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1. INTRODUCTION

1.1 The initiative

In 1996 the proponent (Bitumarin) requested DGIS¹ for an ORET grant² for delivery of materials, equipment and transfer of knowledge for the lining of one kilometre of the Ismailia canal in Egypt. The transaction is to be considered as a pilot project, which if successful, may find large-scale application in lining of irrigation canals in the Nile Delta.

In this pilot project Bitumarin introduces the Hypofors lining material, which has been developed for the Dutch Delta Works and which finds many forms of applications in hydraulic constructions. The combination of concrete blocks and an impermeable Hypofors bituminous liner (HB lining system) is suitable for construction of linings for irrigation canals under wet conditions. The pilot project (testing of the HB lining system on a trial of one kilometre) will provide information necessary to judge the technical feasibility of this lining system. In the ORET grant two objectives are mentioned:

1. Main objective: To test the lining system on the possibilities of wide scale application in order to prevent present substantial leakage in those sections of the canal situated in sandy soils and, at the same time to reduce maintenance costs of the canal.
2. Second objective: The expansion of the discharge capacity of the canal.

The project has been approved in January 1998 by both the Egyptian Government and the Netherlands Government. The actual implementation of the project in the field started in 2000. The present planning is to complete the technical works in 2000. The duration of the monitoring programme is 18 months. After completion of the works monitoring of the effects of lining will be supposed to continue for one year in order to get insight in the effectiveness of the lining system.

On request of DGIS the Commission submitted the following advisory reports:

- Advice for Terms of Reference for the environmental impact statement / technical and financial feasibility study for lining of the Ismailia Canal, Egypt; 20 June 1996.
- Advisory review of the monitoring programme for the Lining of the Ismailia Canal Pilot project, Egypt; 16 March 2000.

¹ DGIS = The Directorate General for International Cooperation, the directorate of the Ministry of Foreign Affairs charged with the implementation of development cooperation.

² ORET = "Ontwikkelingsrelevante Export Transacties" – Export Transactions relevant for Development.

1.2 Justification of the approach

By letter dated 21 June 2000 DGIS requested the Commission to review the monitoring programme at the site in Egypt, see appendix 1. Therefore, the Commission visited Egypt from 28 June to 1 July. For the composition of the working group and the programme of the visit see respectively appendix 2 and 3.

The main objective of the visit was to assess:

- the installed monitoring network;
- quality of the data gathering, -analysis and -presentation;
- the necessity for the execution of an EIA on the short term.

The advice on Terms of Reference (ToR) for this pilot project prepared by the Commission in 1996 (see appendix 4) has been used as a review framework.

During the site visit the Commission observed that the results of the monitoring programme could not be assessed in isolation from the technical works in execution. Therefore, the execution of the technical works has also been considered by the Commission, as far as relevant for the quality of the monitoring programme.

The review findings are based on observations of the working group at the site and discussions with interested parties. The main findings are presented in chapter two. More detailed findings on the monitoring programme and the technical works are respectively presented in appendix 5.

2. MAIN FINDINGS AND RECOMMENDATIONS

2.1 Monitoring programme

The Commission observed a considerable delay in the progress of the lining of the one kilometre canal section, as well as in the execution of the monitoring programme, when compared to planning.

The Commission is of the opinion that in general the quality of the monitoring programme has improved compared with the situation in July 1999 and is according to standards since the Research Institute for Ground Water (RIGW) has become responsible for the programme as a whole in 2000.

The monitoring network: The set up of eight lines of piezo meters and the extension of the number of piezo meters to 49 in January and February 2000 provides a sufficient number of measurement points for the execution of an adequate monitoring programme.

Data gathering: The RIGW and the General Directorate for Water Distribution in the Delta-Tanta are responsible for data gathering of the installed network. The General Directorate for Water Distribution in the Delta-Tanta is also responsible for discharge measurements. Data gathering is executed according to standards. The Commission has confidence in the coordination of data exchange between these two institutes.

Data analysis and presentation: The RIGW is responsible for analysis and presentation of data. During the visit of the Commission monitoring results were not yet available. On basis of a presentation of the proposed analysis the Commission is of the opinion that the analysis and presentation will be executed properly. The second progress report on monitoring will be submitted by RIGW in the first week of July. This report has not been considered in this review, as the report will only present the baseline situation and will not include analysis of measurements.

Recommendation:

- The monitoring programme started in March 2000 and the duration is 18 months, 6 months during the lining and 12 months after completion of the lining. The Commission noticed that lining of the canal might draw out and will not be finalised in August 2000. Required measures should be taken in time to guarantee that monitoring of the ground water will be continued for one year after completion of the lining in order to get insight in the effectiveness of lining.

2.2 The lining activity

The Commission observed that the actual lining started in March 2000 and a length of about 150 meters of canal embankment was covered with mattresses on the 1st of July. No start was yet made with lining of the bottom part of the canal apparently due to lack of proper equipment. To enable judgement of the technical feasibility and the waterproofness of the

construction, which is the main goal of the pilot, it is imperative that the pilot project is executed in accordance with the manual. This means a complete lining of the canal. Lining of only the embankments of the canal will not result in reliable data on seepage from the initiated monitoring programme and will hardly have any meaning for the pilot project. Moreover, if only the embankments will be lined some potential risks have to be taken into account:

- possible scouring at the edge of the slope mattresses; consequently, instability of the slope might occur;
- the effect of the changing of the ground water flow from the canal at the bottom end of the slope (piping influencing the stability of the embankment, effect on water logging).

Recommendation:

- The Commission recommends to execute the lining of the bottom at the same time with lining of the embankments of the canal. This implies that the bottom of the 150 meter canal section should be completed before the installation of the mattresses on the embankments will be continued.

2.3 Socio-economic considerations

If lining of the canal is technically successful seepage to the surroundings reduces. The monitoring programme will show to what extent seepage will decrease. Decrease of seepage directly influences the production circumstances of the farmers living adjacent to the canal. That is a major impact of lining. Indirectly, decrease of seepage might cause expansion of the area with salinization problems in the direction of the canal. These environmental and socio-economic impacts are not planned to be studied. This pilot project offers good opportunities to study these impacts and take this information, besides information on the technical feasibility, into consideration for the decision on large scale application of the HB lining system in canals.

Recommendation:

- The Commission suggests to study the environmental and socio-economic impacts by preparing a land use map and executing a rapid rural appraisal under farmers. In appendix 6, Terms of Reference are provided to carry out this study.