KYRGYZ REPUBLIC

MINISTRY OF AGRICULTURE, FOOD PROCESSING AND LAND IMPROVEMENT OF THE KYRGYZ REPUBLIC

DEPARTMENT OF WATER RESOURCES AND LAND IMPROVEMENT

AGRICULTURAL PRODUCTIVITY AND NUTRITION IMPROVEMENT PROJECT

ENVIRONMENTAL MANAGEMENT PLAN

For WUA «Kur-Tash» Aravan rayon Osh oblast

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Content

Abbreviations and acronyms

AAS	Agricultural Advisory Services
AISP	Agricultural Investment and Services Project
AHE	Ameliorative Hydrogeological Expedition of DWRLI
APNIP	Agricultural Productivity and Nutrition Improvement Project
DSES	Department of Sanitary and Epidemiological Supervision
DWRLI	Department of Water Resources and Land Improvement
E	Environment
EA	Environmental Assessment
EMP	Environmental Management Plan
IDA	International Development Association
ISF	Irrigation Service Fee
GPAFS	Global Program for Agricultural and Food Security
KR	Kyrgyz Republic
OIP-2	Second On-farm Irrigation Project
OIP-2 AF	Additional Financing for OIP-2
O&M	Operation and maintenance
PIU	Project Implementation Unit
POL	Petroleum, Oil and Lubricants
RSU	WUA Rayon Support Unit
RVK	Rayon Irrigation Department (Rayvodkhoz)
SAEPF	State Agency for Environmental Protection and Forestry
SanPin	Sanitary Regulations and Rules
SETI	State Environmental and Technical Inspectorate
WBSMQRS	World Bank safety measures quality rating system
WUA	Water Users Association

1. Introduction

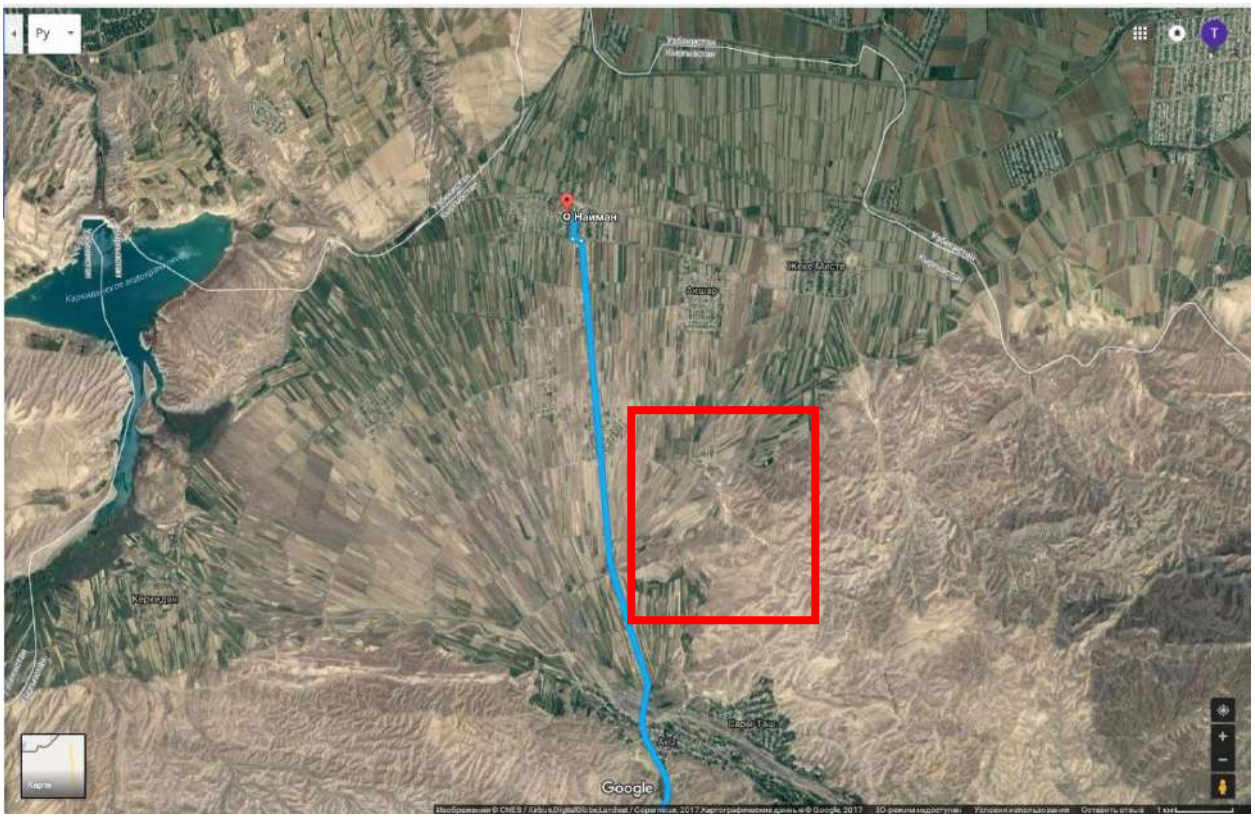
The Agricultural Productivity and Nutrition Improvement Project(APNIP) for the Kyrgyz Republic is being implemented by the International Development Association (IDA) and financed by the Trust Fund of the Global Program for Agricultural and Food Security.

Within APNIP framework, the Environmental Management Plan (EMP) prepared that is aimed at ensuring that the Project complies with the principles and practices of environmental management and environmental protection policy and laws requirements of the Government of the Kyrgyz Republic, as well as IDA policy on environmental safety interventions.

The environmental assessment (EA) goals are to identify significant impact of the proposed project on surrounding environment (positive and negative), identify appropriate preventive and mitigation interventions aimed to minimize or eliminate any expected irreversible impacts. EMP serves as a management tool that ensures proper implementation of interventions to prevent and mitigate the environmental impact, as well as monitoring and institutional strengthening of recommended activities during the implementation of proposed project. EMP also establishes the necessary institutional obligations, proposes timing of the implementation of mentioned activities, as well as cost estimates for their implementation within the project's budget.

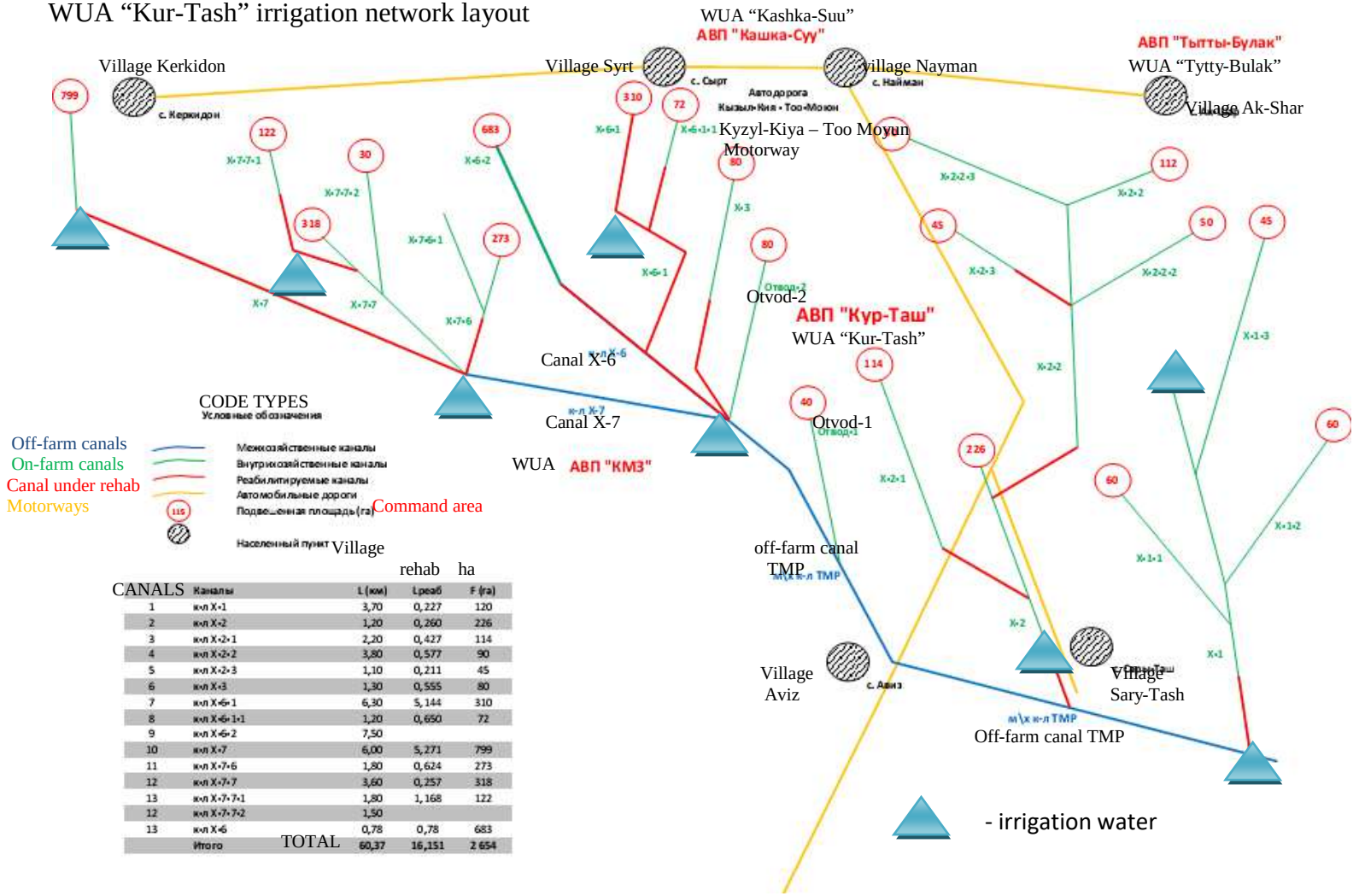
APNIP, in the World Bank environmental risks system , is classified as "B" category. No irreversible or significant impact on the environment is expected.

Based on the general EMP, the Environmental Management and Monitoring Plan (EMMP) for the rehabilitation of WUA "Kur-Tash" has been developed, taking into account the specifics of this particular subproject



Picture1. Overview of WUA “Kur-Tash” location

WUA “Kur-Tash” irrigation network layout



CANALS			rehab	ha
	Каналы	L (км)	Lреаб	F (га)
1	к-л X-1	3,70	0,227	120
2	к-л X-2	1,20	0,260	226
3	к-л X-2-1	2,20	0,427	114
4	к-л X-2-2	3,80	0,577	90
5	к-л X-2-3	1,10	0,211	45
6	к-л X-3	1,30	0,555	80
7	к-л X-6-1	6,30	5,144	310
8	к-л X-6-1-1	1,20	0,650	72
9	к-л X-6-2	7,50		
10	к-л X-7	6,00	5,271	799
11	к-л X-7-6	1,80	0,624	273
12	к-л X-7-7	3,60	0,257	318
13	к-л X-7-7-1	1,80	1,168	122
12	к-л X-7-7-2	1,50		
13	к-л X-6	0,78	0,78	683
	Итого	60,37	16,151	2 654

TOTAL

Picture 2. WUA «Kur-Tash» irrigation network

2. Description of the rehabilitation subproject

Location of WUA "Kur-Tash" within 65.0 km from the district center of village Aravan, Too-Moyun ayil aymak(AA) of Aravan rayon, Osh oblast. The irrigation network built in 1962-1972 mainly in concrete lining and flumes, and completely covers the irrigated lands located compactly within AA (the former territory of farm “Pakhtachi”). However, due to the shortage of WUA funds, the water discharge facilities, water metering hydroposts and stations, flumes network bridge crossings are in the state of emergency.

The total length of on-farm canals is 60.37 km, of which 44.84 km in flumes and concrete linings, the remaining 15.53 km is earth bed canals. The NSR and dams are not within the WUA "Kur-Tash" system. There is no collector-drainage network on the territory of the WUA. GWT observation wells are absent.

The Nayman reservoir delivers irrigation water to WUA “Kur-Tash” on-farm schemes (r.s Kyrgyz-Ata and Chili-Say) through off-farm canal TMR.

2.1. Description of activities, carried out under the project

The WUA’s command areas are of gravel-pebble soils, therefore considerable water filtration losses are observed on earth canals. Due to water shortage, more than 500 hectares are not watered.

As a result of the WUA “Kur-Tash” on-farm irrigation network technical survey, located in Too-Moyun AA, Aravan rayon, conducted by the APNIP Southern Design Group specialists commission, WUA “Kur-Tash” and Aravan WUA RSU, it was revealed that the on-farm network has significant water filtration losses, most of the water outlet structures, hydroposts, bridge crossings of the drainage network are in the state of emergency.

The off-farm canals X-6 and X-7, require replacement of the distribution well gates, construction of tube water outlets and bridge crossings. The present subproject ensures all necessary interventions: canals linings with monolithic concrete, construction of hydraulic structures.

2.2. Description of interventions executed within the Project framework

The off-farm part consists of two main canals - X-6 and X-7. On X-6 canal there is replacement of the distribution well’s shutter gates envisioned on HM7 + 46. On X-7 canal, construction of 3 tubular water outlets on HM16 + 26, 26 + 72, 41 + 86 are envisioned, the bridge crossing on HM 43+67 is also planned.

2.2.1. On-farm canal X-1. To combat water losses, the monolithic concrete lining is planned with the total length of 227 m, slopes curbs build-up (the head part) with a length of 30 m. To improve water distribution, it is planned to build a guide-wall on the off-farm canal TMP, 3 water outlets, a cushion well (tail end). Construction of an aqueduct planned through the mudflow structure for water transportation purposes. A fixed-bed hydropost structure is also planned for water volumes metering. A pipe crossing, with water discharge, for vehicles planned to be built

2.2.2. On-farm canal X-2. To combat water losses, the monolithic concrete lining is planned at the total length of 260 m. To improve water distribution, it is planned to build a guide-wall and cushion well on the off-farm canal TMP. Construction of an aqueduct planned through the mudflow structure for water transportation purposes. A fixed-bed hydropost structure is also planned for water volumes metering. Two pipe crossings, with water discharge, for vehicles planned to be built.

2.2.3. On-farm canal X-2-1. To combat water losses, the monolithic concrete lining is planned with the total length of 427 m. To improve water distribution, it is planned to build 3 turning wells and a distribution chamber. A bridge crossing, with water discharge, for vehicles planned to be built.

2.2.4. On-farm canal X-2-2. To combat water losses, the monolithic concrete lining is planned with the total length of 577 m. To improve water distribution, it is planned to build a turning well, water discharge structure and a distribution chamber.

2.2.5. On-farm canal X-2-3. To combat water losses, the monolithic concrete lining is planned with the total length of 211 m. To improve water distribution, it is planned to build a distribution chamber and earth-bed with concrete lining interlinking.

2.2.6. On-farm canal X-3. To combat water losses, the monolithic concrete lining is planned with the total length of 555 m.

2.2.7. On-farm canal X-6. To combat water losses, the monolithic concrete lining is planned with the total length of 515 m.

2.2.8. On-farm canal X-6-1. To combat water losses, the monolithic concrete lining is planned with the total length of 5144 m. To improve water distribution, it is planned to build 9 water outlet structures and a turning well. A hydropost structure is also planned for improved water volumes metering. A pipe and bridge crossings for vehicles planned to be built.

2.2.9. On-farm canal X-6-1-1. To combat water losses, the monolithic concrete lining is planned with the total length of 1272 m (the head and tail end parts). To improve water distribution, it is planned to build a waterworks structure and 9 pipe crossings.

2.2.10. On-farm canal X-7. To combat water losses, the monolithic concrete lining is planned with the total length of 5271 m. To protect the canal from floods, it is planned to build a protective dam with the length of 26 m. To improve water distribution, it is planned to build a water distribution structure, two cross regulators. Moreover, it is also planned to build 9 water outlets and water discharge facility. To improve water volumes metering, also construction of a hydropost planned. Construction of an aqueduct planned through the mudflow structure for water transportation purposes, as well as pipe crossing for vehicular and livestock transportation.

Reservoirs and dams rehabilitation is not planned. Therefore, the irrigation dams and reservoirs policy (OP 4.37) is not applicable.

The application of the WB's policy OP4.12 (forced resettlement) is not required, since all works will be carried out within the existing irrigation system, without constructing additional facilities that capture lands of an individual landowner and land-user, which could require additional coordination and relocation.

The construction and rehabilitation works deadlines are: years 2018-2019.

3. Description of environmental parameters on subproject

3.1. The Climate

The rayon's climatic characteristics applied in accordance with the "Osh" meteostation database. The rayon is characterized by a hot long summer and a short moderately cold winter:

- Average annual air temperature +12,8^{o}
- Average annual air temperature in vegetation period +23,5^{o}

- Absolute air temperature maximum +42,0°
- Absolute air temperature minimum воздуха –18,0°
- Average maximum temperature of the hottest month +32,5°
- Long-term average annual precipitation 260 мм
- Volume of annual liquid precipitation 206 мм
- Weight of snow coverage per 1 м^2 on horizontal surface 39,2 кгс/м^2

Climatic conditions of the site are, in general, are favorable for cultivating crops in Aravan rayon, provided there is sufficient irrigation.

3.2. Landscape

Specifics of existing WUA «Kur-Tash" surface topography relate to Too-Moyun steppe, located within the lower reach of river Gylgyn-Say (extension of Abshyr-Say river), between Andizhan monticules and Chatyr mountains. Surface topography is flat and gradually depressing towards Fergana Valley.

The WUA "Kur-Tash" surface nature is a geomorphological piedmont plains zone, which is genetically related to the erosion-accumulative rivers, rivulets and temporary built canals' activities. The actual elevation marks are in the range of 700-750 meters above sea level. The WUA's location is on slopes directed from the south to north, and from the east to west and inclination of which is 0.02-0.03. Canals' designed with a slope from the southeast to northwest. The slops are one of the negative factors of the terrain, contributing to water erosion. To prevent erosion, caused by irrigation of agricultural land, it is necessary to apply agro-ameliorative interventions aimed at preventing soil water erosion. In the EMP, these interventions are proposed for the period of operation of the object. Construction works will not affect the lands' erosion processes surrounding the object. Design works will not impact/damage the landscape.

3.3. Hydrology

The main irrigation sources of Too-Moyun AA, Aravan rayon are the Kyrgyz-Ata and Chile-Say (Nayman Reservoir) rivers.

The river Kyrgyz-Ata is the right tributary of Aravan-Say river that gathers water from the glaciers of the Kichi-Alai Range northern slope. The river length is 49.0 km and water catchment area is 318.0 km². The river's water is fresh, the mineralization type of which is bicarbonate-calcium-magnesium. The main water nourishment source is thawed glacial and snow waters. In accordance with the water regime it relates to the Tien Shan river types with a high water in summer (May-September). The average long-term water discharge is 2.92 m³/s.

The river Chili-Say is the left tributary of Aravan-Say river that gathers water from the glaciers of the Kichi-Alai Range northern slope. The river length is 72.0 km and water catchment area is 464.0 km². The river's water is fresh, the mineralization type is bicarbonate-calcium-magnesium. The main water nourishment sources are thawed glacial and snow waters with groundwater replenishment. The flood maximum is in July-August and reaches 45.0 m³/s. The maximum peak water discharge for one-percent water supply is 72.0 m³/s. The average long-term water discharge is 6,014 m³/s.

In the surrounding areas there are no entities that discharge hazardous chemicals, pesticides and sewage into the source of irrigation.

3.4. Geo-Engineering conditions

The WUA's geological-lithological structure along the on-farm canals' route is represented by alluvial-proluvial deposits (loams, clays, sands). A thick layer of loess-like clay soils - loams are laid down from the surface. The loams of light gray color, dry, macroporous, solid, with carbonate deposits inclusion. Ground thickness from 0,6 to 2,0 m. The gravel soils beneath of loams.

The thickness of gravel soil is more than 10.0 m. The depth of groundwater layer is more than 90.0 m. The soil filtration coefficient is 3 m/day. Seismicity of the operating area is IX points[1].

3.5. Vegetation cover

Vegetation cover: grass, farmlands. In the process of canals rehabilitation, it is necessary to execute tree felling that hamper course of works and are in the alienation zone of water facilities/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 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. Prior to commencement of work, the contractor will inform the environmental protection agency of 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 tree and shrubbery cutting is the subject to approval with environmental protection agencies/bodies.

The rehabilitation works will not impact the agricultural areas, as all projected objects for rehabilitation located beyond their borders.

4. Description of procedures related to regular operation works

4.1. Technical supervision on canals and structures conditions

In the operational scheme activities, paramount importance is paid to the timely conduct of preventive and rehabilitation works that exclude probability of system failure, while complying to the rules of its operation.

The main indicators of normal technical condition and reliable operation of the on-farm irrigation network are provision of designed canal's capacity, 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 a 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 construction joint sections of a canal are the subject of constant surveillance. The damaged lining must be reworked immediately. A canal's lined sections must be of monolithic concrete and maintenance must be timely to prevent cracking. A particular attention must be paid to subsiding soils, as concrete lining on those soils is prone to cracks formation.

A 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

[1] Geo-engineering data withdrawn from the working documentation of WUA "Tytty-Bulak irrigation system rehabilitation", Osh oblast, Aravan rayon (PIU OIP-2).

carried out to clean up structures and water distribution units from debris and ice, vegetation overgrowth and sedimentation.

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 filled with new concrete.

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 flumes it is prohibited to dissolve various types of fertilizers that may cause destruction of concrete. It is also not recommended the flumes 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 prohibited. The livestock drinking and dipping allowed on special canal's section only.

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

4.2. Preparing 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 winter watering, as well as for supplying water to the residential areas and livestock farms, filling up reservoirs. 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 structures are covered with the ice, in this case the ice must be chipped without violating integrity of the structures and canal's coating.

4.3. Looking after wood lines and access roads

Forest plantations along canals are designed to protect the canals from vegetation overgrowing, lowering the level of groundwater along a canal's route and reducing the adverse effect of wind force on crops. Alongside of permanently located canals of the farm 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 shrubs. The distances between trees in the strip is 1-3 m, between bushes - 0.75 - 1 m with a distance between greenery strips of 1.5 - 3 m.

The field and on-farm roads on irrigated area, as a rule, are ground roads. If they pass through silty loams and solonchaks, then a road is made of gravel or other coating. Roads maintenance is limited 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 of dirt and vegetation. To improve the 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 practice of irrigation and drainage systems operation the current, major and emergency repair works are executed.

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

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

Preventive repair and a significant part of the current repair, including desilting of canals, vegetation and landslides removal, a minor canal repairs, repair of structures, buildings and other devices are performed annually without stopping the system operation.

Major repair is carried out, as required, within a few years' period and includes: repair works on a canal's sections, dams and parts of structures attritions and destructions, structural modification or replacement of certain elements and structural units.

Emergency repair - 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 which carried out 24/7, and all available material and technical resources and labor resources are mobilized for their implementation.

Repair and construction works on the on-farm network canals performed by WUAs contracting a construction company. Repair works expenses and operation of the on-farm network are annually provided by WUA budget.

4.5. Desilting of canals and vegetation removal

The solid particles of soil form sedimentation that moved around by water flow. 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 banks erosion. The largest bed's 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 on-farm irrigation network.

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

5. Environmental impact

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 best practices of previous projects demonstrate positive impacts on the environment. In fact, many positive impacts of the projects have been identified during the environmental assessment. Namely, this project is aimed at reducing water losses in irrigation schemes, improving water resources management, improving agricultural productivity and improving soil fertility.

During the canals' rehabilitation process, the trees felling and shrubbery vegetation removal required, which is subject to approval with environmental protection authorities. Design and engineering works require strict compliance to the necessary requirements, including noise control, planting new trees to protect against wind erosion and construction of access roads, air pollution and timely construction waste disposal.

The requirements for the prevention of environmental pollution and negative impact on the population are provided for in 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:

- Water losses reduction;
- 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 schedules.

5.2. Potential negative environmental impact

At the same time, while carrying out irrigation network reconstruction 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 they were replaced with structures of more inert materials and, at the moment, problems with asbestos-containing materials are not expected. In the event of removal of asbestos cement pipes asbestos contained materials waste will be collected, transported and finally disposed by applying special protective measures in accordance with the hazardous waste handling standards. See Section 10 for detailed information on disposal of asbestos-containing materials.

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

5.3. Climate change impact

The irrigation and drainage schemes rehabilitation will enhance the agriculture and farming practices, materially-technical procurement, land owning, pastures and water management that will lead to 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, construction and household waste, including liquid wastes.	direct	short-term	immediate	low	low	reversible	average
	surface water and ground water contamination at a construction site, as a result of storage of construction and household waste, including liquid waste	direct	short-term	immediate or delayed	low	low	reversible	low
unloading of excavated soil and construction waste	landscape and animals' natural habitat degradation, local drainage scheme alteration	direct	mid-term	immediate	low	low	reversible	average
transportation of building materials, use of heavy machinery	air pollution and impact on local population/workers during traffic and heavy machinery operation	direct	mid-term	immediate	low	average	reversible	high
canals rehabilitation	Damage and trees felling and shrubbery currying	direct	long term	immediate	high	low	reversible	high
Operation and maintenance phase								
earth-bed canals cleaning while in operation	landscape and animals' natural habitat degradation, local drainage scheme alteration	direct	mid-term	immediate	low	low	reversible	average
increase in irrigation water supply, which increases the volumes of waste water	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 supply that increases the surface water filtration till the groundwater level	ground water pollution with agrochemicals, as a result of excessive application of pesticides and mineral fertilizers	indirect	long-term	delayed	moderate	moderate	reversible	average
increase in irrigation water	soil erosion, related to existing	indirect	long-term	delayed	moderate	moderate	reversible	low

supply that leads to water speed increase	agricultural production practices							

6. Environmental management and monitoring plan

To prevent or mitigate the negative impact of construction, an EMMP is drafted for each rehabilitation subproject. It includes a mitigation and monitoring plan, both for the construction phase and for the O&M phase.

All the construction phase risks are easily monitored and eliminated. They can be minimized by properly designing mitigation measures and monitoring the Contractor while carrying out works.

Among the O&M risks, the risk of landscape and animals' natural habitat degradation while cleaning earth-bed canals and drains is explicit and easily controlled. In case of suspected contamination of surface and groundwater by agrochemicals due to excessive use of pesticides and mineral fertilizers, soil erosion associated with existing practices of agricultural production, increasing groundwater table in the zone of their deep occurrence due to excessive irrigation and, as a consequence, soil salinization, an accredited laboratory will be mobilized for special monitoring.

Table 3: Mitigation plan

Phase	Issue	Preventive/ Mitigation interventions	Cost, US $		Institutional responsibility		Control
			installation	operation	installation	operation	
Construction	organizing a construction site	1) It is forbidden to locate a 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 755 000	PIU/Contractor	Contractor	1) A Contractor bears responsibility to execute environmental mitigation interventions; 2) A construction site inspections made by PIU; 3) State Ecological Inspectorate
	soil after a canal's cleaning	conduct a planned rehab works	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 Inspectorate
	trees and shrubbery vegetation	Coordination with the specially authorized environmental protection agency/body cutting greenery plantations	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 Inspectorate
	vehicular emissions	1) vehicular exhaust systems and	n/a	part of the	PIU/Contractor	Contractor	1) A Contractor bears

	into the atmosphere	construction equipment should be in good condition, in order 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		(re)construction works contract			responsibility to execute environmental mitigation interventions; 2) A construction site inspections made by PIU; 3) State Ecological Inspectorate
	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 responsibility to execute environmental mitigation interventions; 2) A construction site inspections made by PIU; 3) State Ecological Inspectorate
	Workers' and rural population health and 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) ensuring personal protection equipment (helmets, protected shoes, gloves); 4) limiting access to (re)construction sites, zones and equipment locations by local citizens.	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 Inspectorate
Operation	Threats to water quality due to salinity of soils because of drainage	- training on water and soil use improvement; - visual monitoring (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 in accordance with recommended norms, - preventing effluent water discharge into canals and surface water objects,	n/a	n/a	AAS/AISP	WUA members	RSU on-site inspection, approval and coordination with SETI
	Increase of soil erosion	- training on water use and soil science, - outreach campaign - rational use of irrigation water and applying water regimes in accordance with the irrigation requirements, - Arrangement of irrigation furrows on the lowest slope (cross-cut furrows); - shortened furrows length; - altering irrigation technology (sprinklers, drip irrigation)	n/a	n/a	AAS/AISP	WUA members	RSU on-site inspections
	Climate change impact	- education on environmental mitigation activities; - compliance of irrigation norms and regulations.	n/a	n/a	AAS/AISP	WUA members	DWRLI

Table 4. Environmental monitoring plan

Project Phase	Parameter	Location	Method/Equipment	Frequency	Objective	Costs		Responsibility	
						Organization	Performance	Организация	Выполнение
baseline	salinity, concentration of hydrogen ions (pH), water turbidity	Headworks and tail-end of irrigation scheme: river system(r.s) Kyrgyz-Ata and Chili-Say via off-farm canal TMP and waste water	Field equipment for parameters measurement	At the beginning, in the middle and at the end of vegetation season	Rehabilitation works and agricultural activities impact assessment	0	Insignificant	Samples selection RSU	water sampling and analysis
Construction	Site-specific environmental management and monitoring plan	subprojects under rehabilitation	Visual inspection of subproject	Before, during and after completion of construction	Compliance with environmental protection measures	0	Insignificant	PIU/Contractor	PIU/Contractor
	Salinity, concentration of hydrogen ions, turbidity	Canals under rehabilitation, located upstream and downstream of the rehabilitation site	Field equipment for parameters measurement	At the beginning, in the middle and at the end of vegetation season	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	Selectively for subprojects when suspected of contamination. Downstream of rehabilitation subproject	Sample for laboratory analysis	During construction	Civil works impact assessment	0	100 USD	Contractor	Accredited laboratory Water sampling and analysis. Introduction of results to PIU
Operation	Salinity in soil	Problematic sites	Sample of soil/analysis	Quarterly	Soil quality identification	0	300 USD	AHE	AHE

	Salinity, concentration of hydrogen ions, turbidity	Headworks and tail-end of irrigation scheme: r.s. Kyrgyz-Ata and Chili-Say via off-farm canal TMP and waste water	Field equipment for parameters measurement	Before, during and after completion of construction	Civil works impact assessment	0	Insignificant	RSU	RSU

7. Legislative support

In the Kyrgyz Republic there are a number of laws on environmental protection, provisions and regulations, which address specific issues of environmental protection. Table 5 summarizes the legal regulations relevant to this project.

Table 5: Basic laws, provisions and resolutions

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 of interventions within economic and other types of production activities, storage, transportation and production disposal.
Law on environmental appraisal (1999)	It requires 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 protection of atmosphere (1999)	It regulates emissions to atmosphere and specific obligations on protection of atmosphere
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,	Establish 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 amount 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 preservation of biodiversity, proper protection of flora and fauna

The Government of the Kyrgyz Republic ratified a series of 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 international importance for the main habitat for waterfowls (Ramsar Convention) (2002);
- Convention on 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 (Kyrgyz Republic and Kazakhstan) (2000);
- the United Nations Framework Convention on Climate Change (2000 г.);
- Kyoto Protocol (2003).

8. Public hearings

In accordance with Operational Procedures OP4.01.[2] The WB has special requirements for information and public consultations disclosure. The disclosure includes presentation of information about the Project to the general public and population covered by the Project and other stakeholders, starting from earlier implementation cycle and throughout the framework. The information disclosure is intended to facilitate constructive interaction with the population covered by the Project and stakeholders throughout the Project's lifecycle.

In addition, 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 objectives and environmental considerations of the Project.

Public hearings in the WUA " Kyr-Tash" were held on September 24, 2017, in v Arimjan, Aravan rayon, Osh oblast and 41 people took part in the public hearings: representatives of WUAs, local self-governing authorities, farmers, WUA's rayon support units, designers, PIU.

At public hearings, the information was provided concerning technical solutions of the Project and its environmental impact, as well as the interventions that would be taken to prevent and mitigate the impact.

Participants in the hearings were asked a number of questions, the activities for which are included in the EMP.

The minutes of the public hearings, list of participants and photos are attached.

[2] Operational Guidelines of the World Bank: OG 4.01, "Environmental Assessment", point 3.

8.1. Minutes of public hearings

Minutes of Public hearings on environmental issues in the context of the Taymonku WUA irrigation network rehabilitation in Nooken rayon, Jalal-Abad region, under the World Bank project "Agricultural Productivity and Nutrition Improvement"

Arimjan village **September 14, 2017**

Attendees:
A. Ajimatov - APNIP PIU Coordinator for engineering issues in the South
T.I. Neronova – APNIP PIU Environmental Consultant
M.T. Nazirbaeva – Chairman of the WUA Council
A. Isakov – Taymonku WUA Director
L. Karpova - APNIP PIU Design Engineer
K. Anipaev - APNIP PIU Design Engineer
R. Tashbaev - APNIP PIU Design Engineer
A. Tashtanov - Head of Jalal-Abad oblast WUA S&DU
Sh. Bakirov - Main specialist of Nooken rayon WUA S&DU
M. Sultanov - Head of Sakaldinsky ayil district

41 people took part in the public hearings: water users, representatives of peasant farms, individual farmers, WUA members. List of participants of public hearings is attached.

The meeting was presided by Mr. M.N. Nazirbaev, Chairman of the WUA Council.

A.B. Ajimatov, APNIP PIU Coordinator for engineering issues in the South provided information about the project and envisaged works on rehabilitation of the on-farm network under the project "Agricultural Productivity and Nutrition Improvement"

T.I. Neronova, APNIP PIU Environmental Consultant spoke about the requirements of the environmental legislation of the Kyrgyz Republic and the World Bank Environmental Safeguards Policy in the context of project implementation

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

The experience of previous projects demonstrates the positive impact of the proposed project on the environment. In fact, many positive impacts of projects have been identified during the environmental assessment. Namely, this project is aimed at reducing water losses in irrigation systems, improving water management, agricultural productivity and soil fertility.

At the same time, when carrying out construction work on the reconstruction of irrigation networks, there may be some potentially negative impacts on environmental conditions in the project areas that need attention, preventive actions and appropriate mitigation measures while planning, developing, constructing, operating and maintaining.

- No asbestos-containing materials will be used for the planned rehabilitation of irrigation networks. Note that asbestos cement tubular crossings were used previously. But in the past years they were dismantled and replaced with structures made from the more inert materials. In this regard, no problems with asbestos-containing materials are expected.
- Potential negative impacts are relatively small, and positive economic, social and environmental benefits far outweigh them in environmental assessment. Consideration of these impacts is given below.

The main impact that can occur as a result of construction work:

1) Soil contamination at the construction site
2) Pollution of groundwater at the construction site
3) Deterioration of the landscape, destruction of the natural habitat of the animal world, changing the local drainage network
4) Air pollution and impact on workers/population during traffic and heavy equipment operation

EMP is compiled for each of the rehabilitation facilities to prevent or mitigate the negative impact of the construction. It includes a mitigation and monitoring plan, both for the construction phase, and for the OM phase.

All the risks of the construction phase are easily controlled and eliminated. They can be minimized by properly designing mitigation measures and controlling the Contractor in carrying out work.

Among the risks of the operation and maintenance phase (OM), the risk of degradation of the landscape and destruction of the natural habitat of the animal world when cleaning earth canals and drains is obvious and easily controlled. The risks of pollution of surface and groundwater by agrochemicals due to excessive use of pesticides and mineral fertilizers, soil erosion associated with existing practices of agricultural production, rising groundwater levels in the zone of their deep occurrence due to excessive irrigation and, as a consequence, salinization of soils, require special monitoring. The need for mitigating measures at the stage of OM is determined precisely in the process of environmental monitoring.

Questions:

A. Isakov – Taymonku WUA Director: Is it necessary to receive permission to cut green spaces (plantations) if they are in the exclusion zone of the canal?

T.I. Neronova: When examining rehabilitated areas, it was found that green plantations that are subject to cutting in the work area are absent. If such a question arises during the course of the work, the WUA needs to prepare a letter to the Osh Oblast Environmental Protection Agency and they agree on the logging and cutting down issues.

K. Umetaliev: Do noise and dust can affect the population in the course of work?

T.I. Neronova: The settlements are located at a distance more sufficient from the place of work. Therefore, the impact of noise from operating machinery will also not have an impact on the population. Dust can be provided when vehicles pass through settlements. EMP includes the travel through settlements at a low speed, that contributes to less formation of dust and noise.

N.Ibragimov: Construction waste and household garbage, where do they will be removed after construction?

T.I. Neronova: Construction and household waste will be exported by the contractor to the places agreed with the local government. Construction waste can be reused, if it is possible.

A. Tashtanov, Head of Jalal-Abad oblast WUA S&DU: Will there be monitoring of the water in the canal?

T.I. Neronova: The monitoring will be conducted by the rayon WUA support unit at the monitoring points, which will be specified in the EMP. Also, monitoring will be conducted continuously during the operation: mineralization, concentration of hydrogen ions (pH), turbidity of water.

In conclusion, all the participants supported the implementation of this project.

The Chairman of the WUA Council, on behalf of all present thanked for the support and information provided.

Chairman M.T. Nazirbaev

Environmental Consultant T. Neronova

Список участников общественных слушаний 12 сентября 2017г. АВП «Кур-Таш»
Араванский р-н, Ошская область

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9. Photos of subprojects in current condition

Picture 1. Current state of on-farm canal X-6-1-1, 14 September, 2017

Picture 2. Current state of on-farm canal X-6-1, 14 September, 2017

Picture 3 and 4 . Current state of on-farm canal X-7-1, 14 September, 2017

Picture 5. Public hearings, village Aviz, WUA «Kur-Tash», 14 September, 2017

Picture 6. Public hearings, village Aviz, WUA «Kur-Tash», 14 September, 2017

10. Collection, storage, transportation and disposal of asbestos-containing wastes.

Removal of materials that contain asbestos will be carried out in line with the local legislation, including construction standards, work safety issues, air borne emissions of hazardous pollutants and disposal of waste and hazardous waste (in the event that there is no local legislation, the Directive 2003/18/EC of the European Parliament will be used, that amends and supplements Directive of the Council 83/477/EEC on worker protection from workplace asbestos exposure risks: threshold values of airborne dust particles is 0.1 fiber/cm3; also use the Good Practice Note: Asbestos: Health Issues at Workplace and Community; World Bank). Asbestos materials shall be subject to immediate final disposal/burial under special conditions.

According to Order #885 of the Government of the Kyrgyz Republic *On Hazardous Waste Management in the Kyrgyz Republic* of December 28, 2015, asbestos-containing wastes should be disposed as follows.

The hazardous waste management process (waste lifecycle) consists of the following phases: generation, accumulation (collection, temporary storage, stockpiling), transportation, neutralization, recycling, reuse of recycled products, and disposal.

When asbestos is present at a project site, it should be clearly labeled as a hazardous material. Asbestos-containing materials should not be subject to cutting or breaking as this will result in dust generation. In reconstruction, all workers should avoid crushing/damaging asbestos-containing waste, stockpile such waste at designated locations within the construction site and dispose of it properly afterwards to a special location or landfill.

When asbestos-containing waste is subject to temporary on-site storage, they should be properly contained in leak-tight containers and labeled appropriately as a hazardous material. Safety precautions should be taken to prevent any unauthorized removal of such waste from the site.

10.1. Collection and temporary storage of waste

Asbestos waste generation should be minimized by using efficient technologies.

All asbestos-containing materials should be handled and disposed by qualified and experienced personnel only. The personnel should wear appropriate protective equipment (safety masks, gloves and overalls).

The amount of waste stored at the designated site must not be greater than permitted by the standards.

Industrial waste collection sites and access ways must not be blocked up.

When handling asbestos waste, the workers should necessarily wear special protective clothing, gloves and respirators. Prior to removing (if required) asbestos from the site, it should be treated with a wetting agent to minimize asbestos dust emission. Removed asbestos should never be reused.

Keeping foreign items, individual or working clothes, or personal protection equipment, or having meals at waste collection sites is not allowed.

During handling operations, workers must comply with applicable handling requirements and general safety rules. All operations should be carried out mechanically, using labor-saving lifting and transport equipment.

Hazardous wastes should be transported to the landfills by properly equipped vehicles, either own or of a specialized third party carrier. The transport vehicles should be constructed and used in a manner that prevents potential incidents, losses and environmental pollution both on the way to the landfill and when transferring waste from one vehicle to another. All activities that involve loading, transportation and unloading of waste at main and auxiliary sites should be mechanized and use leak-tight equipment. Opening hazardous waste containers during transportation is prohibited.

Solid and dusty wastes should be transported in special containers or containers fitted with gripping devices for unloading by truck cranes. Transporting unpacked asbestos in open trucks or on flat wagons is not allowed.

Using hooks and other sharp tools in handling operations is not allowed.

No one except the driver and staff members authorized to escort the waste off site is allowed to be in vehicles transporting hazardous waste. The drivers of vehicles that will transport asbestos waste must be trained in safe transport requirements.

All operations in connection with loading, transport, unloading and disposal of waste must be mechanized. The waste must be transported in a way to prevent transportation losses and environmental impacts.

10.2. Disposal of asbestos waste

Asbestos waste must be disposed to landfills for municipal solid waste or unrecycled industrial solid waste.