JUNE 29, 2018

Village of Pinehurst

GIS

STRATEGIC PLAN

PREPARED FOR:

VILLAGE OF PINEHURST
INFORMATION TECHNOLOGY

PREPARED BY:

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1895 VILLAGE OF PINEHURST

Village of Pinehurst, North Carolina

GIS STRATEGIC PLAN

Submitted to:

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FOREWARD

WithersRavenel is pleased to present this GIS Strategic Plan to the Village of Pinehurst. The practice used to collect information for this plan included discussions with the organization's Chief Information Officer, reviews of online resources such as the Village website, reviews of strategic and comprehensive plans, and one-on-one interviews with representatives from selected departments. A standard questionnaire was utilized to create a consistency of questioning and a sample is included in the appendix of this document.

This plan communicates opportunities and develops an implementation strategy to achieve defined goals. This document will not detail every step necessary for a successful implementation of each department, but will give an enterprise view of foundational improvements.

Recommendations can be categorized based on the following criteria:

a. Ease of implementation
b. Cost of implementation
c. Return on investment

It will be the responsibility of the Village to determine which of the above factors determines the schedule of implementation. Some implementations may be categorized as a *large cost of implementation*, but also provide a *large return on investment*. Whether that should occur before an *ease of implementation* and a *low-cost implementation* improvement, will be need to be decided by Village staff.

There are Key Recommendations (enterprise level) that will need to be completed before attempting any department level implementations. These Key Recommendations are detailed in the Executive Summary as well as the Summary and Recommendation Section in this document.

EXECUTIVE SUMMARY

PURPOSE

The purpose of this GIS Strategic Plan is to create a framework for the Village of Pinehurst to efficiently and effectively make use of the organization's investment in GIS Technology. A GIS Strategic Plan ensures proper administration of GIS data and resources, improves workflows and business processes, and provides a roadmap for both staff and the public to interact with geospatial data. The recommendations in this plan considers organizational history with GIS, the input of individual departments, and the overall strategic plan of the organization.

KEY RECOMMENDATIONS OF THE PLAN

Goal 1: Data Consolidation, Organization, and Conversion

The foundation of any successful GIS program is the GIS data itself. It is difficult to find, manage, and update digital data if it is stored in multiple locations or in different formats. Furthermore, it is difficult to ensure the origin of the data or if users are accessing the most recent data. It is recommended that the Village perform a digital consolidation, organization, and conversion project using best management practices. A central location for the organization's geospatial data should be created in a file geodatabase format following the ESRI Local Government Information Model (LGIM). This should be completed while using best management practices and standard operating procedures (SOP) for creating, naming, and editing GIS data; performing quality assurance and quality control; database management; and providing overall program management.

Goal 2: Make use of ArcGIS Online Technology

Currently the Village publishes static .pdf maps through the organization's public facing website. Many of these maps are outdated. ArcGIS Online (AGOL) is an online, collaborative web GIS that allows an organization to use, create, and share geographic data. This includes interactive maps that allow the entire organization and the public to explore and understand geographic data. Existing maps published on the website should be examined to determine whether they are up-to-date or still needed. Outdated maps should be immediately refreshed or re-created where necessary. A formalized plan should be created for converting existing static maps into online interactive maps. This plan should consolidate the overall number of interactive maps. While maps can be created for specific purposes or projects, consolidation creates a one-stop shop for several different pieces of information.

Goal 3: Training

It is extremely important that orientation and training be provided to all Village staff who will be utilizing the GIS. A customized GIS training plan should be created for the entire organization. Staff members can be categorized into different roles including viewers, co-creators or story tellers, power users, and an administrator(s). Depending on the role of the individual, different training levels will be required. A recommended training matrix is provided in the Training Section based on user roles. It should also be noted that the organization should host public information sessions or campaigns to increase the overall awareness and use of GIS applications by the public.

Goal 4: Incorporation of GIS into overall Strategic Plan

GIS should be heavily incorporated into the overall Village Strategic Plan. The Village of Pinehurst has a number of strategic goals including to safeguard the public, provide multimodal transportation systems, ensure an attractive residential community, ensure a thriving business community, maintain an active, healthy community, professionally manage a high performing organization, and to attract and retain an engaged workforce. Each of these goals consist of Strategic Initiative Objectives and Initiative Action Plans (IAPs). GIS software, data, and tools can be used to help staff, leaders, elected officials, and the public make more informed decisions within each one of these respective areas. Furthermore, GIS can be used to demonstrate progress towards accomplishing these goals.

DEPARTMENTAL RECOMMENDATIONS

Following the Departmental Interviews that were conducted onsite, the evaluation team reviewed interview notes and documentation to create a list of action items based on the input from key department representatives. Some of the needs identified by staff were part of larger themes that can be addressed through enterprise level Key Recommendations, but some will require more immediate resolutions.

STAFFING

The Village of Pinehurst does not currently have a full-time resource dedicated to GIS. The Village has relied on individuals in the Information Technology, Planning, and Parks and Recreation Departments for GIS needs. The creation of GIS data and maps has been a secondary function to the primary role of these employees. In addition, several of the employees who have served the Village as power GIS users are no longer with the organization. These individuals created data and map products that still exist today. With limited information on the methodology used to create these products, it is difficult for staff members re-build and refresh without starting over. It is also difficult to determine the accuracy and completeness of the datasets being used.

The Village of Pinehurst is planning on creating a new Full Time Equivalency (FTE) position dedicated to GIS for FY19-20. This will create an efficient, dedicated resource that will increase the capacity of the GIS Program. Through the creation of this position, the Village has an opportunity to create a one-stop shop and streamline GIS requests. However, there will continue to be subject matter experts who use GIS in several of the departments. As discussed in more detail later in this document, these users will need to be categorized into groups based on their role and training will need to be provided accordingly.

It should be noted that it is not uncommon for newly hired GIS personnel to be inundated with requests. This is especially true when a key GIS resource has left an organization and there is a backlog of requests. Therefore, the job description, roles, and responsibilities for this individual will need to be clearly defined and workload will need to be closely monitored by the manager. Implementation of other components of this plan such as centralizing data into one location, providing viewers with online resources, and providing overall awareness and training will play an important role making sure the new hire is successful.

GIS JOB DESCRIPTION

The Urban and Regional Information Systems Association (URISA) published a GIS Model Job Descriptions Document which highlights the job functions, education, experience, knowledge, skills and abilities that are required at each level. The Village should consider this document when writing the job description for the FTE. In addition, the NC GIS Listserv hosted by the UNC School of Government can be used to solicit job descriptions from other municipalities around the state and to announce the position once it has been advertised. Once hired, it will be necessary to monitor the actual job tasks of the full-time GIS employee as it relates to the job description.

URISA GIS Model Job Descriptions Document:
https://cdn.ymaws.com/www.mngislis.org/resource/resmgr/imported/salary/urisa_job_descriptions.pdf

NC GIS Listserv:
https://www.sog.unc.edu/resources/listservs/geographic-information-systems-ncgis

TRAINING FOR THE GIS PROFESSIONAL

GIS technology is rapidly changing and it is necessary to stay up-to-date on software and industry trends. Training will be discussed in another section more in-depth, however, it is important to bring attention to the fact that a formal training plan for the full-time GIS position is critical to the success of the overall GIS program.

PROFESSIONAL DEVELOPMENT

It is recommended that the dedicated GIS resource attend conferences and professional development opportunities as time and budget allow. Attendees will learn about emerging technology, best practices, and these opportunities serves as continuing education credits for Geographic Information Systems Professional (GISP) certification. There are a number of conferences and symposiums across North Carolina, the region, and the country. Some of the upcoming opportunities for the remainder of 2018 and in 2019 include:

NCAUG – Annual Conference in Asheville, NC (August 29 – 31, 2018)
NCAUG – Fall Symposium in Hickory, NC (October 26, 2018)
North Carolina GIS Conference in Winston Salem, NC (February 27 – March 2, 2019)
NCAUG – Spring Symposium (location and dates to be determined in 2019)
ESRI - Southeast Users Conference (location and dates to be determined in 2019)
ESRI - International Users Conference (held annually in San Diego, California)
NCAUG – Annual Conference (held annually, location and dates to be determined)
NCAUG – Fall Symposium (location and date to be determined)

IT INFRASTRUCTURE

HARDWARE

Based on the questionnaires completed, onsite interviews, and specifications provided by the Information Technology Manager, the hardware that the Village is planning on purchasing is sufficient to run the existing ArcGIS Desktop Software.

However, it should be noted that hardware decisions should be made with consideration to new products in the market such as ArcGIS Pro, especially for the dedicated GIS employee and any current ArcGIS Desktop Users. ArcGIS Pro software has additional requirements which should be considered with any future hardware decisions.

HARDWARE SUPPORTING ARCGIS PRO:

ArcGIS Pro supports the use of multiple core processors, graphics processing units and more that 4GB of RAM and requires more computer resources to run properly.

Minimum Requirements:

- Windows 64-bit OS
- Windows 7, 8.1, or 10
- Windows Server 2008 R2, 2012, 2012 R2, or 2016
- Hyperthreaded dual core processor
- 4GB RAM
- 32 GB hard drive space
- 2GB video memory
- Microsoft .Net Framework 4.6.1
- Microsoft Internet Explorer 11
- Direct X 11
- OpenGL 3.3
- Shader Model 4.1
- Pixel Shader 4.0
- Vertex Shader 4.0

Optimal:

- 12GB of RAM and an i5 dual core processor, and a separate video card with its own GPU and memory.
- Multiple Monitor Setup

Further discussion about ArcGIS Pro is included in the Software Section of this plan.

MAINTENANCE

The Information Technology Department should continue to follow best practices with regard to maintenance. First, research should be conducted to determine how any future upgrades or updates may impact software systems. Second, when possible updates should be tested before being implemented into a production environment. Finally, updates to hardware, operating systems, and software should occur outside of normal business hours.

SOFTWARE

ESRI ARCGIS DESKTOP AND ARCGIS PRO

The Village of Pinehurst currently uses the industry standard GIS software of ESRI ArcGIS Desktop. The Village has twelve (12) *Basic* ArcGIS Desktop Licenses Deployed at Version 10.5.1. There are three levels of ArcGIS Desktop licenses, which are: Basic, Standard, and Advanced. Each successive level adds functionality to the previous level or levels. Investing in a *Standard* License, will allow the Village to have higher editing, and analysis capabilities. It is suggested that this occur at a minimum before the full-time GIS employee comes on board.

ESRI is moving towards a new updated version of software called ArcGIS Pro which will eventually replace ArcGIS Desktop. The new software is a 64-bit platform that allows for 2D and 3D mapping, more advanced visualization and analysis of GIS data while also being a solid, user friendly software for entry level GIS and Village staff. The Village of Pinehurst currently has 12 licenses of ArcGIS Pro but are only using 1 ArcGIS Pro License at Version 1.4.7. As new staff are being exposed to ArcGIS software, it is recommended that these individuals are taught on ArcGIS Pro or ArcGIS Pro and Desktop. This will mean that they do not need to learn a new software now and turn around and learn a second software in a few years.

The following tables summarize the functionality of each license level and apply to ArcMap as well as ArcGIS Pro.

Map Creation, Interactive Visualization, and Spatial Analysis

Functional area	Advanced	Standard	Basic
Create interactive maps and scenes from file, database, and online sources.	✓	✓	✓
Visually model and spatially analyze a process or workflow.	✓	✓	✓
Access basic spatial analysis tools for overlay, proximity, and summary.	✓	✓	✓
Access statistical tools for analyzing spatial patterns, clusters, and relationships.	✓	✓	✓
Access extensive automated data management tools.	✓	✓	✓
Run scripting, geoprocessing, and other operations using Python.	✓	✓	✓
Create street-level maps that incorporate GPS locations.	✓	✓	✓
View CAD data or satellite/aerial imagery.	✓	✓	✓
Use charts to visualize categories, relationships, distributions, and change in your data.	✓	✓	✓
Publish and share maps and projects as packages and services on the web, mobile apps, and social media.	✓	✓	✓
Create, configure, and print page layouts.	✓	✓	✓

ArcGIS Desktop license level comparison for map creation, interactive visualization, and spatial analysis

Multiuser Editing and Advanced Data Management

Functional area	Advanced	Standard	Basic
Access complete GIS data editing capabilities.	✓	✓	
Edit a multiuser enterprise geodatabase.	✓	✓	
Use disconnected editing in the field.	✓	✓	
Store historical snapshots of your data.	✓	✓	
Automate quality control.	✓	✓	
Create spatial data from scanned maps.	✓	✓	
Manage workflows and job assignments.	✓	✓	

ArcGIS Desktop license level comparison for multiuser editing and advanced data management

Advanced Analysis, High-End Cartography, and Extensive Database Management

Functional area	Advanced	Standard	Basic
Perform advanced GIS data analysis and modeling.	✓		
Produce publication-quality maps.	✓		
Perform advanced data translation and creation.	✓		
Perform advanced feature manipulation and processing.	✓		
Convert data for CAD, raster, dBASE, and coverage formats.	✓		

ArcGIS Desktop license level comparison for advanced analysis, high-end cartography, and extensive database management

License Levels:

http://pro.arcgis.com/en/pro-app/get-started/license-levels.htm

PRODUCT LIFE CYCLES

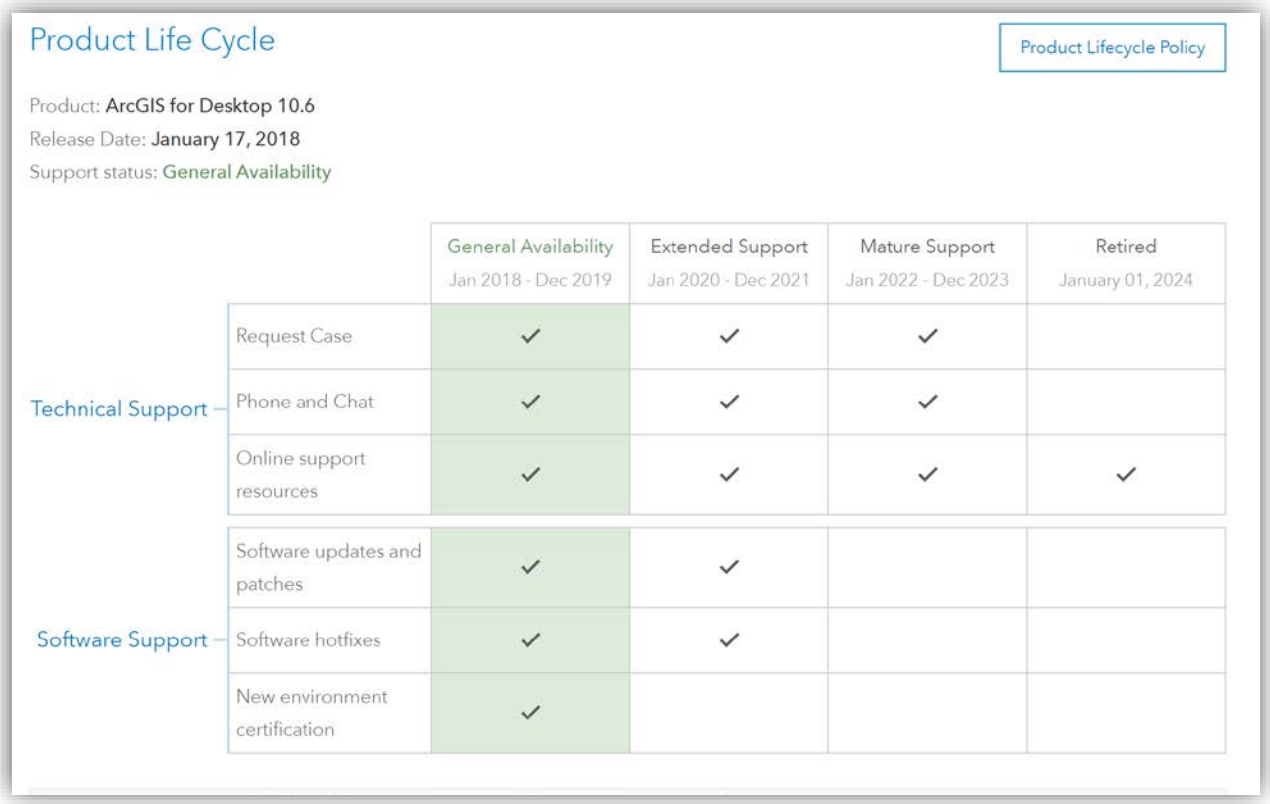
Like all technology, there is a life cycle for the ESRI GIS Software. The time table for the implementation of this plan coincides with a major transition in ESRI GIS Software from ArcGIS Desktop to ArcGIS Pro. Currently ESRI plans on retiring ArcGIS Desktop in January 1, 2024. This lifecycle of software needs to be kept in mind throughout the implementation of this plan and goals may need to be adjusted depending on life cycle stage.

ArcGIS Desktop Product Life Cycle:

Version	Release Date	General Availability	Extended Support	Mature Support	Retired	Release Notes
10.6	January 17, 2018	Jan 2018 - Dec 2019	Jan 2020 - Dec 2021	Jan 2022 - Dec 2023	January 01, 2024	View
10.5.1	June 29, 2017	Jun 2017 - Nov 2018	Dec 2018 - Nov 2020	Dec 2020 - Nov 2022	December 01, 2022	View
10.5	December 15, 2016	Dec 2016 - Nov 2018	Dec 2018 - Nov 2020	Dec 2020 - Nov 2022	December 01, 2022	View
10.4.1	May 31, 2016	May 2016 - Jan 2018	Feb 2018 - Jan 2020	Feb 2020 - Jan 2022	February 01, 2022	View
10.4	February 18, 2016	Feb 2016 - Jan 2018	Feb 2018 - Jan 2020	Feb 2020 - Jan 2022	February 01, 2022	View
10.3.1	May 13, 2015	May 2015 - Nov 2016	Dec 2016 - Nov 2018	Dec 2018 - Nov 2020	December 01, 2020	View
10.3	December 10, 2014	Dec 2014 - Nov 2016	Dec 2016 - Nov 2018	Dec 2018 - Nov 2020	December 01, 2020	-
10.2.2	April 15, 2014	Apr 2014 - Jun 2015	Jul 2015 - Jun 2017	Jul 2017 - Jun 2019	July 01, 2019	View
10.2.1	January 07, 2014	Jan 2014 - Jun 2015	Jul 2015 - Jun 2017	Jul 2017 - Jun 2019	July 01, 2019	View
10.2	July 30, 2013	Jul 2013 - Jun 2015	Jul 2015 - Jun 2017	Jul 2017 - Jun 2019	July 01, 2019	-
10.1	June 11, 2012	Jun 2012 - Dec 2013	Jan 2014 - Dec 2015	Jan 2016 - Dec 2017	January 01, 2018	View
10	June 30, 2010	Jun 2010 - Jun 2012	Jul 2012 - Dec 2013	Jan 2014 - Dec 2015	January 01, 2016	View

ArcGIS for Desktop Version Life Cycle:

https://support.esri.com/en/Products/Desktop/arcgis-desktop/arcmap/10-6#product-support



Product Life Cycle

Product Lifecycle Policy

Product: **ArcGIS for Desktop 10.6**
Release Date: **January 17, 2018**
Support status: **General Availability**

		General Availability Jan 2018 - Dec 2019	Extended Support Jan 2020 - Dec 2021	Mature Support Jan 2022 - Dec 2023	Retired January 01, 2024
Technical Support	Request Case	✓	✓	✓	
	Phone and Chat	✓	✓	✓	
	Online support resources	✓	✓	✓	✓
Software Support	Software updates and patches	✓	✓		
	Software hotfixes	✓	✓		
	New environment certification	✓			

ArcGIS for Desktop Life Cycle:
https://support.esri.com/en/Products/Desktop/arcgis-desktop/arcmap/10-6#product-support

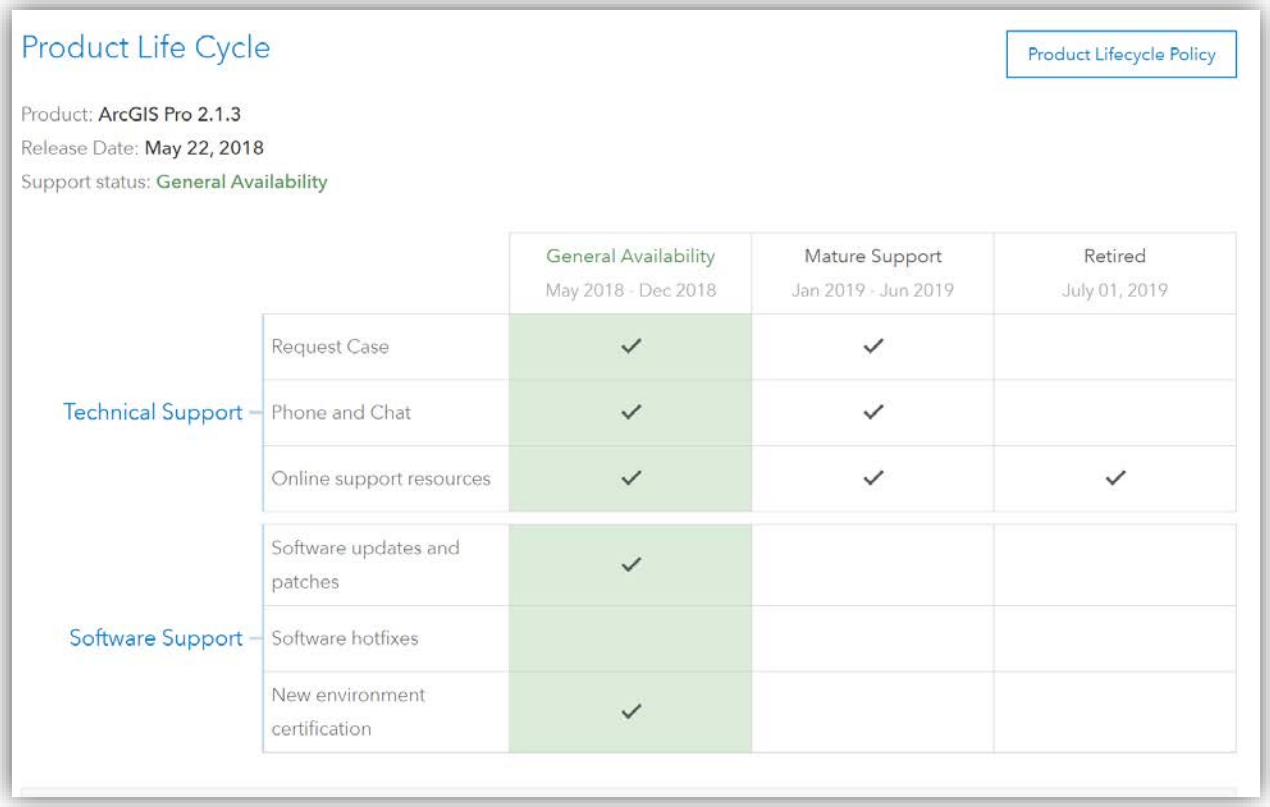
ArcGIS Pro Product Life Cycle

ArcGIS Pro is the latest professional desktop GIS from ESRI and will eventually replace ArcGIS Desktop.

Version	Release Date	General Availability	Mature Support	Retired	Release Notes
2.2	June 26, 2018	Jun 2018 - Dec 2019	Jan 2019 - Jun 2020	July 01, 2020	View
2.1.3	May 22, 2018	May 2018 - Dec 2018	Jan 2019 - Jun 2019	July 01, 2019	-
2.1.2	February 28, 2018	Feb 2018 - Dec 2018	Jan 2019 - Jun 2019	July 01, 2019	-
2.1.1	February 01, 2018	Feb 2018 - Dec 2018	Jan 2019 - Jun 2019	July 01, 2019	-
2.1	January 17, 2018	Jan 2018 - Dec 2018	Jan 2019 - Jun 2019	July 01, 2019	-
2.0.1	August 22, 2017	Aug 2017 - May 2018	Jun 2018 - Dec 2018	January 01, 2019	-
2.0	June 27, 2017	Jun 2017 - May 2018	Jun 2018 - Dec 2018	January 01, 2019	-
1.4.1	February 08, 2017	Feb 2017 - Dec 2017	Jan 2018 - Jun 2018	July 01, 2018	View
1.4	January 11, 2017	Jan 2017 - Dec 2017	Jan 2018 - Jun 2018	July 01, 2018	-
1.3.1	August 23, 2016	Aug 2016 - Jun 2017	Jul 2017 - Dec 2017	January 01, 2018	View
1.3	July 07, 2016	Jul 2016 - Jun 2017	Jul 2017 - Dec 2017	January 01, 2018	View
1.2	March 01, 2016	Mar 2016 - Feb 2017	Mar 2017 - Aug 2017	September 01, 2017	View

ArcGIS Pro Version and Life Cycle Schedule:

https://support.esri.com/en/Products/Desktop/arcgis-desktop/arcgis-pro/2-1-3#product-support



Product Life Cycle

Product Lifecycle Policy

Product: ArcGIS Pro 2.1.3
Release Date: May 22, 2018
Support status: General Availability

		General Availability May 2018 - Dec 2018	Mature Support Jan 2019 - Jun 2019	Retired July 01, 2019
Technical Support	Request Case	✓	✓	
	Phone and Chat	✓	✓	
	Online support resources	✓	✓	✓
Software Support	Software updates and patches	✓		
	Software hotfixes			
	New environment certification	✓		

ArcGIS Pro 2.1.3 Life Cycle:
https://support.esri.com/en/Products/Desktop/arcgis-desktop/arcgis-pro/2-1-3#product-support

DATA

Through our experience with conversion, consolidation, and cleanup projects for municipalities of various sizes, the foundation of any successful GIS program is the GIS data itself. It is difficult to find, manage, and update digital data if it is stored in multiple locations or in different formats. Furthermore, it is difficult to ensure the origin of the data or if users are accessing the most recent data. It is recommended that the Village perform digital consolidation, organization, and conversion project. A central location for the organization's geospatial data should be created in a file geodatabase format following the ESRI Local Government Information Model (LGIM). This should be completed while using best management practices and standard operating procedures (SOP) for creating, naming, and editing GIS data; performing quality assurance and quality control; database management; and providing overall program management.

DATA ANALYSIS AND DATABASE CREATION

The Village of Pinehurst should gather all GIS data and perform a series of QA/QC processes to check for quality and completeness. The results of the checks will include a complete list of data and the most recent and most accurate data is used by the Village. The

industry standard for Municipal Data is the Local Government Information Model (LGIM); we suggest using this database as the basis of consolidating and cleaning up the Village GIS data. During this task staff should investigate what customizations may need to be made to the LGIM database so that the Village can keep all important information that may already exist in their data.

GIS ORGANIZATION

The main goal of GIS organization is to get all data for the Village consolidated and organized in one central network location to ensure all users are accessing the most recent data. This will allow for easier database management by the GIS Manager as well as minimize issues caused by using old or outdated data. The Village will need to formulate and implement a file structure. Once completed, staff all data should be migrated into the appropriate locations and all existing MXD files should be sourced correctly back to the new file structure.

BEST MANAGEMENT PRACTICES & STANDARD OPERATING PROCEDURES

The Village will need to design Best Management Practices & Standard Operating Procedures (SOP) for tasks including, but not limited to: creating, naming, and editing GIS data; preparing digital submittals from internal and externals sources; performing quality assurance and quality control; performing database management; backing up data; updating base data; and providing overall program management.

ARCGIS ONLINE

Currently the Village publishes static .pdf maps through the organization's public facing website. Many of these maps are outdated. The project team worked with staff to inventory existing maps published on the website to determine whether they are up-to-date or still needed. Based on this exercise, staff was able to identify which department each map belonged to and whether or not they needed to be consolidated, updated, or deleted.

MAP LOCATION:

http://www.vopnc.org/our-community/visiting-pinehurst/village-maps

ArcGIS Online (AGOL) is an online, cloud based, collaborative web GIS that allows an organization to use, create, and share geographic data. This includes interactive maps that allow the entire organization and the public to explore and understand geographic data. Outdated maps should be immediately refreshed or re-created where necessary. A formalized plan should be created for converting existing static maps into online interactive maps. This plan should consolidate the overall number of interactive maps. While maps can be created for specific purposes or projects, consolidation creates a one-stop shops for several different pieces of information. Administrative controls through ArcGIS Online will allow the Village to control the security of who can see what data.

TRAINING

GIS technology is rapidly changing and it is necessary to stay up-to-date on software and industry trends. It is extremely important that orientation and training be provided to all Village staff who will be utilizing the GIS. A customized GIS training plan should be created for the entire organization. Staff members can be categorized into different roles including viewers, co-creators or story tellers, power users, and an administrator(s). Depending on the role of the individual, different training levels will be required. For more advanced users this will also require staff to become familiar with the new file structure and SOP of the GIS.

	Role			
	Viewer	**Co-Creator Story Teller**	**Power User**	**Administrator**
Training Level				
Existing Online Maps				
Awareness	√	√	√	√
Location of Resources	√	√	√	√
Basic Navigation	√	√	√	√
ArcMap				
Basic ArcMap		√	√	√
Basic Editing		√	√	√
Advanced ArcMap			√	√
Advanced Editing			√	√
SDE			√	√
ArcOnline				
License	Level 1 Departmental	Level 2 Departmental/Shared	Level 2 Departmental/Shared	Level 2 Individual
Viewing	√	√	√	√
Basic Sharing		√	√	√
Web Map Creation		√	√	√
App Builder		√	√	√
Story Maps		√	√	√
Administration				
SDE Maintenance				√
Database Creation				√
Schema Management				√
Database Management				√
GIS Portal Management				√
Open Data Hub				√
Geospatial Data Standards				√
Staff Development				√

Training plans should include the following:

- Customized plan for the full-time GIS position and for subject matter experts
- Instructor led, hands-on training using Village of Pinehurst Data
- Awareness training for all staff members
- Basic ArcGIS Desktop Training for ArcGIS Desktop Users
- Advanced ArcGIS Desktop Training for the dedicated GIS resource or any power users/subject matter experts who are going to be performing more advanced functions

In terms of a training format, we suggest approximately 6-8 hours of training, broken up into at least two sessions separated by no more than two weeks. Spacing out training allows Village staff to get into the software, test their skills and formulate questions: otherwise, staff may find it difficult to engage with the specifics of their new GIS Program because they have not been afforded adequate explanation and time to get acclimated. Training should follow a pace and appropriate level of detail to ensure all trainees are up to speed and ready to further the GIS program on their own.

Lastly, the training approach should incorporate exercises that directly address needs and goals identified in the Village of Pinehurst Strategic Plan. For example, one of the strategic goals for the Village of Pinehurst is to ensure an attractive residential community. The Strategic Objective for this goal is to guide appropriate redevelopment and growth and the Initiative Action Plan (IAP) includes an update to the comprehensive plan and land use planning. Based on our training philosophy, it would be useful to have a training exercise on best management practices for editing and maintaining the land use layer, especially if this layer is going to be used as one of the starting points for future comprehensive planning. In another example, a more advanced training lesson might include using advanced geoprocessing tools to conduct connectivity or walkability analysis of specified neighborhoods or sections of the Village of Pinehurst

STRATEGIC PLANNING

The Village of Pinehurst Strategic Operating Plan (SOP) is a tool that is used to develop and communicate the Village's strategic priorities for the upcoming fiscal year and the five-year planning period. The Village uses a Balanced Scorecard (BSC) to integrate strategic planning and resource allocation. BSC systems are used to help organizations communicate what they are trying to accomplish, align daily work with a strategy, prioritize projects and services, and measure progress towards strategic goals. A BSC contains goals, objectives, KPIs, and perspectives to ensure achievement of the organization's strategy.

Each BSC goal is related to a perspective (customer, internal, workforce, financial), and contains a strategic objective, Initiative Action Plans (IAPs), associated funding (resources), and KPIs

Geographic Information Systems (GIS) Software can play a significant role in achieving the objectives outlined in the 2018 Village of Pinehurst Strategic Operating Plan.

GIS should be heavily incorporated into the overall Village Strategic Plan. The Village of Pinehurst has a number of strategic goals including to safeguard the public, provide multimodal transportation systems, ensure an attractive residential community, ensure a thriving business community, maintain an active, healthy community, professionally manage a high performing organization, and to attract and retain an engaged workforce. Each of these goals consist of Strategic Initiative Objectives and Initiative Action Plans (IAPs). GIS software, data, and tools can be used to help staff, leaders, elected officials, and the public make more informed decisions within each one of these respective areas. Furthermore, GIS can be used to demonstrate progress towards accomplishing these goals.

DEPARTMENTAL INFORMATION AND RECOMENDATIONS

DEPARTMENT NAME: FIRE DEPARTMENT

Department Manager: Carlton Cole (Chief)

General Department Information:

The daily tasks of the Fire Department range from Fire, Rescue, and EMS response to hydrant inspection, equipment testing, training, smoke detector testing, and community education initiatives and involvement.

Staffing:

The Fire Department is comprised of thirty (30) full-time employees, three (3) of which are office positions and twenty-seven (27) positions are utilized for field response. In addition, there are six (6) reserve/part-time positions.

Hardware:

The type of laptops deployed are Dell Latitude laptops that stay in the truck. Every truck has a mobile modem and laptop with the exception of the Brush Truck. There are 5 desktops at the main station and 3 desktops at the substation. The Inspector uses a tablet for hydrant flow and inspections work.

Software:

The Pinehurst Fire Department utilizes FIREHOUSE Software as their Report Management Software (RMS) and Southern Software for Computer Aided Dispatch (CAD). RMS software is not accessed in the truck, but could be, and the Southern Software CAD can be accessed from the truck.

Target Solutions → online training and records management

GIS and Mapping Needs:

- The RMS software has some mapping capability, but it did not work correctly
- CAD software consumes GIS from the County, but needs some improvement
- The most requested map is for fire insurance districts which the County has online

- Fire hydrant locations are not available online
- District lines for response for the main station and the substation
- Currently use Google to determine who is closest
- Creation of 5 and 6 mile insurance districts
- To help plan by looking at land use (residential, industry, institutional or education) buildings and facilities in response areas
- Review historical demand for service by call type and man hours
- County Currently maintains the hydrants. The Village is trying to get the county to color code them based on flow so it can be put into Southern Software. So they do not have to paint the bonnets.

Suggested Areas for GIS Implementation:

Many of the needs expressed could be addressed through ArcGIS Online. The remaining needs can be met with ArcGIS Desktop and some form of dedicated support through either support services or the full-time GIS position.

Another suggestion is that a data warehouse could be created to show historical incident and inspections data. The Department would then be able to use GIS data to evaluate requests for resources. Giving staff access to various GIS layers will allow leaders in the Fire Department to provide information to management about the demand on resources for any specified period of time.

Another suggestion would be the creation of buildings layer with important information about building use, construction materials, floor plans, pictures, and hazardous material storage. In the future, this information could be accessed on computers or mobile devices in the field.

DEPARTMENT NAME: PARKS AND RECREATION

Department Manager: Mark Wagner

General Department Information:

Provide recreation programs, activities, special events and facilities for the community. Manage capital construction and renovation projects for Village, Parks& Recreation facilities, greenways, and sidewalks. Maintain Village buildings and grounds, park facilities, and the Harness Track facility

Staffing:

The Parks and Recreation Department is comprised of seventeen (17) employees, six (6) of which are office positions and eleven (11) are field positions.

Hardware:

Most of the computers are desktops with the exception of one (1) laptop. The department also makes use of phones and has an old Ipad that is outdated. There is a plan for Mark to transition to a laptop next year.

Software:

The Department has access to ArcMap, but doesn't use it enough to be efficient. While a basic map can be created quickly, creating or editing data takes a long time. The Department also uses ReCPro for registration and scheduling.

GIS and Mapping Needs:

- Special events mapping
- Greenway Maps – update trails, sidewalk sections
- Park Trail Maps
- Facility Maps – aerial images
- Harness Track – marketing materials and map
- Event layout maps, - parking, shuttle routes, race routes, etc..
- Web maps
- Interactive parks map is needed

- Heat maps of where participants reside for different programs

GIS could improve the quality and accuracy of maps provided to the public online and hard copy handouts that are distributed to various physical locations. A dedicated GIS person or company providing the service would improve the time and capability to create and update maps which he is currently not able to do quickly. The department currently has 5 or 6 maps online but only 2 of them are kept up to date. The Department is open to other ideas on how they could use GIS.

Suggested Areas for GIS Implementation:

Many of the needs expressed could be addressed through ArcGIS Online. The creation of map templates would also be useful, especially as it pertains to special events. GIS can compliment work done in various master plans related to Parks and Recreation. For example, maps could be produced that demonstrate the need for new or expanded facilities, sidewalks, greenways, or trails based on connectivity or walkability analysis.

It is also suggested that GIS should be used to help compliment both future and completed projects using ESRI Story Maps. These web-based maps allow staff to combine interactive, authoritative maps with narrative text, images, and multimedia content to tell powerful stories.

DEPARTMENT NAME: PUBLIC SERVICES

Department Manager: Walt Morgan

General Department Information:

Provide public services related solid waste, streets, and grounds. The Solid Waste Division operates automated and semi-automated trash trucks and small garbage trucks to collect trash, recycling, and yard debris. The Streets and Grounds Division maintains paved streets belonging to both the Village and NCDOT, signs, pedestrian walkways, landscape areas, and conducts snow removal operations.

Staffing:

The Public Services Department is comprised of twenty-seven (27) employees, three (3) of which are office positions and twenty-four (24) are field positions.

Hardware:

8 Computers for field staff, all 3office staff have desktop computers. There are 9 laptops.

Software:

The Village of Pinehurst utilizes PUBLICSTUFF software by Accela to accept public initiated work requests and complaints. The software can be accessed from the Village website or on a mobile device using an Android or Apple App. The user can drag the map pin to the issue's location or type the address. In addition, a photo of the issue can be taken and there is a free text box where a description of the issue can be entered. Staff reported that over 60% of Village requests are call backs related to solid waste pickup.

GIS and Mapping Needs:

- Update 2006 GIS Stormwater Data, be able to take pictures and complete inspections and want to collect additional information about the
- Develop a better approach for Stormwater Inspections – proactive
- Pavement condition rating database has to be joined to street centerline data to create a map, manual manipulation because some of ID's do not match
- Creation of maps requires staff to download from the Moore County site and

pull into word to manipulate.
- Tom Haughney manipulates solid waste maps, conducts rebalancing within the day of service.

Suggested Areas for GIS Implementation:

The 2006 GIS Stormwater Data should be transitioned into a file geodatabase following the Local Government Information Model (LGIM) as part of a data conversion project. Furthermore, the dataset should be updated to collect new features and analysis should be run on the dataset for quality control and assurance purposes. This analysis would look at locational accuracy, completeness of attributes, and connectivity. This data preparation would assist in stormwater master planning and asset management in the future.

The Village seeks to monitor and measure Stormwater Inspections to track and better understand the level of service being provided. Areas that are known to flood can be prioritized for inspection prior to or during major rain events through the help of GIS. Furthermore, work order systems that give the Village the ability to set up preventative maintenance work orders on established cycles is preferable . GIS assets loaded into the work order system can be tied back to GIS to create powerful visualizations about the level of service being provided and areas that are being repeatedly visited. This information can provide insight into more systemic issues with infrastructure.

Map templates and ArcGIS Online can be beneficial to both staff and the public with regard to communicating service boundaries and other customer service information.

DEPARTMENT NAME: PLANNING AND INSPECTIONS

Department Manager: Will Deaton

General Department Information:

The Planning and Inspections Department administers and enforces the development ordinance, building code, floodplain regulation, reviews plans, permits, and development applications, issues permits, conducts inspections and responds to zoning inquiries. Staff within the planning department use GIS on a daily basis.

Staffing:

The Department is comprised of eight (8) employees, two (2) inspectors are in the field full-time and some others are in the field 30% of the time or less.

Hardware:

Every employee has desktop pcs with the exception of Will who has a laptop. The Village is in the process of rolling out tablets with new software for inspectors.

Software:

Every employee has a license of ArcMap, with the exception of inspectors. Village is implementing new land use management software (name).

GIS and Mapping Needs:

- Assistance with long range planning initiatives, visioning, and fiscal analysis. Creating scenario maps.
- Analyze problems more quickly and thoroughly, find solutions and monitor long term progress
- Coordination of planning and economic development. Review analysis, compliance, historic preservation, redevelopment, and regional planning.
- Frequently need to check stormwater layer, wetlands, woodpeckers, zoning to see if a plan complies with regulations.
- Provide Historic District Maps online
- Maintain Zoning, ETJ, City Limits, and Preservation Overlays

- Map requests are internal and external, particularly related to empty lots within a home owners association, pavement maps, and zoning.
- Create and view permits through maps
- Interested in being able to use ArcGIS Online to push out data
- Providing maps that overlay different areas for code enforcement
- Take advantage of data from new software for mapping and visualization

Suggested Areas for GIS Implementation:

The data organization and conversion project is essential to the Planning and Inspections Department. Planners are tasked with checking a number of GIS layers when reviewing plans. Accessing a centralized database and having a high level of confidence in the completeness, accuracy, and source of the data is extremely important in order for planners to do their job.

ArcGIS Online will also be a valuable resource that can be used to provide contextual information to discussions at meetings both internally and with the public.

It is also suggested that GIS should be used to help compliment both future and completed projects using ESRI Story Maps. These web-based maps allow staff to combine interactive, authoritative maps with narrative text, images, and multimedia content to tell powerful stories.

DEPARTMENT NAME: POLICE

Department Manager: Earl Phipps (Chief)

General Department Information:

The Police Department is responsible for protecting the life and property of more than 15,760 Village residents. This includes patrolling three response areas, dispatching approximately 1,000 routine and emergency calls monthly, investigating and gathering evidence to solve crimes, and promoting strong community engagement.

Staffing:

The Department is comprised of twenty-five (25) full time sworn employees and six (6) reserves. Five (5) staff members are non-sworn.

Hardware:

Laptops mounted in police cars like fire department. Chief and Deputy Chief have laptops. There are about 16 desktops for various staff and uses. Department also deploys car and body cameras.

Software:

The software utilized by the Police Department is Southern Software CAD and RMS. In addition, the Department has utilized PublicEngines by Motorola. Crime information to the public is published using CrimeReports.

GIS and Mapping Needs:

- Zones (A,B,C)
- Neighborhoods
- Special Events Maps (ability to easily customize maps)

Suggested Areas for GIS Implementation:

There is a significant geospatial component to crime. The ability to view the geographic locations of the crimes, repeat calls for service, premise history, arrests, offender

addresses, suspects addresses, and field interview locations in proximity to each other is invaluable to conducting crime analysis. This information can be used to create actionable intelligence and develop effective response strategies to address both short-term patterns and long-term problems. It can also be used to share information with the public or other law enforcement agencies.

The concept of a crime data warehouse is where crime, calls, arrests, offender, suspects, and field interviews data is geocoded and stored in a geodatabase through an automated process. Furthermore, additional fields can be added to the data and calculated through automated processes to make the data more useful for analytic purposes. This includes standardizing temporal fields to better understand incident time of day and day of week. The data can then be recalled and queried to look for spatial patterns and to help leaders understand resource demand over specific periods of time or for comparisons between specified time periods (such as months or years). This information is also helpful in answering statistics questions posed by internal staff, management, the media, and the public.

The Chief indicated he is interested in the creation of a real-time crime center during the onsite visit, citing previous work experience with real-time crime center and the ESRI White Paper called *GIS for Real-Time Crime Centers* published in June of 2013. Real-time crime centers consist of Command Dashboards and real-time crime viewers. These viewers incorporate various data feeds and displays them on jurisdictional maps. Accurate and reliable GIS data feeds will be critical to any future investment in a real-time crime center.

DEPARTMENT NAME: ADMINISTRATION

Village Administrators: Jeff Sanborn, Natalie Hawkins

General Department Information:

Overall management and administration of internal and external Village Operations

Staffing:

Administration comprised of 7.5 full-time office positions

Hardware:

Department deploys a mix of mobile devices, laptops and desktops.

Software:

Moore County GIS Site, PUBLICSTUFF and MY VOP Software by Accela, web and mobile applications that display public requests by type and status. MY VOP also includes a drilldown map

GIS and Mapping Needs:

- Maps for golf cart permits and approved golf cart crossings
- Customer First Parking Plan
- Village Center Business Map
- Online Interactive Kiosk map for downtown and Welcome Center
- Open Village Hall responses – Pea Democracy Application
- Would like to publish online sidewalk/greenway mapping, and other points of interest
- Stormwater runoff patterns
- Maps for presentations at Council meetings/inclusion in Council agenda packets
- Research water/sewer line location
- Mapping drainage systems
- Topography/wetlands/stream location
- Street sign location cataloging
- Sidewalk mapping

- Access to in-house GIS software to oversee operation of the Planning and Inspections department
- Ability to analyze data such as police and fire calls by location
- Business Analysis

Suggested Areas for GIS Implementation:

Map templates create a uniform look to map products and begins to brand GIS products from the Village. It is recommended that map templates be created in consultation with communication standard logos and styles (text, font, size). Furthermore, ArcGIS Online is a valuable resource that can be used to provide contextual information to discussions at meetings. These maps can be accessed on demand. Implementation of ArcGIS Online can have a significant impact on the overall number of map requests being generated.

Historic data from public work requests can be mapped using ArcGIS Online to show management and the public the volume, work types, and location of work requests completed for any given period of time. Furthermore, industry trends include the ability to not only display these requests geospatially, but to also visualize this data through operational dashboards and open data portals. The Village should look for opportunities to move in this direction.

There were a number of items indicated in the discussions where administrators would like to have additional map layer for assets such as sidewalks and signs. The Village may choose to have some of these features collected as part of future data collection projects like pavement condition surveys. This data can also now be collected through mobile technology such as Collector for ArcGIS.

SUMMARY & RECOMMENDED IMPLEMENTATION CONCLUSIONS

The Village of Pinehurst has made strides to grow and improve their GIS. As stated in the Executive statement, there are 4 main goals of this plan that will help the Village take their GIS to the next level.

Goal 1: Data Consolidation, Organization, and Conversion

Goal 2: Make use of ArcGIS Online Technology

Goal 3: Training

Goal 4: Incorporation of GIS into overall Strategic Plan

Each of the 4 goals build upon one another, so they should be done in order from 1-4, but could include some overlap between goals. Goal 1 of data consolidation, organization and conversion being the most important of all 4 goals as it will lay the framework for all other goals to be successful. Data quality and organization is what drives a solid GIS for any organization. This plan is not static. As the plan is implemented and goals are completed, each goal should be assessed and changes can be made based on Village or Departmental needs. The WithersRavenel Team has provided a sample schedule for the implementation of these goals on a 12-month timeframe. However, the ability to complete these goals on this schedule will depend on the availability of resources to complete this work.

Village of Pinehurst, NC GIS Strategic Plan Goal Schedule

Plan Goal	2018								2019				
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	MAY	JUN
Data Consolidation, Organization, and Conversion													
ArcGIS Online Technology													
Training													
GIS into overall Strategic Plan													

Along with the 4 main goals of the plan. Other recommendations for this plan include;

1. *Standard License*: The Village should review their license level and invest in a standard license by the time they hire a dedicated full time GIS staff member. This will allow for the new GIS staff member to have a more robust mapping, editing and analysis capability.
2. *ArcGIS Pro*: Any staff members being introduced to GIS for the first time, should be trained on ArcGIS Pro. This will minimize having to retrain staff on a new software when the Village starts to transition everyone over to using ArcGIS Pro.
3. *Hardware Upgrades*: As the Village upgrades computer hardware, it will be crucial that any hardware for GIS users meet the needed specs for ArcGIS Desktop and ArcGIS Pro. It should also be considered that these workstations include more than one monitor for efficient GIS workflows.

APENDIX A – INTERVIEW QUESTIONNAIRE FORMS

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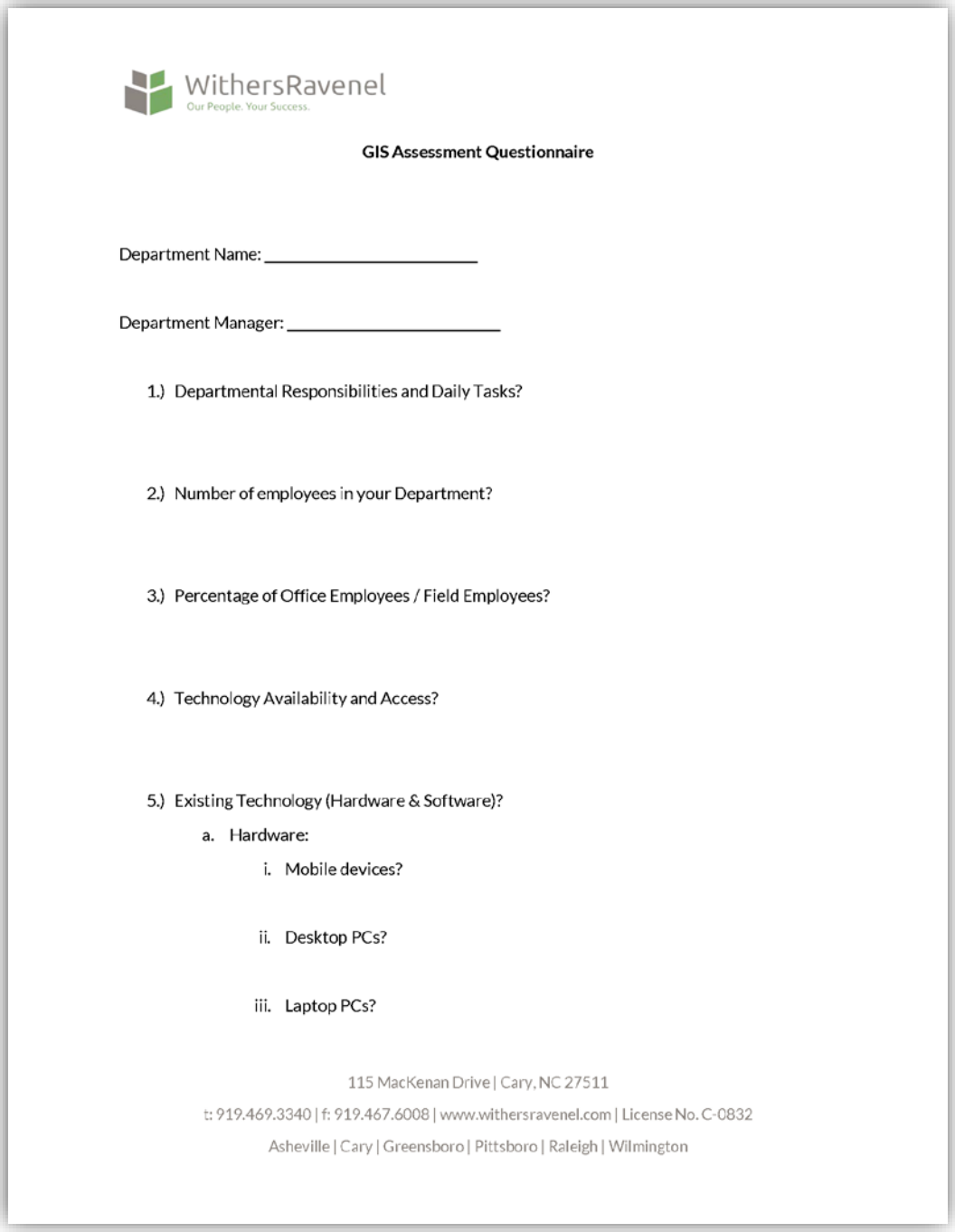

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GIS Assessment Questionnaire

Department Name: _____

Department Manager: _____

1.) Departmental Responsibilities and Daily Tasks?

2.) Number of employees in your Department?

3.) Percentage of Office Employees / Field Employees?

4.) Technology Availability and Access?

5.) Existing Technology (Hardware & Software)?

a. Hardware:

i. Mobile devices?

ii. Desktop PCs?

iii. Laptop PCs?

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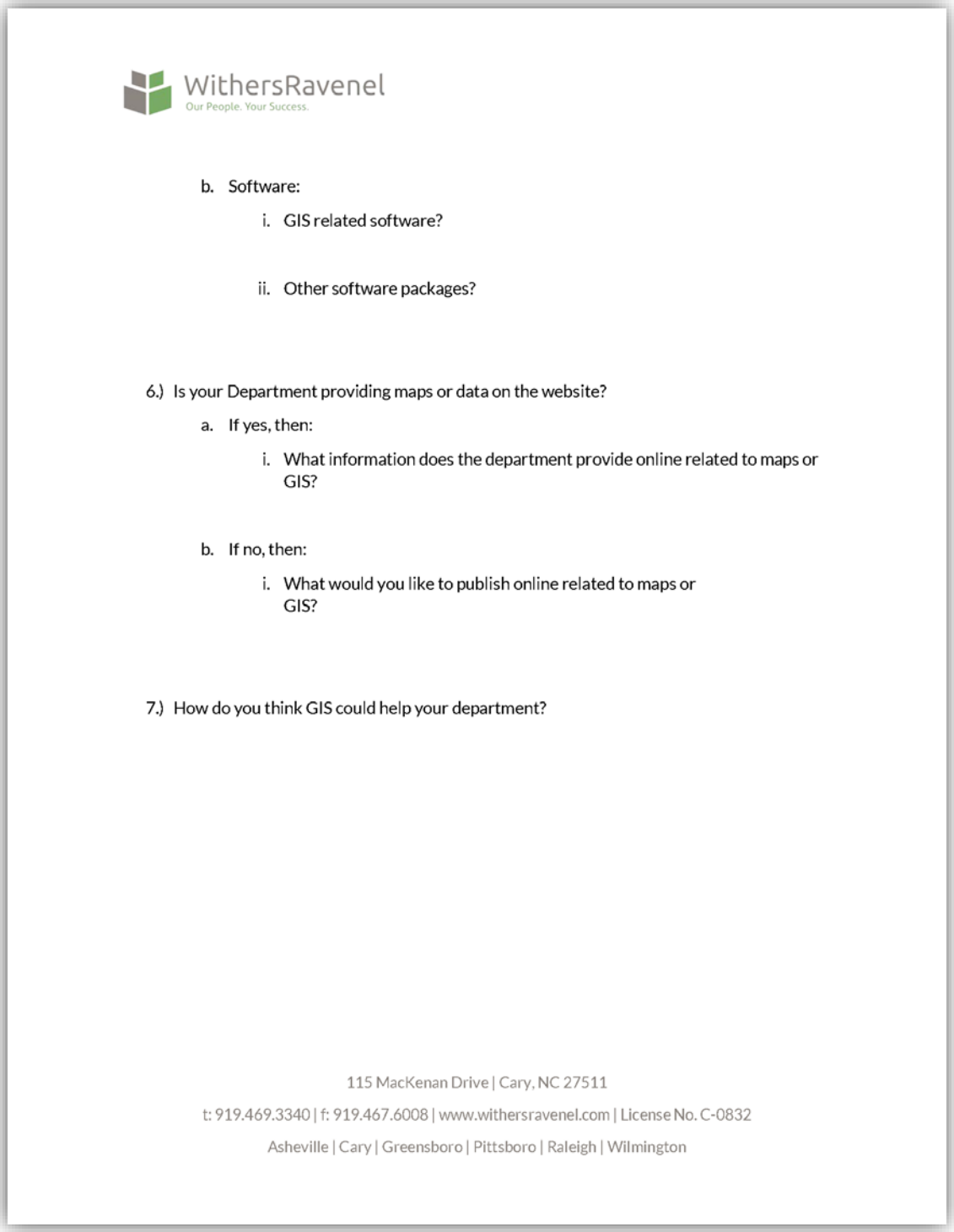

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b. Software:

i. GIS related software?

ii. Other software packages?

6.) Is your Department providing maps or data on the website?

a. If yes, then:

i. What information does the department provide online related to maps or GIS?

b. If no, then:

i. What would you like to publish online related to maps or GIS?

7.) How do you think GIS could help your department?

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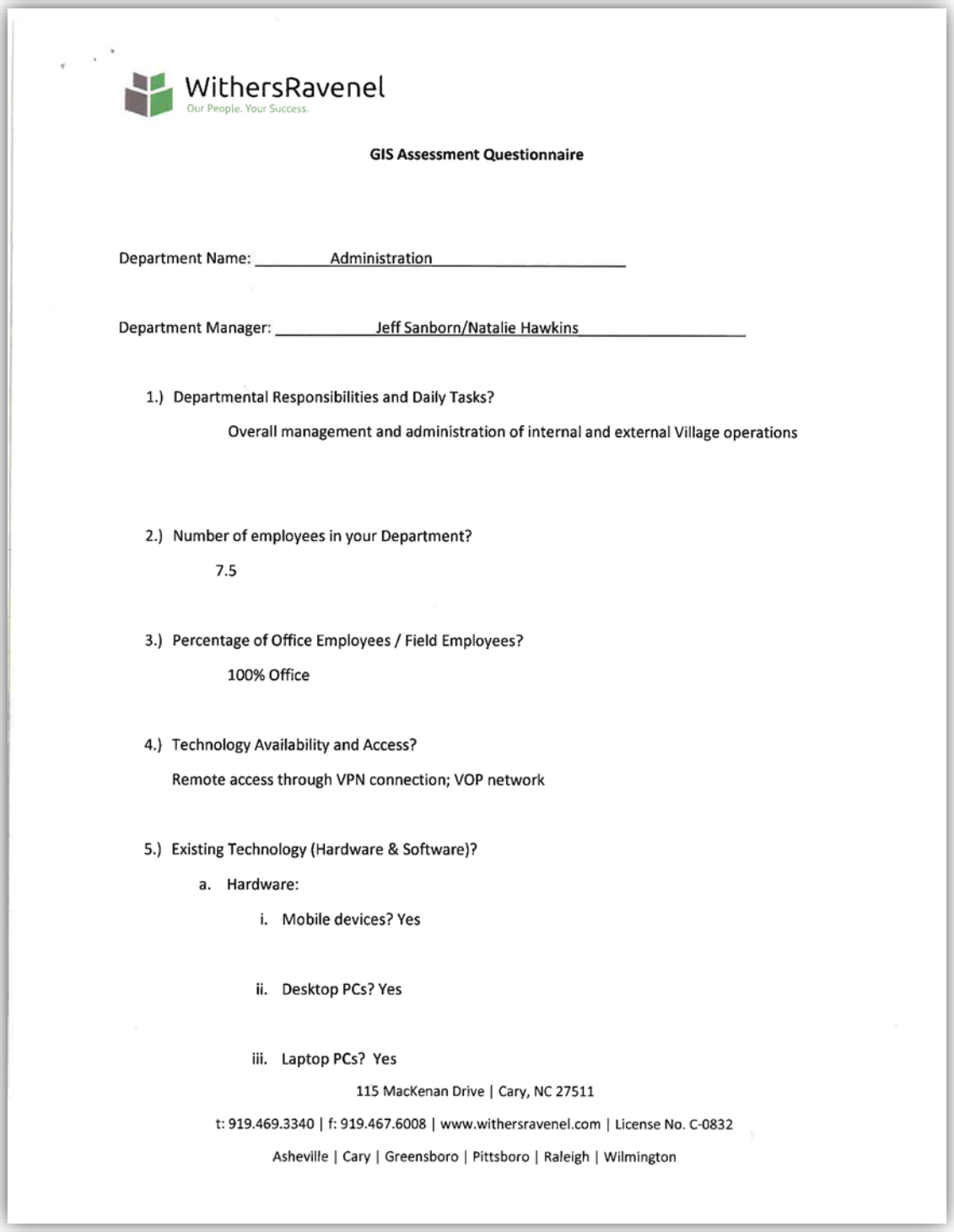

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GIS Assessment Questionnaire

Department Name: Administration

Department Manager: Jeff Sanborn/Natalie Hawkins

1.) Departmental Responsibilities and Daily Tasks?

Overall management and administration of internal and external Village operations

2.) Number of employees in your Department?

7.5

3.) Percentage of Office Employees / Field Employees?

100% Office

4.) Technology Availability and Access?

Remote access through VPN connection; VOP network

5.) Existing Technology (Hardware & Software)?

a. Hardware:

i. Mobile devices? Yes

ii. Desktop PCs? Yes

iii. Laptop PCs? Yes

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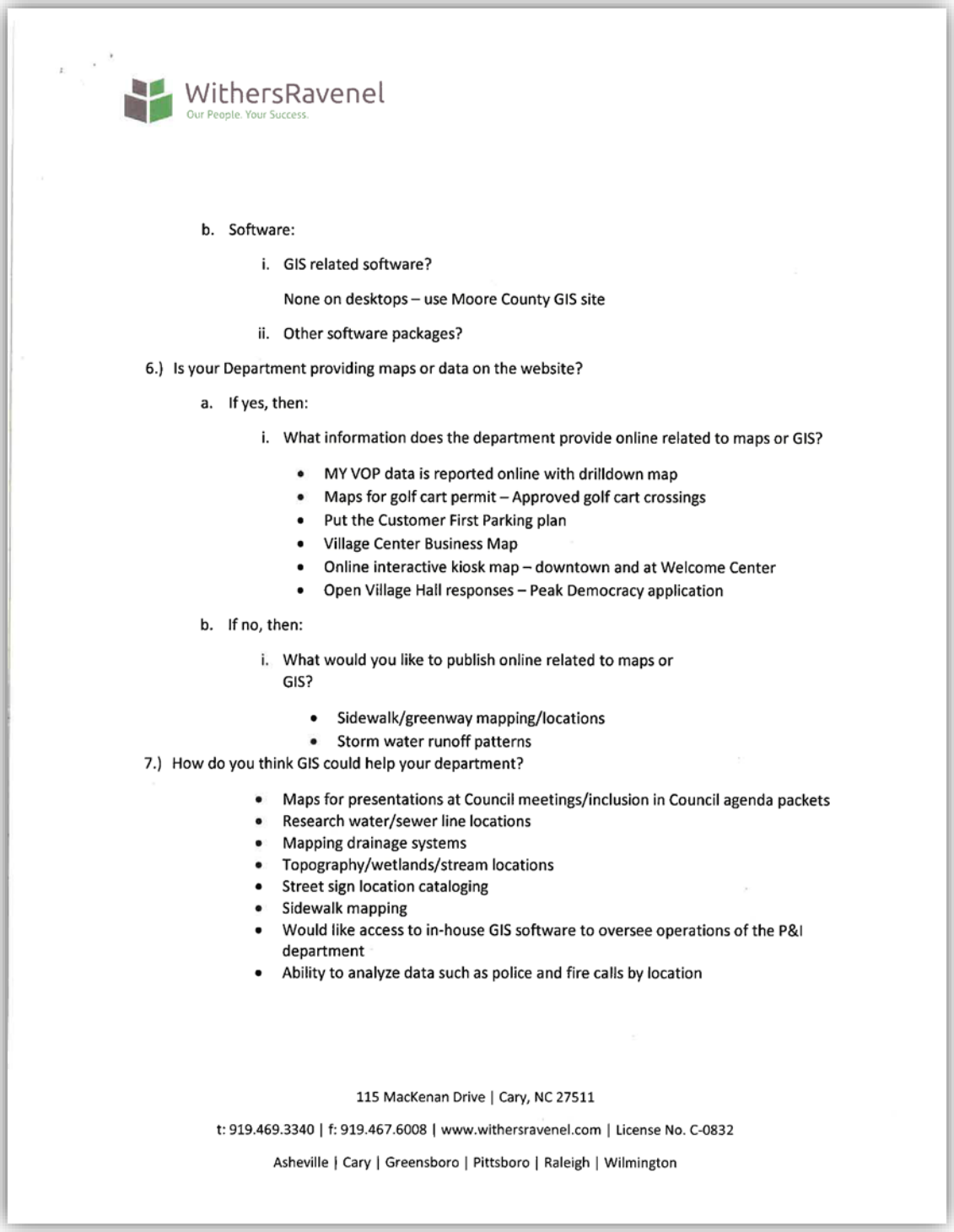

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b. Software:

i. GIS related software?

None on desktops – use Moore County GIS site

ii. Other software packages?

6.) Is your Department providing maps or data on the website?

a. If yes, then:

i. What information does the department provide online related to maps or GIS?

- MY VOP data is reported online with drilldown map
- Maps for golf cart permit – Approved golf cart crossings
- Put the Customer First Parking plan
- Village Center Business Map
- Online interactive kiosk map – downtown and at Welcome Center
- Open Village Hall responses – Peak Democracy application

b. If no, then:

i. What would you like to publish online related to maps or GIS?

- Sidewalk/greenway mapping/locations
- Storm water runoff patterns

7.) How do you think GIS could help your department?

- Maps for presentations at Council meetings/inclusion in Council agenda packets
- Research water/sewer line locations
- Mapping drainage systems
- Topography/wetlands/stream locations
- Street sign location cataloging
- Sidewalk mapping
- Would like access to in-house GIS software to oversee operations of the P&I department
- Ability to analyze data such as police and fire calls by location

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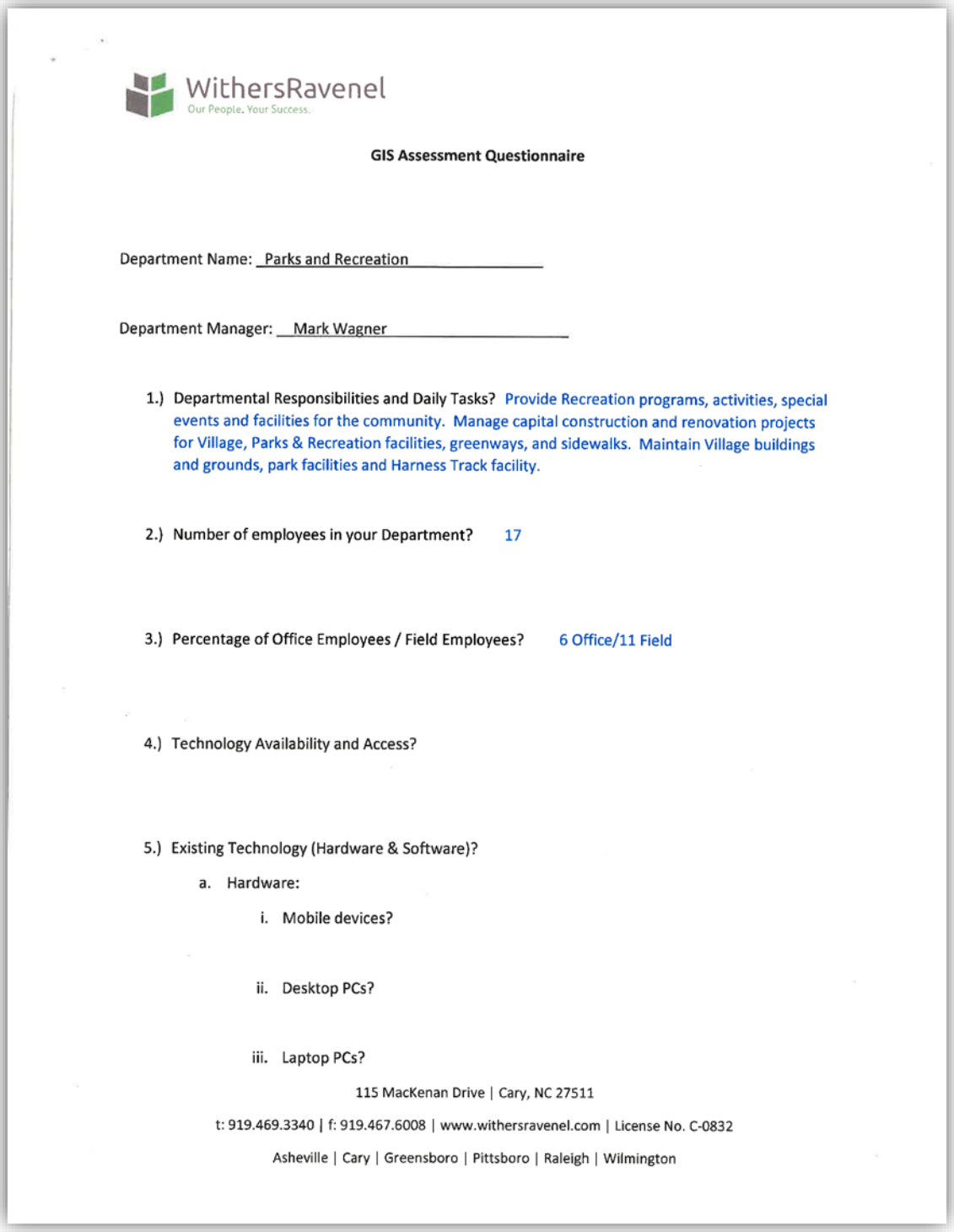
PARKS AND RECREATION PAGE 1:



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GIS Assessment Questionnaire

Department Name: Parks and Recreation

Department Manager: Mark Wagner

1.) Departmental Responsibilities and Daily Tasks? Provide Recreation programs, activities, special events and facilities for the community. Manage capital construction and renovation projects for Village, Parks & Recreation facilities, greenways, and sidewalks. Maintain Village buildings and grounds, park facilities and Harness Track facility.

2.) Number of employees in your Department? 17

3.) Percentage of Office Employees / Field Employees? 6 Office/11 Field

4.) Technology Availability and Access?

5.) Existing Technology (Hardware & Software)?

a. Hardware:

i. Mobile devices?

ii. Desktop PCs?

iii. Laptop PCs?

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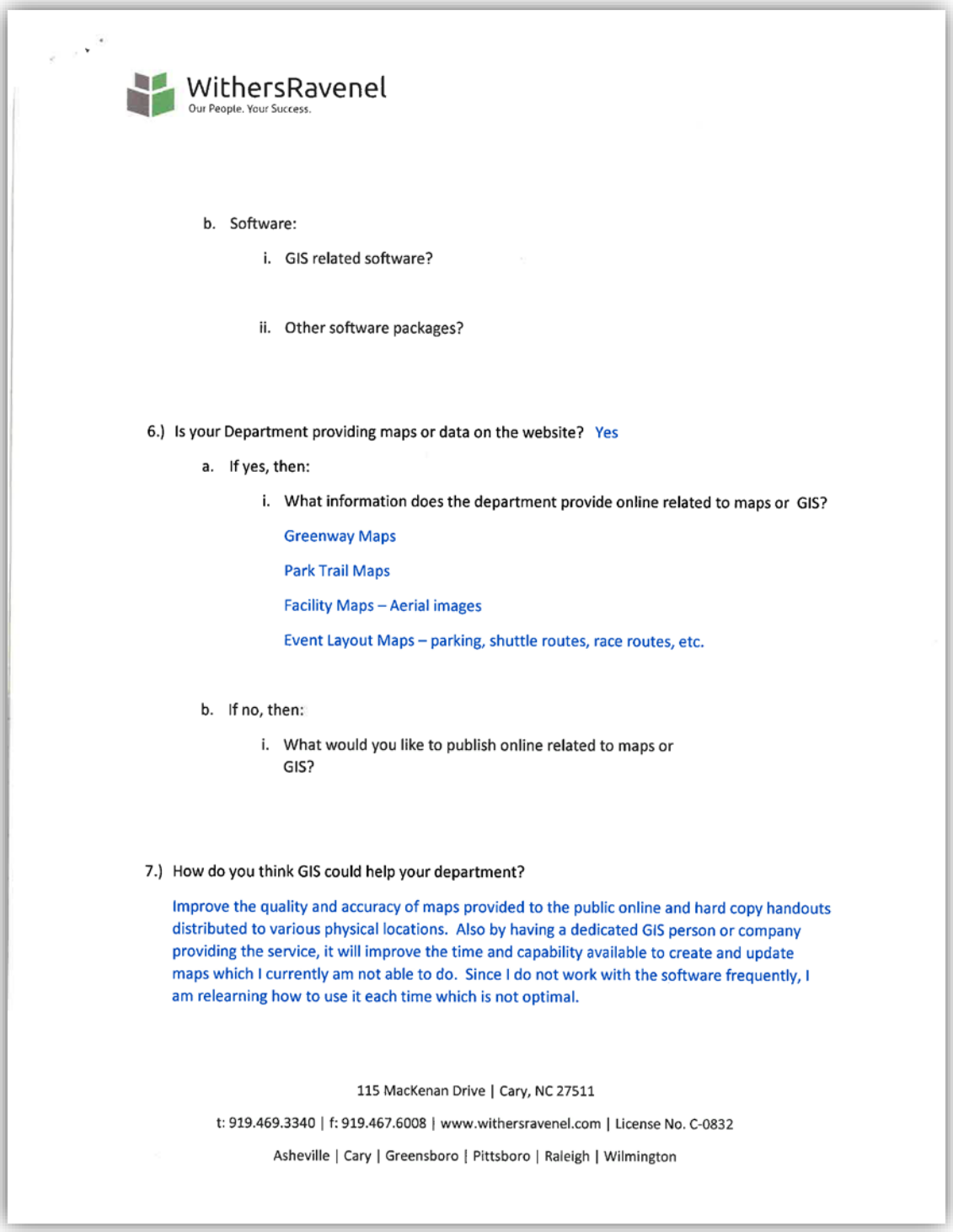
PARKS AND RECREATION PAGE 2:



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b. Software:

i. GIS related software?

ii. Other software packages?

6.) Is your Department providing maps or data on the website? Yes

a. If yes, then:

i. What information does the department provide online related to maps or GIS?

Greenway Maps

Park Trail Maps

Facility Maps – Aerial images

Event Layout Maps – parking, shuttle routes, race routes, etc.

b. If no, then:

i. What would you like to publish online related to maps or GIS?

7.) How do you think GIS could help your department?

Improve the quality and accuracy of maps provided to the public online and hard copy handouts distributed to various physical locations. Also by having a dedicated GIS person or company providing the service, it will improve the time and capability available to create and update maps which I currently am not able to do. Since I do not work with the software frequently, I am relearning how to use it each time which is not optimal.

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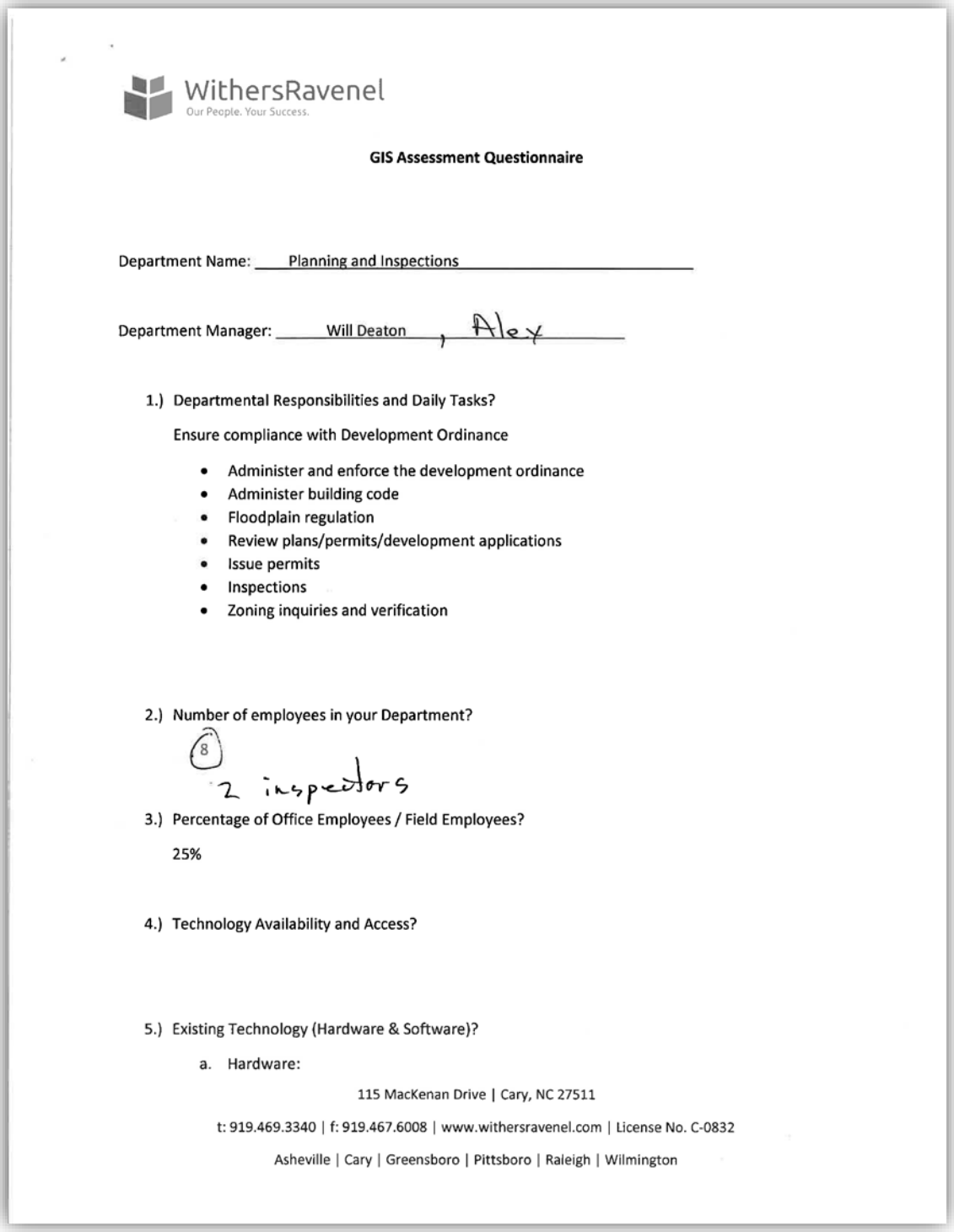
PLANNING AND INSPECTIONS PAGE 1:



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GIS Assessment Questionnaire

Department Name: Planning and Inspections

Department Manager: Will Deaton, Alex

1.) Departmental Responsibilities and Daily Tasks?

Ensure compliance with Development Ordinance

- Administer and enforce the development ordinance
- Administer building code
- Floodplain regulation
- Review plans/permits/development applications
- Issue permits
- Inspections
- Zoning inquiries and verification

2.) Number of employees in your Department?

8

2 inspectors

3.) Percentage of Office Employees / Field Employees?

25%

4.) Technology Availability and Access?

5.) Existing Technology (Hardware & Software)?

a. Hardware:

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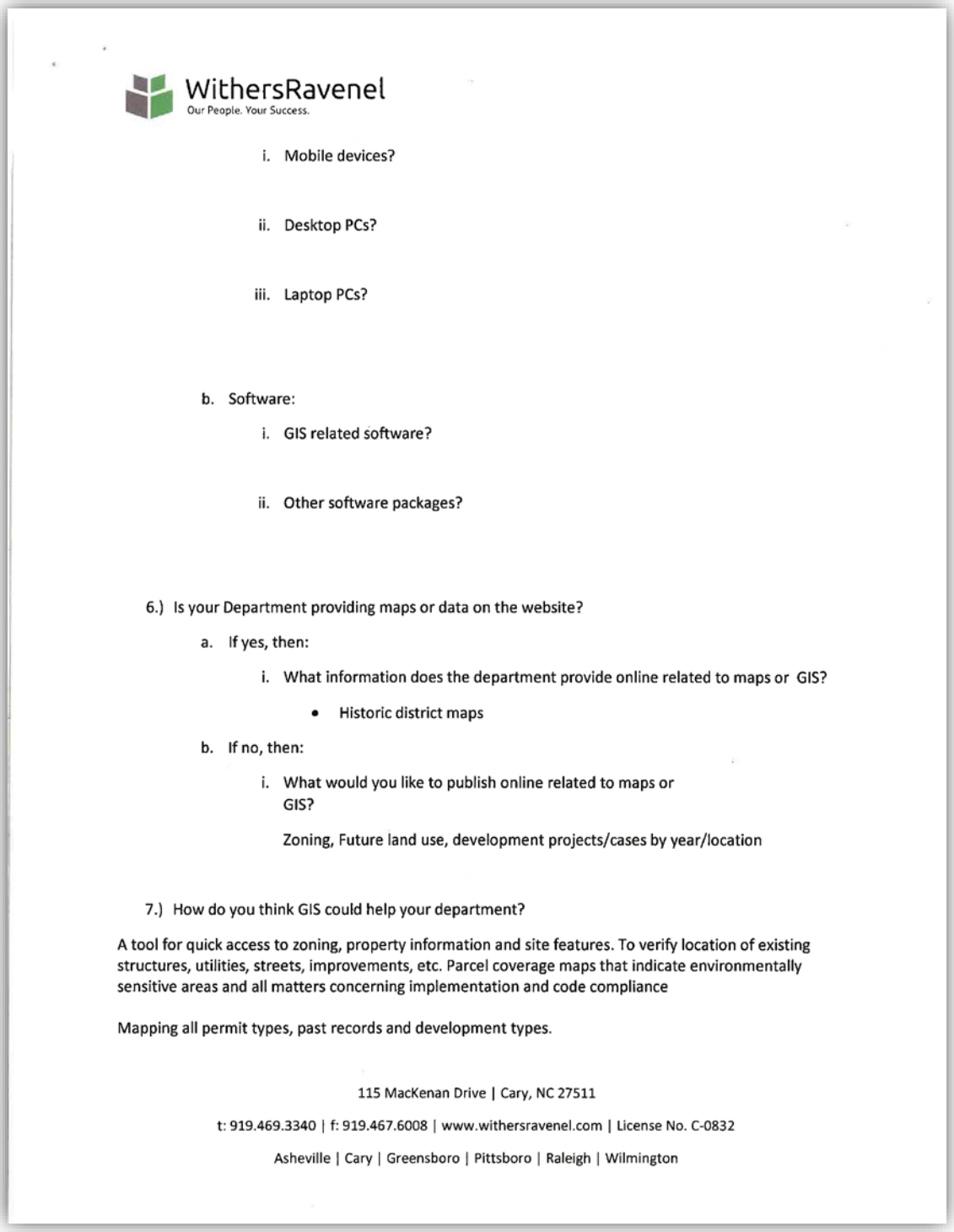

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i. Mobile devices?

ii. Desktop PCs?

iii. Laptop PCs?

b. Software:

i. GIS related software?

ii. Other software packages?

6.) Is your Department providing maps or data on the website?

a. If yes, then:

i. What information does the department provide online related to maps or GIS?

- Historic district maps

b. If no, then:

i. What would you like to publish online related to maps or GIS?

Zoning, Future land use, development projects/cases by year/location

7.) How do you think GIS could help your department?

A tool for quick access to zoning, property information and site features. To verify location of existing structures, utilities, streets, improvements, etc. Parcel coverage maps that indicate environmentally sensitive areas and all matters concerning implementation and code compliance

Mapping all permit types, past records and development types.

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PLANNING AND INSPECTIONS PAGE 3:

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Assistance with long range planning initiatives, visioning and fiscal analysis. Creating scenario maps. Analyze problems more quickly and thoroughly, find solutions and monitor long term progress.

Coordination of planning and economic development. Review analysis, compliance, historic preservation, redevelopment, regional planning.

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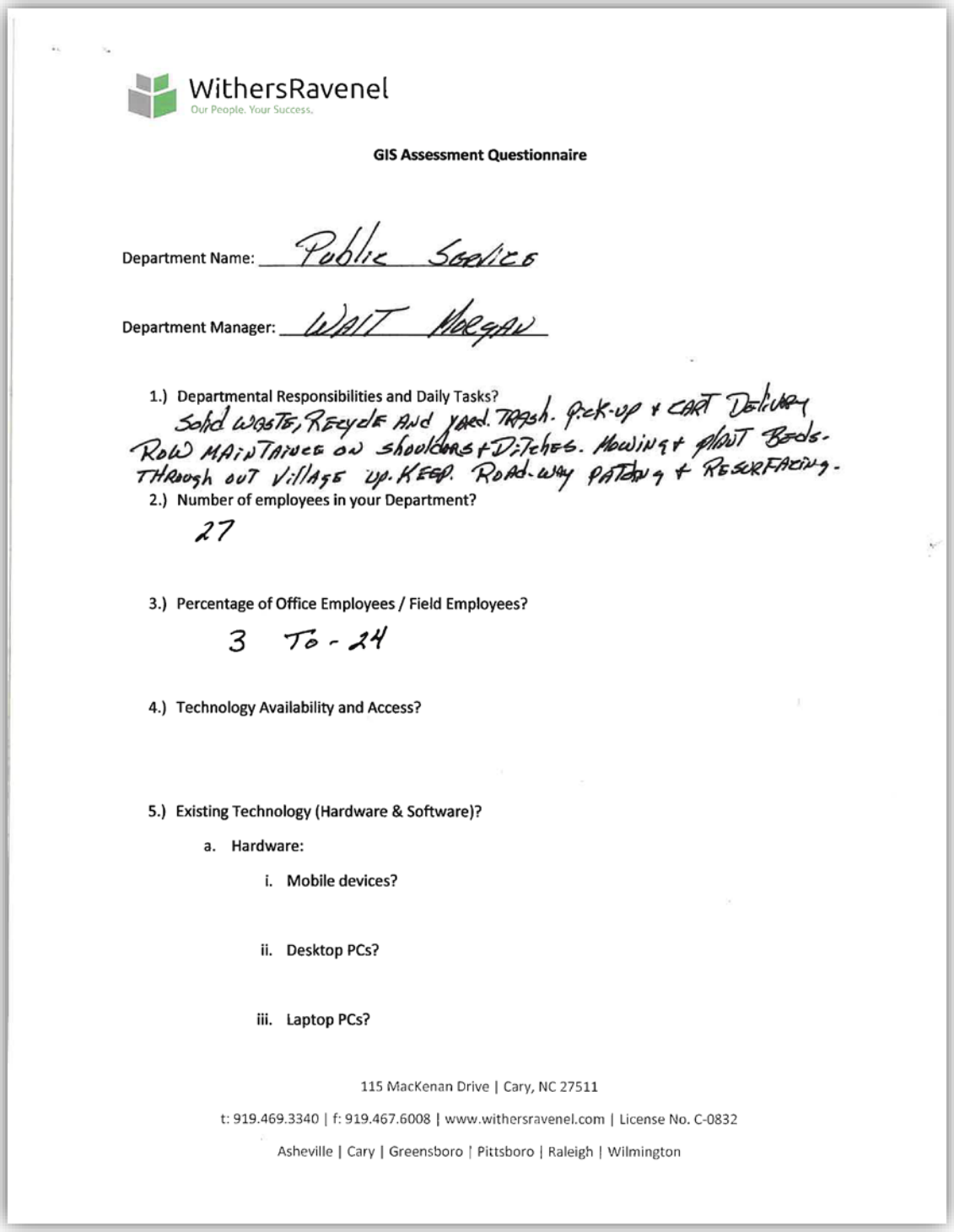
PUBLIC SERVICES PAGE 1:



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GIS Assessment Questionnaire

Department Name: Public Services

Department Manager: WAIT MORGAN

1.) Departmental Responsibilities and Daily Tasks?
Solid Waste, Recycle and yard. Trash. pick-up + cart Delivery
Row Maintained on shoulders + Ditches. Mowing + about Beds.
Through out Village up. Keep. Road-way patching + Resurfacing.

2.) Number of employees in your Department?
27

3.) Percentage of Office Employees / Field Employees?
3 To - 24

4.) Technology Availability and Access?

5.) Existing Technology (Hardware & Software)?

a. Hardware:

i. Mobile devices?

ii. Desktop PCs?

iii. Laptop PCs?

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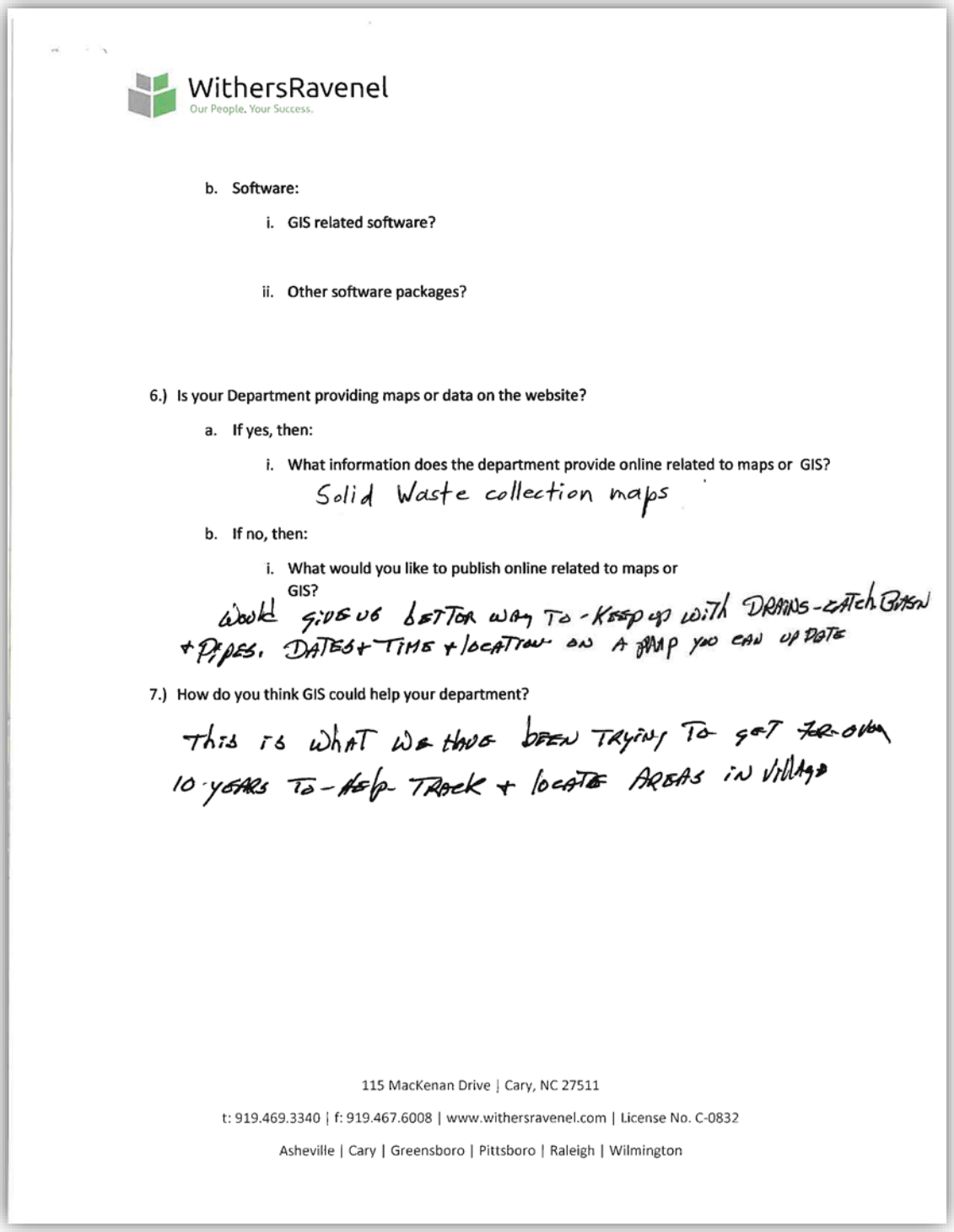

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b. Software:

i. GIS related software?

ii. Other software packages?

6.) Is your Department providing maps or data on the website?

a. If yes, then:

i. What information does the department provide online related to maps or GIS?

Solid Waste collection maps

b. If no, then:

i. What would you like to publish online related to maps or GIS?

Would give us better way to keep up with drains-catch basin + pipes, dates + time + location on a map you can up date

7.) How do you think GIS could help your department?

This is what we have been trying to get for over 10 years to help track + locate areas in Village

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