

# Sana'a Basin Water Management Project

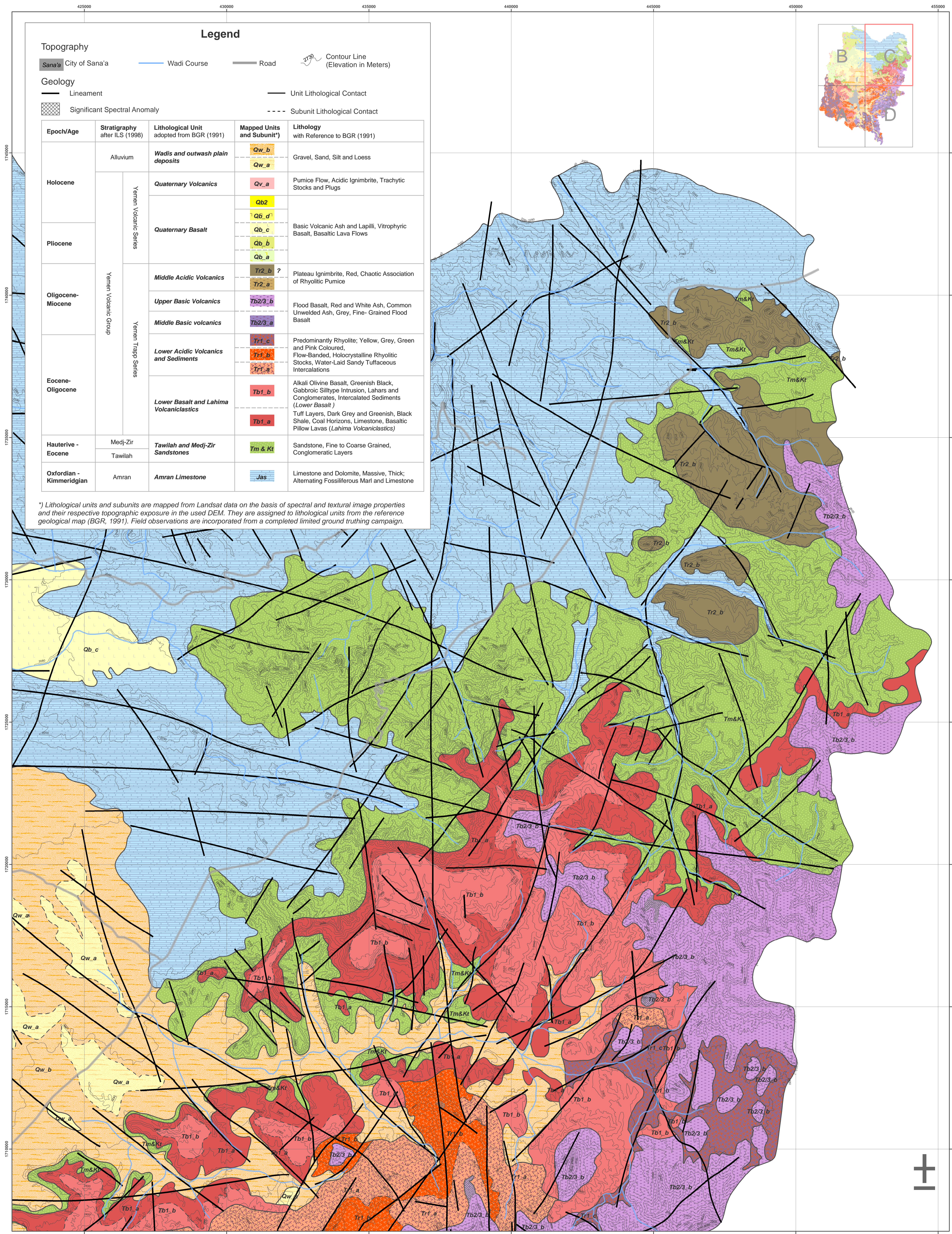
Satellite Imagery / Data Analysis Study along with Ground Truth and Meteorological Monitoring

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

-Republic of Yemen-



## Compiled Geological Map Sheet C



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	
	Yemen Volcanic Series	Quaternary Volcanics	Qv_a	Pumice Flow, Acidic Ignimbrite, Trachytic Stocks and Plugs
			Qb2	
Pliocene	Yemen Volcanic Series	Quaternary Basalt	Qb_d'	Basic Volcanic Ash and Lapilli, Vitrophyric Basalt, Basaltic Lava Flows
			Qb_c	
			Qb_b	
			Qb_a	
Oligocene-Miocene	Yemen Volcanic Series	Middle Acidic Volcanics	Tr2_b ?	Plateau Ignimbrite, Red, Chaotic Association of Rhyolitic Pumice
			Tr2_a	
			Tb2/3_b	
			Tb2/3_a	
Eocene-Oligocene	Yemen Tappa Series	Lower Acidic Volcanics and Sediments	Tr1_c	Predominantly Rhyolite; Yellow, Grey, Green and Pink Coloured, Flow-Banded, Holocrystalline Rhyolitic Stocks, Water-Laid Sandy Tuffaceous Intercalations
			Tr1_b	
		Lower Basalt and Lahima Volcaniclastics	Tb1_b	Alkali Olivine Basalt, Greenish Black, Gabbroic Silltype Intrusion, Lahars and Conglomerates, Intercalated Sediments (Lower Basalt)
			Tb1_a	
Hauterive - Eocene	Medj-Zir	Tawilah and Medj-Zir Sandstones	Tm & Kt	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.

Prepared by:  
**GAFAG**  
GAF AG  
Arnulfstr. 197  
80634 München  
Germany

Prepared for:  
REPUBLIC OF YEMEN  
Ministry of Water and Environment  
Sana'a Basin Water Management Project  
PROJECT Coordination Unit (PCU)

In Association with:  
**VISTA**  
VISTA GmbH  
Anton-Ferrel-Str. 11  
D-82234 Wessling  
Germany

Ghayth Aqatech Ltd.  
Hajrat Asasim Building # 8  
PO Box 7219  
Sana'a  
Republic of Yemen

Projection UTM, Zone 38  
Spheroid WGS84, Datum WGS84

Mapping Base:  
Remote Sensing Data:  
Landsat ETM Colour Composite 741; Spatial Resolution 30m; Path/Row: 166/49 from 20.09.2001  
Spot 5 Colour Merge Mosaic; Spatial Resolution 2.5m; Path/Row: 146218; 146219 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 Geoscience 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.L. Al-Sun, Hamed El Nakhai, Ismail N. Al-Garad, Rasheed S. Barabai, Abdul Salter O. Nani and Mohammad H. Al-Asawah

