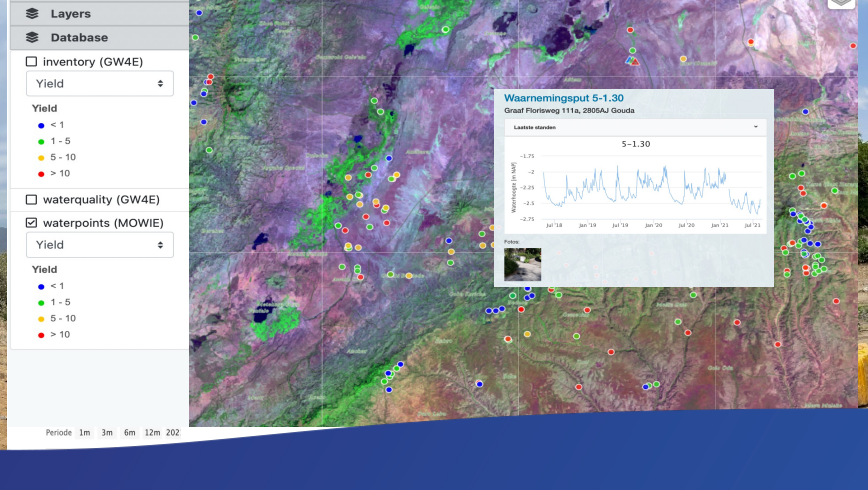

Hydrogeological Mapping for Climate Resilient WASH in Ethiopia – Lot 5

21 Mar 2022

Validation Phase III

BDA/ICB/GW01/2021

Theo Kleinendorst, Arjen de Vries

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MINISTRY OF WATER AND ENERGY
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aquacon ENGINEERING PLC

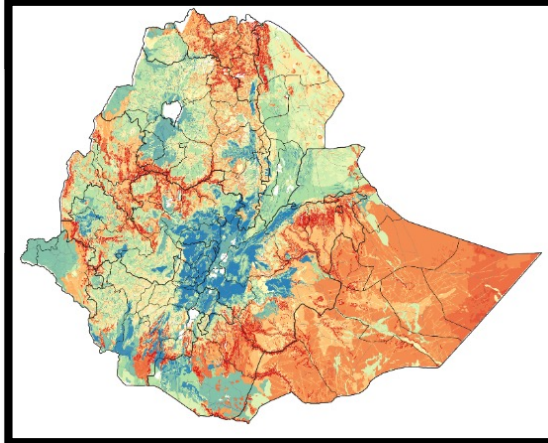
ACACIAWATER
www.acaciawater.com

Content

- Project objectives
- Design
- Capacity building
- Road ahead
- Demo
- Discussion

Key objectives

- Review existing groundwater information systems
- Develop a web-based platform
  - two-way information flow; storage and retrieval
  - Management system for outputs LOT1-4
  - test its operation
- Training RWB/ministry staff
- Migration of existing data into that database



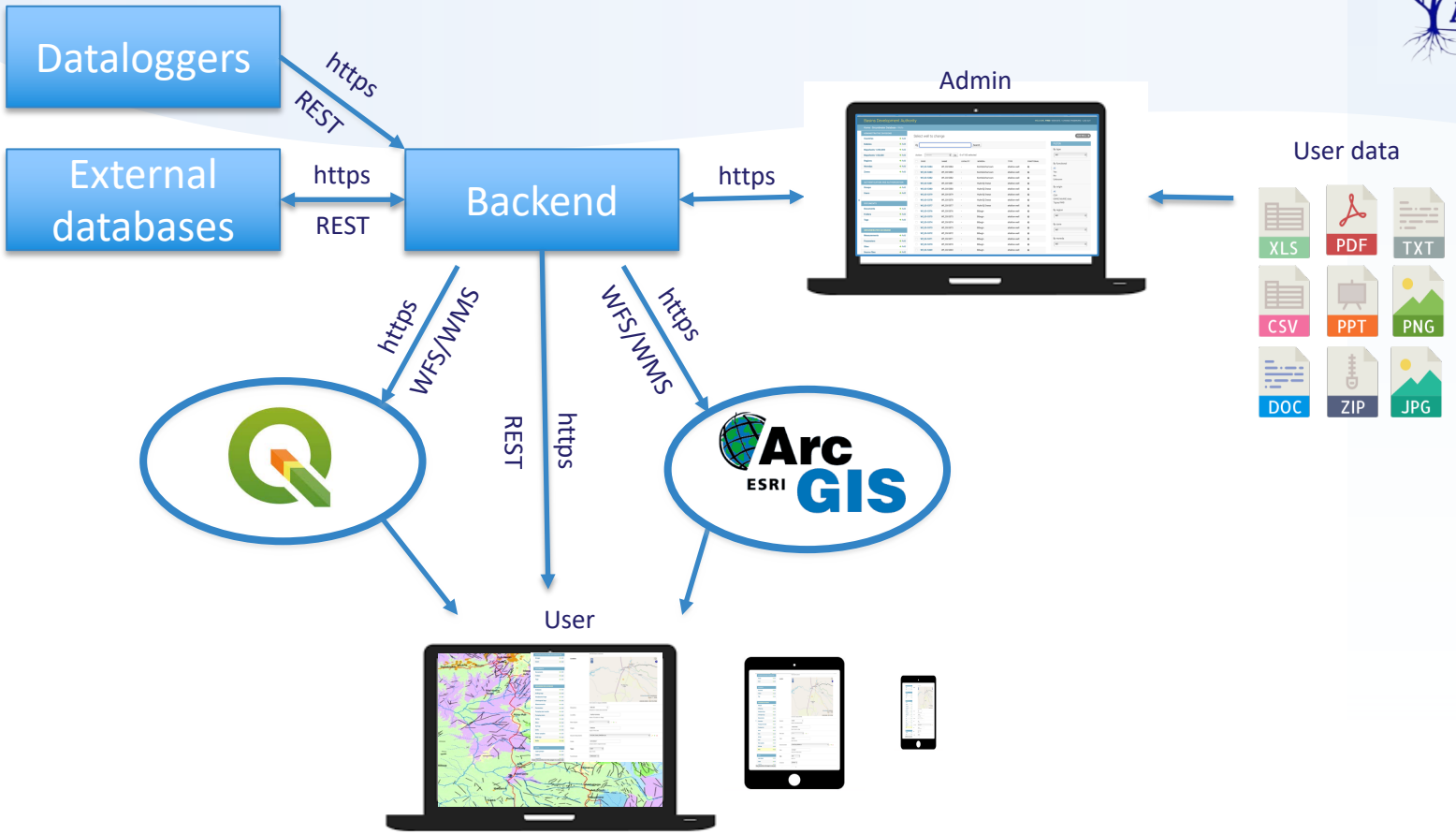
Observations

- Challenges earlier initiatives:
  - Unvalidated data
  - Not all available data used/imported
  - Complex support and post-processing procedures
  - High level of experience needed
  - Restricted access
  - Monitoring data missing
  - No formal database management procedures
- Parallel development of water resources database
  ➔ alignment for GW aspects crucial
- The current system intends to avoid these challenges

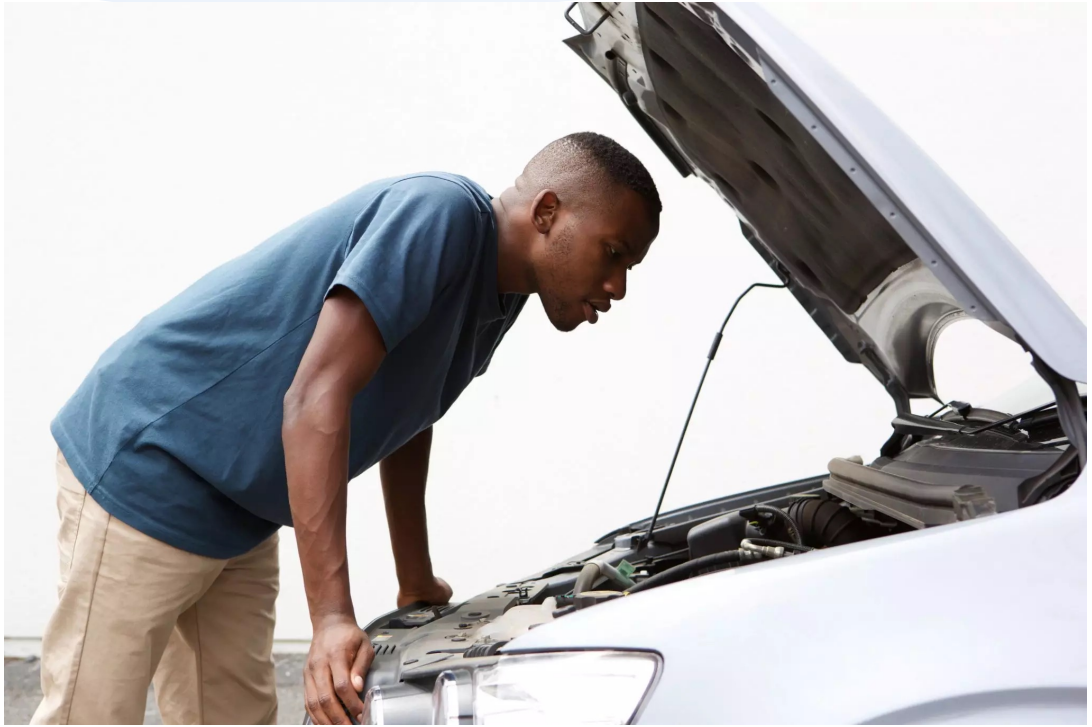
Design principles

- Data store + Content Management System
- Easily accessible to different users/roles
- Validated data
- Modular, extendable (small is beautiful)
- Open source, cloud based, client-server
- Web API for exchange with external systems
- Access through secure, encrypted SSL connection
- Tailorable by administrator

Design


Dataloggers
External databases
https
REST
https
REST
Backend
https
Admin
User data
XLS
PDF
TXT
CSV
PPT
PNG
DOC
ZIP
JPG
https
WFS/WMS
REST
https
WFS/WMS
https
ESRI
ArcGIS
User

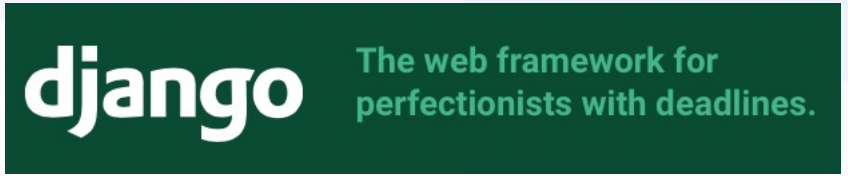
Under the hood

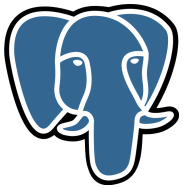


Under the hood

- Django + Rest Framework
- PostgreSQL + PostGIS
- Leaflet
- Redis, celery

- Server:
  - Linux OS (Ubuntu 20)
  - Caddy web server
  - Docker, QGIS, LibreOffice





Backend

- Groundwater data
- Document repository
- User management, roles and authorization
- External data sources (e.g. maps)

Backend: Groundwater data

1. Waterpoint data (inventory data)
2. Well construction data
   - Casing arrangements
   - Screen setting
   - Pump details
3. Groundwater data
   - Well logs (driller's logs, lithological and geophysical logs)
   - Water samples and analyses
   - timeseries of quality and quantity
4. Pumping tests

Backend: document repository

- Project repository
  - Structured according to project lots (1-5)
  - Deliverables like maps, reports
  - GIS files
- Supporting documents
  - Well logs
  - Well completion reports
  - Pumping tests
  - Lab reports (water quality)
  - Pictures
  - . . .

Backend: Authentication and authorization

- Open access (read) to document repository
- Open access (read) to map viewer
- Database access restricted to registered users
- Two-phase registration process
- Authorization (configurable)
  - General user: access denied
  - MoWE user: Read-only access
  - MoWE database user: Read-write access to selected tables or administrative division
  - MoWE database administrator: Full access
  - Superuser

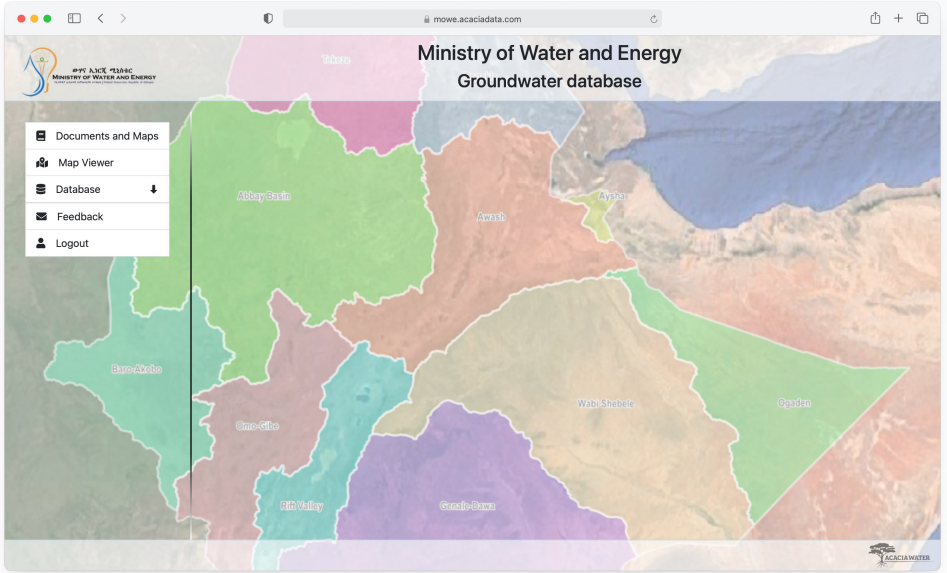
Backend: other data sources

- Administrative divisions (CSA, 2007)
- River basins
- Map sheets (1:250,000 and 1:50,000)
- Configuration of WMS/WFS services

Front-end

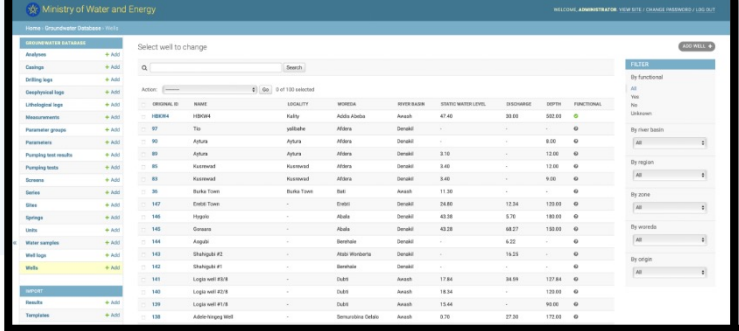
https://mowe.acaciadata.com

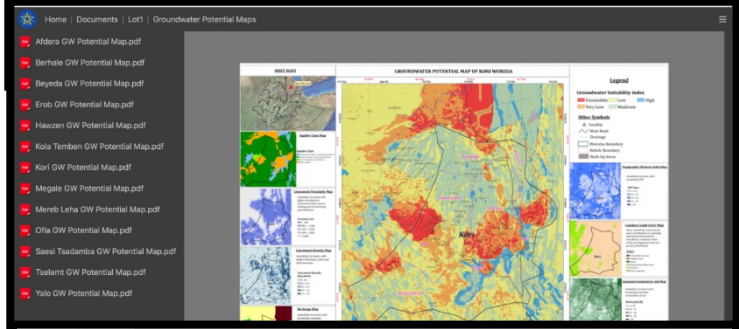
Link on https://mowe.gov.et

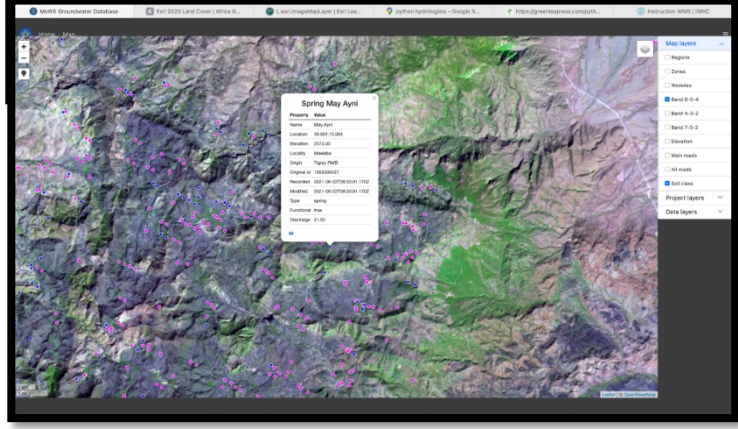


Front-end

1. Database interface
   - Management
   - Data entry, validation
   - Querying
   - Import/export
2. Document repository
   - View/download documents and maps
   - Documents related to database entries
3. Map viewer
   - interactive
   - Standard and project specific layers







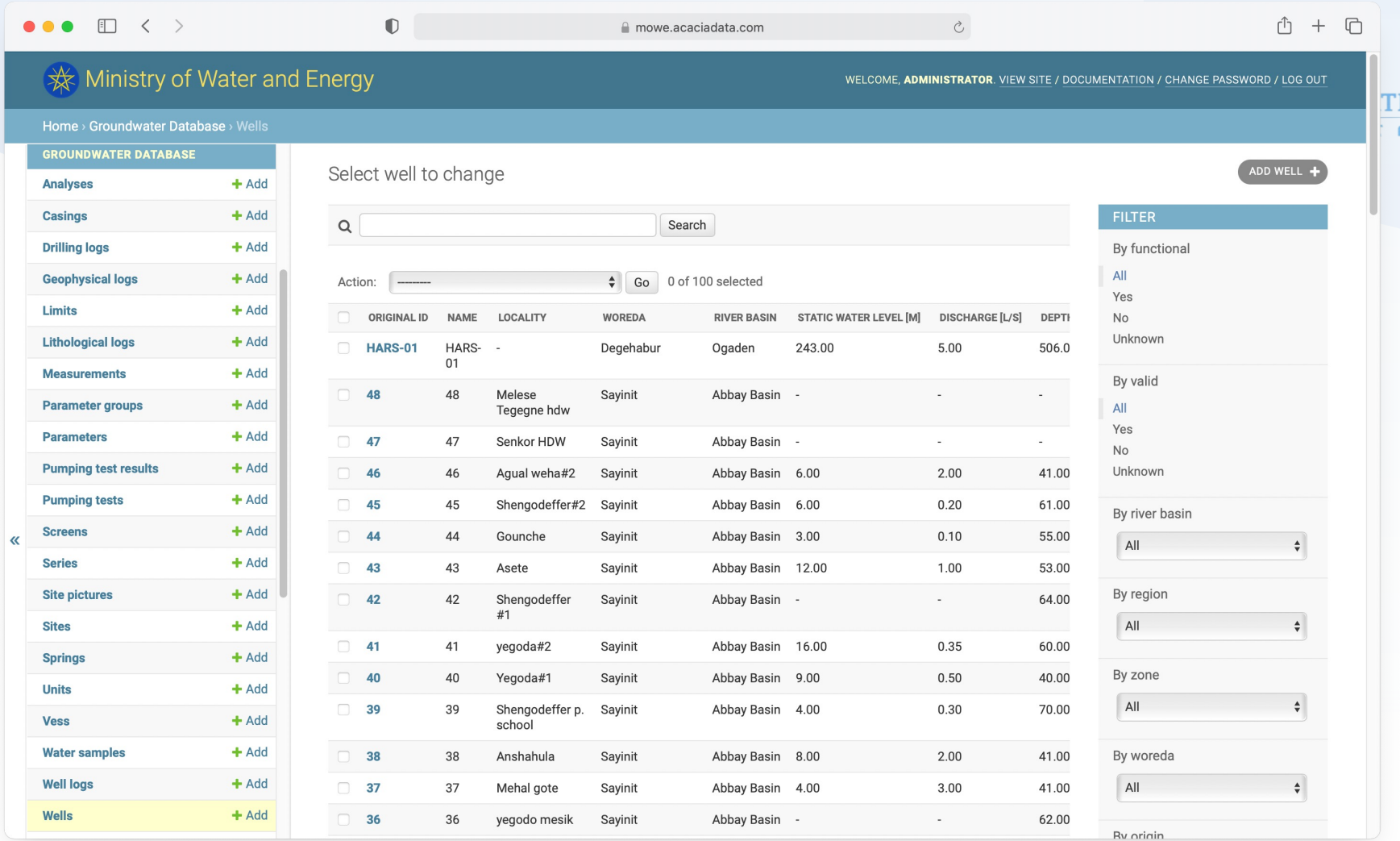
Training

- February 18-22, 2022
- 20 participants
- Database design and management
- Data entry and validation
- Documents and maps
- Map Viewer
- Bulk import/export
- Document upload
- Web API, linkage with GIS

Support after project

- Support hosting transfer
- Support the migration process
- Continue helpdesk
  - to provide support to users and administrators.
  - change requests (RFC) and bug reporting.
- Tailor database
  - Frontend
  - repository structure
  - database structure
- Improve offline functionality
- Bug fixing, updates

Screenshots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Ministry of Water and Energy
WELCOME, ADMINISTRATOR. VIEW SITE / DOCUMENTATION / CHANGE PASSWORD / LOG OUT
Home › Groundwater Database › Wells
GROUNDWATER DATABASE
Analyses + Add
Casings + Add
Drilling logs + Add
Geophysical logs + Add
Limits + Add
Lithological logs + Add
Measurements + Add
Parameter groups + Add
Parameters + Add
Pumping test results + Add
Pumping tests + Add
Screens + Add
Series + Add
Site pictures + Add
Sites + Add
Springs + Add
Units + Add
Vess + Add
Water samples + Add
Well logs + Add
Wells + Add
Select well to change
ADD WELL +
Search
Action: -------- Go 0 of 100 selected
ORIGINAL ID | NAME | LOCALITY | WOREDA | RIVER BASIN | STATIC WATER LEVEL [M] | DISCHARGE [L/S] | DEPTI
HARS-01 | HARS-01 | - | Degehabur | Ogaden | 243.00 | 5.00 | 506.0
48 | 48 | Melese Tegegne hdw | Sayinit | Abbay Basin | - | - | -
47 | 47 | Senkor HDW | Sayinit | Abbay Basin | - | - | -
46 | 46 | Agual weha#2 | Sayinit | Abbay Basin | 6.00 | 2.00 | 41.00
45 | 45 | Shengodeffer#2 | Sayinit | Abbay Basin | 6.00 | 0.20 | 61.00
44 | 44 | Gounche | Sayinit | Abbay Basin | 3.00 | 0.10 | 55.00
43 | 43 | Asete | Sayinit | Abbay Basin | 12.00 | 1.00 | 53.00
42 | 42 | Shengodeffer #1 | Sayinit | Abbay Basin | - | - | 64.00
41 | 41 | yegoda#2 | Sayinit | Abbay Basin | 16.00 | 0.35 | 60.00
40 | 40 | Yegoda#1 | Sayinit | Abbay Basin | 9.00 | 0.50 | 40.00
39 | 39 | Shengodeffer p. school | Sayinit | Abbay Basin | 4.00 | 0.30 | 70.00
38 | 38 | Anshahula | Sayinit | Abbay Basin | 8.00 | 2.00 | 41.00
37 | 37 | Mehal gote | Sayinit | Abbay Basin | 4.00 | 3.00 | 41.00
36 | 36 | yegodo mesik | Sayinit | Abbay Basin | - | - | 62.00
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No
Unknown
By valid
All
Yes
No
Unknown
By river basin
All
By region
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GROUNDWATER DATABASE
Analyses + Add
Casings + Add
Drilling logs + Add
Geophysical logs + Add
Limits + Add
Lithological logs + Add
Measurements + Add
Parameter groups + Add
Parameters + Add
Pumping test results + Add
Pumping tests + Add
Screens + Add
Series + Add
Site pictures + Add
Sites + Add
Springs + Add
Units + Add
Vess + Add
Water samples + Add
Well logs + Add
Wells + Add
IMPORT TEMPLATES

Well

Year of construction: 2016

Depth [m]: 502.00
depth in meter below the surface

Diameter [in]: 7.00
diameter of the well in inches

Use: industrial

Static water level [m]: 47.40
static water level in meter below the surface at time of inventory

Dynamic water level [m]: 117.00
dynamic water level in meter below the surface at time of inventory

TDS [mg/l]:
Total dissolved solids in mg/l

EC [S/cm]:
Electrical conductivity in uS/cm

Temp [oC]:
Temperature in degrees Celcius

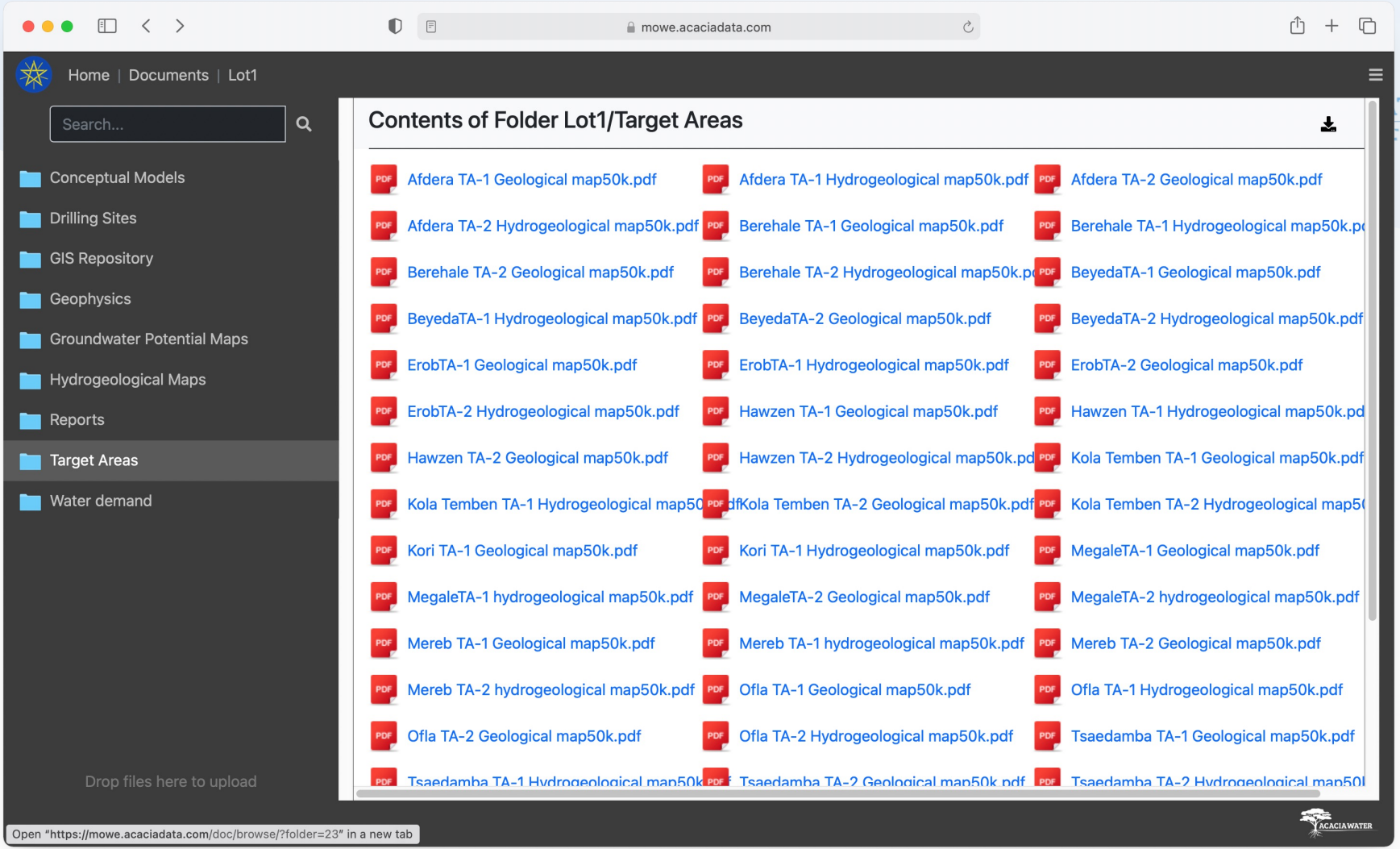
Discharge [l/s]: 60.00
discharge in liter per second at time of inventory

unit: l/s

SITE PICTURES

TITLE	PICTURE	UPLOADED	DELETE?
HBKW4 drilling		Jan. 31, 2022, 6:51 p.m.	

Currently: pictures/IMG_1852.JPG
Change: Choose File no file selected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GIS Repository
Geophysics
Groundwater Potential Maps
Hydrogeological Maps
Reports
Target Areas
Water demand
Drop files here to upload
Contents of Folder Lot1/Target Areas
Afdera TA-1 Geological map50k.pdf
Afdera TA-1 Hydrogeological map50k.pdf
Afdera TA-2 Geological map50k.pdf
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Tsaedamba TA-2 Geological map50k.pdf
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Open "https://mowe.acaciadata.com/doc/browse/?folder=23" in a new tab
ACACIAWATER

Search...

- Afdera TA-1 Geological map50k.pdf
- Afdera TA-1 Hydrogeological map50k.pdf
- Afdera TA-2 Geological map50k.pdf
- Afdera TA-2 Hydrogeological map50k.pdf
- Berehale TA-1 Geological map50k.pdf
- Berehale TA-1 Hydrogeological map50k.pdf
- Berehale TA-2 Geological map50k.pdf
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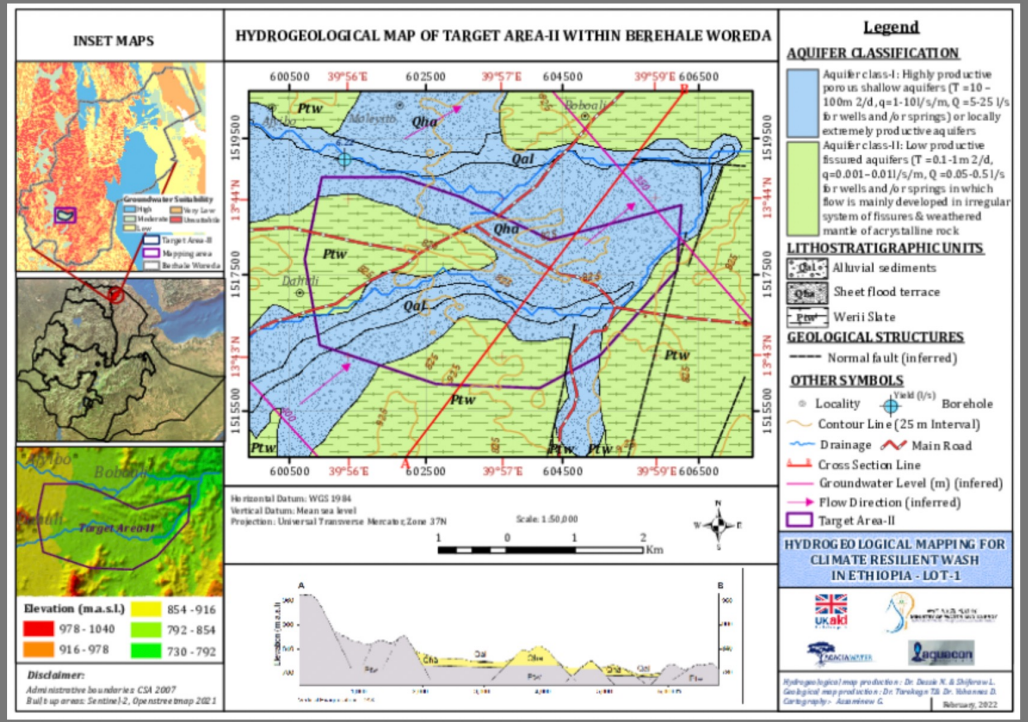

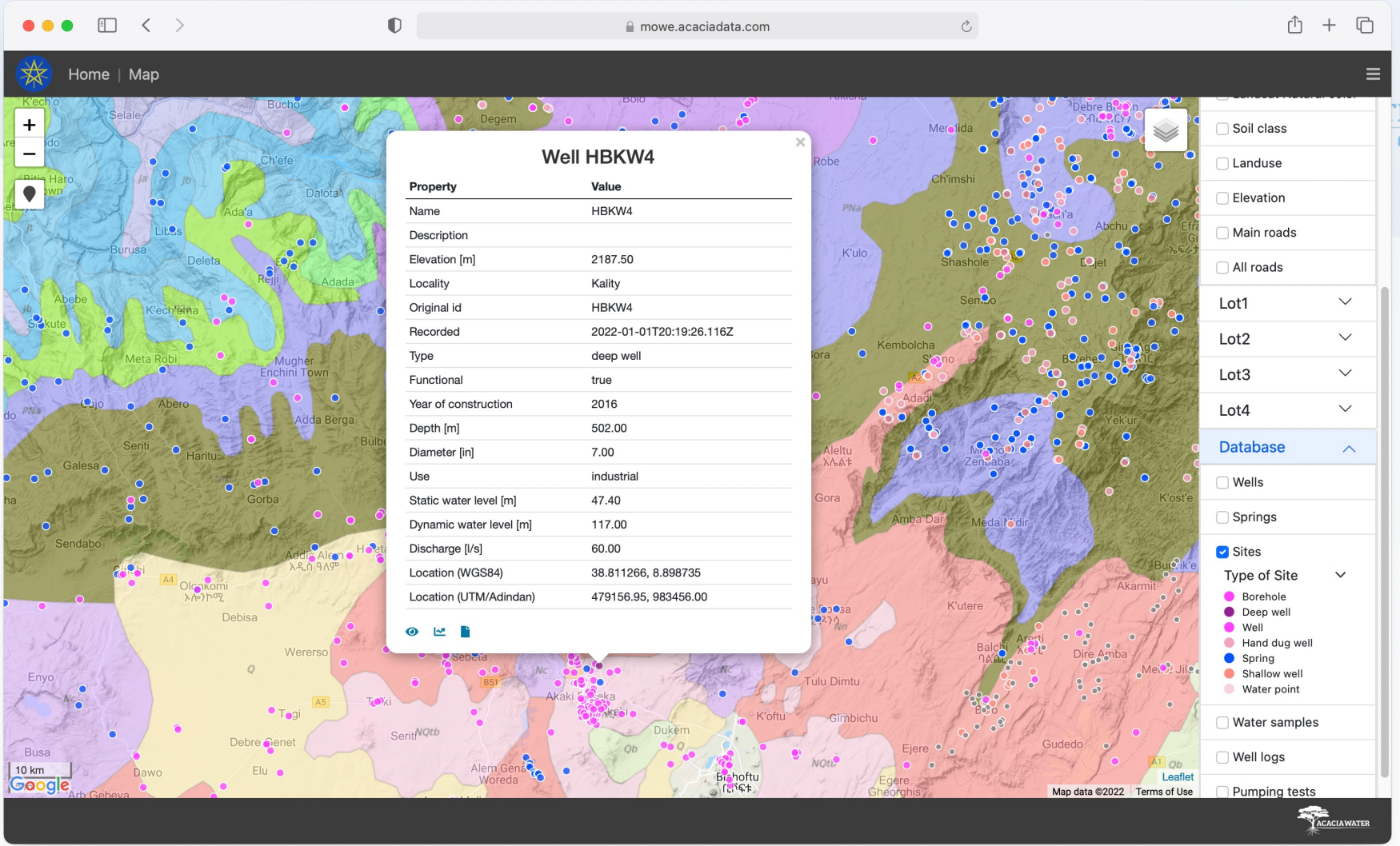
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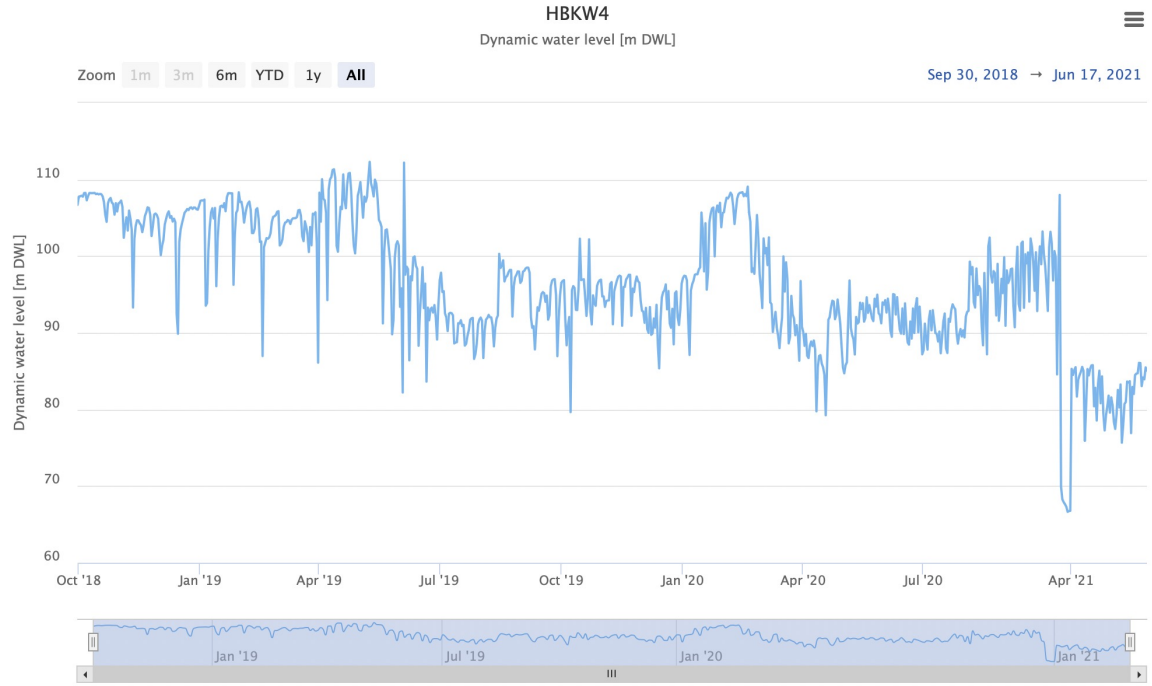
Home | Map
Well HBKW4
Property
Value
Name
HBKW4
Description
Elevation [m]
2187.50
Locality
Kality
Original id
HBKW4
Recorded
2022-01-01T20:19:26.116Z
Type
deep well
Functional
true
Year of construction
2016
Depth [m]
502.00
Diameter [in]
7.00
Use
industrial
Static water level [m]
47.40
Dynamic water level [m]
117.00
Discharge [l/s]
60.00
Location (WGS84)
38.811266, 8.898735
Location (UTM/Adindan)
479156.95, 983456.00
Soil class
Landuse
Elevation
Main roads
All roads
Lot1
Lot2
Lot3
Lot4
Database
Wells
Springs
Sites
Type of Site
Borehole
Deep well
Well
Hand dug well
Spring
Shallow well
Water point
Water samples
Well logs
Pumping tests
Leaflet
Map data ©2022
Terms of Use
10 km
Google
ACACIAWATER

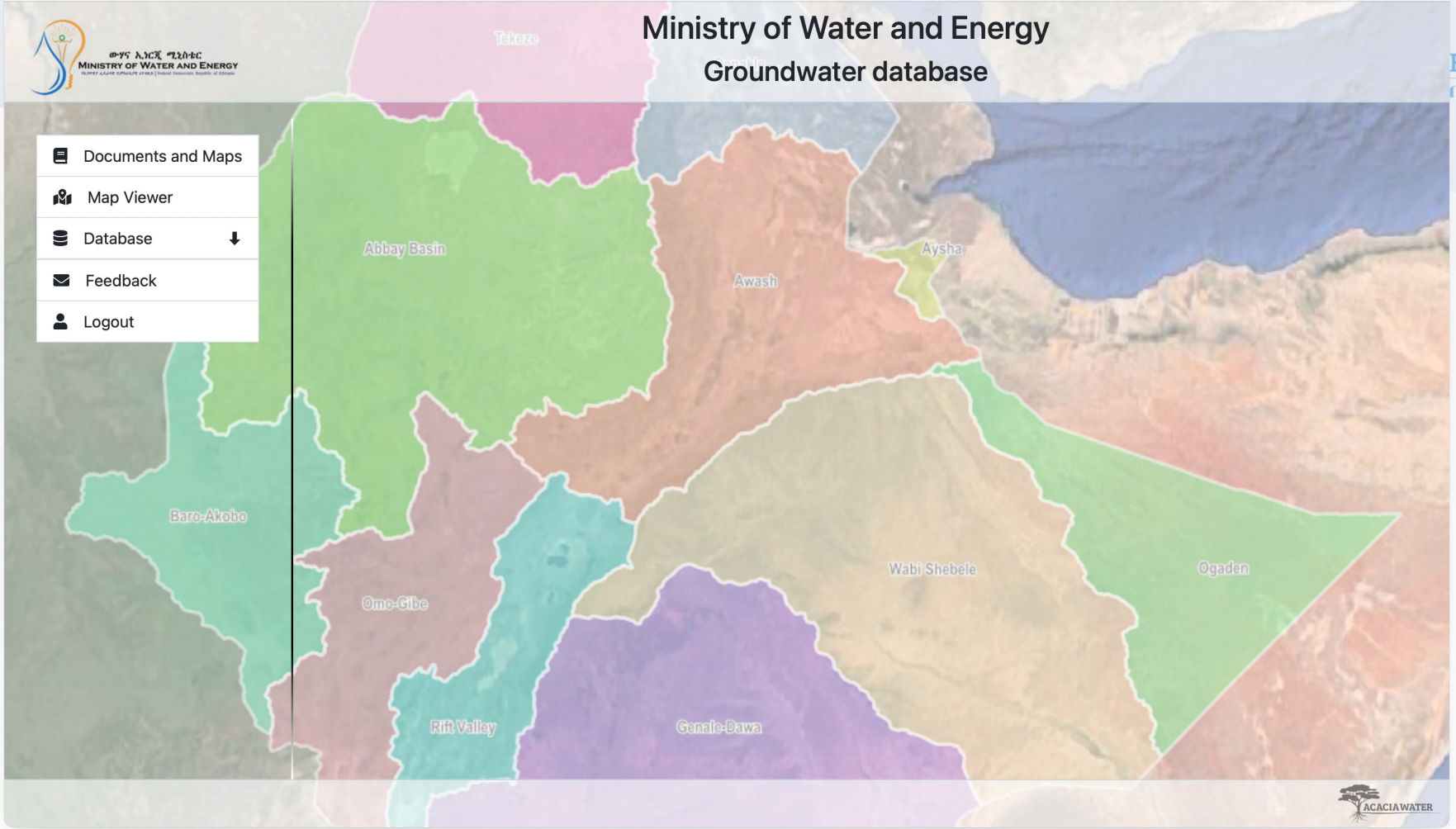
Ministry of Water and Energy

Groundwater database

Resample ----



Demo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Groundwater database
Documents and Maps
Map Viewer
Database
Feedback
Logout
Tekeze
Abbay Basin
Awash
Aysha
Baro-Akobo
Omo-Gibe
Rift Valley
Genale-Dawa
Wabi Shebele
Ogaden
ACACIAWATER

Thanks for your attention

Mar 21, 2022

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