

Sana'a Basin Water Management Project

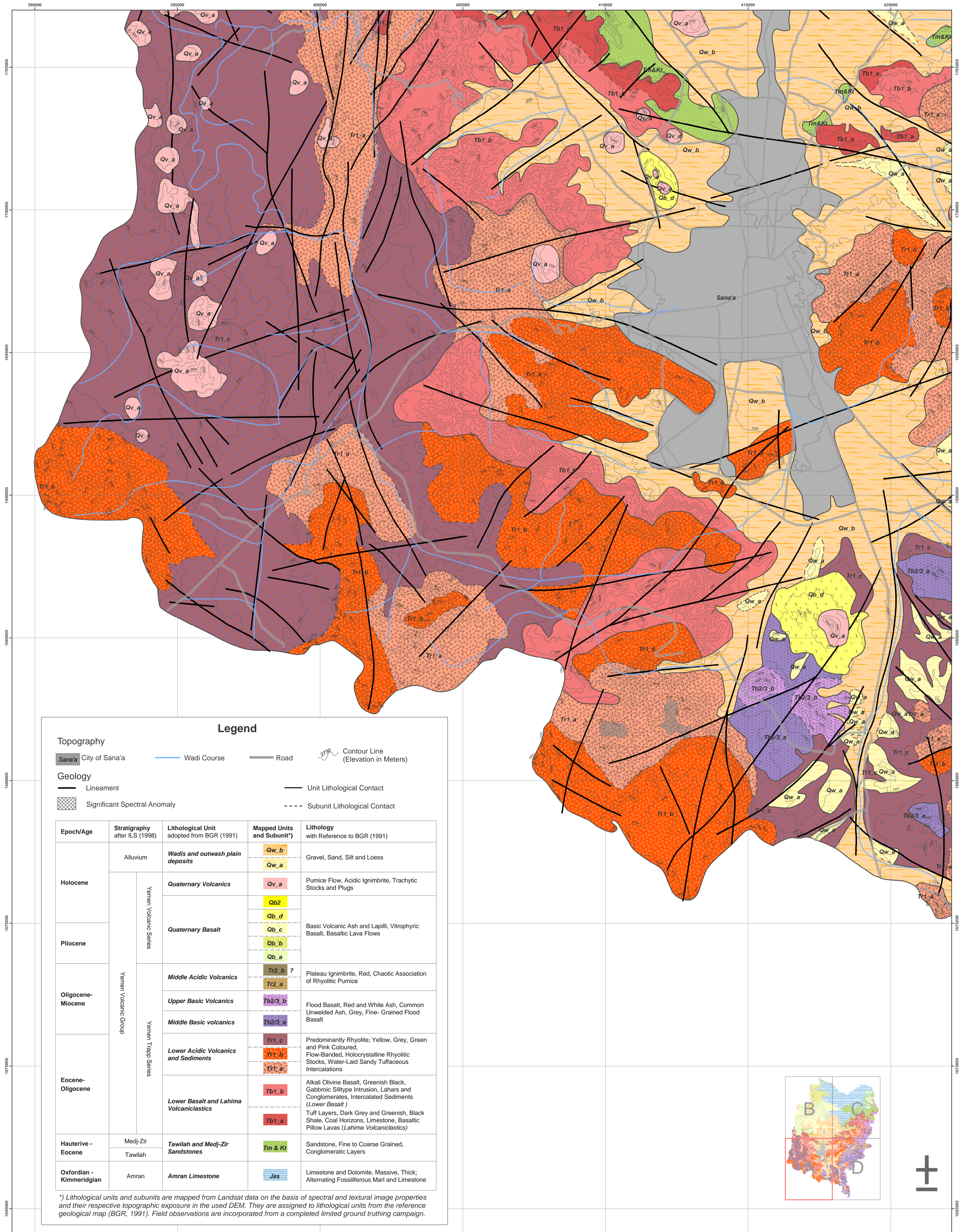
Satellite Imagery / Data Analysis Study along with Ground Truth and Meteorological Monitoring

IDA Credit 3774-YEM
Contract No RFP No 2/04

-Republic of Yemen-



Compiled Geological Map Sheet A



Legend

- Topography**
- Sana'a City of Sana'a
 - Wadi Course
 - Road
 - Contour Line (Elevation in Meters)
- Geology**
- Lineament
 - Unit Lithological Contact
 - Significant Spectral Anomaly
 - Subunit Lithological Contact

Epoch/Age	Stratigraphy after ILS (1998)	Lithological Unit adopted from BGR (1991)	Mapped Units and Subunit ^(*)	Lithology with Reference to BGR (1991)
Holocene	Alluvium	Wadis and outwash plain deposits	Qw_b	Gravel, Sand, Silt and Loess
			Qw_a	
	Yemeni Volcanic Series	Quaternary Volcanics	Qv_a	Pumice Flow, Acidic Ignimbrite, Trachytic Stocks and Plugs
			Qb_d	
Pliocene	Yemeni Volcanic Series	Quaternary Basalt	Qb_c	Basic Volcanic Ash and Lapilli, Vitrophyric Basalt, Basaltic Lava Flows
			Qb_b	
			Qb_a	
			Qv_a	
Oligocene-Miocene	Yemeni Volcanic Group	Middle Acidic Volcanics	Tr2_b	Plateau Ignimbrite, Red, Chaotic Association of Rhyolitic Pumice
			Tr2_a	
		Upper Basic Volcanics	Tb2/3_b	Flood Basalt, Red and White Ash, Common Unwelded Ash, Grey, Fine-Grained Flood Basalt
			Tb2/3_a	
Eocene-Oligocene	Yemeni Trapp Series	Lower Acidic Volcanics and Sediments	Tr1_c	Predominantly Rhyolite; Yellow, Grey, Green and Pink Coloured.
			Tr1_b	Flow-Banded, Holocrystalline Rhyolitic Stocks, Water-Laid Sandy Tuffaceous Interlacations
		Lower Basalt and Lahima Volcaniclastics	Tb1_b	Alkali Olivine Basalt, Greenish Black, Gabbroic Silltype Intrusion, Lahars and Conglomerates, Intercalated Sediments (Lower Basalt)
			Tb1_a	Tuff Layers, Dark Gray and Greenish, Black Shale, Coal Horizons, Limestone, Basaltic Pillow Lavas (Lahima Volcaniclastics)
Hauterive - Eocene	Medj-Zir	Tawilah and Medj-Zir Sandstones	Tm & Kl	Sandstone, Fine to Coarse Grained, Conglomeratic Layers
	Tawilah			
Oxfordian - Kimmeridgian	Amran	Amran Limestone	Jas	Limestone and Dolomite, Massive, Thick; Alternating Fossiliferous Marl and Limestone

^{*)} Lithological units and subunits are mapped from Landsat data on the basis of spectral and textural image properties and their respective topographic exposure in the used DEM. They are assigned to lithological units from the reference geological map (BGR, 1991). Field observations are incorporated from a completed limited ground truthing campaign.

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Projection UTM, Zone 38
Spheroid WGS84, Datum WGS84

Mapping Base:

Remote Sensing Data:
Landsat ETM Colour Composite 741; Spatial Resolution 30m; Path/Row: 16649 from 20.09.2001
Spot 5 Colour Merge Mosaic; Spatial Resolution 2.5m; Path/Row: 146318; 146319 from 05.09.2004

Digital Terrain Model: NASA Shuttle Radar Topography Mission (SRTM) 2000; Spatial Resolution 90 m; C-Band

Geological Reference Maps and Data:
Geological Map Sana'a, Sheet 15 G, 1:250 000, The Natural Resources Project, Ministry of Oil and Mineral Resources, Oil and Mineral Cooperation, Mineral Exploration Board, Republic of Yemen, By Robertson Group.

Geological Map of the Yemen Arab Republic, Sheet Sana'a, 1:250 000, Ministry of Oil and Mineral Resources, Sana'a, Republic of Yemen/Federal Institute of Geosciences and Natural Resources Hannover, 1991, Federal Republic of Germany. By W. Kruck and U. Schäfer.

International Lexicon of Stratigraphy Volume III, Republic of Yemen: Second Edition, Completely Revised, Updated and Expanded, 1998. IUGS Publications No. 34, by Zaid R. Beynon, Mustafa A. Al-Sun, Hamed El Nakhai, Ismail N. Al-Garad, Rasheed S. Barabai, Abdul Salter O. Nari and Mohammad H. Al-Aswahi

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Scale 1 : 50000

