



NORAD supported project in MRRD covering
Capacity Building and Institutional Cooperation in the
field of Hydrogeology for Faryab Province
Afghanistan

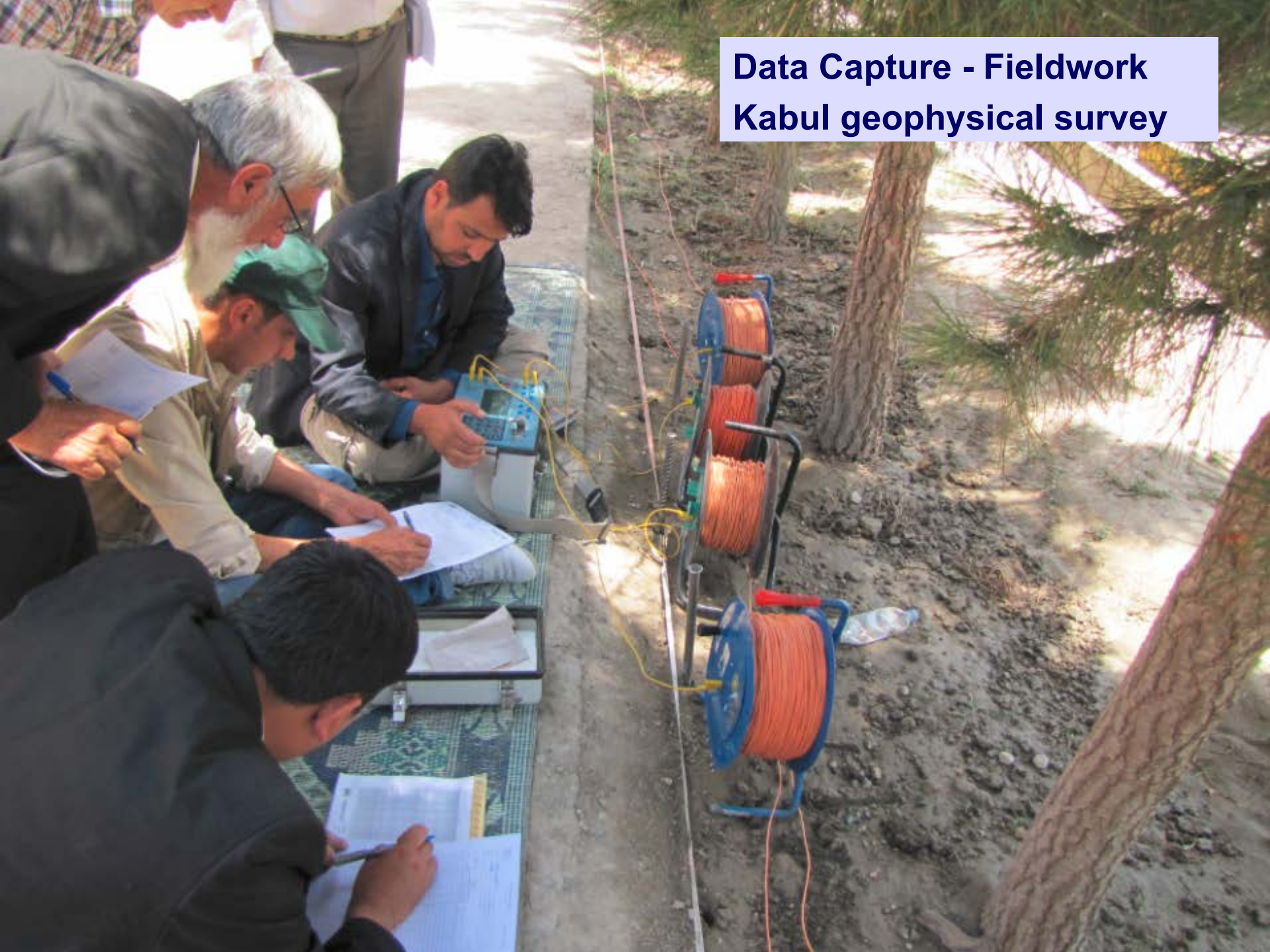
Use of IT / GIS technology to communicate hydrogeological information

by Andreas de Jong & Prof. Shuaib Zarinkhail
08th June 2015

The challenges of Data Management



**Data Capture - Fieldwork
Kabul geophysical survey**



Data Capture - Fieldwork Kabul pumping test



Data Capture – office work



MS Excel



MS Access

Database of hydrogeological information

qry 2 Drilled wells

Water Point	Water Point Code	Type	Name of feature	Village	District
2038	353702065131501	Drilled borehole	Dar e Shakh Kalakan	Dar e Shakh Kalakar	Gurziwan
2056	353705065134801	Drilled borehole	Dara e Shakh	Dara e Shakh	Gurziwan
2099	353711065032801	Drilled borehole	Kaykawos	Kaykawos	Gurziwan
2055	353712065131502	Drilled borehole	Dara e Shakh	Dara e Shakh	Gurziwan
2035	353719065131302	Drilled borehole	Dara e Shakh	Dara e Shakh	Gurziwan
2133	353731065034701	Drilled borehole	Kikawas	Kikawas	Gurziwan
2104	353742065035801	Drilled borehole	Perech	Perech	Gurziwan
2134	353749065041201	Drilled borehole	Kikawas	Kikawas	Gurziwan
2962	353759065132201	Drilled borehole	Water point code 252, Nowabad	Nowabad Dari Shakh	Gurziwan
2105	353800065044301	Drilled borehole	Perech	Perech	Gurziwan
2098	353801065045501	Drilled borehole			
2059	353803065163801	Drilled borehole			
2011	353814065164101	Drilled borehole			
2045	353815065092901	Drilled borehole			
2023	353817065163902	Drilled borehole			
2132	353820065051301	Drilled borehole			
2129	353822065045901	Drilled borehole			
2034	353822065164301	Drilled borehole			
2091	353824065045601	Drilled borehole			
2049	353826065062601	Drilled borehole			
2077	353830065065801	Drilled borehole			
2032	353834065164602	Drilled borehole			
2033	353834065164601	Drilled borehole			
2100	353836065045801	Drilled borehole			

tbl 01 Data

- ID
- WPoint_ID
- Excel_ID
- WIN_Grid
- WIN_No
- WPCode
- Type
- WPname
- WPlabel
- Village
- District
- Province
- Longitude

tbl 03 Links to Well Reports

- ID
- WPoint_ID
- WellLogLink
- WellDropBx

tbl 03 Links to Geophy...

- ID
- WPoint_ID
- GeophLogLk
- LogDropBox

tbl 4 Links to WQ Analysis

- ID
- WPoint_ID
- WQanaLink
- WQDropBox
- WQDropBx2

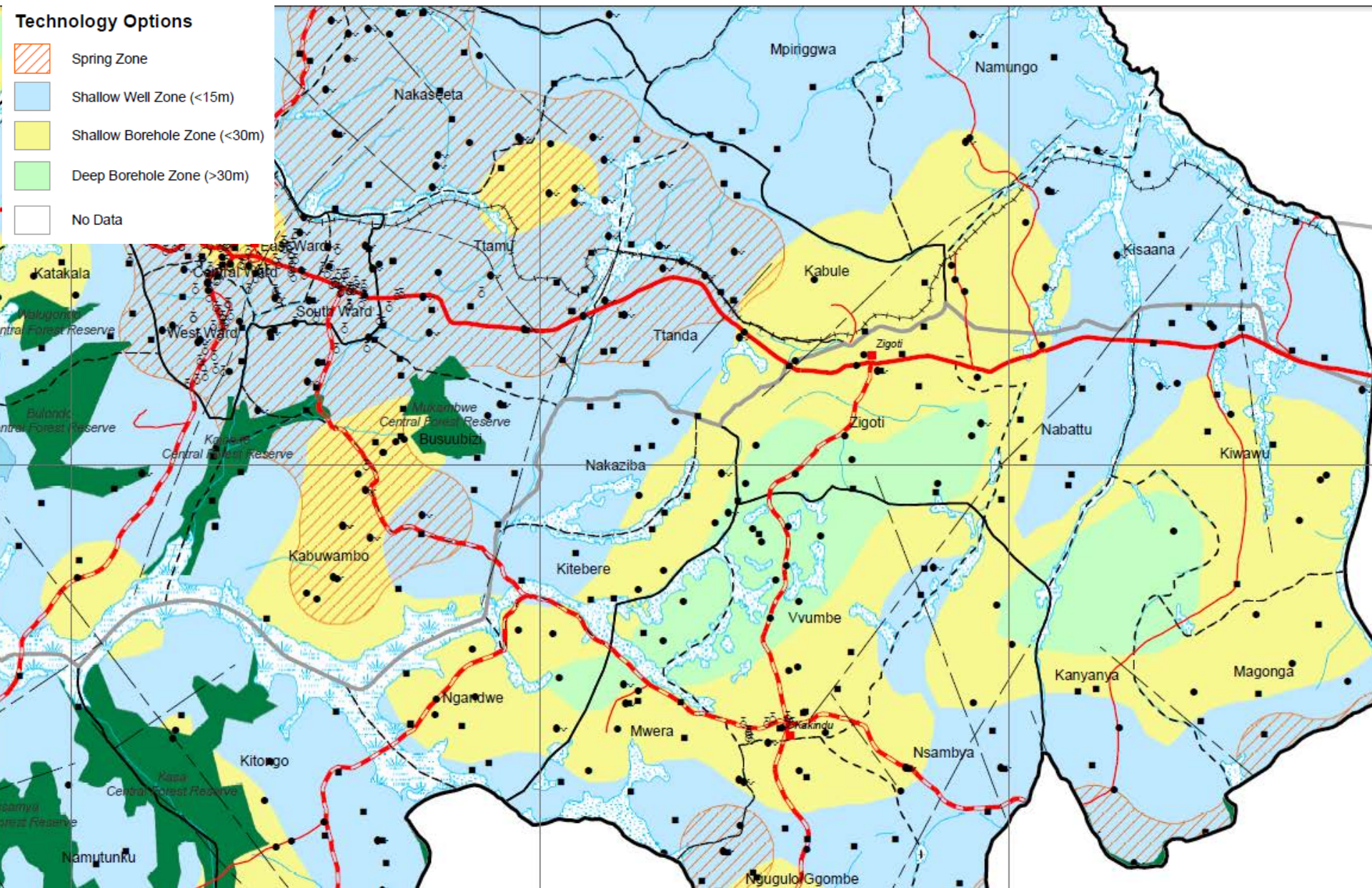
A picture is worth a thousand words



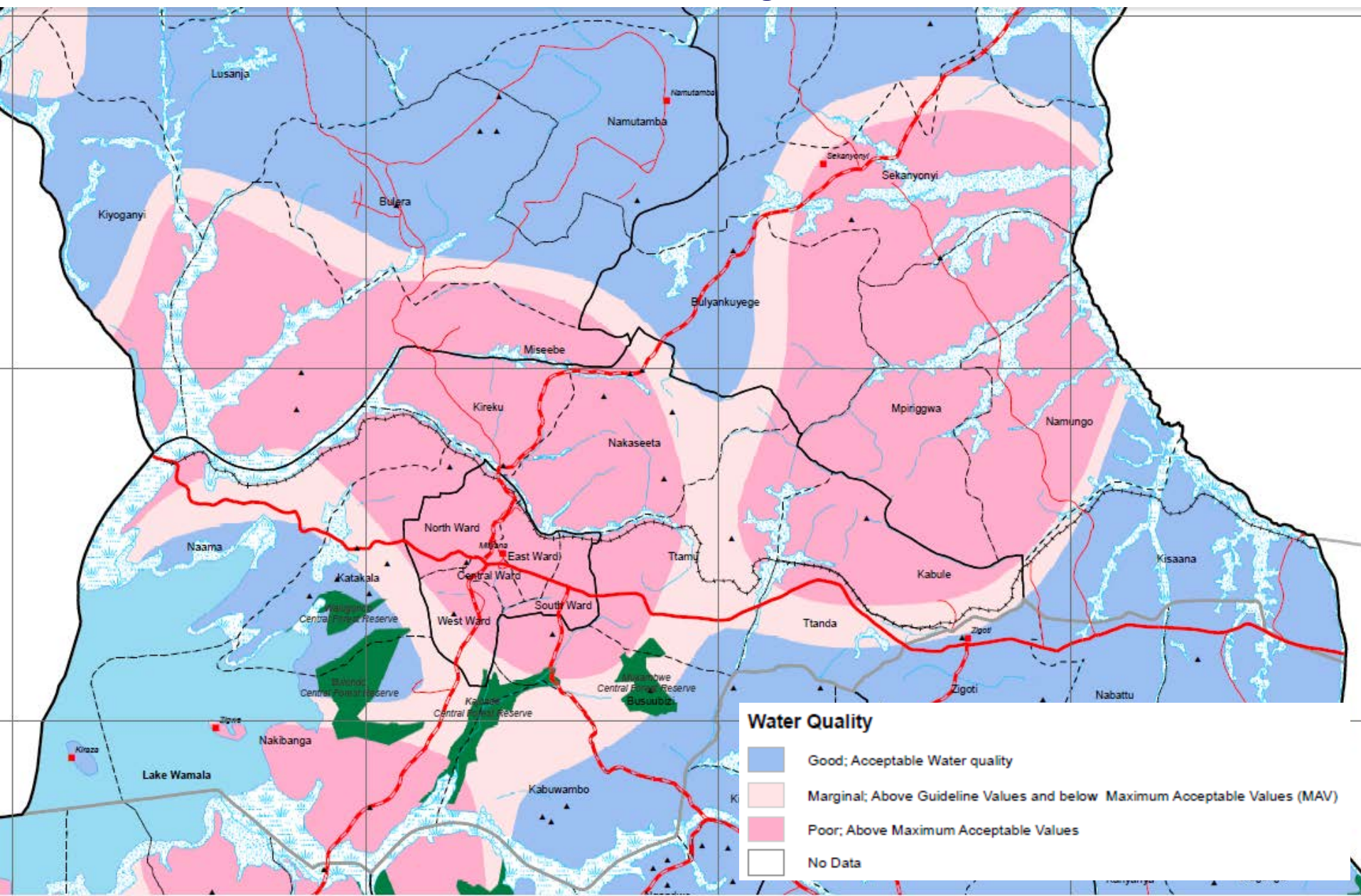
Hydrogeological Data Presentation (1)

Paper Maps Examples from Uganda & Afghanistan

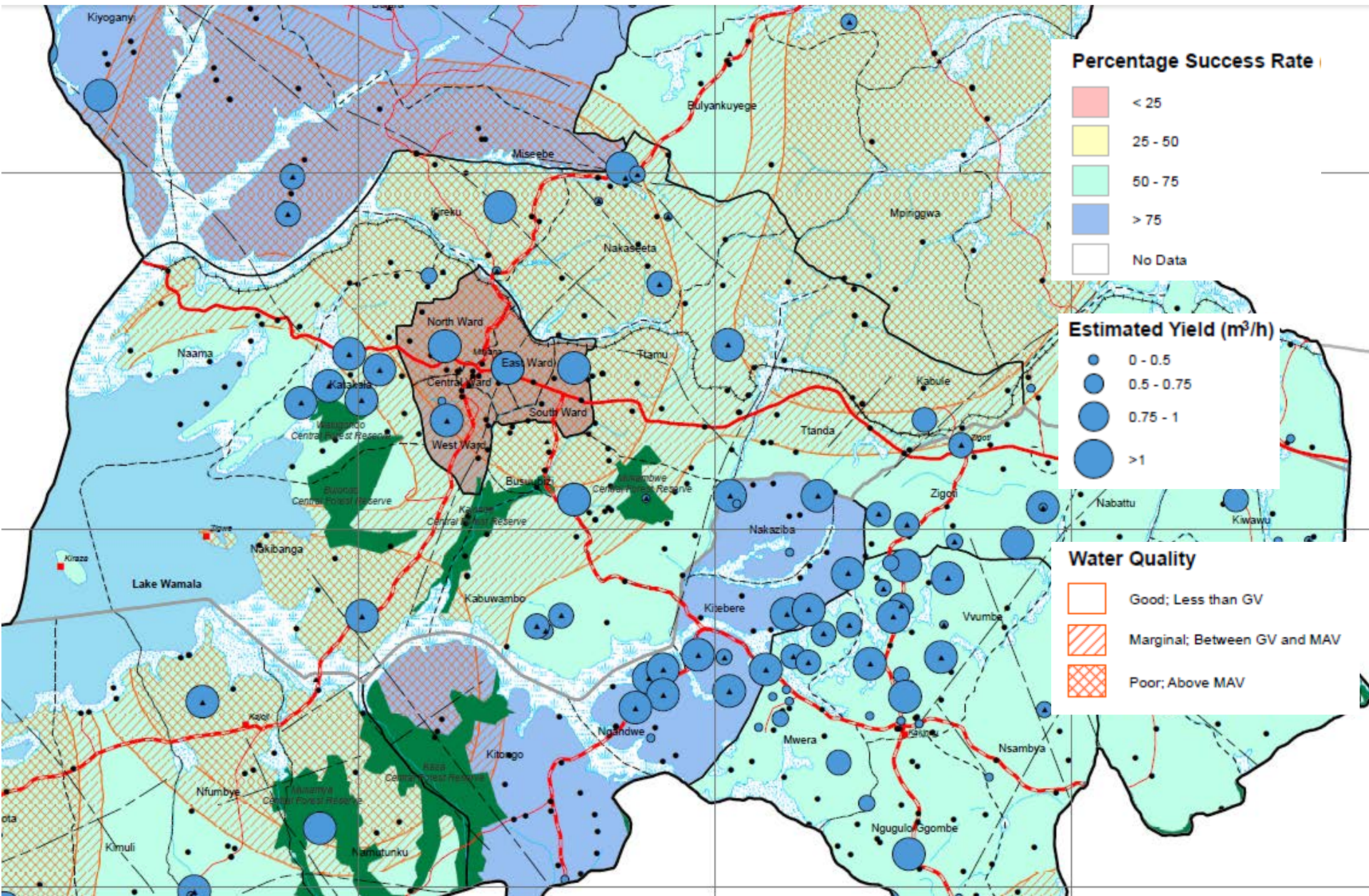
Map 1: Water Supply Technology Options



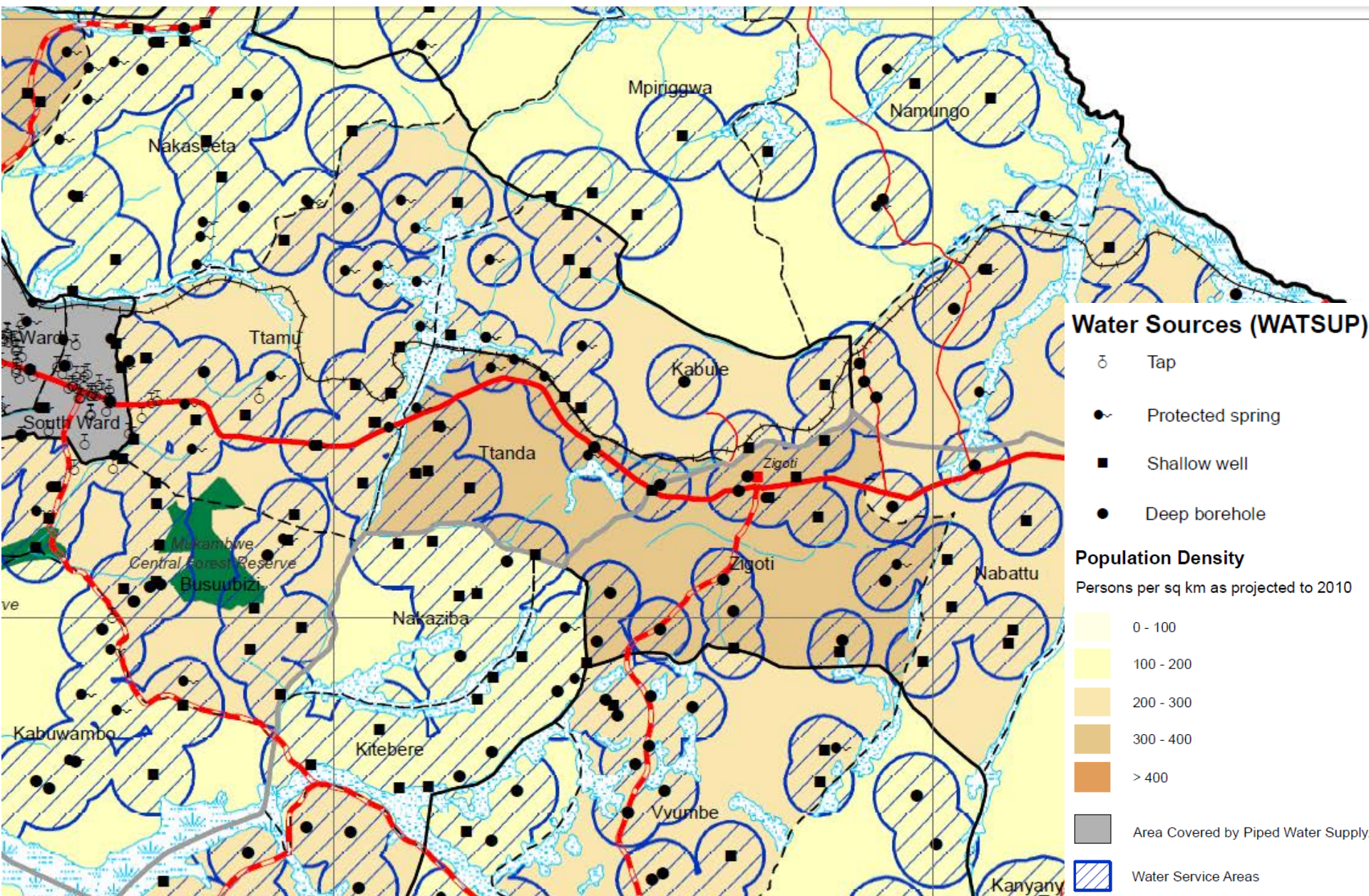
Map 2: Groundwater Quality



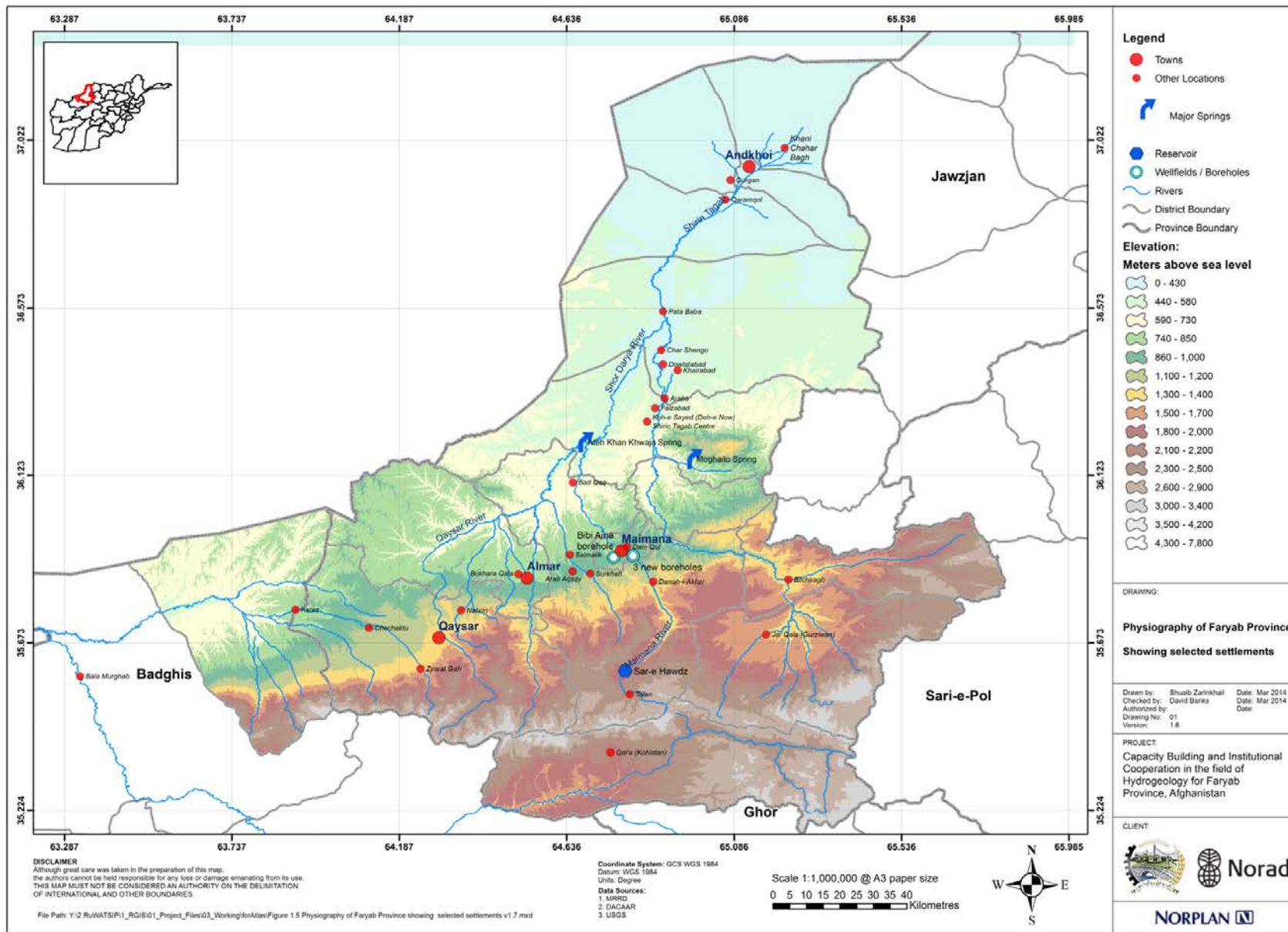
Map 3: Drilling Success Rate



Map 4: Water Service Area & Population Density



Map 5: Faryab Physiography



Legend

- Towns
- Other Locations

Major Springs

- Reservoir
- Wellfields / Boreholes

Rivers

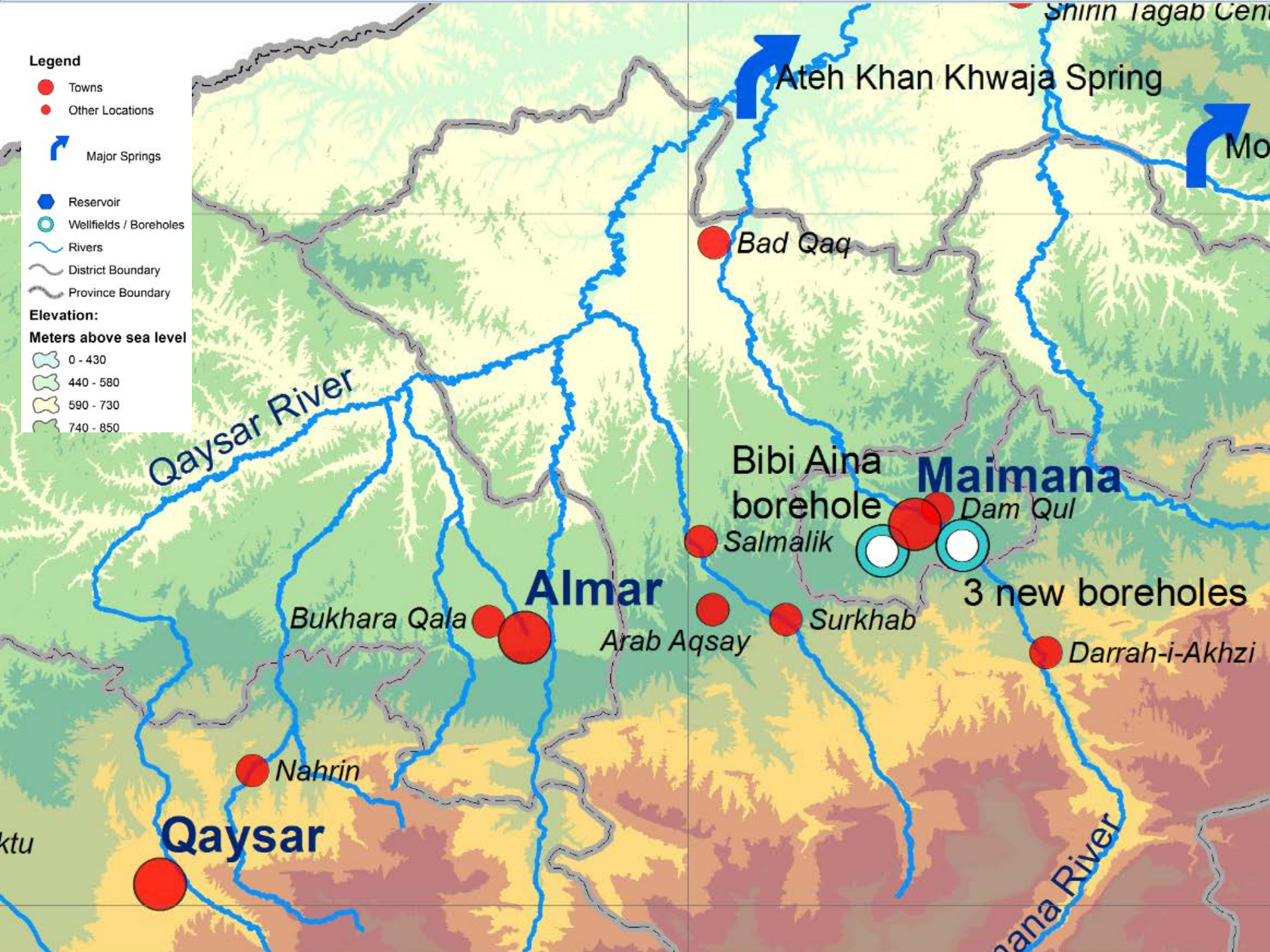
District Boundary

Province Boundary

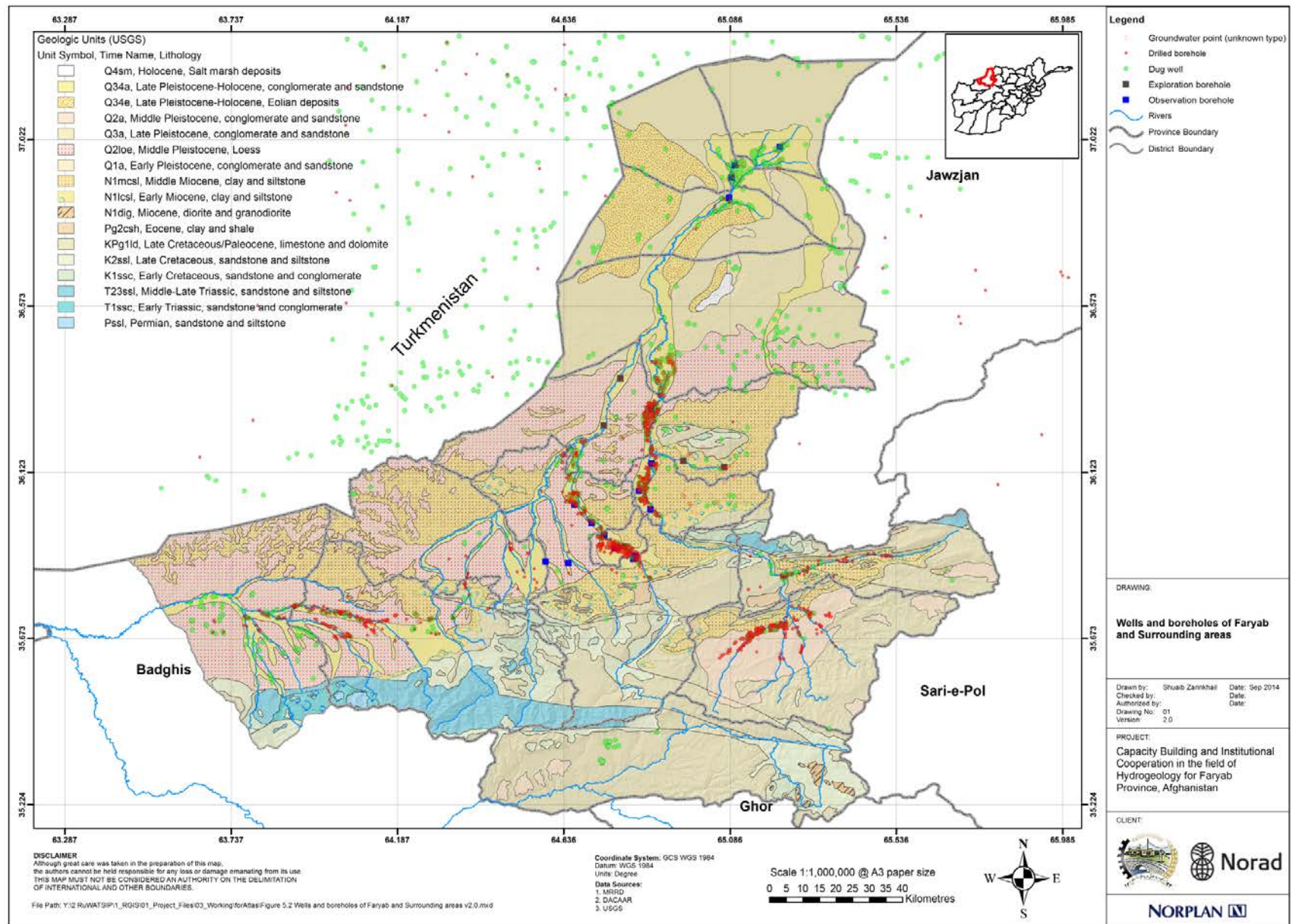
Elevation:

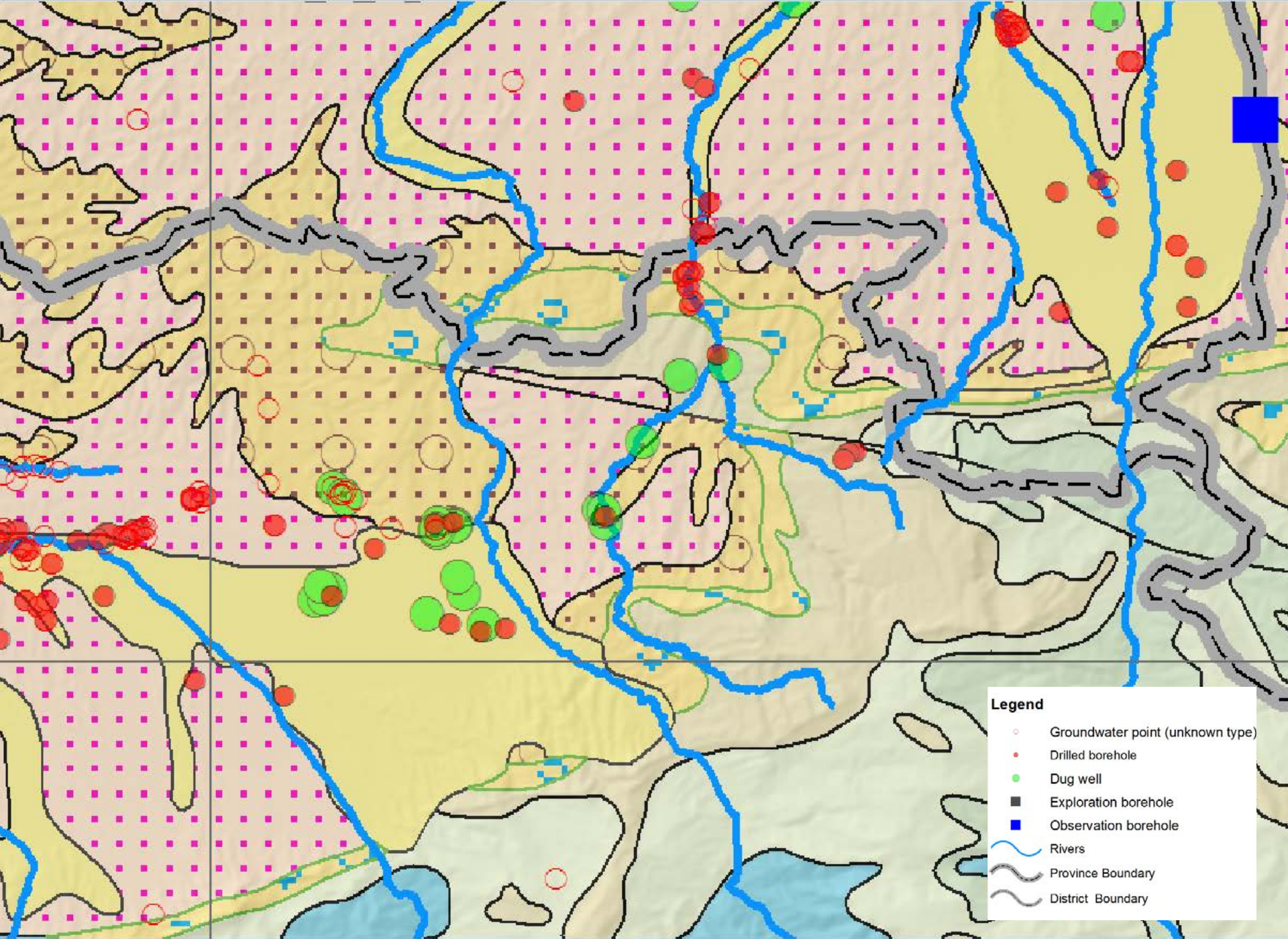
Meters above sea level

- 0 - 430
- 440 - 580
- 590 - 730
- 740 - 850

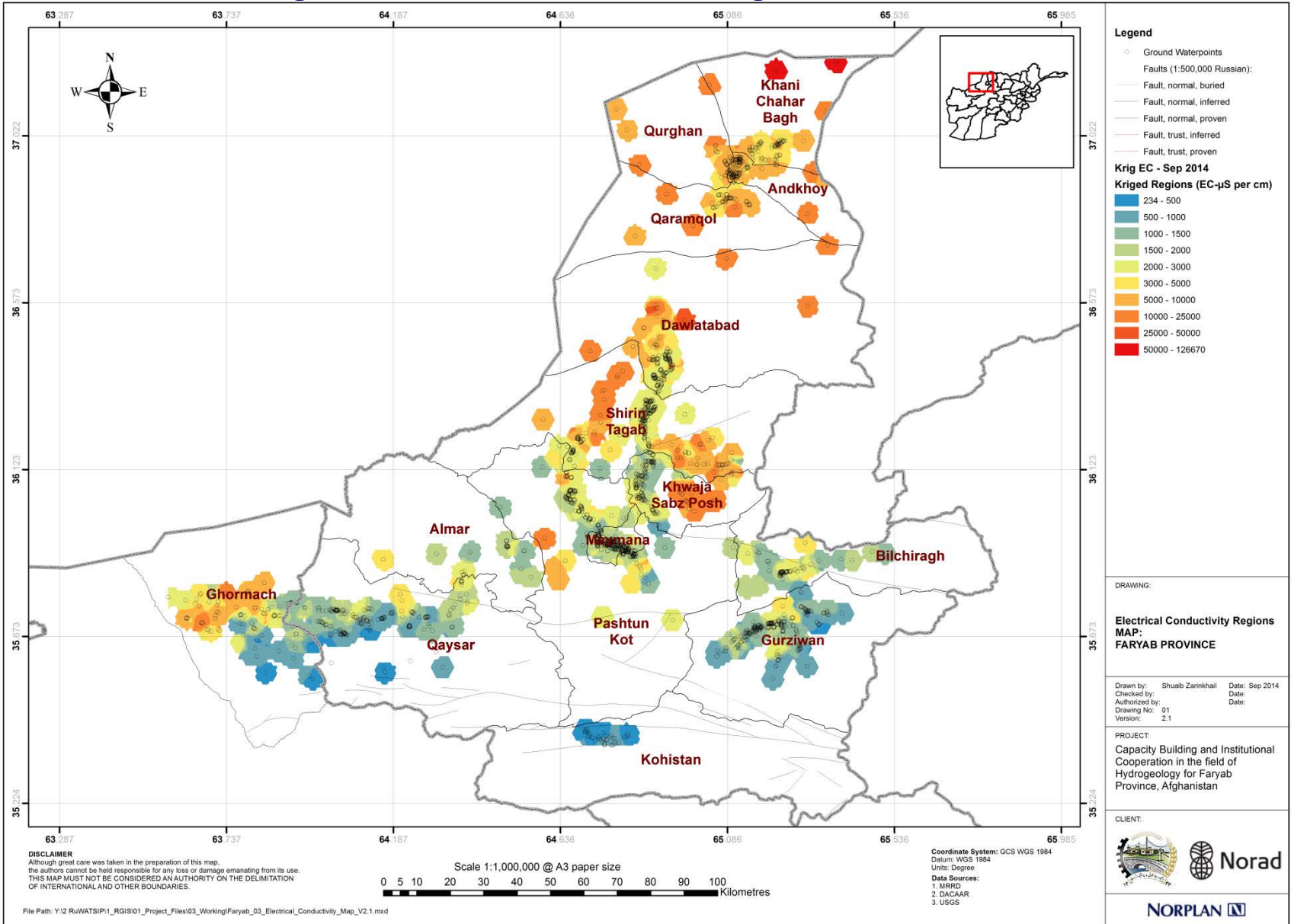


Map 6: Faryab Geology & Water Points

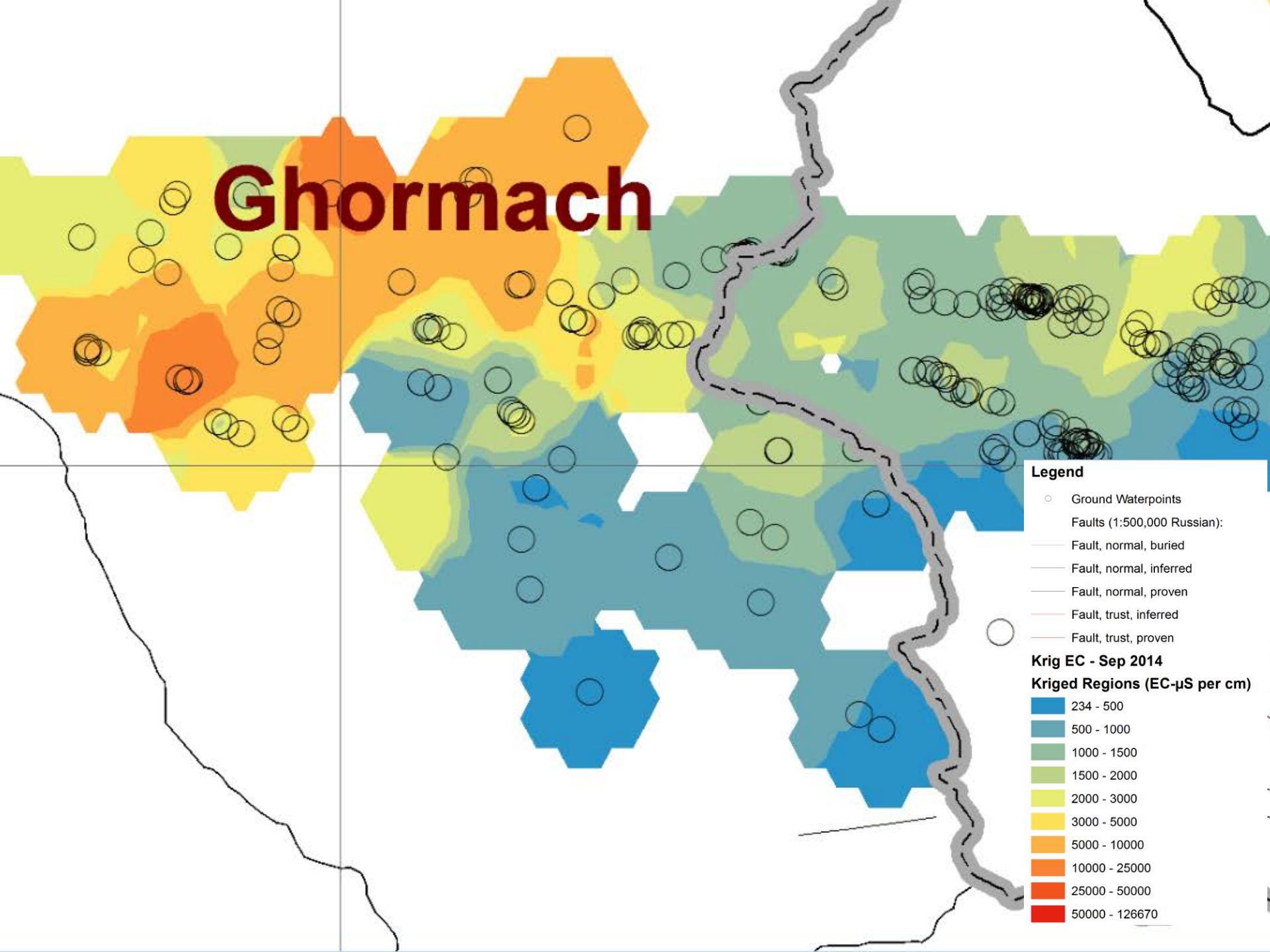




Map 7: Faryab Water Salinity



Ghormach



Hydrogeological Data Presentation (2)

Digital Maps (Google Earth) Example from Afghanistan

What you need






Internet (+/- Fast)



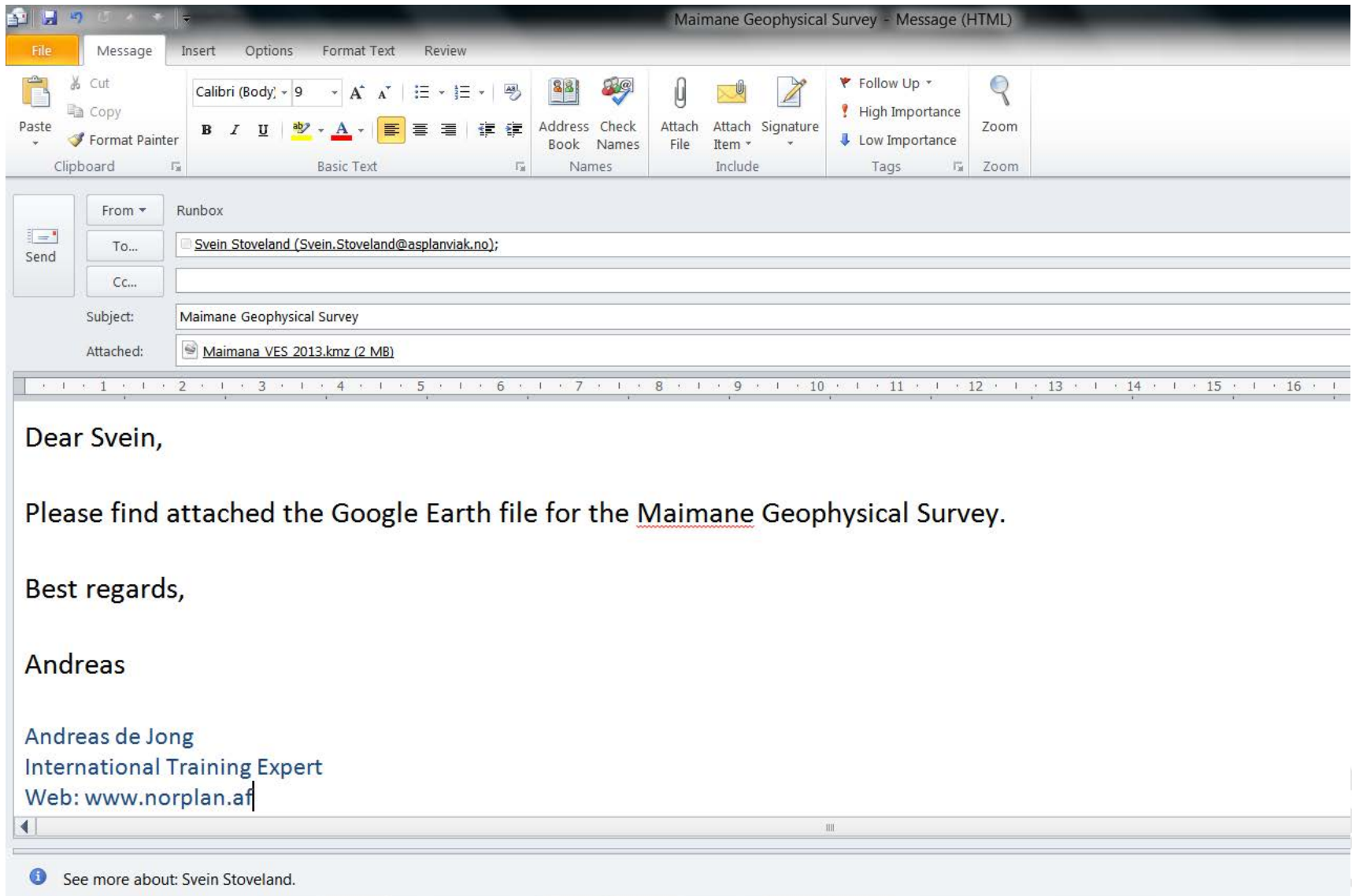
Google Earth

Excel data exported to Google Earth KMZ file

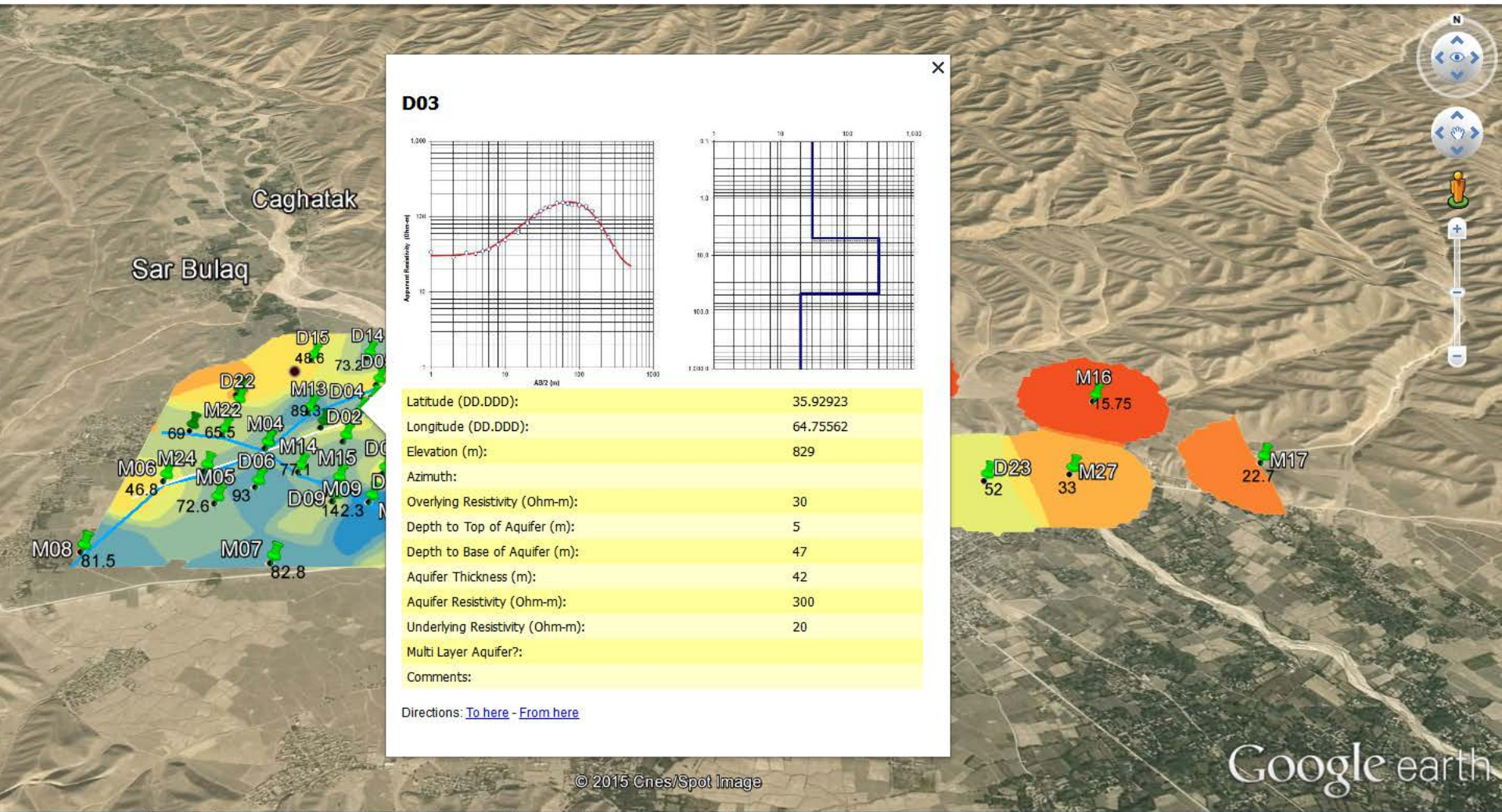
	A	B	C	D	E	F	G	H	I	J	K
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2		Change Filename	File Name: Maimana_VES_2013.kml								
3		Create KML File	  								
5		Coordinates in Decimal Degrees		Change Picture Directory	files\						
6		Eastings	Northings	Location ID	Picture ID	Eastings (D)	Northings (I)	Azimuth	Overlying R	Depth to	To Depth to
7		64.76599	35.92395	M01	M01.jpg	64.766	35.924	180	13	2.8	7.8
8		64.76379	35.92157	M02	M02.jpg	64.76879	35.92157	180	22	2.5	102.5
9		64.74989	35.92611	M03	M03.jpg	64.74989	35.92611	270	25	4.4	79.4
10		64.74986	35.92603	M04	M04.jpg	64.74986	35.926003	270	25	5.5	75.5
11		64.748	35.921	M05	M05.jpg	64.744	35.923	180	25	2.6	72.6
12		64.744	35.923	M06	M06.jpg	64.7345	35.92	225	35	11.8	46.8
13		64.753	35.916	M07	M07.jpg	64.735	35.916	270	40	7.8	82.8
14		64.741	35.917	M08	M08.jpg	64.753	35.917	150	22	1.5	81.5
15		64.758	35.921	M09	M09.jpg	64.7509	35.921	180	15	2.3	142.3
16		64.762	35.919	M10	M10.jpg	64.762	35.719	180	12	3	53
17		64.76064	35.92	M11	M11.jpg	64.76064	35.92	180	37	6	96
18		64.75319	35.92808	M12	M12.jpg	64.75319	35.92808	270	30	7.9	57.9
19		64.75194	35.92958	M13	M13.jpg	64.75194	35.92958	?	32	9.3	89.3
20		64.7527	35.92379	M14	M14.jpg	64.7527	35.92379	180	32	7.1	77.1
21		64.7555	35.92267	M15	M15.jpg	64.7555	35.92267	180	40	5.7	85.7
22		64.80766	35.92966	M16	M16.jpg	64.8076667	35.9296667	180	70	5.75	15.75
23		64.81686	35.92336	M17	M17.jpg	64.76629	35.92755	180	55	3	33
24		64.76629	35.92755	M18	M18.jpg	64.76629	35.92755	180	55	3	113
25		64.76876	35.93129	M19	M19.jpg	64.76876	35.93129	180	20	4.4	111.4
26		64.76879	35.93471	M20	M20.jpg	64.76879	35.93471	?	70	0.2	5.2
27		64.76218	35.93705	M21	M21.jpg	64.76218	35.93705	240	14	2.8	34.8
28		64.74652	35.92744	M22	M22.jpg	64.74652	35.92744	180	20	10.5	65.5
29		64.74414	35.92782	M23	M23.jpg	64.74414	35.92782	180	36	4	69
30		64.74641	35.9239	M24	M24.jpg	64.74641	35.9239	180	30	4.5	74.5

The KML file creator

Google Earth KMZ file sent by e-mail



Data exported to Google Earth



Hydrogeological Data Presentation (3)

Digital Maps (Online) Examples from Afghanistan

What you need



Internet (Fast!)



Internet
Browser

Online Maps - ArcGIS Online



Access ArcGIS Online in your browser

www.arcgis.com/home/group.html?owner=AfghanMaps&title=Faryab Maps

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Faryab Maps

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Maps of Faryab Province, Afghanistan

Group Content

	Title	Owner	Rating	Views	Date
All Results Maps Layers Apps Tools Files <input type="checkbox"/> Show ArcGIS Desktop Content		Faryab Geology Map			
	Geological Map of Faryab, Afghanistan Web Map by AfghanMaps Last Modified: 11 July 2014 ★★★★★ (0 ratings, 0 comments, 116 views)				
	Open	Details			
		Faryab Groundwater Quality (EC)			
	Electrical Conductivity Map of Faryab Province, Afghanistan. Web Map by AfghanMaps Last Modified: 10 September 2014 ★★★★★ (0 ratings, 0 comments, 82 views)				
	Open	Details			
		Faryab Monitoring Wells			
	Monitoring Wells in Faryab Province, Afghanistan Web Map by AfghanMaps Last Modified: 11 September 2014				
	Open	Details			

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AfghanMaps

Status: public

Contributors: All members

Tags:

Faryab, Afghanistan

1 Member

AfghanMaps

Access ArcGIS Online in your browser

ArcGIS - Faryab Geology Map - Waterfox

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ArcGIS Faryab Geology Map

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Details Basemap

Share Print Measure Find address or place

Legend

Faryab_Geology

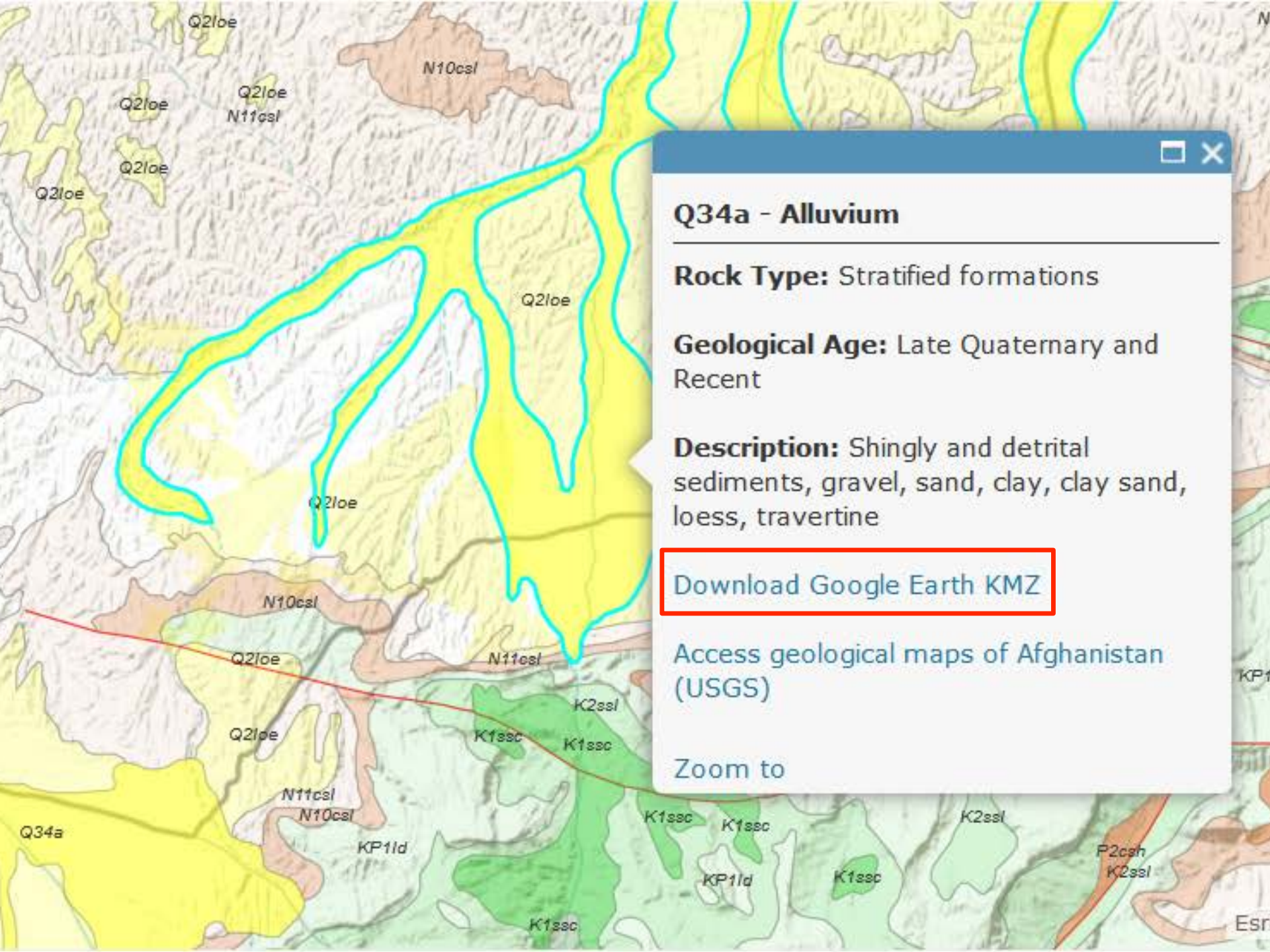
- Q4a: Shingly and detrital sediments, gravel, sand, clay, clay sand, loess, travertine
- Q34a: Shingly and detrital sediments, gravel, sand, clay, clay sand, loess, travertine
- Q3a: Shingly and detrital sediments, gravel, sand, clay, clay sand, loam, loess, travertine
- Q2loe: Shingly and detrital sediments, gravel, sand, clay, clay sand, loam, loess, travertine; trachybasalt, leucite basanite (Sarlog Group); andesitic basalt, olivine basalt (Asparan Group)

0 5 10km

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Q34a - Alluvium

Rock Type: Stratified formations

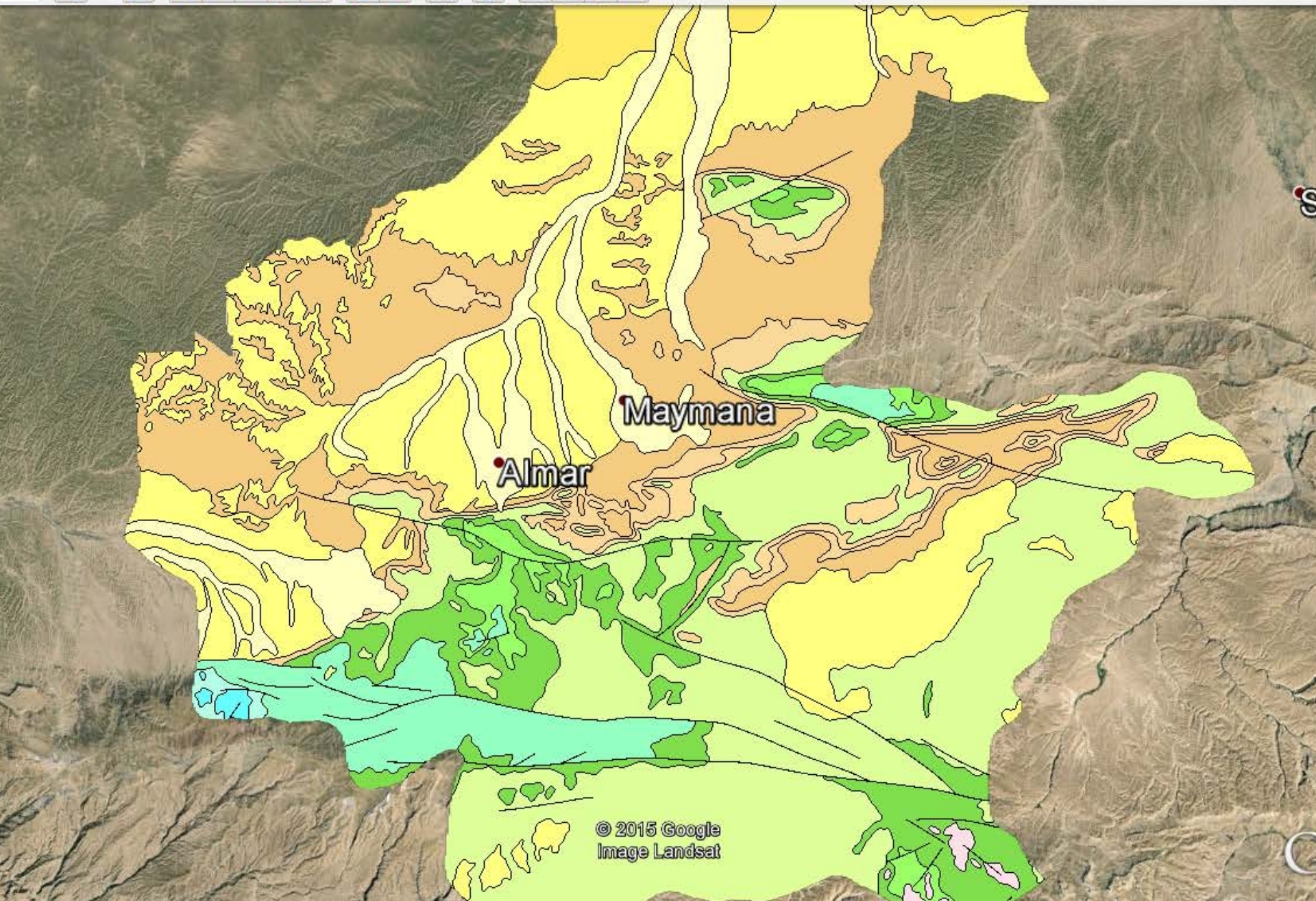
Geological Age: Late Quaternary and Recent

Description: Shingly and detrital sediments, gravel, sand, clay, clay sand, loess, travertine

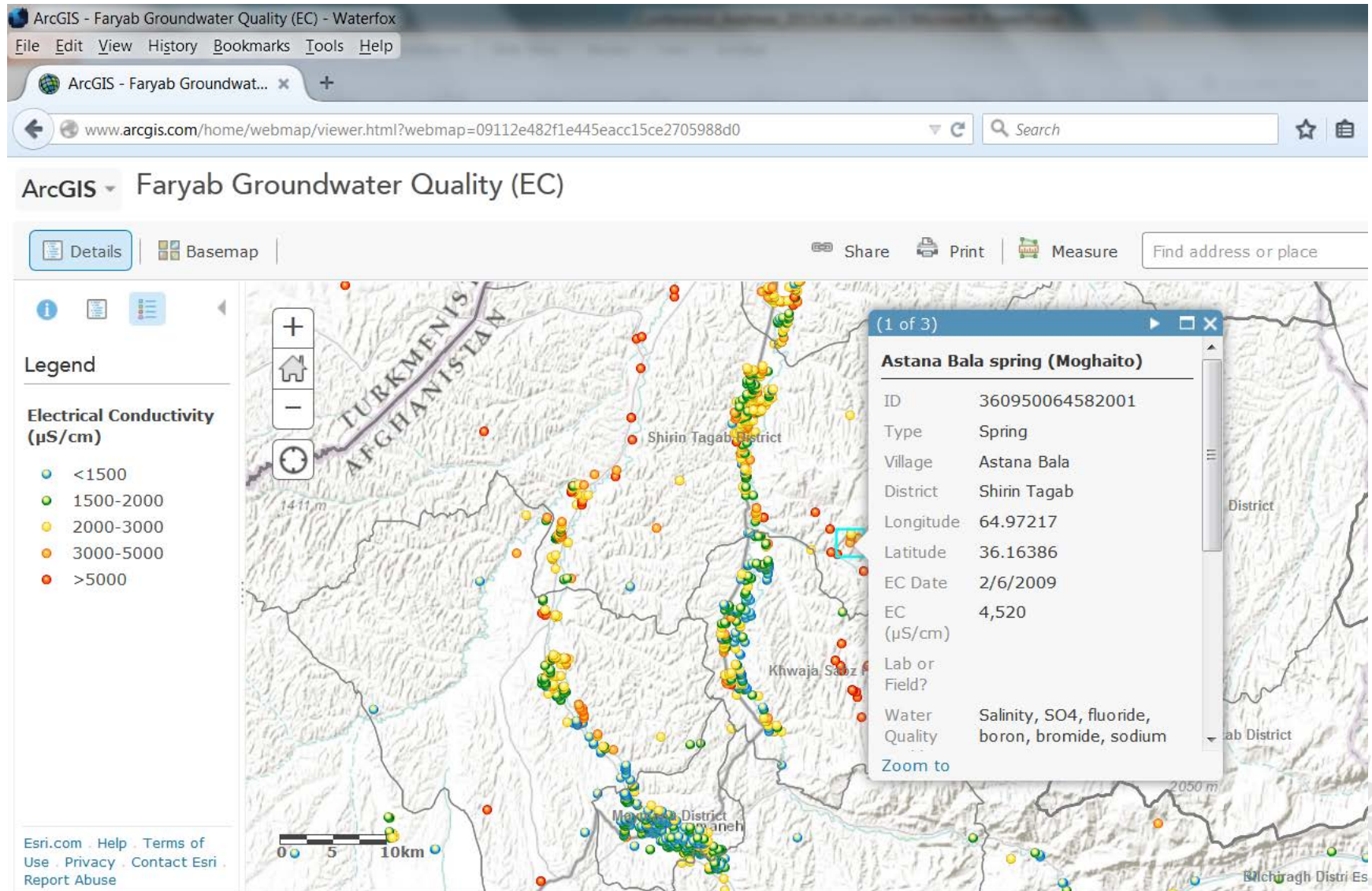
[Download Google Earth KMZ](#)

[Access geological maps of Afghanistan \(USGS\)](#)

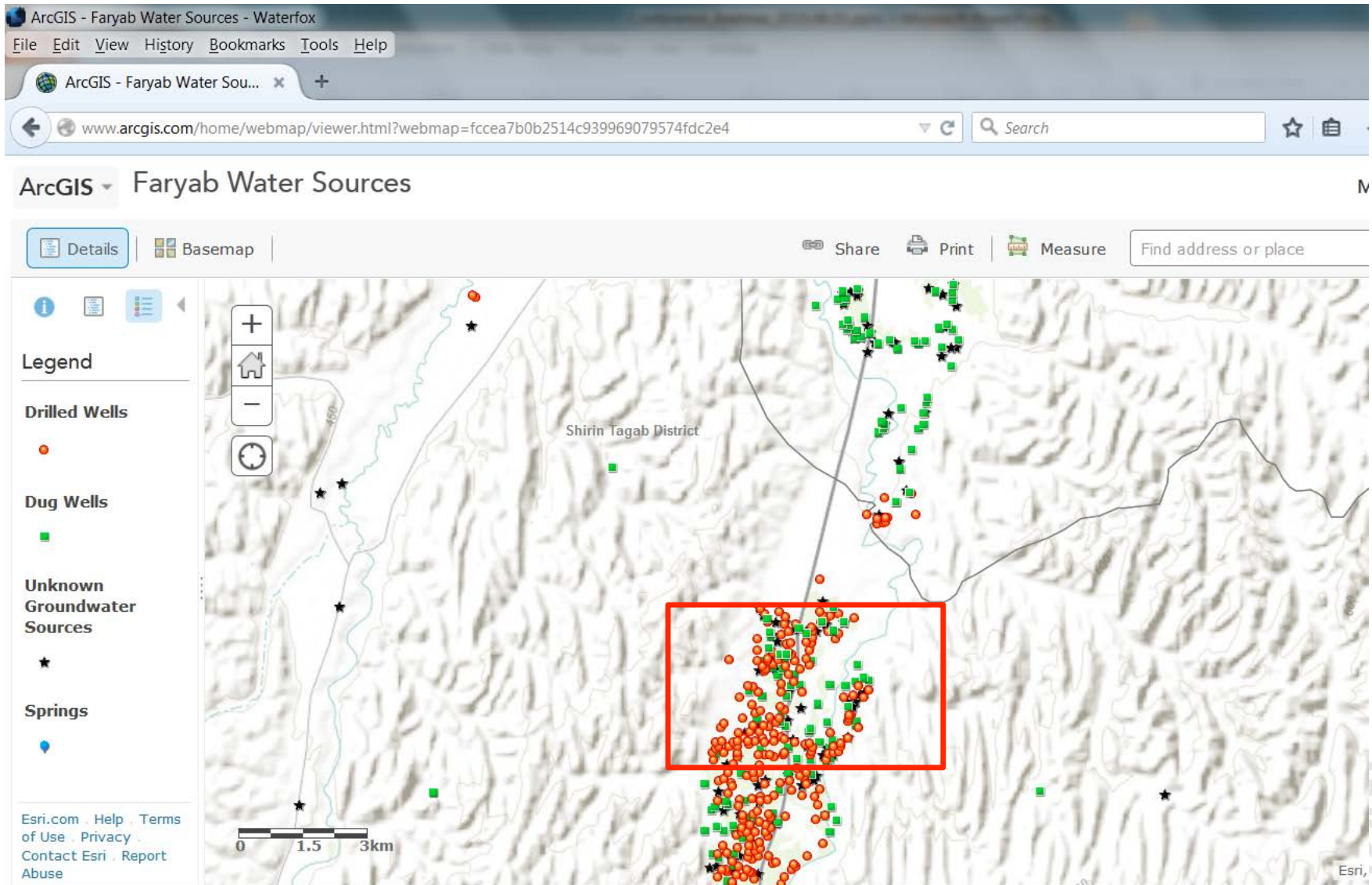
Zoom to



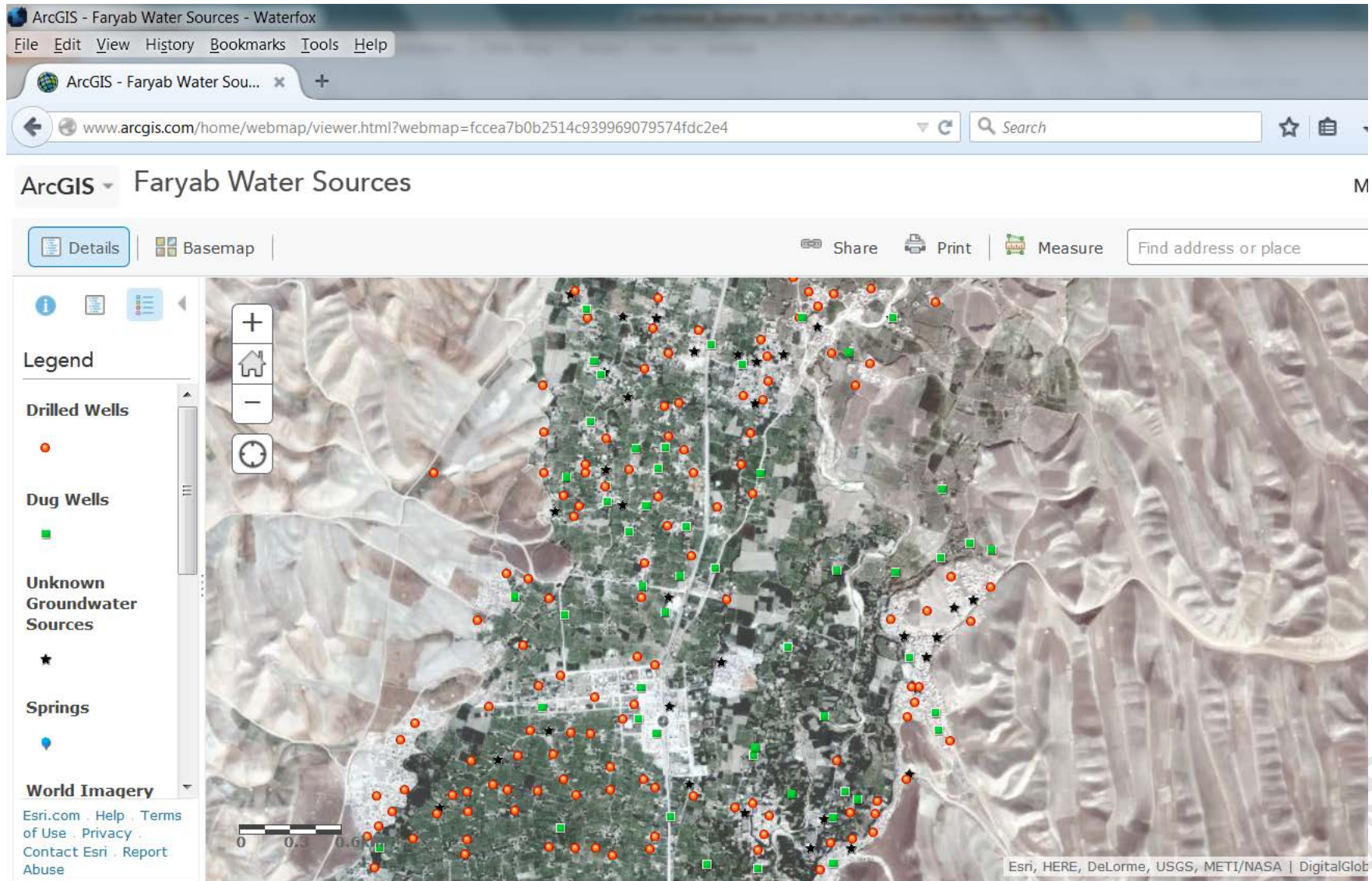
EC map of Faryab



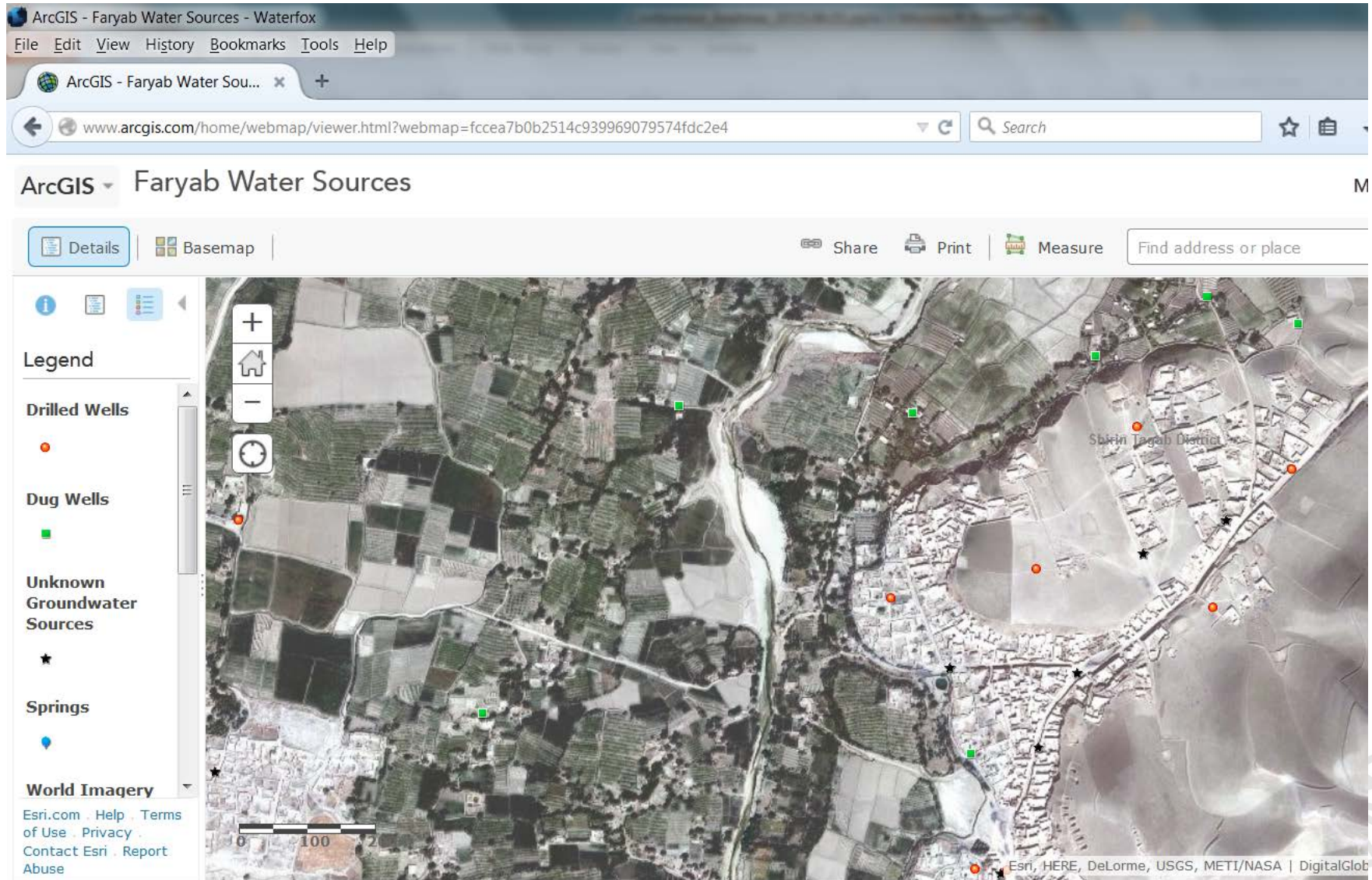
Water sources map of Faryab



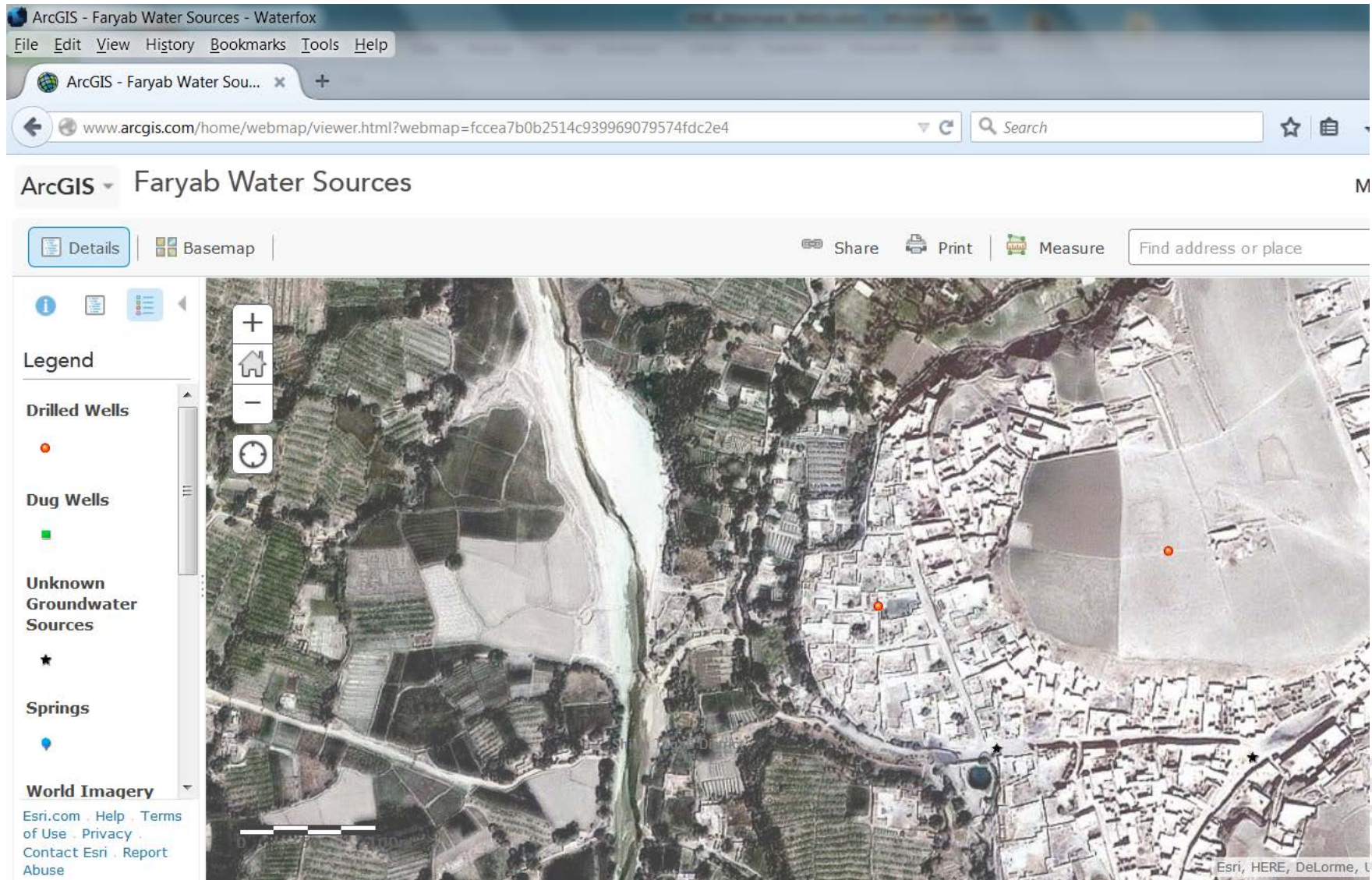
Water sources map of Faryab



Water sources map of Faryab



Water sources map of Faryab



Water sources map of Faryab

ArcGIS - Faryab Water Sources - Waterfox

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ArcGIS - Faryab Water Sou... x +

www.arcgis.com/home/webmap/viewer.html?webmap=fccea7b0b2514c939969079574fdc2e4

ArcGIS Faryab Water Sources

Details Basemap

Share Print Measure Find address or place

Legend

- Drilled Wells
- Dug Wells
- Unknown Groundwater Sources
- Springs
- World Imagery

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Map showing aerial imagery of Faryab, Afghanistan, with a legend on the left and a popup window for a specific water source.

Map controls: +, -, Home, Full Screen, Scale (0, 20, 40m)

Popup window (1 of 3) for Baloch:

Baloch	
ID	361731064531301
Type	Drilled borehole
Name	Baloch
Village	Baloch
District	Shirin Tagab
Longitude	64.88689
Latitude	36.29182
Elevation (m)	485
Year constructed	2013
Implementing agency	DACAAR
Donor	Norwegian
Zoom to	

Water sources map of Faryab

ArcGIS - Faryab Water Sources - Waterfox

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ArcGIS - Faryab Water Sou... x +

www.arcgis.com/home/webmap/viewer.html?webmap=fccea7b0b2514c939969079574fdc2e4

ArcGIS Faryab Water Sources

Details Basemap

Share Print Measure Find address or place

Legend

- Drilled Wells
- Dug Wells
- Unknown Groundwater Sources
- Springs
- World Imagery

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Maymana District

(4 of 4)

Imagery provider: DigitalGlobe

DATE (YYYYMMDD)	20110718
RESOLUTION (M)	0.50
ACCURACY (M)	10.20
DATA SOURCE	WV02

Zoom to

0 20 40m

Access ArcGIS Online via a web site

Untitled Document - Waterfox

File Edit View History Bookmarks Tools Help

Untitled Document x ArcGIS x +

norplan.af/Page_GIS_Web_maps.html

Search

Different maps covers:

Water points showing:-

- Type of water point
- Water quality (EC)
- Dept to static water level
- Wells and drilling reports/logs

Also

- Geology
- Satellite images

Source of data:

- DACAAR water points
- MRRD data
- USGS
- Russian hydrogeological maps

Different layers of information will be added continuously as dynamic on-line maps

Hydrogeological Map of Faryab

Map of Water Points Functionality in Faryab Province, Afghanistan

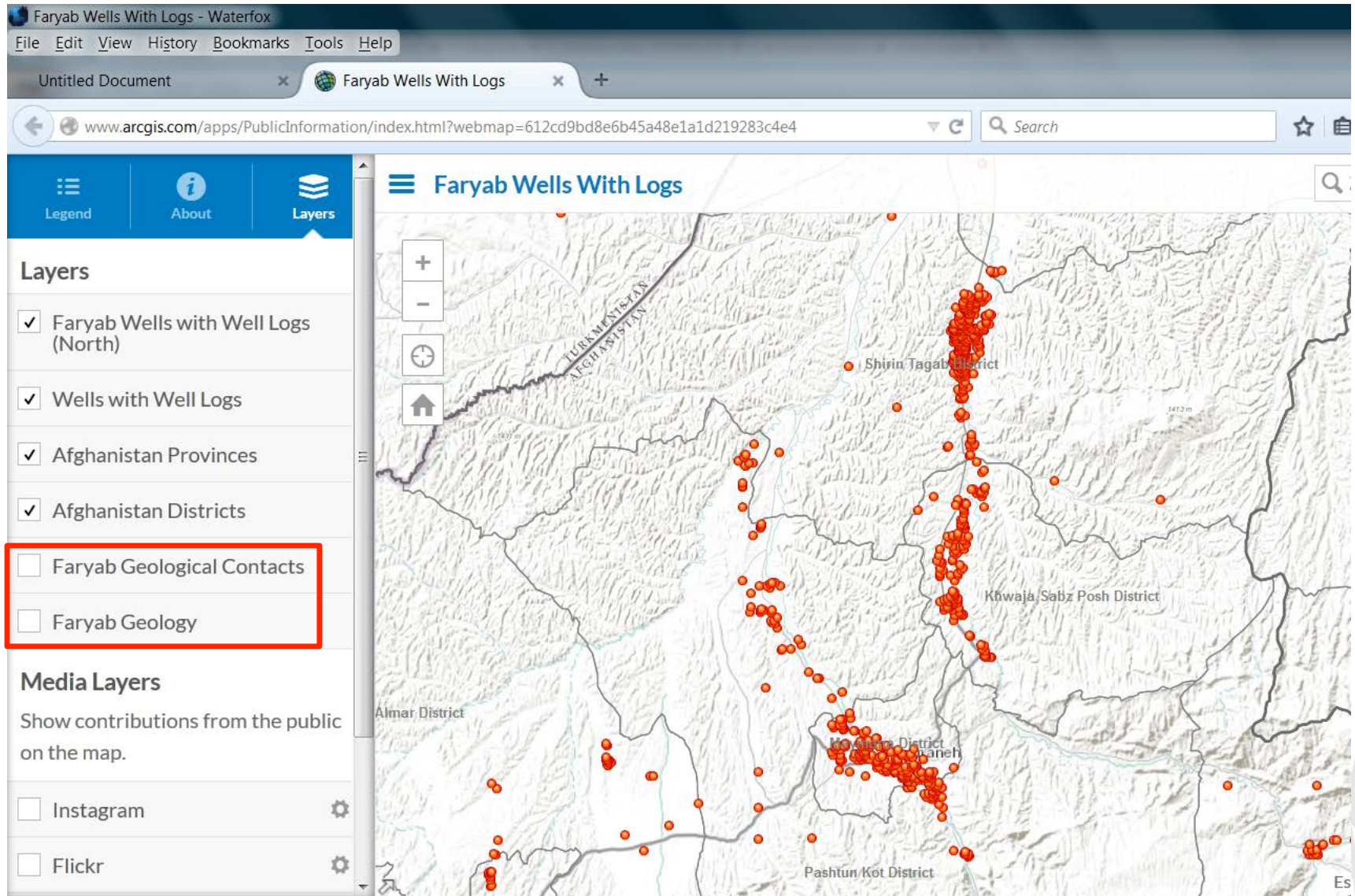
View Map

Faryab Wells With Logs

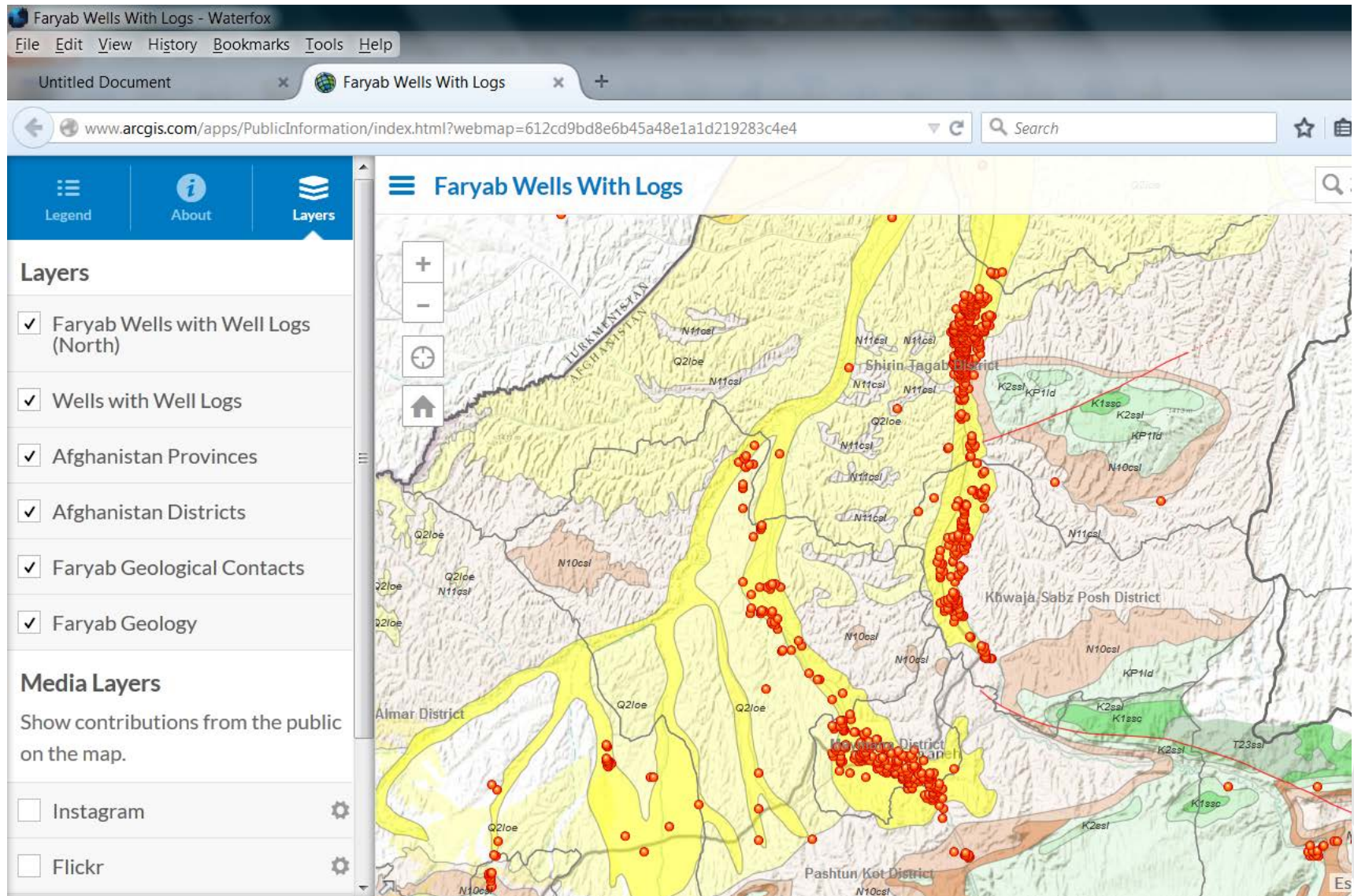
Faryab Rest Water Levels

Faryab Water Points Fun...

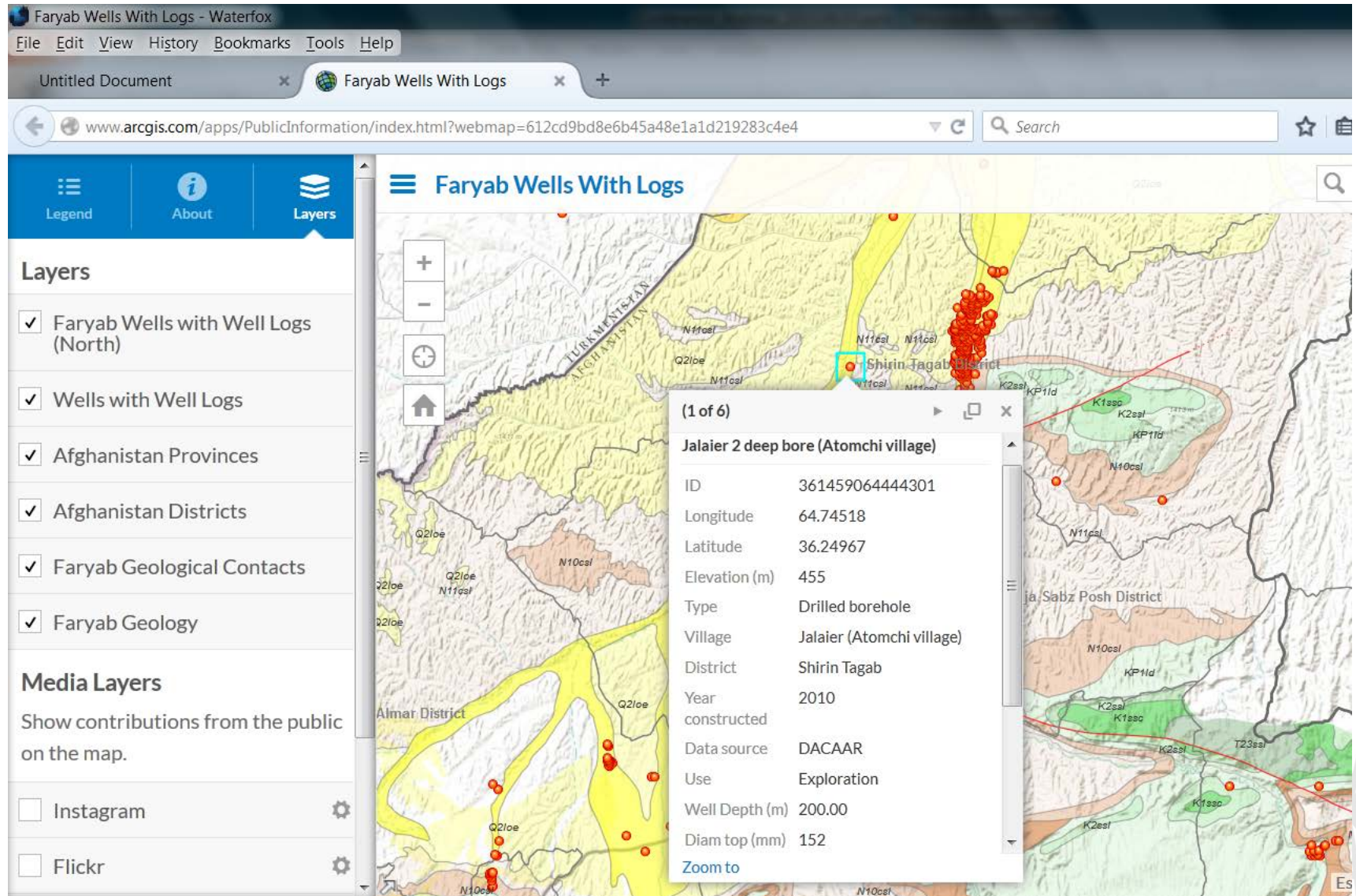
Access ArcGIS Online via a web site



Access ArcGIS Online via a web site



Access ArcGIS Online via a web site



The screenshot shows the ArcGIS Online web interface. The browser address bar displays the URL: www.arcgis.com/apps/PublicInformation/index.html?webmap=612cd9bd8e6b45a48e1a1d219283c4e4. The page title is "Faryab Wells With Logs - Waterfox". The interface includes a top navigation bar with "File", "Edit", "View", "History", "Bookmarks", "Tools", and "Help". Below this is a "Layers" panel on the left with a list of layers and a "Media Layers" section. The main map area shows a topographic map of Faryab, Afghanistan, with various geological features and well locations marked by red dots. A pop-up window titled "(1 of 6)" displays details for a specific well: "Jalaier 2 deep bore (Atomchi village)".

Layers

- ☒ Faryab Wells with Well Logs (North)
- ☒ Wells with Well Logs
- ☒ Afghanistan Provinces
- ☒ Afghanistan Districts
- ☒ Faryab Geological Contacts
- ☒ Faryab Geology

Media Layers

Show contributions from the public on the map.

- ☐ Instagram
- ☐ Flickr

Well Details: Jalaier 2 deep bore (Atomchi village)

ID	361459064444301
Longitude	64.74518
Latitude	36.24967
Elevation (m)	455
Type	Drilled borehole
Village	Jalaier (Atomchi village)
District	Shirin Tagab
Year constructed	2010
Data source	DACAAR
Use	Exploration
Well Depth (m)	200.00
Diam top (mm)	152

[Zoom to](#)

Access ArcGIS Online via a web site

Faryab Wells With Logs - Waterfox

File Edit View History Bookmarks Tools Help

Untitled Document x Faryab Wells With Logs x Connecting...

www.arcgis.com/apps/PublicInformation/index.html?webmap=612cd9bd8e6b45a48e1a1d219283c4e4

Search

Legend About Layers

Layers

- ☒ Faryab Wells with Well Logs (North)
- ☒ Wells with Well Logs
- ☒ Afghanistan Provinces
- ☒ Afghanistan Districts
- ☒ Faryab Geological Contacts
- ☒ Faryab Geology

Media Layers

Show contributions from the public on the map.

- ☐ Instagram
- ☐ Flickr

Faryab Wells With Logs

Map showing Faryab Wells with Well Logs (North) in Afghanistan. The map displays various districts including Shirin Tagab District, Almar District, and Sabz Posh District. A cluster of red dots indicates well locations. A popup window displays details for a selected well.

Well Details (1 of 6)

Village	Jalaier (Atomchi village)
District	Shirin Tagab
Year constructed	2010
Data source	DACAAR
Use	Exploration
Well Depth (m)	200.00
Diam top (mm)	152
SWL (m)	16.70
SWL date	July 2, 2010
Well report	DACAAR\Jalaier 2 Atomchi.pdf
Download data	More info

Zoom to

Access ArcGIS Online via a web site

Dropbox - Jalaier 2 Atomchi.pdf - Waterfox

File Edit View History Bookmarks Tools Help

Untitled Document x Faryab Wells With Logs x Dropbox - Jalaier 2 Atomchi... x +

https://www.dropbox.com/s/9nvuoieX0qm5gf2/Jalaier 2 Atomchi.pdf?dl=0

Jalaier 2 Atomchi.pdf

Download Sign in

Exploration well No-2 Log design (Atonchi village, Jalaier)

Select Station	X (m)	Y (m)	Elevation (m)	TOC (m)
Jalaier 2	64.75	36.25	455.000	456.00

Depth (m)	Lithology	Well Completion details	Drilling protocol
0	Clay		
	Sand		
50	Clay		
	Sandy Clay		
100	Clay		
	Sandy Clay		

Major ions plot by Pie diagram 01/02/2010 (Atonchi village, Jalaier)

Legend

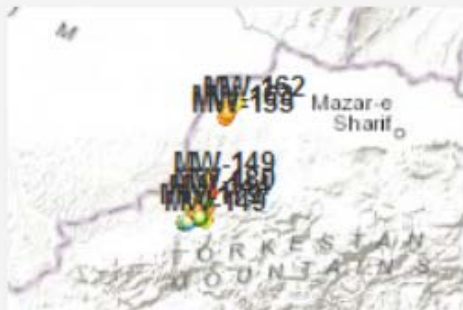
- Na
- Ca
- Mg
- Cl
- HCO₃
- SO₄ as meq/l

44% 27% 6% 1% 2% 20%

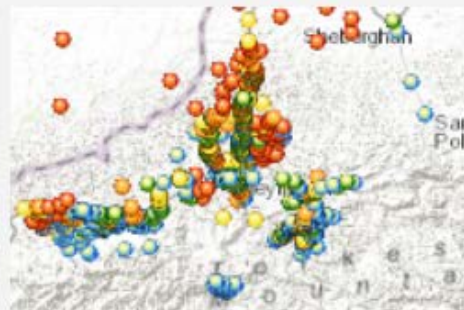
7880 $\mu\text{S/cm}$

Rotary Reverse

All online Faryab maps use a free Public Account



Faryab Monitoring Wells



Faryab Groundwater Quality ...



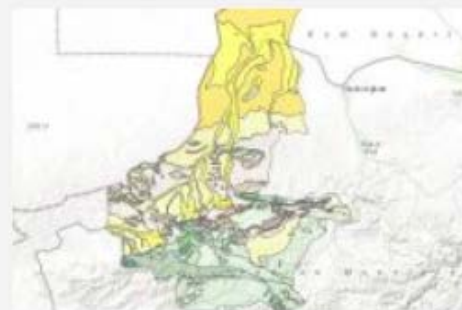
Faryab Water Sources



Faryab Rest Water Levels



Faryab Wells With Logs



Faryab Geology Map

Find them in the **Faryab Maps** group



<http://www.arcgis.com/home/group.html?owner=AfghanMaps&title=Faryab%20Maps>

**Thank you
for your attention!**