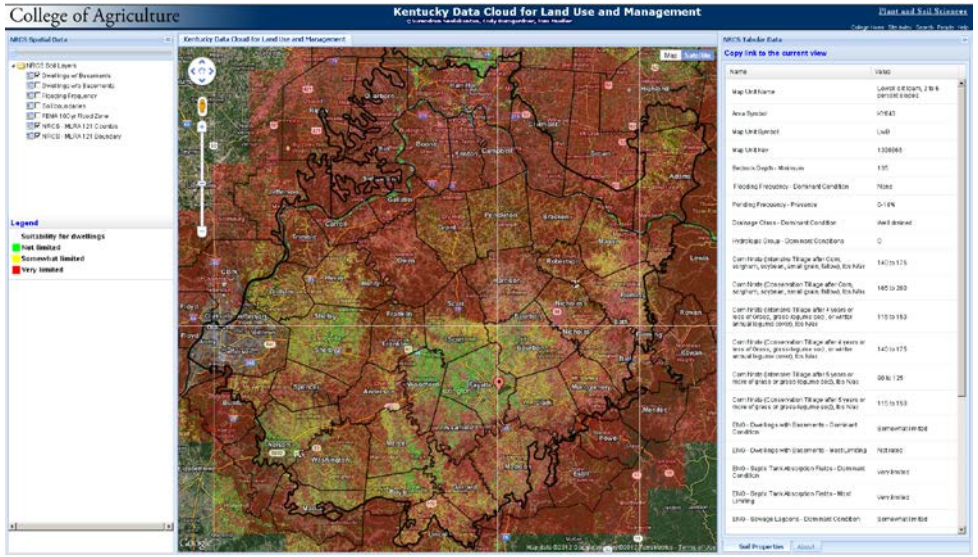
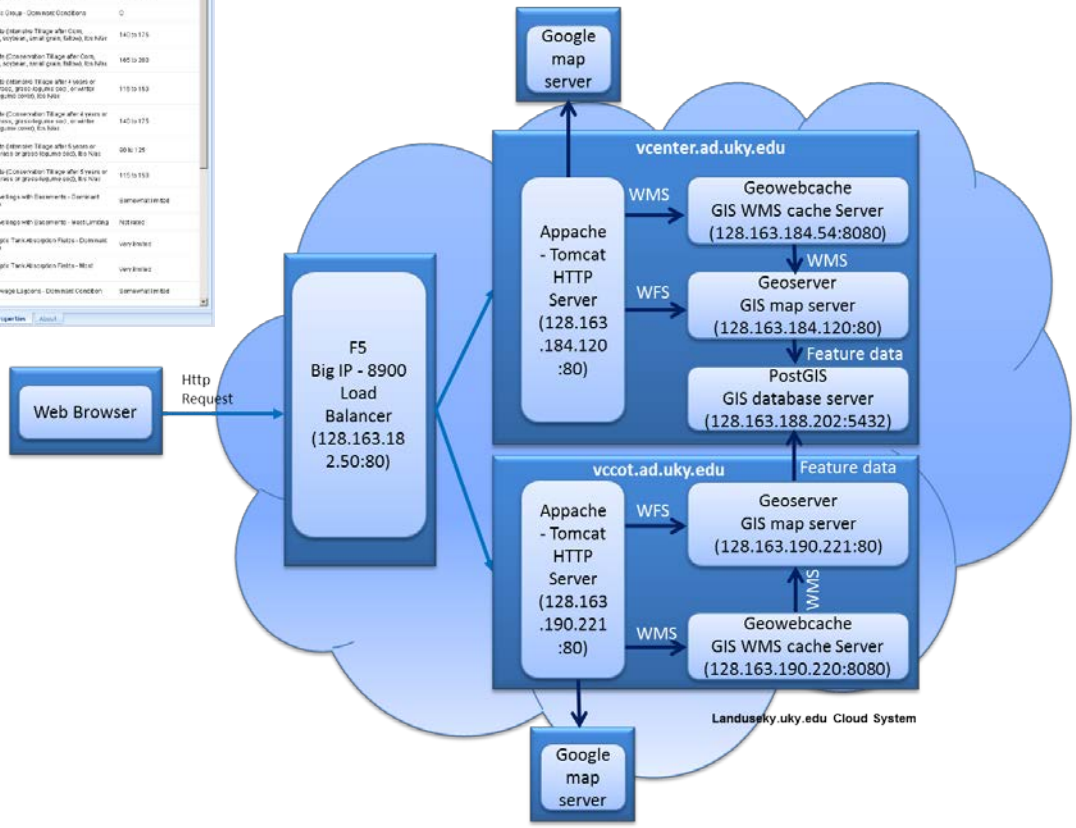
http://landuseky.uky.edu

Cloud Based Soil Survey Land Use Visualization Web 2.0 Spatial Database





Surendran Neelakantan
Tom Mueller
Annamaria Castrignanò
Cody Bumgardner

Soil Survey
(Suitability for Dwellings w/ Basements)

College of Agriculture

Kentucky Data Cloud for Land Use and Management

©Surendran Neelakantan, Cody Bumgardner, Tom Mueller

Plant and Soil Sciences

College Home Site Index Search People Help

NRCS Spatial Data

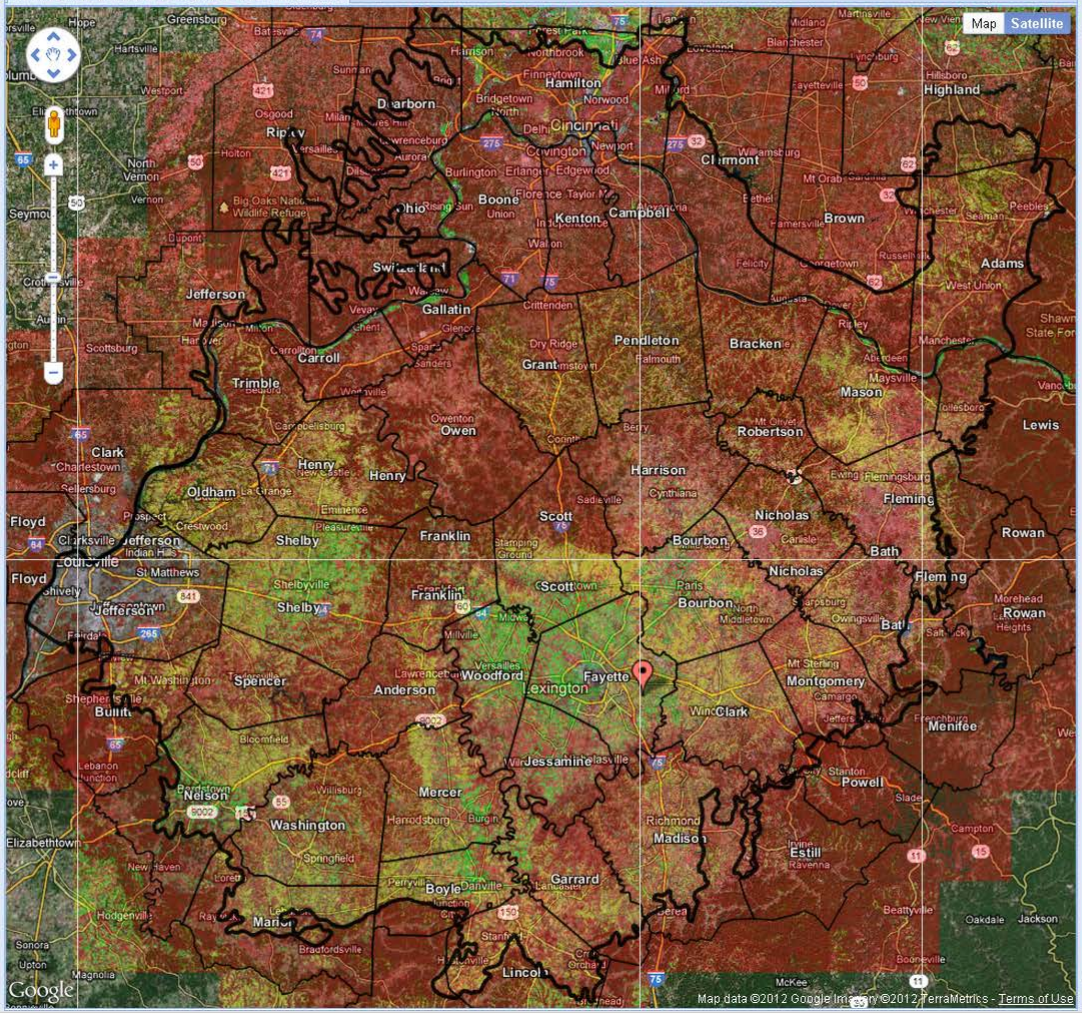
- NRCS Soil Layers
  - [x] Dwellings w/ Basements
  - [ ] Dwellings w/o Basements
  - [ ] Flooding Frequency
  - [ ] Soil boundaries
  - [ ] FEMA 100 yr Flood Zone
  - [x] NRCS - MLRA 121 Countes
  - [x] NRCS - MLRA 121 Boundary

Legend

Suitability for dwellings

- Not limited
- Somewhat limited
- Very limited

Kentucky Data Cloud for Land Use and Management



NRCS Tabular Data

Copy link to the current view

Name	Value
Map Unit Name	Lowell silt loam, 2 to 6 percent slopes
Area Symbol	KY643
Map Unit Symbol	LwB
Map Unit Key	1398866
Bedrock Depth - Minimum	135
Flooding Frequency - Dominant Condition	None
Ponding Frequency - Presence	0-14%
Drainage Class - Dominant Condition	Well drained
Hydrologic Group - Dominant Conditions	C
Corn Nrate (Intensive Tillage after Corn, sorghum, soybean, small grain, fallow), lbs N/ac	140 to 175
Corn Nrate (Conservation Tillage after Corn, sorghum, soybean, small grain, fallow), lbs N/ac	165 to 200
Corn Nrate (Intensive Tillage after 4 years or less of Grass, grass-legume sod , or winter annual legume cover), lbs N/ac	115 to 150
Corn Nrate (Conservation Tillage after 4 years or less of Grass, grass-legume sod , or winter annual legume cover), lbs N/ac	140 to 175
Corn Nrate (Intensive Tillage after 5 years or more of grass or grass-legume sod), lbs N/ac	90 to 125
Corn Nrate (Conservation Tillage after 5 years or more of grass or grass-legume sod), lbs N/ac	115 to 150
ENG - Dwellings with Basements - Dominant Condition	Somewhat limited
ENG - Dwellings with Basements - Most Limiting	Not rated
ENG - Septic Tank Absorption Fields - Dominant Condition	Very limited
ENG - Septic Tank Absorption Fields - Most Limiting	Very limited
ENG - Sewage Lagoons - Dominant Condition	Somewhat limited

Soil Properties | About

FEMA Data

College of Agriculture

Kentucky Data Cloud for Land Use and Management

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Plant and Soil Sciences

College Home Site Index Search People Help

NRCS Spatial Data

- NRCS Soil Layers
  - Dwellings w/ Basements
  - Dwellings w/o Basements
  - Flooding Frequency
  - Soil boundaries
  - FEMA 100 yr Flood Zone
  - NRCS - MLRA 121 Counties
  - NRCS - MLRA 121 Boundary

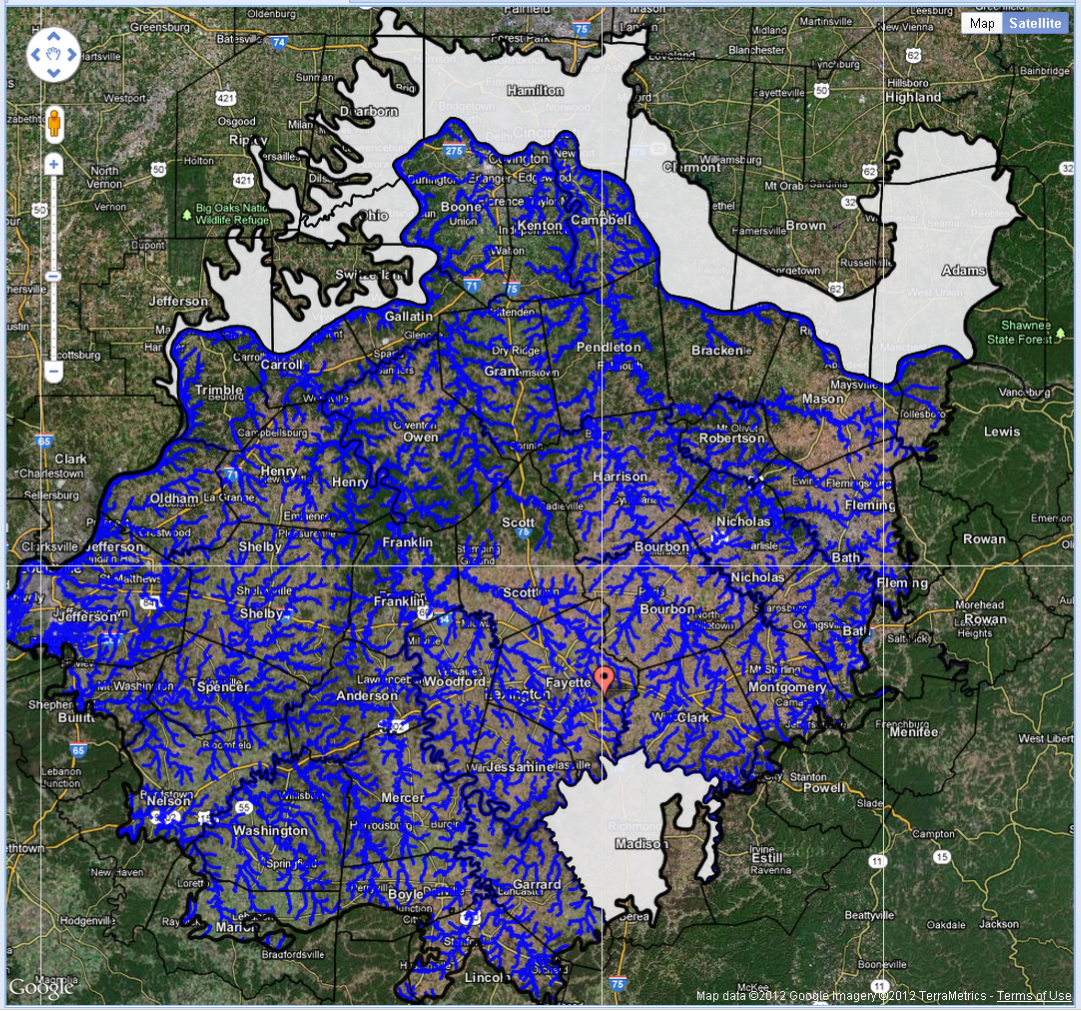
Legend

FEMA 100yr. Flood Data

Flood Zone

No Flood Data

Kentucky Data Cloud for Land Use and Management



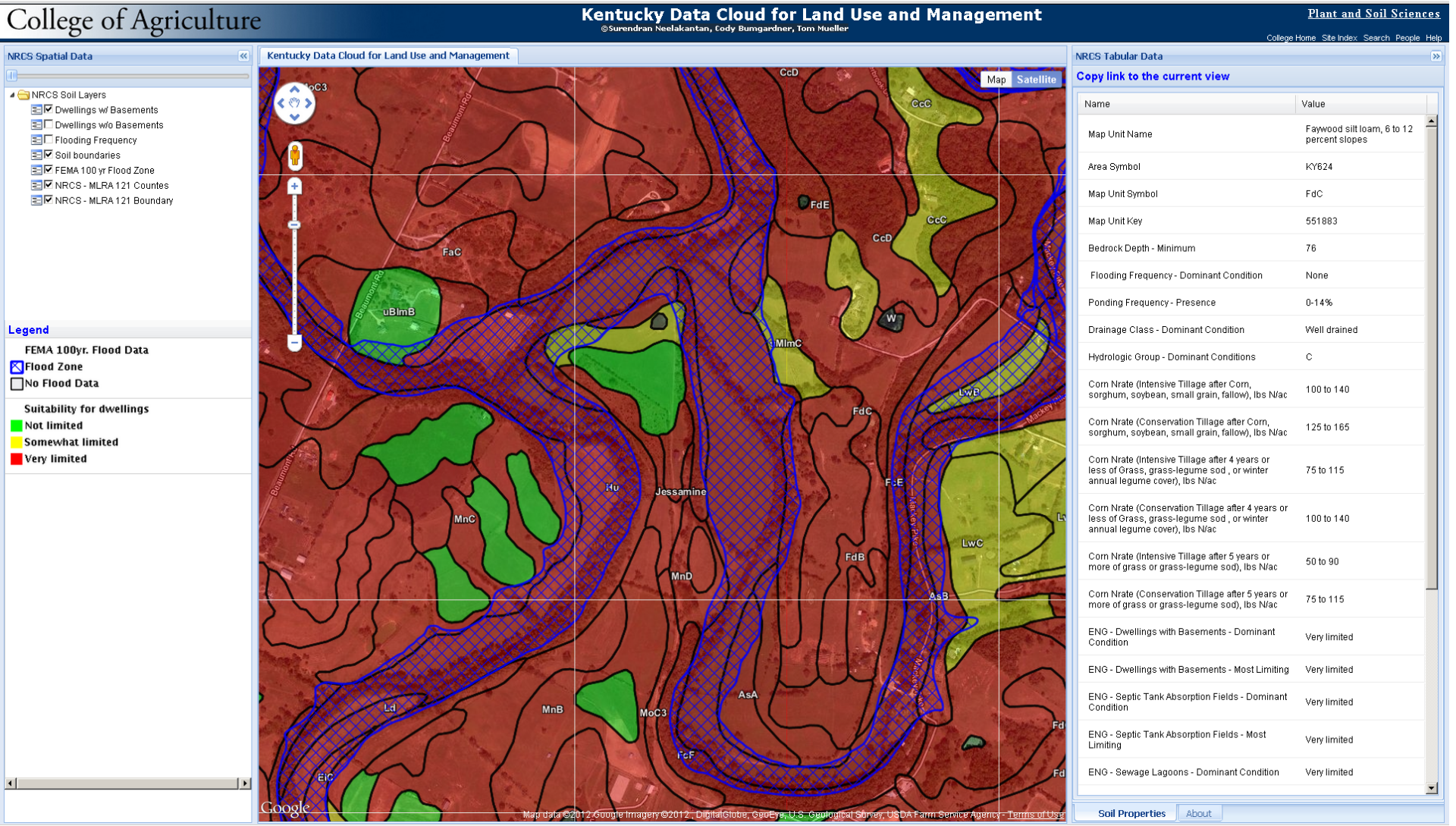
NRCS Tabular Data

Copy link to the current view

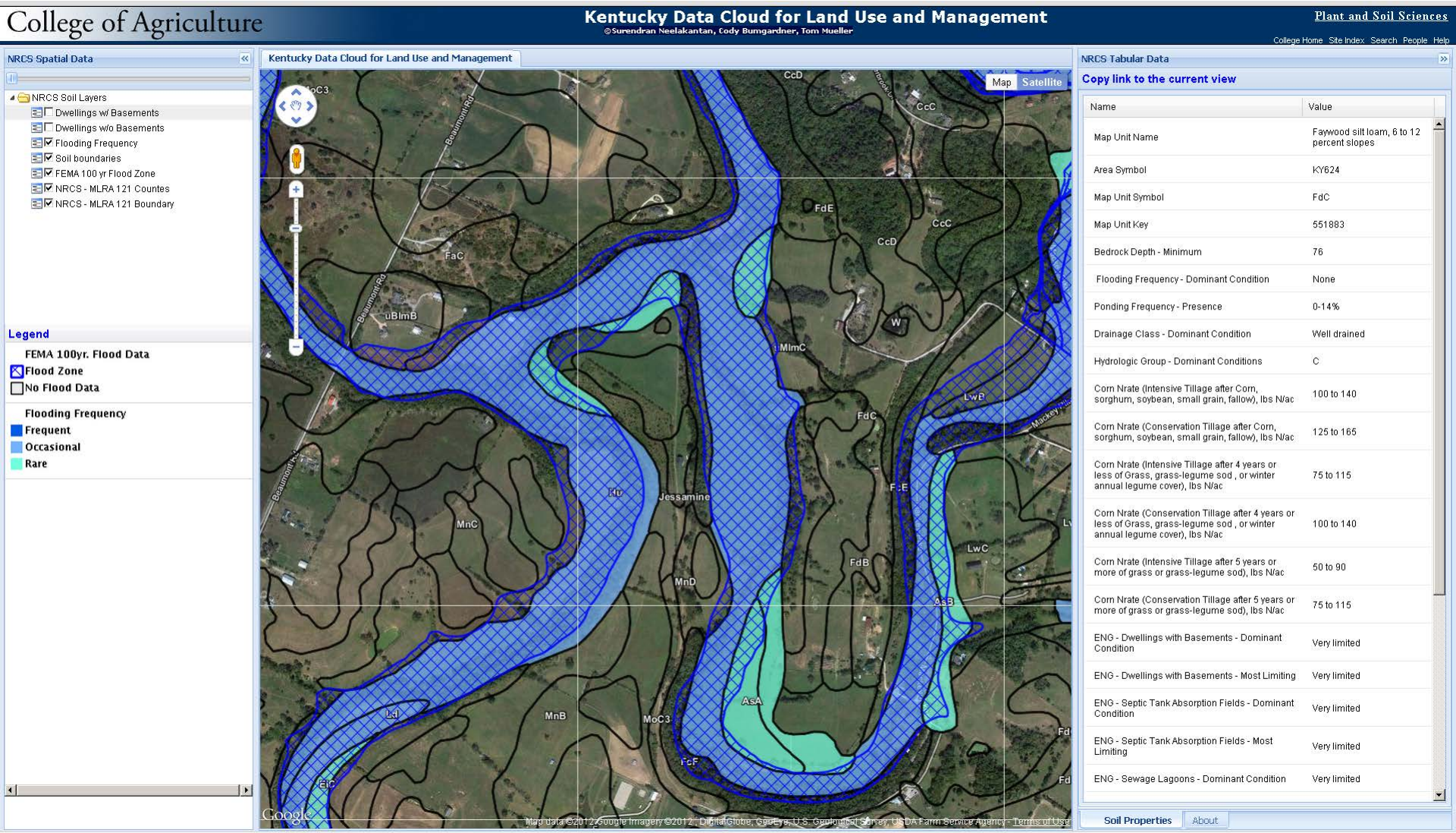
Name	Value
Map Unit Name	McAfee silt loam, 6 to 12 percent slopes
Area Symbol	KY624
Map Unit Symbol	MnC
Map Unit Key	551894
Bedrock Depth - Minimum	76
Flooding Frequency - Dominant Condition	None
Ponding Frequency - Presence	0-14%
Drainage Class - Dominant Condition	Well drained
Hydrologic Group - Dominant Conditions	C
Corn Nrate (Intensive Tillage after Corn, sorghum, soybean, small grain, fallow), lbs N/ac	100 to 140
Corn Nrate (Conservation Tillage after Corn, sorghum, soybean, small grain, fallow), lbs N/ac	125 to 165
Corn Nrate (Intensive Tillage after 4 years or less of Grass, grass-legume sod , or winter annual legume cover), lbs N/ac	75 to 115
Corn Nrate (Conservation Tillage after 4 years or less of Grass, grass-legume sod , or winter annual legume cover), lbs N/ac	100 to 140
Corn Nrate (Intensive Tillage after 5 years or more of grass or grass-legume sod), lbs N/ac	50 to 90
Corn Nrate (Conservation Tillage after 5 years or more of grass or grass-legume sod), lbs N/ac	75 to 115
ENG - Dwellings with Basements - Dominant Condition	Very limited
ENG - Dwellings with Basements - Most Limiting	Very limited
ENG - Septic Tank Absorption Fields - Dominant Condition	Very limited
ENG - Septic Tank Absorption Fields - Most Limiting	Very limited
ENG - Sewage Lagoons - Dominant Condition	Very limited

Soil Properties | About

FEMA over homes w/ basements



FEMA over soils flooding information



Google Maps Tool For General Land Use Planning in Fayette County, KY. Under Construction! © Surendran Neelakantan & T.G. Mueller, 2010

Map | Satellite | Hybrid | Blank

Kentucky Surficial Geology
- Alluvial deposits
- Limestone dominant
- Sandstone dominant
- Shale dominant
- Siltstone dominant
- Other

Kentucky soil boundaries
- Soil boundaries

FEMA 100yr. Flood Data
- Flood Zone

500 ft
200 m

Imagery ©2012 - Map data ©2012 - Terms of Use

Click on the map to get feature info. Right click on the map to clear feature info
Disclaimer: This map is for general land-use planning only. Using it for site-specific decision making could result in serious undesirable consequences.

Land Use Planning Tool for Fayette County, KY (USA)

University of Kentucky, Lexington, KY | Go! | Link

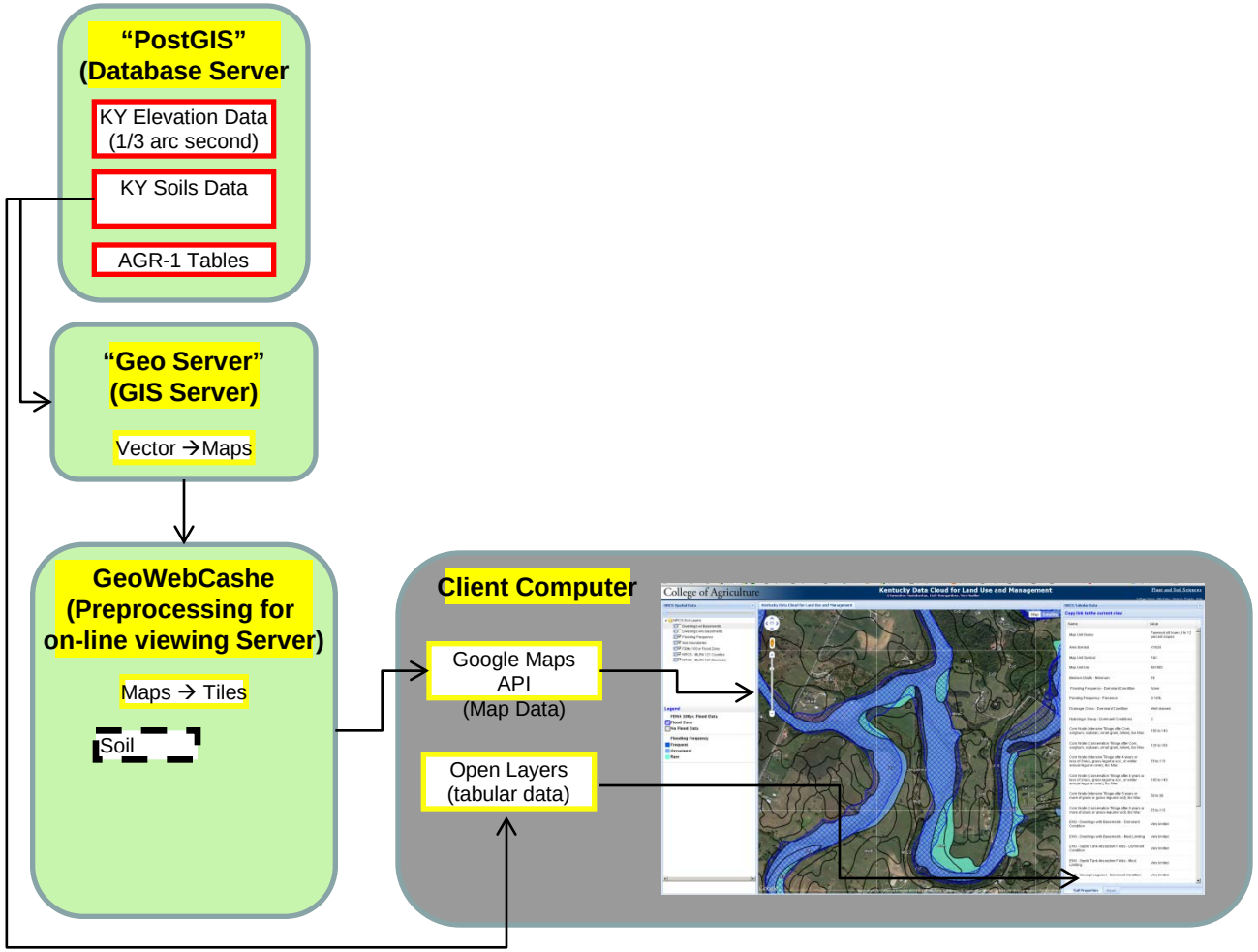
Hover over these buttons to understand how the layer function

LAYERS | ABOUT | INFO

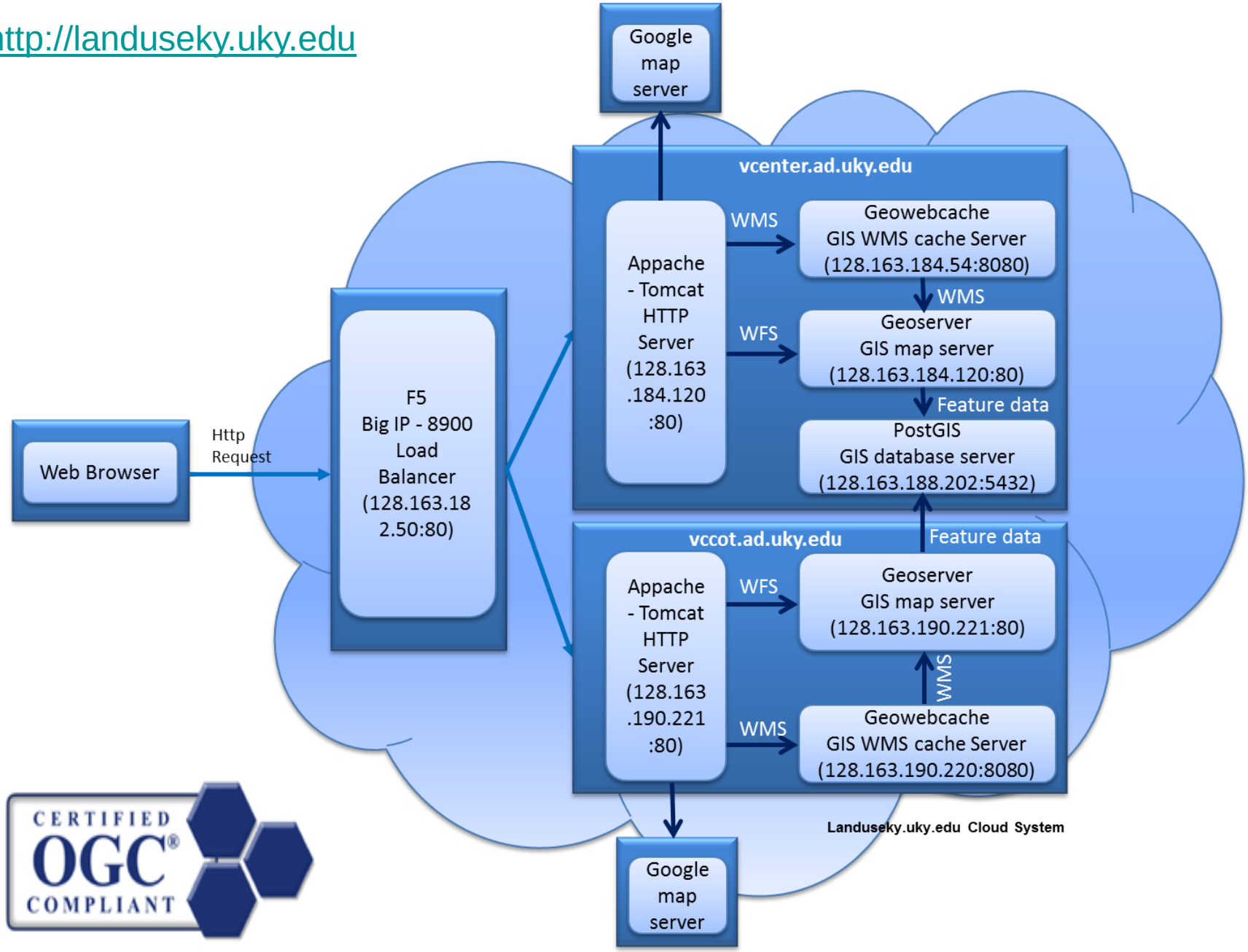
- Hill Shade
- Dwellings w/Basements
- Dwellings w/o Basements
- Limitations for Local Roads and Streets
- Limitations for Small Commercial Buildings
- Soil Boundaries
- Geologic map and interpretations
- Streams
- FEMA 100 yr Flood Zone
- Kentucky Solid Waste Landfills
- Kentucky Wastewater Treatment Plants
- Kentucky sewer line
- Kentucky Faults
- Kentucky Counties

Refresh | Mymap

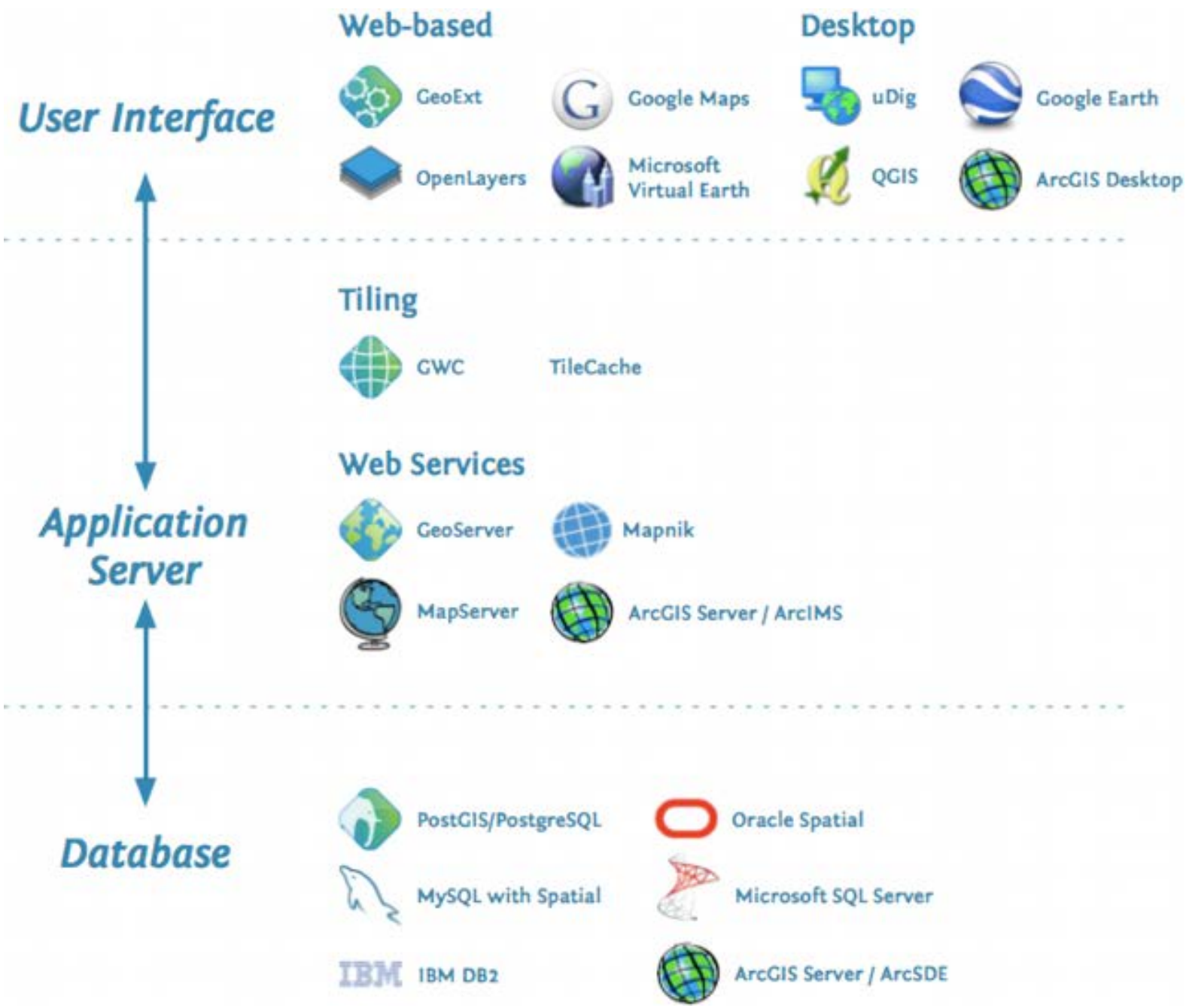
Get Features | Add Marker | Zoom


"PostGIS"
(Database Server
KY Elevation Data
(1/3 arc second)
KY Soils Data
AGR-1 Tables
"Geo Server"
(GIS Server)
Vector → Maps
GeoWebCashe
(Preprocessing for
on-line viewing Server)
Maps → Tiles
Soil
Client Computer
Google Maps
API
(Map Data)
Open Layers
(tabular data)
College of Agriculture
Kentucky Data Cloud for Land Use and Management

http://landuseky.uky.edu

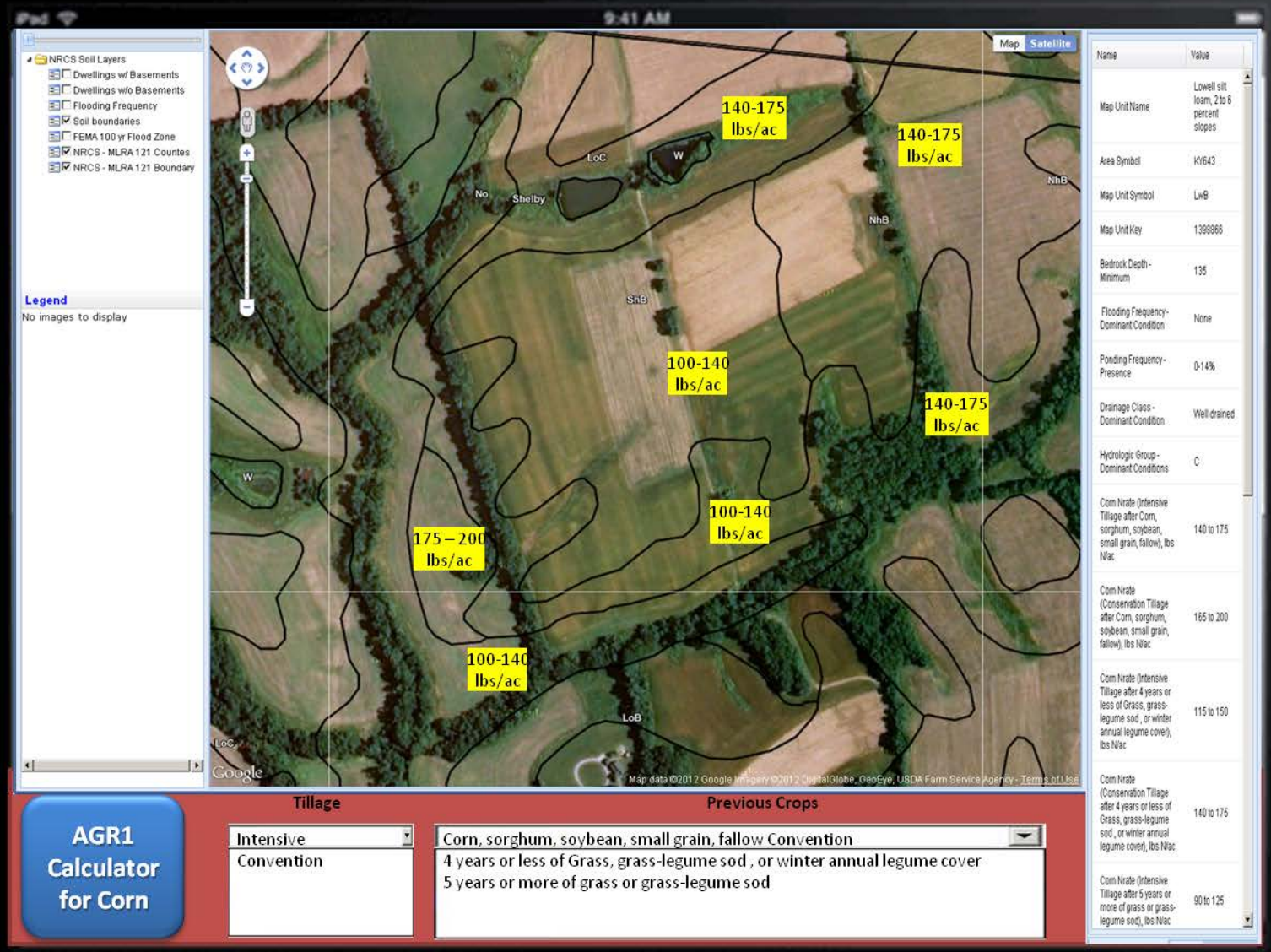


CERTIFIED OGC® COMPLIANT


User Interface
Web-based
GeoExt
Google Maps
OpenLayers
Microsoft Virtual Earth
Desktop
uDig
Google Earth
QGIS
ArcGIS Desktop
Application Server
Tiling
GWC
TileCache
Web Services
GeoServer
Mapnik
MapServer
ArcGIS Server / ArcIMS
Database
PostGIS/PostgreSQL
Oracle Spatial
MySQL with Spatial
Microsoft SQL Server
IBM
IBM DB2
ArcGIS Server / ArcSDE

Other applications of the technology

- Fertilizer Nitrogen
- Waterways vegetative filters
- Geostatistics


iPad
9:41 AM
NRCS Soil Layers
Dwellings w/ Basements
Dwellings w/o Basements
Flooding Frequency
Soil boundaries
FEMA 100 yr Flood Zone
NRCS - MLRA 121 Counties
NRCS - MLRA 121 Boundary
Legend
No images to display
Map
Satellite
140-175 lbs/ac
140-175 lbs/ac
100-140 lbs/ac
140-175 lbs/ac
100-140 lbs/ac
175 – 200 lbs/ac
100-140 lbs/ac
LoC
W
No
Shelby
NhB
ShB
LoB
Google
Map data ©2012 Google Imagery ©2012 DigitalGlobe, GeoEye, USDA Farm Service Agency - Terms of Use
Name
Value
Map Unit Name
Lowell silt loam, 2 to 6 percent slopes
Area Symbol
KY643
Map Unit Symbol
LwB
Map Unit Key
1399866
Bedrock Depth - Minimum
135
Flooding Frequency - Dominant Condition
None
Ponding Frequency - Presence
0-14%
Drainage Class - Dominant Condition
Well drained
Hydrologic Group - Dominant Conditions
C
Corn Nrate (Intensive Tillage after Corn, sorghum, soybean, small grain, fallow), lbs N/ac
140 to 175
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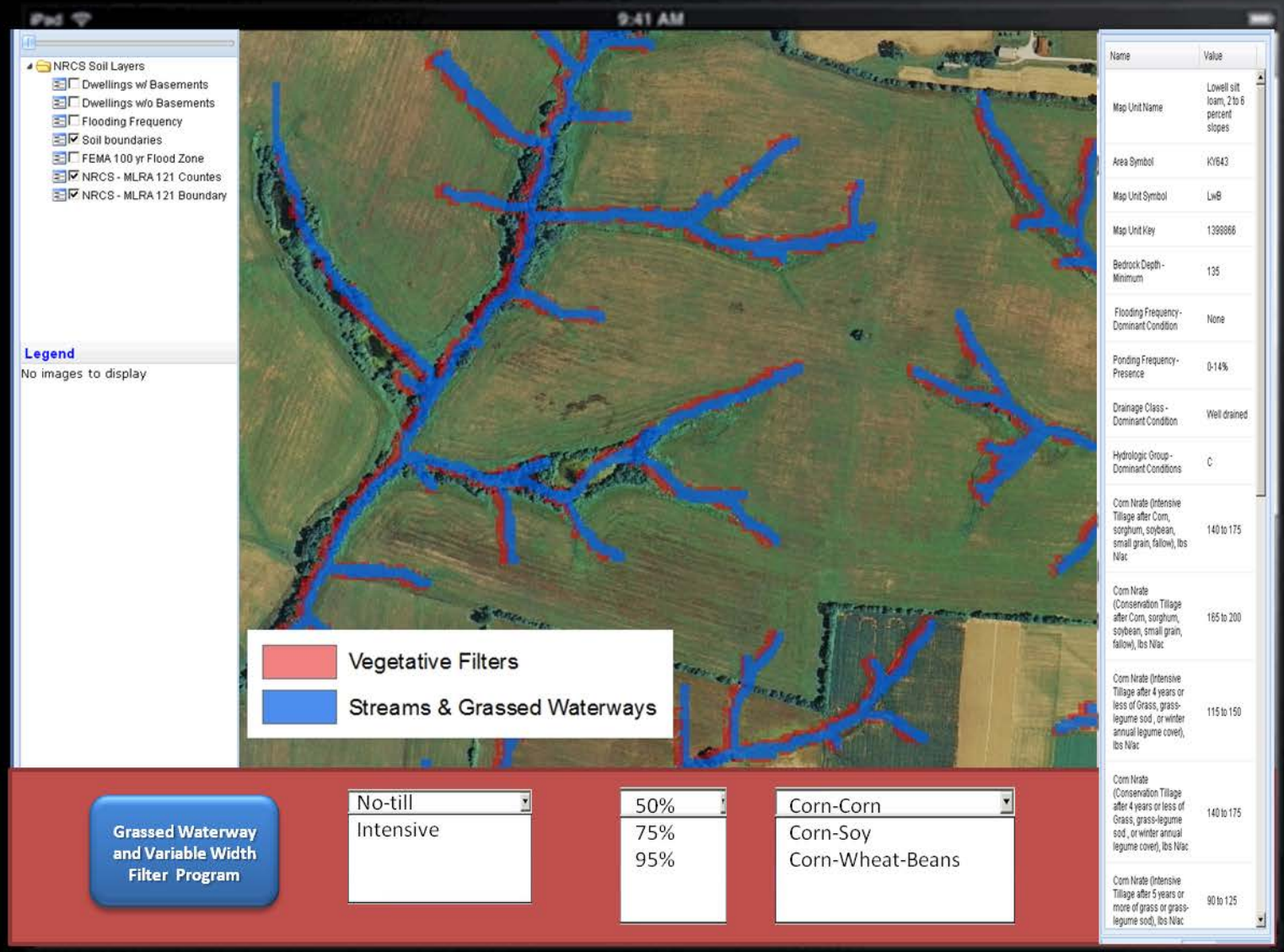
140 to 175
Corn Nrate (Intensive Tillage after 5 years or more of grass or grass-legume sod), lbs N/ac
90 to 125
AGR1 Calculator for Corn
Tillage
Intensive
Convention
Previous Crops
Corn, sorghum, soybean, small grain, fallow Convention
4 years or less of Grass, grass-legume sod , or winter annual legume cover
5 years or more of grass or grass-legume sod


iPad
9:41 AM
NRCS Soil Layers
Dwellings w/ Basements
Dwellings w/o Basements
Flooding Frequency
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FEMA 100 yr Flood Zone
NRCS - MLRA 121 Countes
NRCS - MLRA 121 Boundary
Legend
No images to display
Vegetative Filters
Streams & Grassed Waterways
Name
Value
Map Unit Name
Lowell silt loam, 2 to 6 percent slopes
Area Symbol
KY643
Map Unit Symbol
LwB
Map Unit Key
1399866
Bedrock Depth - Minimum
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Flooding Frequency - Dominant Condition
None
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0-14%
Drainage Class - Dominant Condition
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140 to 175
Corn Nrate (Intensive Tillage after 5 years or more of grass or grass-legume sod), lbs N/ac
90 to 125
Grassed Waterway and Variable Width Filter Program
No-till
Intensive
50%
75%
95%
Corn-Corn
Corn-Soy
Corn-Wheat-Beans

"PostGIS" (Database Server

KY Elevation Data (LiDAR or 1/3 arc second)

KY Soils Data

AGR-1 Tables

ArcGIS Server (GeoProcessigns Server)

Terrain Analysis Algorithm

(D• Upslope Area

D8 Upslope Area

Avg. Slope of upslope area

Slope

Dosskey et al., (2011) Buffer Area Algorithm

Buffer Area (ft²) Required Along Waterway

Waterway Algorithm

Place Buffer in Field Algorithm

Grassed Waterway Planning Map

Vegetative Filter Map

"Geo Server" (GIS Server)

Vector → Maps

GeoWebCashe (Preprocessing for on-line viewing Server)

Maps → Tiles

Slope Map

Water Way Map

Variable Width Buffer Map

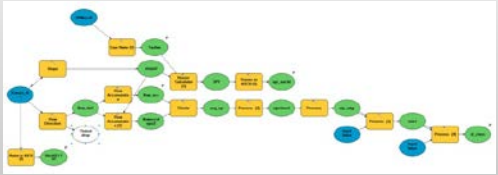
N-rate map

Client Computer

Google Maps API (Map Data)

Open Layers (tabular data)

Terrain Analysis Algorithm



- This process calculates terrain attributes with TauDEM including both the D8 and D• methods. It also calculates the slope of upslope areas in low areas which is used to calculate buffer area requirements.

Waterway Algorithm

- This process uses a simple specific catchment area threshold to identify waterways and streams (i.e., 200 m²). Then the buffer command (7-m) is used to identify margin cells on either side of the stream and waterways. The values from the margin cells are set to the value of the buffer are requirements from the Dosskey et al. (2011) algorithm).

Dosskey et al. (2011) Buffer Area Algorithm

- This process calculate the ratio of buffer area to upslope contributing area as determined with the D• flow direction algorithm.

Place Buffer in Field Algorithm

Main Loop (model builder and python)

•Run Sub A for each margin record from 1 to max buffer integer

Subroutine A

•For each record & previously identified buffer cells, run Sub-B

•Find point in Temp-A with the greatest stream power index (SPI) and write to Output

Subroutine B

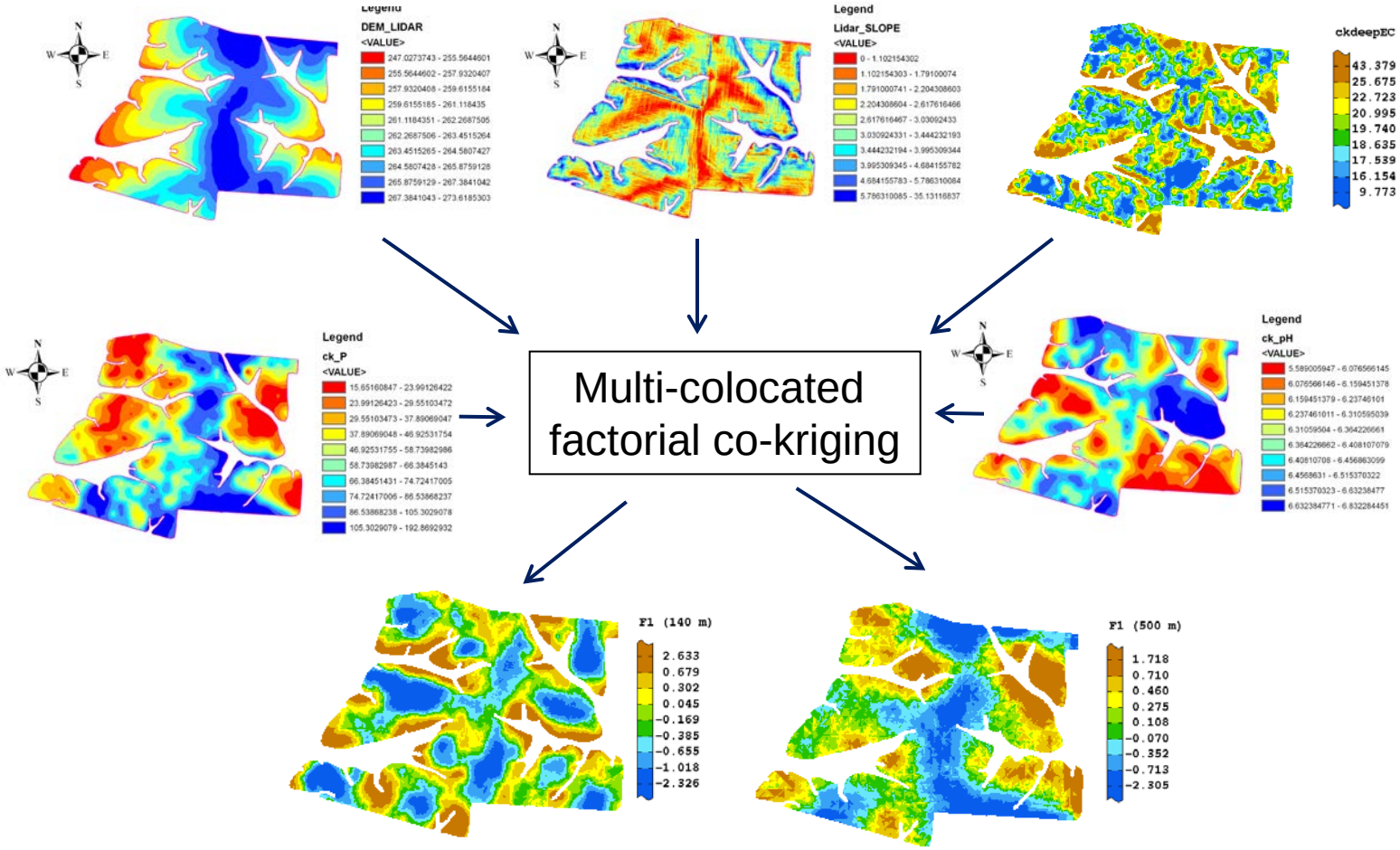
•Find D8 cells and get elevation, SPI, and write to Temp-A

Temp-A

Point with SPI value

Output: Waterways and Buffer Map

- This process places the desired number of buffer cells up the slope in the direction with the greatest contributing area.


Legend
DEM_LIDAR
<VALUE>
247.0273743 - 255.5644601
255.5644602 - 257.9320407
257.9320408 - 259.6155184
259.6155185 - 261.118435
261.1184351 - 262.2687505
262.2687506 - 263.4515264
263.4515265 - 264.5807427
264.5807428 - 265.8759128
265.8759129 - 267.3841042
267.3841043 - 273.6185303
Legend
Lidar_SLOPE
<VALUE>
0 - 1.102154302
1.102154303 - 1.79100074
1.791000741 - 2.204308603
2.204308604 - 2.617616466
2.617616467 - 3.03092433
3.030924331 - 3.444232193
3.444232194 - 3.995309344
3.995309345 - 4.684155782
4.684155783 - 5.786310084
5.786310085 - 35.13116837
ckdeepEC
43.379
25.675
22.723
20.995
19.740
18.635
17.539
16.154
9.773
Legend
ck_P
<VALUE>
15.65160847 - 23.99126422
23.99126423 - 29.55103472
29.55103473 - 37.89069047
37.89069048 - 46.92531754
46.92531755 - 58.73982986
58.73982987 - 66.3845143
66.38451431 - 74.72417005
74.72417006 - 86.53868237
86.53868238 - 105.3029078
105.3029079 - 192.8692932
Multi-colocated factorial co-kriging
Legend
ck_pH
<VALUE>
5.589005947 - 6.076566145
6.076566146 - 6.159451378
6.159451379 - 6.23746101
6.237461011 - 6.310595039
6.31059504 - 6.364226661
6.364226662 - 6.408107079
6.40810708 - 6.456863099
6.4568631 - 6.515370322
6.515370323 - 6.63238477
6.632384771 - 6.832284451
F1 (140 m)
2.633
0.679
0.302
0.045
-0.169
-0.385
-0.655
-1.018
-2.326
F1 (500 m)
1.718
0.710
0.460
0.275
0.108
-0.070
-0.352
-0.713
-2.305