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

Data Management, Paper & Online Map Production: Results from Faryab Province

by Andreas de Jong & Prof. Shuaib Zarinkhail
11th October 2015

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Data Management, Paper & Online Map Production: Results from Faryab Province

1. Data management
2. Paper Maps
3. Online Maps
4. Conclusions & Recommendations

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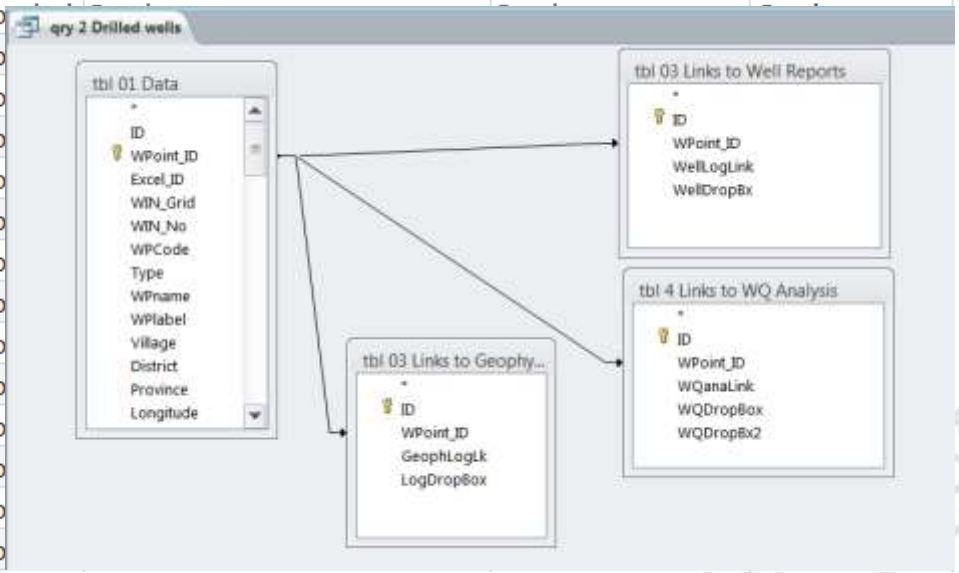
Why do we need Data Management?

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, Nowaba	Nowabad Dari Shakl	Gurziwan
2105	353800065044301	Drilled borehole	Perech	Perech	Gurziwan
2098	353801065045501	Drilled bo			
2059	353803065163801	Drilled bo			
2011	353814065164101	Drilled bo			
2045	353815065092901	Drilled bo			
2023	353817065163902	Drilled bo			
2132	353820065051301	Drilled bo			
2129	353822065045901	Drilled bo			
2034	353822065164301	Drilled bo			
2091	353824065045601	Drilled bo			
2049	353826065062601	Drilled bo			
2077	353830065065801	Drilled bo			
2032	353834065164602	Drilled bo			
2033	353834065164601	Drilled bo			
2100	353836065045801	Drilled bo			



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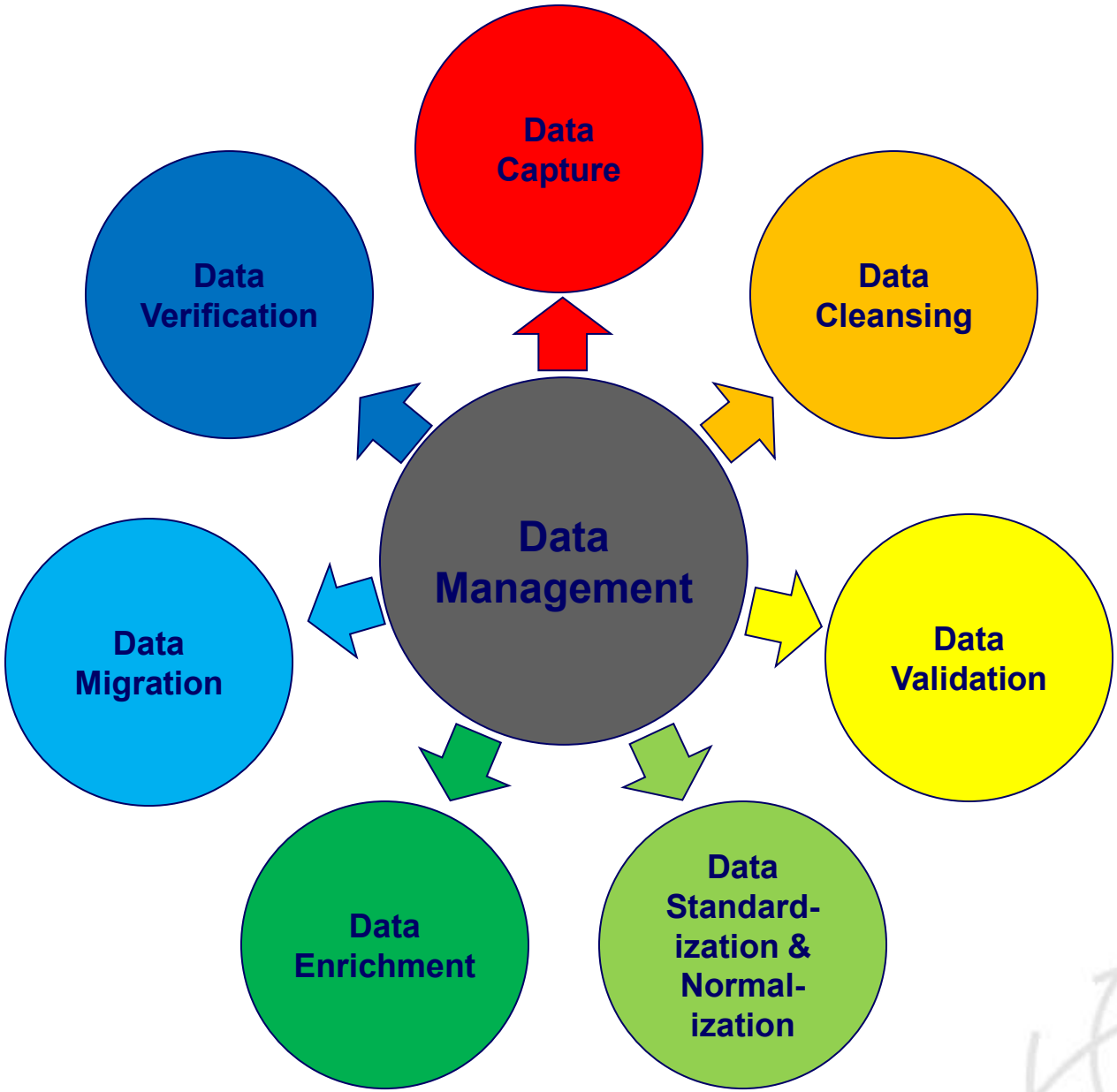
Data Capture
Data Cleansing
Data Validation
Data Standard-ization & Normal-ization
Data Enrichment
Data Migration
Data Verification
Data Management

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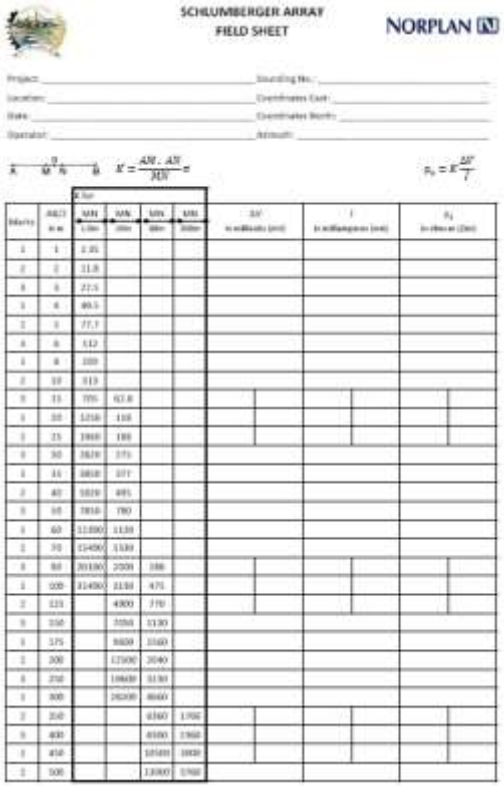
1. Data Capture – Fieldwork



SCHLUMBERGER ARRAY
FIELD SHEET

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Project: _____ Sounding No.: _____

Location: _____ Coordinates East: _____

Date: _____ Coordinates North: _____

Operator: _____ Azimuth: _____

$K = \frac{AM \cdot AN}{MN}\pi$ $\qquad \rho_a = K\frac{\Delta V}{I}$

Marks	AB/2 in m	MN (.5m)	MN (1m)	MN (2m)	MN (5m)	ΔV in millivolts (mV)	I in milliamperes (mA)	ρ_a in ohm-m (Ωm)
1	1	2.35						
2	2	11.8						
3	3	27.5						
4	4	49.5						
5	5	77.7						
6	6	112						
7	8	200						
8	10	313						
9	15	705	621.8					
10	20	1250	110					
11	25	1960	180					
12	30	2820	275					
13	35	3840	377					
14	40	5020	495					
15	45	7850	780					
16	60	11300	1120					
17	70	15400	1530					
18	80	20100	2000	588				
19	100	31400	3130	675				
20	125		4900	770				
21	150		7050	1130				
22	175		9600	1560				
23	200		12500	2040				
24	250		19600	3130				
25	300		28200	4660				
26	350			6360	1700			
27	400			8100	1960			
28	450			10500	2800			
29	500			13000	3760			

Rubbish in = rubbish out (RIRO)

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2. Data Capture – Office Work

MS Excel

MS Access

3. Data Cleansing Examples

1. All number fields as numbers, not text.
2. Date fields in YYYY-MM-DD.
3. ‘Name’ as ‘Name’, not ‘NAME’ or ‘name’.

Source: http://www.japantrendshop.com/rc-sugoi-mop-p-1725.html

The Remote Control Sugoi Mop

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4. Example Data Validation Questions:

1. Are the coordinates within the project area?
2. Are there any duplicates in the data?

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14.09.10 : Database- F:\1_Afghanistan_NORPLAN\Maps\0 Database\Faryab_Wells_2014.09.10.accdb (Access 2007 - 2016 file format) - Access

ase Tools Acrobat Tell me what you want to do...

Selection Advanced Toggle Filter Filter

Refresh All New Save Delete Totals Spelling More Records

Find Replace Go To Select Find

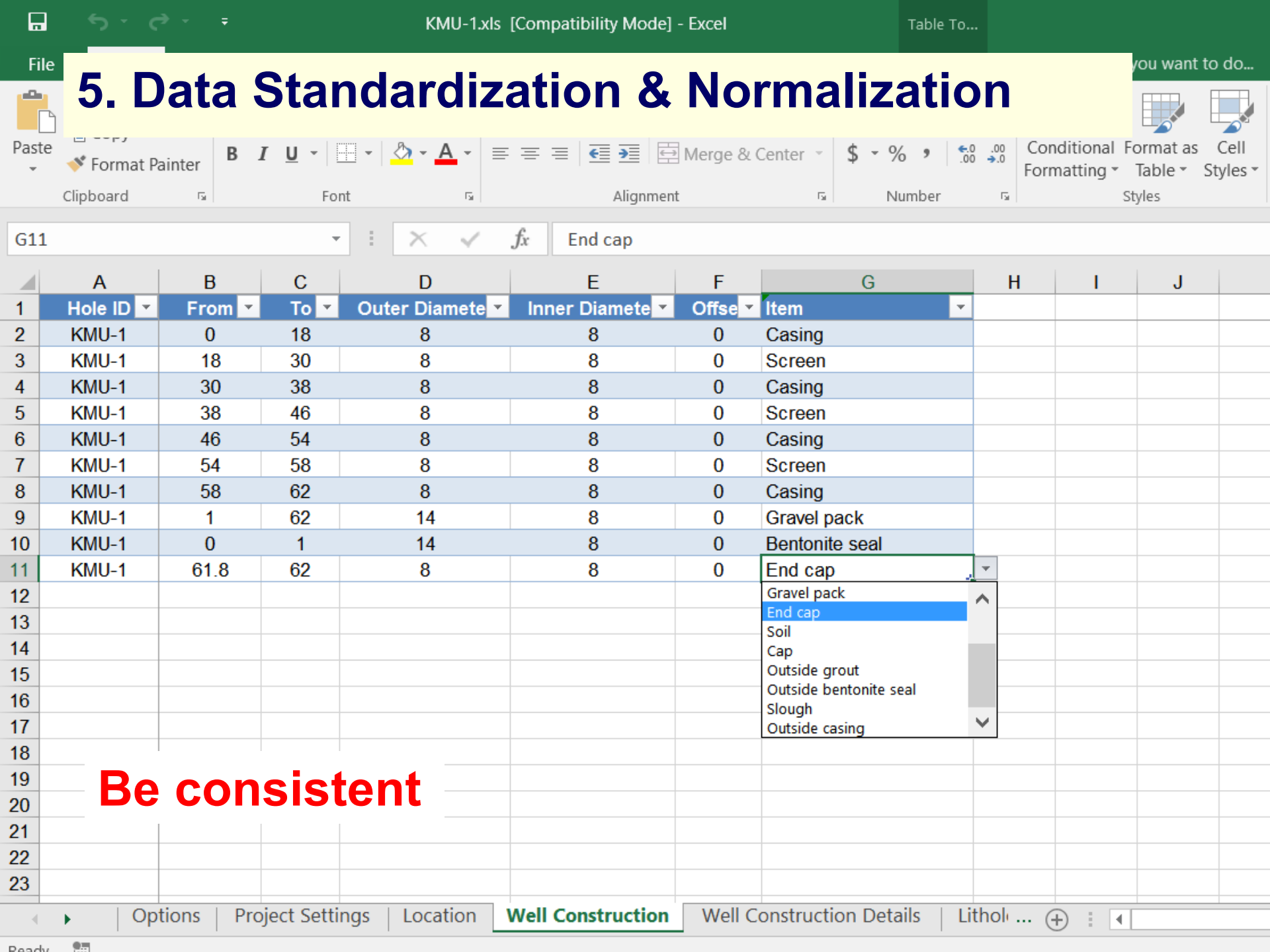
Calibri 11 Text Formatting

zQC Find duplicates for qry 1 Location All

Longitude	Latitude	Water Point ID	Type	Name of feature
63.69164	35.71965	2765	Drilled borehole	Sharshari 2 tubewell
63.69164	35.71965	2766	Drilled borehole	Sharshari 2 tubewell
63.71368	35.76610	886	Dug well	Shar shar (M.Wali)
63.71368	35.76610	916	Dug well	Qalai Wali (1)
64.01599	35.74127	2499	Drilled borehole	Hazar Qala Afghani
64.01599	35.74127	2504	Drilled borehole	Hazar Qala Afghani
64.05947	35.73123	2408	Drilled borehole	Hazara Qala (1)
64.05947	35.73123	2405	Drilled borehole	Hazara Qala (1)
64.65207	36.04302	2320	Drilled borehole	Ag Masjid
64.65207	36.04302	2321	Drilled borehole	Qarg Egale
64.65382	36.05911	522	Dug well	Shah Nazar dug well
64.65382	36.05911	670	Dug well	Qanjegholi dug well
64.66553	36.04999	4185	Dug well	Koh-e Sayad
64.66553	36.04999	4210	Dug well	Qanjegh Ali
64.78000	35.92000	4439	Drilled borehole	Shar Wali (Maimana District): grid reference approximate
64.78000	35.92000	4440	Drilled borehole	Ghund 35 (Maimana District): grid reference approximate
64.78000	35.92000	4438	Drilled borehole	Toshkur Bibi Amina (Maimana District): grid reference approximate
64.86000	36.23000	4442	Drilled borehole	Shirin Tagab Health Centre: grid reference approximate
64.86000	36.23000	4558	Drilled borehole	Shirin Tagab Markaz (Centre) area: grid reference approximate
64.86330	36.24595	2706	Drilled borehole	Tapa Qala
64.86330	36.24595	2712	Drilled borehole	Tash Qala
64.86466	36.26104	2606	Drilled borehole	Kuh-e Sayyad
64.86466	36.26104	2605	Drilled borehole	Kuh-e Sayyad

Record: 1 of 36 No Filter Search

5. Data Standardization & Normalization

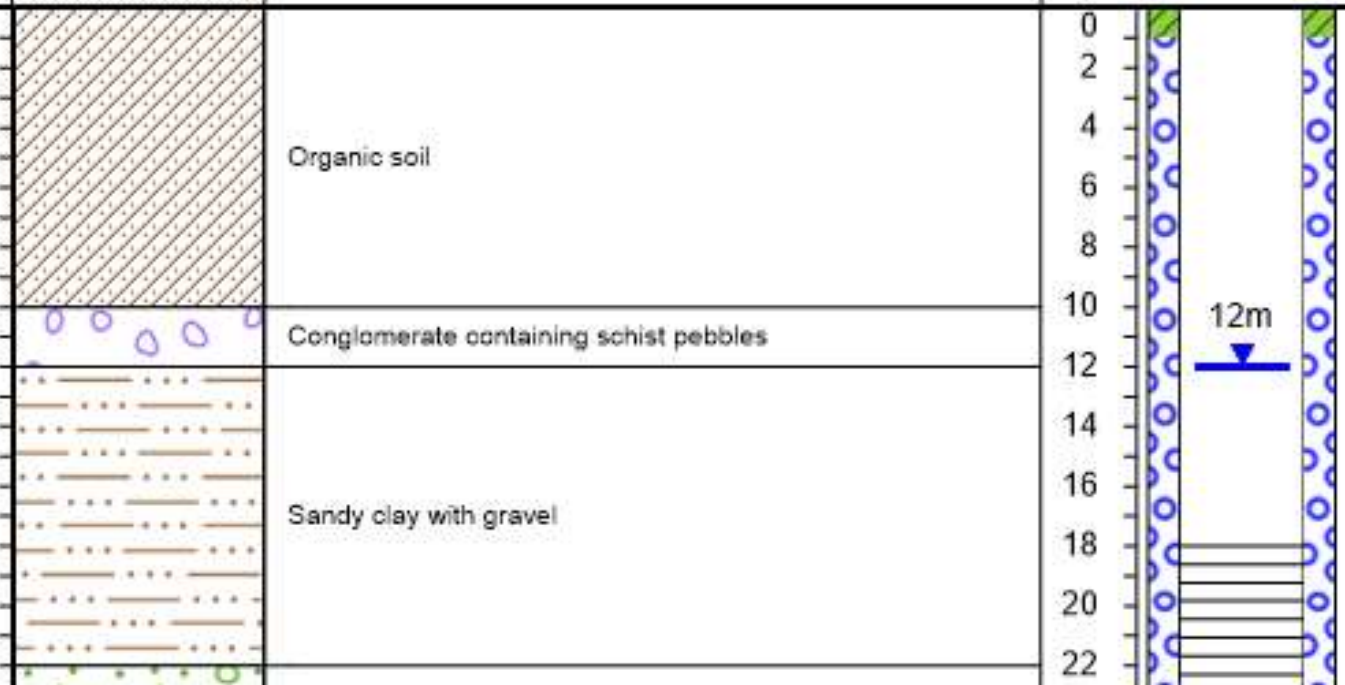


Hole ID	From	To	Outer Diamete	Inner Diamete	Offse	Item
KMU-1	0	18	8	8	0	Casing
KMU-1	18	30	8	8	0	Screen
KMU-1	30	38	8	8	0	Casing
KMU-1	38	46	8	8	0	Screen
KMU-1	46	54	8	8	0	Casing
KMU-1	54	58	8	8	0	Screen
KMU-1	58	62	8	8	0	Casing
KMU-1	1	62	14	8	0	Gravel pack
KMU-1	0	1	14	8	0	Bentonite seal
KMU-1	61.8	62	8	8	0	End cap

Be consistent

	PROJECT: **Kabul Medical University Well**	BOREHOLE ID: **KMU-1**	
	LOCATION: **PD3**	WELL ID: **KMU-1**	
	DRILLING CONTRACTOR: **MRRD**	NORTHING: **34 30' 58.8"**	EASTING: **69 07' 54.9"**
	DRILLING EQUIPMENT: **Chinese Rig**	GROUND SURFACE ELEV.: **1821 m**	TOC ELEVATION: **not measured**
	DRILLING METHOD: **Percussion**	TOTAL DEPTH: **62 m**	DEPTH TO WATER: **12 m**
LOGGED BY: **Eng Poya & Jalil**	SAMPLING METHOD: **Every layer**	DATE STARTED: **05/02/2015**	DATE COMPLETED: **21/02/2015**

Depth (m)	Lithology	Description	Well Construction
0 – 10		Organic soil	0 - 1m: bentonite seal (NOT YET INSTALLED)
10 – 12		Conglomerate containing schist pebbles	12m
12 – 22		Sandy clay with gravel	



6 – Data Migration

MS Access

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

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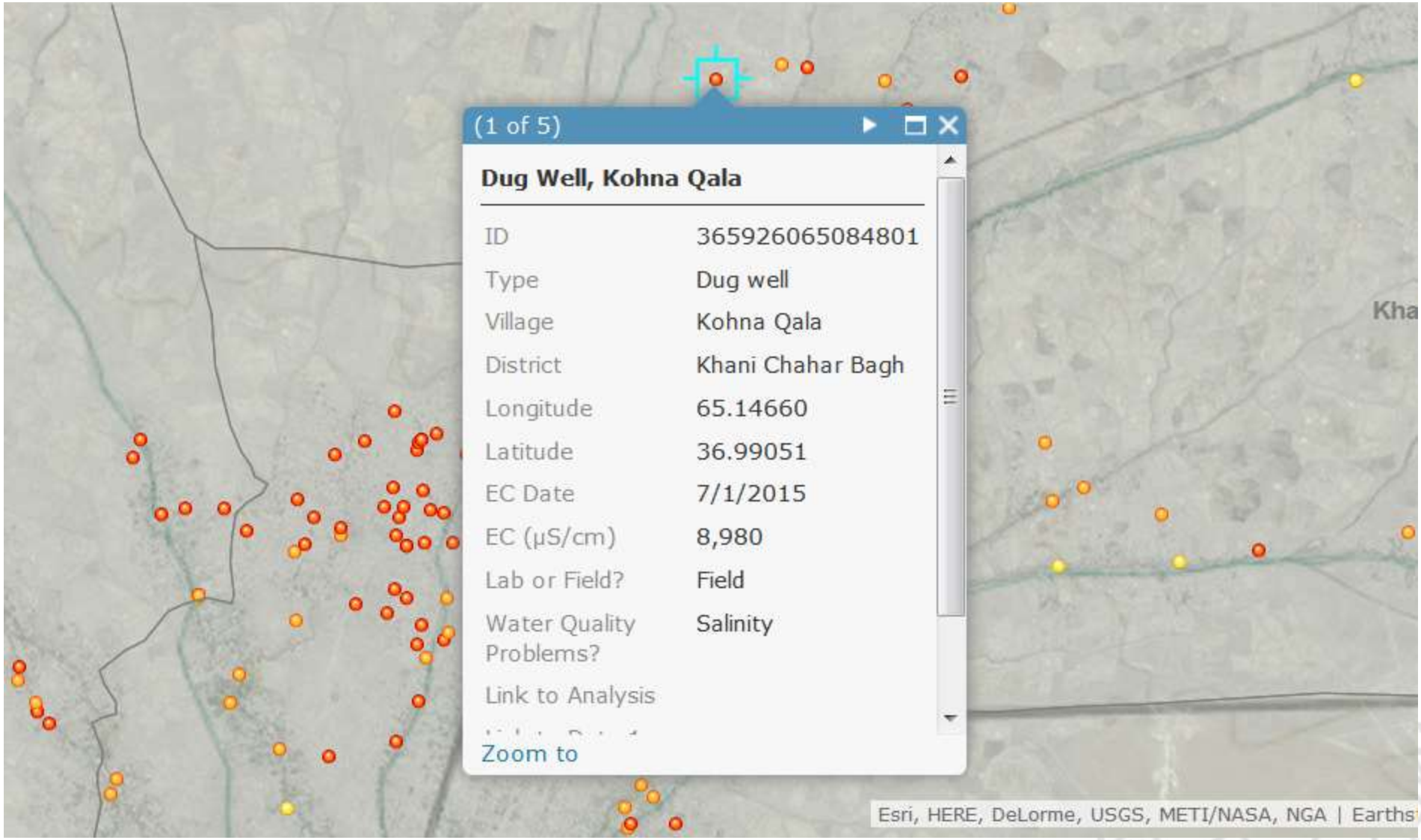
7 – Data Verification Example (Back to the Future)



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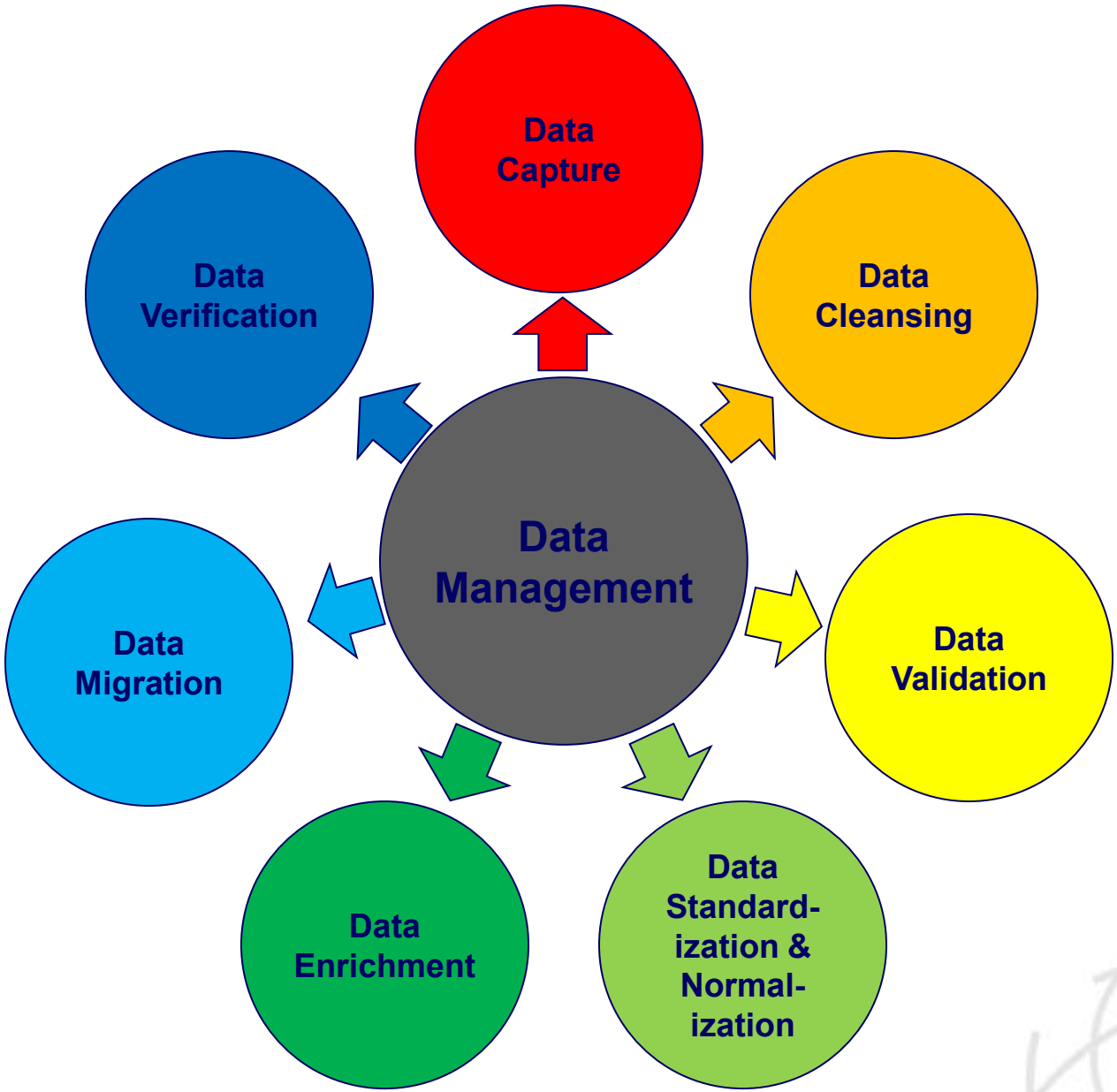
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A picture is worth a thousand words

….but what is the message?

Source: http://layersmagazine.com/photoshop-cs4-a-picture-worth-a-thousand-words.html

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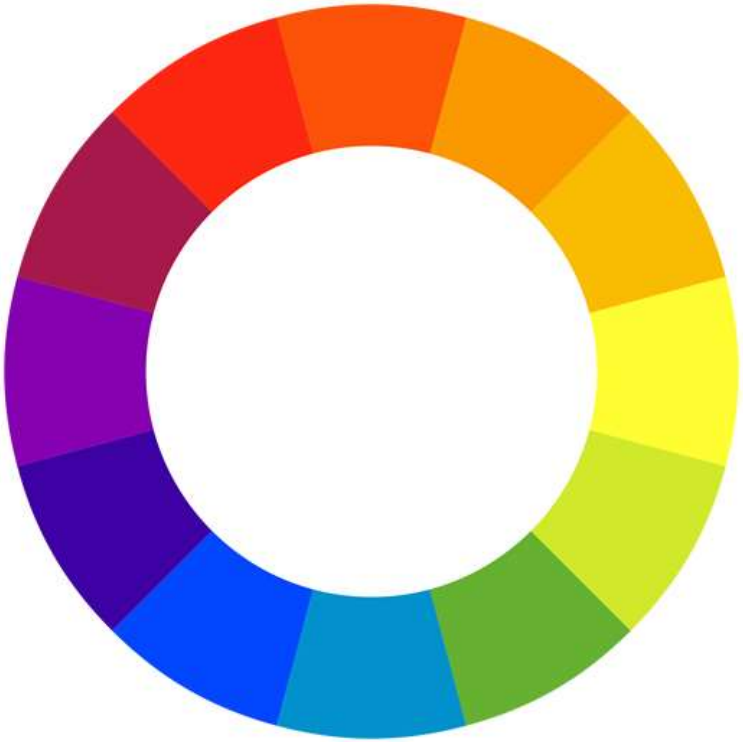
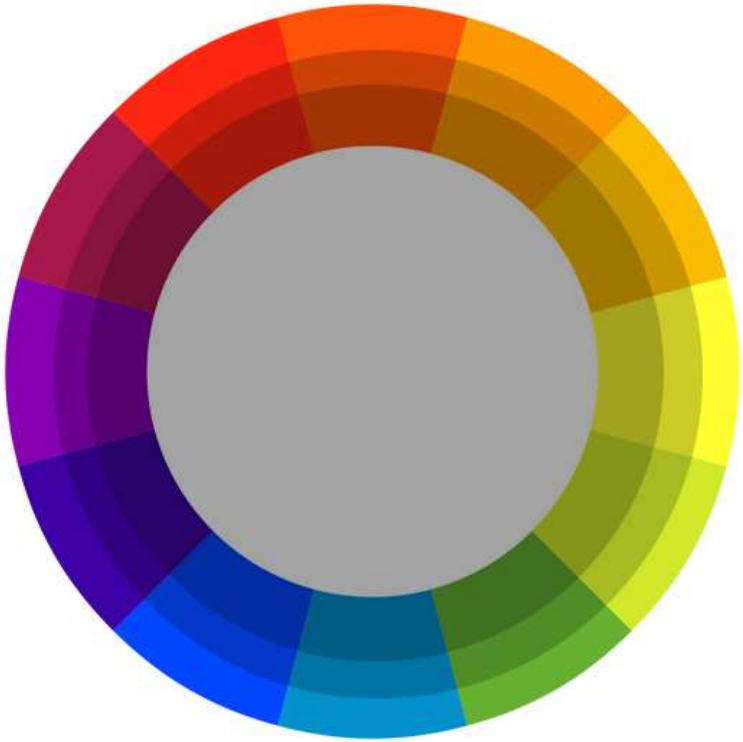
Colour Harmony



The Colour Wheel

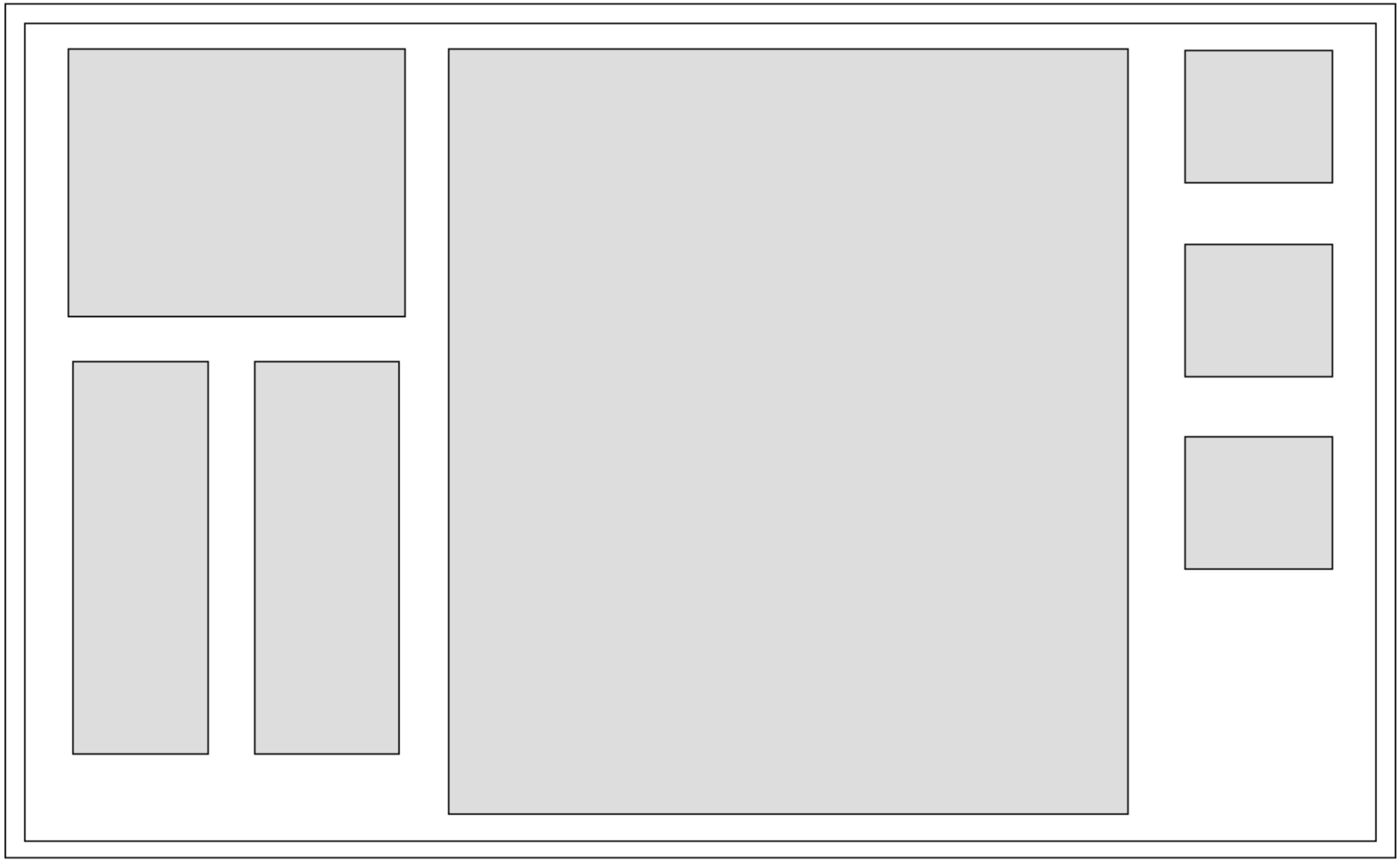


Monochromatic

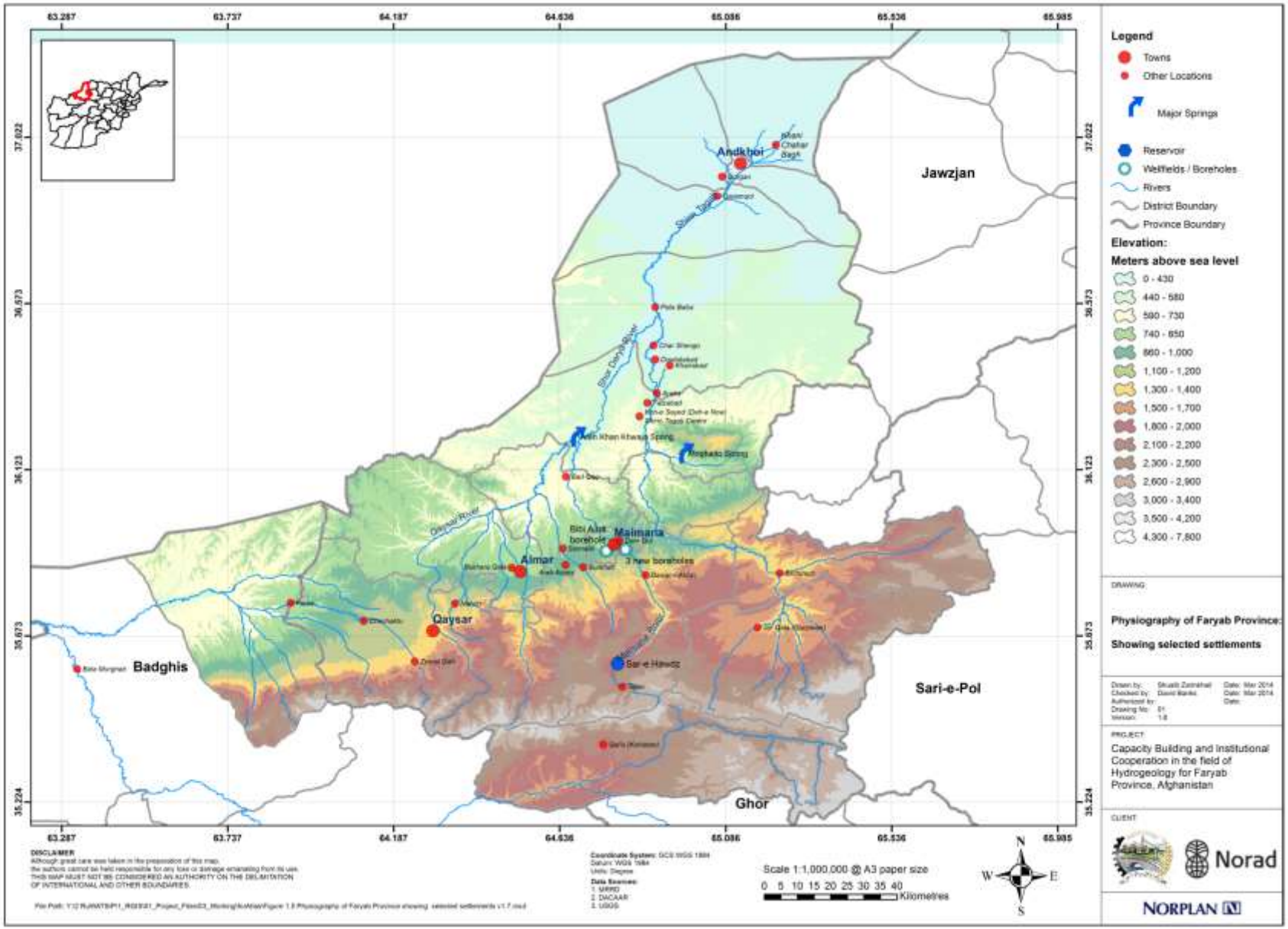
Different shades of a single colour.

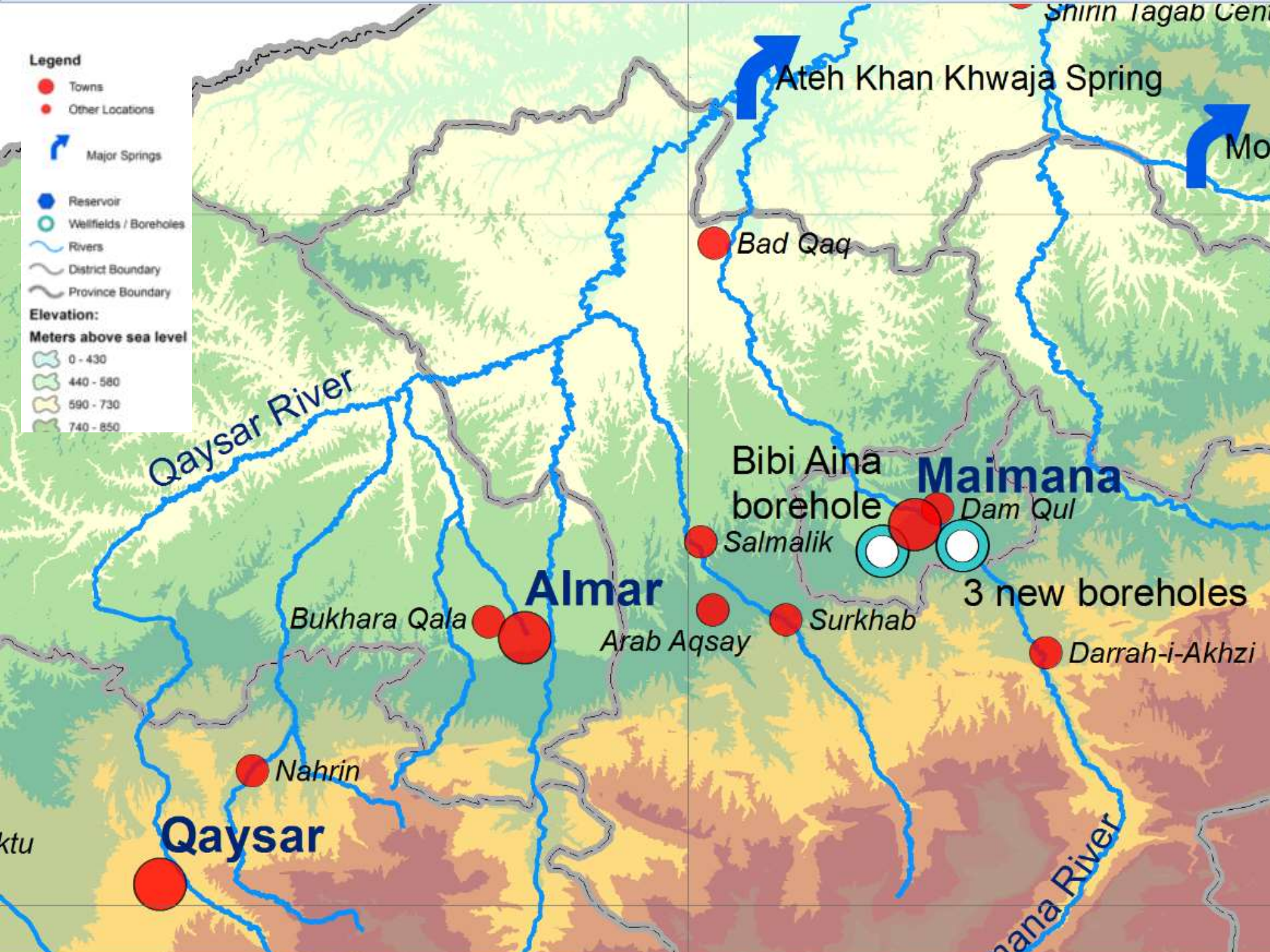
Source: http://www.thewebsqueeze.com/web-design-articles/tip-and-tools-for-creating-a-stunning-colour-scheme.html

Balanced Layout

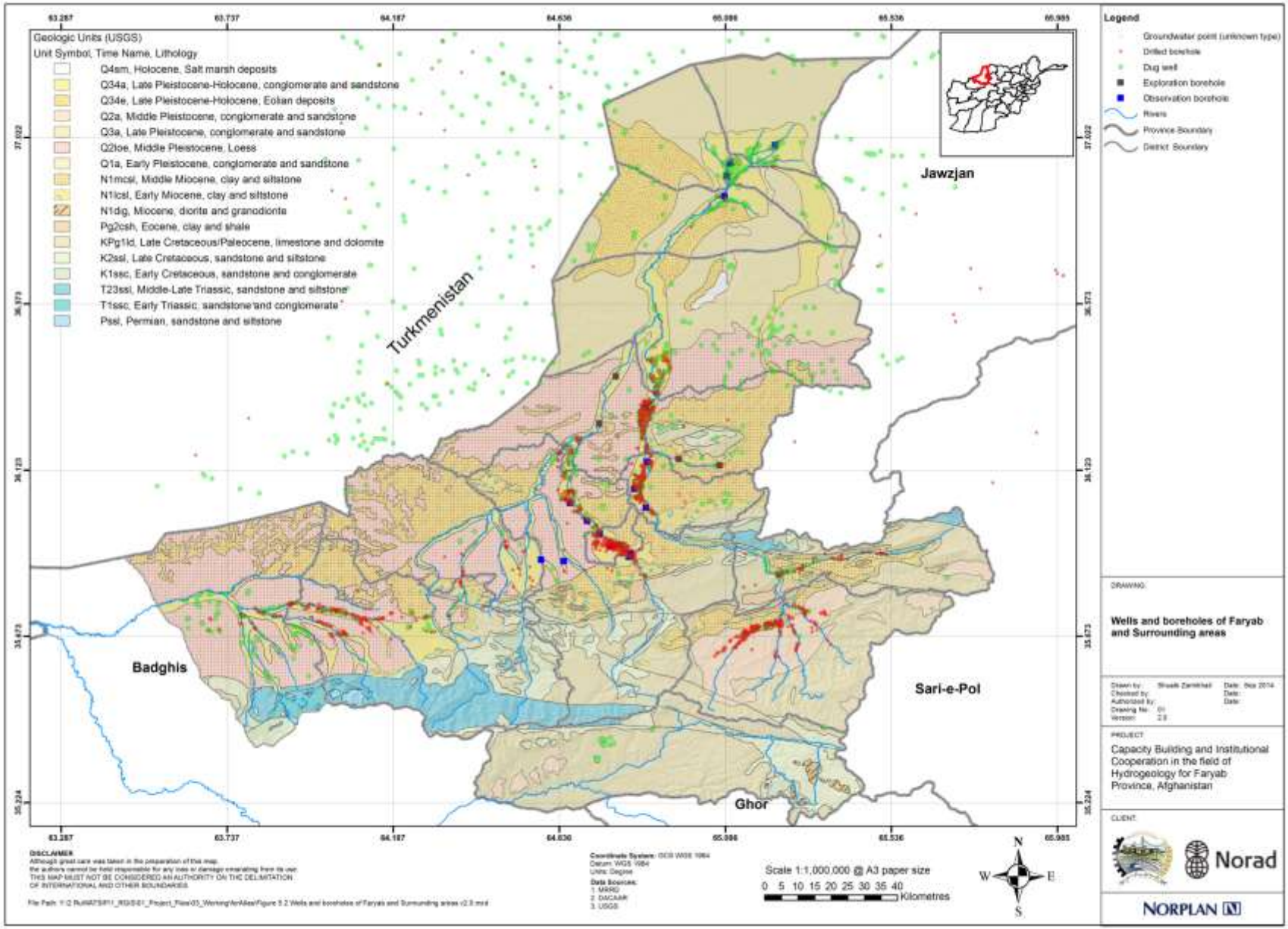


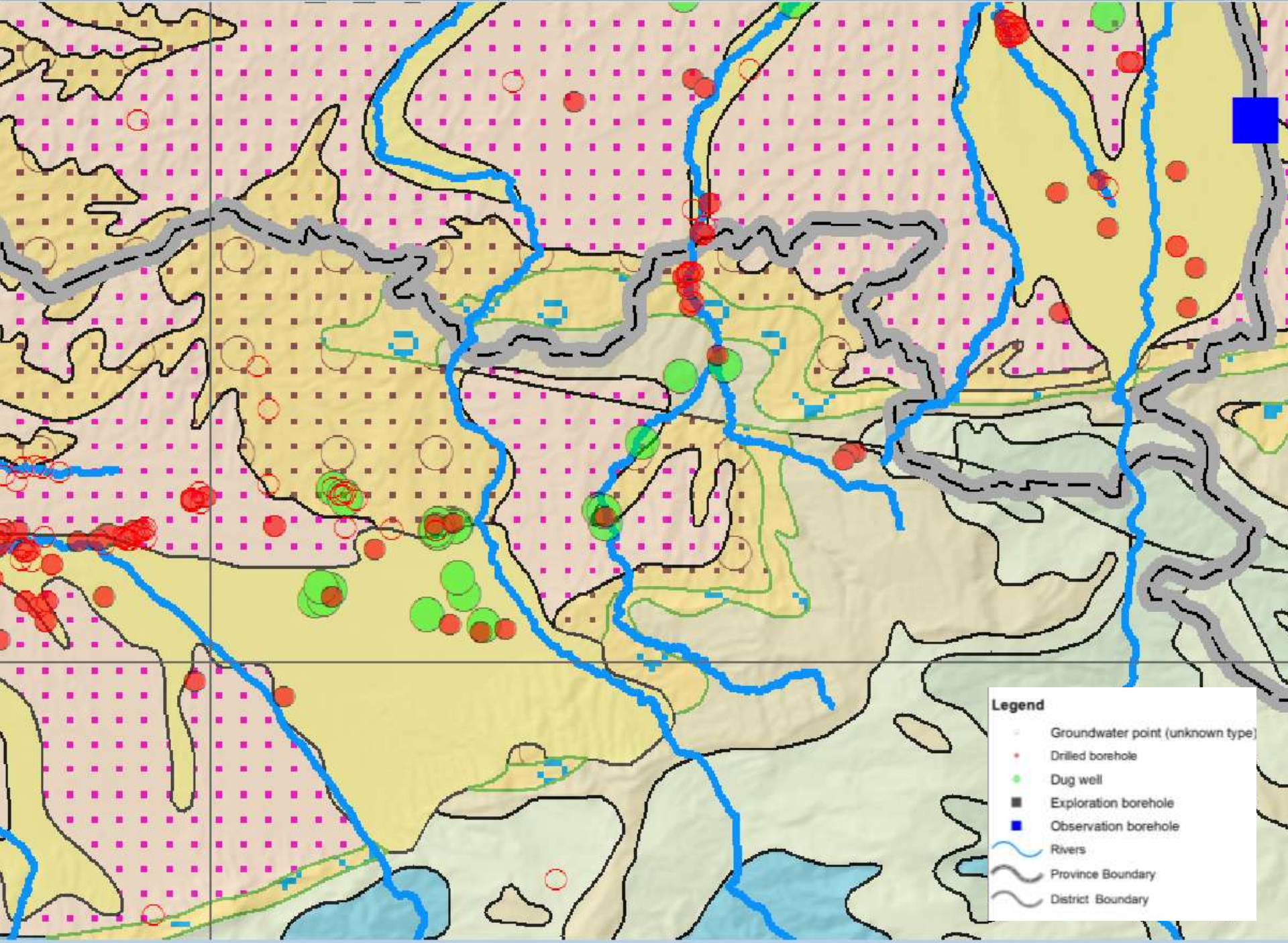
Map 5: Faryab Physiography



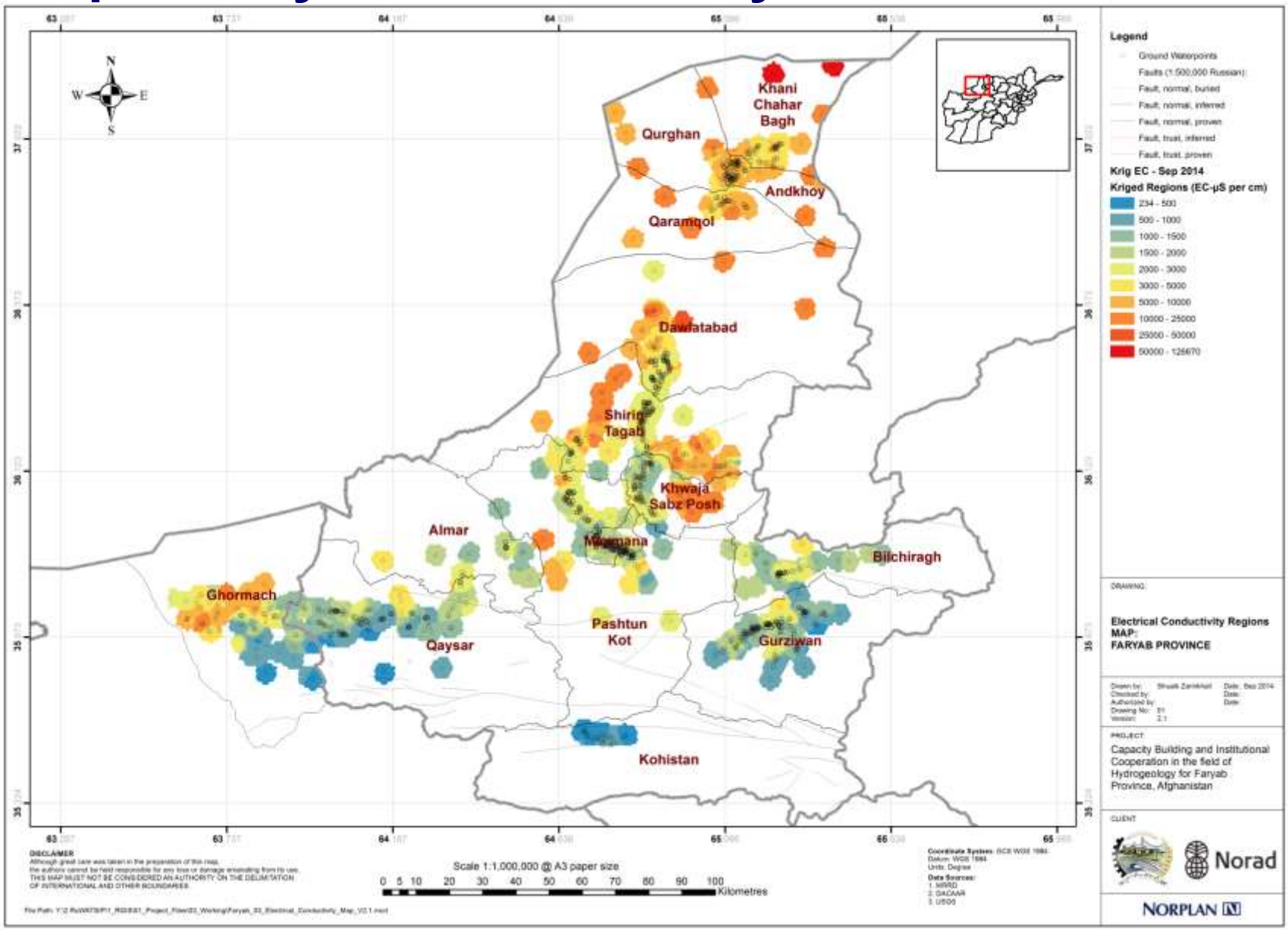

Legend
Towns
Other Locations
Major Springs
Reservoir
Wellfields / Boreholes
Rivers
District Boundary
Province Boundary
Elevation:
Meters above sea level
0 - 430
440 - 580
590 - 730
740 - 850
Ateh Khan Khwaja Spring
Bad Qaq
Qaysar River
Bibi Aina
borehole
Maimana
Dam Qul
Salmalik
Almar
Bukhara Qala
Arab Aqsay
Surkhab
3 new boreholes
Darrah-i-Akhzi
Nahrin
Qaysar

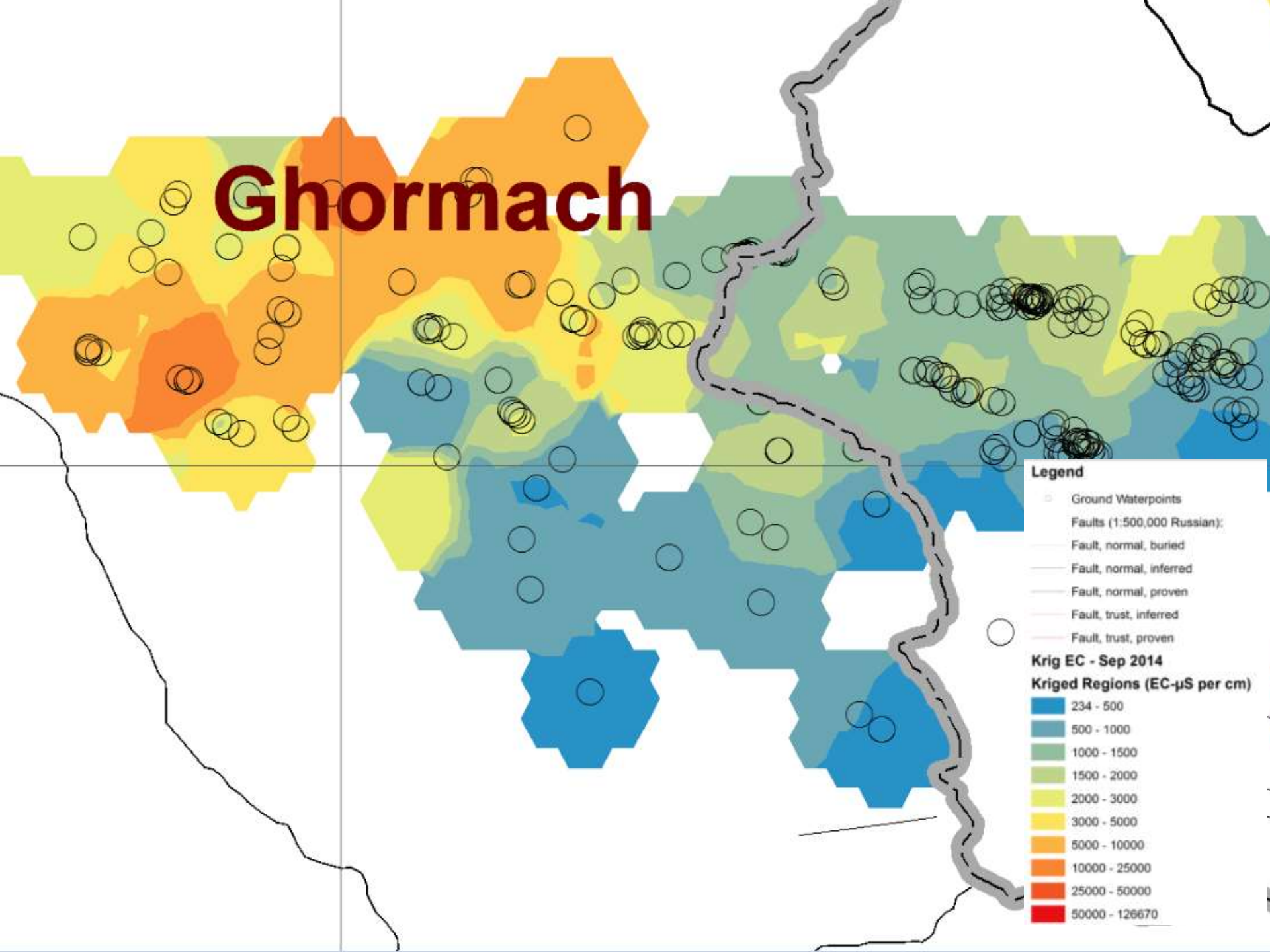
Map 6: Faryab Geology & Water Points




Legend
Groundwater point (unknown type)
Drilled borehole
Dug well
Exploration borehole
Observation borehole
Rivers
Province Boundary
District Boundary

Map 7: Faryab Water Salinity




Ghormach
Legend
Ground Waterpoints
Faults (1:500,000 Russian):
Fault, normal, buried
Fault, normal, inferred
Fault, normal, proven
Fault, trust, inferred
Fault, trust, proven
Krig EC - Sep 2014
Kriged Regions (EC-µS per cm)
234 - 500
500 - 1000
1000 - 1500
1500 - 2000
2000 - 3000
3000 - 5000
5000 - 10000
10000 - 25000
25000 - 50000
50000 - 126670

Data Management, Paper & Online Map Production: Results from Faryab Province

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Online Maps - ArcGIS Online

What you need for ArcGIS Online

Internet (Fast!)

Internet Browser

MS Access

MS Excel

ArcGIS 10.x

	A	B	C	D	E	F	G
1	WPoint_ID	WPCode	Type	WPname	Village	District	Longitude
2	2038	353702065131501	Drilled bor	Dar e Shak	Dar e Shak	Gurziwan	65.22075
3	2056	353705065134801	Drilled bor	Dara e Sha	Dara e Sha	Gurziwan	65.23009
4	2099	353711065032801	Drilled bor	Kaykawos	Kaykawos	Gurziwan	65.05764
5	2055	353712065131502	Drilled bor	Dara e Sha	Dara e Sha	Gurziwan	65.22075
6	2035	353719065131302	Drilled bor	Dara e Sha	Dara e Sha	Gurziwan	65.22025
7	2133	353731065034701	Drilled bor	Kikawas	Kikawas	Gurziwan	65.06296
8	2104	353742065035801	Drilled bor	Perech	Perech	Gurziwan	65.06614
9	2134	353749065041201	Drilled bor	Kikawas	Kikawas	Gurziwan	65.06985

Data with coordinates

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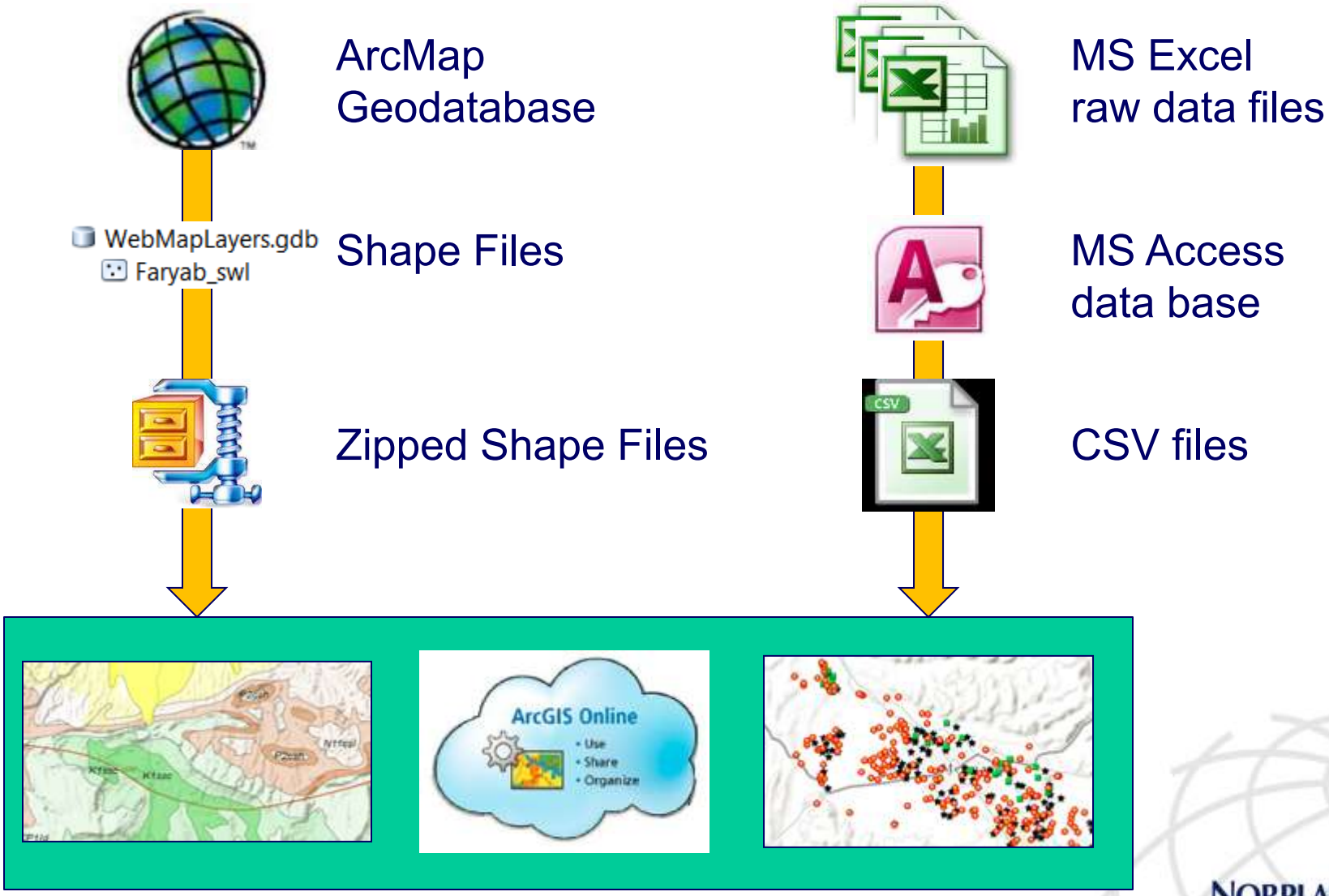
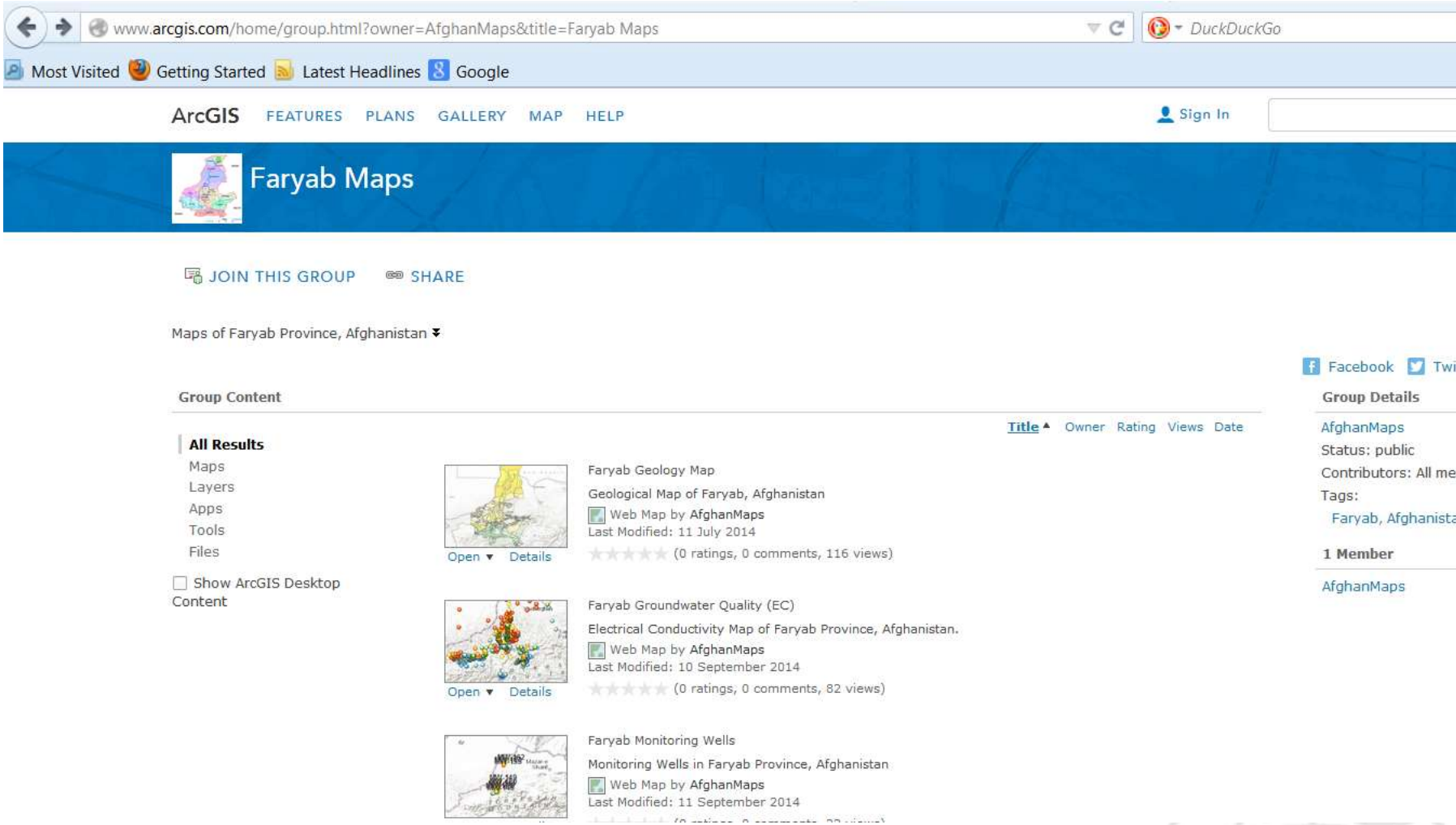
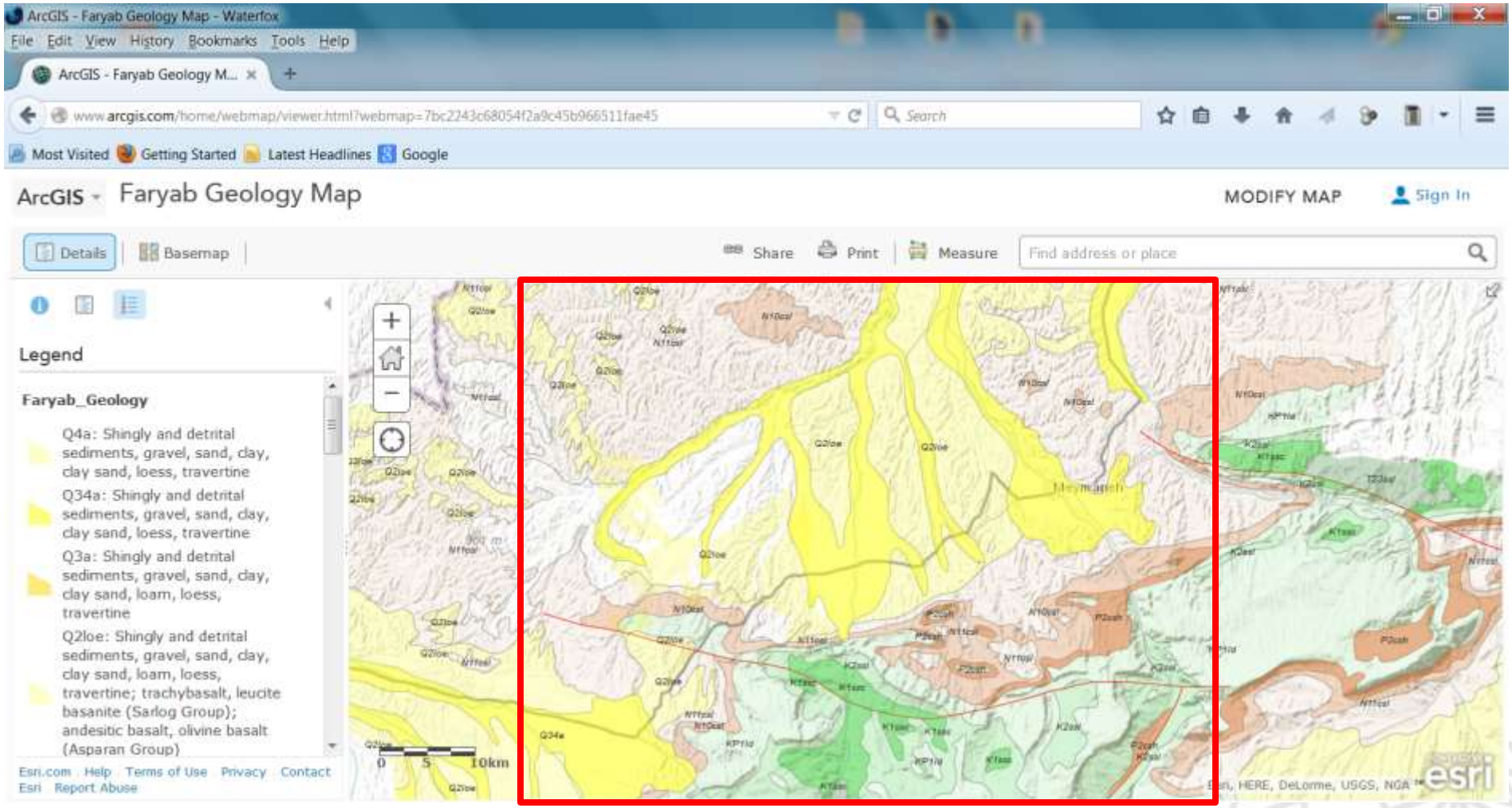
Faryab Maps - Data Flow Paths

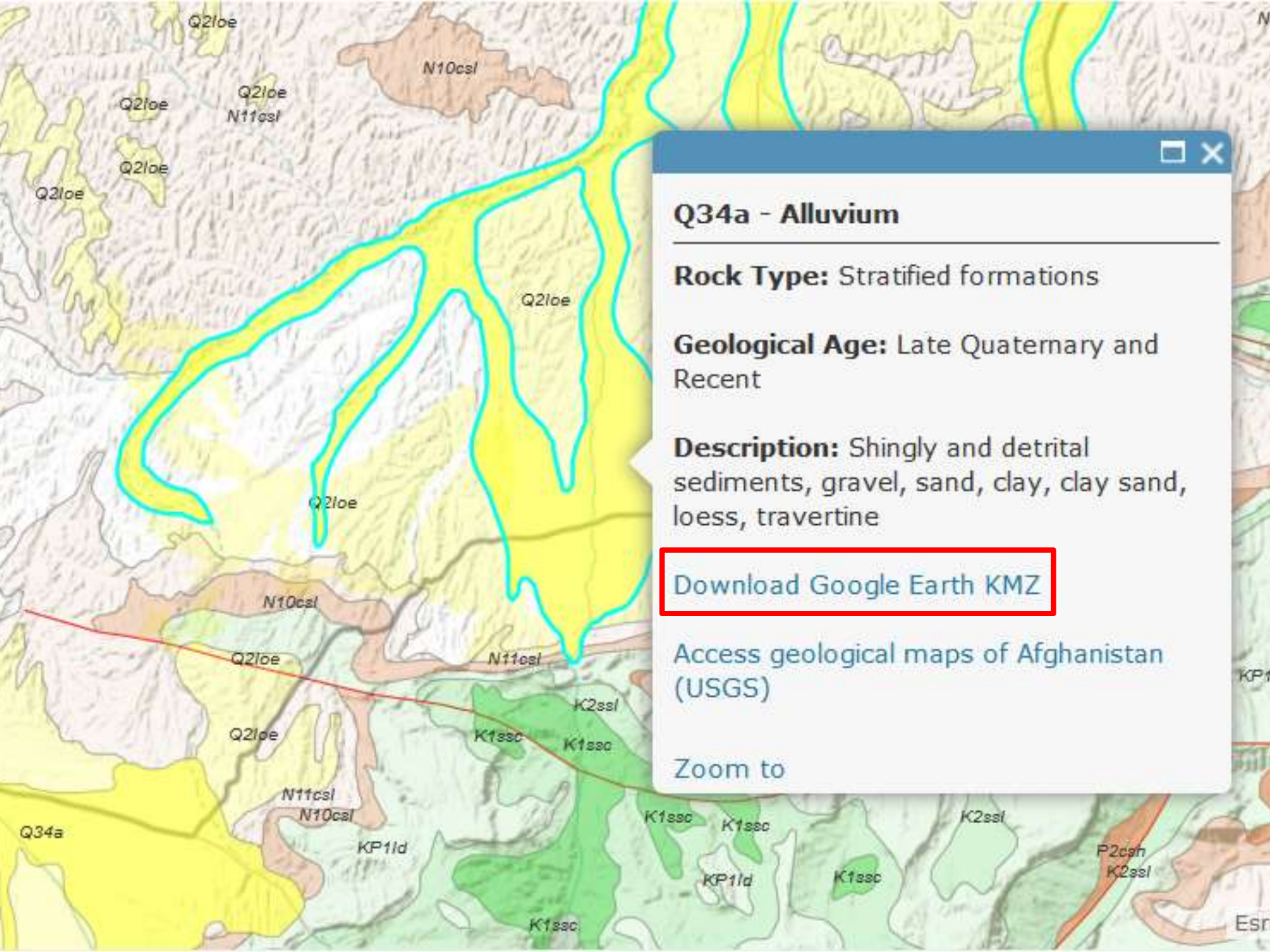


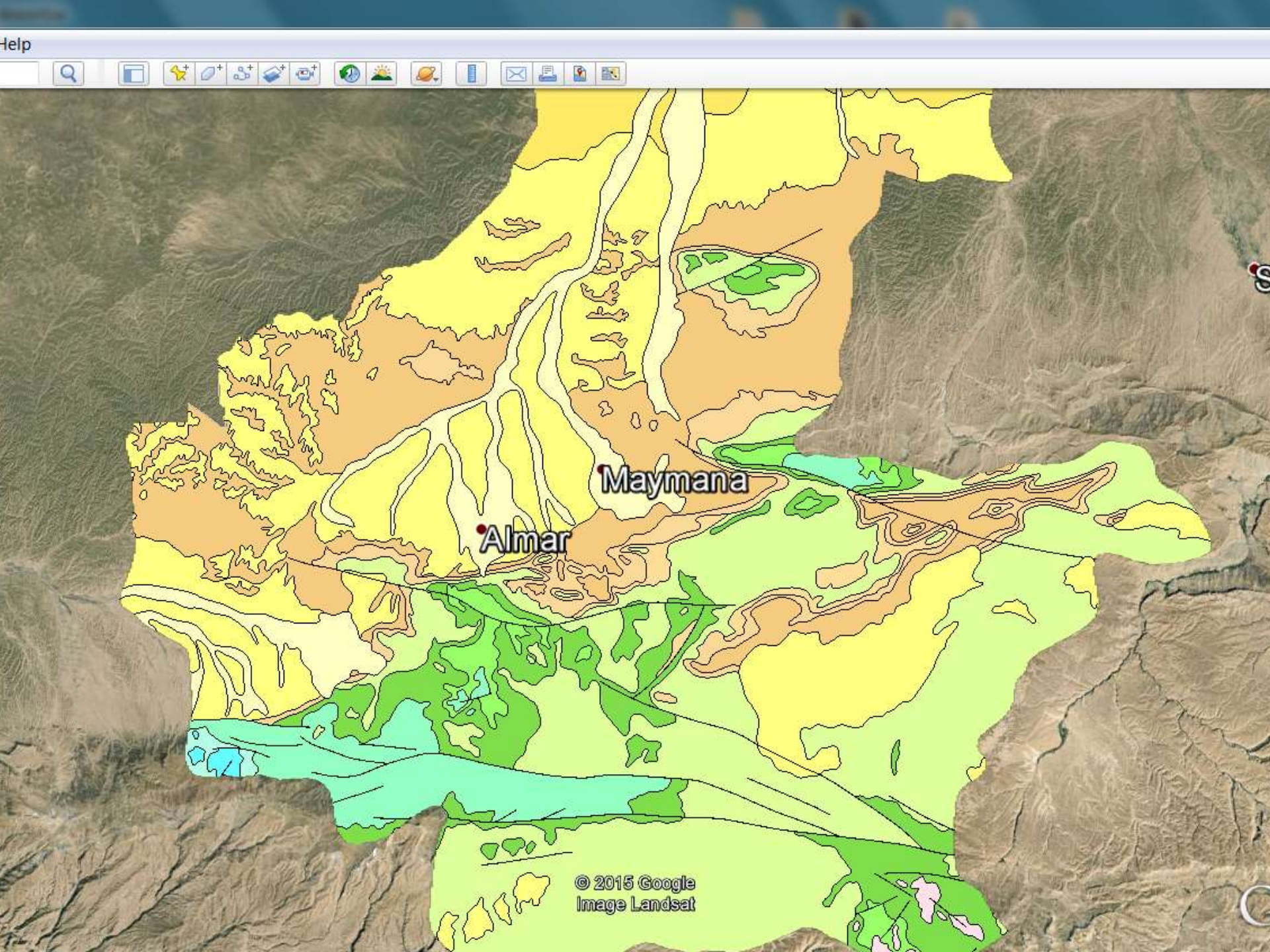
Access ArcGIS Online in your browser



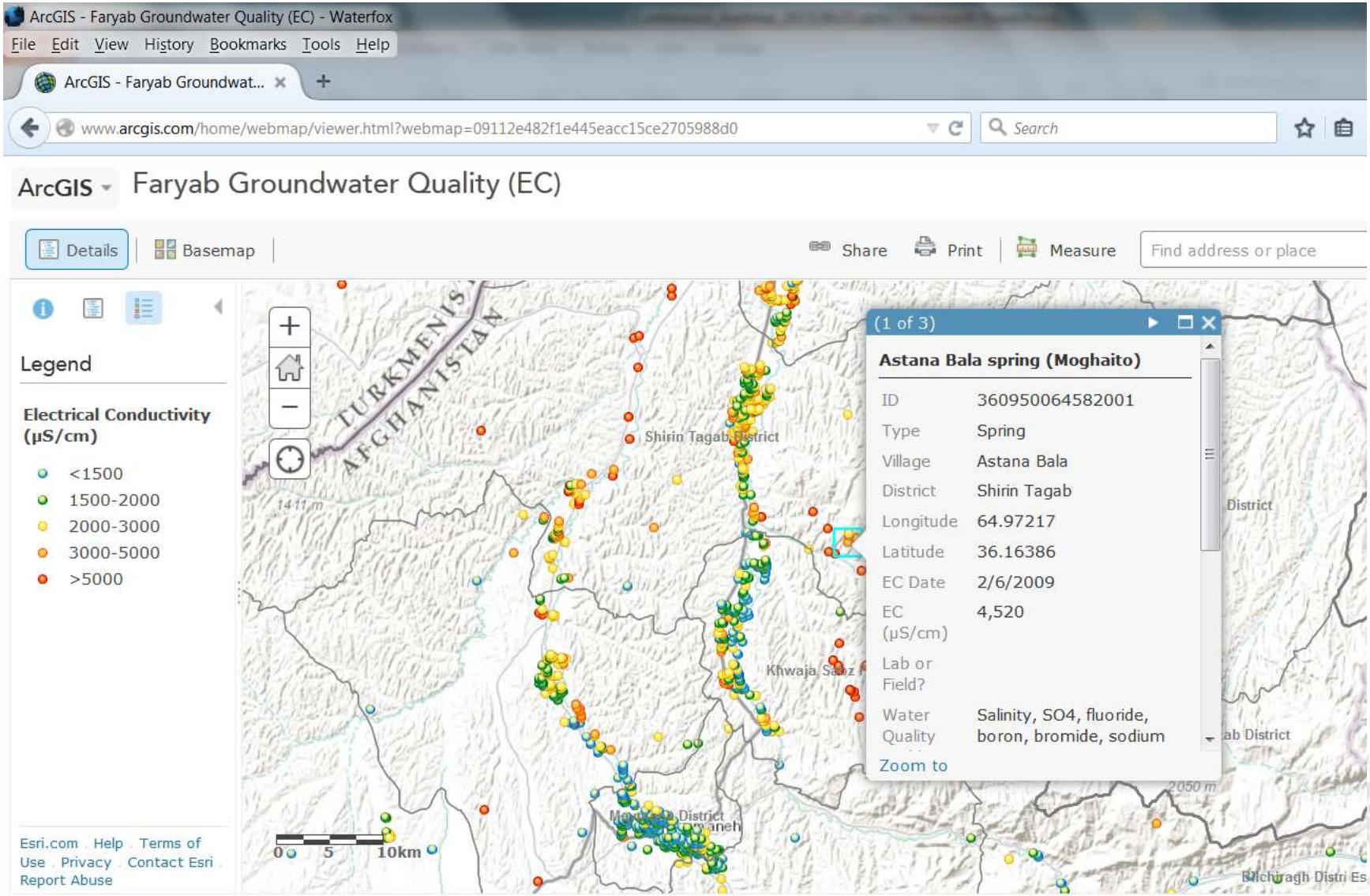
Access ArcGIS Online in your browser




Q2loe
N10csl
Q2loe
N11csl
Q2loe
Q2loe
Q2loe
Q2loe
Q2loe
N10csl
Q2loe
N11csl
K2ssl
K1ssc
K1ssc
Q2loe
N11csl
N10csl
Q34a
KP1ld
K1ssc
K1ssc
K2ssl
P2csh
K2ssl
KP1ld
K1ssc
K1ssc
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


Help
Maymana
Almar
© 2015 Google
Image Landsat

EC map of Faryab



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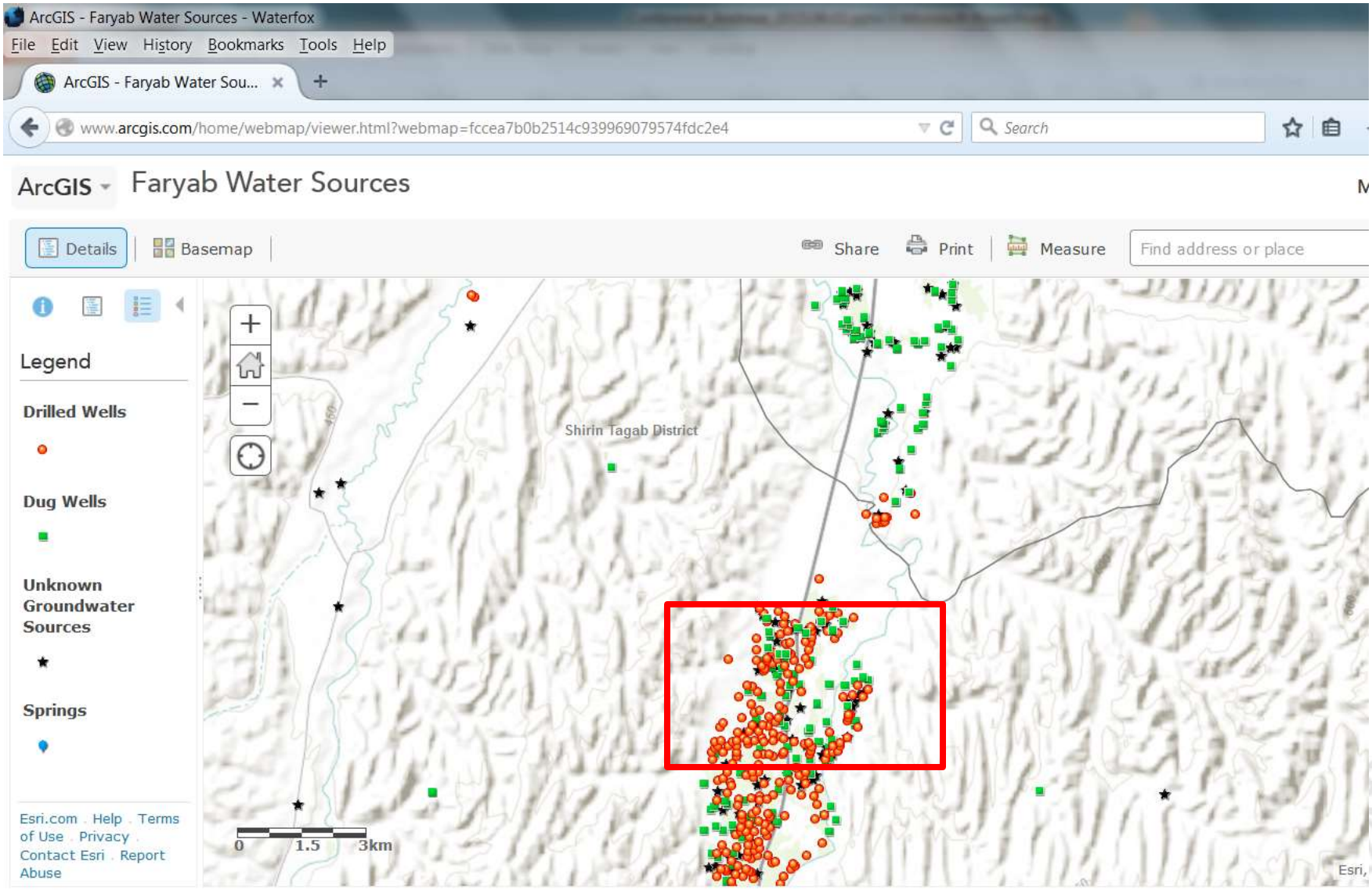
Water sources map of Faryab



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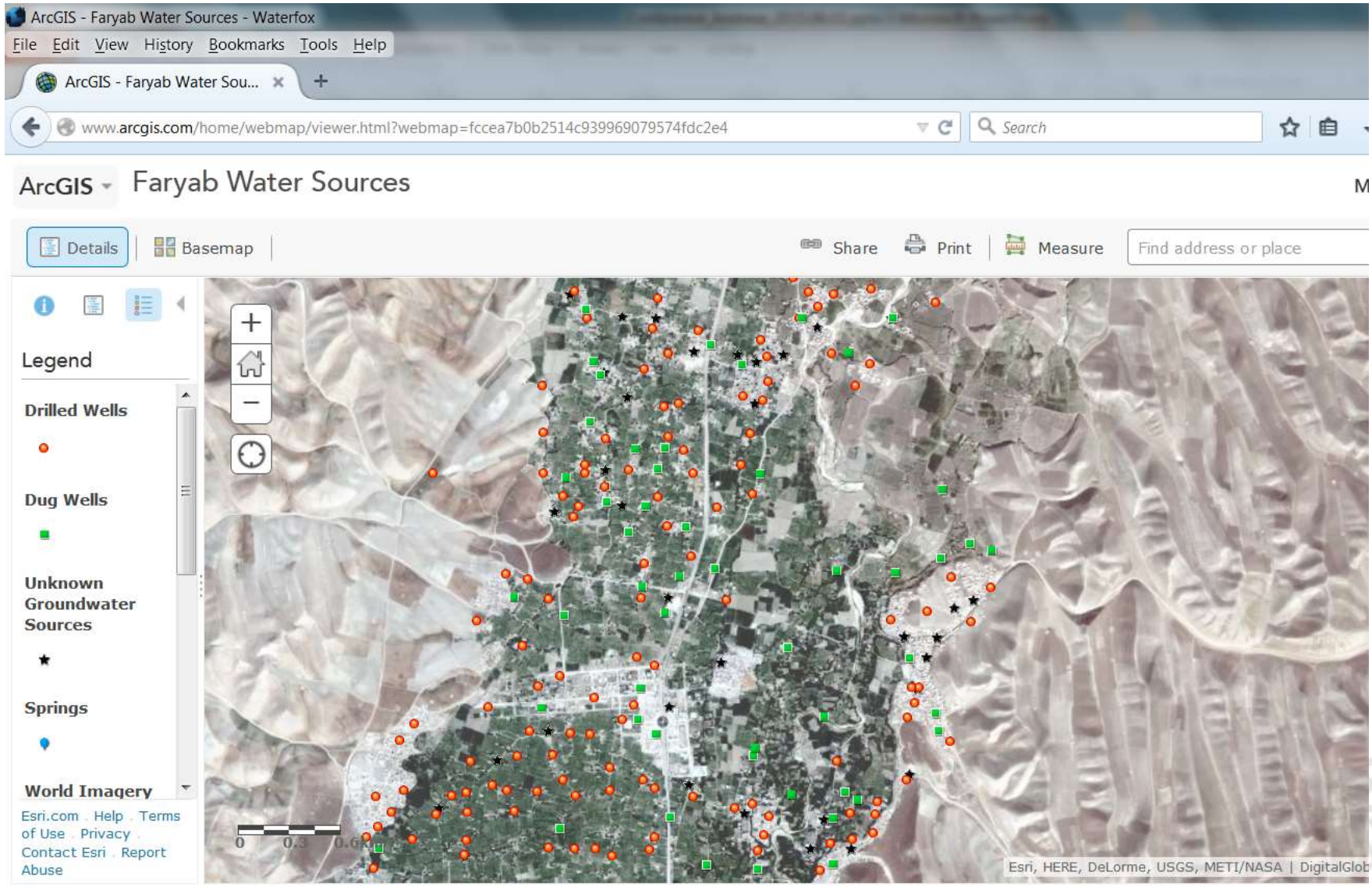
Water sources map of Faryab



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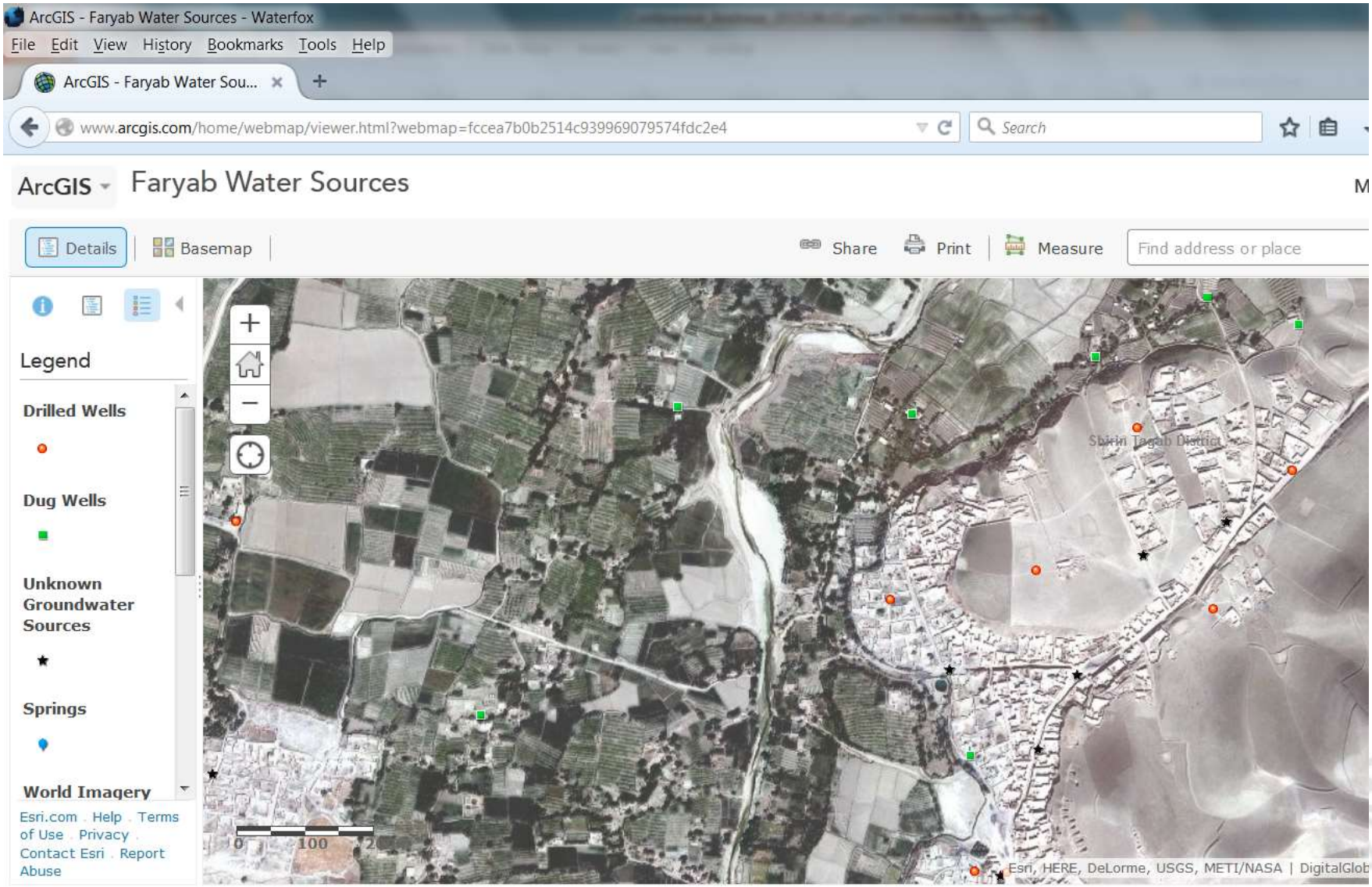
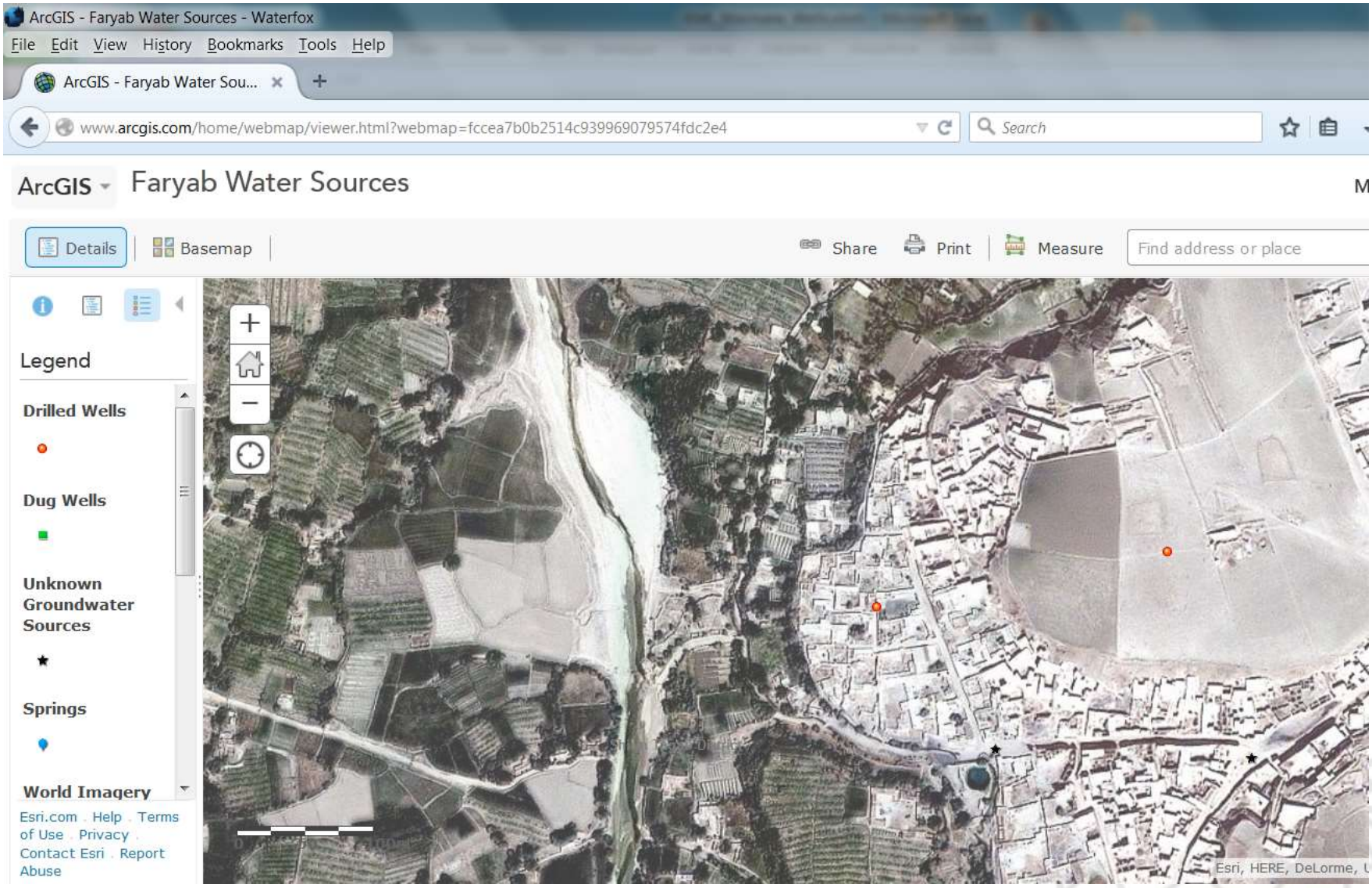
Water sources map of Faryab



Water sources map of Faryab



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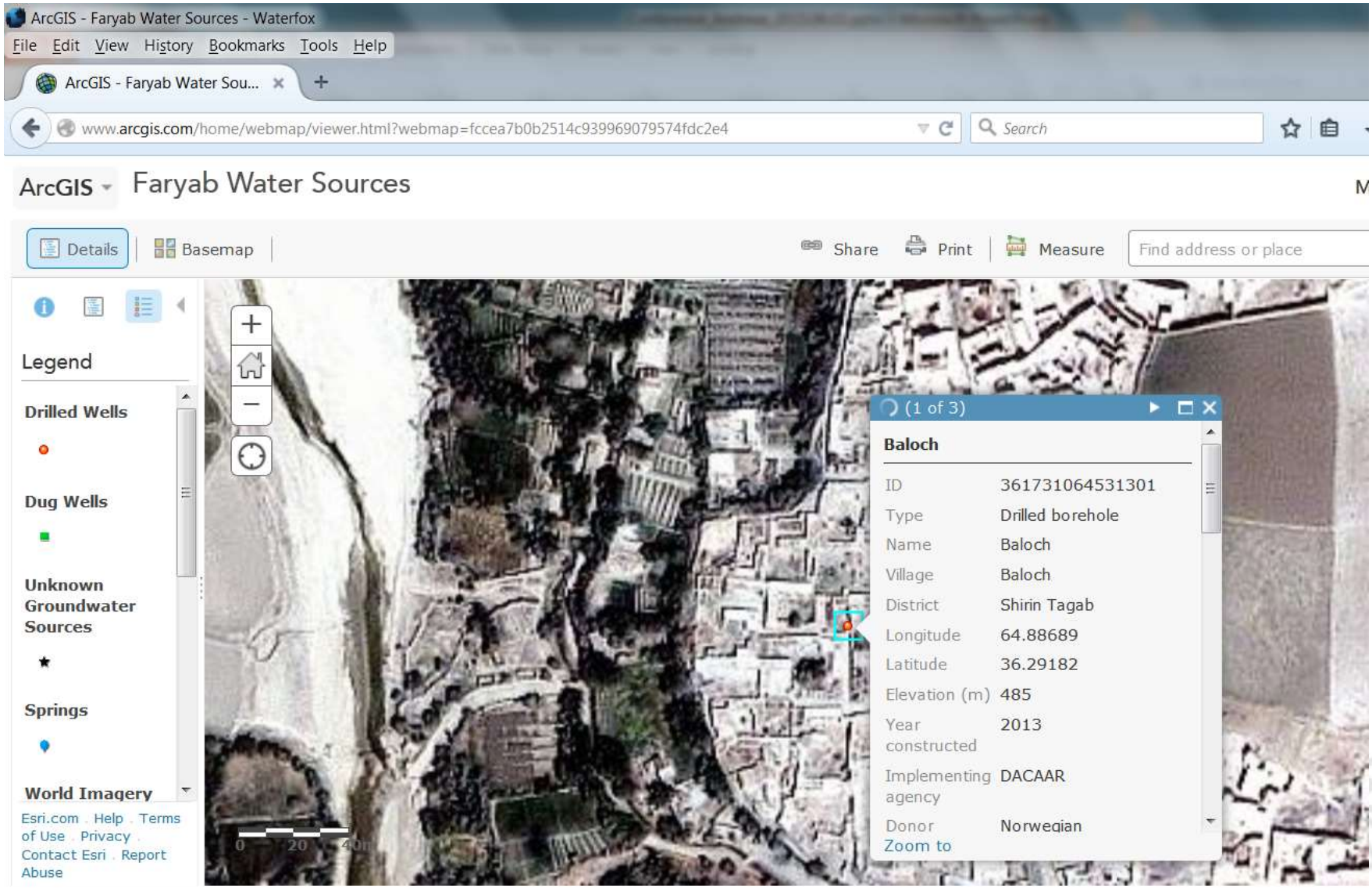
Water sources map of Faryab



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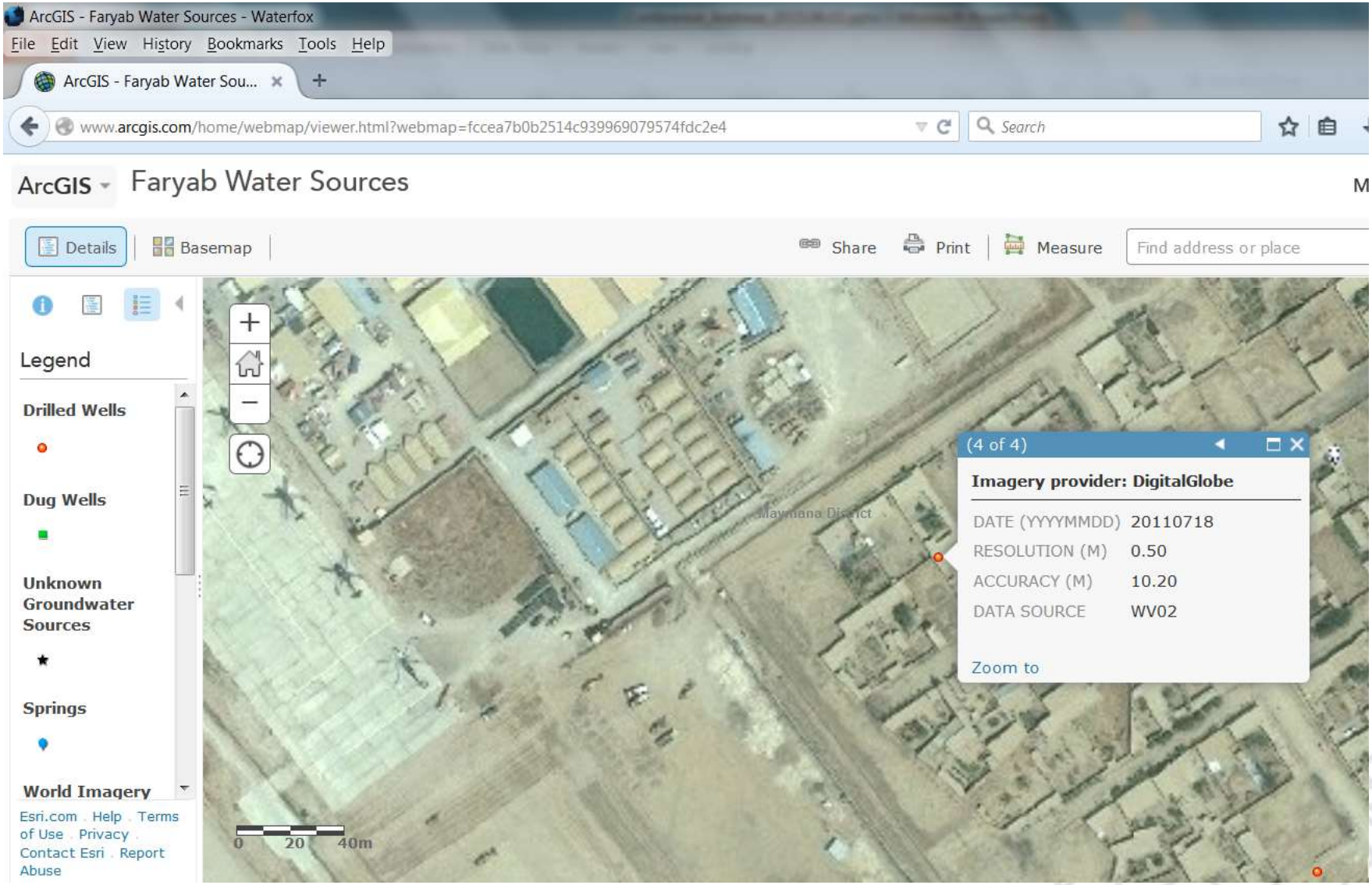
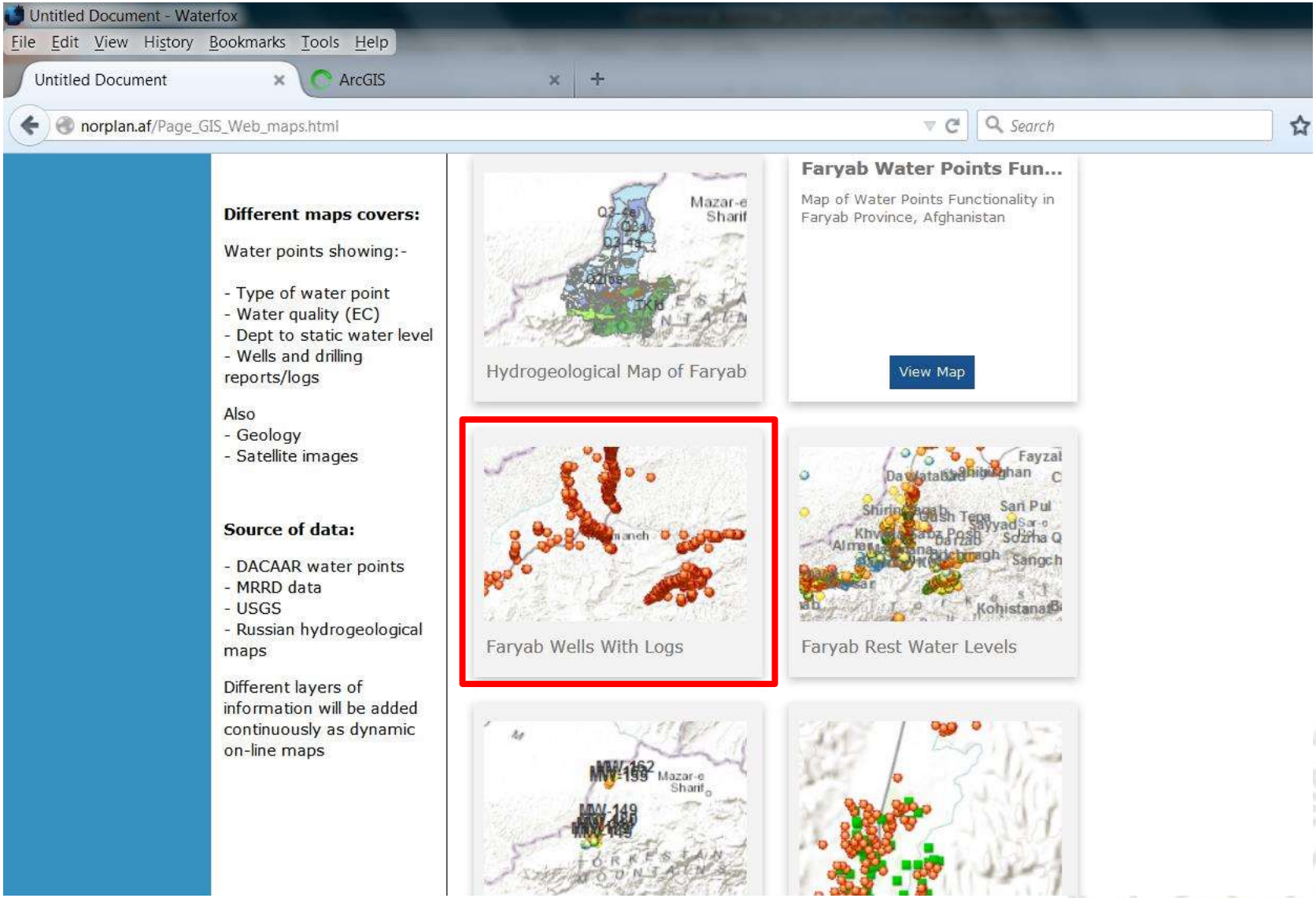
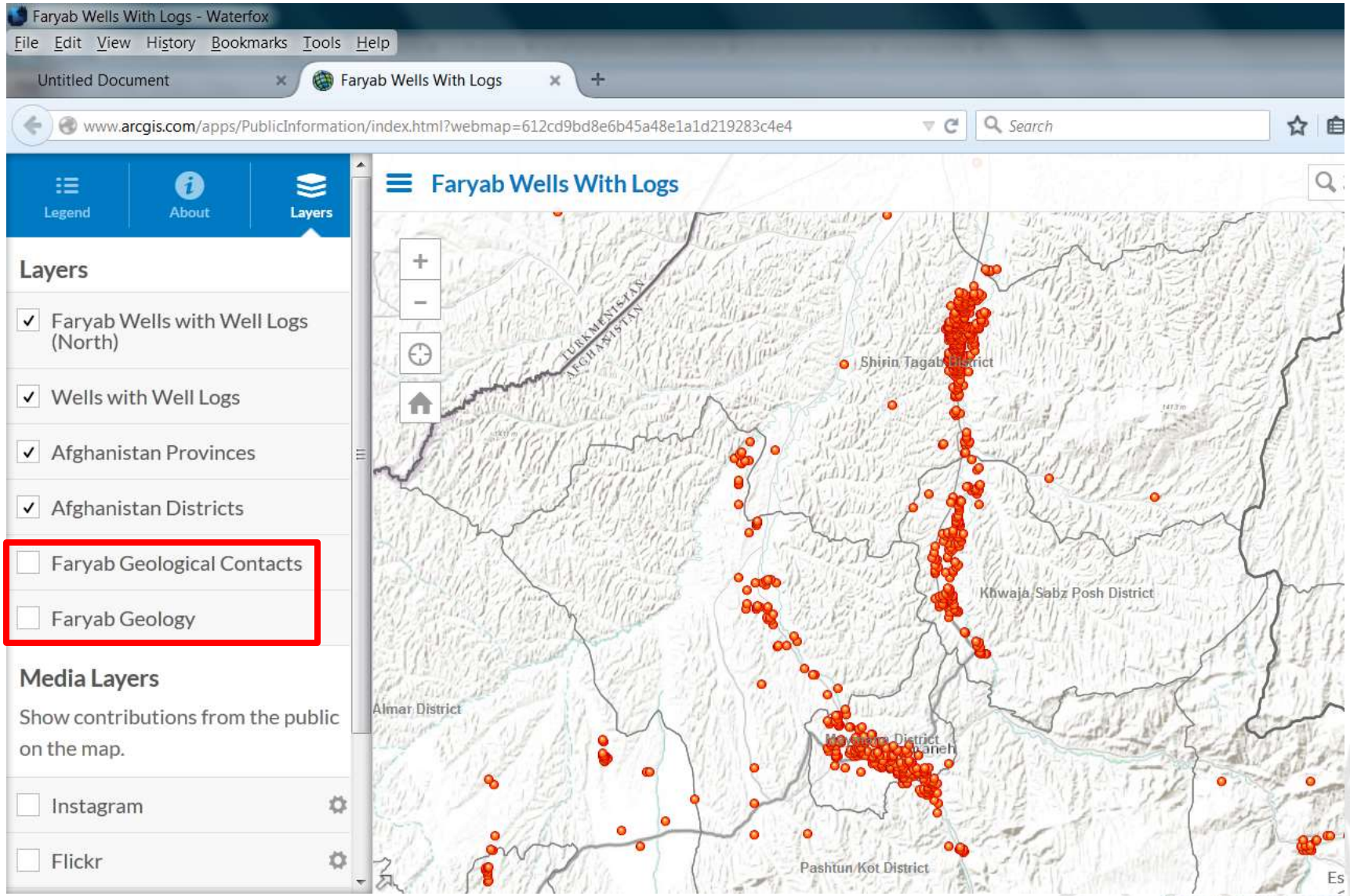
Water sources map of Faryab



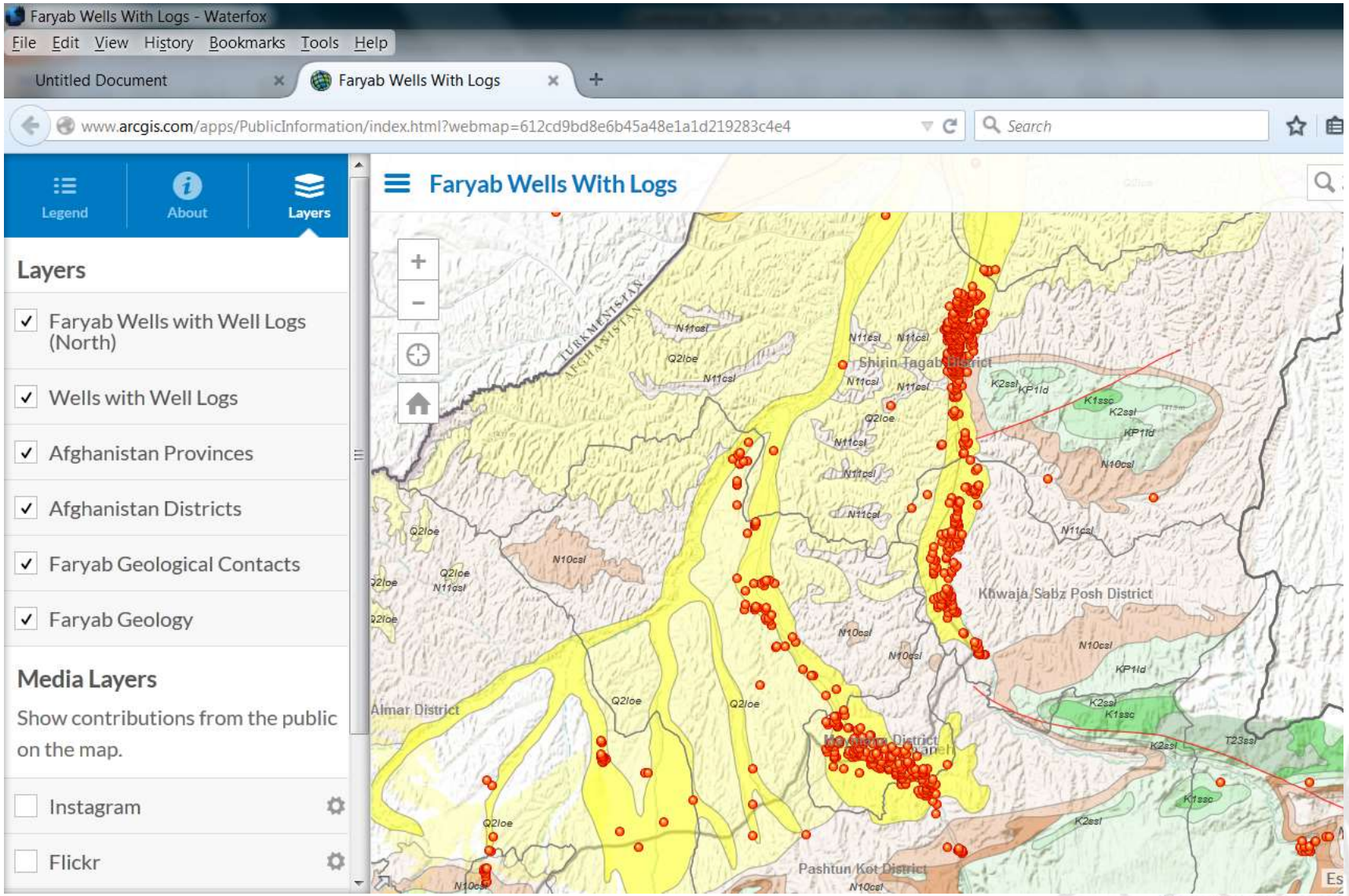
Access ArcGIS Online via a web site



Access ArcGIS Online via a web site



Access ArcGIS Online via a web site



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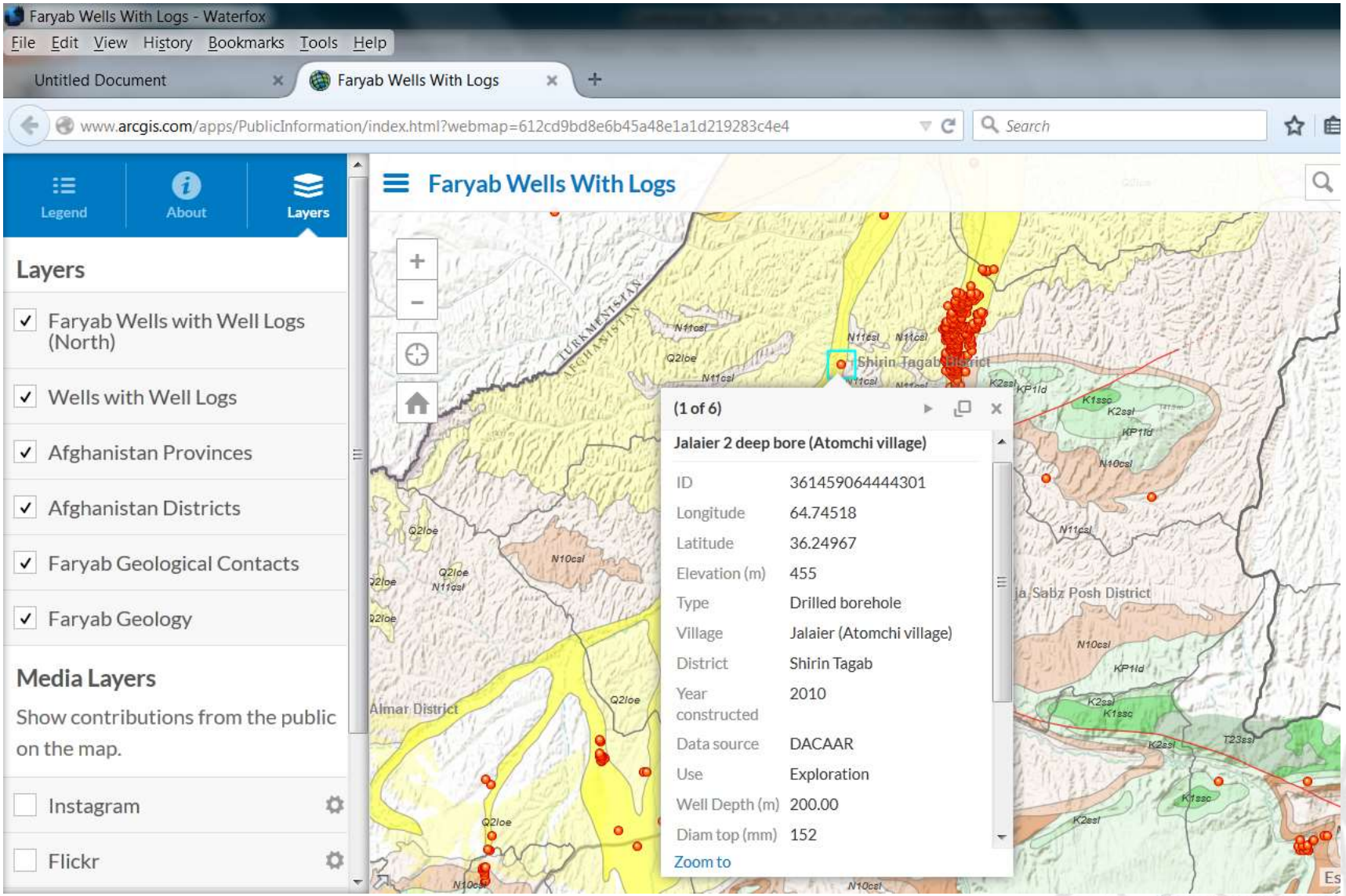

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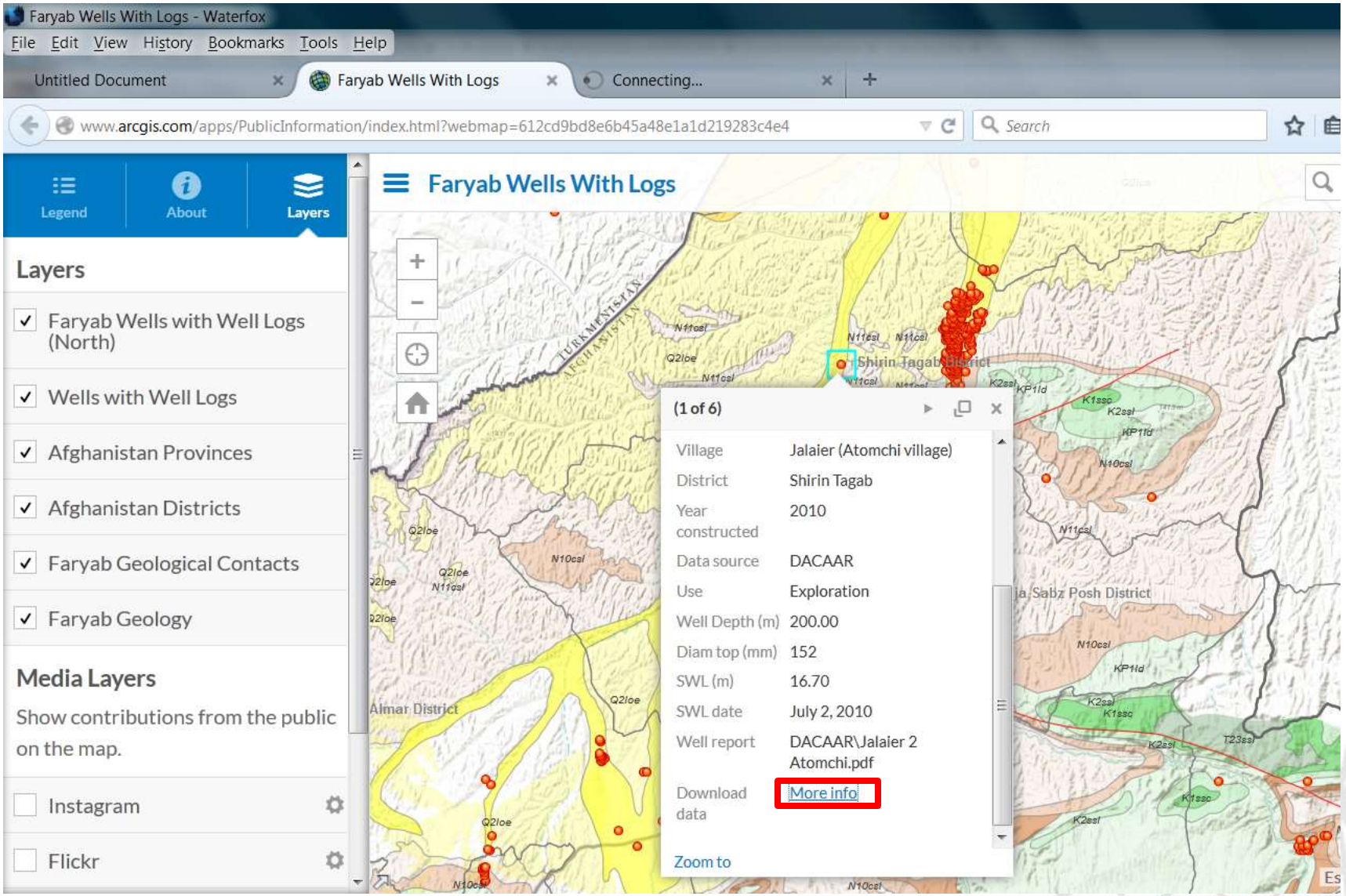
Access ArcGIS Online via a web site



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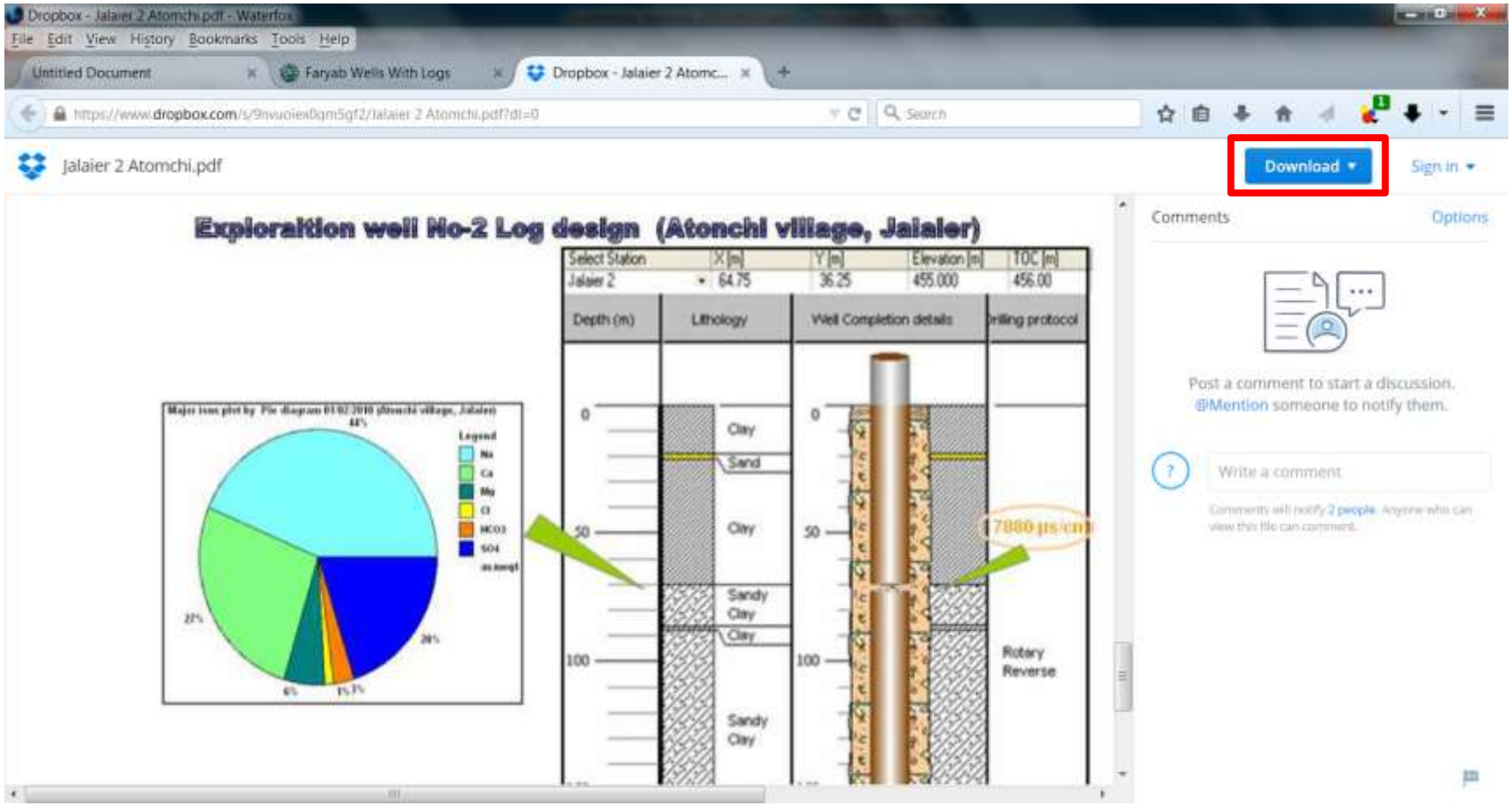

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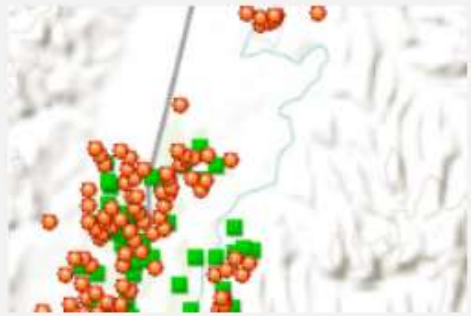
All online Faryab maps use a free Public Account

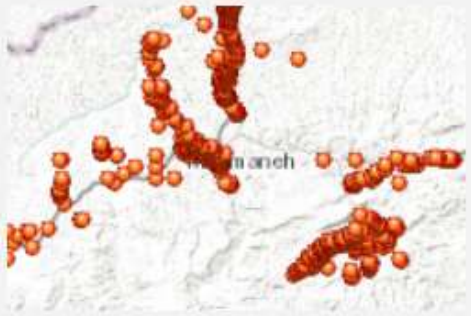
Faryab Monitoring Wells

Faryab Groundwater Quality ...

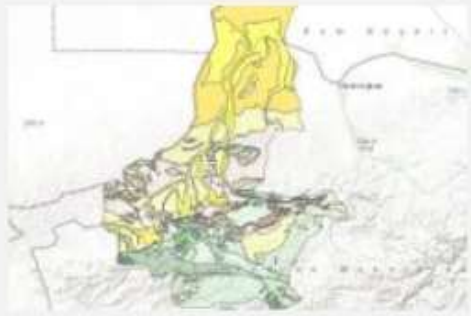


Faryab Water Sources

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

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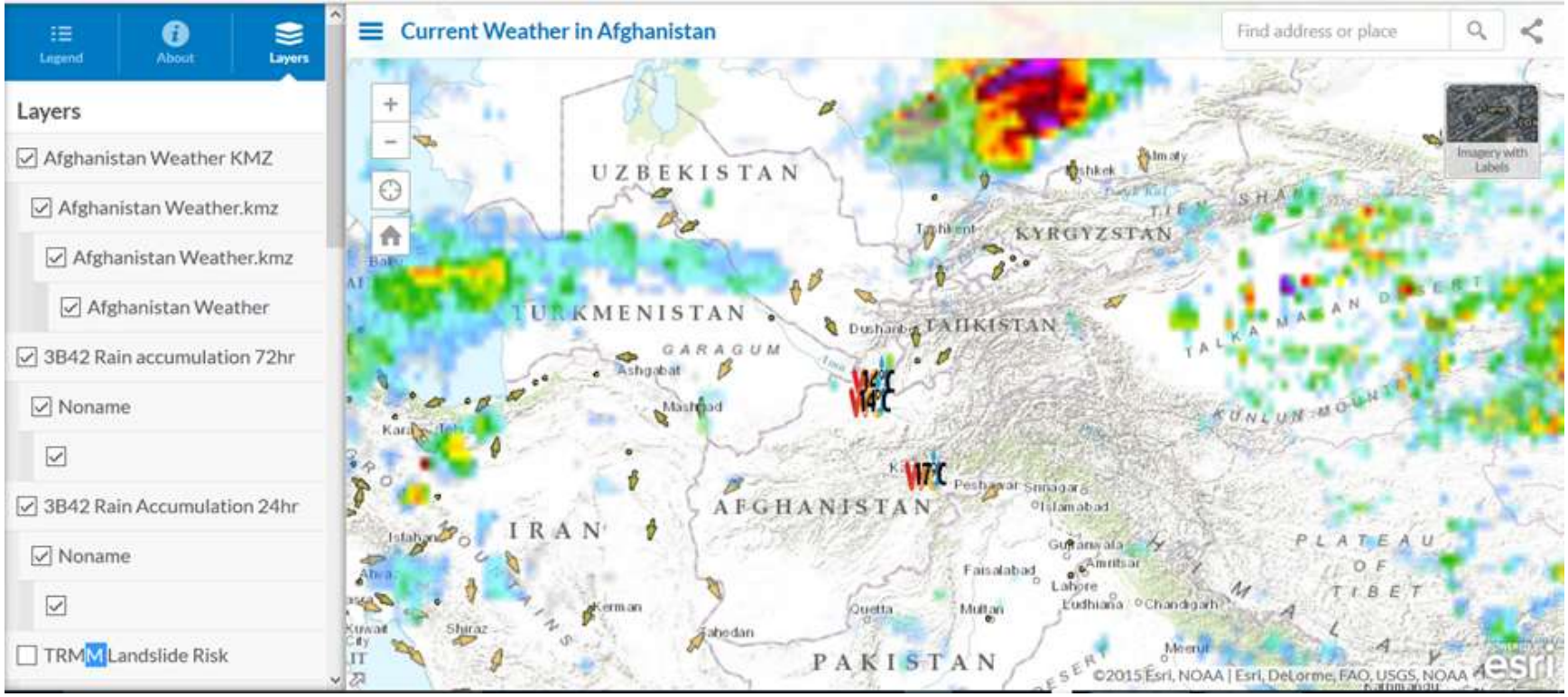
Live Weather Map of Afghanistan



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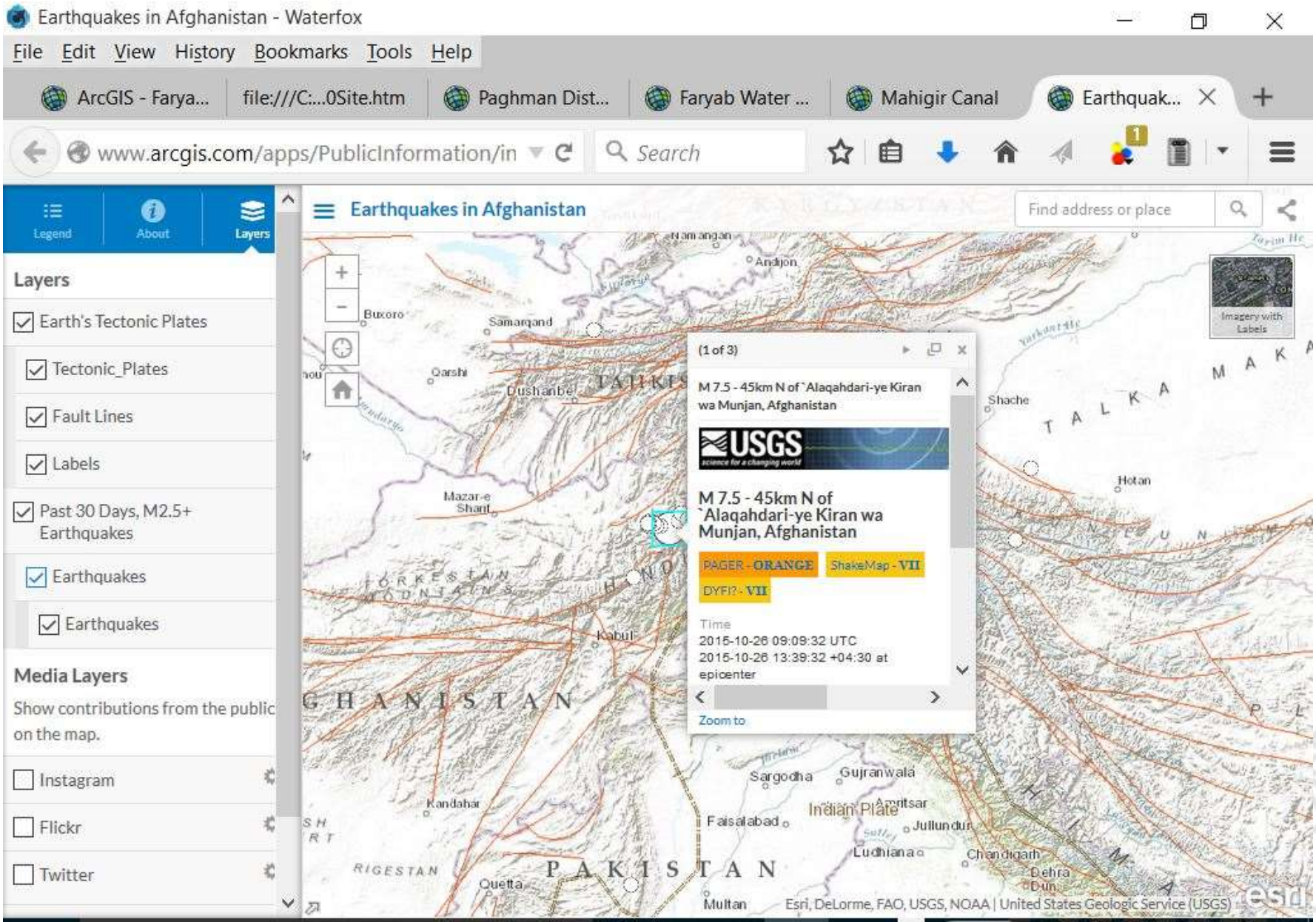
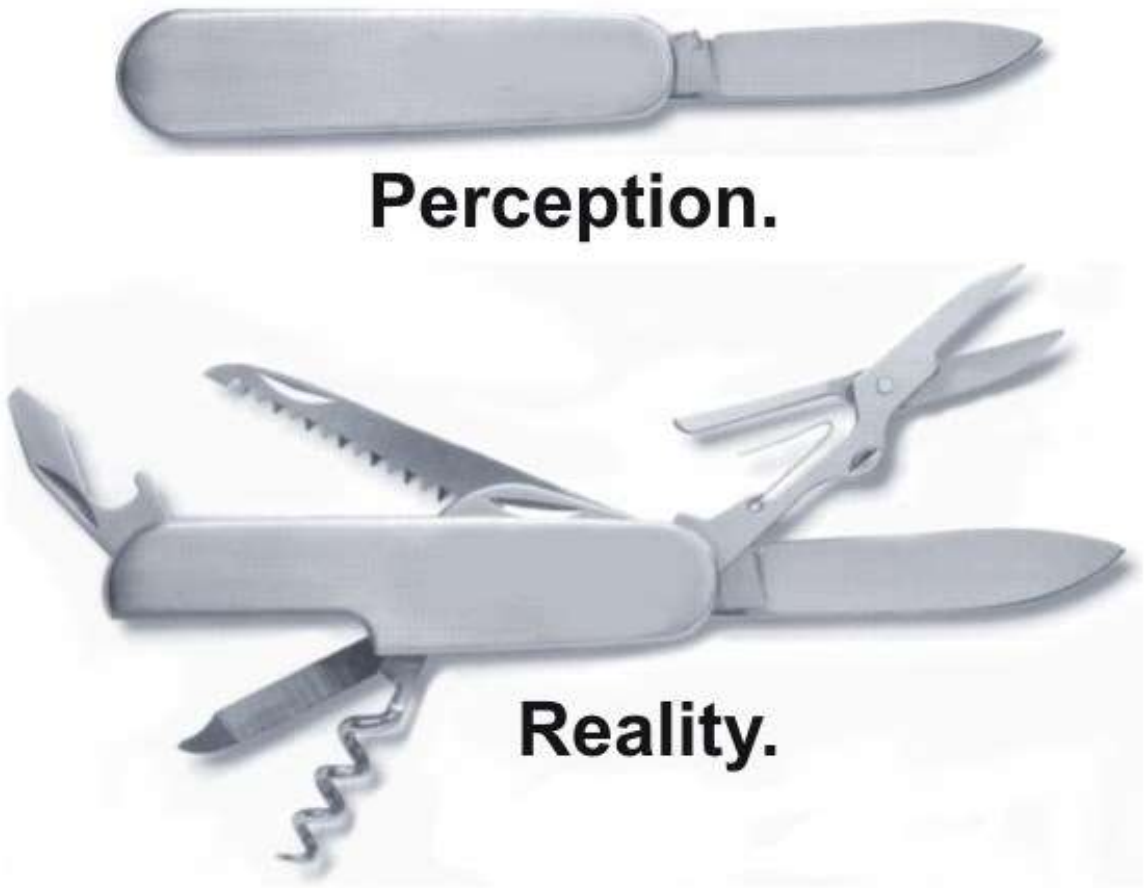
Live Internet Data – Earthquakes from USGS



Data Management, Paper & Online Map Production: Results from Faryab Province

1. Data management
2. Paper Maps
3. Online Maps
4. Conclusions & Recommendations

Conclusions & Recommendations



Data management & GIS is far more complicated than you think!

Source: http://booksite.elsevier.com/9780444528186/htm/reschar_chapter_01/figure_1_16.htm

Conclusions & Recommendations

+/- 800 Participants trained by NORPLAN

Regular training & capacity building needs to be integrated in Ministerial workplans & budgets.

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Conclusions & Recommendations

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GIS & IT are constantly evolving.

Keep studying or you will be left behind.

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Thank you for your attention!

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