Agri-tech Cornwall Soil Carbon Project

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How much organic carbon is there in my soil?

- Lab analysis usually used to determine soil Carbon
- What is the most efficient way to carry out this sampling to give an accurate value for soil Carbon?
- Some of the questions we are asking are:

How often do I did need sample to detect any change in soil carbon over time?

How many soil samples do I need to collect to accurately measure soil carbon?

What time of year should I collect soil samples?

How do I decide where in my fields to collect samples from?

Will soil carbon concentration be the same across a field?

How accurate will the soil carbon final figure be?

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The Answers to these questions will vary from site to site and depend on many factors including:

The soil type

Topography

Climate

Land use type

Grazing practices / livestock movements

Field size

Fertiliser use

Historical management practices

Ploughing Frequency

Landscape features, e.g. rivers

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The Project – How to accurately test for soil Carbon

Step 1 : Farmer survey

Gain as much information about land management /characteristics as possible

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Step 2 : Initial Field Sampling

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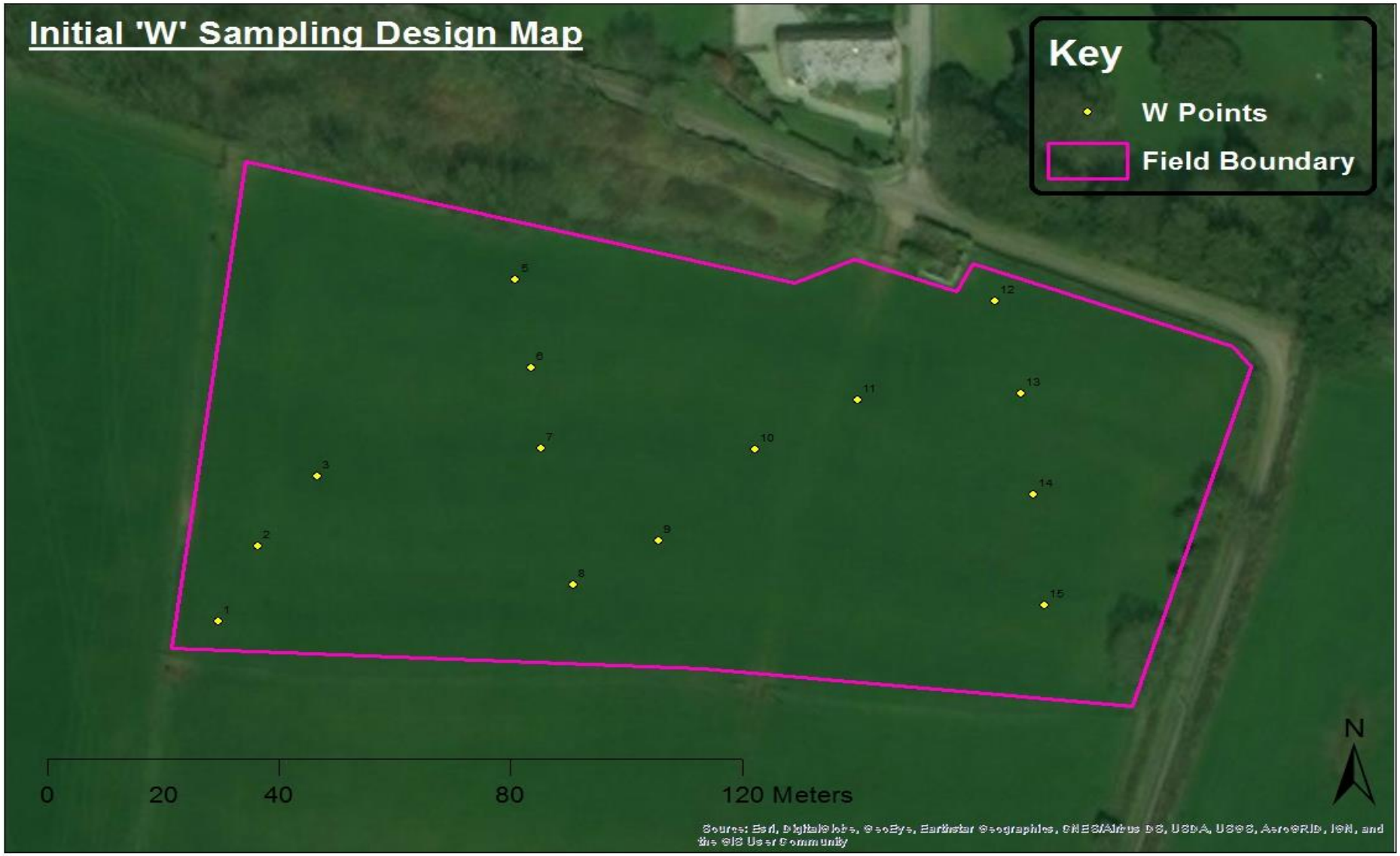
Carry out initial field sampling (15 point W's) to get an indication of soil Carbon variation at field scale level



Step 3 : More intensive field sampling

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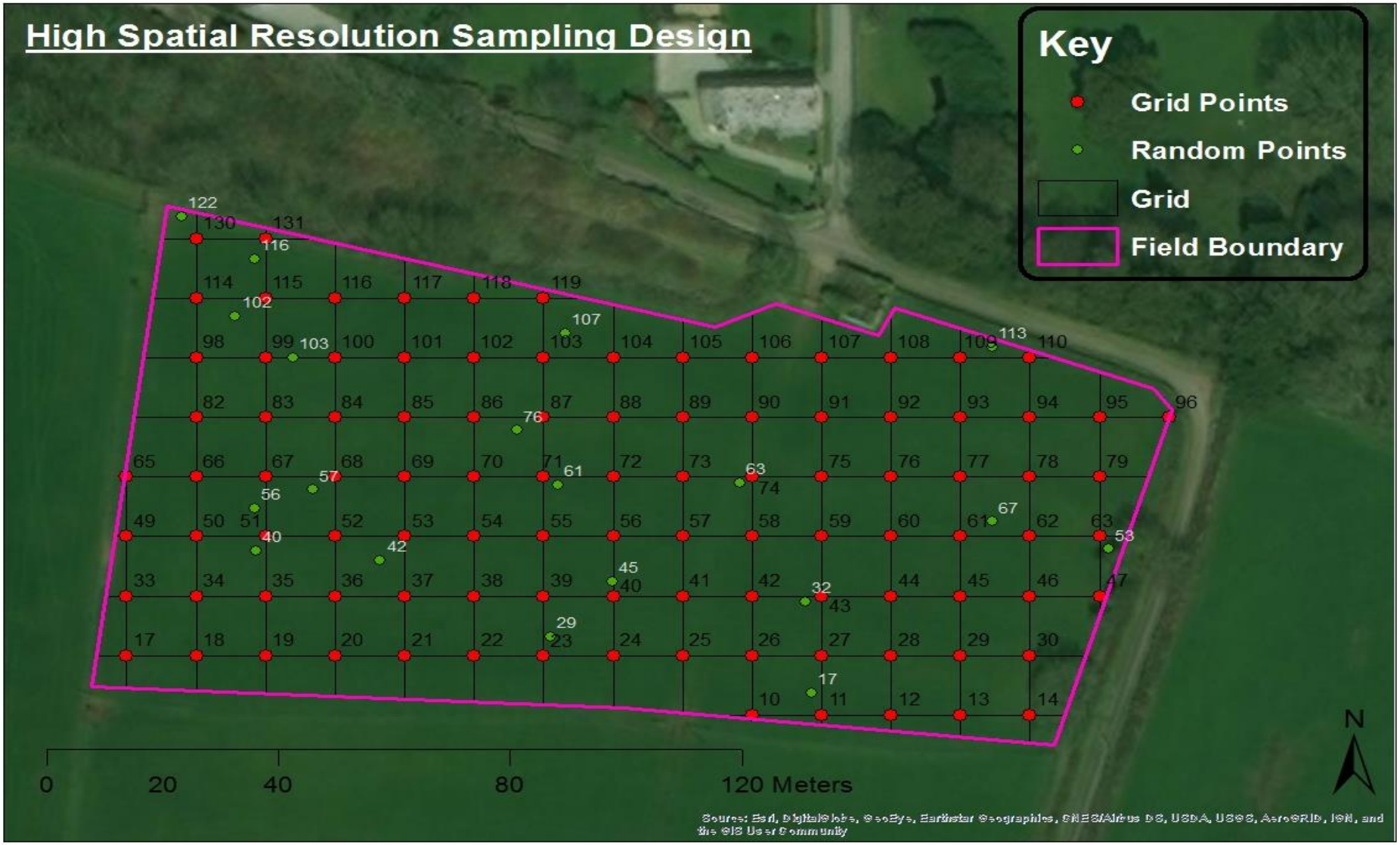
Carry out high spatial resolution sampling in selected fields (80+ points per field)



Step 4 : Linking field sampling to survey data

Use statistical analysis to determine what is causing differences in soil Carbon within a field

Types of Data included analysis:

- Soil Carbon samples
- Farmer Survey
- Environmental Factors

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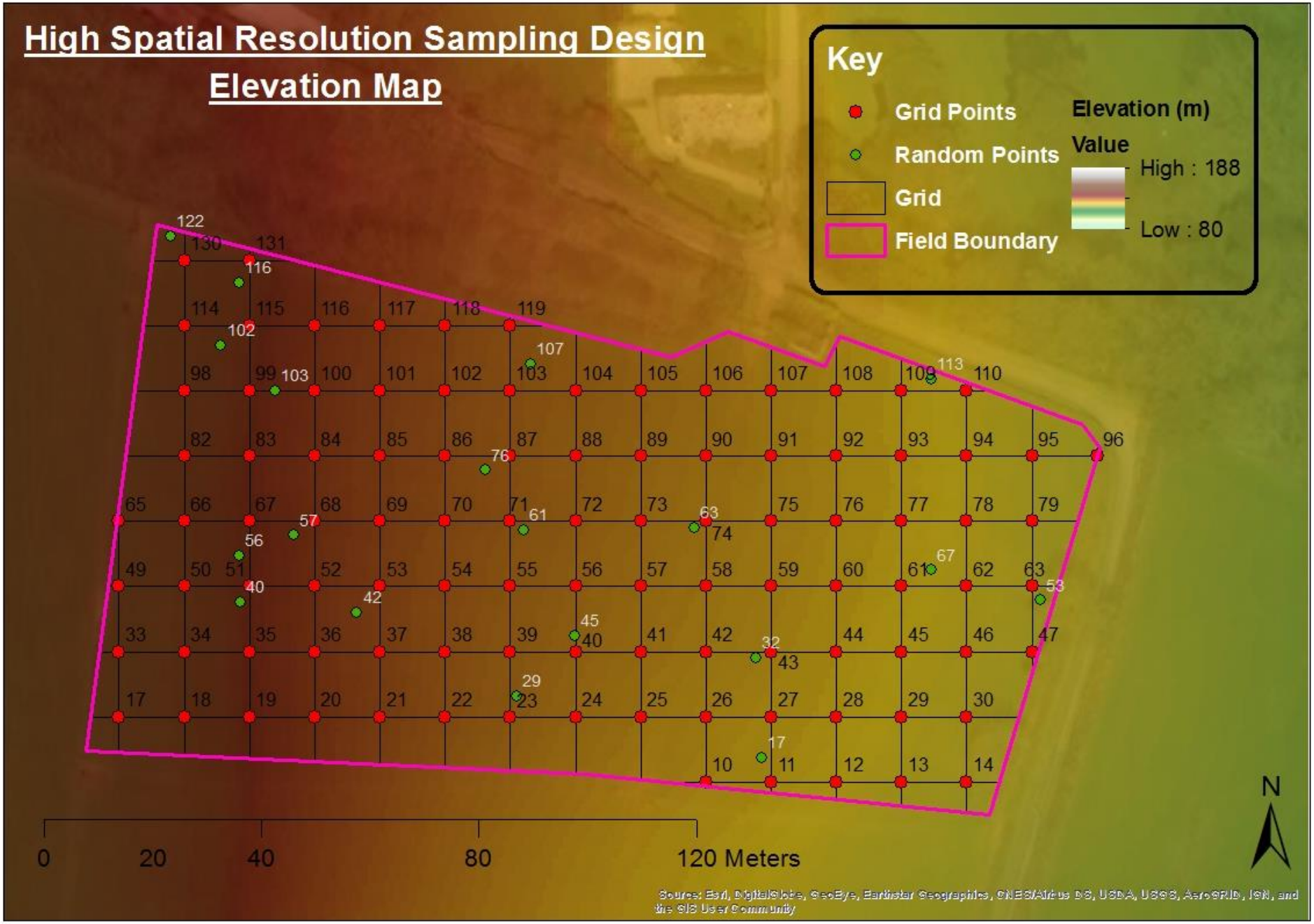
High Spatial Resolution Sampling Design
Elevation Map
Key
Grid Points
Random Points
Grid
Field Boundary
Elevation (m)
Value
High : 188
Low : 80
122
130
131
116
114
115
116
117
118
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102
107
98
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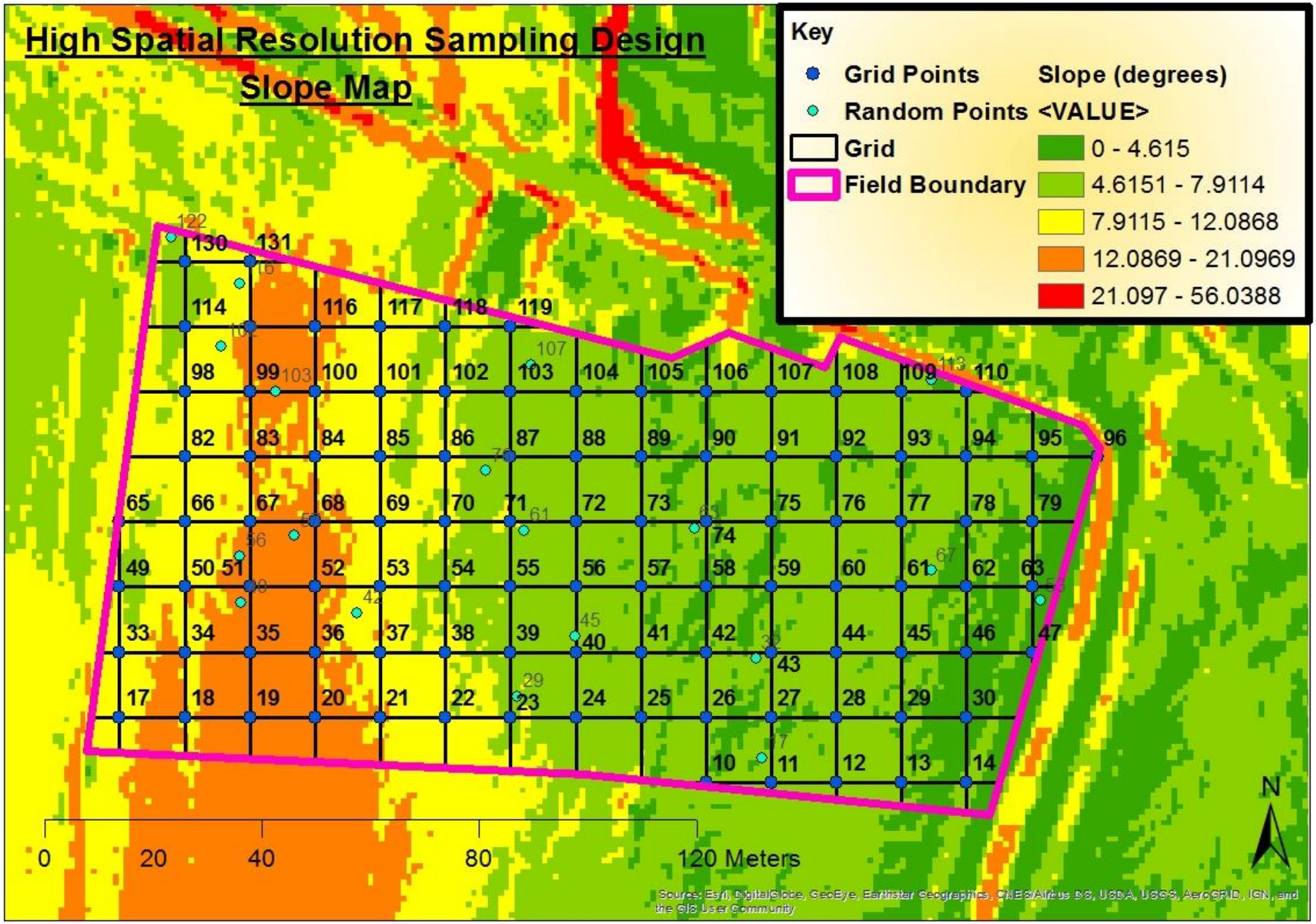
23
24
25
26
27
28
29
30
17
10
11
12
13
14
0
20
40
80
120 Meters
N
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community


High Spatial Resolution Sampling Design
Slope Map
Key
Grid Points
Random Points
Grid
Field Boundary
Slope (degrees)
<VALUE>
0 - 4.615
4.6151 - 7.9114
7.9115 - 12.0868
12.0869 - 21.0969
21.097 - 56.0388
0
20
40
80
120 Meters
N
Sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Step 5 : Design and test an ‘Ideal’ sampling strategy maximise accuracy of findings

- Identify the optimal number and location of soil sampling points and the frequency of sampling needed to accurately determine soil carbon

- ‘Ideal’ strategy will be compared to current W sampling practices

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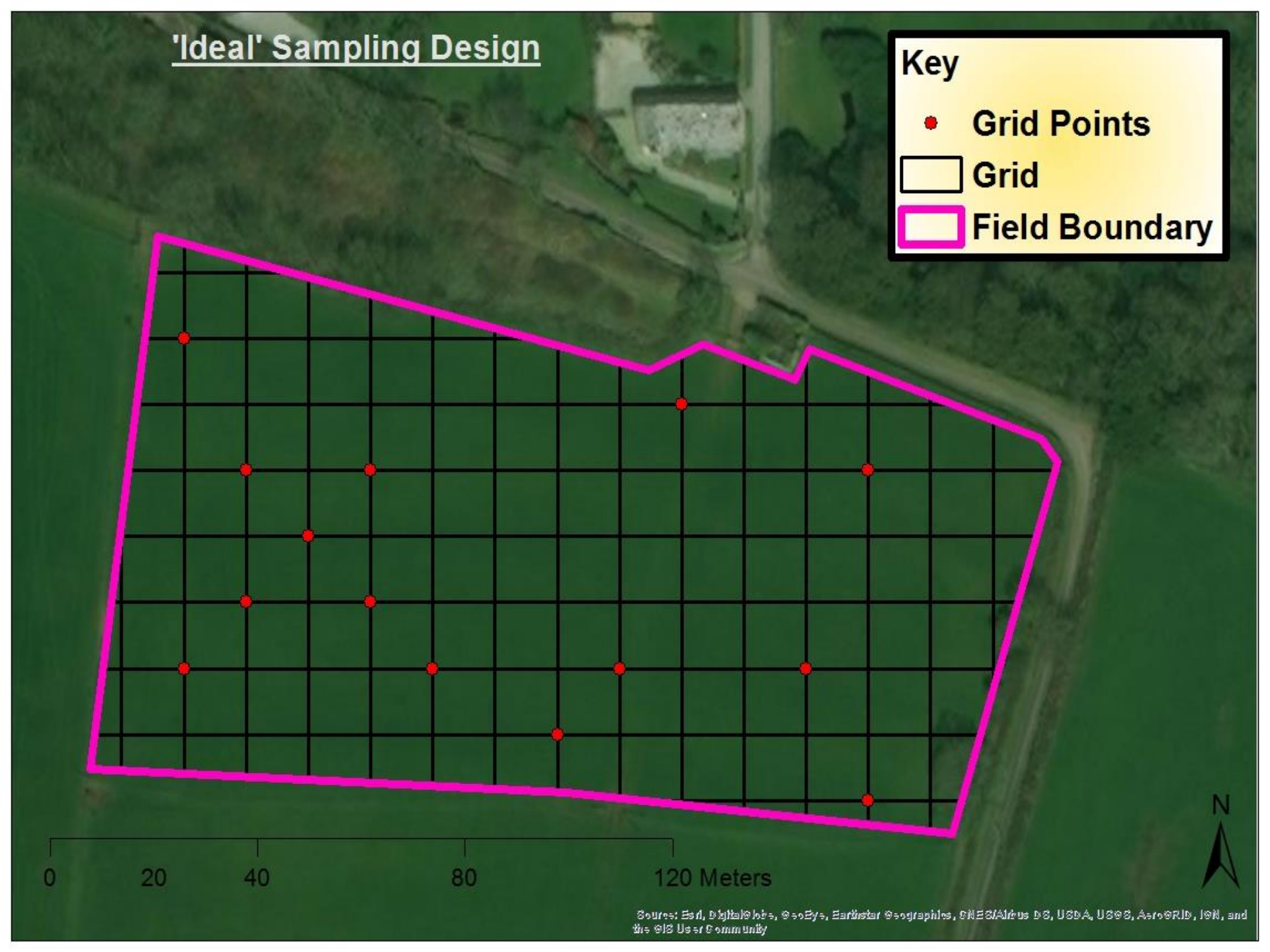
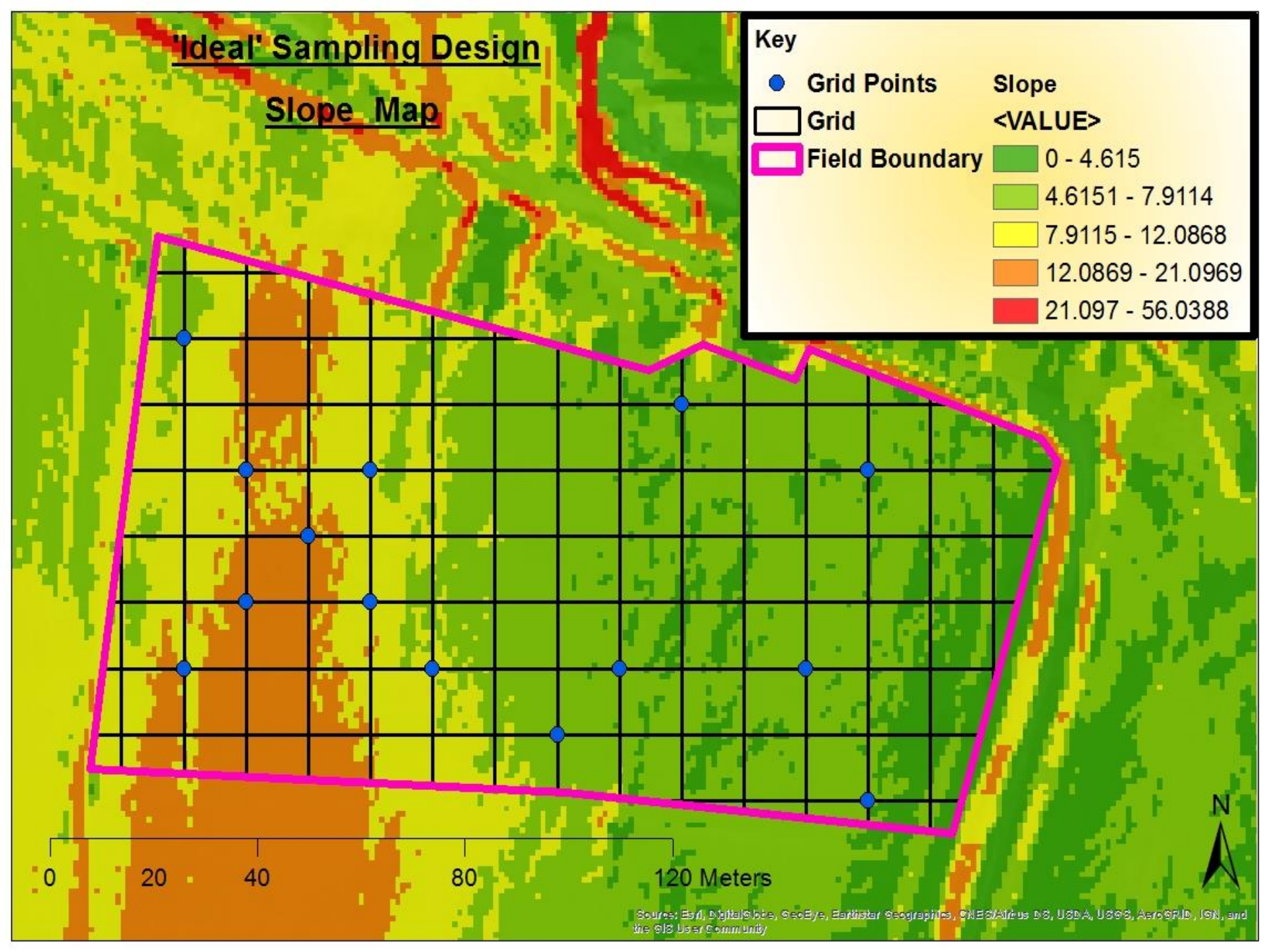

'Ideal' Sampling Design
Key
Grid Points
Grid
Field Boundary
0
20
40
80
120 Meters
N
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community


'Ideal' Sampling Design
Slope Map
Key
Grid Points
Grid
Field Boundary
Slope
<VALUE>
0 - 4.615
4.6151 - 7.9114
7.9115 - 12.0868
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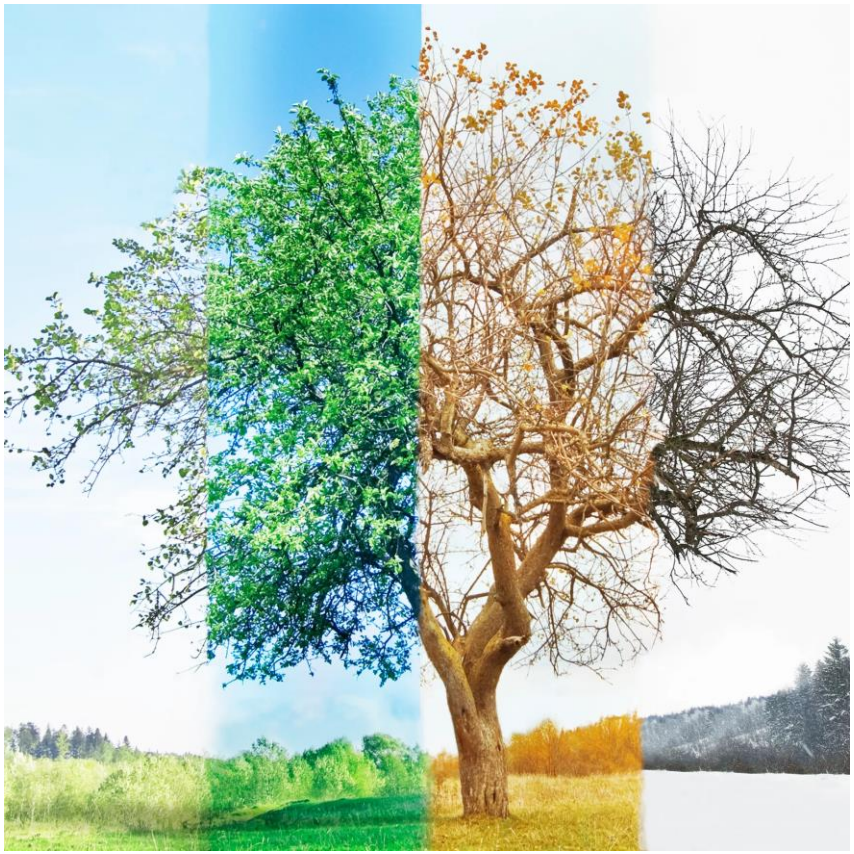
0
20
40
80
120 Meters
N
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Sampling Design Outcomes

- Low Variability – ‘Ideal’ sampling design may not be any different to a W
- High variability - ‘Ideal’ sampling design will capture the variability and be more representative than a W
- Very High variability – High-resolution grid is the only way to get accurate representation – this isn’t practical - so standard W could be used but with high uncertainty

Step 6 : Repeat sampling in different years / at different times of year

- Identify the best time of year to sample soil carbon
- Different Crop type/Land use also taken into account



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Benefits

- Indication on best land management practice
- Possible reduction in inputs
- Possible indication for crop suitability
- Potential for payment under new agricultural Payment Schemes

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Thank you

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