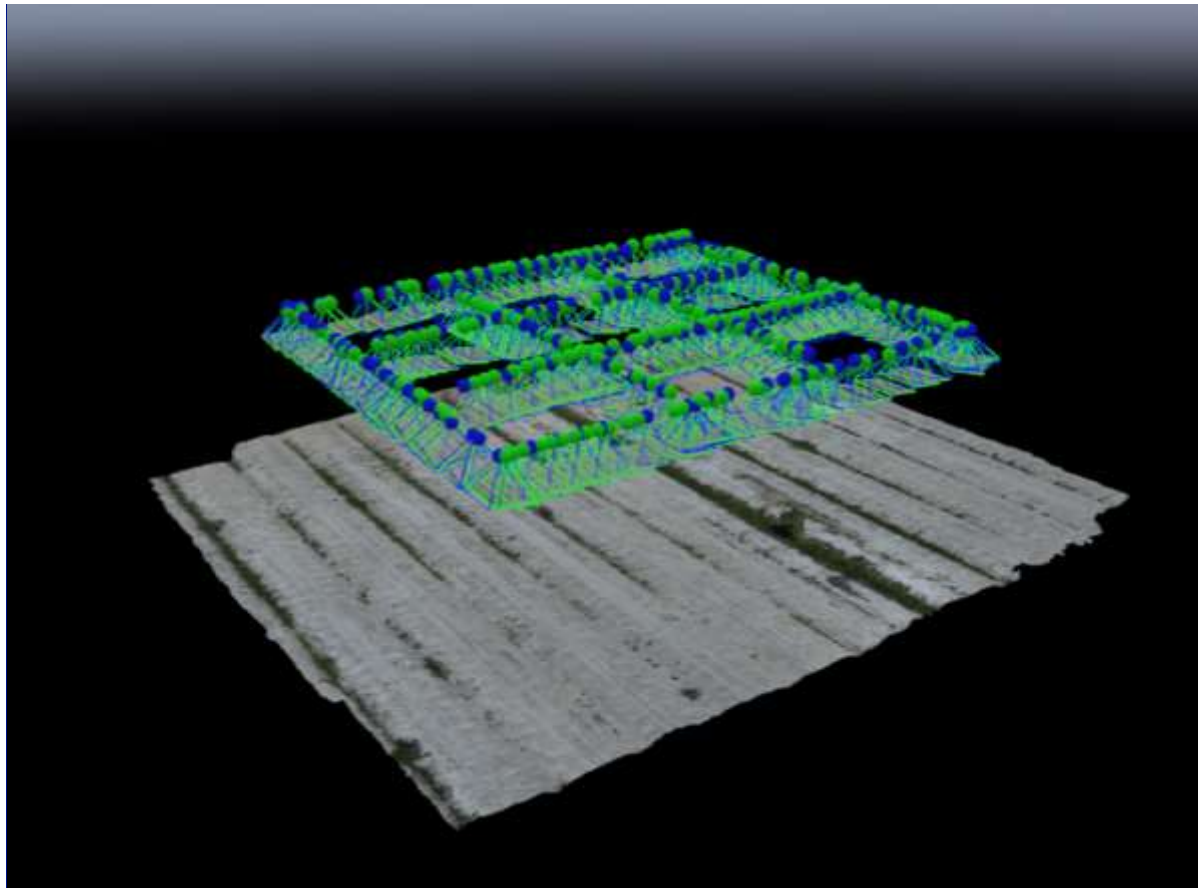


A New Eye in the Sky

A Case Study on 3D Modeling Everglades Restoration Projects with Drone Imagery

NorthStar Contracting Group, Inc.

Daina Stoutenburg, PE

Overview

- Pros/Cons & Requirements
- Flight Planning
- Case Study
- Results
- Implementation
- Additional Modeling

Advantages of Monitoring with Drones

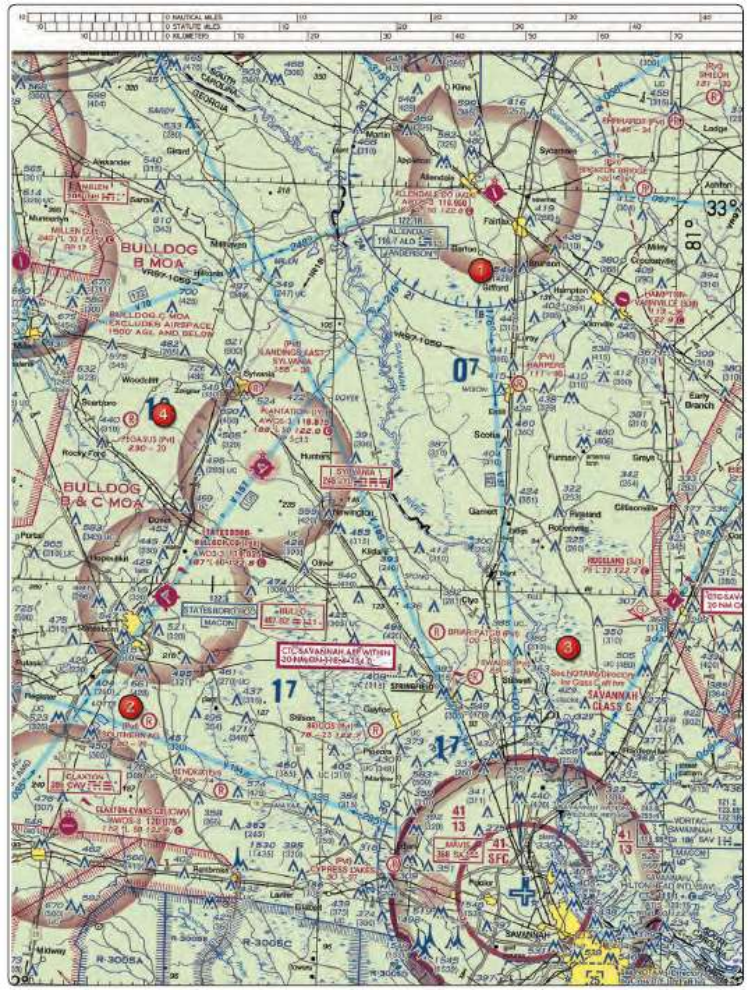
- Helicopters/Planes:
  - Costly
  - Limited Views
  - Scheduling
- Drones:
  - Cost Effective
  - Versatile
  - Repeatable

Disadvantages of Monitoring with Drones

- Weather Dependent
- Location Restrictions
- Battery Restrictions
- Remote Pilot License Required

Requirements

- Register drone with FAA
  - https://registermyuas.faa.gov/
- Obtain Remote Pilot License
  - http://federaldroneregistration.com/registrationform
- Maintain properly working drone
- Be aware and responsible pilot



Flight Considerations

- Aerial Obstacles
  - Manned/Unmanned Aircraft
  - Power Lines
  - Trees
  - Buildings
- Weather Conditions
  - Wind
  - Rain
- Drone Condition
  - Responsiveness
  - Propeller Condition
  - Battery Life
- Technical Obstacles
  - Connectivity
  - Heat Considerations
  - Flight Settings

The Drone

Phantom 3 Professional Drone

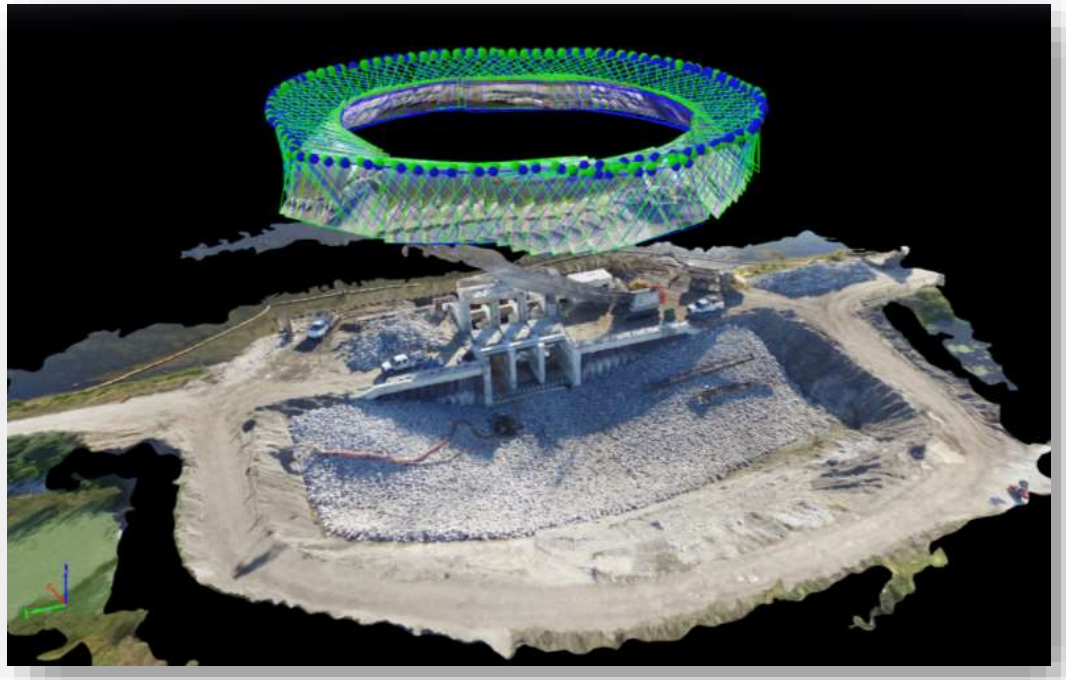
- GPS-assisted flight
- 4K video
- 3-axis gimbal

Data & Resource Management

- Storage of photos
- Allocate resources to run pre and post model
- Storage of results and animations

Data Modeling Software

- A variety of post-processing options available
- 3D Maps & Models
- The key to good maps or models is consistency and overlap

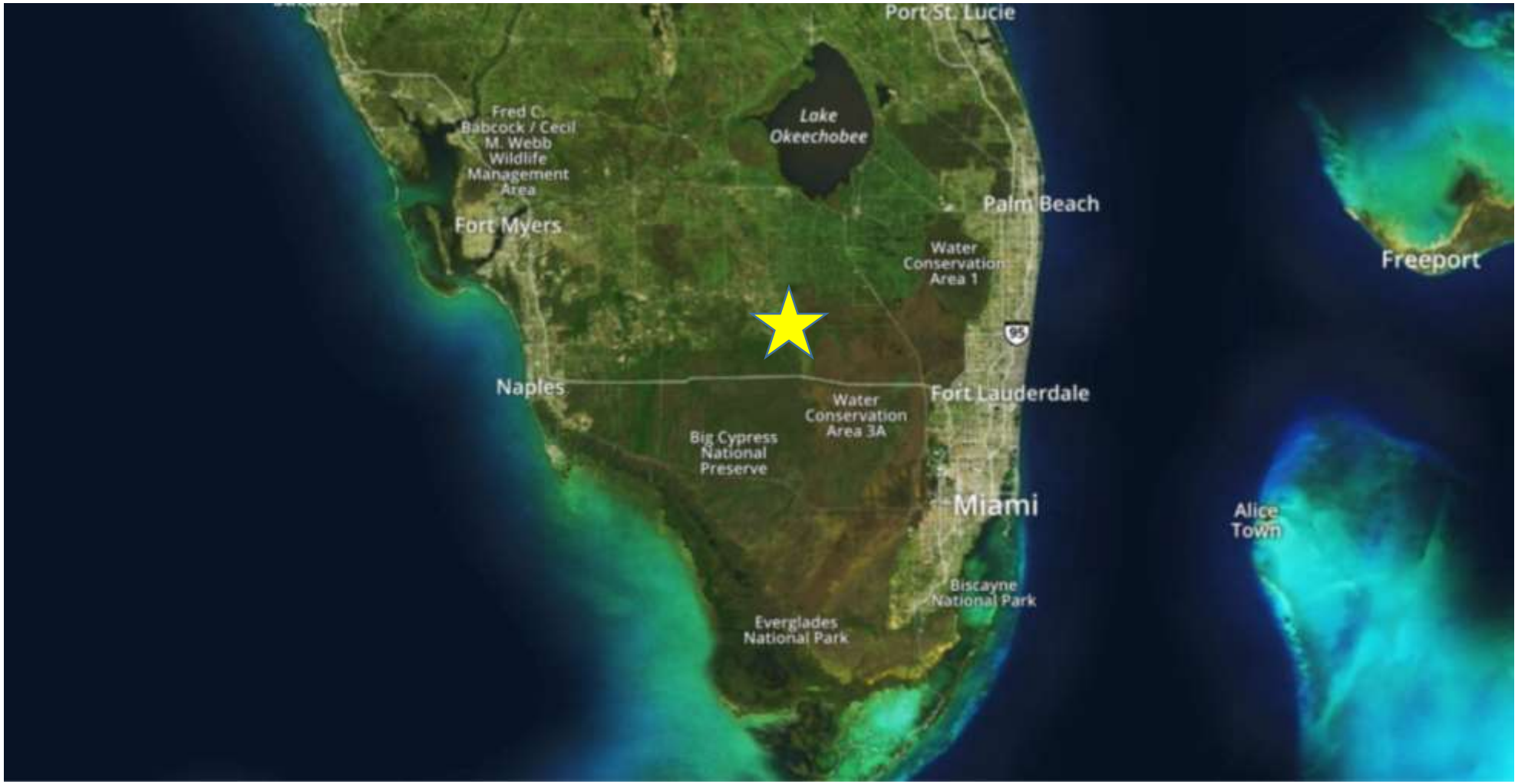


PIX4Dmapper

Data Modeling with Drones – A Primer

1. Weather and Shadows
2. Nadir image capture
3. Oblique image capture
4. Image processing

Case Study


Port St. Lucie
Fred C. Babcock / Cecil M. Webb Wildlife Management Area
Lake Okeechobee
Palm Beach
Fort Myers
Water Conservation Area 1
Freeport
Naples
Water Conservation Area 3A
Fort Lauderdale
Big Cypress National Preserve
Miami
Alice Town
Biscayne National Park
Everglades National Park

Case Study

Everglades Restoration Project:
Construction Management Goals

- Restore citrus groves to historic microtopography and hydrology
- Efficiently and effectively determine if contractor met project goals
- Utilize drone to minimize time and impacts

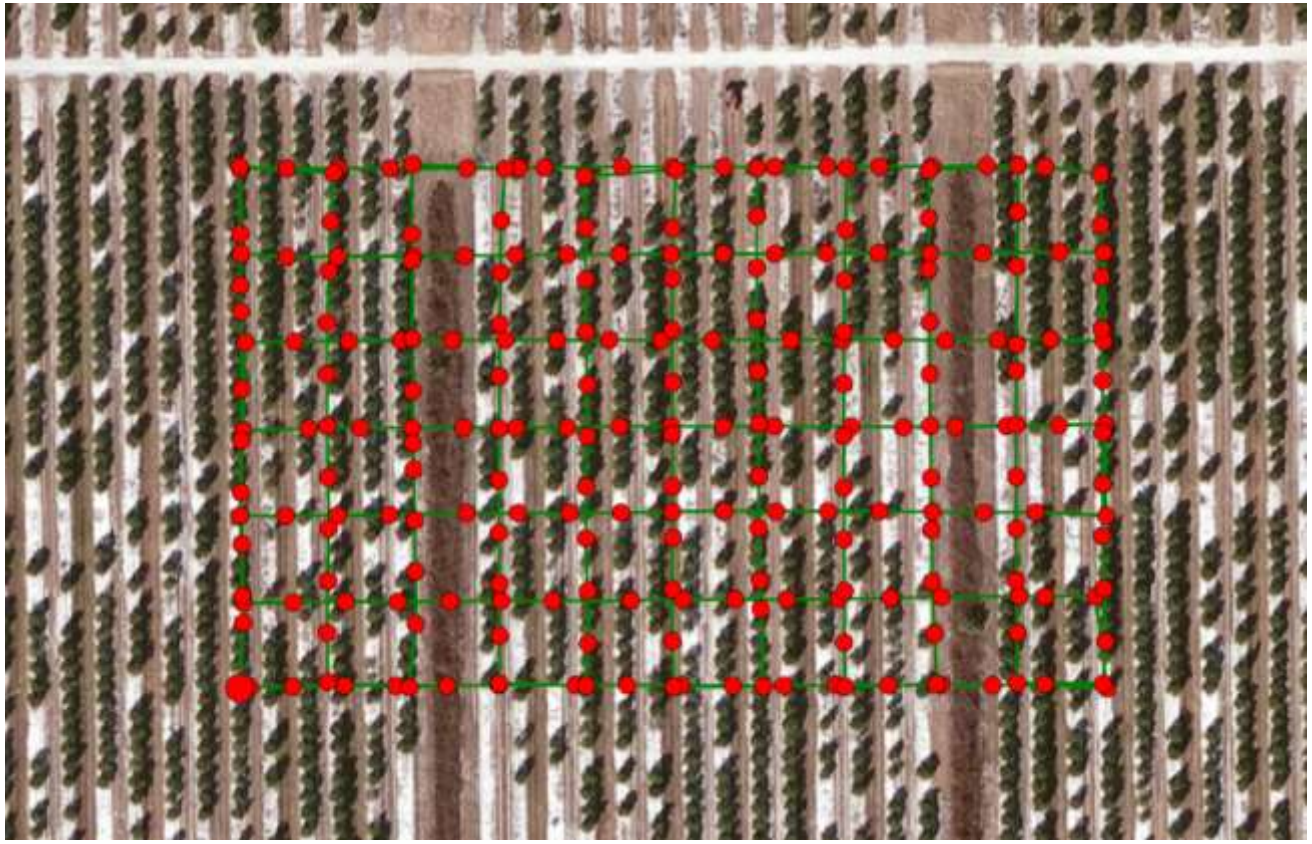
Case Study

Flight Planning

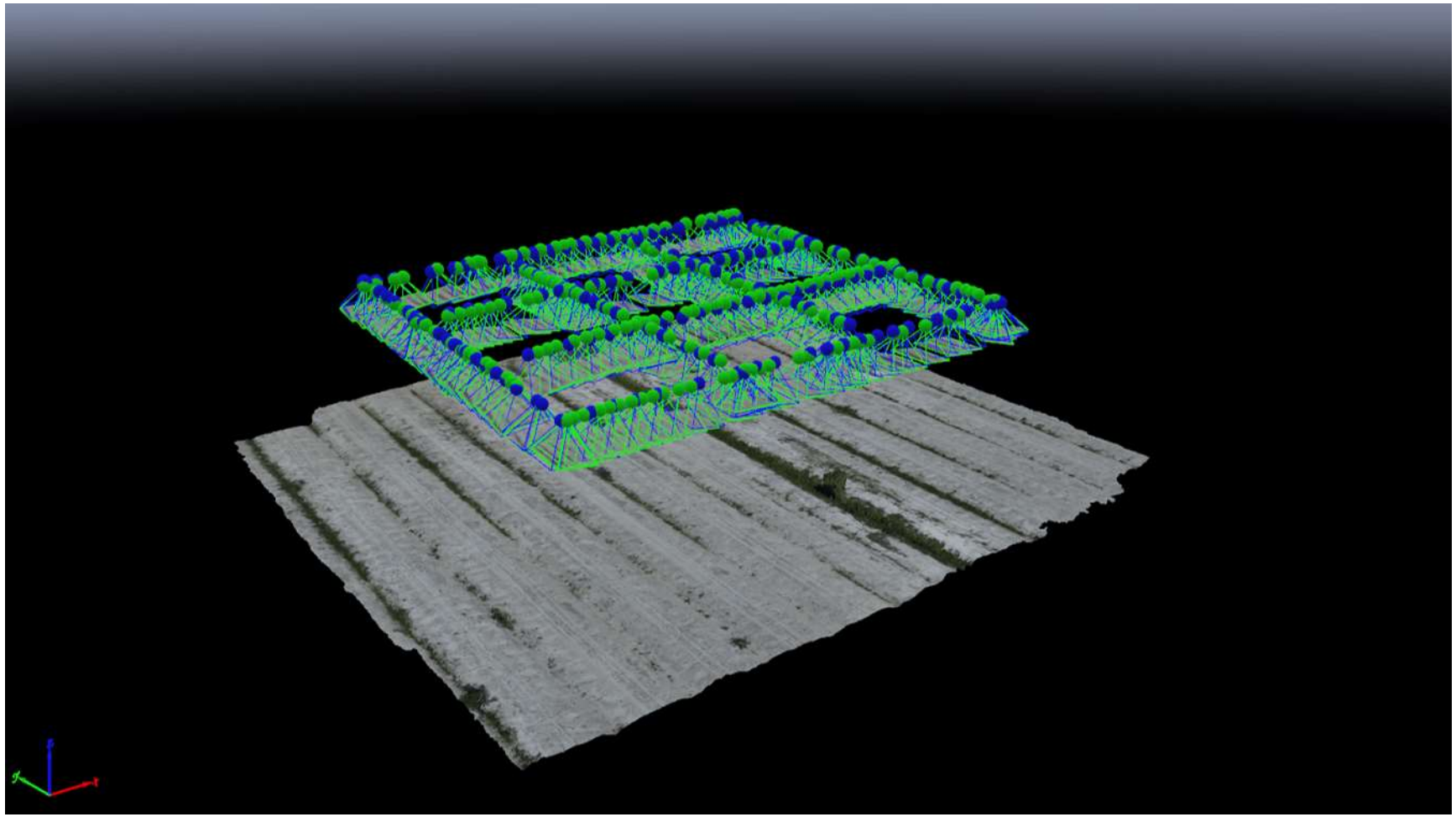
- Plan pre and post flights for comparison
- Pre flight - capture existing conditions with furrows
- Post flight - capture graded area

Double Grid Flight Path

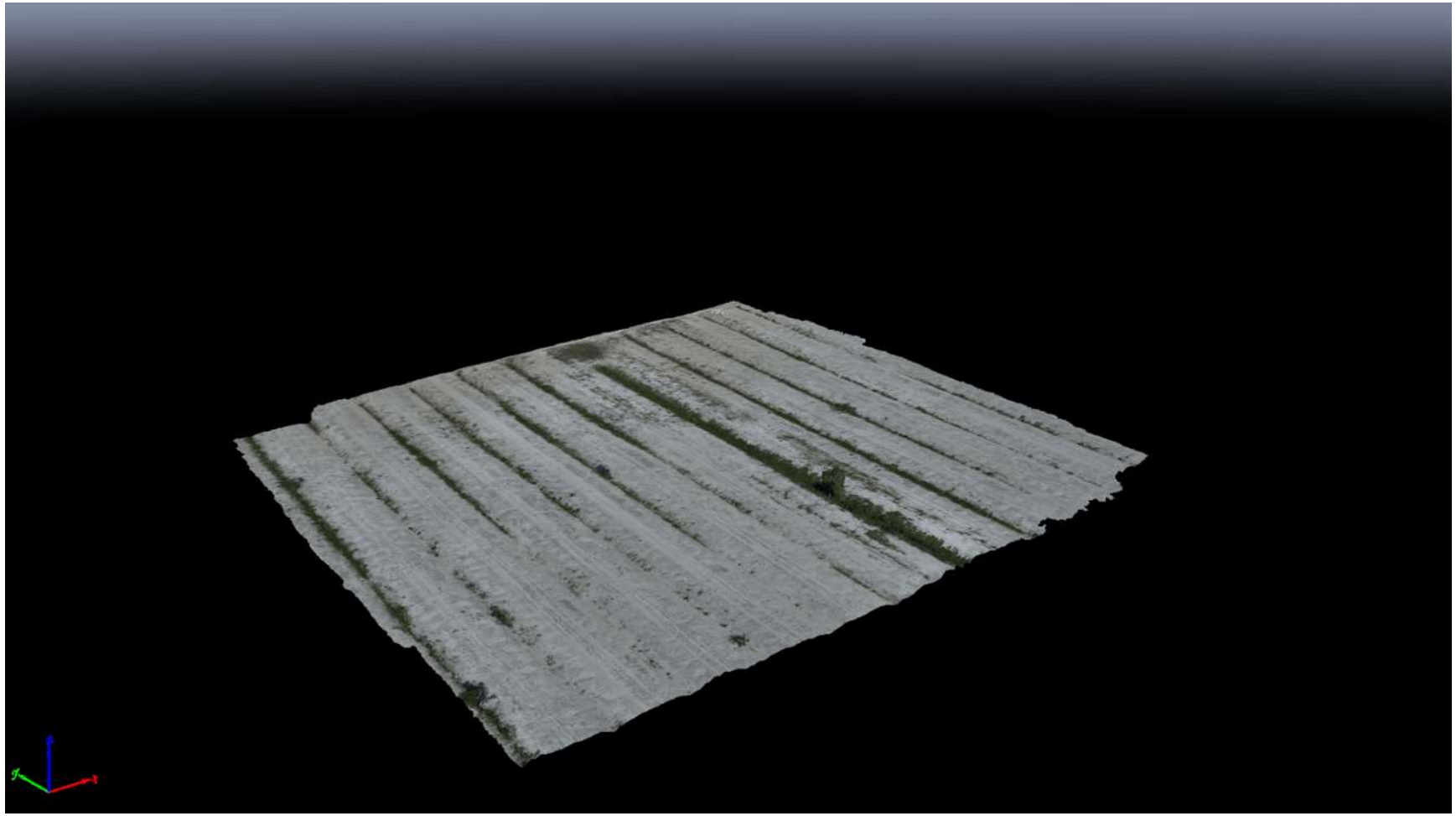
- Choose area size
- Capture images of subject area with appropriate overlap
- Monitor flight



Model Results Pre Work

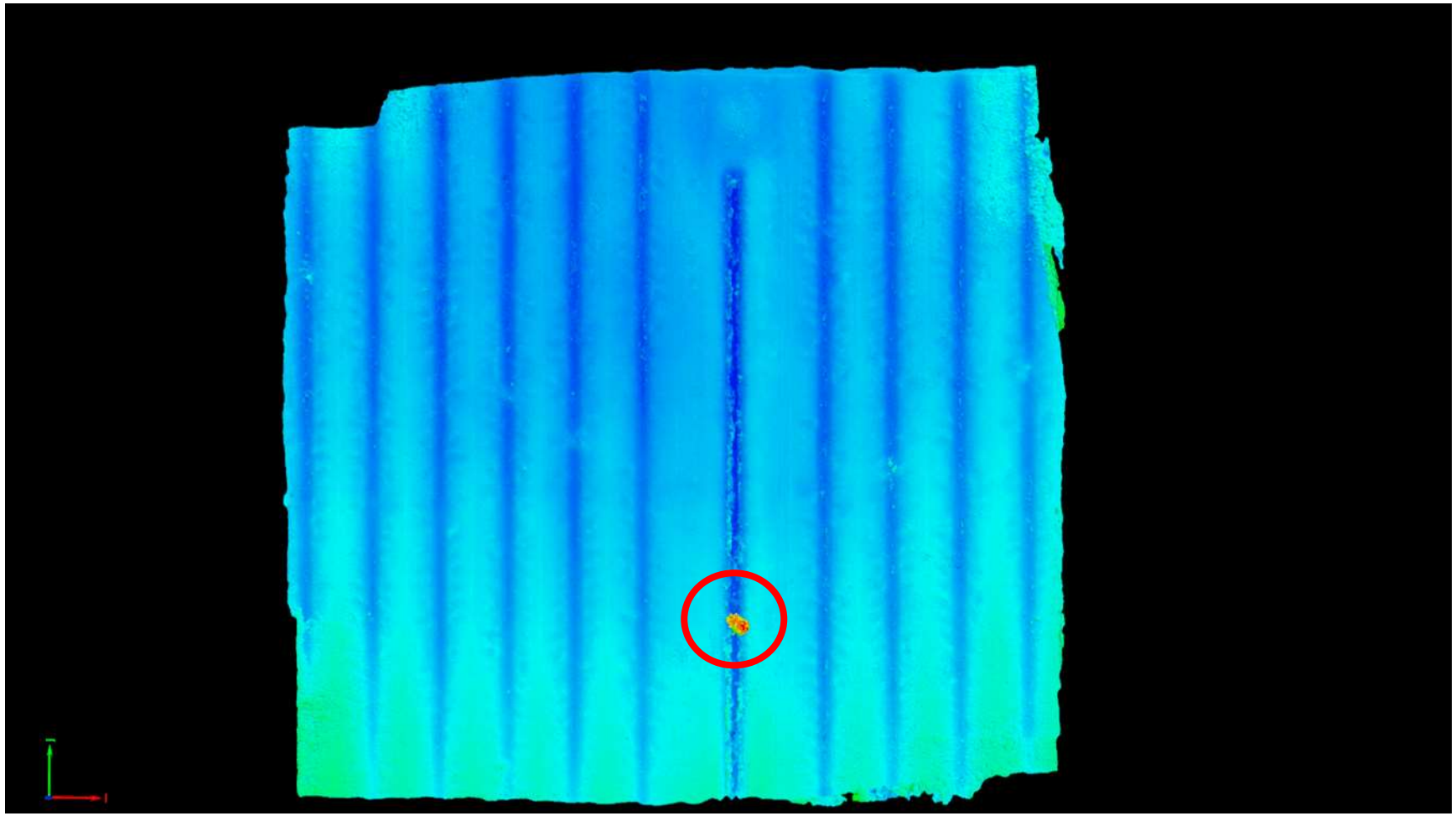


Model Results Pre Work

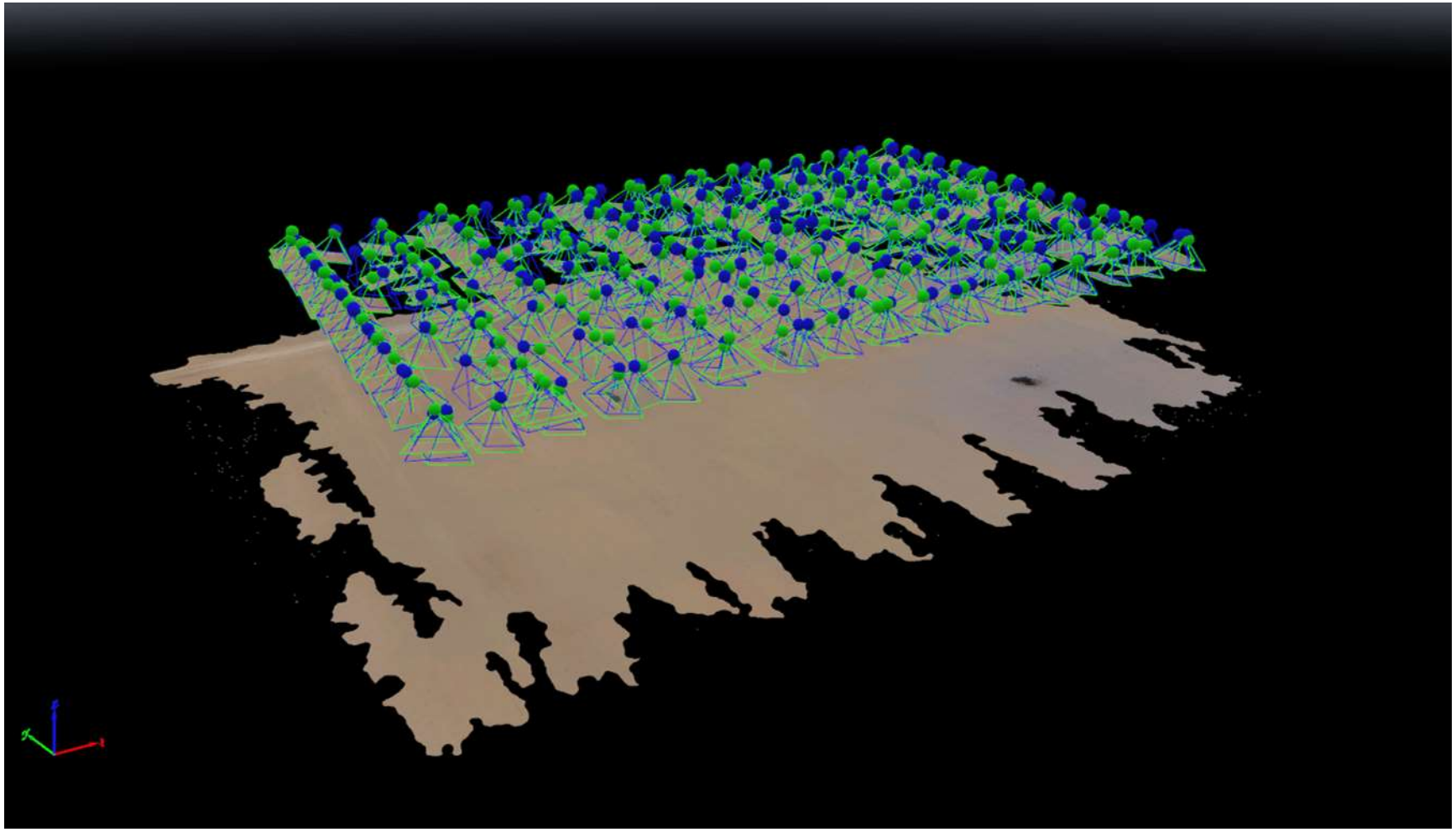


Model Results Pre Work

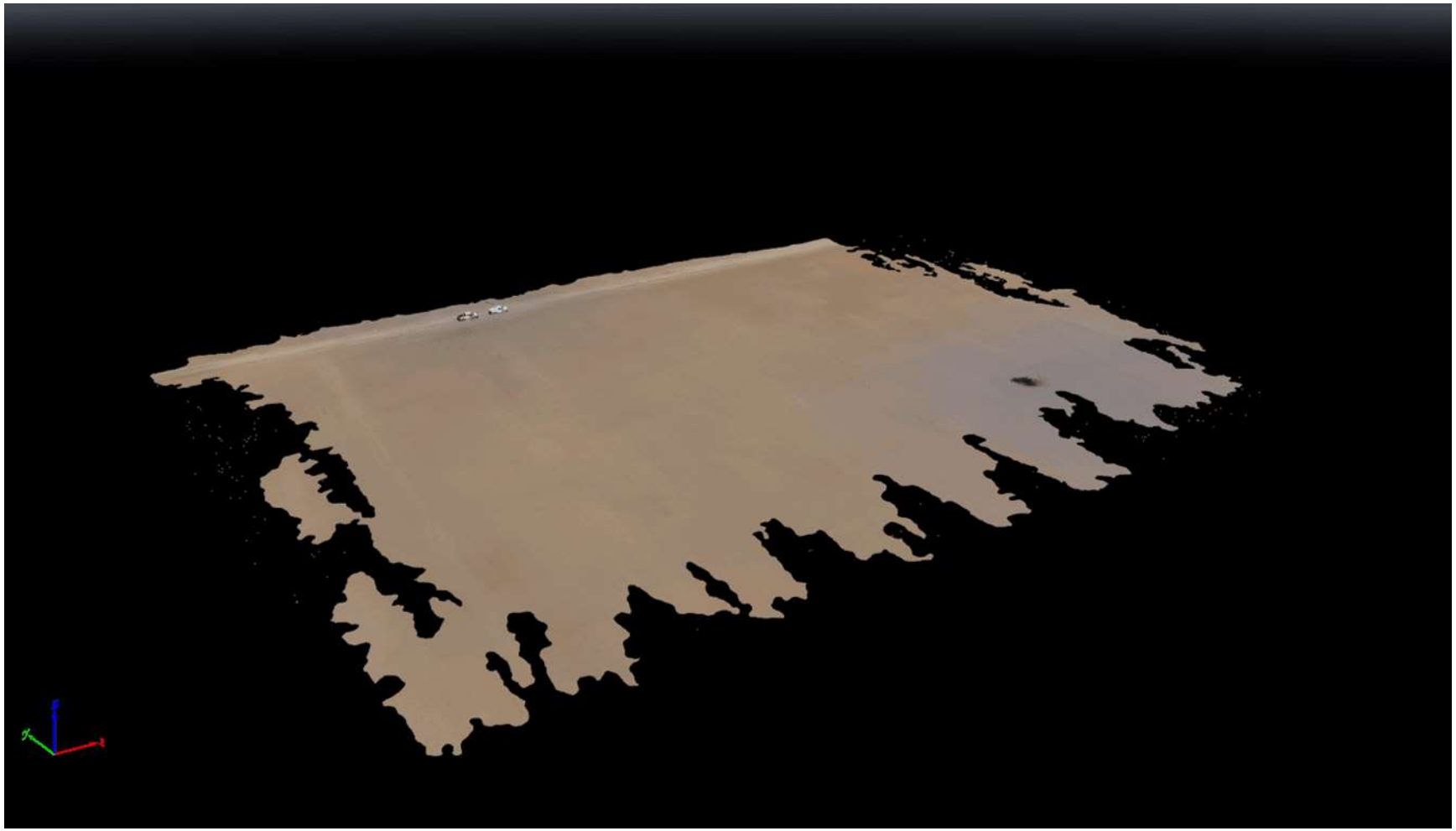
Model Results Pre Work



Model Results Post Work



Model Results Post Work



Model Results Post Work

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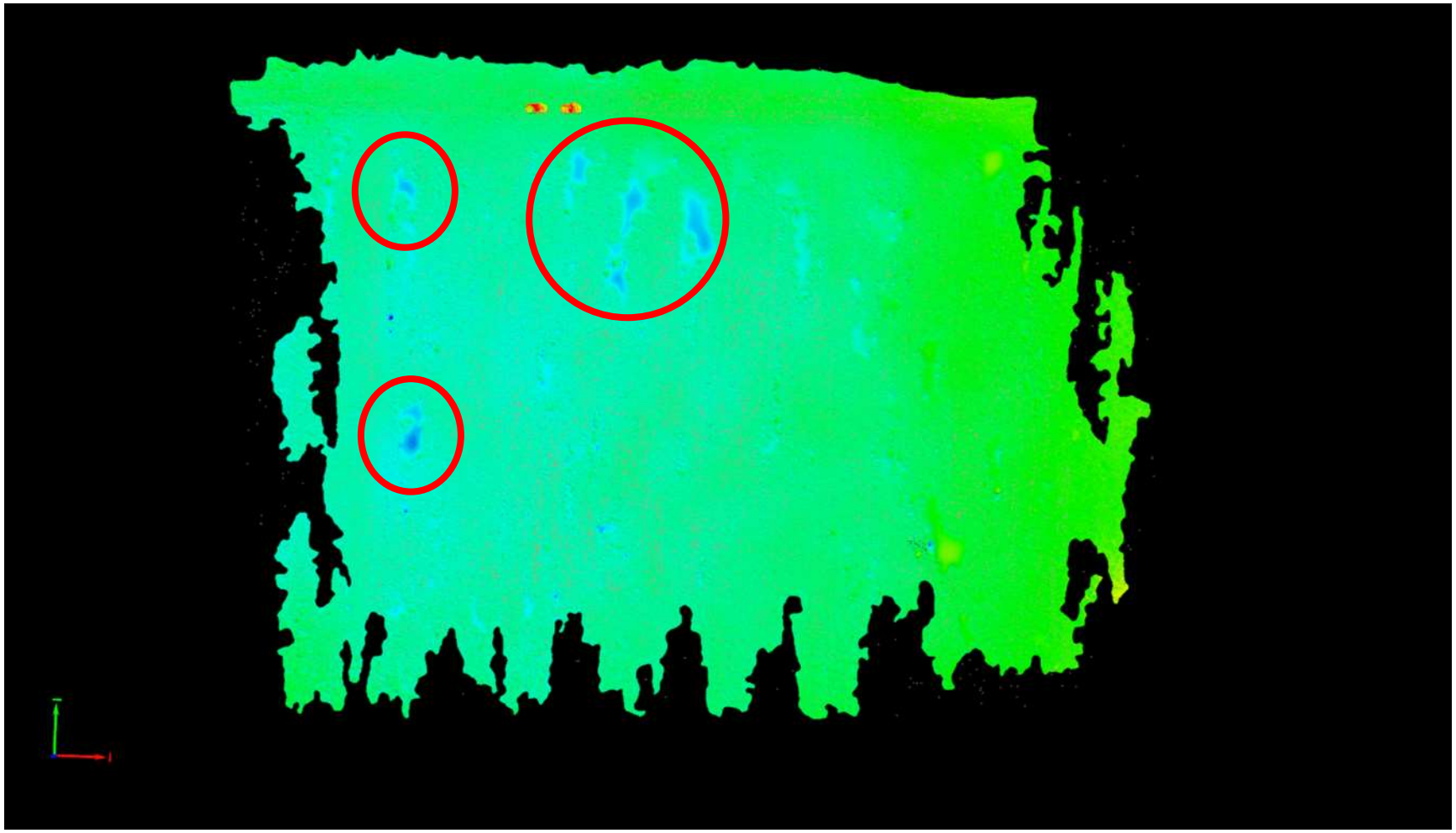
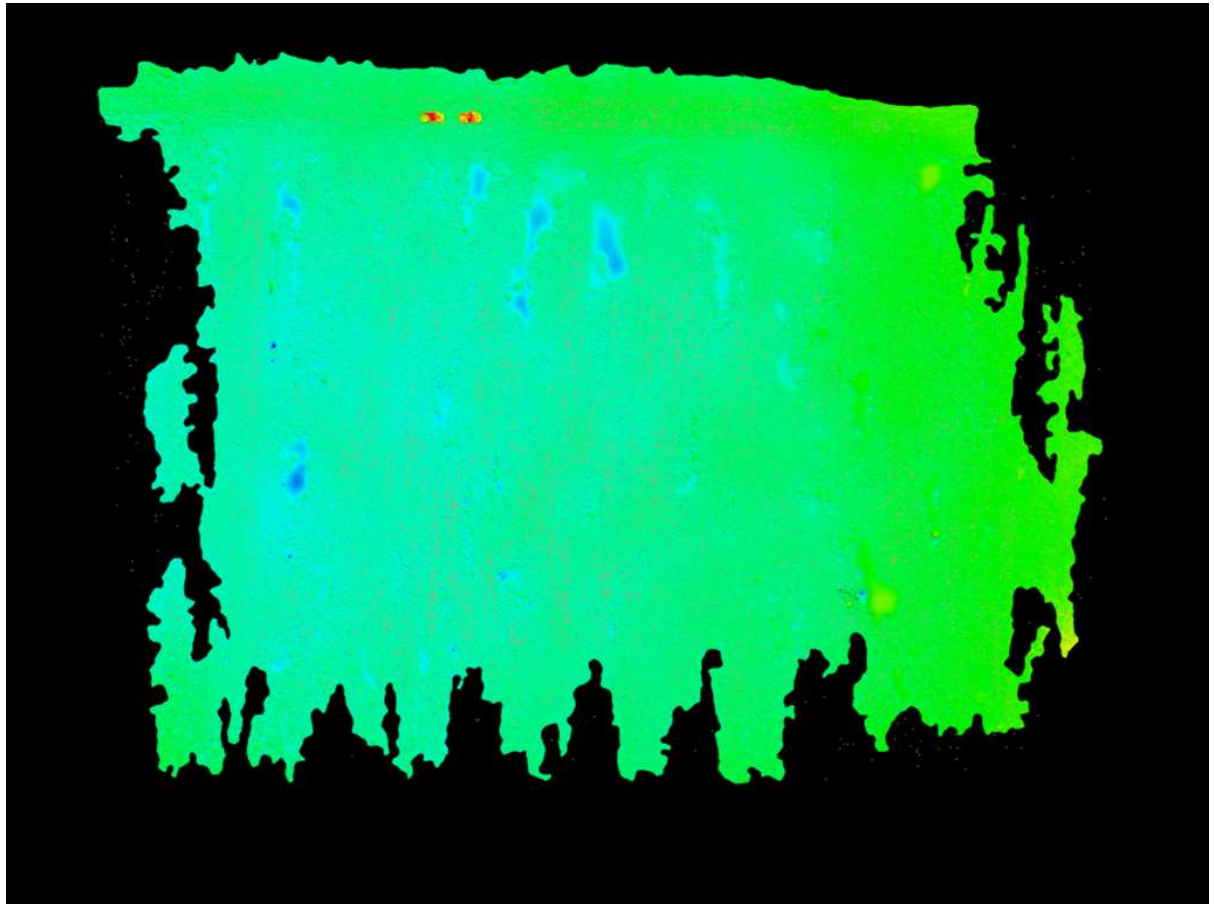
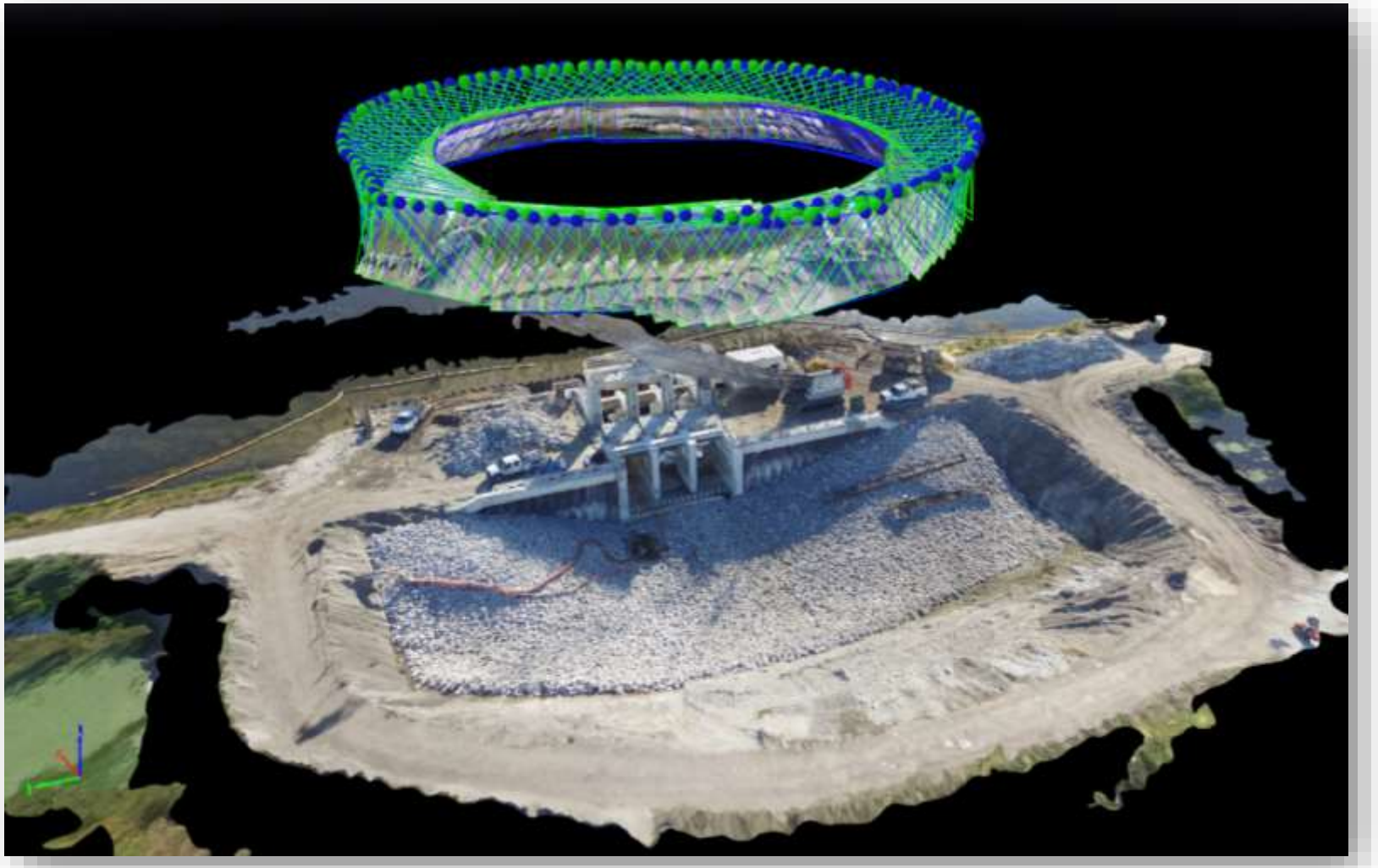


Implementation

- Target locations to ground truth
- Eliminate string test time
- Focus efforts on areas needing rework



Additional 3D Modeling



Thank You…

and remember, think carefully before you fly someone else's drone. ☺