

**KYRGYZ REPUBLIC**

**STATE WATER RESOURCES AGENCY  
UNDER GOVERNMENT OF THE KYRGYZ REPUBLIC**

**“AGRICULTURE PRODUCTIVITY AND NUTRITION IMPROVEMENT PROJECT”**

**ENVIRONMENTAL MANAGEMENT PLAN  
For subproject WUA «ShAb» rehabilitation, Jaiyl rayon, Chu oblast**

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## ACRONYMS

WUA	Water users Association
NSR	Night storage reservoir
DSR	Decade 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
LSGA	Local self-government authorities
EA	Environmental assessment
ES	Environmental safety
FO	Facilitating organization
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
WBQS	World Bank Qualification System
AAS	Agricultural Advisory Services
GWT	Groundwater table
O&M	Operation and Maintenance
masl	Meters above sea level

## **1. Introduction**

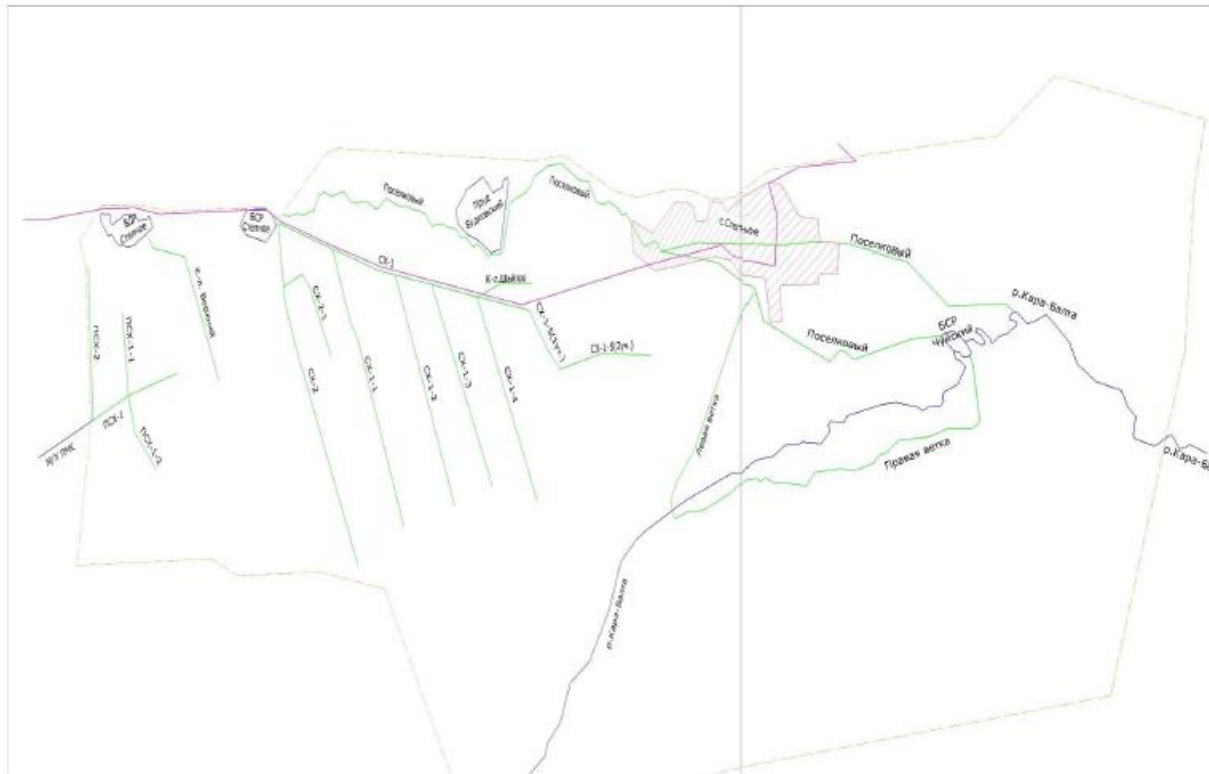
The Agricultural Productivity and Nutrition Improvement Project (APNIP) for the Kyrgyz Republic is implemented with the support of the International Development Association (IDA) and financed by the Trust Fund, provided by the Global Agricultural and Food Security Program (GAFSP).

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 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 «Shab», Jaiyl rayon, Chu oblast, has been developed, considering the Subproject specifics.

## WUA «ShaB» irrigation layout (applied to EMP)



Условные обозначения

	Межхозяйственные каналы
	Внутрихозяйственные каналы в обводнении
	Внутрихозяйственные каналы в зоне русла
	Реконструируемые каналы
	БСР
	Населенные пункты
	Автомаршрут
	Границы зоны обслуживания АВП
	Рекон

Экспликация сооружений

№ п/п	Наименование каналов	протяженность, км		тип обводнения	
		общая, км	реконструируемая, км	существующая	проектная
	Межхозяйственные каналы			Ж.Б. лотки	бетонный
1	ПМК	6,11	0,492		асфальтовый
	Внутрихозяйственные каналы				
	СХ-1	3,4	1,26	Ж.Б. лотки	Ж.Б. лотки и каналы, бетон
2	СХ-1-1	3,54	1,684	Ж.Б. лотки	Ж.Б. лотки и каналы, бетон
3	СХ-1-2	2,75	1,654	Ж.Б. лотки	Ж.Б. лотки и каналы, бетон
4	СХ-1-3	2,61	1,6	Ж.Б. лотки	Ж.Б. лотки и каналы, бетон
5	СХ-1-4	2,58	1,366	Ж.Б. лотки	Ж.Б. лотки и каналы, бетон
6	СХ-1-5	2,8	1,548	Ж.Б. лотки	Ж.Б. лотки и каналы, бетон
7	К-п Шайлово	2,58	1,366	асфальтовый	Металл, бетон
8	СХ-2	4,14	3,23	Ж.Б. лотки	Ж.Б. лотки и каналы, бетон
9	СХ-2-1	1,54	0,312	Ж.Б. лотки	Ж.Б. лотки и каналы, бетон
10	Поселковый	9,96	-	асфальтовый	
11	Верхний	5,96	2,0	Ж.Б. лотки	Металл, бетон
12	ПСК-1	1,41	1,366	Ж.Б. лотки	Ж.Б. лотки и каналы, бетон
13	ПСК-1-1	0,97	0,5	асфальтовый	Металл, бетон
14	ПСК-2	1,78	0,126	Ж.Б. лотки	Ж.Б. лотки и каналы, бетон
	Итого:	43,09	16,892		

## **2. Description of Subproject under rehab**

WUA «SHAB», Stepninsky AA, Jaiyl rayon, Chu oblast, 112 km off Bishkek and 42 km off Kara-Balta, established in 2003 under the Law "On Associations of Water Users". Certificate of re-registration of the Ministry of Justice dated 19.06.2003 reg. cert: №2120 – 3308 – ABII.

WUA owns 65 farming entities, service area - 2527 ha, water delivery provided in accordance with applications, ISF – 0.06 t/m<sup>3</sup>, altitude varies between 560-620 masl. The main agri crops cultivated – winter wheat, maize (grain), perennial grass, gourds(melons)

WUA also owns a large CDN network of open type and subsoil type at length 71.5 km. GWT – 2-3 m deep. The on-farm network (re)construction result in irrigation water delivery losses decrease including waterlogging.

### **2.1 Salient features of Subproject under rehab**

#### **2.1.1. Off-farm canals**

WUA “SHAB” abstracts water from the off-farm distribution c-l «PMK/ПМК», which is on the balance of Jaiyl RVK. Canal is lined with L-shaped blocks, total length -6.11 km, command area - 1795 ha. The headwork and PMK canal built in 1972, general condition can be assessed as satisfactory. Another source of irrigation water is Stepninsky reservoir, with a number of problems on bottom discharge and emergency escape. The third source of irrigation is Stepninsky reservoir, built in 1972, and which is the main irrigation water source for WUA`s arable lands and command area 1832 ha, condition considered as satisfactory.

#### **2.1.2. On-farm canals**

the WUA On-farm canals abstract water from Stepninsky DSR, Stepninsky NSR and off-farm c-l PMK. WUA owns the main on-farm canals: CX-1, CX-2, CX-1-1, CX-1-2, CX-1-3, CX-1-4, CX-1-5, CX-2 -1, CX-2-2, Poselkovyi and Verkhniy. From which second, third and forth-order canals are lined out. The total length of on-farm canals - 43.09 km, of which - 24.4 km concrete lined and 18.69 km - earthbed. The canals` efficiency - 56% with huge water losses, impacting WUA severely because of this. On the on-farm network there are: HTS-160 units, bridges and crossings - 12 units, and 1 NSR

On-farm canals built during the USSR and mainly assembled of prefabs and earthbed. The good financial standing of kolkhoz «Chuiskiy/Чуйский» executed proper maintenance of canals and HTS. Everything changed with the beginning of agrarian reform in early 90<sup>th</sup>, when locals received land allotments, and the on-farm network was left without an owner for a decade, impacting on decreased canals` throughput, water filtration and technical losses increase, and deterioration of irrigation water distribution and accounting. That alone resulted in farmers` relocation and abandonment of their land plots, who look for work a job in neighboring countries. Water metering devices area absent on on-farm canals, and water abstraction is made visually.

WUA "ShAB" annually, on average, abstracts 2485 th.m<sup>3</sup> of water, the irrigation network efficiency - 0.56, resulting in only 1392 th.m<sup>3</sup> of water reaching farmers' fields. The predicted increase in efficiency, after rehabilitation, - 0.80 and, accordingly, the volume of water supply will be 1988 th.m<sup>3</sup>. This will provide an opportunity to increase agri crop yields and due to this, WUA can increase the ISF, respectively, and increased financing for WUA`s irrigation network O&M.

## **2.2. Activities under Subproject**

To improve water delivery to irrigated lands, the Subproject planned:

- dismantling and installation of faulty reinforced concrete slabs;
- dismantling of faulty reinforced concrete prefabs and installation of new ones;
- (re)construction of 100 HTS, including 6 gauging stations;
- Concrete lining of on-farm canals at total length - 15140 m;
- Dismantling and installation of new reinforced concrete L-shape(Г-120) prefabs 120 units  
демонтаж разбитых, и монтаж новых ж/б блоков.

### **2.2.1. off-farm c-1 PMK**

Canal located 25 km off rayon center c.Kara-Balta, total length – 6.11km, command area – 2345 ha, of which 1795 ha owned by «Shab». Throughput - 2,0 m<sup>3</sup>/s, and on the balance of Jaiyl RVK, flows out from Kara-Batla reservoir and stretched up to northern part of v. Kara-Suu, built in 1972, lined with concrete slabs and L-shape prefabs, on the balance on Jaiyl RVK. Condition satisfactory, however some sections of canal are faulty, where slabs and prefabs require reworking and replacement. The Subproject planned dismantling and installation of faulty concrete slabs, L-shape prefabs, concrete and metal works,

### **2.2.2. БДР Степнинский**

#### **DSR (decade storage reservoir) Stepninsky.**

The reservoir is on the balance of Jaiyl RVK. Included in the r.s. Kara-Balta, year of commissioning 1933. The average multi-annual runoff at the entry to the reservoir - 11552 mln.m<sup>3</sup>, maximum depth - 9.7 m, mirror area (upper water level) - 34.0 ha. The canal's condition satisfactory, canal Verkhniy belongs to this system. The Subproject planned following workload:

- bottom (main) discharge and emergency discharge repair;
- concrete and metal works for HTS;
- upstream ducting rehab.

### **2.2.3. off-farm c-1 Verkhniy**

C-1 Verkhniy relates to Stepninsky reservoir system. The bed and slopes of control(measuring) section in reinforced concrete, commissioned in 1940, delivers irrigation water to WUA «Shab» lands, command area - 1348 ha. The Subproject planned following workload:

- Reworking faulty concrete slabs;
- Concrete works.

### **2.2.4. on-farm c-1 CX-1**

Total length - 3,8 км in L-shape(Лп-100) prefabs with gauging station, command area - 546 ha., 1 gauging station. The Subproject planned:

- dismantling and installation of faulty prefabs - 60 units;
- Dismantling of concrete slabs(П-4) – 2250 pcs;
- Concrete lining – 900 m;
- Metal works. Concrete lining – 1070.5 m;

#### **2.2.5. On-farm c-l CX-1-1**

Total length - 3.54 km in prefabs. Existing distribution HTS are severely faulty. Command area - 280 ha. The Subproject planned

- Dismantling faulty prefabs and concrete lining instead - 1,6km;
- Construct 1 transition point;
- 1 gauging station;
- 6 water outlets.

#### **2.2.6. On-farm c-l CX-1-2**

Total length - 2,87 км in L-shape (JIP 60-80) prefabs, command area – 155 ha. The Subproject planned:

- Dismantling/installing faulty prefabs;
- Construct 1 transition point;
- 1 gauging station;
- 6 water outlets;
- 1 water distributor;
- 2 bridge-crossings.

#### **2.2.7. On-farm c-l CX-1-3**

Total length - 2,61 км in L-shape (JIP 60-80) prefabs, command area - 158 ha. The Subproject planned:

- Dismantling/installing faulty prefabs;
- Concrete lining – 1.6 km;
- (re)construction of 6 water outlets;
- (re)construction of 2 vehicle bridge crossings

#### **2.2.8. On-farm c-l CX-1-4**

Total length - 2,58 км in L-shape (JIP 60-80) prefabs, command area - 162 ha. The Subproject planned following:

- Dismantling/installing faulty prefabs,
- Concrete lining – 1300 km;
- (re)construction of water outlets – 6 units;
- 1 gauging station;
- Transition point – 1.

#### **2.2.9. On-farm c-l CX-1-5**

Total length - 2,8 км, in L-shape(JIP 60-80) prefabs, command area - 262 ha. The Subproject planned

- Replacement of L-shape(JIP 60-80) prefabs;
- Concrete lining - 1500m.;
- Construction of – GS;
- 1 transition point;
- 2 water outlets;
- Water distributor (triple-gate)
- Tail-end discharge with pipe-crossing.

Проектом предусматривается:

#### **2.2.10. On-farm c-I Shayloo**

Total length - 2,0 км in earthbed, command area - 80 ha. The Subproject planned following:

- Concrete lining - 1000 м;
- Construction of 1 water distributor;
- 2 pipe-crossings;
- 1 tail-end discharge;
- Water distributor (double-gate) – 1 unit;
- gauging station – unit.

#### **2.2.11. On-farm c-I CX-2**

Total length - 4,14 км in prefabs, command area - 193 ha, tail-end of canal (800 м) absent, which was reused for completing of other canals' sections. Initially, 8-meter prefabs installed, which currently taken off production. The Subproject planned following:

- at the head part of canal, replacement of faulty and washed off L-shape(Лп-100) prefabs – 15 pcs;
- construction of 1 transition section;
- (re)construction of – 2 bridge-crossings;
- Water distributors - 2 units;
- Water distributors (single-gate)– 12
- concrete works - 3100м;

#### **2.2.12. On-farm c-I CX-2-1**

Total length - 1,54 км, command area - 75 ha, in prefabs. The Subproject planned following

- Dismantling/installing faulty prefabs ;
- 1 double gate water distributor;
- 5 water outlets;
- 1 tail-end discharge.

#### **2.2.13. On-farm c-I Верхний**

Total length - 5,96 км, command area – 269 ha, upper reach of canal in concrete slabs (П-4), remaining part in prefabs. Some of the prefabs at the lower reaches faulty, some parts from lower reaches used to replace prefabs on the upper reach. The Subproject planned following

- concrete works – 2000м
- Water distributor – 1;
- 2 transition sections;
- 2 pipe-crossings;
- 1 turning well;
- 7 water outlets.

### 2.2.14. On-farm c-I ПСХ-1

Total length - 1,41 км in prefabs, command area – 486 ha. The Subproject planned following.

- Dismantling/installing faulty prefabs;
- 1 water distributor (triple-gate)

### 2.2.15. On-farm c-I ПСХ-1-1

Total length - 0,97 км in earthbed, command area - 50 ha. The Subproject planned:

- Replacement of faulty slabs, and reworking of 500 m section with concrete lining;
- 3 water outlets.

### 2.2.16. On-farm c-I ПСХ-2

Total length - 1,78 км in prefabs, command area - 118 ha. Tail reach of canal is faulty. The Subproject planned following:

- Replace faulty prefabs and restore missing prefabs;
- water distributor.

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, (re)construction deadlines – 2020-2021.

## 3. Description of environmental parameters of Subproject

### 3.1. . Climate conditions

The climate of the region is continental: cold winter, hot summer, warm short spring and dry autumn. Minimum air temperatures are observed in December, January and February. The southern winds and gusty western winds are the greatest repeatability in the region and of considerable force, which are accompanied by precipitation and lowering temperatures. Their greatest repeatability is noted in the spring. The maximum westward speed at 20 m/s. The sum of temperatures of more than 5 degrees is an average of 3155. The maximum soil freezing depth 100-110 cm.

The temperature fully satisfies the requirements for the growth of heat-loving crops such as sugar beets, melons/gourds, grapes and others. The highest positive air temperatures up to (+27.6) are observed in July-August, the maximum minus temperatures (-30-35) are observed in December-January. Summer is dry and hot. Winter is cold and unstable. Autumn is dry and warm, the transition from winter to summer is fast. The first frosts observed in November and the last in March. The maximum depth of soil freezing 100 cm. The average snow cover in the area does not exceed 20-50 cm. The annual volume of precipitation ranges from 310 to 375 mm

#### Air temperature by meteo-station (m/s) Kara-Balta a

m/s Kara-Balta	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	год
Air T <sup>0</sup>	-9,4	-4,4	+3,3	+11,2	+16,5	+21,1	+23,3	+21,5	+15,4	+7,9	+0,3	-3,7	8,6

## Precipitation volumes

m/s Kara-Balta	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	год
Осадки, мм	13	24	39	80	53	52	22	23	16	37	30	30	419

As it is seen at the table, the maximum precipitation occurs in the spring (up to 40% of the annual rainfall). In other seasons, precipitation is distributed more or less equally. The monthly maximum precipitation is observed in April. The minimum is observed in August. The uneven distribution of precipitation over the seasons and insufficient precipitation in the summer period can be considered that the Kara-Balta system belongs to a semi-arid zone with unstable natural moisture, especially in the considered part of irrigation massif, where the main irrigation areas are concentrated. In the rehabilitation area, there is increased evaporation of moisture from water surfaces. The amount of evaporation only for the period April-October exceeds the annual rainfall by 35-40%.

- Duration of the frost-free period 167 days
- Average annual air T +8,6°
- Hottest months July-August +37,6
- Coldest months January -35 °
- Prevailing wind direction south-west
- Average evaporation from water surface from April to October 548 мм

### 3.2. landscape

The landscape is quite even, with a general decrease from south to north, with a slope of 0.01 and is cut by a number of small depressions, mostly not aquiferous. The absolute height above sea level ranges from 560-620 m. Slopes of the surface range from 0.003 to 0.001 from south to north.

### 3.3. hydrology

WUA "SHAB" command area is abstracting irrigation water from two irrigation sources: off-farm c-1 PMK, Stepninsky DSR, Stepninsky NSR. The water in canals is fresh, the type of mineralization is hydrocarbonate-calcium-magnesium, and is glacial-snow and spring waters origin. In the projected area, GWT at depths of 6-8 m. The considered landscape belongs to the karasu system of r. Kara-Balta and is characterized by a relatively high depth of groundwater. The main wedging of groundwater occurs alongside of the r. Kara-Balta discharge cone. Soil flow has a northward direction, with a slope of about 0.01. The main water source is melt snow and glacial waters. The soils of the entire massif are suitable for agricultural use. The groundwater amplitude fluctuations reach 1.5 m, and the maximum groundwater level rise occurs in the spring.

### 3.4. vegetation layer

Agricrops, trees, shrubs. The vegetation layer will not be disturbed, as (re)construction works will be executed on existing facilities/objects. The works will not affect agricultural fields, as all rehabilitation HTS/facilities are located outside of them. Alongside of canals, there is small amount of tree/shrubbery vegetation cover. In the process of canals rehabilitation, it is necessary to uproot trees that impede execution of works. Prior to commencement of works, WUA shall receive approval from the environmental authority on trees and shrubs surgery.

## **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 timely conduct of preventive and rehab workload that exclude the probability of a 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 to provide a designed canal's throughput, minimum filtration and performance specification water losses, absence of sedimentation, greenery overgrowing, collapse and canal's erosion

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 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 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 on-farm network for 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 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 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 greenery 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**

In order to reduce water filtration losses, the Subproject planned concrete lining of canals. All canals will be reinforced with the necessary HTS as to facilitate the operation of canals (gauging stations, water outlets, bridge-crossings, etc.), which will give the canals an aesthetic appearance, create ease of use, and reduce an exclusion area under canals. The ongoing activities will not affect the current environmental situation. Improving the irrigation system will create optimal conditions for temperature and humidity specifications in surface layer, reduce soil deformation, improve the landscape. The positive impact consists of:

- Concrete lining canals with monolithic concrete will reduce water loss filtration;
- 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, 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.

## Assessment and ranking of environmental risks

Activities	Impact	Type	Duration	Term	Degree	Risk	Reversibility	Probability
<b>Construction phase</b>								
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 on canal's 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
<b>Operation and maintenance phase</b>								
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 delivery, which increases the volumes of filtration losses on GWT	GWT pollution with agrochemicals, as a result of excessive application of pesticides and mineral fertilizers	Indirect	Long-term	Delayed	Moderate	Moderate	Reversible	Low
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
increase in irrigation water delivery, which increases the volumes of filtration losses on GWT	GWT volumes increase within low-depth zones resulting in soil mineralization	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. To prevent or mitigate the negative impact of (re)construction, the EMP is prepared for each rehabilitation facility. It includes a mitigation measures plan and monitoring, both for (re)construction phase, and for O&M.

## **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 above. 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/п(№8/П), 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

## 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 877236,3	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 plantations that grow outside of a canal's alienation zone;	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)
	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;	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) Moisturizing the road surface while driving through the residential area territories					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;
	Working 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; 3) PIU
	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 mineralization of soil by drainage water	- visual surveillance (preventing waterlogging)	n/a	n/a	AAS/AISP	WUA Members	RSU on-site inspection, approval and coordination with SETI
	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 inspections

	<p>Increased of soil erosion</p> <p>Climate change impact</p>	<ul style="list-style-type: none"> <li>- Arrangement of irrigation furrows on the lowest slope (cross-cut furrows);</li> <li>- shortened furrows length;</li> <li>- altering irrigation technology (sprinklers, drip irrigation)</li> <li>- education on environmental mitigation activities;</li> </ul> <p>Compliance of irrigation norms and regulations</p>	n/a	n/a	AAS/AISP	WUA Members	RSU on-site inspections
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### 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, sampling	Water sampling/analysis.
Construction	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	RSU
	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 lab
Operation	Salinity concentration in soil	Problematic sites	Soil sampling/analysis	quarterly	Soil quality	0	USD 300	AHE	AHE
	Salinity, the concentration of hydrogen ions, turbidity	upper and tail reach of the irrigation system control of drainage water	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	Salinity, the concentration of hydrogen ions, turbidity

## **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/cm<sup>3</sup>, 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.

### 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 Governmental Decree of the KR, dated 11/04/2016. №201,	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 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. Grievance redress mechanism

**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>

### 9.1.1. 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.

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. Images of the Subproject before rehab



№1. Shutter gate on DSR Stepninsky, March 2020.



№2. Off-farm c-p Verknny. March 2020.



№3. On-farm c-l CX-1. March 2020.



№4. On-farm c-l CX-1-2. March 2020.