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1 EXECUTIVE SUMMARY

A Geographic Information System (GIS) integrates hardware, software, and data for capturing, managing, analyzing, and displaying geographically referenced information. A GIS is able to visualize data in many ways that reveal relationships, patterns, and trends. A GIS is used in a variety of applications: Utility Management, Emergency Services, Health and Human Services, Land Use Planning, Transportation, Disaster Planning, Forestry Management, Retail and Marketing, Real Estate, and many more.

Since the release of Google Earth and Microsoft’s Virtual Earth in 2005, the popularity and wide use of GIS, satellite/aerial imagery, GPS navigation, and other spatial programs has fueled public and county staff requests for more spatial information. However, GIS use in Mackinac County has been minimal, even with the aforementioned free services. A handful of County departments maintain GIS data for specific department uses. Many external agencies and organizations throughout the County use GIS, and several private businesses use GIS in their tasks. Although GIS is being used, it is being under-utilized. Mackinac County has not had the resources to build a GIS program from the ground up, and has held off on doing so for many years. As a result, many needs have been left unmet. In order to effectively meet the needs of all County Departments and external agencies, and the public, GIS needs to expand.

Mackinac County needs to establish a central GIS entity or external department to handle day-to-day operations and provide support and knowledge. It is recommended the County partner with EUP Regional Planning and Chippewa County to establish a Regional GIS Entity. This should be established before more GIS activities move forward.

For the short-term needs of the County, a file geodatabase should be used. This geodatabase will contain several categories of data: base layers, land records, street network, planning, etc. By categorizing datasets, it will make it easier for users to access the data they need quickly. The County can utilize several free solutions for those users that need to view and query data – ArcReader, ArcGIS Explorer, or ArcGIS Online. All three options are no-cost solutions to the County. ArcReader and ArcGIS Explorer would be installed on office computers and access the shared file geodatabase. ArcGIS Online would require datasets be uploaded to an online service, currently hosted by EUP Regional Planning.

Mackinac County could utilize the resources at Lake Superior State University in Sault Ste. Marie, the Sault Ste. Marie Ontario Community Geomatics Centre, and area Federal Agencies when exploring GIS opportunities. The County will need to invest time and dollars into developing its GIS, and staff will need the necessary training to feel confident in utilizing GIS on a daily basis.
2 INTRODUCTION & PLAN PURPOSE

A Geographic Information System (GIS) integrates hardware, software, and data for capturing, managing, analyzing, and displaying geographically referenced information. A GIS is founded upon the capability to organize information into a series of layers that can be integrated using geographic location. A GIS can visualize data in many ways that reveal relationships, patterns, and trends. A GIS is used in a variety of applications: Utility Management, Emergency Services, Health and Human Services, Land Use Planning, Transportation, Disaster Planning, Forestry Management, Retail and Marketing, Real Estate, and many more. The need for geographic data, applications, and analysis is often over-looked. More often than not, information stored by local governments in computer databases and spreadsheets have some geospatial characteristic that would enable that information to be stored and displayed in a GIS. Spatially representing this information offers valuable insight into activities performed by local government, and could help make these activities more efficient and provide solutions to problems faced by those units of government.

Mackinac County has used a form of GIS technology, to some extent, for over ten years. Many external agencies in the County have used GIS applications for upwards of twenty years. GIS is not a new concept in Mackinac County. In County government however, GIS has not been used outside the Equalization and 911 Departments. The two departments have created some useful datasets, but the County has not systematically assessed its GIS needs or developed a coordinated effort to develop them.

No strategic direction exists for the development and deployment of GIS technology, including standards that would assist in the development and sharing of information among county departments and units of government. Likewise, there exist no defined means to identify and resolve technical barriers to successful GIS deployment and to plan for technical, staffing, and organizational development necessary to support GIS effectively.

It is a goal to have Mackinac County departments, agencies, utilities, and private entities effectively working in cooperation to develop, maintain, and share geographic data and information, to more efficiently analyze situations and make decisions that will benefit each resident, unit of government, and the County in the future.

This Plan will: address data and technology issues, look at future costs for the development of a GIS program and data, define goals of a County GIS, and list some short and long term implementation strategies.
3 CURRENT GIS

3.1 GIS in County Operations

Current GIS use in Mackinac County is very minimal. The Equalization department has used AutoCAD to manage parcels and tax maps, however AutoCAD is not a true GIS system, and linking other information into the system is difficult. The 911 department has worked with a vendor to develop 911 GIS data, and many external agencies and organizations throughout the County use GIS. Although GIS is being used, it is being under-utilized. Mackinac County has not had the resources to build a GIS program from the ground up, and has held off on doing so for many years. As a result, many needs have been left unmet. In order to effectively meet the needs of all County Departments and external agencies, and the public, GIS needs to expand.

Successful County GIS programs have demonstrated fairly high return on investments (ROIs) over the years. However, Mackinac County is very different from other Counties around the State of MI. It’s geographically bigger with far less population than most Counties in the State. Mackinac County is geographically the eighth (8th) largest County in the State of MI, but is ranked 74th in terms of population. This makes it very difficult for Mackinac County to model other successful County GIS programs. It is for this reason that Mackinac County needs to find its own unique solution. It is recommended that Mackinac County cost-share with Chippewa County to share GIS services through the Regional Planning agency. This is discussed in more detail in Section 6.

Key reasons for implementing a County GIS program in Mackinac County:

- GIS will provide all levels of decision makers and elected officials access to quality geospatial information
- GIS will provide better communication and understanding of County resources to County personnel, local governments, and the public
- GIS will be a powerful tool that will support effective management of County infrastructure, economic development, planning, and emergency response.
- The Equalization and 911/Emergency Management Departments will greatly benefit from a well implemented GIS and updated, accurate information.

A great deal of work remains to develop and implement a GIS program. This Strategic Plan will provide a direction for Mackinac County’s GIS program.
3.2 Why does the County need GIS?
Mackinac County manages large data sets and vast amounts of information, both hardcopy and digital. Most of this information contains a geospatial component – a location on Earth. GIS is used as a tool to utilize that data to create and analyze meaningful information. GIS can be used to make confident, effective, data-driven decisions with limited staff and financial resources.

The ultimate reason for deploying GIS within the County is to be able to lookup, access, and use information quickly. And not only access that information, but see where that information is in relation to the real world and use it to make effective decisions.

The following table shows how GIS can be helpful in various County Government Departments.

<table>
<thead>
<tr>
<th>County Department</th>
<th>GIS Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equalization/Register of Deeds</td>
<td>Land information, property/plat management, addressing, PLSS management</td>
</tr>
<tr>
<td>Treasurer</td>
<td>Property tax information</td>
</tr>
<tr>
<td>Prosecutor/Court System</td>
<td>Maps for court cases, sex offender registry lookup, property information</td>
</tr>
<tr>
<td>Clerk’s Office</td>
<td>Voter information, voter districts, census information, polling locations</td>
</tr>
<tr>
<td>Animal Shelter</td>
<td>Maintain database/map of registered pets</td>
</tr>
<tr>
<td>Sheriff’s Office</td>
<td>Crime mapping, emergency management, training exercises</td>
</tr>
<tr>
<td>Emergency Management Office</td>
<td>Addressing lookup, FEMA flood zones, mock disaster preparedness</td>
</tr>
</tbody>
</table>

3.2.1 Townships
Townships in Mackinac County could utilize GIS datasets such as parcels, land use, zoning, imagery, flood zones, State/Federal Land, and addressing. GIS could provide easy lookup of information and easy creation of maps for public meetings. Local planning commissions could utilize GIS to view land use and zoning, along with imagery, to help them make more informed decisions regarding zoning permits and land use issues. Township boards could use parcel information to look up property and tax information during meetings, providing for quicker and more efficient decision making (no longer tabling decisions to next month’s meeting to lookup information.)

Township emergency response crews will soon have GIS on laptops within vehicles to aid in response calls. Hardcopy wall maps and atlases could also aid in emergency situations.

Townships in Mackinac County could also utilize GIS and work with the County clerk in determining voter districts and voter polling locations.

3.2.2 Other Agencies
Many external agencies in the County use GIS, such as the United States Forest Service, NRCS, and the Conservation Districts. The USFS uses GIS for forest and property management within the Hiawatha
National Forest. The NRCS and Conservation Districts use GIS to make soil maps and other mapping products for landowners, and use aerial imagery for conservation and agricultural projects. Cloverland Electric Cooperative will be utilizing GIS technologies throughout the Eastern U.P. as well. All of these external users could benefit from sharing information with the County and having access to County data (parcels and addresses, for example).

3.2.2 Public
The number one goal of creating a County GIS should be to provide better and more efficient services to the public. Generally, the public is not concerned with the “raw” GIS data or the processes that go into making GIS work. The public cares about accessing valuable information and maps in a timely manner. Establishing a County GIS and maintaining and creating data and managing workflows will, in the long-term, provide that information to the public. Creating an online mapping system would provide the public with opportunities to view GIS information at no charge.

3.3 Opportunities and Challenges
The basis for implementing County GIS is the assumption that doing so will provide opportunities to accomplish meaningful objectives and streamline efforts. It is apparent from observing other County and Regional GIS efforts that GIS will provide some Return on Investment (ROI), whether provided through staff time, cost savings, etc. It needs to be understood that GIS is not a “cash-maker” and is not intended to simply be a product for sale. GIS is a tool to be used by the County to effectively and efficiently provide services. GIS provides the opportunity to be efficient. GIS provides the opportunity to consistently improve data and services.

3.3.1 GIS Positives
- Reduction in duplication of efforts creating data and researching information
- Providing instant access to land records and property information
- Improved decision making by County and Local Elected Officials
- Accurate data and mapping services to County Departments and personnel
- Cost savings to the County in the form of more efficient staff time
- Sale of maps and other end products – property maps, County plat books, etc.
- Sale of GIS data – address points, centerlines, parcels, etc.
- Cooperative efforts with Federal & State Agencies, Tribal Government, Private Sector, Non-profits, Utilities, etc.
- Providing information and maps to the taxpayers
- Funding opportunities through the Federal Geospatial Initiative (FGI)

3.3.2 GIS Challenges
- Next Generation 911 (NG911) relies heavily on GIS and will need to proceed with GIS, with or without the County
  - The County should work concurrently with 911 to develop GIS, not follow
- Initial investment can be large in terms of both funding and effort
  - Although a large investment is needed upfront, there will be long-term benefits
- Local units of government may not be onboard
Local units may not fully understand GIS and its potential, and why they should invest

- Local assessors may not agree with GIS efforts
  - Assessors may question why and how GIS will be helpful
- Useful GIS information is not developed and shared, and duplicate efforts continue
  - Duplicate datasets are not as useful as one unified database. Time is wasted updating different datasets when one dataset can be updated and used by all
- County staff and departments may not want to learn how to use GIS
  - Learning new software requires staff time to learn it, and time to continue to use it
- Service Agreements not in place
  - The County needs to protect its data but also needs to share its data with others

Many of these challenges can be averted by providing education and ensuring that this effort is to benefit the County, local units of government, assessors, and the public and not take anything away but to help.

4 VISION & GOALS

The overall vision of Mackinac County’s GIS is to “provide access to geospatial technology and data to County departments, external agencies and organizations, partners, and citizens.”

With the overall vision established, the next step is to express several specific goals that will help drive the overall vision of Mackinac County’s GIS. It is important these goals be achievable, compatible with departments and organizations workflows, and realistic. In addition to listing specific goals, it is also important to list how these goals will be reached, and in what time-frame these goals can realistically be reached.

- Establish a central entity for the coordination of GIS activities within Mackinac County
  - As indicated, GIS has been used minimally and the County does not currently have the resources to create a new GIS program. However, the County does need staff to handle day-to-day operations and provide GIS support and knowledge to users. Options are outlined in Section 5.5 of this document, but it is recommended the County partner with EUP Regional Planning and cost-share with Chippewa County. This should be established before more GIS activities move forward.
- Expand the County GIS Advisory Committee
  - Mackinac County has already established a base GIS Committee, consisting of several Commissioners and staff. This Committee should be expanded to include representatives from local units of government, external agencies, and the private sector (realtors, surveyors, etc.). This Committee would provide recommendations to the County Board on matters related to GIS.
- Develop data standards and metadata standards for local datasets
  - There should be some standardization developed for County GIS data and metadata. There are several examples of standards at both the State and Federal level. This should be done within one or two years of establishing a central entity. This goal is consistent with the State of MI’s GIS Business Plan.
- Establish an imagery program
  - Imagery was collected in 2011, but within several years’ time that imagery becomes less and less valuable. Investing in imagery on a defined schedule provides multiple benefits for GIS, including visual verification for parcels, addressing, land use/zoning, development, and property assessments. This goal is consistent with the State of MI’s GIS Business Plan.

- Raise the level of GIS awareness within the County
  - Although GIS technology has been present in Mackinac County for many years, many agencies, organizations, local units of government, and citizens are not aware of the technology or its capabilities. Mackinac County should work towards providing informational workshops or seminars on using GIS technology. This would be a great opportunity to partner with LSSU, and should be done several times over the next two or three years.

5 REQUIREMENTS
To implement a County-wide GIS it is essential to assess the condition of the existing infrastructure as well as the implementation requirements. The purpose of the section is to explore these elements.

5.1 Data Requirements
Geospatial data is one of the biggest investments in a GIS – costs to develop data, costs to maintain data, storage space for data and digital information, network access to that data, etc. Organization of digital GIS information is crucial to the success of a GIS. If data is scattered among different sources, it’s difficult to know which is the most current or most accurate, and there may be several different versions of a dataset at one source. It is important to maintain as much control and as much organization as possible with GIS data.

Typically the most requested GIS datasets include parcels, Right of Way boundaries, point addressing, road centerlines, and soils. Other requested datasets include improved elevation (LiDAR), transportation and infrastructure, land use/land cover, zoning, and utilities. EUP Regional Planning has been collecting and developing GIS layers for several years. Listed on the following page are some of the GIS datasets available for Mackinac County and the organization that should develop/maintain the data.
<table>
<thead>
<tr>
<th>Layer</th>
<th>Status</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Resolution Orthophotography</td>
<td>Completed 2011</td>
<td>County</td>
</tr>
<tr>
<td>Current Land Use</td>
<td>Ongoing</td>
<td>EUP Regional Planning</td>
</tr>
<tr>
<td>Road Centerlines</td>
<td>Major Update 2012/Ongoing</td>
<td>911</td>
</tr>
<tr>
<td>Address Points</td>
<td>Ongoing</td>
<td>911/EUP</td>
</tr>
<tr>
<td>Zoning</td>
<td>Ongoing</td>
<td>EUP Regional Planning</td>
</tr>
<tr>
<td>County Commissioner Districts</td>
<td>Completed 2011</td>
<td>EUP Regional Planning</td>
</tr>
<tr>
<td>Local Voting Districts</td>
<td>Not Started</td>
<td>County/EUP</td>
</tr>
<tr>
<td>Cadastral Database (parcels)</td>
<td>Started 2012/Ongoing</td>
<td>Equalization/EUP</td>
</tr>
<tr>
<td>Electric Utilities</td>
<td>Work Starting 2012/Ongoing</td>
<td>Cloverland Electric</td>
</tr>
<tr>
<td>Emergency Service Zones</td>
<td>Completed 2011/Ongoing</td>
<td>911/EUP</td>
</tr>
<tr>
<td>PLSS</td>
<td>State Data Current/Local Data Not Started</td>
<td>County</td>
</tr>
<tr>
<td>SSURGO Soils</td>
<td>Started 2011/Ongoing</td>
<td>EUP Regional Planning</td>
</tr>
<tr>
<td>FEMA Flood Zones</td>
<td>Started, Completed by late 2014</td>
<td>FEMA</td>
</tr>
<tr>
<td>MDNR Land</td>
<td>Ongoing</td>
<td>MDNR</td>
</tr>
<tr>
<td>Parks/Recreation Trails</td>
<td>Ongoing</td>
<td>County/EUP</td>
</tr>
<tr>
<td>Water Wells</td>
<td>MDEQ Ongoing (Monthly Updates)</td>
<td>MDEQ/EUP</td>
</tr>
<tr>
<td>MDOT ROW</td>
<td>Not Started</td>
<td>EUP Regional Planning/MDOT</td>
</tr>
<tr>
<td>Road Commission ROW</td>
<td>Not Started</td>
<td>Road Commission/EUP</td>
</tr>
<tr>
<td>Elevation (DEMs)</td>
<td>USGS Completed 10m and 30m</td>
<td>USGS</td>
</tr>
<tr>
<td>Elevation (LiDAR)</td>
<td>Not Started</td>
<td>USGS</td>
</tr>
</tbody>
</table>

When creating and updating GIS layers, it is important to create metadata along with the GIS data. Metadata is “data about your data.” Metadata describes the GIS data being created, and is the Who/What/Where/When of GIS information. Several standards exist for creating metadata, but no matter which standard is adopted or created locally, it is important to note that future GIS data creators need to handle metadata differently than previously done. GIS layers and metadata should be stored in an ESRI file geodatabase.

GIS data is not a one-time purchase. After the initial investment to develop data, it needs to be maintained. A set of procedures and workflow will need to be developed to determine where datasets are maintained. Parcel maintenance is vastly different than road centerline maintenance. The County will need to work with EUP Regional Planning and any vendors to determine how data maintenance should be handled (internally, externally, by EUP staff, by County staff, etc.). For example, once a County parcel dataset is developed, EUP Regional Planning could perform future maintenance. County 911 data is currently being maintained by a vendor. The County and EUP Regional Planning should continue to work with this vendor as they have the experience needed to maintain the 911 information. Each dataset should be assessed as to where maintenance will be performed.

Sharing GIS information with external agencies and users could be done by providing monthly exports or downloads in the form of shapefiles, layer packages, or custom geodatabases. If ArcGIS Server is deployed in the long-term, a web-mapping platform could be created using the County’s existing website.
One final consideration with GIS data is, because of the need to share and distribute data, the establishment of data sharing agreements, or MOAs (Memorandum of Agreement). With so many entities and organizations potentially sharing and accessing data, it is important that these MOAs be in place. With improvement in data, Mackinac County also needs to review and update fee schedules for GIS data. This should be done annually.

### 5.2 Technology Requirements

The most common GIS technology in the EUP is ESRI-based, so it is recommended that the County use an ESRI solution for future GIS applications.

#### 5.2.1 Geodatabase

Because there is a shared need for data, the County should consider utilizing a file geodatabase to house GIS data. A geodatabase is a common data storage and management framework for ESRI’s ArcGIS. It combines "geo" (spatial data) with "database" (data repository) to create a central data repository for spatial data storage and management. It can be leveraged in desktop, server, or mobile environments and allows users to store GIS data in a central location for easy access and management. A file geodatabase is stored in a file system, similar to folders in the Windows OS. There is no file size limit, it supports multiple users, and has several other advantages over a personal geodatabase. It should be a goal to have multiple layers located in one spot, so that data can be updated once and distributed to multiple departments and external agencies. As GIS moves forward and becomes more enterprise in nature, data should be migrated to an SDE geodatabase. An SDE environment is an advanced server-based geodatabase design for enterprise deployment. However, for the short-term needs of the County, this file geodatabase can contain several categories of data: base layers, land records, street network, planning, etc. By categorizing datasets, it will make it easier for users to access the data they need quickly.

When considering the deployment of a GIS, it is important to note the hardware, software, and connectivity of data. Connectivity between systems is crucial to the success of a County GIS. County GIS users should be able to access a central database, if possible. By creating a central GIS database, this reduces the amount of maintenance needed to update several different databases in different locations. Mackinac County currently has the capabilities with its existing hardware and server to store and host a file geodatabase. The County currently has a 2008 Windows Server machine and a network-based login system established. A GIS file geodatabase, as well as the County imagery, can be stored on this server.
machine and shared with County departments. It should not be a major hurdle to initially store a file geodatabase on this machine and allow all County staff access to this shared database within the County network. County Equalization and the County’s IT vendor can work with Region Planning to deploy this solution. As users, needs, and data grows, the hosting solution will need to be re-assessed and upgraded/expanded as needed, however it may be several years before this takes place. Once a file geodatabase is created and more layers and data are added, the database could grow to several gigabytes in size, but still be manageable from a shared network drive. Once the County is ready for an SDE environment, a more expanded system will need to be investigated, as well as a possible upgrade to the network environment.

5.2.2 Initial Deployment
Within a GIS, two types of users exist – viewers and editors/power users. Many users and departments of a County GIS will utilize GIS for viewing and querying data, not editing. There are two options the County can utilize for sharing GIS data: a web mapping interface using web browsers, or using desktop software.

The first solution, a web interface, could be accomplished by either investing an ArcGIS Online or by utilizing ArcGIS Server. ArcGIS Online is a cloud-based web solution with pricing ranging from $2,500 to $10,000. EUP Regional Planning currently has an ArcGIS Online subscription, which could be utilized by the County. ArcGIS Server has two options – an on-premise solution and a web-based solution. Both require unique hardware and software platforms to operate, and is a significant investment (the license alone is $10,000+). As future enterprise GIS expands, the County could consider investing in ArcGIS Server technology to host web applications and other enterprise level uses. For the interim, ArcGIS Online may be a sufficient web solution.

The second solution, installing desktop software, could be accomplished by providing ArcReader or ArcGIS Explorer to end-users. These are two free ESRI desktop applications that allow users to view data and print maps. ArcReader uses Published Map Files (PMF), created by the ArcGIS Publisher extension. ArcReader and ArcGIS Explorer can connect to file geodatabases, so by installing one of these applications on users’ computers and linking into the County’s geodatabase, users will always have the latest and most updated information available. However, in order to deploy ArcReader, the ArcGIS Publisher extension is needed at a cost of $2,500. ArcGIS Explorer does not require any extensions, but is somewhat limited in functionality.

5.2.3 ESRI Software
The County does not currently have any GIS software deployed. The only software similar to GIS is the AutoCAD software in the Equalization Department. This plan recommends the County deploy an ESRI-based solution for GIS. The Equalization department should consider purchasing one or two concurrent seats of ArcGIS Basic for use within the department. A concurrent use license permits execution of the software on any computer on the network. A concurrent use license allows a product to be licensed such that multiple users can gain access to the software concurrently through a shared pool of licenses administered by a central license manager. The number of concurrent licenses determines the number of users who can run the applications concurrently. However, each user only accesses a license when it
is needed since a concurrent use license is not locked to a single computer and as such, can "float" on a network. By deploying a concurrent use license, staff within the Department can access the software when needed, and share the license. Because the majority of County users only need to view and query previously created data, at this time there is no need for the County to purchase additional software licenses other than a concurrent use for Equalization. If the need did arise for power users to edit data, more concurrent use seats could be purchased and deployed.

Based on the recommendation that the County partner with EUP Regional Planning, the Planning Agency would need to purchase additional licenses and upgrade to more advanced licenses. The Regional Planning office currently has only one single-use license of ArcGIS Basic. In order to effectively provide advanced GIS services to the County, the Planning Agency would need to purchase the following ESRI products within the first year:

1 ArcGIS Advanced, Single-Use License $9,000
1 ArcGIS Standard, Single-Use License $6,300
1 ArcGIS Publisher Extension, Concurrent-Use $2,250
1 ArcGIS Spatial Analyst Extension, Concurrent-Use $2,250

Additional extensions or licensing may be required after the first year. However, no additional funding should be required other than discussed in Section 7.

5.3 Resources
What types of resources are available to assist in implementing a County GIS? The most important resource is having a dedicated staff or coordinator that can be the point of contact with all GIS related issues. County staff that will be using GIS need to have the skill set required to perform basic functionally of a GIS. This may involve training and workshops in order to provide the knowledge required to operate GIS on a daily basis. Lake Superior State University provides an excellent resource for GIS. LSSU has staff available for training and has a GIS lab that could provide the needed software for training. Mackinac County could work with LSSU to organize trainings on using ESRI technology.

Another possible resource is the Sault Ste. Marie, Ontario Community Geomatics Centre, part of the SSM Innovation Centre. The Geomatics Centre is a non-profit agency designed to promote the sharing of geospatial data between Canadian government, private, and public agencies. The Geomatics Centre has grown significantly in recent years and the Eastern U.P. should establish a more active relationship with its foreign neighbor.

The State of MI’s Center for Shared Solutions and Partnerships (CSSTP) is another resource that could provide support in any local GIS efforts. EUP Regional Planning has established a good working relationship with CSSTP, and should continue to expand upon that relationship. The CSSTP office has also re-created the State of MI GIS Users Group, which meets every other month in Lansing. This is an opportunity for GIS users statewide to interact and receive updates from various local, State, and Federal agencies and organizations.
ESRI is a resource, providing online trainings and classes for GISs professionals. Many classes are available for free, some for a cost. Since the County and Region will be deploying an ESRI-based solution, these ESRI classes should prove to be a valued resource, and can be taken online anytime.

Of course the most valuable resource for a County GIS is the local user-base. By holding workshops, trainings, conferences, etc., local GIS users can learn from one another and have open discussions about their experiences with GIS and provide input and solutions to further develop and enhance County GIS services. The ESRI Upper Peninsula of Michigan Users Group (EUPMUG) and the ESRI Northern Michigan Users Group (ENMUG) are both valuable resources in networking and learning from other local GIS users. The Michigan Communities Association of Mapping Professionals (MiCAMP) is a fee-based organization that holds an annual two-day conference each year, providing networking opportunities and sessions dealing with day-to-day GIS activities and experiences from Counties and Townships around the State.

5.4 Standards
Establishing standards for GIS development is crucial in the success of a County GIS. The Federal Geographic Data Committee (FGDC) has established a set of standards required for data, metadata, imagery, parcels, and other GIS information. The State of MI has adopted and used many of these standards for the development of the State Framework. For Mackinac County’s GIS to be successful these standards should be reviewed and standards adopted. This ensures that data sharing with local units of government, tribal government, and the private sector are consistent and usable. This will also provide a basis for these organizations and businesses to follow with their GIS data as well. Adopting standards may also increase the County’s ability to partner with organizations and apply for grant funding or cost-sharing opportunities. Standards will ensure GIS data is flexible for use outside County functions.
5.5  Gap Analysis/Public Value Analysis
The following table lists several tasks and items of a County GIS, the value to the public of those items, and the technology and organizational gaps of those items.

<table>
<thead>
<tr>
<th>GIS Item/Tasks</th>
<th>Public Value</th>
<th>Technology Gap</th>
<th>Organization Gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide GIS data and tools to staff within various County departments</td>
<td>• Leverages the value and benefits of GIS to County staff&lt;br&gt;• Reduces duplication of efforts and versions of GIS data&lt;br&gt;• Provides County staff with up-to-date information to make jobs more efficient</td>
<td>• No central access point exists for all County staff to view GIS data&lt;br&gt;• Some GIS data may be difficult for County staff to understand&lt;br&gt;• Software will need to be installed on staff computers</td>
<td>• Most County staff have no experience with GIS and will need training</td>
</tr>
<tr>
<td>Provide GIS data to public through web-mapping platform</td>
<td>• Provides instant access to GIS data and products&lt;br&gt;• Simpler interface than other GIS software&lt;br&gt;• Public can make their own maps</td>
<td>• ArcGIS Server is costly and complex to deploy&lt;br&gt;• ArcGIS Server needs infrastructure&lt;br&gt;• If using ArcGIS Online, need a subscription to host data</td>
<td>• County staff and IT staff will need to coordinate and plan for ArcGIS Server deployment&lt;br&gt;• If using ArcGIS online, staff can be trained to upload data</td>
</tr>
<tr>
<td>Maintain a catalog of GIS data, information, software, and applications</td>
<td>• Provides information on what County GIS data is available, both for purchase and for maps</td>
<td></td>
<td>• Staff time to complete project</td>
</tr>
<tr>
<td>Update and maintain County GIS data</td>
<td>• GIS data is kept up-to-date&lt;br&gt;• Emergency Services crews have updated information&lt;br&gt;• Planning tool for County projects</td>
<td>• GIS staff need proper software to maintain GIS data&lt;br&gt;• One database should be maintain to prevent multiple versions</td>
<td>• Staff need to be trained on editing and updating datasets</td>
</tr>
<tr>
<td>Enhance the GIS system to be enterprise in nature</td>
<td>• Database will provide more functionality for County staff&lt;br&gt;• Integration of GIS data with various County databases</td>
<td>• ArcGIS Server and SDE databases require IT knowledge and infrastructure to deploy</td>
<td>• Staff would need to be trained on new database</td>
</tr>
<tr>
<td>Develop GIS data standards</td>
<td>• Provides consistent information to County staff and the public&lt;br&gt;• Reduces data entry errors and duplication of efforts</td>
<td></td>
<td>• Migration of various County datasets and information is a large and timely project&lt;br&gt;• Not all County information is easily integrated</td>
</tr>
<tr>
<td>Use GIS for public meetings</td>
<td>• Ensures public that tax dollars spent on GIS is useful to them as well as County staff&lt;br&gt;• Provides answers to public questions easily and without doubt</td>
<td></td>
<td>• Staff will need to be trained to use GIS and encouraged to use at meetings</td>
</tr>
<tr>
<td>Provide GIS training to County staff</td>
<td>• Ensures staff are proficient and knowledgeable about GIS&lt;br&gt;• Reduces load on GIS staff providing support</td>
<td></td>
<td>• Requires MOAs be in place&lt;br&gt;• May require policy updates&lt;br&gt;• Requires a data distribution procedure</td>
</tr>
<tr>
<td>Monitor GIS data distribution and map creation</td>
<td>• Use agreements protect County and public from misuse of GIS data&lt;br&gt;• Ensures private data is not distributed&lt;br&gt;• Provides mechanism for County to track GIS usage</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6  ORGANIZATION

How does the County carry-out GIS activities and fulfill all the needs of the local GIS user community? Counties across the State of MI typically handle GIS in one of two ways; the creation of a stand-alone GIS Department or the creation of a sub-department (typically within the Information Systems/Information Technology Department or Equalization Department). The creation of a stand-alone GIS Department seems the most logical, but depends greatly on the County’s view of how GIS will integrate into government operations. A stand-alone Department also requires the greatest investment by the County, requiring a full-time staff, new equipment, office space, separate budget, etc. This could require an annual department budget of anywhere from $100,000 to $175,000.¹

Creating a sub-department has its pros and cons. On the plus side, integrating GIS into an existing department saves on initial investment because the equipment and office space already exist. However, the need still exists for full-time staff, software, and some equipment needed for deployment and storage. Integrating GIS within a department also makes it difficult for budgetary reasons, as staff need to keep track of and itemize GIS expenses vs. other Department expenses.

6.1  Regional GIS Entity

This plan provides for, and recommends, a third unique alternative for Mackinac County – cost-sharing with other Counties in the Eastern U.P. and designating the Eastern U.P. Regional Planning Commission office as the County GIS Department. The EUP Regional Planning Commission is one of fourteen regional agencies in the State of MI. It is a non-profit government agency that provides technical assistance to the three Eastern U.P. Counties and the local units of government within those Counties. EUP Regional Planning has provided limited GIS services for twenty years, and has recently expressed the desire to greatly expand its GIS services and capabilities utilizing ESRI’s GIS technologies and software. This approach could provide the most cost savings and ROI to the County, because the cost of GIS is shared not only with neighboring Counties, but with various funding sources as well. This approach also provides the long-term opportunity to have local governments and municipalities partner as well, thus creating a true regional GIS effort.

Several GIS authorities exist across the State of Michigan. The Saginaw Area GIS Authority (SAGA), for example, is a non-profit organization funded by a membership of local Townships and Counties, 911 Authorities, and other various organizations. They have staff and a board of directors that oversee operations. They provide GIS support in the form of advising authority members of GIS activities and issues, promotion, education, etc. The opportunity presented to Mackinac County and the Eastern U.P. is similar but unique, and the first of its kind in the State of MI. Other Regional Planning Agencies in the State provide some form of GIS support to member Counties – typically on a per project basis. This partnership opportunity would provide a true regional GIS effort in that the Regional Planning Agency would be the acting County GIS department, providing not only support, but data and other GIS services directly to the County, its Townships, and its taxpayers.

¹ Several County GIS Departments across the State of MI were contacted and asked about annual budgets for GIS activities. The largest GIS expense is staff – software the second largest expense. Of the five Counties contacted, no budget was less than $100,000 annually.
### 6.1.1 Regional GIS Responsibilities

If the Regional Planning Agency assumes the role of a County GIS Department, what are the tasks the Agency will be responsible for? Listed below are some specific tasks that Regional Planning staff would assume:

- Work with Department heads to deploy GIS and ensure GIS is functional
- Work with County GIS Committee to develop and enforce GIS standards for common datasets
- Maintain the County parcel database
- Work with 911 and the County’s 911 vendor to improve centerline and address point data
- Hold workshops and trainings for staff and local elected officials, as well as external agencies and businesses
- Field GIS requests for data, maps, and any other GIS-related requests on behalf of the County
- Create maps for County Departments and Townships
- Attend trainings, conferences, and workshops to enhance skills and knowledge
- Build upon the County’s existing GIS database by finding non-spatial databases to integrate into GIS
- Provide a medium to allow County and Regional GIS users to communicate and ask questions
- Participate in Regional and State GIS projects and initiatives by attending meetings/webinars

### 6.2 County Organization

In order for GIS to be used efficiently and effectively, the County staff that will be using the system should be trained on the basics of using a GIS viewer to view and query data. By ensuring County staff can access data and understand how to use that data, this will free up time spent by the regional entity on producing digital or hard-copy maps.

Once the Regional GIS entity is established, it will partner with LSSU to hold numerous educational workshops and trainings for County staff, townships, and any interested individuals.

### 6.2 Committee and Outreach

In addition to creating a GIS entity, a County or Regional GIS Committee should be established. This Committee would provide input and feedback on: future GIS development, GIS projects and standards, trainings and workshops, use agreements and MOAs, outreach and education, and the overall direction for the GIS program. Mackinac County recently organized a GIS Committee, consisting of several County Commissioners and staff. As noted in the goals, this County GIS Committee should be expanded to include several more members, preferably from the Township level and private business. Once a County Committee is established, several members should be chosen to represent the Committee at the Regional level on a Regional GIS Committee. This Regional Committee would possibly meet quarterly to discuss projects and joint efforts in the Region.

As part of organizing a GIS program, there needs to be community outreach and education. Not only in the initial stages of GIS development, but ongoing. LSSU provides the perfect environment for trainings and education workshops. The Cisler Center provides great meeting rooms, and LSSU has a recently updated GIS lab, in which County and Township staff could be trained on using GIS software and
technology. This GIS endeavor provides an excellent opportunity to partner and utilize a higher education institution within the Region. However, because of the travel required, trainings and workshops could also be held in other areas around the County as well. The County and Regional Entity should develop a training program and develop a standard education workshop as well. These workshops could be held several times a year to educate Township officials, assessors, emergency response crews, and other interested individuals.

6.3 Structure
The following graphic best depicts the workflow for future County GIS. Because Regional Planning would be acting as the County GIS Department, any major decisions or capital projects would still need approval of the County Board and the Regional Planning Board. Any ideas, projects, etc. would come from County Departments or GIS Committees, and require County Board, and possibly Regional Planning Board, approval before being implemented.

7 IMPLEMENTATION PROGRAM
As part of the development of this plan, several County GIS Departments around the State were contacted in regards to annual budgets. Many County GIS departments have annual budgets of around $100,000. These budgets cover a full-time GIS coordinator, ESRI software licensing, hardware and computers, and possibly a few part-time staff or interns. Investing this amount of funding into a County GIS program is obviously difficult for Mackinac County to do. For this reason, using the recommended solution of sharing GIS services with Chippewa County through the EUP Regional Planning office provides the most reasonable alternative. The following are cost estimates for developing a GIS program and for the development of various products and workflow items.
7.1 Short Term Implementation & Costs

A short-term implementation would include those activities needed to be completed with two (2) years.

Establish GIS entity - $25,000 annually

This plan recommends partnering with Chippewa County to share GIS services and designate the EUP Regional Planning office as the GIS entity for Mackinac County. EUP Planning has determined it would initially require $50,000 annually to provide GIS services to both Counties. This cost includes staff time as well as hardware and software that would be needed to perform daily tasks. This would require, depending on the way the cost is divided between the Counties, $25,000 annually from Mackinac County.

Establish Regional GIS Committee – no cost

A Regional GIS Committee should be established and should include the following from both Mackinac and Chippewa Counties: County Department Heads, County Commissioner, SSM/St. Ignace representatives, MDOT/DNR/USFS representatives, a Township representative from each County, assessor from each County, and any other relevant external agencies or businesses.

Create GeoDatabase – no cost; part of entity tasks

With the development of a County parcel dataset, the parcels and other base layer information should be housed in a file geodatabase on the County’s server. The Regional entity can assist in establishing this shared database. As more departments access the system, and more information is integrated, a data model will need to be developed to ensure the needs of all departments and staff can be met. This will create the foundation for a future SDE environment.

Purchase ArcGIS Basic for Equalization Department – $3,500 per seat

The Equalization Department could benefit from having more advanced GIS tools than those available in the free viewers. It is recommended a concurrent use license be purchased and shared within the Department.

Deploy GIS software and data to County Departments – no cost; part of entity tasks

Install GIS software readers on staff computers and load GIS data from shared database. Training will need to accompany deployment.

Improve/Maintain 911 data – no cost; part of entity/vendor tasks

Mackinac County 911 has recently updated road centerlines and utilizes a vendor for maintenance of 911 data. Current address points in the County are located on the road centerline or at the driveway of each structure. It could be beneficial to locate address points on top of the structures as well as the driveways. This could be discussed with the 911 Department and the vendor to determine the possibility of creating this dataset.
7.2 Mid Term Implementation & Costs
Long-term solutions would be focused on activities up to three (3) years out.

Develop Dataset Standards – no cost; part of entity tasks

Once a GIS entity is established, one of its tasks would be to work with the Regional GIS Committee to establish data standards for several common datasets, such as addressing, road centerlines, land use/zoning, parcels, etc.

Establish costs for data subscription – no cost; part of entity tasks

Offer a GIS subscription to businesses and individuals and provide updated GIS datasets throughout the year for use in offline software solutions. By establishing a fixed annual fee, subscribers would gain access to updated data sets on a monthly or bi-annual basis. This would provide for a cheaper alternative to re-purchasing datasets each year.

Maintain County GIS Parcels – typically $2-$3 per parcel

Mackinac County’s parcel dataset should be completed around Summer 2013, after which maintenance will need to be determined for the upkeep of the parcel dataset.

7.3 Long Term Implementation & Costs
Long-term solutions would be focused on activities 4+ years out.

Establish imagery program - $70,000 - $80,000

Mackinac County invested $51,500 in 2011 for 12”, natural color, leaf-off high resolution imagery. This imagery will be useful for several years, but the County needs to start considering a future flight, preferably in 2016 or 2017. At current estimated costs of $45 - $50 per square mile, Mackinac County would be looking at investing roughly $80,000 for a new imagery flight. Costs in 2016 could, and most likely will, come down in price for similar products. Mackinac County also partner with Luce and Mackinac Counties on a future flight to reduce the costs. Other partners could also include the State of MI, USFS, and the Tribes.

Migrate to ArcGIS Server/SDE environment – $20,000-$30,000

ArcSDE technology is a core component of ArcGIS for Server. It manages spatial data in a relational database management system (RDBMS) and enables it to be accessed by ArcGIS clients. It is the technology that provides the framework to support long transactions, which facilitates the versioned editing environment in multiuser geodatabases. An SDE environment would allow multiple users to edit GIS data concurrently, and provide the foundation for ArcGIS Server and an enterprise system. Utilizing ArcGIS Server or another online solution, publish parcels, roads, land use, zoning, and other datasets to the public through a web map portal. This task requires a great deal of work and planning. Costs will vary greatly depending on the avenue chosen, but the County should continue to research the best method possibly of getting an online map presence by 2016.
Collect County-wide LiDAR - $200 per sq. mi/$212,000 County-wide (2012 price)

LiDAR stands for Light Detection and Ranging, and is the newest technology in collection elevation and other datasets using laser technology. LiDAR has many applications in GIS, from accurate elevation to forestry and land use. Because LiDAR is very costly, this may be a long-term project that involves many partners including, but not limited to; County, USFS, State of MI, Homeland Security, USDA, and Tribal Government.

7.3 Budget Plan
The previous sections discussed short-term and long-term implementation steps and the associated costs. The following table will provide estimated budgets from year to year as well as potential projects and their estimated costs, up to five (5) years from now. The GIS entity cost of $25,000 is dependent on Mackinac County’s match of $25,000.

<table>
<thead>
<tr>
<th>Task</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year One - 2013</strong></td>
<td></td>
</tr>
<tr>
<td>GIS Entity</td>
<td>$25,000</td>
</tr>
<tr>
<td><strong>Year Two – 2014</strong></td>
<td></td>
</tr>
<tr>
<td>GIS Entity</td>
<td>$25,000</td>
</tr>
<tr>
<td><strong>Year Three - 2015</strong></td>
<td></td>
</tr>
<tr>
<td>GIS Entity</td>
<td>$25,000</td>
</tr>
<tr>
<td>Parcel Maintenance</td>
<td>$2-$3 per parcel</td>
</tr>
<tr>
<td><strong>Year Four - 2016</strong></td>
<td></td>
</tr>
<tr>
<td>GIS Entity</td>
<td>$25,000</td>
</tr>
<tr>
<td>ArcGIS Server/SDE Migration</td>
<td>$20,000 - $25,000 for software, $10,000 for hardware</td>
</tr>
<tr>
<td>Parcel Maintenance</td>
<td>$2-$3 per parcel</td>
</tr>
<tr>
<td><strong>Year Five - 2017</strong></td>
<td></td>
</tr>
<tr>
<td>GIS Entity</td>
<td>$25,000</td>
</tr>
<tr>
<td>Updated County Imagery</td>
<td>$70,000 - $80,000 (if done independently)</td>
</tr>
<tr>
<td>County LiDAR Acquisition</td>
<td>$200,000 - $250,000 (if done independently)</td>
</tr>
<tr>
<td>Parcel Maintenance</td>
<td>$2-$3 per parcel</td>
</tr>
</tbody>
</table>
GIS has proven to be a much needed, and much requested, service in Mackinac County. In today’s technological and spatially-aware world, GIS is playing more important roles in many industries. From Google Earth to highly advanced GIS servers, GIS is all around us.

There needs to be more uniform development and coordination of activities to make GIS use more efficient and more widely-used. But even more importantly is the support and recognition that GIS is important and can be benefited to the County. Without the support or confidence of the County Board and County staff, a County GIS system will not be successful.

Because the County does not have the resources in-house, the County should cost-share with Chippewa County and partner with EUP Regional Planning to develop a Regional GIS Entity, which will handle day-to-day GIS activities, coordinate GIS projects, organize trainings and workshops, and be the lead on County GIS. This is a unique opportunity not only in the U.P., but the State of MI. Mackinac County can no longer be a follower of GIS, but needs to instead be a leader and innovator for GIS in the State of MI.

While the County, and EUP Region, faces tough economic times and budget shortfalls, it can be assured that investing in GIS is a smart choice, and that GIS technology will only improve access to County information and services, both for staff and the public.
APPENDIX A – Supporting Documents
<table>
<thead>
<tr>
<th>Name</th>
<th>County Dept/Township/Agency</th>
<th>Mailing Address</th>
<th>Phone or Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aehra Cot</td>
<td>St. Ignace News</td>
<td></td>
<td><a href="mailto:aehra@stignacenews.com">aehra@stignacenews.com</a></td>
</tr>
<tr>
<td>Al Caravaglia</td>
<td>Hudson Township</td>
<td></td>
<td><a href="mailto:actry@alpha.com">actry@alpha.com</a></td>
</tr>
<tr>
<td>Christina Deven</td>
<td>Clark Township</td>
<td></td>
<td><a href="mailto:assessora@sedarsville.net">assessora@sedarsville.net</a></td>
</tr>
<tr>
<td>Jean Schraka</td>
<td>Baie Blanc Jeuq.</td>
<td></td>
<td><a href="mailto:jhscherka@yahoo.com">jhscherka@yahoo.com</a></td>
</tr>
</tbody>
</table>
September 14, 2012

Mackinac County Board of Commissioners:

On behalf of the Eastern Upper Peninsula Board of REALTORS®, I would like to offer our support and encouragement for the development of a long-term, County-wide GIS.

It is our understanding that Mackinac County is considering the development of a more consistent GIS program that would develop land information, zoning, addressing, and other useful datasets and maps that would be beneficial to our daily tasks. This GIS information, when viewed through desktop software or web-based viewer, would provide information to us and the public that would normally require a visit or phone call to the County or Local offices. Having this information available would reduce the amount of time needed to research and access this information, both of our staff and County/Local staff.

We would like to support a County GIS by purchasing GIS datasets such as parcels, roads, addressing and imagery for internal use, or by purchasing a subscription to a web mapping platform with this information.

Sincerely,

Steve Sanderson  
President  
EUP Board of REALTORS®