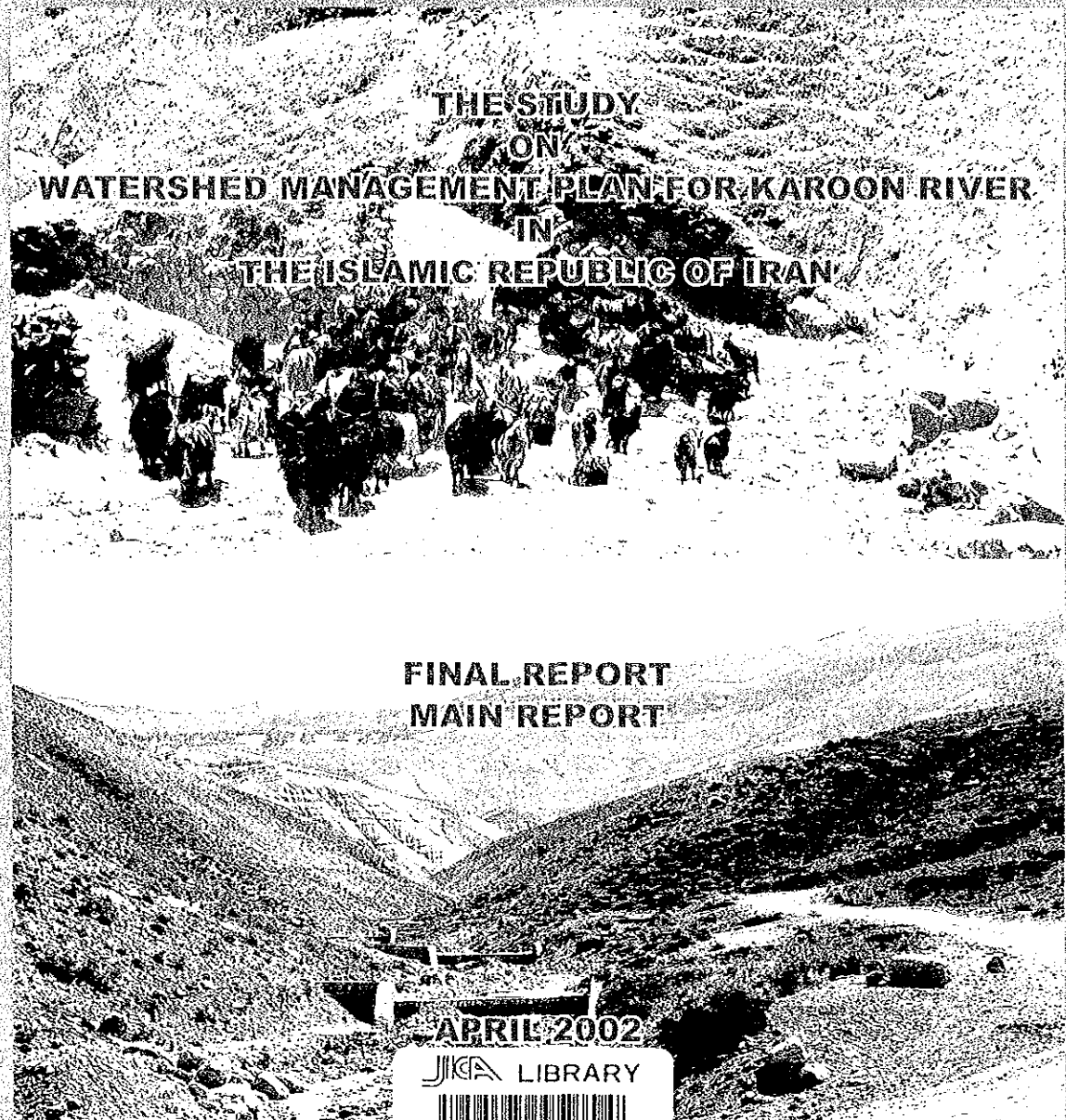


JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)  
WATERSHED MANAGEMENT DEPUTY (WMD)  
MINISTRY OF JIHAD AGRICULTURE  
ISLAMIC REPUBLIC OF IRAN



FINAL REPORT  
MAIN REPORT

APRIL 2002

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INA CORPORATION

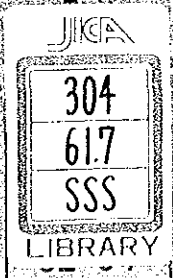
WATERSHED MANAGEMENT DEPUTY (WMD)  
MINISTRY OF JIHAD AGRICULTURE  
ISLAMIC REPUBLIC OF IRAN

THE STUDY ON WATERSHED MANAGEMENT PLAN  
FOR KAROON RIVER IN THE ISLAMIC REPUBLIC OF IRAN

FINAL REPORT  
MAIN REPORT

APRIL 2002

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JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)  
WATERSHED MANAGEMENT DEPUTY (WMD)  
MINISTRY OF JIHAD AGRICULTURE  
ISLAMIC REPUBLIC OF IRAN

**THE STUDY  
ON  
WATERSHED MANAGEMENT PLAN  
FOR  
KAROON RIVER  
IN  
THE ISLAMIC REPUBLIC OF IRAN**

**FINAL REPORT  
(MAIN REPORT)**

**APRIL 2002**

**SANYU CONSULTANTS INC,  
INA CORPORATION**

## **CURRENCY EQUIVALENTS**

(As of July 2001)

Currency Unit = Iranian Rials (Rls)

US\$ 1.00 = 8,000 Rls

US\$ 1.00 = 122.00 Japanese Yen

## **WEIGHT AND MEASURES**

Metric System



1169225(8)

## PREFACE

In response to a request from the Government of Islamic Republic of Iran, the Government of Japan decided to conduct a development study on Watershed Management Plan for Karoon River in Islamic Republic of Iran and entrusted the study to the Japan International Cooperation Agency (JICA).

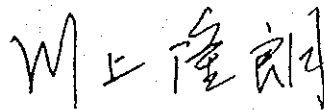
JICA selected and dispatched a study team headed by Mr. Hironori Takahashi of SANYU CONSULTANTS INC. and consist of SANYU CONSULTANTS INC. and INA CORPORATION to Iran, three times between February 2000 and April 2002. In addition, JICA set up an advisory committee headed by Masayuki Watanabe, Senior Advisor of JICA between February 2000 and April 2002, which examined the study from specialist and technical points of view.

The team held discussions with the officials concerned of the Government of Iran, and conducted field surveys at the study area. Upon returning to Japan, the team conducted further studies and prepared this final report.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of Iran for their close cooperation extended to the Team.

April 2002



---

Takao Kawakami

President

Japan International Cooperation Agency

April 2002

Mr. Takao Kawakami  
President  
Japan International Cooperation Agency  
Tokyo, Japan

**Letter of Transmittal**

Dear Sir

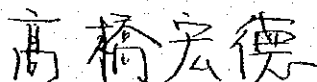
We are pleased to submit herewith the Final Report for the Study on Watershed Management Plan for Karoon River in the Islamic Republic of Iran, upon the completion of the study works. The Report, which describes sub-basin inventory and master plan of five selected areas in the field of natural disaster prevention, soil and vegetation conservation, agriculture and rural development, is compiled in reflecting the advices and suggestions of the authorities concerned of the Government of Japan and your good agency as well as the comments on Draft Final Report made by the Watershed Management Deputy of the Ministry of Jihad Agriculture

The upstream basin of the Karoon River occupies the highly elevated Zagros mountain ranges where floods, debris flows and landslides are prevailing because of the land degradation and subsequent soil erosion. In order to reduce the damage of the above-mentioned disasters, the Government of Iran has made efforts of promoting watershed management in the area.

The Study consists of two phases; Phase I inventory study and Phase II master plan study. The whole study area covers the upper Karoon watershed of 26,8000 km<sup>2</sup> area and Phase I Study is basic study for preparation of inventory on physical and non-physical features of 455 divided sub-basins, and selection of the areas for master plan study. Phase II Study is formulation of master plan for the integrated watershed management for the selected five sub-basin areas. The project purposes of the master plan include 1) mitigation of flood, debris flow and landslide damages, 2) control of soil erosion and conservation of water, 3) restoration and improvement of rangeland vegetation, 4) improvement of living standard, 5) improvement of agriculture product marketing and agriculture extension. In view of such series of envisaged advantages of the master plan, an early implementation thereof is sincerely expected.

Finally, we take this opportunity to express our heartfelt gratitude to your Agency and other authorities concerned of the Government of Japan as well as WMD and other agencies of the Government of Iran for close cooperation and assistance extended to Study Team during the course of the investigations and studies.

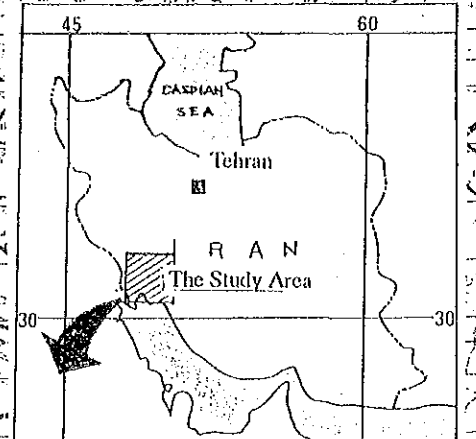
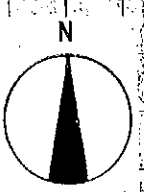
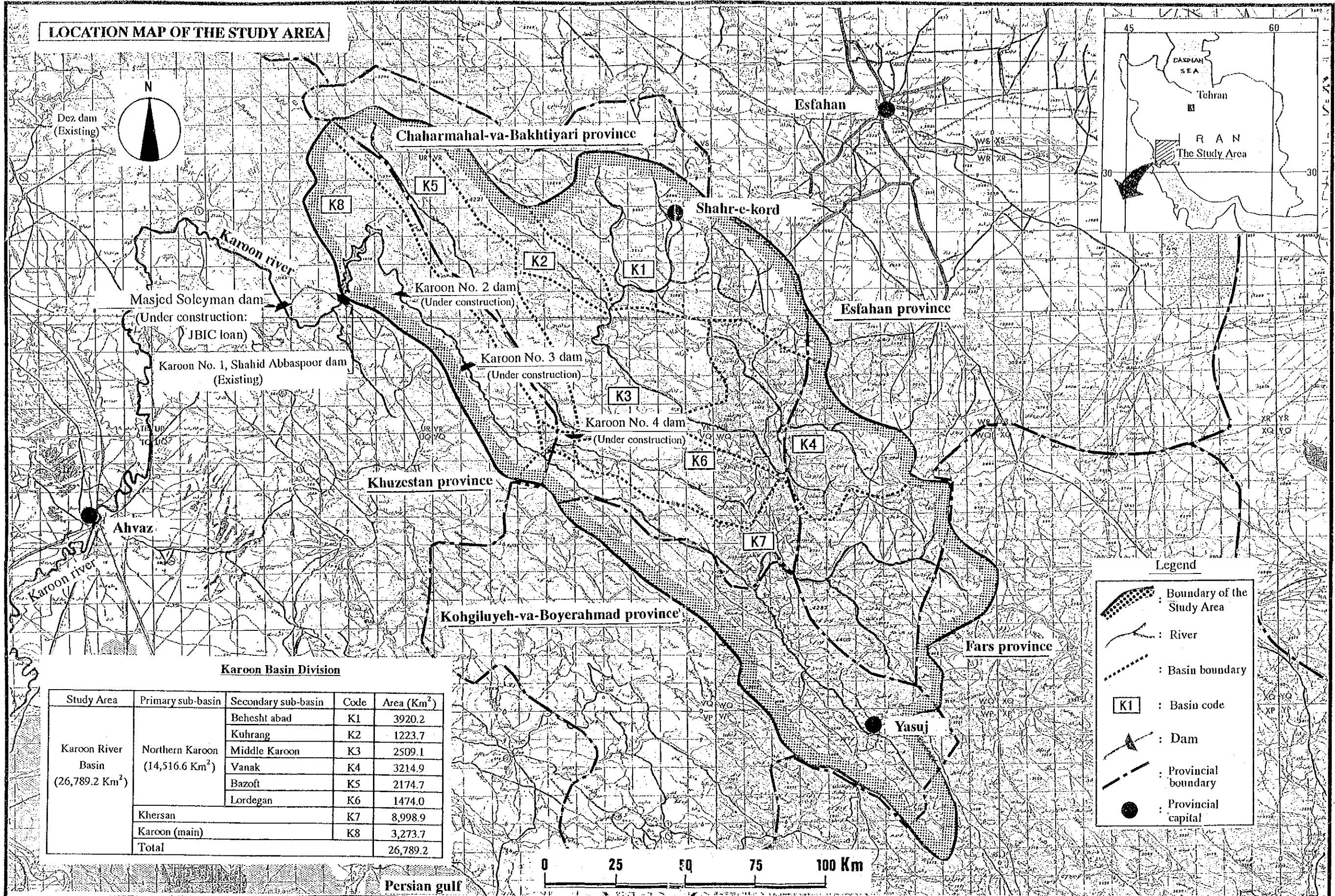
Respectfully yours,



---

Hironori Takahashi  
Leader of Study Team

**LOCATION MAP OF THE STUDY AREA**



**Karoon Basin Division**

Study Area	Primary sub-basin	Secondary sub-basin	Code	Area (Km <sup>2</sup> )
Karoon River Basin (26,789.2 Km <sup>2</sup> )	Northern Karoon (14,516.6 Km <sup>2</sup> )	Behesht abad	K1	3920.2
		Kuhrang	K2	1223.7
		Middle Karoon	K3	2509.1
		Vanak	K4	3214.9
		Bazoft	K5	2174.7
		Lordegan	K6	1474.0
	Khersan		K7	8,998.9
	Karoon (main)		K8	3,273.7
<b>Total</b>				<b>26,789.2</b>

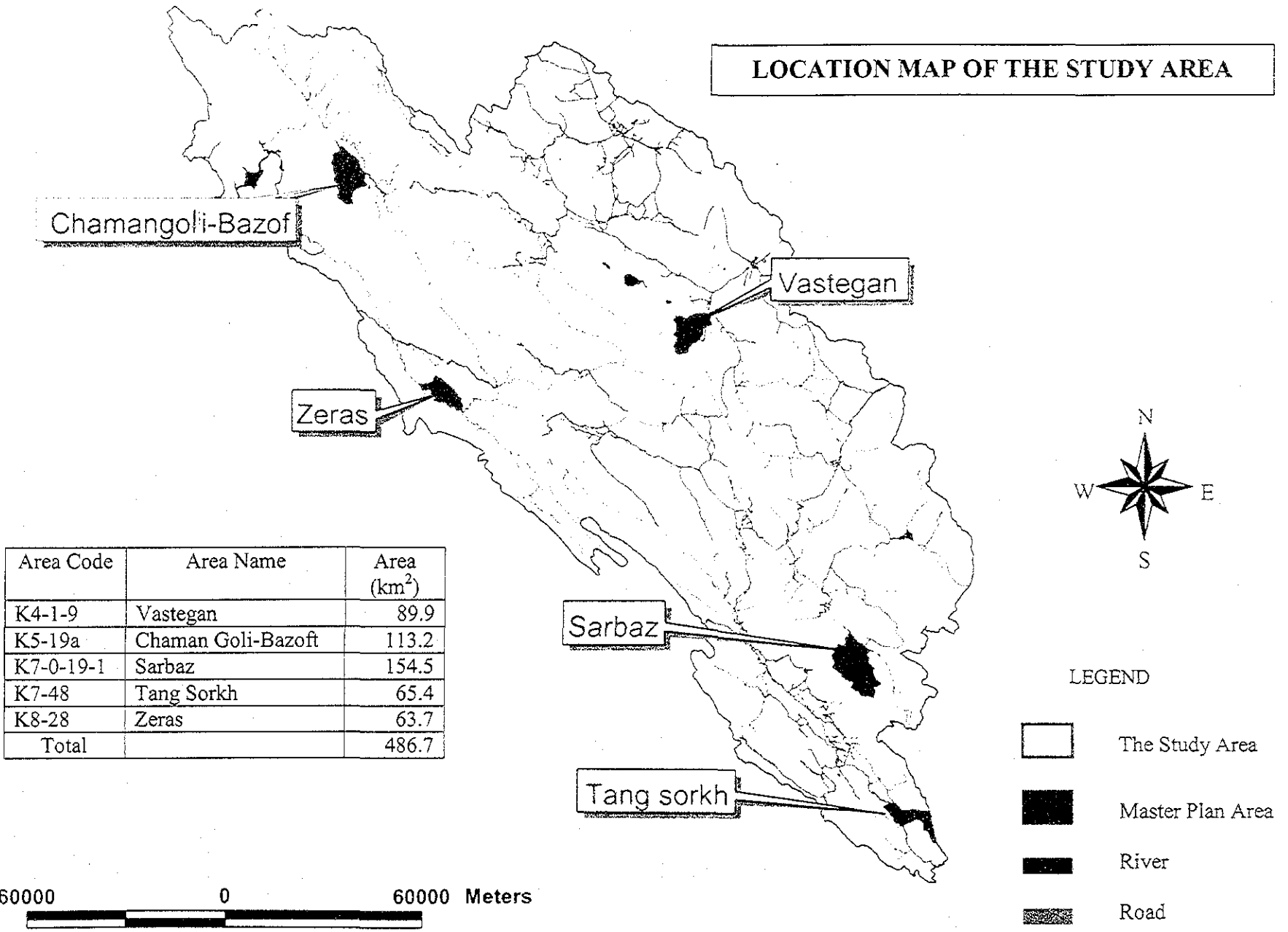
**Legend**

- : Boundary of the Study Area
- : River
- : Basin boundary
- : Basin code
- : Dam
- : Provincial boundary
- : Provincial capital



Persian gulf

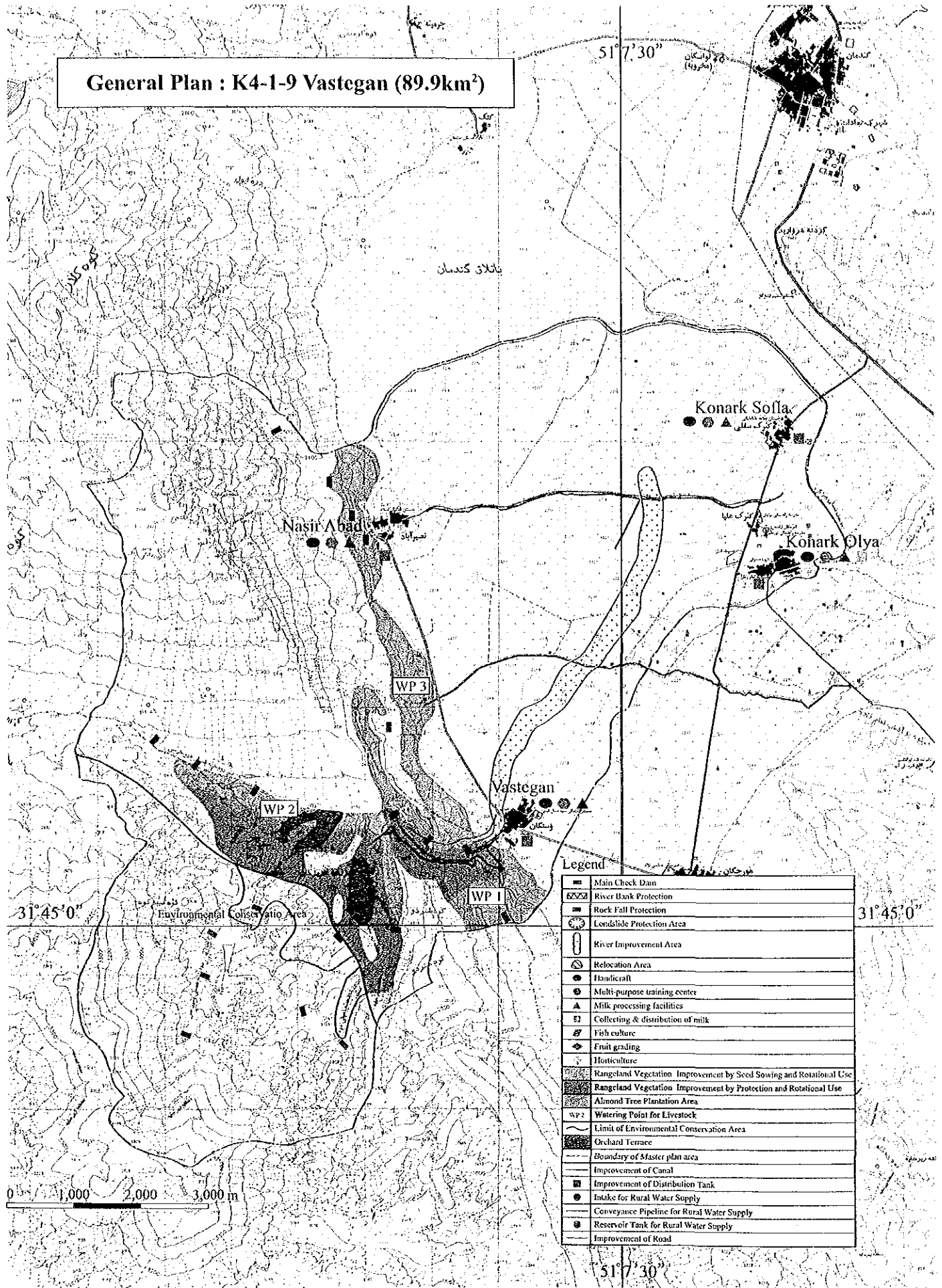
**LOCATION MAP OF THE STUDY AREA**



Area Code	Area Name	Area (km <sup>2</sup> )
K4-1-9	Vastegan	89.9
K5-19a	Chaman Goli-Bazoft	113.2
K7-0-19-1	Sarbaz	154.5
K7-48	Tang Sorkh	65.4
K8-28	Zeras	63.7
Total		486.7

60000 0 60000 Meters

**General Plan : K4-1-9 Vastegan (89.9km<sup>2</sup>)**



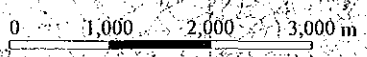
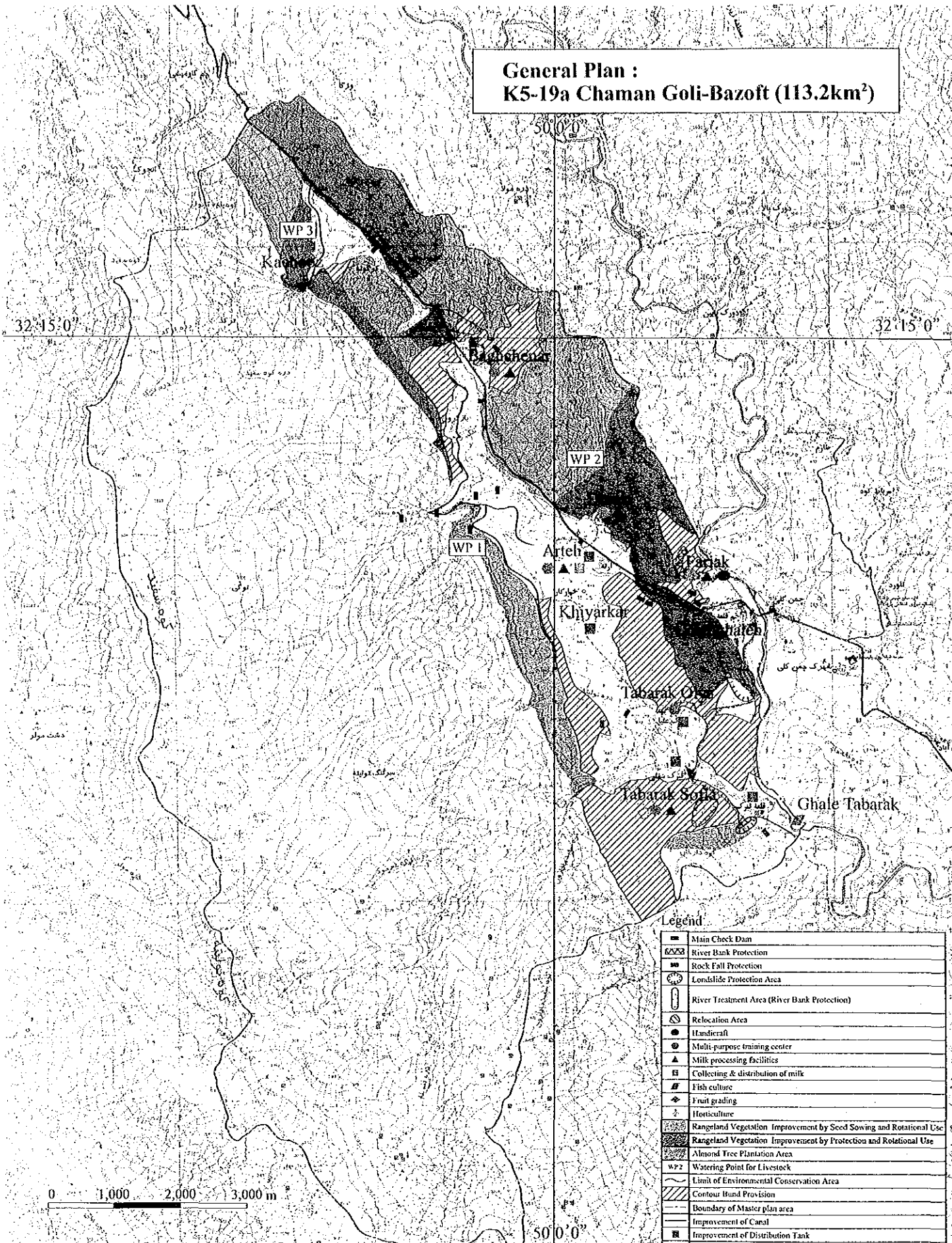
**Legend**

	Main Check Dam
	River Bank Protection
	Rock Fall Protection
	Landslide Protection Area
	River Improvement Area
	Relocation Area
	Handicraft
	Multi-purpose training center
	Milk processing facilities
	Collecting & distribution of milk
	Fish culture
	Fruit grading
	Horticulture
	Rangeland Vegetation Improvement by Seed Sowing and Rotational Use
	Rangeland Vegetation Improvement by Protection and Rotational Use
	Almond Tree Plantation Area
	Watering Point for Livestock
	Limit of Environmental Conservation Area
	Orchard Terrace
	Boundary of Master plan area
	Improvement of Canal
	Improvement of Distribution Tank
	Intake for Rural Water Supply
	Conveyance Pipeline for Rural Water Supply
	Reservoir Tank for Rural Water Supply
	Improvement of Road

0 1,000 2,000 3,000 m



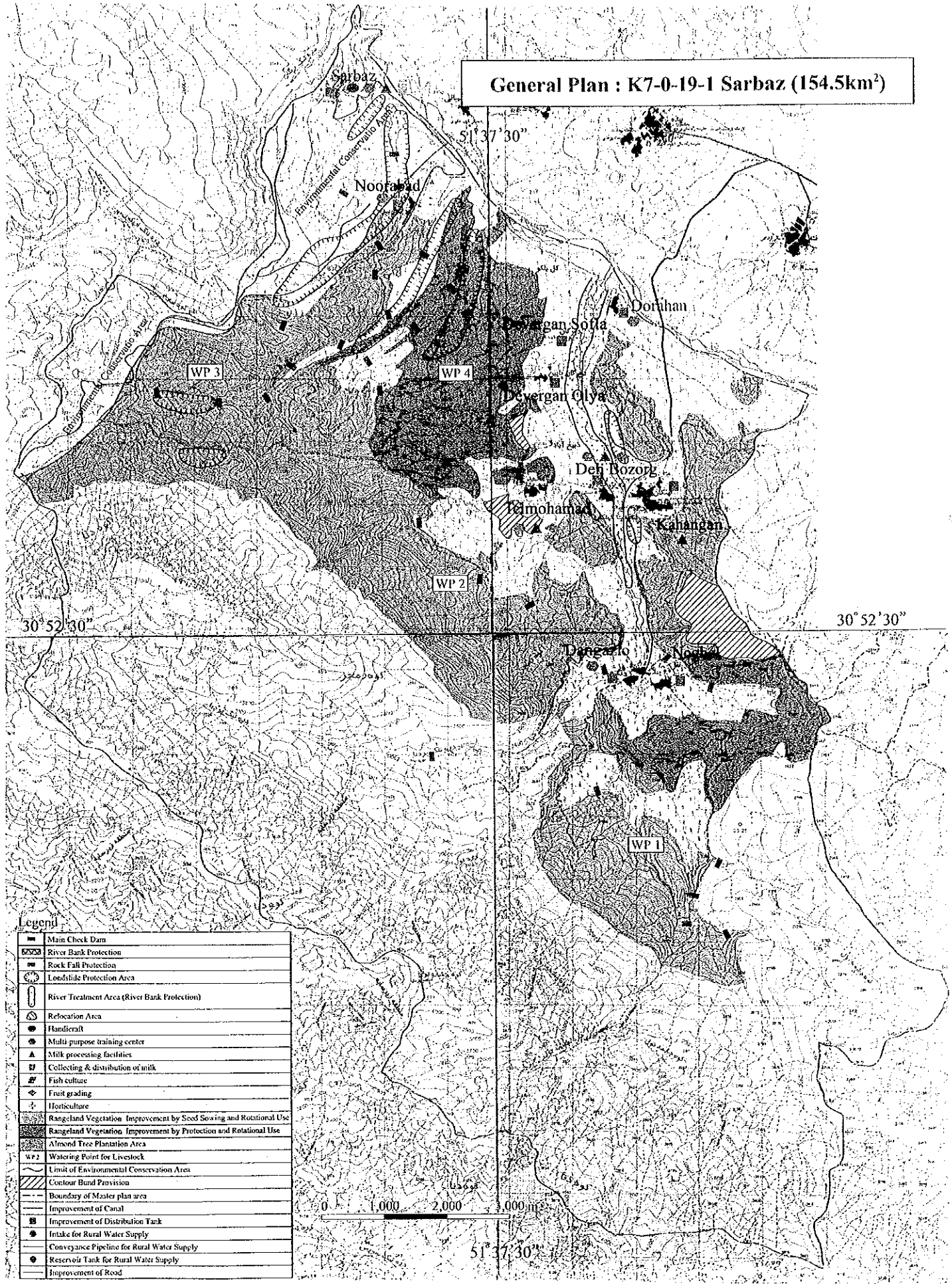
**General Plan :  
K5-19a Chaman Goli-Bazoft (113.2km<sup>2</sup>)**



**Legend**

	Main Check Dam
	River Bank Protection
	Rock Fall Protection
	Landslide Protection Area
	River Treatment Area (River Bank Protection)
	Relocation Area
	Handicraft
	Multi-purpose training center
	Milk processing facilities
	Collecting & distribution of milk
	Fish culture
	Fruit grading
	Horticulture
	Rangeland Vegetation Improvement by Seed Sowing and Rotational Use
	Rangeland Vegetation Improvement by Protection and Rotational Use
	Almond Tree Plantation Area
	WP 2 Watering Point for Livestock
	Limit of Environmental Conservation Area
	Contour Bund Provision
	Boundary of Master plan area
	Improvement of Canal
	Improvement of Distribution Tank
	Intake for Rural Water Supply
	Conveyance Pipeline for Rural Water Supply
	Reservoir Tank for Rural Water Supply
	Improvement of Road

General Plan : K7-0-19-1 Sarbaz (154.5km<sup>2</sup>)

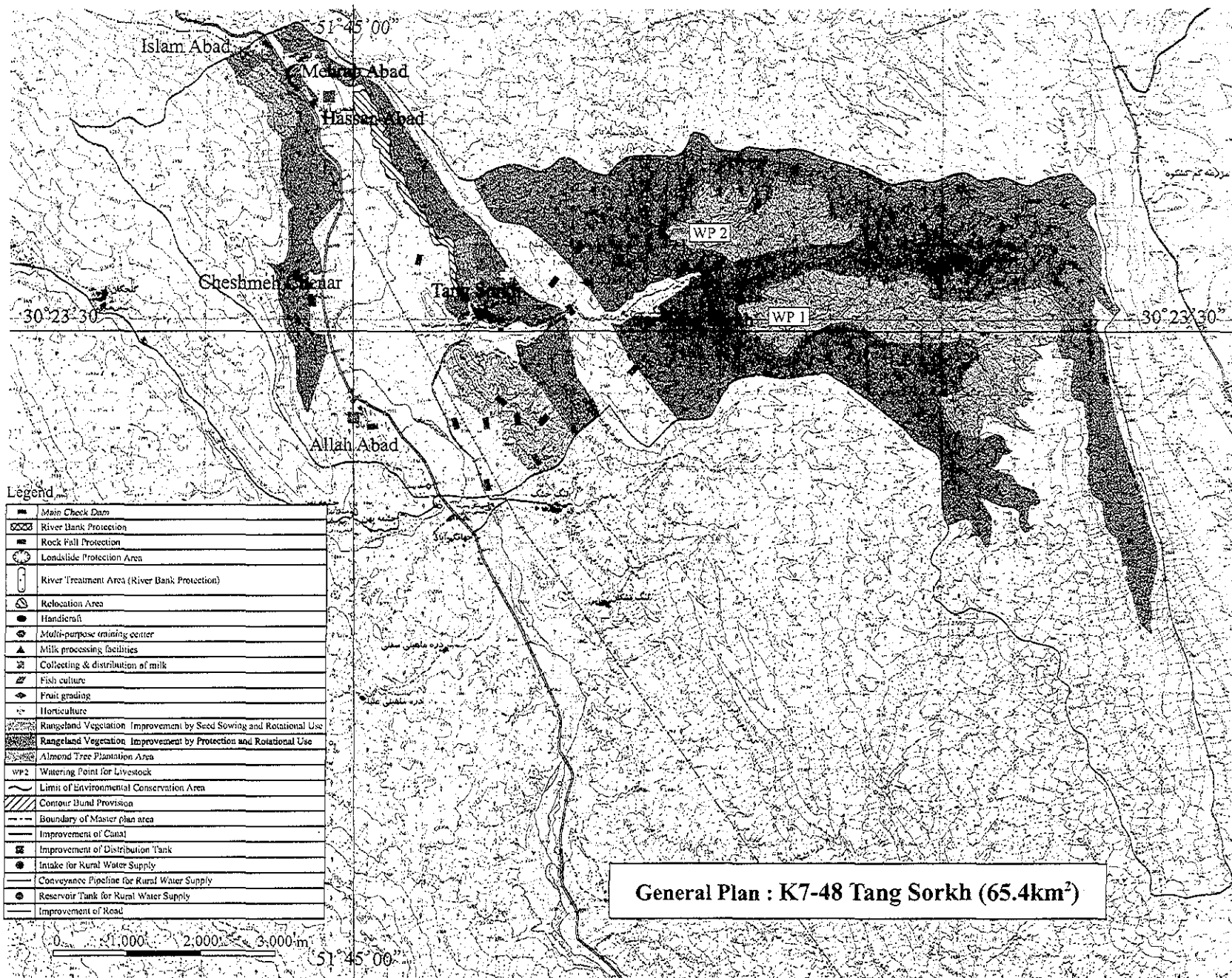


Legend

	Main Check Dam
	River Bank Protection
	Rock Fall Protection
	Landslide Protection Area
	River Treatment Area (River Bank Protection)
	Relocation Area
	Handicraft
	Multi purpose training center
	Milk processing facilities
	Collecting & distribution of milk
	Fish culture
	Fruit grading
	Horticulture
	Rangeland Vegetation Improvement by Seed Sowing and Rotational Use
	Rangeland Vegetation Improvement by Protection and Rotational Use
	Almond Tree Plantation Area
	Watering Point for Livestock
	Limit of Environmental Conservation Area
	Contour Bund Provision
	Boundary of Master plan area
	Improvement of Canal
	Improvement of Distribution Tank
	Intake for Rural Water Supply
	Conveyance Pipeline for Rural Water Supply
	Reservoir Tank for Rural Water Supply
	Improvement of Road

0 1,000 2,000 3,000 m

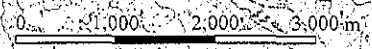
51° 37' 30"



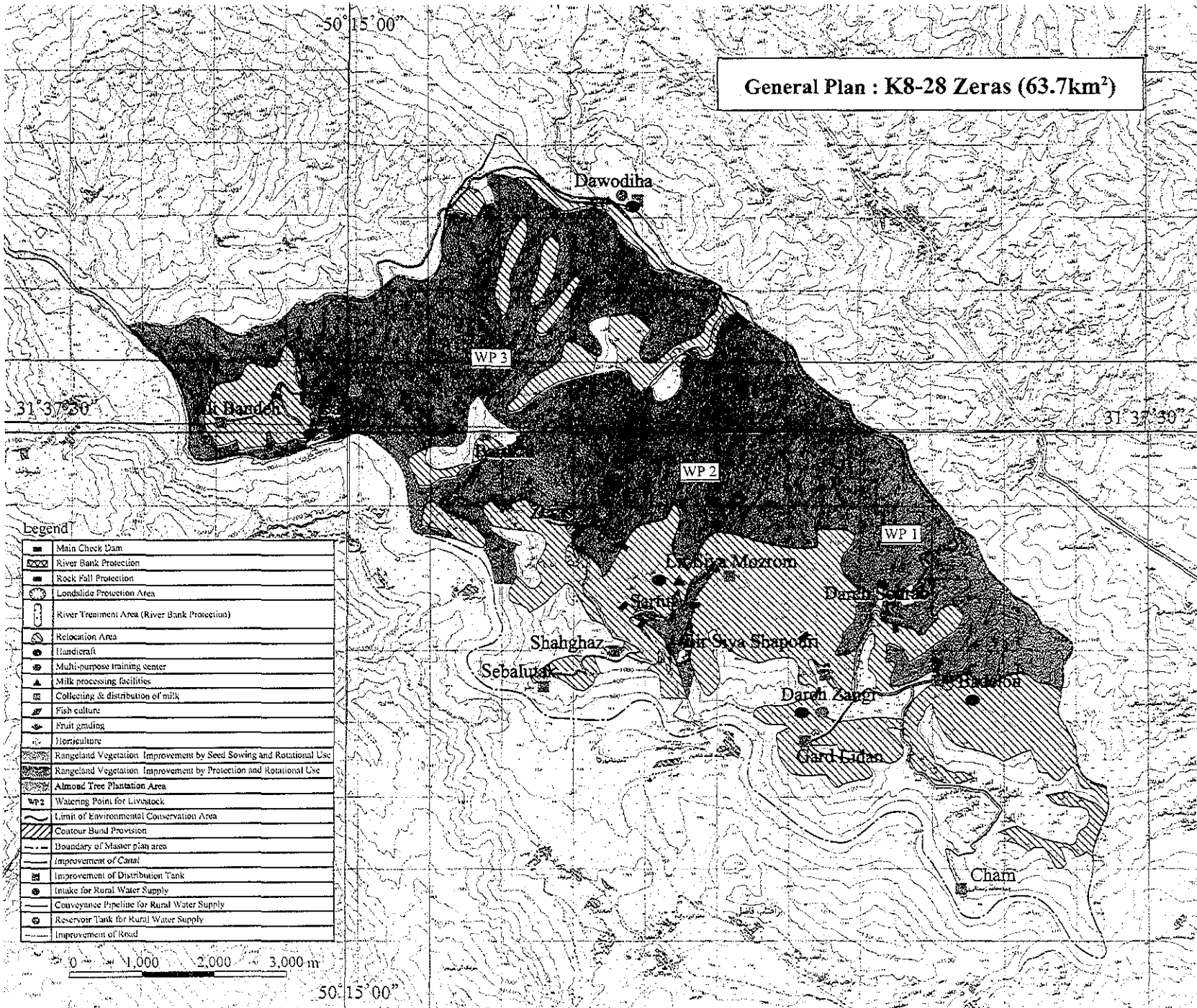
**Legend**

	Main Check Dam
	River Bank Protection
	Rock Fall Protection
	Landslide Protection Area
	River Treatment Area (River Bank Protection)
	Relocation Area
	Handicraft
	Multi-purpose training center
	Milk processing facilities
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	Rangeland Vegetation Improvement by Protection and Rotational Use
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	Watering Point for Livestock
	Limit of Environmental Conservation Area
	Contour Bund Provision
	Boundary of Master plan area
	Improvement of Canal
	Improvement of Distribution Tank
	Intake for Rural Water Supply
	Conveyance Pipeline for Rural Water Supply
	Reservoir Tank for Rural Water Supply
	Improvement of Road

**General Plan : K7-48 Tang Sorkh (65.4km<sup>2</sup>)**



**General Plan : K8-28 Zeras (63.7km<sup>2</sup>)**



**Legend**

[Symbol]	Main Check Dam
[Symbol]	River Bank Protection
[Symbol]	Rock Fall Protection
[Symbol]	Landslide Protection Area
[Symbol]	River Treatment Area (River Bank Protection)
[Symbol]	Relocation Area
[Symbol]	Handicraft
[Symbol]	Multi-purpose training center
[Symbol]	Milk processing facilities
[Symbol]	Collecting & distribution of milk
[Symbol]	Fish culture
[Symbol]	Fruit gmiling
[Symbol]	Horticulture
[Symbol]	Rangeland Vegetation Improvement by Seed Sowing and Rotational Use
[Symbol]	Rangeland Vegetation Improvement by Protection and Rotational Use
[Symbol]	Almond Tree Plantation Area
[Symbol]	Wp2 Watering Point for Livestock
[Symbol]	Limit of Environmental Conservation Area
[Symbol]	Contour Bund Provision
[Symbol]	Boundary of Master plan area
[Symbol]	Improvement of Canal
[Symbol]	Improvement of Distribution Tank
[Symbol]	Intake for Rural Water Supply
[Symbol]	Conveyance Pipeline for Rural Water Supply
[Symbol]	Reservoir Tank for Rural Water Supply
[Symbol]	Improvement of Road

0 1,000 2,000 3,000 m

50° 15' 00"