

## TECHNICAL REPORT NO. 10

# Delineation of Surface Water Protection Zones for the Mujib Dam

Authors: Dr. Armin Margane, Dr. Ariane Borgstedt (BGR);  
Ali Subah, Zakkaria Hajali, Thair Almomani (MWI);  
Ibraheem Hamdan (BGR)  
With contributions from Mohammad Atrash, Ayman Jaber  
(both MWI), Ali Kouz and Farouk Jawal (both JVA)

Commissioned by: Federal Ministry for Economic Cooperation and  
Development (Bundesministerium für wirtschaftliche  
Zusammenarbeit und Entwicklung, BMZ)

Project: Groundwater Resources Management

BMZ-No.: 2005.2110.4

BGR-Archive No.: 0126002

Date of issuance: November 2008

No. of pages: 132

## Summary

The Mujib dam was constructed during the years 1999 to 2002. Impoundment started in winter 2003/04. Since December 2004 the dam was filled at almost all times to full capacity, until in April 2007 water was released to the new conveyor at the Dead Sea. From the dam, the surface water is conveyed by open channel flow in the Wadi Mujib to its mouth where surface runoff is collected by a conveyor line which runs along the shore of the Dead Sea from Wadi Mujib to Sweimeh. There, all surface water collected from the Dead Sea side wadis is treated and then pumped to Amman as well as the hotels at the northern end of the Dead Sea.

The maximum storage capacity of the Mujib dam is 31.2 MCM (live storage: 27.5 MCM). It has an annual safe yield of 16.6 MCM. Average flow expected to be collected by the Mujib diversion weir at the mouth of Wadi Mujib is around 42 MCM/a. The intention is to convey 30 MCM/a from Wadi Mujib to Amman and the hotel area at the Dead Sea and another 12 MCM/a to the Southern Ghor (the total volume of water collected by the diversion weirs at all Dead Sea side wadis from Wadi Mujib to the north is expected to be around 53 MCM/a). In the south it will be used to supply the mining and processing industries, such as the Arab Potash Company (APC), the Salt Factory, the Magnesium Factory and the Bromine Factory (altogether approx. 10 MCM/a),

and provide additional water for irrigation to the Ghor Mazra'a area (approx. 2 MCM/a).

The proposed surface water protection zones aim to improve the quality of the drinking water provided by the Mujib Dam. Moreover, they may serve as a tool for an improved landuse planning in the catchment area as well as an example for selection of dam sites based on existing landuses and landuse planning in general in such an environment. A number of landuse restrictions are proposed to reduce contamination risks, especially pertaining to agricultural management, livestock farming and mining.

Protection zone 1 covers the area extending from the highest possible level of the reservoir 100 m in the upstream direction. The existing fence, erected by JVA at the boundary of the land acquired during construction of the dam, in many cases meets this criterion. However, this fence is not existing in all parts of protection zone 1 and farmers have started cultivating land in zone 1 directly next to the reservoir. JVA needs to enforce the ban on public access in all parts of the new protection zone 1.

If it is planned to construct touristic sites near the Mujib reservoir, they have to apply sound environmental practices and be closely monitored because these activities may have considerable negative impacts on the water quality.

Protection zone 2 was delineated according to the proposed amendment of the 'Drinking Water Resources Protection Guideline' (MARGANE & SUBAH, 2007) because there would remain a high risk of pollution for the reservoirs' water if the existing 'Drinking Water Resources Protection Guideline' would be applied instead.

Protection zone 2 extends onto the plateau area, to where the slope angle becomes less than 2° and covers an area of 91 km<sup>2</sup>. The main landuse restrictions proposed in this area comprise:

- the prohibition/relocation of farming and scattered settlements in the valley area near the dam (protection zone 2);
- the establishment of a wastewater collection and treatment system for all villages near the dam on the plateau area to the north of the dam or an appropriate other solution which seeks to safeguard the water quality;
- the enforcement of the ban on mining and the abolishment of all mining activities in the Mujib area (below 700 m asl).

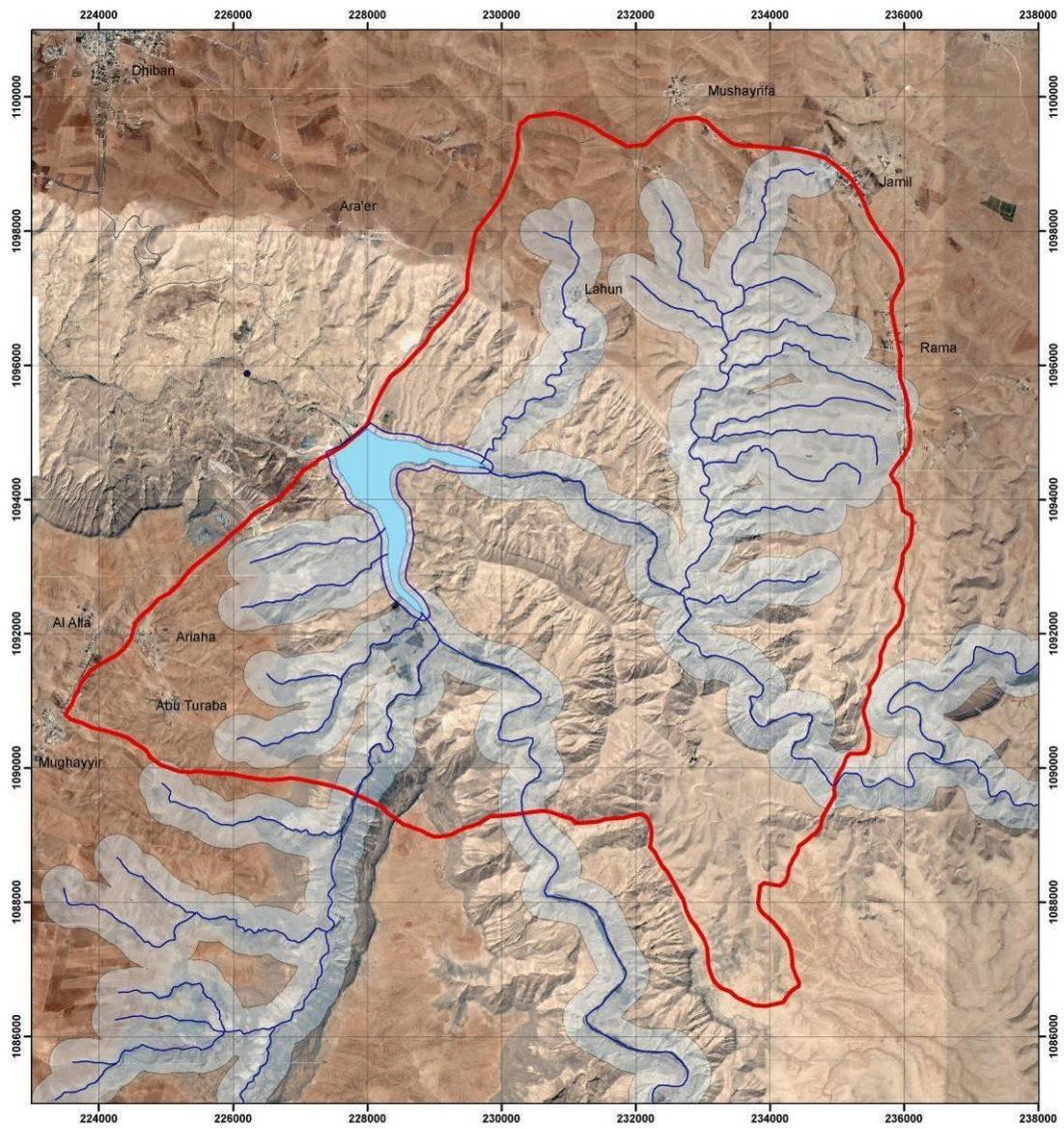
Protection zone 3 covers the entire surface water catchment area and measures about 4,408 km<sup>2</sup> in size. The existing landuses are assumed to constitute only a low risk to the surface water resources of the Mujib reservoir.

In contrast, the proposed oilshale mines and processing plants may have a considerable negative impact on the lake's quality. It is urgently recommended to conduct a very thorough environmental impact assessment for the envisaged facilities with special emphasis on the possible negative impact on the Mujib reservoir.

Surface water from the dam is released whenever needed and flows in the lower Wadi Mujib towards the Dead Sea. Before entering the Dead Sea it is

collected and transferred to the north and south. Since a large share of it will finally be used for drinking purposes, the entire lower Wadi Mujib from the dam to the Dead Sea also urgently needs to be protected from pollution.

Concerning the implementation of the landuse restrictions and other protection measures proposed in this document, it is recommended to prepare an implementation plan and follow up on the status of implementation through a committee which involves all major stakeholders.



**Protection Zone 2 for the Mujib Reservoir and its Major Contributing Wadis**