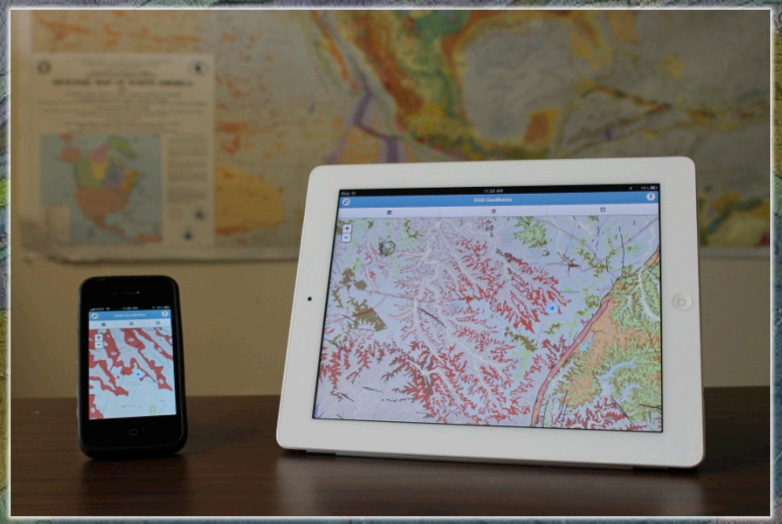
The following was presented at DMT'13
(June 2-5, 2013, Golden, CO).

The contents are provisional and will be
superseded by a paper in the
DMT'13 Proceedings.

See also earlier Proceedings (1997-2012)
http://ngmdb.usgs.gov/info/dmt/

Development of the Kentucky Mobile Geologic Map Application



Doug Curl

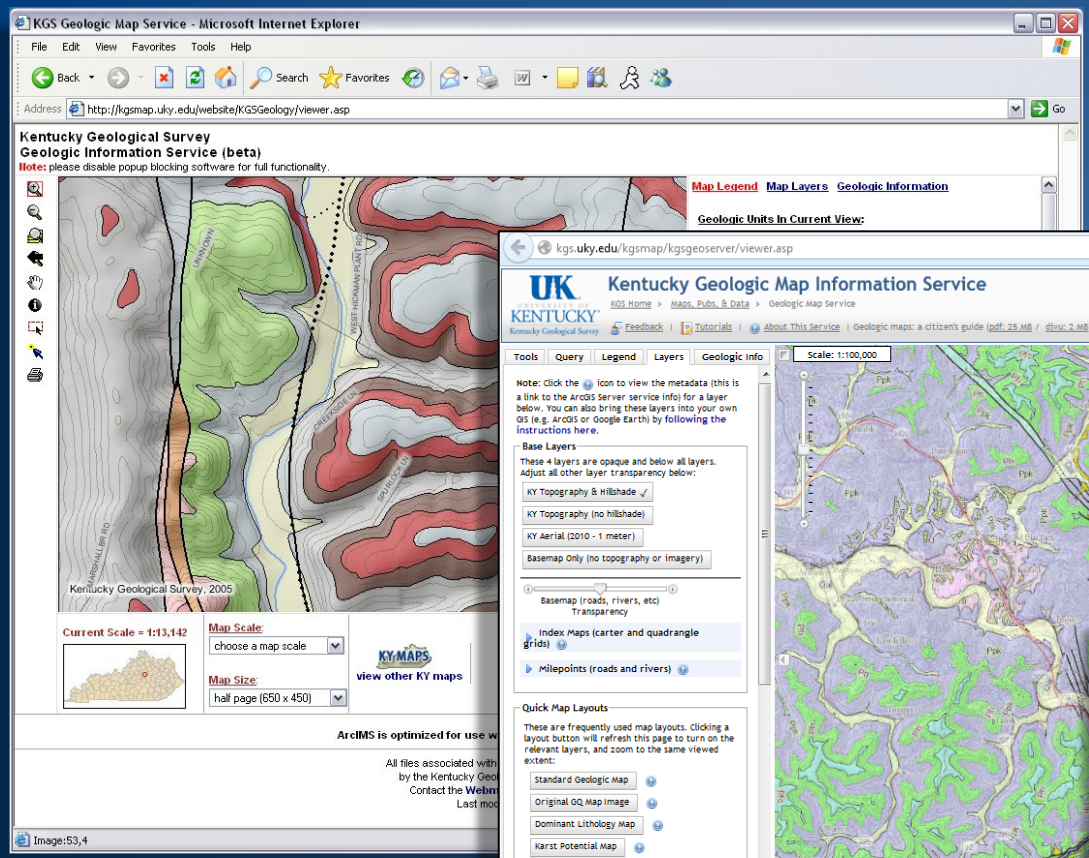
Kentucky Geological Survey

University of Kentucky

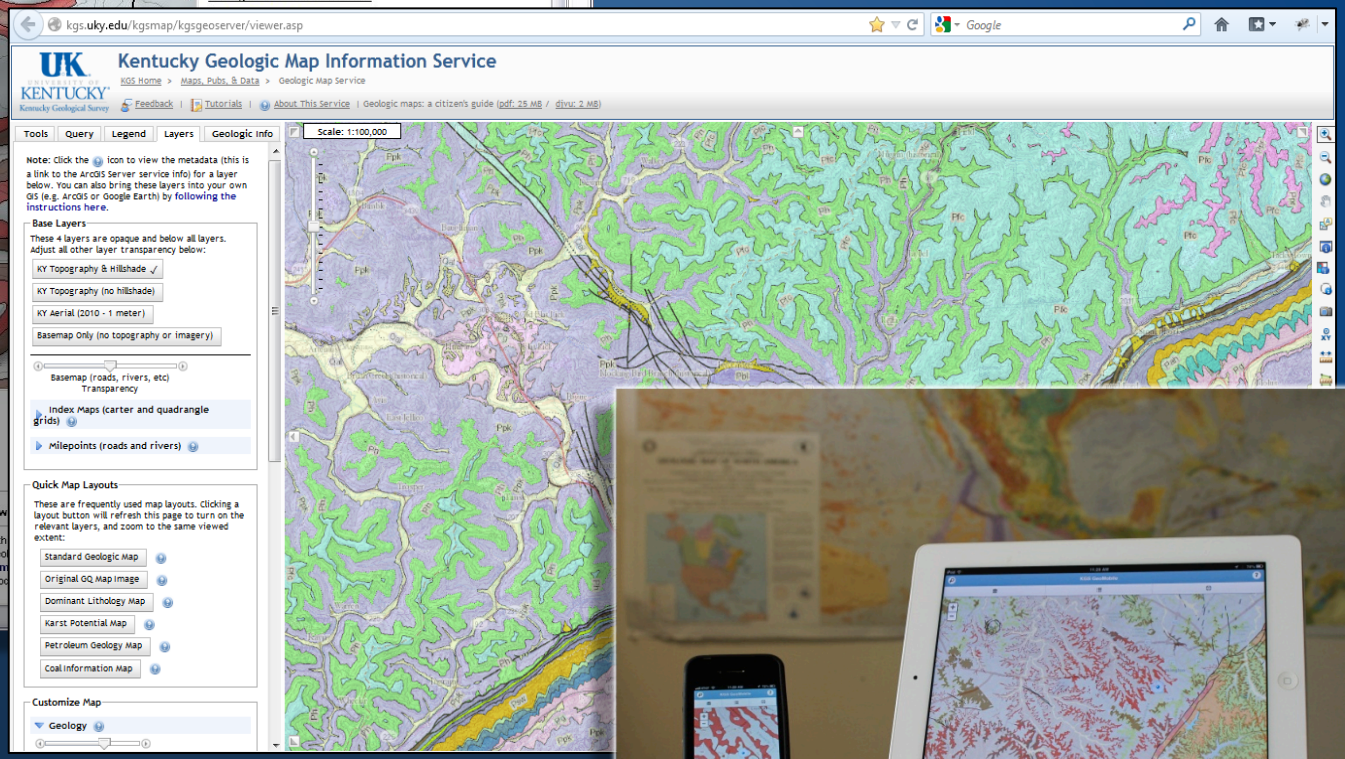
2013 Digital Mapping Techniques

Golden, CO

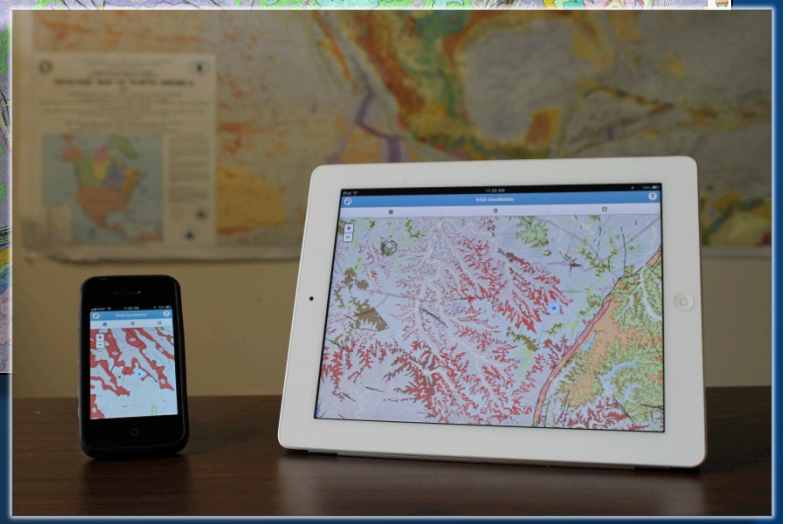
“Desktop” to Mobile Geologic Map Service



ArcIMS (2005) →

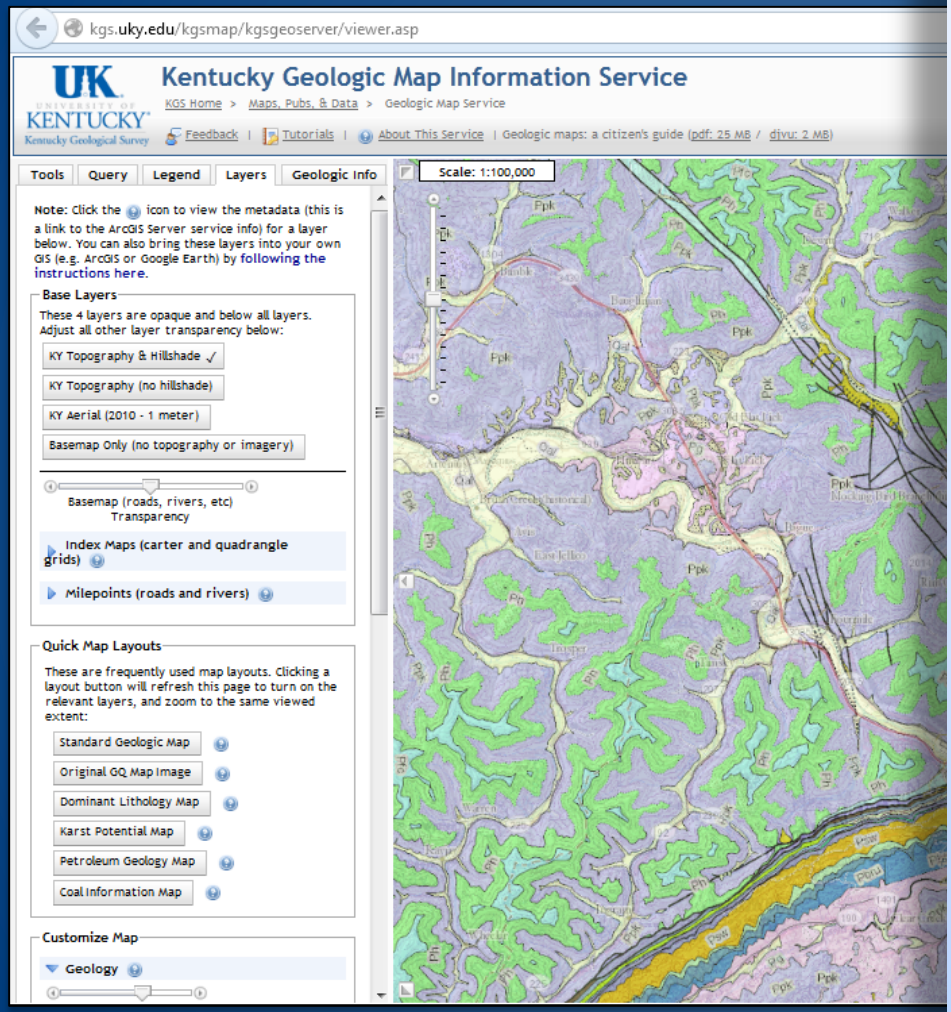


ArcGIS Server (2011) →



Mobile ArcGIS Server (2012)

Ingredients: current KGS web map services



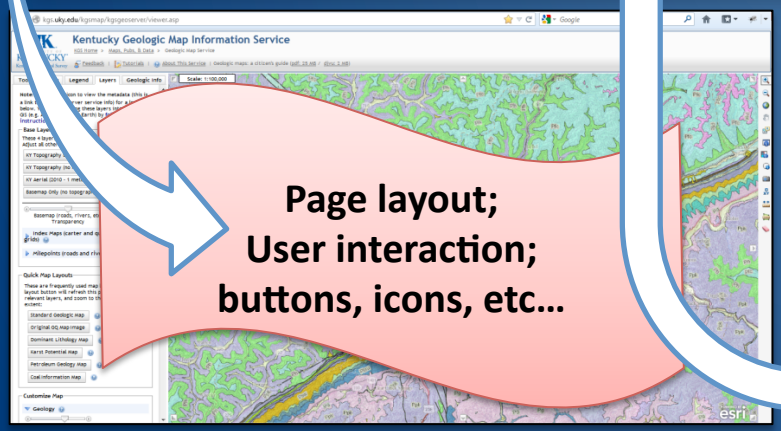
The "Back-End":

- **Web Server:**
  - IIS (Microsoft Server 2008)
- **ArcGIS Server**
  - **Geologic Units**
    - Lithologic Units
    - Karst Units
  - Water Wells & Springs
  - Petroleum Data
  - Coal Information
  - Core Locations
  - Outcrops
  - Image locations
  - Landslide locations
- **KY Division of Geographic Info**
  - Basemaps and Imagery
  - ArcGIS Server Dynamic and Imagery Services
- **ESRI**
  - Basemaps and Imagery
  - ArcGIS Server Dynamic Services
- **SQL Server**
  - Geologic descriptions
  - Geologic legend data

Ingredients: current KGS web map services

The "Front-End":

- **HTML programming:**
  - HTML, Javascript, CSS
    - Dojo framework
    - jQuery framework
- **ArcGIS Server Javascript API**
- **ASP (Active Server Pages)**
  - Yes, we still do…



Page layout;
User interaction;
buttons, icons, etc…

The "Back-End":

- **Web Server:**
  - IIS (Microsoft Server 2008)
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  - **Geologic Units**
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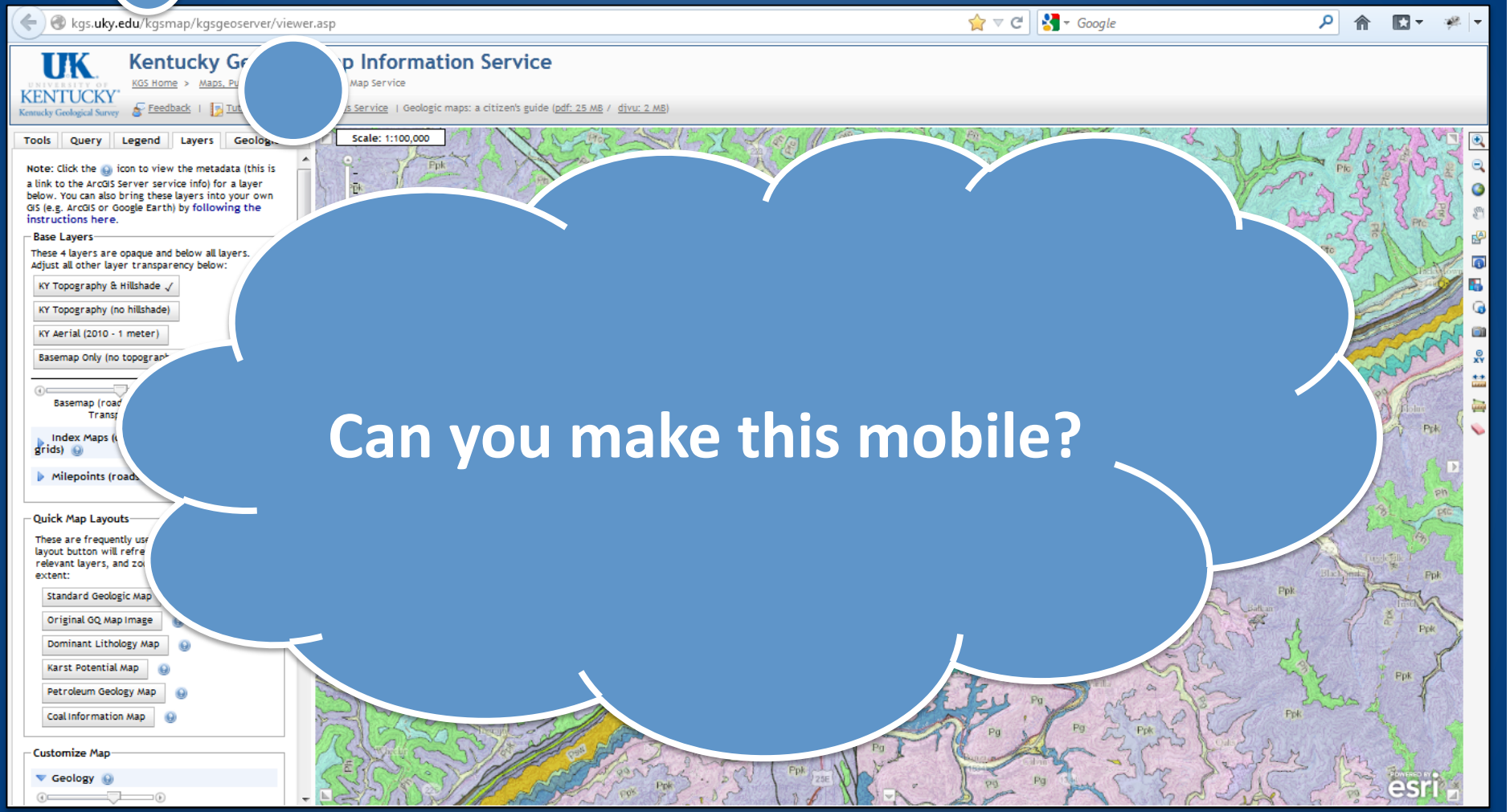

Can you make this mobile?

Decision: stand-alone or web-enabled?

Stand-alone (native):
(Apple iOS, Android, Windows, etc…)

Pros:
- native to device (quick)
- store data on device
- distribute via app stores*

Cons:
- what platform(s)?
- who's gonna program?
- ***development time***

Web-enabled (Javascript):
(any device with a browser)

Pros:
- cross-platform
- ***KGS can actually do it***
- development time
- no app stores*
- no installation (web url only)

Cons:
- cross-platform to a point (older devices)
- cannot store data on device
- network dependent

* Turns out you might able to distribute any type via app stores

Starts with a sample: ArcGIS API for Javascript

Soil details - mobile | ArcG

help.arcgis.com/en/webapi/javascript/arcgis/jssamples/mobile_soilmap.html

ArcGIS API for JavaScript

esri

Tutorials Concepts Samples API Reference Forum All Developer Resources

Search the samples

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  - Tilt gesture
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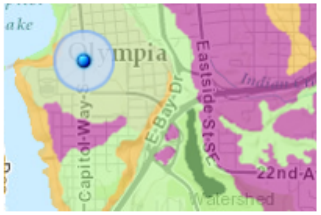
- Printing
- Query and Select
- Renderers

Soil details - mobile

View live sample
Download as a zip file



Description

This sample uses jQueryMobile to build an application for mobile devices that displays soil details. jQueryMobile is a framework that simplifies the process of building an application that will work well on smart-phones like Android, iPhone and Blackberry Torch.

When the application loads, the HTML5 Geolocation API is used to determine the current device location. To determine the current device location use the `navigator.geolocation.getCurrentPosition` method.

```
if (navigator.geolocation) {
navigator.geolocation.getCurrentPosition(initMap, locationError);
}
```

When the current location is found,the callback function (initMap) runs which zooms to the current location and displays the soils layer. The callback function has a parameter that provides access to the current coordinates (latitude, longitude) and additional information such as accuracy, heading, speed and the current time-stamp.

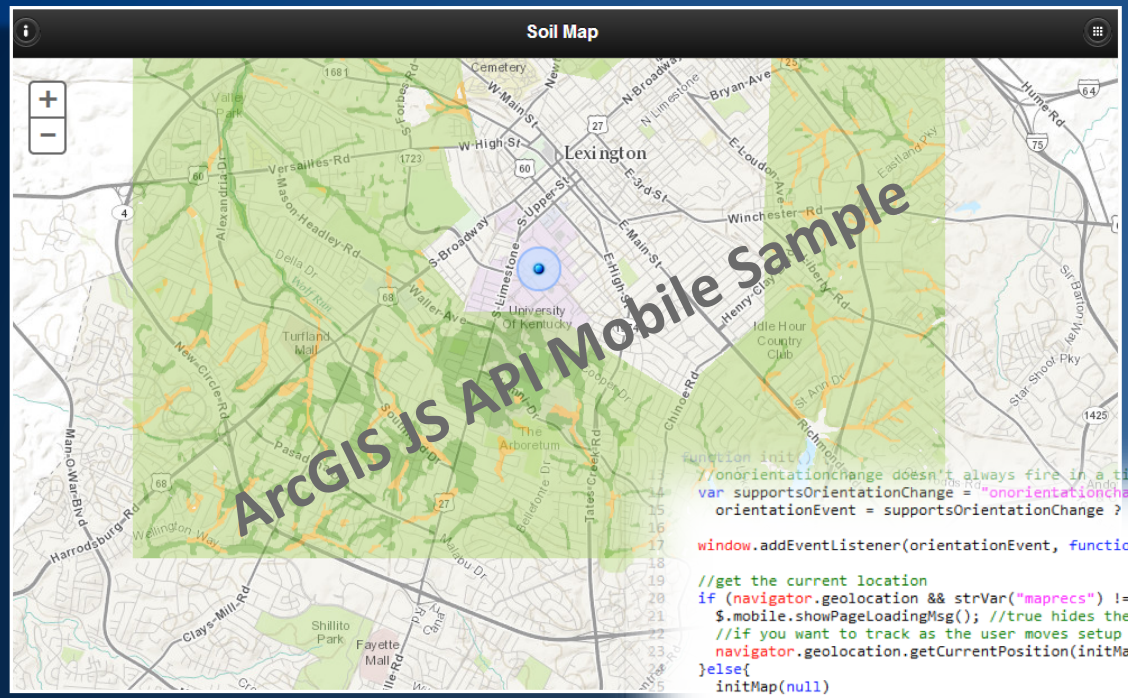
This sample specifies a manifest file, this is a file with a list of resources that will be cached locally. When the web application runs it downloads the resources specified in the manifest and caches them locally. To use a manifest file add the manifest attribute to the `<head>` element. The browser doesn't need to go back to the server for resources defined in the manifest file unless the manifest file changes.

For more details about working with manifest files see the Mozilla Developer Network documentation.

```
<html manifest="mobile.manifest">
```

Code

```
<!DOCTYPE html>
<html manifest="mobile.manifest">
<head>
```

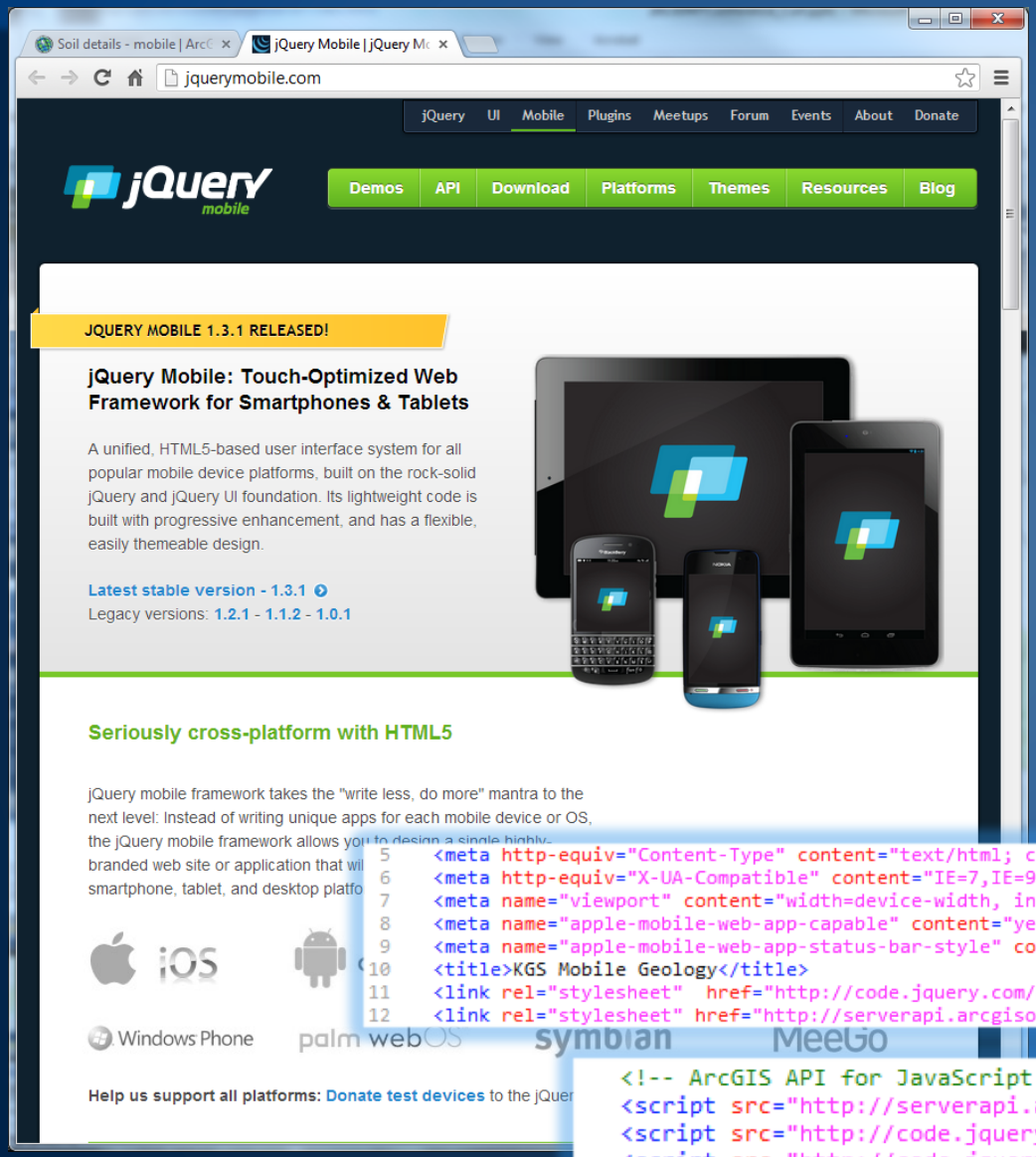


ArcGIS JS API for Javascript does the map configuration / handling

```
function init(){
  //onorientationchange doesn't always fire in a timely manner in Android so check for both orientationchange and resize
  var supportsOrientationChange = "onorientationchange" in window,
    orientationEvent = supportsOrientationChange ? "orientationchange" : "resize";

  window.addEventListener(orientationEvent, function () {orientationChanged();}, false);

  //get the current location
  if (navigator.geolocation && strVar("maprecs") != "true"){
    $.mobile.showPageLoadingMsg(); //true hides the dialog
    //if you want to track as the user moves setup navigator.geolocation.watchPostion
    navigator.geolocation.getCurrentPosition(initMap,initLocErr);
  }else{
    initMap(null)
  }
}

function initMap(location){
  //identify proxy page to use if the toJson payload to the geometry service is greater than 2000 characters.
  //If this null or not available the project and lengths operation will not work.  Otherwise it will do a http post to the proxy.
  esriConfig.defaults.io.proxyUrl = "/arcgisserver/proxy/proxy.ashx";
  esriConfig.defaults.io.alwaysUseProxy = false;
  idParams = new esri.tasks.IdentifyParameters();

  //create a mobile popup
  popup = new esri.dijit.PopupMobile(null, dojo.create("div"));
  map = new esri.Map("map",{basemap:"streets",infoWindow:popup});
  //zoom to the map extent of the state:
  var stateExtent = new esri.geometry.Extent(-10042705.3649355,4215951.78300879,-9058457.44311185,4937733.59234617,
    new esri.SpatialReference({wkid:102100}));

  dojo.connect(map,"onLoad",function(){
    if(location){
      zoomToLocation(location);
    }else{
      map.setExtent(stateExtent)
    }
    resizeMap();
   //hookup jquery
    $(document).ready(jQueryReady);
  });

  dojo.connect(geocoder, "onSelect", function(result){$('#findLoc').dialog('close')});

  arcGISTopo = initTileLayer("http://server.arcgisonline.com/ArcGIS/rest/services/USA_Topo_Maps/MapServer","arcGISBase",false,1.0);
  map.addLayer(arcGISTopo);

  //base and geology:
  KGS_Geo = initDynLayer("http://kgs.uky.edu/arcgis/rest/services/KY_Geo/MapServer","KGS_Geo",true,0.65);
  map.addLayer(KGS_Geo);

  var Ilidar = false
```

For mobile: JS Code not drastically different from “desktop” application code

jQuery Mobile: free cross-platform goodness



jQuery mobile manages all mobile browser compatibility:

So – no need to do this:

- Cross-platform layouts
- Touch capability
- Develop mobile icons & buttons

```
5   <meta http-equiv="Content-Type" content="text/html; charset=utf-8"/>
6   <meta http-equiv="X-UA-Compatible" content="IE=7,IE=9" />
7   <meta name="viewport" content="width=device-width, initial-scale=1, maximum-scale=1, user-scalable=no">
8   <meta name="apple-mobile-web-app-capable" content="yes">
9   <meta name="apple-mobile-web-app-status-bar-style" content="translucent-black">
10  <title>KGS Mobile Geology</title>
11  <link rel="stylesheet"  href="http://code.jquery.com/mobile/1.0/jquery.mobile-1.0.min.css">
12  <link rel="stylesheet" href="http://serverapi.arcgisonline.com/jsapi/arcgis/3.3/js/esri/css/esri.css">
```

```
<!-- ArcGIS API for JavaScript and jQuery Mobile-->
<script src="http://serverapi.arcgisonline.com/jsapi/arcgis/3.3compact"> </script>
<script src="http://code.jquery.com/jquery-1.6.4.min.js"></script>
<script src="http://code.jquery.com/mobile/1.0/jquery.mobile-1.0.js"></script>
```

iPad
2:56 PM
62%
Calendar
Weather
Notes
Maps
Google Maps
App Store
Books
Newsstand
Photography
play
Settings
Remote
Tabs HD
How to Cook Everything
Spotify
Calculator
Google Reader
Facebook
Flipboard
Safari
Mail
Chrome
Photos
Twitter
GarageBand
Music

iPad
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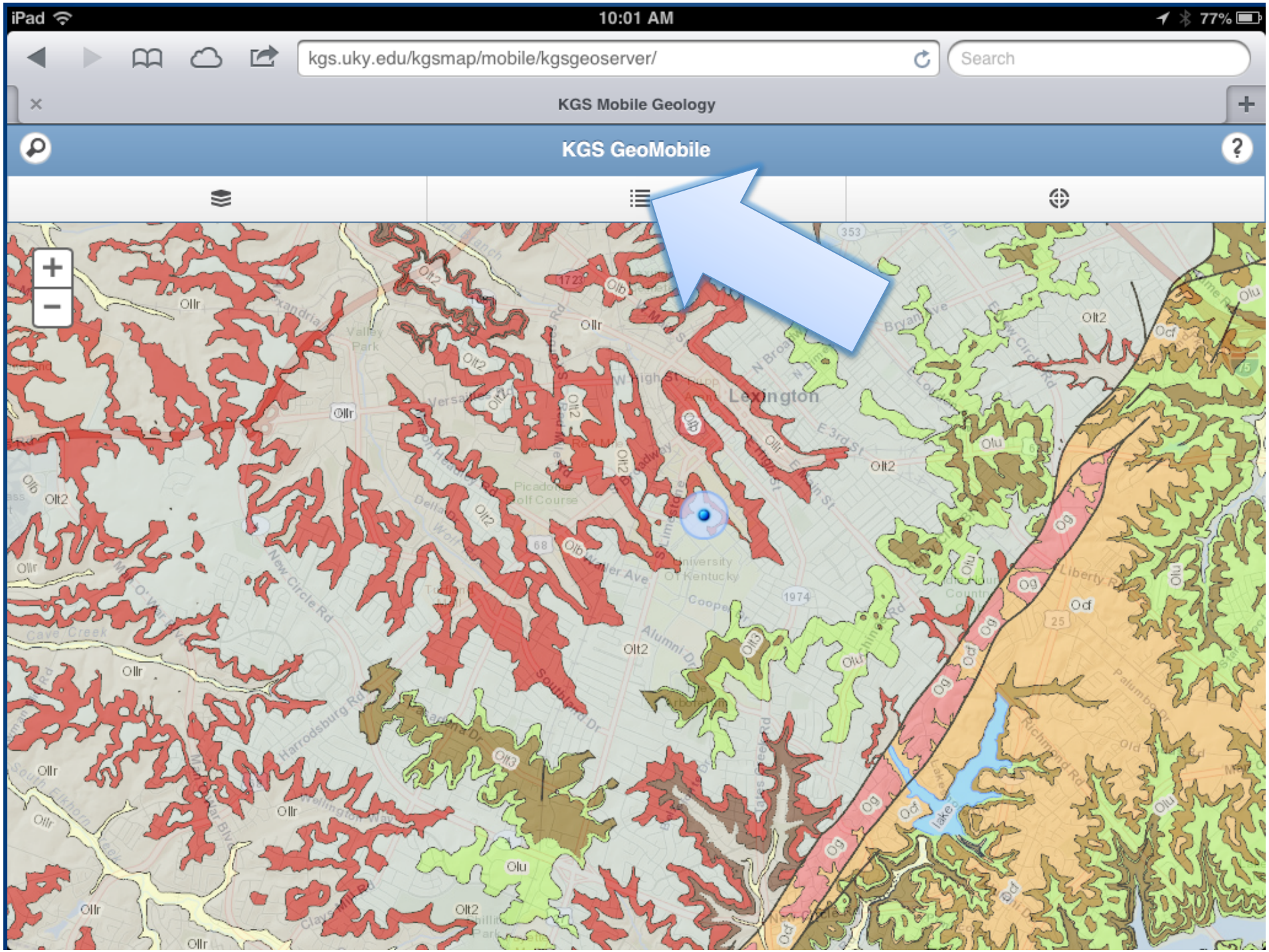
77%
kgs.uky.edu/kgsmap/mobile/kgsgeoserver/
Search
KGS Mobile Geology
KGS GeoMobile
Search & zoom to a different location
Help and Info
- Select basemap
- Turn on/off layers
- Layer transparency
View Legend
Zoom to current location
You are here
Nothing to install. Mobile device is automatically detected.
Lexington


iPad
10:01 AM
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kgs.uky.edu/kgsmap/mobile/kgsgeoserver/
Search
KGS Mobile Geology
KGS GeoMobile
Lexington
University of Kentucky
Picadome Golf Course
Valley Park
Harrodsburg Rd
New Circle Rd
Southland Dr
Alumni Dr
Cooper Dr
Liberty Rd
Richmond Rd
Palumbo Dr
Olt2
Ollr
Olb
Olu
Ocf
Og
Olt3

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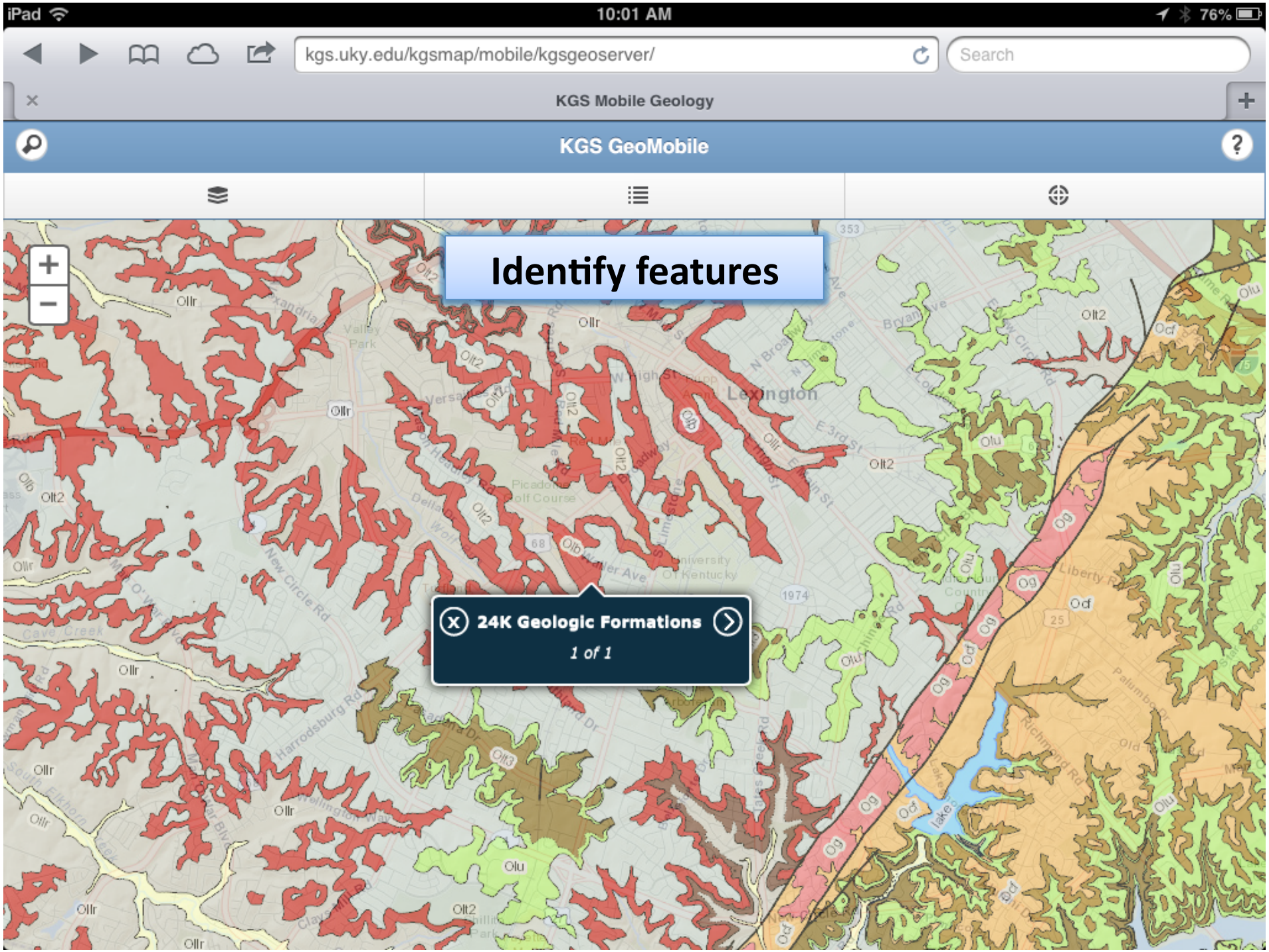
10:02 AM
76%
kgs.uky.edu/kgsmap/mobile/kgsgeoserver/#&u
Search
Legend
Legend
Geologic Units 1:24,000 scale data (detailed geology)
This legend includes all units from the 1:24,000 quadrangles in the current view. Some units on the legend may not appear on the map.
Qal
Alluvium
(Quaternary - Quaternary)
QTf
High-level fluvial deposits
(Tertiary - Quaternary)
DSu
Devonian (?) and Silurian (?) undifferentiated
(Lower Silurian - Upper Devonian)
Od
Drakes Formation
(Upper Ordovician - Upper Ordovician)
Og
Garrard Siltstone
(Middle Ordovician - Upper Ordovician)
Ocf
Clays Ferry Formation
(Middle Ordovician - Upper Ordovician)
Olu
Upper part of Lexington Limestone
(Lower Ordovician - Middle Ordovician)
Olt4
Tanglewood Limestone Member (4)
(Lower Ordovician - Middle Ordovician)
Olt3
Tanglewood Limestone Member (3)
(Lower Ordovician - Middle Ordovician)
Olt2
Tanglewood Limestone Member (2)
(Lower Ordovician - Middle Ordovician)
Olb
Brannon Member
(Lower Ordovician - Middle Ordovician)
Olt1
Tanglewood Limestone Member (1)
(Lower Ordovician - Middle Ordovician)
Ollr
Lower part of Lexington Limestone
(Lower Ordovician - Middle Ordovician)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kgs.uky.edu/kgsmap/mobile/kgsgeoserver/
Search
KGS Mobile Geology
KGS GeoMobile
Identify features
24K Geologic Formations
1 of 1
Lexington
Olt2
Ollr
Olu
Og
Ocf
Olb
Olt3

iPad 10:02 AM 76%

kgs.uky.edu/kgsmap/mobile/kgsgeoserver/ Search

KGS Mobile Geology

1 of 1

24K Geologic Formations

Map Symbol: Olb
KGS Formation Code: 365BRNN
Geologic Quadrangle Number: 600
Formation Name: Brannon Member
KGS Formation Sort Code: 3651100
Youngest Age: Middle Ordovician
Oldest Age: Middle Ordovician
24K Quadrangle: Lexington West
100K Quadrangle: Lexington
County: Fayette

Hide Geologic Description

Description Source:

Geologic map of the Lexington West quadrangle, Fayette and Scott Counties, Kentucky

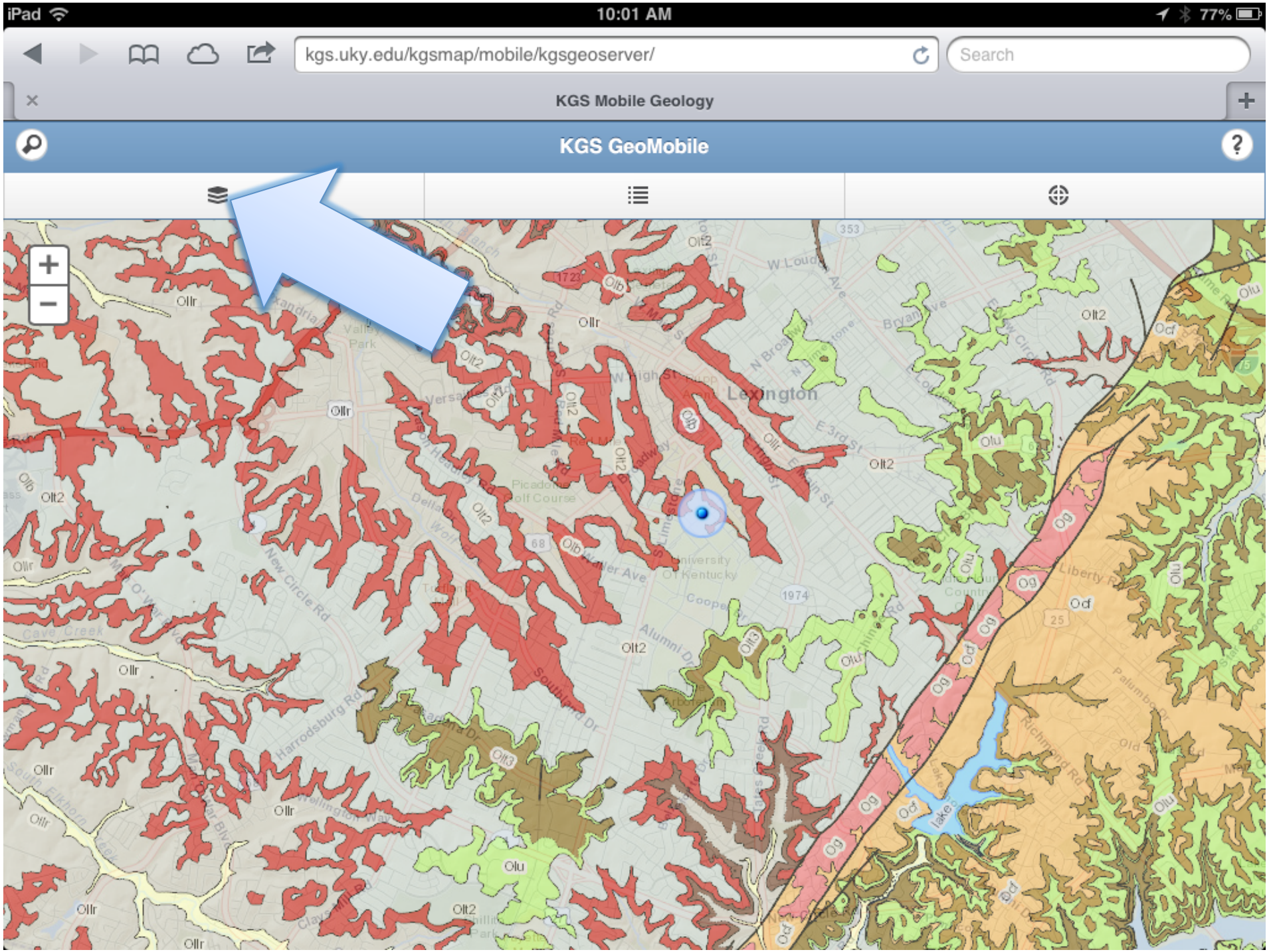
- view stratigraphic column (.pdf) for this quadrangle: GQ-600

Olb

Brannon Member
(Lower Ordovician - Middle Ordovician)
USGS Unit Info: GEOLEX (id: 605)

Mapped or described as these unit(s) on the original GQ:

BRANNON MEMBER
USGS Unit Info: GEOLEX (id: 605)
Primary Lithology: Limestone and shale
Limestone and shale: Limestone, light-gray to light-brownish-gray, microgranular, argillaceous; in part silty with thin beds of medium-dark-gray shale; interbeds of clastic limestone locally present; convolute bedding and flow rolls are common in thicker beds, as along New Circle Road at Frankfort Pike, and along railroad cut beneath Virginia Street overpass; chert occurs as thin beds and as nodules; thin beds of swelling bentonite locally occur near base; springs occur at top, but are more common near contact with underlying bioclastic and granular phosphatic limestones. Weathers to a yellowish clayey soil containing abundant porcelaneous chert and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Search
KGS Mobile Geology
KGS GeoMobile
Lexington
University Of Kentucky
Picadome Golf Course
Valley Park
Harrodsburg Rd
New Circle Rd
Southland Dr
Alumni Dr
Cave Creek
Liberty Rd
Richmond Rd
Palumbo Dr
Olt2
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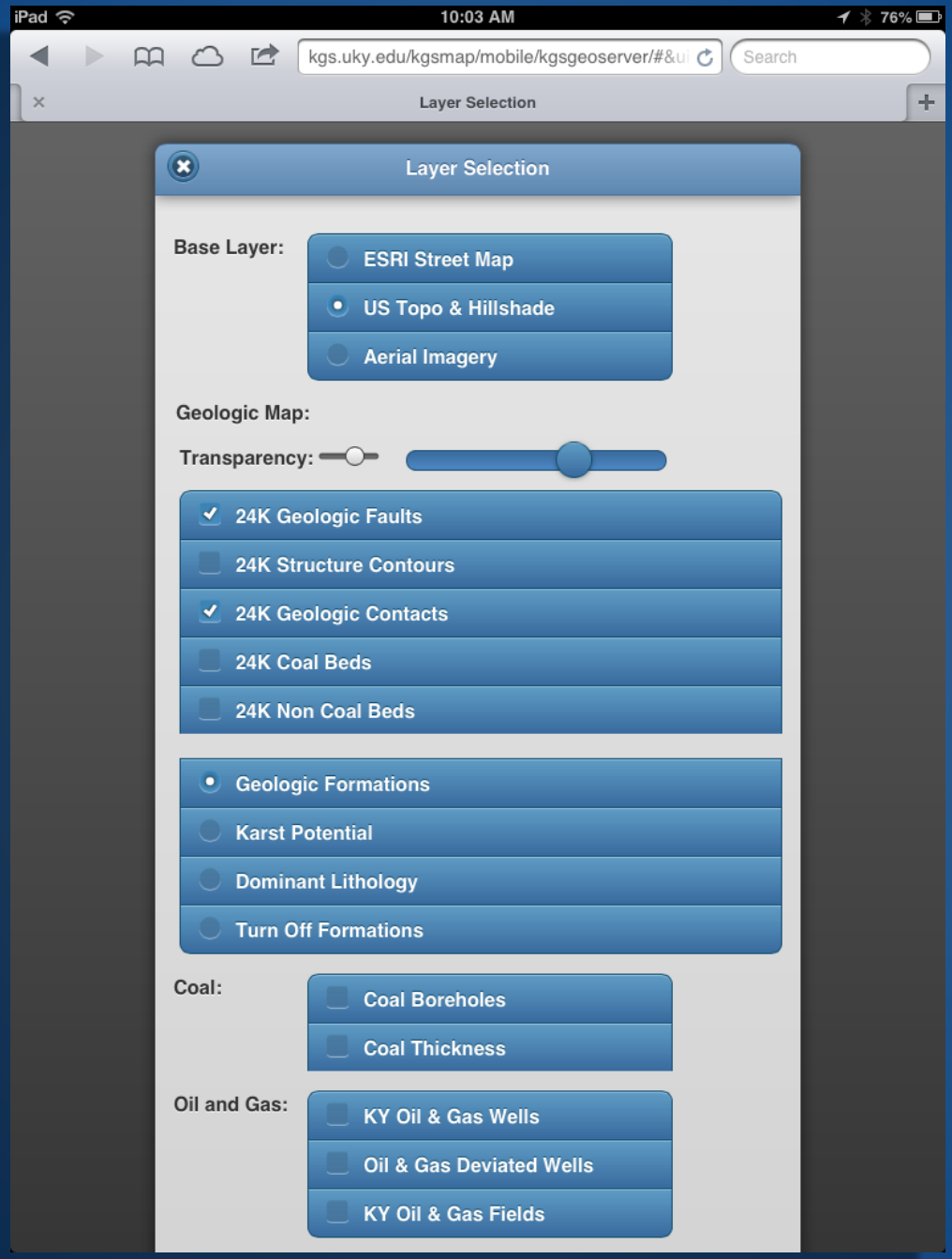
Ocf
Olt3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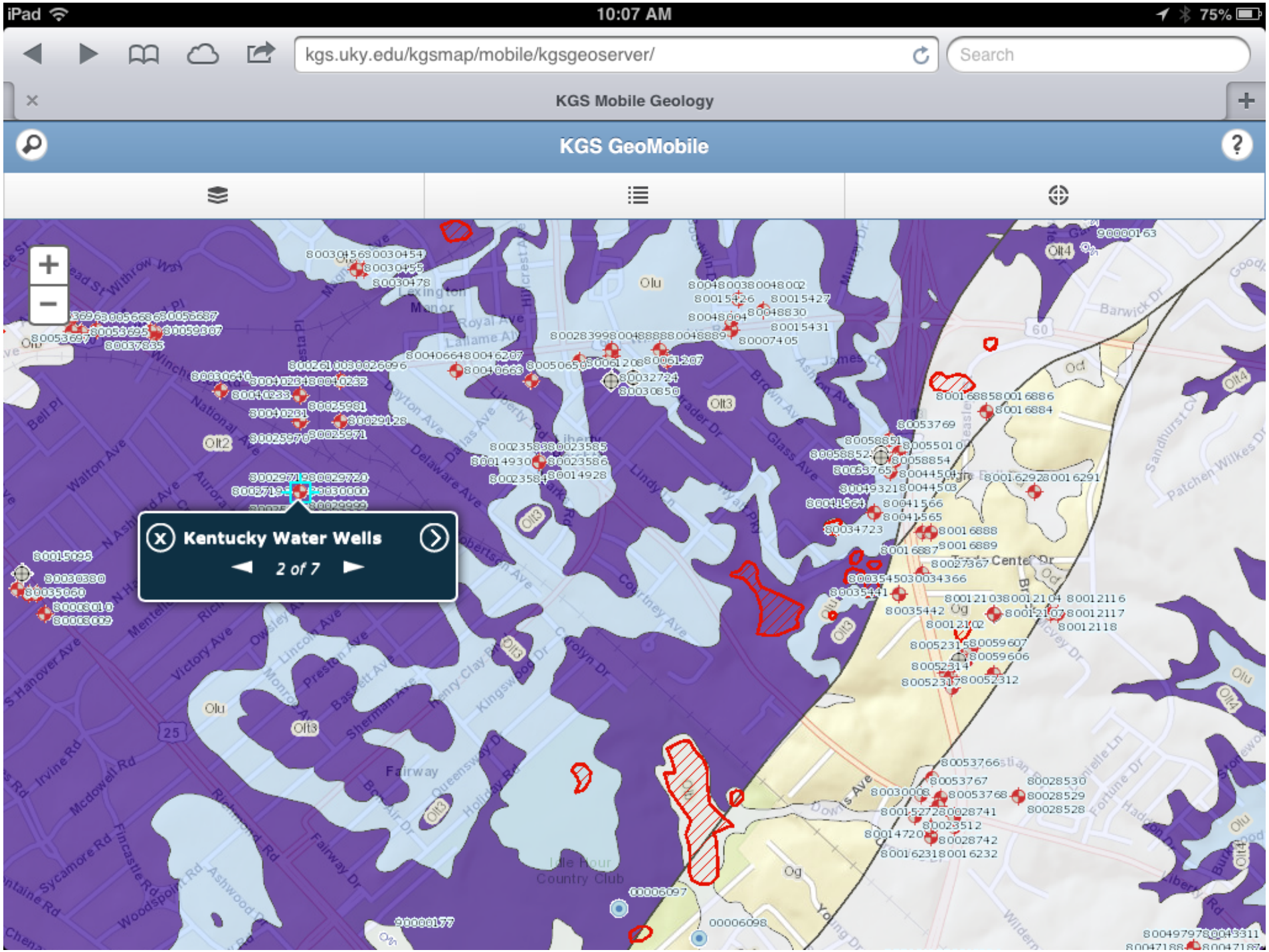
Search
Layer Selection
Layer Selection
Base Layer:
ESRI Street Map
US Topo & Hillshade
Aerial Imagery
Geologic Map:
Transparency:
24K Geologic Faults
24K Structure Contours
24K Geologic Contacts
24K Coal Beds
24K Non Coal Beds
Geologic Formations
Karst Potential
Dominant Lithology
Turn Off Formations
Coal:
Coal Boreholes
Coal Thickness
Oil and Gas:
KY Oil & Gas Wells
Oil & Gas Deviated Wells
KY Oil & Gas Fields


iPad
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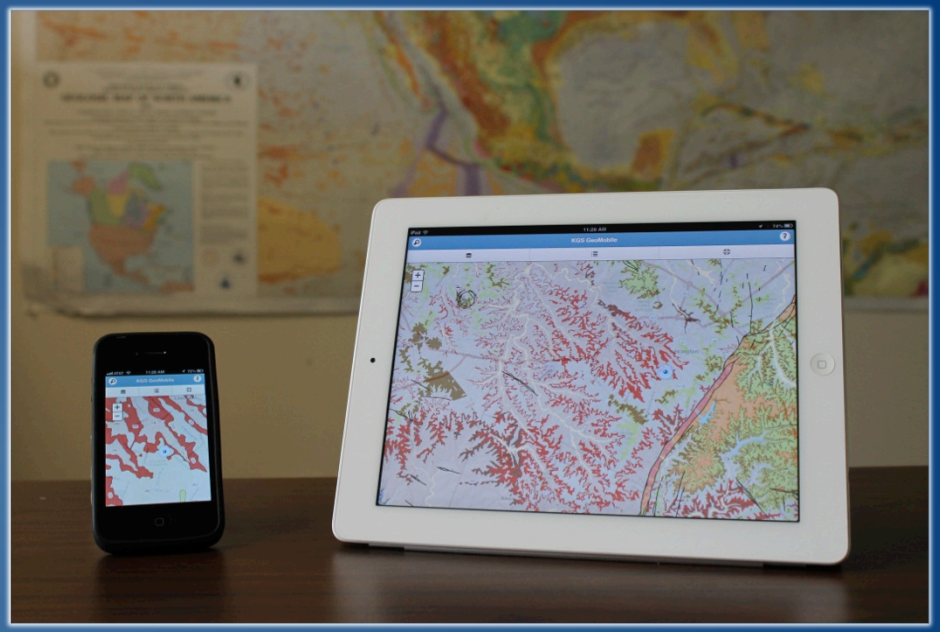
kgs.uky.edu/kgsmap/mobile/kgsgeoserver/
Search
KGS Mobile Geology
KGS GeoMobile
Kentucky Water Wells
2 of 7
Olu
Olt3
Olt2
Olt4
Od
Og
Lexington Manor
Royal Ave
Lafame Ave
Brown Ave
Glass Ave
Ashton Ave
Murray Dr
Barwick Dr
Sandhurst Cv
Patchen Wilkes Dr
Walton Ave
Bell Pl
National Ave
Dayton Ave
Delaware Ave
Dallas Ave
Liberty Rd
Lindy Ln
Courtney Ave
Carolyn Dr
Victory Ave
Preston Ave
Lincoln Ave
Sherman Ave
Henry Clay Pl
Kingswood Dr
Queensway Dr
Holiday Rd
Fairway
Fairway Dr
Richmond Rd
Irvine Rd
Mcdowell Rd
Sycamore Rd
Woodspoint Rd
Ashwood Dr
Isle Hour Country Club
Center Dr
Downs Ave
Young Dr
Fortune Dr
Wilderness
Liberty Rd
Burlwood
Hanover Ave
Menteh
Aurora
N Ashland Ave
Robertson Ave
Withrow Way
Winch
Dr
Pl
Ave
Rd
25
60

Lessons Learned:

- **Detect device & redirect from a desktop application**
  - saves URL confusion
- **Keep it lightweight!**
  - easy to overload with functionality
- **"Touchability" is sometimes quirky**
- **No data / map caching on device**
  - off network use not possible



Future Development:

- **Hybrid native / javascript application?**
  - put on app stores
- **Native application?**
  - data caching

Contact:
Doug Curl
doug@uky.edu

UK UNIVERSITY OF KENTUCKY
Kentucky Geological Survey

Poster session – demo application
http://kgs.uky.edu/geomap