Draft Initial Environmental Examination

August 2018

KGZ: Climate Change and Disaster-Resilient Water Resources Sector Project

Pravaya-Vetka Subproject

Prepared by the Department of Water Resources and Melioration of the Ministry of Agriculture, Food Industry, and Melioration for the Asian Development Bank (ADB)

Table of Contents

List of Figures

List of Tables

Abbreviations

ADB	–	Asian Development Bank
ADF	–	Asian Development Fund
AESI	–	Assessment of environmental and social impact
A.O.	–	Ayil Okmotu (rural council)
CBO	–	Community-based organization
CD	–	Capacity or community development (depending on context)
CWRD	–	Central and West Asia Department
DEE	–	Department of Ecological Expertise (under the SAEPF)
DRR	–	Disaster Risk Reduction
DWR	–	Department of Water Resources and Melioration of the Ministry of Agriculture, Food Industry, and Melioration
EA	–	Environmental Assessment
EARF	–	Environmental Assessment and Review Framework
EIA	–	Environmental impact assessment
EIS	–	Environmental Impact Statement
EMP	–	Environmental Management Plan
EMMP	–	Environmental Management and Monitoring Plan
GKR	–	Government of the Kyrgyz Republic
GOST	–	Commonwealth of Independent States Standards
GRG	–	Grievance Redress Group
GRM	–	Grievance Redress Mechanism
IEE	–	Initial Environmental Examination
IUCN	–	International Union for Conservation of Nature
KR	–	Kyrgyz Republic
LARP	–	Land Acquisition and Resettlement Plan
LFP	–	Local Focal Point
LRP	–	Livelihood Recovery Plan
M&E	–	Monitoring and evaluation
MNR	–	Ministry of Natural Resources

MOA	–	Ministry of Agriculture, Food Industry, and Melioration
MOES	–	Ministry of Emergency Services
NGO	–	Non-governmental organizations
NPV	–	Net present value
NVP	–	Net value of agricultural production
OCR	–	Ordinary Capital Resources
OVOS	–	Russian acronym for “Assessment of Environmental Impacts”
PER	–	Public Environmental Review
PIO	–	Project Implementation Office
PIU	–	Project Implementation Unit
PMO	–	Project Management Office
POW	–	Productivity of water
PPTA	–	Project Preparation Technical Assistance
PSA	–	Poverty and Social Assessment
PV	–	Pravaya-Vetka
RCP	–	Representative Concentration Pathway
RGKR	–	Resolution of the Government of the Kyrgyz Republic
RP	–	Resettlement Policy
SAEPF	–	State Agency for Environment Protection and Forestry
SEMP	–	Site-Specific Environmental Management Plan
SER	–	State Environmental Review
SIEE	–	Summary Initial Environmental Examination
SPRSS	–	Summary Poverty Reduction and Social Strategy
SPS	–	Safeguard Policy Statement
SSEI	–	Secondary Specialized Educational Institution
TOR	–	Terms of Reference
UNECE	–	United Nations Economic Commission for Europe
USAID	–	United States Agency for International Development
WUA	–	Water User Association
WUG	–	Water User Group

Weights and Measures

kg	–	Kilogram
mm	–	Millimeter
m, m^2, m^3	–	Meter, square meters, cubic meters
km, km^2	–	Kilometer, square kilometer
ha	–	Hectare
dB(A)	–	Noise measurements taken with an instrument set on the A weighting scale
mg/l	–	Milligrams per liter

Currency Equivalents

Currency Unit	–	(as at 5 July 2018)	
$1.00	=	68.1905	Som (KGS)

Notes

(i) In this report, "$" refers to US dollars.

Executive Summary

1. Kyrgyz Republic is a country at high risk of impact from the adverse effects of climate change and extreme weather events. The population is vulnerable, as approximately 30% of the population lives below the national poverty line and over 65% live in rural areas dependent on agriculture income. Disasters triggered by natural hazards such as floods and earthquakes are frequent and estimated to cost Kyrgyz Republic approximately 1%–1.5% of the GDP annually. The water resources sector is particularly vulnerable: notable recent water-related disaster events include droughts in northern districts (2009 and 2014), landslides (2003 and 2004), and flooding (2007 and 2012) in southwest districts.
2. Climate change is likely to increase the frequency and magnitude of extreme weather events. Drought and associated water stress may occur more frequently as temperatures increase, precipitation, and snowmelt patterns change adversely, and water availability may decline in the face of growing competing demands. Landslides (including mudflows) and floods may become more frequent due to melting permafrost and more intense precipitation events.
3. Irrigation is critical for sustained agricultural production in Kyrgyz Republic. However, following the collapse of the Soviet Union, Kyrgyz Republic's water resources infrastructure is decayed and inefficient and agricultural productivity is low, thereby offering insufficient protection and resilience to natural hazard events. In addition, the hydro-meteorological capacity for monitoring, analyzing, and forecasting weather events has suffered during the post-independence period due to lack of resources. The situation is likely to be further aggravated due to growing and competing water demand due to population and economic growth and increased demands among agriculture, domestic water supply, and industrial and energy sectors.
4. Consultations with government and civil society stakeholders have identified improvements to climate change and disaster resilience in the water resources sector as a priority area for climate change adaptation. In this context, ADB launched a transactional technical assistance to develop and prepare a proposed investment project to strengthen the resilience of the water resources sector to floods, landslides, and droughts in Kyrgyz Republic. The project was called "Climate Resilience and Disaster Risk Reduction in Water Resources Management". The present Pravaya-Vetka subproject is part of this project.
5. Within the Jalal-Abad Oblast, the Pravaya-Vetka Subproject is located in the Nooken District, in the densely populated foothills of the Fergana Valley. The inter-farm Pravaya-Vetka canal was put into operation in 1954. It is fed by the Kara-Unkur-Sai River. The total length of the canal is 20.1 km. Its design capacity is 22.0 m3/sec at the intake. The surface area of irrigated lands is 10,022 hectares. The irrigation system is serving about 167 farmers. The main crops are cotton, wheat and corn.
6. Due to years of operation and inadequate allocation of funds from the budget for maintenance and repair, hydraulic structures are unsatisfactory. The Channel is silted in places and its capacity has decreased to 15m3. Mudflow discharges into the canals from gullies or mountain brooks add to the maintenance costs and jeopardize the infrastructure.
7. The Pravaya-Vetka Irrigated Agriculture Subproject consists in the canal reconstruction on two sections with a total length of 5.5 km. Two mudflow-crossing structures will be replaced and another one constructed.
8. Lands allocated for the Pravaya Vetka irrigation system refers to lands of long-time or permanent allotment for agricultural purposes. Where vegetation and topsoil is being transformed, numerous facilities are being built; the lithogenic basis (compaction, soil withdrawal), terrain, hydrological regime undergo radical changes. These lands are territories for an undefined period of time taken out of the habitat/living environment. In this context, the fauna and flora in the irrigation system area is poor, and is represented mainly by species of the so-called "cultural landscape". The habitats of notable species of mammals and birds are

located at a safe distance from settlements and agricultural lands.

9. In general, the construction/reconstruction and operation of the Pravaya-Vetka subproject components will not lead to changes in the species communities and will not affect the general state of the populations. Therefore, there is no threat to biodiversity as a whole. The level/degree of impact is rather low, the area is characterized by high human-induced pressures and density of population, and intensive agriculture.

10. Although the environmental survey of the canal has identified a number of potential impacts associated with the operation and maintenance of the canal, the use of good construction practices and simple and affordable mitigation measures will ensure that these impacts are not significant and do not affect the feasibility of the proposed project.

11. The environmental consequences of the proposed subproject components will include:

- Moderate loss of vegetation cover;
- Moderate fragmentation of habitats (mudflow crossing structure n°1);
- Low risk of damage to species that need protection (e.g. Turkestan catfish);
- Low risk of biodiversity loss;
- Minor impact on landscape;
- Low level nuisances to the neighbourhood during the construction period (dust, atmospheric pollution, noise, traffic disturbances, etc.);
- Low greenhouse gas emissions;
- Low risk of exposure to health and safety risks.

12. Positive environmental and social impacts will include:

- Increase the safety level of irrigation water supply;
- Increase employment of local people;
- Potential reduction in the cost of agricultural products, leading to an improved quality of life;
- Potential reduction in the cost of irrigation, leading to increased competitiveness of farmers and entrepreneurs in the agricultural industry.

13. The application of proven, internationally accepted environmentally sound design solutions, good management and construction practices during the project implementation are sufficient measures to avoid, minimize, mitigate and compensate almost all potentially significant adverse effects of the impact on the environment.

14. There are however two notable potential impacts requiring special attention:

- Two components of the subproject (mudflow crossing replacements) will impact a small watercourse, the Shaidan river. This river has no specific protection status, but it hosts a fish listed in the Kyrgyz Red Book of rare or endangered species, the Turkestan catfish. Even if this species is not endemic to the Shaidan river, everything must be done to make sure that this species and its habitat will be as less disturbed as possible during and after the construction works. Hence, during the works, pollution risks must be minimized and the river continuity has to be maintained through an instream flow.
- One component of the subproject (construction of a mudflow structure over the Pravaya-Vetka canal) will impact two farms. Though the loss of land is minimal (0.15 ha), adequate compensation has to be agreed upon with the two farmers and a bridge has to be built to avoid any severance effect.

I. INTRODUCTION

A. Overview

15. Kyrgyz Republic is a country at high risk of impact from the adverse effects of climate change and extreme weather events. Following the collapse of the Soviet Union, Kyrgyz Republic's water resources infrastructure is decayed and inefficient and agricultural productivity is low, thereby offering insufficient protection and resilience to natural hazard events. Consultations with government and civil society stakeholders have identified improvements to climate change and disaster resilience in the water resources sector as a priority area for climate change adaptation. Therefore, ADB launched a transactional technical assistance to develop and prepare a proposed investment project to strengthen the resilience of the water resources sector to floods, landslides, and droughts in Kyrgyz Republic. The project was called "Climate Resilience and Disaster Risk Reduction in Water Resources Management". The present Pravaya-Vetka subproject is part of this project.

B. Identification of the Project and Project Proponents

16. The proposed project will strengthen the resilience of the water resources sector to floods, landslides, and droughts. The project interventions will be both structural (including civil works and equipment) and non-structural (including capacity building, planning, and training) and is likely to comprise four outputs: (i) irrigation infrastructure modernized; (ii) agricultural and land management practices modernized; (iii) flood protection infrastructure modernized; and (iv) disaster risk and water resources data collection and analysis improved. The project outcome is expected to be climate change and disaster resilience of infrastructure and water security improved.

17. The Kyrgyz Republic will be the borrower and the Ministry of Agriculture, Food Industry, and Melioration (MOA) will be the executing agency. There will be two implementing agencies: Department of Water Resources and Melioration of the MOA, responsible for the interventions related to irrigation systems and agriculture (project outputs 1 and 2); and Ministry of Emergency Situations responsible for interventions related to protective infrastructure, monitoring, and analysis (project outputs 3 and 4).

18. The Project will be financed through a concessional OCR loan and ADF DRR Funding (Grant). It will have a 19 month preparation period and an estimated cost of $30 million.

19. The Pravaya-Vetka subproject assessed by this IEE was selected from a candidate shortlist of 6 subprojects identified and prioritized by the MOA. Other subprojects will be identified later on during the project implementation process. Thus, under sector financing, most subprojects are unlikely to be identified before Board approval. An Environmental Assessment and Review Framework (EARF) is required to provide guidance on subproject selection, screening and categorization, information disclosure and consultation, assessment, planning, institutional arrangement, and processes to be followed in the formulation and implementation of subprojects during project implementation.

C. Purpose of the Report

20. This Initial Environmental Examination (IEE) has been prepared for the representative subproject of the Pravaya-Vetka irrigation system. The subroject is classified ADB Environmental Category B. Category B projects require environmental assessment in the form of an initial environmental examination. IEE findings are then used to determine if an environmental impact assessment (EIA) is needed. If it is not, the IEE becomes the final environmental assessment report. Other subprojects identified later in the Project will first be categorized; Category A will be excluded and for the Cat. B subprojects IEEs will be undertaken.

D. Procedure of the Subproject Selection

21. The following shows how the selection procedures was performed.

1. Subproject Screening Criteria

22. Ineligible subprojects, to be excluded from further consideration, are those that:

(i) Are not necessary to improve irrigated agriculture sub-systems.

(ii) Are to be financed by GoKR or other donors;

(iii) Are in transboundary irrigation systems;

(iv) Are in pumped irrigation systems with total pumped lifts of more than 30m;

(v) Require land acquisition for construction of new canals. These involve either:

a. New irrigation systems or:

b. Expansion of existing irrigation systems into new irrigable service areas;

(vi) Are ADB category A subprojects.

2. Irrigated Agriculture Subproject Ranking Criteria

23. The eligible subprojects are ranked according to three criteria:

(i) Available water supply (expressed in liter per second and per hectare). Subprojects should be selected in irrigation systems with enough water to supply their full service area. That is, the available water supply should be adequate and the full service area should be potentially irrigable;

(ii) Potential Economic Viability (expressed in $ per hectare). It is a function of capital cost and present and potential irrigated cropping intensity and crop yields;

(iii) Potential Poverty Reduction (expressed in %). It is a function of existing poverty incidence and incremental financial benefits received by poor.

(iv) Table 1 shows how the eligible subprojects are ranked, 0 being the lowest score and 4 the highest score for the ranking criteria. Then, Table 2 shows the scores and ranks obtained for each eligible subproject.

Table 1: Agreed ranking scores and indicator ranges

Score	Available Water Supply (lps ha^{-1})	Potential Economic Viability ($ ha^{-1})	Potential Poverty Reduction (%)
4	> 2.0	zero - 500	> 60
3	1.5 – 2.0	500 – 1,000	45 – 60
2	1.0 – 2.0	1,000 – 1,500	30 – 45
1	0.5 – 1.0	1,500 – 2,000	15 – 30
0	< 0.5	> 2,000	< 15

Table 2: Indicative subproject scoring and ranking

Subproject	WS	S	EV	S	EB	PI	AV	S	ΣS	Rank
Jany-Jogorko	1.4	2	844	3	50	52	51	3	8	1
Uzgen	2.1	4	1,494	2	7	25	16	1	7	2
Pravaya-Vetka	1.8	3	1,182	2	10	32	21	1	6	3
Zernovoi Kok	1.4	2	1,988	1	18	40	29	1	4	4
Ylai-Talaa	0.6	1	1,429	2	4	30	17	1	4	5
Sapabayeva 2	0.7	1	1,027	2	3	20	12	0	3	6

Legend: AV = average of EB and PI, EB = economic benefit (%), EV = economic viability ($ ha^{-1}), PI = Poverty incidence (%), S= score (out of 4) and WS = water supply (l sec^{-1} ha^{-1}).

3. Conclusion Regarding Environment in the Selection Process

24. Environment was one of the six subproject screening criteria, as Category A subprojects were not eligible. In other words, were excluded of the list of possible subprojects all projects "likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented".

25. As a low environmental impact was a prerequisite for the subproject selection, this criterion was not considered afterwards in the multicriteria analysis of the possible subprojects. However two social criteria were taken into consideration:

- Land acquisition for construction of new canals. This criterion was also used for screening the subprojects. Only projects without (or minimal) land acquisition were eligible.
- Poverty reduction. This criterion was used – among others – to score and rank the six eligible projects.

E. Boundaries of the IEE

26. The boundaries of the IEE study are:

    (i) the basin for larger-scale longer-term environmental baseline description (climate, hydrology, etc.) and impacts;

    (ii) the province or district within which the subproject is located for baseline description relying on secondary census data;

    (iii) the irrigation system within which the subproject will construct, rehabilitate, and upgrade selected civil works for the remaining environmental baseline description and the IEE public consultation;

    (iv) construction site and adjacent areas for assessment and management of construction impacts; and

    (v) potential quarry and/or deposit sites and adjacent areas for assessment and management of quarrying/deposit impacts.

F. Scope of the IEE

1. Methodology

27. The IEE study was prepared for and in coordination with DWR from March 2018 to July 2018 during the project preparation technical assistance (PPTA), by Yves Ennesser, international environment specialist, and Zhanybek Orozaly, national environment specialist. The environmental assessment was based on field visits, interviews and bibliographical analysis.

28. In the present case of the Pravaya-Vetka irrigation system subproject, the nature of the project (disaster risk reduction and improvement of the water resource management) clearly shows that environmental benefits can be expected from the project implementation. Besides, two factors contribute to minimize the project negative environmental impacts:

    (i) the study area is an irrigated agricultural area. Overall, this man made landscape shows little ecological interest;

    (ii) the planned investments mainly deal with rehabilitation and upgrading of the existing hydraulic structures. Therefore, apart from the construction period, there are very limited new impacts compared to the present situation.

29. In this context, the only potentially sensitive environmental receptor requiring detailed and reliable baseline data is the Shaidan River, impacted by the replacement of two mudflow-crossing structures. Sufficient data were found thanks to a survey of the ichthyofauna carried out by the hydrobiological laboratory of the Bishkek's University in 2016.

2. IEE Information Sources and Limitations

30. This IEE incorporates all information available at the time of writing. The list of the main references used for the IEE is shown in Chapter XI of the present report.

31. Like with all environmental impact assessments, the present IEE is subject to data gaps and uncertainties, but none of them is considered as a limiting factor to the impact assessment of the Pravaya-Vetka subproject.

32. The implementation-phase environment specialists will review and revise this IEE and EMP as needed to correspond to the final engineering feasibility studies and designs of the subproject.

G. Structure of the Report

33. The remainder of this report consists of the following sections:

(i) Policy, legal, and administrative framework
(ii) Description of the project
(iii) Description of the environment (baseline data)
(iv) Anticipated environmental impacts and mitigation measures
(v) Analysis of alternatives
(vi) Information disclosure, consultation and participation
(vii) Grievance redress mechanism
(viii) Environmental management and monitoring plan
(ix) Conclusion and recommendation
(x) Main bibliographical references

II. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

A. National and Local Legal and Institutional Framework

1. Environmental Protection Law and Policy

34. The legal basis for environmental assessments in the Kyrgyz Republic is formed by the Law on Environmental Protection (1999), Law on Ecological Expertise (State Environmental Review (1999), Instruction on Procedures of State Environmental Expertise for Pre-Project, Project and other Materials in Kyrgyz Republic (1997), and Instruction on Environmental Impact Assessment Performance Procedures in the Kyrgyz Republic (1997) and other normative documents. The Kyrgyz Republic acceded to the Aarhus Convention on Public Participation and the Espoo Convention on EIA in a Transboundary Context. The relevant environmental legislation of the Kyrgyz Republic is summarized in Table 3.

Table 3: Major legislation on environmental protection

Legislation Year	Passed (Amended)	Purpose / Content
Constitution of Kyrgyz Republic	2010	The land, its resources, airspace, waters, forests, flora and fauna, as well as other natural resources shall be the exclusive property of the Kyrgyz Republic; these shall be used for preserving a unified environmental system as the basis of life and activity of the people of Kyrgyzstan and shall enjoy special protection from the State.
Law on Environmental Protection	1999 (2002, 2003, 2004, 2005, 2009)	The general legal framework for comprehensive environmental protection and for the use of them, including environmental standards setting, legal regime of specially protected area, rules and procedures for the use, etc.
Law on Specially Protected Areas and Biosphere Territories in Kyrgyzstan	1999	It establishes legal requirement for the protection and use of all natural objects within the protected areas.
Law on the Protection of Ambient Air	1999 (2003, 2005)	Ambient air standard and air quality management
Law on waters	2005	Regulates the use and protection of waters
Forest Code	1999	Regulates the use and protection of forest resources
Law on Ecological Expertise (State Environmental Review)	1999 (2003, 2007)	About the use of public ecological expertise of EIA
Law on Wildlife	2002 (2003)	About protection of wildlife habitats

Legislation Year	Passed (Amended)	Purpose / Content
Law on fishing in water bodies in Kyrgyzstan	2008	Determine the preservation of fish resources and their habitats, regulation of fishing, organization and management of fishing and capture of aquatic invertebrates in water bodies
Law on Protection and Use of Flora	2001 (2003, 2007)	About protection, use, and reproduction of flora
Law on Mountain Areas in Kyrgyz Republic	2002 (2003)	About sustainable development of mountain areas, conservation and management of natural resources, historical, cultural and architectural heritage
Law on Waste of Production and Consumption	2001	About waste management.
Law on Rates for Pollution of the Environment (emission, pollutant discharge, and waste disposal)	2002	The law fixes the fees for pollution of the environment in the amount of 1.2 Kyrgyz Som per specific value (ton) of pollutant
KR Law "General Technical Regulation of Environmental Safety in Kyrgyzstan"	2005	Applied to protect environment, defines main parameters of technical regulation in the sphere of environmental safety; introduces general requirements to environmental safety during design and operation of economic facilities for process of production, storage, transportation and utilization of produce. These requirements are mandatory to all legal entities and individuals involved in the above-mentioned activities.
Methodological Guidelines to Identify Payments for Environment Pollution	2004 (2006)	This instruction is for implementation by the users of natural resources, territorial environment protection agencies and executive power of KR
KR Land Code	1999 (2000-2012)	The Code regulates land relationships in KR; grounds to emerge, exercise and terminate right to land and their registration, and aimed at introduction of land market relations for state, municipal and private property and rational land use and its protection.
KR Law on Water Resources	1994	The priority objective of water law is to regulate relations in the sphere of water resources use, protection, prevention of negative impact on water resources and water-related facilities, their improvement and improvement of water-distribution relations.

Legislation Year	Passed (Amended)	Purpose / Content
KR Law on Drinking Water	1999	Regulates drinking water availability and its quality.
KR Law On Industrial Safety of Hazardous Facilities	2001 (2009, 2012)	Defines legal, economic and social grounds to operate potentially dangerous facilities and aimed at emergencies prevention and preparedness of their operators to localize and liquidate their consequences.
KR Law General Technical Regulation "On Safe Operation and Utilization of Machinery and Equipment"	2008	Introduces technical regulation and special rules to identify potential technogenic threats; mandatory requirements to ensure safe operation and utilization of machinery and equipment
KR Law on the KR accession to the UNECE Convention on Access to Information, Public Participation and Access to Justice on Environmental Matters	2001	Provides for legal basis for public participation in decision-making related to environment.
KR Law on Protection of Population and Territories from Natural and Technogenic Disasters	2000	Objectives of this Law: 1) emergencies prevention; 2) reduce the size of loss and damage; 3) emergencies liquidation. The term "emergency" defines "hazardous natural or technogenic event, disaster or catastrophe which may result in casualties, damage to public health or environment, gross material loss and disruption of functions".

35. The State Agency for Environmental Protection and Forestry (SAEPF) is the key authorized institution responsible for the establishment and implementation of environmental policy in Kyrgyz Republic. The Department of the State Environmental Review under the SAEPF is responsible for reviewing environmental assessment documents for projects of national significance.

36. Other major stakeholders – State and municipal organs, responsible for environmental assessment, are:

    (i) Ministry of Health (safety and health, drinking water quality, noise and vibrations);

    (ii) Ministry of Emergency Situations (natural hazards), and its subsidiary agency Kyrgyz Hydromet (KHM, or Hydromet), responsible for ambient air and water quality monitoring;

    (iii) Ministry of Agriculture and Amelioration (land use of agricultural lands and pastures);

    (iv) State Agency on Geology and Mineral Resources under the GKR (certificates and licenses to inert materials reserves);

    (v) State Inspection on Ecological and Technical Safety under the GKR (State environmental control);

(vi) Rayon State Administrations (RSA) on the issues of resettlement and land acquisition, public hearings, information disclosure etc.).

(vii) Organs of Local Self-Governance (OLSG) – Aiyl Okmotu (social issues, allocation of lands for stockpiles, asphalt plants, construction camps, etc).

37. More information about the institutional framework is provided in section II.A.4.

38. The EA system in KR is based on two subsystems: (i) OVOS (the Russian acronym for "Assessment of Environmental Impacts"), and (ii) Ecological Expertise (State Environmental Review, SER). A screening procedure based on screening lists identifies whether a project is the subject to environmental assessment. In case it is required, a Consultant hired by the Project Proponent conducts the OVOS. After presentation of an Environmental Impact Statement (EIS) for public consultation, the EIS is revised based on the feedback from the public. Then the EIS report and a Statement of Environmental Consequences along with other supporting documentation is submitted to a State Expert Commission for the State Environmental Review (SER). The project may be approved, rejected, or sent for re-examination.

39. Public consultation should occur at stage of the OVOS and may be also initiated in parallel to the SER as Public Environmental Review (PER). The implementation of any project is permitted only in case of its approval by the SER. The PER duration depends on the complexity of the project, but should not exceed 3 months after submission of all the OVOS documents and making payment to the SER by the Project Proponent. A formal written notification of local authorities and public notification through the media are transmitted at least one month in advance. A quorum is needed to ensure the representativeness of the presidium.

2. Project Status Regarding Environmental Regulations

40. Appendix 1 of the law of 8 May 2009 on environmental protection provides the list of economic activities subject to mandatory environmental assessment. The Pravaya-Vetka subproject is subject to environmental assessment with respect to the following items:
5. Agriculture and forestry:

1) projects of intensification of agriculture;

3) water management projects for agricultural purposes;

4) land reclamation projects with a view to changing the type of land use;

16. Water supply systems in populated areas, irrigation and drainage systems.

41. It is understood that "rehabilitation/upgrading" projects like Pravaya-Vetka subproject are subject to environmental assessment in the same way as "creation" projects. Hence, according to the Regulation on EIA of the Kyrgyz Republic, the PV subproject can be classified as "facilities/sites subject to state environmental assessment as planned activity - design, construction, reconstruction, expansion (broadening), technical re-equipment, modernization ..." likely to have a negative impact on the environment.

42. As per Appendix 2 of the regulation on the procedure for environmental impact of 13 February 2015, the contents of the Environmental Impact Statement is as follows:

(i) Requisites of the initiator of the project and the executor of works on environmental impact assessment.

(ii) Rationale for the need to organize the planned activities.

(iii) Description of the characteristics of the proposed activity and possible alternatives.

(iv) Analysis of the claimed technologies for compliance with the best available (available) technologies and technical specific standards.

(v) Assessment of the existing state of the environment by components, including assessment of the historical, cultural value of the territory and its socio-economic status.

(vi) Assessment of identified impacts.

(vii) Forecast of changes in the environment and socio-economic conditions in the implementation of the planned activities.

(viii) Basic decisions on measures to reduce, mitigate or prevent negative impacts, assess their effectiveness and implement opportunities.

(ix) The results of the comparison of the expected environmental and related social and economic consequences of the alternatives under consideration, including the option to abandon the activities.

(x) Proposals for the environmental monitoring program.

(xi) Interaction with the public.

(xii) Assessment of the admissibility of the proposed impact.

3. Other Legislation and Standards

a. Air Quality and Vehicle Emissions

43. Air pollution levels in KR are a concern mainly in urban areas. In Bishkek, 90% of all emissions are related to road transport. The air quality at locations away from the towns is expected to be much better. Ambient air quality regulatory responsibility and monitoring of air quality in Kyrgyzstan rests with the Kyrgyz Hydromet (KHM) under the Ministry of Emergencies. Air quality monitoring stations are largely located in populated areas close to sources of pollution: Bishkek, Osh, Tokmak, Kara-Balta, and Cholpon-Ata.

44. Ambient air quality standards are shown in Table 4. Impact monitoring for atmospheric pollution is carried out by the Department of Ecological Monitoring under SAEPF.

Table 4: Ambient Air Quality Standards (in mg/m3except as noted)

Pollutant	Maximum Permissible Concentration	Average Daily Concentration	Hazard Class
Total suspended particulate (TSP)	0.15	0.05	3
Sulfur dioxide (SO2)	0.5	0.05	3
Carbon monoxide (CO)	5	3	4
Nitrogen dioxide (NO2)	0.085	0.04	2
Nitrogen Oxide (NO)	0.40	0.06	3
Tetraethyl Lead	0.0001	0.00004	1

Source: Hygiene norms ГН 2.1.6.1338-03 Of the Kyrgyz Republic

45. The norms of emission in exhaust gases of motor vehicles are in Table 5.

Table 5: Norms for exhaust gases emissions of motor vehicles

Rpm	MPCforCOcontent	MPC for carbons, 1/1.000.000 of volume^{-1} for engines (number of cylinders)	
		less than 4	More than 4
Nmin X.X	1.5	1200	3000
NincrX.X 0.8Nnom X.X	2.0	600	1000

Source: Instruction for the state control of air emissions of polluting substances by automobile facilities in the Kyrgyz Republic.

46. National standards for emission measurements:

- GOST 17.2.2.03-87 defines the contents of carbon oxide (CO), hydrocarbons in burnt gases of vehicles with gasoline engines, “Safety Requirements”
- GOST 21393-75 covers black smoke of burnt gases of vehicles with diesel engines. Norms and methods of measurements. Safety Requirements.

47. GOST 17.2.2.03-87 determines the content of carbon monoxide (CO) and hydrocarbons in the exhaust gases of vehicles with gasoline engines, and GOST 21393-75 –the opacity of exhaust gases of diesel cars.

b. Water quality

48. Norms of water quality identified for three general categories: fishery, drinking water and waste water discharge. Water quality standards in the Kyrgyz Republic include:

(i) Hygienic norms GN 2.1.5.1315-03MPC for chemical substances in water of water bodies designated for economic, drinking and household use(the full list of chemical substances): http://www.nature.kg/lawbase/acts/36_rgs_pdk_water.xml)

(ii) Hygienic norms GN 2.1.5.1316-03 Approximately permissible levels (APL) of chemical substances in water bodies designated for economic, drinking and household use (the full list of chemical substances): http://www.nature.kg/lawbase/acts/37_rgs_odu_water.xml)

49. For the rivers of the subproject study area, there does not exist any specific norms of water quality based on the requirements to protect the indicator species. In this regard, it does not seem feasible to design mitigation measures specific to subproject by using the approach MPC measurements or aggregate pollutants load.

c. Noise

50. Levels of acceptable noise levels are consistent with ADB guidelines. Kyrgyz noise standards are in Table 6.

Table 6: Acceptable noise levels

Description of Activity / Category	Leq	Lmax
Areas immediately adjacent to hospitals and sanatoriums	Day=45 Night =35	Day=60 Night =50
Areas immediately adjaceet to dwellings, polyclinics, dispensaries, rest homes, holiday hotels, libraries, schools, etc.	Day =55 Night =45	Day=70 Night =60
Areas immediately adjacent to hotels and dormitories	Day =60 Night =50	Day =75 Night =65
Recreational areas in hospitals and sanitariums	35	50
Rest areas at the territories of micro-districts and building estates, rest houses, sanatoriums, schools, homes for the aged, etc.	45	60

Source: Collection of important official materials on sanitary and antiepidemic issues, Volume 2, Part 1, Informative publishing centre of State Epidemiological Surveillance Committee, Russian Federation 1994

4. Institutional Framework

51. The main agencies involved in the management of natural resources and environment protection in the KR are listed here. The main source used in the present section is “Kyrgyz

Republic Analysis for Biodiversity" (USAID, 2013).

a. State Agency for Environment Protection and Forestry (SAEPF)

52. SAEPF is the principal agency involved in environment protection in the KR. SAEPF is responsible for the environment protection policy, regulation and coordination, expertise and issuance of licenses and permits. SAEPF has territorial agencies distributed over the country territory. Its functions are:

(i) Administrative activity, coordination of subordinated structures – regional and territorial offices;

(ii) Ecological policy drafting and its implementation;

(iii) Services on ecological information;

(iv) Drafting policy to develop forestry and gaming activity;

(v) Environmental monitoring;

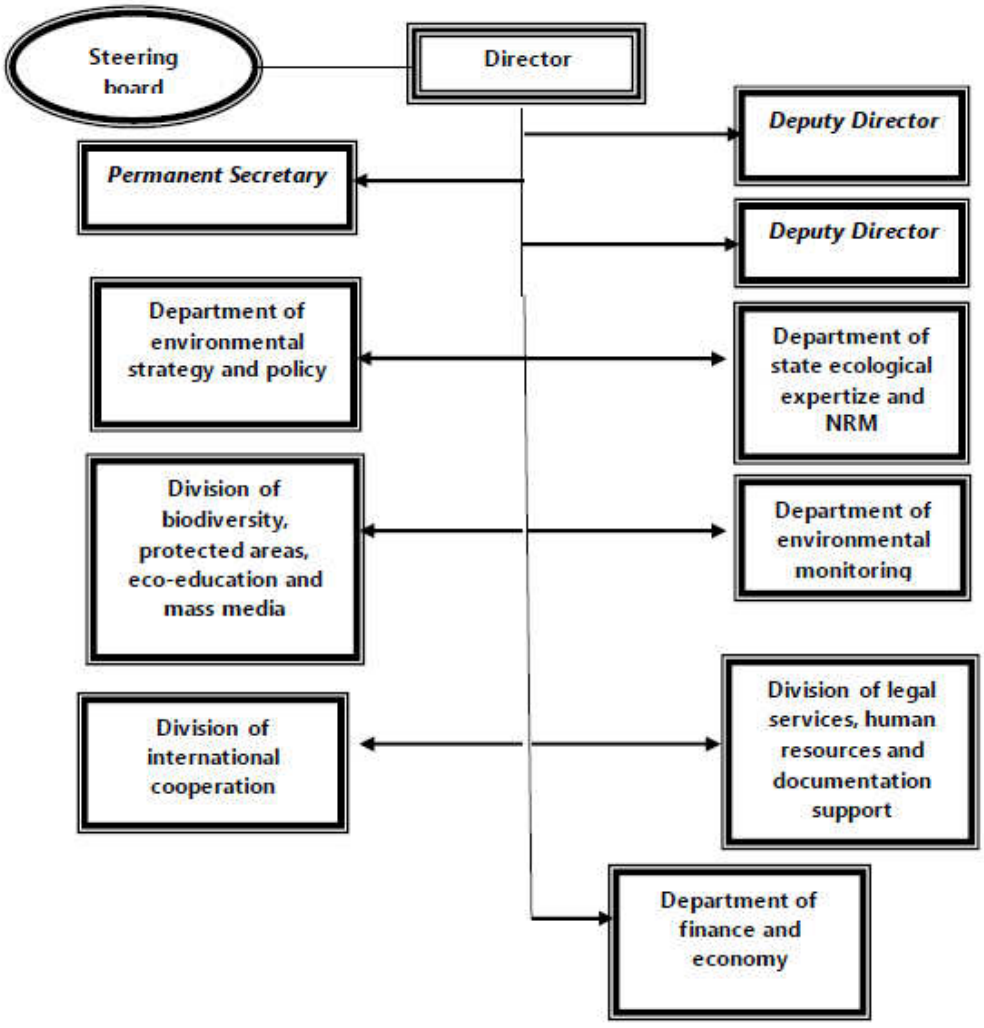
(vi) State environmental expertise;

(vii) Issuance of ecological licenses;

(viii) International cooperation.

The structure of this agency is presented below:

Figure 1: Central Office of the State Agency of Environmental Protection and Forestry



Source: USAID, 2013

b. Ministry of Agriculture, Food Industry, and Melioration (MOA)

53. This ministry has the mandate for providing government policy in these sectors: agriculture, pastureland management, fisheries, water resources, and others that involve environment protection. However, it is understood that environmental considerations are subsumed by productivity and development goals.

c. State Inspection on Technical and Ecological Safety

54. This new state organ was established in January 2012. This Inspection incorporates inspection and oversight functions of some state organs and their agencies, with the most important among them:

(i) functions of environmental control and oversight of the SAEPF;

(ii) functions of State Inspection and Safety in Mining Industry of the former KR Ministry of Natural Resources (MNR);

(iii) functions of Land Inspection and State Control in the land use and protection under the former MNR KR.

d. District Level Authorities

55. The KR is divided into 7 oblasts (provinces), which encompass 40 rayons (districts). Each rayon has its own government administration and is responsible for creating development plans for its area. Due to the economic and social situation in the country, all development plans are focused on social and economic aspects, and only rarely mention ecological aspects that might be related to environment protection.

e. Self-Governance Authorities

56. In KR, the smallest administrative unit is Aiyl Okmot (village self-governance). KR has 459 Aiyl Okmot, and only a few of them that are located in natural areas, depend on natural resources, and have a plan for environment protection. Although many other of the Aiyl Okmoty may mention environmental issues in their plan, these are not acted upon.

f. Local User Groups

57. Rural residents in KR depend heavily on the use of natural resources, and the GKR, recognizing this, has adopted laws that support self-organized, local-level, self-management groups for key resources. Each village has a Pasture Committee and a Water Users Association, both with some relation to environment protection concerns. There is growing evidence that these groups are better managers of their resources than higher government agencies.

B. International Agreements Relevant to the Project

58. The Kyrgyz Republic is getting more actively involved in the world community activity aimed at restraining global environmental threats including the process of the unification efforts of states. The country has ratified the following international Conventions related to environmental management:

(i) Basel Conventions on the Control of Transboundary Movement of Hazardous Wastes and Their Disposal, 1996

(ii) Convention of Biological Diversity (CBD), 1996

(iii) Convention of Long Range Transboundary Air Pollution, 2000

(iv) UN framework Convention on Climate change (UNFCCC), 2000

(v) Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous

Chemicals and Pesticides in International Trade, 2000

(vi) Vienna Convention of the Protection of Ozone Layer, 2000.

(vii) Montreal Protocol on Ozone Depleting Substances, 2000

(viii) Stockholm Convention on Persistent Organic Pollutants, 2002

(ix) UNECE Convention on Environmental Impact Assessment in a Transboundary Context, 2001

(x) Ramsar Convention on Wetlands of International Importance especially as waterfowl Habitat, 2003

(xi) The UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, Kyrgyzstan joined in 2001

(xii) United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa, acceded in 1999

(xiii) Convention on International Trade in Endangered Species of Wild Fauna and Flora, acceded in 2006.

(xiv) The Cartagena Protocol on Biosafety, Kyrgyzstan joined in 2005

(xv) Convention Concerning the Protection of World Cultural and Natural Heritage, acceded in 1995.

C. ADB Requirements

1. Policies

59. Safeguard Policy Statement (2009). SPS 2009 is ADB's current main safeguards policy document. It describes the common objectives and policy principles of ADB's safeguards, and outlines the delivery process for ADB's safeguard policy. It promotes sustainability through protection of people and the environment from the adverse impacts of projects, and by supporting the strengthening of country safeguard systems. It presents a consistent, consolidated framework for environment, resettlement, and indigenous people safeguards.

60. ADB Operations Manual, Safeguard Policy Statement, Section F1/BP [Bank policies] & Safeguard Review Procedures, Section F1/OP [operational procedures] (2013). These documents operationalize SPS 2009. The policy sets forth the scope of SPS 2009 applicability to ADB operations, and the procedures describes the safeguards process and outputs, including consultation and disclosure requirements, through the various stages of project preparation.

61. Public Communications Policy (2011ca) guides ADB's efforts to be transparent and accountable to the people it serves, which it recognizes are essential to development effectiveness. The policy recognizes the right of people to seek, access, and impart information about ADB's operations, and it aims to enhance stakeholders' trust in and ability to engage with ADB, through proactive disclosure, presumption in favor of disclosure, recognition of the right to access and impart information and ideas, country ownership, limited exceptions, and the right to appeal.

2. Guidance

62. Environmentally Responsible Procurement (2007). provides guidance to ADB staff, consultants, and executing agencies on ERP, defined as "a systematic approach to the purchase of goods and services that are thought to be less damaging to the environment than

other goods and services that serve the same purpose," specifically, products that "reduce waste, improve energy efficiency, limit toxic by-products, contain recycled content or are reusable, and are produced with the least environmental impact…[and] services…that help improve the environment, are rendered with minimum environmental and social impacts, and use resources and energy efficiently.

63. Complaint Handling in Development Projects - Grievance Mechanisms: A Critical Component of Project Management (2010). This document presents definitions, concepts, rationale, and history relevant to the ADB project grievance redress mechanism.

64. Complaint Handling in Development Projects - Building Capacity for Grievance Redress Mechanisms (2010). This document presents a framework and practical suggestions for building the capacity of an organization to manage an effective grievance redress mechanism.

65. Environment Safeguards, A Good Practice Sourcebook (2012). This draft working document aims to add clarity, provide technical guidance, and recommend good practices in SPS (ADB 2009) implementation. It updates the Environmental Assessment Guidelines (ADB 2003).

66. Selected References for Good Practice In Environmental Safeguards Implementation (2014). This internal Central and West Asia Department (CWRD) document presents internet hyperlinks to exemplary environmental safeguards documents (IEEs, EIAs, EARFs, etc) prepared for CWRD country projects.

3. Environmental Screening & Categories

67. ADB water resources projects and subprojects are screened using a rapid environmental assessment checklist for irrigation projects (Appendix 1 contains the checklist filled out for the Pravaya-Vetka subproject). This checklist captures the type, location, sensitivity, scale, nature, and magnitude of potential environmental impacts; and availability of cost-effective mitigation measures. Based on the checklist findings, the project or subproject is assigned to one of the following ADB environmental categories:

- Category A – likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment (EIA), including an environmental management plan (EMP), is required.
- Category B – potential adverse environmental impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination (IEE), including an EMP, is required.
- Category C – A proposed project is likely to have minimal or no adverse environmental impacts. An EIA or IEE is not required, although environmental implications need to be reviewed.

68. The category of a project is determined by its most sensitive component (output). The most sensitive components of the Pravaya-Vetka subproject define it as category B.

69. Subprojects assigned to Category A are excluded from Project financing.

III. DESCRIPTION OF THE PROJECT

A. Overall Framework

70. Kyrgyz Republic is a country at high risk of impact from the adverse effects of climate change and extreme weather events. The population is vulnerable, as approximately 30% of the population lives below the national poverty line and over 65% live in rural areas dependent on agriculture income. Disasters triggered by natural hazards such as floods and earthquakes are frequent and estimated to cost Kyrgyz Republic approximately 1%–1.5% of the GDP annually. The water resources sector is particularly vulnerable: notable recent water-related disaster events include droughts in northern districts (2009 and 2014), landslides (2003 and 2004), and flooding (2007 and 2012) in southwest districts.

71. Climate change is likely to increase the frequency and magnitude of extreme weather events. Drought and associated water stress may occur more frequently as temperatures increase, precipitation, and snowmelt patterns change adversely, and water availability may decline in the face of growing competing demands. Landslides (including mudflows) and floods may become more frequent due to melting permafrost and more intense precipitation events.

72. Irrigation is critical for sustained agricultural production in Kyrgyz Republic. However, following the collapse of the Soviet Union, Kyrgyz Republic's water resources infrastructure is decayed and inefficient and agricultural productivity is low, thereby offering insufficient protection and resilience to natural hazard events. In addition, the hydro-meteorological capacity for monitoring, analyzing, and forecasting weather events has suffered during the post-independence period due to lack of resources. The situation is likely to be further aggravated due to growing and competing water demand due to population and economic growth and increased demands among agriculture, domestic water supply, and industrial and energy sectors.

73. Consultations with government and civil society stakeholders have identified improvements to climate change and disaster resilience in the water resources sector as a priority area for climate change adaptation. To mitigate future climate and disaster impacts to the livelihoods of vulnerable communities:

    (i) water access should be made more resilient to future disruptions, variability, and change;

    (ii) resilience to extreme weather events such as floods and landslides should be improved; and

    (iii) institutional capacity for climate and disaster risk monitoring, management, and response should be strengthened.

74. To meet these challenges, ADB launched a transactional technical assistance to develop and prepare a proposed investment project to strengthen the resilience of the water resources sector to floods, landslides, and droughts in Kyrgyz Republic. The project was called "Climate Resilience and Disaster Risk Reduction in Water Resources Management".

75. The project interventions are both structural (including civil works and equipment) and non-structural (including capacity building, planning, and training). It comprises four outputs:

    (i) irrigation infrastructure modernized;

    (ii) agricultural and land management practices modernized;

    (iii) flood protection infrastructure modernized; and

    (iv) disaster risk and water resources data collection and analysis improved.

76. The project outcome is expected to be climate change and disaster resilience of infrastructure and water security improved.

77. The present Pravaya-Vetka subproject is part of this project. Other subprojects will be identified later on during the project implementation process (it is expected that in total the project will include a total of 3-4 sites, including PVIS, located on the lower Syr Darya basin and Chuy basin). As most subprojects are unlikely to be identified before ADB's Board approval, an Environmental Assessment and Review Framework (EARF) is required to provide guidance on subproject selection, screening and categorization, information disclosure and consultation, assessment, planning, institutional arrangement, and processes to be followed in the formulation and implementation of subprojects during project implementation. Once other subprojects will be identified an IEE will be prepared for each and submitted to ADB for approval.

B. The Pravaya-Vetka Subproject

1. Setting

78. The subproject is located in the Jalal-Abad Oblast (region), South of Kyrgyzstan. The main units of the region's topography/terrain are the northeastern outskirt of the Fergana Valley and the mountains of the Western Tien Shan. Due to the isolated, but considerably southern position of the region, its climate is temperate, but rather continental. In the mountains, heavy frosts and snowfalls are possible. In the valleys, in summer time, it is very arid. At the bottom of the mountains the steppes and semi-deserts stretch, on the slopes there are nuciferous (nut-bearing) and coniferous forests, sparse juniper forests; above, subalpine and alpine meadows, rocks and glaciers. The region covers an area of 33,700 km² (about 17% of the area of Kyrgyzstan). More than 70% of its territory is occupied by sparsely inhabited highlands of the western Tien Shan. The remaining 30%, mainly lands along the border with Uzbekistan and the valley of the Naryn River represent densely populated foothills and flat parts of the Fergana Valley, allotted for irrigated agriculture (cotton growing). The region is located in the zone of arid extremely continental climate, but the presence of several large glaciers in the mountains allow it to have quite significant water resources. The main waterway (water artery) of the region is the Naryn River, one of the main constituents of the second largest and most important river of Central Asia - the Syr-Darya, as well as numerous tributaries.

79. Within the Jalal-Abad Oblast, the Pravaya-Vetka Subproject is located in the Nooken District (see Figure 2), in the densely populated foothills of the Fergana Valley.

Figure 2: Location of the Nooken district

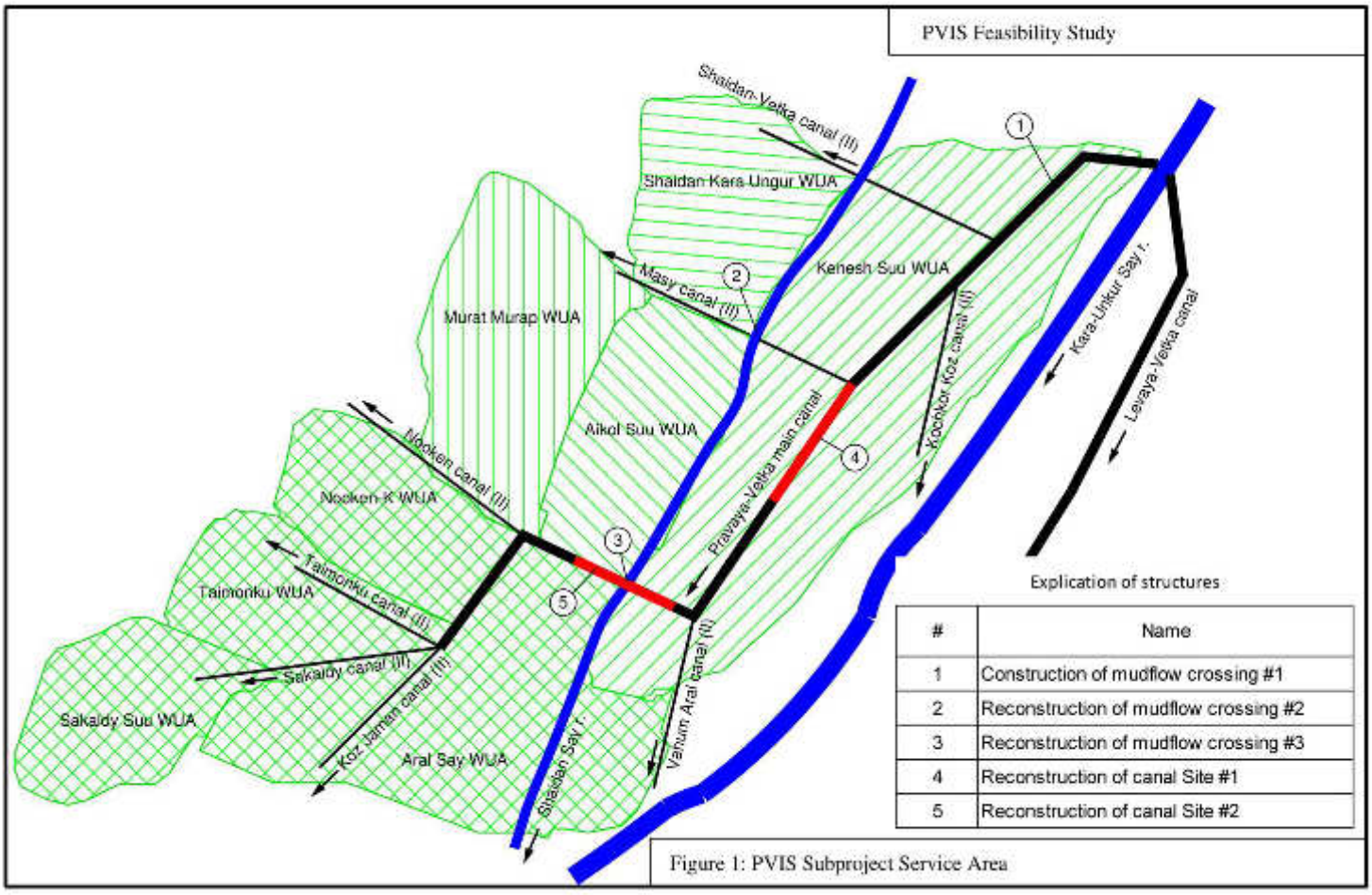
https://commons.wikimedia.org/wiki/File:Kyrgyzstan_Nooken_Raion.png?uselang=ru

2. Present Status of the Pravaya-Vetka Irrigation System

80. The purpose of the present section is only to present some general information about the Pravaya-Vetka Irrigation System. For specific information about each component of the subproject, please refer to Section III.B.3.

81. The inter-farm Pravaya-Vetka Channel was put into operation in 1954. It is fed by the Kara-Unkur-Sai River, in Nooken District. The irrigation system r. Kara-Unkur-Sai includes two inter-farm canals "Pravaya Vetka" and "Levaya Vekta". The water is supplied to the canals by a bilateral water intake. According to the Nooken DWRM, under the Kara-Unkur-Sai river there is 22,100 ha of regularly irrigated land, including 10,022 hectares under the canal "Pravaya Vetka" which is included in the subproject. The total length of the existing canal "Pravaya Vetka" is 20.1 km. The design capacity of the canal is 22 m3/s at the beginning and 8 m3/s at the end. The channel is mainly in earth. The end part is lined with monolithic reinforced concrete and "Reno" mattresses.

Figure 3: Irrigation system of the Pravaya-Vetka canal and location of the subproject components



82. Due to years of operation and inadequate allocation of funds from the budget for maintenance and repair, hydraulic structures are unsatisfactory. The lining of the canal in many places is destroyed and blurred, which led to an increase in infiltration losses and a decrease in the estimated costs. The canal is silted in places, sometimes there are even reverse slopes, and this fact leads to a decrease in the capacity of the estimated water consumption.

83. Some sectoral problems can also be observed:

(i) The existing irrigation system does not have enough water to meet full potential crop water requirements over its authorized service area;

(ii) The existing organization is adequate (neither good nor poor), to maintain the existing low-level equilibrium in irrigation system management (O&M) and performance, but need to develop its capacities to manage modern irrigated agriculture systems;

(iii) At full design discharge, main canal top water levels are too low to fully command its full authorized service area. Furthermore, the main canal is not equipped with cross-regulators to maintain canal water levels during less than full design discharges;

(iv) There are not enough main canal offtakes and tertiary canals, many existing tertiary canals are too low and irrigable areas are less than the authorized service area.

84. Mudflow discharges into the canals from gullies or mountain brooks add to the maintenance costs and jeopardize the infrastructure.

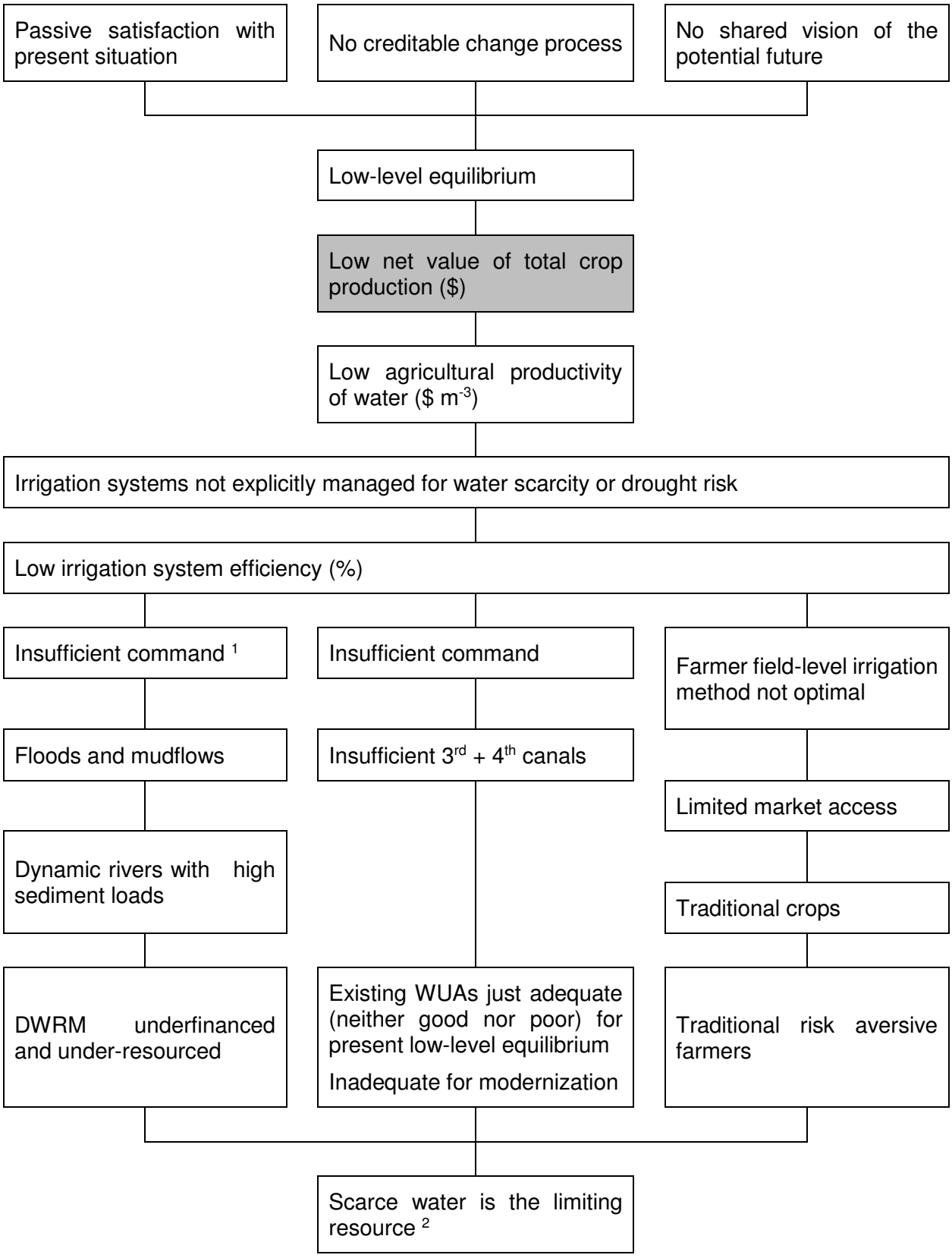
Figure 4: The PV canal major issues

	
Poor condition of the canal at some places	Mudflow discharges into the canal

85. Therefore, the present agricultural productivity of water (PoW) is low. The lack of irrigation water causes a decline in crop yields, and consequently affects the social status of water users.

86. The following diagram shows all the interactions leading to the present degraded situation.

Figure 5: Problem Tree for the Irrigated Agriculture Subsector



[1] Command is the head (difference in elevation), between the canal water level and the farmers field, required to make water flow by gravity to irrigate or "command" the farmers field without pumping.

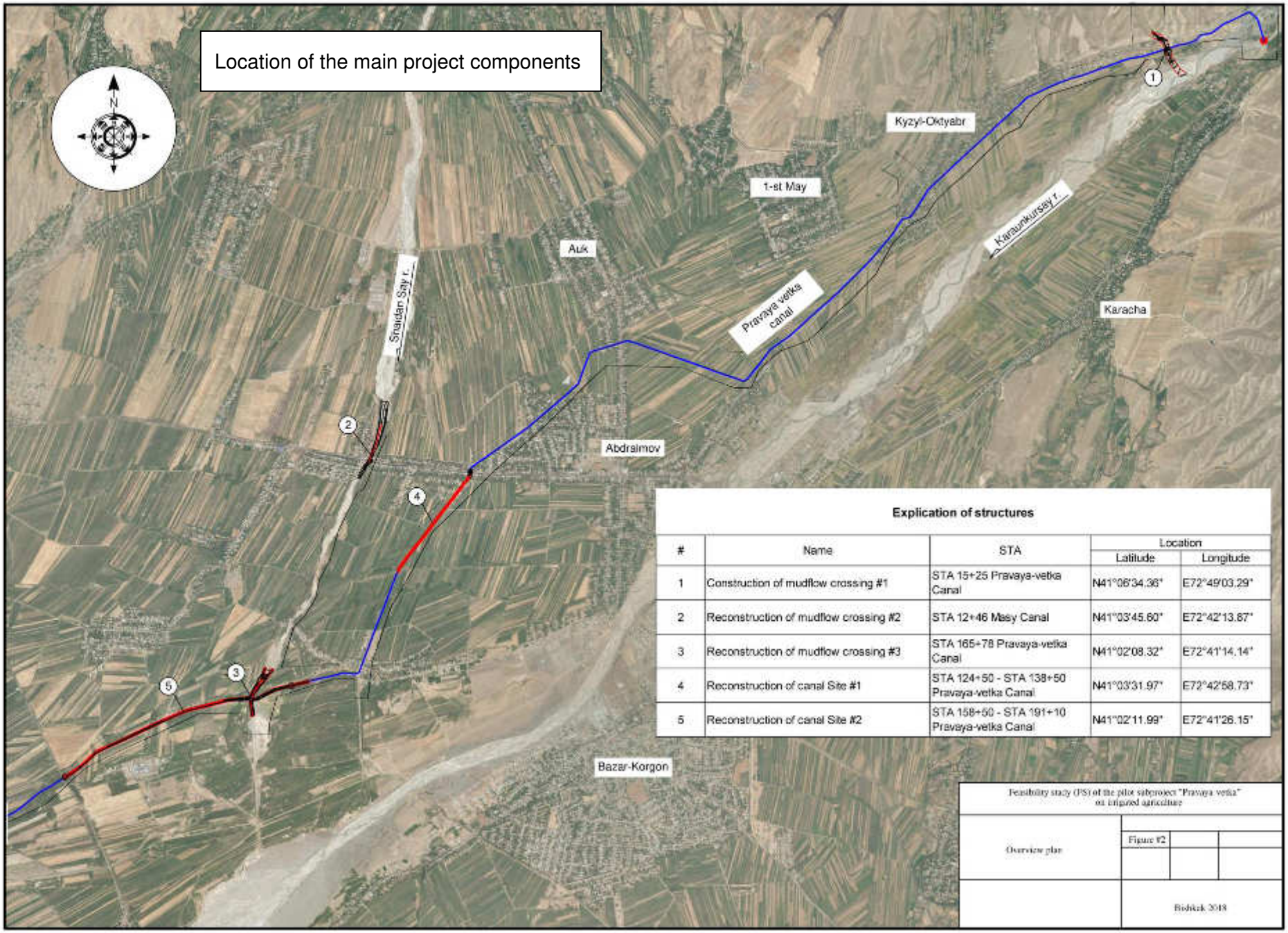
[2] Water is the limiting resource. Soviet-era irrigation systems were designed to meet the social equity objective (limited access to scarce water for many farmers) and not the economic efficiency objective. For example, Pravaya Vetka has only enough water to supply about half potential crop water requirements (ETc) over its authorized service area.

3. Project Components

87. The subproject consists in the Pravaya-Vetka canal reconstruction on two sections with a total length of 5.5 km. Two mudflow-crossing structures will be replaced and another one constructed. The mudflow structures are designed for the flood with a 5% probability of exceedance (Q 5%) and checked for the 1% flood (Q 1%). The subproject layout is shown on the map next page. The numbers on the map refer to the project components. They are described below.

88. Component n°1: Construction of a mudflow crossing structure over the Pravaya-Vetka canal on km 15+25. At this place, a gully discharges significant amount of debris into the canal, resulting in significant silting of the canal. The gully will be stabilized and reinforced with the construction of a rubble concrete trapezoidal canal. A crossing structure will be built over the Pravaya-Vetka canal and extended through a rubble concrete trapezoidal canal across a 160 m wide agricultural area to carry the flows and debris to the Kara-Unkur-Sai river. The following works will be implemented:

- Repair of the existing culvert under the road;
- Construction of an upstream mudflow canal with a capacity of 6.31 m3/s (8.3 m3/s) made of rubble concrete trapezoidal cross-section with parameters m=1.5, b=3.0, H=1.2, thickness t=30 cm.
- Construction of mudflow structure over the canal "Pravaya Vetka" made of reinforced concrete rectangular section b=3.0, H=1.2 m L=23 m and concrete pipes of rectangular cross section 2x2 (3 points) with length of 11 m.
- Construction of a downstream mudflow canal projected with a rubble concrete trapezoidal cross section with a length of 162.3 m.



Explication of structures

#	Name	STA	Location	
			Latitude	Longitude
1	Construction of mudflow crossing #1	STA 15+25 Pravaya-vetka Canal	N41°06'34.36"	E72°49'03.29"
2	Reconstruction of mudflow crossing #2	STA 12+46 Masy Canal	N41°03'45.60"	E72°42'13.87"
3	Reconstruction of mudflow crossing #3	STA 165+78 Pravaya-vetka Canal	N41°02'08.32"	E72°41'14.14"
4	Reconstruction of canal Site #1	STA 124+50 - STA 138+50 Pravaya-vetka Canal	N41°03'31.97"	E72°42'58.73"
5	Reconstruction of canal Site #2	STA 158+50 - STA 191+10 Pravaya-vetka Canal	N41°02'11.99"	E72°41'26.15"

Feasibility study (FS) of the pilot subproject "Pravaya vetka" on irrigated agriculture

Overview plan

Figure #2

Bishkek 2018

Figure 6: Site of the future mudflow crossing structure over the Pravaya-Vetka canal on km 15+25 – Aerial view

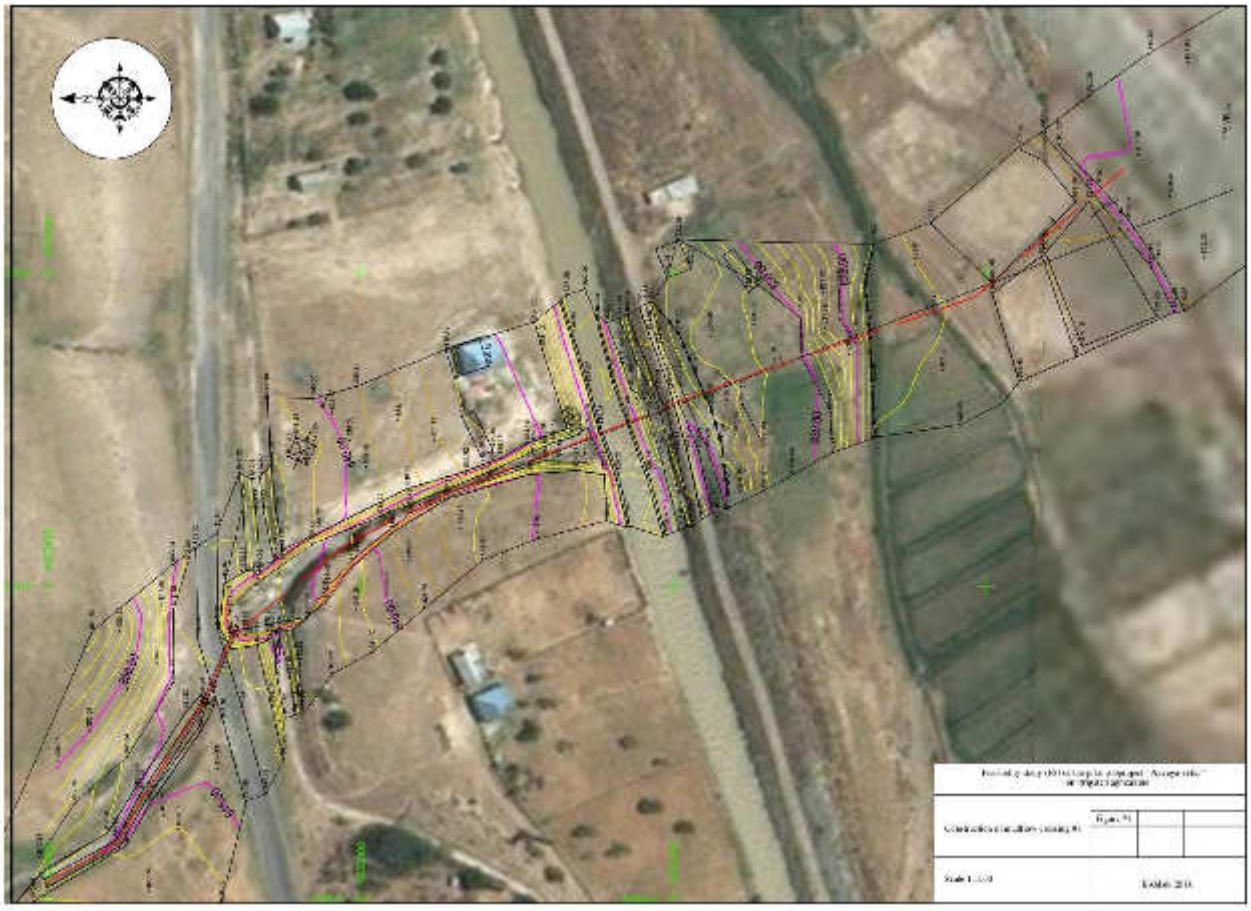


Figure 7: Site of the future mudflow crossing structure over the Pravaya-Vetka canal on km 15+25 – View from the ground

	
At present, the gully flows directly into the canal. A concrete crossing structure will be built over the canal and the gully will be channelized with rubble stone masonry (100 m long)	Downstream of the canal, the gully flows will be discharged into the river through a rubble stone masonry ditch (150 m long)

Figure 8: Horizontal alignment of the future mudflow crossing structure over the Pravaya-Vetka canal on km 15+25

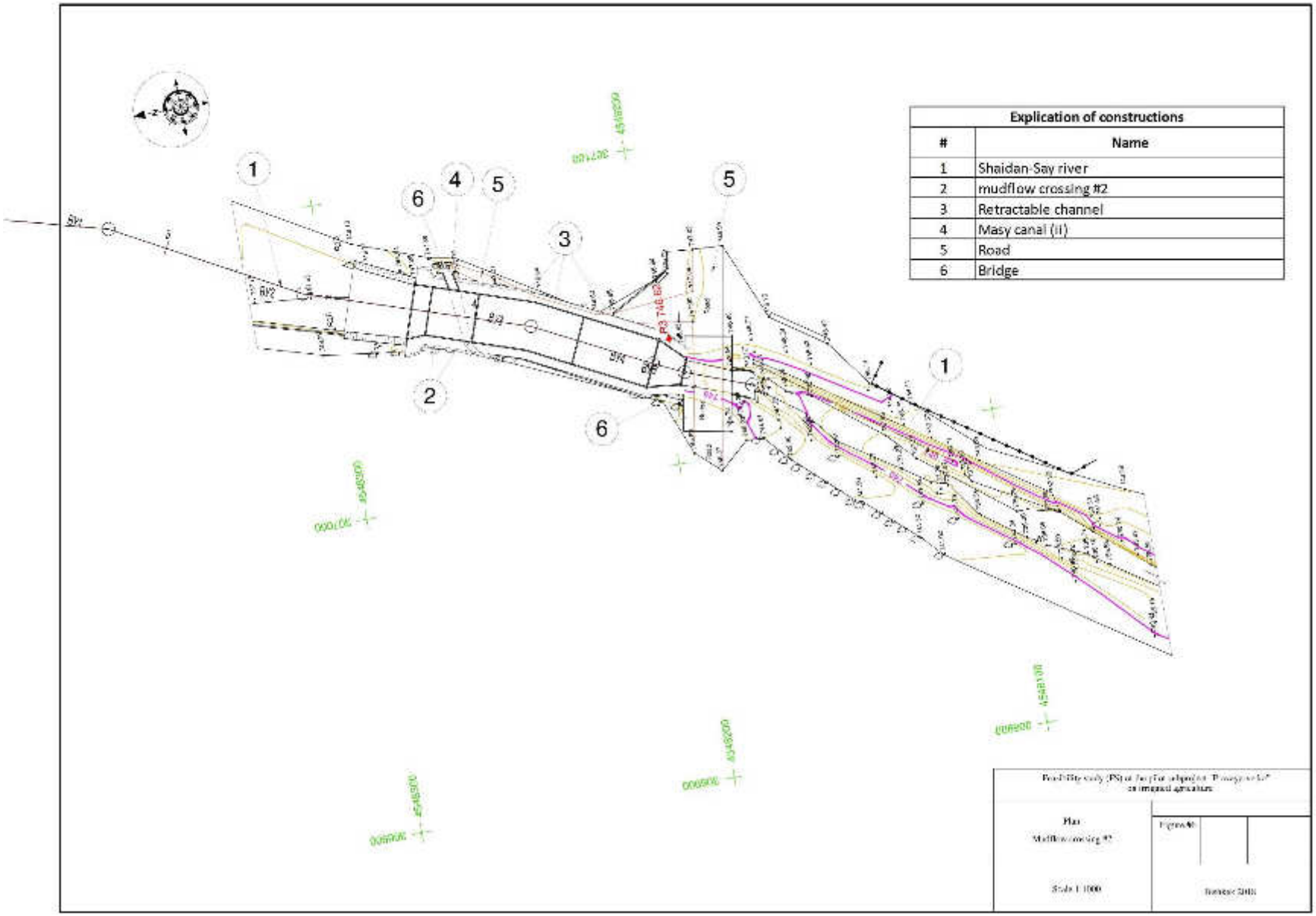
89. Component n°2: Replacement of the mudflow crossing structure over the Masy secondary canal. The existing monolithic reinforced concrete structure carrying the Shaidan river flows over the canal is partly destroyed, leading to regular overflows in the canal. It will be dismantled and a new structure built. The channelized river bed downstream the structure will be rebuilt in rubble stone masonry. Three weirs 65 cm high will be constructed to dissipate the flow energy between the crossing structure and the road bridge 65 m downstream. The following works will be implemented:

- Broadening of the inlet canal upstream of the mudflow structure;
- Widening of the mudflow structure, parameters b=15 m, m=0, H=1.5 m;
- Downstream of the mudflow structure the canal is repaired in a rectangular cross section b=15 m, m=0, H=1.5 m with the construction of three weirs.

Figure 9: The mudflow crossing structure over the Masy secondary canal – View from the ground

	
Downstream view with the crossing structure in the foreground and the road bridge in the background	Upstream view from the road bridge showing the steep gradient of the Shaidan river bed

Figure 10: Horizontal alignment of the future mudflow crossing structure over the Masy secondary canal



90. Component n°3: Replacement of the mudflow crossing structure over the Pravaya-Vetka canal. The existing monolithic reinforced concrete structure carrying the Shaidan river flows over the canal is in unsatisfactory condition, leading to regular overflows into the canal. It will be dismantled and a new structure built. The river will be channelized with dykes upstream and downstream the structure. The following works will be implemented:

- Mechanical levelling Shaidan riverbed to the average slope i=0.015;
- Upstream the mudflow structure, creation of a 400 m long channel. Parameters B=14.5 m, m=1.5, H=1.5 m, fringed with 4 m high dykes. Protection of the right bank with ripraps in two layers (the diameter of the stone is 0.45 m), reinforced with masonry on a length of 100 m.
- Construction of mudflow structure rectangular cross section. Parameters b=14.5 m, m=0, H=1.5 m.;
- Downstream of the mudflow structure, creation of an 800 m long channel. Parameters B=14.5 m, m=1.5, H=1.5 m, fringed with a 4 m high dyke on the left bank. Protection of the first 50 m with dykes on both sides and ripraps.

Figure 11: The mudflow crossing structure over the Pravaya-Vetka canal

	
The Shaidan river crossing structure over the Pravaya-Vetka canal	Upstream the crossing structure the river banks will be protected against erosion on a 300 m length

91. Component n°4: Rehabilitation of the Pravaya-Vetka canal between km 124+50 and 138+50. This canal section is covered with "Reno" mattresses. In some places there are gabion mesh gaps along the bottom of the canal. The grid is torn by moving stones. As a result, the stones that filled the "Reno" mattresses move downstream and forms deposits. On a 1,400 m canal length, the “Reno” mattresses will be reinstalled and covered with a 20 cm thick concrete layer.

Figure 12: Horizontal alignment of the future mudflow crossing structure over the Pravaya-Vetka canal

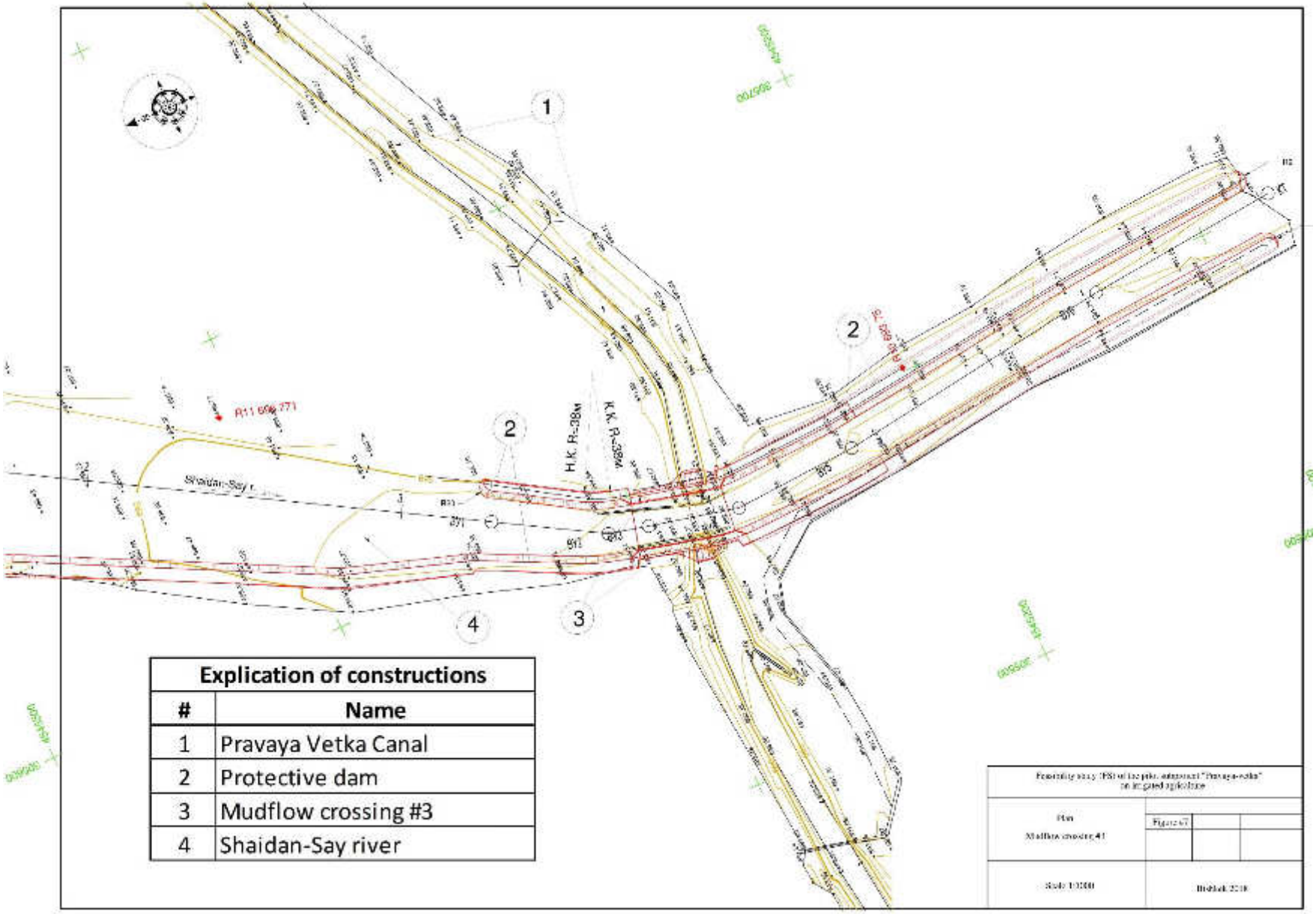
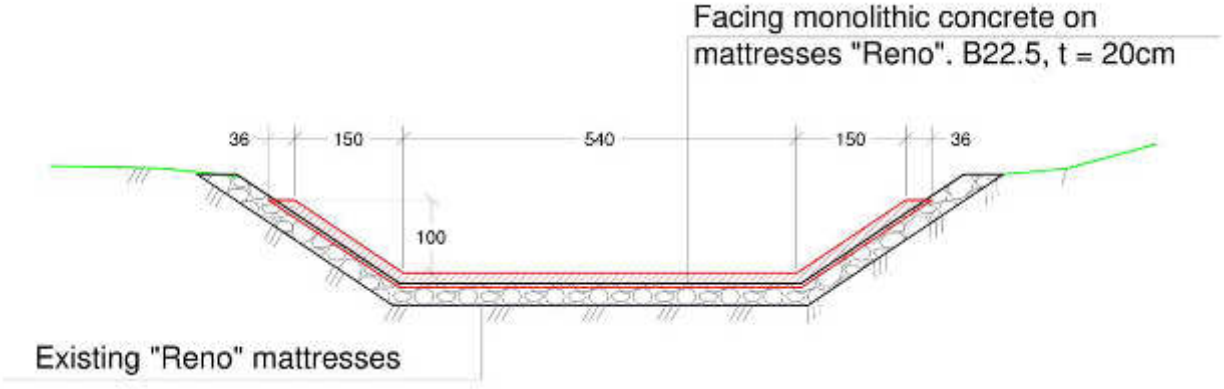


Figure 13: The Pravaya-Vetka canal between km 124+50 and 138+50

	
Winter time view: when the canal is empty, the pebbles from the previous Reno mattresses can be seen	Spring time view: the canal is filled and the side vegetation has grown

Figure 14: Rehabilitation of the Pravaya-Vetka canal between km 124+50 and 138+50



92. Component n°5: Rehabilitation of the Pravaya-Vetka canal between km 158+50 and 191+10. There are fractures of the first layer of concrete. In some places, the second layer is also destroyed. Destructions are mostly at the bottom of the canal. Just upstream the mudflow structure, there is a lowered area with almost a reverse slope. On a 3,260 m canal length, monolithic concrete lining will be put in place. The canal bottom will be levelled at some places. The following works will be implemented:

    - Restoration of the destroyed layer of the concrete lining and construction works on the additional layer of the concrete lining with a thickness of 15 cm of reinforced concrete. 158+35 STA -159+69 STA, 165+82 STA -191+10 STA;
    - Construction work on the formation of the channel and lining it with monolithic reinforced concrete 20 cm thick. STA 159 + 69 - STA 165+68;
    - Rehabilitation of hydraulic structures.

Figure 15: the Pravaya-Vetka canal between km 158+50 and 191+10

	
Winter time view: when the canal is empty, damaged concrete lining can be seen in the canal bottom	Spring time view: damage on canal side

93. The cost estimate for the whole subproject (5 components) is $ 1 864 250. The incremental cost of the mudflow crossing structures for taking climate change into account for the 2050 horizon amounts 15% of the total cost.

94. An additional provision of $1.000 million is made for main canal modernization works. These main (1st and 2nd level) canal works will be designed following a bottom-up participatory planning and design process for lower-level (3rd and 4th) WUA canal modernization. Indicative modernization works include:

    (i) Lower-level: (a) relocated and/or additional tertiary and quaternary canals, to improve irrigation efficiency and increase command (height) and the service area, and (b) gated flow division boxes and measurement flumes or weirs;

    (ii) Main canals: depending on the results of (i) above, additional tertiary offtakes, including improved flow measurement flumes or weirs, new head regulators, across main canals, (cross-regulators) and possible main canal bank raising upstream of cross-regulators.

95. Main and secondary canal works fall under responsibility of DWR-MOA and lower-level canals and ancillary infrastructure fall under the responsibility of water user associations (WUAs). The subproject will support the development of DWR-MOA/WUA joint irrigation management plan and improved on-farm water management and agricultural management. A phased approach will be used (see Section III.B.5).

96. The Pravaya-Vetka subproject will include a participatory and community-based contracting approach for an area of roughly 5000 ha. Consulting services and social mobilization teams will support the system design process and implement capacity-building activities such as farmer field days and comparative field trials.

97. As above-mentioned, the interventions on the subproject are both structural and non-structural (including capacity building, planning, and training). The goal is to develop better irrigation and agricultural practices, while pursuing social development objectives (targeting specifically poverty and gender issues).

Figure 16: Cross sections of the future Pravaya-Vetka canal between km 158+50 and 191+10

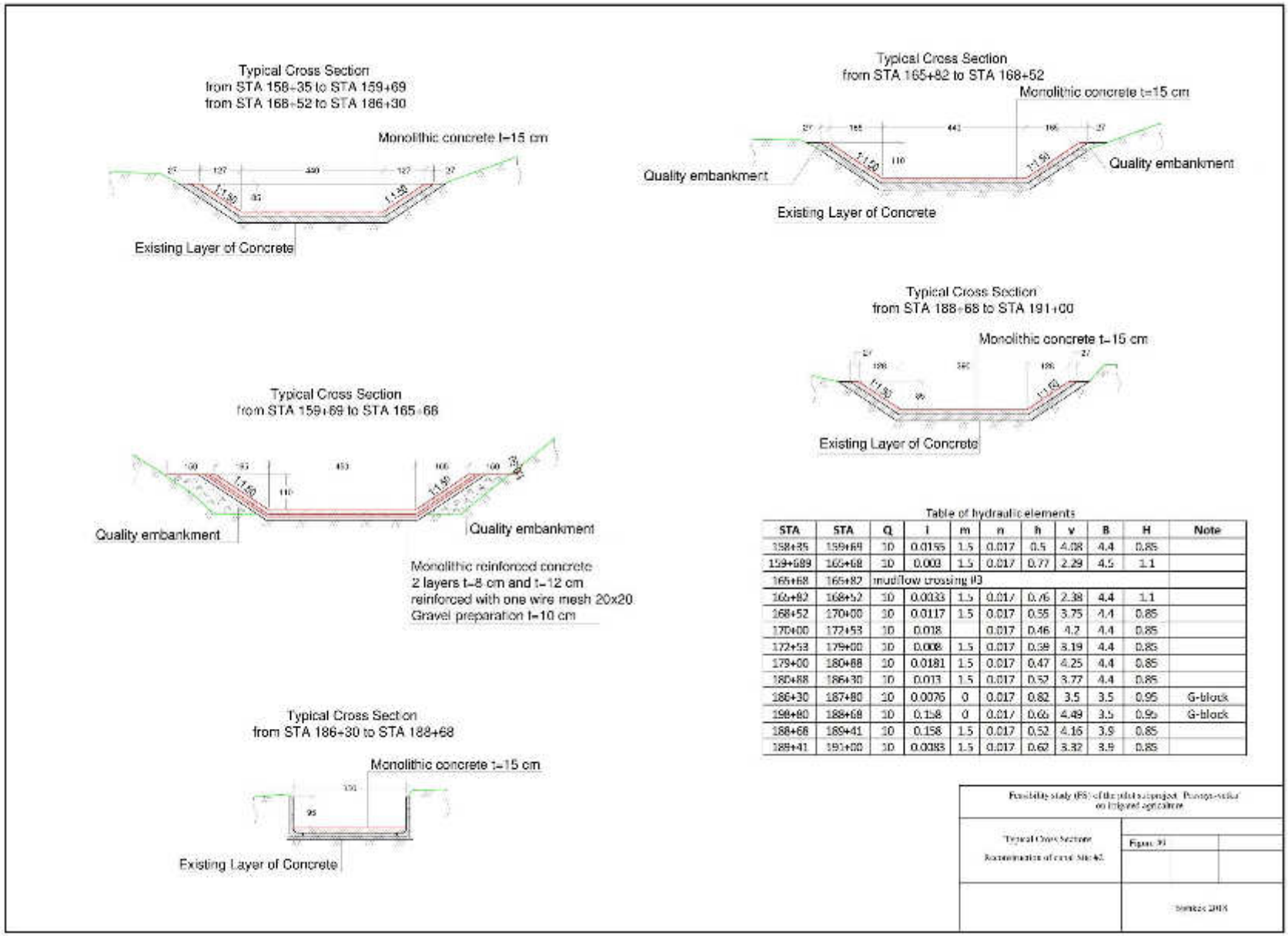


Table of hydraulic elements

STA	STA	Q	i	m	n	h	v	B	H	Note
158+35	159+69	10	0.0155	1.5	0.017	0.5	4.08	4.4	0.85	
159+689	165+68	10	0.003	1.5	0.017	0.77	2.29	4.5	1.1	
165+68	165+82	mudflow crossing #3								
165+82	168+52	10	0.0033	1.5	0.017	0.76	2.38	4.4	1.1	
168+52	170+00	10	0.0117	1.5	0.017	0.55	3.75	4.4	0.85	
170+00	172+53	10	0.018		0.017	0.46	4.2	4.4	0.85	
172+53	179+00	10	0.008	1.5	0.017	0.58	3.19	4.4	0.85	
179+00	180+88	10	0.0181	1.5	0.017	0.47	4.25	4.4	0.85	
180+88	186+30	10	0.013	1.5	0.017	0.52	3.77	4.4	0.85	
186+30	187+80	10	0.0076	0	0.017	0.82	3.5	3.5	0.95	G-block
188+80	188+68	10	0.158	0	0.017	0.6	4.49	3.5	0.9	G-block
188+68	189+41	10	0.158	1.5	0.017	0.52	4.16	3.9	0.85	
189+41	191+00	10	0.0083	1.5	0.017	0.62	3.32	3.9	0.85	

4. Organization of the Construction Works

98. An estimate of the machinery needs is given below:

- 3 excavators 0,65-0,8 m3
- 1 excavator 0,25-0,4 m3
- 2 bulldozer 130 hp
- 1 dragline excavator with compactor plate
- 2 soil compacting machines
- 4 dump trucks with loading capacity up to 10 tons
- 2 crane trucks with loading capacity up to 10 tons
- 2 water tank trucks
- 1 mobile electric power station
- 4 concrete mixer machines

99. The estimated duration of the construction works is determined by the norms of CRiR (construction rules and regulations) 1.04.03-85 "Construction duration norms", including the Guidance document GD (KR) 3/92. The total estimated construction duration is 9 months for all the project components. It will not exceed 2 months at a given place (i.e. construction works of components 1, 2 and 3 will last 1 to 2 months each).

100. The construction works will require dismantling of 430 m^3 of monolithic reinforced concrete, 33,000 m^3 of excavation, and 20,000 m^3 of fill and backfill, 8,000 m^3 of concrete and 420 m^3 of rubble stone will be necessary. The dismantled concrete structures and excavations materials will be used for other public works or disposed of in landfills. The backfilling materials will come from quarries (rubble stones,ripraps) or nearby river flood plains. Trucks will use the canal operational road. The haulage distance will be 2 to 5 km for excavated and backfill materials.

5. Planning

101. Table 7 shows the implementation schedule of the subproject.

Table 7: Implementation schedule of the Pravaya-Vetka subproject

Phases:	1. Mobilize	2. Design and Bidding	3. Construction	4. Management
Period:	6 to 9 months	3-6 months	18 months	12-36 months
Key parties:	• PIU • Consulting firm • Facilitation teams	• PIU • Consulting firm	• Contractor • WUAs/WUGs	• PIU • Consulting firm • Facilitation teams
Outputs:	• Assessment of system potential. • Consultation between DWR and WUAs. • Strengthen WUAs, establish WUGs. • Feasibility study	• Award contracts for main canal and protective works (under DWR) • Award community contracts for on-farm works (to WUGs).	• Completed main canal and protective works. • Completed on-farm works.	• Joint DWR-WUA system O&M plan • WUA on-farm water and agricultural plan • Field trials, farmer field days.

IV. DESCRIPTION OF THE ENVIRONMENT (BASELINE DATA)

A. Physical environment

1. Current Climatic Conditions

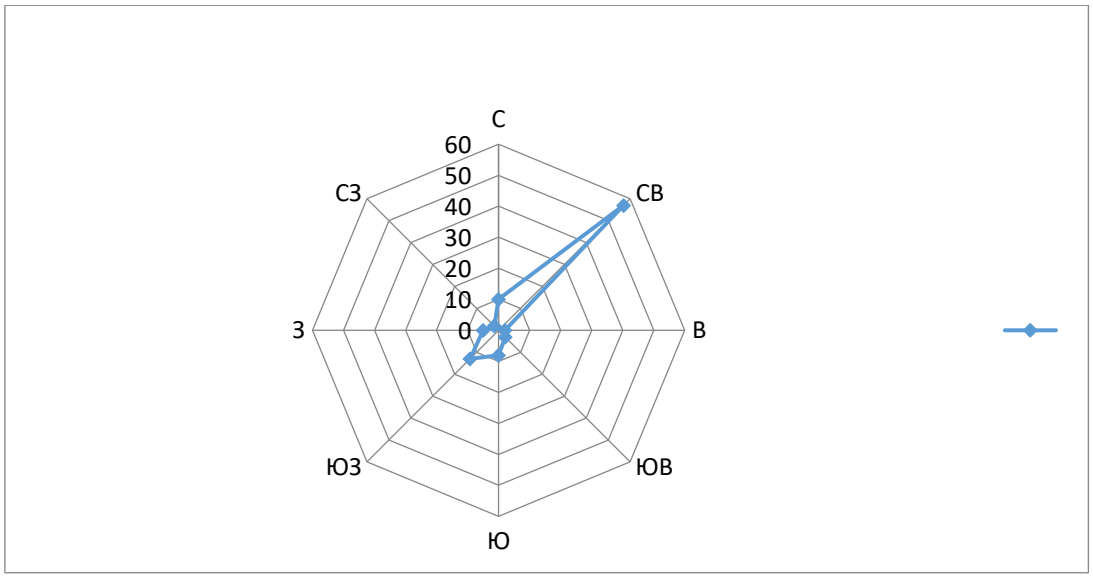
102. The climatic conditions of the Fergana Valley are determined by its geographic location at low latitudes and remoteness from the ocean, which causes a sharp continentality and aridity of the climate. The characteristic climatic features of the region are high intensity of solar radiation, aridity, low clouds, increased solar radiation, sudden fluctuations in daily and daytime temperatures. The peculiar orographic position of the Fergana Valley and the neighborhood with the eastern margins of the desert Kyzylkum determined here the presence of distinct/clearly expressed vertical zoning of the climate. When there is a decrease in absolute altitudes, the climate varies from a cold mountainous to a semi-desert in the western valley and to a hot, sharply continental, desert in the central part.

103. The average annual solar radiation on a horizontal surface during clear sky is 240 kcal/cm2, i.e. not less than in the tropics. The large sum of warmth is explained, first of all, by the high midday solstice above the horizon and by insignificant cloudiness in the warm period of the year (Maskudov, 1979).

104. The air temperature in the foothills and mountains differs significantly from the temperature in the plain zone. In January, the average monthly, average daily air temperatures are below-freezing point throughout the Fergana Valley. However, in the middle of January, even in the foothills up to 1000-1500 m high, they are above-zero. In February, monthly mean air temperatures above-zero are observed throughout the plains and in the foothills of the Turkestan range. In March, to an altitude of 2000-2,200 m, the average daily temperatures reach 2-8 °, daytime 3-11 ° C (Mavlyanov, 1972). In April, the zero-degree isotherm passes at an altitude of 3000 m with some deviations, depending on the exposure of the slopes. During this period, the melting of the main snow reserves in the mountains begins, therefore, on most of the rivers there is a rapid increase in the flood. In May-June, the overall increase in air temperature continues. In July-August, temperatures reach their maximum. The average daily temperature is positive/above-zero even at the highest ridges of the mountains. In September-October, a sudden decrease in temperatures occur in the mountains. In November and December at an altitude of more than 2000-2400 m, temperatures below-zero are observed. In the foothills, average daily temperatures in November are 1-6 ° C, and in December, they are below-zero everywhere (Mavlyanov, 1972). The sum of temperatures above-zero (more than 10 ° C) in the range 4500-4700 °, the frost-free period lasts 196-230 days (Maskudov, 1979). In the cold season over the Fergana Valley is the polar front. Weather conditions are formed under the influence of dry and cold air coming from the Siberian anticyclone, and moist warm air coming as cyclones from the Atlantic side.

105. One of the important factors of climate is the wind. Strong winds occasionally occur here. They wind/weave soils and mobile/drift sands, form dust storms, which complicate the work of transport, industrial enterprises, tear electricity and communication lines. In addition, during strong winds fields, populated areas, canals, roads, small irrigation network are covered with sand. The average annual wind velocities in different areas are not the same. The zone of increased/raised velocities (more than 2 m/sec, and stretches along the Syr-Darya River to the Taldyk River.) In narrower sections, the average wind velocities exceed 4 m/s. For a considerable time, stronger winds are also observed (more than 15m/sec). The average annual number of days with a strong wind reaches in valley mouth is 65 m /sec. Another area of strong winds is the area of the town of Kokand where the wind speed can reach 16-30 m/sec (Maskudov, 1979). As shown below, the prevailing wind directions are north-east, south-west and north.

Figure 17: Wind rose in Jalal-Abad



106. The peculiar geographical position of the valley with a diverse orientation of the mountainous structures that form it causes an uneven distribution of precipitation. The annual amount of precipitation in different areas varies from 55 to 1300 mm. The smallest amount (100 mm) falls on the western half of the plain part of the depression near the city of Kokand. To the east and northeast the amount of precipitation gradually increases, reaching 200-300 mm in the foothill part and from 900 to 1300 mm in the mountains. In the annual precipitation regime, two maxima are observed (at the end of summer and in winter). In the lowland part (plain), as well as in the foothills of the Chatkal and Kuramin ranges, the most rainy is March (14-17% of the annual precipitation), and the other parts of the valley are April, May or June. The least rainy is August or early September (up to 4-5% of the annual sum of precipitation). In the central lowland and low foothills, the largest part occurs as rain; only from an altitude of 1400-1700 m the proportion of precipitation occurring as snow is greatly increased (Mavlyanov, 1972). A stable snow cover is set only on mountain slopes exceeding 1400-1800 m, for 20-40 days. In the lower zone, at an altitude of 1000-1400 m, the snow cover is unstable and does not reach high height/depth. The maximum daily precipitation observed in the subproject area (Shaidan river basin) is 73.0 mm.

107. A distinctive feature of the climate is high evaporation, which reaches 1,200-1,500 mm/year. Due to relatively high winter temperatures, even in the middle of winter, evaporation is about 10 mm per month (January). As early as March it reaches 60 mm, in the future evaporation rapidly increases and in the summer months (July-August) is 230-250 mm. (Maskudov, 1979). Since September, due to a sharp drop in temperature, evaporation decreases, reaching 30-40 mm in November [21].

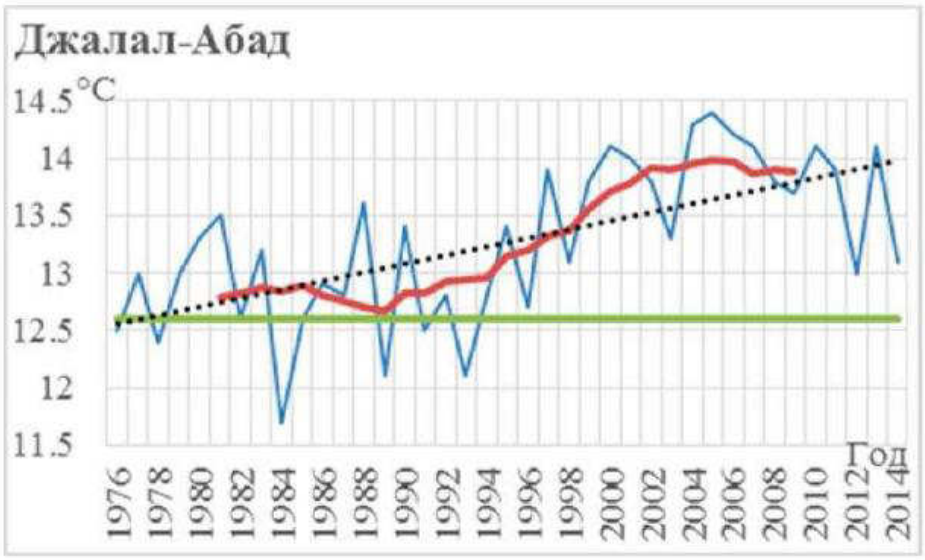
2. Climate Changes

108. In general, in the territory of Kyrgyzstan for the period 1976-2014 an increase in the annual air temperature at a rate of 0.18 ° C for every 10 years (linear trend estimate) has been observed. The highest temperature increase of 0.3-0.4 ° C is noted in the valleys of the Chui, Jalal-Abad, Osh and Talas regions. Therefore, the study area is probably among the Kyrgyz areas which experienced the highest temperature increase these last decades.

109. It is worth noting that the increase in air temperature is not the same for all seasons of the year and is not homogenous and constant in time (see Figure below for Jalalabad). Several cycles of change can be distinguished:

- Slight fall in temperature from 1976 until the end of the 1980s;
- Intense rise of temperatures since the late 80s until the early 2000s;
- Stabilization of temperature rise with a slight cooling trend since the early 2000s until now.

Figure 18: Trends in average annual temperature in Jalalabad



Nota: the black line is a linear approximation of the trend by the least squares method, the green line is the normal value of the annual air temperature for the base period, the red line is the curve of 11 -year moving averages.

110. The observed slowdown in the rise of the average annual air temperature with a slight cooling trend can be explained by the increased frequency of anomalously cold winters, more precisely, by the increase in the duration of frosty days in certain months, the temperature of which affects the average annual value. Thus, in January-February 2008, February 2012, there were steady frosts more than 7 days, in February-2014 - during 18 days [29].

111. Table 8 shows the climate current conditions in the Pravaya-Vetka area and the expected climate changes by 2050 for RCP 8.5 pathways (RCP 4.5 pathways within the bracket). The future projections are based on four of the best performing state-of-the-art ESMs (namely, MPI-ESM-MR model from Germany, MIROC-ESM from Japan, GFDL-CM3 model from USA and ACCESS1 model from Australia) over Central Asia region.

112. According to these projections, an annual mean rise in temperature of 4°C is expected by 2050 for the most pessimistic scenario (RCP 8.5), compared to the baseline period of 1961–1990. Peak warming of close to 5°C is projected in the August and September months (close

to 2°C in August and September months under RCP 4.5 pathway).

113. On an annual mean basis, a 17% increase in precipitation is likely (41% under RCP 4.5 pathway) with peak precipitation increase in the month of December. A decline in summer precipitation (-10% during July month) combined with air temperature rise of 5°C can have serious implications for a rapid soil moisture depletion thus leading to drought conditions. However, precipitation is projected to increase in all months under RCP 4.5 pathway which could offset the impact of modest surface warming on soil moisture.

114. No significant changes are projected in the number of hot (~15 days in a year) or dry (~21 days in a year) days at this site by 2050s. The frequency of dry days affects regional hydrology and ecosystems and potentially influences agriculture. Future changes in the number of dry days per year can either reinforce or counteract projected increases in daily precipitation intensity as the climate warms.

115. However, on an annual basis, additional 40 days are likely as frost fee days mostly during late autumn and winter months by 2050s. This would mean that the snow melt could start early and be more pronounced in a warmer atmosphere. The longer the time without frost, the longer would be the growing season. While this may seem good — more time should lead to a larger crop yield — it could possibly have detrimental effects on the crops as warmer weather helps pests survive longer which can wreak havoc on crops.

116. No significant change (an increase of just 3 days under RCP 8.5 pathway but could be as many as 23 days in a year under RCP 4.5 pathway) is likely in the number of wet days for this site by 2050s.

117. Future increases in peak precipitation intensity are expected to be an important aspect of climate change, since warming will tend to accelerate the overall hydrological cycle, intensifying the wet extremes. A decline of 34% in peak precipitation intensity during August but an increase in peak precipitation intensity of 55% in July and 83% in October month is plausible by 2050s at this site under RCP 8.5 pathway meaning thereby that more intense spells of rainfall are projected at this site. Under RCP 4.5 pathway, May, October and November months may experience heavy spells of daily rainfall (36% to 68% increase in peak intensity) by 2050s.

Table 8: Pravaya-Vetka area climate conditions and projected climate changes

Selected Climate Variables	January	February	March	April	May	June	July	August	September	October	November	December
Maximum Temperature, °C	-3.4	-1.6	5.7	14.5	19.5	24.6	27.4	26.2	21.3	13.4	5.3	-0.7
Minimum Temperature, °C	-13.1	-11.3	-4.3	3.0	6.9	10.5	12.6	11.0	6.1	0.4	-5.3	-9.7
Precipitation (mm/month)	36.6	41.2	62.5	74.0	67.0	36.0	16.2	7.0	9.0	45.0	42.3	37.0
Number of wet days	12	13	17	18	19	15	8	2	0	10	12	12
Projected change in temperature	4.0 (1.2)	4.1 (0.7)	4.2 (0.1)	3.7 (1.0)	3.7 (0.8)	3.8 (0.1)	4.2 (0.8)	5.0 (2.3)	4.9 (1.9)	4.0 (1.2)	3.5 (0.2)	4.2 (0.7)
Projected change in precipitation (%)	40% (76%)	8% (44%)	56% (34%)	7% (33%)	-6% (14%)	-5% (22%)	-10% (27%)	1% (77%)	13% (16%)	-4% (24%)	61% (61%)	42% (63%)
Change in hot days	1 (1)	1 (1)	2 (1)	1 (1)	1 (1)	1 (1)	1 (1)	2 (2)	1 (1)	1 (1)	2 (1)	1 (1)
Change in dry days	2 (0)	3 (0)	1 (0)	1 (0)	3 (1)	2 (0)	2 (1)	0 (1)	0 (0)	3 (2)	2 (0)	2 (-1)
Change in frost days	-3 (-2)	-6 (-3)	-10 (-7)	-1 (-1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	-2 (-2)	-9 (-8)	-9 (-6)
Change in peak precipitation intensity (%)	6% (10%)	10% (32%)	30% (-2%)	5% (-11%)	21% (36%)	26% (17%)	55% (18%)	-34% (-21%)	-12% (16%)	83% (68%)	52% (50%)	8% (20%)
Change in number of wet days	1 (3)	0 (2)	2 (3)	0 (2)	-1 (1)	-1 (2)	0 (2)	0 (0)	0 (0)	0 (1)	1 (3)	1 (4)

Note: The top four rows present day values averaged over 625 square kilometers area from the centre of the site on google earth. The numbers from fifth row until all rows below are changes by 2050s for RCP 8.5 pathways (RCP 4.5 pathways within the bracket).

118. Future increases in peak precipitation intensity are expected to be an important aspect of climate change, since warming will tend to accelerate the overall hydrological cycle, intensifying the wet extremes. An increase in peak precipitation intensity peaking up to 83% in October month plausible by 2050s suggest that more intense spells of daily snowfall/rainfall are projected at this site thus creating more flash flood and mudflow conditions. Under RCP 4.5 pathway, April and October months may experience heavy spells of daily rainfall (30% to 40% increase in peak intensity) by 2050s. As precipitation expected to fall in more intense spells across this site, situations could be favorable for occurrence of floods / flash floods and mudflows.

3. Air Quality

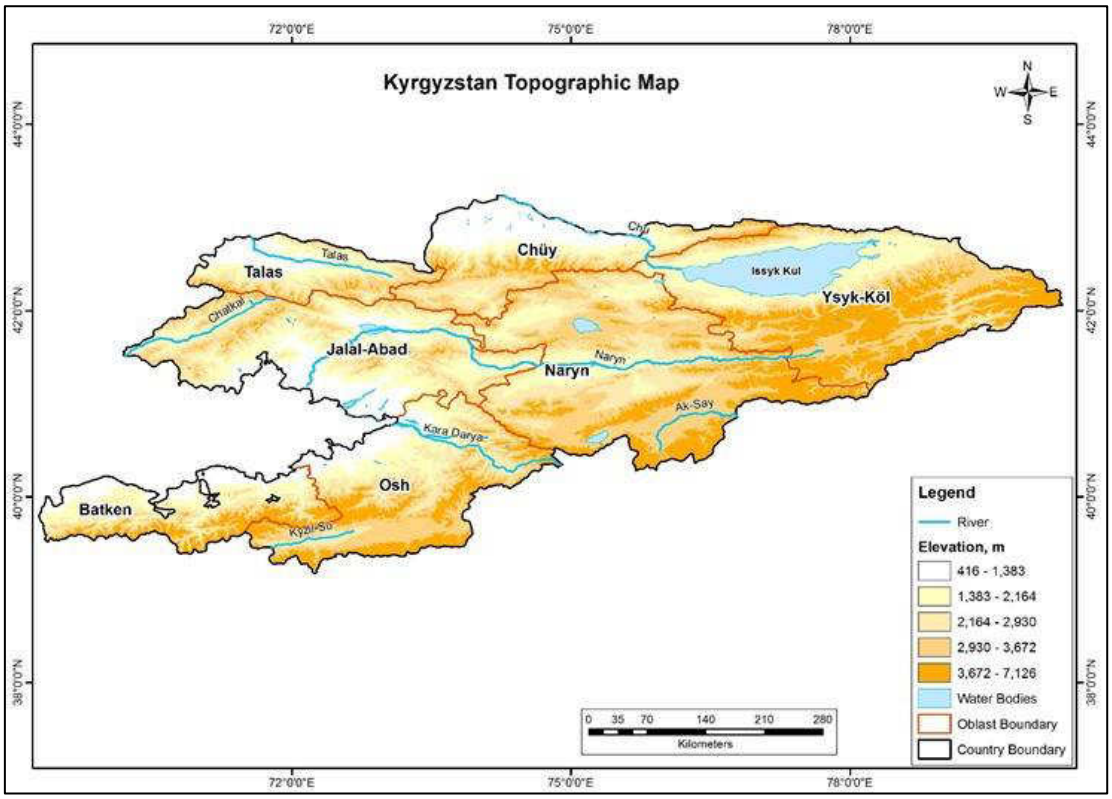
119. Observations of air pollution in cities of the Kyrgyz Republic are carried out by the Agency for Hydrometeorology under the Ministry of Emergency Situations (Kyrgyzhydromet). Monitoring of the quality of air is conducted in 5 cities of the Kyrgyz Republic, where about 64% of the urban population reside. Monitoring is carried out at 14 stationary posts/sites of Air Pollution Observation Station: Bishkek – at 7, Kara-Balta – at 2, Osh – at 1, Tokmok – at 2, Cholpon-Ata –at 2.

120. There is no air quality record in the subproject area, and the surveys implemented in Jalalabad city are not representative of the study area. Given that there are no stationary sources of pollution in the study area and limited road traffic, it is assumed that the air quality is good, except in close vicinity of the main roads. Phytosanitary products are probably the main cause of atmospheric pollution in the Pravaya-Vetka area.

4. Topography, Geology and Soils

121. Kyrgyzstan is a very mountainous country. The Pravaya-Vetka study area lies at the foothill of the Fergana range, in the northeastern part of the Fergana valley. Its altitude varies between 830 m at the main canal water intake and 600 m at the downstream part of the irrigation system.

Figure 19: Kyrgyzstan topographic map



122. The composition of rocks that form the Fergana Valley is complex and diverse, It has a mosaic character in the form of various spots and stripes of rocks. The geological structure of the Fergana depression involves sediments of all ages (from Paleozoic to modern Quaternary). The most ancient Paleozoic formations appear in the highlands and high foothills; with a decrease in altitude, the change of ancient rocks to younger ones is observed. Cretaceous/chalk deposits are found in all foothills. Genesis distinguishes two types: continental formations (lower, up to 1000 m thick), consisting mainly of red-sandstone and conglomerates, and marine (upper, thickness up to 500 m), composed of limestones, marls and sandstones.

123. In addition to the various rocks that create a layered nature/feature of the geological structure of the Fergana Valley, the intrusive magmatic formations of the Carboniferous and Permian are widely distributed in the form of large massifs in the Mogoltau, Kuramin, Alai and partly Turkestan ranges. Granitoid intrusions are strongly disturbed by tectonic cracks. The effusive rocks are formed on the most part of the Kuraminskii, Chatkalskii, Alaiskii and Turkestanskii ranges and the Mogoltau Mountains. The cleavage/rock jointing in them is poorly developed (Mavlyanov, 1972). Effusive and intrusive rocks are now exposed to strong weathering and are destroyed. As a result, formations of eluvial and deluvial trails are formed. The younger sediments - Cretaceous, Paleogene and Neogene, were the main base for the formation of Loess and other fine-grained Quaternary rocks. The role of red-brown clay chalk and Neogene clay in the emergence of modern landslides, which are widely evolved on the slopes of river valleys, is especially great.

124. In intermountain spaces of the Fergana Valley, landscapes of alluvial-proluvial plains are formed, composed of loams, gravel-pebble deposits, with ephemeroid-absinthial vegetation on typical sierozem (gray soil). Because of irrigation and reclamation and a decrease in the quality of the initial properties of soils/soil characteristic, the transformation of natural landscapes into natural-anthropogenic landscapes of irrigated agriculture has occurred [20].

Figure 20: This gully in the Pravaya-Vetka irrigation area shows loams and gravel-pebble deposits

5. Surface Water

125. The Study area is located inside the Kara-Unkur-Sai river basin. This transboundary river with Uzbekistan has a catchment area of 4,130 km2 for a total length of 126 km. It is a tributary of the Kara-Darya River. It belongs to a group of rivers fed by glacier and snow, which is supplemented by numerous tributaries of spring-and-saz (marshy, moist) origin. Such rivers are characterized by the predominance/prevalence of low water temperatures, oxygen supersaturation, the enormous mechanical power of the flow, the mobility/plasticity of the ground of the bottom/bed, sharp fluctuations in the volume of seasonal, annual and daily runoff. The velocity of the flow/stream is usually considerable, it decreases in open valley and often the water is saturated with solid suspended sediments.

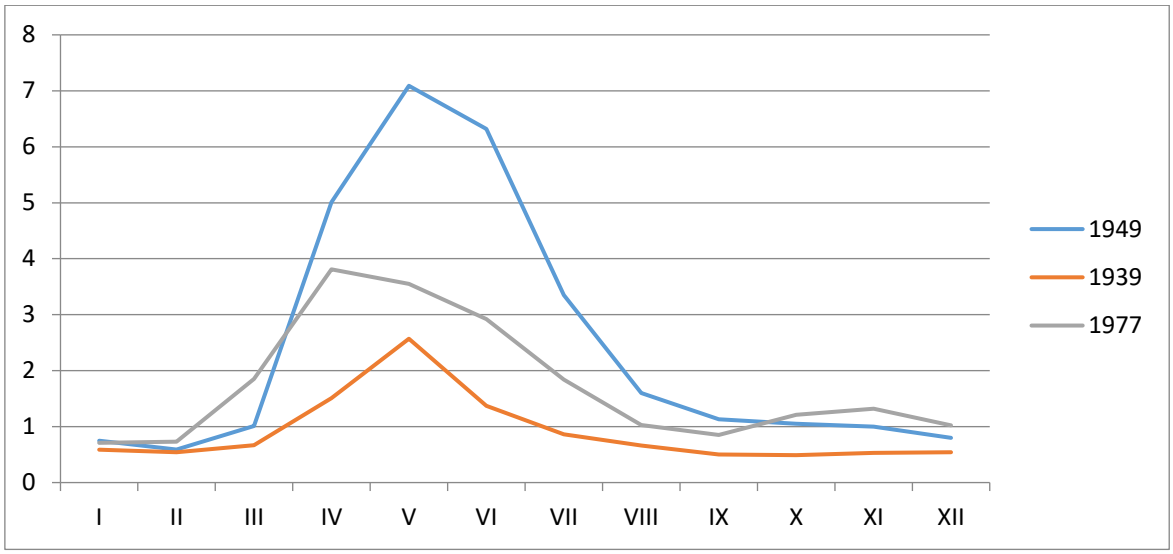
126. A small tributary of the Kara-Unkur-Sai River, the Shaidan River, crosses the Pravaya-Vetka irrigation system. The river is of snow-glacier supply. Its waterhead begins from the north-western range of Babash-Ata. The total length is 30 km, the total area of the basin is 131 km2, with an average elevation of 2,070 m above sea level. It has about 10 small inflows. The hydrological situation on the Shaidan River is relatively well known, but there are no observations of solid runoff, mineralization, chemical composition of waters, etc. The river belongs to the category of snow-glacial feeding, the main source of which is the thawed waters of seasonal snows and glaciers. In the annual river runoff, three main phase-homogeneous periods can be distinguished:

- Snow flood, formed mainly by meltwater seasonal snow lower and middle tiers of the mountains, the volume of high water is well correlated with the amount of precipitation in the previous autumn-winter period. The beginning of the flood is determined by the onset of stable positive air temperatures. The time limits of the snow flood are March-June. During this period, the maximum water consumption is also noted, the average monthly flow rate of the snow flood period reaches Q=3.81 -7.0 m3/s and above. The rise of the flood wave is intense and takes a shorter period compared to the wave of decline of the flood.
- Snow-glacial flood, formed mainly by melt waters of high-mountain snow, snowfields and glaciers. This period falls on the hottest period of the year, falls on July-August and is much weaker than the period of snow flood, because there are no glaciers in the pool.
- Autumn-winter lowland, when the river is fed by waters accumulated by the active surface of the catchment, i.e. groundwater, flow rates vary from Q=0.71 m3/s and below. This period is characterized by low flows, which gradually decrease by the beginning of the flood period, and the absence of daily fluctuations in flow. The autumn-winter low-water period lasts from September to February.

127. To illustrate the foregoing, Fig. 21 presents the hydrographs of the Shaidan River for years of different water hydrology - high water (1949), medium (1977) and low water (1939). The average yearly flow rate is about 2 m3/s. In 1954 the Shaidan River had an outstanding maximum flow rate, equal to Qmax=53.2 m3/s, which was practically repeated in 1999 (53.0 m3/s), and is assumed to be a 50 years frequency.

128. The maximum observed value of turbidity on the Kara-Unkur-Sai River amounted to 20 kg/m3 and was recorded on 10.04.1969. The average annual turbidity is 3.9 kg/m3.

Figure 21: Hydrographs of the river Shaidan, in the village of Shaidan



6. Groundwater

129. Groundwater plays an important role in the formation of physical and geographical processes within the valley. Groundwater and surface water draining/flowing from mountain ridges, atmospheric precipitation, condensation water of the air, water from deep horizons/levels of the ground, infiltration waters from fields and canals serve as sources of groundwater feeding/nourishment. The short rivers of the Turkestan and Alai ranges, which do not carry their waters to the Syr-Darya, replenish the reserves of groundwater. The ground flow from the mountains to the Fergana Valley is estimated at about 3 cubic km / year (Kritsky, Menckel, 1961).

130. Groundwater is the main factor of salt accumulation in soils and undersoil of low-drainage and drainless depressions. It is understood that there is no salinization issue in the Pravaya-Vetka irrigation system. However, the spread of salinization processes in territories classified as second type, where water scarcity is not observed, can occur because of the following factors:

- Low efficiency of collector-drainage systems: the lack of significant investments in maintaining the existing collector-drainage network and the associated ineffective draining lead to activation of salinity, especially in irrigated landscapes of cones of alluvial fan and ancient alluvial plains in areas of difficult outflow of groundwater.
- Excessive water consumption in the fields during its ineffective redistribution: the violation of irrigation and irrigation norms, the values of which exceed the actual needs of the territory in irrigation, leads to an increase in the level of groundwater not drained from the fields, which causes under-flooding and activates the processes of salinization.

B. Biological environment

1. The Aquatic Environment

a. General Background

131. The Kara-Unkur-Sai River feeds mainly on melt waters of seasonal snows forming spring floods and on melt waters of high-mountain snows and glaciers that provide the main runoff in the second half of summer. According to the character of the intra-annual runoff distribution, the river belongs to the so-called "Tien-Shan" type, since they have flooding in the warm (vegetative) period of the year and low-water level in the cold season. According to literature data (Turdakov, 1963) in the Kara-Unkur-Sai River cold-loving/cold water, resistant to harsh external factors fish can be found: common marinka, scaleless osman, trout, Turkestanskii catfish, Tibetan char (31).

132. All aquatic habitats are of ecological importance as habitats of a peculiar Highland Asiatic fish fauna and many invertebrate animals. The Kara-Unkur-Sai River is inhabited by common plant (periphyton) and animal communities, which are exceptionally resistant to severe and constantly changing external factors. The organisms living here are either widespread, or endemic and subendemic to the Central Asian region.

133. Larvae of amphibiotic insects - dayfly, caddis flies/worms, two-winged flies/diptera, as well as crustaceans and truly aquatic organisms - worms, represent the invertebrate fauna and accordingly it is present in the studied Pravaya Vetka subproject area.

b. Characteristics of the Ichthyofauna

134. From the biological point of view, the streams of the study area are mainly low-level water bodies with relatively poor species composition. The fish community (ichthyocenosis) is almost exclusively formed of representatives of Highland Asiatic fish. They are home to some endemic species of fish, which gives them global importance. The bed of the rivers, as an ecosystem includes several habitats: rocky and pebble (rifts), sandbanks (backwaters) and conventional deep part of the river with pits and gullies. Each of them is characterized by a specific set of abiotic factors (flow rate, transparency, turbidity level, thermal and oxygen regimes, etc.).

135. Most of the species of the studied streams are ordinary population of mountain and foothill areas. However, these fish species are not simultaneously found in the same ichthyocenosis (Turdakov, 1963). In the basin of the Kara-Darya river (which includes the Kara-Unkur-Sai River) and in other studied watercourses there are 11 inventoried species of fish:

(i) Kuschakewitsch loach (*Nemachilus kuschakewischi* 1890);

(ii) Severtsev osman (*Diptychus sewezovi* Kessler.1872);

(iii) Marinka (*Schizothorax intermedius* Mc Clelland,1842);

(iv) Turkestan sculpin (*Cottus spinulosus* Kessler 1916);

(v) Turkestan catfish (*Glyptosternum reticulatum* Mc Clelland);

(vi) Riffle minnow (*Alburnoides taeniatus* Kessler);

(vii) Turkestan gudgeon (*Gobio gobio lepidolaemus* Kessler.1905);

(viii) Aral spined loach (*Cobitis aurata aralensis* Kessler 1936);

(ix) Carp (Cyprinus carpio L.);

(x) Turkestan barbel (*Barbus capito conocephalus* Kessler.1872);

(xi) Catfish, *Silurus glanis* 1852.(rare)

(xii) and perhaps other species of fish.

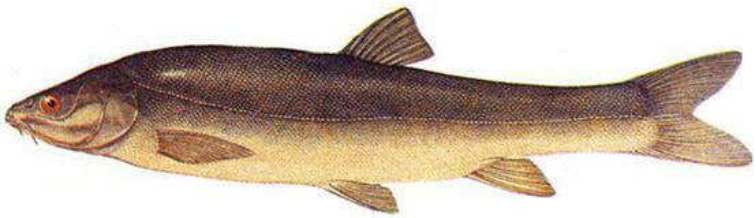
136. The most common fish are catfish, marinka, and barbel carp:

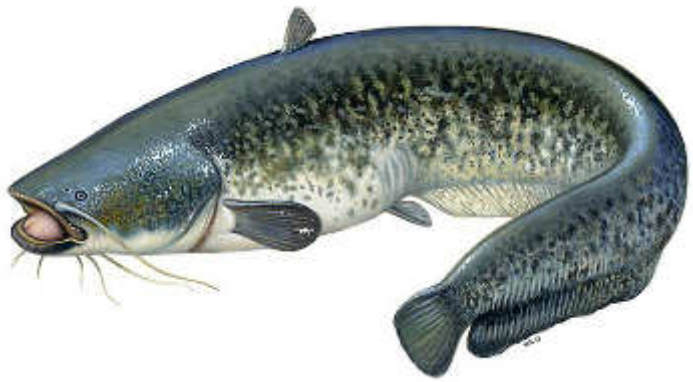
(i) Marinka (Latin: *Schizothorax)*. Ecological form of large fishes, entering the lakes. Length up to 100 cm and weight up to 12 kg. It feeds on aquatic vegetation insignificantly, larvae and imago insects, fish. Among the victims are predominantly *Noemacheilus loaches*. Large specimens are typical predators. The rate of growth, slowed down in the first years, with the transition to a predatory way of life greatly increases. Life expectancy up to 17-19 years. It is not numerous. The reasons are regulation of flows, poaching and acclimatization of predatory fish species, primarily pike perch and catfish. In the river and canal during intensive irrigation or flooding of the river, the population uncontrolledly catches it.

(ii) Sazan or common carp (Latin *Cyprinus carpio*). In the Syrdarya river basin, the Aralskii carp - an omnivorous fish that can change the food spectrum depending on the condition of the food resources of the reservoir. However, its favorite food in most reservoirs is animal, most often, maggot and, primarily, chironomids.The cultural form of sazan - carp - for many years was the only object of pond fish culture, and probably will maintain its leading position here in the future. Until recent times, carp was one of the many freshwater and brackish-water fishes in the republic, being the basis of the fishery.

(iii) Common catfish (*Silurus glanis Raf*). Currently, there are species not more than 2.5 m in length and weighing 150 kg at the age of up to 30 years, the average size in most reservoirs is 70-150 cm and 5-50 kg at the age of 15 years. Food of young catfishes are myzids, larvae of chironomids, stoneflies, water bugs and beetles, leeches, mollusks, tadpoles/frog larva, as well as larvae and baby fishes. Valuable commercial species. Because of intensive fishing and poaching, the number of catfish has decreased everywhere, in most reservoirs it has become rare.

Figure 22: Common fish species

Cyprinoid fishes (Latin Cyprinidae) **Marinka** (Latin Schizothorax)	
Cyprinoid fishes (Latin Cyprinidae) **Sazan** or common **carp** (Latin *Cyprinus carpio*)	

Catfish family (Siluridae) **Common catfish** (Latin *Silurus glanis*)	

c. The Shaidan River Ecosystem

137. A survey of the Ichthyofauna of the Shaidan River was performed in 2016. The characteristics of the site of the survey are: 7 km to the west from Seyit-Kazy, height 947 m above sea level (i.e. upstream the Pravaya-Vetka irrigation system), channel width 6 meters, depth 35 cm, water flow velocity - 1.5 m/s, water temperature 13,5o C, pH 6,97, O2 -104,8 %, NAS KR 2016. The surveyed site has stony banks, the bottom ground is shingly with of mud-sand. The catching technique was a stake net size from 17 to 45 mm, with a float rod and straining network of 8 to 12 mm. Catching time: March 2016.

138. Members of 3 families and 3 species were caught:

(i) Cobitidae Family – loaches, Nemachilus Class

(ii) Nemachilus kushakewitschi Herzenstein species – Nemacheilus Hasselt. 54 specimens.

(iii) Siluriformes group - catfish, Sisoridae Family – Turkestan catfish,

(iv) Glyptosternum Class – Turkestan catfish,

(v) Glyptosternum reticulatum McClelland species – Turkestan catfish, 3 specimens.

(vi) Cyprinidae Family – carps,

(vii) Schizothorax Class – marinka,

(viii) Schizothorax intermedius Mc, Clelland species – marinka. 11 specimens.

139. Of these fish species, Glyptosternum reticulatum McClelland - Turkestan catfish species is included in the Red Data Book of the Kyrgyz Republic (Government Resolution of the Kyrgyz Republic dated April 28, 2005 No.170 (amended by the Government Resolution of the KR dated July 25, 2009 No.471). This area of the Shaidansai River can serve for the spawning of the fish species presented here.

Figure 23: The Shaidan River

d. Fishery

140. The Kara-Darya river basin, which includes the Kara-Unkur-Sai River, according to the list of natural reservoirs and reservoirs of the Kyrgyz Republic approved by the Government of the Kyrgyz Republic dated September 7, 2009, No. 561, is considered to be a reservoir for fishery development and use for fish farming, fishery and aquaculture.

141. According to surveys (polls), the local population is engaged in fishing during the irrigation and lowering of the level of ponds and reservoirs during the watering period or water drain. During the time of draining or watering, these fish species enter the irrigation system after the outflowing water.

142. Illegal fishing during spawning is one of the causes of the decrease in the number of fish, together with the loss of natural habitats and pollution by chemicals and fertilizers.

2. The Terrestrial Environment

a. Flora

143. Due to regional differences in climatic, geomorphological and hydrological conditions within the Fergana Valley, peculiar high altitudinal zonation of types of plant formations is found. The central part of the Fergana Valley is occupied by desert vegetation (psammophytic-shrub, halophytic, tugai, meadow-bog). On the slopes of the mountains, the desert type is replaced by a mountain semi-desert, which is changed to dry grassland/forb steppes. Approximately at an altitude of 1800-2000 m, tree-shrub vegetation is formed. Subalpine meadows and alpine heaths/wastelands follow (Arikhvanova, 1967).

144. In the different ridges surrounding the Fergana Valley, due to the heterogeneity of their geological history, climatic conditions and soils, significant differences are being observed. In the Kuraminskii ridge, xerophytic, semi-shrub and steppe-type vegetation are widespread. The foothills of the Fergana Range are very different from the foothills of the Kuraminskii and Chatkalskii ranges; the Maylisai, Uzgen and Jalalabad adyrs (related to central Asian relief/ terrain) are characterized by the lush development of ephemeral and wormwood vegetation with an admixture of cherry on stone ledges and rare pistachio bushes (Arikhvanova, 1967). The Fergana Range is characterized by a wide spread of adyrs in the upper belt of steppe associations, the basis of which is a bulbous barley. At an altitude of 1200-2500 m, meadows consisting of tall grasses/forbs and broad-leaved (walnut-fruit) forests are formed. Above, the subalpine geranium and onion meadows predominate.

145. Tugai forests on the plain/even land of the plain and the mountain forests of the Alai and Turkestan ranges are almost completely destroyed. The local population uses wood as a fuel, as well as for construction. Intensive deforestation leads to land degradation, increased aridity of the climate, and in the mountains to the likelihood of mudflows.

146. In the floodplains of rivers, in the conditions of high summer temperatures, great dryness of air and abundant ground moistening a tugai-type vegetation is formed. The main components of tugai are constant for all river valleys of Central Asia. They have a long vegetation cycle, do not have a summer dormancy/rest and are characterized by peculiar signs of adaptation to temporary flooding and clogging of the soil surface (Arikhvanova, 1967). Tugai types of vegetation are very volatile and changeable. This depends on the frequent changes in the river bed and the deposition of new debris; on change of level, and with it on the depth of groundwater occurrence; and on human impact expressed in water discharges to unutilized areas. These debris are gradually overgrown with pioneer phytocenosis from cereals of various species (reed, foxtail/alopecurus, cattail, sugar cane). Simultaneously with the above-mentioned cereals, black poplar, willow, dzhida/oleaster/jujube and yulgun settle. If this area is constantly flooded during high floods, then develops a forest stand, consisting of turanga (Asiatic poplar), oleaster and willow. In general, wood tugai (riparian forest) are mixed, sometimes there are also pure thickets consisting of dzhida/oleaster/jujube, willow or turanga (Asiatic poplar). Usually, the latter occupies small areas, being located by narrow strips along the river banks.

147. If the deposit is flooded during small flood, and the water stagnates for a long time, then common meadow-marsh vegetation (reeds) develops in these areas, in this case the tree/woody species do not settle. Along the Pravaya Vetka irrigation canal, the following vegetation types are established:

Figure 24: Common plant species along the Pravaya-Vetka canal

Family: *Poaceae*

Reed (Latin *Phragmites*)

Family: *Cyperaceae*

Sedge (Latin *Carex*)

Sunflower family (Latin Asteraceae), or Composite family (Latin Compositae)

Absinth sage (Artemisia absinthium L.)

Sunflower family (Latin Asteraceae), or Composite family (Latin Compositae)

Ginger plant (Latin *Tanacetum vulgare*)

Bean (pea) family (Fabaceae)

Camel's thorn (*Alhagi*)

Honeysuckle family (Caprifoliaceae)

Honeysuckle

(Latin *Lonicera nummulariifolia)*

Mulberry family (Moraceae)

Mulberry plant, or mulberry tree (Latin *Morus*)

b. Fauna

148. Compared to fish species, the terrestrial fauna is comparatively scarce. The eared hedgehog, central Asian tortoise, lizards, rodents are common. The wolf, fox, wild boar, badger, or porcupine are rare. Among the birds are eagles, hawks, rose-colored starling, hoopoes, larks, nightingales, orioles, turtledoves, bee-eaters, in the floodplain of the river - various species of ducks, pheasant, on the slopes of mountains - mountain partridges. From invertebrates there are scorpions, phalanges, tarantulas, karakurt spiders (black widow spiders).

149. Most of the listed species refer to the so-called common species, which are adapted to anthropogenic zone, and have stable populations. The subproject area is not a route of seasonal migrations and resting places of birds and mammals. High density of population, intensive farming and poaching do not leave any integral habitats and chances for reproduction of animals, existing populations are strongly oppressed and in need of protection.

150. Of the animals of economic importance, there are species related to hunting game - stone partridge, Syrdarya pheasant, wild ducks (primarily mallards).

Figure 25: Animals of economic importance (hunting game birds)

Phasianidae, or Pavonidae = Pheasant, or peacock Alectoris chukar (J.E.Gray) – keklik – kekilik– chukar **partridge**	

Phasianidae, or Pavonidae = Pheasant, or peacock Phasianus colchicus turcestanicus Lorenz 1896 Syr Daria Pheasant	
Dabbing ducks family (Anatidae) **Mallard duck** (Latin Anas platyrhynchos)	

3. Rare or Endangered Species

a. Fish Species

151. *Glyptosternum reticulatum McClelland* - Turkestan catfish species is included in the Red Data Book of the Kyrgyz Republic (Government Resolution of the Kyrgyz Republic dated April 28, 2005 No.170 (amended by the Government Resolution of the KR dated July 25, 2009 No.471). It is found in the Shaidan River.

152. The Turkestan catfish in the North of Kyrgyzstan is found in Naryn with its tributaries, on the South of Kyrgyzstan, the Toktogul reservoir, Kara-Daria river and its tributaries Kara-Unkur-Sai and Shaidan, Ak-Buura and Kyzyl-su. Its biology is little studied. It lives in the mountain and foothills of the rivers on sandy-stony places. It feeds on larvae of aquatic insects and small fish. It reaches 25-28 cm in length. This fish species spawns in June.

Figure 26: The Turkestan catfish

b. Terrestrial Species

153. The rare and endangered species in the territory under consideration include one species of bird *Phasianus colchicus turcestanicus* Lorenz 1896 - Syr Daria Pheasant, and one species of mammal, Indian porcupine (Latin Hystrix indica).

154. The Indian porcupine is listed in the Red Data Book of Kyrgyzstan, which includes 23 species of mammals. In Kyrgyzstan, its distribution area covers the Fergana valley and the surrounding mountains, including the Kara-Unkur-Sai River basin. This large herbivorous rodent, whose weight reaches 18 kg, leads predominantly nocturnal life, eating juicy rhizomes and bulbs of plants. They live in forests, mountains and on the plain. It can climb to a height of 3900 m above sea level. They live in burrows (up to 18 meters long) or crevices of rocks. Porcupine descends into the valley during the ripening of vine and vegetable crops on cultivated fields. Therefore, there is a possibility of meeting it on the territory under consideration during the ripening stage.

155. The Syr Daria Pheasant inhabits the Fergana Valley, but disappeared from most of its initial distribution area. In the studied area, this species inhabited until recent times, which is evidenced by the stories of local residents and the presence of a village called Kyrgool, which means "Pheasant" in Kyrgyz language.

Figure 27: The Indian Porcupine and Syr Daria Pheasant

156. The question of conservation status of these species in the absence of recorded encounters in recent times remains open and unlikely, since during examination of anthropogenically modified biotopes adjacent to the canal Pravaia Vetka, no traces of the pheasant or porcupine were found. The absence of these species on the projected territory

is also confirmed by interviewing of local residents who deny their habitat on the territory adjacent to the Pravaya-Vetka canal, and available evidence of encounters refer to the period 15-10 years ago. However, it seems still possible that some pheasants penetrate from Uzbekistan through irrigation canals and agricultural fields.

4. Protected Areas

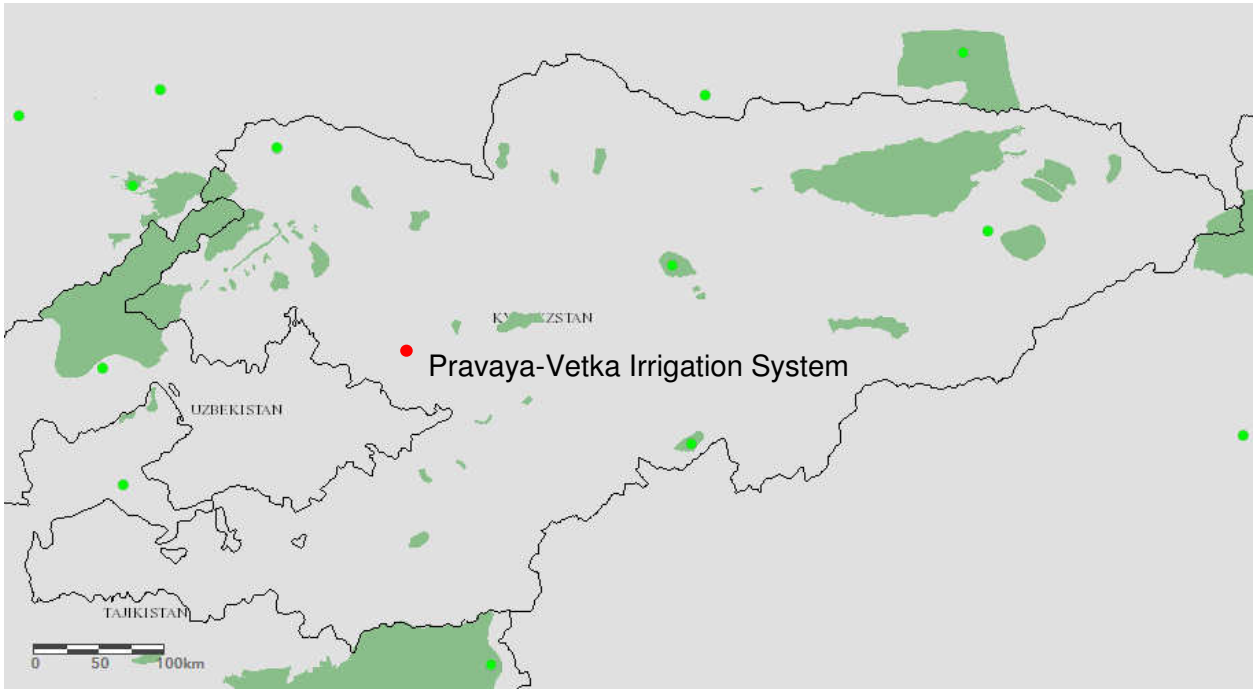
157. There are two protected areas in the Jalal-Abad oblast (see Table below). However, there is no protected natural areas in the Nooken district.

Table 9: Data on the state nature reserves of the Kyrgyz Republic in Jalal-Abad oblast

Name	Act and date of establishment	Location	The objective and focus of core activity	Area, ha
Dashmanskii	Resolution of the Government of the Kyrgyz Republic of 12 July 2012	Jalal-Abad oblast, raion (district) Bazar-Korgon	Conservation of biodiversity and unique relict/old-growth forests	7958,1
Padyshatinskii	Resolution of the Government of the KR of 03 July 2003 No. 405	Jalal-Abad oblast, raion (district) Ak-Syi	Preservation of the population of Semenov fir and archa (juniper) forests of the Western Tien Shan	30560

Source: State Agency for Environmental and Forestry Protection under Government of the Kyrgyz Republic [29].

Figure 28: Map of the protected areas in Kyrgyzstan



Source: World Database on Protected Areas (WDPA)

C. Human environment

1. Administrative Context

158. Jalal-Abad Oblast (region) (in Kyrgyz language - Jalalabat oblusu) is one of the administrative-territorial units of the Kyrgyz Republic located in the south-west of the country. Formed by Decree of the Presidium of the Supreme Soviet of the USSR on November 21, 1939. The administrative center of the region is the city Jalal-Abad. The population is 1 036 700 people (2011). In terms of ethno-cultural and economic view, the region together with the neighboring Osh and Batken provinces (oblasts) is part of Southern Kyrgyzstan. It is the second biggest in population (1 146 500 people as of January 1, 2016) and the third by area (33,700 km2) region of the republic.

Figure 29: Map of the Jalal-Abad Oblast

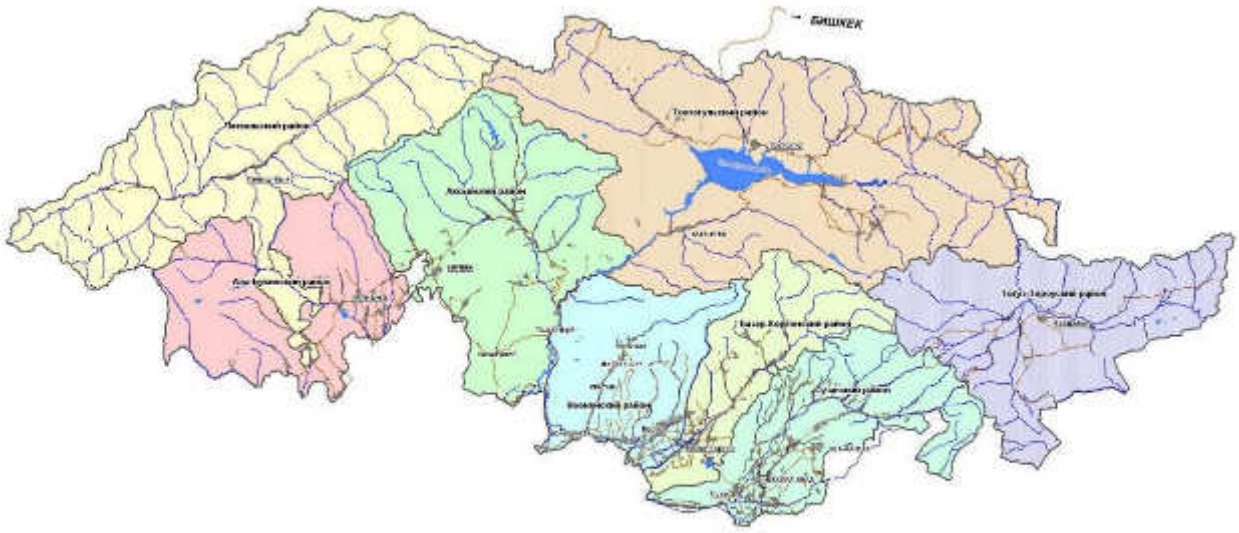


Рис. 4.1 Карта-схема административно-территориального деления Джалал-Абадской области

159. Within the Jalal-Abad Oblast, the Pravaya-Vetka Subproject is located in the Nooken raion (district) (in Kyrgyz Nooken raionu), founded in 1935. The administrative center is the village of Massy (16,689 inhabitants). The Nooken raion includes 8 ayilnyi (rural) okrugs (districts/community disctrict) (ayil okmotu in Kyrgyz language):

(i) Aralskii ayilnyi okrug — village Aral

(ii) Byurgendinskii ayilnyi okrug — village Byurgendi

(iii) Dostukskii ayilnyi okrug — village Shamaldy-Sai

(iv) Massynskii ayilnyi okrug — village Massy

(v) Mombekovskii ayilnyi okrug — village Mombekovo

(vi) Nookenskii ayilnyi okrug — village Kurulush

(vii) Sakaldinskii ayilnyi okrug — village Sakaldy

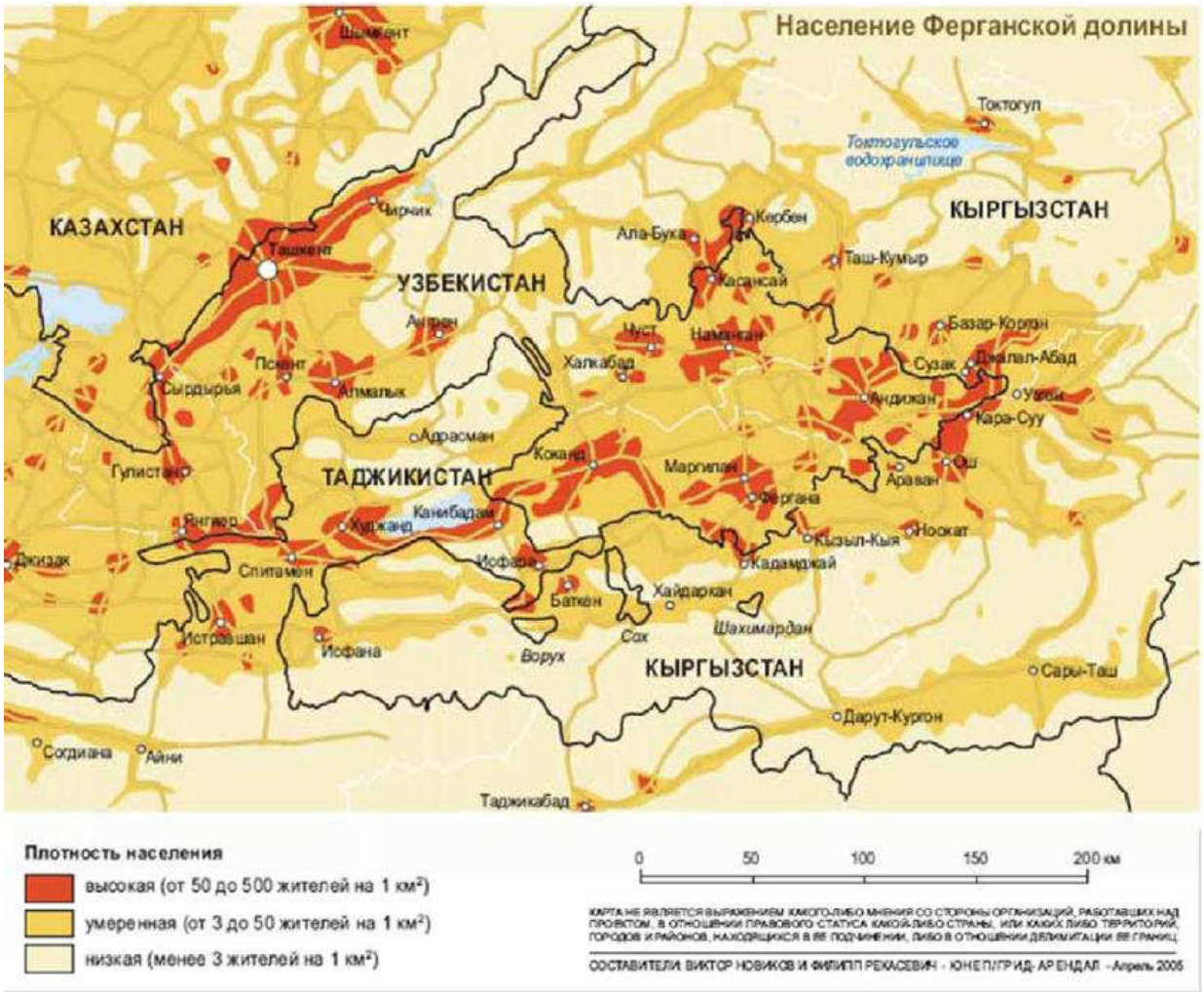
(viii) Shaidanskii ayilnyi okrug — village Alma

2. Population

160. According to the census of the population (2009), the Kyrgyz people make up 81,192 people out of 117,055 residents of the Nooken district (or 69.4%), Uzbeks - 32 702 people or 27.9%, Uygurs/Uyghur - 1181 people or 1.0%, Tajiks - 456 people or 0.4 %, Russians - 375 people or 0.3%, Tatars - 313 people or 0.3%, Turks - 309 people or 0.3%.

161. Because of the high population density, the Fergana Valley is raising critical questions about lack of resources, primarily land and water resources. The demographic issue is one of the main reasons for the instability in Fergana. A large population when combined with a shortage of jobs and a lack of economic prospects leads to migration of people from disadvantaged areas (often arid, mountainous or irrigated areas with a high population density) to large urban centers and less populated rural areas. Migrants from the villages flock to Osh and Jalal-Abad (the largest industrial centers) and the surrounding areas. Overcrowding leads to a reduction in the area of fertile agricultural land per capita and further depletion of mountain areas, which directly affects the standard of living.

Figure 30: Distribution of the population of the Fergana Valley (Denisov, 2005)



162. The sociological profile of the beneficiaries of the Pravaya-Vetka subproject is shown in the table below:

Table 10: Baseline information on the beneficiaries of the Pravaya-Vetka subproject

Basic data about population:			***Aral ayil okmotu (rural council)***	***Nooken ayil okmotu***	***Sakaldy ayil okmotu***
Population (2017)			6 510	15 805	17 185
Growth rate per year:			*Will be provided*		
Composed of:	**Age/gender:**	0-16 years (F)	1 052	2 691	2 263
		0-16 years (M)	1 007	2 389	2 363
		16-60 years (F)	1 990	4 800	5 343
		16-62 years (M)	2 064	5 210	5 656
		60 лет + (F)	265	350	542
		62 лет + (M)	132	365	314
	Ethnic origin:	Kyrgyz	56.5%	86,4%	75%
		Uzbek	31.3%	10,43%	21%
		other	12.2%	3,2%	4%
	Gender:	male	3 203	7 959	8 701
		female	3 307	7 846	8 484
Household (2017):	**Number:**		1 081	2 840	3 049
	Average number of household members:		6	5.6	5.6
	Gender of the head of household:				
	One person:				
Mortality:	**The mortality rate (per 1,000 persons of population): (State level, 2016)**		12.5		
	Infant mortality rate per 10 000 newborns: (State level, 2016)		165,7		
	Maternal mortality: (State level, 2016)		48		
Marriage:	**Average age at marriage (marriages registered in the district office of civil registration):**	(18 years in accordance with law):			
Divorce:	**One person per category: (widows / widowers, unmarried, abandoned / divorced persons-by gender):**		widows / Widowers: divorced: unmarried: divorced / abandoned:	widows / Widowers: divorced: unmarried: divorced / abandoned:	widows / Widowers: divorced: unmarried: divorced / abandoned:
Divorce rate: National level		In rural areas, for 1,000 marriages up to 120 divorces per year			

Source: Egis' survey, 2018

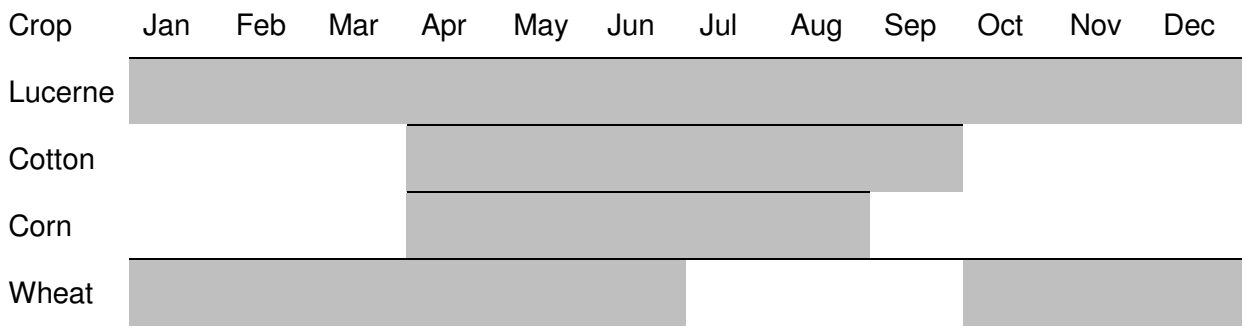
3. Land Management and Activities

163. The overwhelming majority of the population is engaged in agriculture. The total area of agricultural land in the district is 40,868 ha. The total area of arable land is 18,985, 95% of which is irrigated. There are 4,795 farmer and peasant households, 6 enterprises for processing agricultural products, 83 agricultural cooperatives, and 4 credit unions.

Figure 31: Farmers in the Pravaya-Vetka irrigation system

164. Because of the frozen winter there is only a single main Kyrgyz cropping season.

Figure 32: Present Pravaya Vetka cropping pattern



165. According to Pravaya-Vetka irrigation system farmers, the main agricultural production constraint is the shortage of water, particularly in the summer dry season from July to September inclusive. Therefore:

(i) Pasture (lucerne) for livestock is a critical crop as it is a perennial;

(ii) Cotton is also a critical crop as its growing season extends until the end of September;

(iii) Corn is an intermediate crop as its growing season extends until the end of August;

(iv) Winter wheat is not a critical crop, as its growing season does not extend into summer.

166. Physical water losses are generally highest at farmer field-level, decrease in tertiary and secondary canals and are lowest in main canals. Therefore, in well-operated irrigation systems, application efficiencies are the most important and tertiary irrigation efficiencies are next.

4. Infrastructure and Public Facilities

167. Since the Soviet period, the villages are equipped with water supply and sewerage systems. There are 27 health facilities in the district, including 2 hospitals. The educational background shows 29 pre-school institutions, 55 general-education schools (including 43 high schools), 3 vocational colleges, and 2 secondary specialized educational institutions.

5. Historical, Archaeological, Paleontological or Architectural Monuments

168. In the Nooken district, there is no specially protected areas and valuable natural complexes, such as: reserves, wildlife sanctuaries, natural reservoirs, and valuable tree species, nature monuments that represent historical, aesthetic, scientific and cultural value.

D. Focus on the project components

169. The aim of the present section is to provide site-specific information about the main sensitive environmental receptors of the project components.

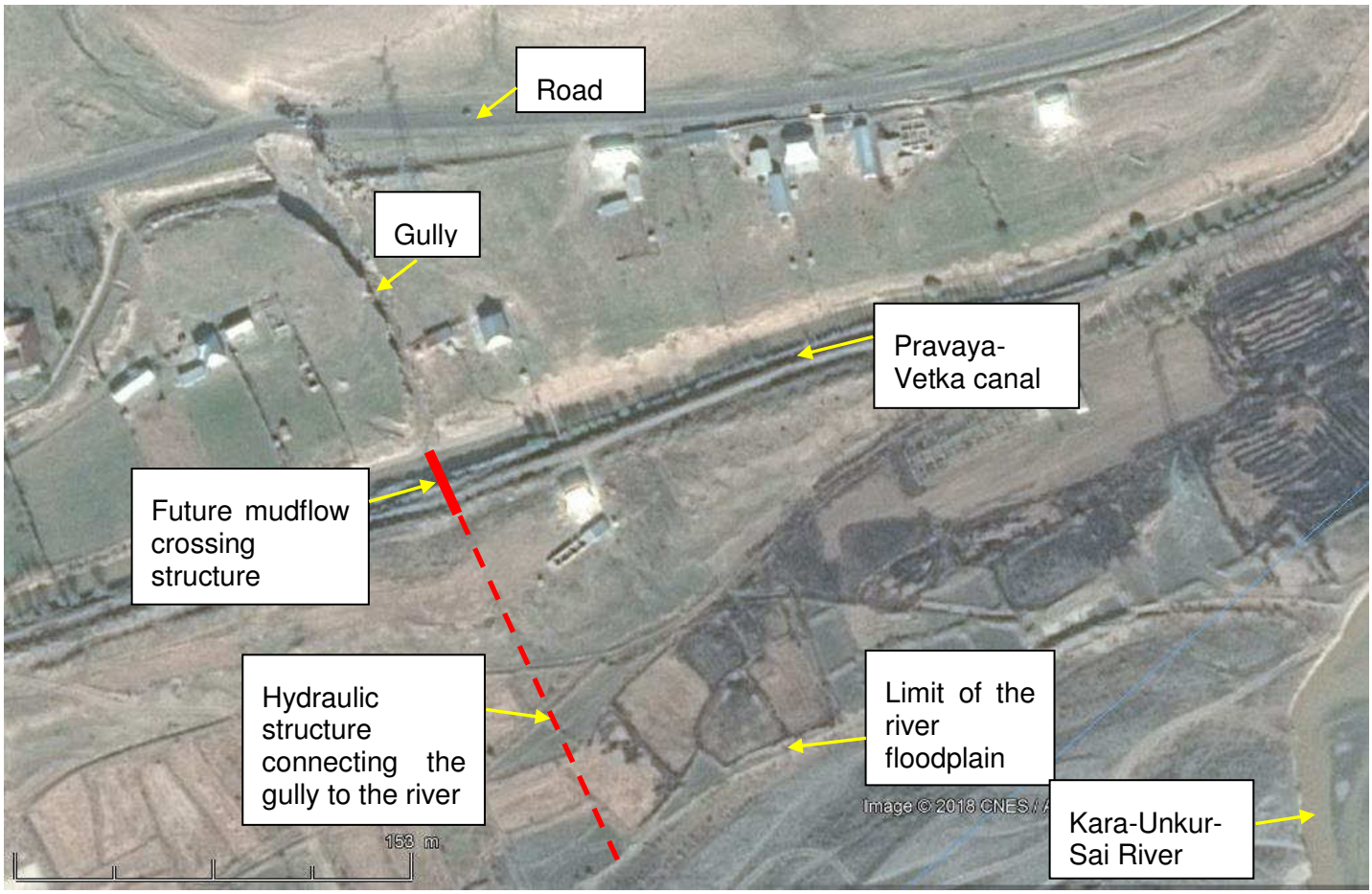
1. Mudflow Crossing Structure n°1

170. The environmental setting of Mudflow Crossing Structure n°1 is shown on Figure 33. The sensitive environmental receptors identified at the construction site or in its surroundings are as follows:

- Physical environment: soils are highly erodible and a deeply incised gully developed north of the canal. The gully runs approximately 120 m to reach the irrigation canal. It becomes narrowed in its mid-section before widening out as it enters the irrigation canal. It is reported to flow once to several times per year. There is a significant drop in level from the top of the bank of the irrigation canal down to the river level.
- Biological environment: though it is not a natural habitat, the canal hosts many fish species coming from the Kara-Unkur-Sai river. The farmers collect these fish after the irrigation season. The mud walls of the gully are used as nesting sites by common bird species including the European Roller (*Coracias garrulus*) and Common Mynah (*Acridotheres tristis*). The former species is classified as Least Concern by the IUCN but was previously considered to be declining at a rate that warranted a Near Threatened status. A review of the rate of decline resulted in the reclassification to Least Concern. This species is migratory and declining in Europe but appears to have stable population numbers in Central Asia. The Common Mynah is non-native to the Kyrgyz Republic and is a highly invasive species.

- Human environment: a road runs alongside the valley. The original design of the road culverts has led to erosion of the soils and created the deeply incised cut. There are houses/farms present on both sides of the irrigation canal (5 houses are located within 100 m of the construction site); a barn is close to the gully. Land use within the area is small scale agricultural production with the land south of the main irrigation canal being in use primarily for rice production. Two farmers are likely to be affected by the subproject component. Their farms cover a total surface area of 3.5 ha. The lands were transferred by the local authorities of the Kenesh ayil okmotu for use to the two local farmers on a free basis for land development. There are 6 persons in each household. Both households have additional sources of income such as providing temporary services for building and repairing buildings and private business management. Both farms breed cows and sheep. A small area of uncultivated land (meadow) lies between the irrigation canal and the rice fields.

Figure 33: Aerial view of the mudflow crossing structure n°1 site



Source: Google Earth, November 2016

Figure 34: View on the land crossed by the hydraulic structure (meadow and rice fields) before reaching the Kara-Unkur-Sai River

2. Mudflow Crossing Structure n°2

171. The environmental setting of Mudflow Crossing Structure n°2 is shown on Figure 35. The sensitive environmental receptors identified at the construction site or in its surroundings are as follows:

- Physical environment: The Shaidan River passes over the Masy secondary canal. This mountain brook shows a torrential regime, with sudden floods and high sediment transport generating mudflows. As the canal is almost at the same level than the river, the canal crossing structure is more or less in the bed of the river and includes an upstream weir with a half-meter drop in water level (see foreground on the photo of Figure 36).
- Biological environment: The Shaidan river hosts a fish species listed in the national Red List (not evaluated by the IUCN), *Glyptosternum reticulatum McClelland* - Turkestan catfish, but with a wide range of distribution. The right bank of the river is covered with shrubs and trees of common riparian species.
- Human environment: 65 m downstream the mudflow crossing structure, the M41 bridge crosses above the river. A pipe crosses the river between the bridge and the mudflow structure. Three houses are located within 100 m of the construction site. The premises of a small restaurant (the Shaidan River Café) spread over the canal area on the right bank of the river. The restaurant premises include several buildings, among them a yurt. Some of them were constructed over the irrigation canal. One is located very close to the Shaidan River. None of these premises complies with the easement area along the river and canal. The restaurant activity seems to be occasional (it was closed during the several site visits performed in the framework of the present project).

Figure 35: Aerial view of the mudflow crossing structure n°2 site

Source: Google Earth, June 2017

Figure 36: Downstream view from the crossing structure on the building located alongside the river right bank and M41 bridge

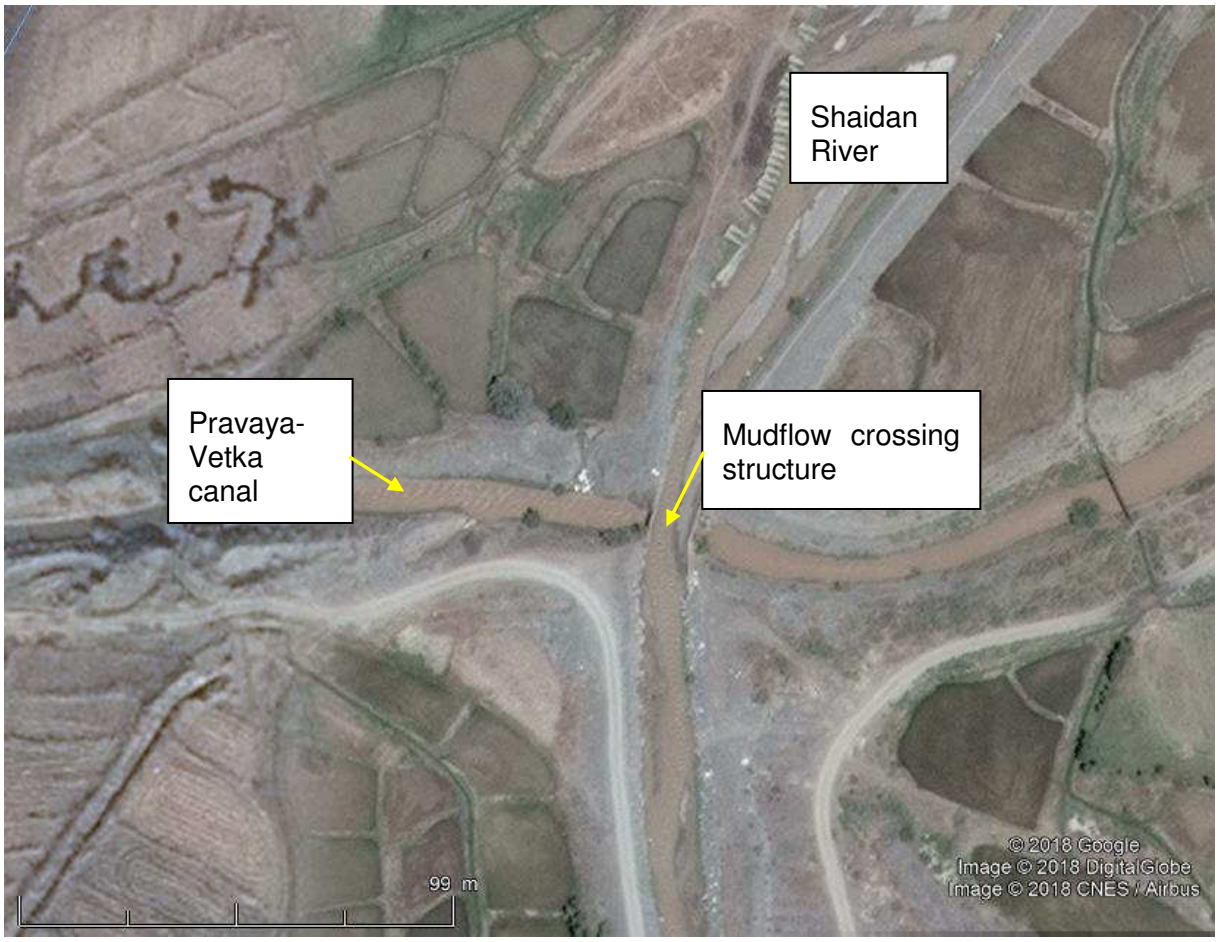
Source: Egis, May 2018

3. Mudflow Crossing Structure n°3

172. The environmental setting of Mudflow Crossing Structure n°3 is shown on Figure 37. The sensitive environmental receptors identified at the construction site or in its surroundings are as follows:

- Physical environment: The Shaidan River passes over the Pravaya-Vetka canal. This mountain brook shows a torrential regime, with sudden floods and high sediment transport generating mudflows. This mudflow crossing structure is located 3 km downstream the crossing structure over the Masy secondary canal. As shown on the photo of Figure 38 the riverbed is already channelized.
- Biological environment: The Shaidan river hosts a fish species listed in the national Red List (not evaluated by the IUCN), *Glyptosternum reticulatum McClelland* - Turkestan catfish, but with a wide range of distribution. A notable bird species, the Hobby (Falco Subbuteo) was observed in the general area. These were hawking and feeding in the area and were likely a breeding pair. This species is classed as Least Common under IUCN red listing. The species is migratory and declining in numbers globally but not at a rate that causes a higher classification than Least Concern at present and dependent upon wetland areas but also requires trees for nesting. The river banks are covered with a sparse herbaceous vegetation and a few trees (mainly *Salix sp.),* see Figure 38. No rare or endangered species are likely to be found in this common riparian vegetation.
- Human environment: The location is rural, with surrounding fields of agriculture with rice and maize being dominant crops. The site is accessed along tracks and the proposed development site is accessible from either side of the river. There is no house within 900 m of the construction site.

Figure 37: Aerial view of the mudflow crossing structure n°3 site



Source: Google Earth, June 2017

Figure 38: The Shaidan River banks upstream the mudflow crossing structure.

4. Pravaya-Vetka Canal n°4

173. The environmental setting of Mudflow Crossing Structure n°3 is shown on Figure 39. The sensitive environmental receptors identified at the construction site or in its surroundings are as follows:

- Physical environment: The canal is filled with water during the irrigation period, i.e. half of the year.
- Biological environment: The canal is fringed with a grass and hygrophilous vegetation (e.g. *Phragmites sp.*) on both sides (see photo on Figure 40). No rare or endangered species are likely to be found in this common riparian vegetation.
- Human environment: The location is rural (open fields) at the south end and urban at the north end of the canal section to be rehabilitated. The site is accessed along tracks and the proposed development site is accessible from either side of the river. There are 20-25 houses within 100 m of the construction site at the north end of the site.

Figure 39: Aerial view of the Pravaya-Vetka Canal n°4 site

Source: Google Earth, June 2017

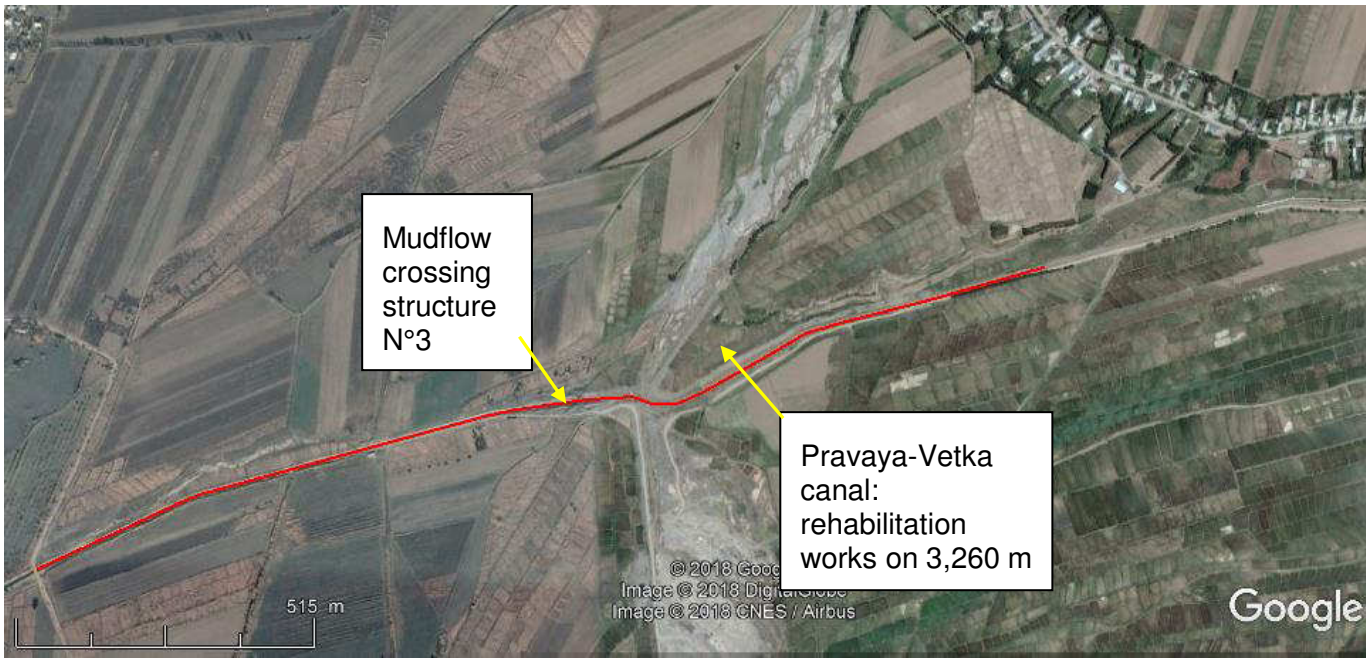
Figure 40: View on the canal and its vegetation in springtime

5. Pravaya-Vetka Canal n°5

174. The environmental setting of Mudflow Crossing Structure n°3 is shown on Figure 41. The sensitive environmental receptors identified at the construction site or in its surroundings are as follows:

- Physical environment: The canal is filled with water during the irrigation period, i.e. half of the year.
- Biological environment: The canal mainly supports a vegetation of grass, reeds, and sparse small trees (e.g. *Salix sp*) on both sides, showing low ecological interest (see photo on Figure 42).
- Human environment: The location is rural, with surrounding fields of agriculture with rice and maize being dominant crops. The site is accessed along tracks and the proposed development site is accessible from either side of the river. The closest houses are more than 100 m of the construction site (eastern end).

Figure 41: Aerial view of the Pravaya-Vetka Canal n°5 site



Source: Google Earth, June 2017

Figure 42: View on the canal and its vegetation in springtime

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Introduction

175. As the Pravaya-Vetka subproject mainly deals with the rehabilitation and upgrading of existing structures, most of the impacts will be limited to the construction period. They will be therefore mainly temporary (1-2 months on each site) and will be mitigated through prescriptions to be included within the Contractor's technical specifications.

176. The impacts and mitigation measures are presented site by site, for the five sites that are subject to construction works (Sections V.B. to V.F). For each site, the impacts and mitigation measures are differentiated depending on the subproject component nature and implementation stage:

(i) Construction impacts: this stage may imply significant impacts but on a limited period. The impacts are therefore direct and temporary.

(ii) Structural impacts: the physical presence of the structure (surface, height, visual appearance…) is a source of impacts per se. These impacts are direct and permanent.

(iii) Operational impacts: the structure operation may induce new or increased impacts. These impacts are direct or indirect, and may change depending on the operational processes.

177. Then, information on the expected benefits of the water resource management in the framework of the subproject is provided (Section V.G).

178. The cumulative impacts resulting from the implementation of all the subproject components, either positive or negative, are discussed (Section V.H).

179. If all the mitigation measures mentioned below are actually enforced, the residual negative impacts of the project will be very low, and quite environmentally and socially acceptable.

180. If the subproject design changes as part of the detailed design in a way that the assessment would be affected, then the assessment should be updated. In this respect, it should be borne in mind that the project will include additional elements such as relocated and/or additional tertiary and quaternary canals, water control points, sluices, etc. The need for these and their location is not known at the time of writing the present report. It is assumed that these investments will not have significant environmental effects, and therefore will not require updating of the IEE and new disclosure. However, at the detailed design stage for the main canal rehabilitation and protective works, all additional subproject components to be managed at the farm level by WUGs will have to be specified. An addendum to the IEE will be prepared to address the potential environmental impacts and related mitigation measures of all new elements in the subproject. A simplified disclosure process will be implemented (e.g. a poster campaign to inform the local population that the IEE and its addendum is retrievable in the town halls).

B. Mudflow Crossing Structure n°1

181. Brief description of the works: Construction of a mudflow crossing structure over the Pravaya-Vetka canal on km 15+25. At this place, a gully discharges significant amount of debris into the canal, resulting in significant silting of the canal. The gully will be stabilized and reinforced with the construction of a rubble concrete trapezoidal canal. A crossing structure will be built over the Pravaya-Vetka canal and extended through a rubble concrete trapezoidal canal across a 160 m wide agricultural area to carry the flows and debris to the Kara-Unkur-Sai river.

182. Anticipated impacts and mitigation measures:

Table 11: Impacts and mitigation measures related to Mudflow Crossing Structure n°1

Impact Description	Significance of Impact (Very low, Low, Medium, High) and justification	Proposed Mitigation Measures	Significance of Residual Impact
Construction impacts			
Water pollution from construction machines (accidental spill of oil from machinery), equipment and material stores, poor sanitation at work sites, release of soil and cement into surface water.	Low, because the canal flow reaches almost 20 m3/s at that place (strong dilution effect). In addition, the natural water turbidity in the canal is high (approx. 4 kg/m3). In wintertime, when the canal is not in use, the pollution risk is minimal, as the canal is dry and an accidental spill could be easily confined.	To avoid possible pollution of the Pravaya-Vetka canal and safety issues, the works will be conducted when the canal is empty (after the agricultural season). Control measures for oily residues, lubricants and refuelling shall be prescribed. Within the project detail planning, maintenance yards have to be designed. Dedicated drainages need to be considered that can capture run-off. Oily residues and fuel need to be captured at source and refuelling and maintenance must take place in dedicated areas away from surface water resources. Proper training of the machinists must ensure that refilling and oil changes are undertaken with utmost care and disposal of any residue from these activities. In case temporary work camps are required, construction of worker camps shall be located close to settlement areas but not near sensitive water resources. In such cases, the constructor needs to provide a detailed design of each work camp including infrastructure planning (water supply, electricity supply, waste management, wastewater treatment and disposal). Workers need to be trained how to behave and to handle waste and waste water according environmental management requirements.	Very low
Air Pollution from earthworks, demolition/construction activities and transport (atmospheric pollutants, dust and cement), especially during the dry or strong prevailing winds periods.	Very low: field observations indicate that ambient air quality is generally acceptable at construction sites and that emissions from powered mechanical equipment are rapidly dispersed. So, no significant impact can be expected. Only one house, in close vicinity of the works could be affected.	For safety reasons the Contractor shall take all necessary precautions to prevent the occurrence of smoke emissions or fumes from the site concrete mixer plant or stored fuel oils, and drifting of such emissions and fumes into residential areas. In particular, the concrete plant shall be well maintained and measures taken so as not to be left running unnecessarily for long periods when not directly in use. The Contractor shall not install any furnace, boiler or other similar plant or equipment using any fuel that may produce air pollutants without the prior written consent of the State Inspection on Ecological and Technical Safety. The Contractor shall instigate effective dust suppression measures as may be necessary to avoid creating dust nuisance arising because of the works on site. Construction materials (sand, gravel, and rocks) and spoil materials will be transported by trucks covered with tarpaulin.	Very low
Noise and vibration from trucks and construction machinery.	Low: five houses are located within 100 m of the construction site and will be especially affected. As the works will	The Contractor shall consider noise as an environmental constraint, which must be addressed in the planning and execution of the works. He shall take all reasonable measures to reduce noise to a minimum. The construction works will be limited to daytime (8 am to 8 pm) and will be prohibited in weekends. The Contractor shall take all necessary	Very low

Impact Description	Significance of Impact (Very low, Low, Medium, High) and justification	Proposed Mitigation Measures	Significance of Residual Impact
	require approx. 3,000 m3 of construction materials, about 300 trucks will be necessary for the haulage, i.e. between 10 and 20 per day. This will not significantly increase the traffic noise in the urban areas crossed by the trucks.	measures to ensure that the operation of all mechanical equipment and construction processes, on or off site, shall not cause any unnecessary and excessive noise which may disturb any occupant of nearby dwellings, schools, hospitals, or premises with similar sensitivity to noise.	
Wastes from construction activities are mainly spoils generated by excavations (6,000 m3). Disposal of these materials on land may cause destruction of plants, loss of vegetation, unsightly view and other nuisances to the local community.	Low, because the excavated materials are harmless (no pollution). It is assumed that they will be disposed of in the nearby Kara-Unkur-Sai floodplain (200 m distance).	The Contractor shall remove from the site all excavated material, spoil, surplus materials and rubbish from whatever on-site source and shall, except where otherwise specified in the Contract, make his own arrangements for their disposal. The Contractor shall also comply with any legal requirements applying to disposal of any contaminated spoil. The process of classifying waste types, stockpiling of waste at site, transportation and disposal of waste shall be subject to the approval/review of the State Inspection on Ecological and Technical Safety. Fly-tipping shall not be permitted. Loads must be deposited solely at authorized tips. Deposition shall be carried out in accordance with the requirements of Local Authorities. To prove the correct depositing of excavated material and to prevent the occurrence of fly-tipping, daily logs of all spoil removed from site by lorry shall be maintained and kept available both on site and at the authorized tips deposition for inspection by the relevant authorities. Spoils generated by excavations shall be disposed of in the nearby Kara-Unkur-Sai floodplain. The disposal site has to be devoid of vegetation (bare gravel strands). The deposits will be spread out so as not forming a mound. The site used to provide the backfilling material could also be used for the disposal of the spoils. In that case, the spoils will be temporary stockpiled, and the area used for the temporary deposit will then be restored.	Very low
Construction materials extracted from borrow pits or quarries.	Low: approx. 8,000 m3 of backfilling material and small volume of rubble stones (424 m3) Their haulage to the construction site will generate the same impact than for the other construction materials (see above).	The backfilling material required for the construction works will come from the Kara-Unkur-Sai floodplain, and the rubble stones from quarries. Only duly authorized quarries will be chosen. The borrow pits for backfilling material have to be devoided of vegetation (bare gravel strands). After extraction, they will be filled with spoils or secured with gentle slopes in order to avoid accidents.	Very low
Disturbance of agricultural activities will result from access restriction, soil compaction, trenching.	Medium: two farms will be affected.	The construction works shall be carried out after the agricultural season.	Low

Impact Description	Significance of Impact (Very low, Low, Medium, High) and justification	Proposed Mitigation Measures	Significance of Residual Impact
Visual intrusion. During the construction period, the visual quality is usually poor, because of material stockpiles, waste depots, prefabricated offices and construction machines.	Low: one house/farm will be especially exposed to this nuisance	During the progress of the works, the Contractor shall keep the site reasonably free from all unnecessary obstructions and shall store or dispose of any constructional plant and surplus materials and clear away and remove from the site any wreckage, rubbish or temporary works no longer required. After the completion of the works, the Contractor shall immediately clear the work site from all materials, dust and rubbish.	Low
Access and safety issues related to truck traffic and construction machinery.	Low: access to the project site will be provided through the existing roads and can sufficiently transport materials	The Contractor shall take all the necessary arrangements and precautions during the execution of the works to avoid disturbance to the public, any reason that may prevent the access or the use of the public & private roads, footpaths, or properties. The Contractor shall use the suitable and appropriate means of transport, and take all necessary arrangement and precautions to avoid any damage or destruction to the public roads or bridges located on the route from and to the work site. The Contractor shall adhere to take the necessary procedures to secure the work site to prevent any accidents through construction of temporary fencing around the site in an appropriate height and type. The Contractor will bear the responsibility to guard and secure the work site during night and daytime (24 hours / day), provide the necessary lighting thereto, and fire protection and fire-fighting equipment. In general, the Contractor should take all necessary procedures and precautions to prevent injuries or death cases for the workmen or any other person. Safety to workers and the public shall be enhanced by: (i) Proper briefing and training of workers on safety precautions, and their responsibilities for the safety of themselves and others. (ii) Provision to workers of protective clothing including hard hats, and protective footwear. (iii) Ensuring plant and vehicle operators are properly licensed and trained. (iv) Arranging for the provision of first aid facilities, readily available trained paramedical personnel, and emergency transport to the nearest hospital with accident and emergency facilities, and allocation of responsibility for ensuring that these arrangements are continually in place. (v) Arranging for regular safety checks of vehicles and material, and allocation of responsibility for this. (vi) Provision of hazard warning signs around construction sites.	Very low
Communicable diseases: as elsewhere, where worker's housing areas are established near residential households and communities, there will be short-terms risks	Low, because this is a small construction site, requiring only a few workers.	To mitigate the risk, the contractors' contracts must show a clause on occupational health and safety measures to be guaranteed, and include a paragraph, saying e.g.: "The Contractor is obliged to ensure awareness raising information to his employees on how to protect oneself and others (local sex-workers, spouses, and other) from contamination	Very low

Impact Description	Significance of Impact (Very low, Low, Medium, High) and justification	Proposed Mitigation Measures	Significance of Residual Impact
of the spread of communicable diseases from the 'imported' workers to local women or men and vice versa (STI/HIV/AIDS, T.B., Dengue fever, scabies, bed bugs and other diseases and infections).		by STI/HIV/AIDS and other communicable diseases, and how to practice "safe sex", personal hygiene, and protect oneself against T.B, Rabies, Hepatitis" etc." . It should also be required that construction contractors distribute or request that the local health officer distribute information material / awareness campaigns and free condoms to immigrant workers and the local sex-workers. Also, contractors shall maximize the number of local, residential workers, to minimize the risk to the local communities from imported labor.	
Potential opportunity for local unemployed people to work as unskilled day labor, temporary during the civil works.	Beneficial impact		
The local communities and households nearest to the construction sites / canals could provide services during the construction periods: catering, cleaning, laundry, transportation, housing, etc.	Beneficial impact		
Structural impacts			
Due to the difference in levels of the proposed mudflow crossing point and the main irrigation canal there will need to be a deep cut developed for the new mud flow channel.	Low: to make this a safe construction with sloping side walls, an estimated 50 m of land will be removed from land at the top of the slope, decreasing in width as the mud flow channel approaches the river bed	Fences shall be installed on both sides of the channel.	Very low
The construction of a hydraulic structure (rubble stone masonry ditch) to connect the gully to the river floodplain will cause the loss of approx. 1,000 m² of natural habitat: meadow used for livestock farming.	Low: due to the relatively low ecological interest of this habitat, and the low surface area affected, the impact is not significant.	No need to consider any mitigation measure.	Low
Loss of nesting sites in the mud walls of the gully.	Medium, because of the presence of the European Roller (*Coracias garrulus*).	The works will have to take place out of the nesting season (May to July). A dozen of nest boxes 25 × 25 × 25 cm (access diameter: 60 mm), will be installed on nearby pylons and trees.	Low

Impact Description	Significance of Impact (Very low, Low, Medium, High) and justification	Proposed Mitigation Measures	Significance of Residual Impact
The ditch may impair fauna movements alongside the right bank of the Kara-Unkur-Sai River.	Low: big animals can easily bypass it downstream. Small animals (invertebrates, amphibians, reptiles, rodents) may be trapped if the ditch sides are too steep. However, the rubble stone masonry will provide an uneven surface that should allow most of them to escape easily.	The slope of the walls of the ditch connecting the mudflow crossing structure to the river floodplain must not exceed 1/1, in order to reduce safety risks and allow animals or people fallen by accident into the ditch to get out more easily.	Very low
Loss of land for two farmers, due to the construction of the ditch downstream the mudflow crossing structure. These land users do not pay rent and land tax to local authorities for the used land. Considering that land cultivation by households was carried out based on a formal decision of the local government, households affected by the impact should be considered with legitimate rights..	Medium: less than 10% of the cultivated plots of both farmers will be affected (0.045 ha on 0.52 ha in one case, 0.114 ha on 3 ha in the second case); 0.089 ha of corn fields and 0.07 ha of rice fields; one household will lose two productive trees (apple and walnut); 10 m of fences will be destroyed. No household will be severely affected and none can be considered a vulnerable household in accordance with Kyrgyz and ADB's policy requirements.	As the land plots were provided to households for use and improvement on the basis of the decision of the local self-government, the two farmers agreed upon a donation of the land needed for the construction works. Financial compensations will be provided to the two farmers: based on the harvest value for one year for the loss of corn and rice fields, based on market value for the two trees, and based on the full replacement cost for the fence.	Low: the donation may have a slight impact on the livelihoods of the households (inconveniences for land use, slight income loss).
The hydraulic structure will also act like a barrier, cutting the farm holdings into two pieces.	Medium: the farmers may need to increase the travel distance by 400 m.	A bridge shall be built over the ditch to allow access to the agricultural plots.	Low
The mudflow crossing structure and related upstream and downstream hydraulic structures will degrade the local landscape.	Low, taking into consideration the absence of sensitive landscape components, the low extent of the planned hydraulic structures, and the low number of houses with direct view over the structures.	No need to consider any mitigation measure.	Low

Impact Description	Significance of Impact (Very low, Low, Medium, High) and justification	Proposed Mitigation Measures	Significance of Residual Impact
The subproject will recreate the gully's outlet to the Kara-Unkur-Sai River, suppressed when constructing the Pravaya-Vetka canal. It will therefore contribute to the restauration of the natural hydrographical pattern. It will also stabilize the gully upstream the canal, which developed very quickly these last years and is currently threatening a barn and the main road on the right bank of the Kara-Unkur-Sai river (see Figure 43).	Beneficial impact		
The hydraulic structure constructed downstream the mudflow crossing will channelize the water and mudflows through the fields. If only the mudflow crossing structure is built, the resulting flows would spread over the cultivated areas and would affect them much more than what is expected from the downstream hydraulic structure. In other words, the main beneficiaries of the downstream ditch will be the farmers.	Beneficial impact		
Operational impacts			
Even without flows, the new hydraulic structures represent a danger to people and livestock, because of their deepness and steep banks, especially in the upstream section (between the road and the canal).	Low, because it is already the case in the present situation, at least upstream of the canal.	The ditch shall be fenced on his whole length.	Very low
The mudflow structure will consider climate change projections and will be designed for the 2050 centennial design flood	Beneficial impact		

Figure 43: The subproject will contribute to the protection of nearby assets

	
A barn may be destroyed if the gully continues to widen	The road embankment is heavily eroded and the road may experience serious damage if no protection measure is implemented

C. Mudflow Crossing Structure n°2

183. Brief description of the works: Replacement of the mudflow crossing structure over the Masy secondary canal. The existing monolithic reinforced concrete structure carrying the Shaidan river flows over the canal is partly destroyed, leading to regular overflows in the canal. It will be dismantled and a new structure built. The channelized river bed downstream the structure will be rebuilt in rubble stone masonry. Three weirs 65 cm high will be constructed to dissipate the flow energy between the crossing structure and the road bridge 65 m downstream.

184. Anticipated impacts and mitigation measures:

Table 12: Impacts and mitigation measures related to Mudflow Crossing Structure n°2

Impact Description	Significance of Impact (Very low, Low, Medium, High) and justification	Proposed Mitigation Measures	Significance of Residual Impact
Construction impacts			
The river may be diverted into the canal during the construction works. It means that the river continuity may be interrupted during the construction works (between 1 and 2 months).	Medium: as this river hosts a fish listed on the Kyrgyz Red List of rare or endangered species (the Turkestan catfish), the potential impact is significant, even if a small portion of the fish population is affected.	To minimize hydrobiological impacts (especially on the Turkestan catfish), the following measures will be implemented: (i) During the construction works, the river flows may be diverted into the canal. A weir will be built in this respect. As catfish species usually stay close to the river bottom, it may be assumed that the weir will be an obstacle to their movements. As a result, only a few catfishes would reach the canal. A wire netting positioned at the top of the weir would prevent any fish to pass into the canal. (ii) To maintain the aquatic life downstream the works, an instream flow has to be preserved. Usually, instream flows amount to at least 1/10 of the average yearly flow rate. Therefore, the instream flow to be considered for the Shaidan river should amount 200 l/s. A temporary pipe culvert must be installed in the river bed during the construction works to ensure this hydraulic continuity.	Low
Water pollution from construction machines (accidental spill of oil from machinery), equipment and material stores, poor sanitation at work sites, release of soil and cement into surface water (either the river or the canal).	Medium: the water contamination risk is moderate, because the canal flow reaches almost 3 m3/s at that place (significant dilution effect). In addition, the natural water turbidity in the canal is rather high. In wintertime, when the canal is not in use, the pollution risk is minimal, as the canal is	To reduce possible pollution of the Masy secondary canal and safety issues, the works will be conducted when the canal is empty (after the agricultural season). Control measures for oily residues, lubricants and refuelling shall be prescribed. Within the project detail planning, maintenance yards have to be designed. Dedicated drainages need to be considered that can capture run-off. Oily residues and fuel need to be captured at source and refuelling and maintenance must take place in dedicated areas away from surface water resources. Proper training of the machinists must ensure that refilling and oil changes are undertaken with utmost care and disposal of any residue from these activities.	Low

Impact Description	Significance of Impact (Very low, Low, Medium, High) and justification	Proposed Mitigation Measures	Significance of Residual Impact
	dry and an accidental spill could be easily confined. However, as the works mainly concern the Shaidan river bed, the main pollution risks are likely to affect this natural water course, hosting the Turkestan catfish.	In case temporary work camps are required, construction of worker camps shall be located close to settlement areas but not near sensitive water resources. In such cases, the constructor needs to provide a detailed design of each work camp including infrastructure planning (water supply, electricity supply, waste management, wastewater treatment and disposal). Workers need to be trained how to behave and to handle waste and waste water according environmental management requirements.	
Air Pollution from earthworks, demolition/construction activities and transport (atmospheric pollutants, dust and cement), especially during the dry or strong prevailing winds periods.	Very low: field observations indicate that ambient air quality is generally acceptable at construction sites and that emissions from powered mechanical equipment are rapidly dispersed. Only the premises of a small restaurant, in close vicinity of the works – on the right bank of the river - could be affected	For safety reasons the Contractor shall take all necessary precautions to prevent the occurrence of smoke emissions or fumes from the site concrete mixer plant or stored fuel oils, and drifting of such emissions and fumes into residential areas. In particular, the concrete plant shall be well maintained and measures taken so as not to be left running unnecessarily for long periods when not directly in use. The Contractor shall not install any furnace, boiler or other similar plant or equipment using any fuel that may produce air pollutants without the prior written consent of the State Inspection on Ecological and Technical Safety. The Contractor shall instigate effective dust suppression measures as may be necessary to avoid creating dust nuisance arising because of the works on site. Construction materials (sand, gravel, and rocks) and spoil materials will be transported by trucks covered with tarpaulin.	Very low
Noise and vibration from trucks and construction machinery.	Low: three houses and a restaurant are located within 100 m of the construction site and will be especially affected. As the works will require only 900 m3 of construction materials, approx. 90 trucks will be necessary for the haulage. This will not significantly increase the traffic noise in the urban areas crossed by the trucks.	The Contractor shall consider noise as an environmental constraint, which must be addressed in the planning and execution of the works. He shall take all reasonable measures to reduce noise to a minimum. The construction works will be limited to daytime (8 am to 8 pm) and will be prohibited in weekends. The Contractor shall take all necessary measures to ensure that the operation of all mechanical equipment and construction processes, on or off site, shall not cause any unnecessary and excessive noise which may disturb any occupant of nearby dwellings, schools, hospitals, or premises with similar sensitivity to noise.	Very low
Wastes from construction activities are mainly spoils generated by excavations (2,000 m3) and dismantling of the current mudflow crossing structure (11 m3). Disposal of these materials on land may	Low: the excavated materials are harmless (no pollution). It is understood that they will be disposed of in authorized landfills.	The Contractor shall remove from the site all excavated material, spoil, surplus materials and rubbish from whatever on-site source and shall, except where otherwise specified in the Contract, make his own arrangements for their disposal. The Contractor shall also comply with any legal requirements applying to disposal of any contaminated spoil. The process of classifying waste types, stockpiling of waste at site, transportation and disposal	Very low

Impact Description	Significance of Impact (Very low, Low, Medium, High) and justification	Proposed Mitigation Measures	Significance of Residual Impact
cause destruction of plants, loss of vegetation, unsightly view and other nuisances to the local community.		of waste shall be subject to the approval/review of the State Inspection on Ecological and Technical Safety. Fly-tipping shall not be permitted. Loads must be deposited solely at authorized tips. Deposition shall be carried out in accordance with the requirements of Local Authorities. To prove the correct depositing of excavated material and to prevent the occurrence of fly-tipping, daily logs of all spoil removed from site by lorry shall be maintained and kept available both on site and at the authorized tips deposition for inspection by the relevant authorities.	
Construction materials extracted from borrow pits or quarries.	Low: approx. 350 m3 of backfilling material and small volume of rubble stones (165 m3 needed for the construction works). Their haulage to the construction site will generate the same impact than for the other construction materials (see above).	The backfilling material required for the construction works will come from the Shaidan floodplain, and the rubble stones from quarries. Only duly authorized quarries will be chosen. The borrow pits for backfilling material have to be devoided of vegetation (bare gravel strands). After extraction, they will be secured with gentle slopes in order to avoid accidents.	Low
Visual intrusion. During the construction period, the visual quality is usually poor, because of material stockpiles, waste depots, prefabricated offices and construction machines.	Low: only one house will be exposed to this nuisance.	During the progress of the works, the Contractor shall keep the site reasonably free from all unnecessary obstructions and shall store or dispose of any constructional plant and surplus materials and clear away and remove from the site any wreckage, rubbish or temporary works no longer required. After the completion of the works, the Contractor shall immediately clear the work site from all materials, dust and rubbish.	Low
Access and safety issues related to truck traffic and construction machinery.	Low: access to the project site will be provided through the existing roads and can sufficiently transport materials.	The Contractor shall take all the necessary arrangements and precautions during the execution of the works to avoid disturbance to the public, any reason that may prevent the access or the use of the public & private roads, footpaths, or properties. The Contractor shall use the suitable and appropriate means of transport, and take all necessary arrangement and precautions to avoid any damage or destruction to the public roads or bridges located on the route from and to the work site. The Contractor shall adhere to take the necessary procedures to secure the work site to prevent any accidents through construction of temporary fencing around the site in an appropriate height and type. The Contractor will bear the responsibility to guard and secure the work site during night and daytime (24 hours / day), provide the necessary lighting thereto, and fire protection and fire-fighting equipment. In general, the Contractor should take all necessary procedures and precautions to prevent injuries or death cases for the workmen or any other person. Safety to workers and the public shall be enhanced by: (i) Proper briefing and training of workers on safety precautions, and their responsibilities for the safety of themselves and others.	Very low

Impact Description	Significance of Impact (Very low, Low, Medium, High) and justification	Proposed Mitigation Measures	Significance of Residual Impact
		(ii) Provision to workers of protective clothing including hard hats, and protective footwear. (iii) Ensuring plant and vehicle operators are properly licensed and trained. (iv) Arranging for the provision of first aid facilities, readily available trained paramedical personnel, and emergency transport to the nearest hospital with accident and emergency facilities, and allocation of responsibility for ensuring that these arrangements are continually in place. (v) Arranging for regular safety checks of vehicles and material, and allocation of responsibility for this. (vi) Provision of hazard warning signs around construction sites.	
Disturbance to the restaurant's activity.	Medium: at the present feasibility study stage, it is understood that it will be possible to perform the mudflow crossing structure works without requiring any demolition. It should be noted that the restaurant activity seems to be occasional. As the works duration for the new crossing structure will not excess 2 months, the disturbance to the restaurant's activity should be rather low.	An agreement has to be reached between the constructor and the restaurant's owner to get access to the river right bank through his land plot in order to ensure minimum disturbance (no damage to the premises, no works during the restaurant opening days and hours, replantation of any tree that will need to be cut or removed).)	Low
Potential damage to public facilities.	Medium: a pipe crosses the river in the section to be rehabilitated.	The Contractor shall maintain and protect all public utilities inside or adjacent to the work sites and should take the necessary measures to ensure their continuous operation without any damage therein even if the matter has necessitated supporting, suspension or diversion of these public utilities outside the work site. Items damaged or interfered with as a result of the works, as well as those removed to enable the works to be carried out, shall be reinstated to condition at least the same they had been at before the works had started.	Low
Communicable diseases: as elsewhere, where worker's housing areas are established near residential households and communities, there will be short-terms risks of the spread of communicable diseases from the 'imported' workers to local women or men and vice versa (STI/HIV/AIDS, T.B.,	Low, because this is a small construction site, requiring only a few workers.	To mitigate the risk, the contractors' contracts must show a clause on occupational health and safety measures to be guaranteed, and include a paragraph, saying e.g.: "The Contractor is obliged to ensure awareness raising information to his employees on how to protect oneself and others (local sex-workers, spouses, and other) from contamination by STI/HIV/AIDS and other communicable diseases, and how to practice "safe sex", personal hygiene, and protect oneself against T.B, Rabies, Hepatitis" etc." . It should also be required that construction contractors distribute or request that the local health officer distribute	Very low

Impact Description	Significance of Impact (Very low, Low, Medium, High) and justification	Proposed Mitigation Measures	Significance of Residual Impact
Dengue fever, scabies, bed bugs and other diseases and infections).		information material / awareness campaigns and free condoms to immigrant workers and the local sex-workers. Also, contractors shall maximize the number of local, residential workers, to minimize the risk to the local communities from imported labor.	
Potential opportunity for local unemployed people to work as unskilled day labor, temporary during the civil works.	Beneficial impact		
The local communities and households nearest to the construction sites / canals could provide services during the construction periods: catering, cleaning, laundry, transportation, housing, etc.	Beneficial impact		
Structural impacts			
The channelized river bed downstream the structure will be rebuilt in rubble stone masonry. This will result in the loss of a few m² of riparian vegetation of low ecological interest on the right river bank.	Low: as the river bed is already artificial (concrete structure), and therefore does not show any ecological interest, the impact in terms of loss of terrestrial and aquatic habitat will be insignificant.	No need to consider any mitigation measure.	Low
The construction of three small weirs (65 cm high) against riverbed erosion between the crossing structure and the road bridge may create an obstacle to fish seasonal movements.	Low: the canal crossing structure already creates an obstacle to fish movements and it is not considered necessary to restore the river ecological continuity, despite the presence of the Turkestan catfish.	No need to consider any mitigation measure.	Low
Landscape and visual impact.	Low: the mudflow crossing structure and related downstream hydraulic structures will not change the visual perception by the site users and neighboring inhabitants significantly.	No need to consider any mitigation measure.	Low

Impact Description	Significance of Impact (Very low, Low, Medium, High) and justification	Proposed Mitigation Measures	Significance of Residual Impact
The riverbed will be better protected against erosion downstream the mudflow crossing structure	Beneficial impact		
Operational impacts			
The replacement of the crossing structure and rehabilitation of the downstream section will improve flood flows.	Low: this may create erosion risks to the road bridge located 65 m downstream the crossing structure.	It is already planned within the feasibility study to incorporate a conventional energy dissipator / stilling basin downstream of main mudflow crossing structure and well upstream of the existing bridge. This will significantly reduce the erosion risk to the existing road bridge. The cost is already included in the total cost of Mudflow Crossing Structure n°2.	Very low
The mudflow structure will consider climate change projections for 2050 and will be designed for the 100-year frequency flood. There will not be overflow any longer (for the design flood frequency) into the canal, while it is rather usual at present.	Beneficial impact		

D. Mudflow Crossing Structure n°3

185. Brief description of the works: Replacement of the mudflow crossing structure over the Pravaya-Vetka canal. The existing monolithic reinforced concrete structure carrying the Shaidan river flows over the canal is in unsatisfactory condition, leading to regular overflows into the canal. It will be dismantled and a new structure built. The river will be channelized with dykes upstream and downstream the structure.

186. Anticipated impacts and mitigation measures:

Table 13: Impacts and mitigation measures related to Mudflow Crossing Structure n°3

Impact Description	Significance of Impact (Very low, Low, Medium, High) and justification	Proposed Mitigation Measures	Significance of Residual Impact
Construction impacts			
The river may be diverted into the canal during the construction works. It means that the river continuity may be interrupted during the construction works (between 1 and 2 months).	Medium: as this river hosts a fish listed on the Kyrgyz Red List of rare or endangered species (the Turkestan catfish), the potential impact is significant, even if a small portion of the fish population is affected.	To minimize hydrobiological impacts (especially on the Turkestan catfish), the following measures will be implemented: (i) Both construction works for mudflow crossings n°2 and 3 have to be carried out at the same time. It will also simplify the works management for the crossing structure n°3, as it will not be necessary to divert the river flows into the canal. (ii) To ensure the river flow continuity, the same instream flow temporary culvert as for the crossing structure n°2 will have to be installed during the construction works.	Low
Water pollution from construction machines (accidental spill of oil from machinery), equipment and material stores, poor sanitation at work sites, release of soil and cement into surface water (either the river or the canal).	Low, because the canal flow reaches 10 m3/s at that place (significant dilution effect). In addition, the natural water turbidity in the canal is rather high. In wintertime, when the canal is not in use, the pollution risk is minimal, as the canal is dry and an accidental spill could be easily confined. However, as the works mainly concern the Shaidan river bed, the main pollution risks are likely to affect this natural water course. The river hosts a fish listed on the Kyrgyz Red List of rare or endangered species (the Turkestan catfish).	To reduce possible pollution of the canal and safety issues, the works will be conducted when the canal is empty (after the agricultural season). Control measures for oily residues, lubricants and refuelling shall be prescribed. Within the project detail planning, maintenance yards have to be designed. Dedicated drainages need to be considered that can capture run-off. Oily residues and fuel need to be captured at source and refuelling and maintenance must take place in dedicated areas away from surface water resources. Proper training of the machinists must ensure that refilling and oil changes are undertaken with utmost care and disposal of any residue from these activities. In case temporary work camps are required, construction of worker camps shall be located close to settlement areas but not near sensitive water resources. In such cases, the constructor needs to provide a detailed design of each work camp including infrastructure planning (water supply, electricity supply, waste management, wastewater treatment and disposal). Workers need to be trained how to behave and to handle waste and waste water according environmental management requirements.	Low
Air Pollution from earthworks, demolition/construction activities and transport (atmospheric pollutants, dust and cement), especially during the dry or strong prevailing winds periods.	Very low: field observations indicate that ambient air quality is generally acceptable and that emissions from powered mechanical equipment are rapidly dispersed. There is no house exposed to this pollution.	For safety reasons the Contractor shall take all necessary precautions to prevent the occurrence of smoke emissions or fumes from the site concrete mixer plant or stored fuel oils, and drifting of such emissions and fumes into residential areas. In particular, the concrete plant shall be well maintained and measures taken so as not to be left running unnecessarily for long periods when not directly in use. The Contractor shall not install any furnace, boiler or other similar plant or equipment using any fuel that may produce air pollutants without the prior written consent of the State Inspection on Ecological and Technical Safety.	Very low

Impact Description	Significance of Impact (Very low, Low, Medium, High) and justification	Proposed Mitigation Measures	Significance of Residual Impact
		The Contractor shall instigate effective dust suppression measures as may be necessary to avoid creating dust nuisance arising because of the works on site. Construction materials (sand, gravel, and rocks) and spoil materials will be transported by trucks covered with tarpaulin.	
Noise and vibration from trucks and construction machinery.	Low: as there is no house within 900 m of the construction site, the impact will not be significant. The works will require approx. 5,100 m3 of construction materials, so about 510 trucks will be necessary for the haulage. Even if the traffic volume is low (15-20 trucks per day), it may be a source of nuisance for the Mogol-Korgon village, before reaching the main road.	The Contractor shall consider noise as an environmental constraint, which must be addressed in the planning and execution of the works. He shall take all reasonable measures to reduce noise to a minimum. The construction works will be limited to daytime (8 am to 8 pm) and will be prohibited in weekends. The Contractor shall take all necessary measures to ensure that the operation of all mechanical equipment and construction processes, on or off site, shall not cause any unnecessary and excessive noise which may disturb any occupant of nearby dwellings, schools, hospitals, or premises with similar sensitivity to noise.	Very low
Wastes from construction activities are mainly spoils generated by excavations (24,000 m3), mechanical cleaning (22,800 m3), and dismantling of the current mudflow crossing structure (190 m3). Disposal of these materials on land may cause destruction of plants, loss of vegetation, unsightly view and other nuisances to the local community.	Low: the excavated materials are harmless (no pollution). It is understood that the excavated material will be dumped in the Shaidan floodplain downstream of the works, and the concrete debris disposed of in authorized landfills.	The Contractor shall remove from the site all excavated material, spoil, surplus materials and rubbish from whatever on-site source and shall, except where otherwise specified in the Contract, make his own arrangements for their disposal. The Contractor shall also comply with any legal requirements applying to disposal of any contaminated spoil. The process of classifying waste types, stockpiling of waste at site, transportation and disposal of waste shall be subject to the approval/review of the State Inspection on Ecological and Technical Safety. Fly-tipping shall not be permitted. Loads must be deposited solely at authorized tips. Deposition shall be carried out in accordance with the requirements of Local Authorities. To prove the correct depositing of excavated material and to prevent the occurrence of fly-tipping, daily logs of all spoil removed from site by lorry shall be maintained and kept available both on site and at the authorized tips deposition for inspection by the relevant authorities. Spoils generated by excavations will be disposed of in the Shaidan downstream floodplain. The disposal site has to be devoid of vegetation (bare gravel strands). The deposits will be spread out so as not forming a mound. The site used to provide the backfilling material could also be used for the disposal of the spoils. In that case, the spoils will be temporary stockpiled, and the area used for the temporary deposit will then be restored.	Very low
Construction materials extracted from borrow pits or quarries.	Low: 3,000 m3 of backfilling material and 4,700 m3 of ripraps needed for the construction works. Their	The backfilling material required for the construction works will come from the Shaidan floodplain, and the rubble stones / ripraps from quarries. Only duly authorized quarries will be chosen. The borrow pits for backfilling material have to be devoided of vegetation (bare	Low

Impact Description	Significance of Impact (Very low, Low, Medium, High) and justification	Proposed Mitigation Measures	Significance of Residual Impact
	haulage to the construction site will generate the same impact than for the other construction materials (see above).	gravel strands). After extraction, they will be filled with spoils or secured with gentle slopes in order to avoid accidents.	
Visual intrusion. During the construction period, the visual quality is usually poor, because of material stockpiles, waste depots, prefabricated offices and construction machines.	Very low: no house will be exposed to this nuisance.	During the progress of the works, the Contractor shall keep the site reasonably free from all unnecessary obstructions and shall store or dispose of any constructional plant and surplus materials and clear away and remove from the site any wreckage, rubbish or temporary works no longer required. After the completion of the works, the Contractor shall immediately clear the work site from all materials, dust and rubbish.	Very low
Access and safety issues related to truck traffic and construction machinery.	Low: access to the project site will be provided through the existing roads and can sufficiently transport materials. Access to farmland to the north can be easily maintained.	The Contractor shall take all the necessary arrangements and precautions during the execution of the works to avoid disturbance to the public, any reason that may prevent the access or the use of the public & private roads, footpaths, or properties. The Contractor shall use the suitable and appropriate means of transport, and take all necessary arrangement and precautions to avoid any damage or destruction to the public roads or bridges located on the route from and to the work site. The Contractor shall adhere to take the necessary procedures to secure the work site to prevent any accidents through construction of temporary fencing around the site in an appropriate height and type. The Contractor will bear the responsibility to guard and secure the work site during night and daytime (24 hours / day), provide the necessary lighting thereto, and fire protection and fire-fighting equipment. In general, the Contractor should take all necessary procedures and precautions to prevent injuries or death cases for the workmen or any other person. Safety to workers and the public shall be enhanced by: (i) Proper briefing and training of workers on safety precautions, and their responsibilities for the safety of themselves and others. (ii) Provision to workers of protective clothing including hard hats, and protective footwear. (iii) Ensuring plant and vehicle operators are properly licensed and trained. (iv) Arranging for the provision of first aid facilities, readily available trained paramedical personnel, and emergency transport to the nearest hospital with accident and emergency facilities, and allocation of responsibility for ensuring that these arrangements are continually in place. (v) Arranging for regular safety checks of vehicles and material, and allocation of responsibility for this. (vi) Provision of hazard warning signs around construction sites.	Very low

Impact Description	Significance of Impact (Very low, Low, Medium, High) and justification	Proposed Mitigation Measures	Significance of Residual Impact
Communicable diseases: as elsewhere, where worker's housing areas are established near residential households and communities, there will be short-terms risks of the spread of communicable diseases from the 'imported' workers to local women or men and vice versa (STI/HIV/AIDS, T.B., Dengue fever, scabies, bed bugs and other diseases and infections).	Low, because this is a small construction site, requiring only a few workers.	To mitigate the risk, the contractors' contracts must show a clause on occupational health and safety measures to be guaranteed, and include a paragraph, saying e.g.: "The Contractor is obliged to ensure awareness raising information to his employees on how to protect oneself and others (local sex-workers, spouses, and other) from contamination by STI/HIV/AIDS and other communicable diseases, and how to practice "safe sex", personal hygiene, and protect oneself against T.B, Rabies, Hepatitis" etc." . It should also be required that construction contractors distribute or request that the local health officer distribute information material / awareness campaigns and free condoms to immigrant workers and the local sex-workers. Also, contractors shall maximize the number of local, residential workers, to minimize the risk to the local communities from imported labor.	Very low
Potential opportunity for local unemployed people to work as unskilled day labor, temporary during the civil works.	Beneficial impact		
The local communities and households nearest to the construction sites / canals could provide services during the construction periods: catering, cleaning, laundry, transportation, housing, etc.	Beneficial impact		
Structural impacts			
The Shaidan River will be channelized on 400 m upstream and 800 m downstream of the mudflow crossing structure.	Low: the river is already channelized, so the impact on the terrestrial environment will be minimal. The riverbed will not be affected, so the aquatic habitats will not be impacted.	No need to consider any mitigation measure.	Low
Landscape and visual impact.	Very low: the mudflow crossing structure and related upstream works will not change the visual perception by the site users and neighboring inhabitants significantly	No need to consider any mitigation measure.	Very low

Impact Description	Significance of Impact (Very low, Low, Medium, High) and justification	Proposed Mitigation Measures	Significance of Residual Impact
The riverbed will be better protected against erosion downstream the mudflow crossing structure	Beneficial impact		
Operational impacts			
The mudflow structure will consider climate change projections for 2050 and will be designed for the 100-year frequency flood. There will not be overflow any longer (for the design flood frequency) into the canal, while it is rather usual at present.	Beneficial impact		

E. Pravaya-Vetka Canal n°4

187. Brief description of the works: Rehabilitation of the Pravaya-Vetka canal between km 124+50 and 138+50. This canal section is covered with "Reno" mattresses. In some places there are gabion mesh gaps along the bottom of the canal. The grid is torn by moving stones. As a result, the stones that filled the "Reno" mattresses move downstream and forms deposits. On a 1,400 m canal length, the “Reno” mattresses will be reinstalled and covered with a 20 cm thick concrete layer.

188. Anticipated impacts and mitigation measures:

Table 14: Impacts and mitigation measures related to Pravaya-Vetka Canal n°4

Impact Description	Significance of Impact (Very low, Low, Medium, High) and justification	Proposed Mitigation Measures	Significance of Residual Impact
Construction impacts			
Water pollution from construction machines (accidental spill of oil from machinery), equipment and material stores, poor sanitation at work sites, release of soil and cement into surface water (canal).	Very low: the pollution risk is minimal, as the works will take place when the canal is dry and an accidental spill will be easily confined.	Control measures for oily residues, lubricants and refuelling shall be prescribed. Within the project detail planning, maintenance yards have to be designed. Dedicated drainages need to be considered that can capture run-off. Oily residues and fuel need to be captured at source and refuelling and maintenance must take place in dedicated areas away from surface water resources. Proper training of the machinists must ensure that refilling and oil changes are undertaken with utmost care and disposal of any residue from these activities. In case temporary work camps are required, construction of worker camps shall be located close to settlement areas but not near sensitive water resources. In such cases, the constructor needs to provide a detailed design of each work camp including infrastructure planning (water supply, electricity supply, waste management, wastewater treatment and disposal). Workers need to be trained how to behave and to handle waste and waste water according environmental management requirements	Very low
Air Pollution from earthworks, demolition/construction activities and transport (atmospheric pollutants, dust and cement), especially during the dry or strong prevailing winds periods.	Low: field observations indicate that ambient air quality is generally acceptable at construction sites and that emissions from powered mechanical equipment are rapidly dispersed. There is a dozen of houses exposed to this pollution.	For safety reasons the Contractor shall take all necessary precautions to prevent the occurrence of smoke emissions or fumes from the site concrete mixer plant or stored fuel oils, and drifting of such emissions and fumes into residential areas. In particular, the concrete plant shall be well maintained and measures taken so as not to be left running unnecessarily for long periods when not directly in use. The Contractor shall not install any furnace, boiler or other similar plant or equipment using any fuel that may produce air pollutants without the prior written consent of the State Inspection on Ecological and Technical Safety. The Contractor shall instigate effective dust suppression measures as may be necessary to avoid creating dust nuisance arising because of the works on site. Construction materials (sand, gravel, and rocks) and spoil materials will be transported by trucks covered with tarpaulin.	Very low
Noise and vibration from trucks and construction machinery.	Low: there are 20-25 houses within 100 m of the construction site at the north end of the canal section likely to be disturbed with this noise. The works will also require approx. 3,000 m3 of construction materials, i.e. about 300 trucks will be necessary for the	The Contractor shall consider noise as an environmental constraint, which must be addressed in the planning and execution of the works. He shall take all reasonable measures to reduce noise to a minimum. The construction works will be limited to daytime (8 am to 8 pm) and will be prohibited in weekends. The Contractor shall take all necessary measures to ensure that the operation of all mechanical equipment and construction processes, on or off site, shall not cause any unnecessary and excessive noise which may disturb any occupant of nearby dwellings, schools, hospitals, or premises with similar sensitivity to noise.	Very low

Impact Description	Significance of Impact (Very low, Low, Medium, High) and justification	Proposed Mitigation Measures	Significance of Residual Impact
	haulage. Given the relatively low traffic volume (20-30 trucks per day), and knowing that the construction site is directly accessible from the main road (M41), this extra traffic should not change the noise levels significantly along the haulage route.		
Waste	Very low: it is understood that there will not be much waste on this construction site, as it will not be necessary to dismantle the existing canal and the pebbles covering the canal bottom will be reused for the new “Reno” mattresses.	The Contractor shall remove from the site all excavated material, spoil, surplus materials and rubbish from whatever on-site source and shall, except where otherwise specified in the Contract, make his own arrangements for their disposal. The Contractor shall also comply with any legal requirements applying to disposal of any contaminated spoil. The process of classifying waste types, stockpiling of waste at site, transportation and disposal of waste shall be subject to the approval/review of the State Inspection on Ecological and Technical Safety. Fly-tipping shall not be permitted. Loads must be deposited solely at authorized tips. Deposition shall be carried out in accordance with the requirements of Local Authorities. To prove the correct depositing of excavated material and to prevent the occurrence of fly-tipping, daily logs of all spoil removed from site by lorry shall be maintained and kept available both on site and at the authorized tips deposition for inspection by the relevant authorities.	Very low
Construction materials extracted from borrow pits or quarries.	Low: the additional pebbles needed for the “Reno” mattresses will be extracted from the nearby Kara-Unkur-Sai floodplain. It will therefore not necessitate long haulage distance.	The pebbles borrow pits have to be devoided of vegetation (bare gravel strands). After extraction, they will be filled with spoils or secured with gentle slopes in order to avoid accidents.	Very low
Visual intrusion. During the construction period, the visual quality is usually poor, because of material stockpiles, waste depots, prefabricated offices and construction machines.	Low: approx. 15 households will have a direct visual perception of the works.	During the progress of the works, the Contractor shall keep the site reasonably free from all unnecessary obstructions and shall store or dispose of any constructional plant and surplus materials and clear away and remove from the site any wreckage, rubbish or temporary works no longer required. After the completion of the works, the Contractor shall immediately clear the work site from all materials, dust and rubbish.	Low
Access and safety issues related to truck traffic and construction machinery.	Low: access to the project site will be provided through the	The Contractor shall take all the necessary arrangements and precautions during the execution of the works to avoid disturbance to the public, any reason that may prevent the access or the use of the public & private roads, footpaths, or properties. The Contractor shall use the suitable and appropriate means of transport, and take all necessary	Very low

Impact Description	Significance of Impact (Very low, Low, Medium, High) and justification	Proposed Mitigation Measures	Significance of Residual Impact
	existing roads and can sufficiently transport materials.	arrangement and precautions to avoid any damage or destruction to the public roads or bridges located on the route from and to the work site. The Contractor shall adhere to take the necessary procedures to secure the work site to prevent any accidents through construction of temporary fencing around the site in an appropriate height and type. The Contractor will bear the responsibility to guard and secure the work site during night and daytime (24 hours / day), provide the necessary lighting thereto, and fire protection and fire-fighting equipment. In general, the Contractor should take all necessary procedures and precautions to prevent injuries or death cases for the workmen or any other person. Safety to workers and the public shall be enhanced by: (i) Proper briefing and training of workers on safety precautions, and their responsibilities for the safety of themselves and others. (ii) Provision to workers of protective clothing including hard hats, and protective footwear. (iii) Ensuring plant and vehicle operators are properly licensed and trained. (iv) Arranging for the provision of first aid facilities, readily available trained paramedical personnel, and emergency transport to the nearest hospital with accident and emergency facilities, and allocation of responsibility for ensuring that these arrangements are continually in place. (v) Arranging for regular safety checks of vehicles and material, and allocation of responsibility for this. (vi) Provision of hazard warning signs around construction sites.	
Communicable diseases: as elsewhere, where worker's housing areas are established near residential households and communities, there will be short-terms risks of the spread of communicable diseases from the 'imported' workers to local women or men and vice versa (STI/HIV/AIDS, T.B., Dengue fever, scabies, bed bugs and other diseases and infections).	Low, because this is a small construction site, requiring only a few workers.	To mitigate the risk, the contractors' contracts must show a clause on occupational health and safety measures to be guaranteed, and include a paragraph, saying e.g.: "The Contractor is obliged to ensure awareness raising information to his employees on how to protect oneself and others (local sex-workers, spouses, and other) from contamination by STI/HIV/AIDS and other communicable diseases, and how to practice "safe sex", personal hygiene, and protect oneself against T.B, Rabies, Hepatitis" etc." . It should also be required that construction contractors distribute or request that the local health officer distribute information material / awareness campaigns and free condoms to immigrant workers and the local sex-workers. Also, contractors shall maximize the number of local, residential workers, to minimize the risk to the local communities from imported labor.	Very low
Potential opportunity for local unemployed people to work as unskilled day labor, temporary during the civil works.	Beneficial impact		

Impact Description	Significance of Impact (Very low, Low, Medium, High) and justification	Proposed Mitigation Measures	Significance of Residual Impact
The local communities and households nearest to the construction sites / canals could provide services during the construction periods: catering, cleaning, laundry, transportation, housing, etc.	Beneficial impact		
Structural impacts			
The canal is fringed with a grass and hygrophilous vegetation (e.g. *Phragmites sp.*) on both sides. This vegetation will disappear with the rehabilitation of the canal.	Low: given the ubiquity of these habitats within the wider landscape no significant effects are predicted.	No need to consider any mitigation measure.	Low
Landscape and visual impact.	Low: the loss of vegetation on both sides of the canal and its replacement with concrete banks will change the visual perception by the site users (more artificial environment).	No need to consider any mitigation measure.	Low
The canal rehabilitation will allow a more efficient irrigation (reduction of water loss).	Beneficial impact		
Operational impacts			
These rehabilitation works are necessary for a sustainable and efficient use of the Pravaya-Vetka irrigation system (see Section V.G).	Beneficial impact		

F. Pravaya-Vetka Canal n°5

189. Brief description of the works: Rehabilitation of the Pravaya-Vetka canal between km 158+50 and 191+10. There are fractures of the first layer of concrete. In some places, the second layer is also destroyed. Destructions are mostly at the bottom of the canal. Just upstream the mudflow structure, there is a lowered area with almost a reverse slope. On a 3,260 m canal length, monolithic concrete lining will be put in place. The canal bottom will be levelled at some places.

190. Anticipated impacts and mitigation measures:

Table 15: Impacts and mitigation measures related to Pravaya-Vetka Canal n°5

Impact Description	Significance of Impact (Very low, Low, Medium, High) and justification	Proposed Mitigation Measures	Significance of Residual Impact
Construction impacts			
Water pollution from construction machines (accidental spill of oil from machinery), equipment and material stores, poor sanitation at work sites, release of soil and cement into surface water (canal).	Very low: the pollution risk is minimal, as the works will take place when the canal is dry and an accidental spill will be easily confined.	Control measures for oily residues, lubricants and refuelling shall be prescribed. Within the project detail planning, maintenance yards have to be designed. Dedicated drainages need to be considered that can capture run-off. Oily residues and fuel need to be captured at source and refuelling and maintenance must take place in dedicated areas away from surface water resources. Proper training of the machinists must ensure that refilling and oil changes are undertaken with utmost care and disposal of any residue from these activities. In case temporary work camps are required, construction of worker camps shall be located close to settlement areas but not near sensitive water resources. In such cases, the constructor needs to provide a detailed design of each work camp including infrastructure planning (water supply, electricity supply, waste management, wastewater treatment and disposal). Workers need to be trained how to behave and to handle waste and waste water according environmental management requirements	Very low
Air Pollution from earthworks, demolition/construction activities and transport (atmospheric pollutants, dust and cement), especially during the dry or strong prevailing winds periods.	Very low: field observations indicate that ambient air quality is generally acceptable at construction sites and that emissions from powered mechanical equipment are rapidly dispersed. There is no house exposed to this pollution.	For safety reasons the Contractor shall take all necessary precautions to prevent the occurrence of smoke emissions or fumes from the site concrete mixerplant or stored fuel oils, and drifting of such emissions and fumes into residential areas. In particular, the concrete plant shall be well maintained and measures taken so as not to be left running unnecessarily for long periods when not directly in use. The Contractor shall not install any furnace, boiler or other similar plant or equipment using any fuel that may produce air pollutants without the prior written consent of the State Inspection on Ecological and Technical Safety.	Very low

Impact Description	Significance of Impact (Very low, Low, Medium, High) and justification	Proposed Mitigation Measures	Significance of Residual Impact
		The Contractor shall instigate effective dust suppression measures as may be necessary to avoid creating dust nuisance arising because of the works on site. Construction materials (sand, gravel, and rocks) and spoil materials will be transported by trucks covered with tarpaulin.	
Noise and vibration from trucks and construction machinery.	Low: the closest houses are more than 100 m of the construction site (eastern end), and most of the works will take place more than 1,000 m from the closest houses. The noise disturbance will therefore be low. The works will also require approx. 4,200 m3 of construction materials, i.e. about 420 trucks will be necessary for the haulage. Even if the traffic volume is relatively low (30-40 trucks per day), it may be a significant source of nuisance for the Mogol-Korgon village, which will be crossed before reaching the main road.	The Contractor shall consider noise as an environmental constraint, which must be addressed in the planning and execution of the works. He shall take all reasonable measures to reduce noise to a minimum. The construction works will be limited to daytime (8 am to 8 pm) and will be prohibited in weekends. The Contractor shall take all necessary measures to ensure that the operation of all mechanical equipment and construction processes, on or off site, shall not cause any unnecessary and excessive noise which may disturb any occupant of nearby dwellings, schools, hospitals, or premises with similar sensitivity to noise.	Very low
Wastes from construction activities are mainly sediments extracted from the canal (1,600 m3). Disposal of these materials on land may cause destruction of plants, loss of vegetation, unsightly view and other nuisances to the local community.	Low: the excavated materials are harmless (no pollution is expected). It is understood that the excavated material will be dumped in the Shaidan floodplain downstream of the works.	The Contractor shall remove from the site all excavated material, spoil, surplus materials and rubbish from whatever on-site source and shall, except where otherwise specified in the Contract, make his own arrangements for their disposal. The Contractor shall also comply with any legal requirements applying to disposal of any contaminated spoil. The process of classifying waste types, stockpiling of waste at site, transportation and disposal of waste shall be subject to the approval/review of the State Inspection on Ecological and Technical Safety. Fly-tipping shall not be permitted. Loads must be deposited solely at authorized tips. Deposition shall be carried out in accordance with the requirements of Local Authorities. To prove the correct depositing of excavated material and to prevent the occurrence of fly-tipping, daily logs of all spoil removed from site by lorry shall be maintained and kept available both on site and at the authorized tips deposition for inspection by the relevant authorities. Spoils generated by excavations will be disposed of in the Shaidan downstream floodplain. The disposal site has to be devoid of vegetation (bare gravel strands). The deposits will be spread out so as not forming a mound. The site used to provide the backfilling material	Very low

Impact Description	Significance of Impact (Very low, Low, Medium, High) and justification	Proposed Mitigation Measures	Significance of Residual Impact
		could also be used for the disposal of the spoils. In that case, the spoils will be temporary stockpiled, and the area used for the temporary deposit will then be restored.	
Construction materials extracted from borrow pits or quarries.	Low: 2,900 m3 of backfilling material.	The backfilling material required for the construction works will come from the Shaidan floodplains. The borrow pits have to be devoided of vegetation (bare gravel strands). After extraction, they will be filled with spoils or secured with gentle slopes in order to avoid accidents.	Very low
Visual intrusion. During the construction period, the visual quality is usually poor, because of material stockpiles, waste depots, prefabricated offices and construction machines.	Very low: No house will be exposed to this nuisance.	During the progress of the works, the Contractor shall keep the site reasonably free from all unnecessary obstructions and shall store or dispose of any constructional plant and surplus materials and clear away and remove from the site any wreckage, rubbish or temporary works no longer required. After the completion of the works, the Contractor shall immediately clear the work site from all materials, dust and rubbish.	Very low
Access and safety issues related to truck traffic and construction machinery.	Low: access to the project site will be provided through the existing roads and can sufficiently transport materials.	The Contractor shall take all the necessary arrangements and precautions during the execution of the works to avoid disturbance to the public, any reason that may prevent the access or the use of the public & private roads, footpaths, or properties. The Contractor shall use the suitable and appropriate means of transport, and take all necessary arrangement and precautions to avoid any damage or destruction to the public roads or bridges located on the route from and to the work site. The Contractor shall adhere to take the necessary procedures to secure the work site to prevent any accidents through construction of temporary fencing around the site in an appropriate height and type. The Contractor will bear the responsibility to guard and secure the work site during night and daytime (24 hours / day), provide the necessary lighting thereto, and fire protection and fire-fighting equipment. In general, the Contractor should take all necessary procedures and precautions to prevent injuries or death cases for the workmen or any other person. Safety to workers and the public shall be enhanced by: (i) Proper briefing and training of workers on safety precautions, and their responsibilities for the safety of themselves and others. (ii) Provision to workers of protective clothing including hard hats, and protective footwear. (iii) Ensuring plant and vehicle operators are properly licensed and trained. (iv) Arranging for the provision of first aid facilities, readily available trained paramedical personnel, and emergency transport to the nearest hospital with accident and emergency facilities, and allocation of responsibility for ensuring that these arrangements are continually in place. (v) Arranging for regular safety checks of vehicles and material, and allocation of responsibility for this.	Very low

Impact Description	Significance of Impact (Very low, Low, Medium, High) and justification	Proposed Mitigation Measures	Significance of Residual Impact
		(vi) Provision of hazard warning signs around construction sites.	
Communicable diseases: as elsewhere, where worker's housing areas are established near residential households and communities, there will be short-terms risks of the spread of communicable diseases from the 'imported' workers to local women or men and vice versa (STI/HIV/AIDS, T.B., Dengue fever, scabies, bed bugs and other diseases and infections).	Low, because this is a small construction site, requiring only a few workers.	To mitigate the risk, the contractors' contracts must show a clause on occupational health and safety measures to be guaranteed, and include a paragraph, saying e.g.: "The Contractor is obliged to ensure awareness raising information to his employees on how to protect oneself and others (local sex-workers, spouses, and other) from contamination by STI/HIV/AIDS and other communicable diseases, and how to practice "safe sex", personal hygiene, and protect oneself against T.B, Rabies, Hepatitis" etc." . It should also be required that construction contractors distribute or request that the local health officer distribute information material / awareness campaigns and free condoms to immigrant workers and the local sex-workers. Also, contractors shall maximize the number of local, residential workers, to minimize the risk to the local communities from imported labor.	Very low
Potential opportunity for local unemployed people to work as unskilled day labor, temporary during the civil works.	Beneficial impact		
The local communities and households nearest to the construction sites / canals could provide services during the construction periods: catering, cleaning, laundry, transportation, housing, etc.	Beneficial impact		
Structural impacts			
The canal is fringed with grass, reeds, and sparse small trees (e.g. *Salix sp.*) on both sides, showing low ecological interest. This vegetation will disappear with the rehabilitation of the canal.	Low, as no rare or endangered species are likely to be found in this common riparian vegetation.	No need to consider any mitigation measure.	Low
Landscape and visual impact.	Low: the loss of vegetation on both sides of the canal and its replacement with concrete banks will change the visual perception by the site users (more artificial environment).	No need to consider any mitigation measure.	Low

Impact Description	Significance of Impact (Very low, Low, Medium, High) and justification	Proposed Mitigation Measures	Significance of Residual Impact
The canal rehabilitation will allow a more efficient irrigation (reduction of water loss).	Beneficial impact		
Operational impacts			
These rehabilitation works are necessary for a sustainable and efficient use of the Pravaya-Vetka irrigation system (see also Section V.G).	Beneficial impact		

G. Water Resource Management

191. Ultimately, the purpose of the five investments above discussed is to enhance the water resource management within the Pravaya-Vetka irrigation system, thanks to a more efficient water supply network, protected against floods and mudflows.

192. First, it should be kept in mind that the subproject implementation will not affect either the quantity or quality of the available water resources in the project area (the water supply conditions at the Pravaya-Vetka canal intake will remain the same).

193. The project will improve resilience to disasters under future climate change. The design and monitoring framework (DMF) is summarized in Table 16.

Table 16: Summary of project design and monitoring framework (DMF)

Outcome Indicator	Output	Implementing Agency	*Output* Indicator
Net value of agricultural production (NVP) increased	Irrigation system infrastructure protected and modernized	Department of Water Resources and Melioration of the Ministry of Agriculture, Food Industry, and Melioration (DWR)	Main canals protected against flood and mudflow
			Main canal infrastructure modernized
			Lower- canal infrastructure modernized
Productivity of water (PoW) withdrawn increased	Irrigation system and agricultural land management modernized		Management (operation and maintenance) plans implemented
			Agriculture and water management (farmer field-level irrigation method and scheduling) extension plans implemented
			Drought risk management and climate change adaptation plans implemented
Irrigated land and settlements protected	National disaster risk management capacity improved	Ministry of Emergency Situations	Flood and mudflow machinery provided and utilized
			HMM equipment provided and utilized
			Disaster and water information system installed, utilized and developed

194. Achievement of the agricultural PoW and NVP outcome, requires the phased development and implementation of an efficient and effective innovative behavioral change process, as shown in Table 17.

Table 17: Summary of irrigated agricultural system strategic problems and proposed solutions

Strategic Problems	Proposed Solutions
Traditional risk-aversive farmers and water users	Mobilize communities to catalyze latent demand and form new lower level Water User Groups (WUGs)
Existing Water Users Associations (WUAs) are too large to be effective	
Low-level performance equilibrium of existing governance and management organizations	Reorganize existing Water User Associations to form modern representative democratic WUAs
Existing main canals are often too low, are not equipped with cross or head-regulators and there are not enough suitable lower-level canals; Therefore, irrigation systems cannot command [1] their full permissible service area (PSA) [2]	Modernize and revitalize system management Modernize infrastructure to facilitate operation
Systems designed to meet social equity objective; limited water is overallocated = scarcity by design	Optimize the win-win trade-off between the social equity and economic efficiency objectives;
Irrigation systems are in a low-level performance equilibrium and are not achieving their considerable agricultural PoW and NVP potential	Organization and community behavioral change to modernize system management and achieve the PoW and NVP *outcome*.

[1] Command is the head (difference in elevation), between the canal water level and the farmers field, required to make water flow by gravity to irrigate or "command" the farmers field without pumping.

[2] The permissible service area (PSA) excludes villages and government infrastructure (canals, drains and roads etc). However, the PSA includes both: (i) similar WUA or farmer infrastructure as well as (ii) land that is too high to irrigate by gravity. Therefore, the PSA is between the normal gross and net service areas, where the NSA is the irrigable area.

195. For an efficient and effective community and organization change process, "how you do things" (participation of most farmer water users) is just as important, if not more so, than "what you do" (the technical project cycle and modern irrigation system management etc). Therefore, an integrated participatory – technical implementation process will be:

(i) First; developed, implemented and documented, in a process implementation manual, in the third (furthest downstream) secondary canal in Pravaya Vetka Irrigation System, which DWR has selected as the core subproject, and:

(ii) Subsequently; implemented in three non-core subprojects to be selected by DWR.

196. Herein, capacity development (CD) stands for both community development, of lower-level irrigation canals where communities are represented by their WUGs and WUAs, etc., and organizational (DWR, WUAs and WUGs) capacity development, for irrigation modernization, based on established principles:

(i) Capacity for development: is the availability of resources and the efficiency and effectiveness with which societies manage those resources to identify and pursue their development goals on a sustainable basis. Capacity is not something external, to people, organizations and society, it is internal. Therefore, CD must be owned by these units and their external partners can only facilitate development of their capacity.

(ii) Capacity development: is a community-driven learning process that brings about change to enhance local ownership, efficiency and effectiveness of development. CD is an internal change process, whereby people, organizations and society unleash, create, strengthen, adapt and maintain their capacity. Capacity is also a necessary project input to achieve expected development outputs and (agricultural PoW and NVP) outcomes.

(iii) Formal Training: Therefore, external training has only a small CD role to play. However, the CD process is a more effective form of on-the-job training and adult learning-by-doing.

197. The entire framework above described will allow avoiding usual irrigation systems deficiencies, such as:

- waterlogging and soil salinization due to inadequate drainage and farm management;
- leaching of soil nutrients and changes in soil characteristics due to excessive application of irrigation water;
- soil pollution, polluted farm runoff and groundwater, and public health risks due to excessive application of fertilizers and pesticides;
- soil erosion (furrow, surface);
- scouring of canals;
- logging of canals by sediments;
- clogging of canals by weeds.
- Etc.

198. On the social side of the subproject, the potential benefits include employment or entrepreneurship opportunities for locals during construction (including women), equal opportunities of training and extension in canal and agriculture/ water management and adaptation to climate change for all farmers and members of WUGs, including women and vulnerable farmers. The approach to participation in the project decision-making and benefits is “leave no one behind”. The project also suggests measures to maximize the positive impacts and benefits from the project on gender equality, social inclusion and community, and poverty (a do-more-approach is applied).

199. More precisely, it is anticipated that the direct beneficiaries / the primary stakeholders (the female and male farmers/villagers/WUA members and management; farmer cooperatives and other existing CBOs) will benefit from the sub-project, as summarised in Table 18.

Table 18: Social benefits of the Pravaya-Vetka subproject

Sub-project component:	Direct benefits:	Indirect benefits:	Assumption:
Rehabilitation of 2 km primary canal:	Potentially, employment opportunities for local communities / unemployed youth, poor, during construction; Primary stakeholders / beneficiaries is the Nooken Rayon Water Dept.	Reduction of water loss in main canal; Increased water availability for secondary and tertiary canals, in principle, leading to improved irrigation and increased yields.	Water Department and WUA cooperation is smooth. WUA management ensures equitable distribution of waters to each zone along the tertiary canals, and to 'poor' payers (of water tariffs).
Mud-flow bridge:	n/a	Reduction of risks of river flooding of fields, roads, settlements.	Main risks are due to river flooding.
Additional small-scale community-driven projects, related to Infrastructure / irrigation:			
Rehabilitation of the tertiary canals:	Reduction of water losses/ increased water availability for irrigation, and potentially increased water efficiency.	Potentially increased production and yields due to improved irrigation and increased #ha of farm land being irrigated; Potentially thus increased incomes and/ or food security / poverty reduction.	The 'voice' of the poorest/ most vulnerable households and/or female farmers are heard and taken into account (poor payers of WUA tariffs) in WUA decision making and implementation of such activities.
Additional small-scale community-driven projects related to agriculture extension, food security, poverty reduction, nutrition, inclusiveness, gender equality:			
Micro-scale, low-tech, low-cost drip-irrigation/'green house' cultivation of vegetables, fruits, herbs, spices, berries; on-farm gardens plots, by women, poor households:	Water saving irrigation of on-farm gardens and small plots, cultivated by women, primarily, and potentially expansion of irrigated land for vegetables on-farm or on-field; Extension of cultivation season (use of green houses);	Improved households nutrition and increased food security; and/or Increased income of women farmers and/or vulnerable households, poverty reduction; Capacity building and empowerment of women and vulnerable households.	Identification of interested women and vulnerable households is participatory/need-based/interest-based and/or the intended beneficiaries are interested in the activity.

	Reduced expenses on ground water consumption.		
Testing of climate change-resilient new crops or farming methodologies on irrigated land with farmers/ Cooperatives:	Potentially, increased yields.	Potentially improved food security; and/or increased income and poverty reduction.	Farmers (coops or individual) / WUA clients are interested in agricultural extension and testing new crops.
Testing of (high-value) new crops on irrigated land with farmers / Cooperatives	Potentially, increased income.	Poverty reduction.	A market / value chain survey is indicating that extension or demonstration of new *high-value* crops should be introduced to farmers.
Testing / demonstrating crop rotation with *legumes* on the irrigated land (alfalfa, mustard, beans, lucerne etc.):	Improved soil fertility and increased food crop or cash crop yields.	Improved income and poverty reduction, improved households food security and nutrition.	Farmers want to spend the improved irrigation of land on production of animal fodder (clover and other crops) for increasing livestock population (for marketing meat and milk).

200. In summary, project positive effects on poverty and gender equality include, but are not limited to:

- Increased community spirits, social inclusion and gender equality;
- Women's increased participation in decision making and leadership;
- Equitable and inclusive access to and future distribution of irrigation water and modern, efficient infrastructure for all female and male farmers (members of WUA and WUG);
- Decreases households expenses on irrigation water;
- Farmers', including women and vulnerable households, increased knowledge and skills, income and empowerment, through increased access to extension services and training;
- Reduction of women's hardship and production workloads;
- Increased household food security; and
- Increased protection against floods and disaster will prevent households from the negative impacts of mudflow disasters and will secure irrigation water.

201. The indirect beneficiaries of the sub-project components include Government stakeholders at all levels, primarily the Water Department staff at Oblast and Rayon level, who can benefit directly from training and capacity building, and indirectly from the civil works, financed by the project, which would 'create room' in the Department's own budgets. The Ayul Okmotu (municipality) administration will benefit indirectly from the sub-project in the sense that all sub-project components would potentially reduce vulnerability and poverty, which could, potentially reduce the A.O. social welfare expenses / budgets.

202. For more information about the social development side of the subproject, please refer to the Poverty, Social and Gender Assessment and Summary Poverty Reduction and Social Strategy.

H. Cumulative Impacts

203. In the previous sections, the environmental impacts of the five project investment components were analyzed separately, for the sake of clarity and comprehensiveness. However, this approach does not allow identifying potential cumulative impacts. Cumulative impacts can be of two types: i) same impacts occurring at different places; ii) impacts of different project components occurring at the same place. The cumulative impacts can concern the construction period, the physical characteristics of the project components (e.g. surface area), or the operational period.

204. With respect to the Pravaya-Vetka subproject, cumulative impacts first apply to the operational period, as it is the global effect of all the planned investments, which will improve the water resource management and natural disasters reduction within the irrigation system (synergic effects).

205. Cumulative impacts also apply to environmental negative impacts. In the framework of the present project, they mainly concern the construction period:

- The hydrobiological impacts of the works of the mudflow crossing structures 2 and 3 will cumulate, as they affect the same river (Shaidan river). Both construction works will have to be scheduled in order to minimize these impacts.
- If the works of the project components 3 and 5 are carried out at the same time, nuisances like noise, dust, air pollution, visual intrusion would cumulate. However, as the construction sites are far from the dwelling areas, the impacts would remain low.
- If all the project components were constructed at the same time, significant nuisances (noise, air pollution, traffic safety) would arise because of the high traffic levels on local roads. However, it is more likely that the different construction works will spread out over a year.

VI. ALTERNATIVES TO THE SELECTED SUBPROJECT

206. As the selected Pravaya-Vetka subproject mainly deals with the rehabilitation of an irrigation system, there is no real alternative in terms of site, technology, design, and operation. However, during the feasibility study, two project components were added. While, at first, only one mudflow crossing structure replacement was included in the subproject (n°3), it was considered that two others mudflow crossing structures should be subject to construction or rehabilitation works (n°1 and 2). No other alternatives have been discussed with DWR.

207. On Mudflow Crossing Structure n°1, one of the farmers requested the mudflow channel on the south side of the Pravaya-Vetka irrigation canal to be set within buried culvert. This would avoid the permanent land take and risk of humans and animals falling into the deep channel. He has been replied that this option would be studied. However, it quickly became clear to the designers that such option could not be realistic due to cost and maintenance issues, the latter relating to possible debris entering the culvert and causing a blockage. Nevertheless, it can be considered that it would be worth looking at this option in more detail and provide cost benefit analysis of the two options. It is understood that there are already trash screens fitted to the upstream side of the road culverts. A total alternative approach would be to refill the eroded channel, which will need to be completed sometime to prevent the road falling into the eroded hole and then placing a concrete lined channel at surface level, crossing the irrigation canal at a higher level and using a culvert below surface level with a steep gradient to take the mudflows to the river edge.

208. A “No Action Alternative” would be not to undertake the proposed subproject. This alternative would result in the continued deterioration of the irrigation system, water losses, and worse irrigation distribution. All positive benefits would be foregone. The relatively minor environmental impacts and inconveniences would be avoided in the short-term. In the long-term, however, the steadily decline of the irrigation system would severely hamper economic development in this agricultural area.

VII. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

A. Process Undertaken During the Project Preparation for Engaging Stakeholders

209. The process undertaken during the Pravaya-Vetka subproject design and preparation for informing and engaging the stakeholders first started by a three days field visit of the environment and social development specialists, from Monday 26th March to 29th March, 2018. The activities undertaken during this field mission were:

- Site visit of the proposed sub-project;
- semi-structured interviews with key stakeholders at Oblast, Rayon, Ayul Okmotu (A.O) levels, Water Dept and MoES staff, A.O social workers, WUA representatives, individual female farmers, villagers at risk of mud-flooding;
- Identified target beneficiary communities (A.O, WUA, villages) and collected environmental, demographic and socio-economic baseline data from target A.O / "A.O. passports" (Aral, Sakaldy, Nooken).

210. Interviews and meetings were an opportunity for project information disclosure and consultation with affected people and other stakeholders. The list of people met during this field visit is presented in Appendix 2.

Figure 44: Some of the meetings held during the site visit

		
Meeting with Nooken Rayon / Water management department	Meeting with Aral A.O. Chairman and Deputy Chairman:	Meeting with Social Welfare Officers, Masy A.O

	
Meeting with a couple of farmers	Meeting with a female farmer

211. During the project feasibility study, the land acquisition and resettlement specialist met the two farmers concerned by land acquisition on mudflow crossing structure n°1. Contacts with these farmers were maintained during the whole design process.

212. Last, a public hearing was organised the 13th June, 2018 in Massy (main municipality of the district). This meeting gathered 35 persons (see the list of participants in Appendix 2). Affected households by land acquisition were invited to participate, but did not attend the meeting because they received the necessary information during previous conversations and discussions. The information presented to the participants was first the purpose of the project, the works currently being conducted, and the subproject components. Then the environmental assessment process was dealt with, including a presentation of possible emergence of conflicts during the project implementation and the existing mechanisms and ways to resolve these conflicts. The speakers answered the questions of the participants.

B. Summary of the Comments and Concerns Received from Affected People and other Stakeholders

213. All affected people and stakeholders are expecting significant improvements with the subproject implementation. During the field mission, the following comments and concerns were collected:

- Farmers face either flooding and too much water for their fields, when they don't need much water; - or draught/water scarcity, during the production season;
- The biggest problem for farmers /WUA is the poor conditions of the (tertiary) channel system, which lead to big losses (up to 40%) of irrigation water before it reaches the field;
- However, they also recognize that some crops are over-irrigated, resulting in declining yields. So, they think the subproject could help build farmers' awareness and capacity to manage water effectively and efficiently;
- With the zoning of land along the irrigation system, some zones and sub-groups of farmers are at the 'tail' and at the longest distance from the channels, and are therefore disadvantaged concerning access to water /irrigation;
- The major reason for poverty is small farmers' lack of capital to invest in equipment and pay for labour to cultivate their land plots; lack of collateral for bank loans;

- The biggest problem for widows and other single women or people living with disabilities are lack of manpower /male labour to cultivate their fields. In some villages, 40% households are practicing male labour migration to Russia and Uzbekistan, due to lack of employment opportunities and land scarcity, poverty, hence, widows /single women often need to hire labour, which makes it little profitable to cultivate / lease land and pay for water.
- Due to male labour migration, the younger women/wives are often de facto farm and water managers, but poorly represented in the WUA Boards WUA Management groups.
- Inter-farm conflicts and intra-farm conflicts (family members potential conflicts of interest / husband-wife) over land and water should be reduced after the subproject implementation;
- Apart from meteorological disasters (flood, mudflows and draught), no environmental issues were mentioned during meetings and interviews.

214. All these comments were addressed in project design, through the Poverty, Social and Gender Assessment, SPRSS, and GAD.

215. With respect to the two farmers impacted by land acquisition on mudflow crossing structure n°1, several options are currently studied to mitigate the impact. One of the farmers formulated three options:

(i) Donation of the farmer's assets for the construction of an overhead mudflow, structure with the condition of building a fence (wall) along the entire structure, providing irrigation water to its site, ensuring passage through the structure (bridge), planting trees in its section near the structure and providing the necessary assistance from the contractor to improvement of its remaining part of the site.

(ii) Donation of his assets for the construction of an underground mudflow structure, with the condition of providing irrigation water, improving the soil on the site and planting trees.

(iii) In case the two first options are not possible, receiving compensation for lost assets in accordance with the requirements and procedures of ADB and the legislation of the Kyrgyz Republic.

The second farmer is fully prepared to donate his assets to the project under the following conditions:

(i) Installation of a pipe for irrigation;

(ii) Installation of a bridge for passage through the mudflow construction;

(iii) The new mudflow construction must be built and brought to the floodplain of the river.

216. These requests were discussed with the designers and engineers and it has been confirmed that these issues will be included in the design of the subproject.

217. During the public hearing on 13th June, 2018, the main comments and concerns raised by the participants were:

- The canal is often filled up with sand and clay;
- Lack of water in some parts of the irrigation system. It is necessary to design new canal outlets/modules that will provide these lands with water;
- The project should consider the on-farm WUA network;
- Construction works should not create problems with water access during the agricultural season;
- Ensure that all WUAs are represented in the commission to participate in the studies;
- Water is distributed in % for each WUA. Is it possible to reconsider the percentages for

WUAs that have been rehabilitated?

- Need to organize farmers' cooperative farms, like former sovkhoz.

218. The subproject engineers answered these questions. The minutes of the meeting is presented in Appendix 3. No questions were asked on environmental or social issues.

C. Planned Information Disclosure Measures

219. Information disclosure and public consultations for the Pravaya-Vetka subproject is carried out in accordance with the ADB' Public Communications Policy 2011, as discussed below.

220. Core- sub-project stakeholders / beneficiaries (definition):

- Primary stakeholders: Department of Water Resources and Melioration of the Ministry of Agriculture, Food Industry, and Melioration (Mud-flow control, rehabilitation of primary, secondary irrigation canals, access roads);
- Secondary stakeholders: WUA and WUA clients /irrigation farmers (cooperatives and/or individual households).

221. Objectives

- Meeting 1: Collection of stakeholders' opinion, advice and questions about the core-sub-project and environmental and Land Acquisition scoping assessment process;
- Meeting 2: Collection of stakeholders' comments and recommendations to the environmental assessment (IEE) report and Land Acquisition screening/scoping assessment report.

222. Schedule

(i) Middle of June: Presentation of the project, based on the elements available at this time.

(ii) End of August: Presentation of the IEE results.

223. Organization

- The MoA/Rayon Department of Water Resources and Melioration of the Ministry of Agriculture, Food Industry, and Melioration is in charge of reserving the meeting room, sending invitations to interested parties, and chairing the meetings. The meetings should be hold in one of the four concerned municipalities (Aiyul Ogmodul): Aral, Nooken, Sakaldy, and possibly Kenesh. The logic would be to choose the municipality according to the number of interested parties. It should be borne in mind that only preliminary information about the project will be available at the time of the first meeting (the feasibility study report is to be delivered at the end of July). At this preliminary stage, it is inappropriate to proceed to an extensive consultation process involving all the targeted beneficiaries/ farmers. The targeted meeting participants are representatives of WUA farmer cooperatives/farmer groups, and representatives of poor farmers. The objective is to gather at least 30 participants for each meeting and to aim at gender balance. Women should be invited from all stakeholder groups; WUA, farmer cooperatives /farmer groups, vulnerable groups; and Department of Water Resources and Melioration of the Ministry of Agriculture, Food Industry, and Melioration).
- Egis is in charge of preparing the visual aids, leading the discussion and writing the minutes.

224. General prescriptions:

- Relevant and adequate information (in Kyrgyz or Russian) about the project and IEE process/results has to be provided to interested parties together with the invitations to the meeting, at least one week before the meeting.
- The consultation process must be pro-poor, gender inclusive and responsive, and discussions must be addressing the needs of all farmers, including women and disadvantaged and vulnerable groups/ poor farmers. The issue of affordable and fair distribution of irrigation water should be discussed.
- Land Acquisition and resettlement and other potential adverse impacts and issues should be discussed during the meeting;
- Leaders or members of farmer cooperatives should represent the farmers. WUA represents WUA.

VIII. GRIEVANCE REDRESS MECHANISM

A. Objectives

225. The Grievance Redress Mechanism (GRM) is a process and forum through which the affected people need a trusted way to voice and resolve concerns about LAR and the project also finds an effective way to address affected people's concerns. For this project, A GRM will be established.

226. APs and local people have the right to file complaints and/or queries on any aspect of the project, including LAR, environmental and other safeguard issues. Under the GRM, people may appeal any decision, practice or activity related to the project. All possible avenues will be made available to the affected persons and others to voice their grievances. The PIU will ensure that grievances and complaints on any aspect of the project are addressed in a timely and effective manner.

227. Objectives of the GRM are:

- To reach mutually agreed solutions satisfactory to both the project and the APs, and to resolve any grievances locally, in consultation with the aggrieved party;
- To facilitate the smooth implementation of the LARP, particularly to cut down on lengthy litigation processes and prevent delays in project implementation; and
- To facilitate the development process at the local level, while maintaining transparency as well as to establish accountability to the affected people.

228. The mechanism will consist of grievance resolution of two levels, the local and central levels. At each level, a grievance redress group (GRG) will be established. The role and responsibility of the GRGs is to accept claim and complaints, assess its validity, determine the scope of eventual impacts, and timely resolve the issue, including the claims regarding the compensation and maintain GRM as flexible and efficient to address and resolve the claims as raised during LARP and project implementation.

229. The GRM covers issues related to social, environmental and other safeguard issues under the ADB safeguard covenants and Kyrgyz laws.

B. Grievance Redress Groups

230. The Grievance Redress Groups (GRGs) will be established at both local and central levels. The GRGs will function for the duration of both LARP and project implementation. The local GRGs include one in each affected Ayil-Okmotu (village) and the central GRG is set at DWR-MOA in Bishkek.

231. The contact information of GRGs will be included in the Resettlement Information Brochure that will be distributed among affected households prior to LARP implementation.

232. At each level of appeal, the GRG will be assisted as needed by the professional capacity to solve specific case. They include:

(i) Representatives of State Rayon Administration

(ii) Representatives of the Rayon Branch of the State Agency for Architecture and Construction

(iii) State Registration Services of the Rayon

(iv) Ministry of Agriculture, Food Industry and Melioration

(v) State Agency for Environment and Forestry

(vi) Ministry of State Property

(vii) Ministry of Emergency

(viii) Technical expertise from professional engineers, and consultants with relevant experience in social safeguards and resettlement.

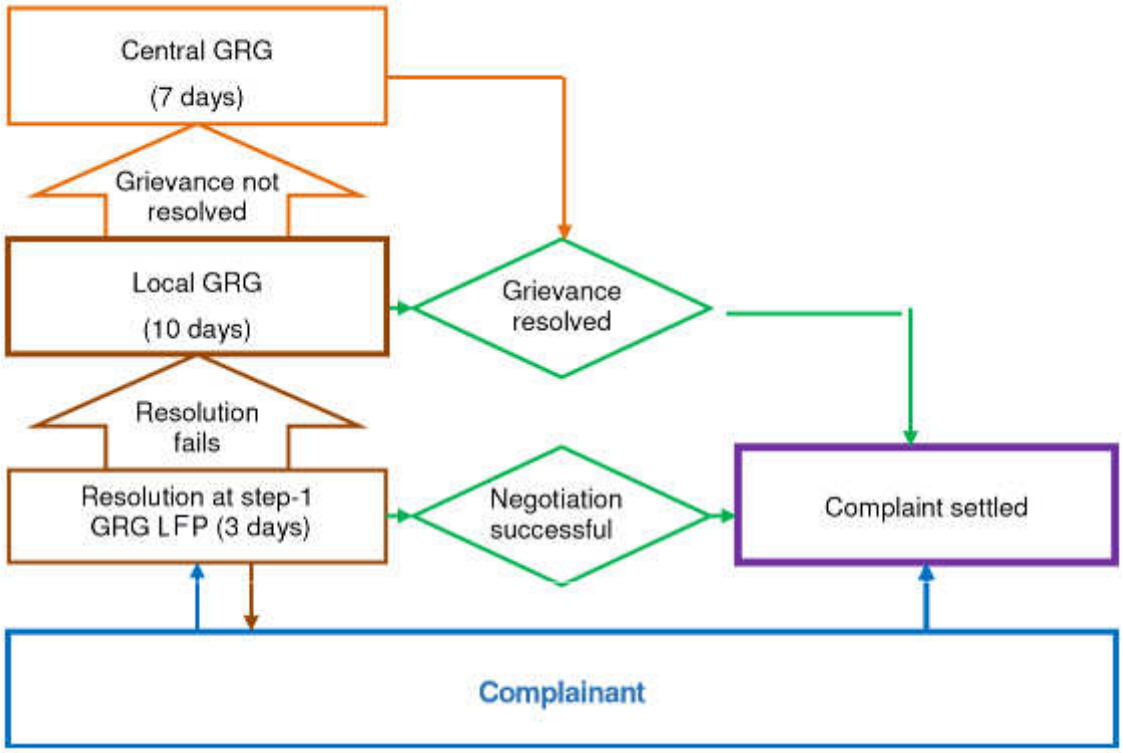
C. Grievance Resolution Process

233. The complaints and grievances from the affected households will be addressed through the procedure described in Table 19 and Figure 45 further illustrates it.

Table 19: Grievance Redress Procedure

Step	Action Level	Process	Timeline
1	Resolution by Local Focal Point (LFP)	At initial stage, the LFP will give hearing to the aggrieved person and try to give acceptable solutions. If an aggrieved person is not satisfied with the solutions, then she/he will lodge grievances in written to the local GRG within 3 days.	3 days
2	Resolution at local level	After receiving written complaint, the LFP will review and prepare a Case File for GRG hearing and resolution. A formal hearing will be held with the GRG on a date fixed by the LFP in consultation with the aggrieved person. On the date of hearing, the aggrieved person will appear before the GRG and present proofs in support of his/her claim. The LFP will note down the statements of the complainant and document all proofs. The decision from majority of the members will be considered final from the GRG and will be issued by the LFP and signed by other members of the GRG. The case record will be updated and the decision will be communicated to the aggrieved person by the LFP within 10 days. If aggrieved person is not satisfied with the solution, the LFP will lodge grievance in written to the central GRG at MOA with conclusion and supporting documents prepared at local level.	10 days
3	Resolution at central level	After receiving written complaint, the central GRG Chairperson will review and prepare a Case File for GRG hearing and resolution. A formal hearing will be held on a date fixed by the GRG Chairperson and the aggrieved person. GRG members will contact the complainant and visit his/her village. The safeguard specialist/sociologist of PIU will note down the statements of the complainant and document all proofs. The decisions from majority of the members will be considered final from the central GRG and will be issued by the Chairperson and signed by other members. The case record will be updated and the decision will be communicated to the aggrieved person by the safeguard specialist/sociologist of PIU within 7 days of submission.	7 days

Figure 45: Grievance Redress Procedure



D. Additional Mechanisms

234. Any physical and legal person, any appellant can communicate his/her concern to the court at any stage of grievance redress. The GRGs will not restrict or influence the affected persons from applying to court for legal remedies. If the complaint is found invalid, the GRG will formulate a response and send a written letter to the complainant, explaining the reasons of rejection.

235. In addition, ADB has its Accountability Mechanism Policy (2012) (see https://www.adb.org/site/accountability-mechanism/main) that is to be accountable to people for ADB-assisted projects as a last resort mechanism. The accountability mechanism provides a forum where people adversely affected by ADB-assisted projects can voice and seek solutions to their problems and report alleged noncompliance of ADB's operational policies and procedures.

236. The complainant, if not satisfied with GRG's decision or even the court's decision, can appeal the case to Office of the Special Office Facilitator of ADB (see www.adb.org/site/accountability-mechanisn/contacts). The GRGs will not in any way impede APs' access to the ADB Accountability Mechanism.

E. Complaint Documentation

237. The PIU of the MOA will document all grievances in both written and electronic forms.

IX. ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

A. Purpose and Content of the Environmental Management and Monitoring Plan

238. The Environment Management and Monitoring Plan (EMMP) is aimed at contributing to sustainable development and minimising any negative environmental impacts. Through this document, the contractor is committed to continuous improvement of environmental performance, implementation of appropriate environmental management systems, fulfilment of all relevant statutory obligations, and cooperation with the appropriate authorities. The main objectives of the EMMP are:

- To comply with the ADB's prescriptions and Kyrgyz legislation relevant to the project,
- To take all the necessary precautions to protect the surroundings from any pollution that may arise from the construction processes,
- To reduce the effect of noise, dust, disturbance, emissions and inconvenience from operational activities,
- To develop, publish and monitor formal policy, establishing formal organisational arrangements for environmental management,
- To nominate an Environmental Officer with specific responsibility for environmental matters,
- To develop a framework for continued environmental improvement through the progressive implementation of an environmental management system, which will ensure that the environmental impact of the project are evaluated,
- To prepare plans and management procedures for the prevention of pollution,
- To produce action plans, which set realistic and achievable targets, and monitoring, reviewing and updating these plans according to the activities,
- To work closely with DWR, SAEPF, partners, consultants, suppliers, subcontractors and, where appropriate, members of the community to develop good environmental practices and solutions,
- Actively involve employees and ensure that appropriate training is given to raise awareness and appreciation of environmental issues.

239. The Environmental Management and Monitoring Plan includes the following key components (with the level of detail commensurate with the project's impacts and risks): mitigation, monitoring, implementation arrangements, performance indicators. The EMMP will be presented in two parts in the following sections:

(i) Management of the impacts;

(ii) Monitoring and implementation arrangements.

B. Environmental Management Plan

240. One EMP is provided for each subproject component, divided into construction and operation (if relevant), under the form of a table with the following headings: potential issues / impacts, mitigation / management measures, impact/ performance indicators, implementation responsibilities.

Table 20: Environmental management plan related to Mudflow Crossing Structure n°1

Potential issues / Impacts	Mitigation / management measures	Impact / performance indicators	Implementation responsibilities
Construction period			
Potential damage to public or private properties and public facilities.	The Contractor shall bear the sole responsibility of any damages that may occur during the work execution for the adjacent properties and buildings of the work site, and shall bear the direct responsibility, of any death, injuries, damages, stealing or losses whatsoever their type that may result due to his negligence, his agents, his workmen or the negligence of his sub-contractors during the work execution. The Contractor should maintain and protect all public utilities inside or adjacent to the work sites and should take the necessary measures to ensure their continuous operation without any damage therein even if the matter has necessitated supporting, suspension or diversion of these public utilities outside the work site. Items damaged or interfered with as a result of the works, as well as those removed to enable the works to be carried out, shall be reinstated to condition at least the same they had been at before the works had started.	Number of grievances submitted / number of grievances redressed	Contractor, under the authority of the DWR Unit Head of the Project Implementation Office (PIO).
Water pollution from construction machines (accidental spill of oil from machinery), equipment and material stores, poor sanitation at work sites, release of soil and cement into surface water.	Works to be conducted when the canal is empty (after the agricultural season). Control measures for oily residues, lubricants and refuelling. Within the project detail planning, maintenance yards have to be designed. Dedicated drainages need to be considered that can capture run-off. Oily residues and fuel need to be captured at source and refuelling and maintenance must take place in dedicated areas away from surface water resources. Proper training of the machinists must ensure that refilling and oil changes are undertaken with utmost care and disposal of any residue from these activities. In case temporary work camps are required, construction of worker camps shall be located close to settlement areas but not near sensitive water resources. In such cases, the constructor needs to provide a detailed design of each work camp including infrastructure planning (water supply, electricity supply, waste management, wastewater treatment and disposal). Workers need to be trained how to behave and to handle waste and waste water according environmental management requirements.	Construction period Number of spill emergencies recorded / number of spill emergencies contained and cleaned (based on Environment Incident Forms)	Contractor, under the authority of the Construction Supervisor of the PIO.
Air Pollution from earthworks, demolition/construction activities and transport (atmospheric pollutants, dust and cement), especially during the dry or strong prevailing winds periods.	Take all necessary precautions to prevent the occurrence of smoke emissions or fumes from the site concrete plant or stored fuel oils, and drifting of such emissions and fumes into residential areas. In particular, the plant shall be well maintained and measures taken so as not to be left running unnecessarily for long periods when not directly in use. Not install any furnace, boiler or other similar plant or equipment using any fuel that may produce air pollutants without the prior written consent of the State Inspection on Ecological and Technical Safety. Instigate effective dust suppression measures as may be necessary to avoid creating dust nuisance arising because of the works on site. Construction materials (sand, gravel, and rocks) and spoil materials will be transported by trucks covered with tarpaulin.	Number of grievances submitted / number of grievances redressed	Contractor, under the authority of the Construction Supervisor of the PIO.

Potential issues / Impacts	Mitigation / management measures	Impact / performance indicators	Implementation responsibilities
Noise and vibration from trucks and construction machinery.	Consider noise as an environmental constraint, which must be addressed in the planning and execution of the works. Take all reasonable measures to reduce noise to a minimum. Take all necessary measures to ensure that the operation of all mechanical equipment and construction processes, on or off site, shall not cause any unnecessary and excessive noise which may disturb any occupant of nearby dwellings, schools, hospitals, or premises with similar sensitivity to noise. The construction works will be limited to daytime (8 am to 8 pm) and will be prohibited in weekends.	Number of grievances submitted / number of grievances redressed	Contractor, under the authority of the Construction Supervisor of the PIO.
Wastes from construction activities are mainly spoils generated by excavations (6,000 m3). Disposal of these materials on land may cause destruction of plants, loss of vegetation, unsightly view and other nuisances to the local community.	Remove from the site all excavated material, spoil, surplus materials and rubbish from whatever on-site source and, except where otherwise specified in the Contract, make arrangements for their disposal. Comply with any legal requirements applying to disposal of any contaminated spoil. The process of classifying waste types, stockpiling of waste at site, transportation and disposal of waste shall be subject to the approval/review of the State Inspection on Ecological and Technical Safety. Fly-tipping shall not be permitted. Loads must be deposited solely at authorized tips. Deposition shall be carried out in accordance with the requirements of Local Authorities. To prove the correct depositing of excavated material and to prevent the occurrence of fly-tipping, daily logs of all spoil removed from site by lorry shall be maintained and kept available both on site and at the authorized tips deposition for inspection by the relevant authorities. Spoils generated by excavations shall be disposed of in the nearby Kara-Unkur-Sai floodplain. The disposal site has to be devoid of vegetation (bare gravel strands). The deposits will be spread out so as not forming a mound. The site used to provide the backfilling material could also be used for the disposal of the spoils. In that case, the spoils will be temporary stockpiled, and the area used for the temporary deposit will then be restored.	Number of fly-tipping / daily logs of all spoil removed from site, with precise GPS location	Contractor, under the authority of the Construction Supervisor of the PIO.
Supply of backfilling and construction material.	The backfilling material required for the construction works will come from the Kara-Unkur-Sai floodplain, and the rubble stones from quarries. Only duly authorized quarries will be chosen. The borrow pits for backfilling material have to be devoided of vegetation (bare gravel strands). After extraction, they will be filled with spoils or secured with gentle slopes in order to avoid accidents.	Daily logs of all backfilling material carried to site, with precise GPS location	Contractor, under the authority of the Construction Supervisor of the PIO.
Visual intrusion. During the construction period, the visual quality is usually poor, because of material stockpiles, waste depots, prefabricated offices and construction machines.	Keep the site reasonably free from all unnecessary obstructions and store or dispose of any constructional plant and surplus materials and clear away and remove from the site any wreckage, rubbish or temporary works no longer required. After the completion of the works, immediately clear the work site from all materials, dust and rubbish.	Visual inspection	Contractor, under the authority of the Construction Supervisor of the PIO.
Access and safety issues related to truck traffic and construction machinery.	Take all the necessary arrangements and precautions during the execution of the works to avoid disturbance to the public, any reason that may prevent the access or the use of the public & private roads, footpaths, or properties. Use the suitable and appropriate means of transport, and take all	Number of emergency events recorded / number of emergency events treated (based	Contractor, under the authority of the Construction

Potential issues / Impacts	Mitigation / management measures	Impact / performance indicators	Implementation responsibilities
	necessary arrangement and precautions to avoid any damage or destruction to the public roads or bridges located on the route from and to the work site. Implement the necessary procedures to secure the work site to prevent any accidents through construction of temporary fencing around the site in an appropriate height and type. Bear the responsibility to guard and secure the work site during night and daytime (24 hours / day), provide the necessary lighting thereto, and fire protection and fire-fighting equipment. In general, take all necessary procedures and precautions to prevent injuries or death cases for the workmen or any other person.	on Environment Incident Forms)	Supervisor of the PIO.
Occupational hazards	Safety to workers and the public shall be enhanced by: (i) Proper briefing and training of workers on safety precautions, and their responsibilities for the safety of themselves and others; (ii) Provision to workers of protective clothing including hard hats, and protective footwear; (iii) Ensuring plant and vehicle operators are properly licensed and trained; (iv) Arranging for the provision of first aid facilities, readily available trained paramedical personnel, and emergency transport to the nearest hospital with accident and emergency facilities, and allocation of responsibility for ensuring that these arrangements are continually in place; (v) Arranging for regular safety checks of vehicles and material, and allocation of responsibility for this; (vi) Provision of hazard warning signs around construction sites.	Number and frequency of accidents recorded	Contractor, under the authority of the Construction Supervisor of the PIO.
Communicable diseases: STI/HIV/AIDS, T.B., Dengue fever, scabies, bed bugs and other diseases and infections).	Clause on occupational health and safety measures. Distribute or request that the local health officer distribute information material and free condoms to his/her workers and the local sex-workers. Require that construction contractors maximize the number of local, residential workers, to minimize the risk to the local communities from imported labor.	Number of infections detected among the workers	Contractor, under the authority of the Social Safeguard Specialist of the PMO
Employment opportunities for local communities	See recommendations of the reports on “Poverty, Social and Gender Assessment” and “Summary Poverty Reduction and Social Strategy”	Number of local employees on the construction works	Contractor, under the authority of the Social Safeguard Specialist of the PMO
Loss of nesting sites in the mud walls of the gully.	The works will have to take place out of the nesting season (May to July). A dozen of nest boxes 25 × 25 × 25 cm (access diameter: 60 mm), will be installed on nearby pylons and trees.	Construction period / Number of nest boxes installed	Contractor, under the authority of the Construction Supervisor of the PIO.
The ditch may impair fauna movements alongside the right bank of the Kara-Unkur-Sai River.	The slope of the walls of the ditch connecting the mudflow crossing structure to the river floodplain must not exceed 1/1, in order to reduce safety risks and allow animals or people fallen by accident into the ditch to get out more easily.	Compliance with the mitigation measure	Contractor, under the authority of the Construction

Potential issues / Impacts	Mitigation / management measures	Impact / performance indicators	Implementation responsibilities
			Supervisor of the PIO.
Disturbance of agricultural activities will result from access restriction, soil compaction, trenching.	Carry out the construction activities after the agricultural season.	Construction period	Contractor, under the authority of the Construction Supervisor of the PIO.
Loss of land for two farmers, due to the construction of the ditch downstream the mudflow crossing structure. These land users do not pay rent and land tax to local authorities for the used land. Considering that land cultivation by households was carried out based on a formal decision of the local government, households affected by the impact should be considered with legitimate rights..	As the land plots were provided to households for use and improvement on the basis of the decision of the local self-government, the two farmers agreed upon a donation of the land needed for the construction works. Financial compensations will be provided to the two farmers: based on the harvest value for one year for the loss of corn and rice fields, based on market value for the two trees, and based on the full replacement cost for the fence.	Compliance with the mitigation measures	DWR
The hydraulic structure will also act like a barrier, cutting the farm holdings into two pieces.	A bridge shall be built over the ditch to allow access to the agricultural plots.	Compliance with the mitigation measures	Contractor, under the authority of the Construction Supervisor of the PIO.
Operational period			
Even without flows, the new hydraulic structures represent a danger to people and livestock, because of their deepness and steep banks, especially in the upstream section (between the road and the canal).	The ditch shall be fenced on his whole length, downstream and upstream the mudflow crossing structure.	Compliance with the mitigation measures	Contractor, under the authority of the Construction Supervisor of the PIO.

241. All the mitigation measures related to the construction works will have to be included as specific environmental clauses (Particular Conditions) within the Contractual Documents of the construction company/companies. The bidders will have to incorporate all the resulting costs in their financial offer.

Table 21: Environmental management plan related to Mudflow Crossing Structure n°2

Potential issues / Impacts	Mitigation / management measures	Impact / performance indicators	Implementation responsibilities
Potential damage to public or private properties and public facilities	The Contractor shall bear the sole responsibility of any damages that may occur during the work execution for the adjacent properties and buildings of the work site, and shall bear the direct responsibility, of any death, injuries, damages, stealing or losses whatsoever their type that may result due to his negligence, his agents, his workmen or the negligence of his sub-contractors during the work execution. The Contractor should maintain and protect all public utilities inside or adjacent to the work sites and should take the necessary measures to ensure their continuous operation without any damage therein even if the matter has necessitated supporting, suspension or diversion of these public utilities outside the work site. Items damaged or interfered with as a result of the works, as well as those removed to enable the works to be carried out, shall be reinstated to condition at least the same they had been at before the works had started.	Number of grievances submitted / number of grievances redressed	DWR Unit Head of the Project Implementation Office.
The river may be diverted into the canal during the construction works. It means that the river continuity may be interrupted during the construction works (between 1 and 2 months).	To minimize hydrobiological impacts (especially on the Turkestan catfish), the following measures will be implemented: (i) During the construction works, the river flows may be diverted into the canal. A weir will be built in this respect. As catfish species usually stay close to the river bottom, it may be assumed that the weir will be an obstacle to their movements. As a result, only a few catfishes would reach the canal. A wire netting positioned at the top of the weir would prevent any fish to pass into the canal. (ii) To maintain the aquatic life downstream the works, an instream flow has to be preserved. Usually, instream flows amount to at least 1/10 of the average yearly flow rate. Therefore, the instream flow to be considered for the Shaidan river should amount 200 l/s. A temporary pipe culvert must be installed in the river bed during the construction works to ensure this hydraulic continuity.	Compliance with the mitigation measures	Contractor, under the authority of the Construction Supervisor of the Project Implementation Office.
Water pollution from construction machines (accidental spill of oil from machinery), equipment and material stores, poor sanitation at work sites, release of soil and cement into surface water (either the river or the canal).	To reduce possible pollution of the Masy secondary canal and safety issues, the works will be conducted when the canal is empty (after the agricultural season). Control measures for oily residues, lubricants and refuelling. Within the project detail planning, maintenance yards have to be designed. Dedicated drainages need to be considered that can capture run-off. Oily residues and fuel need to be captured at source and refuelling and maintenance must take place in dedicated areas away from surface water resources. Proper training of the machinists must ensure that refilling and oil changes are undertaken with utmost care and disposal of any residue from these activities. In case temporary work camps are required, construction of worker camps shall be located close to settlement areas but not near sensitive water resources. In such cases, the constructor needs to provide a detailed design of each work camp including infrastructure planning (water supply, electricity supply, waste management, wastewater treatment and disposal). Workers need to be trained how to behave and to handle waste and waste water according environmental management requirements.	Construction period Number of spill emergencies recorded / number of spill emergencies contained and cleaned (based on Environment Incident Forms)	Contractor, under the authority of the Construction Supervisor of the PIO.

Potential issues / Impacts	Mitigation / management measures	Impact / performance indicators	Implementation responsibilities
Air Pollution from earthworks, demolition/construction activities and transport (atmospheric pollutants, dust and cement), especially during the dry or strong prevailing winds periods.	Take all necessary precautions to prevent the occurrence of smoke emissions or fumes from the site concrete mixer plant or stored fuel oils, and drifting of such emissions and fumes into residential areas. In particular, the plant shall be well maintained and measures taken so as not to be left running unnecessarily for long periods when not directly in use. Not install any furnace, boiler or other similar plant or equipment using any fuel that may produce air pollutants without the prior written consent of the State Inspection on Ecological and Technical Safety. Instigate effective dust suppression measures as may be necessary to avoid creating dust nuisance arising because of the works on site. Construction materials (sand, gravel, and rocks) and spoil materials will be transported by trucks covered with tarpaulin.	Number of grievances submitted / number of grievances redressed	Contractor, under the authority of the Construction Supervisor of the PIO.
Noise and vibration from trucks and construction machinery.	Consider noise as an environmental constraint, which must be addressed in the planning and execution of the works. Take all reasonable measures to reduce noise to a minimum. Take all necessary measures to ensure that the operation of all mechanical equipment and construction processes, on or off site, shall not cause any unnecessary and excessive noise which may disturb any occupant of nearby dwellings, schools, hospitals, or premises with similar sensitivity to noise. The construction works will be limited to daytime (8 am to 8 pm) and will be prohibited in weekends.	Number of grievances submitted / number of grievances redressed	Contractor, under the authority of the Construction Supervisor of the PIO.
Wastes from construction activities are mainly spoils generated by excavations (400 m3) and dismantling of the current mudflow crossing structure (170 m3). Disposal of these materials on land may cause destruction of plants, loss of vegetation, unsightly view and other nuisances to the local community.	Remove from the site all excavated material, spoil, surplus materials and rubbish from whatever on-site source and, except where otherwise specified in the Contract, make arrangements for their disposal. Comply with any legal requirements applying to disposal of any contaminated spoil. The process of classifying waste types, stockpiling of waste at site, transportation and disposal of waste shall be subject to the approval/review of the State Inspection on Ecological and Technical Safety. Fly-tipping shall not be permitted. Loads must be deposited solely at authorized tips. Deposition shall be carried out in accordance with the requirements of Local Authorities. To prove the correct depositing of excavated material and to prevent the occurrence of fly-tipping, daily logs of all spoil removed from site by lorry shall be maintained and kept available both on site and at the authorized tips deposition for inspection by the relevant authorities.	Number of fly-tipping / daily logs of all spoil removed from site, with precise GPS location	Contractor, under the authority of the Construction Supervisor of the PIO.
Supply of backfilling and construction material.	The backfilling material required for the construction works will come from the Shaidan floodplain, and the rubble stones from quarries. Only duly authorized quarries will be chosen. The borrow pits for backfilling material have to be devoided of vegetation (bare gravel strands). After extraction, they will be secured with gentle slopes in order to avoid accidents.	Daily logs of all backfilling material carried to site, with precise GPS location	Contractor, under the authority of the Construction Supervisor of the PIO.
Visual intrusion. During the construction period, the visual quality is usually poor, because of material stockpiles, waste	Keep the site reasonably free from all unnecessary obstructions and store or dispose of any constructional plant and surplus materials and clear away and remove from the site any wreckage, rubbish or temporary works no longer required. After the completion of the works, immediately clear the work site from all materials, dust and rubbish.	Visual inspection	Contractor, under the authority of the Construction

Potential issues / Impacts	Mitigation / management measures	Impact / performance indicators	Implementation responsibilities
depots, prefabricated offices and construction machines.			Supervisor of the PIO.
Access and safety issues related to truck traffic and construction machinery.	Take all the necessary arrangements and precautions during the execution of the works to avoid disturbance to the public, any reason that may prevent the access or the use of the public & private roads, footpaths, or properties. Use the suitable and appropriate means of transport, and take all necessary arrangement and precautions to avoid any damage or destruction to the public roads or bridges located on the route from and to the work site. Implement the necessary procedures to secure the work site to prevent any accidents through construction of temporary fencing around the site in an appropriate height and type. Bear the responsibility to guard and secure the work site during night and daytime (24 hours / day), provide the necessary lighting thereto, and fire protection and fire-fighting equipment. In general, take all necessary procedures and precautions to prevent injuries or death cases for the workmen or any other person.	Number of emergency events recorded / number of emergency events treated (based on Environment Incident Forms)	Contractor, under the authority of the Construction Supervisor of the PIO.
Occupational hazards	Safety to workers and the public shall be enhanced by: (i) Proper briefing and training of workers on safety precautions, and their responsibilities for the safety of themselves and others; (ii) Provision to workers of protective clothing including hard hats, and protective footwear; (iii) Ensuring plant and vehicle operators are properly licensed and trained; (iv) Arranging for the provision of first aid facilities, readily available trained paramedical personnel, and emergency transport to the nearest hospital with accident and emergency facilities, and allocation of responsibility for ensuring that these arrangements are continually in place; (v) Arranging for regular safety checks of vehicles and material, and allocation of responsibility for this; (vi) Provision of hazard warning signs around construction sites.	Number and frequency of accidents recorded	Contractor, under the authority of the Construction Supervisor of the PIO.
Disturbance to the restaurant's activity.	An agreement has to be reached between the constructor and the restaurant's owner to get access to the river right bank through his land plot in order to ensure minimum disturbance (no damage to the premises, no works during the restaurant opening days and hours, replantation of any tree that will need to be cut or removed).)	No grievance submitted by the restaurant's owner	Contractor, under the authority of the Construction Supervisor of the PIO.
Communicable diseases: STI/HIV/AIDS, T.B., Dengue fever, scabies, bed bugs and other diseases and infections).	Clause on occupational health and safety measures. Distribute or request that the local health officer distribute information material and free condoms to his/her workers and the local sex-workers. Require that construction contractors maximize the number of local, residential workers, to minimize the risk to the local communities from imported labor.	Number of infections detected among the workers	Contractor, under the authority of the Social Safeguard Specialist of the PMO
Employment opportunities for local communities	See recommendations of the reports on "Poverty, Social and Gender Assessment" and "Summary Poverty Reduction and Social Strategy"	Number of local employees on the construction works	Contractor, under the authority of the Social Safeguard

Potential issues / Impacts	Mitigation / management measures	Impact / performance indicators	Implementation responsibilities
			Specialist of the PMO

242. All the mitigation measures related to the construction works will have to be included as specific environmental clauses (Particular Conditions) within the Contractual Documents of the construction company/companies. The bidders will have to incorporate all the resulting costs in their financial offer.

Table 22: Environmental management plan related to Mudflow Crossing Structure n°3

Potential issues / Impacts	Mitigation / management measures	Impact / performance indicators	Implementation responsibilities
Potential damage to public or private properties and public facilities	The Contractor shall bear the sole responsibility of any damages that may occur during the work execution for the adjacent properties and buildings of the work site, and shall bear the direct responsibility, of any death, injuries, damages, stealing or losses whatsoever their type that may result due to his negligence, his agents, his workmen or the negligence of his sub-contractors during the work execution. The Contractor should maintain and protect all public utilities inside or adjacent to the work sites and should take the necessary measures to ensure their continuous operation without any damage therein even if the matter has necessitated supporting, suspension or diversion of these public utilities outside the work site. Items damaged or interfered with as a result of the works, as well as those removed to enable the works to be carried out, shall be reinstated to condition at least the same they had been at before the works had started.	Number of grievances submitted / number of grievances redressed	DWR Unit Head of the Project Implementation Office.
The river may be diverted into the canal during the construction works. It means that the river continuity may be interrupted during the construction works (between 1 and 2 months).	To minimize hydrobiological impacts (especially on the Turkestan catfish), the following measures will be implemented: (i) Both construction works for mudflow crossings n°2 and 3 have to be carried out at the same time. It will also simplify the works management for the crossing structure n°3, as it will not be necessary to divert the river flows into the canal. (ii) To ensure the river flow continuity, the same instream flow temporary culvert as for the crossing structure n°2 will have to be installed during the construction works.	Compliance with the mitigation measures	Contractor, under the authority of the Construction Supervisor of the Project Implementation Office.

Potential issues / Impacts	Mitigation / management measures	Impact / performance indicators	Implementation responsibilities
Water pollution from construction machines (accidental spill of oil from machinery), equipment and material stores, poor sanitation at work sites, release of soil and cement into surface water (either the river or the canal).	To reduce possible pollution of the Masy secondary canal and safety issues, the works will be conducted when the canal is empty (after the agricultural season). Control measures for oily residues, lubricants and refuelling. Within the project detail planning, maintenance yards have to be designed. Dedicated drainages need to be considered that can capture run-off. Oily residues and fuel need to be captured at source and refuelling and maintenance must take place in dedicated areas away from surface water resources. Proper training of the machinists must ensure that refilling and oil changes are undertaken with utmost care and disposal of any residue from these activities. In case temporary work camps are required, construction of worker camps shall be located close to settlement areas but not near sensitive water resources. In such cases, the constructor needs to provide a detailed design of each work camp including infrastructure planning (water supply, electricity supply, waste management, wastewater treatment and disposal). Workers need to be trained how to behave and to handle waste and waste water according environmental management requirements.	Construction period Number of spill emergencies recorded / number of spill emergencies contained and cleaned (based on Environment Incident Forms)	Contractor, under the authority of the Construction Supervisor of the PIO. Random control by the SIETS.
Air Pollution from earthworks, demolition/construction activities and transport (atmospheric pollutants, dust and cement), especially during the dry or strong prevailing winds periods.	Take all necessary precautions to prevent the occurrence of smoke emissions or fumes from the site concrete mixer plant or stored fuel oils, and drifting of such emissions and fumes into residential areas. In particular, the plant shall be well maintained and measures taken so as not to be left running unnecessarily for long periods when not directly in use. Not install any furnace, boiler or other similar plant or equipment using any fuel that may produce air pollutants without the prior written consent of the State Inspection on Ecological and Technical Safety. Instigate effective dust suppression measures as may be necessary to avoid creating dust nuisance arising because of the works on site. Construction materials (sand, gravel, and rocks) and spoil materials will be transported by trucks covered with tarpaulin.	Number of grievances submitted / number of grievances redressed	Contractor, under the authority of the Construction Supervisor of the PIO.
Noise and vibration from trucks and construction machinery.	Consider noise as an environmental constraint, which must be addressed in the planning and execution of the works. Take all reasonable measures to reduce noise to a minimum. Take all necessary measures to ensure that the operation of all mechanical equipment and construction processes, on or off site, shall not cause any unnecessary and excessive noise which may disturb any occupant of nearby dwellings, schools, hospitals, or premises with similar sensitivity to noise. The construction works will be limited to daytime (8 am to 8 pm) and will be prohibited in weekends.	Number of grievances submitted / number of grievances redressed	Contractor, under the authority of the Construction Supervisor of the PIO.
Wastes from construction activities are mainly spoils generated by excavations (800 m3) and dismantling of the current mudflow crossing structure (155 m3). Disposal of these materials on land may cause destruction of plants, loss of vegetation, unsightly	Remove from the site all excavated material, spoil, surplus materials and rubbish from whatever on-site source and, except where otherwise specified in the Contract, make arrangements for their disposal. Comply with any legal requirements applying to disposal of any contaminated spoil. The process of classifying waste types, stockpiling of waste at site, transportation and disposal of waste shall be subject to the approval/review of the State Inspection on Ecological and Technical Safety. Fly-tipping shall not be permitted. Loads must be deposited solely at authorized tips. Deposition shall be carried out in accordance with the requirements of Local Authorities. To prove the correct depositing of excavated material and to prevent the occurrence of fly-tipping,	Number of fly-tipping / daily logs of all spoil removed from site, with precise GPS location	Contractor, under the authority of the Construction Supervisor of the PIO.

Potential issues / Impacts	Mitigation / management measures	Impact / performance indicators	Implementation responsibilities
view and other nuisances to the local community.	daily logs of all spoil removed from site by lorry shall be maintained and kept available both on site and at the authorized tips deposition for inspection by the relevant authorities. Spoils generated by excavations will be disposed of in the Shaidan downstream floodplain. The disposal site has to be devoid of vegetation (bare gravel strands). The deposits will be spread out so as not forming a mound. The site used to provide the backfilling material could also be used for the disposal of the spoils. In that case, the spoils will be temporary stockpiled, and the area used for the temporary deposit will then be restored.		
Supply of backfilling and construction material.	The backfilling material required for the construction works will come from the Shaidan floodplain, and the rubble stones / ripraps from quarries. Only duly authorized quarries will be chosen. The borrow pits for backfilling material have to be devoided of vegetation (bare gravel strands). After extraction, they will be filled with spoils or secured with gentle slopes in order to avoid accidents.	Daily logs of all backfilling material carried to site, with precise GPS location	Contractor, under the authority of the Construction Supervisor of the PIO.
Visual intrusion. During the construction period, the visual quality is usually poor, because of material stockpiles, waste depots, prefabricated offices and construction machines.	Keep the site reasonably free from all unnecessary obstructions and store or dispose of any constructional plant and surplus materials and clear away and remove from the site any wreckage, rubbish or temporary works no longer required. After the completion of the works, immediately clear the work site from all materials, dust and rubbish.	Visual inspection	Contractor, under the authority of the Construction Supervisor of the PIO.
Access and safety issues related to truck traffic and construction machinery.	Take all the necessary arrangements and precautions during the execution of the works to avoid disturbance to the public, any reason that may prevent the access or the use of the public & private roads, footpaths, or properties. Use the suitable and appropriate means of transport, and take all necessary arrangement and precautions to avoid any damage or destruction to the public roads or bridges located on the route from and to the work site. Implement the necessary procedures to secure the work site to prevent any accidents through construction of temporary fencing around the site in an appropriate height and type. Bear the responsibility to guard and secure the work site during night and daytime (24 hours / day), provide the necessary lighting thereto, and fire protection and fire-fighting equipment. In general, take all necessary procedures and precautions to prevent injuries or death cases for the workmen or any other person.	Number of emergency events recorded / number of emergency events treated (based on Environment Incident Forms)	Contractor, under the authority of the Construction Supervisor of the PIO.
Occupational hazards	Safety to workers and the public shall be enhanced by: (i) Proper briefing and training of workers on safety precautions, and their responsibilities for the safety of themselves and others; (ii) Provision to workers of protective clothing including hard hats, and protective footwear; (iii) Ensuring plant and vehicle operators are properly licensed and trained; (iv) Arranging for the provision of first aid facilities, readily available trained paramedical personnel, and emergency transport to the nearest hospital with accident and emergency facilities, and allocation of responsibility for ensuring that these arrangements are continually in place; (v) Arranging for regular safety checks of vehicles and material, and allocation of responsibility for this; (vi) Provision of hazard warning signs around construction sites.	Number and frequency of accidents recorded	Contractor, under the authority of the Construction Supervisor of the PIO.

Potential issues / Impacts	Mitigation / management measures	Impact / performance indicators	Implementation responsibilities
Communicable diseases: STI/HIV/AIDS, T.B., Dengue fever, scabies, bed bugs and other diseases and infections).	Clause on occupational health and safety measures. Distribute or request that the local health officer distribute information material and free condoms to his/her workers and the local sex-workers. Require that construction contractors maximize the number of local, residential workers, to minimize the risk to the local communities from imported labor.	Number of infections detected among the workers	Contractor, under the authority of the Social Safeguard Specialist of the PMO
Employment opportunities for local communities	See recommendations of the reports on "Poverty, Social and Gender Assessment" and "Summary Poverty Reduction and Social Strategy"	Number of local employees on the construction works	Contractor, under the authority of the Social Safeguard Specialist of the PMO

243. All the mitigation measures related to the construction works will have to be included as specific environmental clauses (Particular Conditions) within the Contractual Documents of the construction company/companies. The bidders will have to incorporate all the resulting costs in their financial offer.

Table 23: Environmental management plan related to Pravaya-Vetka Canal n°4

Potential issues / Impacts	Mitigation / management measures	Impact / performance indicators	Implementation responsibilities
Potential damage to public or private properties and public facilities	The Contractor shall bear the sole responsibility of any damages that may occur during the work execution for the adjacent properties and buildings of the work site, and shall bear the direct responsibility, of any death, injuries, damages, stealing or losses whatsoever their type that may result due to his negligence, his agents, his workmen or the negligence of his sub-contractors during the work execution. The Contractor should maintain and protect all public utilities inside or adjacent to the work sites and should take the necessary measures to ensure their continuous operation without any damage therein even if the matter has necessitated supporting, suspension or diversion of these public utilities outside the work site. Items damaged or interfered with as a result of the works, as well as those removed to enable the works to be carried out, shall be reinstated to condition at least the same they had been at before the works had started.	Number of grievances submitted / number of grievances redressed	DWR Unit Head of the Project Implementation Office.

Potential issues / Impacts	Mitigation / management measures	Impact / performance indicators	Implementation responsibilities
Water pollution from construction machines (accidental spill of oil from machinery), equipment and material stores, poor sanitation at work sites, release of soil and cement into surface water (canal).	Control measures for oily residues, lubricants and refuelling. Within the project detail planning, maintenance yards have to be designed. Dedicated drainages need to be considered that can capture run-off. Oily residues and fuel need to be captured at source and refuelling and maintenance must take place in dedicated areas away from surface water resources. Proper training of the machinists must ensure that refilling and oil changes are undertaken with utmost care and disposal of any residue from these activities. In case temporary work camps are required, construction of worker camps shall be located close to settlement areas but not near sensitive water resources. In such cases, the constructor needs to provide a detailed design of each work camp including infrastructure planning (water supply, electricity supply, waste management, wastewater treatment and disposal). Workers need to be trained how to behave and to handle waste and waste water according environmental management requirements.	Number of spill emergencies recorded / number of spill emergencies contained and cleaned (based on Environment Incident Forms)	Contractor, under the authority of the Construction Supervisor of the PIO. Randoml control by the SIETS.
Air Pollution from earthworks, demolition/construction activities and transport (atmospheric pollutants, dust and cement), especially during the dry or strong prevailing winds periods.	Take all necessary precautions to prevent the occurrence of smoke emissions or fumes from the site concrete mixer plant or stored fuel oils, and drifting of such emissions and fumes into residential areas. In particular, the plant shall be well maintained and measures taken so as not to be left running unnecessarily for long periods when not directly in use. Not install any furnace, boiler or other similar plant or equipment using any fuel that may produce air pollutants without the prior written consent of the State Inspection on Ecological and Technical Safety. Instigate effective dust suppression measures as may be necessary to avoid creating dust nuisance arising because of the works on site. Construction materials (sand, gravel, and rocks) and spoil materials will be transported by trucks covered with tarpaulin.	Number of grievances submitted / number of grievances redressed	Contractor, under the authority of the Construction Supervisor of the PIO.
Noise and vibration from trucks and construction machinery.	Consider noise as an environmental constraint, which must be addressed in the planning and execution of the works. Take all reasonable measures to reduce noise to a minimum. Take all necessary measures to ensure that the operation of all mechanical equipment and construction processes, on or off site, shall not cause any unnecessary and excessive noise which may disturb any occupant of nearby dwellings, schools, hospitals, or premises with similar sensitivity to noise. The construction works will be limited to daytime (8 am to 8 pm) and will be prohibited in weekends.	Number of grievances submitted / number of grievances redressed	Contractor, under the authority of the Construction Supervisor of the PIO.
Waste.	Remove from the site all excavated material, spoil, surplus materials and rubbish from whatever on-site source and, except where otherwise specified in the Contract, make arrangements for their disposal. Comply with any legal requirements applying to disposal of any contaminated spoil. The process of classifying waste types, stockpiling of waste at site, transportation and disposal of waste shall be subject to the approval/review of the State Inspection on Ecological and Technical Safety. Fly-tipping shall not be permitted. Loads must be deposited solely at authorized tips. Deposition shall be carried out in accordance with the requirements of Local Authorities. To prove the correct depositing of excavated material and to prevent the occurrence of fly-tipping, daily logs of all spoil removed from site by lorry shall be maintained and kept available both on site and at the authorized tips deposition for inspection by the relevant authorities.	Number of fly-tipping / daily logs of all spoil removed from site, with precise GPS location	Contractor, under the authority of the Construction Supervisor of the PIO.

Potential issues / Impacts	Mitigation / management measures	Impact / performance indicators	Implementation responsibilities
Supply of backfilling and construction material.	The pebbles borrow pits have to be devoided of vegetation (bare gravel strands). After extraction, they will be filled with spoils or secured with gentle slopes in order to avoid accidents.	Daily logs of all backfilling material carried to site, with precise GPS location	Contractor, under the authority of the Construction Supervisor of the PIO.
Visual intrusion. During the construction period, the visual quality is usually poor, because of material stockpiles, waste depots, prefabricated offices and construction machines.	Keep the site reasonably free from all unnecessary obstructions and store or dispose of any constructional plant and surplus materials and clear away and remove from the site any wreckage, rubbish or temporary works no longer required. After the completion of the works, immediately clear the work site from all materials, dust and rubbish.	Visual inspection	Contractor, under the authority of the Construction Supervisor of the PIO.
Access and safety issues related to truck traffic and construction machinery.	Take all the necessary arrangements and precautions during the execution of the works to avoid disturbance to the public, any reason that may prevent the access or the use of the public & private roads, footpaths, or properties. Use the suitable and appropriate means of transport, and take all necessary arrangement and precautions to avoid any damage or destruction to the public roads or bridges located on the route from and to the work site. Implement the necessary procedures to secure the work site to prevent any accidents through construction of temporary fencing around the site in an appropriate height and type. Bear the responsibility to guard and secure the work site during night and daytime (24 hours / day), provide the necessary lighting thereto, and fire protection and fire-fighting equipment. In general, take all necessary procedures and precautions to prevent injuries or death cases for the workmen or any other person.	Number of emergency events recorded / number of emergency events treated (based on Environment Incident Forms)	Contractor, under the authority of the Construction Supervisor of the PIO.
Occupational hazards	Safety to workers and the public shall be enhanced by: (i) Proper briefing and training of workers on safety precautions, and their responsibilities for the safety of themselves and others; (ii) Provision to workers of protective clothing including hard hats, and protective footwear; (iii) Ensuring plant and vehicle operators are properly licensed and trained; (iv) Arranging for the provision of first aid facilities, readily available trained paramedical personnel, and emergency transport to the nearest hospital with accident and emergency facilities, and allocation of responsibility for ensuring that these arrangements are continually in place; (v) Arranging for regular safety checks of vehicles and material, and allocation of responsibility for this; (vi) Provision of hazard warning signs around construction sites.	Number and frequency of accidents recorded	Contractor, under the authority of the Construction Supervisor of the PIO.
Communicable diseases: STI/HIV/AIDS, T.B., Dengue fever, scabies, bed bugs and other diseases and infections).	Clause on occupational health and safety measures. Distribute or request that the local health officer distribute information material and free condoms to his/her workers and the local sex-workers. Require that construction contractors maximize the number of local, residential workers, to minimize the risk to the local communities from imported labor.	Number of infections detected among the workers	Contractor, under the authority of the Social Safeguard Specialist of the PMO

Potential issues / Impacts	Mitigation / management measures	Impact / performance indicators	Implementation responsibilities
Employment opportunities for local communities	See recommendations of the reports on “Poverty, Social and Gender Assessment” and “Summary Poverty Reduction and Social Strategy”	Number of local employees on the construction works	Contractor, under the authority of the Social Safeguard Specialist of the PMO

244. All the mitigation measures related to the construction works will have to be included as specific environmental clauses (Particular Conditions) within the Contractual Documents of the construction company/companies. The bidders will have to incorporate all the resulting costs in their financial offer.

Table 24: Environmental management plan related to Pravaya-Vetka Canal n°5

Potential issues / Impacts	Mitigation / management measures	Impact / performance indicators	Implementation responsibilities
Potential damage to public or private properties and public facilities	The Contractor shall bear the sole responsibility of any damages that may occur during the work execution for the adjacent properties and buildings of the work site, and shall bear the direct responsibility, of any death, injuries, damages, stealing or losses whatsoever their type that may result due to his negligence, his agents, his workmen or the negligence of his sub-contractors during the work execution. The Contractor should maintain and protect all public utilities inside or adjacent to the work sites and should take the necessary measures to ensure their continuous operation without any damage therein even if the matter has necessitated supporting, suspension or diversion of these public utilities outside the work site. Items damaged or interfered with as a result of the works, as well as those removed to enable the works to be carried out, shall be reinstated to condition at least the same they had been at before the works had started.	Number of grievances submitted / number of grievances redressed	DWR Unit Head of the Project Implementation Office.
Water pollution from construction machines (accidental spill of oil from machinery), equipment and material stores, poor sanitation at work sites, release of soil and cement into surface water (canal).	Control measures for oily residues, lubricants and refuelling. Within the project detail planning, maintenance yards have to be designed. Dedicated drainages need to be considered that can capture run-off. Oily residues and fuel need to be captured at source and refuelling and maintenance must take place in dedicated areas away from surface water resources. Proper training of the machinists must ensure that refilling and oil changes are undertaken with utmost care and disposal of any residue from these activities. In case temporary work camps are required, construction of worker camps shall be located close to settlement areas but not near sensitive water resources. In such cases, the constructor needs to provide a detailed design of each work camp including infrastructure planning (water supply, electricity supply, waste management, wastewater treatment and disposal). Workers need to be trained how to behave and to handle waste and waste water according environmental management requirements.	Number of spill emergencies recorded / number of spill emergencies contained and cleaned (based on Environment Incident Forms)	Contractor, under the authority of the Construction Supervisor of the PIO. Randoml control by the SIETS.

Potential issues / Impacts	Mitigation / management measures	Impact / performance indicators	Implementation responsibilities
Air Pollution from earthworks, demolition/construction activities and transport (atmospheric pollutants, dust and cement), especially during the dry or strong prevailing winds periods.	Take all necessary precautions to prevent the occurrence of smoke emissions or fumes from the site concrete mixer plant or stored fuel oils, and drifting of such emissions and fumes into residential areas. In particular, the plant shall be well maintained and measures taken so as not to be left running unnecessarily for long periods when not directly in use. Not install any furnace, boiler or other similar plant or equipment using any fuel that may produce air pollutants without the prior written consent of the State Inspection on Ecological and Technical Safety. Instigate effective dust suppression measures as may be necessary to avoid creating dust nuisance arising because of the works on site. Construction materials (sand, gravel, and rocks) and spoil materials will be transported by trucks covered with tarpaulin.	Number of grievances submitted / number of grievances redressed	Contractor, under the authority of the Construction Supervisor of the PIO.
Noise and vibration from trucks and construction machinery.	Consider noise as an environmental constraint, which must be addressed in the planning and execution of the works. Take all reasonable measures to reduce noise to a minimum. Take all necessary measures to ensure that the operation of all mechanical equipment and construction processes, on or off site, shall not cause any unnecessary and excessive noise which may disturb any occupant of nearby dwellings, schools, hospitals, or premises with similar sensitivity to noise. The construction works will be limited to daytime (8 am to 8 pm) and will be prohibited in weekends.	Number of grievances submitted / number of grievances redressed	Contractor, under the authority of the Construction Supervisor of the PIO.
Wastes from construction activities are mainly sediments extracted from the canal (1,600 m3). Disposal of these materials on land may cause destruction of plants, loss of vegetation, unsightly view and other nuisances to the local community.	Remove from the site all excavated material, spoil, surplus materials and rubbish from whatever on-site source and, except where otherwise specified in the Contract, make arrangements for their disposal. Comply with any legal requirements applying to disposal of any contaminated spoil. The process of classifying waste types, stockpiling of waste at site, transportation and disposal of waste shall be subject to the approval/review of the State Inspection on Ecological and Technical Safety. Fly-tipping shall not be permitted. Loads must be deposited solely at authorized tips. Deposition shall be carried out in accordance with the requirements of Local Authorities. To prove the correct depositing of excavated material and to prevent the occurrence of fly-tipping, daily logs of all spoil removed from site by lorry shall be maintained and kept available both on site and at the authorized tips deposition for inspection by the relevant authorities. Spoils generated by excavations will be disposed of in the Shaidan downstream floodplain. The disposal site has to be devoid of vegetation (bare gravel strands). The deposits will be spread out so as not forming a mound. The site used to provide the backfilling material could also be used for the disposal of the spoils. In that case, the spoils will be temporary stockpiled, and the area used for the temporary deposit will then be restored.	Number of fly-tipping / daily logs of all spoil removed from site, with precise GPS location	Contractor, under the authority of the Construction Supervisor of the PIO.
Supply of backfilling and construction material.	The backfilling material required for the construction works will come from the Shaidan floodplains. The borrow pits have to be devoided of vegetation (bare gravel strands). After extraction, they will be filled with spoils or secured with gentle slopes in order to avoid accidents.	Daily logs of all backfilling material carried to site, with precise GPS location	Contractor, under the authority of the Construction Supervisor of the PIO.
Visual intrusion. During the construction period, the visual	Keep the site reasonably free from all unnecessary obstructions and store or dispose of any constructional plant and surplus materials and clear away and remove from the site any wreckage, rubbish or temporary works	Visual inspection	Contractor, under the authority of the

Potential issues / Impacts	Mitigation / management measures	Impact / performance indicators	Implementation responsibilities
quality is usually poor, because of material stockpiles, waste depots, prefabricated offices and construction machines.	no longer required. After the completion of the works, immediately clear the work site from all materials, dust and rubbish.		Construction Supervisor of the PIO.
Access and safety issues related to truck traffic and construction machinery.	Take all the necessary arrangements and precautions during the execution of the works to avoid disturbance to the public, any reason that may prevent the access or the use of the public & private roads, footpaths, or properties. Use the suitable and appropriate means of transport, and take all necessary arrangement and precautions to avoid any damage or destruction to the public roads or bridges located on the route from and to the work site. Implement the necessary procedures to secure the work site to prevent any accidents through construction of temporary fencing around the site in an appropriate height and type. Bear the responsibility to guard and secure the work site during night and daytime (24 hours / day), provide the necessary lighting thereto, and fire protection and fire-fighting equipment. In general, take all necessary procedures and precautions to prevent injuries or death cases for the workmen or any other person.	Number of emergency events recorded / number of emergency events treated (based on Environment Incident Forms)	Contractor, under the authority of the Construction Supervisor of the PIO.
Occupational hazards	Safety to workers and the public shall be enhanced by: (i) Proper briefing and training of workers on safety precautions, and their responsibilities for the safety of themselves and others; (ii) Provision to workers of protective clothing including hard hats, and protective footwear; (iii) Ensuring plant and vehicle operators are properly licensed and trained; (iv) Arranging for the provision of first aid facilities, readily available trained paramedical personnel, and emergency transport to the nearest hospital with accident and emergency facilities, and allocation of responsibility for ensuring that these arrangements are continually in place; (v) Arranging for regular safety checks of vehicles and material, and allocation of responsibility for this; (vi) Provision of hazard warning signs around construction sites.	Number and frequency of accidents recorded	Contractor, under the authority of the Construction Supervisor of the PIO.
Communicable diseases: STI/HIV/AIDS, T.B., Dengue fever, scabies, bed bugs and other diseases and infections).	Clause on occupational health and safety measures. Distribute or request that the local health officer distribute information material and free condoms to his/her workers and the local sex-workers. Require that construction contractors maximize the number of local, residential workers, to minimize the risk to the local communities from imported labor.	Number of infections detected among the workers	Contractor, under the authority of the Social Safeguard Specialist of the PMO
Employment opportunities for local communities	See recommendations of the reports on “Poverty, Social and Gender Assessment” and “Summary Poverty Reduction and Social Strategy”	Number of local employees on the construction works	Contractor, under the authority of the Social Safeguard Specialist of the PMO

245. All the mitigation measures related to the construction works will have to be included as specific environmental clauses (Particular Conditions) within the Contractual Documents of the construction company/companies. The bidders will have to incorporate all the resulting costs in their financial offer.

C. Environmental Monitoring Plan

246. Environmental monitoring must provide information about key environmental aspects of the subprojects, particularly the project environmental impacts and the effectiveness of taken mitigation measures. Such information enable an evaluation of the success of mitigation as part of project supervision, and allows corrective action(s) to be implemented, when needed. In this regard the EMMP identifies monitoring objectives and specifies the type of monitoring, and their link to impacts and mitigation measures.

247. The tables below show for each subproject component the monitoring prescriptions regarding the anticipated impacts and mitigation measures performances. What the impact/performance indicators in the environmental management plans were, here become the monitoring parameters of the environmental monitoring plan.

D. Site-Specific Environmental Management Plans (SEMP)

248. SEMPs will be developed during the detailed design phase and will be implemented prior to the start of the construction works. They will contain procedures and plans to ensure that the mitigation measures and monitoring requirements are implemented during the construction period.

249. The list of SEMPs to be required by the contractor is as follows:

- Waste Management Plan and Procedure (waste categories, handling and intermediate storage and transport, waste reuse and recycling, disposal);
- Surface Water Management Plan and Spill Emergency Procedure (spill categories, small spill intervention, large spill emergencies, spill kit materials, procedures for containment and clean-up, personnel training);
- Soil Management Plan and Spill Emergency Procedure (spill categories, small spill intervention, large spill emergencies, spill kit materials, procedures for containment and clean-up, personnel training);
- Noise and Vibration Management Plan (by category of vehicle/machinery/plant, procedures for limitation, personnel training);
- Atmospheric Emissions and Dust Management Plan (by category of vehicle/machinery/plant, procedures for limitation, personnel training);
- Visual and Cleanliness Management Plan (organization of the construction site, material and waste management procedures, personnel training)
- Health and Safety Management Plan (incident/accident categories, emergency kit material, procedures for risk reduction, personnel training);
- Damage Management Plan and Grievance Redress Procedure (damage categories, small/big damage intervention, registration, communication with owners/operators, grievance record and follow up);
- Environmental Inspection and Monitoring (environmental checklist, environmental inspection report, environmental incident form, monitoring of resource consumption);
- Environmental Training Plan (environmental induction awareness, environmental training, environment department staff, registration and filing).

250. The SEMPs will include the following monitoring requirements.

Table 25: Common monitoring requirements for all components of the subproject (construction period)

Potential impacts	Monitoring parameters/methods	Location	Frequency	Responsibility	Reporting
Damage to public or private properties and public facilities	Record of grievances from public or private owners.	Construction site	As needed	DWR Unit Head of the Project Implementation Office (PIO)	To the Project Director of the Project Management Office (PMO) in Bishkek
Water pollution	Visual inspection Record of spill emergencies	Construction site	Once per week Daily	Environmental safeguard specialist of the Project Management Office (PMO) in Biskek. Construction Supervisor of the PIO.	Filling up Environment Incident Forms
Air Pollution	Visual inspection Record of grievances from neighbourhood or farmers	Construction site and nearby houses/fields	Once per week Daily	Environmental safeguard specialist of the PMO. Construction Supervisor of the PIO.	Filling up Environment Incident Forms
Noise and vibration	Site inspection Record of grievances from neighbourhood	Construction site and nearby houses	Once per week Daily	Environmental safeguard specialist of the PMO. Construction Supervisor of the PIO.	Filling up Environment Incident Forms
Wastes from construction activities	Visual Inspection of all disposal sites Record of fly-tipping sites Daily logs of all spoil removed from site, with precise GPS location of disposal sites	Waste disposal sites	Once per week Daily	Environmental safeguard specialist of the PMO. Construction Supervisor of the PIO.	Filling up Environment Incident Forms
Supply of backfilling and construction material	Visual inspection of all borrow pits and quarries Daily logs of all backfilling material carried to site, with precise GPS location	Borrow pits and quarries	Once per week Daily	Environmental safeguard specialist of the PMO. Construction Supervisor of the PIO.	Filling up Environment Incident Forms
Visual intrusion	Visual inspection	Construction site	Once per week Daily	Environmental safeguard specialist of the PMO. Construction Supervisor of the PIO.	Filling up Environment Incident Forms

Potential impacts	Monitoring parameters/methods	Location	Frequency	Responsibility	Reporting
Access and safety issues related to truck traffic and construction machinery.	Visual inspection Record of grievances and emergency events	Construction site and transport routes	Once per week Daily	Health and safety specialist of the PMO. Construction Supervisor of the PIO.	Filling up Health & Safety Incident Forms
Occupational hazards	Visual inspection Checking training level of the workers Record of accidents	All sites	Once per week Daily	Health and safety specialist of the PMO. Construction Supervisor of the PIO.	Filling up Health & Safety Incident Forms
Communicable diseases	Checking awareness level of the workers Record of infections detected among the workers	Construction site or camp	Once per week	Health and safety specialist of the PMO.	Filling up Health & Safety Incident Forms
Employment opportunities for local communities	Record of local employees on the construction works and gender share	Construction site	Once per week	Environmental safeguard specialist of the PMO.	Environmental monthly reports

Table 26: Specific monitoring requirements for Mudflow Crossing Structure n°1

Potential impacts	Monitoring parameters/methods	Location	Frequency	Responsibility	Reporting
Construction period					
Water pollution	Ensure that works are carried out when the Pravaya-Vetka canal is empty (after the agricultural season).	Construction site	Before starting the construction works	DWR Unit Head of the PIO.	Give clearance for the commencement of the construction works
Loss of nesting sites in the mud walls of the gully.	Ensure that works are performed out of the nesting season Number of nest boxes installed and nesting birds	Construction site and surroundings	Before starting the construction works Once per month	DWR Unit Head of the PIO. Environmental safeguard specialist of the PMO	Give clearance for the commencement of the construction works Environmental monthly reports
The ditch may impair fauna movements	Compliance with the mitigation measure Inventory of the animals trapped in the ditch	Construction site	Once per month	Environmental safeguard specialist of the PMO	Environmental monthly reports
Disturbance of agricultural activities	Carry out the construction activities after the agricultural season.	Construction site	Before starting the construction works	DWR Unit Head of the PIO.	Give clearance for the commencement of the construction works
Loss of land for two farmers	Compliance with the mitigation measures and LARP	Farms	Before starting the construction works	Project Implementation Unit	LARP implementation report
Severance effect of the ditch	Compliance with the mitigation measures	Construction site	At the beginning of the construction works	Environmental safeguard specialist of the PMO	Environmental monthly reports
Operational period					
Fall hazard into the ditch	Compliance with the mitigation measures	Construction site	As the project moves forward	Environmental safeguard specialist of the PMO	Environmental monthly reports

Table 27: Specific monitoring requirements for Mudflow Crossing Structure n°2 (construction period)

Potential impacts	Monitoring parameters/methods	Location	Frequency	Responsibility	Reporting
River diversion into the canal during the construction works	Compliance with the mitigation measures	Construction site	Once per week Daily	Environmental safeguard specialist of the Project Management Office (PMO) in Bishkek. Construction Supervisor of the PIO.	Filling up Environment Incident Forms
Water pollution	Ensure that works are carried out when the Masy canal is empty (after the agricultural season).	Construction site	Before starting the construction works	DWR Unit Head of the PIO.	Give clearance for the commencement of the construction works
Disturbance to the restaurant's activity.	Record of grievances	Restaurant property	Once per week Daily	Environmental safeguard specialist of the PMO. Construction Supervisor of the PIO.	Filling up Environment Incident Forms

Table 28: Specific monitoring requirements for Mudflow Crossing Structure n°3 (construction period)

Potential impacts	Monitoring parameters/methods	Location	Frequency	Responsibility	Reporting
River diversion into the canal during the construction works	Ensure that works are carried out at the same time as Mudflow Crossing Structure n°2 Compliance with the mitigation measures	Construction site	Before starting the construction works Once per week Daily	DWR Unit Head of the PIO. Environmental safeguard specialist of the Project Management Office (PMO) in Bishkek. Construction Supervisor of the PIO.	Give clearance for the commencement of the construction works Filling up Environment Incident Forms
Water pollution	Ensure that works are carried out when the Pravaya-Vetka canal is empty (after the agricultural season)	Construction site	Before starting the construction works	DWR Unit Head of the PIO..	Give clearance for the commencement of the construction works

251. The SEMPs implementation will require the following implementation arrangements: the Contractor's Site Manager is responsible for the implementation of the SEMP at the construction site, based on legal requirements and IEE. To achieve this task, he mainly relies on the company's Environmental Officer. The Contractor's Site Manager must:

- Request the necessary Licenses and Authorizations that correspond to the environmental matter that will be affected by the Project.
- Carry out the control of the corresponding Licenses and Authorizations.
- Contract the necessary services to withdraw the waste generated by the Project (handling, haulage, dump, etc.)
- Control of the waste quality.
- Comply with the legal and environmental requirements that apply to the project.
- Assess everyday compliance with the requirements.
- Sign the Operation Control Sheets, in case of anomaly.
- Identify and Register any Non-Conformity that could happen regarding the environmental plan and implement the appropriate action when an incident occurs.
- Verify the implementation and efficiency of the implemented action.
- Act in case of emergency.
- Identify and register the external communications.

252. Under the responsibility of the Project Director of the PMO, monitoring of construction-phase impacts and mitigation will be integrated into the work plans of the PIO construction supervisors. Schedules of monitoring activities, procedures, and checklists to be used by these supervisors will be prepared in collaboration with them. On-the-job training and backstopping of PIO construction supervisors will be provided as required by the PMO environment safeguard and health & safety specialists.

253. The PMO specialists and PIO Construction Supervisor will be responsible for monitoring environmental impacts and proper implementation of the various preventive actions and mitigation measures required by the SEMPs. This will entail regular site visits to verify that environmental impacts are under control and appropriate preventive actions and/or mitigation measures have been implemented.

254. The State Inspection on Ecological and Technical Safety (SIETS), based on random inspections, will perform control activities. In order to raise awareness of the Department of Water Resources and Melioration of the Ministry of Agriculture, Food Industry, and Melioration (DWR) on environmental issues, its local representatives (Nooken District) should be trained to support the SEMP. As representatives of the affected people and member of the Grievance Redress Group, the Water Users Associations of the Pravaya-Vetka irrigation system will also play an important role in the EMMP implementation monitoring (grievance record).

255. Given the short duration of the construction period (18 months) the status of compliance with agreed environmental mitigation measures is to be reported by the PMO and PIO in monthly reports on project implementation. All the non-conformities (incidents) and the necessary actions to reduce the negative impacts and eliminate the non-conformity causes will be included in the report. The results of project monitoring and supervision will be recorded and maintained by the PMO throughout the life of the project. The PMO will report the results of its monitoring program in the periodic progress reports it submits to the MOA and ADB; Bank supervision missions will review the results of the monitoring program on a regular basis.

E. EMMP Cost

256. The contractor has to take fully account of the EMP specifications and shall bear all the costs for its implementation in the framework of its Environmental Management System (EMS). As such, he shall make a provision in its financial proposal for all costs incurred by the necessary measures to avoid, reduce or compensate all environmental impacts related to the subproject construction works.

257. The monitoring costs are included in the PMO and PIO staff costs. For information, the cost of the Environmental Specialist within the PMO amounts $ 22,500 for the whole Project duration.

258. The EMMP costs referred to in the present section are those likely to increase the initial cost as estimated in the feasibility study report. They mainly concern Mudflow Crossing Structure n°1, as the other subproject components deal with the replacement/rehabilitation of existing infrastructure and therefore do not create new impacts compared to the present situation, apart from the construction period.

Table 29: Cost of the mitigation measures

Project Component	Mitigation measure	Quantity	Unit cost ($)	Cost estimate ($)
1	Nest boxes	12	5	60
1	Security fences along both upstream and downstream ditches	560 m	5	2,800
1	Slope of the walls of the ditch connecting the mudflow crossing structure to the river floodplain not exceeding 1/1	10% extra cost		6,000
1	Financial compensations to the two farmers: based on the harvest value for one year for the loss of corn and rice fields, based on market value for the two trees, and based on the full replacement cost for the fence.	Lump sum (see LARP)		753
1	Bridge over the ditch downstream the crossing structure	Lump sum		48,860
2 and 3	Temporary pipe culvert to keep an instream flow during the works	2	3,500	7,000
2	Provision for tree plantation in the restaurant's property	3	3	9
			TOTAL	65,500

259. The cost of the mitigation measures amounts to 3.5% of the initial total cost of the Pravaya-Vetka subproject.

X. CONCLUSION AND RECOMMENDATION

260. Lands allocated for the Pravaya Vetka irrigation system refers to lands of long-time or permanent allotment for agricultural purposes. Where vegetation and topsoil is being transformed, numerous facilities are being built; the lithogenic basis (compaction, soil withdrawal), terrain, hydrological regime undergo radical changes. These lands are territories for an undefined period of time taken out of the habitat/living environment. In this context, the fauna and flora in the irrigation system area is poor, and is represented mainly by species of the so-called "cultural landscape". The habitats of notable species of mammals and birds are located at a safe distance from settlements and agricultural lands.

261. In general, the construction/reconstruction and operation of the Pravaya-Vetka subproject components will not lead to changes in the species communities and will not affect the general state of the populations. Therefore, there is no threat to biodiversity as a whole. The level/degree of impact is rather low, the area is characterized by high human-induced pressures and density of population, and intensive agriculture.

262. Although the environmental survey of the canal has identified a number of potential impacts associated with the operation and maintenance of the canal, the use of good construction practices and simple and affordable mitigation measures will ensure that these impacts are not significant and do not affect the feasibility of the proposed project.

263. The environmental consequences of the proposed subproject components will include:

- Moderate loss of vegetation cover;
- Moderate fragmentation of habitats (mudflow crossing structure n°1);
- Low risk of damage to species that need protection (e.g. Turkestan catfish);
- Low risk of biodiversity loss;
- Minor impact on landscape;
- Low level nuisances to the neighbourhood during the construction period (dust, atmospheric pollution, noise, traffic disturbances, etc.);
- Low greenhouse gas emissions;
- Low risk of exposure to health and safety risks.

264. Positive environmental and social impacts will include:

- Increase the safety level of irrigation water supply;
- Increase employment of local people;
- Potential reduction in the cost of agricultural products, leading to an improved quality of life;
- Potential reduction in the cost of irrigation, leading to increased competitiveness of farmers and entrepreneurs in the agricultural industry.

265. The application of proven, internationally accepted environmentally sound design solutions, good management and construction practices during the project implementation are sufficient measures to avoid, minimize, mitigate and compensate almost all potentially significant adverse effects of the impact on the environment.

266. There are however two notable potential impacts requiring special attention:

- Two components of the subproject (mudflow crossing replacements) will impact a small watercourse, the Shaidan river. This river has no specific protection status, but it hosts a fish listed in the Kyrgyz Red Book of rare or endangered species, the Turkestan catfish. Even if this species is not endemic to the Shaidan river, everything must be done to make sure that this species and its habitat will be as less disturbed as possible during and after

the construction works. Hence, during the works, pollution risks must be minimized and the river continuity has to be maintained through an instream flow.

- One component of the subproject (construction of a mudflow structure over the Pravaya-Vetka canal) will impact two farms. Though the loss of land is minimal (0.15 ha), adequate compensation has to be agreed upon with the two farmers and a bridge has to be built to avoid any severance effect.

XI. MAIN BIBLIOGRAPHICAL REFERENCES

1) The Law of the Kyrgyz Republic *On Environmental Protection*, of June 16, 1999, No. 53 (as amended by the Laws of the KR of February 4, 2002 No. 22, June 11, 2003 No. 101, 11 August 2004 No. 113, August 6, 2005 No. 124).
2) Law of the Kyrgyz Republic *On the Protection of Atmospheric Air* of June 12, 1999 No. 51.
3) Law of the Kyrgyz Republic *On Environmental Expertise* of June 16, 1999 No. 54.
4) Health protection zones and sanitary classification of enterprises, structures and other facilities approved by the Government of the Kyrgyz Republic on April 11, 2016 No. 201.
5) Zoology of vertebrates. S.P. Naumov. M., Publication *Prosveshenije*, 1973.
6) Encyclopedia. Kyrgyz Soviet Socialist Republic, Academy of Sciences of the Kyrgyz SSR, Frunze, 1982.
7) Reference dictionary on physical geography. A.I. Soloviyev, G.V. Karpov. M., *Prosveshenije*, 1983.
8) Soviet Encyclopedic Dictionary, M, Soviet Encyclopedia, 1983.
9) Illustrated Encyclopedia of Birds. Jan Gaznak. Prague, Artiya, 1985.
10) Rare and endangered animals. I.P. Sosnovskii. M., *Metallurgija*, 1987.
11) The determinant of weed plants in Kyrgyzstan. Frunze. Kyrgyzstan. 1989
12) Reference dictionary and a list of normative and technical documentation on environmental protection. 1990
13) Encyclopedia. Kyrgyz land. Kyrgyz SSR Academy of Sciences. Frunze. 1990 (in Kyrgyz language)
14) A big dictionary of geographical names. Yekaterinburg. *U-Factorija*. 2003
15) Forest types of the Kyrgyz Republic. Bishkek. INTERCOOPERATION. 2008
16) Cadastre of the genetic fund of Kyrgyzstan. Volume 4. Institution for Biology and Soil of the National Academy of Sciences of the Kyrgyz Republic. Bishkek. 2015
17) http://www.meteo.ktnet.kg - Official website of the Hydrometeorological Service of the Kyrgyz Republic.
18) http://mes.kg/ru/ - Official website of the Ministry of Emergency Situations of the Kyrgyz Republic.
19) http://nooken.kg/. Official website of Management in Nooken District © - 2015 – 2018.
20) Landscape-geoecological rationale for optimizing water use in irrigated land in the Fergana Valley. Nikanorova A.D. Moscow State University. Moscow 2015
21) Analysis of the distribution of water resources in conditions of irrigated agriculture in the Fergana Valley. Nikanorova A.D. Moscow State University. Moscow 2015
22) Illustrated Encyclopedia of Birds. Jan Gaznak. Prague, Artiya, 1985.
23) A big dictionary of geographical names. Yekaterinburg. *U-Factorija*. 2003
24) Fedjanina T.F. Experience of semi-voluntary pheasant breeding in Kyrgyzstan and prospects for their re-acclimatization // Acclimatization of animals in the USSR. Alma-Ata, 1963. pp. 198-200.
25) Shnitnikov V.N. Birds of the Semirechye. M. - L., 1949.

26) Gabuzov O.S. (ed.) Artificial breeding of pheasants (methodical recommendations). Central Scientific Research Laboratory of Hunting Industry Management and Reserves of the Russian Federation. Moscow, 1987. 142 p.

27) Maskudov A. Soils of Central Fergana. Ed. Fan, Tashkent, 1979, 119 p.

28) http://www.stat.kg - Official website of the National Statistical Committee of the Kyrgyz Republic.

29) National report on the state of the environment of the Kyrgyz Republic. Approved by the Decree of the Government of the Kyrgyz Republic of December 19, 2016 No. 549-p.

30) Resolution of the Government of the Kyrgyz Republic On the approval of lists of rare and endangered species of animals and plants for entry into the Red Book of the Kyrgyz Republic (As amended by Resolution of the Government of the Kyrgyz Republic No. 471 of July 25, 2009).

31) Turdakov F.A. Fishes of Kyrgyzstan. 1963.

Appendices

Appendix 1 – Rapid Environmental Assessment (REA) Checklist of the Pravaya-Vetka Subproject

Rapid Environmental Assessment (REA) Checklist **IRRIGATION**

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Siting Is the Project area adjacent to or within any of the following environmentally sensitive areas?			
• Protected Area		X	
• Wetland		X	
• Mangrove		X	
• Estuarine		X	
• Buffer zone of protected area		X	
• Special area for protecting biodiversity		X	
B. Potential Environmental Impacts Will the Project cause…			
• loss of precious ecological values (e.g. result of encroachment into forests/swamplands or historical/cultural buildings/areas, disruption of hydrology of natural waterways, regional flooding, and drainage hazards)?		X	
• conflicts in water supply rights and related social conflicts?		X	See Social Development Report
• impediments to movements of people and animals?	X		
• potential ecological problems due to increased soil erosion and siltation, leading to decreased stream capacity?		X	
• Insufficient drainage leading to salinity intrusion?		X	
• over pumping of groundwater, leading to salinization and ground subsidence?		X	
• impairment of downstream water quality and therefore, impairment of downstream beneficial uses of water?		X	
• dislocation or involuntary resettlement of people?		X	
• potential social conflicts arising from land tenure and land use issues?		X	See Social Development Report
• soil erosion before compaction and lining of canals?		X	
• noise from construction equipment?	X		
• dust?	X		
• labor-related social problems especially if workers from different areas are hired?		X	
• waterlogging and soil salinization due to inadequate drainage and farm management?		X	
• leaching of soil nutrients and changes in soil characteristics due to excessive application of irrigation water?		X	
• reduction of downstream water supply during peak seasons?		X	

• soil pollution, polluted farm runoff and groundwater, and public health risks due to excessive application of fertilizers and pesticides?		X	
• soil erosion (furrow, surface)?		X	
• scouring of canals?		X	
• logging of canals by sediments?		X	
• clogging of canals by weeds?		X	
• seawater intrusion into downstream freshwater systems?		X	
• introduction of increase in incidence of waterborne or water related diseases?		X	

Appendix 2 – List of People Met During the Field Visit

List of people met by the Environment and Social Development Specialist team: 27-30 March 2018 *JALAL-ABAD* OBLAST /REGION *Nooken* and *Bazar Korgon* Rayon/ District			
Pre-fix	Name	Organization and Position	Contact information
Water Resources Management Department Jalal-Abad Oblast, Nooken Rayon			
Mr.	Orozbaev Jainak Khavytovich	Chief Engineer of Jalal-Abad Basin	0 770 06-06-15
Mr.	Kadyrbek Sheralievich Kudaiberdiev	Director	0773 044 995
Mr.	Kazimjan Myrzahmedov	Chief Engineer	0 771 61-52-84
Mr.	Pazul Djalalov	Head of the repair and construction department	0 772 22-74-25
Mr.	Mahkam Mashrapov	Head of the Nooken Rayon	0 770 24-71-10
Mr.	Beksultan Ryskulov	Engineer of the repair and construction	0 779 59-33-00, 0 505 59-33-00 Emai: suli312@mail.ru
Water Users Associations			
Mr.	Marat Kadyrbekov	Director of "Aral-Say" WUA	0 553 08-80-76
Mr.	Gairat Bodoshev	Deputy Director Toymonku WUA	0 773 88-66-44
Mr.	Almazbek Manapov	Director of WUA Masy village	0 551 33-38-35
Mr.	Kamil Alimov	Engineer Murat-Murab WUA	0 771 14-91-71
Jalal-Abad regional department Sel-vodo zashita of the MoES			
Mr.	Nurali Abdujalilov	Jalal-Abad regional department *of MoES*	0 770 22-70-01
Mr.	Ergesh Aulkasimovich Bekbaev	Chief Specialist of Bazar-Korgon	0 777 15-11-81

A.O. Noken District, Jalal-Abad			
Mr.	Bolot Mamadaliev	Head of Aral A.O	0 555 05-90-02
Ms.	Gulshair Akmatova	Executive Secretary Aral A.O	0 773 54-50-37
Mr.	Tursunbay Joroev	Specialist in military registration of Aral A.O	0 555 23-94-22
Mr.	Dadashev Zakirjan	Aiyl Bashy /village leader; Seidikum A.O, Dunkur village, (near border)	
Mr.	Rashid Muminov	Deputy of the Head Seidikum A.O.	0 556 86-71-40
Mr.	Kurmabnbek Mamatov	Specialist on land issues of Masy A.O	0 773 24-24-80
Ms.	Aida Maksutalieva	Chief Specialist of the Social Department of Masy A.O	0 778 20-80-45,
Ms	Sanabar Amrakunova	Specialist of the Social Department of Masy A.O	0 772 56-73-19
Mr.	Melis Kalmurzaev	Specialist in military registration of Masyl A.O	0 773 38-62-00
Farmers:			
Ms.	Ziaydahan Ahmadjanova	Ak-Altyn 3, seed cooperative (Case story 1)	n/a
Ms.	Dilarom Kurbanohunova	Farmer, 'green house' (Case story 2)	n/a
Ms.	Turgunbubu Tashtemirova	Farmer, widow (Case story 3)	n/a
Mr.	Malik Abdukarimovich Beshbakov	Leading Engineer of Bazar-Korgon	0 773 56-49-11

Appendix 3 – Minutes of the Public Hearing

Project title: Climate Resilience and Disaster Risk Reduction in Water Resources

Minutes

Village Massy 13 June 2018

Venue: village Massy. Water Management Department of Nooken raion (district).

Number of participants – 35

Opening remarks at public hearings were made by the head of the District (raion) Water Management Department - K. Kudaiberdiev. He presented the programme and introduced the representatives of the project. Then he gave the floor to the national expert Musaev K.

K. Musaev, hydraulic engineer, made a presentation in which he told about the purpose of the project, gave information about works being conducted, and about future works.

Then, Zhanybek Orozaly Uulu, Environmental specialist, presented the environmental impact assessment process and the main potential impacts of the project to the participants.

Lastly, Azamat Omorbekov, Land Acquisition and Resettlement Specialist, made a presentation on the possible emergence of conflicts during the project implementation and what mechanisms and ways there are to resolve these conflicts.

After completing the presentations, they moved to questions and answers:

1. Arzybayev Zhanyshaly. Question: Before sand and pebbles did not flow in the canal Pravaya vetka, recently the canal is quickly filled up by sand and clay. Will the project address this issue?

Musaev K.'s answer: Of course, this issue will be considered by a project, there is a dirt collector (sediment trap) at headworks. Designers will examine a dirt collector (sediment trap), if necessary, additional construction will be included, and other possibilities will be considered.

Question: Village Sovetskoje is located at the head of the water (at the source of the water), but there is not enough water, since irrigating ditch/canal (which is laid from ranging point (or mark/station) - 72, passes through the village with a length of 3,5-4 km long. Therefore, in that connection, within the framework of your project will you move the bypass canal (or diverter)?

Answer: When the designers come, they will be accompanied by 2 engineers from district (raion) and many similar questions will arise and they will try to take into account everything.

2. Abdrakhmanov Choro. Question: Will the project consider the on-farm WUA network?

Answer: International experts are working on this issue and you will receive an answer in the near future.

3. Eshiev Mambet: The canal outlets (the diversions of water/bypass canal/modules) were built without taking into account the land areas that are located in front of the canal and in your project it is necessary to design new canal outlets/modules that will provide these lands with water, because all residents living along the entire canal should be equally provided with water. Secondly, when planning rehabilitation works, it is necessary to take into account the time when farmers use irrigation water and civil works should not create problems with water access.

4. Kudaiberdiev Kadyrbek: The water system has its own standards for the location of the canal outlets and it is necessary to follow these rules and regulations. Laying canal outlets to each house is prohibited. It is necessary to make canal outlets as in the past. If there is a need for additional canal outlets, then this will be considered.

5. Sultanov Makhamatali: There are 2 WUAs - Taimonku and Sakaldy-Suu - in Sakaldy rural council (ayil okmotu) and they are located at the end of the canal Pravaya Vetka. Before placing/laying out these canal outlets, it would be good to include their representatives in the commission to participate in the studies.

6. Eshiev Mambet: question to Koshmatov B.: When water reduces in the canal Pravaya Vetka, water is distributed in % and is it possible to reconsider the percentages of those WUAs that have been rehabilitated?

Answer: Cannot be reconsidered, because the goal of rehabilitation is to reduce losses, and improve the water supply and increase yields.

7. Myrzakhmedov Kazim: In times of collective farms and state farms (sovkhoz in Russian language), this water was enough for everyone, now the whole land is divided into proportions (as land allotments) and water delivery is very inconvenient, therefore we need to organize farmers' cooperative farms. Based on this, we would shift to a crop rotation and the distribution of water would be improved, the yield would increase.

At the end of the meeting, the chief engineer of Water Management Department of the Nooken raion (district) assured that they will try to work closely with the population, conduct awareness-building activities (advocacy works) and prevent conflicts. We think that there will be no obstacles for the project implementation.

Koshmatov B.T. summed up the results of public hearings and once again explained the purpose of the project, expressed great gratitude for the active participation of all those present.

The Chairman of the Hearing: K.Kudaiberdiev

Secretary: Sh.Bakirov

Appendix 4 – List of the Participants of the Public Hearing

LIST OF PARTICIPANTS

Preliminary public hearings

Project on: Climate Resilience and Disaster Risk Reduction in Water Resources Management

Date: June 13th, 2018 Venue:_____

СПИСОК УЧАСТНИКОВ

предварительных общественных слушаний

проекта «Устойчивость к изменению климата и снижение риска стихийных бедствий в управлении водными ресурсами»

Дата: 13 июня 2018 г. Место проведения: ……

№	участники	participants
1.	Г-н Мамытов Омурзак Начальник ремонтно-строительного отдела области Жалал-Абадского бассейнового управления водного хозяйства	Mr. Mamytov Omurzak Head of Maintenance and Construction Unit of Jalal-Abad Basin Water Management Department
2.	**Г-н Мырзахмедов Казимжан** Главный инженер Ноокенского районного управления водного хозяйства	Mr. Myrzakhmedov Kazimjan Chief Engineer of Nooken District(raion) Water Management Department (DWMD)
3.	Г-н Мадмаров Турдумамат Главный инженер Базар-Коргонского районного управления водного хозяйства	Mr. Madmarov Turdumamat Chief Engineer of Bazar-Korgon District Water Management Department
4.	Г-н **Шарабидин Бакиров** Главный специалист отдела поддержки АВП, Ноокенского РУВХ	Mr. Sharabidin Bakirov Chief Specialist of WUA support Division, Nooken DWMD
	Ноокенский район, Арал а/о	Nooken District, Aral a/o
5.	Г-н Болот Мамадалиев Глава айыл окмоту	Mr. Bolot Mamadaliyev Head of ayil okmotu
6.	Г-н Абдрашит Ахмеджанов Землеустроитель/специалист по ЧС	Mr. Abdrashid Akhmedzhanov Land surveyor/ Specialist on emergencies

7.	Г-жа Жамиля Машрапова Соцработник	Ms. Zhamilia Mashrapova Social/Community worker
8.	Г-н Марат Кадырбеков АВП Арал-Сай	Mr. Marat Kadyrbekov WUA Aral-Sai
9.	Г-н Кубаныч Сыдыков Фермер (м/ж)	Mr. Kubanych Sydykov Farmer (male/female)
	Ноокенский район, Массы а/о	Nooken District, Masy a/o
10.	Г-н Жаныбек Эшенкулов Глава айыл окмоту	Mr. Zhanybek Eshenkulov Head of ayil okmotu
11.	Г-н Курманбек Маматов Землеустроитель/специалист по ЧС	Mr. Kurmanbek Mamatov Land surveyor/ Specialist on emergencies
12.	Г-жа Аида Максуталиева Соцработник	Ms. Aida Maksutaliyeva Social/Community worker
13.	Г-н Алмаз Маматов АВП «Мурат»	Mr. Almaz Mamatov WUA Murat
14.	Г-н Мусрап Абжапаров Фермер (м/ж)	Mr. Musrap Abzhaparov Farmer (male/female)
	Ноокенский район, Ноокен а/о	Nooken District, Nooken a/o
15.	Г-н Жакшылык Эгембердиев Глава айыл окмоту	Mr. Zhakshylyk Egemberdiyev Head of ayil okmotu
16.	Г-н Сариев Кулназар Землеустроитель/специалист по ЧС	Mr. Sariyev Kulnazar Land surveyor/ Specialist on emergencies
17.	Г-жа Токтомуратова Канымгул Соцработник	Ms. Toktomuratova Kanymgul Social/Community worker
18.	Г-н Азим Абдиллаев АВП «Ноокен»	Mr. Azim Abdillayev WUA Nooken
19.	Г-н Кожомуратов Кадырбек Фермер (м/ж)	Mr. Kozhomuratov Kadyrbek Farmer (male/female)
	Ноокенский район, Сакалды а/о	Nooken District, Sakaldy a/o

20.	Г-н Махаматали Султанов Глава айыл окмоту	Mr. Makhamatali Sultanov Head of ayil okmotu
21.	Г-н Хамыт Адилет уулу Землеустроитель/специалист по ЧС	Mr. Khamyt Adilet uulu Land surveyor/ Specialist on emergencies
22.	Г-н Элбек Умаров Соцработник	Mr. Elbek Umarov Social/Community worker
23.	Г-н Урмат Эргешов АВП «Сакалды-Суу»	Mr. Urmat Ergeshov WUA Sakaldy-Suu
24.	Г-н Аким Исаков АВП «Таймонку»	Mr. Akim Isakov WUA Taimonku
25.	Фермер (м/ж)	Farmer (male/female)
	Ноокенский район, Шайдан а/о	Nooken District, Shaidan a/o
26.	Г-н Шергазы Аликулов Глава айыл окмоту	Mr. Shergazy Alikulov Head of ayil okmotu
27.	Г-н Эркин Токаев Землеустроитель/специалист по ЧС	Mr. Erkin Tokyev Land surveyor/ Specialist on emergencies
28.	Г-н Нурсейит Ырысбеков Соцработник	Mr. Nurseyit Yrysbekov Social/Community worker
29.	Г-н Чоно Абдрахманов АВП «Айкол-Суу»	Mr. Chono Abdrakhmanov WUA Aikol-Suu
30.	Г-н Токтобек Абласанов АВП «Шайдан-Кара-Ункур»	Mr. Toktobek Ablasanov WUA Shaidan-Kara-Unkur
31.	Г-н Тажибаев Турсунбай Фермер (м/ж)	Mr. Tazhibayev Tursunbai Farmer (male/female)
	Базар-Коргонский район, Кенеш а/о	Bazar-Korgon District, Kenesh a/o
32.	Г-н Рахман Омурзаков Глава айыл окмоту	Mr. Rakhman Omurzakov Head of ayil okmotu
33.	Г-н Баатыр Молдокулов	Mr. Baatyr Moldokulov

	Землеустроитель/специалист по ЧС	Land surveyor/ Specialist on emergencies
34.	Г-н Жанышалы Арзыбаев Соцработник	Mr. Zhanyshaly Arzybayev Social/Community worker
35.	Г-н Тойчу Эргешов АВП «Кенеш-Суу»	Mr. Toichu Ergeshov WUA Kenesh-Suu
36.	Г-н Мехманбай Турдиев Фермер (м/ж)	Mr. Mekhmanbai Turdiyev Farmer (male/female)
37.	Г-н Жаныбек Орозалы Уулу, специалист по охране окружающей среды	**Mr. Zhanybek Orozaly Uulu** Environmental Specialist
38.	Г-н Азамат Оморбеков, специалист по переселению	**Mr. Azamat Omorbekov** Resettlement and Indigenous People Specialist
39.	**Г-жа Зуура Мендикулова** специалист по социальным вопросам	**Ms. Zura Mendikulova** Social Development Specialist
40.	Г-н Кудретали Мусаев, гидротехник	Mr. Kudretali Musaev Hydrotechnics/ Water Engineer
41.	Г-н Баратали Кошматов гидротехник	Mr. Baratali Koshmatov Hydrotechnics/ Water Engineer