand throughout the Huron basin, W.R. Cowan (personal communication, 22 May, 2010) has cautioned that there is no well-developed candidate for the Algoma beach at Sault Ste. Marie, and some of the lower terraces may even be the result of seasonal flooding or other fluvial events associated with the St. Mary's River. This advice is consistent with a detailed reconstruction of late Holocene (3.5 ka to present) water levels in the Michigan basin undertaken by Thompson and Baedke (1999), which identifies quasi-periodic fluctuations (ca. 150 years) of the Huron-Michigan basin on the order of up to a metre above the historical average, with new beaches forming at an average rate of 33 years/ridge (see also Larsen 1985; 1999: 29). For the purposes of the current study, two of the more salient late Holocene beach scarps have been identified at 193 and 188 metres asl, respectively, through analysis of high-resolution topographical contours (1 metre interval). These strands illustrate the infilling of the central bays of Sault Ste. Marie as well as the formation of the Pointe-des-Chênes sand spit throughout the late Holocene. A paleo strandplain or ridge-and-swale landscape (Albert *et al*. 2003: 6-7) situated west of Town Line Road, south of Base Line Road, is further evidence of infilling of the large bay traversed by the Carp River, while Shore Ridges Conservation Area exemplifies a similar landscape that is still actively developing.

Figure 57 illustrates the various strandlines.

5.3.4 Hydrography

Sault Ste. Marie is situated at one of the most important nexus points in the Great Lakes basin, a water transportation node which connects the Superior and Huron-Michigan basins. It is also within about 75 kilometres overland, or about 150 kilometres by water, from the Straits of Mackinac, which connect Lake Michigan and Lake Huron. Together, these two nodes define the centre of the Upper Great Lakes canoe routes, with additional connections 300 kilometres to east into the St. Lawrence Valley via the French River/Lake Nipissing/Mattawa River/Ottawa River route and 500 kilometres to the west into Northern Ontario via the Nipigon River and Lake Nipigon.

A line drawn between Gros Cap and Nadoway Point in Michigan, onetime location of a sill holding back glacial Lake Minong, artificially defines the transition from Lake Superior's Whitefish Bay to the head of the St. Mary's River. Along the north shore, from Gros Cap to Pointe Louise, several small streams, ranging in length from a few hundred metres to over three kilometres, drain westerly from the edge of the Nipissing beach ridge into the St. Mary's River. A similar assortment of streams finds the St. Mary's River east of Pointe Louise and around Marks Bay. Continuing downstream, the Big Carp River is the first major watercourse encountered. With its headwaters at Walls Lake on the Gros Cap Highland, the Big Carp River drains the southern highland and western lowland before reaching the St. Mary's River, where it has formed a small cuspate delta at its outlet separating Marks Bay from Leigh Bay. The Little Carp River likewise reaches onto the Gros Cap Highland for its headwaters, joining the St. Mary's River about 650 metres east of the Big Carp River. The western upland forms the drainage divide between the Little Carp River and Leigh Bay Creek. Together with several smaller streams, these rivers drain over 8500 hectares of western Sault Ste. Marie and Prince Township into Leigh Bay. Central Sault Ste. Marie, comprising over 7800 hectares, is drained by West Davignon Creek, with its major tributaries Bennett Creek and Central Creek, and by East Davignon Creek and Fort Creek. West and East Davignon Creeks

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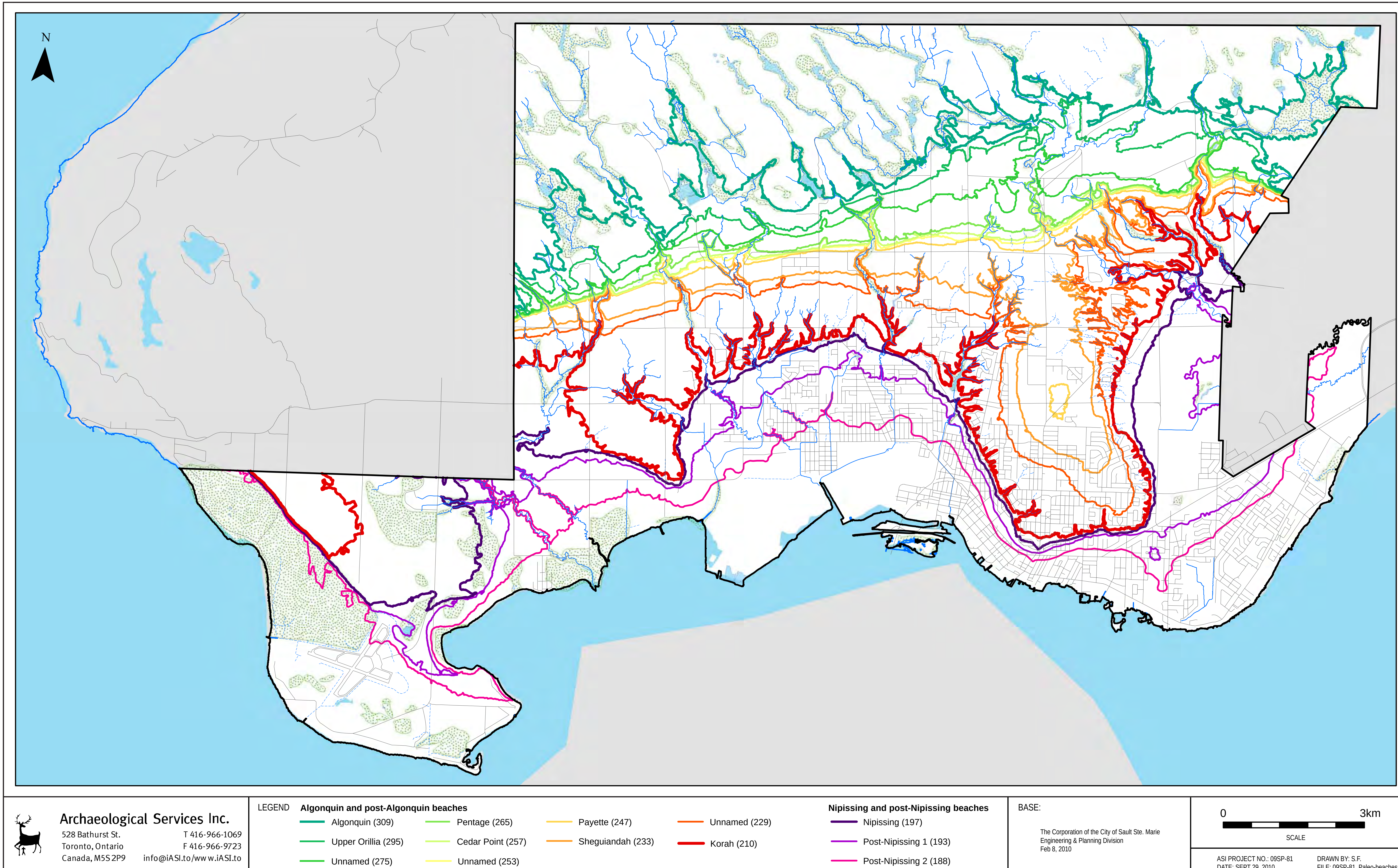

Figure 57: Strandlines in Sault Ste. Marie

both arise on the Gros Cap Highland, while the headwaters of Fort Creek lie in the sands and gravels of the Lake Algonquin beach north of East Korah and along the west flank of the central upland. These central drainages currently meet the St. Mary's River along the heavily industrialized waterfront. Although heavily modified by development of the shipping canals and locks, this central reach of the St. Mary's River, approximately 4 kilometres in length, is the location of the bedrock sill which controls the level of Lake Superior and which forms Whitefish Island and the adjacent St. Mary's Rapids. Downstream, Clark Creek and several smaller streams, ranging in length from about one to six kilometres, drain the central upland directly into the St. Mary's River. Finally, the northeastern flanks of the central upland and the eastern area of the Gros Cap Highland, comprising an area of over 5500 hectares, are drained by the Root River and its many tributaries.

The watersheds of Sault Ste. Marie, the most important of which are summarized in Tables 4 and 5, can be classified as being of two main types: (1) relatively large watersheds which arise on the Gros Cap Highland to flow southerly across the Quaternary deposits of the lowlands before joining the St. Mary's River, and (2) relatively small watersheds which fill in the gaps between the larger watersheds and which arise on either the central upland or on similar intermediate elevations, such as the terraces above the Nipissing beach ridge (Figure 58). The major watercourses share similar gradients, lengths, and flow characteristics (Table 4), and these are consistent with the similarity of their watersheds. All can be considered low-gradient streams, with slopes in the range of about two percent, although some may have reaches with higher gradients, such as where they flow off the Gros Cap Highland. Their relatively low gradients are reflected in their tendency towards meandering. Many also exhibit entrenchment in their lower reaches, a legacy of lower base levels during early Holocene low levels in the Huron basin.

Table 4: Principal Watersheds of Sault Ste. Marie

Drainage Basin	Major Watershed	Minor Watershed
St. Mary's River (Lake Huron)	Big Carp River	
	Little Carp River	
		Leigh Bay Creek
	West Davignon Creek	Bennett Creek
		Central Creek
	East Davignon Creek	
	Fort Creek	
		Clark Creek
	Root River	Black Creek
		Canon Creek
		West Root River
		Coldwater Creek
		Crystal Creek

Table 5: Watershed Attributes

Watercourse	Gradient (m/km)	Length	Drainage Area (ha)	Mean Flow (m^3/s)
Big Carp River	18.9	16.5	3785	0.63
Little Carp River	22.4	15.6	2254	0.44
West Davignon Creek	26.4	13.2	2150	0.38
Bennett Creek	24.3	16.5	3247	--
East Davignon Creek	25.7	13.6	2008	0.32
Root River	20.4	19.8	21000	2.23

Data from: SSMRCA, LaMP 2000: Addendum 6-C

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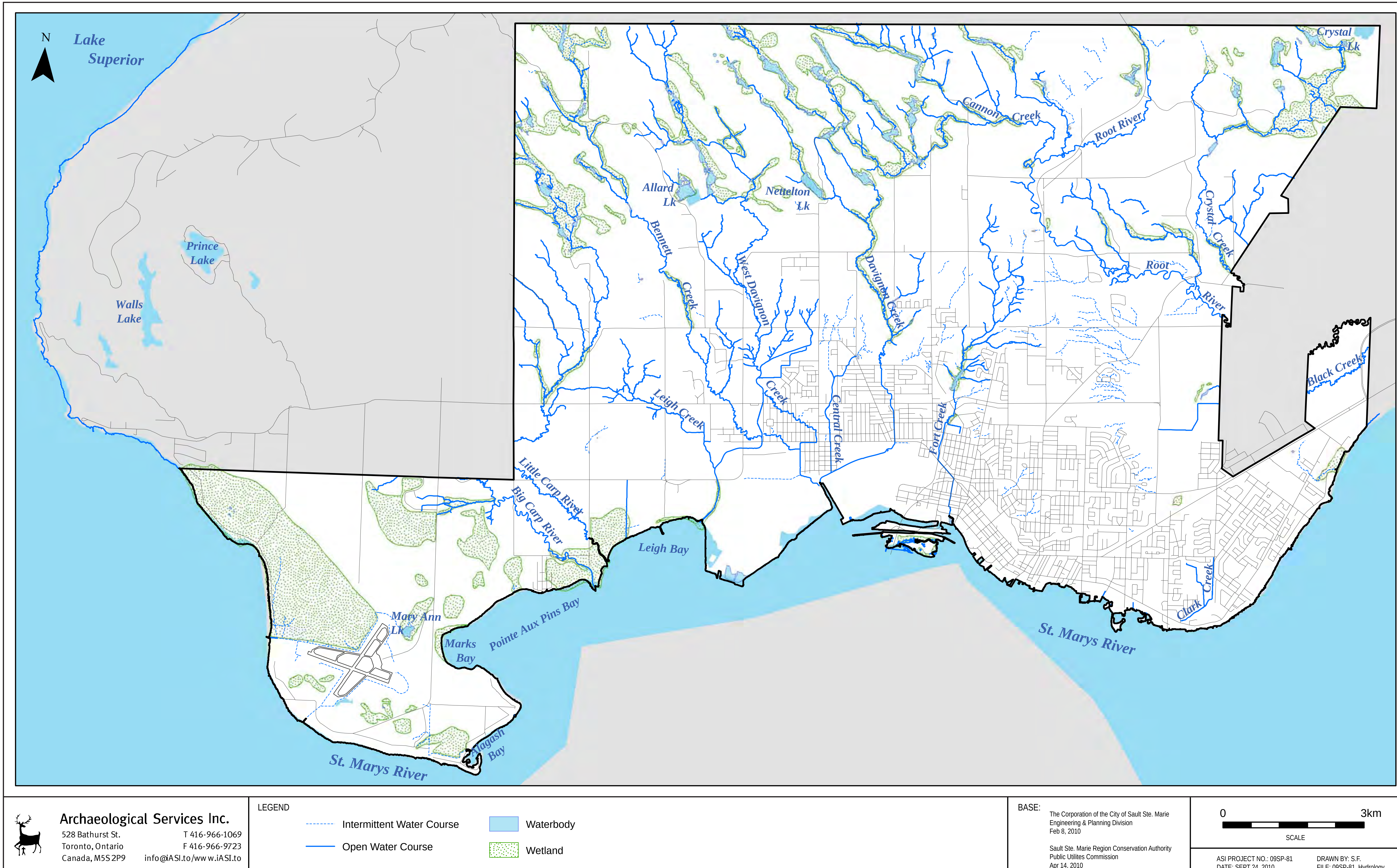

Figure 58: Hydrography of Sault St. Marie

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The City of Sault Ste. Marie has identified 2,200 hectares of wetland within its jurisdiction (SSM OP 1996: 24) (Figure 58), major components of which are summarized in Table 6. Under the Canadian Wetland Classification System (Warner and Rubec 1997), most wetlands in Sault Ste. Marie would fall within the swamp class, which are wooded wetlands with trees and/or tall shrubs, and many would be further classified as riparian swamps, given their proximity to and relationships with adjacent rivers and streams. Riparian swamps are common along headwater streams on the Gros Cap Highland, due to the shallow depth of soils and uneven bedrock topography, which creates many poorly drained depressions. Beaver dams have no doubt expanded such wetland areas. In the lowlands, the largest number and extent of wetlands occur in the following areas: along the Marks Bay and Leigh Bay waterfronts below the Nipissing beach; on the plateau above the Nipissing beach north of the airport; in depressional areas of the Pointe-des-Chênes sand spit; and throughout the strandplain of the Shore Ridges Conservation Area. Within these swamps, other wetland forms occur, including riparian fens and bogs. Fens are peatlands with fluctuating water tables, whereas bogs are peatlands which are level with or raised above the surrounding terrain and are thus unaffected by runoff or groundwater from the surrounding mineral soil. Very small marshes—wetlands with open water and emergent vegetation—also occur. The largest wetland complex, encompassing most of the Shore Ridges Conservation Area, illustrates the interplay of wetland classes and forms, comprising about 74% swamp, 25% fen, and 1% marsh (SSMRCA 2010). Whereas the sandy upland above the Nipissing beach ridge supports a forest composed of red maple (*Acer rubrum*), white birch (*Betula papyrifera*), red oak (*Quercus rubra*), trembling aspen (*Populus tremuloides*) and largetooth aspen (*Populus grandidentata*), the raised beach ridges on the strandplain below support a mainly deciduous forest dominated by white birch and red maple with a few scattered red oak. Fire-scarred stumps indicate that white pine (*Pinus strobus*) once dominated these ridges. Between the ridges are peatlands which support a variety of wetland vegetation communities, including: cedar (*Thuja occidentalis*) and larch (*Larix laricina*) coniferous swamps; thicket swamps; larch-treed fens; open, low shrub fen; open graminoid fen; and marsh (NHIC 2010a). A candidate Life Sciences Area of Natural and Scientific Interest (ANSI) on the west side of Marks Bay exhibits a similar toposequence, with sand plain and low bluffs supporting sugar maple (*Acer saccharum*) deciduous forest, mixed forest dominated by red (*Pinus resinosa*) and white pine of exceptional height and diameters, and mixed red and white pine-red oak forest, while the wetland area backing the bay supports alder (*Alnus incana* ssp. *rugosa*) thicket swamp and cedar coniferous swamp (NHIC 2010b).

Table 6: Major Wetland Complexes

Wetland Location	Dominant Class/Form	Area (ha)
Crystal Creek	swamp/riparian	146
East Davignon Creek	swamp/riparian	246
West Davignon Creek	swamp/riparian	122
Upper Little Carp Creek, Bennett Creek	swamp/riparian	276
Leigh Bay, Lower Little Carp Creek, Lower Big Carp Creek	swamp	195
Marks Bay	swamp	101
Pointe-des-Chênes	swamp	70
West-central Big Carp River	swamp and fen	185
Shore Ridges Conservation Area	swamp and fen	647

5.3.5 Soils

A relatively modest array of soils has developed on the Quaternary deposits of Sault Ste. Marie. These have been mapped according to 16 soil associations together with two rock/soil complexes, marsh land, water, and urban land (see Table 7).

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The distribution of soils (Figure 59, 60, 61) is strongly correlated with the geological origins of the parent materials (Figure 62), with fine-grained materials primarily derived from glacio-lacustrine silts and clays and coarser materials derived from sandy, stony, glacial till and sandy to gravely glacio-lacustrine deltaic and glacio-fluvial outwash deposits. On the Gros Cap Highland the soils are primarily mapped as a complex of exposed rock and Monteagle gravelly sandy loam which has developed on the intermittent deposits of glacial till. In the northeast a similar complex of exposed rock and Wendigo sandy loam is mapped. Both of these complexes are considered well drained, but are rated very poor for agriculture due to their adverse topography and shallow depth. Extending southerly from the edge of the Gros Cap Highland, through the area of Lake Algonquin near-shore bars and strands, are soils which have formed on non-calcareous medium and coarse sand and gravelly sand outwash (Wendigo, Mallard, Kenabeek, Eakett). Patches of these coarse materials also occur below the Nipissing strand. Most of these porous soils are well drained, although they tend to have low fertility and low moisture-holding capacity where drainage is good. Even the best of these soils are only rated Class 4 for agriculture, with severe limitations that restrict the range of suitable crops or require special farming practices, or both. Many have either very severe limitations (Class 5), or are only suitable for producing perennial forage crops (Class 6) (CLI 1972: 7). These coarse upland soils grade into loams, ranging in texture from sandy to clayey (Delamere, Albany, Casimar, Tarentorous, Ouellette), that have developed on off-shore deposits of fine sediments both above and below the Nipissing strand.

Table 7: Soils of the City of Sault Ste. Marie

Parent Materials	Soil Series	Percent of Soils	CSSC Taxon	Texture	Drainage	CLI Class
calcareous clay loam or silty clay loam over lacustrine clay	Delamere		O.GL	clay loam	well	3D
	Albany		GL.GL	clay loam	imperfect	3D
	Casimar		RH.G	gravel	poor	3DW
non-calcareous clay loam, silty clay and/or lacustrine clay	Tarentorous		O.GL	sandy loam	well	3D
	Ouellette		O.G	sandy loam	poor	4DW
non-calcareous very fine sandy outwash or deltaic sand	Killaby		O.HFP	sandy loam	well	3F
	Bradley		G.HFP	sandy loam	imperfect	3F
non-calcareous fine sandy outwash or deltaic sand	Dokise		O.HFP	sandy loam	well	4FM
	Fremlin		O.HFP	sandy loam	well	4FM
	Medette		G.HFP	sandy loam	imperfect	4F
	Gouvereau		O.HG	sandy loam	poor	4WF
	Warren		O.HG	sandy loam	poor	5WF
	Wendigo		O.HFP	sandy loam	well	4FM to 6TS
	Wendigo/ Rock complex		O.HFP	sandy loam	well	6TS
non-calcareous medium and coarse sand and gravelly sand outwash	Mallard		G.HFP	sandy loam	imperfect	4F to 7PR
	Kenabeek		O.G	sandy loam	poor	5WF
	Eakett		O.HG	sandy loam	poor	6WF
non-calcareous very stony sand and/or sandy loam glacial till	Rock/Monteagle complex		O.HFP	gravelly sandy loam	well	7R
n/a	marsh		n/a	organic	poor	7W

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Canadian System of Soil Classification (CSSC) Taxons: O.HG=Orthic Humic Gleysol, O.G=Orthic Gleysol, RH.G=Rego Humic Gleysol, O.GL=Orthic Gray Luvisol, GL.GL=Gleyed Gray Luvisol, O.HFP=Orthic Humo-Ferric Podzol, G.HFP=Gleyed Humo-Ferric Podzol

Canada Land Inventory (CLI) Limitation Classes: D=poor structure/permiability, W=excess moisture, M=low moisture-holding capacity, F=low fertility, T=adverse topography, P=stony, R=shallow bedrock, S=multiple limitations

Where the topography is fairly level these soils tend to be imperfectly drained, while they are well drained on slopes. Where well drained, these soils comprise some of the best farmland in Sault Ste. Marie, with Class 3 ratings for agriculture and only moderately severe limitations arising from poor structure and/or permeability. West of the Little Carp River and in patches along the St. Mary's River and elsewhere throughout the lowland are soils which have developed on non-calcareous fine and very fine sandy outwash or deltaic sand (Killaby, Bradley, Dokise, Fremlin, Medette, Gouvereau, Warren). Most are well to imperfectly drained, although the strandplain of the Shore Ridges Conservation Area comprises one particularly large area of poorly drained Warren sandy loam. The finer sands, which have better moisture-holding capacity, are rated Class 3 for agriculture, with low natural fertility as the limitation. The coarser sands are rated Class 4, also with low natural fertility as a limitation together with either droughtiness or excess moisture, depending on their particular drainage situation.

The majority of soils are well drained (54%), while 16% are imperfectly drained and 7% are poorly drained (Figure 60). Since texture is a key factor affecting soil moisture-holding capacity, Figure 61 illustrates the composite distribution of soil texture and drainage attributes.

The soils mapping includes classification of the soil series polygons in terms of their general slope characteristics in five categories: level to very gently sloping (0 to 2% slope); gently sloping (3 to 6% slope); moderately to strongly sloping (7 to 12% slope); steeply sloping (13 to 20% slope); and very steeply sloping (21 to 30% slope) (Figure 63). The areas with the steepest slopes tend to be upper beach bar deposits of glacial Lake Algonquin, which are classified as very steeply sloping. Virtually all of the Gros Cap Highland is mapped as steeply sloping, as are a few middle sections of entrenched lowland valleys. Areas around the Nipissing strand and some of the upper Lake Algonquin strands are mapped as moderately to strongly sloping, while some of the latter are merely classified as gently sloping. The remainder of Sault Ste. Marie, comprising the vast majority of the lowland area, is mapped as level to very gently sloping.

Only one soil series, Guerin loam, representing 1.4% of the study area, is rated as Class 1 for agriculture by the Canada Land Inventory (Figure 64). Nevertheless, there are substantial quantities of Class 2 (18.5%) and Class 3 (14%) soils, bringing the total arable land in Sault Ste. Marie to 34%. A significant area is made up of Class 6 (4%) and Class 7 (24%) soils which have virtually no capacity for agriculture. Marginal soils, comprising Class 4 (31%) and Class 5 (5.0%) make up the remainder of the soils. Inadequate depth to bedrock is the predominant limiting factor for agricultural capability. Other limitations include excess moisture, poor structure or permeability, adverse topography, stoniness, and nutrient deficiencies.

The mineral soils of Sault Ste. Marie are dominated by those of the Podzolic soil order. Soils of the Podzolic order are well to imperfectly drained mineral soils that have developed under the influence of forest or heath vegetation in mild to cold, humid to perhumid conditions. Weathering has produced amorphous complexes of soluble organic matter and mobile compounds of aluminum and iron, which have accumulated to form a discrete podzolic B horizon. This B horizon typically has an abrupt upper boundary and may form a cemented pan. The A and B horizons, and usually the C horizons, are characteristically acidic. In the study area, the Podzolic soils belong exclusively to the Humo-Ferric Podzol great group. These usually form on acidic, iron-rich, non-calcareous materials and are characterized by podzolic B horizons high in iron and aluminum colloids and low in organic matter. Humic A horizons are thin and eluvial Ae horizons are highly bleached. Parent materials are typically coarse, frequently stony, glacial till, outwash, or glacio-fluvial sand deposits. Loamy textured parent materials are less common. Podzolic soil development usually occurs on gently to steeply rolling lands. The productivity of Podzolic soils is generally not great, owing to fertility limitations as well as local constraints, including stoniness, shallowness to bedrock, and imperfect drainage due to topography. Structural limitations are usually not a problem except where iron pans occur (Clayton et al. 1977:1:120-124).

Luvisols are well to imperfectly drained mineral soils that have developed on calcareous parent materials under the influence of the growth and decomposition of forest vegetation in subhumid to humid, mild to very cold climates. Luvisols are characterized by eluvial Ae horizons and illuvial Bt horizons with silicate clay as the main accumulation product. The A and B horizons are slightly to moderately acidic and the C horizons are usually neutral to alkaline. The Luvisolic soils of the study area belong to the Gray Luvisol great group. In eastern Canada, Gray Luvisols have developed under boreal or mixed forest vegetation in humid to perhumid areas, usually on calcareous medium to fine textured parent materials. Gray Luvisols typically exhibit greater forest litter (L, F, H) horizons and less well developed Ah horizons than Gray Brown Luvisols. Luvisolic soils usually develop on gently to moderately rolling lands, especially on adequately drained, middle and upper slopes (ACECSS 1987: 78-79).

The poorly drained mineral soils of Sault Ste. Marie are primarily Orthic Humic Gleysols and Orthic Gleysols, although one area of Rego Humic Gleysol, lacking a B horizon, has also been mapped. Gleysolic soils are poorly drained mineral soils that are saturated with water and are under reducing conditions, due to lack of aeration, for some or all of the year. Vegetative regimes are hydrophytic and range from tundra to forest and meadow. By definition these soils include dull, greenish to bluish grey gleyed horizons, although surface horizons may vary from organic O horizons to organic-mineral Ah and Ae horizons, with or without a B horizon. In the study area Gleysolic soils belong to the Humic Gleysol and Gleysol great groups. Humic gleysols have well-developed humic A horizons, over 8 cm in depth, overlying gleyed B or C horizons. Gleysols have either no humic A horizon or a thin or weakly developed one. Parent materials are typically alluvial, glacio-lacustrine, or resorted till deposits. Where Gleysols are dominant, the topography is usually level to gently rolling, often in association with lacustrine or alluvial deposits. Where they are subordinate, they often occupy local depressions or kettles. Fertility limitations of gleysolic soils are minor and productivity can be high for a variety of crops if drainage is artificially improved. Humic Gleysols commonly support meadow grasses and sedges in the natural state, while Gleysols support hydrophytic trees and shrubs with an understorey of grasses, sedges, reeds, and mosses (Clayton et al. 1977:1:136-140).

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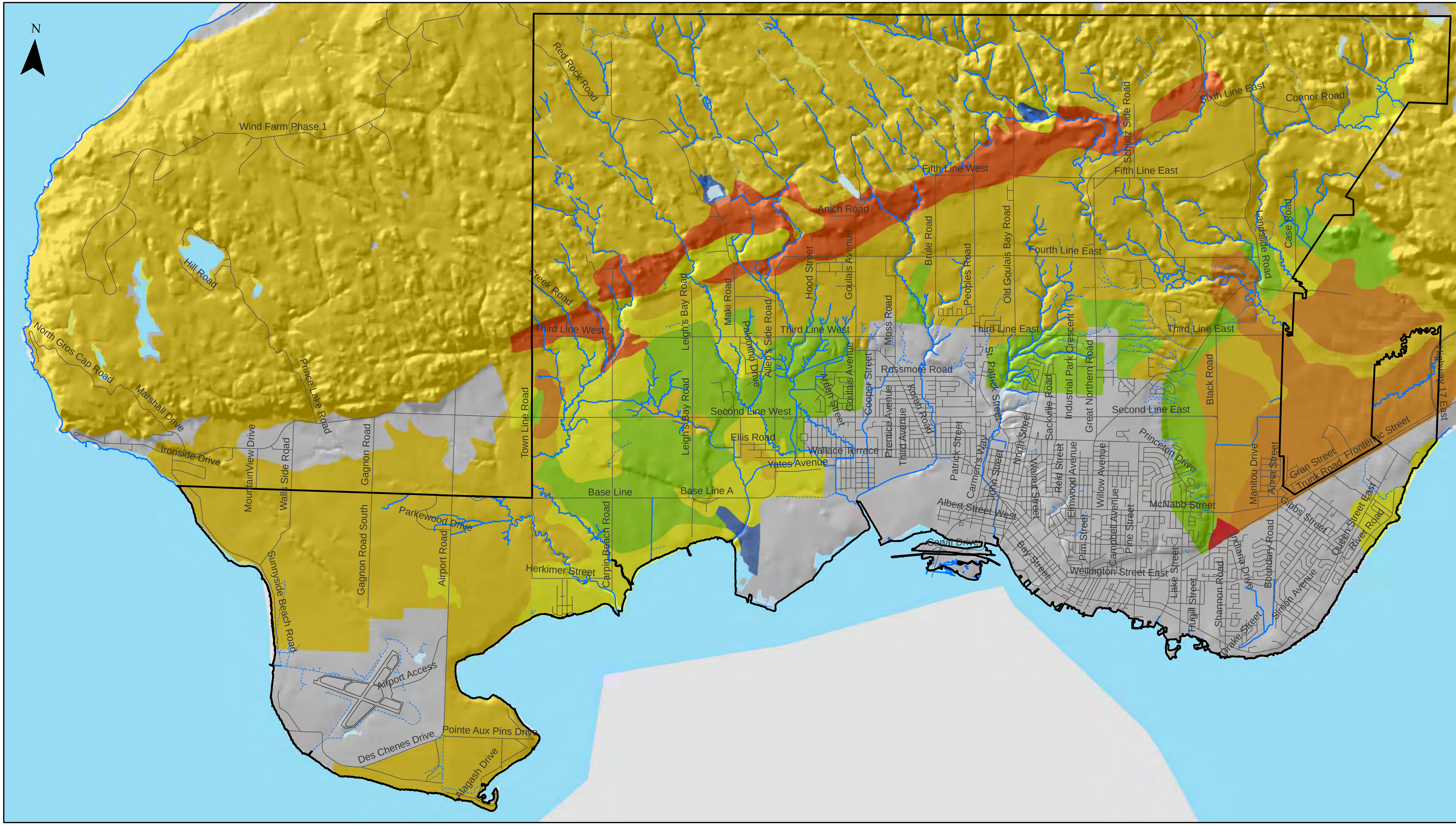

LEGEND

- gravel
- gravelly sandy loam
- fine sandy loam
- very fine sandy loam
- sandy loam
- sand
- clay loam
- organic
- n/a

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BASE:

The Corporation of the City of Sault Ste. Marie
Engineering & Planning Division
Feb 8, 2010

0 3km
SCALE

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FILE: 09SP-81_Soils

Figure 59: Soil Attributes - Texture

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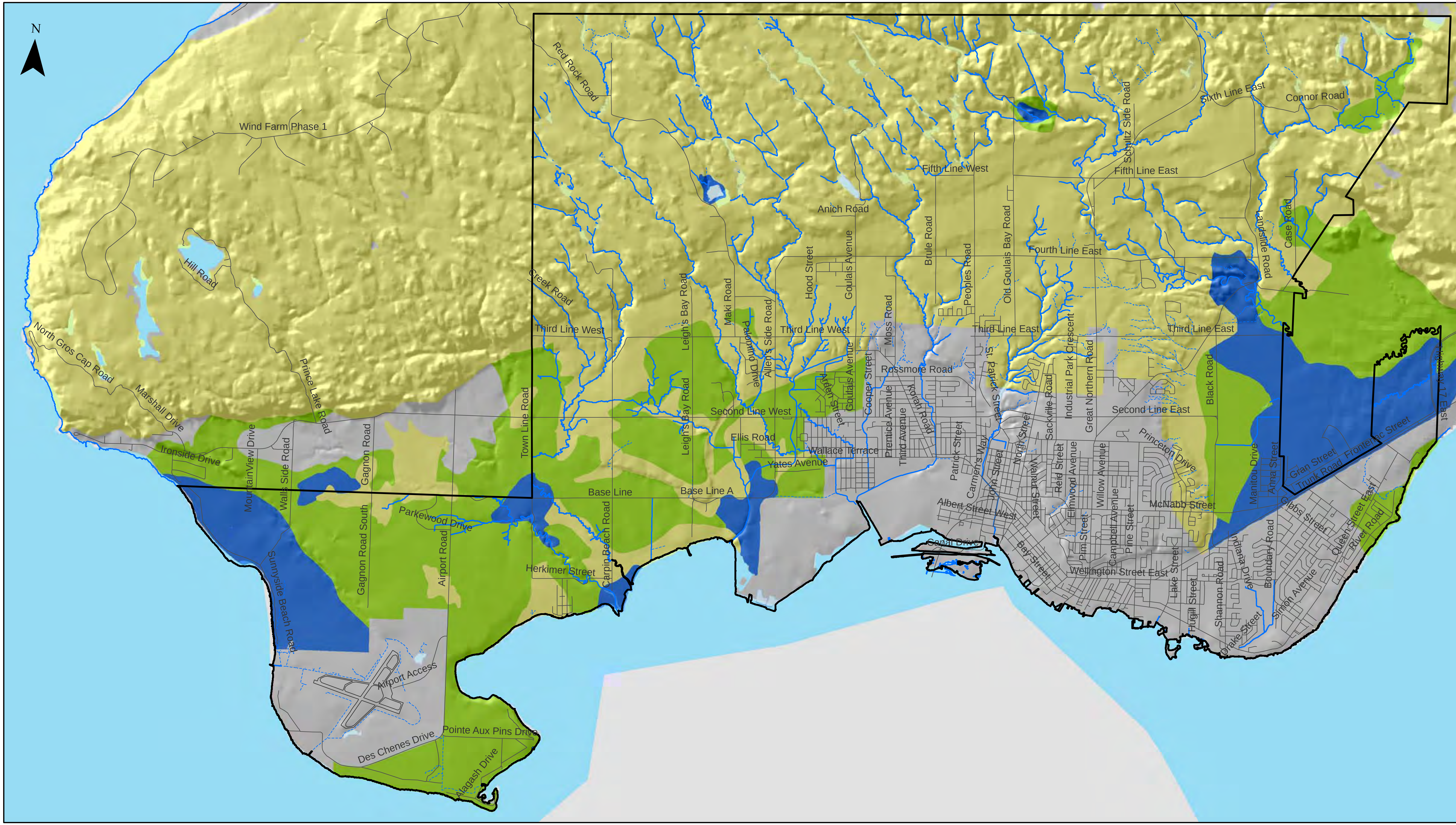

LEGEND

well	poor
imperfect	n/a

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Figure 60: Soil Attributes - Drainage

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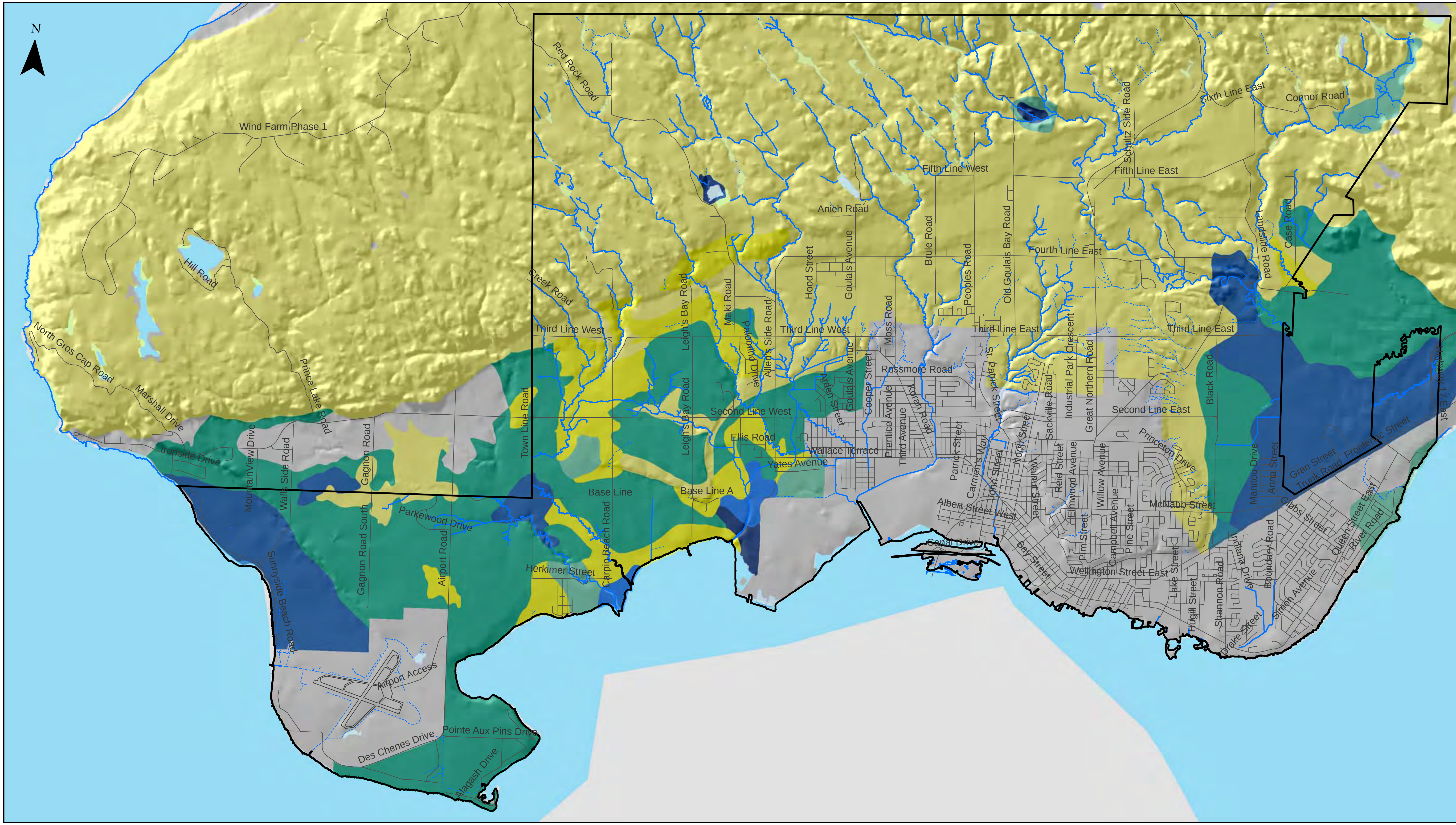

LEGEND

sand/w	loam/i	loam/p
loam/w	gravel/p	organic/p
sand/i	sand/p	n/a

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Figure 61: Soil Attributes - Texture and Drainage

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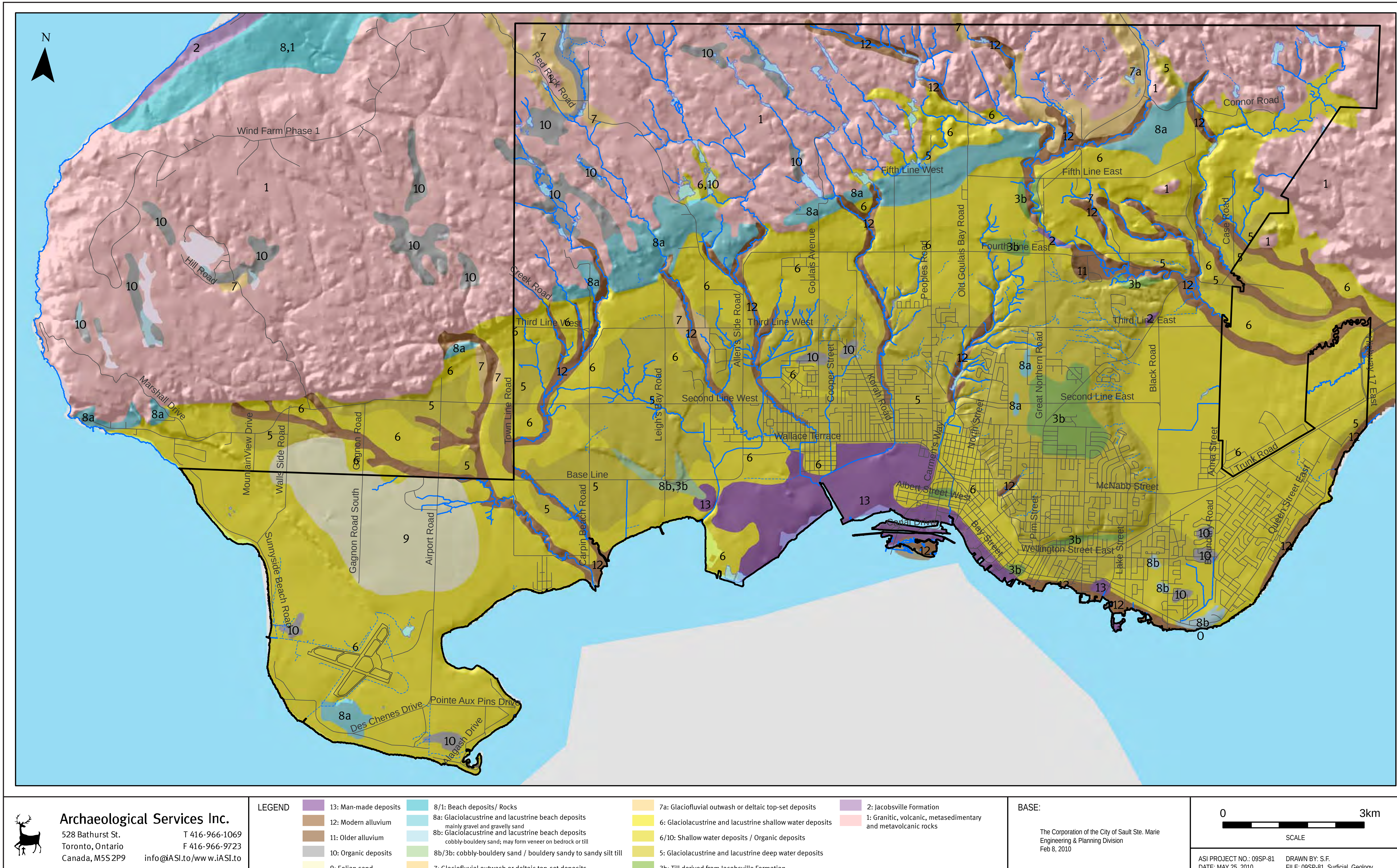

Figure 62: Surficial Geology of Sault Ste. Marie

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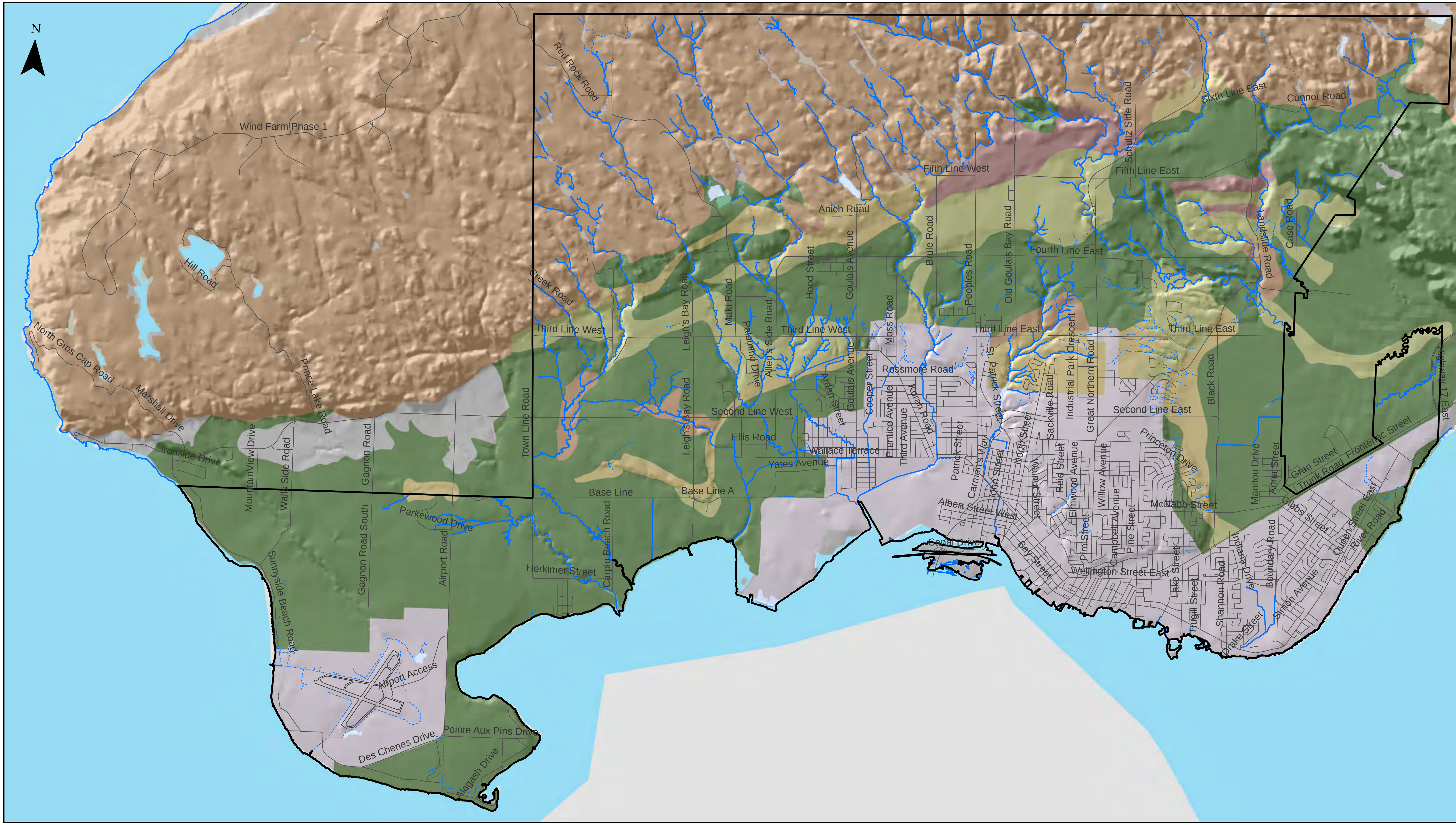

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LEGEND

0 to 2%	13 to 20%
3 to 6%	21 to 30%
7 to 12%	n/a

BASE:

The Corporation of the City of Sault Ste. Marie
Engineering & Planning Division
Feb 8, 2010

0 3km
SCALE

ASI PROJECT NO.: 09SP-81 DRAWN BY: S.F.
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Figure 63: Soil Attributes - Slope Classes

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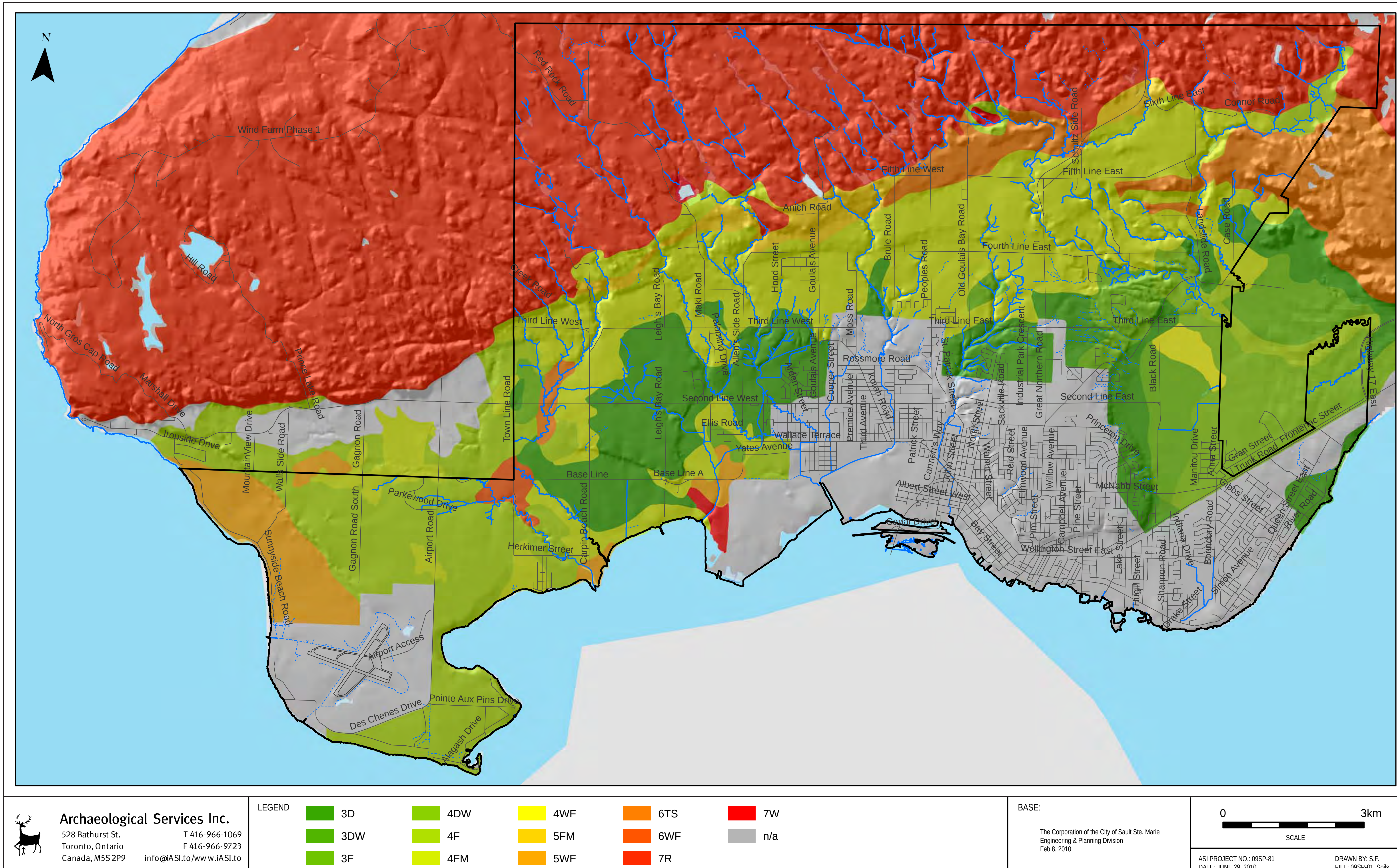

Figure 64: Soil Attributes - Capability for Agriculture

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5.3.6 Paleoclimatology

The climate of southern and central Ontario[2] is described as having warm summers, mild winters and a long growing season with usually reliable rainfall. Precipitation is fairly evenly distributed throughout the year. Regional climatic variations are due primarily to elevation and topography, prevailing winds and proximity to the Great Lakes. Year to year variability is attributable to the nature and frequency of weather systems which cross the area (Brown *et al*. 1980:1-2).

The fossil pollen record available for southern and central Ontario has provided an outline of the region's paleoclimate. After adjustments are made for the differential dispersion of pollen by various species, a diachronic reconstruction of the prevailing climatic conditions can be undertaken on the basis of the preferred habitats of those species.

During the period of initial deglaciation (after ca. 11 ka), a harsh climate characterized by cool and extremely dry conditions prevailed in the study area. Mean annual temperatures in the study region were probably less than -3° Celsius (McAndrews 1981). Some have attributed these low temperatures throughout the Great Lakes-St. Lawrence region to the inflow of large volumes of glacial meltwater or proglacial lake water (Lewis and Anderson 1989). In central Ontario, the proximity of the Laurentide ice sheet would have had a cooling effect on local climate.

In southern Ontario, a trend towards warming temperatures has been interpreted for the period from around 10.5 ka to 10 ka as the glacial lake levels receded in the Huron basin. A climatic reversal at around 10 ka has been interpreted as the cause of the Marquette re-advance of glacial ice across the Superior basin. This was followed by a brief warming trend until the period between c. 9.5 ka and 8 ka, when there was another apparent climatic reversal with winters becoming longer and more severe, and summers warmer and drier than previously. This trend has traditionally been seen a result of the extremely low water levels in the Great Lakes basins, which reduced the moderating effects of the evolving Great Lakes, however, it has recently been suggested that this deterioration was also caused by a new influx of cold waters from Glacial Lakes Agassiz and Ojibway during the brief "Mattawa flood" (Lewis and Anderson 1989). These observations suggest that, at Sault Ste. Marie, the retreat of glacial Lake Algonquin after 10.5 ka and the subsequent lowering of Lake Minong after about 9.5 ka may have had a similar effect of reducing local climatic moderation.

From c. 8,000-6,500 B.P., the region's climate became more moderate, experiencing warmer mean annual temperatures and greater precipitation. At their maximum, during the Hypsithermal, temperatures probably exceeded present levels by 1° to 2° Celsius. It is unlikely, however, that this climatic amelioration was sufficient to affect the zonal vegetation (McAndrews 1981). Essentially modern mean annual temperatures (7° Celsius) and precipitation levels were reached by c. 6,000 B.P.

Climatic trends and fluctuations play a significant role in determining the character of the natural environment to which human populations must adapt. As the shift in climatic conditions which occurred following deglaciation was relatively gradual, the concomitant changes which were necessary to the subsistence modes of pre-contact populations were also gradual. While long-term climatic trends did not directly influence the subsistence practices of a population in the short term, there are many short-term climatic factors that had significant implications for local settlement-subsistence practices, the most critical of which were temperature, precipitation, potential evapotranspiration, frost-free days, snowfall, and wind-speed and direction. Short-term climatic irregularities may have been most keenly felt during

[2] Sault Ste. Marie lies at the northwestern limit of the study area used in the landmark monograph, *The Climate of Southern Ontario* (Brown *et al*. 1980).

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the last millennium of pre-contact history, as Aboriginal groups became increasingly reliant upon agriculture to supplement their dietary requirements.

The number of frost-free days, which represents the effective length of the growing season for agriculture, would have been of importance to pre-contact horticulturalists. The mean length of the frost-free period is about 115 to 125 days in the Sault Ste. Marie area, which is adequate for traditional Aboriginal agriculture. Moreover, Sault Ste. Marie lies within the 2100 to 2300 range for crop heat units (CHU), a measure of capacity for maturation of field crops such as corn based on maximum and minimum daily temperatures. Grain corn is typically grown in areas exhibiting >2500 CHU, while corn can be grown for sileage in areas of only 2100 CHU (Brown *et al*. 1980: 37-38). The historical capacity of Sault Ste. Marie to support maize agriculture is illustrated by the following footnote from the narrative of the life of Indian language interpreter John Tanner (James 1830: 17):

> It is probably within the recollection of many persons now living, when the very considerable quantities of corn required for the fur trade in the country about Lake Superior, were purchased from the Indians, by whom it was raised at a place called *Ketekawwe Seebee*, or Garden River, a small stream falling into the strait between Lakes Superior and Huron, about six miles below the Saut (sic) St. Marie.

More recently, the widespread utilization of maize well into the boreal forest, from *circa* A.D. 500 onward, including its cultivation in certain more southerly locales of this ecozone, has been documented by Boyd and Surette (2010). At the same time, however, there is documentary evidence to suggest that maize may not have been cultivated locally by Aboriginal groups until the nineteenth century. Writing about the indigenous population of Sault Ste. Marie in 1669, Jesuit missionary Claude Dablon noted:

> This convenience of having fish in such quantities that one has only to go and draw them out of the water, attracts the surrounding Nations to the spot during the Summer. These people, being wanderers, without fields and without corn, and living for the most part only by fishing, find here the means to satisfy their wants; (Thwaites 1899:54: 130).

The mean annual precipitation in the Sault Ste. Marie area is about 89 cm, with monthly means fairly evenly distributed at about 7.4 cm +/- 1.5 cm (Environment Canada 2010). Factors influencing local precipitation are slope, elevation, proximity to Lake Superior, and the prevailing winds. The last two variables exert considerable influence on local precipitation patterns. For Aboriginal horticulture the amount of precipitation during the growing season was sufficient, especially given the good water-holding capabilities of most local soil types.

Climatic conditions have been far from constant over the last millennium. Of particular importance is a climatic period characterized by cooling and referred to as the "Little Ice Age" (Bryson and Murray 1977; Grove 2004). This episode, which is conventionally dated to between A.D. 1550 and 1880, may have reduced average daily temperatures in southern and central Ontario by about one-half degree Celsius. In addition, early fall temperatures may have been reduced by about 1.5 degrees Celsius (Bryson and Murray 1977).

5.3.7 Paleovegetation

While a comprehensive discussion of the pre-contact vegetation of the study area is beyond the scope of this study, it is possible to draw some general conclusions regarding the development of Sault Ste. Marie's plant communities since the Pleistocene. In addition, as the nature of understorey and forest floor vegetation is often dependent on the same factors which determine forest cover, and on the forest cover itself, an understanding of these factors may be useful in the recognition of particular floral resources within the environment which may have been actively sought out by past populations. The identification of these potential resources, and the determination of their general spatial and temporal variation within the study area, will further assist in reconstructing the subsistence strategies of the region's pre-contact occupants, and the diachronic changes these practices may have undergone.

The late Pleistocene and Holocene forest history of the Upper Great Lakes area has been summarized by Terasmae (1967, 1968), Anderson and Lewis (2002), Anderson (1995, 2002), and Liu (1990) based on pollen and other paleoenvironmental data obtained from sample transects across this area. Pollen sample sites within 100 kilometres of Sault Ste. Marie include Quadrangle Lake (Terasmae 1967), Prince Lake (Figure 65), and Upper Twin Lake (Figure 66) (Saarnisto 1974) in Ontario, and Wolverine Lake (Figure 67) and Ryerse Lake (Figure 68) (Futyma n.d. a, b) in the upper peninsula of Michigan.

The pollen record at the Sheguiandah Paleo-Indian site on Manitoulin Island, approximately 200 km east-southeast of Sault Ste. Marie, has been classified by Anderson (2002: 187-188) according to five temporal zones, and similar trends can be observed in other regional pollen diagrams, including those in the Sault Ste. Marie area noted above. Zone 5 is generally dominated by spruce (*Picea* sp.), willow (*Salix* sp.), and herb pollen which indicate that, immediately following deglaciation, the landscape was colonized by tundra which fairly quickly transformed into open spruce woodland. Continuing climatic amelioration is illustrated by pollen zone 4, which is characterized by a rise in pine pollen, continuing strong representation by spruce, and notable increases in poplar (*Populus* sp.), elm (*Ulmus* sp.) and juniper/cedar (*Juniperus/Thuja* sp.) (Anderson 2002: 187).

Pollen zone 3 is characterized by a major recurrence and peak in spruce pollen and a concomitant decline in pine (Anderson 2002: 187). This anomaly occurs widely in pollen records of the upper Great Lakes. It has been dated to the period between about 10 and 7.5 ka and has been attributed to the North Atlantic Pre-boreal Oscillation climatic cooling event, the initial stages correlating with the Marquette glacial re-advance in the Superior basin (Anderson 2002: 187-191; Anderson and Lewis 2002: 216-218). Persistence of spruce around the eastern Superior and northern Huron basins after about 9.5 ka has been attributed to two factors: (1) southward outbreaks of arctic air masses circulating over the collapsing central dome of the Laurentide ice sheet over Hudson Bay, and (2) lake effect cooling from the Superior basin. Renewed influxes of glacial meltwater from Lake Agassiz would likely have enhanced the chilling effect on the prevailing westerlies as they traversed the newly emerged cold waters of Lake Superior (Anderson and Lewis 2002: 216-221). It has been suggested that the resulting tongue of cool, moist air, extending east-southeasterly from Lake Superior, affected the northward migration of the pine-spruce ecotone, suppressing its movement north of the Sault Ste. Marie area until sometime after about 7.8 ka (Anderson and

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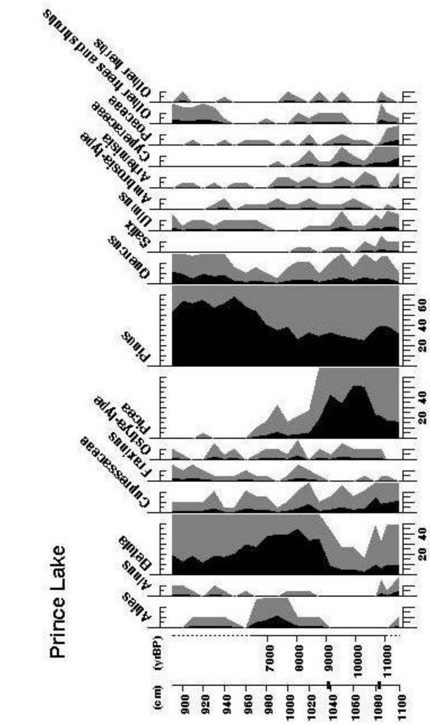

Figure 65: Pollen Diagram from Prince Lake (Saarnisto 1974)

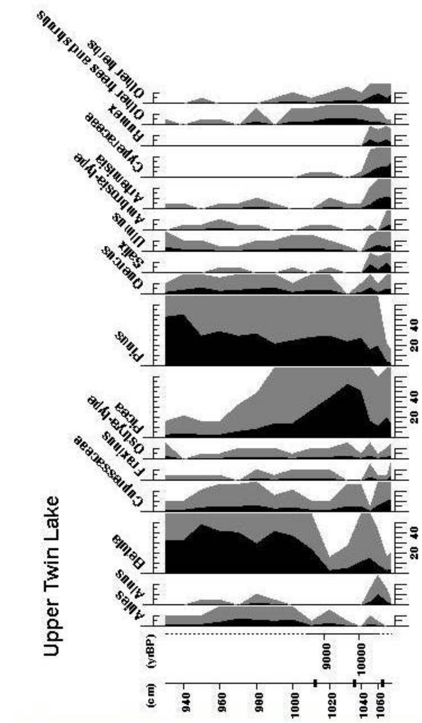

Figure 66: Pollen Diagram from Upper Twin Lake (Saarnisto 1974)

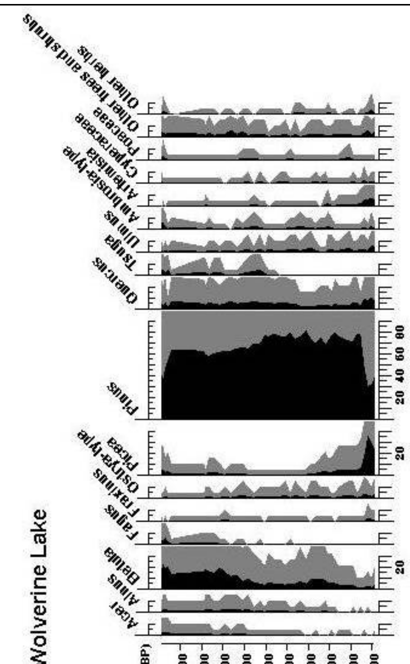

Figure 67: Pollen Diagram from Wolverine Lake (Futyma n.d.)

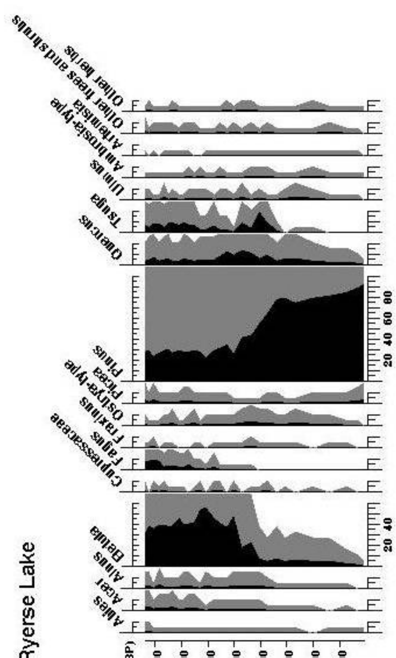

Figure 68: Pollen Diagram from Ryerse Lake (Futyma n.d.)

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Lewis 2002: 220-211, Figure 8.7). This phenomenon can be seen clearly in the pollen diagram from Prince Lake (Figure 65).

Pollen zone 2 is characterized by the recurrence of the pine maximum, decline of spruce to minimum values, and significant increases in birch (*Betula* sp.) and oak (*Quercus* sp.) (Anderson 2002: 188). Regionally, this zone sees the advent of species typical of the northern hardwood forest, including maple, beech (*Fagus grandifolia*), hemlock (*Tsuga canadensis*), elm, ash (*Fraxinus* sp.), and basswood (*Tilia americana*). This indicates a return to regional warming throughout the upper Great Lakes after about 7.8 ka, following the final drainage of glacial lakes Agassiz and Ojibway in northern Ontario (Anderson and Lewis 2002: 221). By 7 ka, the forest of the upper Great Lakes region was dominated by white pine (*Pinus strobus*), it having encroached upon and replaced large areas of jack pine (*Pinus banksiana*), birch, and spruce (Anderson 1995:108-109). The establishment of an essentially Great Lakes-St. Lawrence forest—albeit dominated by white pine rather than the hardwoods which currently characterize this region—reflects the continued climatic warming which culminated in the Hypsithermal peak at around this time, with summer temperatures around 1 to 2 degrees Celsius higher than at present (McAndrews 1981). This pushed the ecotone between the boreal and Great Lakes-St. Lawrence forest northward by about 140 kilometres (Liu 1990: 206-207). Notably, populations of other taxa currently typical of this ecozone, such as maple, beech, hemlock, oak, elm, and ash, do not show a concomitant expansion of their ranges and population increases, although the ecotone between the Carolinian and northern hardwood forests appears to have shifted northward by up to 70 kilometres during this period (Anderson 1995: 109). It has been suggested that the warm, dry conditions of the Hypsithermal promoted fire regimes in the pine-dominated forest that kept these tree populations in check (Liu 1990: 207), although fire may also account for the southerly expansion of birch and alder (*Alnus* sp.) into the Georgian Bay basin around this time, as these trees are vigorous post-fire colonizers. By 6 ka, white pine had expanded northward close to its modern range limit, while cedar/juniper had expanded well into the area north of Sault Ste. Marie. The onset of post-Hypsithermal cooling after about 6 ka has been attributed to the increasing climatic moderation afforded by the rising water levels of the Nipissing Great Lakes (Anderson 1995: 113). This resulted in southerly retreat of the boreal-northern hardwood forest ecotone and the expansion of hemlock into the upper peninsula of Michigan, replacing pine in the Georgian Bay watershed (Anderson 1995: 108; Booth *et al*. 2002: 126). The boreal-northern hardwood forest ecotone currently remains roughly 150 kilometres north of Sault Ste. Marie, having stabilized there over the last millennium (Liu 1990: 207). Between the end of the Nipissing phase of the Great Lakes and the historical period, the mosaic of conifers and hardwoods that comprise the northern hardwood forest continued to experience change, such as the immigration of yellow birch (*Betula alleghaniensis*) at around 4 ka and regional increases in spruce, hemlock, and maple between about 3.2 and 2.3 ka (Booth *et al*. 2002: 126, 128).

Pollen zone 1 is signified by a rise in non-arboreal pollen which is generally indicative of agricultural land clearance from the colonial period to the present (Anderson 2002: 188). A number of sources are available to permit the reconstruction of local vegetation immediately prior to Euro-Canadian settlement in the nineteenth century. These include historical descriptions, early surveyor's notes and maps, phytosociological reconstruction based on soils, and extrapolation from extant forest stands in, and adjacent to, the study area. The use of historical survey data involves the reconstruction of vegetation based on the observations of early land surveyors. These surveyors routinely recorded information about trees located along their survey lines. These data are found in the surveyors' notebooks, diaries, and maps, compiled when the original land surveys were carried out in the early nineteenth century. The quantity and quality of information regarding vegetation in these notebooks, however, is quite variable (Gentilcore and Donkin 1973). The procedure for transcribing vegetational data from the notebooks to topographic maps has been outlined by Heidenreich (1973).

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Reconstruction of pre-settlement regional forests using Ontario land survey records from ca. 1857 indicate a northern hardwood forest dominated by maple and yellow birch with subordinates that included eastern white cedar (*Thuja occidentalis*), white birch (*Betula papyrifera*), balsam fir (*Abies balsamea*), pine (white and red), spruce, tamarack (*Larix laricina*), and black ash (*Fraxinus nigra*) (Jackson *et al*. 2000: Table 2). A similar study immediately south of Sault Ste. Marie, in the Luce District, Grand Marais Subdistrict of the upper Michigan peninsula, documented a pre-settlement mosaic of northern hardwoods (44%), mixed conifers (28%), and fire-susceptible pinelands (12%) together with lesser areas of wetland and other vegetation communities. Tree taxa in these communities included: beech (14.4%), sugar maple (14.3%), white pine (10.3%), hemlock (10.1%), yellow birch (7.7%), spruce (7.7%), eastern white cedar (6.7%), red pine (5.6%), jack pine (5.6%), tamarack (4.8%), red maple (4.4%), balsam fir (4.4%), white birch (1.9%), and minor percentages of other hardwoods (Zhang *et al*. 2000: Table 5). The distribution of specific forest communities was seen as the result of a complex interplay between local climate, edaphic/physiographic growing conditions, and agents of natural disturbance, such as wind and fire (Zhang *et al*. 2000: 106). Post-settlement changes in forest composition, such as increasing dominance of maple in both in Michigan and central Ontario, are attributed to a range of factors, including natural agents such as climate change and insect pests, as well as human induced factors such as logging and fire suppression (Jackson *et al*. 2000: 609-610; Pinto *et al*. 2008: 1853; Zhang *et al*. 2000: 107-108). Throughout Sault Ste. Marie, culling of red and white pine through logging in the nineteenth and early twentieth centuries has been cited as a major factor in the current predominance of tolerant hardwood forest, containing maple, yellow birch, and red oak with patches of other communities largely dependent on edaphic conditions or disturbance (Attwell and Gagnon 2007).

The trends in forest distribution observed by the early surveyors are consistent with the various ecological land classifications that have been undertaken in Ontario. Sault Ste. Marie is situated within Ecodistrict 14 of the Nipissing Ecoregion as defined in *Ecoregions of Ontario* (Wickware and Rubec 1989). This Ecodistrict indicates strong affinities between Sault Ste. Marie, the north shore of the North Channel west of Blind River, and Manitoulin Island. The Nipissing Ecoregion encompasses the eastern shores of Georgian Bay, the Algonquin Dome, the Sudbury basin, and the upper Ottawa Valley south of Lake Nipissing. Sault Ste. Marie is also situated within the Great Lakes-St. Lawrence Forest Region as defined by Rowe (1972) and within Site Region 5E Georgian Bay under the forest classification system developed for Ontario by Angus Hills (1960; revised by Burger 1993).

The characteristic tree species for this Site Region are indicated in Table 8. Under normal moisture and temperature conditions, the dominant species for this Forest Site Region are typically sugar maple, yellow birch, hemlock, white pine, basswood, white ash (*Fraxinus americana*), white and red spruce (*Picea glauca/P. rubens*), and balsam fir. Pioneering species include trembling and largetooth aspen (*Populus tremuloides/P. grandidentata*), white birch, and red oak (*Quercus rubra*). Wetter sites tend to be dominated by black ash, red maple (*Acer rubrum*), white elm (*Ulmus americana*), white spruce, balsam fir, and eastern white cedar, with pioneering species of trembling aspen and balsam poplar (*Populus balsamifera*). In addition to these species, sites that are both colder and wetter may contain tamarack, while warmer mesic sites may contain black cherry (*Prunus serotina*) and beech (Burger 1993).

The Canada Land Inventory classifies soils in their natural state on the basis of capability for the growth of commercial forests. Productivity is evaluated with respect to the best tree taxa adapted to the site and is expressed in terms of gross merchantable cubic foot volume (to a minimum diameter of four inches) per acre per year. Class 1 soils, having no important limitations to commercial forest growth, can be expected to produce more than 111 cu.ft./ac./yr. At the other end of the spectrum, Class 7 soils, having severe limitations which preclude commercial forest growth, can be expected to produce less than 10 cu.ft./ac.yr. Classes 2 through 6 are demarcated at 20 cu.ft./ac./yr. intervals between these extremes. In Sault Ste. Marie, the Gros Cap Highland is mapped as Class 6, with severe limitations that include moisture

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deficiency, low fertility, and restriction of the rooting zone by bedrock. Class 6 capability for forestry is also mapped for the Shore Ridges strandplain and Pointe-des-Chênes sand spit, where low fertility and excess soil moisture are limitations. The remainder of Sault Ste. Marie is mapped as Class 4, with moderately severe limitations arising from the density and excess moisture of the clay soils or moisture deficiency and low fertility of the sands (Figure 64).

Table 8: Typical Tree Species & Site Relationships in Forest Site Region 5E Georgian Bay

	ECOCLIMATE (TEMPERATURE)								
	Hotter			Normal			Colder		
	—SOIL MOISTURE—								
	Drier	Fresh	Wetter	Drier	Fresh	Wetter	Drier	Fresh	Wetter
climax species	**r Oak, w Pine**	*h, r Maple r Oak Beech e Hemlock w Pine Basswood r Spruce*	*w Elm r Maple b Ash w Spruce e Hemlock*	**w Pine e Hemlock r Oak**	**h Maple y Birch e Hemlock w Pine Basswood w Ash w, r Spruce ba Fir**	b Ash r Maple w Elm w Spruce ba Fir ew Cedar	*w Pine b, w Spruce ba Fir*	*w Spruce ba Fir w Pine*	ba Fir b Spruce e Larch
pioneer species	**r Pine t Aspen**	*w Birch t, l Aspen b Cherry*	*ba Poplar*	**r Pine t, l Aspen**	**t, l Aspen w Birch r Oak**	t Aspen ba Poplar	*j, r Pine t Aspen*	*ew Cedar*	ew Cedar

Bold = High proportion of site region
Normal = Moderate Proportion of site region
Italics = Low Proportion of site region
Abbreviations: b=black, ba=balsam, e=eastern, ew=eastern white, h=hard, j=jack, l=largetooth, r=red, t=trembling, w=white, y=yellow

(based on Burger 1993)

With the preceding analytical background in mind, we can now critically examine the pre-settlement forest distributions for the City of Sault Ste. Marie.

The Precambrian hills of the Gros Cap Highland comprise a marginal landscape characterized by extensive areas of thin soils, exposed bedrock, and rolling terrain. Both capability for agriculture and capability for forestry mapping underscore the challenges to tree growth in this region. The local exceptions are primarily bedrock basins where deeper soils have accumulated or where wetlands have developed. Nevertheless, this area remains the most heavily forested part of Sault Ste. Marie, and there is little doubt that it has been forested throughout the Holocene, beginning with open woodland dominated by spruce with birch, pine, juniper, willow, and oak. Similar to the modern boreal forest, these woods were likely a complex patchwork which reflected the highly variable quality of local growing conditions as well as the contingencies of fire and windthrow which tend to characterize such forests. Although relatively diverse, the biotic productivity of such forests tend to be fairly low, especially in closed-canopy stands where there only a marginal understorey. The exception would be the chains of riparian swamps and wetland pockets, which would tend to have higher biotic productivity. This situation was likely perpetuated through the period of pine-dominated forest that followed (ca. 10 – 7.5 ka). It seems likely that the conifer-dominated forest only relinquished its hold on the Gros Cap Highland within the last two or three millennia, and even then, maintained a strong presence of white pine and spruce along with white and yellow birch, red oak, elm, and other taxa which could compete with the dominant maples under specific growing conditions. Stream valleys and associated wetlands would have continued to partition the area into a wooded collage.

The physiographic area referred to herein as the post-Algonquin terraces is primarily characterized by thick, well- to imperfectly drained sands, sandy loams, and clay loams. Although the natural fertility and moisture-holding capacity of the sandier soils may not be optimal, they would nevertheless have supported a most vigorous forest throughout the Holocene. Only the very porous, gravelly substrates of the main Algonquin beach bars would have presented a challenge to forest growth, although there species such as spruce, white pine, white birch, and red oak would have been able to cope with the xeric conditions. It is suggested that closed-canopy conditions likely prevailed across this area throughout the Holocene, although fire and wind would have opened up areas for colonization by birch and poplar from time to time during the periods of spruce and pine domination (ca. 10,500 to 3 ka). Since the advent of the northern hardwood forest, the frequency of fire as an agent of disturbance may have been reduced, depending on the density of conifers such as white pine within any given stand. Some variability in forest composition would also be introduced into this area by the various beach ridges and the cross-cutting array of stream valleys, producing vegetative toposequences from the xeric upland margins down into the moist stream valleys. Some, including Little Carp Creek, Bennett Creek, Davignon Creek, Fort Creek, Coldwater Creek, and Crystal Creek contain riparian swamps within these ravines. The biotic diversity introduced by such toposequences would have stood in contrast to the relatively monotonous and impoverished understorey that would have prevailed under closed-canopy conditions on the upland terraces.

For the post-Nipissing terraces, situated between the Nipissing strand and the St. Mary’s River, the forest history that we are most concerned with is that which spans period from the retreat of the Nipissing high water levels to the time of European contact. While this area would have been forested prior to that, during the post-Algonquin low water phases of the Huron-Michigan basin, it is assumed that much of the natural and cultural history of this period would have been erased by the Nipissing transgression. As the Nipissing waters withdrew around 4 ka, the exposed land would have been colonized by forests dominated by white pine, although early successional taxa such a white birch, red pine, and poplar may have been the initial colonists, with alder, cedar, red maple, hemlock, spruce, tamarack (larch), and balsam fir in the wetter areas. A diverse forest with a similar range of species occupying the various substrates exists today at Mark’s Bay (Attwell and Gagnon 2007: 61-63), and it may be a fair analogue to the sort of complex forest which pioneered the emerging land. Yellow birch also appeared in the area at about this time, and was in the vanguard of tolerant hardwoods which would replace many of the white pine stands over the subsequent millennia, especially on the thick, imperfectly drained sandy and clay loams which abound in the post-Nipissing terraces. In drier locales, such as sandy ridges, white pine would have maintained an advantage, and occurrences of mature pine stands are historically recorded and even reflected in historical place names such as Pointe aux Pins, which was described in 1792 as “a sand bank of several miles. . .covered with red and white pines” (Attwell and Gagnon 2007: 58). The sandy ridges of the Shore Ridges Conservation Area also show evidence of previous white pine domination:

> The raised beach ridges (i.e. strands) support mainly deciduous forest dominated by white birch and red maple with a few scattered red oak. Once large white pine (*Pinus strobus*) dominated these ridges as evidenced by many fire-scarred stumps (NHIC 2010a).

The post-Nipissing terraces also feature the most extensive tracts of poorly drained land in Sault Ste. Marie, including the Shore Ridges strandplain, the Big Carp River valley, and most of the Clark Creek – Black Creek lowland. The Shore Ridges strandplain features a complex array of wetlands between the aforementioned beach ridges, described as follows:

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> The peatlands, which dominate much of this lower plain, support a broad array of wetland community dominance types. Particularly well-represented are cedar (*Thuja occidentalis*) and larch (*Larix laricina*) coniferous swamps, larch treed fen, a number of open low shrub fen and thicket swamp dominance types, open graminoid fen and marsh dominance types. Some "patterning" occurs on parts of the open portion of the peatland. The patterns consist of low shrub fen-dominated ridges with either ponded or wet graminoid fen swales (NHIC 2010a).

A similarly complex array of swamps interdigitating with upland forest communities would have characterized the other major areas of poorly drained land noted above, and riparian swamp grading into marsh would have been a constant feature of certain reaches of the St. Mary's River.

5.3.8 Plant and Animal Subsistence Resources

A wide variety of wild plant resources was available to Aboriginal populations residing in the Sault Ste. Marie area. Of particular importance to this study were plant species that appear to have been integral to Native subsistence. Nut-bearing trees were abundant in the study area, and could have provided an important and storable source of protein and fat. High in calories and rich in oil, nuts may have provided an important diet supplement. However, certain nuts required a considerable expenditure of energy for collection and processing, and nut masts are not consistent from one year to another. Nut-bearing trees found in the study area include oak and beech. The floodplains of major watercourses and associated wetlands also would have offered a wide variety of resources, including foods such as roots, tubers, greens, as well as fibres and building materials, such as bark and cedar poles.

Fleshy fruits were an important resource in Aboriginal subsistence systems, as they are high in energy and are a good source of Vitamin C, an antiscorbutic. Elderberry (*Sambucus* sp.), cranberry and blueberry (*Vaccinium* sp.), serviceberry (*Amelanchier* sp.), hawthorn (*Crataegus* sp.), cherry (*Prunus* sp.), plum (*Prunus nigra*), currant (*Ribes* sp.), strawberry (*Fragaris* sp.), viburnum (*Viburnum* sp.), and bramble (*Rubus* sp.) all flourished within the study area, the majority favouring disturbed or forest-edge habitats (Soper and Heimburger 1982). The remains of these species are commonly recovered from archaeological sites where conditions have favoured their preservation.

As with vegetation, a comprehensive discussion of fauna within the study area is not relevant to this study, however, local fauna did provide an extensive resource base for pre-contact populations and are worthy of consideration. Different forest zones can be considered as micro-environments to which certain animal species may be principally adapted, although clearly, faunal habitats are of a clinal rather than a discrete nature. Generally, biotic diversity tends to be greatest where topography, drainage, and soils are most variable, resulting in a broader range of habitats per unit area. In contrast, areas with uniform topography, adequate drainage, and suitable soils tend to produce closed canopy climax forest with an impoverished under-storey that is less attractive to many animals.

In Sault Ste. Marie, it is expected that the greatest habitat diversity and biotic productivity would be found in the post-Nipissing terraces, especially throughout the Shore Ridges – Pointe aux Pins lowland, the Mark's Bay – Leigh Bay lowland, and the Lower Davignon – Whitefish Island lowland. These areas encompass the evolving lower reaches of the major drainages, the evolving riparian wetlands of these watercourses and the St. Mary's River, and the ecotonal toposequences between the uplands and the valley floors. While it is likely that these areas were the most diverse from the time of the final retreat of Lake Algonquin ca. 10 ka onward, they likely became increasingly complex as the Pointe-des-Chênes sand spit developed along with the deltas of the Big Carp River and Little Carp Creek after the retreat of the Nipissing waters ca. 4 ka.

The next most biotically productive landscapes were likely the upper reaches of the major watercourses where the rough terrain of the Gros Cap Highland would have tended to maximize the ecotones between the knobby uplands and the chains of small lakes and riparian wetlands that characterize these streams, thereby increasing habitat diversity and biotic productivity. The current diversity of forest cover in the Hiawatha Conservation Area likely exemplifies the sort of biotic variability that would have prevailed in this area.

The post-Algonquin terrace would have been much less productive than the other two physiographic areas. While local edaphic conditions, as well as agents of forest opening such as fire and windthrow, would have introduced some variability in the vegetation cover, overall these uplands would have supported relatively monotonous closed-canopy spruce, white pine, or northern hardwood forests throughout much of the Holocene. The main exception would be areas where it was traversed by the middle reaches of the major watercourses, where moist valley bottoms and ecotonal toposequences would have locally increased biotic diversity and productivity.

For the vast majority of the pre-contact period, ungulates represent the most significant game species in Sault Ste. Marie. Historically, the range of woodland caribou (*Rangifer tarandus*) extended throughout most of the Lake Superior basin, but by the early twentieth century they had been extirpated from the southern (U.S.) part of the watershed, and by the mid-twentieth century their range had contracted northward to about the latitude of Wawa (LSBP 2004:6:139-140). In the boreal forest, Woodland caribou range over areas of 200 to 4000 km^2, territories 5 to 100 times larger than moose and deer. In part, they require such large areas because they prefer relatively un-fragmented patches of open, mature forest through which they can navigate relatively easily and where they can find adequate supplies of ground lichen, especially in the winter when this is their primary food. Such areas tend to support little browse for moose and deer, and relatively low densities of predators such as wolves (Rothfels and Russell 2005; SARA 2010). The Gros Cap Highland was likely good woodland caribou habitat prior to its transformation into a northern hardwood forest. Given their wide-ranging habits, woodland caribou were likely common inhabitants of Sault Ste. Marie throughout the Holocene, and probably the most important ungulate prey species for Aboriginal hunter-gatherers. The range of white-tailed deer (*Odocoileus virginianus*) did not extend to the Sault Ste. Marie area until the twentieth century, when deer habitat was created by land clearance. Elk or wapiti (*Cervus elaphus*) historically ranged throughout the northern hardwood forest, preferring early successional communities with conifers such as red pine, white pine, cedar, and balsam fir that provided shelter, security, and good browse. Dense conifer forests, though, are not preferred by elk. Similar to woodland caribou, elk are not migratory, yet range over relatively large areas of about 500 to 1000 km^2. Archaeological evidence indicates that elk were present in southern Ontario throughout the Holocene, although Sault Ste. Marie may have been at about the northern limit of their range. They were extirpated from Ontario in 1893. Since ridge habitats seem to be important to elk, the Gros Cap Highland and the fossil beaches of the post-Algonquin and post-Nipissing terraces may have provided suitable habitat, although currently Sault Ste. Marie is not deemed to have suitable elk habitat (MNR 2010; Telfer 1990). Moose (*Alces alces*) have similar habitat needs, preferring a mix of early successional—especially conifer—forest to provide browse and cover, as well as late successional conifer forest to provide shelter and protection in winter. In summer they also require lakes and rivers with aquatic vegetation. Unlike caribou and elk, though, moose are relatively solitary, with population densities on the order of 10 to 30 per 100 km^2 and ranges of only about 40 km^2 (Telfer 1997). Early successional forests and marshy bays along the St. Mary's River/Strait may have been the best habitat for moose throughout the Holocene, although they may also have ranged up the river valleys and into the lakes and streams of the Gros Cap Highland. With respect to small game, forest margins and early successional areas would have provided good habitat for snowshoe hare (*Lepus americanus*), while the watercourses of the Gros Cap Highland would have provided suitable habitat for beaver (*Castor canadensis*) and muskrat (*Ondatra zibethica*). Wetland margins, stream valleys, and river floodplains, especially those with access to mast-producing oak forest, would also attract raccoons (*Procyon lotor*). Black bears (*Ursus americanus*), are wide-ranging omnivores with home territories of between 10 and 100 km^2 and typical densities of about two per 10 km^2. They prefer heavily wooded areas with access to food sources such as berry patches and mast-producing forest, and would have occurred throughout Sault Ste. Marie in small numbers.

Upland game birds, including ruffed grouse (*Bonasa umbellus*), spruce grouse (*Falcipennis Canadensis*), and sharp-tailed grouse (*Tympanuchus phasianellus*) would have been available in modest numbers year round, while sandhill cranes (*Grus canadensis*) and great blue heron (*Ardea herodias*) would have been available in summer. More likely prey would have been migratory and resident populations of waterfowl, such as Canada goose (*Branta canadensis*), snow goose (*Chen caerulenscens*), swans (*Cygnus* sp.), and various species of duck (e.g. *Anas* sp.), which would frequent the bays of the St. Mary's River/Strait and Lake Superior.

Whitefish Bay, the St. Mary's River, and the major rivers and streams of Sault Ste. Marie would have provided an important fishery to Aboriginal peoples throughout the Holocene. Resident populations of such species as brook trout (*Salvelinus fontinalis*) in the cold in-land streams and, brown bullhead (*Ictalurus nebulosus*), smallmouth bass (*Micropterus dolomieui*), yellow perch (*Perca flavescens*), pike (*Esox lucius*) and muskellunge (*Esox masquinongy*) in the weedy river shallows, would have been available through much of the year. Spring spawning runs of fish such as lake sturgeon (*Acipenser fulvescens*), walleye (*Stizostedion vitreum*), and sucker (*Catostomus* sp.), would have occurred in early May to late June, with fish migrating from Lake Superior into the St. Mary's River, and its tributaries. Sturgeon spawn in swift water of 0.5 to 5 metres depth. Walleye spawn on rocky substrates below impassable falls in rivers or on coarse-gravel shoals in lakes. Suckers prefer shallow, gravelly streams or lake margins, and thousands may ascend a suitable stream. These spawning runs would have attracted Aboriginal groups to the lower reaches of rivers and large streams to intercept the fish as they moved upstream. Fall spawning fish of economic importance were primarily those of the family Salmonidae, including lake trout (*Salvelinus namaycush*), lake whitefish (*Coregonus clupeaformis*), and lake herring (*Coregonus artedii*), which migrated into the shallows of Whitefish Bay and the St. Mary's River above the rapids at Whitefish Island. Spawning occurred in November and December, generally over rocky substrates at depths typically ranging from 1 to 10 metres, but sometimes much deeper (10 to over 30 metres) (Scott and Crossman 1973).

5.4 Deductive Site Potential Model: GIS Layers and Analysis

This section considers the paleoecology of the region in order to develop a deductive narrative which outlines probable pre-contact land-use trends in the City of Sault Ste. Marie through time.

The archaeological potential model was developed using an ArcGIS® Geographic Information System to summarize and map various data sets as separate, but complementary layers. Modelling criteria were then derived through analysis of these layers, and these criteria were applied to produce a final, composite layer, which is a map of archaeological site potential within the City of Sault Ste. Marie.

Digital data for the initial base layer was provided by the City of Sault Ste. Marie and consisted of 1:10,000 scale mapping. Included on this layer were: hydrographic features, including watercourses, lakes, ponds, and wetlands; topography; the road network; parcel fabric; and current vegetation. We also received a layer with designated heritage structures.

5.4.1 Pre-contact Aboriginal Site Layer

There are 36 documented archaeological sites within the City boundaries, all of which were mapped and entered into the project GIS as a discrete layer. All of these are registered by the provincial site database. For site potential modeling purposes, each registered site plotted as a point was buffered by 100 metres (Figure 69).

5.4.1.1 Pre-contact Aboriginal Site Potential Layer

Prior to European contact, the inhabitants of the City of Sault Ste. Marie were hunter-gatherers who practised an annual subsistence round to exploit a broad range of natural resources for food and raw materials for such needs as shelter construction and tool fabrication. Assuming that access to natural resources influenced and constrained the movement and settlement of Aboriginal peoples, our goal was to understand what these resources were, how they may have been distributed, how their use and distribution may have changed over time, and how the landscape itself may have constrained movement and access to resources as well as settlement location. Given the requirements of this study, and our limited ability to precisely resolve details of past environments, we began by considering the relative merits of the physiographic areas, as it could be demonstrated that these represented certain constellations of environmental attributes. We proceeded chronologically in this investigation, since certain aspects of Sault Ste. Marie had changed dramatically through the period of human occupation.

Hunter-gatherer bands have likely occupied the Sault Ste. Marie area beginning as early as 10.4 ka, as suggested by the discovery of Late Paleo-Indian artifacts about one kilometre north of Leigh Bay (Dalla Bona, personal communication, April 2010). During this interval, Paleo-Indian hunters in the Sault Ste. Marie area would have been living on the receding shoreline of glacial Lake Algonquin. At this time, the open boreal woodlands likely offered a rather limited selection of floral resources; hence subsistence would have been primarily oriented towards hunting and fishing. Accordingly, Paleo-Indians would have most likely been drawn to well-drained locations with access to both interior upland hunting grounds and lakeshore hunting and fishing areas. Given the rarity of such sites in Ontario, the low population densities of the time, and the spartan landscape that these Aboriginal foragers were colonizing, the frequency of Paleo-Indian sites in Sault Ste. Marie is expected to be very low. The Post-Algonquin Terraces, especially points of land and bays containing the mouths of major watersheds, would seem to hold the greatest promise for encountering Paleo-Indian campsites.

The transition from the Late Paleo-Indian to Early Archaic period (ca. 10 – 8 ka) encompasses the return to cold conditions, the Marquette re-advance of the Laurentide ice sheet in the Superior Basin, the drainage of the Huron-Michigan basin to its lowest levels, and the return of spruce-dominated forests at around 10 ka. Assuming that the descendants of the Late Paleo-Indian colonists were not deterred by these events, it seems likely that Early Archaic hunter-gatherer bands would have established warm-weather base camps along the St. Mary's River where resources such as spawning fish could support populations of 50 or more people. The lower reaches and mouths of the major watersheds, especially around complex shorelines, would have been the best localities to sustain such population aggregations. Complex shorelines may possess various features, including: (1) points of land with good visibility up and down river; (2) bays which may have beaches for canoe access as well as good fish habitat; (3) stream or river mouths which may have been both nodal points in the canoe transportation network as well as areas where nutrients flowed into the river thereby attracting fish and other game; and especially (4) combinations of these features. Unfortunately, areas such as these would have been subsequently inundated by the Nipissing transgression and are unlikely to have survived the erosive forces of the rising and falling waters of the St. Mary's River.

Throughout the Holocene, the distance from the St. Mary's River waterfront to the height of land on the Gros Cap Highland was never more than about 16 km, and probably averaged only about 8 km. Indeed, the overland distance to Goulais Bay on Lake Superior was less than 20 km. With this potential hunting area within easy range, the pattern of late fall—winter—early spring dispersal into interior, nuclear family hunting camps that we historically see amongst certain boreal hunter-gatherers would seem to have been unnecessary. Nevertheless, hunting of caribou, moose, raccoon, beaver, muskrat, and black bear to provide skins, meat, bone, and antler would have been an important activity, especially in the fall and winter when the furs were in prime condition and when bears could be hunted in their dens. The chains of lakes and wetlands of the Gros Cap Highland may have been especially attractive during the hunting season. Like complex shorelines, the margins of interior lakeshores and wetlands are areas of increased biotic productivity and diversity. Seasonal hunting camps would likely tend to be situated on upland ridges or terraces overlooking the lakes and stream valleys. Winter camps may have been more focussed within the valleys, encouraged by the protection they offered from winter storms. Swamps would have also provided fuel, building materials, roots and tubers, and small game. Small interior hunting camps on the Gros Cap Highland or the Post-Algonquin Terraces may provide the only remaining evidence of the Early Archaic period occupation of Sault Ste. Marie.

Return of the pine-dominated forest during the Hypsithermal warming trend at the beginning of the Middle Archaic period (ca. 8 – 4.5 ka) likely had little effect on the overall settlement and land-use strategies of local hunter-gatherers. At a scale that cannot be resolved by this study, however, there were likely local habitat changes—due to such things as more frequent forest fires, immigration of new tree species, and the encroachment of the rising waters of the Huron-Michigan basin to the Nipissing maximum—to which these people had to adapt. Here again, the evidence of settlement along the St. Mary's River dating prior to about 5.5 ka has likely been erased by the Nipissing transgression, although, contemporary interior hunting camps may exist. The last millennium of the Middle Archaic period, from ca. 5.5 to 4.5 ka, represents the second interval during which occupation of the St. Mary's Strait waterfront may have left archaeological evidence of hunter-gatherer base camps. While the current archaeological evidence for such sites remains scanty, the Base Line site (CdIc-5) and Copper Cache site (CdIc-7) have been identified as probable Middle Archaic sites, and both are situated in close proximity to the Nipissing strand. Middle Archaic period sites can be expected to occur along the Nipissing strand, especially where the strand is crossed by major watercourses, and along the major watercourses from the strand upstream onto the Gros Cap Highland.

The Late Archaic period (ca. 4.5 to 3 ka) witnessed the retreat of the Nipissing waters and the immigration of new tree taxa which transformed the white pine-dominated forest into a mixed northern hardwood forest. Patches of mast-producing trees, such as red oak, would have added new resources for both the Aboriginal foragers and their prey, and the importance of fire as a disturbance agent would have been reduced in predominantly deciduous forest areas. The understorey would likewise have been affected, both through the introduction of new species which would increase the overall diversity, and through shading by closed-canopy deciduous forest, which would locally reduce the productivity of the forest floor. The evolving waterfront of the St. Mary's River would have maintained its importance as a focus of settlement and resource procurement, while the river and stream valleys would continue to serve as important conduits into interior hunting grounds. Conway (1980: 4-14) had documented a series of Late Archaic archaeological sites on relict beaches within the Post-Nipissing Terraces, referring to them

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collectively as the Mark's Bay complex. He views these as being pre-cursors to the large waterfront fishing stations which characterize the following Woodland period (ca. 3 ka to contact).

Historically, the prosperous Aboriginal fishery at Sault Ste. Marie is well documented, and it seems likely that this fishery is of great antiquity (Figures 70 and 71). In 1669, Jesuit missionary Claude Dablon described this fishery as follows:

> It is at the foot of these rapids, and even amid these boiling waters that extensive fishing is carried on, from Spring until Winter, of a kind of fish found usually only in Lake Superior and Lake Huron. It is called in the native language *Atticameg*, and in ours "whitefish," because in truth it is very white; and it is most excellent, so that it furnishes food, almost by itself, to the greater part of all these peoples. Dexterity and strength are needed for this kind of fishing; for one must stand upright in a bark Canoe, and there, among the whirlpools, with muscles tense, thrust deep into the water a rod, at the end of which is fastened a net made in the form of a pocket, into which the fish are made to enter. One must look for them as they glide between the Rocks, pursue them when they are seen; and, when they have been made to enter the net, raise them with a sudden strong pull into the canoe. This is repeated over and over again, six or seven large fish being taken each time, until a load of them is obtained (Thwaites 1899:54: 128-130).

In referring to Lake Superior, he writes:

> It is almost everywhere so abundant in Sturgeon, Whitefish, Trout, Carp, and Herring, that a single Fisherman Will catch in one night twenty large [Page 149] Sturgeon, or a hundred and fifty Whitefish, or eight hundred Herring, in one net (Thwaites 1899:54: 148-149).

Describing a similar fishery at the Staits of Mackinac in 1703, Baron de Lahontan notes the relative ease with which fish are obtained in comparison to "harts" [wapiti or caribou?] or "elks" [European elk = moose]:

> You can scarce believe, Sir, what vast shoals of whitefish are caught about the middle of the channel, between the continent and the isle of Missilimackinac. The Outaouas and the Hurons could never subsist here without that fishery; for they are obliged to travel about twenty leagues [~65 km] in the woods, before they can kill any harts or elks, and it would be an infinite fatigue to carry their carcasses so far overland (Thwaites 1905:147).

Cleland (1982: 765) makes the same point in his landmark article on the pre-contact Aboriginal fishery of the upper Great Lakes:

> As it is not an area of rich land resources, important game animals—such as the moose and woodland caribou of the northern forests and the deer and elk typical of the deciduous regions in the south—all occur in marginal habitats and in relatively low density. Similarly, the plant resources, particularly those seed-bearing and nut-bearing species exploited by the pre-contact gatherers to the south of the Great Lakes, are not abundant in the Lake Superior basin and the northern portions of the basins of lakes Michigan and Huron. Although the Late Woodland Indians of the region seem to have experimented with farming, except for some extremely local situations the short growing season precluded reliance on domesticated plant species. Despite the paucity of these plant and animal resources, Indians of the upper Great Lakes not only survived but, at

various times in prehistory, attained a high degree of residential stability and population concentration.

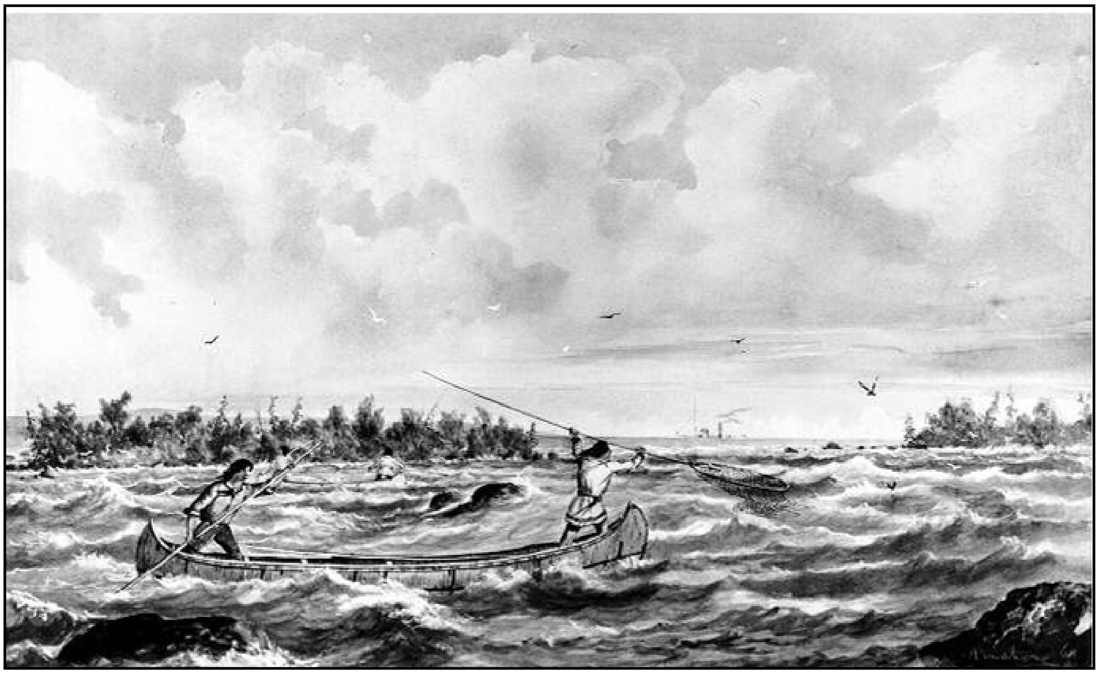

Figure 70: Fishing near Sault Ste. Marie, 1869 by Ojibway Indians.
William Armstrong - National Archives of Canada

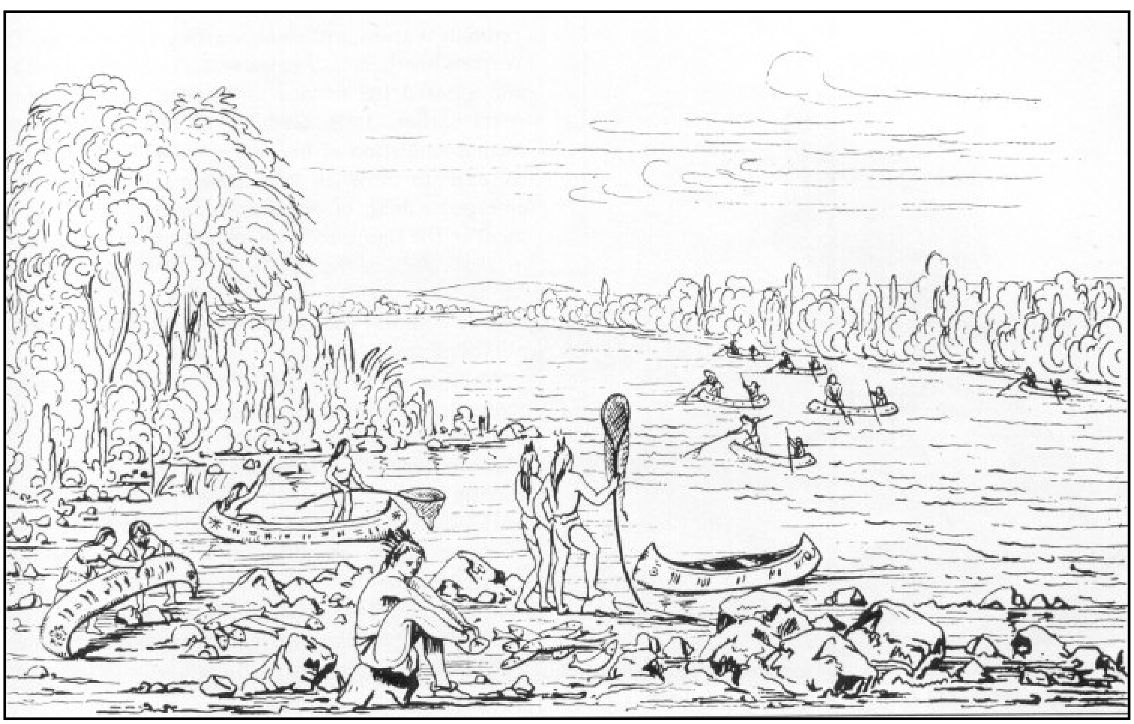

Figure 71: Ojibway Fishing at Sault Ste. Marie in 1836 – Sketch by George Catlin

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Based on archaeological evidence, Cleland (1982) notes that the earliest substantive evidence of Aboriginal fishing consists of tackle manufactured from native copper, including fish hooks, gorges, harpoon heads, multi-barbed spears, and gaff hooks. Dating from around 5 ka, these Middle to Late Archaic tools are indicative of angling and spearing of individual fish, rather than bulk harvesting by means of nets. Although notched pebble net sinkers appear in the lower Great Lakes at about this time, Cleland (1982: 769) saw no evidence of their use in the upper Great Lakes prior to the Middle Woodland period ca. 1.5 ka. Even then, fish spears and harpoons of bone and copper seem to have remained popular (Cleland 1982: 770). Much of this early fishing seems to have been directed at spring-spawning fish, either large species, such as sturgeon and pike, or numerous ones, such as suckers. These would have been an important resource at the time of year when hunting is most difficult and least productive, due to the absence of cover and the poor condition of game. The addition of seine net technology would have improved the efficiency of the fish harvest during the spring spawning runs, by allowing shoals of fish to be corralled (Cleland 1982: 774). By the Late Woodland period, the archaeological evidence suggests that netting of fall-spawning salmonids had become a major component of the annual subsistence cycle. Gill netting technology also appears to have come into use during the Late Woodland period. The Whitefish Island site (CdIc-2) site in the St. Mary's River is an example of a substantial Middle to Late Woodland settlement with strong evidence of whitefish harvesting (Conway 1980:14-16), while the Metal Toad site (CdId-1) near Gros Cap represents a similarly large settlement likely supported by the fall fishery (Conway 1980:16) (Figure 72). Smaller, summer fishing stations are thought to be represented by the Black Thistle (CcIc-3), Maids O'Mull (CcIc-15), and Point Louise (CcIc-14) sites.

Figure 72: Indian Encampment, Sault Ste. Marie (Southeastern Ojibway) August 1845. Paul Kane.

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There is evidence to indicate that the resident population of Sault Ste. Marie and the time of European contact, and by extension probably during the Late Woodland period, comprised a single band of about 150 people (Figure 73). The first line of evidence is Dablon's relation of 1669:

> The principal and native Inhabitants of this district are those who call themselves *Pahouitingwach Irini*, and whom the French call *Saulteurs*, because it is they who live at the Sault as in their own Country, the others being there only as borrowers. They comprise only a hundred and fifty souls, but have united themselves with three other Nations which number more than five hundred and fifty persons, to whom they have, as it were, made a cession of the rights of their native Country; and so these live here permanently, except the time when they are out hunting (Thwaites 1899:54: 130).

Dablon's reference to "borrowers" seems to pertain to other bands that were seasonally attracted to Sault Ste. Marie by the vast fishery:

> This convenience of having fish in such quantities that one has only to go and draw them out of the water, attracts the surrounding Nations to the spot during the Summer. These people, being wanderers, without fields and without corn, and living for the most part only by fishing, find here the means to satisfy their wants; (Thwaites 1899:54: 130).

Figure 73: Canoe Race near Sault Ste. Marie, 1836–37 Ojibway/Chippewa.
George Catlin - Smithsonian American Art Museum

For Public Release.

In 1839, U.S. Indian Agent Henry R. Schoolcraft undertook a census of Aboriginal peoples in the upper Great Lakes area, recording 152 "Chippewas" at Sault Ste. Marie (Schoolcraft 1839). Cleland (1989: 607) has analysed Schoolcraft's data to discover that Algonquian bands in the area ranged in size from about 50 to 170 people, with a mean size of about 103. These figures are consistent with the population estimates made by Dablon 170 years earlier.

To summarize, the waterfront of the St. Mary's River/Strait is considered to have always been the focus of Aboriginal settlement in the City of Sault Ste. Marie (Figure 74). Throughout the Holocene, the location of this waterfront has changed dramatically, first through the retreat of glacial Lake Algonquin and then by the advance and retreat of the Nipissing phase. In truth, these are best thought of as major episodes comprising a complex series of shorter-lived but not necessarily less-substantial fluctuations in lake levels. It would thus be fair to say that, at various points in time, the St. Mary's River waterfront has occurred everywhere below the Gros Cap Highland in Sault Ste. Marie, and it is therefore possible that pre-contact Aboriginal campsites could be found anywhere in this area. Fortunately, we can refine this model substantially by considering several facts.

Figure 74: Sault Ste. Marie, 1836–37
George Catlin - oil 19 5/8 x 27 1/2 in. - Smithsonian American Art Museum.
Described by Catlin as "a view of the Sault de St. Mary's, taken from the Canada shore, near the missionary-house, which is seen in the foreground of the picture, and in the distance, the United States Garrison, and the Rapids; and beyond them the Capes at the outlet of Lake Superior" (Letters and Notes, vol. 2, p. 161, pl. 265).
Sketched in 1836. A nineteenth-century print after the painting was published in the Sault Star, January 27, 1967.

For Public Release.

While water levels certainly transgressed the entirety of the Post-Algonquin and Post-Nipissing terraces, levels remained relatively constant only at certain elevations, as evidenced by the formation of recognizable relict beaches. There is therefore a higher probability that these beaches were occupied by Aboriginal hunter-gatherers by virtue of their relatively greater longevity. This is especially true of the Nipissing strand, given its proximity to the post-Algonquin Korah beach. There is thus the potential for both Late Paleo-Indian and Middle Archaic period occupations of this ridge, a possibility that seems to be supported by archaeological evidence. Along these relict waterfronts, certain localities will also tend to have higher archaeological potential than other localities, such as sheltered bays, points of land, or outlets of major watercourses which likely acted as travel corridors into the interior throughout the Holocene. Since the layout of the interior drainage systems in Sault Ste. Marie has remained essentially the same since the late Pleistocene, the intersections of the relict beaches with the watercourses can be identified as important nodes of archaeological potential.

The middle and upper reaches of the inland drainage systems may have been utilized to access fall and winter hunting territories on the Gros Cap Highland analogous to those recorded historically throughout the Great Lakes-St. Lawrence region. Higher order stream valleys would have been most important in this regard, as they would contain the largest watercourses and chains of lakes and wetlands. While wintertime land use would not have been constrained by access to well-drained campsites, such routes would have still provided familiar, relatively vegetation-free corridors for travel.

By about the beginning of the Late Archaic period (ca. 4.5 ka) the St. Mary's River waterfront had effectively assumed its modern form, and by about 3 ka the biotic landscape of Sault Ste. Marie was essentially the same as that which existed at the time of European contact. While the environment continued to fluctuate and evolve up to the historic period as a result of natural processes such as forest fire, down-cutting of waterways, organic in-filling of wetlands, animal population cycles, and others, these generally cannot be resolved with currently available paleoenvironmental data. Nor is it necessary to do so given the scope and analytical scale of this study. The lifestyle of Late Archaic period (ca. 4.5 to 3 ka.) and Woodland period (ca. 3 ka to contact) hunter-gatherers seems to have been relatively unchanged from that practised by their Middle Archaic ancestors. Major base camps were likely situated in riverine venues where abundant local resources could sustain the band. Smaller seasonal camps, representing the temporary occupation of specialized hunting or collecting parties, were likely distributed throughout the interior in areas of higher biotic diversity and productivity. In light of the general continuity in environmental and cultural practices after about 4.5 ka, it is suggested that the land-use patterns described above for the Early and Middle Archaic periods, and based on ethno-historic analogues, continued with only local variation up to the historic period.

5.4.1.2 Watercourses

Larger watercourses, such as the St. Mary's River, served a variety of functions, such as navigable waterway, fish and game habitat, source of plant foods and fibre from riparian wetlands, source of potable water, etc. Smaller streams may have served only one or a few such functions. Thus, the importance of watercourses, as predictors of archaeological site potential, decreases with their relative size. To address this fact, watercourses can be classified and ranked through a process called stream ordering according to their relative position in the drainage network from headwater stream to river mouth. This is a method for identifying and classifying types of streams based on their number of tributaries. The method of stream ordering that was used in this study provides an indication of the relative size of each watercourse and assigns a new order at every stream intersection adding valuable information about the number of tributaries in the network.

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The project digital elevation model was the basis for stream order analysis. Once the analysis was undertaken, the watercourses were selected for buffering based on the numeric order. For the purposes of identifying streams considered to be large enough to have attracted Aboriginal settlement, it has been decided that any watercourses in Sault Ste. Marie higher than third order would be included in the potential model buffers. This analysis resulted in a 45% reduction (measured by length) of the watercourses to be considered significant and buffered for archaeological potential.

The analysis allowed for consideration of the middle reaches of the inland drainage systems that may have comprised late fall and winter microband hunting and fishing territories analogous to those recorded historically throughout the Great Lakes-St. Lawrence region. Throughout these waterways, stream confluences may have been routinely used as stop-over spots, leaving traces in the archaeological record. While wintertime land use would not have been constrained by access to well-drained campsites or the limits of navigable waterways, such routes would have still provided familiar, vegetation-free corridors for travel.

5.4.2 Historical Site Potential Layer

The mapped layer of historical features is based largely on primary source documents including maps which range in date from 1797 to 1899 (Figure 75 and 76). It is recognized that these maps did not always illustrate historic features that may be of interest, therefore, it can in no way be considered definitive and all of the mapped locations should be considered to be approximate.

It is recognized that some of the more massive features associated with many historic archaeological sites are likely to have survived as deeply buried deposits in areas that have been developed. The historic core area of the City features concentrations of features for which their property boundaries have been defined. The properties can be considered to have potential for the presence of structural remains and associated deposits such as privies, cisterns and middens. Commercial and industrial buildings have also been mapped.

Transportation routes such as early settlement roads (buffered by zones of 100 metres either side), and early railways (buffered by zones of 50 metres either side) have been mapped to draw attention to potential heritage features adjacent to their rights-of-way.

Cemeteries and family burial grounds have been included in the historic theme layer due to their particularly sensitive nature and the fact that these sites may become invisible in the modern landscape. Information concerning pioneer cemeteries was obtained from the nineteenth century maps, the Ontario Genealogical Society (OGS), and in some instances from Land Registry records. Their locations were plotted based on an examination of the historic maps and OGS transcriptions. These locations were not field verified. The active municipal and private cemeteries that were in the City GIS layer have also been plotted.

All features already designated under the *Ontario Heritage Act*, situated inside the historic core had their property footprints added to the final archaeological potential mapping. They are not subject to exclusion through the integrity layer. Those designated properties outside of the historic core were also plotted and buffered by a radius of 100 metres for archaeological potential.

Isolated rural homesteads, schools, places of worship and commercial buildings, such as inns, that occur outside of the major settlement centre were not mapped as their locations were not shown on the historic maps. Should the archaeological remnants of any such features be encountered during the course of development, they will need to be evaluated in association with the Ministry of Tourism and Culture to determine their worthiness for systematic archaeological investigation given their quantity and ubiquity.

5.4.3 Integrity Layer

An integrity layer was compiled based on a review of present land uses within the City (Figure 77). The objective of this task was to distinguish between those lands upon which modern development activities have likely destroyed any pre-contact archaeological resources, and those lands, such as schoolyards, parks and golf courses, which potentially remain wholly or primarily undisturbed.

This layer was compiled using the built-up layer from the National Topographic Data Base together with high-resolution ortho-imagery provided by the City.

Areas deemed to have no remaining archaeological integrity were subsequently excluded from the zone of archaeological potential. This layer is best viewed on the City's GIS platform.

Alterations to the evaluation of integrity may result from a detailed Stage 1 report which demonstrates clearly that a study area has been severely disturbed thereby negating archaeological potential.

5.4.6 Composite Archaeological Potential Layer

The final GIS layer, which is the map of the composite zone of archaeological potential within the City of Sault Ste. Marie, was compiled by merging the zones of pre-contact archaeological potential and thematically defined zones of historic archaeological potential, as defined through application of the various modelling criteria (Table 9) (Figures 78 and 79). All areas lacking landscape integrity were then excluded from this layer. The resultant potential mapping presents an approximation of the overall distribution of archaeological resources in the City of Sault Ste. Marie. On the basis of this mapping, it may be suggested that 51% of the total landmass of the City of Sault Ste. Marie exhibits potential for the presence of hitherto undocumented archaeological sites. For purposes of comparison, it was determined that the Ministry of Tourism and Culture's generic proximity to water model (MTC 1997) captures over 90% of the city.

Table 9: Summary of Site Potential Modelling Criteria

Environmental or Cultural Feature	Buffer Distance (metres)	Buffer Qualifier
	Pre-contact Aboriginal Site Potential	
lakes	150	none
third order and above watercourses	150	none
wetlands	150	none
valley lands (top of bank)	150	none
select glacial beach ridges	150	upland margins and bases
slopes $\geq$ 10 degrees	excluded from potential	
	Historic Euro-Canadian Site Potential	
designated sites	point data or lot polygon as mapped	no buffer, override integrity
domestic sites	100	none
breweries and distilleries	100	none
hotels/taverns	100	none
historic schools and churches	100	none
historic industries	100	none
early settlement roads	100	none

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Table 9: Summary of Site Potential Modelling Criteria

Environmental or Cultural Feature	Buffer Distance (metres)	Buffer Qualifier
early railways	50	both sides
train stations	100	both sides
cemeteries	100	none
	General Criterion	
all registered archaeological sites	100	override integrity

5.5 Model Evaluation and Implementation

5.5.1 Model Evaluation

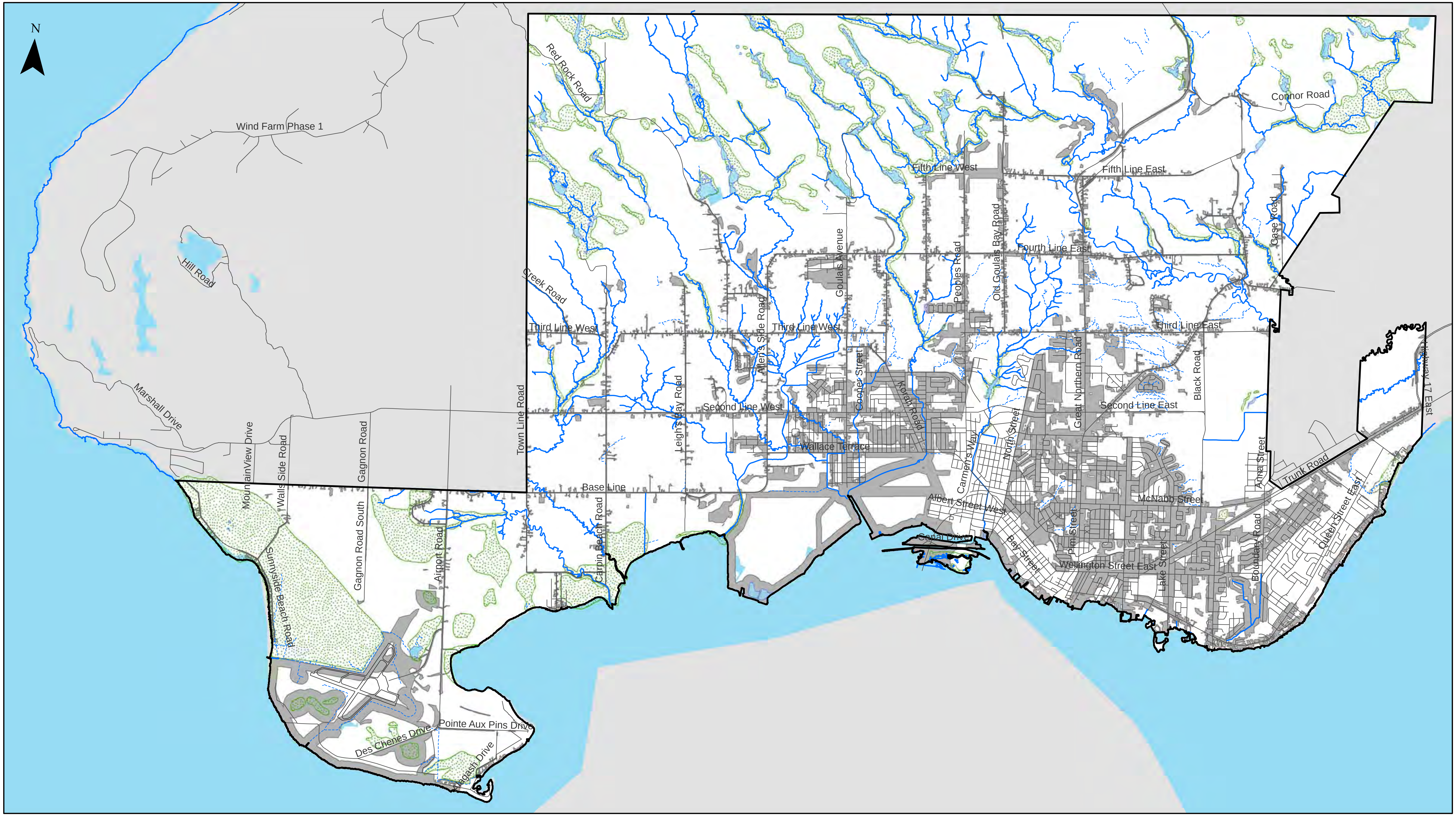
The deductive modelling exercise undertaken above presents a first approximation of the overall distribution of archaeological resources in the City of Sault Ste. Marie. The purpose of this exercise has been to provide land-use planners and heritage resource managers with a theoretically supported estimate of the scope of a resource for which there is extremely limited substantive data available. Given the hypothetical nature of such a model, however, potential users must be fully aware of its limitations in order to employ it appropriately.

The unknown but undoubtedly complex distribution of sites in Sault Ste. Marie can be described in terms of a geographical continuum of density, or potential for discovery, ranging from none to very high. In this study, the continuum has been subdivided into two classes: areas that demonstrate archaeological potential and areas that do not demonstrate potential. Through a deductive modelling procedure, involving interpretation of the changing pre-contact landscape and the expected land-use patterns of its pre-contact and historic human occupants, Sault Ste. Marie has been tentatively partitioned into zones representing these categories. Since the principal orientation of the model revolves around access to water for travel and subsistence, it is anticipated that certain site classes, sacred sites for example, may not conform to the mapped zonation. Residual sites of this kind, and sites in localized zones of potential that could not be resolved at this mapping scale, can be expected to occur throughout the City of Sault Ste. Marie.

The validity and utility of archaeological site potential models can be assessed in terms of predictive capacity or gain. Predictive gain has been explicitly defined as follows (Kvamme 1988:329):

$$Gain = 1 - \left(\frac{\text{percentage of total area covered by model}}{\text{percentage of total sites within model area}} \right)$$

where the total sites variable would represent all known and unknown archaeological sites within the City of Sault Ste. Marie. Of course since the total number of sites is never known, the evaluation of gain cannot be based on a random sample of sites. One way of dealing with this problem is to undertake a random sample of the study area in the hope that this will constitute a suitable proxy for a random sample of sites (e.g., Wilson and Horne 1995). In most cases, where there is reason to believe that site distributions may be non-random, the confidence of this approach can often be improved by stratifying the sample into hypothetical density classes. For example, the site potential model for Sault Ste. Marie has suggested that sites may be non-randomly distributed and has defined two zones to predict the nature



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LEGEND

- Areas of Potential with Compromised Integrity
- Intermittent Water Course
- Open Water Course
- Wetland
- Waterbody

BASE:

The Corporation of the City of Sault Ste. Marie
Engineering & Planning Division
Feb 8, 2010

0 3km
SCALE

ASI PROJECT NO.: 09SP-81
DATE: JUNE 2, 2010
DRAWN BY: S.F.
FILE: 09SP-81_Compromised_Integrity

Figure 77: Integrity Layer

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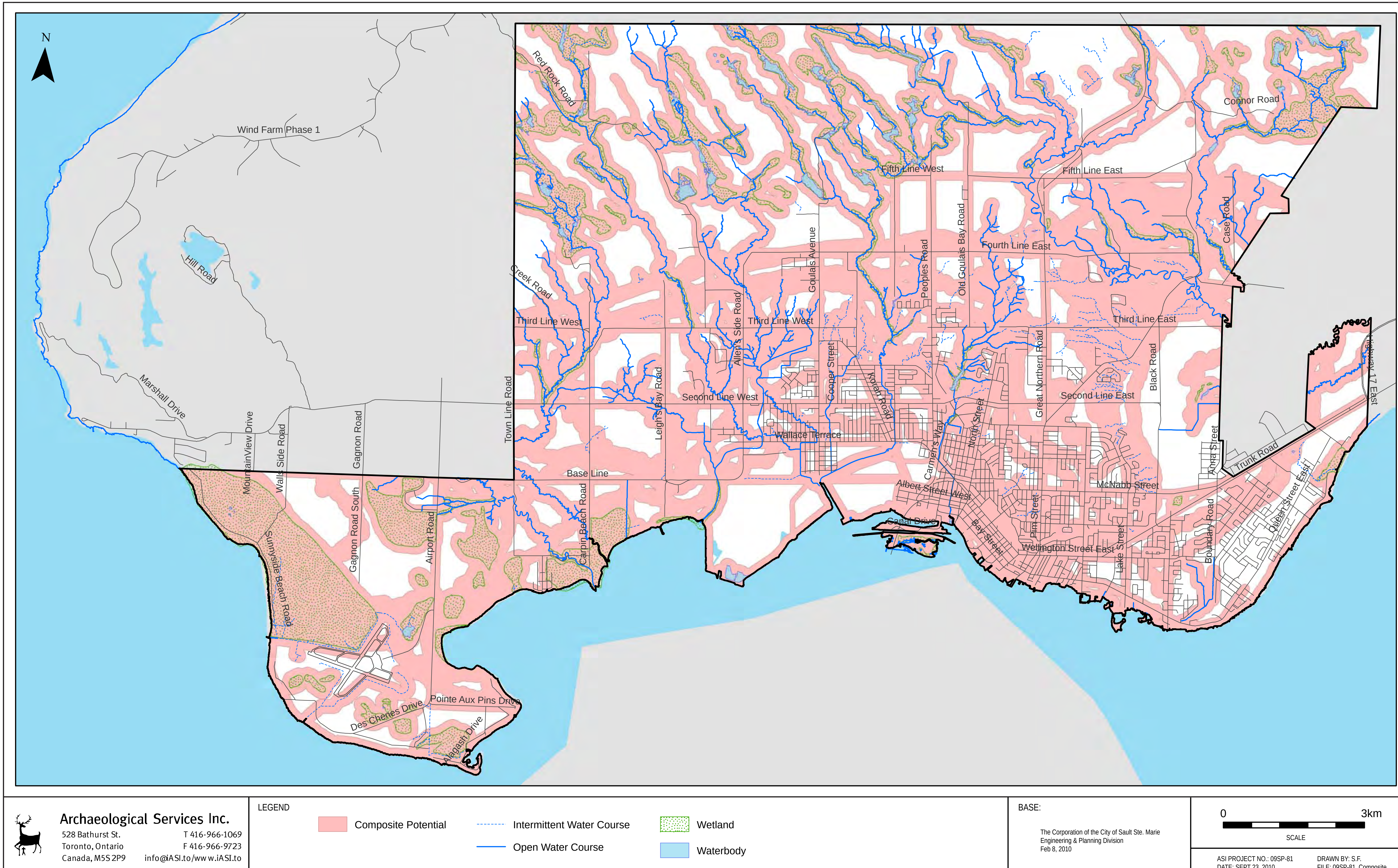

Figure 78: Composite Zone of Archaeological Potential

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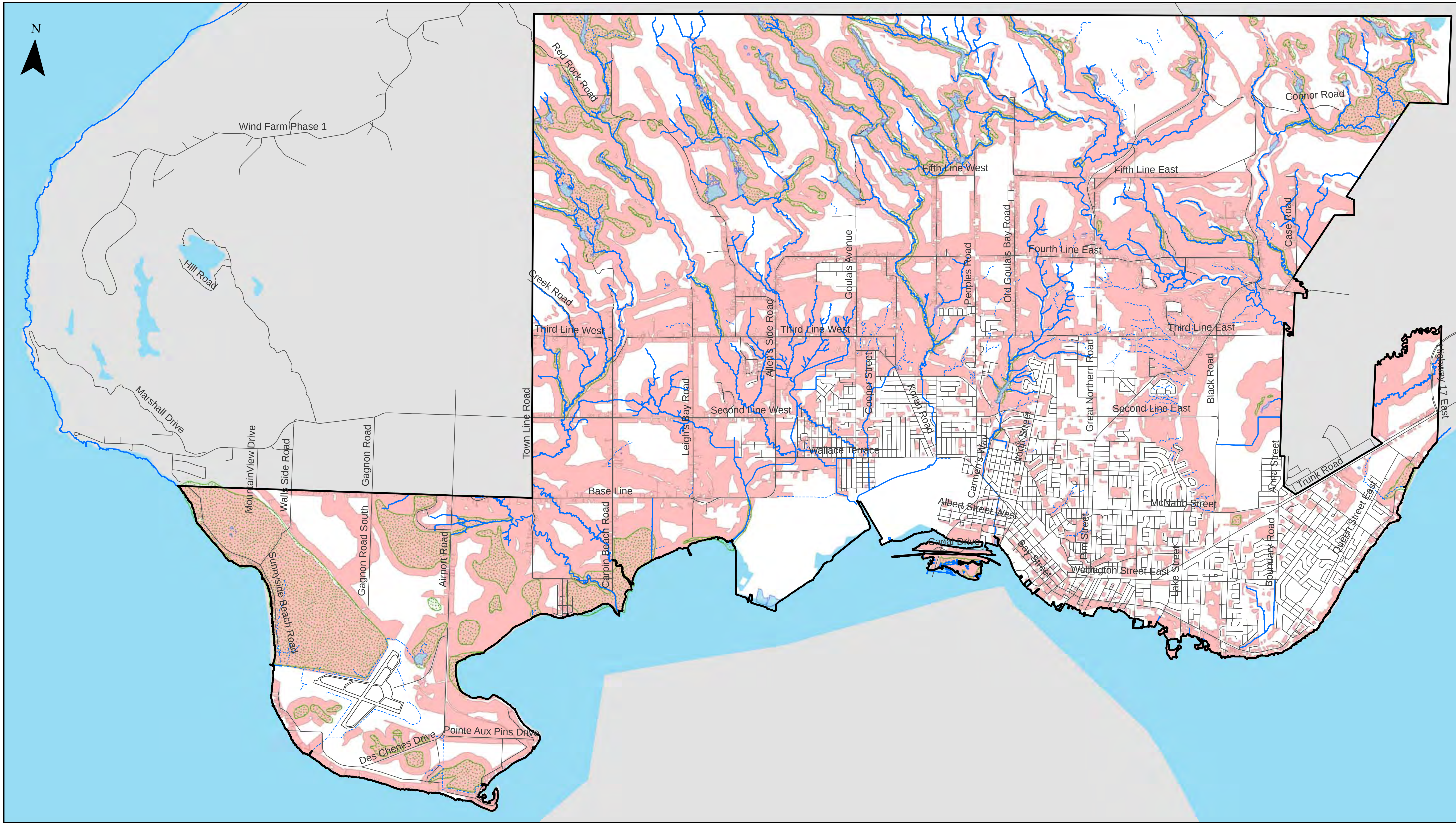

LEGEND

Archaeological Potential with integrity and no slope exceeding 10degrees

Intermittent Water Course

Open Water Course

Wetland

Waterbody

BASE:

The Corporation of the City of Sault Ste. Marie
Engineering & Planning Division
Feb 8, 2010

0 3km

SCALE

ASI PROJECT NO.: 09SP-81
DATE: SEPT 27, 2010

DRAWN BY: S.F.
FILE: 09SP-81_Final Potential

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Figure 79: Final Zone of Archaeological Potential

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of the distribution. A stratified random sample of the city would therefore draw separately from both of these zones.

An alternative approach for evaluating gain is to employ relatively large samples or data acquired through some sort of preliminary investigation (cf. Altschul and Nagle 1988:265-268; Kvamme 1988:403-404; Rose and Altschul 1988:205). Systematic archaeological survey, undertaken in the City of Sault Ste. Marie in the context of the pre-development approvals process, will provide just this sort of information, and once the site sample has grown to a reasonable size, the gain statistic can eventually be evaluated. This is one reason why the companion Planning Report recommends that, where any part of a development application falls into the zone of archaeological potential, the entire application should be subject to assessment. This will continue to afford the opportunity of examining lands beyond the archaeological potential zone, thereby improving the site sample and avoiding the self-fulfilling prophesy of only finding sites where one looks for them.

5.5.2 Model Implementation

Land-use planners and heritage resource managers, seeking to make use of this model of pre-contact archaeological site potential in the City of Sault Ste. Marie are reminded that:

- neither this nor any model can specifically predict where a site or sites will be found;
- neither this nor any model can specifically predict where a site or sites will not be found;
- some sites will occur in areas where the model predicts they are not likely to occur;
- this and any such models must remain open to revision in light of new data.

With these limits in mind, the following recommendations are offered for the practical application of this model:

Recommendation 1
All lands that fall partially or wholly within the zone of archaeological potential should be subjected to comprehensive field assessment by licensed archaeological personnel prior to any land development.

Recommendation 2
In order to ensure the long term viability of the Sault Ste. Marie Archaeological Master Plan, it is recommended that the potential model and planning protocols be subject to comprehensive review on a five year basis. Such a review should consider any changes in MTC criteria for site significance, any data gaps in the site inventory, changes required to the archaeological potential modelling, and all procedures and protocols related to the implementation of the Plan.

Such reviews should be conducted by a licensed archaeologist, and any proposed modifications should be mutually acceptable to the City of Sault Ste. Marie planning and development approvals department and MTC.

The process of implementation, maintenance and review of the archaeological potential model, and the associated issues, are fully discussed in the City of Sault Ste. Marie Archaeological Master Plan: Planning Report.

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6.0 USING THE POTENTIAL MODEL

The archaeological potential mapping will be used in determining requirements for archaeological assessments in the development review process. The process of implementation, maintenance and review of the archaeological potential model, and the associated issues, are fully discussed in the companion volume to this document, entitled, *Planning for the Conservation of Archaeological Resources in the City of Sault Ste. Marie*. The recommendations presented in the Planning report may be found in the Executive Summary of this report.

Upon reviewing the City of Sault Ste. Marie's archaeological potential mapping, City staff will determine if any portion of an application falls within a zone of archaeological potential. Should any portion of the property have archaeological potential, the proponent will be required to undertake a Stage 1-2 Archaeological Assessment of the entire subject property, not simply the portion(s) that falls within the zone of archaeological potential. The Ministry of Tourism and Culture must approve any deviation from this approach.

If the development history of the property is in question or an assertion of complete disturbance is made by a development proponent, or it is uncertain whether archaeological deposits might have survived, a Stage 1-2 archaeological assessment (background research and field review) will be undertaken, to ascertain whether there remains any potential for the survival of deposits on the property. It must be recognized that some features associated with many historic archaeological sites are likely to have survived, as deeply buried deposits, in areas that have been developed and even re-developed. Research must be undertaken to determine whether the subject property was entirely disturbed during previous development, or just the footprint(s) of former or existing buildings. Only where land has been completely disturbed to a depth of ten or more feet should it be concluded that there is no potential for survival and therefore no requirement to carry out Stage 2 field work.

Once the archaeological assessment, consisting of background research and a field survey (Stage 1-2), has been completed, the archaeological consultant will submit a report to the Cultural Programs Branch of the Ministry of Tourism and Culture. Ministry staff will review the report to determine if the assessment has met current licensing and technical standards. If this is not the case, the Ministry will require the consultant to carry out additional fieldwork and/or provide more extensive documentation.

If the assessment did not result in the documentation of any significant archaeological resources, the Ministry of Tourism and Culture will provide a copy of the letter to the City's Planning and Development Department noting that all provincial concerns with respect to archaeological resource conservation and archaeological licensing have been met. Upon receipt of this notification of Ministry of Tourism and Culture approval, and supporting documentation from the archaeological consultant, the City may then clear the planning application of any further archaeological concern. At that time, all consultant archaeologists are required to file a copy of the report with the Planning and Development Department, City of Sault Ste. Marie.

If the assessment does result in the documentation of one or more significant archaeological resources, the proponent shall carry out a Stage 3 and/or Stage 4 archaeological assessment of the entire development property and mitigate, through preservation or resource removal and documentation, adverse impacts to any significant archaeological resources found. No demolition, grading or other soil disturbances shall take place on the subject property prior to the City and the Ministry of Tourism and Culture confirming that all archaeological resource concerns have met licensing and resource conservation requirements.

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Upon receipt of notification that all Ministry of Tourism and Culture archaeological conservation and licensing concerns have been addressed, and receipt of the necessary supporting documentation from the archaeological consultant, the City will clear the planning application of further archaeological concern.

No Stage 4 archaeological investigations on Aboriginal sites should be undertaken within the City of Sault Ste. Marie without first filing a First Nations consultation report with the Planning and Development Department. Such a report should contain a description of the engagement with the appropriate Aboriginal community(s) and copies of any documentation arising from the process. The report must include a rationale for identifying which communities were engaged, a description of the engagement procedures were, dates of when the engagement occurred, documentations of the strategies undertaken to incorporate the input of the Aboriginal community(s) in to the fieldwork (e.g., monitoring) and a description of the process for reporting results to the community(s).

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6.1 Glossary of Terms

alluvium	sediment deposited by rivers and streams
alvar	a biological environment based on a limestone plain with thin or no soil and, as a result, sparse vegetation
antiscorbutic	a food rich in vitamin C that prevents scurvy
archaeological site	any location which shows evidence of the prior presence or influence of human beings. Individual archaeological sites (that collectively form the archaeological resource-base) are distributed in a variety of locational settings across the landscape, being locations or places that are associated with past human activities, endeavours, or events. These sites may occur on or below the modern land surface, or may be submerged under water. The physical forms that these archaeological sites may take include: surface scatters of artifacts; subsurface strata which are of human origin, or incorporate
archaeology	the science and/or methods concerned with the recovery, description, analysis and explanation of the physical remains of past human cultures. In North America, some archaeologists view their task as the cultural anthropology of the past while others restrict themselves to the culture history or the chronicling of events of a particular area. Archaeology may deal with either pre-contact history or history -- that period since the introduction of written records.
artifact	any object manufactured, used, moved or otherwise modified by human beings, including all waste materials and by-products of these processes. Occasionally, the term is used in the more restricted sense of a completed object as opposed to the associated detritus.
artifact assemblage	all artifacts of one culture or time period found within the context of an archaeological site
biotic landscape	the living component of the landscape
biotic systems	networks of relations between the living elements of an ecosystem
Borden Designation	the standard archaeological site designation system in Canada. The label consists of four letters (alternating upper and lower case) followed by a number, e.g. EaKv-l. The alphabetic prefix refers a block of l0 minutes by l0 minutes within a grid system which covers all of Canada south of 62 N latitude. The numerical suffix indicates that this is the first site within this block to be designated.
botanical communities	communities of plants
burial	1. the covering-over of an object with earth. 2. the ceremonial entombment of a dead body beneath the ground or in a chamber. 3. the feature thus created consisting of the individual(s) and the context. bundle

	burial. the (re-)burial of bundled-up disarticulated, defleshed remains. extended burial. placement of the individual with arms at the sides and legs extended. flexed burial. placement of the individuals with arms and legs bent up against the body. intrusive burial. the excavation of a grave into a burial pit or mound constructed at an earlier period. Two individuals may thus appear to be in association although they are not contemporaneous. multiple burial. collective internment; the placement of two or more bodies within the same grave. platform burial. see scaffold burial. primary burial. placement of the dead in a grave with the flesh at least partially intact such that after further decomposition, the bones remain articulated. scaffold burial. placement of the dead on a scaffold above the ground where it may be defleshed by scavengers. The remains may be interred at a later date. seated burial. entombment of the deceased in a sitting position. secondary burial. the final interment of an individual subsequent to an earlier burial in which the flesh decomposed. Secondary burials are therefore not articulated (or frequently improperly articulated) and some bones may have been lost. supine burial. placement of the dead on the back with face and palms upward.
chert	a fine-grained stone similar to flint, used by pre-contact peoples for the manufacture of tools; differences in chert properties (colour, texture, mineral composition) are often indicative of the specific bedrock source.
clinal	pertaining to gradual change
debitage	debris produced during the manufacture of flaked stone tools
deductive modelling	in archaeology, the analysis of environmental indicators and known cultural land-use patterns to predict areas of archaeological potential within a given area (see also inductive modelling)
deglaciation	the melting and withdrawal of glacial ice
dendritic	pertaining to a branching pattern
diachronic	relating to or involving the study or development of something through time
drumlin	a teardrop-shaped hill of glacial debris of uncertain origin
ecosystem	a localized group of interdependent organisms together with the environment that they inhabit and depend on
ecotone	a zone of transition between two different ecosystems
edaphic	pertaining to the effect of soil characteristics, especially chemical or physical properties, on plants and animals
esker	a sinuous ridge of sand or gravel deposited by a stream flowing under a glacier
estuarine	pertaining to an estuary, the wide lower course of a river where lake or ocean waters mix

ethnographic analogy	the study of lifeways among existing human cultures as a basis for understanding similar lifeways in the archaeological past
evapotranspiration	the return of moisture to the air through both evaporation from the soil and transpiration by plants
excavation	digging up and removing artifacts and features from an archaeological site in order to analyze and predict past human behaviour.
facies	a distinct kind of sediment or sedimentary rock for an area which reflects a certain depositional environment
feature	something distinctive encountered on the ground surface or during the course of excavations which is not artifactual in the usual sense. Its significance may lie not in the object or objects which constitute the feature, but rather in the relationship of the objects to each other. Thus while a cobble, fleck of ash or fragment of burned bone would mean little if found in isolation, a concentration of bone and ash surrounded by a circle of cobbles would suggest a cooking area, and this patterning would constitute the feature. Other examples of features could include post moulds, storage pits, a garbage dump, a cache of tools, a flint knapping area, a collapsed dwelling or a burial.
findspot	the location in which an artifact is found.
geographical information system (GIS)	computer-based techniques for managing and analyzing spatial data, especially in a digitally mapped format
glacial lake	a lake in contact with a glacier
glacio-fluvial	pertaining to rivers flowing on, under, or in contact with glaciers
glacio-lacustrine	pertaining to glacial lakes (q.v.)
gyttja	a fine-grained, nutrient-rich organic mud deposited in lakes and ponds
Holocene epoch	the last 10,000 years of geological time
hydrographic features	various types of water features on the landscape, including lakes, ponds, rivers, streams, and wetlands
hydroseral development	pertaining to the succession of wetlands from open water to closed peatlands
Hypsithermal	period from about 9,000 to 5,000 years ago when the climate was warmer than present - also known as the Holocene Climatic Optimum
inductive modelling	in archaeology, the extrapolation of archaeological potential on the basis of known site locations (see also deductive modelling)

isostatic uplift or rebound the upward movement of the earth's crust following release from a weight such as a continental glacier

isolated find the recovery, usually from the surface, of a single artifact with no other artifacts in association.

lacustrine pertaining to lakes

Laurentide glacier the continental ice sheet that covered most of Canada during the Wisconsinan glaciation (q.v.)

lithics stone tools manufactured by the selective removal of flakes, or by grinding, to achieve a desired form.

macroband the largest unit of a hunter-gatherer community, comprising two or more microbands

marl a naturally occurring fine crumbly mixture of clay and limestone, often containing shell fragments and sometimes other minerals

mast the fruit of nut-bearing trees

microband the smallest unit of a hunter-gatherer community above the level of the individual nuclear family

microclimate dealing with localized climatic regimes

microenvironments localized ecosystems

midden a heap or stratum of refuse generally located near a habitation site.

mitigation measures that reduce the deleterious effects of project construction, operation and maintenance on archaeological resource values. Actions designed to prevent or avoid adverse impacts are also regarded as mitigation.

outwash sediment deposited from glacial meltwater

paleoclimatic dealing with climatic regimes in the past

paleoecology the study of past environments and the relationships between various life forms

paleoenvironment a natural environment of the past

paleofauna animal communities of the past

Paleozoic era the period of geological time from about 542 to 241 million years ago

palustrine pertaining to wetlands

physiography	the study and description of the landscape
phytosociological	pertaining to the study of the characteristics, classification, relationships, and distribution of plant communities
Pleistocene epoch	the geological period from about 2 million years ago to 10,000 years ago
pollen profile	a chart illustrating the frequency distribution of fossil (ancient) pollen from various depths of a sediment sample
Precambrian	the earliest geological period from about 4.5 billion to 542 million years ago
predictive modelling	in the archaeological context, the analysis of past environmental conditions and human settlement and subsistence patterns in order to develop an informed understanding of land-use trends that can be used to predict the likelihood of encountering archaeological sites in a given area
projectile point	an arrow- or spearhead
Quaternary period	the last 2 million years of geological time
riparian	situated or taking place along or near the bank of a river
salvage archaeology	archaeology conducted primarily because a site or area is in imminent danger of destruction by natural forces or by construction or development. The British equivalent to this term -- rescue archaeology -- is self-explanatory. Also referred to as mitigation.
socio-political systems	the complex web of social and political institutions, including kinship groups, peer networks, trade relations, social hierarchies, etc., that organize and manage human societies
stochasticity	behaviour that is the result of random contingencies
stratigraphy	the study of the sequence of soil accumulation and deposition. The basic premise underlying this interpretive approach to archaeological sites is that if one deposit overlies another, it must have accumulated later in time than the lower, which could not have been inserted beneath a layer already there. Study of the stratification, or ordering of soil layers, and of the different artifacts recovered from the various layers is a method of estimating the dates (relative to one another) of various events that occurred on an archaeological site.
substrate	an underlying sedimentary layer
surficial geology	the study of unconsolidated sediments across the landscape
survey	l. the investigation of an area to locate archaeological sites and to acquire a preliminary understanding of its prehistory. This latter aim is most commonly achieved by means of surface collecting and the excavation of test pits. 2. to systematically map and grid an archaeological site. Surveying instruments

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	such as the total station, transit and the theodolite are generally used.
taxon (plural, taxa)	a group to which organisms are assigned according to the principles of taxonomy, including species, genus, family, order, class, and phylum
test excavation	Subsurface excavations in areas which are either defined as sites based on surface artifacts or thought to contain buried deposits based on the landform.
test pit	a unit excavated to determine the presence or absence of an archaeological site, or the nature of the deposits.
topographic features	various types of landforms that produce relief in the landscape
transgression	in geological terms, the expansion of a water body beyond its earlier limits
understorey	the area of a forest which grows in the shade of the forest canopy
vertebrate palaeontology	the study of past, often extinct, animals with backbones
Wisconsinan glaciation	the most recent glacial period, from about 110,000 to 10,000 years ago, within the Pleistocene epoch (q.v.)
zooarchaeology	the study of animals remains from archaeological sites
zoological landscape	communities of animals

REFERENCES CITED

Agriculture Canada Expert Committee on Soil Survey (ACECSS)
1987 The Canadian System of Soil Classification. Second edition. *Agriculture Canada Publication* 1646.

Albert, D.A., J. Ingram, T. Thompson, and D. Wilcox
2003 *Great Lakes Coastal Wetlands Classification*. First Revision (July 2003). Submitted on behalf of the Great Lakes Coastal Wetlands Consortium. http://www.glc.org/wetlands/pdf/wetlands-class_rev1.pdf.

Altscul, J.W. and C.L. Nagle
1988 Collecting New Data for the Purpose of Model Development. In: *Quantifying the Present and Predicting the Past: Method, Theory, and Application of Archaeological Predictive Modelling*, W.J. Judge and L.W. Sebastian (eds.). Pp. 257-299. Denver: U.S. Department of the Interior, Bureau of Land Management Service Center.

Anderson, T.W.
1995 Forest Changes in the Great Lakes Region at 5-7 KA BP. *Géographie Physique et Quaternaire* 49(1): 99-116.

2002 Pollen Stratigraphy and Vegetation History, Sheguiandah Archaeological Site. In: *The Sheguiandah Site: Archaeological, Geological and Paleobotanical Studies at a Paleoindian Site on Manitoulin Island, Ontario*, P.J. Julig, ed. Pp. 179-194. *Archaeological Survey of Canada, Mercury Series, Paper* 161. Canadian Museum of Civilization.

Anderson, T.W. and C.F.M. Lewis
2002 Upper Great Lakes Climate and Water-Level Changes 11 to 7 ka: Effect on the Sheguiandah Archaeological Site. In: *The Sheguiandah Site: Archaeological, Geological and Paleobotanical Studies at a Paleoindian Site on Manitoulin Island, Ontario*, P.J. Julig, ed. Pp. 195-234. *Archaeological Survey of Canada, Mercury Series, Paper* 161. Canadian Museum of Civilization.

Archaeological Services Inc. (ASI)
1990 A Guide to Prehistoric Archaeological Resources: Approaches to Site Potential Modelling for Environmental Assessment. Report on file, Land Use and Environmental Planning Department, Ontario Hydro, Toronto.

1998 The Master Plan of Archaeological Resources of the Regional Municipality of Halton. Two Volumes. Unpublished report submitted to the Regional Municipality of Halton.

Attwell, Brent and Peter Gagnon
2007 2008 – 2017 Forest Management Plan for the Sault Ste. Marie Region Conservation Authority Properties. Unpublished report prepared by Regen Forestry, Sault Ste. Marie.

Batchewana First Nation
2010 1850 Huron Robinson Treaty -1859 Pennefather Treaty Research. http://www.batchewana.ca/content/content.html?page=24. Accessed on August 3, 2010.

For Public Release.

Bennett, Gerald
1981 *The Huronian Rocks between Sault Ste. Marie and Thessalon, District of Algoma, Ontario: Field Excursion Guide*. Prepared for the 27th Annual Meeting of the Institute on Lake Superior Geology, Lansing, Michigan, May 11-12, 1981.

Benton-Banai, Edward
1988 *The Mishomis Book—the Voice of the Ojibway*. Indian Country Communications. Hayward, Wisconsin.

Binnema, Theodore, and Susan Neylan, eds.
2007 *New Histories for Old: Changing Perspectives on Canada's Native Pasts*. University of British Columbia Press, Vancouver.

Booth, Robert K, Stephen T. Jackson, and Todd A. Thompson
2002 Paleoecology of a Northern Michigan Lake and the Relationship among Climate, Vegetation, and Great Lakes Water Levels. *Quaternary Research* 57:120–130.

Bunting, M.J. and B.G. Warner
1998 Hydroseral Development in Southern Ontario : Patterns and Controls. *Journal of Biogeography* 25(1): 3-18

Boyd, Matthew and Clarence Surette
2010 Northernmost Precontact Maize in North America. *American Antiquity* 75(1): 117-133.

Brown, D.M., G.A. McKay and L.J. Chapman
1980 The Climate of Southern Ontario. *Canada Department of Transport, Meterological Branch, Climatological Studies* No. 5.

Bryson, .A. and T.J. Murray
1977 *Climates of Hunger: Mankind and the World's Changing Weather*. Madison: University of Wisconsin Press.

Burger, D.
1993 Revised Site Regions of Ontario: Concepts, Methodology and Utility. *Ontario Forest Research Institute, Forest Research Report* 129.

Capp, Edward H.
1904 *The story of Baw-a-ting: being the annals of Sault Sainte Marie*. Sault Ste. Marie: Sault Star Press

Challener, F. S.
[---] Étienne Brûlé at the mouth of the Humber. Toronto: Government of Ontario Art Collection, 619849

Champlain, Samuel de
1632 Carte de la Nouvelle France. Libraries and Archives Canada (LAC), R11981-62-6-F

Chute, Janet
1998 *The Legacy of Shingwaukonse—a Century of Native Leadership*. University of Toronto Press. Toronto.

City of Sault Ste. Marie (CSSM)
2010 Local History. http://www.city.sault-ste-marie.on.ca/Open_Page.aspx?ID=838&deptid=1. Accessed on April 16, 2010

Clayton, J.S., W.A. Ehrlich, D.B. Cann, J.H. Day, and I.B. Marshall
1977 *Soils of Canada*. 2 volumes. Research Branch, Canada Department of Agriculture.

Cleland, Charles E.
1982 The Inland Shore Fishery of the Northern Great Lakes: Its Development and Importance in Prehistory. *American Antiquity* 47(4): 761-784.

1989 Comments on "A Reconsideration of Aboriginal Fishing Strategies in the Northern Great Lakes Region" by Susan R. Martin. *American Antiquity* 54(3): 605-609.

Coldwell, R. W.
1888 Plan of the Town of Sault Ste. Marie, District of Algoma. Toronto: Archives of Ontario, F004127

Conway, Thor
1974 *Interview with Aleck Sonny Daigle of Gros Cap*. Notes on file. Heritage Discoveries Inc. Sault Ste. Marie.

1977 Whitefish Island: A Remarkable Archaeological Site at Sault Ste. Marie, Ontario. *Data Box 310*, Research Manuscript Series, Historical Planning and Research Branch. Ontario Ministry of Culture and Recreation, Sault Ste. Marie.

1979 A Middle Mississippian Pot from Sault Ste. Marie. *Arch Notes, The Newsletter of the Ontario Archaeological Society*, Volume 79(4): 9-10.

1980 Heartland of the Ojibway. In *Collected Archaeological Papers*, edited by David S. Melvin, pp. 1-28. Archaeological Research Report 13. Historical Planning and Research Branch, Ontario Ministry of Culture and Recreation, Toronto.

1981 *Archaeology in Northeastern Ontario—Searching for Our Past*. Ontario Ministry of Culture & Recreation, Historical Planning & Research Branch. Toronto.

1984 Rare Oneota Pipes from the Whitefish Island Site in Sault Ste. Marie, Ontario. *Arch Notes, Newsletter of the Ontario Archaeological Society*, Volume 84 (3): 15-17.

1986 An Unusual 19th Century Portrait Pipe from Northern Ontario. *Ontario Archaeologist* 46: 63-72.

1993 *Painted Dreams—Native American Rock Art.* Northword Press. Minocqua.

Cowan, W.R.
1976 Quaternary Geology of the Sault Ste. Marie Area, District of Algoma. In: Summary of Fieldwork, 1976, by the Geological Branch, V.G. Milne, W.R. Cowan, K.D. Card and J.A. Robertson, eds. Pp. 134-136. *Ontario Division of Mines Miscellaneous Paper* 67.

1978 Radiocarbon Dating of Nipissing Great Lakes Events near Sault Ste. Marie, Ontario. *Canadian Journal of Earth Sciences* 15(12): 2026-2030.

For Public Release.

1985 Deglacial Great Lakes Shorelines at Sault Ste. Marie, Ontario. In: *Quaternary Evolution of the Great Lakes*, P.F. Karrow and P.E. Calkin, eds. Pp. 33-37. *Geological Association of Canada Special Paper* 30.

Cowan, W.R. and B.E. Broster
1988 Quaternary Geology of the Sault Ste. Marie Area, District of Algoma, Ontario. Ontario *Geological Survey Map* P. 3104. Geological Series—Preliminary Map. Scale 1: 100,000. Geology 1976.

Cowan, W.R., P. McAuley and G. Bennett
1998 Urban Geology: City of Sault Ste. Marie, Ontario. In: *Urban Geology of Canadian Cities*, P.F. Karrow and O.L. White, eds. Pp. 197-205. *Geological Association of Canada Special Paper* 42.

Department of Crown Lands
1846 Plan of the Park Lots adjoining the Town of St. Mary's.

1859 Tarentorus. Toronto: Archives of Ontario, F007428

1859 Korah & Awenge Townships. Toronto: Archives of Ontario, D020787

1882 Block of Land in the Rear of the Village of Sault Ste. Marie. Toronto: Archives of Ontario, D020788

1901 Map of Eastern Algoma and Northern Nipissing. Toronto: Copp Clark Co.

Devlin, Sheila
2002 Working With Water—Goulais Mission Memories. *The Canadian Journal of Native Studies*, Volume XXII, Number 2, pp. 269-326.

Dewdney, Selwyn
1975 *The Sacred Scrolls of the Southern Ojibway*. University of Toronto Press. Toronto.

Dickie, Matthew and Paul Stubbert
2002 Figure 4.2 Bedrock Elevation. Sault Ste. Marie Area Groundwater Management and Protection Study. Report prepared for the Sault Ste. Marie Public Utilities Commission by R.J. Burnside and Associates.

Environment Canada
2010 http://www.weatheroffice.gc.ca/canada_e.html. Accessed on July 21, 2010.

Eschman, Donald F. and Paul F. Karrow
1985 Huron Basin Glacial Lakes: A Review. In: *Quaternary Evolution of the Great Lakes*, P.F. Karrow and P.E. Calkin, eds. Pp. 79-93. *Geological Association of Canada Special Paper* 30.

Farrand, William R. and Christopher W. Drexler
1985 Late Wisconsinan and Holocene History of the Lake Superior Basin. In: *Quaternary Evolution of the Great Lakes*, P.F. Karrow and P.E. Calkin, eds. Pp. 17-32. *Geological Association of Canada Special Paper* 30.

For Public Release.

Francescut, Nevio
1980 Forest Associations and Drainage Patterns 1790-1865 (1:506,880 scale map). In: Heritage Studies on the Rideau-Quinté-Trent-Severn Waterway, David Skene Melvin, general editor. *Ontario Ministry of Culture and Recreation, Historical Planning and Research Branch, Heritage Planning Study* No. 6.

Futyma, R.P.
n.d.a Unpublished pollen data for Ryerse Lake, Northern Michigan. National Oceanic and Atmospheric Administration, Paloeclimatology Program, North American Pollen Database. ftp://ftp.ncdc.noaa.gov/pub/data/paleo/pollen/asciifiles/fossil/ascfiles/gpd/ryerse.txt.

n.d.b Unpublished pollen data for Wolverine Lake, Northern Michigan. National Oceanic and Atmospheric Administration, Paloeclimatology Program, North American Pollen Database. ftp://ftp.ncdc.noaa.gov/pub/data/paleo/pollen/asciifiles/fossil/ascfiles/gpd/wolverin.txt.

Garden River First Nation
2001 History. http://www.gardenriver.org/about/history.htm. Accessed on August 3, 2010

Gentilcore, Louis and Kate Donkin
1973 Land Surveys of Southern Ontario: An Introduction and Index to the Field Notebooks of the Ontario Land Surveyors 1784-1859. *Cartographica Monograph* No. 8, Supplement No. 2 to *Canadian Geographer* 10.

Geomatics Canada
1996 *Standards and Specifications of the National Topographic Data Base, Edition 3.1.* Minister of Supply and Services Canada. Catalogue No M52-70/1996E.

2003 *National Topographic Data Base, Edition 3.1 Simplified User's Guide.* Geomatics Canada, Centre for Topographic Information, Customer Support Group, Sherbrooke, QC.

Grove, Jean M.
2004 *Little Ice Ages: Ancient and Modern*. 2nd edition. Routledge, London.

Heath, Frances
1988 *Sault Ste. Marie: city by the rapids: an illustrated history*. Burlington: Windsor Publications

Heidenreich, C.E.
1971 Huronia. Toronto: McClelland and Stewart.

1973 Appendix: A Procedure for Mapping the Vegetation of Northern Simcoe County from the Ontario Land Survey. In: Land Surveys of Southern Ontario: An Introduction and Index to the Field Notebooks of the Ontario Land Surveyors, 1784-1859, by Louis Gentilcore and Kate Donkin, pp. 105-113. *Cartographica Monograph* No. 8, Supplement No. 2 to the *Canadian Geographer* Volume 10.

Hinshelwood, A.
1995 Descriptive analysis of 19th century European clay pipes from the Whitefish Island site (CdIc-2), Sault Ste. Marie, Ontario. *Wisconsin Archaeologist*, 76 (3-4): 365-398.

For Public Release.

Hinsperger, Aileen C.
1967 *Stories of the Past: 300 Years of Soo History*. Sault Ste. Marie: Sault Star Commercial Print

Jackson, L.J., C. Ellis, A.V. Morgan and J.H. McAndrews
2000 Glacial Lake Levels and Eastern Great Lakes Palaeo-Indians. *Geoarchaeology* 15(5): 415-440.

Jackson, S.L. and J.A. Fyon
1992 The Western Abitibi Subprovince in Ontario. In: *Geology of Ontario*, P.C. Thurston, H.R. Williams, R.H. Sutcliffe and G.M. Stott, eds. Pp. 405-484. *Ontario Geological Survey Special Volume* 4.

Jackson, Scott M., Fred Pinto, Jay R. Malcolm and Edward R. Wilson
2000 A Comparison of Pre-European Settlement (1857) and Current (1981-1995) Forest Composition in Central Ontario. *Canadian Journal of Forest Research* 30 (4): 605-612.

James, Edwin
1830 *A Narrative of the Captivity and Adventures of John Tanner, (U.S. Interpreter at the Saut de Ste. Marie,) During Thirty Years Residence Among the Indians in the Interior of North America*. London: Baldwin and Cradock.

Johns, G.W., S. McIlraith and T.L. Muir
2003 Bedrock geology compilation map—Sault Ste. Marie–Blind River sheet. *Ontario Geological Survey, Map* 2670, scale 1:250 000.

Kohler, T.A. and S.C. Parker
1986 Predictive Models for Archaeological Resource Location. In M.B. Schiffer (ed.), *Advances in Archaeological Method and Theory* 9:397-452. Toronto: Academic Press.

Kvamme, K.L.
1988 Development and Testing of Quantitative Models. In: *Quantifying the Present and Predicting the Past: Method, Theory, and Application of Archaeological Predictive Modelling*, W.J. Judge and L.W Sebastian (eds.). Pp. 325-428. Denver: U.S. Department of the Interior, Bureau of Land Management Service Center.

Lake Superior Binational Program Superior Work Group (LSBP)
2004 *Lake Superior Lakewide Management Plan (LaMP) 2004*. Lake Superior Binational Program.

Larsen, Curtis E.
1985 Lake Level, Uplift, and Outlet Incision, the Nipissing and Algoma Great Lakes. In: *Quaternary Evolution of the Great Lakes*, P.F. Karrow and P.E. Calkin, eds. Pp. 63-77. *Geological Association of Canada Special Paper* 30.

1999 A Century of Great Lakes Levels Research: Finished or Just Beginning? In: *Retrieving Michigan's Buried Past: The Archaeology of the Great Lakes State*, John R. Halsey, ed. Pp. 1-30. *Cranbrook Institute of Science, Bulletin* 64.

Leahy, E.J. and P.E. Giblin
1979 Bedrock Topography of the Sault Ste. Marie Area, District of Algoma. *Ontario Geological Survey, Preliminary Map* P.2235. Bedrock Topography Series, Scale 1:25,000. Geological compilation 1976-1978.

For Public Release.

Leffler, Hunter
2006 The Forgotten People. Metis Nation of Ontario, Region 4. http://members.shaw.ca/mno-ssm/metis-info/forgotten-people.htm. Accessed on December 1, 2011

Lewis, C.F.M. and T.W. Anderson
1989 Oscillations of levels and cool phases of the Laurentian Great Lakes caused by inflows from glacial Lakes Agassiz and Barlow-Ojibway. *Journal of Paleolimnology* 2:99-146.

Libraries and Archives Canada (LAC)
1998 A community's history through the prism of it's heritage sites. http://epe.lac-bac.gc.ca/100/205/301/ic/cdc/ssm/pages/english/home.html. Accessed on March 26, 2010.

Liu, Kam-Biu
1990 Holocene Paleoecology of the Boreal Forest and Great Lakes-St. Lawrence Forest in Northern Ontario. *Ecological Monographs* 60(2): 179-212.

Long, D.G.F., P.J. Julig and R.G.V. Hancock
2002 Characterization of Sheguiandah Quartzite and other Potential Sources of Quartzarenite Artifacts in the Great Lakes Region. In: *The Sheguiandah Site: Archaeological, Geological and Paleobotanical Studies at a Paleoindian Site on Manitoulin Island, Ontario*, P.J. Julig, ed. Pp. 195-234. *Archaeological Survey of Canada, Mercury Series, Paper* 161. Canadian Museum of Civilization.

Lovis, William A. and Robert I. MacDonald
1999 Archaeological Implications of Great Lakes Paleoecology at the Regional Scale. In: *Taming the Taxonomy: Toward a New Understanding of Great Lakes Archaeology*, Ronald F. Williamson and Christopher M. Watts, eds. Pp. 125-149. The Ontario Archaeological Society/Eastendbooks, Toronto.

Lytwyn, Victor P.
1998 Historical Report on the Metis Community at Sault Ste. Marie. *Métis Nation of Ontario*. http://www.metisnation.org/media/141026/powley%20case%20report%20-%20victor%20lytwyn.pdf. Accessed on December 1, 2011

Macdonald, Graham
1981a Commerce, Civility, and Old Sault Ste. Marie: Part I. *Beaver* 312(2): 19-25.

1981b Commerce, Civility, and Old Sault Ste. Marie: Part II. *Beaver* 312(3): 52-59.

MacDonald, R.I. and R. H. Pihl
1994 Prehistoric Landscapes and Land Uses: The Role of Predictive Modelling in Cultural Resource Management. In: *Great Lakes Archaeology and Paleoecology: Exploring Interdisciplinary Initiatives for the Nineties*, R.I. MacDonald (ed.), pp. 25-59. *Quaternary Sciences Institute Publication* No. 10.

McAndrews, J.H.
1981 Late Quaternary Climate of Ontario: Temperature Trends from the Fossil Pollen Record. In: *Quaternary Paleoclimate*, W.C. Mahaney (ed.), pp. 319-333. Norwich: GeoAbstracts.

McHale Milner, Claire
1998 *Ceramic Style, Social Differentiation, and Resource Uncertainty in the Late Prehistoric Upper Great Lakes*. Unpublished Ph.D. Dissertation, Department of Anthropology, University of Michigan, Ann Arbor.

McNab, David T.
1999 *Circles of Time: Aboriginal Land Rights and Resistance in Ontario*. Wilfred Laurier University Press, Waterloo.

Metis Nation of Ontario (MNO)
2011 Métis Historic Timeline. http://www.metisnation.org/culture--heritage/metis-timeline.aspx. Accessed on December 1, 2011

Mika, Nick and Helma Mika
1977 Places in Ontario: Their Name Origins and History, Part I, A-E. Belleville: Mika Publishing Company

1981 Places in Ontario: Their Name Origins and History, Part II, F-M. Belleville: Mika Publishing Company

1983 Places in Ontario: Their Name Origins and History, Part III, N-Z. Belleville: Mika Publishing Company

Ministry of Municipal Affairs and Housing, Ontario
2005 Vision for Ontario's Land Use Planning System. *Provincial Policy Statement* Part IV, pp. 2-3. Toronto.

Ministry of Natural Resources (MNR)
2010 *Backgrounder on Elk in Ontario*. Toronto: Ontario Ministry of Natural Resources.

Ministry of Tourism
1955 Photograph of a portrait painting of Samuel de Champlain. Toronto: Archives of Ontario, RG 65-35-1, 30-J-45

Ministry of Tourism and Culture (MTC)
1997 *Conserving A Future For Our Past: Archaeology, Land Use Planning & Development in Ontario*. Toronto: Cultural Programs Branch, Archaeology & Heritage Planning Unit
2008 *Ontario Heritage Properties Database*. http://www.hpd.mcl.gov.on.ca/scripts/hpdsearch/english/popupSearch.asp?pid=2521. Accessed on March 19, 2010

Ministry of Transportation Township Plan
1900s Toronto: Archives of Ontario, D750834

Monaghan, G. William and William A. Lovis
2005 *Modeling Archaeological Site Burial in Southern Michigan: A Geoarchaeological Synthesis*. Environmental Research Series Volume 1, David L. Ruggles, series editor. Michigan State University Press, East Lansing, MI.

For Public Release.

Moore, Clint
1998 *Memories of Korah township in history, 1776-1964*. Sault Ste. Marie: Moose Enterprise.

Natural Heritage Information Centre (NHIC)
2010a Natural Areas Report: Shore Ridges Conservation Area. Area ID: 4844. http://nhic.mnr.gov.on.ca/MNR/nhic/areas/areas_report.cfm?areaid=4844.

2010b Natural Areas Report: Marks Bay. Area ID: 4831. http://nhic.mnr.gov.on.ca/MNR/nhic/areas/areas_report_old.cfm?areaid=4831

Ontario Archives
1881 *Northern District Marriage Records*, Microfilm MS 932, 1881, Entry 1011-81. Toronto.

Osborne, Brian and Donald Swainson
1986 *The Sault Ste. Marie Canal: a chapter in the history of Great Lakes transport*. Ottawa: National Historic Parks and Sites Branch, Parks Canada

Pinto, F., S. Romaniuk, and M. Ferguson
2008 Changes to preindustrial forest tree composition in central and northeastern Ontario, Canada. *Canadian Journal of Forest Research* 38: 1842–1854.

Pollock, John
1983 *Archaeological Resource Evaluation: Whitefish Island Prehistoric Site, Sault Canal*. Report to Ontario Ministry of Culture, Tourism and Recreation. Toronto.

Préfontaine, Darren R.
2003 The Early Great Lakes Métis. *The Virtual Museum of Métis History and Culture*. Gabriel Dumont Institute, December 1, 2011. PDF file.

Purvis, Michael
2005 "Will wind park encroach on sacred site? Elder recalls offerings made to 'Frog Woman' around Gros Cap." *The Sault Star, Saturday*, April 25, 2005.

Rand McNally and Company
1902 New Ontario including the districts of Nipissing, Algoma, Sault Ste. Marie, Thunder Bay, Fort William, Port Arthur, Lake Nepigon, Rainy River, Alberton, Fort Frances, Rat Portage, Keewatin, Wabigoon, Dryden. http://prod.library.utoronto.ca/maplib/digital/G_3500_2217_1902_R.html. Accessed on April 14, 2010.

Rankin, Arthur
1892 Purtorah, adjoining Sault Ste. Marie: Purtorah lands and town sites for sale. Toronto: Alexander & Cable Co. Ltd.

Rayburn, Alan.
1997 *Place Names of Ontario.* Toronto: University of Toronto Press.

For Public Release.

Rose, M.R. and J.R. Altschul
1988 An Overview of Statistical Method and Theory for Quantitative Model Building. In: *Quantifying the Present and Predicting the Past: Method, Theory, and Application of Archaeological Predictive Modelling*, W.J. Judge and L.W Sebastian (eds), pp. 173-255. Denver: U.S. Department of the Interior, Bureau of Land Management Service Center.

Rothfels, M. and D. Russell
2005 Caribou. Ministry of the Environment, Hinterland Who's Who. http://www.hww.ca/hww2p.asp?id=85&cid=0.

Rowe, J.S.
1972 Forest Regions of Canada. *Canada Ministry of the Environment Publication* No. 1300.

Saarnisto, M
1974 The Deglaciation History of the Lake Superior Region and Its Climatic Implications. *Quaternary Research* 4: 316-339.

Sadler, Douglas C. and Howard G. Savage
2003 Birds from the Ground: The Record of Archaeology in Ontario. *Trent University Occasional Papers in Anthropology* No. 15.

Sauer, William C.
1899 Illustrated atlas of the twin cities Sault Ste. Marie, Michigan and Ontario. Detroit: C.E. Publisher.

Sault Ste. Marie Museum
2003 Sault Ste. Marie Museum: preserving our local heritage. http://www.saultmuseum.com. Accessed on April 14, 2010.

Sault Ste. Marie Planning Division (SSM OP)
1996 Official Plan (Office Consolidation): Sault Ste. Marie. Prepared by the Sault Ste. Marie Planning Division. Revised May 30, 2003.

Sault Ste. Marie Public Library (SSMPL)
2008 *Sault History Online*. http://www.cityssm.on.ca/library/Index.html, Accessed on March 3, 2010

Sault Ste. Marie Region Conservation Authority (SSMRCA)
2010 Wetlands. http://www.ssmrca.ca/Section.aspx?ID=17.

Schoolcraft, H. R.
1839 Census of Michigan Indian Population under the Treaty of Washington 1836. R66:41828, The Papers of Henry R. Schoolcraft 1782-1878. Library of Congress, Washington, D.C. Microfilm.

1851 *Personal Memoirs of a Residence of Thirty Years with the Indian Tribes on the American Frontiers with Brief Notices of Passing Events, Facts & Opinions A.D. 1812 to A.D. 1842*. Lippincott, Grambo & Co. Philadelphia.

Scott, W.B. and E.J. Crossman
1973 *Freshwater Fishes of Canada*. Fisheries Research Board of Canada, Bulletin 184. Ottawa.

For Public Release.

Sebastian, L.W. and J. Judge
1988 Predicting the Past: Correlation, Explanation, and the Use of Archaeological Models. In: *Quantifying the Present and Predicting the Past: Method, Theory, and Application of Archaeological Predictive Modelling*, W.J. Judge and L.W Sebastian (eds), pp. 1-18. Denver: U.S. Department of the Interior, Bureau of Land Management Service Center.

Semken, H.A., Jr.
1983 Holocene Mammalian Biogeography and Climatic Change in the Eastern and Central United States. In: *Late-quaternary Environments of the United States, Volume 2, The Holocene*, H.E. Wright (ed.), pp. 182-207. Minneapolis: University of Minnesota Press.

Smith, Beverly
1996 *Systems of Subsistence and Networks of Exchange in the Terminal Woodland and Early Historic Periods in the Upper Great Lakes*. Unpublished Ph.D. Dissertation, Department of Anthropology, Michigan State University, East Lansing.

Soper, James H. and Margaret L. Heimburger
1982 *Shrubs of Ontario*. Toronto: Royal Ontario Museum.

Species at Risk Public Registry (SARA)
2010 Species Profile: Woodland Caribou (Boreal population). Environment Canada, Species at Risk Act (SARA) Public Registry. http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=636.

Surveys and Mapping Branch, E.M.R.
1974 *Topographic Mapping Manual of Compilation Specifications and Instructions*. Compiled by the Topographic Mapping Division, Surveys and Mapping Branch, Ministry of Energy, Mines and Resources, Ottawa.
1976 A Guide to the Accuracy of Maps. *Surveys and Mapping Branch, Technical Report Series*. M52-46/1976.

Sutcliffe, R.H.
1992 Proterozoic Geology of the Lake Superior Area. In: *Geology of Ontario*, P.C. Thurston, H.R. Williams, R.H. Sutcliffe and G.M. Stott, eds. Pp. 627-660. *Ontario Geological Survey Special Volume* 4.

Telfer, E.S.
1990 North American Elk. Ministry of the Environment, Hinterland Who's Who. http://www.hww.ca/hww2.asp?id=98.

1997 Moose. Ministry of the Environment, Hinterland Who's Who. http://www.hww.ca/hww2p.asp?id=93&cid=0.

Terasmae, J.
1967 Postglacial Chronology and Forest History in the Northern Lake Huron and Lake Superior Regions. In *Quaternary Paleoecology,* E.J. Cushing and H.E. Wright, Jr., eds. Pp. 45-58. New Haven, CT: Yale University Press,

1968 A Discussion of Deglaciation and the Boreal Forest in the Northern Great Lakes Region. *Proceedings of the Entomological Society of Ontario* 99:31-43.

The Shingwauk Project
2009 http://www.shingwauk.auc.ca. Accessed on April 16, 2010.

Thompson, Todd A. and Steve J. Baedke
1999 Strandplain Evidence for Reconstructing Late Holocene Lake Level in the Lake Michigan Basin. In: *Proceedings of the Great Lakes Paleo-Levels Workshop: The Last 4000 Years*, Cynthia E. Sellinger and Frank H. Quinn, editors. *NOAA Technical Memorandum ERL GLERL*-113. NOAA Great Lakes Environmental Research Laboratory, Ann Arbor, Michigan, August 1999.

Thwaites, Reuben Gold (ed.)
1899 *The Jesuit Relations and Allied Documents.* Volume 54, Iroquois, Ottawas, Lower Canada 1669—1671. Cleveland: The Burrows Brothers Company, Publishers.

1905 *New Voyages to North-America, by Baron de Lahontan*. 2 vols. Reprint from 1703 English edition. A. D. McClurg, Chicago.

Trudeau, Alfreda
2003 Bellevue Park - Sault Ste. Marie. http://www.townies.ca/sault/extras/BellevuePark/bellevueparkinterpretationprogram.htm. Accessed on March 24, 2010

Vidal, Alexander
1846 Vidal Survey of Sault Ste. Marie. http://www.bussineau.com/vidal_survey_map.htm. Accessed on March 19, 2010

Warren, William
1885 *History of the Ojibway People*. Collections of the Minnesota Historical Society, Volume 5. St. Paul.

Warner, B.G. and C.D.A. Rubec, eds.
1997 *The Canadian Wetland Classification System*. Second Edition. Prepared by the National Wetlands Working Group. Waterloo: Wetlands Research Centre, University of Waterloo.

Wickware, G.M. and C.D.A. Rubec
1989 Ecoregions of Ontario. *Ecological Land Classification Series* No. 26. Sustainable Development Branch, Environment Canada, Ottawa.

Wilson, Jim and Malcolm Horne
1995 The City of London Archaeological Master Plan. Volume 1. Unpublished report on file, Department of Planning and Development, City of London.

Wilson, Joseph
1876 5 Maps of Early Sault Ste. Marie, Ontario, Canada. http://www.bussineau.com/Images/maps/map1of5.gif. Accessed on March 19, 2010.

Zhang, Quanfa, Kurt S. Pregitzer, David D. Reed
2000 Historical Changes in the Forests of the Luce District of the Upper Peninsula of Michigan. *American Midland Naturalist* 143(1): 94-110.

For Public Release.

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1864 Sessional Papers Volume II: Second Session of the Eighth Parliament of the Province of Canada. Quebec: Hunter, Rose and Lemieux

1887 Land in Algoma and western Ontario. Montreal: Canadian Pacific Railway Co.

1911 Algoma West Census, LAC microfilm T-20365-20366.

For Public Release.