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REPUBLIC OF KAZAKHSTAN

MINISTRY OF AGRICULTURE

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

SECOND IRRIGATION AND DRAINAGE IMPROVEMENT PROJECT

ENVIRONMENTAL MANAGEMENT PLAN
(Draft)

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TABLE OF CONTENTS

ACRONYMS

CWR	**Committee for Water Resources**
EA	**Environmental Assessment**
EIA	**Environmental Impact Assessment**
EMP	**Environmental Management Plan**
FSU	**Former Soviet Union**
GDP	**Gross Domestic Product**
GOK	**Government of Kazakhstan**
IBRD	**International Bank for Reconstruction and Development**
IDIP-1	**Irrigation and Drainage Improvement Project**
IDIP-2	**Second Irrigation and Drainage Improvement Project**
IPM	**Integrated Pest Management**
ISDS	**Integrated Safeguards Data Sheet**
ISF	**Irrigation Service Fee**
MOA	**Ministry of Agriculture**
MOEB	**Ministry of Ecology and Biological Resources**
MOM	**Management, Operation and Maintenance**
NEAP	**National Environmental Action Plan**
NGO	**Non-governmental organization**
PIU	**Project Implementation Unit**
PMU	**Project Management Unit**
REAP	**Regional Environmental Action Plan**
RCC	**Rural Consumer Cooperatives**
SEE	**State Ecological Expertise**

1. INTRODUCTION

The Republic of Kazakhstan has requested the International Bank for Reconstruction and Development (IBRD) to co-finance a **Second Irrigation and Drainage Improvement Project (IDIP-2)**. This Environmental Management Plan (EMP) has been prepared in order to ensure that the proposed project incorporates sound environmental management principles and practices and thus complies with the environmental policies and laws of the Government of Kazakhstan (GOK), as well as with IBRD environmental safeguard policies.

1.1 Background

Kazakhstan is a land-locked country in Central Asia, bordering Russia to the north and northwest, Turkmenistan, Uzbekistan and Kyrgyzstan to the south and China to the East. It also borders the Caspian Sea in the west. The national territory is 2.72 million km^2, which extends 3200 km east to west and 1800 km north to south.

Kazakhstan has a semi-arid continental climate with cold snowy winters and hot dry summers. Annual precipitation ranges from less than 150 mm in the north to 450 mm in the southern foothills. Kazakhstan's land ranges from semi-arid steppes in the northern and central regions to desert and mountains along the southern borders with Uzbekistan and Kyrgyzstan. Most irrigated agriculture occurs in the south along the Syr Darya River. Crop land includes about 34 million ha, of which 32 million are rain-fed and about 2.4 million irrigated. Soils are moderately fertile.

The cultivable area, including the area suitable for pasture/grazing and notably the steppe, is estimated at 222 million ha, or 82 percent of the total area. The cultivated area was estimated at 34.4 million ha in 1993, or 15 percent of the cultivable area, of which 99 percent consisted of annual crops. Fodder accounts for more than 10 million ha. There has been a dramatic increase in the cultivated area since 1950, mainly due to political decision taken in 1950 to develop agriculture on semi-desert land, called "virgin land", notably in the northern and central part of the republic. From 7.8 million ha in 1950, the cultivated area increased to 28.5 million ha in 1960. In 1993, sovkhoz (state farms) and kolkhoz (collective farms) were still predominate in Kazakhstan, with private plots covering less than 1 percent of the cultivable area, joint stock companies and farmers associations less than 8 percent of the cultivated area. The land reform process was extended through private ownership or long term leases (99 years). With the possibility of selling private land, transferring land lease, an increase in the average farm size has been reported, up from 5 ha to more than 7 ha per farm between 1994 and 1997.

IBRD has been involved in the irrigation and drainage sub-sector in Kazakhstan for some time. It co-financed the first **Irrigation and Drainage Improvement Project (IDIP-1)** from 1996 to 2005, which involved the rehabilitation of irrigation and drainage infrastructure on 32,000 ha, as well as improvement of water management, operation and maintenance. **IDIP-1** was implemented in a number of oblasts around the country and produced encouraging results. In May 2006, the GOK requested IBRD to begin preparation of **IDIP-2** to assist in accelerating implementation of the GOK's program to revitalize the irrigation and drainage sub-sector.

1.2 Objective

The objective of the environmental assessment (EA), which was completed during project preparation in 2006 and is summarized in Sections 1-5 of this document, is to identify the significant environmental impacts of the proposed project (both positive and negative) and to specify appropriate preventive actions and mitigation measures to prevent, minimise or eliminate any anticipated adverse impacts. The objective of the environmental management plan (EMP)

contained in Section 6 of this document is to ensure that the environmental prevention and mitigation measures identified in the EA, as well as the monitoring and institutional strengthening activities recommended, will be properly undertaken during implementation of the proposed project. The EMP also establishes the necessary institutional responsibilities, proposes a timetable for implementing these activities and estimates their costs for the proposed project budget.

1.3 IBRD Safeguard Policies

The initial Integrated Safeguards Data Sheet (ISDS) for **IDIP-2** (March 2006) classified it as a Category "B" project, triggering the IBRD safeguard policies for environmental assessment and projects on international waterways. (A subsequent decision concluded that the project also triggers the safeguard policy for safety of dams.) The EA confirmed the Category "B" designation for the proposed project, finding no significant, irreversible, cumulative or long-term adverse impacts. The EA identified a number of positive impacts of the proposed project and only relatively minor negative impacts that could be effectively prevented or reduced through application of appropriate preventive actions or mitigation measures (see discussion of impacts in Section 5). The EA also confirmed the application of the safeguard policies for projects on international waterways and safety of dams; it examined but rejected application of the safeguard policies for pest management, involuntary resettlement, cultural property, forestry, natural habitat, indigenous peoples or projects in disputed areas. A discussion of the EA's findings with respect to these policies follows.

Environmental Assessment (OP 4.01) The anticipated environmental impacts of the infrastructure improvements (i.e. irrigation and drainage rehabilitation) in the proposed project trigger this safeguard policy. Because the anticipated adverse impacts will not be significant or irreversible, however, and because they can be effectively prevented or reduced through appropriate preventive actions or mitigation measures, the project is correctly classified a Category "B" project, which requires only partial environmental assessment under this policy. The EA performed during project preparation and this EMP, which ensures that recommended preventive actions and mitigation measures will be taken during project implementation, satisfies this safeguard policy.

Safety of Dams (OP 4.37) Several of the irrigation and drainage systems to be addressed in the proposed project fall under the command of dams (and related headworks), which triggers this safeguard policy. In January-February 2007, a dam safety expert visited the dams (Bugun-Karazhantak, Tasotkel and Bartogai) and the Arys River headworks and gathered information on their safety conditions. This assessment found safety problems at the Bugun, Karazhantak and Tasotkel dams, which will need to be addressed in the context of the project. It also raised some concern about the safety conditions of the Bartogai dam, but further investigation will be required for a more satisfactory evaluation. The headworks located on the Arys River will also need repair. The Kapchagay dam was not inspected; therefore, its safety conditions are currently unknown. The Government recognizes the need to address the dam safety problems and has indicated its intention to undertake the appropriate measures to ensure the safety of these dams. The works on the dams are divided in two stages. The first stage would be undertaken during IDIP-2 and includes implementation of already identified priority works such as replacement of gates and mechanical and electrical lifting equipment, cleaning of toe drainage systems, and repair to upstream and downstream slopes. In addition, IDIP-2 will finance detailed investigations to determine the additional interventions required for the safe operation of the dams, including installation of piezometers and settlement stations, and geotechnical investigations. The works required for these additional interventions would be undertaken during the proposed follow-on IDIP-3 and would include any major repairs or upgrading of the dams considered necessary as derived from the studies and investigations undertaken under IDIP-2.

Projects on International Waterways (OP 7.50) The Syr Darya River, which provides water to the irrigation systems in South Kazakhstan (Makhtaaral, Kyzylkum and Aris Turkistan), is an international waterway shared by Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan; it thus triggers this safeguard policy. However, since Kazakhstan is the most downstream riparian country on the Syr Darya River, the project will have no effect on the rights of the upstream riparian countries. Furthermore, since the project does not include construction of any new canals or head works that would allow increased water abstraction from the Syr Darya River and, in fact, should result in decreased water withdrawals because of increased water efficiency, the project will have no effect on the Aral Sea, the other international water body (shared by Kazakhstan and Uzbekistan) in the project area. Therefore, the project should not have a significant impact on the quantity or quality of water flowing through or into these waterways and thus should have no adverse effect on the rights of the other riparian countries. Given the expected negligible impacts of the project on international waterways, the project falls within the exception to the notification requirement under OP 7.50.

Pest Management (OP 4.09) The project does trigger the pest management safeguard policy. The project will not procure any pesticides nor will the project alone induce an increase in the use of pesticides. However, farmers use agro-chemical pesticides in the project areas, particularly in the cotton-growing areas. Although the current use is relatively low due to economic conditions, it is likely that as a result of improved water availability at field level, farmers may become more confident and start using more fertilizer and agro-chemical pesticides. As the EMP provides appropriate mitigation measures for addressing any impacts linked to improper pest management, e.g. pest management and IPM promotion in the farmer capacity training program, a separate pest management plan was not required. The advisory services to be provided should minimize the environmental impacts from any pesticide use.

Involuntary Resettlement (OP 4.12) The EA also determined that the project, as currently designed, does not trigger the involuntary resettlement policy. The project will not involve any physical relocation of local populations, nor will it result in any loss of assets (e.g. farmlands) or access to assets, or loss of income sources (e.g. crops) or means of livelihood. On the contrary, the project is specifically designed to improve the value of farm assets and thus increase farm incomes. Furthermore, the project will not impose any restrictions on access to local farmlands; any interference with access to farmlands resulting from the rehabilitation works on irrigation canals or drainage collectors will be temporary, short-term and insignificant in nature.

Physical Cultural Resources (OPN 11.03) The EA concluded that the project will not involve any "cultural property" as defined by the safeguard policy. The project by definition will be implemented on already existing irrigation and drainage systems on long-established agricultural lands, which were largely converted to agriculture some 50 years or more ago during Soviet times. Furthermore, the project will not involve any extension of these lands into non-agricultural areas. While these farmlands and the associated man-made assets in the area are perhaps of national and local importance in terms of their agricultural productivity and economic output, they are without any particular archeological, historical, religious or cultural significance for the Republic of Kazakhstan.

Remaining Safeguard Policies The EA also found that, consistent with the initial ISDS determination, the remaining safeguard policies were not triggered by the project for the following reasons:

- **Forests (OP 4.36)** The project will involve no forested or woodland areas, which would trigger this policy.

- **Natural Habitats (OP 4.04)** The project will involve no conversion of natural areas or critical natural habitats, which would trigger this policy.
- **Indigenous Peoples (OD 4.2)** The project will involve no indigenous peoples, ethnic minorities or tribal groups, which would trigger this policy.
- **Projects in Disputed Areas (OP 7.60)** The project will not be implemented in a disputed area, which would trigger this policy.

2. DESCRIPTION OF THE CURRENT SITUATION

2.1 Description of Physical Environment

Current environmental problems and degradation of natural resources in Kazakhstan arise from the past economic policies and practices of the former Soviet Union (FSU) that fixed quantitative targets for the economy of the whole former Soviet Union and its different sectors by central planning authorities. These policies were accompanied by pricing policies under which natural resources were under-valued and the environment as whole treated as a free good. This notion prevailed both in productive sectors and among consumers. Simultaneously, the lack of sound and realistic environmental policies, legislation or standards has led over the years to the overuse and degradation of natural resources, as well as to pollution levels with increasingly adverse effects on the public health.

The following problems are identified as constraints to environmentally sustainable agriculture development in the oblasts of southern Kazakhstan:

- Surface and ground water scarcity and uneven seasonal and territorial distribution accompanied by increasing water losses in irrigated agriculture in South Kazakhstan
- Surface and ground water pollution by agriculture, including run-off due to past over application of agrochemicals
- Loss of soil fertility due to poor agricultural practices
- Increasing wind and water erosion due to reduced afforested efforts
- Waterlogging and salinization of soils due to poor design and construction, reduced operations and maintenance and failure of irrigation and drainage systems
- Inadequate environmental standards and policies, that are in some cases incompatible with international norms, which in turn are not appropriately implemented, enforced or monitored due to ineffective environmental management and monitoring systems and
- Lack of capacity to develop and implement projects in an environmentally sustainable fashion.

In 1993, about 242,000 ha (10.5 percent) of the irrigated area in Kazakhstan were classified as saline by Central Asian Standard (toxic ions exceed 0.5 percent of total soil weight). These areas are mainly concentrated in the south of the country.

Little maintenance has been done on the drainage network since 1990. Moreover, part of the agricultural drainage system does not work properly because of deficiencies in design and construction. It is estimated that about 90 percent of vertical drainage systems are not in use due to the high cost of pumping. A problem also exists with the disposal of highly mineralized water.

Most of the soils in Makhtaaral are highly saline. About 60 percent of the ground water is above the 3 gm/L (much above the normal value of 1 gm/L). In contrast, the soils of Kyzyl-Orda and Zhambul are weakly saline. Recently, these figures have changed very little. Most of the Kyzyl-Orda and Zhambul project areas are less than 2 m depth to the water table. These high levels of saline soils in Makhtaaral are the major environmental problems in the **IDIP-2** project area.

2.2 Description of Biological Environment

IDIP-2 activities will primarily take place in areas of south Kazakhstan long ago converted to agricultural use; therefore, they are not expected to have significant adverse impacts on the biological environment. Potential impacts on the biological environment identified in the EA include the following:

- **Fisheries** The immediate project area does not include significant fisheries and the project may benefit Aral Sea fisheries by increasing the flow of the Syr Darya as a result of increased water efficiencies.
- **Aquatic biology** The aquatic biology in the project area is a not significant factor in the proposed project's environment.
- **Wildlife** The flood plains of the Syr Darya and Ili Rivers once supported abundant wildlife. However, the project areas in the Almaty, Zhambul, South Kazakhstan and Kyzyl-Orda Oblasts have been farmed for more than 30 years and little wildlife remains within these project areas.
- **Forests** For all practical purposes, the project areas do not have any forests or wooded areas. The project work will only take place in cultivated areas.
- **Rare or Endangered Species** The GOK has identified important fauna and flora, including rare and endangered species. However, there are no detailed reports on rare or endangered species for the **IDIP-2** project areas, except for Kyzyl-Orda, where there is not enough information about the environmental requirements for sustainability and bio-diversity planning for the project to use. It is unlikely that proposed project activities will have any significant impacts on the fish or birds in the project areas.
- **Protected Areas** There are no protected areas within the project areas.

3. POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

3.1 Policy Context

The transition to environmentally sustainable development is among the primary objectives of Kazakhstan's overall development strategy. A major part of this strategy is the **National Environmental Action Plan for Sustainable Development** (NEAP), first adopted in 1998. The NEAP identified seven critical environmental issues, including rational use of water resources, reduction in water pollution and sustainable management of pastures and arable lands (most acutely manifested in the south). Within the framework of the NEAP, a Joint Announcement of the Ministers of the Central Asian countries was signed stipulating the development of a Central-Asia Regional Environmental Action Plan (REAP).

The **Concept of Ecological Safety** of 1996 established strategic directions for national ecological policy, as well as the legal and institutional framework and economic and social activities for environmental protection. Finally, the **Strategy 2030: Ecology and Natural Resources**, adopted in 1998, identifies long-term prospects for integration of national policy and environmental protection, one of its priorities being the establishment of an environmental management system. Until recently, neither the NEAP nor the other plans received adequate financing for effective implementation.

3.2 Legal/Regulatory Framework for Environmental Assessment/Management

In February 2007, a comprehensive new Environmental Code (EC) went into effect in Kazakhstan. The Code subsumes the provisions of several other environment-related laws adopted in the 1990s, including the Law on Environmental Protection and the Law on Ecological Expertise. Under the Environmental Code, environmental impact assessment (EIA) is mandatory for any kind of economic or other activity capable of producing an impact (direct or indirect) on the environment or human health. For reconstruction/retrofitting projects, the EIA results may be presented either as a separate report or as an update to the original EIA report, if available. The EIA is a pre-requisite for obtaining an environmental license to operate the (re)-constructed facility. Overall, the EIA process will now conform more closely with the international practice and will consist of several phases integrated with the development of the project design documentation. An Environmental Management Plan (EMP) is one of the elements of the new EIA process[1].

The EC also requires the performance of the State Ecological Expertise (SEE), which is the public review of the environmental impacts caused by a proposed project or program. All EIA documents are subject to SEE.

SEE is required for all investment projects, including all investments by foreign or international organizations (e.g. IBRD, ADB). The GOK has adopted a number of other environmental laws, regulations and resolutions addressing specific environmental issues, including the Water Code, the Land Code, the Forestry Code and the Law on Wildlife. Those relevant to the project are

[1] The specific phases of the new Kazakh EIA process are as follows:
Phase 1: Assessment of territory (state of local environment) for optimal siting of the proposed object;
Phase 2: Preliminary EIA;
Phase 3: EIA (includes analysis supporting emission permit request and EMP);
Phase 4: Environmental chapter of project design document;
Phase 5: Post-project analysis.

summarized in Table 1:

Table 1: Principal Environmental Laws, Regulations and Resolutions

Legal Authority	Legal Mandate
Water Code (2003)	Establishes national policy, legal and institutional framework for management and conservation of water resources
Land Code (2003)	Establishes national policy and legal framework for land ownership and management
Forest Code (2003)	Establishes national policy and legal framework for sustainable conservation and management of forest and woodlands
Law on Specially Protected Natural Territories (1997)	Defines different types of specially protected natural territories, where different types and/or levels of economic activities
Law on Protection, Reproduction and Use of Wildlife (1993)	Establishes national policy and legal framework for conservation, protection and use of wildlife

As was previously provided by the Law on Ecological Expertise, the Ministry of Ecology and Biological Resources (MOEB) carries out the following tasks in the SEE procedure required for the planning of almost any economic activity:

- The determination of the environmental validity of designated actions, which may affect the environment and natural resources
- The determination of completeness and accuracy of management, economic, investment impact assessment and other activities affecting the environment and population health, including the analysis of possible social, economic and environmental consequences; and the environmental risk level determination
- The estimate of efficiency, completeness and adequacy of measures on environmental protection, efficient use of natural resources, and population health protection
- The preparation of environment expertise solution, the prompt transfer to governmental and other agencies, which take the decision on project implementation, the provision of necessary information to the population and all interested agencies
- The verification of environmental standards compliance of supporting documentation, in accordance with the laws, standards, norms, and regulations of the GOK.

The MOEB implementation of SEE, however, remains very limited. The limited experience and lack of qualified multidisciplinary staff in MOEB make it very difficult to conduct a proper EA for agricultural development projects, including irrigation and drainage.

Considering the above, the IBRD and the MOEB agreed that for the **IDIP-2** the foreign and local consultants would prepare the general EIA/EA to address these limitations and to enhance the quality of environmental assessment of the project. Furthermore, under **IDIP-2** additional site-specific environmental assessment will take place for individual sub-projects, which will be reflected in site-specific EIAs and EMPs. In this way, the process under IDIP-2 will be satisfactory to the Bank and fully compliant with the new environmental legislation (Environmental Code) of Kazakhstan.

3.3 Institutional Framework for Environmental Assessment/Management

Since 1992, the Ministry of Ecology and Biological Resources (MOEB) has been responsible for the coordination of all national environmental activities within Kazakhstan. The MOEB is the successor to the State Committee on Ecology and Nature Use and Ministry of Forestry. The MOEB is also responsible for setting environmental standards, issuing permits and licenses, monitoring environmental quality and implementing the SEE requirements. Furthermore, MOEB established 19 oblast departments as the foundation for regional environmental management and as an important channel to local governments or agencies.

During the FSU time, Kazakhstan developed a large environmental monitoring system, including monitoring plans, analytical methods and standards. Many agencies were involved in this environmental monitoring system. At the present time, however, Kazakhstan is not technically capable or financially able to provide the adequate budgetary resources to manage a proper environmental monitoring system. This has resulted in dramatically reduced staffs, under=-equipped monitoring stations and limited sampling and analysis throughout South Kazakhstan.

Table 2: Primary State Environmental Institutions

Institution	Relevant Responsibilities
Ministry of Ecology and Biological Resources (MOEB)	Management of environmental protection activities, Monitoring of the state of the environment in general and the water bodies in particular, Reviewing Ecological Expertise of diverse projects, Monitoring wastes from economic activities.
Ministry of Agriculture (MOA): Committee for Water Resources (CWR)	Development of necessary off –farm infrastructure for use of water for irrigation purposes, Operating and maintaining the off-farm irrigation infrastructure, Assisting the water users in organizing into WUAs, Training WUAs in operating and maintaining the infrastructure they manage.
Hydro-Geological Expedition	Collecting data on quantity and quality of surface and ground-water resources.

4. DESCRIPTION OF PROJECT AND ALTERNATIVES CONSIDERED

4.1 Description of Project

4.1.1 Project Objective The project development objective is to improve the performances and sustainability of irrigated agriculture in four oblasts of Southern Kazakhstan. This will be achieved through the rehabilitation and improvement of irrigation and drainage schemes, their sustainable management, operation and maintenance and the development of improved agricultural practices.

4.1.2 Project Scope After implementation of **IDIP-1**, it was recommended that future support should be given to areas having more favourable agro-climatic conditions for increasing crop productivity. Eventually, this led to the selection of irrigated areas in the South Kazakhstan and Kyzylorda Oblasts (in the Syr Darya Basin), and Zhambul and Almaty Oblasts. These locations have warmer weather and comprise large plains with a comparative advantage in cropping activities. They offer good possibilities for cultivation of higher value crops with export potential, such as cotton and for generating higher employment through the processing of cotton and manufacturing of related products. Farm sizes in these areas are quite small and population density is high (less than one ha of irrigated land per person), thus any irrigation and drainage infrastructure rehabilitation would extend benefits to a large number of rural people. The benefiting population is estimated at about 46,500 households, equivalent to about 240,000 persons. Some 16,000 peasant farms would be covered, each comprising on average 2-3 households and managing a command area of usually 5 to 15 ha.

4.1.3 Project Components The project has the following four components:

- The **Rehabilitation and modernization of irrigation and drainage infrastructure component** comprises the rehabilitation of all infrastructure in selected sub-project areas, which contribute to the conveyance of irrigation water from the source of diversion from a river (or release from a dam) up to the cropped field, and additionally to the safe evacuation of all excess water being on (waterlogging) or under (high groundwater table) the cropped field. The objectives of the rehabilitation measures proposed under this component are, therefore, to minimize operation and conveyance losses through rehabilitation of the existing irrigation water distribution network and to improve soil conditions through rehabilitation of the drainage systems and regular leaching. The rehabilitation works would cover an area of about 220,000 ha undertaken in all 13 individual sub-project areas, ranging from 2,500 ha to 74,000 ha.
- The **Sustainable Management and Operation and Maintenance (MOM) Component** aims at ensuring the sustainability of the irrigation and drainage schemes after their rehabilitation. It will strengthen the institutional arrangements supporting the formation and functioning of the Rural Consumer Cooperatives (RCCs) as the key water management organizations promoted by the GOK, in order to facilitate efficient, equitable and sustainable local water management. The component will support the RCC consultancy units currently being established by the GOK within the structure of the CWR at the national, oblast, and rayon levels. These units will provide institutional capacity building to the RCCs on organizational matters, improved system MOM, contractual issues of MOM and financial issues including the fixation of suitable irrigation service fees (ISF) and cost recovery requirements.
- The **Agricultural Development Component** aims to work directly with farmers and provide technical advice, improved access to various services and the promotion of improved techniques and marketing for them, in order to take advantage of the rehabilitation and improved operation and maintenance of the irrigation and drainage

infrastructure. In order to organize the various activities supported by the component and to improve access to services, the establishment of **Farmer Service Cooperatives (FSCs)** would be promoted and supported by the project. These would consist of farmer-owned and controlled cooperatives aimed at supporting the access to capacity building, services, marketing but, contrary to existing production cooperatives, would not collectively organize and manage production.

- The **Project Management, Monitoring and Evaluation** component will support the establishment of a decentralized, action-oriented implementation and management structure, as well as a participatory monitoring and evaluation system.

4.2 Analysis of Project Alternative

No Action Alternative The 'no action' alternative is undesirable from an economic, ecological or social point of view. This alternative would allow the existing systems to continue to deteriorate - decreasing water availability at the water user level, reducing the productivity of the agricultural lands, increasing the loss and irrational use of water resources, increasing the likelihood of waterlogging and soil salinization in some locations and, finally, increasing migration from rural areas. Given the importance of agriculture to the welfare of the local population and the critical role irrigation plays for agriculture in the country as a whole, the 'no action' alternative would not be an acceptable option.

5. ENVIRONMENTAL IMPACTS AND PROPOSED PREVENTIVE ACTIONS AND MITIGATION MEASURES

Like **IDIP-1** before it, **IDIP-2** is designed to provide economic, social and environmental benefits - through the rehabilitation of irrigation and drainage infrastructure, the strengthening of water user organizations and the delivery of agricultural training/extension services - to the farmers, farm families and rural communities in the project areas. Experience from **IDIP-1** suggests that the overall environmental impact of the proposed project is likely to be positive. In fact, the EA identified many positive impacts of the project, including reduced irrigation system water losses, enhanced management of water resources, increased agricultural productivity and improved soil fertility. The EA also identified some potential negative impacts on environmental conditions in the project areas that will require attention, preventive action and appropriate mitigation measures in the planning, design, construction, operation and maintenance phases of the project. Fortunately, the potential negative impacts are relatively minor and are far outweighed by the positive economic, social and environmental benefits the EA considered. A discussion of these impacts follows.

The proposed project would finance the rehabilitation of irrigation and drainage infrastructure in order to improve water use efficiency, increase delivery within existing irrigation systems and arrest the process of land degradation from waterlogging and salinization of soils. Stakeholder involvement in irrigation water management and the operation and maintenance of the irrigation infrastructure will be based on strengthening the RCCs. This engagement of the water users themselves is expected to instil a greater sense of individual and community responsibility and even encourage measures to protect the surrounding environment (protection of vegetative cover, planting of trees).

5.1 Anticipated Positive Environmental Impacts

The overall environmental impact of **IDIP-2** is expected to be positive. The EA based this conclusion after performing a field-based assessment of about 70 percent of the project areas (e.g. Makhtaaral, Kyzylkum, Arys-Turkestan and Kyzyl-Orda). **IDIP-2** will not expand irrigation to new areas but will improve irrigation infrastructure on existing agricultural land, leading to improved water conservation and agricultural practices. The proposed drainage improvements on these lands would reduce present and potential waterlogging and salinity problems. The project would have an additional positive environmental impact by reducing water losses through improved system conveyance and flow control. Pesticide runoff would be reduced through disseminating information to farmers and training on the safe use of pesticides, including techniques for IPM. This will reduce water pollution and soil contamination.

5.1.1 Reduction in Water Losses Estimates are that significant amounts of the water currently entering the irrigation systems are lost as a result of infiltration, evaporation and inefficient on-farm use of water. These water losses from the system contribute in some places to the high levels of groundwater, the salinity of the soils and the occurrence of waterlogging in low-lying areas. Experience from **IDIP-1** suggests that the irrigation and drainage improvements of **IDIP-2** will help curb many of these water losses. The PIU estimates that reduction in water losses and improvements in water efficiency as a result of project interventions could result in water efficiencies as high as 70 to 85 percent (see Table 3). The rehabilitation/lining of irrigation canals and installation of control structures under **IDIP-2** should permit better management and monitoring of water delivery, prevent significant water leakage and minimize water erosion. The reduction in losses and improved irrigation distribution on-farm will, besides improving the equity among farmers, reduce seepage losses and over-supply of irrigation, with beneficial effects for the area: a lower water table, a lower risk of waterlogging and soil salinity.

Table 3: Improvements in Water Use Efficiency Before and After IDIP-2

Current System Efficiency	Before Project	Project Measures	After Project
Irrigation technology efficiency	50-60 %	- Irrigation technology training - Zoning irrigation technology - RCC and operating services - Water control outlets	70 %
Irrigation canals/systems efficiency	60 %	- Progressive technical design - High-grade reconstruction - RCC and operating services - Operating machinery - Operating staff training	85 %
Technology and system efficiency as a whole	30 %		60 %
Estimated water loss	60-70 %		40 %

Source: CWR Design Institute, Shymkent (2007)

5.1.2 Enhanced Water Resources Management The semi-arid climate of the Kyrgyz Republic makes its agriculture heavily dependent on irrigated cultivation and should provide ample incentive for rational management of water resources. Yet, the general deterioration of irrigation systems and control structures, coupled with the general lack of understanding of effective on-farm water management practices, has resulted in widespread mismanagement of irrigation water resources. The installation of better irrigation water measurement and control structures and the delivery of training and extension on on-farm water management to RCC members under **IDIP-2** should significantly improve water resources management.

5.1.3 Improved Soil Fertility Drainage system improvements undertaken by **IDIP-2** should have positive impacts on the areas of poorly drained agricultural land. As noted above, many of the project areas, particularly Makhtaaral, have poor drainage and high groundwater levels that pose problems with soil salinity. The depth of the groundwater is critical for the incidence of secondary salinity in the soil, particularly where the groundwater itself is saline and accumulated salts in the soils are not periodically leached. Regular leaching of the soils has stopped in some areas. Reducing soil salinity would improve yields of most salt-sensitive crops, help prevent significant erosion and increase agricultural productivity. Experience with **IDIP-1** in Makhtaaral, for example, indicates significant reductions in soil salinity after the drainage infrastructure improvements were completed (the percentage of soils without salinity problems rose in some cases from below 20 percent to above 50 percent).

5.1.4 Increased Agricultural Productivity Finally, the irrigation and drainage improvements under **IDIP-2** should contribute to increased agricultural productivity. Agricultural productivity, as a whole, has declined in recent years, in large part because of the significant deterioration of the irrigation and drainage systems. The direct results of this deterioration have been decreasing delivery of irrigation water, increasing water losses, decreasing fertility of soils, expanding areas of fallow agricultural land and rising groundwater levels in some places. The infrastructure improvements planned under **IDIP-2** should help restore and improve productivity by increasing delivery of irrigation water (reducing water losses), improving the fertility of soils and expanding the area of agricultural lands returned to production. Furthermore, the strengthening of the RCCs should improve water resource and soil fertility management and promote consistent operation and maintenance of irrigation and drainage systems.

5.2 Potential Negative Environmental Impacts

The principal adverse impacts of **IDIP-2** will be largely limited to the construction phase, but there are other impacts during the operational phase that will also require preventive actions and mitigation measures. The potential negative impacts during the construction phase include construction-related damage/pollution caused by contractors during construction activities, including dumping of excavated sediments and other materials from irrigation canals and drainage collectors. During the operational phase the potential for increased surface water contamination from agrochemical pollution resulting from the increased use of pesticides and fertilizers will be a concern. Furthermore, as some of the proposed project areas are in Syr Darya River basin, one of the watersheds of the Aral Sea, there will be a need to guard against any further damage to the ecosystems and the hydrological system.

5.2.1 Environmental Impacts Related to Project Design

Land Acquisition As currently designed, the proposed infrastructure improvements to irrigation and drainage systems under **IDIP-2** will not affect agricultural lands or property. There will be no need for resettlement of populations or compensation since all main and inter-farm rehabilitation construction will be confined to GOK easements, which do not involve residents, habitation or agricultural production. Any on-farm civil works will only be undertaken pursuant to participatory agreements with both the relevant RCCs and the farmers to proceed with both design and construction, therefore, negating any need for compensation. Construction will be done to suit seasonal cropping, farming and irrigation requirements and needs.

Obstruction of Access The shaping and widening of canals and construction of drains as part of infrastructure improvement may temporarily restrict the movement of people and animals and limit accessibility to sites by vehicles and carts. This can be mitigated by the provision of crossings made of permanent materials and adequately sized culverts. The design proposals will include provision for piped culvert crossings on all canals and drains where it is considered appropriate and locations have been assessed as suitable to farm and village access routes. There is not a large demand for new crossings, as the previous design included sufficient crossing to satisfy human and vehicular traffic for both human and farm operations and tasks. The project has made provision for the rehabilitation and construction of new crossing structures on both canals and drains.

5.2.2 Environmental Impacts Related to Construction

Damage/Pollution from Construction Activities The infrastructure improvements under **IDIP-2** for the most part will involve rehabilitation of existing canals and drains in the proposed project areas. All civil works will be designed and operated in accordance with environmentally sound engineering practices and governed by the applicable environmental standards of Kazakhstan. These works will require the use of heavy machinery (i.e. excavators, bull dozers) but will be relatively small in scale and will take place on public lands or lands already under agricultural use. The principal construction impacts will involve (i) management of dredged sediment and construction debris; (ii) interference with access and movement; (ii) disturbance of agricultural activities resulting from access restriction; soil compaction, trenching; (iii) waste, noise, mud and dust at sites and on access roads; (iv) damage to trees or other vegetation along canals and (v) disturbance of wildlife at sites close to any ecologically sensitive areas.

The infrastructure improvements will involve excavation and will result in temporary increases in fine sand and silt runoff, which can be controlled by the use of silt traps. Proper management of dredged sediment will require careful deposition of sediments, ensuring that they are not cast

directly over canal embankments. To the extent possible, sediments should be used as fill, either where required for the scheme or to construct level surfaces, as desired by farmers. In all cases, it must be compacted and treated either using bio-engineering techniques or by using dry stone walls or stone pitching.

The generation of dust caused by construction operations can be mitigated by wetting excavation sites and other sources of dust to control its emission. The disturbance caused by noise can be mitigated by the use of properly maintained equipment. Land owners will be compensated for temporary use of land for temporary facilities for construction contractors (accommodations, camp canteen, camp facilities, medical centre, sanitation and other applicable facilities as described within the construction contract); the land will be restored to its former state after completion of the construction. Construction operations may also involve the temporary closure of certain irrigation systems. Because construction will take place mainly during the dry season, this may have significant impact on crops and livestock and the overall livelihood of the farmers depending on such assets. This can be mitigated by the use of temporary diversion, either in channels or by the use of flexible hose pipes.

Recommended Preventive Actions or Mitigation Measures The EA recommends a combination of preventive actions and monitoring to minimize the potential construction-related impacts described above.

- First, all contractors will be required to prepare a site-specific environmental management plan (EMP), which will describe in detail the measures proposed to prevent or mitigate construction-related environmental impacts. Guidelines for preparing these EMPs are contained in Annex A. These site-specific EMPs will be prepared under the supervision of the PMU and reviewed by the MOEB in order to comply with its SEE requirements before any financing or construction can begin at the irrigation system.

- Second, all bidding documents and construction contracts will have the standard environmental, health and safety clauses required by Kazakh legislation and IBRD procedures (see Annex B for model environmental contract clauses). The PMU will ensure that these clauses are included in all project-approved documents and oversee contractor compliance with them during construction activities.

These two preventive measures should address any potential adverse impacts from the rehabilitation activities. In each case, the need for mitigation measures should be fully assessed in the site-specific EMP prepared during the detailed design phase and appropriate measures included in contract documentation. The RCC will also be involved in scheme planning and construction, ensuring that local farmers are aware of the construction schedules to further mitigate the effects of any temporary closure.

There are GOK regulations with respect to the cleaning of drains and irrigation canals and the depositing of excavated sediments. A minimum width of five meters must be provided and maintained on either side of the collector drains for use as inspection and access roads. The deposition of sediment from the collector drain, not removed from sites, must be stockpiled by bull-dozer into trapezoidal formation. In order to prevent impact on the ecology due to wind erosion, the stockpile is to be stabilized by planting suitable drought-resistant plants.

Monitoring As was done under **IDIP-1**, the PMU engineers will conduct site inspections prior to, during and upon completion of construction activities to ensure full compliance with the site-specific EMP and contract conditions. Final payment to the contractor should be contingent on the final inspection, with particular attention to the requirement to restore the site to its original

condition upon completion of construction activities.

The environmental monitoring of the construction sites will include regular sampling of soil and water within and around the construction sites; the involvement of the MOEB in monitoring and evaluation will help in developing systematic environmental monitoring at rehabilitated sites. The provision of basic sampling equipment and training by **IDIP-2** will help to improve the long-term water quality monitoring capabilities of CWR's Hydro-Geological Expeditions.

5.2.3 Environmental Impacts Related to Project Operation

Effects on Downstream Water Use About 70 percent of the project areas, comprising South Kazakhstan and Kyzyl-Orda Oblasts, drain into the Syr Darya River. The other 30 percent from Almaty and Zhambul Oblasts drains to the Illi and Shu Rivers. The construction of new drains and collectors and the rehabilitation of existing drains will not significantly increase the amount of salts and agricultural chemicals entering these natural waterways for the following reasons: (i) the salinity content of project drains is low (2-3 g/l) due to present location and (ii) the quantity of water carried by the drains is low when compared to the discharge of the rivers. The collector drains from the majority of the Kyzylkum and Makhtaaral area could drain into desert sinks or desert swamps like "Arnasay Swamp". The usefulness of this new outlet for disposal of irrigation and drainage water should be investigated.

Downstream Water Use - Water Sharing of the Syr Darya River The monthly inflow to from the Syr Darya to the Shardara reservoir is affected by the water use in upstream riparian countries, i.e. Kyrgyzstan, Tajikistan and Uzbekistan, and by the regulation of natural discharges operated by the upstream reservoirs. The interstate agreement between Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan and Turkmenistan for use of Syr Darya River water was signed in 1992 at Almaty. Accordingly, the annual share of Kazakhstan is 10 BCM at 75 percent guarantee and 8.7 BCM at 95 percent guarantee. The average annual inflow to the Shardara Reservoir, however, has been 13.6 BCM in recent years (1970-1996), which is higher than the internationally agreed volume.

Despite this apparent surplus of water inflows, the Syr Darya River basin remains one of the most degraded river basins in the world; in fact, its degradation over the last decades resulted in the destruction of the Aral Sea, one of the most widely recognized ecological disasters in the world. For this reason, **IDIP-2** will have to be extremely careful that its project interventions do not contribute to further degradation of the river basin.

Recommended Preventive Actions or Mitigation Measures In order to ensure that project interventions do not contribute to further degradation of the Syr Darya River basin, **IDIP-2** will undertake the following preventive actions:

- During the detailed design phase for each irrigation and drainage system to be rehabilitated, the CWR will perform a comprehensive hydrological system study for the project area, including water balance analysis as appropriate, to calculate the maximum irrigation water withdrawals allowable (considering drainage system discharge returns) to ensure the ecological integrity of the river basin
- During the operational phase, once rehabilitation of the irrigation and drainage system has been completed, the CWR will monitor and record irrigation water withdrawals and drainage system discharges in order to ensure compliance with the withdrawal limits established by the hydrological study.

The MOEB will participate, to the extent practicable, in this hydrological study and monitoring program in order to ensure that appropriate measures are taken to avoid any further degradation of

the river basin caused by irrigated agriculture.

Soil Salinity In the **IDIP-2** project areas, most of the soil salinity is secondary, that is, most commonly associated with poorly managed irrigation and drainage systems, which results in (i) water leakage from supply canals, (ii) excessive application of water and (iii) poor drainage. Most of the salinity problems in the field are the direct result of poor management of water. A recent World Bank study estimated that only about 20 percent of the water abstracted from the irrigation canal is required to satisfy the crop requirements, about 15 percent is wasted or lost in the main canal and about 65 percent is wasted on-farm and discharged to groundwater, adding pressure on an inadequate and dysfunctional drainage system (World Bank 2000).

While leaching soils is often recommended to address soil salinity, it does not resolve the salinity and high ground water problem. It only sustains secondary salinization and high ground water tables. The key to managing saline soils is to control the flow of water into the crop rooting zone and to reduce on-farm water losses. Salinity control will depend on proper land preparation (leveling, deep ripping) and improved irrigation scheduling and water management procedures. Deep ripping will improve soil drainage, by breaking up the compacted subsoil and plough pans and by removing any perched water table, it will increase both the rooting depth of the crops as well as draw back the water table. Improved irrigation scheduling and water management procedures will reduce the amount of water being added to the crop at any one time, reducing water losses into the drainage system and associated risk of rising water tables. In areas of moderate salinity, keeping the soil moist by increasing the number of summer irrigations could reduce any salinity effects. The total amount of water required in one cropping season may not increase but should be reduced as a result of improved water efficiencies.

Infrastructure improvements will result in intensification of agricultural practices. The nature and extent of this change will be influenced by dominant agricultural practices. The changes in agricultural practices may result in formation of hardpan below the topsoil, reduced nutrient status and impaired structure if organic matter content is not maintained. The hardpan condition below can be avoided by proper plowing practices. By promoting soil & water conservation, proper land use and agriculture extension the above mentioned soil conditions can be avoided. The introduction of more organic based farming, soil and water management, minimum and/or zero tillage that are planned for model farms, may be practiced for other project areas.

Recommended Preventive Actions or Mitigation Measures The EA again recommends preventive actions rather than mitigation measures to address the problems of soil salinity. The **IDIP-2** should ensure that farmers in the project RCCs receive information, training and extension services on proper irrigation water management and agricultural practices in order to minimize impacts on soil salinity in areas prone to these problems. **IDIP-2** will address all of these issues of improved irrigated agriculture and their impact on soil and water conservation. RCC training planned under Component 3 will address:

- Proper land preparation (leveling, deep ripping),
- Improved irrigation scheduling and water management practices,
- Soil conservation and fertility management
- Crop rotation, environmentally sound pest management and other GAP.

The services of agricultural extension, together with improved seeds that are planned for model farms, will also be utilized for other project areas. Through a comprehensive farmer training program and with the help of the MOA's extension program, appropriate GAP will be introduced into the project areas.

Monitoring The PMU should make every effort to ensure that the farm extension and farmer training programs include the proper soil management practices described above. The PMU should make routine site inspections to farmlands where salinity poses a problem to ensure that proper management practices are being used and, where rehabilitation activities are planned, that appropriate drainage system rehabilitation measures are included. .

Environmental monitoring will include regular sampling and analysis of soils for salinity by CWR's Hydro-Geological Expeditions in areas of known salinity problems (e.g. Makhtaaral). The provision of basic sampling and laboratory analysis equipment and training by **IDIP-2** will help to improve the long-term soil quality monitoring capabilities of the expeditions.

Agrochemical Contamination While the use of agrochemicals in project areas has been decreasing in recent years and there has been an increased emphasis on the use of biological pest control, the intensification of agriculture may result in increased use of agrochemicals, including chemical fertilizers, herbicides and pesticides. This may result in increasing soil and water contamination around **IDIP-2** rehabilitated project areas. Currently, the use of agrochemicals in the project areas is far less then the level applied in highly productive agricultural systems. The future application of these agrochemicals will need to be carefully monitored under the project and preventive measures taken through farmer training and agricultural extension that includes the following:

- optimum balance of mineral fertilizers with organic manure, mulching, etc.
- promotion of environment-friendly and cost effective pest management techniques, including IPM
- disincentives for the use of persistent pesticides
- application of internationally-recognized GAP, e.g. minimum or zero tillage systems, crop rotation and sustainable land use planning.

Recommended Preventive Actions or Mitigation Measures The EA recommends preventive actions rather than mitigation measures to address the potential for increased agrochemical pollution. The **IDIP-2** will ensure that farmers in the project RCCs receive information, training and extension services on proper application and disposal of chemical fertilizers, herbicides and pesticides, as well as more environment-friendly pest management practices, including IPM, and GAP generally. The training activities already planned under Component 3 of **DIP-2** should address these issues.

Monitoring The PMU should make every effort to monitor the RCC and farmer training and extension programs in order to evaluate their effects on farm management practices in the project areas. This may include routine inspections to farmlands to ensure that proper management practices are being used. The Hydro-Geological Expeditions will continue to monitor water quality for agrochemical residues. Again, **IDIP-2**'s provision of basic sampling and laboratory analysis equipment and training will help to improve the long-term soil and water quality monitoring capabilities of the expeditions.

Biodiversity Despite some 30 to 50 years of irrigated agriculture in the project areas, native flora and fauna are still in abundance (see EA for lists of flora and fauna found in the project areas). No species on this list, however, are registered as endangered species or included in the Red List for Kazakhstan; therefore, they are not recognized as endangered or specially protected. The current flora and fauna seem to have readily adapted to the irrigated agricultural environment.

The proposed improvements in irrigation and agriculture under the project may impact the biodiversity (flora and fauna) of the project areas, as a result of possible increased use of agro-

chemicals and the introduction of high-yield crop varieties at the expanse of traditional low-yield varieties. A substantial increase in agriculture cropping intensity is not expected in the near future but there will be changes in agricultural cropping patterns (land use planning and crop rotations), which will be planned as being advantageous to environment and the soil improvement (IPM, minimum and/or zero tillage). All these new ideas will have a beneficial impact on agriculture, environment and the flora and fauna which use the agricultural area/cultivated area as their habitat.

Recommended Preventive Actions or Mitigation Measures The EA recommends the following preventive actions in order to reduce the impacts on biodiversity of the changes in agricultural practices resulting from project interventions:

- raising awareness through the agricultural extension component and through training and support to RCCs and farmers of the importance of maintaining the diversity of farming practices and the local landscape
- promoting the maintenance of a variety of production of both cash and subsistence crops
- encouraging the use of indigenous multipurpose trees for soil protection, watershed management and cash crop production
- employing GAP in planting (mulching, crop rotations, crop diversification, adding green manure, organic manure, minimum and/or zero tillage) and pest management practices (IPM).

Most of these activities will be included in Component 3 of **IDIP-2**, but the PMU will need to ensure that adequate attention is given to biodiversity considerations in the project areas in the design, construction and operation of the rehabilitated irrigation and drainage systems.

6. ENVIRONMENTAL MANAGEMENT PLAN

The EMP contained in this section is the mechanism that ensures that the environmental prevention and mitigation measures identified in the EA will be properly undertaken during implementation of the proposed project. The EMP also includes the monitoring plan and institutional strengthening activities that help ensure that the project will have beneficial impacts on the project areas. Finally, the EMP establishes the necessary institutional arrangements, proposes a schedule for implementing these activities and indicates their costs in the proposed project budget.

6.1 Mitigation Plan

The preventive actions and mitigation measures recommended by the EA above are shown in the mitigation plan in Table 4. The plan identifies these measures according to the phase of project implementation in which the preventive actions should be taken or the potential impacts are likely to occur:

- the design phase, which covers the detailed, pre-construction planning and design of the irrigation and drainage rehabilitation works
- the construction phase, which covers the actual civil works financed by the project at selected irrigation and drainage systems and involves the immediate construction impacts and sediment/waste disposal impacts described in Section 5 above and
- the operation phase, which covers the period after actual construction of the civil works has been completed and involves the continuing and longer-term impacts on water and soil quality.

The plan then identifies the recommended preventive actions and mitigation measures, estimates the costs of installation (e.g. purchase price for equipment) and operation (e.g. operating costs for equipment or sampling/monitoring) for these measures where appropriate and assigns the institutional responsibility (e.g. PMU, CWR or MOEB) for ensuring that the measures are effectively implemented.

6.2 Monitoring Plan

As part of its overall responsibility for execution of **IDIP-2**, the PMU will ensure that regular environmental monitoring and evaluation of project activities take place. The PMU should basically continue and reinforce the PMU environmental oversight and CWR monitoring activities initiated by under **IDIP-1**. Under **IDIP-1**, the PIU contracted a national environmental specialist to oversee the environmental management and oversight activities under the project.

Under **IDIP-2** the PMU should continue this oversight and monitoring program, incorporating the environmental monitoring identified above as part of the preventive actions and mitigation measures proposed to address potential adverse impacts. The results of such monitoring will be recorded, analyzed and maintained by the PMU throughout the life of the project. The PMU will report the results of its monitoring program in the periodic progress reports it submits to IBRD; IBRD supervision missions will review the results of the monitoring program on a regular basis.

Table 4: Mitigation Plan

			Cost		Institutional Responsibility		Oversight
Phase	**Issue**	**Preventive Action/ Mitigation Measure**	**Install**	**Operate**	**Install**	**Operate**	
Design	Effects on downstream water use	Preparation of detailed hydrological studies and water withdrawal limits	to be determined (tbd)	n/a	CWR	CWR	MOEB oversight of water withdrawals
	Restrictions on access	Preparation of site-specific EMPs for rehabilitation works	tbd	n/a	Contractors	Contractors	PMU oversight of EMP preparation, contract provisions
		Incorporation of environmental clauses in construction contracts	n/a	n/a	PMU	PMU	
	Soil salinization and changes in water table	Appropriate drainage design measures	n/a	n/a	PMU	PMU	
Construction	Construction impacts (silt, dust, noise, waste materials, temporary closure, contractor camp site, etc.)	Implementation of site-specific EMP measures	n/a	tbd	n/a	Contractors	PMU site inspection, MOEB coordination
		Implementation of environmental clauses in construction contracts	n/a	tbd	n/a	Contractors	Site inspections as above
	Excavated sediment management, construction waste management	Appropriate disposal practices following CWR/MOEB guidelines	n/a	tbd	n/a	Contractors	Site inspections as above
Operation	Threats to soil salinity from intensified agriculture	Training in improved water and soil management practices	n/a	Component 3	PMU/MOA	PMU/MOA	PMU site inspection, MOEB coordination
	Threats to soil and water quality from agrochemical contamination	Training/extension in improved pest management practices, including IPM	n/a	Component 3	PMU/MOA	PMU/MOA	PMU site inspection, MOEB coordination
	Threats to biodiversity	Public awareness raising, promotion of agricultural diversity/tree planting	n/a	Component 3	PMU/MOA	PMU/MOA	PMU site inspection, MOEB coordination

Oversight of Compliance with Preventive Actions and Mitigation Measures As initiated under **IDIP-1**, the PMU will be responsible for overseeing proper implementation of the various preventive actions and mitigation measures required by the EA above, by the site-specific EMP or by the MOEB. This will entail periodically making site visits to verify that the appropriate preventive actions and/or mitigation measures have been implemented. The PMU also will conduct random evaluations of project sites to determine the effectiveness of measures taken and the impacts of project activities on the surrounding environment.

Monitoring of Ecological Indicators During the life of **IDIP-2**, the PMU, through the oblast units and with the collaboration of MOEB, will carry out periodic monitoring and analysis of the soils, water resources and ground water levels at sites where project rehabilitation works will take place. This will include the ecological monitoring activities identified above in the EA or in the site-specific EMP as part of the preventive actions and mitigation measures proposed to address potential adverse impacts. As detailed in the monitoring plan in Table 5, this monitoring will include regular analysis of:

- the quantity and quality of irrigation water withdrawals and drainage waters discharged, i.e. analysis of mineralization, pH, temperature and turbidity (as initiated under **IDIP-1**)
- the quality of selected receiving waters, i.e. analysis of chemicals and pesticides (as initiated under **IDIP-1**)
- the quality of soils, including salinity and humus content (content of phosphorus, potassium, nitrogen), groundwater levels and mineralization, where needed.

As was done under **IDIP-1**, the water management specialists in the CWR's raion Hydro-Geological Expeditions will take samples of soil and water at selected project sites, keep records of the results and report these results periodically to the PMU. Samples taken for chemical analysis will be sent to the oblast laboratory maintained by CWR for laboratory analysis. The PMU will analyze and report on the results of the water quality monitoring program on an annual basis, recommending appropriate preventive actions or mitigation measures where the results warrant such actions.

6.3 Institutional Strengthening

In order to ensure proper implementation of the various environmental activities (preventive actions/mitigation measures, monitoring) recommended in this EMP, **IDIP-2** will provide the necessary institutional strengthening to the PMU and CWR, as well as support public outreach on environmental management issues to the RCCs and RCC members. This institutional strengthening will comprise building technical capacity within the PMU, the delivery of technical assistance and training, the purchase of necessary sampling and monitoring equipment and support for public outreach/awareness activities. One of the goals of the project is to institutionalize these environmental activities within CWR. Each of these activities is described below.

Technical Capacity within the PMU As was done under **IDIP-1**, under **IDIP-2** the PMU will recruit an environmental specialist on a full-time basis, to be based in Shymkent for the life of the project. This specialist will oversee and coordinate implementation of all environmental oversight and monitoring activities identified in the EA and EMP. He/she will record and analyze the results of such monitoring. The PMU will report the results of its monitoring program in the periodic progress reports. Draft terms of reference for this environmental specialist are included in Annex C.

Design and construction supervision consultants will have immediate field-level responsibility for

the monitoring of the implementation of the site-specific EMP. Among the consultants' staff will be environmental specialists who will provide regular monitoring of the construction works and the adherence by the contractors to the EMP. The consultants' staff will report on a regular basis to the PMU's environmental specialist. Similar arrangements were successfully followed under **IDIP-1**, as a result of which the EMPs were successfully implemented.

Table 5: Ecological Monitoring Plan

						Cost US$		Responsibility	
Project Phase	**Parameter**	**Location**	**Method/ Equipment**	**Frequency**	**Purpose**	**Install**	**Operate**	**Install**	**Operate**
Baseline (pre-irrigation/ drainage rehabilitation)	Soil salinity, pesticide levels	Problem areas (1/100 ha)	Field sampling equipment	Once before, during, after growing season	Establish baseline data	n/a	15,000	CWR sampling	CWR sampling
	Groundwater levels	Problem areas (1/75 ha)	Water gauge measurement	Once, before, during, after growing season	Establish baseline data	n/a	13,000	CWR sampling	CWR sampling
	Groundwater quality	Problem areas (head, middle, tail of system)	Field sampling, lab analysis	Variable during growing season	Establish baseline data	n/a	50,000	CWR sampling	CWR sampling
	Pesticide residues in fish, fodder crops	Receiving waters, project area farms	CWR laboratory analysis	Once first year	Establish baseline data	n/a	10,000	CWR sampling	CWR sampling
Construction (irrigation/ drainage rehabilitation)	Site-specific EMP measures Environmental contract clauses	Irrigation system rehabilitation sites	Rehabilitation site inspections	Once before, during and after completion	Ensure compliance with EMP measures, contract clauses	n/a	negligible	n/a	PMU/ MOEB
	Soil and water monitoring as above	As above	Field sampling, lab analysis	Before, during, after growing season	Measure impacts of civil works		88,000	n/a	CWR sampling, analysis
Operation (post-irrigation/ drainage rehabilitation)	Soil salinity, pesticide levels	Problem areas (as above)	Soil sampling/ analysis	Every two years	Measure soil quality changes	n/a	200,000 total	n/a	RSU/ SAEPF
	Groundwater levels	Problem areas (as above)	Water gauge measurement	Every two years	Determine water levels	n/a		n/a	CWR
	Groundwater quality	Problem areas (head, middle, tail of system)	Field sampling, lab analysis	Variable during growing season	Determine impacts of civil works	n/a		n/a	RSU sampling
	Pesticide residues	Receiving waters, area farms	CWR lab analysis	Annually	Measure impacts of project	n/a			

Technical Assistance and Training The environmental specialist will organize appropriate environmental training for the water management specialists in the PMU and its oblast offices, both to raise environmental awareness and to strengthen overall environmental management capacity in the project team. This training will address the specific technical skills necessary to perform the environmental oversight and monitoring functions required. Additionally, the environmental specialist will support environmental outreach activities for RCCs and RCC members, raising their awareness of on-site compliance with environmental requirements and the results of water quality monitoring activities.

Monitoring and Laboratory Equipment IDIP-2 will provide the field sampling and laboratory analysis equipment necessary to support the soil and water quality monitoring program performed by the CWR Hydro-Geological Expeditions at the raion and oblast levels (e.g. Turkestan). The project may also purchase additional equipment determined necessary to strengthen the monitoring program. The project should consider providing the PMU with a geographic information system (GIS) for irrigation design purposes; it would also serve for mapping the monitoring network, displaying environmental monitoring results, identifying areas of particular concern, etc.

Public Outreach and Awareness As recommended by the EA, **IDIP-2** will also support better outreach on environmental concerns to the RCCs and RCC members and dissemination of information on the environmental compliance and water quality monitoring activities of the project and CWR. This support will include meetings or workshops with RCCs organized at the oblast level, distribution of printed material on soil and water quality monitoring or other public outreach and information activities of this nature.

The various elements and activities included in this institutional strengthening program are presented in summary form in Table 6.

Table 6: Institutional Strengthening Program

Component	Activity/Unit	Recipients
Environmental specialist (on full-time basis for life of project)	Oversee and coordinate the environmental measures and activities included in EA and EMP	PMU project component managers
Environmental technical assistance (on as needed basis for life of project)	Technical assistance for implementation of environmental oversight and monitoring activities	PMU/CWR soil/water management specialists
Training	Oversight of on-site compliance with environmental requirements, water/soil sampling for monitoring program	PMU/CWR soil/water management specialists at oblast and raion levels
Monitoring and Laboratory Analysis Equipment	Field sampling and monitoring equipment, laboratory analysis equipment at oblast and raion levels	CWR Hydro-Geological Expeditions at oblast and raion levels

6.4. Schedule

Implementation of the activities described in the EMP will begin in the first year of project implementation, with an immediate review and refinement of the details of the mitigation plan,

monitoring plan and institutional strengthening program proposed above. The PMU, with the support of the environmental specialist, will then ensure implementation of the mitigation and monitoring plans and institutional strengthening program, as appropriate given the schedule of infrastructure rehabilitation at selected sites under the project. The preparation of site-specific EMPs, with their mitigation measures for construction impacts, for example, will obviously track the pace of infrastructure rehabilitation. These activities will continue, as appropriate, throughout the life of the project.

The institutional strengthening activities will take place over the life of the project, on the basis of identified needs, with scheduled training for PMU/CWR water management specialists occurring early in project implementation, followed by the outreach activities with the RCCs. The environmental specialist will be provided to the PMU on a full-time basis for the life of the project. The monitoring plan will be implemented throughout the life of the project based on the schedule of rehabilitation activities, with periodic monitoring used to evaluate the impacts of mitigation measures and track baseline environmental conditions in the project areas. Most of the purchase of field equipment should take place in the first year of the project, but additional needs may be identified at later times.

The proposed schedule for implementing EMP activities is shown in Table 7.

Table 7: EMP Implementation Schedule

EMP Activities	Year 1	Year 2	Year 3	Year 4	Years 5-7
Review and refinement of EMP activities					
Mitigation Plan:					
-- Preparation of hydrological studies					
-- Preparation of site-specific EMPs for irrigation systems and dams					
-- Oversight of construction impacts					
-- Training in water/soil management, GAP					
-- Biodiversity awareness raising					
Monitoring Plan:					
-- General implementation of civil works contracts for irrigation systems and dams and adherence by contractors to the EMP. Provisions for this are provided in the technical specifications that are part of the contracts.					
-- Water quality					
-- Groundwater level					
-- Soil quality					
-- Pesticide residues in fish, fodder crops					
Institutional Strengthening:					
-- Environmental specialist in PMU					
-- Technical assistance as needed					
-- Training					
-- Purchase of monitoring/lab equipment					
-- Public outreach for RCCs					

6.5 Institutional Arrangements

Responsibility for implementation of the EMP will be shared by the PMU, the CWR and MOEB. CWR, working through the PMU, will have overall responsibility for implementation of **IDIP-2** and will ensure that the EMP is fully integrated into implementation of the project, including the monitoring and reporting required by IBRD. More specifically:

- The PMU will assume responsibility for ensuring that: (i) the design and assessment of the physical works are in accordance with Kazakh environmental norms, regulations and requirements, (ii) the preparation of site-specific EMPs are in accordance with the guidelines included in the EMP and (iii) the physical implementation of the activities under the project complies with the above environmental requirements. The PMU's engineers and externally engaged design engineers will assume the primary responsibility for providing designs and for preparation of the bidding documents with specifications taking into account environmental protection requirements. Contractors will be responsible for implementation of the rehabilitation works in accordance with environmental requirements specified in the site-specific EMPs and bidding/contract documents.
- The PMU's environmental specialist will work to ensure that all preventive actions and mitigation measures identified by the site-specific EMP are undertaken in a proper and timely manner and will take the necessary actions to monitor their effectiveness. To the extent feasible, the local MOEB staff in the project raions will assist the environmental specialist in monitoring implementation of the mitigation plan. Where it becomes apparent that different or additional measures are required to minimize potential negative impacts, the environmental specialist, with the advice of the MOEB staff, will recommend such measures to the PMU.
- The environmental specialist will also oversee implementation of the ecological monitoring plan specified in the EMP, ensuring that the monitoring assigned to the CWR hydro-geological expeditions is performed effectively and that the information is shared promptly with appropriate project and CWR officials. The specialist will package the results of the ecological monitoring in annual reports to the PMU Project Coordinator, national and local GOK officials and IBRD staff.
- The environmental specialist will directly manage the institutional strengthening activities recommended by the EMP, including scheduling training, overseeing the purchase of equipment and managing efforts to raise RCC awareness.

CWR and MOEB will work closely with the PMU in implementing the EMP. In particular, CWR will support the environmental specialist in institutionalizing these environmental activities in the oblast and raion offices through training and technical assistance.

MOEB, through its SEE functions, will be the primary monitoring agency for **IDIP-2** activities and will support the environmental specialist in the assessing the environmental impacts of project activities, evaluating the effectiveness of the preventive actions and mitigation measures taken and performing the ecological monitoring assigned.

Finally, the RCCs will collaborate with the environmental specialist to ensure that environmental considerations are incorporated into their activities, not only in the rehabilitation, operation and maintenance of irrigation and drainage infrastructure but in improved practices for agricultural, water and soil resources management among their members.

7. CONSULTATION WITH STAKEHOLDERS AND BENEFICIARIES

During preparation of the EA in 2006, the team consulted with the various GOK institutional stakeholders for the project, i.e. the departments and agencies responsible for environmental assessment, management and environmental monitoring, as well as other agencies involved in the collection and measurement of surface and ground water quality, flora and fauna, soil and land, agriculture and climate. These departments and agencies included:

- the State University of South Kazakhstan

- the Department of Ecology and Biological Resources in Shymkent, the oblast office of MOEB
- the Department of Environmental Protection, MOA, at oblast and raion levels
- the Departments and Sections of CWR.

During its visits to the various proposed project areas, the EA team met with RCC officials and farmers involved in managing the irrigation infrastructure proposed for rehabilitation under the project. Many of these discussions dealing with the problems faced by farmers informed the EA proposals with respect to training programs on environmental management, RCC involvement in soil and water monitoring, reforestation and biodiversity conservation activities the EMP. The EA includes the reports from 53 public interviews conducted in Makhtaaral, Kyzylkum, Arys-Turkestan, Kyzyl-Orda and Zhambul Oblasts. The farmers and residents of these areas were asked to complete a prepared questionnaire. The responses record their views and comments on **IDIP-2**, which have proved useful to CWR, MOEB, MOA and IBRD in formulating the proposed project.

Additional consultations with relevant stakeholders and beneficiaries took place during a subsequent preparation mission in March 2007, when an FAO preparation team met with officials from the CWR and the design team in Shymkent, oblast and raion officials in South Kazakhstan Oblast (Kyzylkum, Makhtaaral and Arys-Turkestan), RCC officials and farmers in proposed project areas.

Stakeholders were generally supportive of the proposed project scope and components, the technical, financial, and environmental impacts to be expected, and their involvement in the project. The current situation in the schemes is so bad, with deteriorated infrastructure and unreliable water supply, that the project is fully supported by all those consulted. The key stakeholders are the water users in the project areas, most of whom are members of Rural Consumer Cooperatives. All project interventions will be determined through a participatory process with the involvement of the management and members of RCCs. Thus, further stakeholder meetings and consultations will take place in each sub-project area during project implementation.

8. PROPOSED BUDGET

The estimated costs of implementing the various activities specified in the EMP are displayed in Table 8. The costs are broken down in terms of personnel expenses (i.e. the full-time environmental specialist), institutional strengthening expenses (i.e. technical assistance, training, outreach), monitoring program expenses (laboratory analyses) and equipment costs.

IDIP-2 will finance these expenses as part of the project budget. The project should make every effort, however, to ensure that the GOK shares some of the costs that support government functions (e.g. monitoring by CWR and MOEB). The costs of the EMP will be included in the total costs of the **IDIP-2** and will be financed with funds from the IBRD loan. No additional costs are envisaged in implementation of the EMP.

Table 8: Proposed EMP Budget

EMP Category	Quantity	Unit Rate (US$)	Cost (US$)
Personnel:			
PMU environmental specialist (full-time/5 years)	60 m*	700/m	42,000
National environmental experts (part-time/5 years)	20 m	1,000/m	20,000
Institutional Strengthening:			
- Training, workshops, etc.	10	3,000	30,000
- Public outreach/awareness campaigns	10	1,500	15,000
Monitoring Program Expenses:			
Laboratory analysis costs	5 yrs.	8,000	476,000
Field Monitoring Equipment:			
- handheld GPS units, computer download	100	250	25,000
- EC meters (electrical conductivity)	100	250	25,000
Hydro-Geological Expedition Lab Equipment:			
- Turkestan Expedition Laboratory	1 set	50,000	50,000
- Other	? set	50,000	50,000
Small-scale Ecological/Biodiversity Investments:			
- Reforestation activities	10	5,000	50,000
- Habitat restoration activities	10	5,000	50,000
TOTAL			833,000

* person months of labour

ANNEX A

GUIDELINES FOR PREPARATION OF SITE-SPECIFIC EMPS

I. Introduction

In order to elaborate a site-specific EMP, the preparer must gather the details from the selected site for rehabilitation. The information needed includes the environmental description of the affected area. It is encouraged that the preparer perform a site visit to get acquainted with the environmental characteristics of the location and the specific activities of the project in its different phases, including details on its regular operating procedures (e.g. amount of water diverted from the river at headworks, etc.).

Once all the information is gathered, the preparer should identify the appropriate activities for each of the phases of the project, and identify the relevant impacts due to the environmental characteristics of the sites. Following this, the impacts need to be ranked (see next section), and the EMP responsibilities specified.

The ranking of the impacts is the crucial step for obtaining an effective and efficient EMP. If the impacts are overstated, then unnecessary hurdles and expenses are attached to the project. If, on the contrary, they are understated, then preventable, potentially severe environmental damage can be inflicted.

II. Ranking of Impacts

Once the specific activities of the project, the regular operating conditions and the environmental conditions have been identified, the relevant impacts must be ranked. The characteristics to be used for ranking impacts are shown in the table below.

Impact Characteristics and Their Corresponding Ranking

Impact Characteristic	Ranking
Type	- **Direct**: The impact may occur as a direct consequence of the activities of the project. - **Indirect**: The impact may occur as a consequence of combination of activities of the project and external factors, or due to an output of the project there are changes in the input of another activity (external to the project) that will generate impact. - **External**: The impact occurs due to factors that are not controllable by the activities, or changes in the design of the project.
Duration	- **Short term**: Severe impact but spike situation; duration within one day; or moderate impact with duration less than one month. - **Medium term**: Less than one year. - **Long term**: Greater than one year. - **Permanent**: Continuous.

Timing	- **Immediate**: The impact occurs immediately as the activity is performed. - **Delayed**: The impact manifests after the conclusion of the activity.
Extent	- **High**: Regional extent. - **Moderate**: Several locations are impacted, and/or difficult to contain. - **Low**: Moderate impact but localized and readily containable.
Severity	- **High**: Regulations/environmental standards are broken; or extreme impact and/or potential for global impact. - **Moderate**: Moderate impact over several locations. - **Low**: Minimal impact; or moderate impact but localized and readily containable.
Reversibility	- **Reversible**: If the impact occurs, the environment can be restored to its original condition. - **Irreversible**: If the impact occurs, the environment cannot be restored to its original condition.
Likelihood	- **Certain**: If an activity of the project is performed, the impact will certainly occur. - **High**: It can occur with high probability during normal operating conditions, or traditional methods of performing activities. - **Medium**: Occurs during maintenance activities; or if an action is performed there is medium probability of the impact occurs. - **Low**: Occurs during abnormal/emergency conditions, and it occurrence can be managed. Or, if an activity is performed, is very unlikely that the impact will occur. - **Uncertain**: If an activity of the project is perform, there is no information about the probability of occurrence of the impact.

Once the appropriate ranking has been done, the significance must be determined. If the impact is significant, specific mitigating measures must be identified and implemented. The executing, monitoring and supervising responsibilities must be identified. The EMP plan preparer will have specified all the aspects of the site-master plan.

As practical guidance, to make sure that the ranking symbols used in each of the characteristics is the correct one, an impact is significant if it has any of the following characteristics:
- are extensive over space or time;
- are intensive in concentration or in relation to assimilative capacity;
- exceed environmental standards or thresholds;
- do not comply with environmental policies/ land use plans;
- affect ecological sensitive areas and heritage resources; or
- affect community lifestyle, traditional land uses and values.

Finally, another practical test for significance can be performed by asking the following three questions:
- Are there residual environmental impacts?
- If yes, are these likely to be significant or not?
- If yes, are these significant effects likely to occur?

If the impact is not significant, then the mitigating measures identified in the plan must not be

implemented immediately, but it should be monitored to prevent from becoming significant over time.

Example - Model Outline of the Site Specific EMP

Baseline Data

Description of Project Activities

Determine the list of the Activities to be performed during the Construction phase and the O&M phase. The system consists of headworks, a concrete lined canal of 24.9 km in length, and a storage/regulation basin for low flow periods. The proposed works include cleaning of the reservoir (60 percent siltation), rehabilitation of headworks, and repair of the canal. This implies location of Construction site, earth movements, and dumping of large quantities of dredged material.

Description of Environmental Characteristics of the Site

The canal system diverts water from the river, which has fish in it. The canal is located on an intervened area, mostly agricultural lands.

Description of Regular Operating Procedures of Concern

For example, it is standard practice to divert 100 percent of the river waters for a period of approximately 20 days per year, usually during April.

EMP specifics

A detail of the activities that can generate potential negative impacts and the significant impacts that may be generated are shown in the following table.

Activities and Potential Significant Impacts by Project Phase

Phase	Activity	Impact
Construction	Location of Construction camps	- Soil pollution; - Groundwater pollution;
	Extraction of Construction Material	- Landscape degradation; - Habitat Loss/Fragmentation; - Change in local Drainage Patterns;
	Dumping of Dredged/Excavated Material & Debris	- Landscape degradation; - Habitat Loss/Fragmentation; - Change in local Drainage Patterns;
	Handling of Construction Materials	- Air Pollution; - Workers/Population Exposure;
	Use of Heavy Machinery	- Air Pollution; - Noise Pollution;
	Movement of Trucks (Construction Materials Transportation)	No significant impacts;
	River bed works	No significant impacts;
	Repairs to structures (concrete)	No significant impacts;

Phase	Activity	Impact
	Repair/replacement of gates on structures	No significant impacts;
	Patching of cracks and joints in concrete lining	No significant impacts;
	Cleaning sediment from overpass structures	No significant impacts;
	Cleaning of trash racks	No significant impacts;
	Grading service roads	No significant impacts;
	Repairs to electrical equipment	No significant impacts;
Operation/ Maintenance	Location of Construction Camps	No significant impacts;
	Extraction of Construction Material	No significant impacts;
	Dumping of Dredged/Excavated Material & Debris	No significant impacts;
	Handling of Construction Materials	No significant impacts;
	Use of Heavy Machinery	No significant impacts;
	Movement of Trucks (Construction Materials Transportation)	No significant impacts;
	River bed works	No significant impacts;
	Repairs to structures (concrete)	No significant impacts;
	Repair/replacement of gates on structures	No significant impacts;
	Patching of cracks and joints in concrete lining	No significant impacts;
	Cleaning of trash racks	No significant impacts;
	Grading service roads	No significant impacts;
	Repairs to electrical equipment (e.g. motors on gate hoists)	No significant impacts;
	Machinery Maintenance and Repair	No significant impacts;
	Water Extraction from Rivers	Reduction in downstream flows, affecting depending ecosystems;
	Water Delivery to In-Farm Infrastructure	No significant impacts;
	Motorcycle Traffic between Structures	No significant impacts;
	Office Activities	No significant impacts;
	Transport and storage of "in-kind" payment for WUA	No significant impacts;

Those impacts deemed significant should have the mitigation measures in place in order to have the residual impact being non significant. Those identified as No Significant Impacts should be monitored so that they do not turn into significant as the project is implemented.

ANNEX B

ENVIRONMENTAL CLAUSES FOR CONSTRUCTION CONTRACTS

Environmental clause for bidding documents and contracts:

For environmental damage possibly caused by contractors during construction activities, such as noise, dust, solid wastes, excavated sediments and other materials from irrigation and drainage canals and structures and any damage to natural vegetation etc., appropriate mitigating measures would constitute an integral part of the design and implementation, including the contracts binding the contractors to carry out the environmental obligations during construction. The standardized environmental clauses will be included in each contract under IDIP-2 during the design. Other clauses specified by the raions will be included in the awarded contract and will provide additional details for following environmental precautionary clauses.

The key mitigating measures for the potential negative impacts that are being envisaged under the project EMP are as follows:

"The natural landscape should be preserved to the extent possible by conducting operations in a manner that will prevent unnecessary destruction or scarring of natural surroundings. Except where required for permanent works, quarries, borrow pits, staging and processing areas, dumps, and camps, all trees, saplings, and shrubbery should be protected from unnecessary damage by project-related activities. After construction any unavoidable damage should be restored to quasi-original conditions where appropriate;

"The contractor's operations should be performed so as to prevent accidental spillage of contaminants, debris, or other pollutants, especially into streams or underground water resources. Such pollutants include untreated sewage and sanitary waste, tailings, petroleum products, chemical, biocides, mineral salts, and thermal pollution. Wastewater, including those from aggregate processing and concrete batching, must not enter streams without settling ponds, grave filters, or other processes, so as not to impair water quality or harm aquatic life;

"The contractor should ensure proper disposal of waste materials and rubbish. If disposal by burial or fire, it should not cause any negative impact to either the air, soil nor ground water supplies;

"The contractor should minimize air and water pollution emissions. Dust from the handling or transporting of aggregates, cement, etc., should be minimized by sprinkling or other methods. Materials, brush or trees should only be burned when the owners permit, under favourable weather conditions;

"The contractor's facilities, such as warehouses, labour camps and storage areas, should be planned in advance to decide what the area will look like upon completion of construction. These facilities should be located so as to preserve the natural environment (such as trees and other vegetation) to the maximum extent possible. After project construction, camps and building should either serve as permanent residences and form future communities, if such use can be foreseen and approved, or be torn down and the area restored to its quasi-original condition in order to avoid deterioration into shanty towns;

"Borrow pits should be landscaped and planted according to an ecological design to provide some substitute area for lost natural landscapes and habitats."

ANNEX C

TERMS OF REFERENCE FOR ENVIRONMENTAL SPECIALIST

Qualifications and Work Experience The environmental specialist should have a PhD in Environmental Sciences or Water Resources Management, along with good experience in environmental assessment and management. The specialist should have at least 10 years of work experience specifically related to water resources management and agriculture and irrigation impacts on environment. The specialist should be familiar with the procedures for environmental monitoring and have knowledge of national and international environmental standards and requirements for drinking water, irrigation and lands, public health and technical parameters and safety standards. The specialist should have at least four years work experience in private, local or national government administration, and some experience with international organizations.

Tasks Working under the direct supervision of the PMU Coordinator in the PMU based in Shymkent, the environmental specialist will perform the following tasks:

- review the environmental current status of each proposed project area, including the hydrological system study
- review and evaluate the site-specific EMP prepared by the contractor before rehabilitation activities at irrigation and drainage systems, discuss the measures recommended in the site-specific EMP with environmental staff in charge of SEE at the MOEB
- establish the baseline information for the major ecological parameters, as well as the long-term ecological monitoring program for key ecological indicators as part of general project monitoring and evaluation
- oversee implementation of the preventive actions, mitigation measures and monitoring requirements specified in the EA and EMP
- organize the various training activities for PMU, CWR and RCC staff and RCC members, as appropriate
- submit periodic reports to the PMU on the adequacy of preventive actions and mitigation measures taken in preventing adverse environmental impacts
- provide guidance for project staff in the PMUs for preparing procurement documents with environmental covenants and reviewing site-specific EMPs
- serve as a liaison between the environmental staff in MOEB oblast and raion offices and the PMUs.