

**REHABILITATION OF THE HELMAND VALLEY
IRRIGATION AND DRAINAGE SYSTEM**

And

Information about Kajakai Power Plant and
The Completion of Kajakai Gates and Spillway
Construction Project

By

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Presented to:

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Introduction:

The Helmand project has been under development since the 1950's. It includes the following undertakings:

- Construction of the reservoir dam and power plant in Kajakai,
- Construction of the Bughra Canal, Shamalan Canal, and Derwishan Canal,
- Development of Seraj Canal,
- Improvement of drainage networks,
- Development of related structures and facilities.

The Kajakai power plant currently generates 33 MW of electricity, and has a maximum generation capacity of 150 MW. The Bughra Power plant generates 680 kW. The irrigation network serves approximately 127,000 hectares, and has the potential to serve an additional 123,000 hectares, for a total service capacity of 250,000 hectares.

This report is comprised of two parts, (1) irrigation, drainage and Kajakai Power Plant, and (2) Kajakai Gates and Spillway Project.

1. Irrigation, Drainage and Kajakai Power Plant

The irrigation and drainage network includes the Bughra Canal and its related structures, Shamalan Canal and New Shamalan, Derwishan Canal, Seraj Canal, Kajakai Power Plant, and irrigation tunnels.

Due to the lack of maintenance and control of the water distribution the system has been damaged extensively. Canals and drains are filled with sedimentation and debris, control structures are not functioning properly, and illegal use of water caused the downstream lands to be destroyed. The affect of last four years of drought made the condition even worst.

a. Bughra Canal:

The Bughra Canal has a length of 75 km and a flow rate of 72.4 cubic meters per second (cu.m/s). It irrigates approximately 21,590 hectares of land.

Bughra Intake Structure:

Burgha has four radial gates at its intake structure, three radial gates at its spillway, and various concrete and masonry dikes. The changing path of the river is currently threatening the stability of the intake structure. In 2000, a UN-OPS team completed the survey and design of a diversion dike to protect the existing headwork structure and to

control its flow path. According to Mr. Khaliq Daweri, head of the Helmand Valley Authority (HVA), the final design report is with the UN-OPS office in Kabul. It is imperative that the UN office be contacted for a copy of the study.

Other observations include:

- Of the four radial intake gates and their support balancers, one gate and support balancer is broken, leaving the gate in closed position.
- The lifter hook of one of the three spillway gates is busted, leaving the spillway gate inoperable.
- The structure wing walls backfill and the down stream left berm have been washed out.

Bughra main canal and related structures:

Our team's assessment of the main canal and related structures provided the following observations:

- The designed capacity of the canal has been decreased due to sedimentation and growth of vegetations.
- The service road for the canal is in very poor condition.
- The wing walls backfill of the control structures and outlet structures downstream stabilizers have been eroded.
- The control gates throughout the canal are in poor condition.

b. Shamalan Canal, and New Shamalan:

The Shamalan Canal has a length of 65 km and a capacity of 21.2 cu.m/s. The New Shamalan canal runs 38 km long and has a capacity of 11.2 cu.m/s. Both canals irrigate 29,200 hectares of land. At Shamalan Canal, Station 6+200, the river has washed out approximately 250 meters of the canal. The canal is reconnected at Station 8+500 with the help of a newly constructed bypass.

Our team's other observations included the following items:

- The capacities of both canals have diminished due to extensive sedimentation.
- The service roads are in poor condition.
- Most of the support structures have been damaged due to the improper maintenance.
- The control gates are in poor condition and need urgent repair.
- The Shamalan Canal drop structure at Station 27+150 and the spillway structure have sunk in, and both structures are damaged beyond repair.

c. Derwishan Canal:

Derwishan canal runs 50 km long and has a capacity of 29 cu.m/s. It covers 38,300 of hectares irrigable land.

- The river has washed out the dike below the intake structure together with the right-side berm. Although attempts have been made to repair the damage, the berm remains to be fixed. The dike of the intake structure needs to be redesigned and reconstructed.
- The canal capacity has diminished due to extensive sedimentation.
- The canal service road is in poor condition.
- Most of the structures have been damaged and some of the intake and spillway gates are inoperable.

d. Seraj Canal:

The Seraj canal is 62 Km long, and has a capacity of 12 cu.m/s. It covers 21,350 hectares of irrigable land.

Observations:

- The intake gates and structure are in good condition.
- Canal capacity has been decreased due to sedimentation.
- The service road and the gates are in poor condition.

e. Kajakai Power Plant and irrigation tunnels:

The powerhouse is generally in good condition, and requires only minor repairs. Perhaps the only major issue lies with the irrigation tunnel jet valve, which is stacked and remains open at 35 percent.

The irrigation tunnel slide gate has never been utilized due to a fear that if operated, the gate might become damaged.

2. Kajakai Gates and Spillway Project:

Background Information:

The Kajakai project study was performed by the International Engineering Company (IECO) and designed by HERZA Engineering Co. Construction started in 1978 by the

Helmand Construction Corporation (HCC), but was stopped short of completion in 1980. All of the construction equipment, materials, mechanic shops, warehouses and the offices are either ransacked or destroyed.

The following areas remain to be completed:

- Elevating the dam by one meter
- Raising the crest of the emergency spillway by 4 meters. Note that construction of seven piers and the bridge are about 40 percent complete
- Installing radial gates
- Completing the construction of the remaining 10 percent of the drainage tunnel
- Completing the remaining 10 percent excavation of the auxiliary spillway

With the completion of the project the reservoir capacity will increase from 1.3 million cu.m to 2.7 million cu.m, which will increase the irrigated land from 127,000 hectares to 250,000 hectares. With the reservoir capacity increase four more turbines can be installed, and the power generation will increase from 33 MW to 150 MW.

Based on our survey, 40% of the project was completed. The project cost was estimated to be \$17,000,000 in 1997. With the inflation rate of 2.5% per year, the remaining 60% would cost 10,200,000.

Recommendation:

Previously, both the Helmand Valley Authority (HVA) and the HCC shared the responsibility for performing maintenance of the irrigation and drainage networks. However, no maintenance work has been performed during the past 20 years. Due to the lack of maintenance, the canals and the drainage system have been filled with extensive sedimentation and debris.

The quantity estimate for rehabilitation of the project is prepared with the help of the HVA office.

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|---|------------------------------|
| 1. Cleaning 70 km of Bughra Canal | approximately 1,050,000 cu.m |
| 2. Cleaning 45 km of Derwishan Canal | approximately 180,000 cu.m |
| 3. Cleaning 90 km of Shamalan Canal | approximately 540,000 cu.m |
| 4. Cleaning 58 km of Seraj Canal | approximately 208,000 cu.m |
| 5. Cleaning 550 km of drainage | approximately 275,000 cu.m |
| 6. Repairing and grading service roads | approximately 1,360 km |
| 7. Repairing damaged concrete | approximately 400 cu.m |
| 8. Repairing six gates | |
| 9. Checking and operating gates at Kajakai dam. | |
| 10. Checking and operating jet valves | |

We recommend the temporary establishment of an authority under the direct supervision of the AACCA, or to combine HVA maintenance department and HCC's Chah-i-Anjir unit to rehabilitate the Helmand irrigation project. The new authority will be comprised of trained staff from HCC's Chah-i-Anjir unit and HVA's maintenance section. The camp in Chah-i-Anjir is a desirable operations base for the new authority where it can use the camp's entire office building, warehouse and the shops. Upon completion of the project, the facility together with the equipment can be transferred to HVA for future maintenance needs.

The farmers should follow the future maintenance of the project. HVA should help the farmer to establish associations for future maintenance and water distribution control. The transfer of the maintenance from HVA to the farmers should take place in phases. Phase one; the system should be rehabilitated by the HVA with farmers to clean small channels. Phase two, should be started with selling of small equipments to the farmers and providing credit to maintain the small irrigation channels and drains. HVA should maintain the major canals. Phase three, should be the complete transfer of the maintenance to the farmers. The association also can be created in each district, such as Saraj area, Upper Bughra, Nadi-I Ali, Shamalan, Marja, and Derweshan.

We also recommend that the Afghan government help re-establish HCC as a corporation with some private investor participation. HCC will then be responsible for the completion of the Kajakai, Salma, Khanabad, and Kamal Khan development projects. It is estimated that the unfinished works will be completed within two years. After that time, the HCC may be transferred to private ownership.

Inventory

Our team performed a walk thru of HCC and HVA facilities in order to assess the qualified personal and perform equipment inventory. The following list shows major equipments owned by HVA and HCC, together with equipment that will be needed in order to complete the project in twelve-months. Note that the equipments proposed herein are preliminary, and may be modified per actual project needs.

Equipment Type	HVA	HCC	Proposed
Dozer	Russian 1 ea.	*Komatsu 55 1 ea & 55A 2 ea.	250 to 300 Hp 1 ea.
Motor Grader	1	Russian Brand 2 ea.	150 to 200 Hp 1 ea.
Dragline	3	Russian Brand 2 ea.	70 Feet Beam 1 ea.
Wheel Loader	4	0	Two Cu.m 1 ea.
Low Bed	1	1	50' to 80' Ton 1 ea.
Water Tank	1	0	20,000 Gal. 1 ea.
Crane	1 20 Ton	0	70 Ton 1 ea.
Dump Truck	1 ea.	0	3-5 Cu.m 6 ea.
Flat Bed Truck	1	0	5-10 Ton 4 ea.
Pick up Truck	0	0	4 ea.
Fuel & lube Truck	0	0	1 ea.
Back Hoe	0	0	1 Cu.m 2 ea.
Back Hoe Loader Combined	0	0	2 ea.
Mechanics Truck	0	0	1 ea.
Welding Machine	0	0	1 ea.
Compressor	0	0	300 cfm 1 ea.
Generator	0	0	5 Kw 4 ea. 200 Kw 1 ea.
Water Pump	0	0	4" in 4 ea.
Gas Tanker Truck	0	0	10000 Gal. 1 ea.
Two Way Radio	0	0	On six vehicles
Cell Phone	0	0	1 ea.
Bobcat	0	0	1 ea.
Gradal	0	0	1 ea.
Roller Compactor	0	0	10 Ton 1 ea.
Hand held Compacter	0	0	4 ea.
Concrete Mixer	0	0	1/2 cu.m 1 ea.
Concrete Vibrator	0	0	Air operated 4 ea.

*HVA and HCC equipment to be repaired.

To rehab the irrigation and drainage system by HVA/HCC an approximate cost estimate of the proposed equipment and repairing of the existing equipment and the facilities would be 3,600,000.00.

If the rehabilitation were to be undertaken by the private contractors, the approximate cost would be \$ 2,800,000.00.

Immediate Action Plan

For Rehabilitation of Helmand Irrigation and Drainage Project

April, 2002-04-17

A report for the rehabilitation of Helmand irrigation and drainage system has been submitted to the Afghan Assistance Coordination Agency (AACA) office in Kabul on April 5th, 2002.

This action plan is prepared to serve as a mobilization and the start of minimum rehab works, which will make a positive impact on the farmers and on the communities.

Introduction

The Helmand Construction Corporation (HCC), and Helmand Valley Authority (HVA) maintenance department previously maintained the Helmand irrigation project. The project hasn't been maintained in the last 23 years. Canals have lost its capacity due to the sedimentation and drains have been filled with debris. Access roads are in a poor condition. Most of the control structures and gates have to be repaired. Bughra Canal diversion dike was surveyed and designed by UN-OPS in 2000 and their office in Kabul has been contacted to obtain a copy of the design. Derweshan Canal diversion dike need to be surveyed and designed. One of the control structure on Shamalan canal should also to be reconstructed.

Recommendation

Until the equipment proposed with the previous report, the rehabilitation of some of the canals, drains and access roads could be started with this plan.

The preliminary estimate of quantities for rehabilitation of the project is as follows:

1. Cleaning 70 km of the Bughra Canal	1,050,000 cu.m
2. Cleaning 45 km of Derwishan Canal	180,000 cu.m
3. Cleaning 90 km of Shamalan Canals	540,000 cu.m
4. Cleaning 58 km of Seraj Canal	208,000 cu.m
5. Cleaning 550 km of drains	275,000 cu.m
6. Repairing and grading service roads	1360 km
7. Repairing six of the control gates	

The list of equipments required to complete the rehabilitation is attached. An inventory of the facilities, equipments and staff in HVA and HCC has been made in this month. It was concluded that the repairable equipment to be repaired and the essential staff from HCC Chah-i-Anjir units and HVA maintenance department be hired and a tentative list of description and numbers attached. The camp in Chah-I-Anjir, which has a central location and has workshops, warehouses, office and other facilities, can be rehabilitated with a minimal cost. Equipment operators, mechanics, surveyors, and some skilled labours are available locally.

The cost to rehab the Chah-i-Anjir camp, repair the equipments, purchase vehicles, supply fuel, spare parts, and hire the minimum labour and operators would requires \$303,500 for the first three months.

Preliminary cost estimate for the first three months

Operators	15	\$5/day	\$75/day	\$5,625
Mechanics	5	\$5/day	\$25/day	\$1875
Admin.	4	\$5/day	\$20/day	\$1500
Labour	10	\$2/day	\$20/day	\$1500
Fuel & Oil				\$13,000
Spare Parts				\$30,000
Vehicles				\$50,000
Repair of the facilities				\$200,000
Total				\$303,500

End

We recommend the temporary establishment of an authority under the direct supervision of the AACCA, or to combine HVA maintenance department and HCC's Chah-i-Anjir unit to rehabilitate the Helmand irrigation project. The new authority will be comprised of trained staff from HCC's Chah-i-Anjir unit and HVA's maintenance section. The camp in Chah-i-Anjir is a desirable operations base for the new authority where it can use the camp's entire office building, warehouse and the shops. Upon completion of the project, the facility together with the equipment can be transferred to HVA for future maintenance needs.

The farmers should follow the future maintenance of the project. HVA should help the farmer to establish associations for future maintenance and water distribution control. The transfer of the maintenance from HVA to the farmers should take place in phases. Phase one; the system should be rehabilitated by the HVA with farmers to clean small channels. Phase two, should be started with selling of small equipments to the farmers and providing credit to maintain the small irrigation channels and drains. HVA should maintain the major canals. Phase three, should be the complete transfer of the maintenance to the farmers. The association also can be created in each district, such as Saraj area, Upper Bughra, Nadi-I Ali, Shamalan, Marja, and Derweshan.

The transfer of irrigation system maintenance and establishing of the water user organization has been experienced successfully by the World Bank in Turkey. It was fortunate that an Afghan supervised the project; name Mr. Juma M. Mohamadi, current senior advisor to the AACCA. The model can be followed in Afghanistan, not only for Helmand project but also for other irrigation projects.

We also recommend that the Afghan government help re-establish HCC as a corporation with some private investor participation. HCC will then be responsible for the completion of the Kajakai, Salma, Khanabad, and Kamal Khan development projects. It is estimated that the unfinished works will be completed within two years. After that time, the HCC may be transferred to private ownership.