

CHAPTER 10 ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

10.1 Result of the Initial Environmental Examination (IEE)

Through Initial Environment Examination (IEE) conducted in the master plan stage, it was concluded that Environmental Impact Assessment (EIA) Study was needed in the feasibility study stage for priority project. Objectives of EIA are to identify and examine expected impacts in the priority project, and to recommend countermeasures against the expected negative impacts.

Result of the IEE, that specifies environmental items and the contents to be considered in the EIA study, is shown in Table 10.1.

Table 10.1 Contents of the EIA Study

| No. | Item | Content | Result of IEE |
|-----|-----------------------------------|--|---------------|
| 1 | Resettlement | Quick examination of potential impacts after selection of alternatives for the reservoir sites. Detailed plan will depend on the options proposed. | C |
| 2 | Economic Activities | Field inspection of transmission pipeline corridor after formulation of more precise alternatives of pipeline routes. Vegetation pattern (agricultural, road protection zone) and engineering structures may be affected by the construction. Clarification of potential scale of damages expected and assessment of site specific compensation/mitigation measures. | B and C |
| 3 | Traffic and Public Facilities | Assessment of existing traffic conditions and formulation of project relation scenarios. Impact scale identification and development of preventive actions. | B and C |
| 4 | Cultural Property | After pre-selection of transmission pipelines corridors and reservoir tanks locations the request for relocation of archeological sites will be necessary. It is normal procedures not only for EIA but for all designing documentation as well. | C |
| 5 | Water Rights and Rights of Common | The detailed plan will depend on the formal requirements of fish authorities. Preliminary discussion will be necessary. If identification of effects to the fish rights is obligatory, the field investigation of aquatic population (bio-assessment) should be implemented and potential impacts should be studied as well as compensation/mitigation measures. | C |
| 6 | Public Health Condition | Attention should be paid to the identification of water leaking areas within the towns. The capacities and technical conditions of sewer and treatment facilities should be evaluated. Preliminary discussion with health authorities will be helpful. | C |
| 7 | Waste | Estimation of waste generation rate and evaluation of their hazard properties. Formulation of mitigation measures. | B |

| No. | Item | Content | Result of IEE |
|-----|------------------------|--|---------------|
| 8 | Topography and Geology | Quick examination of potential impacts after determination of alternatives for reservoir sites. Detailed plan will depend on the options proposed. | C |
| 9 | Groundwater | Quick examination of potential impacts after formulation of technical options for sludge drying bed. Assessment of groundwater table and vulnerability of aquifer affected. Detailed plan will depend on options proposed. | D and C |
| 10 | Fauna and Flora | Site specific assessment of natural habitats located closely to the construction sites. Identification of protected species to be affected. Assessment of vulnerable seasons (reproduction, breeding, and migration). Proposals for impact reduction measures. | B |
| 11 | Landscape | Quick examination of potential impacts after determination of alternatives for reservoir sites. Detailed plan will depend on the options proposed. | C |
| 12 | Air Pollution | Estimation of air pollutant emission from construction vehicles and evaluation of air quality by prediction models. | B |
| 13 | Water Pollution | Estimation of pollutant discharges, assessment of toxicity and other effects of drying bed supernatant liquor. Probably a number of toxicity experiments will be required. | B |
| 14 | Soil Contamination | Quick examination of potential impacts after selection of technical options for sludge drying bed. Detailed plan will depends on options proposed. | D and C |
| 15 | Noise and Vibration | Assessment of noise and vibration by using models (if available) or previous experience or professional judgments. Impact scale and magnitude identification. Development of mitigation measures. | B |

Note)

A - Serious impact is expected.

B - Some impact is expected.

C - Extent of impact is unknown. (Examination is needed. Impacts may become clear with progress of the Study)

D - No impact is expected. EIA is not necessary.

The EIA Study was contracted out to the local institution, ACVAPROJECT, and the Study was carried out in accordance with the Moldovan regulations. Summary of the EIA Study is described below

10.2 Comparison of the Impacts Between With and Without the Project

(1) EIA Alternatives Definition

Two possible alternatives were studied on EIA - i) an alternative of planning activity rejection (without Project) and ii) an alternative of project adoption (with Project).

(2) Impacts Without Project

This alternative is the rejection of the project. The main hypothesis for this alternative is an autonomous development in the region (in particular nearby the zone where project implementation is planned), which does not provide serious and large-scale changes of both economic activity and environment conservation management. In this case all environment components remain under the same social pressure, of which characteristic and direction are the same as in the present.

The main reference points for this alternative are as follows:

- The existing water supply system is left in an inadequate regime of the present same level due to electric power supply irregularity, damaged equipment and management trouble. The negative influences of the existing water supply system will gradually increase with the physical wear of equipment, materials and constructions due to more frequent breakdowns, more frequent and prolonged cutting off of potable water supply from the Nistru River. Electricity costs of the pumping water remain high as the inefficient pumps are utilized, and the pumping equipment should be repaired more frequently.
- The water treatment plant in Soroca continues to work in the same regime; and the equipment for coagulation and chlorination continue to malfunction, and other non-functioning pieces of equipment are left as they are, thereby not allowing the water treatment plant to operate in a stable manner to produce safe and healthy water.
- The water supply system in Balti does not allow storing the necessary daily water volume for normal functioning. Periodically, the town pumps up groundwater of poorer quality. It is necessary to treat raw groundwater properly in order to achieve acceptable potable water quality, as the water contains fluoride and so on. Amount of intake groundwater is exceeding than groundwater incharge, so the groundwater sources might be potentially reduced. The uncompleted reservoir in Balti will be left as they are and the structure deteriorates by weathering.
- Soroca town uses mainly available groundwater source in the flood plain of Nistru River. The water supply network is installed in most of the Soroca City but the capacity of the water supply system is not enough. The water supply system cannot serve the high land residential area due to the lack of pumping capacity. So the people need to keep on using the groundwater of their private wells.
- Present water supply sources in Falesti and Riscani are groundwater, which is not safe as potable water, according to the national water quality standard. Population consumes poor-quality water with high percentage fluorine concentration. But the present water supply operations carry on.

- Areas along the planned pipelines of the Balti-Falesti and Balti-Riscani pipelines and areas of planned reservoirs in these towns remain in the same land use as at present - mostly for agricultural purposes.

(3) Impacts With Project

This alternative is to implement the project. The main hypothesis for this alternative is improvement of water supply in Balti, Soroca, Riscani and Falesti by means of rehabilitation of the existing water supply system, new provision of the extension and management improvement. In this case some environment components can be under the temporary negative influence during the construction stage and under both negative and positive influence during the operation stage.

Main reference points for this alternative are as follows:

- Pumps and some related equipment are replaced at all pumping stations in order to reduce energy costs and increase water supply efficiency.
- Rehabilitation of water treatment plant by replacing the valves and chemical dosing system and some related equipment is carried out in order to produce safe water efficiently.
- Replacement of air relief valves, gate valves and blow-off valves along the existing pipeline Soroca-Balti is carried out to keep water-transmitting capacity sufficient and to maintain the main pipe properly.
- Reservoir rehabilitation and construction in Balti, Falesti and Riscani is carried out to store enough water in these city/towns.
- Balti-Falesti and Balti-Riscani pipeline construction is carried out for stable and high-quality water supply of necessary volume for these towns.

More detail impacts by the project implementation (with Project) and the required countermeasures to mitigate the impact are described in the following sections.

10.3 Impacts of the Project

10.3.1 Social Environmental Factors

(1) Resettlement

The resettlement of population is not necessary due to the fact that the distribution reservoirs in Falesti and Riscani will be constructed at the edge of the towns in the agricultural zones, where there is no residential houses at the planned sites.

(2) Economic Activities

The impact to the economic activities within the project area can be categorized as negative and positive.

Negative impacts include the following.

Permanent immobilisation of 10,000 m² of agricultural lands will be required for the construction of the new reservoirs in Falesti (6,000 m²) and Riscani (4,000 m²). In both towns, the construction will affect the agricultural lands. The rest of facilities covered by the project (replacement of pumping equipment at pumping stations, rehabilitation of the water treatment plant, finalisation of uncompleted construction reservoirs in Balti) are located in already secured lands. The acquisition of lands reduces the benefit of agricultural farmers and associations due to the reduction of agricultural output.

Temporal land allocation for the construction works of the new pipelines from Balti to Riscani and from Balti to Falesti, will be required for about 0.5 km². The pipeline construction will affect agricultural lands of various farmers and their associations, second houses yards of people around the Balti reservoir, apple garden of village Recea and so on. The construction works can reduce the profit (one vegetation season) of farmers.

The temporal use of small plots of lands will be required for rehabilitation of manholes at the existing Soroca-Balti pipeline. If heavy construction machines are used, they may destroy the crops and compress the soils around the site. It will result in the reduction of profits of local farmers.

Construction of new water supply facilities (pipelines, reservoirs) will require sanitary protected zones around the facilities in accordance with the regulation, that control land use as gas station and solid waste disposal site and not exist in a certain area from the facilities. Due to this regulation some of economic activities (mainly related to the pollution) should be limited within the protection zone. So the construction can affect some of existing private gas-petrol stations.

The discharge of water from the pipe segments through the temporal outlets (after-construction testing) may cause local top-soil erosion and reduce soil fertility with expected economic losses of landowners. It happens only locally at the slopes if the water flow velocity is significant.

Positive impacts are expected, as the local industries in the cities/towns will receive clean water suitable for production of high quality products. It can raise the competitiveness of local producers by reducing the cost of products, if they currently operate their own water treatment facilities.

(3) Traffic and Public Facilities

Traffic of the principal automobile roads and railroads routes will not be affected significantly as the new pipelines cross by the horizontal drilling method not to obstruct the transportation.

The impacts are expected for small roads (connected to rural settlements from the main roads), which will be crossed by the open cut method to install pipe. Within the towns (Riscani and Falesti) and a village (Recea), the construction affects local traffic, as the construction works will be done along the streets. The construction makes difficulty for people walking, communication and automobile traffic, but the impact is occurs at local area and in a short period. In addition impacts to several commercial and living areas are expected as well as to access to local drinking wells and gas-petrol-stations.

The irrigation facilities (near village Corlateni) probably will not be affected, as well as gas-supply pipeline (near Balti), communication and electro power cables, water supply and sewerage pipes (in Recea, Falesti and Riscani) if the works will be carefully planned and agreed by respective authorities.

(4) Cultural Property

No impacts are expected to the archeological sites by the construction of the pipelines and reservoirs. But the contractors should be informed about potential existence of spots of historical interest in advance of the constructions.

The temporal impacts are expected to the green-parks within the towns Riscani and Falesti. These parks provide aesthetic surroundings of the towns and are used for recreation by the population.

(5) Water Rights and Rights of Common

There is no direct impact to the existing water rights identified. The project doesn't change the water source as the Soroca-Balti water supply system. The quantity of water extraction will increase towards the future. But it does not affect other users of the Nistru River water, since the river flow rate is regulated by the dam upstream and quantity is sufficient for down stream users as well.

(6) Public Health Conditions

Positive impact is expected for the population living in the cities/towns of Balti, Falesti and Riscani. The new water supply facilities will ensure the high quality drinking water supply to the areas. It should be mentioned that the project could significantly benefit the areas if local authorities allocate

resources for improving local water supply networks and management of water/sanitation systems in general.

In the future the adequate water supply can be also organized for the towns and other village communities in the region. It can raise the positive aspect of the current project, and make it more durable (new water users will contribute to the stable management of the bulk water supply utility).

(7) Wastes

There are no significant impacts identified regarding waste generations. The typical wastes will be construction residuals. They should be landfilled at appropriated places. The surplus of soils from the construction of the pipelines and the reservoirs can be used for reinforcement of local ravines and hollows or dumped at the nearest disposal sites. depression

10.3.2 Natural Environmental Factors

(8) Topography and Geology

The project does not significantly modify topography and geology. The impacts on geological characteristics of the area are not expected during the construction period as construction works will be carried out at a depth of about 2 m (a trench for the new pipeline) and 4 - 6 m (reservoirs) from the soil surface. Other works will be done on the surface (replacement of the air valves and others) or inside of the buildings (rehabilitation of the water treatment plant and the pumping stations). The impacts on topographic condition of the areas are not expected as well because the water pipelines will be installed following the present landscape.

The impacts on geological characteristics of the area are not expected during the construction and operation period, if all new structures are well protected from water leakage.

(9) Groundwater

During the construction of the new pipelines, a local impact of the trench digging and sand banking up is expected on the groundwater around the pipelines. Because the trench filled by the sand can work as a drainage channel and may affect the groundwater level and flow. For example, on the edge of the Falesti town and at the spring near Riscani, the water pipelines cross the ground aquifer, and that could impact the local water source (which is used for watering cows at the Falesti Noi village) as well as hydrology of wetland and artificial willow planting zones. The impact is expected permanently, so it is necessary to take countermeasures to mitigate the change of the groundwater level and flow.

(10) Fauna and Flora

There are no valuable and rare fauna and flora around the project sites except at the Nistru River, that is fish such as barbell, starlet and others.

Some parts of the existing Soroca-Balþ water transmission main, where valves replacement are required, are located in areas covered by natural vegetation (in river plains, ashore, and near-by forests and forest belts). The vegetation will be fully exterminated during the rehabilitation works but it will be rapidly restored within 2-3 vegetative seasons.

Balþ-Falesti and Balti-Riscani water transmission mains will partly cross natural grass and artificial forest-bushes areas. Path cutting for construction works is needed in some places, although no considerable impact is expected on the plant kingdom especially natural forests, productive meadows or rare plants. The impact can be local, and then vegetation will be recovered to the initial form.

No considerable fauna impact is expected during construction-installation works as they will be carried out mostly in already existing buildings (PS-1, PS-2, PS-3, PS-4, and water treatment plant). From the potential impact factors it can be distinguished noise (transport, equipment dismantling-installation) and vibration (for instance, during abolition of old pump foundations). This can cause some troubles for surface and soil fauna near PS-1, PS-2, and PS-4 locating not far from the forest zone.

There will be local non-significant fauna impact during replacement of valves for the existing Soroca-Balti pipeline taking into account that manholes are "small islands" where rather small vertebrates can live even near agricultural areas. These impacts will be temporary and reversible. The nature of the fauna will be restored after grasses, meadows, and crops are recovered.

The trouble factor for animals and birds may be important during the reservoir construction especially in Falesti as the construction zone is located not far from the tract of forest. But the strongest surface fauna impact will be due to the trench digging for the Balti - Falesti and Balti - Riscani water transmission mains.

The pipe-laying trench is in most cases along roads where there are several small zones of forest belts, gardens, wetlands, anti-erosion forests, crop fields and meadows. The behavior of animals will be affected as they constantly migrate from one area to another during all the seasons but mostly in spring-summer period. A long trench can be a dangerous trap in which animals can die. The size of animal destruction will depend on the trench length, the period of the trench remains open, season, and biotope character. Referring to the average size of the enumerated species, more than 10

specimens of green and nimble lizard, about 5 specimens of ordinary grass snake, more than 10 of small mammals (mice), more than 20 frogs and toads can get into the trench. Besides, it should be taken into consideration that amphibian mass migration could take place for some years (for example, gray and green toads) in case when their density is more than 100 specimen/m². If there is such a trench on their way, several thousands of animals can die to the population detriment.

No impact is expected on aquatic ecosystems by the project during construction-installation works except chlorine water discharges after system disinfecting. It is because the pipe and reservoir disinfecting is required after construction (at the concentration 1-3 mg/l), so chlorine water can get into local water streams causing death of aquatic organisms and fish. The discharge shall be well controlled not to affect on the aquatic ecosystems.

The same negative consequences remain during operation of the facilities as the discharge water (with concentration of residual chlorine 0.1-0.3 mg/l) after emptying of the pipeline is evacuated to the surface water streams. However, it should be pointed out that new pipelines are considerably close to natural reservoirs used for fish-breeding or amateur fishing (the Leadovanskoe Reservoir, small reservoirs in the Copaceanca River, small reservoirs near-by Balti, Falesti, villages - Pirlia, Rauþl, Ciuluc, Egorovka), where there exists a potential toxic chlorine impact on large quantities of industry fish. A constant chlorine water discharge has a serious negative impact on the reservoir ecosystem, economic activity, and recreation. It is because the chlorine in concentration around 0.05 mg/l has a negative impact on gills and skin of fish and other hydrobionts causing strong slime excretions and respirator epithelium destruction. In result, oxygen access to tissue is reduced and suffocation appears. Even slight chlorine penetration in a natural reservoir can cause local fish starvation resulting in organism's destruction (in unfavorable coincidence - small oxygen content in water, freeze-up, etc.).

Currently the impact on the Nistru ecosystems depends on the condition and efficiency of the fish-protecting constructions on the water-intake head at PS-1. The existing fish-protecting constructions are two metal appliances with nets (8 m²). It is known that the appliances are silted and the nets are faulty. Although there are not any other detail investigation data, it is supposed that the fish-protecting appliances do not operate, thereby having negative impact on the water ecosystems and especially fish resources. The annual fish resources damage (young fish and small hydrobionts) is valued at 100,000 - 120,000 Lei. Taking into account that there are fish spawning places in the zone of the water intake (PS-1), the impact is considerable also to very rare species which are in the Red Book (barbell, starlet, etc.).

In the priority project, improvement of the water intake is included with a fish protection screen. Inlet water velocity is maintained to be under 0.1m/sec and small fish can escape from the intake. So, the present impact will be mitigated.

Besides, the existing water pipelines itself blocks the way for fish migration during the spawning period around the watercourses (the Bulata river, the Cainari river).

(11) Landscape

There are no landscape impacts identified. No apparent changes in green protected zones along the roads are expected as the new pipelines will lie mostly not far from strips of forest. Cutting of trees and bushes is required only in some places. The new reservoirs will not affect the landscape characteristics.

Some changes of visual characteristics of the Copaceanca and Raut rivers valley, some small water streams, and associated natural water-marsh zones (Recea village, the stream in the Riscani fork) can be expected as the pipe can be raised by 2-3 m from the surface level.

10.3.3 Pollution factors

(12) Air Pollution

Local and insignificant air pollution is expected in the area of the pumping stations, water treatment plant, valves replacement places, reservoir construction and laying new water pipelines during the construction period. Pollution sources are construction machines, welding works and dust. Large and long construction is planned in such projects of water treatment plant, reservoirs, and new pipes, although the water treatment plant and reservoirs (except reservoir in Falesti) are located in the long distance from natural areas sensitive to the air pollution and populated areas. However, the approximate pollutant emissions (in tons/year) are estimated as: CO - 0.01; CH - 0.002; NO₂ - 0.006; SO₂ - 0.004; Carbon-black - 0.0003; Iron - 9.46; Manganese - 1.86, which are not significant for changing the existing atmosphere condition even locally.

Potential cases of atmosphere pollution during operation stage can be eliminated by careful operation of chlorination units at the water treatment plant.

(13) Water Pollution

Water pollution by toxic chlorine can be expected after the disinfecting of system and during routine water pipe emptying for maintenance works. The item should be investigated carefully in terms of real risk definition.

The accumulation of the sludge from the water treatment plant in the two sludge-retaining ponds remains the same as it is now. The impact is non-considerable. Two existing ponds are still used for accumulation of sediments from the water treatment plant. Sludge removal is required periodically for the sustainable use. The residuals of aluminum contained in the coagulant (alum) are not toxic to the aquatic environment. The discharge water may have slightly low pH by the coagulant adding during the treatment process, and the impact is negligible.

(14) Soil Contamination

The impact is not expected, except small oil spills at the construction sites.

(15) Noise and Vibration

The temporal, local and non-significant impacts to residential areas are expected during the construction works along pipelines in urban areas.

The temporal, local and non-significant impacts to small animals and birds are expected during construction works at the pumping stations, reservoirs and at the pipelines if areas of natural vegetation (forests) are located closely to the facilities.

10.3.4 Supplementary Study

Following two items were not selected at the stage of IEE for the subjects of the EIA study. However, these have been included in the present EIA study as some impacts are expected.

(1) Soil Erosion

It is not expected that the construction of new reservoirs and all repair works on the existing facilities will bring significant changes of the existing erosion trends (top soil erosion, landslide formation, slump, ravines, etc.). No soil impact is expected during the rehabilitation works pumping stations, and the water treatment plant as all works will be carried out in the firm artificial surface area and in buildings. While replacing the valves of the existing Soroca-Balti water supply pipeline, there is almost no soil works. Only while constructing, local temporary non-considerable soil impact is expected, for instance soil compression by construction machines.

While laying the new Balti - Falesti and Balti - Riscani transmission mains, a trench around 2 m wide and 2 m deep will be dug up. Wide (about 10m) is allotted for laying pipe and temporal access road for the construction.

There are dolines and steep slopes (areas in Racaria, Recea, Grinau Ț, and Rautel) on the route of the pipeline. On the one hand it is difficult to lay the pipelines due to the area slope; on the other hand the construction can cause the erosion intensification.

The local erosion process intensification is possible at downstream of the blow-off valves when pipelines are maintained. The erosion depends on the discharging water volume and discharge flow velocity. Protection of soil erosion is required where the downstream is steep.

Attention should be drawn to the planned Falesti reservoir, in the case of significant water leakage from the reservoir, since as it will be located on the border of the landslide zone.

(2) Hydrological Situation

No surface water hydrology impact is expected during construction and installation works. New pipelines will cross the Raut and Copaceanca rivers within Balti city border, the Copaceanca River within the Riscani town border, the nameless stream near the Recea village, several hollows, valleys and marshy areas located along the motor-roads. While crossing rivers there will be water pipe bridges (the Raut River, the Copaceanca River) ensuring the floodwater to pass. Small valleys will be crossed under the bottom of creeks and it can raise local, temporal and probably non-significant impacts (related to the construction works at the river-bank, digging the river bed, sediment moving, etc.) to the surface streams.

During operational stage it can be expected slight impact downstream of water discharge places at blow-off valves while the water pipeline is emptied for maintenance. It is possible that temporary water level rising and bank erosion at the natural streams happen.

10.4 Countermeasures Against Negative Impacts

Although, most of the negative impacts of the planned activities have temporal, local, and non-significant characters, some mitigating measures should be taken. Some of the countermeasures should be planned and carried out in appropriate time at the stage of detailed design. In general, environmental preservation depends considerably on the environmental education to workers and the engineering staff carrying out construction-installation works. Measures on ecological instruction to a working brigade should not be neglected before beginning of works. It should be mentioned as a general remark that mechanisms of the environment impact compensation should be foreseen for possible inadequate construction and operation.

The expected impacts of the projects and the corresponding recommended measures are presented in Table 10.2.

Table 10.2 Expected Impacts and Recommended Measures

| Expected Impact | Location | Recommended Measures |
|--|--|--|
| Anxiety factor for surface fauna | PS-1, PS-2, manholes of the valves, Falesti reservoir, and new pipelines | <ul style="list-style-type: none"> • While planning the repairs-restoration and construction works, it is recommended to take into account the reproduction season (spring-summer). |
| Emissions of lubricants and pollutants into the landscape after washing of the pumps | PS-1, PS-2, PS-3, and PS-4 | <ul style="list-style-type: none"> • To carry out the preliminary cleaning of pumping sets. • To pay special attention to PS-1 and PS-2 to discharge washed water into Nistru River |
| Surface fauna destruction during earth works | Manholes of the valves and new pipelines at areas of non-agricultural use | <ul style="list-style-type: none"> • While planning the repairs-restoration works and construction, it is recommended to take into account the construction period to avoid the reproduction season (spring-summer). |
| Possible leakage of water from reservoirs into landslide formation | Falesti reservoir | <ul style="list-style-type: none"> • Thorough careful technological control of construction materials and construction works. • To carry out preliminary geological investigation works. • Construction of an observation well on the border of the plot where landslide is possible. • Periodical control of technical conditions of reservoirs. |
| Temporary land use for the rehabilitation of the existing water transmission pipeline and valves (Borrowing land) | Manholes of the malfunctioned valves in agricultural areas | <ul style="list-style-type: none"> • While planning of repairs-restoration works and construction, it is recommended to take into account the construction period to avoid the harvesting season (spring-summer-autumn). • To use machinery with the minimal degree of ground compression. • To minimize movements of heavy machinery in agricultural areas. • To agree in advance the time of the construction works and crop sowing with land users. • To foresee the possibility of yield losses compensation. |
| Permanent land use for new construction of reservoirs (Purchase of land) | Falesti and Riscani reservoirs | <ul style="list-style-type: none"> • To implement all the national requirements and foresee the losses compensation of agricultural land for landowners. |
| Temporal land use for new pipeline construction | New pipelines to Falesti and Riscani | <ul style="list-style-type: none"> • To implement all the national requirements and foresee the losses compensation of agricultural crops (yield) for landowners. |
| Discomfort factor for inhabitants and traffic | Falesti and Riscani towns, Recea village, villages having exit roads to highways crossed by the pipelines by open cut method | <ul style="list-style-type: none"> • Prior information to the public, producers and commercial organizations of the contents of construction works, start of the works and the duration. <p>(Information program is important to achieve accountability of the water supply project for the public.)</p> |
| Hydrogeological changes of groundwater due to the drainage characteristics of the trench | Slope, lower and wet plots along the new pipelines | <ul style="list-style-type: none"> • To foresee low-cost engineering decisions on preventing drop of groundwater level and modification of the flow regime (for instance, putting internal clay walls in the trench to stop groundwater flow along the trench). |

| Expected Impact | Location | Recommended Measures |
|---|---|---|
| Cutting artificial forest plantations | Plots on the new pipelines in forests | <ul style="list-style-type: none"> • Preliminary co-ordination with the authorities concerned. • To avoid crossing forest belts as far as possible, and try to affect only their edges if there is no such a possibility. • To regulate machinery movement not to pass frequently the narrow path. |
| Soil erosion by laying the new water pipelines | Cliff or steep slope along the new water pipelines | <ul style="list-style-type: none"> • To carry out preliminary geological investigation. • To fasten the pipe firmly and solidify the upper soil layer of the landslide zone. • Periodical investigation of the pipelines on corrosion weariness and leakage. |
| Surface flora destruction during earth works | Plots along the new pipelines | <ul style="list-style-type: none"> • To coordinate with ecological services to prevent an impact on the rare types of grass-undergrowth plants. |
| Falling of surface animals in the trench of the pipeline | Routes of the new pipelines | <ul style="list-style-type: none"> • While planning the construction, attention should be paid to the time of season (end of April through end of June) when most of animals reproduce. • If there is no possibility to construct them during the safe period, construction should be planned in areas where there are no tree-bushes plantations in the neighborhood or works should be carried out in a short period. • To reduce the impact by shortening the length of the open trenches as possible. • If a long trench remains to be open, gentle slopes should be made on each 50 m, so that animals can go out. • One gentle slope shall be made at one small excavation work. |
| Hydrological changes of small water streams | Plots along the new pipelines | <ul style="list-style-type: none"> • To minimize the construction period and the amount of work in riverbeds and flood plains. |
| Troubles on motor roads, rail roads, power and communication cables, and water, sewage, gas supplying systems | Populated areas along the new pipeline (Balti, Falesti, Riscani, and Recea) | <ul style="list-style-type: none"> • Preliminary co-ordination with the parties concerned. |
| Soil erosion by water discharge from pipeline facilities such as blow-off valves | Areas along the new pipelines | <ul style="list-style-type: none"> • To carry out preliminary geological investigation. • Preliminary co-ordination with the landowners concerned. • To prevent high water flow velocity and dispersal in order to prevent erosion of upper soil layer. |
| Chlorine containing water discharge into surface water | Plots on the new pipelines, reservoirs | <ul style="list-style-type: none"> • To investigate in advance the possibility whether the chlorine containing water reach at fish-farming reservoirs. • To prepare temporal ponds between the outlet and the fish reservoir/public open water. • To neutralize the chlorine containing water before discharge onto the landscape. |
| Damage of fish resources | PS-1 at Nistru River | <ul style="list-style-type: none"> • To improve fish-protective facilities. • To carry out investigations lasting 3 years on the water ecosystems condition in order to assess real damages. |

| Expected Impact | Location | Recommended Measures |
|--|---|--|
| Possibility of sanitation problem by solid waste disposal sites along the pipeline | Solid waste disposal sites along the pipelines | <ul style="list-style-type: none"> To replace the existing landfills which are located above the pipelines. |
| Damage of existing pipelines | <ul style="list-style-type: none"> Inadequate protection of existing pipelines at crossing with small rivers and streams Exposed pipe at steep slopes Pipe in corrosive soil | <ul style="list-style-type: none"> To improve segments of the pipeline. To reinforce the pipeline To cover the pipelines with soil. To protect pipe segments by cathode protection |
| Leakage from the reservoirs and pipelines | Reservoirs and pipelines | <ul style="list-style-type: none"> Investigation of leakage from reservoirs and pipes during operation period. |
| Inadequate management of the water supply system | Water supply system | <ul style="list-style-type: none"> To establish effective and safe water supply system with appropriate control system to achieve proper operation and maintenance. To organize programs of staff training for operation and maintenance including how to handle emergency cases (power failure, equipment breakdown, etc.). To establish the operation and maintenance manual. To establish the proper management system. |

The priority project is planned to maintain harmony with the EIA study by adopting the appropriate countermeasures against the potential negative impacts.

10.5 Conclusion of the EIA

As it was mentioned before, the priority project itself might have some negative impacts. But most of the recommended countermeasures have been adopted in the preliminary design in the F/S in coordination with the EIA Study. Remaining impacts are temporal, local and non-significant, and they can be mitigated during the construction period with low-cost measures.

It is considered that some environmental items that are not covered by the current EIA may need to be dealt with in the future on such a stage as detailed design.

In general, the project will have positive impacts on the public health and daily life in the cities/towns concerned, and also will help in enhancing economic activities of local enterprises that are in need of sufficient amount of quality water.

CHAPTER 11 PROJECT EVALUATION

11.1 Economic Evaluation

As for the economic benefit of the Project, we estimated quantitatively the labor saving with the improvement of the water supply. As the basis of labor cost, we adopted the average income of the residents of four cities in the study area. There is substantial discrepancy between the income of the residents in Balti and Soroca and the income of the residents in Falesti and Riscani; the average monthly family income (average size of family is 3 person) is about 600 lei in Balti and Soroca and about 400 lei in Falesti and Riscani.

The economic benefit other than labor saving, we can consider the positive effect on the health of the residents but it is very difficult to estimate quantitatively. The increase of the land value and the positive effect in industrial promotion may not have direct correlation with water supply improvement.

When the all four package proposed in this F/S is implemented (Case 1), the EIRR is 4.75% (Table 11.1.1). This EIRR considers only labor saving by water supply improvement. Actual EIRR will exceed this value if we consider other positive effect. If we consider only package 1 and 2 (Case 3), that is, excluding the pipeline extension to Falesti and Riscani, EIRR will increase to 8.75% (Table 11.1.2).

The water supply situation is very serious in both Falesti and Riscani with respect to both quality and quantity. But the cost of the pipeline extension to two cities, small number of residents and the low income of the residents, will decrease the monetary value of labor saving.

Table 11.1.1 EIRR Estimate (Case 1)

(2002 USD)

| Year | Total Cost | Labor Saving | Net Benefit | EIRR |
|------|------------|--------------|--------------|-------|
| 2003 | 581,140 | | (581,140) | |
| 2004 | 10,049,240 | | (10,049,240) | |
| 2005 | 8,821,000 | | (8,821,000) | |
| 2006 | 7,092,027 | 2,353,684 | (4,738,343) | |
| 2007 | 1,378,163 | 2,530,988 | 1,152,825 | |
| 2008 | 1,578,510 | 2,720,138 | 1,141,628 | |
| 2009 | 1,678,655 | 2,921,876 | 1,243,221 | |
| 2010 | 1,790,318 | 3,136,988 | 1,346,670 | |
| 2011 | 1,911,684 | 3,369,436 | 1,457,752 | |
| 2012 | 2,040,583 | 3,617,286 | 1,576,703 | |
| 2013 | 2,174,443 | 3,881,498 | 1,707,055 | |
| 2014 | 2,319,752 | 4,163,132 | 1,843,380 | |
| 2015 | 2,474,114 | 4,463,132 | 1,989,018 | |
| 2016 | 2,474,114 | 4,463,132 | 1,989,018 | |
| 2017 | 2,474,114 | 4,463,132 | 1,989,018 | |
| 2018 | 2,474,114 | 4,463,132 | 1,989,018 | |
| 2019 | 2,474,114 | 4,463,132 | 1,989,018 | |
| 2020 | 2,474,114 | 4,463,132 | 1,989,018 | |
| 2021 | 2,474,114 | 4,463,132 | 1,989,018 | |
| 2022 | 2,474,114 | 4,463,132 | 1,989,018 | |
| 2023 | 2,498,458 | 4,463,132 | 1,964,674 | |
| 2024 | 3,206,437 | 4,463,132 | 1,256,695 | |
| 2025 | 7,715,706 | 4,463,132 | (3,252,574) | |
| 2026 | 7,646,328 | 4,463,132 | (3,183,196) | |
| 2027 | 2,474,114 | 4,463,132 | 1,989,018 | |
| 2028 | 2,474,114 | 4,463,132 | 1,989,018 | |
| 2029 | 2,474,114 | 4,463,132 | 1,989,018 | |
| 2030 | 2,474,114 | 4,463,132 | 1,989,018 | |
| 2031 | 2,474,114 | 4,463,132 | 1,989,018 | |
| 2032 | 2,474,114 | 4,463,132 | 1,989,018 | |
| 2033 | 2,474,114 | 4,463,132 | 1,989,018 | |
| 2034 | 2,474,114 | 4,463,132 | 1,989,018 | |
| 2035 | 2,474,114 | 4,463,132 | 1,989,018 | |
| 2036 | 2,474,114 | 4,463,132 | 1,989,018 | |
| 2037 | 2,474,114 | 4,463,132 | 1,989,018 | |
| 2038 | 2,474,114 | 4,463,132 | 1,989,018 | |
| 2039 | 2,474,114 | 4,463,132 | 1,989,018 | |
| 2040 | 2,474,114 | 4,463,132 | 1,989,018 | |
| 2041 | 2,474,114 | 4,463,132 | 1,989,018 | |
| 2042 | 2,474,114 | 4,463,132 | 1,989,018 | 4.75% |

Table 11.1.2 EIRR Estimate (Case 3)

(2002 USD)

| Year | Total Cost | Labor Saving | Net Benefit | EIRR |
|------|------------|--------------|-------------|-------|
| 2003 | 581,000 | | (581,000) | |
| 2004 | 9,492,000 | | (9,492,000) | |
| 2005 | 3,210,000 | | (3,210,000) | |
| 2006 | 1,240,027 | 2,119,722 | 879,695 | |
| 2007 | 1,319,753 | 2,279,402 | 959,649 | |
| 2008 | 1,400,640 | 2,449,750 | 1,049,110 | |
| 2009 | 1,488,910 | 2,631,435 | 1,142,525 | |
| 2010 | 1,578,583 | 2,825,164 | 1,246,581 | |
| 2011 | 1,680,460 | 3,034,506 | 1,354,046 | |
| 2012 | 1,782,904 | 3,257,719 | 1,474,815 | |
| 2013 | 1,893,009 | 3,495,668 | 1,602,659 | |
| 2014 | 2,011,333 | 3,749,267 | 1,737,934 | |
| 2015 | 2,136,879 | 4,019,486 | 1,882,607 | |
| 2016 | 2,136,879 | 4,019,486 | 1,882,607 | |
| 2017 | 2,136,879 | 4,019,486 | 1,882,607 | |
| 2018 | 2,136,879 | 4,019,486 | 1,882,607 | |
| 2019 | 2,136,879 | 4,019,486 | 1,882,607 | |
| 2020 | 2,136,879 | 4,019,486 | 1,882,607 | |
| 2021 | 2,136,879 | 4,019,486 | 1,882,607 | |
| 2022 | 2,136,879 | 4,019,486 | 1,882,607 | |
| 2023 | 2,635,435 | 4,019,486 | 1,384,051 | |
| 2024 | 10,432,458 | 4,019,486 | (6,412,972) | |
| 2025 | 4,740,887 | 4,019,486 | (721,401) | |
| 2026 | 2,136,879 | 4,019,486 | 1,882,607 | |
| 2027 | 2,136,879 | 4,019,486 | 1,882,607 | |
| 2028 | 2,136,879 | 4,019,486 | 1,882,607 | |
| 2029 | 2,136,879 | 4,019,486 | 1,882,607 | |
| 2030 | 2,136,879 | 4,019,486 | 1,882,607 | |
| 2031 | 2,136,879 | 4,019,486 | 1,882,607 | |
| 2032 | 2,136,879 | 4,019,486 | 1,882,607 | |
| 2033 | 2,136,879 | 4,019,486 | 1,882,607 | |
| 2034 | 2,136,879 | 4,019,486 | 1,882,607 | |
| 2035 | 2,136,879 | 4,019,486 | 1,882,607 | |
| 2036 | 2,136,879 | 4,019,486 | 1,882,607 | |
| 2037 | 2,136,879 | 4,019,486 | 1,882,607 | |
| 2038 | 2,136,879 | 4,019,486 | 1,882,607 | |
| 2039 | 2,136,879 | 4,019,486 | 1,882,607 | |
| 2040 | 2,136,879 | 4,019,486 | 1,882,607 | |
| 2041 | 2,136,879 | 4,019,486 | 1,882,607 | |
| 2042 | 2,136,879 | 4,019,486 | 1,882,607 | 8.75% |

11.2 Financial Evaluation

(1) Scope of the Analysis

The scope of the financial evaluation in the feasibility study is focused to ACSB. The WITH is the case that the proposed four packages in FS are implemented and the WITHOUT is that the proposed packages are not implemented. As for the equipment that is now out of operation due to power disconnection, we assumed that the normal and stable operation in long-term period of this old equipment would be impossible. Technical judgment by the professional engineers in the study team supports this treatment. Thus the object of the analysis is the difference between WITH and WITHOUT. The cumulative liabilities, account receivables and the depreciation of the existing facilities are out of analysis in this feasibility study because they are included in both WITH and WITHOUT. The time frame of the feasibility study is from 2003 to 2015.

(2) Cases

We have set up the following three cases for the analysis of the feasibility study.

Case 1: All the four packages are implemented with low interest loan.

Case 2: The package one and two are implemented with low interest loan and the package three and four are implemented with government subsidy.

Case 3: The package one and two are implemented with low interest loan and the package three and four are suspended.

(3) Economic Trends

The economy of the Republic of Moldova is now considerably stable in price level and foreign exchange rate. The economy seems to get rid of past confusion in several years and ride on growth trend. We adopted preliminary economic forecast done by the World Bank (until 2008) and expected the continuation of the same trend from 2009 to 2015 (see the Supporting Report). The exchange rate is constant at USD 1=13.60 lei.

(4) Water Supply Plan

1) Water Production Plan and Water Sales Plan

They are shown in the Supporting Report based on engineering plan. The water from the package one and two will be supplied from 2006 and the water from the package three and four will be supplied from 2007. The difference between water production volume and water billing volume is unaccounted-for-water (UFW).

2) Water Tariff Structure

Currently, the wholesale price of ACSB is 1.43 lei/m³. ACSB is trying to increase the tariff to 1.62 lei/m³ and it will be realized within a couple of years. The 1.62 lei/m³ is at 2002 price level and it is assumed that the tariff increase will be possible in proportion to inflation rate and real GDP growth rate. As a result, the water tariff of ACSB at 2015 will be 6.00 lei/m³ (2015 price) as shown in the Supporting Report. The VAT (value added tax, currently 20%) is excluded from the analysis.

3) Estimation of the Revenue

The revenue from water sales depends on the three factors, i.e., billing volume, tariff structure and collection rate. The major cause of financial trouble of ACSB was low collection rate. This must be improved. But until 2006, we expect the normalization of the payment from the retail Apa Canals to ACSB, thus assume 100 % collection rate.

(5) Estimation of the Costs

1) Construction Costs

Initial investment costs consist of Machine and Electrical Equipment and Civil Works. Engineering fee and contingencies are added. The depreciation period is 20 years for machine and electrical equipment and 40 years for civil works at straight-line method (10% salvage value).

2) O&M costs and General Administrative expenditure

In addition to the O&M costs, we have to add the general and administrative expense. We adopt the general and administrative expenditure of ACSB at 1999 financial reports when ACSB operated during 12 months. O&M will be assumed to increase in proportion to inflation and at the rate of 70 % on real GDP growth.

(6) Financing Plan

As for the financial resources, the internal financing is absolutely impossible for ACSB.

The loan condition assumed is 2 % interest rate, 30 years loan with 10-year grace period. The loan at this category reflects grant nature at substantial degree. It has to be kept in mind that a loan at this condition is usually not available and that the analysis actually shows the necessity of government subsidy.

(7) FIRR

FIRR was 3.62% in Case 1 (Table 11.2.1), 7.99% in Case 2 (Table 11.2.3), and 6.51% in Case 3 (Table 11.2.6). The Case 1 shows the lowest FIRR because all the four packages will be implemented with low interest loan. Even with extremely low interest loan, the result of the analysis shows that the project is not feasible without government subsidy. With government subsidy for package 3 and 4, the FIRR is improved to 7.99%. If the package 3 and 4 are excluded from the project, the FIRR will be 6.51%.

(8) Sensitivity Analysis of FIRR

1) O&M expenditure

If O&M expenditure increases in proportion to the real GDP per capita growth, FIRR in Case 1 will be 1.91% (Table 11.2.2), FIRR in Case 2 will be 5.89% (Table 11.2.4), and FIRR in Case 3 will be 4.39% (Table 11.2.7). The rationalization to keep O&M in low level is absolutely necessary.

2) Tariff Collection Rate

If the expected tariff collection rate is decreased to 90%, the FIRR in Case 1 becomes negative, FIRR in Case 2 will be 2.63% (Table 11.2.5), and FIRR in Case 3 (Table 11.2.8) will be 1.13%. Thus, the collection rate at high level is critically important.

Until the year that new facilities will be operated, the two or four retail Apa Canals have to establish the systems of the retail tariff collection and the payment to ACSB. During the past one year, the improvement of the financial management in ACB and ACS is remarkable. We expect full tariff collection from these two cities.

(9) Financial Statements

The pro forma financial statements are estimated for three cases. The year that net income become positive is 2010 in Case 1 (Table 11.2.9), 2006 in Case 2 (Table 11.2.10), and 2006 in Case 3 (Table 11.2.11). The water sales start from 2006 and the depreciation does not require actual cash outlay, therefore, the financial situation of the ASCB will be not so serious. The cumulative liabilities will disappear at 2014 in Case 1, at 2009 in Case 2, and at 2009 in Case 3. After that, ACSB will be able to accumulate profit, and the cumulative trade liabilities before 2002 will be repaid with this surplus.

As for the cash flow, the first four years in Case 1, first three years in Case 2 and Case 3 will face to cash shortage. There is no cash income during first three years (2003 - 2005), but the payment of the

interest for the loan will start from the first year. Therefore short-term working capital must be secured somehow for the project implementation.

The negative equity situation will disappear at 2014 in Case 1, at 2004 in Case 2 and at 2004 in Case 3. But before these years, the cash position will be abundant and these cash will be used for the repayment of the trade liability before 2002.

(10) The Affordability of the Retail Apa Canals

ACB and ACS informally accepted 1.62 lei/m³ level of wholesale tariff. But in order to realize this new tariff, the stable water supply from ACSB is necessary. From the last year, ACS did not increase any new debt to ACSB. The existing debt to ACSB by ACS was accumulated before the summer of 2001. The new uniform tariff in ACB will support the stable payment to ACSB.

As for ACF and ACR, there are some uncertainties in payment to ACSB. But even in Riscani, there was financial improvement between 2001 and 2002. We believe that new uniform tariff in Balti will have effect on surrounding cities/towns, and the economic recovery in the region will improve the financial situation of local Apa Canals

(11) The Issue of Outstanding Debt of ACSB

As mentioned above, ACSB will be able to repay the substantial portion of the outstanding debt using the surplus cash in the pro forma financial statements. In addition to the cash surplus from the operation, the collection of the existing tariff receivables will be utilized to debt repayment firstly. Therefore we envisage full repayment until 2015 if the assumption of the analysis is realized.

Table 11.2.1 FIRR Estimate for ACSB (Case 1, O&M 70%)

(2002 USD)

| Year | Land | Civil Works | M&E | OM&GA | Total Outflow | Revenue | Net Cashflow | FIRR |
|------|-------|-------------|-----------|-----------|---------------|-----------|--------------|-------|
| 2003 | 140 | 27,049 | 553,951 | | 581,140 | | (581,140) | |
| 2004 | 8,240 | 813,692 | 9,227,308 | | 10,049,240 | | (10,049,240) | |
| 2005 | 0 | 5,823,991 | 2,997,009 | | 8,821,000 | | (8,821,000) | |
| 2006 | 0 | 5,746,905 | 105,095 | 1,240,027 | 7,092,027 | 1,870,556 | (5,221,471) | |
| 2007 | | | | 1,378,163 | 1,378,163 | 2,125,217 | 747,054 | |
| 2008 | | | | 1,578,510 | 1,578,510 | 2,492,122 | 913,612 | |
| 2009 | | | | 1,678,655 | 1,678,655 | 2,693,549 | 1,014,894 | |
| 2010 | | | | 1,790,318 | 1,790,318 | 2,913,931 | 1,123,613 | |
| 2011 | | | | 1,911,684 | 1,911,684 | 3,154,910 | 1,243,226 | |
| 2012 | | | | 2,040,583 | 2,040,583 | 3,412,702 | 1,372,119 | |
| 2013 | | | | 2,174,443 | 2,174,443 | 3,682,550 | 1,508,107 | |
| 2014 | | | | 2,319,752 | 2,319,752 | 3,976,979 | 1,657,227 | |
| 2015 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2016 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2017 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2018 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2019 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2020 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2021 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2022 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2023 | | | 498,556 | 2,474,114 | 2,972,670 | 4,291,644 | 1,318,974 | |
| 2024 | | | 8,304,577 | 2,474,114 | 10,778,691 | 4,291,644 | (6,487,047) | |
| 2025 | | | 2,697,308 | 2,474,114 | 5,171,422 | 4,291,644 | (879,778) | |
| 2026 | | | 94,586 | 2,474,114 | 2,568,700 | 4,291,644 | 1,722,944 | |
| 2027 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2028 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2029 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2030 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2031 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2032 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2033 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2034 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2035 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2036 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2037 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2038 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2039 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2040 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2041 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2042 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | 3.62% |

Note: O&M will increase at 70 percent of the growth of per capita GDP.

Table 11.2.2 FIRR Estimate for ACSB (Case 1, O&M 100%)

(2002 USD)

| Year | Land | Civil Works | M&E | OM&GA | Total Outflow | Revenue | Net Cashflow | FIRR |
|------|-------|-------------|-----------|-----------|---------------|-----------|--------------|-------|
| 2003 | 140 | 27,049 | 553,951 | | 581,000 | | (581,000) | |
| 2004 | 8,240 | 813,692 | 9,227,308 | | 10,041,000 | | (10,041,000) | |
| 2005 | 0 | 5,823,991 | 2,997,009 | | 8,821,000 | | (8,821,000) | |
| 2006 | 0 | 5,746,905 | 105,095 | 1,303,116 | 7,155,116 | 1,870,556 | (5,284,560) | |
| 2007 | | | | 1,466,746 | 1,466,746 | 2,125,217 | 658,471 | |
| 2008 | | | | 1,700,622 | 1,700,622 | 2,492,122 | 791,500 | |
| 2009 | | | | 1,829,938 | 1,829,938 | 2,693,549 | 863,612 | |
| 2010 | | | | 1,973,933 | 1,973,933 | 2,913,931 | 939,998 | |
| 2011 | | | | 2,130,903 | 2,130,903 | 3,154,910 | 1,024,007 | |
| 2012 | | | | 2,298,634 | 2,298,634 | 3,412,702 | 1,114,068 | |
| 2013 | | | | 2,474,339 | 2,474,339 | 3,682,550 | 1,208,211 | |
| 2014 | | | | 2,665,515 | 2,665,515 | 3,976,979 | 1,311,464 | |
| 2015 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2016 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2017 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2018 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2019 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2020 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2021 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2022 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2023 | | | 498,556 | 2,869,621 | 3,368,178 | 4,291,644 | 923,467 | |
| 2024 | | | 8,304,577 | 2,869,621 | 11,174,199 | 4,291,644 | (6,882,554) | |
| 2025 | | | 2,697,308 | 2,869,621 | 5,566,929 | 4,291,644 | (1,275,285) | |
| 2026 | | | 94,586 | 2,869,621 | 2,964,207 | 4,291,644 | 1,327,437 | |
| 2027 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2028 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2029 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2030 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2031 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2032 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2033 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2034 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2035 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2036 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2037 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2038 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2039 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2040 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2041 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2042 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | 1.91% |

Note: O&M will increase in proportion to the growth of per capita GDP.

Table 11.2.3 FIRR Estimate for ACSB (Case 2, O&M 70%)

(2002 USD)

| Year | Land | Civil Works | M&E | OM&GA | Total Outflow | Revenue | Net Cashflow | FIRR |
|------|------|-------------|-----------|-----------|---------------|-----------|--------------|-------|
| 2003 | 140 | 27,049 | 553,951 | | 581,140 | | (581,140) | |
| 2004 | 0 | 274,690 | 9,217,310 | | 9,492,000 | | (9,492,000) | |
| 2005 | 0 | 316,658 | 2,893,342 | | 3,210,000 | | (3,210,000) | |
| 2006 | 0 | 0 | 0 | 1,240,027 | 1,240,027 | 1,870,556 | 630,529 | |
| 2007 | | | | 1,378,163 | 1,378,163 | 2,125,217 | 747,054 | |
| 2008 | | | | 1,578,510 | 1,578,510 | 2,492,122 | 913,612 | |
| 2009 | | | | 1,678,655 | 1,678,655 | 2,693,549 | 1,014,894 | |
| 2010 | | | | 1,790,318 | 1,790,318 | 2,913,931 | 1,123,613 | |
| 2011 | | | | 1,911,684 | 1,911,684 | 3,154,910 | 1,243,226 | |
| 2012 | | | | 2,040,583 | 2,040,583 | 3,412,702 | 1,372,119 | |
| 2013 | | | | 2,174,443 | 2,174,443 | 3,682,550 | 1,508,107 | |
| 2014 | | | | 2,319,752 | 2,319,752 | 3,976,979 | 1,657,227 | |
| 2015 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2016 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2017 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2018 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2019 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2020 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2021 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2022 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2023 | | | 498,556 | 2,474,114 | 2,972,670 | 4,291,644 | 1,318,974 | |
| 2024 | | | 8,295,579 | 2,474,114 | 10,769,693 | 4,291,644 | (6,478,049) | |
| 2025 | | | 2,604,008 | 2,474,114 | 5,078,122 | 4,291,644 | (786,478) | |
| 2026 | | | 0 | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2027 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2028 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2029 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2030 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2031 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2032 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2033 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2034 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2035 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2036 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2037 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2038 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2039 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2040 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2041 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | |
| 2042 | | | | 2,474,114 | 2,474,114 | 4,291,644 | 1,817,530 | 7.99% |

Note: O&M will increase at 70 percent of the growth of per capita GDP.

Table 11.2.4 FIRR Estimate for ACSB (Case 2, O&M 100%)

(2002 USD)

| Year | Land | Civil Works | M&E | OM&GA | Total Outflow | Revenue | Net Cashflow | FIRR |
|------|------|-------------|-----------|-----------|---------------|-----------|--------------|-------|
| 2003 | 140 | 27,049 | 553,951 | | 581,000 | | (581,000) | |
| 2004 | 0 | 274,690 | 9,217,310 | | 9,492,000 | | (9,492,000) | |
| 2005 | 0 | 316,658 | 2,893,342 | | 3,210,000 | | (3,210,000) | |
| 2006 | 0 | 0 | 0 | 1,303,116 | 1,303,116 | 1,870,556 | 567,440 | |
| 2007 | | | | 1,466,746 | 1,466,746 | 2,125,217 | 658,471 | |
| 2008 | | | | 1,700,622 | 1,700,622 | 2,492,122 | 791,500 | |
| 2009 | | | | 1,829,938 | 1,829,938 | 2,693,549 | 863,612 | |
| 2010 | | | | 1,973,933 | 1,973,933 | 2,913,931 | 939,998 | |
| 2011 | | | | 2,130,903 | 2,130,903 | 3,154,910 | 1,024,007 | |
| 2012 | | | | 2,298,634 | 2,298,634 | 3,412,702 | 1,114,068 | |
| 2013 | | | | 2,474,339 | 2,474,339 | 3,682,550 | 1,208,211 | |
| 2014 | | | | 2,665,515 | 2,665,515 | 3,976,979 | 1,311,464 | |
| 2015 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2016 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2017 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2018 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2019 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2020 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2021 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2022 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2023 | | | 498,556 | 2,869,621 | 3,368,178 | 4,291,644 | 923,467 | |
| 2024 | | | 8,295,579 | 2,869,621 | 11,165,200 | 4,291,644 | (6,873,556) | |
| 2025 | | | 2,604,008 | 2,869,621 | 5,473,629 | 4,291,644 | (1,181,985) | |
| 2026 | | | 0 | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2027 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2028 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2029 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2030 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2031 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2032 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2033 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2034 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2035 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2036 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2037 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2038 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2039 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2040 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2041 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | |
| 2042 | | | | 2,869,621 | 2,869,621 | 4,291,644 | 1,422,023 | 5.89% |

Note: O&M will increase in proportion to the growth of per capita GDP.

Table 11.2.5 FIRR Estimate for ACSB (Case 2, O&M 100%, 90% Collection)

(2002 USD)

| Year | Land | Civil Works | M&E | OM&GA | Total Outflow | Revenue | Net Cashflow | FIRR |
|------|------|-------------|-----------|-----------|---------------|-----------|--------------|-------|
| 2003 | 140 | 27,049 | 553,951 | | 581,000 | | (581,000) | |
| 2004 | 0 | 274,690 | 9,217,310 | | 9,492,000 | | (9,492,000) | |
| 2005 | 0 | 316,658 | 2,893,342 | | 3,210,000 | | (3,210,000) | |
| 2006 | 0 | 0 | 0 | 1,303,116 | 1,303,116 | 1,683,500 | 380,384 | |
| 2007 | | | | 1,466,746 | 1,466,746 | 1,912,695 | 445,949 | |
| 2008 | | | | 1,700,622 | 1,700,622 | 2,242,910 | 542,287 | |
| 2009 | | | | 1,829,938 | 1,829,938 | 2,424,195 | 594,257 | |
| 2010 | | | | 1,973,933 | 1,973,933 | 2,622,538 | 648,605 | |
| 2011 | | | | 2,130,903 | 2,130,903 | 2,839,419 | 708,516 | |
| 2012 | | | | 2,298,634 | 2,298,634 | 3,071,432 | 772,797 | |
| 2013 | | | | 2,474,339 | 2,474,339 | 3,314,295 | 839,956 | |
| 2014 | | | | 2,665,515 | 2,665,515 | 3,579,281 | 913,766 | |
| 2015 | | | | 2,869,621 | 2,869,621 | 3,862,480 | 992,858 | |
| 2016 | | | | 2,869,621 | 2,869,621 | 3,862,480 | 992,858 | |
| 2017 | | | | 2,869,621 | 2,869,621 | 3,862,480 | 992,858 | |
| 2018 | | | | 2,869,621 | 2,869,621 | 3,862,480 | 992,858 | |
| 2019 | | | | 2,869,621 | 2,869,621 | 3,862,480 | 992,858 | |
| 2020 | | | | 2,869,621 | 2,869,621 | 3,862,480 | 992,858 | |
| 2021 | | | | 2,869,621 | 2,869,621 | 3,862,480 | 992,858 | |
| 2022 | | | | 2,869,621 | 2,869,621 | 3,862,480 | 992,858 | |
| 2023 | | | 498,556 | 2,869,621 | 3,368,178 | 3,862,480 | 494,302 | |
| 2024 | | | 8,295,579 | 2,869,621 | 11,165,200 | 3,862,480 | (7,302,720) | |
| 2025 | | | 2,604,008 | 2,869,621 | 5,473,629 | 3,862,480 | (1,611,150) | |
| 2026 | | | 0 | 2,869,621 | 2,869,621 | 3,862,480 | 992,858 | |
| 2027 | | | | 2,869,621 | 2,869,621 | 3,862,480 | 992,858 | |
| 2028 | | | | 2,869,621 | 2,869,621 | 3,862,480 | 992,858 | |
| 2029 | | | | 2,869,621 | 2,869,621 | 3,862,480 | 992,858 | |
| 2030 | | | | 2,869,621 | 2,869,621 | 3,862,480 | 992,858 | |
| 2031 | | | | 2,869,621 | 2,869,621 | 3,862,480 | 992,858 | |
| 2032 | | | | 2,869,621 | 2,869,621 | 3,862,480 | 992,858 | |
| 2033 | | | | 2,869,621 | 2,869,621 | 3,862,480 | 992,858 | |
| 2034 | | | | 2,869,621 | 2,869,621 | 3,862,480 | 992,858 | |
| 2035 | | | | 2,869,621 | 2,869,621 | 3,862,480 | 992,858 | |
| 2036 | | | | 2,869,621 | 2,869,621 | 3,862,480 | 992,858 | |
| 2037 | | | | 2,869,621 | 2,869,621 | 3,862,480 | 992,858 | |
| 2038 | | | | 2,869,621 | 2,869,621 | 3,862,480 | 992,858 | |
| 2039 | | | | 2,869,621 | 2,869,621 | 3,862,480 | 992,858 | |
| 2040 | | | | 2,869,621 | 2,869,621 | 3,862,480 | 992,858 | |
| 2041 | | | | 2,869,621 | 2,869,621 | 3,862,480 | 992,858 | |
| 2042 | | | | 2,869,621 | 2,869,621 | 3,862,480 | 992,858 | 2.63% |

Note: O&M will increase in proportion to the growth of per capita GDP.

Table 11.2.6 FIRR Estimate for ACSB (Case 3, Package 1 and 2 only, O&M 70%)

(2002 USD)

| Year | Land | Civil Works | M&E | OM&GA | Total Outflow | Revenue | Net Cashflow | FIRR |
|------|------|-------------|-----------|-----------|---------------|-----------|--------------|-------|
| 2003 | 140 | 27,049 | 553,951 | | 581,000 | | (581,000) | |
| 2004 | 0 | 274,690 | 9,217,310 | | 9,492,000 | | (9,492,000) | |
| 2005 | 0 | 316,658 | 2,893,342 | | 3,210,000 | | (3,210,000) | |
| 2006 | 0 | 0 | 0 | 1,240,027 | 1,240,027 | 1,870,556 | 630,529 | |
| 2007 | | | | 1,319,753 | 1,319,753 | 2,025,053 | 705,300 | |
| 2008 | | | | 1,400,640 | 1,400,640 | 2,185,751 | 785,111 | |
| 2009 | | | | 1,488,910 | 1,488,910 | 2,357,456 | 868,545 | |
| 2010 | | | | 1,578,583 | 1,578,583 | 2,540,867 | 962,284 | |
| 2011 | | | | 1,680,460 | 1,680,460 | 2,742,019 | 1,061,559 | |
| 2012 | | | | 1,782,904 | 1,782,904 | 2,951,376 | 1,168,472 | |
| 2013 | | | | 1,893,009 | 1,893,009 | 3,174,813 | 1,281,805 | |
| 2014 | | | | 2,011,333 | 2,011,333 | 3,419,344 | 1,408,011 | |
| 2015 | | | | 2,136,879 | 2,136,879 | 3,673,956 | 1,537,077 | |
| 2016 | | | | 2,136,879 | 2,136,879 | 3,673,956 | 1,537,077 | |
| 2017 | | | | 2,136,879 | 2,136,879 | 3,673,956 | 1,537,077 | |
| 2018 | | | | 2,136,879 | 2,136,879 | 3,673,956 | 1,537,077 | |
| 2019 | | | | 2,136,879 | 2,136,879 | 3,673,956 | 1,537,077 | |
| 2020 | | | | 2,136,879 | 2,136,879 | 3,673,956 | 1,537,077 | |
| 2021 | | | | 2,136,879 | 2,136,879 | 3,673,956 | 1,537,077 | |
| 2022 | | | | 2,136,879 | 2,136,879 | 3,673,956 | 1,537,077 | |
| 2023 | | | 498,556 | 2,136,879 | 2,635,435 | 3,673,956 | 1,038,521 | |
| 2024 | | | 8,295,579 | 2,136,879 | 10,432,458 | 3,673,956 | (6,758,501) | |
| 2025 | | | 2,604,008 | 2,136,879 | 4,740,887 | 3,673,956 | (1,066,931) | |
| 2026 | | | 0 | 2,136,879 | 2,136,879 | 3,673,956 | 1,537,077 | |
| 2027 | | | | 2,136,879 | 2,136,879 | 3,673,956 | 1,537,077 | |
| 2028 | | | | 2,136,879 | 2,136,879 | 3,673,956 | 1,537,077 | |
| 2029 | | | | 2,136,879 | 2,136,879 | 3,673,956 | 1,537,077 | |
| 2030 | | | | 2,136,879 | 2,136,879 | 3,673,956 | 1,537,077 | |
| 2031 | | | | 2,136,879 | 2,136,879 | 3,673,956 | 1,537,077 | |
| 2032 | | | | 2,136,879 | 2,136,879 | 3,673,956 | 1,537,077 | |
| 2033 | | | | 2,136,879 | 2,136,879 | 3,673,956 | 1,537,077 | |
| 2034 | | | | 2,136,879 | 2,136,879 | 3,673,956 | 1,537,077 | |
| 2035 | | | | 2,136,879 | 2,136,879 | 3,673,956 | 1,537,077 | |
| 2036 | | | | 2,136,879 | 2,136,879 | 3,673,956 | 1,537,077 | |
| 2037 | | | | 2,136,879 | 2,136,879 | 3,673,956 | 1,537,077 | |
| 2038 | | | | 2,136,879 | 2,136,879 | 3,673,956 | 1,537,077 | |
| 2039 | | | | 2,136,879 | 2,136,879 | 3,673,956 | 1,537,077 | |
| 2040 | | | | 2,136,879 | 2,136,879 | 3,673,956 | 1,537,077 | |
| 2041 | | | | 2,136,879 | 2,136,879 | 3,673,956 | 1,537,077 | |
| 2042 | | | | 2,136,879 | 2,136,879 | 3,673,956 | 1,537,077 | 6.51% |

Note: O&M will increase at 70 percent of the growth of per capita GDP.

Table 11.2.7 FIRR Estimate for ACSB (Case 3, Package 1 and 2 only, O&M 100%)

(2002 USD)

| Year | Land | Civil Works | M&E | OM&GA | Total Outflow | Revenue | Net Cashflow | FIRR |
|------|------|-------------|-----------|-----------|---------------|-----------|--------------|-------|
| 2003 | 140 | 27,049 | 553,951 | | 581,000 | | (581,000) | |
| 2004 | 0 | 274,690 | 9,217,310 | | 9,492,000 | | (9,492,000) | |
| 2005 | 0 | 316,658 | 2,893,342 | | 3,210,000 | | (3,210,000) | |
| 2006 | 0 | 0 | 0 | 1,303,116 | 1,303,116 | 1,870,556 | 567,440 | |
| 2007 | | | | 1,404,582 | 1,404,582 | 2,025,053 | 620,471 | |
| 2008 | | | | 1,508,992 | 1,508,992 | 2,185,751 | 676,759 | |
| 2009 | | | | 1,623,093 | 1,623,093 | 2,357,456 | 734,363 | |
| 2010 | | | | 1,740,483 | 1,740,483 | 2,540,867 | 800,384 | |
| 2011 | | | | 1,873,164 | 1,873,164 | 2,742,019 | 868,855 | |
| 2012 | | | | 2,008,369 | 2,008,369 | 2,951,376 | 943,007 | |
| 2013 | | | | 2,154,090 | 2,154,090 | 3,174,813 | 1,020,723 | |
| 2014 | | | | 2,311,124 | 2,311,124 | 3,419,344 | 1,108,220 | |
| 2015 | | | | 2,478,477 | 2,478,477 | 3,673,956 | 1,195,480 | |
| 2016 | | | | 2,478,477 | 2,478,477 | 3,673,956 | 1,195,480 | |
| 2017 | | | | 2,478,477 | 2,478,477 | 3,673,956 | 1,195,480 | |
| 2018 | | | | 2,478,477 | 2,478,477 | 3,673,956 | 1,195,480 | |
| 2019 | | | | 2,478,477 | 2,478,477 | 3,673,956 | 1,195,480 | |
| 2020 | | | | 2,478,477 | 2,478,477 | 3,673,956 | 1,195,480 | |
| 2021 | | | | 2,478,477 | 2,478,477 | 3,673,956 | 1,195,480 | |
| 2022 | | | | 2,478,477 | 2,478,477 | 3,673,956 | 1,195,480 | |
| 2023 | | | 498,556 | 2,478,477 | 2,977,033 | 3,673,956 | 696,924 | |
| 2024 | | | 8,295,579 | 2,478,477 | 10,774,055 | 3,673,956 | (7,100,099) | |
| 2025 | | | 2,604,008 | 2,478,477 | 5,082,485 | 3,673,956 | (1,408,528) | |
| 2026 | | | 0 | 2,478,477 | 2,478,477 | 3,673,956 | 1,195,480 | |
| 2027 | | | | 2,478,477 | 2,478,477 | 3,673,956 | 1,195,480 | |
| 2028 | | | | 2,478,477 | 2,478,477 | 3,673,956 | 1,195,480 | |
| 2029 | | | | 2,478,477 | 2,478,477 | 3,673,956 | 1,195,480 | |
| 2030 | | | | 2,478,477 | 2,478,477 | 3,673,956 | 1,195,480 | |
| 2031 | | | | 2,478,477 | 2,478,477 | 3,673,956 | 1,195,480 | |
| 2032 | | | | 2,478,477 | 2,478,477 | 3,673,956 | 1,195,480 | |
| 2033 | | | | 2,478,477 | 2,478,477 | 3,673,956 | 1,195,480 | |
| 2034 | | | | 2,478,477 | 2,478,477 | 3,673,956 | 1,195,480 | |
| 2035 | | | | 2,478,477 | 2,478,477 | 3,673,956 | 1,195,480 | |
| 2036 | | | | 2,478,477 | 2,478,477 | 3,673,956 | 1,195,480 | |
| 2037 | | | | 2,478,477 | 2,478,477 | 3,673,956 | 1,195,480 | |
| 2038 | | | | 2,478,477 | 2,478,477 | 3,673,956 | 1,195,480 | |
| 2039 | | | | 2,478,477 | 2,478,477 | 3,673,956 | 1,195,480 | |
| 2040 | | | | 2,478,477 | 2,478,477 | 3,673,956 | 1,195,480 | |
| 2041 | | | | 2,478,477 | 2,478,477 | 3,673,956 | 1,195,480 | |
| 2042 | | | | 2,478,477 | 2,478,477 | 3,673,956 | 1,195,480 | 4.39% |

Note: O&M will increase in proportion to the growth of per capita GDP.

Table 11.2.8 FIRR Estimate for ACSB
(Case 3, Package 1 and 2 only, O&M 100%, 90% Collection)

(2002 USD)

| Year | Land | Civil Works | M&E | OM&GA | Total Outflow | Revenue | Net Cashflow | FIRR |
|------|------|-------------|-----------|-----------|---------------|-----------|--------------|-------|
| 2003 | 140 | 27,049 | 553,951 | | 581,000 | | (581,000) | |
| 2004 | 0 | 274,690 | 9,217,310 | | 9,492,000 | | (9,492,000) | |
| 2005 | 0 | 316,658 | 2,893,342 | | 3,210,000 | | (3,210,000) | |
| 2006 | 0 | 0 | 0 | 1,303,116 | 1,303,116 | 1,683,500 | 380,384 | |
| 2007 | | | | 1,404,582 | 1,404,582 | 1,822,548 | 417,966 | |
| 2008 | | | | 1,508,992 | 1,508,992 | 1,967,176 | 458,184 | |
| 2009 | | | | 1,623,093 | 1,623,093 | 2,121,710 | 498,618 | |
| 2010 | | | | 1,740,483 | 1,740,483 | 2,286,780 | 546,297 | |
| 2011 | | | | 1,873,164 | 1,873,164 | 2,467,817 | 594,654 | |
| 2012 | | | | 2,008,369 | 2,008,369 | 2,656,238 | 647,869 | |
| 2013 | | | | 2,154,090 | 2,154,090 | 2,857,332 | 703,242 | |
| 2014 | | | | 2,311,124 | 2,311,124 | 3,077,410 | 766,285 | |
| 2015 | | | | 2,478,477 | 2,478,477 | 3,306,561 | 828,084 | |
| 2016 | | | | 2,478,477 | 2,478,477 | 3,306,561 | 828,084 | |
| 2017 | | | | 2,478,477 | 2,478,477 | 3,306,561 | 828,084 | |
| 2018 | | | | 2,478,477 | 2,478,477 | 3,306,561 | 828,084 | |
| 2019 | | | | 2,478,477 | 2,478,477 | 3,306,561 | 828,084 | |
| 2020 | | | | 2,478,477 | 2,478,477 | 3,306,561 | 828,084 | |
| 2021 | | | | 2,478,477 | 2,478,477 | 3,306,561 | 828,084 | |
| 2022 | | | | 2,478,477 | 2,478,477 | 3,306,561 | 828,084 | |
| 2023 | | | 498,556 | 2,478,477 | 2,977,033 | 3,306,561 | 329,528 | |
| 2024 | | | 8,295,579 | 2,478,477 | 10,774,055 | 3,306,561 | (7,467,495) | |
| 2025 | | | 2,604,008 | 2,478,477 | 5,082,485 | 3,306,561 | (1,775,924) | |
| 2026 | | | 0 | 2,478,477 | 2,478,477 | 3,306,561 | 828,084 | |
| 2027 | | | | 2,478,477 | 2,478,477 | 3,306,561 | 828,084 | |
| 2028 | | | | 2,478,477 | 2,478,477 | 3,306,561 | 828,084 | |
| 2029 | | | | 2,478,477 | 2,478,477 | 3,306,561 | 828,084 | |
| 2030 | | | | 2,478,477 | 2,478,477 | 3,306,561 | 828,084 | |
| 2031 | | | | 2,478,477 | 2,478,477 | 3,306,561 | 828,084 | |
| 2032 | | | | 2,478,477 | 2,478,477 | 3,306,561 | 828,084 | |
| 2033 | | | | 2,478,477 | 2,478,477 | 3,306,561 | 828,084 | |
| 2034 | | | | 2,478,477 | 2,478,477 | 3,306,561 | 828,084 | |
| 2035 | | | | 2,478,477 | 2,478,477 | 3,306,561 | 828,084 | |
| 2036 | | | | 2,478,477 | 2,478,477 | 3,306,561 | 828,084 | |
| 2037 | | | | 2,478,477 | 2,478,477 | 3,306,561 | 828,084 | |
| 2038 | | | | 2,478,477 | 2,478,477 | 3,306,561 | 828,084 | |
| 2039 | | | | 2,478,477 | 2,478,477 | 3,306,561 | 828,084 | |
| 2040 | | | | 2,478,477 | 2,478,477 | 3,306,561 | 828,084 | |
| 2041 | | | | 2,478,477 | 2,478,477 | 3,306,561 | 828,084 | |
| 2042 | | | | 2,478,477 | 2,478,477 | 3,306,561 | 828,084 | 1.13% |

Note: O&M will increase in proportion to the growth of per capita GDP.

Table 11.2.9 Apa Canal Soroca-Balti Proforma Financial Statements (Case 1)

(USD, Current Price)

| Year | 2,003 | 2,004 | 2,005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|--------------------------------------|----------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------------|------------|
| Income Statement | | | | | | | | | | | | | |
| Revenue | | | | 2,361,472 | 2,823,823 | 3,485,183 | 3,964,636 | 4,514,189 | 5,144,102 | 5,856,566 | 6,651,436 | 7,560,355 | 8,586,867 |
| O&M+GeneAdmi | | | | 1,565,464 | 1,831,196 | 2,207,515 | 2,470,813 | 2,773,516 | 3,117,013 | 3,501,862 | 3,927,487 | 4,409,918 | 4,950,291 |
| Depreciation | | 28,035 | 306,370 | 782,495 | 1,114,947 | 1,114,947 | 1,114,947 | 1,114,947 | 1,114,947 | 1,114,947 | 1,114,947 | 1,114,947 | 1,114,947 |
| Interest | 12,463 | 241,514 | 453,124 | 600,881 | 600,881 | 600,881 | 600,881 | 600,881 | 600,881 | 600,881 | 600,258 | 588,805 | 578,225 |
| Total Expenditure | 12,463 | 269,549 | 759,495 | 2,948,840 | 3,547,023 | 3,923,342 | 4,186,640 | 4,489,343 | 4,832,840 | 5,217,689 | 5,642,691 | 6,113,670 | 6,643,462 |
| Net Income | (12,463) | (269,549) | (759,495) | (587,368) | (723,200) | (438,160) | (222,004) | 24,846 | 311,261 | 638,877 | 1,008,745 | 1,446,685 | 1,943,405 |
| Cum Net Income | (12,463) | (282,012) | (1,041,507) | (1,628,874) | (2,352,074) | (2,790,234) | (3,012,238) | (2,987,392) | (2,676,131) | (2,037,254) | (1,028,509) | 418,177 | 2,361,581 |
| Fund Flow Statement | | | | | | | | | | | | | |
| Loan | 623,156 | 11,452,520 | 10,580,539 | 7,387,821 | | | | | | | | | |
| Revenue | 0 | 0 | 0 | 2,361,472 | 2,823,823 | 3,485,183 | 3,964,636 | 4,514,189 | 5,144,102 | 5,856,566 | 6,651,436 | 7,560,355 | 8,586,867 |
| Total Inflow | 623,156 | 11,452,520 | 10,580,539 | 9,749,293 | 2,823,823 | 3,485,183 | 3,964,636 | 4,514,189 | 5,144,102 | 5,856,566 | 6,651,436 | 7,560,355 | 8,586,867 |
| Investment | 623,156 | 11,452,520 | 10,580,539 | 7,387,821 | | | | | | | | | |
| O&M+GeneAdmi | 0 | 0 | 0 | 1,565,464 | 1,831,196 | 2,207,515 | 2,470,813 | 2,773,516 | 3,117,013 | 3,501,862 | 3,927,487 | 4,409,918 | 4,950,291 |
| Interest | 12,463 | 241,514 | 453,124 | 600,881 | 600,881 | 600,881 | 600,881 | 600,881 | 600,881 | 600,881 | 600,258 | 588,805 | 578,225 |
| Loan Repayment | | | | | | | | | | | 31,158 | 603,784 | 1,132,811 |
| Total Outflow | 635,620 | 11,694,034 | 11,033,663 | 9,554,166 | 2,432,076 | 2,808,396 | 3,071,694 | 3,374,397 | 3,717,894 | 4,102,742 | 4,558,902 | 5,602,507 | 6,661,326 |
| Net Inflow | (12,463) | (241,514) | (453,124) | 195,127 | 391,747 | 676,787 | 892,942 | 1,139,792 | 1,426,208 | 1,753,824 | 2,092,534 | 1,957,848 | 1,925,540 |
| Net Inflow (cum) | (12,463) | (253,977) | (707,101) | (511,974) | (120,227) | 556,560 | 1,449,502 | 2,589,294 | 4,015,501 | 5,769,325 | 7,861,859 | 9,819,707 | 11,745,248 |
| Balance Sheet | | | | | | | | | | | | | |
| Cash | (12,463) | (253,977) | (707,101) | (511,974) | (120,227) | 556,560 | 1,449,502 | 2,589,294 | 4,015,501 | 5,769,325 | 7,861,859 | 9,819,707 | 11,745,248 |
| Fixed Assets ex. Land | 623,006 | 12,066,136 | 22,646,675 | 30,034,496 | 30,034,496 | 30,034,496 | 30,034,496 | 30,034,496 | 30,034,496 | 30,034,496 | 30,034,496 | 30,034,496 | 30,034,496 |
| Cum Depreciation | 0 | 28,035 | 334,406 | 1,116,900 | 2,231,847 | 3,346,793 | 4,461,740 | 5,576,686 | 6,691,633 | 7,806,579 | 8,921,526 | 10,036,472 | 11,151,419 |
| Fixed Assets ex. Land (net) | 623,006 | 12,038,101 | 22,312,269 | 28,917,596 | 27,802,649 | 26,687,703 | 25,572,756 | 24,457,810 | 23,342,863 | 22,227,917 | 21,112,970 | 19,998,024 | 18,883,077 |
| Land | 150 | 9,541 | 9,541 | 9,541 | 9,541 | 9,541 | 9,541 | 9,541 | 9,541 | 9,541 | 9,541 | 9,541 | 9,541 |
| Total Assets | 610,543 | 11,784,124 | 21,605,168 | 28,405,622 | 27,682,422 | 27,244,262 | 27,022,258 | 27,047,103 | 27,358,364 | 27,997,242 | 28,974,829 | 29,817,731 | 30,628,325 |
| Loan (net) | 623,156 | 12,075,677 | 22,656,215 | 30,044,037 | 30,044,037 | 30,044,037 | 30,044,037 | 30,044,037 | 30,044,037 | 30,044,037 | 30,012,879 | 29,440,253 | 28,911,226 |
| Capital | (12,613) | (291,553) | (1,051,047) | (1,638,415) | (2,361,615) | (2,799,774) | (3,021,779) | (2,996,933) | (2,685,672) | (2,046,795) | (1,038,049) | 377,478 | 1,717,099 |
| Total Liabilities and Owner's Equity | 610,543 | 11,784,124 | 21,605,168 | 28,405,622 | 27,682,422 | 27,244,262 | 27,022,258 | 27,047,103 | 27,358,364 | 27,997,242 | 28,974,829 | 29,817,731 | 30,628,325 |

Table 11.2.10 Apa Canal Soroca-Balti Proforma Financial Statements (Case 2)

| Year | (USD, Current Price) | | | | | | | | | | | | |
|--------------------------------------|----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| | 2,003 | 2,004 | 2,005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| Income Statement | | | | | | | | | | | | | |
| Revenue | | | | 2,361,472 | 2,823,823 | 3,485,183 | 3,964,636 | 4,514,189 | 5,144,102 | 5,856,566 | 6,651,436 | 7,560,355 | 8,586,867 |
| O&M+GeneAdmi | | | | 1,565,464 | 1,831,196 | 2,207,515 | 2,470,813 | 2,773,516 | 3,117,013 | 3,501,862 | 3,927,487 | 4,409,918 | 4,950,291 |
| Depreciation | | 28,035 | 278,472 | 451,736 | 451,736 | 451,736 | 451,736 | 451,736 | 451,736 | 451,736 | 451,736 | 451,736 | 451,736 |
| Interest | 12,463 | 228,812 | 305,819 | 305,819 | 305,819 | 305,819 | 305,819 | 305,819 | 305,819 | 305,819 | 305,195 | 294,378 | 290,528 |
| Total Expenditure | 12,463 | 256,848 | 584,290 | 2,323,018 | 2,588,750 | 2,965,069 | 3,228,367 | 3,531,070 | 3,874,567 | 4,259,416 | 4,684,418 | 5,156,031 | 5,692,554 |
| Net Income | (12,463) | (256,848) | (584,290) | 38,454 | 235,073 | 520,113 | 736,269 | 983,119 | 1,269,534 | 1,597,151 | 1,967,019 | 2,404,323 | 2,894,312 |
| Cum Net Income | (12,463) | (269,311) | (853,601) | (815,148) | (580,074) | (59,961) | 676,308 | 1,659,427 | 2,928,961 | 4,526,111 | 6,493,130 | 8,897,453 | 11,791,766 |
| Fund Flow Statement | | | | | | | | | | | | | |
| Loan | 623,156 | 10,817,467 | 3,850,304 | 0 | | | | | | | | | |
| Revenue | 0 | 0 | 0 | 2,361,472 | 2,823,823 | 3,485,183 | 3,964,636 | 4,514,189 | 5,144,102 | 5,856,566 | 6,651,436 | 7,560,355 | 8,586,867 |
| Total Inflow | 623,156 | 10,817,467 | 3,850,304 | 2,361,472 | 2,823,823 | 3,485,183 | 3,964,636 | 4,514,189 | 5,144,102 | 5,856,566 | 6,651,436 | 7,560,355 | 8,586,867 |
| Investment | 623,156 | 10,817,467 | 3,850,304 | 0 | | | | | | | | | |
| O&M+GeneAdmi | 0 | 0 | 0 | 1,565,464 | 1,831,196 | 2,207,515 | 2,470,813 | 2,773,516 | 3,117,013 | 3,501,862 | 3,927,487 | 4,409,918 | 4,950,291 |
| Interest | 12,463 | 228,812 | 305,819 | 305,819 | 305,819 | 305,819 | 305,819 | 305,819 | 305,819 | 305,819 | 305,195 | 294,378 | 290,528 |
| Loan Repayment | | | | | | | | | | | 31,158 | 572,031 | 764,546 |
| Total Outflow | 635,620 | 11,046,280 | 4,156,122 | 1,871,283 | 2,137,014 | 2,513,334 | 2,776,632 | 3,079,334 | 3,422,832 | 3,807,680 | 4,263,840 | 5,276,327 | 6,005,365 |
| Net Inflow | (12,463) | (228,812) | (305,819) | 490,189 | 686,809 | 971,849 | 1,188,004 | 1,434,854 | 1,721,270 | 2,048,886 | 2,387,596 | 2,284,028 | 2,581,502 |
| Net Inflow (cum) | (12,463) | (241,276) | (547,094) | (56,905) | 629,904 | 1,601,753 | 2,789,757 | 4,224,612 | 5,945,881 | 7,994,767 | 10,382,364 | 12,666,391 | 15,247,893 |
| Balance Sheet | | | | | | | | | | | | | |
| Cash | (12,463) | (241,276) | (547,094) | (56,905) | 629,904 | 1,601,753 | 2,789,757 | 4,224,612 | 5,945,881 | 7,994,767 | 10,382,364 | 12,666,391 | 15,247,893 |
| Fixed Assets ex. Land | 623,006 | 12,066,136 | 22,646,675 | 30,034,496 | 30,034,496 | 30,034,496 | 30,034,496 | 30,034,496 | 30,034,496 | 30,034,496 | 30,034,496 | 30,034,496 | 30,034,496 |
| Cum Depreciation | 0 | 28,035 | 306,507 | 758,243 | 1,209,978 | 1,661,714 | 2,113,449 | 2,565,185 | 3,016,920 | 3,468,656 | 3,920,392 | 4,372,127 | 4,823,863 |
| Fixed Assets ex. Land (net) | 623,006 | 12,038,101 | 22,340,167 | 29,276,253 | 28,824,518 | 28,372,782 | 27,921,047 | 27,469,311 | 27,017,575 | 26,565,840 | 26,114,104 | 25,662,369 | 25,210,633 |
| Land | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 |
| Total Assets | 610,543 | 11,796,825 | 21,793,073 | 29,219,348 | 29,454,422 | 29,974,535 | 30,710,804 | 31,693,922 | 32,963,457 | 34,560,607 | 36,496,468 | 38,328,760 | 40,458,526 |
| Loan (net) | 623,156 | 11,440,623 | 15,290,927 | 15,290,927 | 15,290,927 | 15,290,927 | 15,290,927 | 15,290,927 | 15,290,927 | 15,290,927 | 15,259,769 | 14,718,896 | 14,526,381 |
| Capital | (12,613) | 356,202 | 6,502,146 | 13,928,421 | 14,163,494 | 14,683,608 | 15,419,877 | 16,402,995 | 17,672,530 | 19,269,680 | 21,236,699 | 23,609,864 | 25,932,145 |
| Total Liabilities and Owner's Equity | 610,543 | 11,796,825 | 21,793,073 | 29,219,348 | 29,454,422 | 29,974,535 | 30,710,804 | 31,693,922 | 32,963,457 | 34,560,607 | 36,496,468 | 38,328,760 | 40,458,526 |

Table 11.2.11 Apa Canal Soroca-Balti Proforma Financial Statements (Case 3)

| Year | (USD, Current Price) | | | | | | | | | | | | |
|--------------------------------------|----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| | 2,003 | 2,004 | 2,005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| Income Statement | | | | | | | | | | | | | |
| Revenue | | | | 2,361,472 | 2,690,733 | 3,056,729 | 3,469,940 | 3,936,248 | 4,470,880 | 5,064,880 | 5,734,360 | 6,500,274 | 7,350,976 |
| O&M+GeneAdmi | | | | 1,565,464 | 1,753,585 | 1,958,767 | 2,191,528 | 2,445,502 | 2,740,001 | 3,059,656 | 3,419,160 | 3,823,603 | 4,275,540 |
| Depreciation | | 28,035 | 278,472 | 451,736 | 451,736 | 451,736 | 451,736 | 451,736 | 451,736 | 451,736 | 451,736 | 451,736 | 451,736 |
| Interest | 12,463 | 228,812 | 305,819 | 305,819 | 305,819 | 305,819 | 305,819 | 305,819 | 305,819 | 305,819 | 305,195 | 294,378 | 290,528 |
| Total Expenditure | 12,463 | 256,848 | 584,290 | 2,323,018 | 2,511,139 | 2,716,321 | 2,949,082 | 3,203,056 | 3,497,555 | 3,817,210 | 4,176,091 | 4,569,716 | 5,017,803 |
| Net Income | (12,463) | (256,848) | (584,290) | 38,454 | 179,594 | 340,408 | 520,858 | 733,191 | 973,325 | 1,247,670 | 1,558,270 | 1,930,558 | 2,333,173 |
| Cum Net Income | (12,463) | (269,311) | (853,601) | (815,148) | (635,554) | (295,146) | 225,713 | 958,904 | 1,932,229 | 3,179,899 | 4,738,169 | 6,668,727 | 9,001,899 |
| Fund Flow Statement | | | | | | | | | | | | | |
| Loan | 623,156 | 10,817,467 | 3,850,304 | 0 | | | | | | | | | |
| Revenue | 0 | 0 | 0 | 2,361,472 | 2,690,733 | 3,056,729 | 3,469,940 | 3,936,248 | 4,470,880 | 5,064,880 | 5,734,360 | 6,500,274 | 7,350,976 |
| Total Inflow | 623,156 | 10,817,467 | 3,850,304 | 2,361,472 | 2,690,733 | 3,056,729 | 3,469,940 | 3,936,248 | 4,470,880 | 5,064,880 | 5,734,360 | 6,500,274 | 7,350,976 |
| Investment | 623,156 | 10,817,467 | 3,850,304 | 0 | | | | | | | | | |
| O&M+GeneAdmi | 0 | 0 | 0 | 1,565,464 | 1,753,585 | 1,958,767 | 2,191,528 | 2,445,502 | 2,740,001 | 3,059,656 | 3,419,160 | 3,823,603 | 4,275,540 |
| Interest | 12,463 | 228,812 | 305,819 | 305,819 | 305,819 | 305,819 | 305,819 | 305,819 | 305,819 | 305,819 | 305,195 | 294,378 | 290,528 |
| Loan Repayment | | | | | | | | | | | 31,158 | 572,031 | 764,546 |
| Total Outflow | 635,620 | 11,046,280 | 4,156,122 | 1,871,283 | 2,059,403 | 2,264,586 | 2,497,346 | 2,751,321 | 3,045,820 | 3,365,475 | 3,755,513 | 4,690,012 | 5,330,614 |
| Net Inflow | (12,463) | (228,812) | (305,819) | 490,189 | 631,330 | 792,144 | 972,594 | 1,184,927 | 1,425,060 | 1,699,406 | 1,978,847 | 1,810,262 | 2,020,362 |
| Net Inflow (cum) | (12,463) | (241,276) | (547,094) | (56,905) | 574,425 | 1,366,568 | 2,339,162 | 3,524,089 | 4,949,149 | 6,648,555 | 8,627,402 | 10,437,665 | 12,458,027 |
| Balance Sheet | | | | | | | | | | | | | |
| Cash | (12,463) | (241,276) | (547,094) | (56,905) | 574,425 | 1,366,568 | 2,339,162 | 3,524,089 | 4,949,149 | 6,648,555 | 8,627,402 | 10,437,665 | 12,458,027 |
| Fixed Assets ex. Land | 623,006 | 12,066,136 | 22,646,675 | 30,034,496 | 30,034,496 | 30,034,496 | 30,034,496 | 30,034,496 | 30,034,496 | 30,034,496 | 30,034,496 | 30,034,496 | 30,034,496 |
| Cum Depreciation | 0 | 28,035 | 306,507 | 758,243 | 1,209,978 | 1,661,714 | 2,113,449 | 2,565,185 | 3,016,920 | 3,468,656 | 3,920,392 | 4,372,127 | 4,823,863 |
| Fixed Assets ex. Land (net) | 623,006 | 12,038,101 | 22,340,167 | 29,276,253 | 28,824,518 | 28,372,782 | 27,921,047 | 27,469,311 | 27,017,575 | 26,565,840 | 26,114,104 | 25,662,369 | 25,210,633 |
| land | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 |
| Total Assets | 610,543 | 11,796,825 | 21,793,073 | 29,219,348 | 29,398,942 | 29,739,350 | 30,260,208 | 30,993,400 | 31,966,725 | 33,214,395 | 34,741,507 | 36,100,034 | 37,668,660 |
| Loan (net) | 623,156 | 11,440,623 | 15,290,927 | 15,290,927 | 15,290,927 | 15,290,927 | 15,290,927 | 15,290,927 | 15,290,927 | 15,290,927 | 15,259,769 | 14,718,896 | 14,526,381 |
| Capital | (12,613) | 356,202 | 6,502,146 | 13,928,421 | 14,108,015 | 14,448,423 | 14,969,281 | 15,702,473 | 16,675,798 | 17,923,468 | 19,481,737 | 21,381,138 | 23,142,279 |
| Total Liabilities and Owner's Equity | 610,543 | 11,796,825 | 21,793,073 | 29,219,348 | 29,398,942 | 29,739,350 | 30,260,208 | 30,993,400 | 31,966,725 | 33,214,395 | 34,741,507 | 36,100,034 | 37,668,660 |

11.3 Environmental Evaluation

From the result of the Environmental Impact Assessment (EIA), the evaluation of the priority project in terms of environment can be summarized as follows:

- 1) Measures to prevent negative impacts during construction and operation have been incorporated into preliminary design of the facilities that might otherwise have important potential impact.
- 2) Other impacts are temporal, local, and insignificant.
- 3) As a whole, the implementation of the priority project will contribute to improve hygienic conditions and convenience of daily life of the population, and also give positive influence on the economic activities in the areas.

CHAPTER 12 RECOMMENDATIONS

1) Improvements of Institutional and Legislative Provisions

To implement projects proposed in the priority project and in the master plan, and to achieve sustainable operation of the facilities developed, it is important to improve the present institutional/legislative systems and the operation and maintenance systems. These improvements are needed, as proposed in this report, at national and local levels, and at the level of water supply utilities. It is recommended to facilitate the proposed improvements under the leadership and coordination of the central government and the cooperation of all the organizations concerned.

2) Financial Assistance to Low-income Population

The responsibility of water supply to the population has been transferred to the municipalities such as cities and towns. However, municipal Apa Canals presently have serious financial problems to perform the duties. Particularly for small scale Apa Canals in such towns as Falesti and Riscani, it is very difficult to achieve the financial independence. It is indispensable for the financial independence of Apa Canals to have water tariff revenues that can cover the cost. However, there are inhabitants whose dispensable incomes are too low to afford such a level of the water tariff. It is recommended that the central government consider the social policy to provide financial assistance to such population.

3) Renewal and Expansion of Existing Distribution Networks

Major components of the priority project are the rehabilitation of the existing Soroca-Balti water supply system and the extensions of the water transmission pipeline to the towns of Falesti and Riscani. However, rehabilitation and/or expansion of water distribution networks in the 4 cities/towns are not included in the priority project. These networks have become quite old, and leakage rates are high at around 30 %. In Falesti and Riscani, the service rate is still low at 30 - 50 % due to insufficient distribution network. To obtain maximum benefit from the implementation of the priority project, the following are necessary: 1) to renew existing distribution pipes step by step in order to reduce the leakage rate, and 2) to expand the distribution networks in Falesti and Riscani in order to raise the service rates. It is recommended to implement these measures in parallel to the implementation of the priority project.

4) Operation and Maintenance of Distribution Reservoirs

The priority project includes the completion of an unfinished distribution reservoir located in the city of Balti. Also included is construction of new distribution reservoirs in the towns of Falesti and Riscani at the end points of the extended transmission pipelines. In the financial project evaluation

of the present study, it has been assumed tentatively that these reservoirs would be owned and operated by Apa Canal Soroca-Balti (ACSB). It is recommended that organizations concerned discuss and coordinate the ownerships and operations of these reservoirs so that the facilities can be operated and maintained smoothly.

5) Facility Specifications for the Case of Urgent Implementation

In the preliminary design of the priority project, the capacities of the water transmission pumps were determined based on the total water demand of the 4 cities/towns (Balti, Soroca, Falesti, Riscani) in 2015. However, in the case when all or a part of the project is implemented through a grant as an urgent project, it may be required that the specifications be determined based on a nearer future demand. Therefore, an additional case has been studied by making the following modifications: i) specifications of the transmission pumps are determined base on the water demand in 2008, and ii) in the instrumentation for the pumping stations and distribution reservoirs, some components that do not necessarily require urgently implementation are excluded. The result of the study is summarized in the Appendix to this volume. For the promotion of the project implementation, it is recommended to give sufficient consideration to such a case also.

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APPENDIX

**STUDY FOR THE CASE OF
URGENT IMPLEMENTATION
OF THE PRIORITY PROJECT**

Appendix

Study for the Case of Urgent Implementation of the Priority Project

In the feasibility study on the priority project presented in Part 3 of the main text, the target year was set to 2015 as it was in the master plan. However, an additional study has been made for the case of more urgent implementation of the project. The result is presented below.

1. Modifications of the 2015 Case

In the preliminary design presented in the main text, the capacities of the water transmission pumps were determined based on the total water demand of the 4 cities/towns (Balti, Soroca, Falesti, Riscani) in the year 2015. In this more urgent case, the pump capacities will be determined based on the water demand in the year 2008.

In the 2015 case, it was designed that each of the pumping stations and distribution reservoirs will have a remote terminal unit (RTU) and transmits data to the central control room in the water treatment plant through optical fiber cable network to realize supervisory control and data acquisitions (SCADA) system. Since this provision is not considered to be an urgent necessity, it will be excluded in the 2008 case.

Other provisions are the same in the 2015 case.

2. Water Demand in 2008

The projected total water demand from the 4 cities/towns in 2008 is 54,500 m³/d, with the following respective quantities:

| | |
|---------|--------------------------|
| Soroca | 9,900 m ³ /d |
| Balti | 37,900 m ³ /d |
| Riscani | 2,700 m ³ /d |
| Falesti | 4,000 m ³ /d |

Figure 1 shows the design water flows.

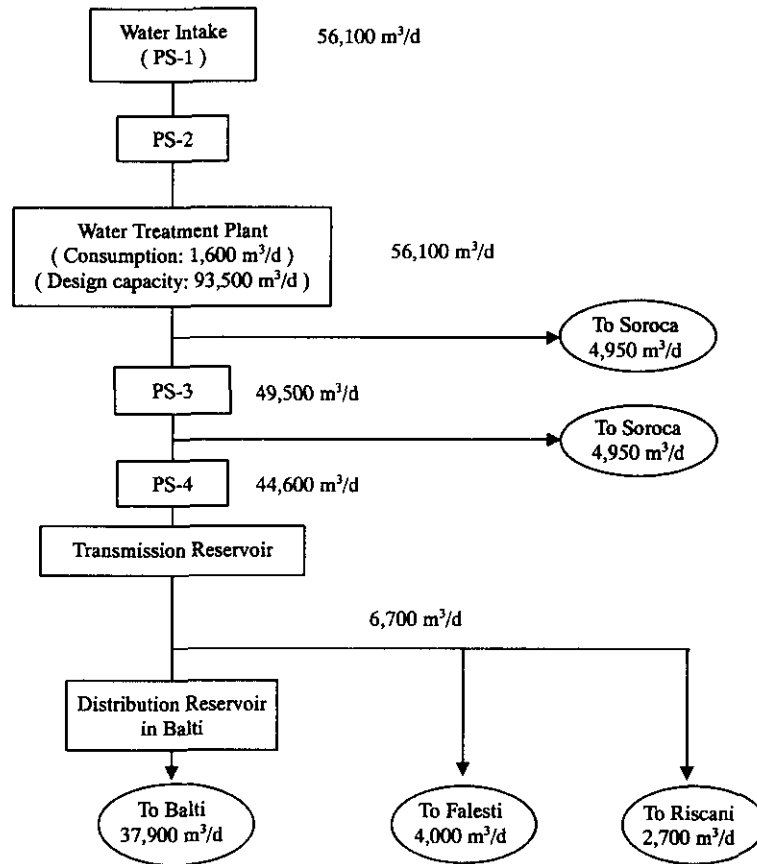


Figure 1 Design Water Flow in 2008

3. Specifications of the Pumps in the Pumping Stations

Pump specifications in the 2008 case are shown in Table 1, that are different from those of the 2015 case, since the design water demands are different. The numbers and types of pump are the same as those of the 2015 case.

Table 1 Specifications of Pumps

| Pumping Station | Pump Function | Specification | Number of Pump |
|-----------------|---------------|---|----------------|
| PS-1 | Intake | 19.5 m ³ /min x 52 m x 250 kW | 3 |
| | Bilge | 1.0 m ³ /min x 20 m x 7.5 kW | 2 |
| PS-2 | Booster | 19.5 m ³ /min x 89 m x 420 kW | 3 |
| PS-3 | Transmission | 17.2 m ³ /min x 74 m x 320 kW | 3 |
| | Backwash | 15.0 m ³ /min x 21.0 m x 75 kW | 2 |
| PS-4 | Transmission | 17.7 m ³ /min x 80 m x 350 kW | 3 |

4. Water Hammer Prevention

Water hammer prevention measures are the same as those in the 2015 case, since the design water flows are not greatly different between the 2 cases.

5. Construction Schedule and Costs

5.1 Construction Schedule

The construction schedule is the same as that of the 2015 case, since the types of work are the same, and only the difference is specification of pumps.

5.2 Construction Cost

Construction costs of the 2008 case for the improvement of the existing Soroca-Balti water supply system are shown in Table 2 in comparison to the 2015 case.

Table 2 Construction Costs for Improvement of the ACSB Water Supply System

| Item | | Cost (US\$) | |
|-------------------------------------|-----------|-------------|------------|
| | | 2008 Case | 2015 Case |
| Pumping Station | PS-1 | 1,330,000 | 1,390,000 |
| | PS-2 | 1,330,000 | 1,390,000 |
| | PS-3 | 1,640,000 | 1,690,000 |
| | PS-4 | 1,770,000 | 1,800,000 |
| | Sub-total | 6,070,000 | 6,270,000 |
| Water Treatment Plant | | 2,160,000 | 2,160,000 |
| Transmission Mains | | 561,000 | 561,000 |
| Water Supply Instrumentation System | | 731,000 | 1,740,000 |
| Total | | 9,522,000 | 10,731,000 |

There is no large difference between the costs of improving the pumping stations in the 2 cases. On the other hand, the cost for the instrumentation system is significantly smaller in the 2008 resulting from the exclusion of the remote terminal units and optical fiber cables for data transmission from the pumping stations and distribution reservoirs.

5.3 Project Cost

The costs for the implementation of the priority project of the 2008 case consisting of Package 1, as indicated above, through Package 4 are shown in Table 3 in comparison to the 2015 case.

Table 3 Total Project Cost

| Item | | Cost (US\$) | |
|--------------------------------------|--|-------------|------------|
| | | 2008 Case | 2015 Case |
| Construction Cost Package 1) - 4) | 1) Rehabilitation of the ACSB water supply system | 9,522,000 | 10,731,000 |
| | 2) Completion of the unfinished reservoir in Balti | 336,000 | 336,000 |
| | 3) Expansion of the transmission pipeline of common section | 1,410,000 | 1,410,000 |
| | 4) Expansion of the transmission pipeline to Riscani and Falesti | 8,596,000 | 8,596,000 |
| | Subtotal | 19,864,000 | 21,073,000 |
| Land Acquisition | | 9,000 | 9,000 |
| Engineering Service | | 1,990,000 | 2,110,000 |
| Physical Contingency | | 1,990,000 | 2,110,000 |
| Total | | 23,853,000 | 25,300,000 |

5.4 Operation and Maintenance Cost

Annual operation and maintenance costs for the 2080 case are shown in Table 4.

6. Economic and Financial Evaluations

The results of the economic and financial evaluations for the 2008 case conducted under the same assumptions made in the 2015 case are summarized below.

EIRR is 5.88 % when all of 4 packages are implemented (Table 5), and 11.22 % when packages 1 and 2 only are implemented (Table 6), both being improved substantially in comparison to the 2015 case.

FIRR estimates are as follows: 2.15 % for Case 1 where all of 4 packages are implemented with low interest loan (Table 7), 7.45 % for Case 2 where packages 1 and 2 are implemented with low interest loan and the rest is implemented by government subsidy (Table 8), and 6.26 % for Case 3 where packages 1 and 2 are implemented with low interest loan and the rest is not implemented (Table 9). The FIRRs are somewhat reduced in comparison to the 2015 case, due to the loss of the revenue opportunity in the later period where the water supply quantity will not increase after 2008, while it will increase until 2015 in the 2015 case.

Table 4 Annual Operation and Maintenance Cost (2008 Case)

Unit: US\$

| Year | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Supplied Water (m3/d) | 45,100 | 48,800 | 54,500 | 54,500 | 54,500 | 54,500 | 54,500 | 54,500 | 54,500 | 54,500 |
| Supplied Water (m3/y) | 16,461,500 | 17,812,000 | 19,892,500 | 19,892,500 | 19,892,500 | 19,892,500 | 19,892,500 | 19,892,500 | 19,892,500 | 19,892,500 |
| Accounted-for water (m3/d) | 36,080 | 39,040 | 43,600 | 43,600 | 43,600 | 43,600 | 43,600 | 43,600 | 43,600 | 43,600 |
| Accounted-for water (m3/y) | 13,169,200 | 14,249,600 | 15,914,000 | 15,914,000 | 15,914,000 | 15,914,000 | 15,914,000 | 15,914,000 | 15,914,000 | 15,914,000 |
| Electricity | 717,000 | 776,000 | 867,000 | 867,000 | 867,000 | 867,000 | 867,000 | 867,000 | 867,000 | 867,000 |
| Chemical for WTP | 50,000 | 54,000 | 61,000 | 61,000 | 61,000 | 61,000 | 61,000 | 61,000 | 61,000 | 61,000 |
| Personnel and Repairing for WTP | 157,000 | 170,000 | 190,000 | 190,000 | 190,000 | 190,000 | 190,000 | 190,000 | 190,000 | 190,000 |
| O/M cost for Pumping Station | 126,000 | 126,000 | 126,000 | 126,000 | 126,000 | 126,000 | 126,000 | 126,000 | 126,000 | 126,000 |
| Total (Annual Operation and Maintenance Cost) | 1,050,000 | 1,126,000 | 1,244,000 | 1,244,000 | 1,244,000 | 1,244,000 | 1,244,000 | 1,244,000 | 1,244,000 | 1,244,000 |

[Note] 1. Exchange Rate 1US\$ = Lei 13.6 = Yen 120.0

2. Life spans for facilities and equipment are as follows:

1) Civil and architectural facilities: 40 years

2) Mechanical and electrical equipment: 20 years

Table 5 EIRR Estimate (Case 1 of 2008 Case)

(2002 USD)

| Year | Total Cost | Labor Saving | Net Benefit | EIRR |
|------|------------|--------------|--------------|-------|
| 2003 | 581,140 | | (581,140) | |
| 2004 | 10,049,240 | | (10,049,240) | |
| 2005 | 8,821,000 | | (8,821,000) | |
| 2006 | 7,092,027 | 2,353,684 | (4,738,343) | |
| 2007 | 1,378,163 | 2,530,988 | 1,152,825 | |
| 2008 | 1,578,510 | 2,720,138 | 1,141,628 | |
| 2009 | 1,638,032 | 2,921,876 | 1,283,844 | |
| 2010 | 1,700,530 | 3,136,988 | 1,436,458 | |
| 2011 | 1,766,153 | 3,369,436 | 1,603,283 | |
| 2012 | 1,835,057 | 3,617,286 | 1,782,229 | |
| 2013 | 1,907,406 | 3,881,498 | 1,974,092 | |
| 2014 | 1,983,372 | 4,163,132 | 2,179,760 | |
| 2015 | 2,063,137 | 4,463,132 | 2,399,995 | |
| 2016 | 2,063,137 | 4,463,132 | 2,399,995 | |
| 2017 | 2,063,137 | 4,463,132 | 2,399,995 | |
| 2018 | 2,063,137 | 4,463,132 | 2,399,995 | |
| 2019 | 2,063,137 | 4,463,132 | 2,399,995 | |
| 2020 | 2,063,137 | 4,463,132 | 2,399,995 | |
| 2021 | 2,063,137 | 4,463,132 | 2,399,995 | |
| 2022 | 2,063,137 | 4,463,132 | 2,399,995 | |
| 2023 | 2,561,693 | 4,463,132 | 1,901,439 | |
| 2024 | 10,367,714 | 4,463,132 | (5,904,582) | |
| 2025 | 4,760,445 | 4,463,132 | (297,313) | |
| 2026 | 2,157,723 | 4,463,132 | 2,305,409 | |
| 2027 | 2,063,137 | 4,463,132 | 2,399,995 | |
| 2028 | 2,063,137 | 4,463,132 | 2,399,995 | |
| 2029 | 2,063,137 | 4,463,132 | 2,399,995 | |
| 2030 | 2,063,137 | 4,463,132 | 2,399,995 | |
| 2031 | 2,063,137 | 4,463,132 | 2,399,995 | |
| 2032 | 2,063,137 | 4,463,132 | 2,399,995 | |
| 2033 | 2,063,137 | 4,463,132 | 2,399,995 | |
| 2034 | 2,063,137 | 4,463,132 | 2,399,995 | |
| 2035 | 2,063,137 | 4,463,132 | 2,399,995 | |
| 2036 | 2,063,137 | 4,463,132 | 2,399,995 | |
| 2037 | 2,063,137 | 4,463,132 | 2,399,995 | |
| 2038 | 2,063,137 | 4,463,132 | 2,399,995 | |
| 2039 | 2,063,137 | 4,463,132 | 2,399,995 | |
| 2040 | 2,063,137 | 4,463,132 | 2,399,995 | |
| 2041 | 2,063,137 | 4,463,132 | 2,399,995 | |
| 2042 | 2,063,137 | 4,463,132 | 2,399,995 | 5.88% |

Table 6 EIRR Estimate for ACSB (Case 3 of 2008 Case)

(2002 USD)

| Year | Total Cost | Labor Saving | Net Benefit | EIRR |
|------|------------|--------------|-------------|--------|
| 2003 | 521,140 | | (521,140) | |
| 2004 | 8,481,000 | | (8,481,000) | |
| 2005 | 2,826,000 | | (2,826,000) | |
| 2006 | 1,233,219 | 2,119,722 | 886,503 | |
| 2007 | 1,308,753 | 2,279,402 | 970,649 | |
| 2008 | 1,383,268 | 2,449,750 | 1,066,482 | |
| 2009 | 1,435,428 | 2,631,435 | 1,196,007 | |
| 2010 | 1,490,196 | 2,825,164 | 1,334,968 | |
| 2011 | 1,547,702 | 3,034,506 | 1,486,804 | |
| 2012 | 1,608,083 | 3,257,719 | 1,649,636 | |
| 2013 | 1,671,484 | 3,495,668 | 1,824,184 | |
| 2014 | 1,738,054 | 3,749,267 | 2,011,213 | |
| 2015 | 1,807,953 | 4,019,486 | 2,211,533 | |
| 2016 | 1,807,953 | 4,019,486 | 2,211,533 | |
| 2017 | 1,807,953 | 4,019,486 | 2,211,533 | |
| 2018 | 1,807,953 | 4,019,486 | 2,211,533 | |
| 2019 | 1,807,953 | 4,019,486 | 2,211,533 | |
| 2020 | 1,807,953 | 4,019,486 | 2,211,533 | |
| 2021 | 1,807,953 | 4,019,486 | 2,211,533 | |
| 2022 | 1,807,953 | 4,019,486 | 2,211,533 | |
| 2023 | 2,254,340 | 4,019,486 | 1,765,146 | |
| 2024 | 9,196,979 | 4,019,486 | (5,177,493) | |
| 2025 | 4,106,649 | 4,019,486 | (87,163) | |
| 2026 | 1,807,953 | 4,019,486 | 2,211,533 | |
| 2027 | 1,807,953 | 4,019,486 | 2,211,533 | |
| 2028 | 1,807,953 | 4,019,486 | 2,211,533 | |
| 2029 | 1,807,953 | 4,019,486 | 2,211,533 | |
| 2030 | 1,807,953 | 4,019,486 | 2,211,533 | |
| 2031 | 1,807,953 | 4,019,486 | 2,211,533 | |
| 2032 | 1,807,953 | 4,019,486 | 2,211,533 | |
| 2033 | 1,807,953 | 4,019,486 | 2,211,533 | |
| 2034 | 1,807,953 | 4,019,486 | 2,211,533 | |
| 2035 | 1,807,953 | 4,019,486 | 2,211,533 | |
| 2036 | 1,807,953 | 4,019,486 | 2,211,533 | |
| 2037 | 1,807,953 | 4,019,486 | 2,211,533 | |
| 2038 | 1,807,953 | 4,019,486 | 2,211,533 | |
| 2039 | 1,807,953 | 4,019,486 | 2,211,533 | |
| 2040 | 1,807,953 | 4,019,486 | 2,211,533 | |
| 2041 | 1,807,953 | 4,019,486 | 2,211,533 | |
| 2042 | 1,807,953 | 4,019,486 | 2,211,533 | 11.22% |

Table 7 FIRR Estimate for ACSB (Case 1 of 2008 Case)

(2002 USD)

| Year | Land | Civil Works | M&E | OM&GA | Total Outflow | Revenue | Net Cashflow | FIRR |
|------|-------|-------------|-----------|-----------|---------------|-----------|--------------|-------|
| 2003 | 140 | 27,049 | 553,951 | | 581,140 | | (581,140) | |
| 2004 | 8,240 | 813,692 | 9,227,308 | | 10,049,240 | | (10,049,240) | |
| 2005 | 0 | 5,823,991 | 2,997,009 | | 8,821,000 | | (8,821,000) | |
| 2006 | 0 | 5,746,905 | 105,095 | 1,240,027 | 7,092,027 | 1,870,556 | (5,221,471) | |
| 2007 | | | | 1,378,163 | 1,378,163 | 2,125,217 | 747,054 | |
| 2008 | | | | 1,578,510 | 1,578,510 | 2,492,122 | 913,612 | |
| 2009 | | | | 1,638,032 | 1,638,032 | 2,616,728 | 978,696 | |
| 2010 | | | | 1,700,530 | 1,700,530 | 2,747,564 | 1,047,034 | |
| 2011 | | | | 1,766,153 | 1,766,153 | 2,884,943 | 1,118,790 | |
| 2012 | | | | 1,835,057 | 1,835,057 | 3,029,190 | 1,194,133 | |
| 2013 | | | | 1,907,406 | 1,907,406 | 3,180,649 | 1,273,244 | |
| 2014 | | | | 1,983,372 | 1,983,372 | 3,339,682 | 1,356,309 | |
| 2015 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2016 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2017 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2018 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2019 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2020 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2021 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2022 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2023 | | | 498,556 | 2,063,137 | 2,561,693 | 3,506,666 | 944,973 | |
| 2024 | | | 8,304,577 | 2,063,137 | 10,367,714 | 3,506,666 | (6,861,048) | |
| 2025 | | | 2,697,308 | 2,063,137 | 4,760,445 | 3,506,666 | (1,253,779) | |
| 2026 | | | 94,586 | 2,063,137 | 2,157,723 | 3,506,666 | 1,348,943 | |
| 2027 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2028 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2029 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2030 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2031 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2032 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2033 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2034 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2035 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2036 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2037 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2038 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2039 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2040 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2041 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2042 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | 2.15% |

Note: O&M will increase at 70 percent of the growth of per capita GDP.

Table 8. FIRR Estimate for ACSB (Case 2 of 2008 Case)

(2002 USD)

| Year | Land | Civil Works | M&E | OM&GA | Total Outflow | Revenue | Net Cashflow | FIRR |
|------|------|-------------|-----------|-----------|---------------|-----------|--------------|-------|
| 2003 | 140 | 25,014 | 495,986 | | 521,140 | | (521,140) | |
| 2004 | 0 | 270,971 | 8,210,029 | | 8,481,000 | | (8,481,000) | |
| 2005 | 0 | 271,893 | 2,554,107 | | 2,826,000 | | (2,826,000) | |
| 2006 | 0 | 0 | 0 | 1,240,027 | 1,240,027 | 1,870,556 | 630,529 | |
| 2007 | | | | 1,378,163 | 1,378,163 | 2,125,217 | 747,054 | |
| 2008 | | | | 1,578,510 | 1,578,510 | 2,492,122 | 913,612 | |
| 2009 | | | | 1,638,032 | 1,638,032 | 2,616,728 | 978,696 | |
| 2010 | | | | 1,700,530 | 1,700,530 | 2,747,564 | 1,047,034 | |
| 2011 | | | | 1,766,153 | 1,766,153 | 2,884,943 | 1,118,790 | |
| 2012 | | | | 1,835,057 | 1,835,057 | 3,029,190 | 1,194,133 | |
| 2013 | | | | 1,907,406 | 1,907,406 | 3,180,649 | 1,273,244 | |
| 2014 | | | | 1,983,372 | 1,983,372 | 3,339,682 | 1,356,309 | |
| 2015 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2016 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2017 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2018 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2019 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2020 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2021 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2022 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2023 | | | 446,387 | 2,063,137 | 2,509,525 | 3,506,666 | 997,141 | |
| 2024 | | | 7,389,026 | 2,063,137 | 9,452,163 | 3,506,666 | (5,945,497) | |
| 2025 | | | 2,298,696 | 2,063,137 | 4,361,833 | 3,506,666 | (855,167) | |
| 2026 | | | 0 | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2027 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2028 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2029 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2030 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2031 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2032 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2033 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2034 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2035 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2036 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2037 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2038 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2039 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2040 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2041 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | |
| 2042 | | | | 2,063,137 | 2,063,137 | 3,506,666 | 1,443,529 | 7.45% |

Note: O&M will increase at 70 percent of the growth of per capita GDP.

Table 9 FIRR Estimate for ACSB (Case 3 of 2008 Case)

(2002 USD)

| Year | Land | Civil Works | M&E | OM&GA | Total Outflow | Revenue | Net Cashflow | FIRR |
|------|------|-------------|-----------|-----------|---------------|-----------|--------------|-------|
| 2003 | 140 | 25,014 | 495,986 | | 521,140 | | (521,140) | |
| 2004 | 0 | 270,971 | 8,210,029 | | 8,481,000 | | (8,481,000) | |
| 2005 | 0 | 271,893 | 2,554,107 | | 2,826,000 | | (2,826,000) | |
| 2006 | 0 | 0 | 0 | 1,233,219 | 1,233,219 | 1,870,556 | 637,337 | |
| 2007 | | | | 1,308,753 | 1,308,753 | 2,025,053 | 716,300 | |
| 2008 | | | | 1,383,268 | 1,383,268 | 2,185,751 | 802,483 | |
| 2009 | | | | 1,435,428 | 1,435,428 | 2,295,039 | 859,611 | |
| 2010 | | | | 1,490,196 | 1,490,196 | 2,409,791 | 919,595 | |
| 2011 | | | | 1,547,702 | 1,547,702 | 2,530,280 | 982,578 | |
| 2012 | | | | 1,608,083 | 1,608,083 | 2,656,794 | 1,048,711 | |
| 2013 | | | | 1,671,484 | 1,671,484 | 2,789,634 | 1,118,150 | |
| 2014 | | | | 1,738,054 | 1,738,054 | 2,929,115 | 1,191,061 | |
| 2015 | | | | 1,807,953 | 1,807,953 | 3,075,571 | 1,267,618 | |
| 2016 | | | | 1,807,953 | 1,807,953 | 3,075,571 | 1,267,618 | |
| 2017 | | | | 1,807,953 | 1,807,953 | 3,075,571 | 1,267,618 | |
| 2018 | | | | 1,807,953 | 1,807,953 | 3,075,571 | 1,267,618 | |
| 2019 | | | | 1,807,953 | 1,807,953 | 3,075,571 | 1,267,618 | |
| 2020 | | | | 1,807,953 | 1,807,953 | 3,075,571 | 1,267,618 | |
| 2021 | | | | 1,807,953 | 1,807,953 | 3,075,571 | 1,267,618 | |
| 2022 | | | | 1,807,953 | 1,807,953 | 3,075,571 | 1,267,618 | |
| 2023 | | | 446,387 | 1,807,953 | 2,254,340 | 3,075,571 | 821,231 | |
| 2024 | | | 7,389,026 | 1,807,953 | 9,196,979 | 3,075,571 | (6,121,408) | |
| 2025 | | | 2,298,696 | 1,807,953 | 4,106,649 | 3,075,571 | (1,031,078) | |
| 2026 | | | 0 | 1,807,953 | 1,807,953 | 3,075,571 | 1,267,618 | |
| 2027 | | | | 1,807,953 | 1,807,953 | 3,075,571 | 1,267,618 | |
| 2028 | | | | 1,807,953 | 1,807,953 | 3,075,571 | 1,267,618 | |
| 2029 | | | | 1,807,953 | 1,807,953 | 3,075,571 | 1,267,618 | |
| 2030 | | | | 1,807,953 | 1,807,953 | 3,075,571 | 1,267,618 | |
| 2031 | | | | 1,807,953 | 1,807,953 | 3,075,571 | 1,267,618 | |
| 2032 | | | | 1,807,953 | 1,807,953 | 3,075,571 | 1,267,618 | |
| 2033 | | | | 1,807,953 | 1,807,953 | 3,075,571 | 1,267,618 | |
| 2034 | | | | 1,807,953 | 1,807,953 | 3,075,571 | 1,267,618 | |
| 2035 | | | | 1,807,953 | 1,807,953 | 3,075,571 | 1,267,618 | |
| 2036 | | | | 1,807,953 | 1,807,953 | 3,075,571 | 1,267,618 | |
| 2037 | | | | 1,807,953 | 1,807,953 | 3,075,571 | 1,267,618 | |
| 2038 | | | | 1,807,953 | 1,807,953 | 3,075,571 | 1,267,618 | |
| 2039 | | | | 1,807,953 | 1,807,953 | 3,075,571 | 1,267,618 | |
| 2040 | | | | 1,807,953 | 1,807,953 | 3,075,571 | 1,267,618 | |
| 2041 | | | | 1,807,953 | 1,807,953 | 3,075,571 | 1,267,618 | |
| 2042 | | | | 1,807,953 | 1,807,953 | 3,075,571 | 1,267,618 | 6.26% |

Note: O&M will increase at 70 percent of the growth of per capita GDP.

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