



# **Streamlining a City-wide Process for Optimal Small Cell Site Locations: A Collaborative Approach**



**CITY OF NAPERVILLE, ILLINOIS**  
**MAY 28, 2019**

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## Section A: System Information

### System Names

Streamlining a City-Wide Process for Optimal Small Cell Locations: a Collaborative Approach

### Exemplary Systems in Government Category

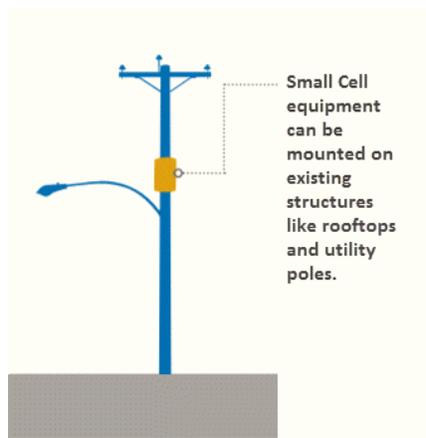
Enterprise Systems

### Letter from Executive Administrator Authorizing Submission

See **Attachment A**

### System Summary

In 2018, Illinois passed a state law, Illinois Public Act 100-585, the Small Cell Wireless Facilities Deployment Act which will assist in speeding up the implementation of 5G networks by private companies and result in requiring local authorities to rapidly issue new policies that would manage the deployment of small cell wireless infrastructure within their jurisdiction. Like many other cities across the country who have found



Small Cell equipment can be mounted on existing structures like rooftops and utility poles.

themselves in a similar circumstance, the City of Naperville had to quickly pull together a multi-department business process for incoming wireless vendor applications that needed to be reviewed. This quickly assembled ad-hoc process was composed of a variety of different applications such as city emails, Excel spreadsheets, Microsoft One Note, Microsoft SharePoint, and GIS maps.

In order to streamline the application submittals, the City Small Cell Site Review Team worked with GIS and IT staff to assist with designing a process that would result in all wireless providers submitting their data with geographic coordinates. Automation processes were created to use these coordinates to automatically populate a SharePoint list and a Geocortex Web map application to help guide staff during the review process and rapidly coordinate with providers to find optimal site

locations.

Developing the methods to update the SharePoint list and web maps required a creative technical approach to fully automate the process due to the large variety of data sources. Each would have to be streamlined to provide City staff with the information needed to make quick and accurate decisions. The IT-GIS team used a combination of scripting resources such as PowerShell, Python, ArcPy, and SQL Server Integration services to integrate with SharePoint and to import data from our ERP software into the GIS database.

The reason this system is exemplary is because the timeline, complexity, and cross-departmental nature of this project required both extensive communication and technical effort. After many months and numerous meetings, idea gathering sessions, and iterative testing we succeeded in automating the following processes used by the Small Cell Site Review Team to review incoming applications for optimal site locations:

- The initial small cell application submittal from wireless vendors for review of prospective pole sites, along with tracking the status of each proposed site location
- Daily update of data used in mapping applications for communicating site review status to both city staff and external telecom companies
- Update of SharePoint list and dashboard used to track inquiries

- Download of existing site applications from the City’s permit system SunGard Naviline
- Email notification to City staff when new sites were submitted or when the review period has been completed
- Notification of vendor when the review of an entire batch submitted is complete
- Update of GIS feature datasets that are under review as potential sites
- Location of small cell sites that have already been reviewed for either approval or rejection as an optimal site
- Location of all city-owned pole for electric utility poles, streetlight poles, and traffic signals (over 18,000 poles)
- Location of all poles that have existing permitted small cell hardware mounted shared in the web map

Automation of the above tasks allowed City staff to focus on the actual site location review, rather than administration of the inquiries and creation of reports needed for telecom vendors.

## Testimonial Letters

See **Attachments B, C, and D**

## Section B: Jurisdiction

### City of Naperville, Illinois

The City of Naperville has a population of 147,682. It has a City Council-City Manager form of government. The Naperville Municipal Center is located at 400 South Eagle Street, Naperville IL 60540. The City covers approximately 39.24 square miles, and is located approximately 30 miles west of Chicago. The annual operating budget is \$451.4 million.

### Mayor

#### **Steve Chirico**

400 South Eagle Street  
Naperville, IL 60540

### City Manager

#### **Doug Krieger**

400 South Eagle Street  
Naperville, IL 60540

### Application Contact

#### **GIS Coordinator**

#### **Eva Cancino**

400 South Eagle Street  
Naperville, IL 60540  
Phone: (630) 548-1318  
Fax: (630) 305-5957

## Section C: System Design

### Motivation for Change

After the Small Cell Wireless Facilities Deployment Act was implemented, it quickly became apparent that it would be necessary to define a more efficient and timely workflow for reviewing optimal site locations for small cell devices on street lights and utility poles throughout the city. The original process of tracking site location requests from telecom companies and their vendors was implemented by operations staff in the Transportation, Development, and Engineering Department (TED) using City email and a Microsoft OneNote Notebook. GIS staff had also quickly implemented a web map that showed the location of existing electric, streetlight, and traffic signal poles, but did not show the location of poles being reviewed. The original workflow would eventually lack the capacity to handle the influx of applications from telecom vendors. The workflow needed to be automated and refined so that City staff would have access to all the data needed to make the decisions throughout the review process.

*Screenshot of the notebook in Microsoft OneNote*

The screenshot shows a Microsoft OneNote page for a permit application. The page title is "19-55500013 (1091 Oswego Rd)". The page is divided into several sections:

- Master Matrix:** A list of permit numbers and addresses, with "19-55500013 (1091 Oswego Rd)" highlighted.
- APPLICATION FACTS:** A table with the following information:

METER ADDRESS:	1091 Oswego Road
POLE ADDRESS:	1103 Oswego Road
INSTALLATION TYPE:	ComED Pole
CITY POLE NUMBER:	098037
- Pole Attachment Agreement:** A section with the following details:

Required:	YES
Customer Notified:	YES
Status:	Pending from Legal
- FIRST SUBMITTAL:** A section with the following details:

Received:	1/18/19
Revised:	1/18/19
Review Deadline:	2/11/19

**Comments/Notes:** WAITING FOR CONFIRMATION FROM ELECTRIC ABOUT ALUMINUM

Status:

  - REJ
  - AP
  - APWC
  - HOLD
  - egal (Lutzke) - REJ  
NO ATTACHMENT AGREEMENT REQUIRED - COM ED POLE
  - DPW (Girard)
  - DPW (Rendek)  
Pole Location is acceptable

Sheet C-1 states aluminum replacement pole  
Detail on Sheet C-7 is for existing City Pole  
City prefers replacement pole with divider within the pole that separates the City power cables from the small cell wires. The concrete foundation is also modified to allow for additional raceways for the small cell wiring.

Equipment Pole Load Analysis is Required.  
Load analysis info must incorporate future City Banners and Security Cameras.
- Standards Notes:** A list of review items:
  - Water/WW (Bolster) - APC
  - Electric (Calderone) - REJ  
Payment Required  
Technical Concerns
  - Public Safety (Cordine)  
Location is acceptable. No Concerns.
  - TED Engineering - NA  
Need info on trenching or boring technique  
Need details of equipment
- Map:** A map showing the location of the pole at the intersection of Oswego Rd and another street.
- Street Light Poles:** A table with the following information:

Pole #:	098037
Pole Material:	Wood
Pole Height:	32 ft
Arm Design:	Single Arm
Arm Length:	18 ft
Coordinate Design:	LED Cables
Banner:	No
Small Cell:	NOT RESS

Each inquiry had a checklist that tracked approvals or denials from the Small Cell Site Review Team. This team consisted of members from the Legal Department, Public Works, Engineering and Development, Water and Electric Utilities. The team would review each

inquiry and then they would check off whether the site was approved or denied and add comments. If a pole was denied, an alternative location would be suggested.

As the team tracked an increased frequency of new requests, it quickly became difficult to manage. Each batch of up to fifty requests needed to be tracked and replied to within three weeks. This meant that each site location needed to be reviewed within that time period, and a report sent back to the telecom vendor detailing the status of all site locations submitted.

Reports needed to be generated and the information was not in a format accessible to reporting systems such as Power BI. The notification process was too costly to automate, and the maps used were static images rather than interactive searchable mapping applications. The system also had no way of saving the status of each site location, so City staff had to perform manual text searches to determine if a site location had been previously reviewed.

The Small Cell Site Review Team decided to contact the Information Technology Department's GIS group to see how the review process could be automated. Specifically, they wanted to improve the service the City was providing telecom companies to review small cell site locations. City staff also wanted to improve interdepartmental communication of the status of each site under review.

### Services Targeted for improvement

After an initial meeting with the Small Cell Site Review Team and the Information Technology's GIS Team, the following goals were determined:

- Save time gathering information for each specific site using GIS mapping applications
- Improve communication between City departments during the review process
- Automate the process of updating interactive GIS mapping applications
- Automate the notification process for the telecom companies as location submittals are completed
- Integrate data from the City's permitting system into GIS to track the status of all small cell installation permits

Six different departments and fourteen staff members were involved in the review process. In addition, each major telecom company was affected by the application and review process.

### Unexpected Benefits

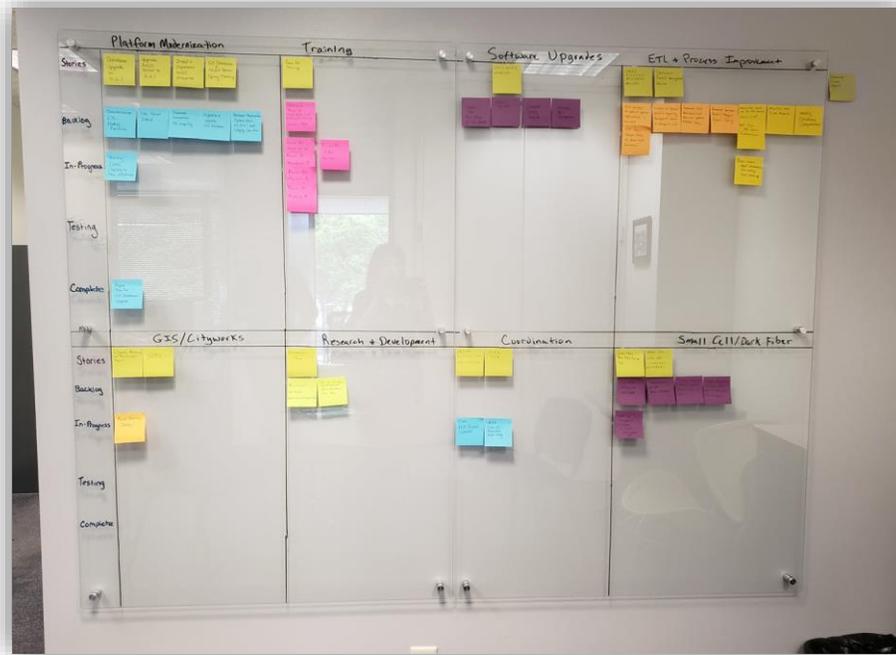
As the cross-departmental teams began working on improving the process, there were several unintended benefits. As each step progressed, the group was finding more ways to integrate data from different systems using scripting languages such as Python, PowerShell and integration technologies such as SQL Server Integration Services (SSIS). Lessons learned from previous GIS and automation projects were refined and altered to match the new scenario. The IT GIS Team applied and refined their newly implemented project management initiative; the

Agile two-week sprint process. Applying the Agile methodology allowed the team to continue to keep adapting as application requirements changed.

The team progressed through several new learning curves sharpening their skills in the following areas:

- A new way to download and process Excel spreadsheets stored in SharePoint using PowerShell
- New Geoprocessing libraries in Python's ArcPy libraries
- New process mapping techniques
- A new way to schedule automation scripts using SQL Server Integration Service

Another unexpected result was the increased level of trust between operations staff at the City and development staff in IT. Using the two-week sprint cycle reinforced this level of trust and kept goals both clear and flexible as requirements changed over time.



## System Design Problems Encountered

The initial system design faced two primary hurdles. The first and most difficult challenge was that the business process was only recently implemented and still evolving. The initial system design struggled to both stay flexible and find predictable opportunities for automation. Bi-weekly meetings helped to keep constant communication between operational staff on the Small Cell Site Review Team and development staff in IT. The challenge was to keep two-week sprint cycle tasks focused on deliverables that were more certain in nature rather than those that may face changes or be eliminated from the process altogether.

The second was a more technical hurdle. The PowerShell scripting libraries used to download and process Excel files and update SharePoint lists would not work the same in SharePoint Teams sites as they did for normal SharePoint sites. This required the team to go through a learning curve with new PowerShell libraries. This proved to be only a minor hurdle however and the IT-GIS team quickly adapted and were able to implement automation tasks in time for the new system to go live.

### What differentiates this system from others?

The original system for reviewing site locations was a manual process using email and Microsoft OneNote. Most typical workflows that are targeted for automation work are not usually completely manual in nature. Many times there are several disparate systems that need to be integrated, and in this particular project, it was the equivalent of pen and paper as the starting point.

In addition, the process was initiated based on a legally mandated requirement, which meant that there were no existing resources to use as a starting point. That meant the entire workflow automation was based on operational workflow that had never been established.

After the automation process was completed, the resulting system turned out to be a unique integration of processes and automation technologies. The new site review system uses a combination of PowerShell, Python and its GIS library ArcPy, SharePoint, InfoPath, Geocortex, ArcGIS Server and SQL Server Integration Services. Although this was a single process automation effort, this project affected each department involved in the site review process. the City's Water Utility, Electric Utility, Public Works, Transportation Engineering and Planning (TED), Legal and Communications departments all benefited from the automation process.

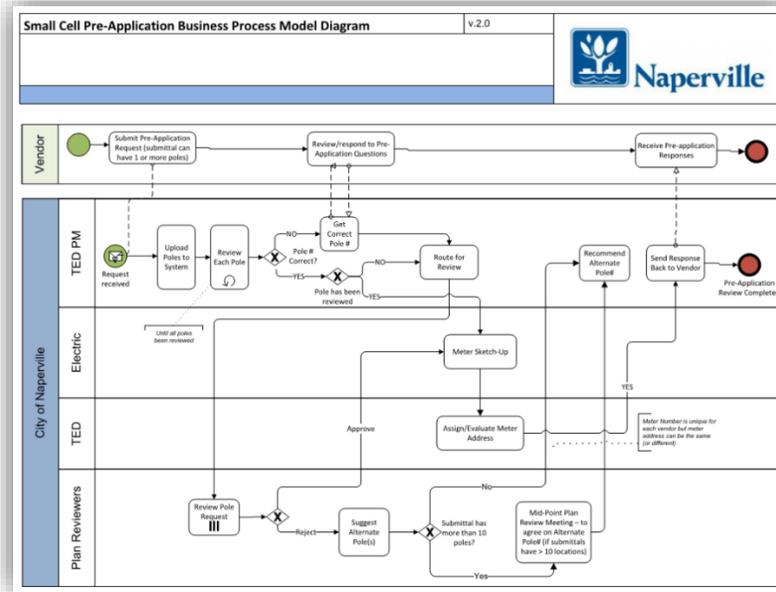
## Section D: Implementation

### Phases of Development

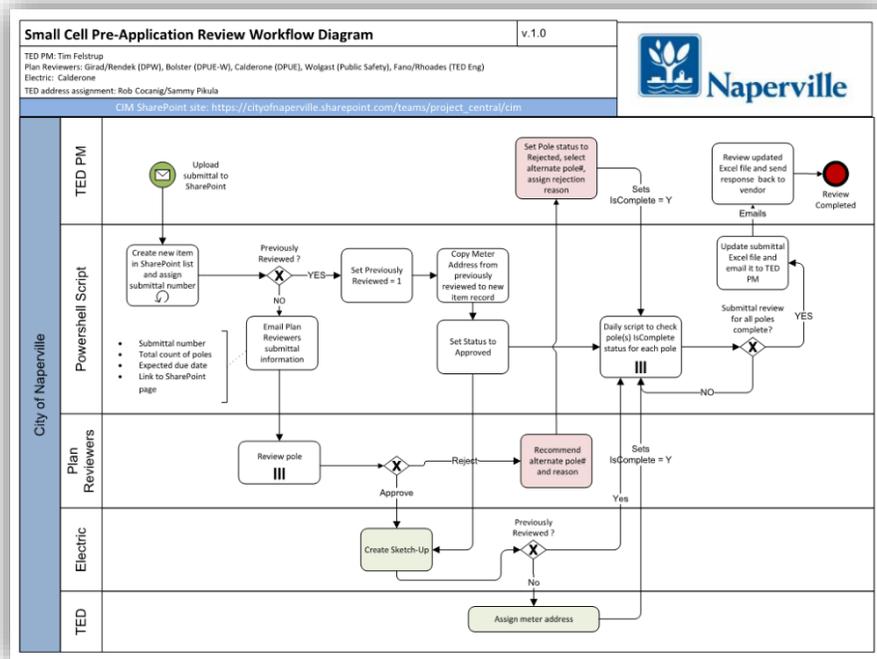
#### Phase 1: Design Phase

The GIS Team and IT staff began the project by meeting with leaders of the Small Cell Site Review Team and operational GIS staff technicians to define the existing business process and identify opportunities for automation. During this meeting, the GIS team and IT Business Analysts worked together to storyboard the process on a whiteboard and identified opportunities for improvement. The initial desired business process was mapped and then allowed to evolve over time.

The "Small Cell Pre-Application Business Process Model Diagram" walks the reviewer through the entire process from initial submittal of the vendor request to final evaluation of the site location.

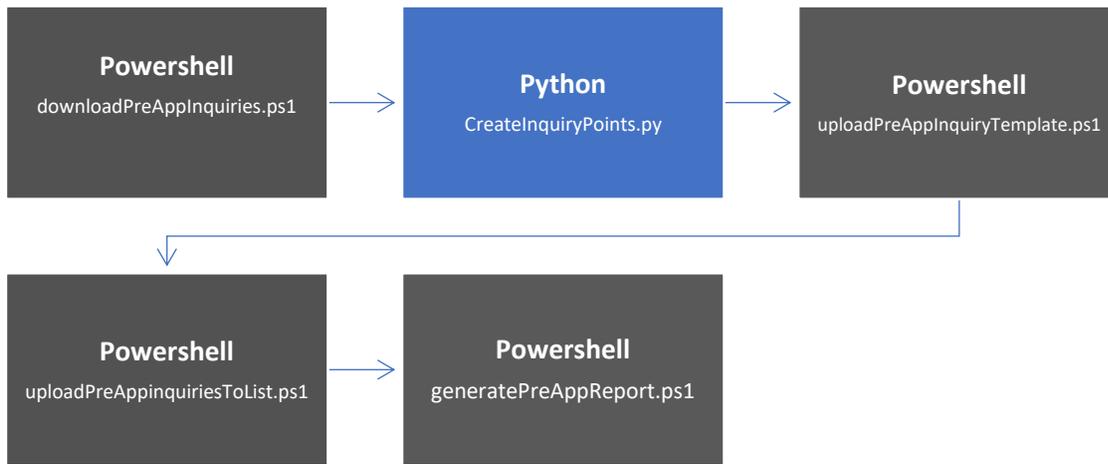


The “Small Cell Pre-Application Review Workflow Diagram” maps out the technical workflow that is launching the small cell review process.

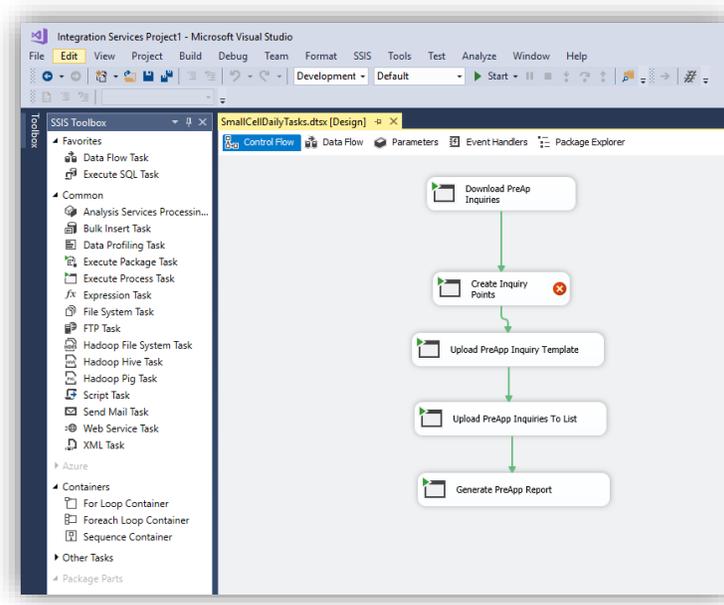


### Phase 2: Development and Automation Phase

During the automation phase the IT-GIS team defined the automation tasks for downloading Excel spreadsheets submitted by telecom vendors using PowerShell, creating ArcGIS feature classes with Python using the location information in the spreadsheets, creating interactive web applications and Power BI reports.



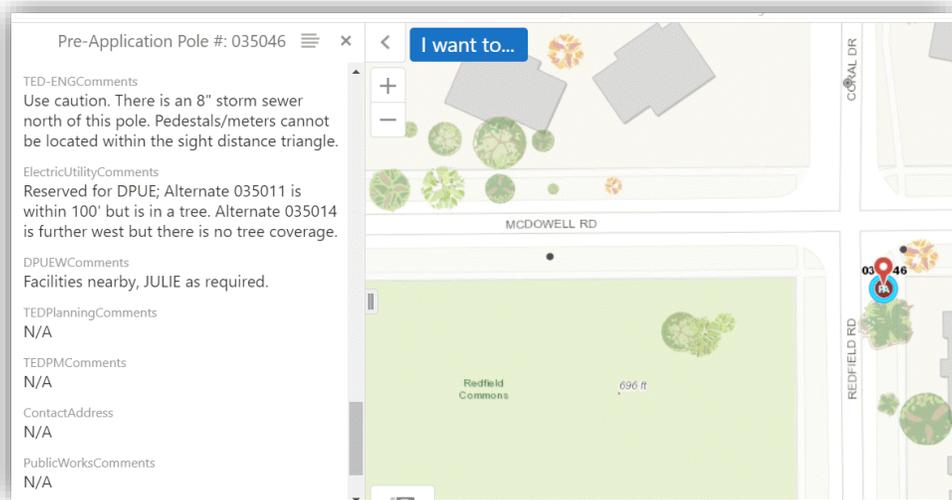
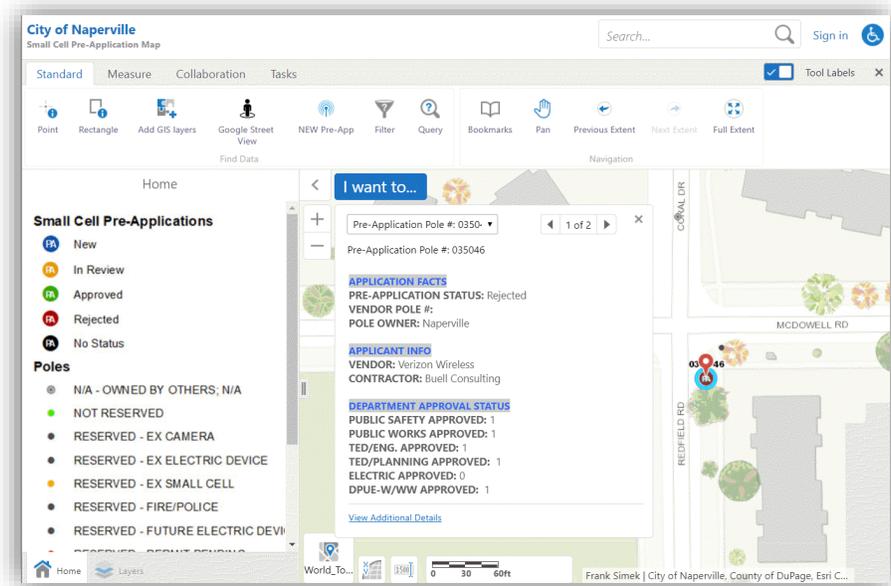
All resulting tasks were automated using SQL Server Integration Services.



### Phase 3: GIS Web App Development Phase

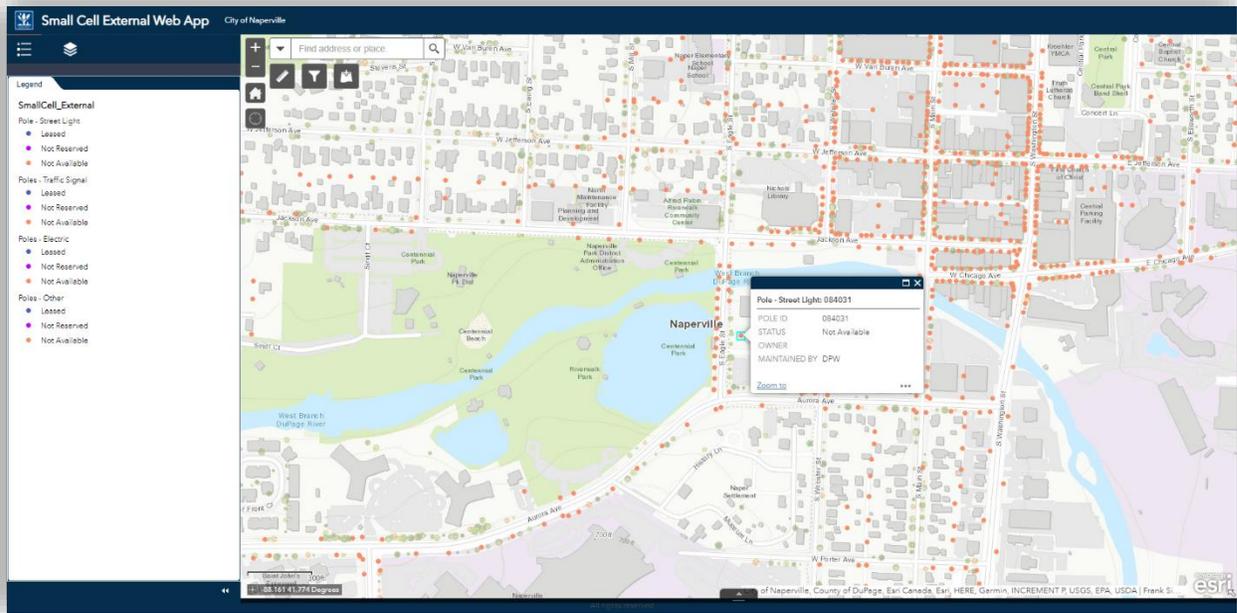
#### **Internal Web Mapping Application**

The internal viewer was created to facilitate the review process and to give departmental reviewers spatial context in order to make the best decision for locating optimal site locations. While the SharePoint List was a beneficial way to track and update the data, the map viewer allows users to work with multiple data source such as location of right of way trees and existing small cell locations.



## External Web Mapping Application

The external viewer was created as a means to communicate to interested telecom vendors the location of City-owned poles and poles that have existing permitted hardware installed on them. Because the public facing viewer only needed basic functionality, we chose to use the ESRI Web App Builder for its ability to be hosted on ArcGIS Online and for the easy-to-navigate interface.



## Modifications to the Original System Design

Currently no modifications to the original system design have been needed. However, we do anticipate as we move forward there will be opportunities to integrate some of the new capabilities in Office 365 such as Microsoft Flow and Microsoft PowerApps.

## Section E: Organizational Impact

### User community the system serves

This system serves both internal and external user communities. Internally, the system serves the cross departmental Small Cell Review Team listed below. As the telecom companies begin to ramp up their efforts to install small cell devices, an influx of requests is expected. The initial process in place was manual, prone to errors, and did not provide the information needed by the review team for each step in the process. The following list of reviewers highlights the cross departmental nature of the review team and shows each step of automated notifications during the process.

### Current List of Plan Reviewers

DEPT/ROLE	Names
LEGAL	Jennifer <a href="#">Lutzke</a>
DPW	Kathy <a href="#">Rendek</a> , Fred Girard, Anne Stillson
DPU-WATER/WW	Bill Bolster
DPU-Electric	Phil Calderone, Jesus Gonzalez, Giovanni Hernandez
Public Safety	Dirk Wolgast
TED <a href="#">Eng</a>	Ray Fano, Christine Rhoades
TED Planning	Tim <a href="#">Felstrup</a>
TED PM	Tim <a href="#">Felstrup</a> (Amy Emery as backup/secondary)
Meter Address	Sammie Pikula, Christine Liu

\*Plan Reviewers are shaded in green -->

### Workflow Notifications

#	Notification Description	System	Receivers
1	Notify reviewers to review uploaded poles	PowerShell	All Plan Reviewers
2	Notify Electric for Sketch-up	SharePoint	Phil Calderone, Jesus Gonzalez, Giovanni Hernandez
3	Notify TED for Meter address	SharePoint	Sammie Pikula, Rob <a href="#">Cocanig</a>
4	Notify TED PM for rejected pole	SharePoint	Tim <a href="#">Felstrup</a> , cc: Amy Emery
5	Notify TED PM when re-application review is completed per submittal	PowerShell	Tim <a href="#">Felstrup</a> , cc: Amy Emery

Externally, the system supports both the telecom community and Naperville residents. The system is designed with the purpose of streamlining the City’s response to site location requests, and ensuring that Naperville residents are kept informed so that they’re aware of right-of-way construction projects, as well as how they will benefit from them. Interactive status maps communicate to telecom vendors which sites have been approved, and residents can see where work is taking place now, as well as where it will occur in the future.

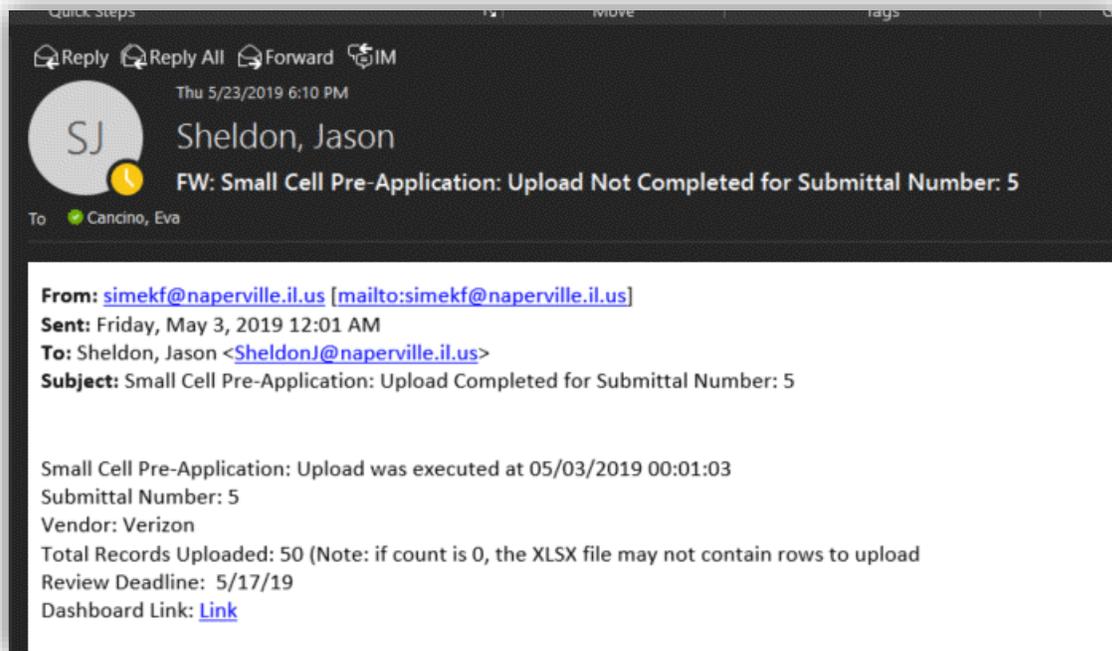
### Decisions Operation and Services Affected

The new process put in place provides City staff with information to make informed decisions regarding the site review process. Reports and analytics showing the status of submittals provide decision makers with information to track the number of requests, as well as the timeliness of city responses.

Interactive maps communicate to decision makers as well. City operations for road construction, or right-of-way improvement projects are improved as City staff can see ahead of time where small cell installations will be taking place. Call takers at the City can quickly respond to residents who call inquiring about installations of small cell devices occurring in their neighborhoods with up-to-date data that is easily searchable.

The City will also be able to handle far more inquiries than the previous manual system would have allowed. This means better service to both telecom companies and residents who ultimately benefit from the small cell installations.

Beyond these direct impacts, the City's IT-GIS team has been affected in a positive manner as well. The team went through several learning curves using new technologies that will benefit future projects throughout the City. This makes the IT-GIS team more responsive to automation projects of all kinds.



## Qualitative Impacts

The qualitative improvements to this process cannot be underestimated. The initial manual system required a tremendous amount of time to keep up-to-date and responsive to the onslaught of requests. This process was prone to errors, and inefficiencies. The City is required by law to respond to site review requests within a few short weeks. The automated nature of this system eliminated the manual data entry process and ensured the data in SharePoint and GIS systems were kept in sync.

Another qualitative impact was the improvement in notifications. Without an automated way to track submittals in batches, it would have been very easy to produce incomplete or inaccurate responses to telecom vendors.

Screenshot of spreadsheet returned to vendor showing the status of each site:

Review Results (Y=Approve; N=Rejected)							TO BE COMPLETED BY CITY OF NAPERVILLE			
Public Safety	Electric Utility	Public Works	DPU-W/WW	TED-Eng	TED-Planning	Meter Address	NAPERVILLE COMMENTS Please leave any comments here with your Initials/Dept (e.g. AE-TED: Comment; KC-PD: Comment, KR-DPW: Comment). If rejecting, please provide alternative pole #.	RECOMMENDED ALT. POLE #	GENERAL NOTES/Status	
Y	Y	Y	Y	Y	Y	1525 N Loomis St			Approved for Permit Application	
Y	Y	Y	Y	Y	Y	644 N Route 59			Approved for Permit Application	
Y	Y	Y	Y	Y	Y	800 W 5th Av			Approved for Permit Application	
Y	Y	Y	Y	Y	Y	659 E. Ogden Av			Approved for Permit Application	
Y	Y	Y	Y	Y	Y	1991 Stanford Dr			Approved for Permit Application	
Y	Y	Y	Y	Y	Y	4784 Snapjack Cr			Approved for Permit Application	
Y	Y	Y	Y	Y	Y	1522 Cortland Dr			Approved for Permit Application	
Y	Y	Y	Y	Y	Y	ComED	No pole attachment required; ComEd to Powe		Approved for Permit Application	
Y	Y	Y	Y	Y	Y	1251 Frontenac Rd			Approved for Permit Application	
Y	Y	Y	Y	Y	Y	458 Valley Drive			Approved for Permit Application	
Y	Y	Y	Y	Y	Y	510 Springhill Circle			Approved for Permit Application	
Y	Y	Y	Y	Y	Y	1435 Larsen			18-5550002	

### Quantitative Impacts

Quantitatively, the new system increases the number of requests that the City can respond to within the legally defined period. City staff can see quantitative reports highlighting which submittals need to be processed first, and the system provides up-to-date reports and dashboards that are kept in sync between SharePoint and GIS.

The new system also serves to reduce the overall number of site requests to be reviewed. Telecom companies can view on an interactive map which sites have already been approved or denied, saving them the effort of submitting duplicate requests. This reduces the stress on City staff, and allows telecom companies to focus on more productive efforts.

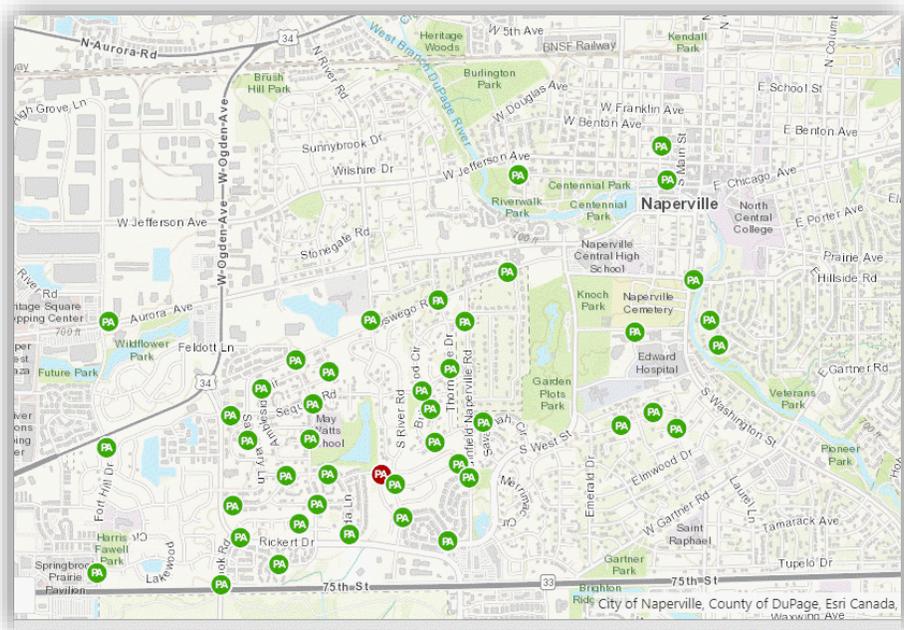
Small Cell Applications > 1 See all

Naperville Pole#	GIS Map	Pre-Application Sta...	Alternate Pole	Installation Type	Vendor	Total Review Compl...	workflowStatus
034074	<a href="#">View Map</a>	Approved		Streetlight	Verizon Wireless	6	Pending Meter Add
049078	<a href="#">View Map</a>	Approved		Streetlight	Verizon Wireless	6	Pending Meter Add
035046	<a href="#">View Map</a>	Rejected	35011	Streetlight	Verizon Wireless	6	Pending PM Review Rejected Pole
053019	<a href="#">View Map</a>	Rejected	53020	Streetlight	Verizon Wireless	6	Pending PM Review Rejected Pole

Pending Review							<a href="#">See all</a>
Submittal_Number	DTReviewDeadline	Vendor Name	Naperville Pole#	Installation Type	Link1	CNT_TotalReview	DPW
1		Verizon	34037	Light Pole - Medium	<a href="#">View Map</a>	4	Y
1		Verizon	4020	Light Pole - Medium	<a href="#">View Map</a>	3	
1	5/12/2019	Verizon	N/A	Light Pole - Tall	<a href="#">View Map</a>	1	
1	5/12/2019	Verizon	4003	Light Pole - Medium	<a href="#">View Map</a>	3	

Pending Sketch-Up						<a href="#">See all</a>
Submittal_Number	Vendor Name	Naperville Pole#	Link1	workflowStatus	Pre-Application Sta...	
4	Verizon	040063	<a href="#">View Map</a>	Pending Sketch-up	Approved	
4	Verizon	064067	<a href="#">View Map</a>	Pending Sketch-up	Approved	
4	Verizon	068053	<a href="#">View Map</a>	Pending Sketch-up	Approved	
4	Verizon	056046	<a href="#">View Map</a>	Pending Sketch-up	Approved	



## Effects on Productivity

The main increases in productivity came from the reduction in the amount of time the Small Cell Site Review Team needed to respond to incoming requests. The original system required an enormous amount of manual data entry, as well as the manual creation of static map images. City staff is now freed up to work on more productive tasks within their departments.

The new system has also reduced the total number of duplicate submittals. Internal web mapping applications allow City staff to instantly see if a site has previously been reviewed.

## Other Impacts of the System

The process of automating the review brought on several positive changes. Cross-department teams began interacting more closely and a sense of teamwork and trust was created. Business Systems Analysts in IT worked with Project Managers on the Development Team to map out business processes, as well as streamline the use of SharePoint lists. The GIS-IT Team used these to find opportunities to automate the process.

Communication between all teams created a new network of talent that can be used in future projects that may involve similar processes. In this manner, this project can serve as a model for cross departmental cooperation.

Finally, this project created a more amicable relationship between the telecom vendors and the Small Cell Site Review Team. The telecom vendors have higher confidence that their site review requests will be handled efficiently and in a timely manner, and City staff can better track the requests and provide more detailed responses.

## Changes in How Business is Conducted

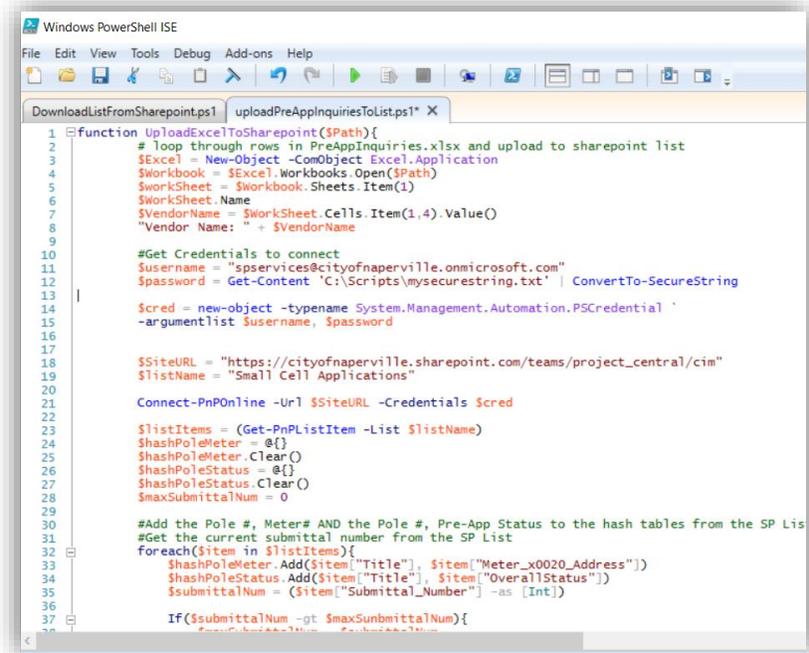
The original system required the Small Cell Site Review Team Project Manager to manually create a Microsoft OneNote page for each site review request. This required extensive manual data entry to copy the data from the excel spreadsheet that the telecom vendors provided. In the new system, the manager only needs to copy the spreadsheet submitted by telecom vendors into a SharePoint folder. The automation scripts perform a check each day to see if a new spreadsheet exists. If so, the scripts create a batch submittal ID number and then inserts each item into the SharePoint list.

*Spreadsheet submitted by telecom vendors for each site to be reviewed.*

	A	B	C	D	E	F	G	H	I	J	K	L
1	PRE-APPLICATION NAME:		Verizon via Insite									
2	DATE SUBMITTED TO CITY OF NAPERVILLE:		Varies									
3												
4	TO BE COMPLETED BY APPLICANT											
5	#	Naperville Pole #	Lat	Long	Pole Address	Nearest Street Intersection to Pole	Installation Type	Pole Owner (City of Naperville, ComEd, Other)	Ground Mounted Equipment Anticipated (Y OR N)	Pole Replacement (Y OR N)	Desired Pole Height When Installed (Feet)	Questions/Comments
6	1	040063	41.793660° N	88.143270° W			Streetlight					
7	2	064067	41.778610° N	88.205480° W			Streetlight					
8	3	068053	41.780660° N	88.163700° W			Streetlight					
9	4	056046	41.786000° N	88.136800° W			Streetlight					
10	5	TBD					Streetlight					
11	6	260046	41.681040° N	88.190880° W			Streetlight					
12	7	144080	41.741590° N	88.147920° W			Streetlight					
13	8	212049	41.702530° N	88.217150° W			Other					
14	9	046001	41.790700° N	88.229070° W			Streetlight					
15	10	067056	41.779740° N	88.173980° W			Streetlight					
16	11	072030	41.782220° N	88.125870° W			Streetlight					
17	12	456230	41.786690° N	88.115360° W			Streetlight					
18	13	NA					Other	ComED				
19	14	087042	41.776550° N	88.119670° W		Oleson & Chicago	Streetlight					
20	15	072011	41.783910° N	88.121470° W			Streetlight					
21	16	144002	41.747640° N	88.147780° W			Streetlight					
22												

The automation scripts also perform a check of each location submitted to see if they have previously been approved or denied. If it has been previously reviewed, the review status is automatically updated when the new list item is created. The Python portion of the automation creates point features based on x,y coordinates in a GIS dataset. These datasets are hosted in web map applications used both internally and externally.

*Screenshot of PowerShell scripts upload Excel data to SharePoint list.*



```
1 function UploadExcelToSharepoint($Path){
2     # Loop through rows in PreAppInquiries.xlsx and upload to sharepoint list
3     $Excel = New-Object -ComObject Excel.Application
4     $Workbook = $Excel.Workbooks.Open($Path)
5     $Worksheet = $Workbook.Sheets.Item(1)
6     $Worksheet.Name
7     $VendorName = $Worksheet.Cells.Item(1,4).Value()
8     "Vendor Name: " + $VendorName
9
10
11     #Get Credentials to connect
12     $username = "spservices@cityofnaperville.onmicrosoft.com"
13     $password = Get-Content 'C:\Scripts\mysecurestring.txt' | ConvertTo-SecureString
14
15     $cred = new-object -typename System.Management.Automation.PSCredential `
16     -argumentlist $username, $password
17
18     $SiteURL = "https://cityofnaperville.sharepoint.com/teams/project_central/cim"
19     $listName = "Small Cell Applications"
20
21     Connect-PnPOnline -Url $SiteURL -Credentials $cred
22
23     $listItems = (Get-PnPListItem -List $listName)
24     $hashPoleMeter = @{}
25     $hashPoleMeter.Clear()
26     $hashPoleStatus = @{}
27     $hashPoleStatus.Clear()
28     $maxSubmittalNum = 0
29
30     #Add the Pole #, Meter# AND the Pole #, Pre-App Status to the hash tables from the SP List
31     #Get the current submittal number from the SP List
32     foreach($item in $listItems){
33         $hashPoleMeter.Add($item["Title"], $item["Meter_x0020_Address"])
34         $hashPoleStatus.Add($item["Title"], $item["OverallStatus"])
35         $submittalNum = ($item["Submittal_Number"] -as [Int])
36
37         If($submittalNum -gt $maxSubmittalNum){
38             $maxSubmittalNum = $submittalNum
39         }
40     }
41 }
```

The original system also required the Small Cell Site Review Team Project Manager to periodically perform a manual review of approval/denial check boxes in hundreds of Microsoft OneNote documents. While these documents were meticulously maintained, it made tracking entire batches of requests extremely difficult. The Project Manager had to review each individual site in a batch to see if all of them had been reviewed or not. This manual review process was replaced with a SharePoint dashboard. All members of the Small Cell Site Review Team can now see the status of each site in each batch submitted.

City staff would also have to manually create a spreadsheet with review notes to send to the telecom vendors once a submitted batch was complete. This process was replaced with a daily automation script that checks the status of each site request in each submittal. Once each site request has been either approved or denied, the automation script creates a spreadsheet with each site request, as well as notes of approval or denial. This spreadsheet is then automatically emailed to the Small Cell Site Review Team manager for review before forwarding to the telecom vendors.

Finally, the daily automation scripts update each site location in GIS based on any changes that may have occurred in the SharePoint list. This ensures that the data is kept in sync between systems with no manual data entry

*Screenshot of Python Script to create GIS dataset points.*

```
CreateInquiryPoints.py
No Python interpreter configured for the project
61 sContactAddress"])
62
63 with open('C:\\docs\\PreAppData.txt') as csvfile:
64     isheader = True
65     for r in reader(csvfile, delimiter=','):
66         pprint(r)
67         if isheader == False:
68             pprint(len(r))
69             sNapervillePoleNum = r[0].strip()
70             pprint(sNapervillePoleNum)
71             sVendorPoleNum = r[1].strip()
72             sPoleAddress = r[2].strip()
73
74         try:
75             fLat = float(r[3][0:8])
76         except:
77             fLat = 0.00
78         try:
79             fLng = float(r[4][0:9])
80         except:
81             fLng = 0.00
82         xy = (fLng, fLat)
83
84         sMeterAddress = r[5].strip()
85         sInstallationType = r[6].strip()
86         sVendorComments = r[7].strip()
87         sVendorName = r[8].strip()
88         sVendorContractor = r[9].strip()
89         sVendorContract = r[10].strip()
90         sContactPhone = r[11].strip()
91         sContactEmail = r[12].strip()
92         sPoleOwner = r[13].strip()
93         sCLAvail = r[14].strip()
94         sRowControlNum = r[15].strip()
95         sPublicSafetyReview = r[16].strip()
96         sPublicSafetyReview = strings_to_numbers(sPublicSafetyReview)
97         sPublicWorksReview = r[17].strip()
```

## Section F: System Resources

### Primary Hardware Components

#### ArcGIS Server 10.3.1

Windows Server 2012 R2  
100 GB, 28 GB RAM, 12 CPUs

#### Geocortex Essentials Server

Windows Server 2012 R2  
70 GB, 8 GB RAM, 4 CPUs

#### Automation Server

Windows Server 2012 R2  
60 GB, 16 GB RAM, 4 CPUs

#### SQL Server

Windows Server 2008 R2  
280 GB, 132 GB RAM, 16 CPUs

## Primary Software Components

ArcGIS Desktop 10.5.1  
ArcGIS Server 10.3.1  
ArcGIS Online  
ESRI WebApp Builder  
Geocortex Essentials 4.9.2 and HTML5 Viewer 2.10.1  
SQL Server 2008 R2  
SunGard Naviline  
Microsoft SharePoint Online  
SQL Server Integration Services

## System Data

The system uses permit data that is extracted from our SunGard Naviline ERP software. This data is joined with GIS point feature classes to show locations of each site to be reviewed. This GIS data is stored in a SQL Server 2008 R2 Enterprise Geodatabase. Site data is stored in a SharePoint list. This list is converted to spatial data in the same SQL Server 2008 R2 Geodatabase. Initial site review requests and final responses back to telecom vendors are stored in Excel spreadsheets.

## Staff Resources

2.5 FTE City staff resources.

## Unusual Resource Reporting

The City is currently in the middle of a new ERP implementation. The process currently involves using data that is being tracked in our legacy ERP System (SunGard Naviline) because the new ERP system (Tyler Munis EnerGov) is not fully implemented.



# Naperville

May 28<sup>th</sup>, 2019

RE: Authorization of Submission for the **URISA Exemplary Systems in Government Award**

To Whom It May Concern:

On behalf of the Technology Department of the City of Naperville, I am pleased to authorize the submission of our “Streamlining a city-wide process for Small Cell Deployment” for your consideration of the prestigious **URISA Exemplary Systems in Government Category**.

GIS is a critical and integral part of the City of Naperville business operations. Widely used by the Police Department, Fire Department, Finance Department, Transportation/Engineering and Development Department, Public Works Department and Electric & Water Utilities Departments, GIS plays an important role in increasing work efficiencies and citizen engagement.

In 2018, Illinois passed the Small Cell Wireless Facilities Deployment Act (Illinois Public Act 100-585) with the intent to help Telecommunications companies speed up the implementation of 5G networks by requiring local authorities to rapidly issue new policies and permits to manage the deployment of small cell wireless infrastructure within their jurisdiction.

A cross-functional team from different departments along with GIS team members designed and automated a process to facilitate and expedite the application submittal, review and approval process. In addition to saving time and effort for the applicants and City staff, the process improves public service by providing transparency on the status of Small Cell deployment in Naperville.

I am very proud of the team’s innovation and achievement and strongly believe that this project is deserving of this award.

Thank you for considering Naperville for this award.

Sincerely,

A handwritten signature in blue ink that reads "Jacqueline Nguyen". The signature is fluid and cursive.

Jacqueline Nguyen  
Interim Information Technology Director



May 28, 2019

To Whom it May Concern:

I am excited to write a letter of support for the 2019 URISA Exemplary Systems in Government Award for the nomination of the City of Naperville's Small Cell Pre-Approval process as an outstanding example of automating a workflow using GIS. The effort has literally transformed our process to make the overwhelming manageable.

Across America 5G technology is coming. The rollout of this technology requires a blanket of fiber optic wires and cellular antennae installations within municipal right-of-way (ROW) and on city assets (e.g. traffic signals and streetlights). The Illinois State Statute guarantees many rights to the communication providers and requires municipalities to review, process, and approve applications under extremely tight timelines. In Naperville alone, thousands of locations are anticipated with each requiring individual permit review.

Every application for an installation in our City ROW, must be routed for technical review by representatives of many City departments and divisions (e.g., Fire, Engineering, Building, Public Works, Electrical and Water Utilities and more). These reviews are critical to making sure new installations will not adversely impact existing water, sewer, electric or other infrastructure.

The automated workflow using GIS has empowered our staff to handle hundreds of small cellular requests with great ease. Before the GIS, we would cobble together comments in a MS Word document with each department adding to the document in a different color. The document would be repeatedly emailed between staff as updates were added. Tracking separate requests was quickly becoming impossible using available tools (e.g. OneNote). The new automated GIS based workflow has completely replaced the clunky, troublesome, inefficient process.

Now, when we receive a batch of locations from a customer (in an MS Excel file) for city review, we simply upload the spreadsheet into SharePoint. From there, it automatically converts each requested location into a simple form for staff members in each department to easily input their review results and any comments. Departments can quickly see what others are saying and also access GIS maps to thoroughly assess each application with one click. At the end of the review period, all the comments are easily extracted into a single spreadsheet that is returned to the customer.

I wholeheartedly give my highest endorsement for this award. We would not be able to keep up with the incoming volume of permit requests without this automated process. Since it has rolled out, we have used the workflow nearly every day to facilitate reviews of the wave of requests submitted to the City of Naperville.

Sincerely,  
  
Amy Emery, AICP  
Operations Manager



May 24, 2019

To Whom it May Concern,

My name is Tim Felstrup and I am the Project Manager assigned to the management of right-of-way permits for the City of Naperville. Recently, with new advancements in telecommunication technology we have seen a large increase in the number of permit applications for installations of facilities in the right-of-way to construct the infrastructure required to support the upcoming 5G network rollout through small cell transmissions. We were faced with a problem on several levels; the number of requests, the relationship of the proposed equipment to existing City owned infrastructure, the number of applicants submitting requests, and that most of the proposed locations are not associated with existing address points since they are not on private property.

To help us manage the inundation of requests we turned to our IT Department's GIS Team to help us develop a tool that would utilize the City's existing software including our permitting system and our GIS system and utility infrastructure layers and keep a history of the requests to help us manage future requests. The Small Cell Pre-Application process tool developed for this project really helps check all the boxes for this project. It provides a "one stop shop" where representatives from our plan review departments are notified when a new request comes in with a link and a due date, that the reviewer can follow to the application. This tool also includes a link to our GIS map so right from the dashboard the reviewer can go right to the utility pole location under review and look at the layers of our existing infrastructure for their review. It gives them a place to enter their comments for the location, records a history of the review for the utility pole in case future telecom customers inquire about the same location our reviewers do not have to duplicate efforts. The tool helps keep track of all associated with the request and the automation built into the system really maximizes the efficiency of the process and all involved with it.

I am proud of the development of this tool and the work done by the team in creating it. They were great to work with, brought excellent ideas for solutions to the team and were crucial to the solidification of our current process. The tool developed has saved so much time organizing the review comments, establishing a clear connection between these applications and our existing infrastructure and has made the process more efficient and organized.

Respectfully,



Tim Felstrup

Project Manager | TED Business Group

City of Naperville | 400 S. Eagle Street | Naperville, Illinois 60540

P: 630-420-6692 | E: [felstrupt@naperville.il.us](mailto:felstrupt@naperville.il.us)



# Naperville

May 28, 2019

To Whom It May Concern,

As a member of the review team I would like to share my thoughts and experiences using the Small Cell Pre-Approval process created with GIS as a power tool to navigate through the Small Cell Application workload. This tool allows me the opportunity to complete reviews accurately and on time while still focusing on quality assurance and proper damage control as it pertains to our underground water/wastewater infrastructure. The scope of the Small Cell Project includes street light replacements and directional bore paths for more than 200 sites to date. This tool gives us the ability to review information and puts utility locations at our fingertips to provide information back to the contractor quickly to avoid utility conflicts and meet review deadlines. Being able to track permit approval status via a singular database as opposed to multiple spreadsheets improves project organization and allows for a single system of record.

I call the Small Cell Pre-Application process created with GIS a power tool because of the amount of information it provides in one setting. Although a large project, the Small Cell Application is just one small example of potential projects this process tool can be successfully used, since it quickly moves projects forward to meet schedule deadlines.

William Bolster, City of Naperville  
Utility Inspection Supervisor, DPU-W/WW  
630-420-4122