POGO®

Superior insight | Better decisions | Healthier turf

GMANZ – NZGCSA

Summit and Fine Turf Seminar

Soil Moisture Management using POGO

Guilherme Barcellos
Agronomist | Product Development Manager

PGG Wrightson Turf

Experts from earth to turf

Guilherme Barcellos

- Agronomist
- Living on this side of the world for the last 4 years
- Varied background at Golf Courses, Stadiums, Parks, Irrigation Design, Precision Agriculture
- Turf Breeding/Evaluation Agronomist at Kimihia Research Centre

How can POGO help golf courses make every drop count?


TURFHEALTH
FIRMNESS
BALLSPEED
TRANSPIRATION
PHOTOSYNTHESIS
COOLING
CHEMICALPOSITIONING
NUTRIENTUPTAKE
GROWTH
PLAYABILITY
POROSITY
LANDSCAPEFEATURE
LIMITEDRESOURCE

Water

Irrigation

How much?

When?

Where?

Irrigation is a data driven process

Subjective

- Turf Appearance
- Resistance to penetration
- Feel

Objective

- Weather Forecast
- Local weather station
- Measure
- Estimate (**SOIL MOISTURE SENSORS**)

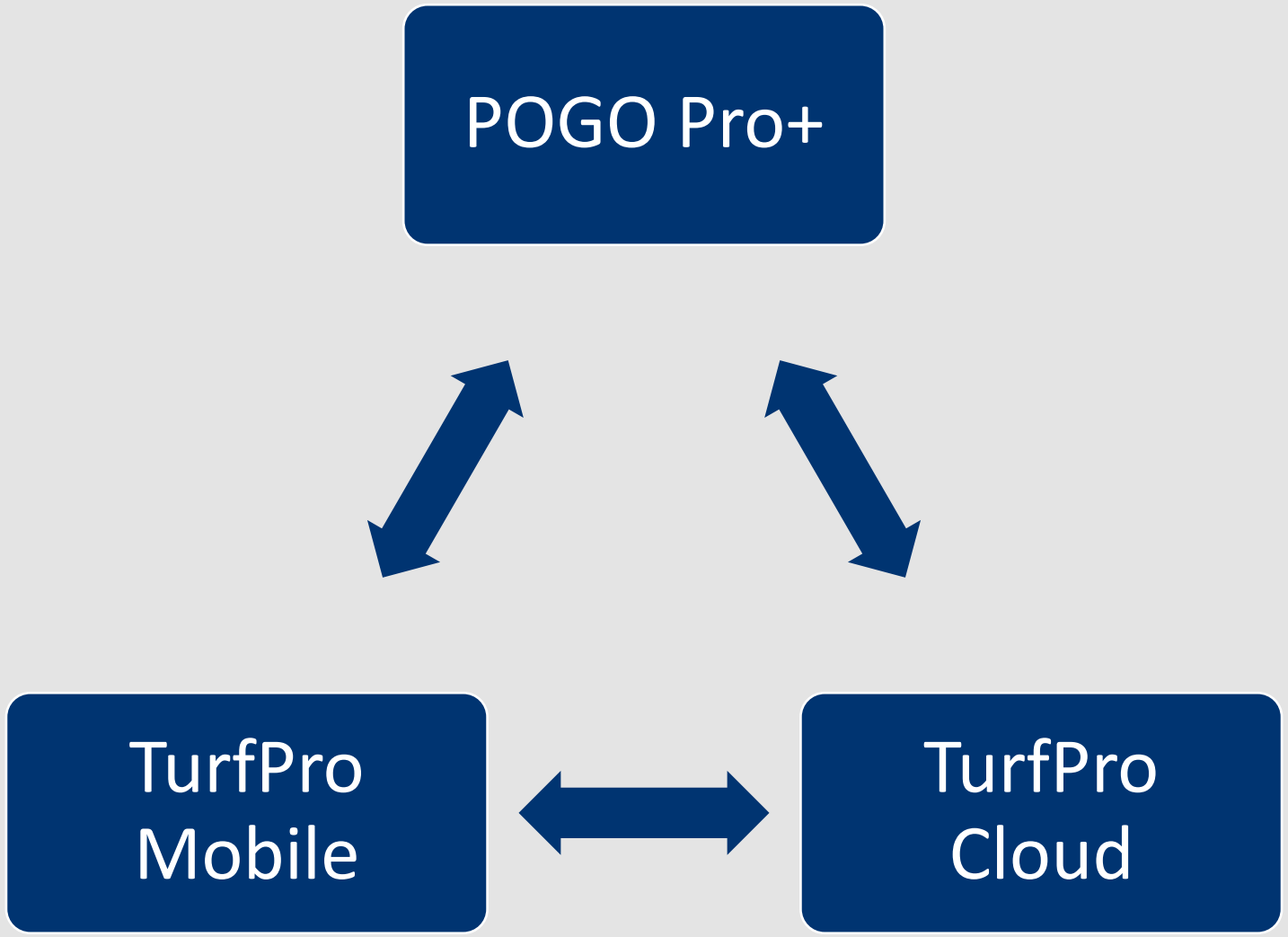
Data Quality

Calibration of the method

- How good is the information?
- How consistent is the data?
- Should I trust it?
- Same for the entire property?

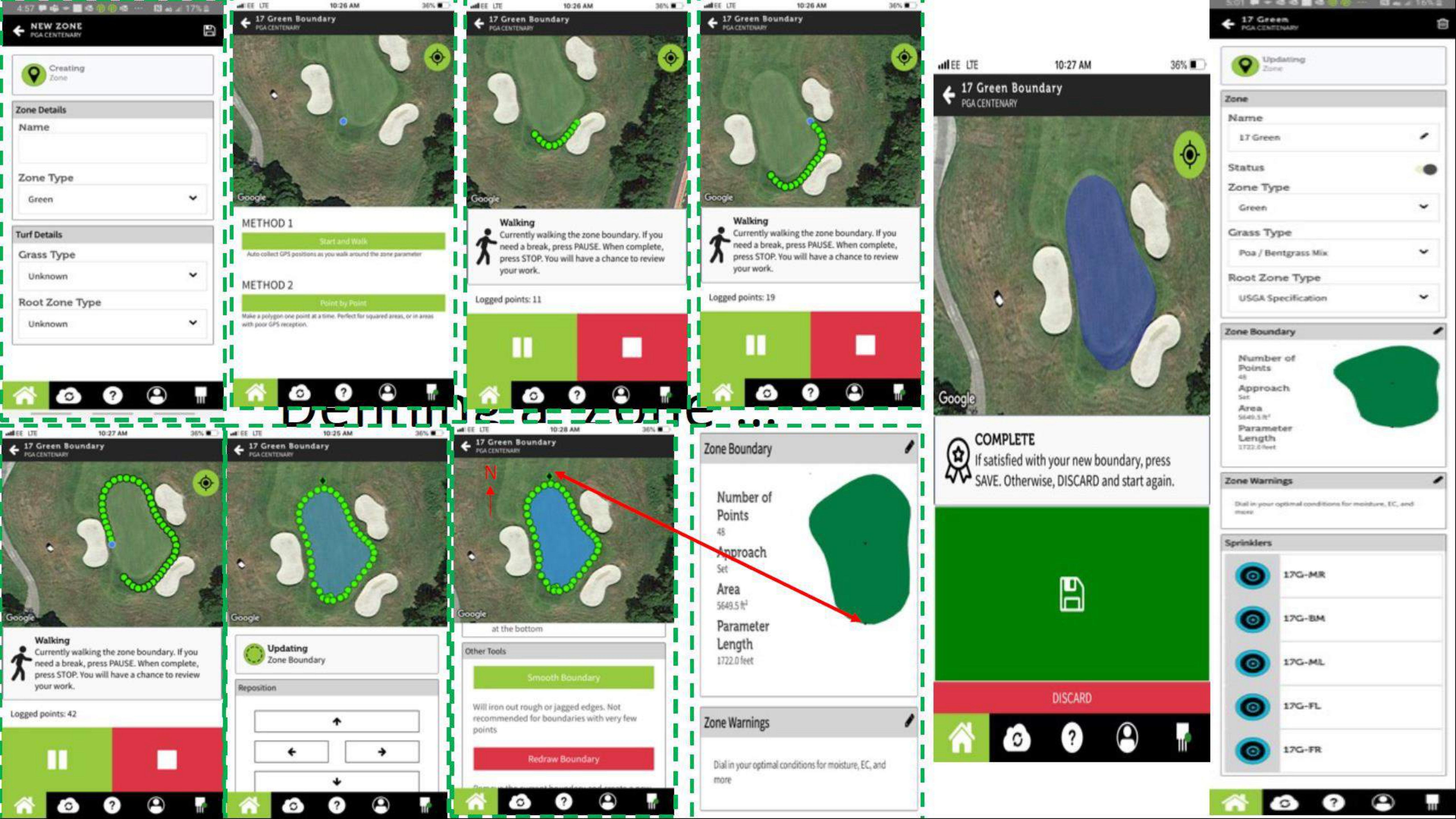
Work flow

A systematic approach

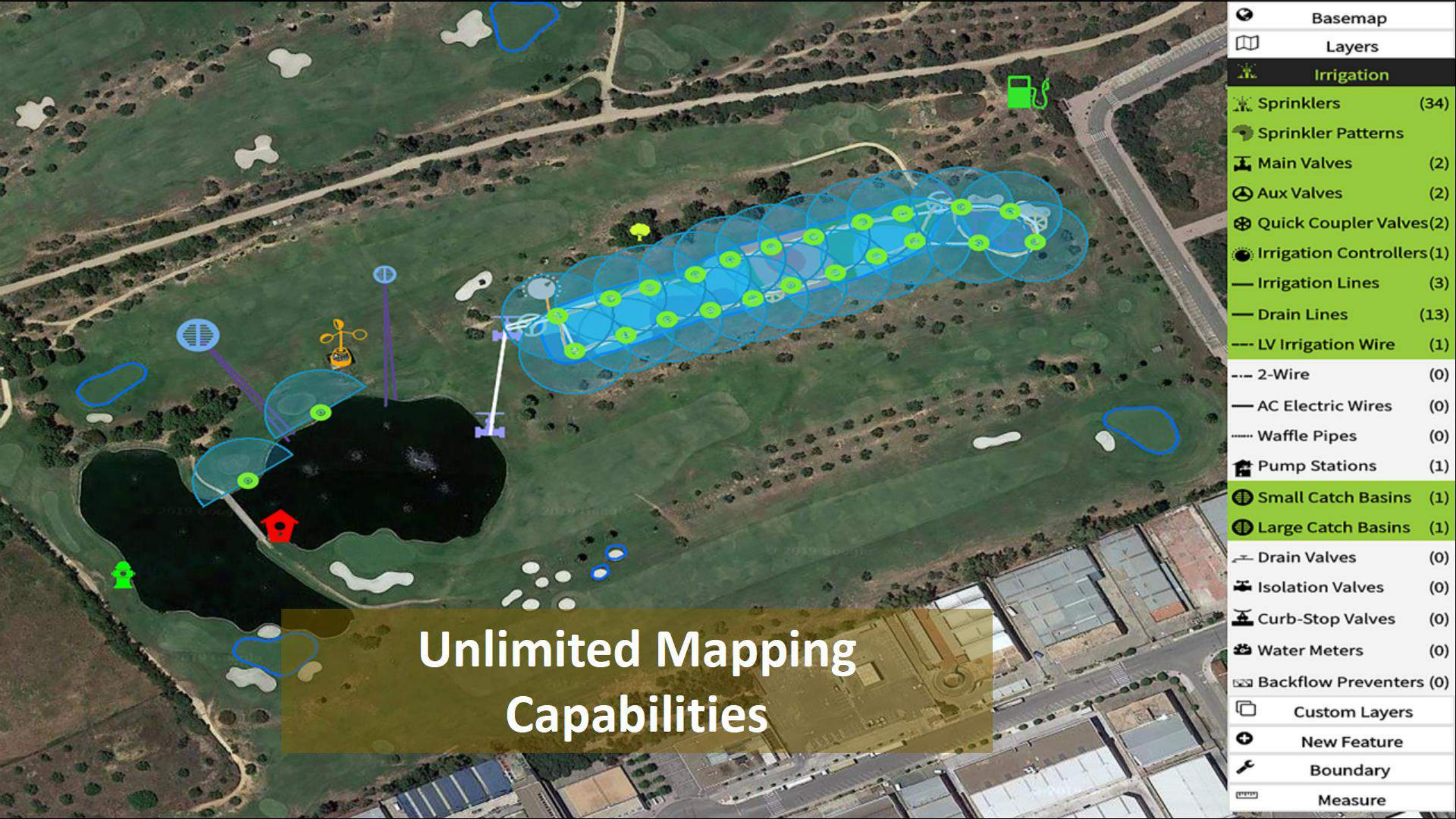

POGO Pro+
TurfPro Mobile
TurfPro Cloud

POGO Pro+


POGO
Pro+
by
STEVENS
pogoturfpro.com
in
cm
0
1
2
4
5
6
2.5
5.1
10.2
12.7
15.2



Defining a zone ...
NEW ZONE
PGA CENTENARY
Creating Zone
Zone Details
Name
Zone Type
Green
Turf Details
Grass Type
Unknown
Root Zone Type
Unknown
17 Green Boundary
METHOD 1
Start and Walk
Auto collect GPS positions as you walk around the zone parameter
METHOD 2
Point by Point
Make a polygon one point at a time. Perfect for squared areas, or in areas with poor GPS reception.
Walking
Currently walking the zone boundary. If you need a break, press PAUSE. When complete, press STOP. You will have a chance to review your work.
Logged points: 11
Logged points: 19
Logged points: 42
Updating Zone Boundary
Reposition
N
at the bottom
Other Tools
Smooth Boundary
Will iron out rough or jagged edges. Not recommended for boundaries with very few points
Redraw Boundary
Zone Boundary
Number of Points
48
Approach
Set
Area
5649.5 ft²
Parameter Length
1722.0 feet
Zone Warnings
Dial in your optimal conditions for moisture, EC, and more
COMPLETE
If satisfied with your new boundary, press SAVE. Otherwise, DISCARD and start again.
DISCARD
17 Green
Updating Zone
Zone
Name
17 Green
Status
Zone Type
Green
Grass Type
Poa / Bentgrass Mix
Root Zone Type
USGA Specification
Sprinklers
17G-MR
17G-BM
17G-ML
17G-FL
17G-FR


Basemap
Layers
Irrigation
Sprinklers (34)
Sprinkler Patterns
Main Valves (2)
Aux Valves (2)
Quick Coupler Valves (2)
Irrigation Controllers (1)
Irrigation Lines (3)
Drain Lines (13)
LV Irrigation Wire (1)
2-Wire (0)
AC Electric Wires (0)
Waffle Pipes (0)
Pump Stations (1)
Small Catch Basins (1)
Large Catch Basins (1)
Drain Valves (0)
Isolation Valves (0)
Curb-Stop Valves (0)
Water Meters (0)
Backflow Preventers (0)
Custom Layers
New Feature
Boundary
Measure
Unlimited Mapping Capabilities

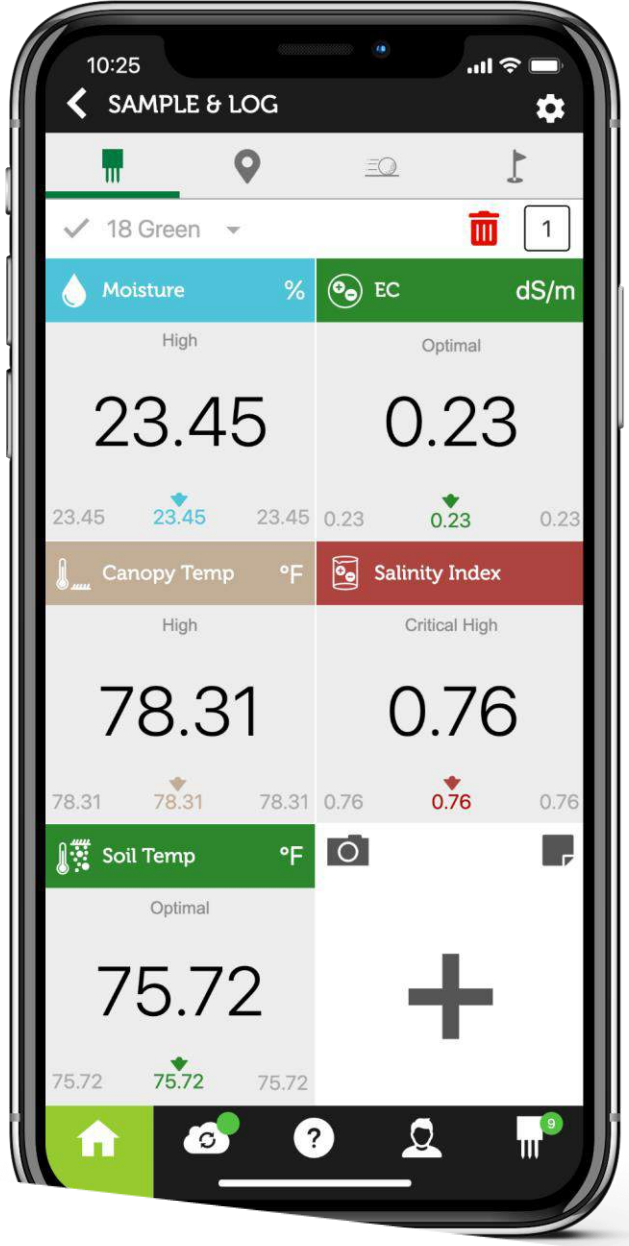
CSV PDF

Zone	Area (m²)
Browntop Demonstration Green	490.18
Field 3	9203.06
Front lawn	388.48
Golf fairway	1680.16
Golf Green	251.55
Putting	349.09
Rugby Field	2123.72
Tee	144.25

8 total

Multi-Parameter

- Moisture (VWC)
- Electroconductivity (EC)
- Salinity Index (EC vs VWC)
- Canopy Temperature
- Soil Temperature
- GPS position



Multi-Parameter

- Moisture (VWC)
- Electroconductivity (EC)
- Salinity Index (EC vs VWC)
- Canopy Temperature
- Soil Temperature
- *GPS position*

CURRENT ZONE

12 Green

VISUAL INSIGHT

POGO | Spec

Nov 17, 2015 | Set 1

November 17, 2015 12:09 PM | Dataset 1 | 14 Samples

Click the boxes below for Visual Insight

Moisture - Optimal
32 %
42 ↑
19 ↓

Distribution Uniformity 74.73

Turf Performance ↑0

22.00	28.00
Critical Low	Low
33.00	39.00
High	Critical High

Save Warnings | Copy + Save

EC - Optimal
0.27 dS/m
0.46 ↑
0.16 ↓

Distribution Uniformity 69.32

Turf Performance ↑0

Temperature - Optimal
71.5 °F
72.3 ↑
70.7 ↓

Turf Performance ↑0

Salinity Index - Low
0.84
1.1 ↑
0.84 ↓

Turf Performance ↑0

Edit POGO Samples

Basemap
Layers
Irrigation
New Feature
Boundary

November 17, 2015 12:06 PM
Set 1
Carmen

Moisture - Critically High
42 %

EC - Critically High
0.35 dS/m

Temperature - Optimal
71.9 °F

Salinity Index - Low
0.83

Move | Delete

Start Date
Jul 4, 2015

End Date
Jul 31, 2015

Zones
01 Green

Attributes

Moisture
Avg Min Max

EC
Avg Min Max

Temperature
Avg Min Max

Salinity Index
Avg Min Max

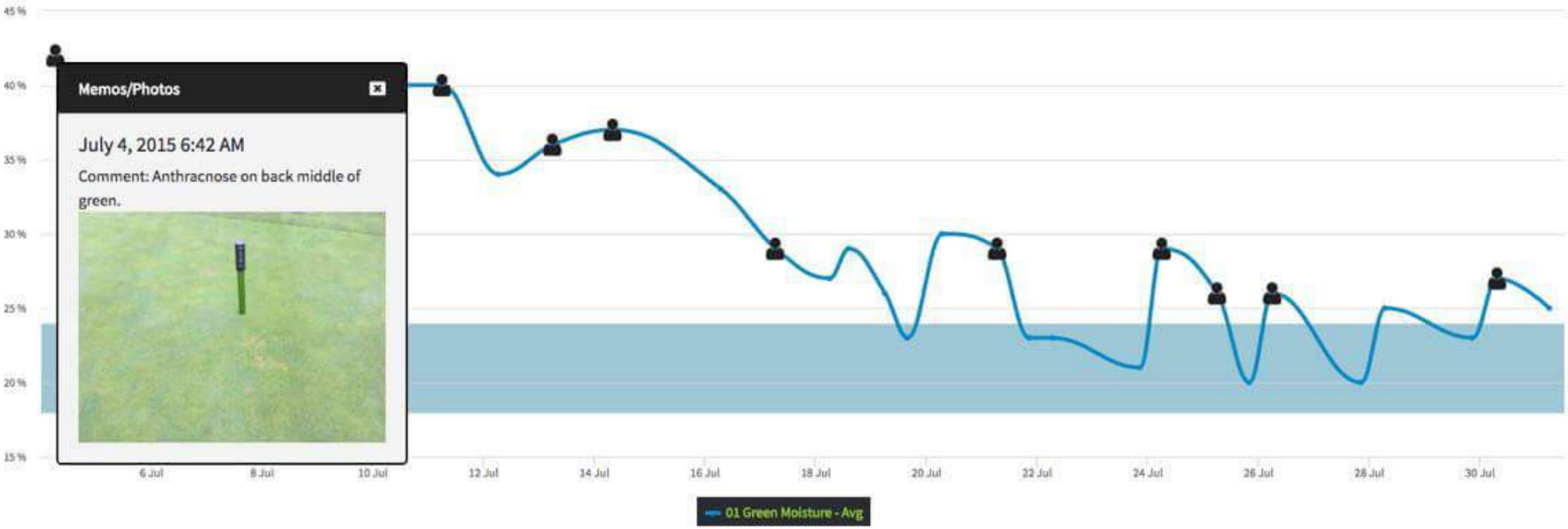
Plot Datasets
Together Separate

Chart Per Zone
Yes No

Plot Optimal Range
None
Moisture
EC
Temperature
Salinity Index

Victory Hills Golf Course

2015-07-04 - 2015-07-31



POGO Data

CSV

Zone	Sample Date	Dataset	Moisture - Avg (%)
01 Green	2015-07-04 06:42:06	1	42
01 Green	2015-07-05 06:27:46	1	37
01 Green	2015-07-07 06:09:33	1	33
01 Green	2015-07-08 06:25:11	1	39
01 Green	2015-07-09 07:04:04	1	36
01 Green	2015-07-10 06:17:30	1	40

Visual Insight Type
POGO | Spec

Date Type
Single | Range

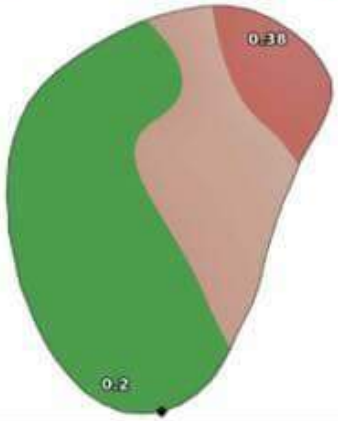
Date
May 1, 2017

Dataset
All

POGO Attributes
Moisture
EC
Temperature
Salinity Index

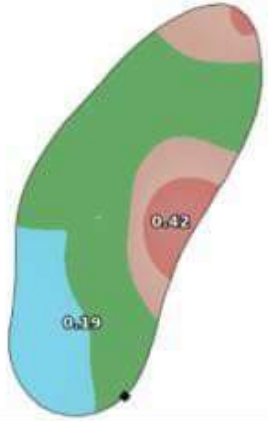
Zones
Search...
All Zone Types
Select all | Unselect all
01 Green
02 Green
03 Green
04 Green
05 Green
06 Green
07 Green
08 Green
09 Green
10 Green
11 Green

17 Green
EC - Optimal
0.27 dS/m
Distribution Uniformity 76.7
Turf Performance ↑98



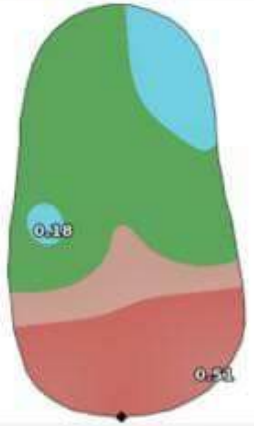
May 1, 2017 7:35 AM
Dataset 1 - 11 Samples

18 Green
EC - Optimal
0.24 dS/m
Distribution Uniformity 79.04
Turf Performance ↓100



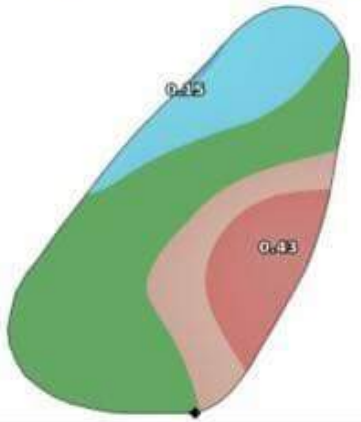
May 1, 2017 9:04 AM
Dataset 1 - 13 Samples

19 Green
EC - High
0.3 dS/m
Distribution Uniformity 62.18
Turf Performance ↑92



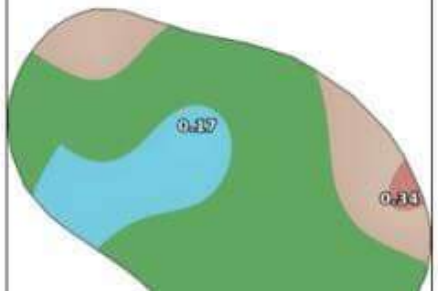
May 1, 2017 10:24 AM
Dataset 1 - 8 Samples

20 Green
EC - Optimal
0.26 dS/m
Distribution Uniformity 64.13
Turf Performance ↑99



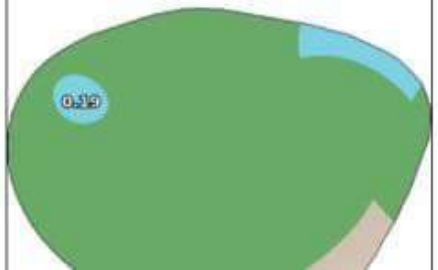
May 1, 2017 7:00 AM
Dataset 1 - 11 Samples

21 Chaquita Green
EC - Optimal
0.23 dS/m
Distribution Uniformity 77.51
Turf Performance ↓100

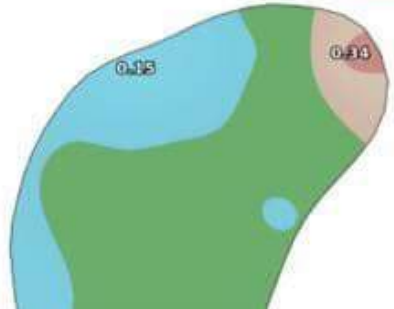


22 Large Putting Green
EC - High
0.28 dS/m
Distribution Uniformity 67.7
Turf Performance ↑97

23 Chipper 1 Green
EC - Optimal
0.23 dS/m
Distribution Uniformity 85.19
Turf Performance ↓100



24 Chipper 18 Green
EC - Optimal
0.23 dS/m
Distribution Uniformity 75.37
Turf Performance ↓100

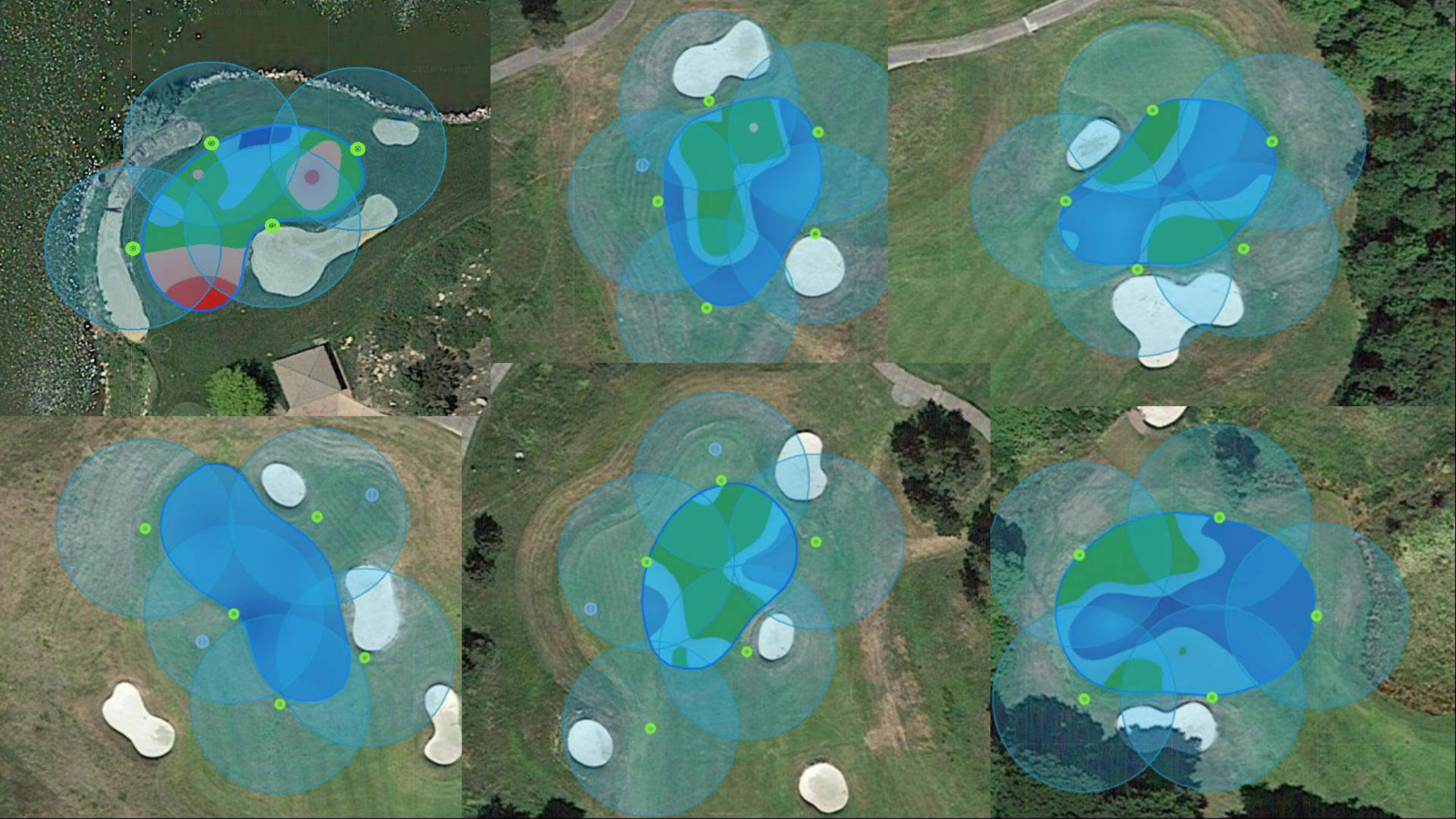


Distribution Uniformity

There is a big difference from the Irrigation System DU and the Soil Moisture DU

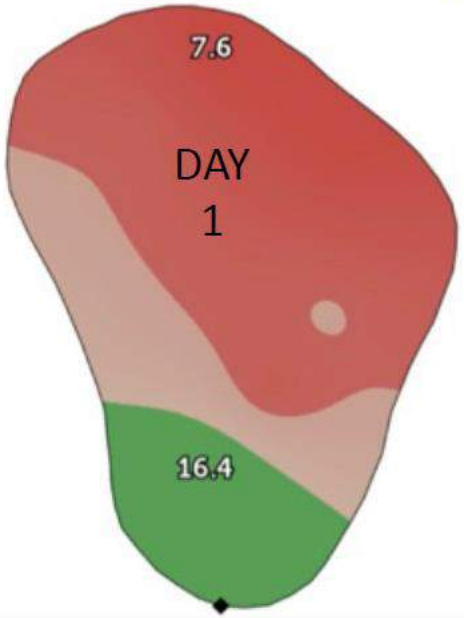
Influencing Factors:

- Topography
- Water Infiltration
- Compaction
- Hydrophobicity
- Organic Matter



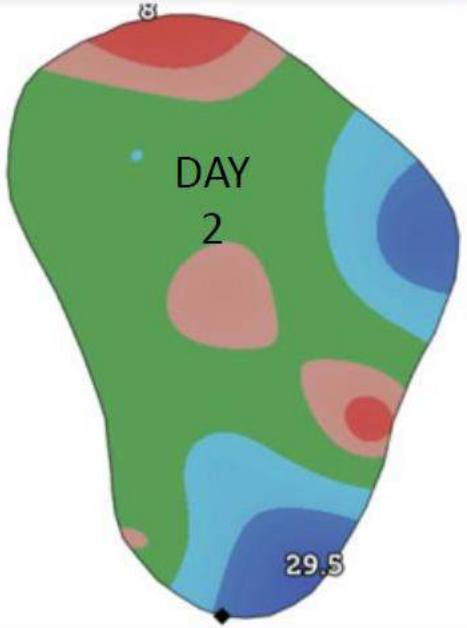
Distribution Uniformity 67

Turf Performance ↓83



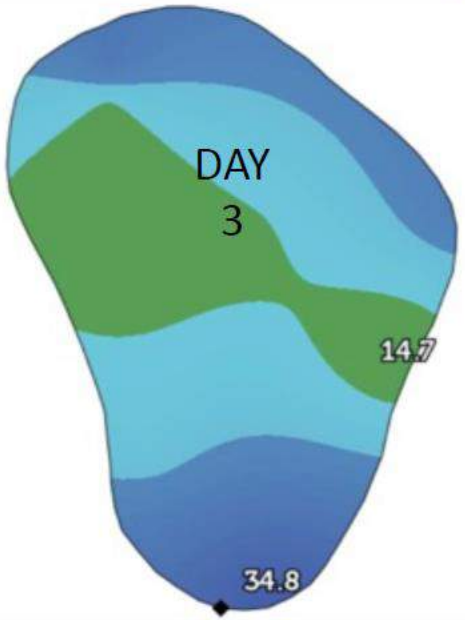
Distribution Uniformity 57

Turf Performance ↑98



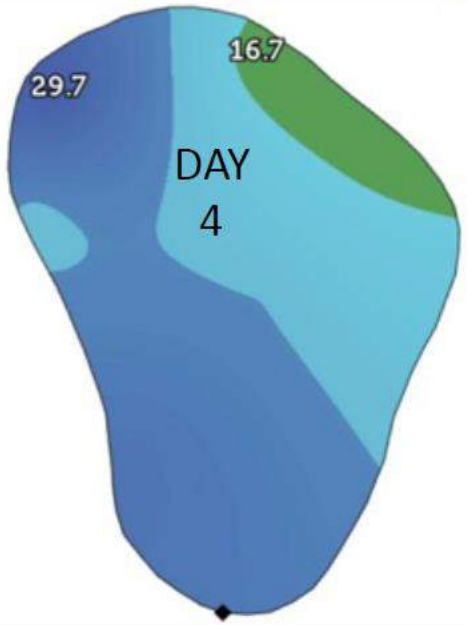
Distribution Uniformity 74

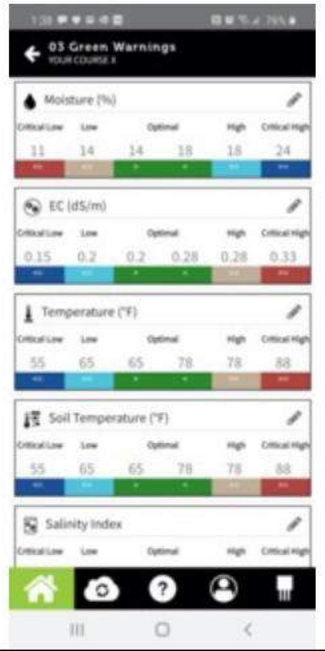
Turf Performance ↑78

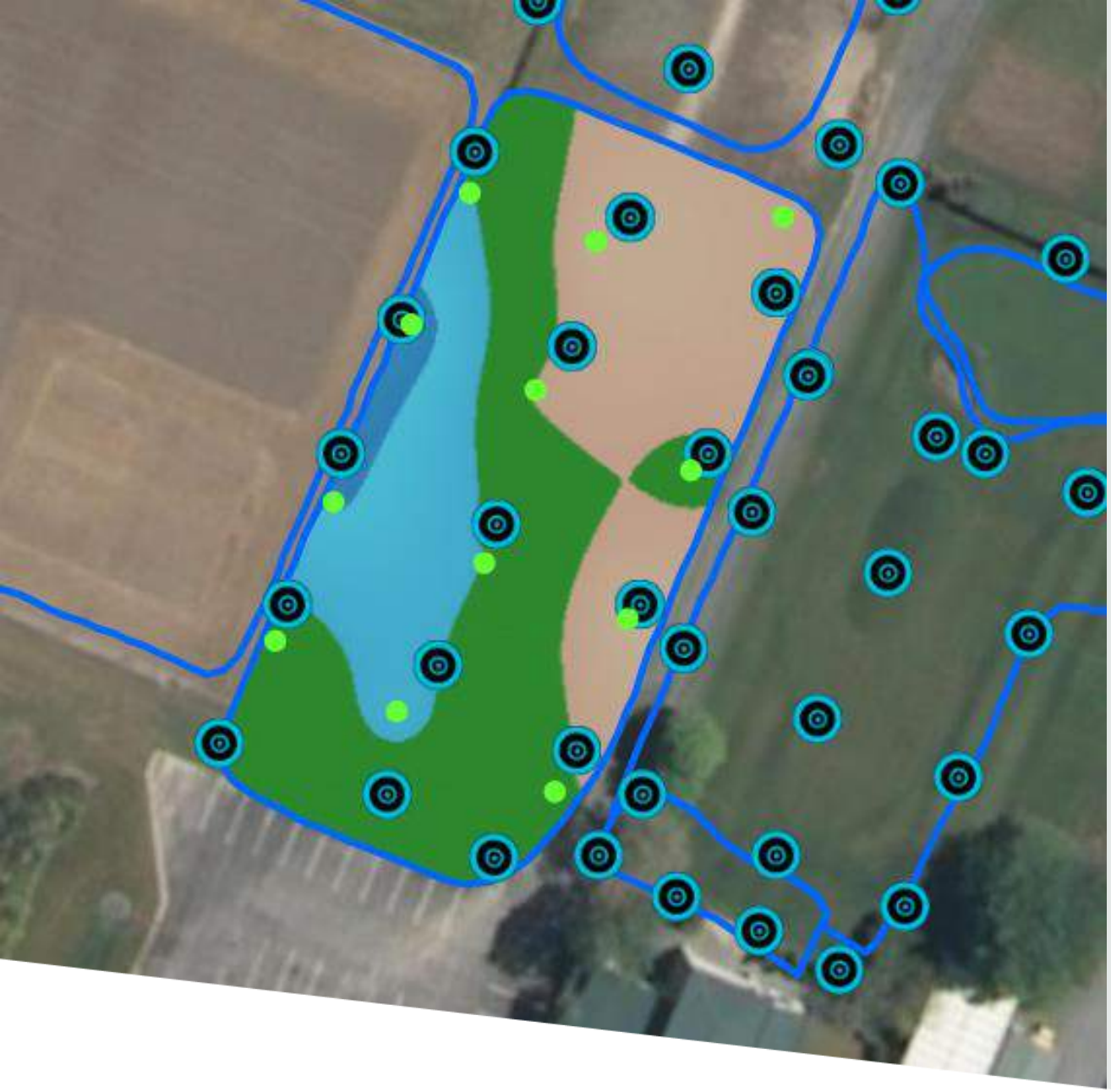


Distribution Uniformity 76

Turf Performance ↑73







How many points do I need to collect?

The more sophisticated the system is the more data points will need to be collected in order to fully utilize the potential of the system.

Be mindful of your water management zones sizes.

How many points do I need to collect?

- 9 to 18 points per putting green
- Randomly sample fairways and other large turf areas – 18 to 24 points
- Monitoring properly requires a representative sample set of the area

Keep an as-built map
Sample zones
Visualise the results
Track changes over time
Create auditable records

Future upgrades

- More sensors are currently being developed and tested
- Integration with irrigation controllers
- More functionalities on the TurfPro Cloud

The only way to make every drop count is to account for every drop.

Thank you.

Any Questions?

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Guilherme Barcellos
gbarcellos@pgwturf.co.nz
+640273173267

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Experts from earth to turf