STATE WATER RESOURCES AGENCY
UNDER GOVERNMENT OF THE KYRGYZ REPUBLIC

"AGRICULTURE PRODUCTIVITY AND NUTRITION IMPROVEMENT PROJECT"

ENVIRONMENTAL MANAGEMENT PLAN
For WUA «Tilla-Suu» subproject rehabilitation, Kadamjai rayon, Batken oblast

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Content

ACRONYMS

WUA	Waterrusers Association
NSR	Night storage reservoir
SWRA	State Water Resources Agency
SAEPF	State Agency for Environmental Protection and Forestry
POL	Petroleum, Oil, Lubricants
HTS	Hydro-technical structures
SETI	State Ecological and Technical Inspectorate
AF	Additional Financing
CDN	Collector and drainage network
EC	Efficiency coefficient
KR	Kyrgyz Republic
IDA	International Development Association
AHE	Ameliorative Hydrogeological Expedition
Off-farm	Off-farm
LSGA	Local self-government authorities
ES	Environmental safety
FO	Environment
PIU	Project Implementation Unit
OIP	Second On-farm Irrigation Project
ISF	Irrigation Service Fee
SVL	Soil Vegetation layer
AISP	Agriculture Investments and Services Project
APNIP	Agricultural Productivity and Nutrition Improvement Project
RSU	WUA Rayon support union
RVK	District Irrigation Department (Rayvodkhoz)
SanPin	Sanitary Regulations and Rules
AAS	Agricultural Advisory Services
GWL	Groundwater level
O&M	Operation and Maintenance

1. Introduction

The Agricultural Productivity and Nutrition Improvement Project (APNIP) for the Kyrgyz Republic is implemented with the support of the International Development Association (IDA) and financed by the Trust Fund, provided by the Global Agricultural and Food Security Program.

The General Environmental Management Plan (EMP) was prepared under APNIP. The EMP is addressed to ensure compliance of the Subproject with the environmental management principles and practices and, therefore, with the requirements of environmental protection policy and laws of the Government of the Kyrgyz Republic, as well as the IDA environmental safeguards.

The objectives of environmental assessment (EA) is to identify the significant impact(s) of the proposed Subproject on the surrounding environment (positive and negative), identify appropriate preventive and mitigation interventions aimed at preventing, minimizing or eliminating any expected irreversible impact(s). The EMP serves as a management tool that ensures proper implementation of interventions to prevent and mitigate any environmental impact(s), as well as monitoring and institutional acknowledgment of recommended activities during the implementation of the proposed Subproject. The EMP also establishes the necessary institutional obligations, proposes the implementation timing of such activities, and cost estimates within the budget proposed by the Subproject.

APNIP, in the World Bank safety measures quality rating system (WBSMQRS), is classified as "B". No irreversible or significant impact(s) on the surrounding environment is expected.

Based on the general EMP, the Environmental Management Plan (EMP) for WUA «Tilla-Suu», Kadamjai rayon, Batken oblast, has been developed, considering the subproject specifics.

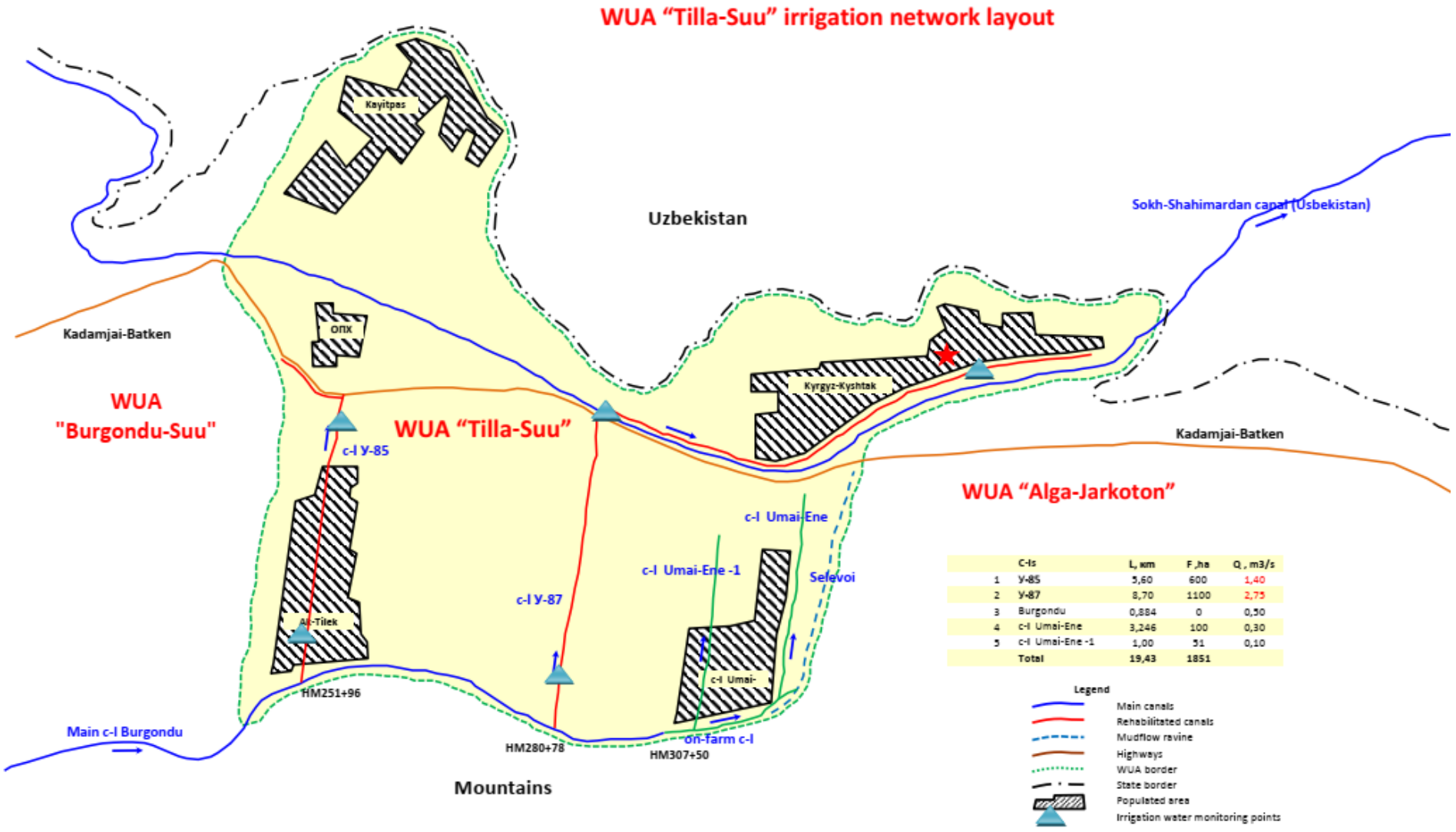

Image1. WUA “Tilla-Suu” irrigation network layout

2. Description of subproject under rehab

The WUA "Tilla-Suu" is located 60,0 km from off regional center of Batken city, at the territory of the Kyrgyz-Kyshtak Aiyl okrug, Kadamzhai rayon, Batken oblast, with AA population - 8 000 people.

The WUA “Tilla-Suu” established in 2002 under the Law "On Associations (Associations) of Water Users”. Certificate of registration of the Ministry of Justice dated 03.07.2003 reg. cert: №822-3309-АВП). The WUA service area - 1851 ha. The altitude of the terrain varies between 600-650 masl.

The WUA owns 31 farming entities, 14 individual farmers, 162 leases (AA redistribution fund),1156 household plots owners.

WUA`s annual water abstraction - 13 285,0 th/m³ from owned sources, average water efficiency - 0,62, and only -8 236,7 th/m³ reaching farmers' fields. The main agricrops cultivated - orchards, perennial grass, rice, maize, winter wheat, gourds, oil crops, potato, and vegetables.

The WUA`s irrigation network owns no NSR or dams and there is no CDN at the territory of WUA.

During the examination of the rehabilitated canals and the territory adjacent to them, it has been established:

1) The main ecological risks in WUA are related to mudflow ravines.
2) There are 1 mudflow canal are on the territory of WUA.
3) There is some vegetation cover along the canals that is the subject of uprooting/removal.

2.1. Salient features of Subproject under rehab

The on-farm irrigation network of WUA "Tilla-Suu" has a multibranch prefabs irrigation network. The prefab canals were built in the 1970s of the last century, so most of the prefab blocks are destroyed, as a result, there are significant technical water losses. The total length of on-farm canals - 19,430 km, of which 9,786 km are in reinforced prefabricated blocks, 5,224 km area in the concrete lining, the remaining 4,420 km are in earthen bed.

The prosperous financial position of the Soviet-era allowed proper maintenance of the canals and structures. With the beginning of agrarian reform in the early 1990s, when local farmers received land plots, the on-farm network was left out without owner for more than a decade, most of the concrete-lined and prefab canals were destroyed, canal throughput decreased sharply resulted in infiltration and technical water loss, and irrigation water distribution and metering worsened.

2.2. Description of interventions executed under Subproject

As part of the rehabilitation plan, it is expected to reduce water losses and improve overall water use efficiency. The planned increase in efficiency after rehabilitation of the WUA from 0,62 to 0.80 and 10 628,0 th/m³ of water will reach to farmer fields. This will allow increasing crop yields and due to this, WUA can increase the ISF, therefore funds for operation and maintenance of WUA irrigation network will increase respectively.

All canals will be reinforced with the necessary structures to facilitate the operation of canals (gauging station/HP, water outlets, bridge-crossings, etc.), which will give the canals an aesthetic appearance, create ease of use, and reduce the right-of-way zone under the canals.

2.1.1. Off-farm c-l Burgondu

The off-farm network is in good condition, there are no significant problems, but some rehabilitation measures are required to improve water supply in the WUA. WUA "Tilla-Suu" abstracts water from off-farm canal Burgondu (Sokh river system). Sokh). Off-farm canal

Burgondu is on the balance Kadamjai RVK and abstracts water from the Sokh River. The total length - 30,75 km and in concrete lining, command area - 8700 ha, throughput capacity- 18,8 m³/s.

Due to long-term operation, the headwater outlet is faulty. Water distribution and water metering is difficult due to the malfunction of turning well and gauging station/HP. Difficult passage for a vehicle due to the absence of the bridge crossing.

To improve water distribution and water metering the subproject planned the following (re) construction of headwater outlet, concrete section, gauging station/HP "fixed bed", turning well and bridge-crossing at HM280+78 (drainage У-87).

2.1.2. On-farm c-l У-87

C-l У-87 abstracts water from off-farm canal Burgondu. Canal length - 8,70 km, of which 5,00 km in the concrete lining, 3,70 km in reinforced prefabricated blocks, 3,553 km needs to be under rehabilitation. The command area - 1100 ha, designed throughput - 2,75 m³/c.

Due to long-term operation, reinforced-concrete slabs are destroyed, resulting in technical water losses. Difficult water distribution due to faulty water outlets and turning well.

To prevent water losses, the subproject provides for monolithic concrete lining at length of 3553 m.

To improve water, discharge the subproject provides for the construction of 6 water outlets. Moreover, the construction of discharge structure and turning well.

2.1.3. On-farm c-l У-85

C-l У-85 abstracts water from off-farm canal Burgondu. Canal length is 5,60 km, of which 2,84 km in reinforced concrete blocks, 2,76 km in earthen bed, 4,091 km needs to be re(constructed). The command area - 600 ha, design water discharge - 1,40 m³/c.

Due to long-term operation, reinforced-concrete blocks are destroyed, resulting in technical water losses. Difficult water distribution due to faulty water outlets. There is no water accounting due to the failure of the water metering structure. Difficult passage for a vehicle due to the emergency condition of the bridge-crossing.

To prevent the water losses, the subproject, provide for monolithic concrete lining at length of 4091m.

To improve water, discharge the subproject provides for the construction of 9 water outlets. To improve water metering, the construction of the gauging station/HP "fixed-bed" is planned. The construction of 4 bridge crossings for passage transport planning. Besides, the construction of 2 turning wells.

The rehabilitation of the reservoirs and dams is not planned. Thus, the policy on irrigation dams and reservoirs (Dam safety - OP 4.37) is not applicable.

The construction workload deadlines: 2020-2021.

3. Description of environmental parameters of Subproject

3.1. Climate conditions

The area`s climatic specifications are introduced by the meteo-station "Kyzyl-Kya" and indicative with hot extended summer and short moderately cold winter:

- Average annual air T˚ +11,1º
- Absolute maximum of air T˚ +41.0º
- Absolute minimum of air T˚ -26.0º
- Average max annual air T˚ +31,8º
- Standard free of snow period 206 days
- The volume of annual precipitations 292 mm
- prevailing wind direction south-easterly direction

Average air humidity (at 1.00 pm)

- Average T° of the coldest month 59%
- Average T° of the hottest month 3%

The standard depth of soil freezing on an open surface (free of snow):

- Loam and clay 53,0 cm
- loamy sand, fine and silty sands 64,0 cm
- gravel, large and medium-sized sands 69,0 cm
- macrofragmental soil 78,0 cm

3.2. Landscape

The nature of the current terrain in the WUA "Tilla-Suu" is assigned to the northern spurs of the Alai Range and is rugged terrain. According to surface on the territory of the WUA, there is a geomorphological zone of the piedmont plains, which is genetically associated with the erosion-accumulative activity of rivers, streams and temporary flow paths. The absolute masl ranges from 600-650 m.

The facility is located on the territory of the Kyrgyz-Kyshtak ayil okrug of the Kadamzhai rayon. Off-farm canals are mainly designed with a slope from west to east, and on-farm canals - from south to north, the average slope of the area is ____ 0.03__.

3.3. Hydrology

The Sokh river is the main water source for lands of Kyrgyz-Kyshtak AO, Kadamjai rayon. The off-farm canal Burgondu provides WUA "Tilla-Suu" with irrigation water.

The Sokh River flows through the territory of Batken and Kadamzhai rayons, previously the left-bank tributary of the Syr Darya. Runoff is formed on the slopes of the Alai and Turkestan ranges in the area of their junction at the Matchinsky plexus of mountains. Flowing into the Ferghana Valley, the Sokh River diverges its water to fantail canals for irrigation purposes and does not reach the Syr Darya. The river length - 124 km, catchment area - 3510 km ^{2}. The Sokh system contains over 100 watercourses; the largest tributaries are Kojo-Ashkan, Garaty, Kyshtut, Gauyan. The main water source is the meltwater of glaciers and seasonal snow. The Sokh's water regime is referred to as the Tien Shan type of rivers with high water in the summer (from May to early October). The average long-term water flow 44 km off the river mouth is 42 m³/s.[1].

The average long-term flow of Sokh river

average monthly water runoff, m³/s												Q ave, m³/s	
I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**	**XI**	**XII**	**annum**	**veg.**
14,00	14,04	14,01	15,81	25,39	69,89	124,75	131,45	63,85	27,24	19,58	15,64	44,65	71,86

Average monthly runoff, thous.m³												Annual, thous. m³
I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**	**XI**	**XII**	
37498	33974	37801	40988	67996	181146	334130	352085	165491	72960	50743	41881	1 416 693

3.4. Geo-engineering conditions

The geological structure of the area, mainly, proluvialalluvial-diluvial deposits of the Middle Quaternary and Upper Quaternary age, and mainly represented by gravel-cobble

[1] Ramazan M. S. some features of the hydrological regime and hydrotechnical classification of rivers of the Kyrgyz Republic

sediments, with sand-gravel filler. The dry density of soil is 1,85 t/m3. Hand processing difficulty of gravel soil is classified as the III-construction category. The thickness of gravel soil is more than 10,0 m. On top of the gravel and pebble deposits are covered with loam and a vegetative layer 20-30 cm thick.

The soil is represented by serozem-like soil, which is spread in the piedmont plain zone within the absolute heights of 900-1020 meters. Typical serozems form in hot and arid climates under ephemeral desert-steppe vegetation.

The soil-forming material for typical gray soils is loess-like Quaternary loams. Serozem typical of mechanical composition is mostly medium and heavy loam. In terms of soil profile capacity, they are classified as low and medium soil[2].

The physical properties of loams are characterized by the following data:

- the natural moisture content of soil (by weight) 7,87%
- actual weight 2,71 g/cm3
- volume weight 1,61 g/cm3
- dry density 1,49 g/cm3
- plastic index 9,2
- maximum molecular moisture content 15,79%
- porosity ratio 0,815

The loams development difficulty is classified as the II-nd group. Standard weight value is up to 2,0 kg/sm^2 (SNiP IV-5-82). The depth of the groundwater layer is more than 90,0 m. The seismicity of the area under rehab - IX points.

3.5. Vegetation cover

Alongside the canals, there are trees and shrubbery cover. During the canal' rehab, it is necessary to uproot trees that complicate conducting workload, and which are within the alienation zone of water management structures. According to the requirements of the Water Code of the Kyrgyz Republic, art. 80 p. 3, while executing repair and rehabilitation works, the shrubbery cutting and forest cover felling within the alienation zones of water management structures and canals, as well as sanitary cutting and deadwood cutting, do not require permission from specially authorized state agencies/bodies. Before the commencement of work, the contractor shall inform the environmental protection agency of the forthcoming tree and shrub vegetation cutting to be conducted.

If rehabilitation works to-be-conducted on the sections that are not within alienation water management zones, then a tree and shrubbery cutting is subject to approval with authorized environmental protection agencies/bodies. Before the commencement of work, WUA has to get approval from authorized environmental protection agencies/bodies on tree and shrubbery cutting and the necessity of compensatory measures. During the re(construction) the soil vegetation layer will not be impacted.

4. Description of procedures related to regular operation works

4.1. Technical surveillance on canals and HTS condition

In the operational scheme activities, the paramount importance is paid to the timely conduct of preventive and rehab workload that exclude the probability of system failure, while complying to the rules of its operation. The main indicators of decent technical condition and reliable operation of the on-farm irrigation network are the provision of a designed canal's throughput, minimum filtration and performance specification water losses, absence of sedimentation, greenery overgrowing, collapse and canal's erosion.

[2] Geo-engineering data given from the working materials of the “Re(construction) of the WUA “Burgondu-Suu” irrigation system”, Kadamjai rayon, Batken oblast (PIU-OIP-2)

If the actual canal’s capacity corresponds to the estimated throughput, then the technical condition of a canal is good and considered as reliable. If there are 20 -25% throughput deviations, then a canal’s reliability is reduced, and the technical condition is an average. If the deviations are more than 25%, then a canal’s performance considered as unreliable and its technical condition is below the average.

To ensure a canal's throughput, it is necessary to conduct careful monitoring over water regulating structures. The water volumes regulating structures must be easily and reliably (re)adjusted and controlled. While operating water regulating structures, it is necessary to ensure that there is no water leakage through the water outlet gates and no canals' erosion and destruction on its structural parts.

The lined sections, expansion and joint sections construction of a canal are the subjects of constant surveillance. The damaged lining must be reworked immediately.

Daily maintenance of lined and unlined canals, facilities and equipment located on them, keeping them in good condition is reduced to the removal of vegetation and floating objects that block canals and lead to sedimentation in certain areas. During the maintenance, works are carried out to clean up structures and water distribution units from debris and ice, vegetation overgrowth and sedimentation.

A canal's lined sections must be of monolithic concrete and maintenance must be timely to prevent cracking. Particular attention must be paid to subsiding soils, as concrete lining on those soils is prone to cracks formation. A slight and gradual canal's base degradation, sometimes, leads to the formation of cracks on the lining that impossible to rehabilitate. In this case, the cracked and battered lining sections are cut down and reworked.

The joint sections of a canal, with prefabricated reinforced concrete slabs, are the subject of particular attention. Constant surveillance of which is necessary and, if there any urgency, must be treated with resilient water-resistant materials that can withstand a vegetation impact.

Within the prefabs, it is prohibited to dissolve various types of fertilizers that may destroy concrete. It is also not recommended the prefabs network operation if water flow temperature is below - 5…10°C. Therefore, in the process of preparing the network for winter, the whole canal’s route must be completely freed of water.

The livestock crossing and pasturing on canal’s dams and slopes is strictly prohibited. Life stock crossing and drinking points, etc. allowed on a special canal section only.

To monitor the quality of irrigation water and prevent a canal's sedimentation, the water samples must be regularly inspected by RSU WUA for the following indicators: turbidity, temperature, hydrogen index, and mineralization.

4.2. Preparing the on-farm network for the winter period

In the winter period, the on-farm irrigation network can be used for water charging irrigation, washing off and other types of winter watering, as well as for supplying water to the residential areas and livestock farms, filling up reservoirs. The control over canals and structures operation, in the winter, should be paid particular attention, as to prevent the formation of ice jams near bridges, crossings, etc. The trash racks that were set for the summer in front of water structures must be removed for the winter. When frosts are formed and HTS are covered with the ice, in this case, the ice must be chipped without disturbing the integrity of the structures and canal's lining/coating

4.3. Maintaining wood lines and access roads

Forest plantations alongside the canals are designed to protect canals from vegetation overgrowing, lowering the level of groundwater alongside a canal's route and reducing the adverse effect of wind force on agricrops. Alongside permanently embedded canals within a farming network that require constant desilting interventions, it is recommended to create, on the one side,

two-row or three-row strips of fast-growing trees and shrubbery. The distances between trees in the strip are 1....3 m, between bushes – 0,75.... 1 m with the distance between greenery strips of 1.5 .... 3 m.

The field and on-farm access roads on irrigated areas, as a rule, are ground roads. If they pass through silty loams and solonchaks, then a road is made of gravel or other coatings. Road maintenance is reduced to keeping the upper layer in good condition. The thickness of gravel coated roads is maintained within 8 ....10 cm. The roadbed condition is also the subject of maintenance and must be periodically planned and compacted. Roadside cuvettes and canals must be cleaned off dirt and vegetation. To improve water flow into cuvettes, the roadways must be made with slopes and with a slight lateral inclination from the middle to the cuvettes.

4.4. Repair works

The irrigation schemes are subject to repair works according to the annually developed and approved plans. In the irrigation and drainage systems operation practice, the current, major and emergency repair workload(s) are executed.

The current repair works executed annually including desilting of canals, removal of vegetation, strengthening and widening dams, cleaning berms, eliminating small landslides, collapses, rifts and sandpits, repairing damaged anchorages and canals' lining, repairing small damages of a structural parts While carrying out current repair works, a complex technical upgrading and modifying a structural construction is not included. The preventive (prophylactic) repair workloads include:

- Patching ratholes;
- Structural cracks maintenance after ice impact;
- Tightening fixing bolts;
- Drainage structures winterization etc.

The preventive repair and a significant part of the current repair, including desilting of canals, vegetation and landslides removal, a minor canal repair(s), repair of structures, buildings and other devices are performed annually without stopping the scheme's operation.

The major repair is executed, as required, within a few years' periods and includes repair workloads on a canal's sections, dams and parts of structure attrition and destruction, structural modification or replacement of certain elements and structural units.

The emergency repair is the rehabilitation of canals, dams, and structures or parts of them, destroyed as a result of natural phenomena (mudslides, floods, etc.), or violations of the technical operation rules, execution of all available material and technical resources and labor resources are mobilized for the execution of emergency repair.

Rehab and (re)construction workloads on on-farm network canals performed by WUAs contracting a construction company. Repair works expenses and operation of an on-farm network are annually provided by a WUA's budget.

4.5. Desilting of canals and vegetation removal

The solid particles of soil form sedimentation that moved around by water flow. When precipitated, they form stream-bed deposits. The content of solid particles, per water volume unit, characterizes the water flow saturation with sediments, or its turbidity.

Sediments, often, are formed as a result of soil wash-away in the catchment basin via snow/glaciers melting and rain waters. Partly the sedimentation is a product of a canal/river bed and bank erosion.

The largest bed sedimentation with pebbles and coarse sand observed and remain within the head section of a bulk water supply canal. The average-sized sediment particles washed into a canal's distribution network and even into an on-farm irrigation network. Silty fractions are washed in an irrigation network.

On average, about 80% of sediments remain in the off-farm canals network and about 20% inflow into an on-farm irrigation network. A canal's slopes have an impact on the sedimentation process if an inclination is too steep then about 60% of sediments washed in on-farm network and fields. Desilting executed on an annual basis and, if necessary, more often.

5. Environmental impact

The implementation of APNIP is addressed to provide economic, social and environmental benefits to farmers, farmer entities and local communities through WUA's development, the rehabilitation and modernization of irrigation and drainage infrastructures in projected areas. The experience of previous projects demonstrates the positive impact of the Project on the environment. Namely, this Project is aimed at reducing water losses in irrigation schemes, improving water management, scaling up agricultural productivity and improving soil fertility.

The Project workload requires compliance with some mandatory requirements, including strict compliance with noise reduction, air quality, timely removal of solid and liquid domestic waste, construction debris. The requirements for prevention of environmental pollution and negative impact on the population are provided by the Law of the Kyrgyz Republic "General Technical Regulations for Ensuring Environmental Safety in the Kyrgyz Republic", the Law "On Production and Consumption Wastes", the Law "On Protection of Atmospheric Air", SanPin "Noise in the workplaces, in premises of residential, public buildings and on the territory of residential buildings" the Governmental Decree of the KR, dated 11.04.2016. №201,

5.1. Expected positive environmental impact

The positive impact consists of:

- Lining the canals with monolithic concrete will reduce filtration in the canals, as a result, water losses will be reduced;
- Improved water resources management, consisting of construction and rehabilitation of water distribution and water-metering structures;
- Agricultural productivity increase;
- Improved soil fertility by increasing humus while applying an efficient irrigation schedule.

5.2. Potential negative environmental impact

At the same time, while executing irrigation network (re)construction works, there may be some potentially negative impacts on environmental protection conditions in the projected areas and require attention, preventive actions, and appropriate mitigation measures during planning, development, construction, operation, and maintenance.

While performing the planned irrigation networks rehabilitation works, no asbestos-containing materials will be used. It is necessary to mention that previously asbestos cement pipe crossings were used. But in the last years, they were replaced with structures of more inert materials. Thus, no issues concerning asbestos-containing materials are expected In the case(s) if asbestos-cement pipes will be detected, asbestos-containing materials will be stockpiled, transported and finally disposed of, and specific protective interventions will be executed under the hazardous wastes standards handling and disposal. For detailed information concerning the asbestos-containing materials removal, see section 10.

The potential negative impacts are relatively minor, and positive economic, social and environmental benefits far outweigh them in environmental assessment. The consideration of these impacts is given below.

5.3. Impact on climate change

The irrigation and drainage schemes rehab will enhance the agricultural and farming practices, improve materially-technical procurement, land-owning, pastures, and water management, resulting in productivity increase and adaptation to climate change, and sustainable use of natural resources.

Table 2. Assessment and ranking of environmental risks

Activities	Impact	Type	Duration	Term	Degree	Risk	Reversibility	Probability
Construction phase								
Construction site location	Soil contamination at a construction site as a result of storage, of construction and household waste, including liquid waste	Direct	Short-term	Immediate	Low	Low	Reversible	Average
	Surface water and groundwater contamination at a construction site, as a result of stockpiling of construction and household waste, including liquid waste	Direct	Short-term	Immediate or postponed	Low	Low	Reversible	Low
uploading of excavated soil during (re)construction works of new earthbed	the landscape degradation, destruction of the animal world habitat	Direct	Mid-term	Immediate	Low	Low	Reversible	Average
construction materials transportation, heavy machinery used	air pollution and noise impacting the population/workers while heavy machinery and vehicles in use	Direct	Short-term	Immediate	Low	Moderate	Reversible	High
Canals rehab	1) Damage and trees felling and shrubbery cutting 2) SVL removal	Direct	Long-term	Immediate	High	Low	Reversible	High
Operation and maintenance phase								
earth-bed canals and drains cleaning that in operation	the landscape degradation, destruction of the animal world habitat	Direct	Mid-term	Immediate	Low	Low	Reversible	Average

increase in irrigation water delivery, which increases the volumes of wastewater	surface water pollution with agrochemicals, as a result of excessive application of pesticides and mineral fertilizers	Indirect	Mid-term	Delayed	Moderate	Moderate	Reversible	Average
increase in irrigation water volumes delivery that leads to the water speed increase	Soil erosion, related to existing agricultural production practices and with an existing surface slope in WUA	Indirect	Long-term	Delayed	Moderate	Moderate	Reversible	Low

6. Environmental Management and Monitoring Plan.

All the (re)construction phase risks are easily monitored and eliminated. They can be minimized by properly designing mitigation measures and monitoring the Contractor while executing the workload. During the (re)construction works, trees felling and shrubbery cutting in a canal's alienation zone will be carried out under the requirements of the Water Code (art. 80, p. 3.) and in agreement with the specially authorized environmental protection agency/body. Excavated soil-vegetation layer will be transferred to the local authorities or WUA members to apply for agricultural purposes or/and landscape improvement.

Among the O&M risks, the risk of landscape and animals' natural habitat degradation, while cleaning earth-bed canals and drains, is clear and easily controlled. The risks of surface and groundwater pollution by agrochemicals, due to excessive use of pesticides and mineral fertilizers, soil erosion associated with the existing practices of agricultural production, an increase of near-surface/shallow groundwater table, due to excessive irrigation and, as a consequence, soil salinization, require specific monitoring. The need for environmental mitigation interventions, while on the O&M phase, is determined exactly in the process of environmental monitoring.

7. Health and safety at work

Under the KR`s legislation requirements, concerning occupational health and safety, as well as the World Bank protective policy, the EMP owns measures to protect health and safety during the (re)construction work under the Subproject, see Table 2.

Developed and approved by order №8/п of the PIU Director, dated March 16, 2018. The regulation "Requirements for environmental protection, occupational health, and safety to people involved in work and the provision of services at facilities implemented as part of the World Bank's project "Improving Agricultural Productivity and Nutrition" had been developed and approved by the PIU Director`s Order No. 8/p, dated March 16, 2018. The regulations are sent to all subcontractors involved in rehabilitation and (re)construction works under this subproject.

Control over compliance with safety at a (re)construction site will be executed by the PIU, state control executed by the State Inspectorate of Environmental and Technical Safety under the Government of the Kyrgyz Republic

Table 3: Mitigation plan

Phase	Subject	Preventive/mitigation activities	Cost, US $		Institutional responsibility		Control
			Installation	Operation	Installation	Operation	
Construction works	Organizing a construction site	1) It is forbidden to locate a (re)construction site in the water protection zones of rivers and canals; 2) Ensure removal of all waste and construction rubble from (re) construction sites to dispose on the authorized municipal landfills, with the permission of local authorities; 3) Execute planning and restoration measures to restore troubled lands during and after completing (re)construction	n/a	part of the (re)construction works contract 701,047	PIU/Contractor	Contractor	1) A Contractor bears the responsibility to execute environmental mitigation interventions; 2) A construction site inspections made by PIU; 3) State Ecological and Technical Inspectorate (SETI)
	soil after laying a canal`s route	1) soil transportation to the designated areas, approved by the local authorities; 2) executing rehabilitation and planning activities	n/a		PIU/Contractor	Contractor	1) A Contractor bears responsibility to execute environmental mitigation interventions; 2) A construction site inspections made by PIU; 3) State Ecological and Technical Inspectorate (SETI)
	1) Trees and shrubbery cover;	Coordination with the specially authorized environmental protection agency/body cutting greenery	n/a	part of the (re)construction works contract	PIU/Contractor	Contractor	1) A Contractor bears responsibility to execute

	2) SVL excavations	plantations that grow outside of a canal`s alienation zone; 2) SVL handled by WUAs or local authorities					environmental mitigation interventions; 2) A construction site inspections made by PIU; 3) State Ecological and Technical Inspectorate (SETI)
	Vehicular emissions into the atmosphere	1) vehicular exhaust systems and construction equipment should be in good condition, to minimize air pollution; 2) Limiting the speed of vehicles and selecting suitable transportation routes to minimize dust emissions; 3) Moisturizing the road surface while driving through the residential area territories	n/a	part of the (re)construction works contract	PIU/ Contractor	Contractor	1) A Contractor bears responsibility to execute environmental mitigation interventions; 2) A construction site inspections made by PIU; 3) State Ecological and Technical Inspectorate (SETI)
	Noise impact within labor area	Machinery and equipment operation	n/a	part of the (re)construction works contract	PIU/ Contractor	Contractor	1) A Contractor bears the responsibility to execute the safety of staff; 2) SETI on-site inspections;
	Work area safety	1) construction sites will be equipped with information and designator boards concerning working regulations and requirements; 2) easily accessible and complete first aid kit to treat an injury. 3) Workers' health and safety (helmets, protected shoes, gloves);	n/a	part of the (re)construction works contract	PIU/ Contractor	Contractor	1) A Contractor bears the responsibility to execute employee safety measures 2) SETI on-site inspections;

	Safety of local population	limiting access to (re)construction sites, zones and equipment locations by local citizens.	n/a	part of the (re)construction works contract	PIU Contractors	Contractor	1) A Contractor bears the responsibility to execute employee safety measures 2) SETI on-site inspections;
Operation	Threats to water quality due to contamination by agrochemicals	- best practices on pesticides application, - application of agrochemicals following recommended norms, - preventing effluent water discharge into canals and surface water objects, - outreach campaign - rational use of irrigation water and applying water regimes under the irrigation requirements,	n/a	n/a	AAS/AISP	WUA Members	RSU on-site inspection, approval and coordination with SETI RSU on-site inspection, approval and coordination with SETI RSU on-site inspections
	Increased of soil erosion	- Arrangement of irrigation furrows on the lowest slope (cross-cut furrows); - shortened furrows length; - altering irrigation technology (sprinklers, drip irrigation) - education on environmental mitigation activities; Compliance of irrigation norms and regulations.	n/a	n/a	AAS/AISP	WUA Members	
	Climate change impact		n/a				RSU on-site inspections

				n/a	AAS/AISP	WUA Members	

Table 4. Environmental monitoring plan

Project Phase	Parameter	Location	Method/Equipment	Frequency	Objective	Costs		Responsibility	
						Organization	Performance	Organization	Performance
Baseline	Salinity, the concentration of hydrogen ions (pH), water turbidity	upper and lower reaches of irrigation canal under rehab	Field equipment for parameters measurement	In the beginning, in the middle and at the end of vegetation season	Rehabilitation works and agricultural activities impact assessment	0	Insignificant	RSU	Water sampling/analysis.
Construction	Environmental Management Plan	subprojects under rehab	visual inspection of construction site	Before, during and after completion of construction	Ensure compliance with environmental protection measures	0	Insignificant	Contractor PIU	Contractor PIU
	Salinity, the concentration of hydrogen ions, turbidity	Canals under rehabilitation, located upstream and downstream of rehabilitation site	Field equipment for parameters measurement	Before, during and after (re)construction completion	Assessment of construction works impact	0	Insignificant	RSU	water sampling and analysis. Introduction of results to PIU
	Pollution of watercourses by petroleum, oil, and lubricants	When suspected of contamination. Downstream of rehabilitation subproject	Sample for laboratory analysis	During construction	Assessment of construction works impact	0	100 USD	Contractor	Accredited laboratory Water sampling and analysis. Introduction of results to PIU
Operation	Salinity, the concentration of hydrogen ions, turbidity	upper and tail reach of the irrigation system of Sokh river	Field equipment for parameters measurement	In the beginning, in the middle and at the end of vegetation season	irrigation and waster waters quality control	0	Insignificant	RSU	RSU

7. Stockpiling, transportation and disposal of asbestos-containing materials/wastes

Asbestos-containing materials disposal will be executed under the local legislation, including construction standards, occupational health and safety regulations, emissions of harmful substances into the atmosphere, disposal/removal of construction and hazardous wastes (in cases of a specific domestic legislation absence, the European Parliament Directive 2003/18/EU, which amends and updates the EU Directive 83/477/EEC on protection of workers against workplace exposure to hazards from asbestos and asbestos-containing materials: the air pollution thresholds are 0.1 fiber/cm³, and also use the recommended standards Notes: Asbestos: "Health problems at the workplace and in the community", the World Bank). The asbestos materials are subject to immediate unconditional disposal/entombment in special conditions.
By the Government of the Kyrgyz Republic's Order No. 885 "On Management of Hazardous Wastes in the Kyrgyz Republic, December 28, 2015," asbestos-containing wastes should be disposed of the following order:

- The process of handling hazardous wastes (waste lifecycle) consists of the following stages: generation, accumulation (collection, temporary storage, stockpiling), transportation, neutralization, recycling, reuse of processed products and disposal/entombment.
- If there is asbestos on a construction site, it should be marked as a hazardous material. Asbestos-containing materials should not be cut or destroyed, as this leads to dust formation. During the (re)construction, all workers should avoid crushing/destroying the asbestos-containing waste, store such waste(s) in designated areas on a construction site and properly dispose of thereafter in a special place or landfill.
- When asbestos-containing wastes are to be temporarily stored at a designated area(s)/construction site, they should be properly placed in sealed containers and marked appropriately as a hazardous material. Precautions must be taken to prevent unauthorized disposal of such wastes from a designated area/site.

7.1. Storage and stockpiling of wastes

- Asbestos-containing materials extraction should be minimized through the use of efficient technologies.
- All asbestos-containing materials should be recycled and disposed of by experienced specialists. The specialists are obliged to wear a protective outfit (face masks, gloves, uniform)
- The stockpiled wastes, on a designated area(s), should not exceed established volumes/requirements.
- The access roads for removal of industrial and construction wastes from a designated area(s) should not be obstructed.
- While handling asbestos-containing wastes, all operating staff members should wear a protective outfit (facemask, gloves, etc.). Before removal of asbestos waste (if necessary) the stockpiled area should be treated with a moisturizing agent to minimize the emission of asbestos-containing dust. Disposed asbestos should not be reused.
- Storage of inappropriate items, individual protective or working outfit is strictly prohibited at the designated asbestos waste(s) locations.
- During handling operations, all workers should strictly follow the asbestos treatment requirements, and health and safety requirements. All operations should be executed with the use of mechanized machinery, elevating and transportation equipment.
- Hazardous waste(s) should be transported by the superficially equipped Vehicles to the landfill locations, either contracted or owned. The Vehicles should be designed and used in such a way, as to prevent possible incidents, losses, and pollution of the environment, both on the way to the disposal site location, and during the (re)loading of waste from one vehicle

onto another. All types of handling and transportation of waste operations from/to the main and supporting facilities should be mechanized, and airtight equipment used. It is strictly prohibited, during transportation, to open the hazardous waste containers.

- Solid and dusty wastes are the subject of transportation in a specially designed container, equipped with gripping devices for (un)loading by cranes. The transportation of asbestos wastes on the open-bed vehicles and railway cars is strictly prohibited.
- The use of hooks and other sharp tools, while processing the waste, is strictly prohibited.
- The driver of the Vehicle, transporting hazardous waste and authorized accompanying staff only, are allowed on the Vehicle(s). The Driver(s) must be aware of safe transportation requirements. (During transportation asbestos waste)
- All handling, transportation, (un)loading and disposal of waste must be mechanized. The waste must be transported in such a way, as to prevent transport losses and impact on the environment.

7.2. Disposal of asbestos-containing wastes

- Asbestos-containing waste must be disposed of in municipal solid waste dumps or non-recyclable industrial solid waste damp-yards.

8. Legislative support

In the Kyrgyz Republic, there are some environmental protection laws, regulations, and requirements, which address the specific issues of environmental protection. Table 5 summarizes the legal norms relevant to the Subproject.

Table 5: The main subordinate legislation, regulations, and requirements

Legal authority	Legal mandate
Constitution (2010)	The state's ownership of natural resources, rights, and duties of citizens.
Water Code of the Kyrgyz Republic (2005)	It identifies the state policy, legislative and institutional basics on water resources management and protection
Law on environmental protection (1999)	It identifies state policy on environmental protection, legislative and institutional basics on water resources management and environmental protection
Law "General technical regulation on ensuring environmental safety in the Kyrgyz Republic" (2009)	The Regulation determines the main provisions of technical regulation in the field of environmental safety and establishes general requirements for ensuring environmental safety while designing and implementing interventions within economic and other types of production activities, storage, transportation, and product disposal.
Law on environmental expertise (1999)	It requires a review of environmental protection issues (environmental appraisal) and prevents negative environmental impacts and human health as a result of economic and other activities
Law on specifically protected natural reservations (2011)	It establishes regulations for specially protected natural areas, various types and/or levels of economic activity.
Law on the protection of atmosphere (1999)	It regulates emissions to the atmosphere and specific obligations on protection of the atmosphere
SanPin "Noise on the workplaces, in premises of residential, public buildings and on the territory of residential buildings" the	Establishes sanitary-epidemiological requirements, standardized parameters, and maximum permissible noise levels at (re)construction sites, noise classification, permissible noise levels in the Projected rooms, (re)construction sites, (re)constructed and operated

Governmental Decree of the KR, dated 11/04/2016. №201,	residential, public buildings and on the territory of residential buildings.
the GovKR. Provision No.224 of 03/05/2013. "On approval of fees for calculating the number of penalties for damages caused to objects of animal and plant life, mumijo-containing mineral materials and mushrooms by legal entities and individuals"	Fees designed to ensure the preservation of biodiversity, proper protection of flora and fauna

The Government of the Kyrgyz Republic ratified multiple international conventions on environmental protection and agreements, related to this Project:

- Convention on environmental impact assessment of the transboundary territories Espoo (2001);
- Agreement on cooperation in environmental protection and efficient use of natural resources (Kyrgyz Republic, Kazakhstan, Uzbekistan) (1998),
- Convention on wetlands, representing the international importance for the waterfowls' main habitat (Ramsar Convention) (2002);
- Convention on the right to use international watercourses as transport routes (1997), Agreement on the use of water structures for interstate purposes on the Chu and Talas Rivers (the Kyrgyz Republic and Kazakhstan) (2000);
- the United Nations Framework Convention on Climate Change (2000);
- Kyoto Protocol (2003).

9. Awareness rising campaign, consultations and public attendance

9.1. Public consultations

Under Operational Procedures OP4.01.[3] The WB has special requirements for disclosure of information and public consultations. The disclosure includes the introduction of information about the Project affected population (PAP) and other stakeholders, from the Project's early implementation cycle, and throughout the lifecycle of the Project, the information disclosure is intended to facilitate comprehensive interaction with the Project affected population, and stakeholders throughout the lifecycle of the Project.

Moreover, the Kyrgyz Republic is a member of the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, the United Nations Economic Commission for Europe, which also contains provisions for ensuring the disclosure of the objectives and environmental considerations of the subproject.

Public hearings in WUA "Tilla-Suu" were held on November 27, 2019, at Kyrgyz Kyshtak, Kadamjai rayon, Batken oblast, which was attended by 35 people; WUA representatives, local authorities, farmers, RSU WUA, design engineers, PIU.

The public hearings delivered general info of the subproject, as well as technical solutions and activities that will be undertaken to prevent and mitigate the impact(s). The minutes of Public Hearings, the list of participants and pictures, are attached.

EMP was uploaded on the APNIP webpage, "Reports on environment" section: http://apnip.water.gov.kg/en/reports/environmental-reports/.

9.2. Grievance redress mechanism (GRM)

[3] World Bank Project Operational Manual OP 4.01, «Ecological assessment», para.3.

Objective. The primary target of GRM and the population's statements is the identification, registry, and assistance in solving complaints that were stressed during the Project activities.

The GRM main principles are:

(i) Protection of Citizens' rights;
(ii) Transparency;
(iii) Accessibility to a free GRM mechanism and without follow-up prosecution;
(iv) Appropriateness, from the point of local cultural sensitivities view;
(v) Personal responsibility for the performance duties;
(vi) Accountability of during the GRM consideration and applications by the PIU.

Complaints and applications filed under the established procedure are subject to a mandatory review, refusal to admit is not allowed. Complaints and applications of citizens, without indication of the name and postal address, to which the reply should be sent, are considered anonymous and are not subjected to revision.

The GRM does not hinder the right of citizens to applying to the Judiciary authorities. Citizens have the right to apply to the court, or other state bodies for the resolution of emerging issues related to the violation of their rights emerged under the Project.

For the GRM implementation, the PIU and WUA created a register of complaints and statements from the population. Moreover, anyone can apply to the PIU in an online format at https://mail.rambler.ru/m/redirect?url=http%3A//apnip.water.kg/%25D0%25BE%25D0%25B1%25D1%2580%25D0%25B0%25D1%2589%25D0%25B5%25D0%25BD%25D0%25B8%25D1%258F-%25D0%25B8-%25D0%25B6%25D0%25B0%25D0%25BB%25D0%25BE%25D0%25B1%25D1%258B/&hash=8ef50d487d10168e5d891f2d9dd443cd

9.2.1. The general processing of a complaint

- In the process of the assets assessment, PAP will be introduced to the information concerning filing and reviewing the procedure.
- The first step in the process of handling complaints will be a personal verbal appeal to the Subproject representative, local authority, or by phone (the mobile phone number will be provided on the information board of AO's office, and also posted in ads in places frequented by the population). If the problem cannot be resolved within 5 days, consideration of the complaint will be done at the next level.
- An aggrieved person can file a complaint on the issue related to the process of resettlement or compensation, in writing from, to the PIU APNIP Director. A complaint must be signed and dated by an aggrieved party. The APNIP social affairs consultant will maintain a direct link with the PAP. The PIU will determine the validity of a complaint and notify an aggrieved person that he/she will be assisted. The answer will be provided within 14 working days, during which meetings and discussions will be held with an aggrieved person.
- If a complaint concerns an asset assessment at the expense of the Subproject, a secondary or even a third assessment of an asset will be carried forward until it is accepted by both parties. The follow-up assessments can also be carried forward by an independent appraiser(s) at the expense of an aggrieved party. The PIU will assist to an aggrieved party at all stages to resolve a complaint and ensure that a complaint is treated the best-of-breed.
- If, after receiving a response from the PIU, an aggrieved party remains unsatisfied, then a complaint is considered in the working group of the Project under AO, which will be established by the head of AO's resolution, from the members of the Local AO deputies, WUAs representatives, local dignitaries, and the PIU specialists.
- In case of an objection, regarding the working group decision, which is provided within 30 working days, the PAP may appeal to the court.

9.2.2. Management of registered complaints

A local representative of the Subproject should ensure a weekly transfer of received complaints from the PAP to the PIU, as well as the first instance consideration result(s). The local authorities should work with complaints under the established order and should file the complaints and proposals in the processing registry.

The PIU upon receipt of information, the social consultant should ensure that each complaint has an individual identification number and a progress report in reviewing each complaint reflected in the FRP, which identifies a person(s) responsible for each complaint and recording the dates of the following events:

- the date of filing a complaint;
- the date of entering a Complaint(s) Registry in the Project database;
- the date when the information on the proposed solution measure(s) was sent to an aggrieved party (if applicable);
- the response date to an aggrieved party.

The general information on complaints received (number, type of complaint), progress in resolving it and problems encountered, should be included in the Subproject's periodic reporting submitted to the World Bank.

10. The minutes of Public hearings

The minutes of public hearings on environmental protection and social issues in WUA «Tilla-Suu», Kadamai rayon, Batken oblast, under "APNIP" World Bank.

Kyrgyz-Kyshtak A/O **27 November 2019**

Attendees:
Neronova T.I. - environmental consultant APNIP;
Anipaev. K. -engineer in south region APNIP PIU;
Zinina O.V. -environmental specialist PIU APNIP
Kuluev I.K. - WUA Director "Tilla-Suu";

The public hearing was attended by 35 people; water-users, representatives from farming entities, WUA members. The list of attendees is applied.

Chairperson -Kuluev I.K.

Anipaev K.– engineer in south region APNIP PIU, introduced the information about the projected (re)construction works for the on-farm network under APNIP.

Neronova T. I. - has explained about the Kyrgyz Republic's environmental legislation requirements and the World Bank's policy on environmental protection under the Project.

The task of environmental assessment is to identify the Project's significant impact on the environment (positive and negative), identify appropriate preventive measures and mitigation measures aimed at preventing, minimizing or eliminating any expected irreversible impact(s).

The experience of previous projects demonstrates the positive impact of the Project on the environment. Many positive impacts of projects have been identified during the environmental assessment. Namely, this Project is aimed at reducing water losses in irrigation schemes, improving water management, scaling up agricultural productivity and improving soil fertility.

At the same time, while carrying out civil works on (re)construction of irrigation networks, there may be some potentially negative impacts on environmental protection conditions in projected areas that may need attention, to undertake preventive actions and appropriate mitigation measures during planning, development, construction, operation, and maintenance. The potential negative impacts are relatively minor, and positive economic, social and environmental benefits far outweigh them in environmental assessment. The consideration of these impacts is given below.

The main impact(s) that can be seen as a result of the (re)construction works:

1) Soil pollution on construction sites.
2) Groundwater pollution on construction sites.
3) Deterioration of the landscape, destruction of the natural habitat of the animal world, changing the local drainage network.
4) Air pollution and noise impacting the population/workers while heavy machinery and vehicles in use

The site-specific EMP is composed of each of the rehabilitation subprojects to prevent or mitigate the negative impact of the construction works. It includes a mitigation and monitoring plan, both for the construction phase and the O&M phase.

All the (re)construction phase risks are easily monitored and eliminated. They can be minimized by properly designing mitigation measures and monitoring the Contractor while executing the workload.

From the risks of the O&M phase, the risk of landscape deterioration and destruction of the natural habitat of the animal kingdom when cleaning earth canals and drains is clear and easily controlled. The risks of surface and groundwater pollution by agrochemicals due to excessive use of

pesticides and mineral fertilizers, soil erosion associated with existing agricultural practices, increase in groundwater levels in the zone of their not deep occurrence due to excessive irrigation and, as a result, salinization of soils, require special monitoring. The need for mitigation measures at the O&M stage is determined precisely in the process of environmental monitoring.
Social issues were raised. In particular, the participants in the public hearings were told about the World Bank policy 4.12 "Involuntary Resettlement", which is aimed at eliminating the risks associated with involuntary resettlement by resolving issues of minimizing risks.

In the public interest and WUA members, a GRM has been developed. WUA has a complaint form and GRM. Moreover, all WUAs have a complaint form and GRM.

Besides, the PIU site (www.apnip.water.gov.kg) has a separate section on appeals and complaints, where anyone can send their appeal or complaint about the Project's activities.
For effective monitoring and management of complaints of the population and GRM, the PIU maintains a database of appeals and complaints.

Questions:
Adilov V.- who is in charge of controlling environmental conditions during (re)construction?
Neronova T.I. -The Contractor is responsible for the implementation of activities specified in the EMP and will appoint a person/specialist in charge. Moreover, PIU will control the subcontractor's work performance, as well as the SIETS, will maintain its controlling functions.
Dubachev A. -who will be responsible for monitoring the quality of water in canals? If yes, who?
Neronova T.I. - The monitoring of water quality in the canals will be carried out by the rayon water use support unit. They will conduct rapid analyzes of water for mineralization, acid-base analysis, and turbidity of the water.

Tashtanov I. - Is it necessary to obtain permission for felling/cutting greenery (shrubs and trees) if they are within the alienation zone?
Neronova T.I.- During the surveying of canals, it was found that there is some greenery within those zones. Thus, WUA has to compose the formal letter with the request for felling the greenery (shrubs and trees) to the territorial environment protection department, and they will be responsible for considering this issue.
Bogdanov B.- the question about (re)construction and household wastes. Where they will be removed (sites)?
Neronova T.I.- All types of wastes will be buried at designated by the local authority landfills and the Contractor will be in charge of it, some of the (re)construction waste could be re-used.
E. Kuluev - what is the point of Grievance Redress Mechanism (GRM)
Neronova T. – residents who have questions and concerns during the (re)construction works can make an entry into the complaints register. If WUA/water user will not receive a response, the complaint will be submitted to the PIU APNIP for follow-up revision.

Usonov T. - who is eligible to make a complaint?
Neronova T. - any resident and WUA member can do it. Complaints can be submitted at any time orally or in writing during the preparation and implementation of the project.

At the end of the meeting, all the attendees supported the implementation of the subproject.

Mr. Kuluev E. expressed acknowledgment on behalf of all attendees, who have supported the implementation of the subproject and for delivered information.

Chairperson **Kuluev E.**

Environmental consultant **Neronova T. I.**

Environmental Specialist APNIP PIU **Zinina O.**

11. Images

Image #1. Public hearings in WUA “Tilla-Suu”, November 2019.

Image # 2. MC “Burgondu”, the territory prone to mudslides, March 2019.

Image # 3. Canal У-87, March 2019

Image # 4. Canal У-85, March 2019