GIS Automation, Planning Data, and Spatial Analytics

A 5-minute summary of my responsibilities, technical project work, achievements, and next-step innovation.

Michael Okoroh

Civil & Environmental Engineering, Ph.D. student (Third year)
Old Dominion University

Executive Intern, Municipal Intern II

City Planning GIS Team

Internship period: May 18 to July 24, 2026

Responsibilities

Approved site-plan GIS layer and attributes

Achievement

ArcPy mailing-list automation

Learning

ArcGIS Pro courses and applied tools

Innovation

Deep learning for aerial-photo compliance review

Presentation roadmap

1

Who I am

School, program, role, and internship site

2

What I was assigned

City Planning GIS responsibilities and approved site-plan data

3

What I built

Automated mailing-list workflow using ArcGIS Pro and ArcPy

4

What I learned

Courses, tools, analytical thinking, and communication

5

Where this can go

Deep learning concept for aerial imagery and permit-compliance review

ROLE CONTEXT

Internship site and core responsibilities

City of Norfolk | City Planning GIS Team

- Worked under Matthew Straley, Principal Planner, City Planning.
- Supported practical municipal GIS work tied to public planning operations.
- Built experience in city operations, public policy, and stakeholder communication.

Learning outcome

I connected technical GIS work to real municipal decisions: accurate records, clearer review, better communication, and better operational traceability. – I completed a five-year backlog of site plans in four weeks.

Assigned GIS responsibilities

- Build out a GIS layer and attributes of approved site plans.
- Research and digitize approved site plans.
- Create polygons representing approved site-plan areas.
- Gather and populate specific attributes for each site plan.
- Create an online mapping layer to display the data.

PROJECT HIGHLIGHT

Achievement: Automated mailing-list workflow

Operational problem

- The previous mailing list tool was effective for generating a mailing list for one parcel and one distance at a time.
- However, it had limitations when staff needed to process multiple parcels, compare multiple buffer distances, remove duplicate recipients, exclude city-owned properties, or produce clean mail-ready outputs.

Automation response

- A request CSV controls Case ID, GPINs, buffer distance, civic league, and exemptions.
- ArcPy performs lookups, buffers, parcel selection, Proval matching, dedupe, and exports.
- Outputs are clean Excel records and Avery 5160 PDF mailing labels.

FUNCTIONALITY

What the ArcPy tool delivered

① Multi-GPIN input

One case can include multiple target parcels. Many cases can be run at a time – an improvement to Norfolk Air.

② Flexible buffers

Same distance, paired distances, or all distances for all GPINs.

③ Civic-league option

Run citywide or restrict output to a named civic league.

④ City exemption

City of Norfolk records can be removed from the mail list – This eliminates costs involved in the city sending mails to itself.

⑤ Duplicate control

Same Owner1 + Own_street is mailed once.

⑥ Output package

Excel, Avery 5160 PDF, summaries, and buffer features.

```
target_values = split_target_values(row["Target_Values"])
mode, distances = parse_buffer_field(row["BufferFt"])
build_target_distance_pairs(target_values, mode, distances)

dedupe_key = (normalize(Owner1), normalize(Own_street))
```

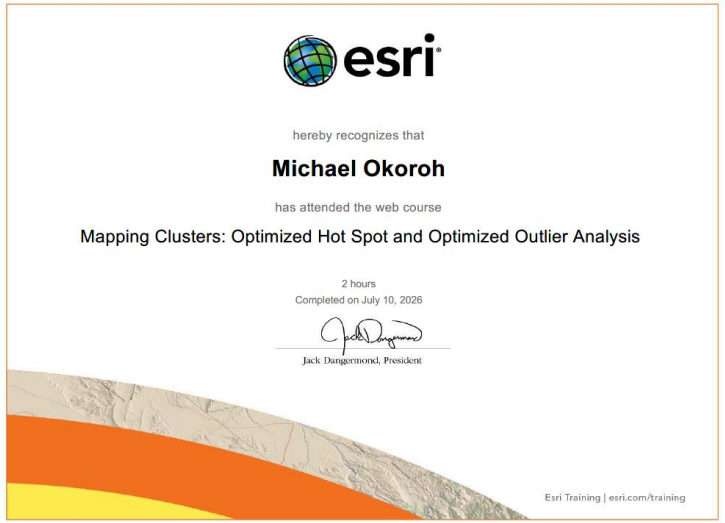
Our ArcPy model reduces manual cleanup, improves accuracy, saves staff time, and creates a more reliable end-to-end mailing-list process for planning and public-notice workflows.

COURSES COMPLETED

ArcGIS professional development

- **Deep Learning Using ArcGIS Pro**
- **Mapping Clusters**
- **Space-Time Analysis**
- **Creating and Sharing Animation**

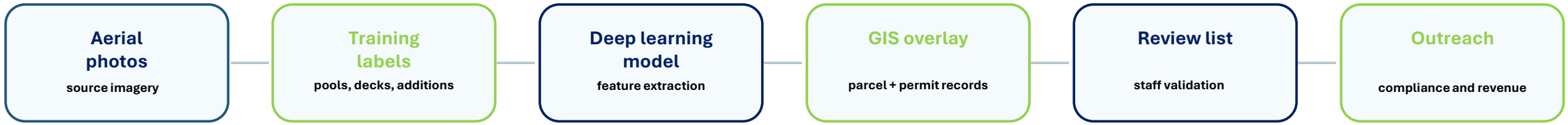
The coursework strengthened the technical bridge between GIS production, spatial statistics, temporal analysis, imagery analysis, and communication.



FUTURE APPLICATION

Innovation concept: imagery-assisted permit compliance

Applying deep learning to aerial imagery could help the City Planning team identify features that may require permit review.



Use case

Detect likely swimming pools, accessory structures, additions, or other visible improvements, then compare them with permit records for staff review.

✓ Governance

Treat model output as a screening layer, not an enforcement decision. Human review, current imagery, parcel context, and permit records must confirm every case.

Potential benefit: better compliance targeting, faster review, improved fairness, and new city revenue from permitted improvements that were previously hard to find.

REFLECTION

What I learned and where I am going

01 Technical growth

I improved my GIS production skills, learned to automate repetitive work with ArcPy, and strengthened my understanding of spatial statistics, time-series clustering, and deep learning concepts in ArcGIS Pro.

02 Professional growth

I learned how GIS work supports public service: clear records, reliable workflows, repeatable outputs, and communication with staff/stakeholders who need usable results, not just maps.

03 Future direction

I plan to keep building at the intersection of civil engineering, water resources and stormwater engineering, GIS, automation, and data-driven municipal decision support.

My main takeaway: I learned to use ArcGIS Pro professionally to process information accurately, perform clear analysis, present results effectively, and support solid decision-making.

Thank you

Questions and discussion

Michael Okoroh
Executive Intern, Municipal Intern II | City of Norfolk