UNDERSTANDING THE FLOODING PROBLEM

Clemson Capstone: The WPA contacted Clemson Capstone to conduct a preliminary drainage study and explore design alternatives.

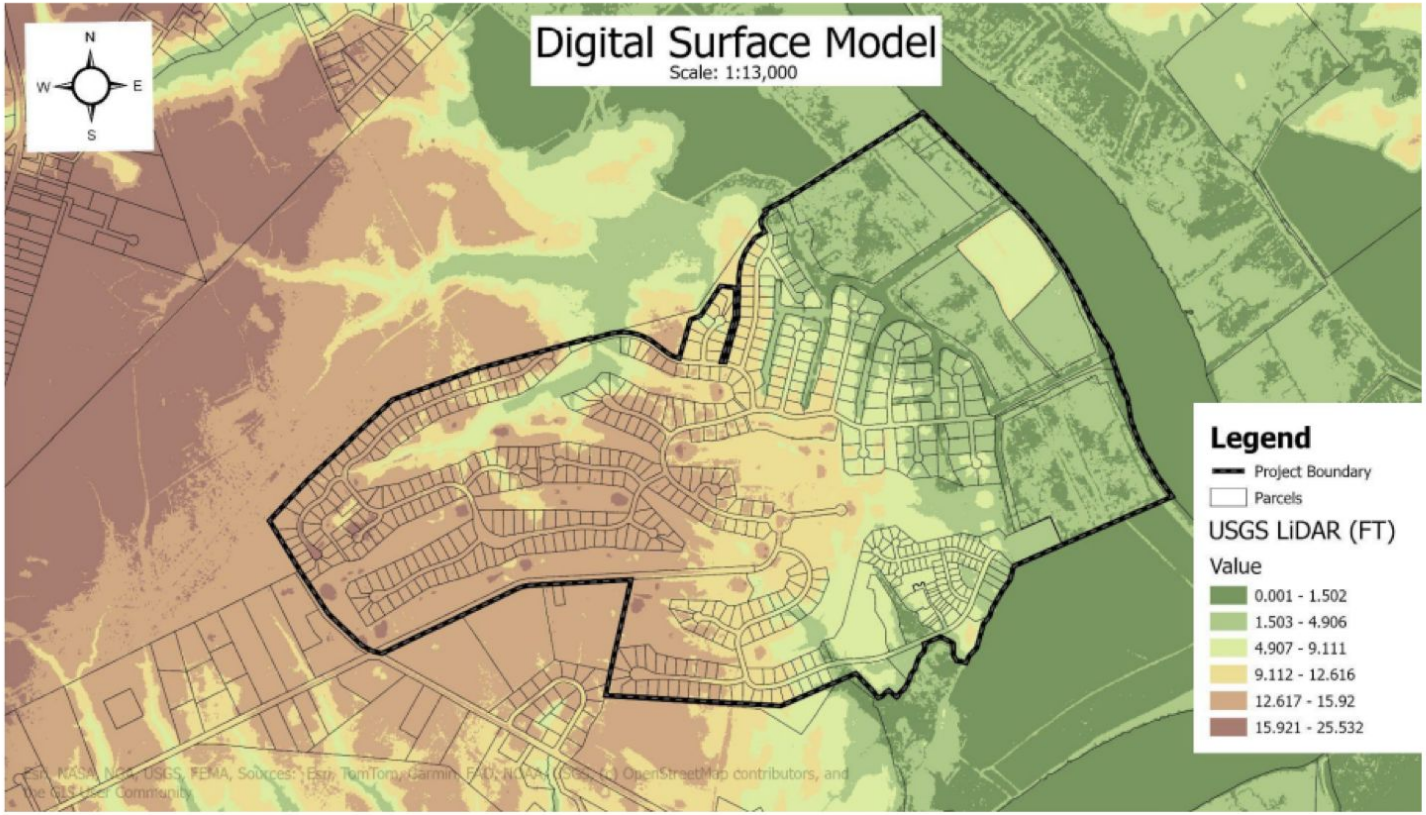
- **The Site Location**: The site is bordered by the Black River, duck ponds, and historic rice paddies.
- **Elevation**: It is a low-lying community, ranging from 1 to 18 feet above sea level.
- **Drainage System**: Several canal fingers accept flow from the community drainage system and outlet into the Black River.
- **Background Historical Flooding**: Fooding is an increasing concern, many residents noting the issue had become particularly bad after the 1000-year storm during Hurricane Joaquin in 2015.
- **Impact of Community Build-Out**: The building/development within the community over the last 8 years has impacted the load on the drainage system.

Impact of Community Development

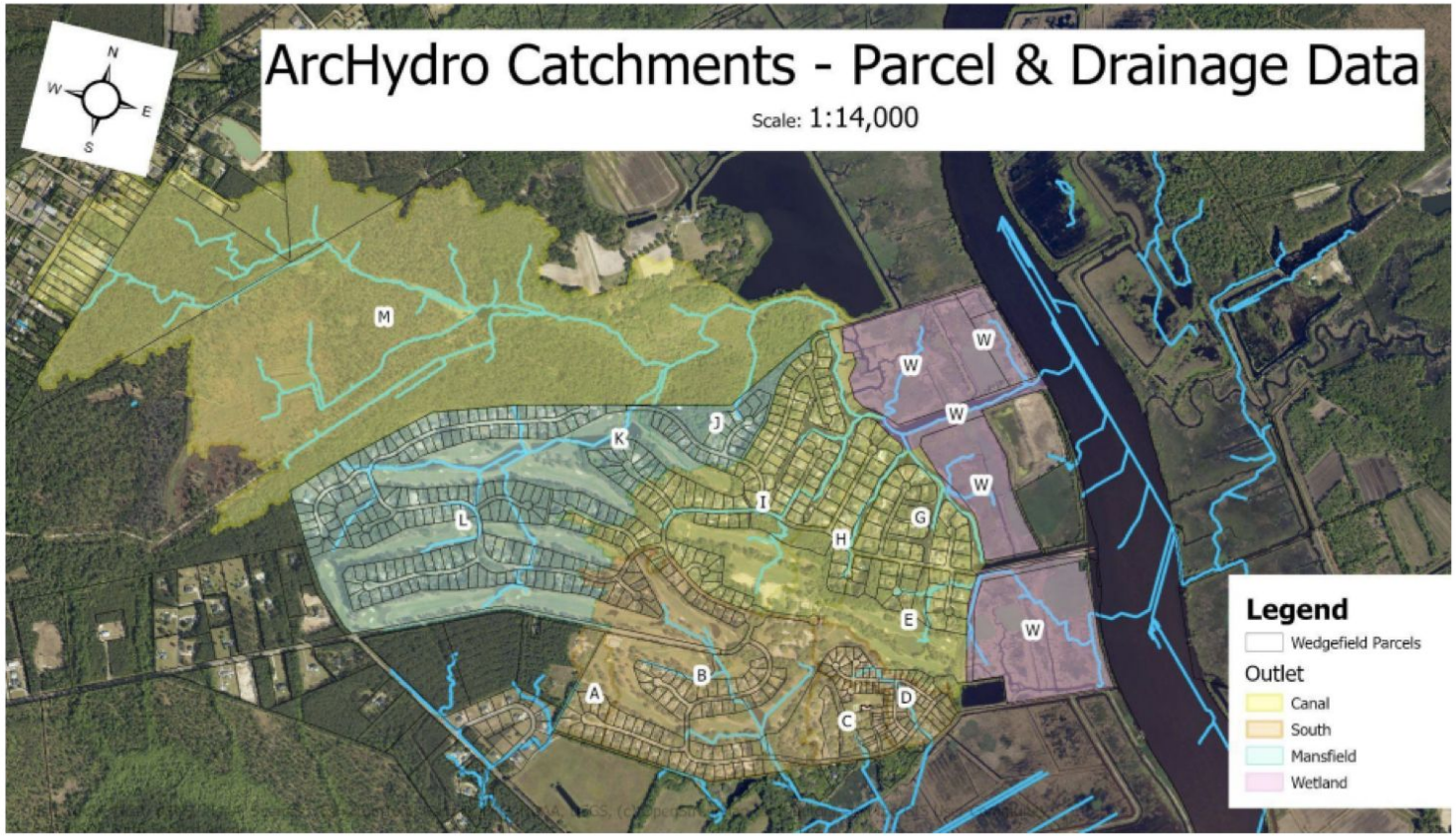
In 2015, the community had a significant amount of undeveloped lots. These lots would receive and store storm water runoff.

The 2024 picture shows the new development in the community that has produced Non-Permeable Areas, that contributes to our storm-water load on our drainage system & canals.

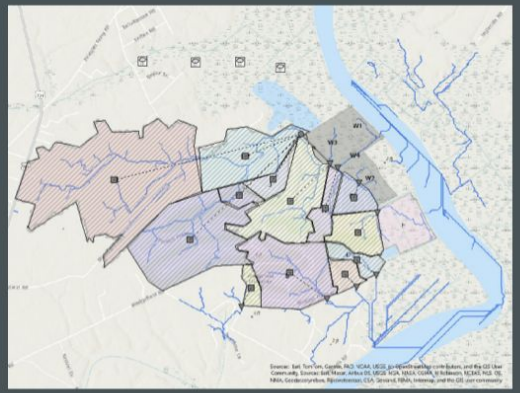
Elevation Map of WPA shows how the storm-water runoff from the higher elevations in orange to the lower areas in green.



The Parcel & Drainage Data Map of WPA shows how the storm-water drains through the community and to the canals.



DESIGN APPROACH



Calculations Conducted

Data Models that Clemson Ran

- Watershed Delineation using ArcGIS
- Peak flow using NRCS TR-55 Method
  - Curve Number (CN) & Total Area (Am)
  - Storm Runoff Volume (Q)
  - Total Peak Discharge (Qp)
  - Peak flows for 2-, 10-, and 100-year storms
- Peak flow using EPA-SWMM
  - Modeling of stormwater drainage infrastructure
  - Peak flows for 2-, 10-, 25-, and 100-year storms
  - Theoretical Pipe Flow Calculations

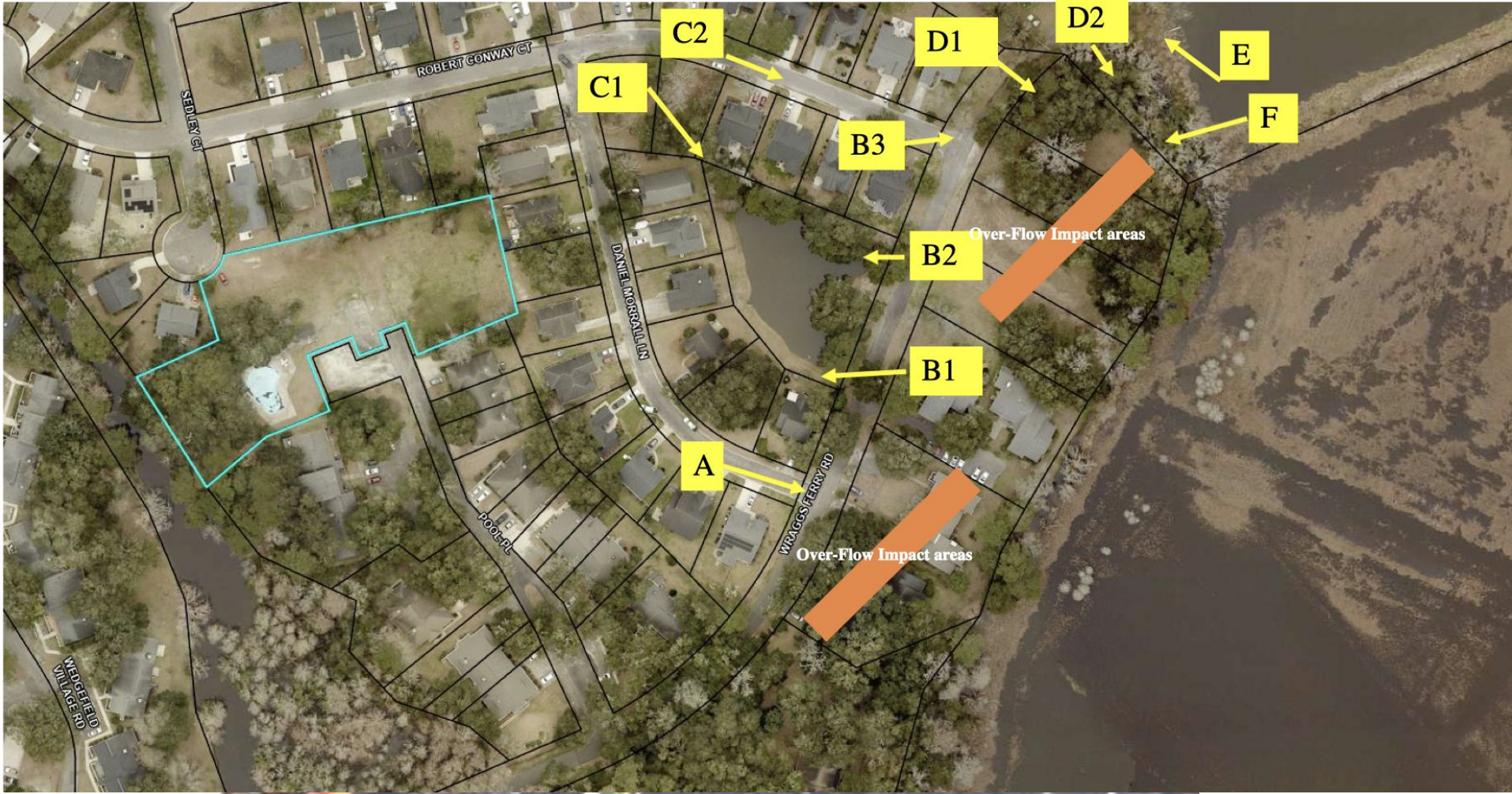
POSSIBLE SOLUTIONS

- Canal Dredging
- Reestablishment of Existing Infrastructure

RECOMMENDATIONS FROM CLEMSON

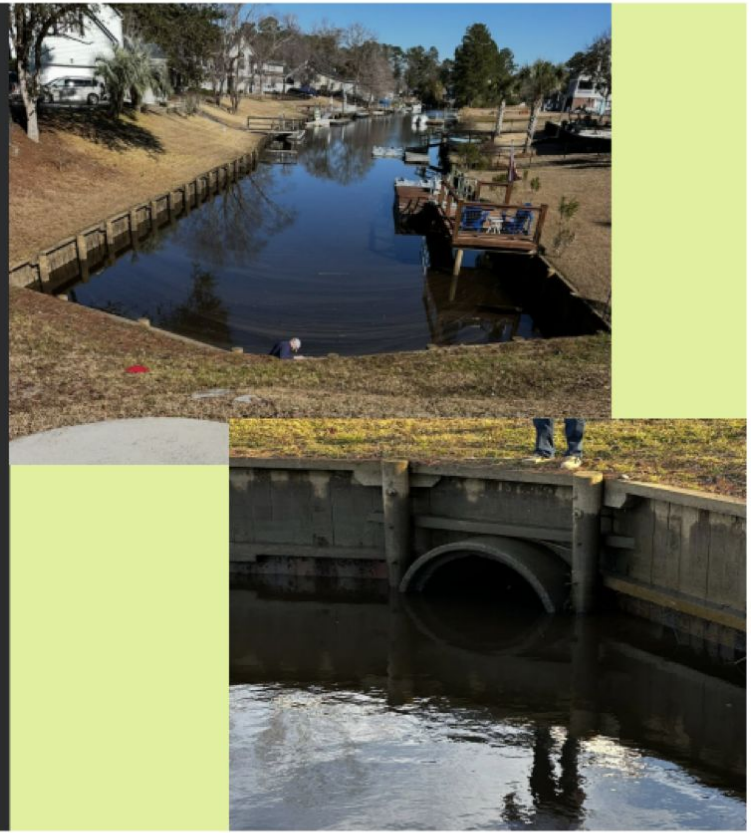
REESTABLISH EXISTING INFRASTRUCTURE

- ❑ Cleaning existing pipes and culverts
- ❑ Clearing roadside ditches
- ❑ Reinforcing large ditches that have become eroded
- ❑ Replacing pipes that have become damaged
- ❑ Rebuilding the berm along duck ponds


C2
C1
D1
D2
E
F
B3
B2
B1
A
Over-Flow Impact areas
Over-Flow Impact areas
ROBERT CONWAY CT
SEDLEY CT
DANIEL MORRALL LN
WRAGGS FERRY RD
POOL PL
WEDGEFIELD VILLAGE RD

CANAL DREDGING

- The Wedgefield canals experience tidal motion, which increases sedimentation
- Stormwater outfall pipes discharge into canals, and can get clogged with sediment
- Reduced pipe flow can cause flood inundation in parts of the community



Conclusions

It was stated several times by both Dr. Ladner & the engineering grad students that "the canals are important to the overall drainage system."

KEY TAKEAWAYS

- This is a **preliminary drainage study**
- **Canal dredging** can improve water conveyance and reduce flood inundation time
- **Reestablishment of the existing system** is a good management practice that can extend the current life of the system
- Findings are meant to **inform and guide** the Wedgefield community
- **Additional calculations and design work** will be needed for implementation