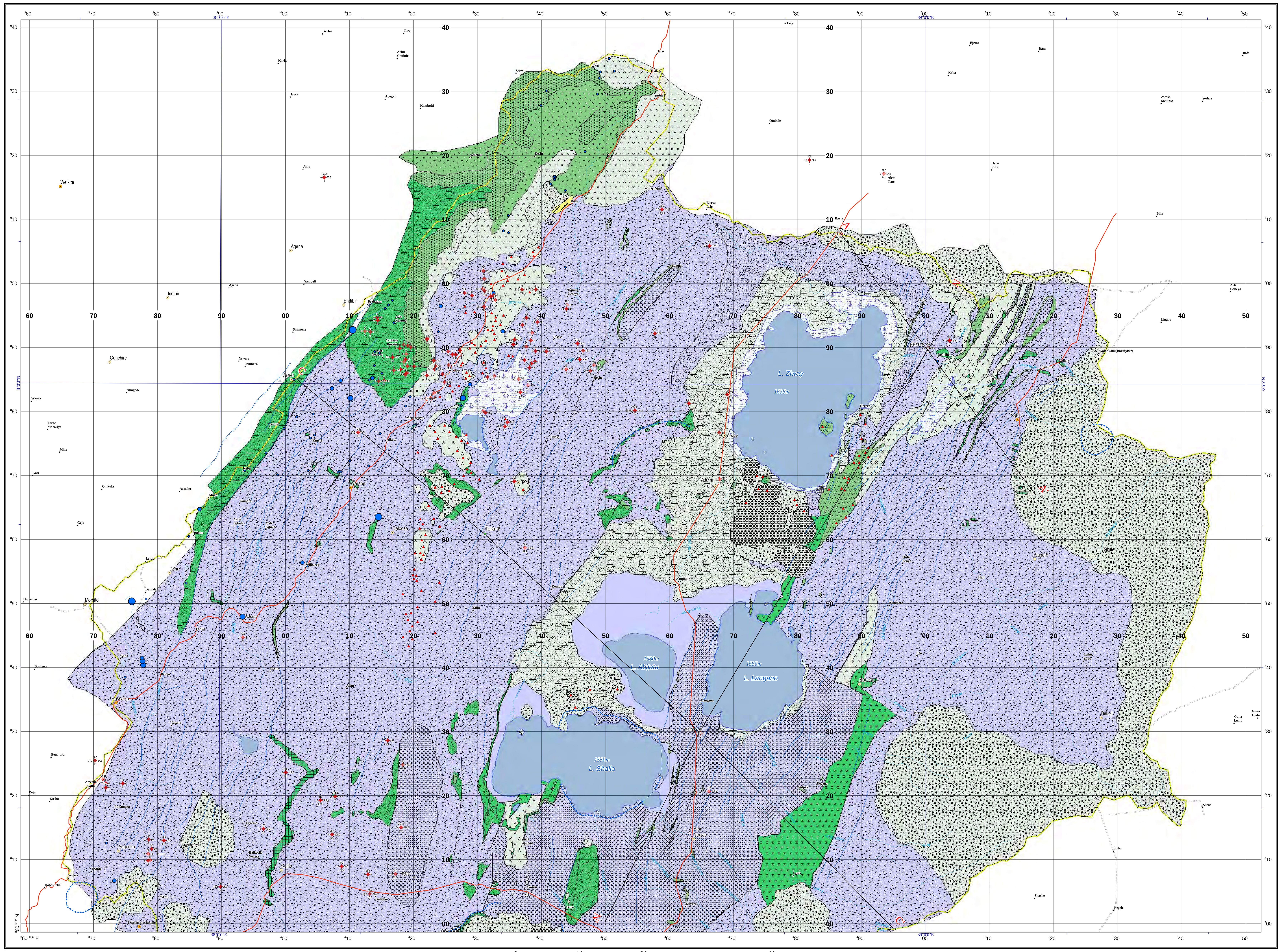
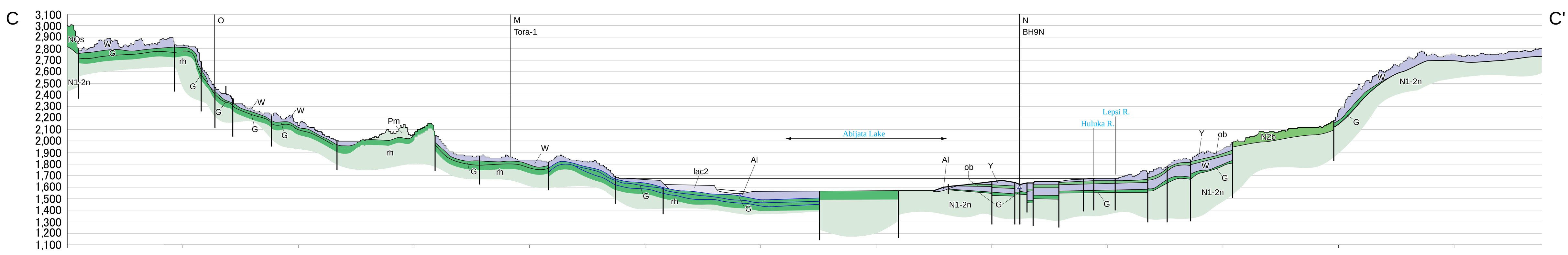
HYDROGEOLOGICAL MAP OF HOSAINA - ASELA AREA

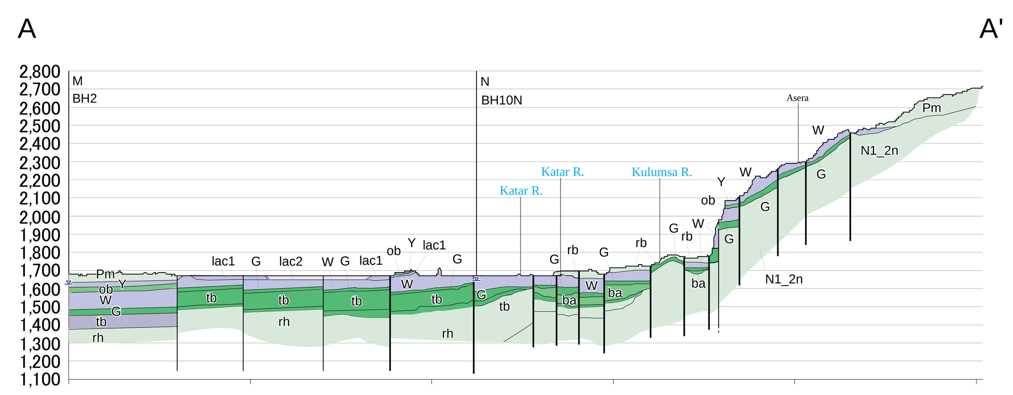


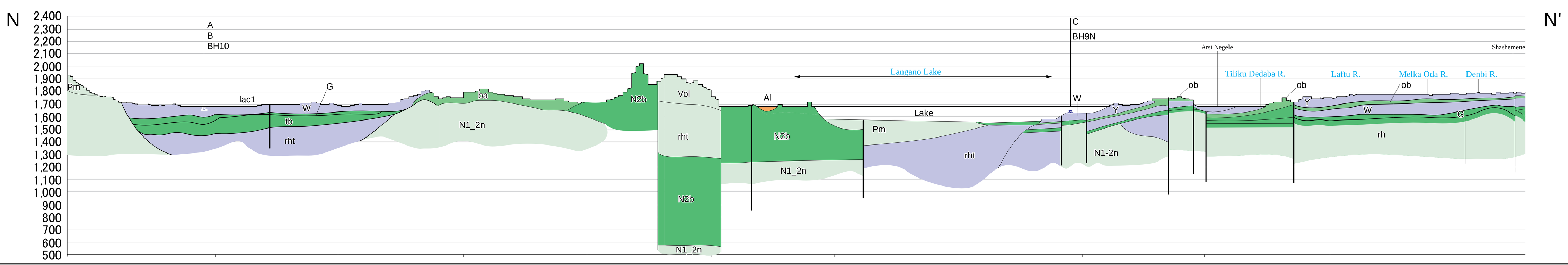
VERTICAL SCALE = 10 x HORIZONTALSCALE

SCALE 1:250,000 — 0 10 20 40 km

TRANSVERSE MERCATER PROJECTION







Towns

- Region Capital
- Zone Capital
- Woreda Capital
- Developed Area

Roads

- Asphalt
- Gravel

Rivers

- Major Rivers

Lakes

- Swamp
- Lake

Boundaries

- Basin Boundary
- National Boundary

Spring Discharge [l/s]

- 0.01 - 0.75
- 0.75 - 2.50
- 2.50 - 6.00
- 6.00 - 16.00
- 16.00 -

Geological Structure

- Major fault, downthrown shown
- Major fault
- Normal fault, downthrow shown
- Normal fault
- Inferred fault, downthrown shown
- Inferred fault
- Major fault, downthrown shown, by satellite images
- Major fault, by satellite images
- Normal fault, downthrow shown, by satellite images
- Normal fault, by satellite images
- Inferred fault, downthrown shown, by satellite images
- Inferred fault, by satellite images
- Geology boundary
- Inferred geology boundary
- Caldera edge
- Volcano / Volcanic Cone

Borehole (Well)

Total depth [mbgl]
Specific capacity [l/min/m] — Static water level [m]
Draw down [m]

- JICA Well

TEM

- Survey Point of Transient-phenomenon (or Time-domain) Electromagnetic Exploration Method

Geology

Holocene

- Al — Alluvium; *Fine sand - mud*
- Q — Unclassified Fluvial Deposits; *Sandy gravel-mud*
- lac2 — Bulbla Lacstrine Deposits; *Lake deposits such as gravel, sand and mud*
- Pm — Corbetti Pumice Flow & Fall Deposits; *Pumice falls and pumice flow deposits*
- Vol — Corbetti Rhyolitic Volcanics; *Rhyolite lava flows and Obsidian lava flows*
- rb — Butajira Recent Basalt; *Basalt lavas and reddish brown basaltic scoria*
- lac1 — Meki Lacustrine Deposits; *Lake deposits such as poorly-sorted gravel, sand, pumice, tuff, and volcanic sand*

Pleistocene

- Y — Langano Poorly Welded Pumiceous Pyroclastics; *Yellowish white rhyolitic pumice tuff*
- ob — Kulumusa Highly Welded Tuff; *Rhyolitic to andestic welded tuff*
- W — Ketar River Acidic Volcanic Sedimentary Rocks; *Rhyolitic tuffs and pumice tuffs*
- G — Gonde Strongly Green Welded Tuff; *Rhyolitic to andestic welded tuff*
- tb — Adami Tulu Basaltic Pyroclastics; *Basaltic tuff breccias and lapilli tuffs*
- ba — Ogolche Pleistocene Basalt; *Massive basalt lavas*
- lake — Lekansho Lacustrine Deposits; *Lake deposits such as sand stone and alternate layer*

Plio-Pleistocene

- rh — Gademotta Rhyolite; *Rhyolite lava flows and rhyolitic tuffs*
- N2b — N2b Basalt; *Basalt lavas and basaltic pyroclastics*
- NQs — NQs Rhyolite; *Rhyolitic tuffs*

Pliocene

- rht — N1_2n Rhyolitic Volcanics; *Plagiocrase rhyolite tuff and rhyolite lava flows containing obsidian*
- N1_2n — N1_2n Rhyolitic Tuff; *Plagiocrase rhyolitic tuff, pumice tuff and crystal tuff*
- N1n — N1n Basalt; *Anchar Basalt*
- N1ar — N1ar Rhyolite; *Rhyolite*

Miocene

- Ngs — Sharenga Rhyolite; *Rhyolite piles and necks*
- Ngu — Upper Basalt; *Porous basalt lavas*
- Ngb — Beyana Tuff; *Lapilli tuff with minor laminated tuff*
- Ngm — Middle Basalt; *Porphyritic basalt lavas*

Eocene-Oligocene

- Pgs — Shole Welded Tuff; *Densely-welded rhyolitic welded tuff*
- Pgl — Lower Basalt; *Porphyritic basalt lavas*

MESOZOIC

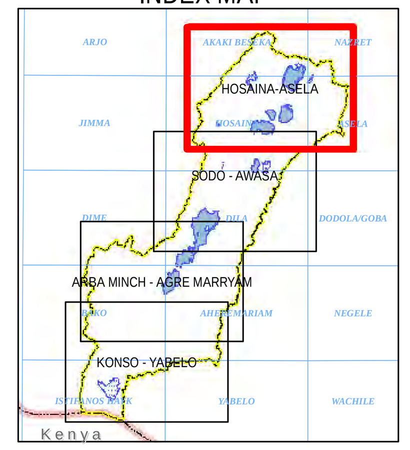
- Ms — Adigrat Sandstone, Antaro Limestone; *Sandstone, Shale and Limestone*

PRECAMBRIAN

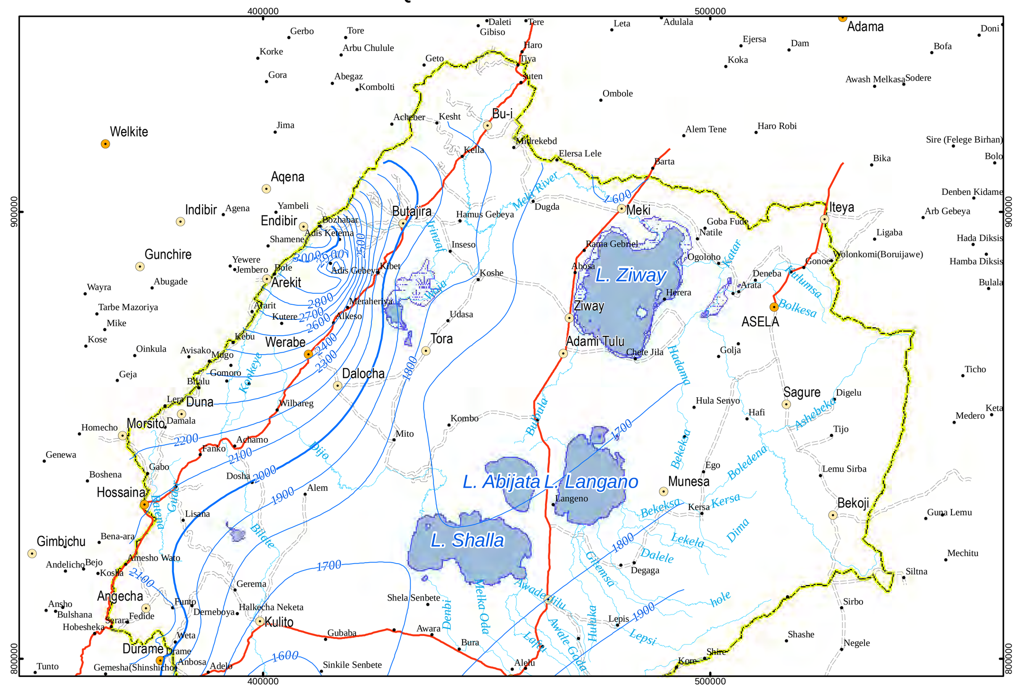
- Pre — Biotite Gneiss, Pegmatite; *Biotite Gneiss, Granite, Biotite Metagranite*

No.	Description	Lithology	Productivity Classes		
1	Extensive aquifer with intergranular permeability	Unconsolidated sediments, alluvium, elluvium, colluvium, lacstrine sediments, poorly cemented sandstone	A	High	
			B	Moderate	
			C	Low	
2	Extensive aquifers with fracture and/or karstic permeability	Consolidated sediments and metamorphosed carbonate; Limestone, sandstone, shale, marl, evaporate marble	High, moderate, low (A, B, C) (Note: Not applicable in this map)		
3	Extensive aquifers with fracture permeability	Volcanic rocks, basalts, rhyolites, trachytes, ignimbrites	A	High	
			B	Moderate	
			C	Low	
4	Localized aquifers with fracture and intergranular permeability	Non carbonate metamorphic rocks, granitic intrusives,dolerites	C	Low	
			D	Poor	
5	Main geothermal areas	Common occurrence of thermal groundwater in fractured volcanic rocks and subordinate unconsolidated sediments	Moderate or high productivity (A,B) (Note: Not applicable in this map)		

INDEX MAP

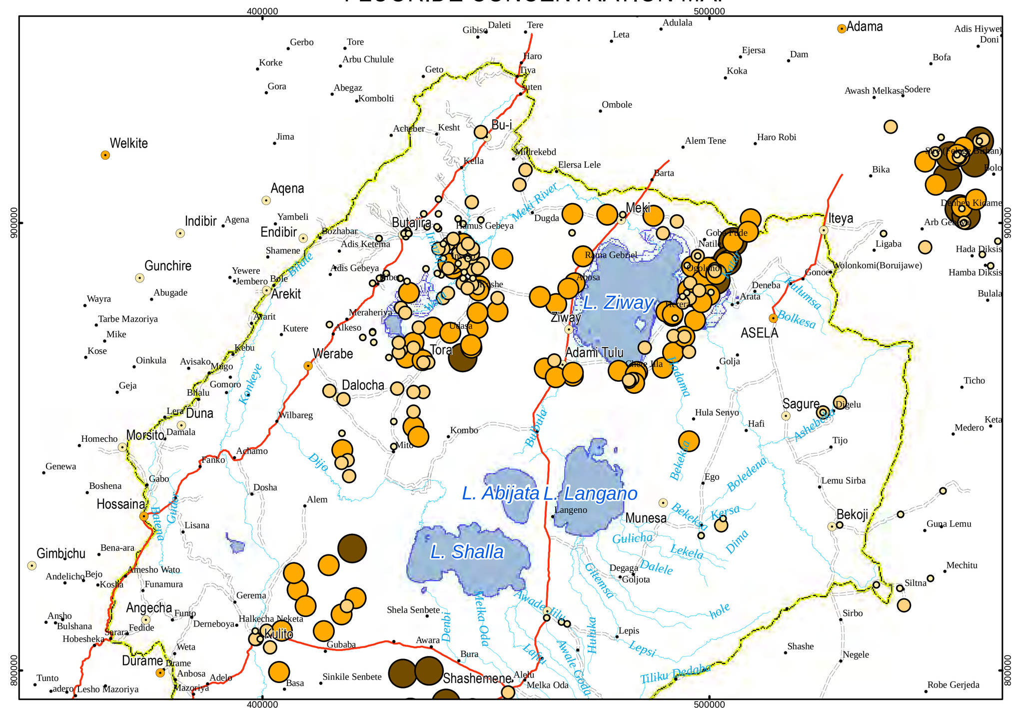


AQUIFER SURFACE CONTOUR



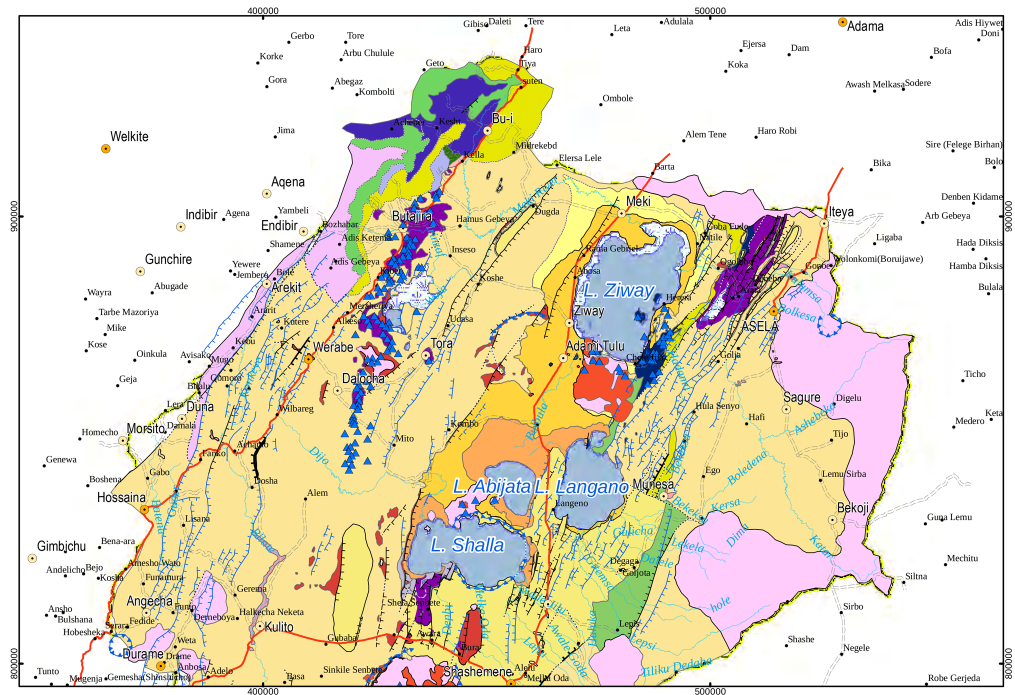
Upper Aquifer Surface Contour — 100m interval — 1000m interval — SCALE 1:1,000,000 — 0 10 20 40 km

FLUORIDE CONCENTRATION MAP



Fluoride [mg/l] — 0.0 - 1.5 — 1.5 - 3.0 — 3.0 - 10.0 — 10.0 - — SCALE 1:1,000,000 — 0 10 20 40 km

GEOLOGICAL MAP



SCALE 1:1,000,000 — 0 10 20 40 km

Hydrogeological Map	March 2012
THE STUDY ON GROUNDWATER RESOURCES ASSESSMENT IN THE RIFT VALLEY LAKES BASIN	
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)	