

1-4-4 Infrastructure Conditions

(1) Irrigation and Drainage System

a) Irrigation Area

The irrigation water of Sredna Tundja Study Area is supplied by the Jrebchevo dam. Its commanded area is summarized below and further details are given in Table J-1-2, Appendix J.

Description	Area	
Study Area	97,000.0 ha	
Nova Zagora Block	22,400.0 ha	
Suitable Irrigable Land		22,400.0 ha
Unsuitable Land for Cultivation		0.0 ha
Mlekaevo Padarevo Block	20,000.0 ha	
Suitable Irrigable Land		20,000.0 ha
Unsuitable Land for Cultivation		0.0 ha
Binkos Marash Block	35,000.0 ha	
Suitable Irrigable Land		33,174.3 ha
Unsuitable Land for Cultivation		1,825.7 ha
Kerman Roza Block	19,600.0 ha	
Suitable Irrigable Land		19,358.1 ha
Unsuitable Land for Cultivation		241.9 ha

b) Water Resources

There is only one storage dam in the Study Area, Jrebchevo dam having 400 mcm of total storage capacity. This dam is operated and maintained by the ISC. Major dimensions of the Jrebchevo dam are described in Table J-1-4, Appendix J.

There are two outlets from dam, one outlet delivers the irrigation water to Korten tunnel through the discharge control structure for Nova Zagora Block and Mlekaevo Padarevo Block. Other outlet releases the water to Tundja river, and the irrigation water is taken at Bincos headworks for Binkos Marash Block and Kerman Roza Block.

c) Irrigation Facilities

Irrigation facilities such as pumping stations and canals under the operation of ISC are described below. (refer to Exhibit K-2-3, Appendix K)

i) Nova Zagora Block

The irrigation water for this Block is introduced from the Jrebchevo dam through Korten tunnel and M-3 main canal at a high altitude. There are four (4) secondary canals (pipe lines) on the M-3 main canal. There is no pumping station in this Block because sprinkler can work by the water head between the main canal and agricultural land. M-3 main canal is about 10.0 km in length, all parts of the canal are lined, and the canal dimensions are as follows:

Width of canal bottom	0.80 to 2.10 m
Height of canal	1.25 to 1.40 m
Side slope of canal	1 : 1.067 to 1.5

Only about half of the Nova Zagora Block can be irrigated by M-3 main canal. M-2 main canal was designed after turn out at the outlet of Korten tunnel, however of the M-2 main canal only the part to Nova Zagora siphon was constructed. Construction works of M-2 main canal for east part of Nova Zagora Block has not commenced.

ii) Mlekaevo Padarevo Block

There are no irrigation facilities such as canal and pumping station except Nova Zagora siphon which was designed with two lines of steel pipe (ϕ 2,420 mm, L = 8,330 m), but only one line with about 8,000 m was constructed.

M-4 main canal designed for this Block was commenced in construction, however due to some reasons, construction works has been suspended after some hundred meters of construction.

iii) Binkos Marash Block

The irrigation water of this Block is taken at Binkos head works on Tundja river at down stream of the Jrebchevo dam and introduced to M-1 main canal. After turnoff of the water to M-1-1, M-1 main canal run to the northern part of the Block which is located at a higher altitude then the agricultural field. However, this altitude difference between the main canal and the field is not enough for the water head to operate sprinklers. To get enough water pressure, there are six (6) pumping stations along M-1 main canal and another seven (7) pumping stations exist for boosting the pressure in the field. All pumping stations can be operated, but most pumps did not operate due to a lack of demand and the use of furrow irrigation method.

M-1 main canal is about 45 km in length and all part of canal are lined, and canal dimensions are as follows:

Width of canal bottom	2.50 m
Height of canal	3.70 to 4.20 m
Side slope of canal	1 : 1.5

iv) Kermen Roza Block

The irrigation water for this Block comes from M-1-1 main canal, Djinovo siphon, Kovachite tunnel and M-1-3 main canal. Djinovo siphon was designed with two-lined reinforced concrete pipes. One line of siphon has been completed but construction on another line is suspended, without construction of Tundja river crossing about 900 m in length.

Main canal for this canal is about 27.2 km in total length. All part of the canal are lined and canal dimensions are as follows:

Width of canal bottom	1.60 to 2.00 m
Height of canal	3.15 to 5.80 m
Side slope of canal	1 : 0.5 to 1.5

d) On-Farm Facilities

A pipe network for pressured irrigation methods such as sprinkler, center pivot or irrigation machine with reel has been facilitated as shown as follows:

Nova Zagora Block	13,220.4 ha
Mlekaevo Padarevo Block	0.0 ha
Binkos Marash Block	28,669.9 ha
Kerman Roza Block	7,267.3 ha
Total	49,157.6 ha

e) Drainage Facilities

There are underground pipe drainage systems around Straldja of Binkos Marash Block because of the high ground water level. This ground water is drained by pump and wastes to the canal.

There is surface drainage in other Blocks for removing the excess water from the soil, either irrigation or rain.

(2) Roads Conditions

The roads in the Study Area are divided into two categories: public road networks and farm roads. The public roads are paved by asphalt and maintained well by the national government and local government such as municipalities. All farming lots are planned

to be connected with the main road by farm road with 6.0 m width on the land reform plan, however farm roads are not clear since land reform was not completed and land ownership is not settled.

1-4-5 Environmental Conditions

(1) Flora and Fauna

The Sredna Tundja area is situated along the Tundja river and has an interesting biological diversity. The phytocenosis includes a number of protected and endemic species. Among the most prominent ones are the Yambol autumn crocus, the Greek vidritsa, the Stribarnieva vidritsa and the shiny tulip. They are all in the Red Book of Bulgaria. The regions of Ormana in Yambol, Blatets in Sliven and Palauzovo in Straldja are famous for medical plants where loddon lily are found abundantly.

The varied relief of the river bank, the presence of lowland forests and presence of ponds due to human's intervention supports the existence of species from many different ecosystems. These factors have also created a favorable environment for water-dwelling birds to nest and spend the winter. The above mentioned factors together with the existence of a traditional, age-long migration route along the river course make it an important winter home for many rare, protected species. There are colonies of egrets nearby the Zhrebchevo dam, as well as in the reservation areas along the Tundja river.

(2) Water Quality

There is a good water quality monitoring system in the river network of Sredna Tundja. There are 28 points along Tundja river and its tributaries. Out of the total 28 points along Tundja, six are within the project area. Regarding quality, only one point which is on the Assenovska river, a Tundja tributary, is under 3rd category, while the rest are 2nd category. According to the Bulgarian regulations, only category-I can be used as drinking water.

There are two main sources that pollute the river water in the area - the flow of untreated sewage water into the river system and the waste water from the factories. At this moment only Sliven and Nova Zagora have sewage water treatment facilities.

Apart from these two main sources of pollution for the Tundja river, illegal household waste dumping sites and industries in Yambol aggravate the quality of its waters.

(3) Air Quality

There are no permanent monitoring points in the area. Periodic measurements of SO₂, NO₂, CO₂, CO and CH₄ are made using mobile laboratories. The results of the latest mobile laboratory measurement (June 1996), found Sliven and Yambol within the allowed limit of pollution. Periodic measurements are also made in the big industrial sites in Sliven. Conversion of vapor stations of the industries from fuel to gas has brought a good result in air quality.

(4) Cultural Heritage

In the Sredna Tundja Study Area, Nova Zagora region is famous for its very old prehistoric sites. The prehistoric villages, burial mounds with items such as ornaments, earthenwares, surgical instruments etc. have been discovered by the Nova Zagora museum authority in the villages such as Karanovo, Asenovetz, Korten, Sadiovo, Zagortzi, Nova Zagora and Pet Nogili. Financial constraints hamper further investigations in some sites which already have been identified.

(5) Others

Gully erosion in the steep slopes, drainage problems and presence of problem soils in small areas are noticeable.

1-5 Rural Society and Farm Economic Survey

The purpose of the rural socioeconomic survey is to clarify points which are difficult to determine through the field survey or by direct interview. During the limited survey period, it examined the current agricultural structure in the Study Areas. The survey especially targeted private farmers or cooperative members as respondents.

The survey results can be summarized as follows.

Petrich is much different from the other two Study Areas in its scale of farming, the private farmers in Petrich are engaging in agriculture at a rather small scale. The average farm size which private farmers received through land restitution is 12 decares. On the other hand, private farmers in Rositza received more than 25 decares, and those in Sredna Tundja 60 decares. The small size of the farms in Petrich encourages a high cropping intensity and cash crop oriented agriculture. In comparing the scale of farming in Rositza and in Sredna Tundja, Sredna Tundja has a tendency for larger scale farming.

A common point for all the Study Areas was that private farmers are not farming all the lands that they received through land restitution. They are working on only 1 to 30 decares and assigning the rest of their lands to APCs to cultivate. The area of consigning farmland changes depending on each Study Area. For example, in Petrich or Rositza, it was 20 to 30 decares. In Sredna Tundja, it varied from 30 to 100 decares. They were receiving rental fees of Lev 300 per decare (96, July) for their land. This means these farmers, are receiving Lev 10,000 to 30,000 per year as a rent from APCs.

The main reasons for consigning were unavailability of machinery, the old age of the farmer, the lack of finance, and also the social custom from the former socialist system in these rural communities. While the majority of private farmers are working on their lands for self-sufficiency and making a living, others are consigning their lands to APC for receiving land rental fee.

Comparing with the three study area, It is found that Rositza and Sredna Tundja were feeding more livestock than Petrich. In Rositza, chicken was the most common livestock kept, while in Sredna Tundja it was sheep. Under mechanization, half of private farmers had horse cart and almost half of farmers in Rositza and Petrich had a water pump in comparison with only one fifth of them in Sredna Tundja. However, farmers in Sredna Tundja had more kinds of machinery than the other two Study Areas. For harvest, about half of farmers were leasing the combine from other farmers or the APC.

In irrigation, almost all farmers in Petrich were using irrigation for farming and are participating in WUA at a high percentage rate.

In agriculture inputs and outputs, farmers were purchasing urea fertilizer from other farmers or APC and were often using Manure. The same tendency was shown for chemicals. In seeds, more than 60 percent of farmers were using their own seeds and also were purchasing seeds from a biggest seeds provider, a state enterprise.

On farm management, all farmers had similar problems. They were the high prices of inputs and lack of finance. They collected information for agriculture mainly from friends or television, and received extension services such as agriculture machine rental or seeds supply from the APCs.

Under organizational participation, Rositza was more advanced in the formulation of new organizations, with 80 percent of farmers joining in APC's. Contrary to that, only 4 % of farmers in Sredna Tundja were joining APC's and no farmers in Petrich had joined an APCs.

The average farm has 4 family members and their average age were 45 to 60 and the terminal education was primary school. Looking at the willingness to engage in agriculture, 90 percent of farmers in Sredna Tundja replied that they would continue working in agriculture in the future.

After the former collective farms were liquidated or privatized, many properties were transferred directly to newly established APCs. Looking at the management style and the members of these new cooperatives, many of managers are from the former collective farms and they still continue the former socialistic management style, which doesn't reflect on enterprise management style which is currently being used in other agricultural developed countries.

CHAPTER 2. FORMULATION OF THE STUDY AREAS

2-1 Key Issues of the Study Areas

- Bulgarian agriculture is finally beginning to recover from the disruption caused by the transition to a market economy;
- The macro-economic climate is expected to improve by 1997;
- In terms of the areas ready to irrigate, areas to be rehabilitated, and potential new irrigated areas, the three study areas are comparatively different;
- In terms of socio-economic characteristics the three study areas are comparatively similar;
- The farm size in the three study areas and the crops grown are comparatively distinct; and
- The existing patterns of marketing; the land restitution process; and the pattern of land use is different for the three areas;

2-1-1 Petrich Study Area

Specific characteristics of the Area are;

- Warmer climate;
- Near to the borders with Greece and Macedonia and accessible to the capital city, Sofia;
- Small land holdings;
- Behind schedule for land restitution;
- Vegetable and tobacco production in intensive agriculture;
- No farmers' cooperatives except for tobacco; and
- Uncertain water resources and a pump operated water intake system.

Potential target area for increasing fruit and vegetable exports.

The Petrich study area extends along the narrow Struma river valley and the adjacent hillsides. Located within the southern portion of the Greater Sofia region, bordering the Republic of Macedonia to the west and the Republic of Greece to the south, the average temperature is slightly higher than the other two study regions, making fruit and vegetable production 10 to 15 days earlier than the other regions. The study area lies within two river valleys, the Struma and the Strumeshnitsa, and the crop agriculture is found predominately on the alluvial soils of the narrow valley floor, while the vineyards,

pastures and orchards are found on the bench terraces. Much of the irrigation water is pumped so costs are high. In recent years, upstream water use on both rivers, particularly the Strumeshnitsa, has reduced the flows, and the future availability of water is limited without construction of expensive reservoirs. Topography combined with population means that arable land ownership per household is small. The main town within the study area is Petrich, and the major market for the area's production is Sofia. The climate is transitional Mediterranean, and the growing season gives the possibility of multicropping and early vegetable production.

The main crops are tobacco, fruit, vines and vegetables. The majority of farms are small, intensive, and use hand labor. The farms grow mainly tobacco, melons and vegetables for the market, with cereals and fodder crops only grown by the larger farmers. The orchards are limited in extent, mainly peaches on the lower slopes of the surrounding hills. The area under vineyards is larger, but many of these plantings are neglected badly or have been uprooted. Commercial animal production is limited by the small farm size.

The limited availability of land and water will always restrict the possibilities for agricultural production in this study area. Their comparative advantage is in terms of early season production, and their access to the Sofia market, but these small individual producers of fruit and vegetables are likely to be difficult to organize for the production of the consistent volumes of high value product required for export. The small farm size is also a limit to productivity, and although the local population is aggressively farming their available land, the low domestic prices for their products, and the competition will tend to restrict returns.

2-1-2 Rositza Study Area

Specific characteristics of the Area are;

- Cooler autumn weather
- Near to Romanian border
- Medium land holdings
- Land restitution advanced.
- 50 years experience of irrigated agricultural production.
- Mainly winter cereals and sunflower
- Well organized farmers' cooperatives.
- Much of the system needs rehabilitation
- Food processing industries at Poliski Trambesh, (sunflower oil) and Suhindol

(wine).

Potential target area for increasing output of the food processing industries.

The study area is located in the Lovech region in the north central part of Bulgaria, located on the northern fringe of the Balkan range. The topography of this Study Area is gently rolling, with areas of flat or gently sloping plain along the river valleys, with areas of steeper sloping upland dividing the area. The climate is moderate continental, and the temperature in the winter is slightly lower than Sredna Tundja and thus the first frosts come earlier, by October. The area has fertile alluvial and black earth soils, combined with less fertile grey forest soils away from the lowlands. The water supply for the Rositza irrigation system, which was constructed in the 1950's, comes from the Aleksandar Stamboliiski dam, built on the Rositza River. The irrigation system is built along the alluvial soils of the main Rositza river valley, and the irrigation water is conveyed via gravitational canals and pumping stations into the surrounding areas. Originally designed to cover 50,700 ha, only 36,025 ha are currently ready to irrigate, a further 12,599 ha require some kind of rehabilitation of their facilities. Only a portion of the facilitated area can be served by gravity irrigation along the Main Left Nikyupski Canal Block, and two of the three irrigation Blocks, Main Lower Right Canal Block and the North Main Canal Block have pumping stations installed to boost the water to irrigate the upland areas. Much of the system requires rehabilitation.

According to the survey data, land restitution in the area is comparatively advanced, with 55.0% of the 150 farmers surveyed having temporary use permits, and 24.8% with notary deeds. The arable land ownership is comparatively small, given the predominance of grain and fodder farming in the area. The average size is 1.9 ha and the farms in the area are mainly operated by some sort of cooperative. There are 45 cooperatives operating in the Study Area and they are strongly supported by the local municipal authorities. Eighty percent of the farmers in this area belong to a production cooperative.

The main crops are wheat, barley, sunflower, with some maize and alfalfa, vineyards for wine are found in the western area, and small amounts of other vegetable and technical crops, such as soy (around Pavlekeni) and sugar beet. Extensive areas of cropland are infested with perennial weeds. The settlement pattern, which consists of numerous small well established villages has encouraged the development of small subsistence plots around the villages, with mechanized farming within the settlements, usually with machinery operated by the cooperative. Only 10% of the farms in this area own

tractors. The potential for increases in production is limited somewhat by the generally poor state of the land and the irrigation system, and the comparatively older age of the farmers in this Study Area.

Sugarbeet is still grown to a small extent, but it is now frequently grown by individual farmers, and harvested by hand rather than mechanically. The area of vegetables has declined drastically. The processing factories are unable to attract sufficient quantities at the current prices and are running at 20% of their capacity. The orchards are neglected, due to the low domestic prices and the high costs of spray inputs and their labor requirements discouraging their maintenance and upkeep. On the other hand the vineyards are beginning to see a revival, with individuals maintaining their own areas in the larger plantings and the wineries beginning to make loans for the maintenance and rehabilitation of the neglected plantings. Pigs and sheep are important in the area, though mainly kept in subsistence or smaller private enterprises.

The main markets for grain in the Area are the State milling company in Veliko Tarnova, private millers in Pavlikeni, and the stock market for grain in Dobrich, which also handles sunflower. The other main market for sunflower is the State processing facility at Polski Trambesh. The export market for the grain from the Study Area is Varna, which has port facilities for handling grain. The EBRD/GTZ wholesale market rehabilitation project planned to rehabilitate the Pleven wholesale fruit and vegetable market, but this is currently of low priority, as the municipality has shown little interest in pursuing the project. The main agribusiness centers in the Study area are Polski Trambesh, which has vegetable processing and oil extraction plants, and Pavlikeni, which has a range of processing industries including wine, and flour milling. Much of Bulgaria's sugar beet is grown in the region, and the sugar beet processing factory is in Gorna Oryahovitza.

The Study Area was divided into three Blocks.

The Main Lower Right Canal Block, which has an area of 12,020 ha, a mixture of flat, alluvial soils in the bottom land, and a larger area of undulating and gently sloping forest soils, of which a total of 9,850 ha are ready to irrigate. The system combines gravity supply with pumping stations. More than 65% of the water in this system requires pumping prior to its delivery to the field.

The Main Left Nikyupsky Canal Block is less undulating than the Main Lower Right Canal area. The canals that irrigate this area are all supplied by gravity. The

facilitated area is 9,151 ha, of which 7,596 ha are ready to irrigate. The soils in this area are alluvial along the river or black earth in the eastern part.

The third Block is the North Main canal a mixture of mainly undulating land, north of Pavlekeni. It has 18,579 ha ready to irrigate, and a further 9,164 ha that needs rehabilitation. The area is primarily supplied using a series of pumping stations, although many of them have not operated for some time. The agriculture in this area is mainly sunflower and dryland grain.

This area has been hit hard by the decline of Bulgaria's markets for processed fruit and vegetables, the decline in the importance of livestock, and the higher labor requirements of the new farming systems. The major revenue earner now appears to be sunflower where the favorable overseas market is encouraging its production. How long the area can continue to produce reasonable yields of sunflower remains to be seen. Poor seeds, inadequate husbandry, weeds and failure to rotate are all beginning to have an impact. Wheat, barley, sunflower and vines are likely to be important in the future. The emergence of small numbers of private farmers, owning and operating machinery on his and his neighbors land is likely to continue

2-1-3 Sredna Tundja Study Area

Specific Characteristics of the Area are;

- Length of growing season between Petrich and Rositza.
- Larger land management units
- Cereal production, including maize
- Gravity Irrigation, adequate water
- Farmers organizations are not as strong as Rositza. Restructuring of farmers coop. to promote farmers organization needs to be promoted.
- Extension service is necessary to promote the horticultural production.
- Private farmers are important

Potential target area for introduction of diversified agricultural production: promoting horticulture production to connect with the wholesale market planned by EBRD to be established at Sliven and Stara Zagora, and cereal production for the domestic market.

Located in Burgas region, south of the Balkan range, the extensive plains around the Tundja river combine with a climate that is transitional between continental and Mediterranean to provide near ideal conditions for irrigated crop production. The

soils vary from alluvial adjacent to the river, to black earth's along the extensive valley bottoms, especially in the south west, (Mlekarevo and Nova Zagora) to brown-forest soils on the edges of the plains and along the foothills. The topography of this Study Area is extensive areas of flat or gently sloping plain, with intermingled areas of higher land. The temperature in the winter is slightly higher than Rositza and thus the growing season is slightly longer. Although the irrigation system was originally planned for 97,000 ha, only 49,157 ha have had irrigation facilities constructed. The main water source is the Jhrebchevo dam, built on the Tundja river, which releases water to the Binkos Barrage, where M-1 starts, a 70 km canal with a discharge of 42 m³/sec to irrigate Binkos Marash Block. A 4 km tunnel direct from the dam, Korten tunnel, supplies water to the other system M-3. The entire facilitated area can be served by gravity irrigation, although one of the four irrigation Blocks, Binkos Marash has pumping stations installed to boost the pressure in the system to allow the use of pressurized delivery systems.

Land restitution in the area is comparatively lagging. According to the survey data of 150 farmers, 84% of them had temporary use rights of land but only 2% received notary deeds. The farm management size is comparatively large, with an average size of 137 decares (13.7 ha) and there is also a rental market operating with 17% of the farmers renting an average area of 196 decares (19.6 ha) each. Out of the 80 cooperatives in the Study Area, 13 have legally finalized their land restoration process on a total of 249,189 decares (24,919 ha) of land.

The main crops are wheat, barley, maize, peach orchards, vineyards for wine and dessert grapes, and a variety of other vegetable and technical crops. The farm size here is significantly larger than in the other two study areas. The topography and the settlement pattern have encouraged the development of mechanized farming, and 50% of the farmers in this area own tractors. The potential for increases in production is large.

The main market for the grain from the Study Area is Burgas, which has two terminals at the port for handling grain. The EBRD/GTZ wholesale market rehabilitation project plans to rehabilitate the Sliven wholesale fruit and vegetable market, serving the surrounding area up to 45-50 km. The municipality will hold 51% of the market management company, and they have already allocated 23.1 ha of land. They expect to issue the tender for this project in September 1996, but it will be delayed due to economic crisis in the end of 1996. With this project, a nursery for producing new peach variety seedlings is going forward. The main agribusiness centers in the Study

Area are Nova Zagora and Yambol, which have a range of processing industries including dairy, wine, flour milling, feed, and meat processing. The sunflower oil processing factory is in Burgas.

The Study Area was divided into four Blocks.

The Nova Zagora Block has an area of 22,400 ha, mainly flat, black earth soils, of which 12,940 ha are ready to irrigate. There is a further 9,180 ha where could be irrigated if the M-2 Main canal is completed. Part of this area is currently irrigated by a temporary canal which takes water from the outlet of the Kovachite tunnel. The major agribusiness center of Nova Zagora is located in this Block.

The Mlekarevo Padarevo Block is more undulating than the Nova Zagora Block. The M-4 and M-5 canals that were planned to irrigate this area have not been constructed, so the facilitated area is zero.

The Binkos Marash Block is the flat land along the base of the Balkan range to the east of Sliven. It has 26,352 ha ready to irrigate, a further 2,318 ha that needs rehabilitation, and 4,504 ha that is potentially irrigable. The area can be irrigated using gravity, though the installed pumping stations would need to be operated to see pressurized irrigation system. The most eastern portion of this area has drainage problems.

The Kermen-Roza Block is similar to Mlekaevo Padarevo, mainly flat land with occasional upland areas in the south. Out of 19,600 ha it currently only has 6,777 ha ready to irrigate due to the non-completion of the M-1-3 main canal. The agriculture in this area is mainly sunflower and dryland grain.

In terms of agricultural potential, this study area has not only the richest resource base in terms of flat arable land, water available and infrastructure, (irrigation, processing, roads, markets) but also seems to be developing a diversity of solutions to how to farm in Bulgaria under the new conditions. The Sredna Tundja region has perhaps the most diverse cropping pattern of the three study areas, with the exception of tobacco, most of the field, horticultural and orchard crops found in the other two areas are grown here.

2-2 Master Plan Formulation

2-2-1 Plan of Approach

(1) Overall Development Concepts

The development concepts for the Bulgarian Agricultural Reform are as follows;

- 1) To specify the role of agricultural sector in the national economy from the view point of macroeconomics on the basis of the stabilization policy of the macroeconomic situation.
- 2) To clarify the economic policy, strategy and development plan in the retrenchment and subsidy elimination, restoration of property rights and liberalization of prices and trade.
- 3) To formulate the agricultural reform situation in the condition of land restitution, liquidation of collective farms and privatization of food processing industry.
- 4) To formulate the importance of regional differences of farming characteristics, farmers willingness to organize their cooperatives and the policy of the related municipalities, in the view point of local government, for the agriculture sector.
- 5) To cooperate with on-going projects assisted by international agencies, such as EC-PHARE, EBRD and World Bank, etc., especially in the field of marketing activities and water users' association.
- 6) To formulate the agricultural production system, to improve the marketing system and farm management and economy.
- 7) To promote extension and supporting services in the institutional frame-work.
- 8) To evaluate the environmental impact for implementing the project.
- 9) To estimate the improvement and rehabilitation plan of the existing irrigation facilities; major facilities as well as on farm facilities.
- 10) To estimate the economic viability of the three Study Areas as well as irrigation blocks wise.

(2) Sub-dividing of the Study Areas

It is mentioned in the Scope of Work for the Project, that the Pilot Project area will be less than 30,000 ha. In the Study Area of the Rositza and Sredna Tundja, the size of the total areas are 50,700 ha and 97,000 ha, respectively. These Study Areas have been sub-divided into blocks, which are called "Block" in this report. The area was divided on the basis of the irrigation system networks, not by the administrative boundary. The Rositza Study Area has been divided into three blocks in accordance with the main canal networks; North Main Canal Block, Main Left Nikyupski Canal Block and Main Lower Right Canal Block. The Sredna Tundja Study Area has been

divided into four irrigation blocks; Binkos Marash Block, Nova Zagora Block, Kerman Roza Block, and Mlekarevo Padarevo Block. The area of the Petrich Study Area is 11,000 ha, so it was not necessary to sub-divide the area. But the existing irrigation area is 6,600 ha and the Study area is 11,000 ha, which includes a irrigation area operated by farmers cooperatives, so two cases of the Petrich Study Area have been considered.

Acreage of the Block in the Study Areas

Name of Study Area & Block	Acreage(ha)
Petrich Study Area	11,000
Rositza Study Area	50,700
North Main Canal Block	29,300
Main Left Nikyupski Canal Block	9,380
Main Lower Right Canal Block	12,020
Sredna Tundja Study Area	97,000
Nova Zagora Block	22,400
(Nova Zagora M3 Block)	(13,220)
Mlekarevo Padarevo Block	20,000
Binkos Marash Block	35,000
Kerman Roza Block	19,600
Total of the Study Areas	158,700

2-2-2 Development Strategy for the Study Areas

(1) Petrich Study Area

In order to utilize the advantage of the location near to the foreign countries, it will be possible to promote an export oriented agriculture in the Petrich Study Area. Also, due to the warm climate compared with other regions, it will be possible to promote intensive agriculture and early production of vegetables, fruits and highly profitable tobacco. Promoting the intensified agriculture production will contribute to employment in the region. In order to overcome the disadvantage of the small land holdings, it will be proposed to organize farmers' cooperatives among the intensified farming group to enlarge the farm size. Through the cooperative, a share purchase system can be introduced for agricultural input materials and farm machinery.

Because an intensive crop production system with a high requirement for irrigation water has been introduced, and a sophisticated farm management system on the basis of this irrigated agriculture production system should be established. In order to attain an effective and timely supply of the irrigation water, water users' associations should be organized and the association should operate and maintain their terminal irrigation

facilities by themselves.

As for the availability of the water resources, there is no large size reliable reservoir in the Study Area. In addition, most of the irrigation water has to be pumped from the river. In order to utilize the limited water resources effectively, the existing small size storage dam should be repeatedly utilized to store pumped up water from the river.

As for the on farm irrigation facilities, a pipe-line system can be introduced to save a loss of water, as well as to attain an easy operation and maintenance system. During the water shortage period, a rotational irrigation system can be introduced to save water, and for this purpose the pipe-line system will be easier than the open canal system.

Farming practices for the intensive crops of vegetables require high technology and careful timing of fertilizing, pesticide, water control, and will require sufficient supporting services and institutional backup. It will possible to increase the production volume, and also improve the quality.

As for the marketing improvement, a collecting point in Petrich at the existing marketing site is proposed, in order to make a marketing network with Sandanski where the EBRD Project will set up a wholesale market.

(2) Rositza Study Area

The topography of the area extends in elevation to about 200m in the hilly and mountain area. The annual average rainfall is about 100 mm more than the Sredna Tundja area. The soil condition is also fertile. However, cereal production will not be profitable for small farmer because of the price control of the cereals by the Government. Therefore it will be recommendable to introduce profitable crops such as vegetables, roses and strawberry and to market products in Veriko Tarnovo where tourism is a major industry and Poliski Trambesh Area where is a food processing industry area. Also the farm size of the private farmers is rather small at about 1.9 ha, so it will be recommendable to promote farmers cooperatives.

The irrigation facilities in the Rositza Study Area were constructed in 1945, about 50 years ago. Also the major water resource at Stamboliiski Dam has adequate capacity to irrigate the whole area. Approximately 40% of the Study Area is irrigated by pumps, and at present most of the pumps are not operated due to the high cost of operation and cost of electricity. Especially in the area under the North Main Canal Block in the Karaisen Regulating Reservoir area, the pump head required is very high,

about 50m to 60m. Also due to long period of operation, most of the pump equipment is out of order or destroyed. In such an area it will be very difficult to be economically viable even after the rehabilitation works are completed. The following table shows the acreage of the pumping and gravity irrigation area in each block.

Table of Pump and Gravity Irrigation Area

Name of Study Areas and Blocks	Irrigation Area by Pumping(ha)	Irrigation Area by Gravity(ha)	Total Area (ha)
Peirich Study Area	4,300	6,700	11,000
Rositza Study Area	23,380	27,320	50,700
North Main Canal Block	14,200	15,100	29,300
Main Left Nikyupski Block	1,130	8,254	9,380
Main Lower Right Block	8,050	3,970	12,020
Sredna Tundja Study Area	55,800	41,200	97,000
Nova Zagora Block	0	22,400	22,400
(Nova Zagora M3 Block)	(0)	(13,220)	(13,220)
Mlekarevo Padarevo Block	13,800	6,200	20,000
Binkos Marash Block	30,300	4,700	35,000
Kerman Roza Block	11,700	7,900	19,600
Total of Study Area	83,480	75,200	158,700

Water charges in the pumped area will be very high due to the high electricity charges. Also the rehabilitation cost will be very expensive, because most of the pump equipment has to be newly installed. Therefore, it has been proposed to exclude from the rehabilitation, those areas where the rehabilitation cost becomes very expensive. The gravitational irrigation area will be given a higher priority for rehabilitation. However, the Left Nikyupski Canal is very old and mostly an unlined canal. In order to save the water loss and reduce the maintenance cost, this canal should be lined by concrete.

As for the marketing networks, a rehabilitation project of the wholesale market will be planned at Pleven, but the project is not a high priority and also Pleven is rather far from the Rositza Study Area. So, a collecting point at Pavlikeni is proposed for vegetables and fruits.

(3) Sredna Tundja Study Area

The land ownership is rather large, and the size of the cooperatives are also quite large in the Study Area. In part of the Study Area the construction of the irrigation facilities is not finished, but the whole area can potentially be irrigated by gravity from the main dam at Jrebchevo. However it will be rather difficult to irrigate the whole potential area of 97,000 ha. At first, the water availability should be checked to find the possible irrigable area, and it should be clarified whether the non-facilitated area in the

Mlekarevo-Padarevo Block should be included or not. Then the agricultural development strategy for the Area is focused on the farming system on the basis of cereals cultivation by large scale of farmers cooperatives. In order to support and promote the livestock production, maize and fodder production should be promoted in the area.

As for the present cooperative, the main function is limited to producers cooperatives, such as purchasing agricultural inputs and share holding of the land. For the future, functions of marketing and price decision and credit should be added and strengthened for the cooperatives.

At the moment, a rehabilitation project by EBRD for the wholesale market at Sliven will be started in 1996. These can be tied up with this project, to strengthen the marketing networks in the Study Area. Also marketing characteristics can be investigated through the consumers market in the Sliven to meet with their demand.

The main canal system has been lined already, so a pipeline system for on-farm facilities is proposed to reduce the water loss. Water users associations will be organized to operate such modernized terminal facilities. The water users association should be able to operate and maintain their terminal facilities by themselves. Also the on farm development can be done by the water users association.

2-2-3 Components of Development

In order to promote the agricultural reform to the market-oriented economy, the following components of development has been considered.

Rehabilitation of irrigation facilities

- Rehabilitation of main irrigation system

- Improvement of terminal facilities

- Introducing the water management facilities.

Improvement of Marketing conditions

- Market and distribution Networks.

- Post harvest facilities, storage, cooling system

Improvement of supporting services and institutions

- Strengthening the function of farmers cooperatives

- Marketing function

- Credit

Price information system

2-3 Criteria for Selection of the Pilot Project Area

2-3-1 Major Function to be a Pilot Project

In order to select the Pilot Project Area for further feasibility analysis, the following "selection criteria" were used.

- 1) The function of the pilot area is to be replicable to the other areas of Bulgaria. That is, the pilot area is a typical agricultural area in Bulgaria.
- 2) The area to be chosen is currently promoting an advanced agriculture compared with the other project areas, because the area with such conditions will allow the pilot project to succeed, and ease implementation. The pilot project area needs to meet the conditions described below:

Irrigation system with low cost rehabilitation, Readiness to establish water users' association, Advanced marketing system and collaboration style for consignment of the production, Development potential of cooperatives, Rental system of farm machinery, Advanced farming technology supported by institutional and supporting services.

2-3-2 Selection Criteria

In order to select the Pilot Project Area for further feasibility analysis, 40 "selection criteria" summarized in the table is used for the first and second selection of pilot project area mentioned in 2-3-3.

2-3-3 Selection Procedure

The selection procedure has 3 steps to choose a pilot project area.

(1) First Selection : Comparison of 3 Study Areas and Selection of 2 Study Areas

By using 40 "selection criteria", the appropriateness for a pilot Study Area will be first evaluated. Because irrigation blocks within one Study Area would have similar characteristics for most "selection criteria", only study areas are considered. Thus the Team selected two Study Areas containing the potential pilot project area.

Each Study Area was scored according to a scoring standard for each criterion and the points were weighed by a percentage for each subsection. Under this process, full points are 100. By comparing the score which each Study Area obtained, 2 Study Areas were selected for further comparison.

(2) **Second Selection : Comparison of Irrigation Blocks and Selection of 3 Irrigation Blocks**

This step selected irrigation blocks which are suitable for a pilot project area. As blocks only refer to irrigation, they were evaluated using only the selection criteria of "Irrigation". Thus 4 irrigation blocks in the selected 2 Study Areas were chosen for the next step.

(3) **Third Selection : Comparison of the Economic Viability of Blocks**

This last step evaluated the economic viability of blocks using benefit-cost (B/C) ratio. Blocks suitable for a pilot project area, but not economically profitable, were excluded at this last stage. Thus one irrigation block was chosen to be a pilot project area for the Feasibility Study.

Table 2-3-1 Selection Criteria

	Sub scores	Weights (%)	Sub-scoring Standard	Comments
NATURAL AND PHYSICAL CONDITIONS				
1. Natural Conditions				
		50		
1	Topographical conditions; Slope, extent	50	Typical condition in Bulgaria 50pts, Not typical 15pts.	1 Geographic appropriateness as a pilot area.
2	Soil conditions; Fertility	50	Very good 50pts, good 35pts, not good 15 pts, bad 0 pts.	2 Area with fertile soil can expect more benefit by project.
	Sub-Total (1.)	100		
2. Irrigation Conditions				
		35		
3	Availability of the water resources.	10	Lot 10pts, normal 5pts, none 0 pts.	3 If the amount of water at water source is less than the amount of needed water, doesn't
4	Possible irrigation acreage under the existing irrigation facilities without rehabilitation.	10	Many 10pts, normal 5pts	4 In case many irrigation facilities w/o rehabilitation exists, can expect high return by low
5	Possible irrigation acreage with the rehabilitation of the existing facilities.	10	Many 2pts, normal 5pts, none 10pts	5 In case many facilities to rehabilitate exist, rehabilitation costs more.
6	Drainage problem area.	10	Many 2pts, normal 5pts, none 10pts	6 If drainage improvement is needed, costs more and decreases the effect of irrigation.
7	Area without irrigation facilities.	10	Many 2pts, normal 5pts, none 10pts	7 If new construction is needed, the cost is more expensive than that of rehabilitation.
8	Irrigation area and percentage of facilitated area by gravitational irrigation.	10	Lot 10pts, normal 5pts	8 The O&M cost of gravity irrigation is cheaper than that of pumping irrigation.
9	Irrigation area and percentage of facilitated area by pump irrigation.	10	Many 2pts, normal 5pts, little 10pts	9 Pumping irrigation has less advantage than gravity irrigation in terms of electricity fee.
10	Problems of the main irrigation facilities and their rehabilitation cost.	10	Many 2pts, normal 5pts, little 10pts	10 High cost requires benefit corresponding to the cost.
11	Providing facilities for water management system such as check gate, regulating reservoir.	10	Lot 10pts, normal 5pts	11 Administrative facilities is necessary to promote the efficient use of water resource.
12	Condition of on-farm irrigation facilities.	10	Good 10pts, normal 5pts, bad 0 pts.	12 If on-farm facilities is already installed, it responds to new land ownership scheme smoo
	Sub-Total (2.)	100		
SOCIAL CONDITIONS				
3. Sociology				
		10		
13	Percentage of unemployment in the area.	15	High 15pts, average 10pts, low 5pts	13 Project implementation have potential to improve high unemployment. therefore projec
14	Alternative employment opportunities outside of agriculture.	15	Alternative not exist 15pts, medium 10pts, alternative exists 5pts	14 If alternative employment opportunities exists, other sector can absorb labor. if not, ag
15	Local government ability for implementing project.	15	High ability 15 pts, good ability 10 pts, normal 5 pts, poor 0 pts.	15 The ability is one of important factors to implement project easily and sustain the proje
16	Land restitution conditions.	20	Advanced 20pts, average 10pts, slow 5pts, not at all 0 pts.	16 Quick process of land restitution contributes to the more benefit by project.
17	Number and varieties of the food processing factories.	15	Many and diverse 15 pts, common 10pts, not much 5pts, none 0 pts.	17 Agri processing factories can make agri products process and contributes to bring bene
18	Willingness to agriculture	20	High 20pts, common 10 pts, low 5pts	18 The willingness shows the degree of participating to the project of the direct beneficiar
	Sub-Total (3.)	100		
ECONOMIC CONDITIONS				
4. Economy				
		10		
19	Share of agriculture in the regional economy.	25	High 25pts, medium 18pts, Low 10pts	19 If the share is high, the project contributes the regional economy at high degree.
20	Share of agricultural workers.	25	High 25pts, medium 18pts, Low 11pts	20 The contribution of benefit to many agricultural workers help improve their income and
21	Average annual salary (Lev) in 1994.	25	Low 25pts, average 18pts, High 10pts	21 The implementation of the project in the area with low salary contributes the correction
22	Economic development program of municipality.	25	Good plan exists 25pts, plan exists 15pts, None 0 pts.	22 Project can contribute the regional economy in the framework of the economic develop
	Sub-Total (4.)	100		
AGRICULTURAL CONDITIONS				
5. Marketing				
		35		
23	Major agro-processing industries in the region.	5	Have good facilities 5pts, normal 3pts, poor 1pts	23 If the industries have good facilities, rehabilitating those facilities to some degree contr
24	Accessibility from/to domestic transportation condition.	5	Very good 5pts, good 3pts, common 1pts, poor 0 pts.	24 Finally, it contributes to the improvement of farmers.
25	Accessibility from/to international transportation condition.	5	Very good 5pts, good 3pts, common 1pts, poor 0 pts.	25 Finally, it contributes to the improvement of farmers.
26	Existence or planning of wholesale market or consumer market near the area.	7	Exists 7pts, under plan 4pts, doesn't exist 0 pts.	26 The markets (within 50 km diameter) makes to sell agri products possible in a efficient v
27	Existence or planning of market information system.	5	Exists 5pts, under plan 3pts, doesn't exist 0 pts.	27 The effective use of the system contributes the project effectively.
28	Foreign assistance agriculture related projects.	5	Exists related projects and have high potential to cooperate 5 pts, Exists related projects, but low potential to cooperate 2pts, none 0 pts.	28 Can expect the mutual effect through cooperation with other donors.
6. Agriculture				
29	Major crop production yield and unit production amount.	5	Yield low 5pts, average 3pts, high 1pts	29 At area with low yield, can expect high project effect.
30	Farm inputs supply	6	Can procure inputs easily 6pts, medium 3pts, difficult 1pts	30 In purchasing them easily, can expect high project effect.
31	Possession of farm machinery.	5	High 5pts, average 3pts low 1pts compared with other areas	31 Area with high percentage, can expect the high project effect.
32	Percentage of rented machinery.	5	High 5pts, average 3pts low 1pts compared with other areas	32 Area with high renting percentage means the existence of related organization and by s
33	Existence of extension and supporting services.	7	Lot 7pts, average 4pts, a little 2pts, none 0 pts.	33 If already exists, can expect more project benefit through effective use and strengthen
7. Farm management and economics				
34	Major crop producing farm size.	7	More than 5 ha in average 7pts, 2 to 5 ha 4pts, less than 2 ha 1pts	34 Large farms can show economies of scale according to Bulgarian typical agriculture and
35	Farmers expenditure for food.	5	High 5pts, medium 3pts, Low 1pts	35 In point of self-sufficiency, high pts mean the high necessity of the project.
8. Cooperative and WUA				
36	Number of cooperatives and their acreage of farm land.	7	Balanced in number and acreage with private farmers in them 7pts, not balanced 2pts	36 Appropriateness as a pilot area
37	Existence of private producer's organization.	7	Exists a lot 7pts, Exists a little 4pts, doesn't exists 0 pts.	37 High possibility to take advantage of them in the framework of the project.
38	Existence or planning of water user's association.	7	Exists a lot 7pts, Exists a little 4pts, doesn't exists 0 pts.	38 High possibility to take advantage of them in the framework of the project.
39	Organizational structure of cooperative.	7	Advanced and well functioning 7pts, medium 4pts, not well 2pts	39 Can expect project benefit through improving and strengthening the structure.
	Sub-Total (5-8.)	100		
ENVIRONMENTAL CONDITIONS				
9. Environmental Impact				
		5		
40	Impact of the Project Implementation to the environment.	100	None 100pts, have modest impact 30pts, very high impact 0 pts.	40 Impossible to implement the project in area with high environmental impact.
	Sub-Total (9.)	100		
	Total	100		

	Sub scores	Weights (%)	Sub-scoring Standard	Comments for sub-scoring
		5		
	50		Typical condition in Bulgaria 50pts, Not typical 15pts.	1 Geographic appropriateness as a pilot area.
	50		Very good 50pts, good 35pts, not good 15 pts, bad 0 pts.	2 Area with fertile soil can expect more benefit by project.
Sub-Total (1.)	100			
		35		
ation.	10		Lot 10pts, normal 5pts, none 0 pts.	3 If the amount of water at water source is less than the amount of needed water, doesn't need rehabilitation.
	10		Many 10pts, normal 5pts	4 In case many irrigation facilities w/o rehabilitation exists, can expect high return by low cost.
	10		Many 2pts, normal 5pts, none 10pts	5 In case many facilities to rehabilitate exist, rehabilitation costs more.
	10		Many 2pts, normal 5pts, none 10pts	6 If drainage improvement is needed, costs more and decreases the effect of irrigation.
	10		Many 2pts, normal 5pts, none 10pts	7 If new construction is needed, the cost is more expensive than that of rehabilitation.
	10		Lot 10pts, normal 5pts	8 The O&M cost of gravity irrigation is cheaper than that of pumping irrigation.
	10		Many 2pts, normal 5pts, little 10pts	9 Pumping irrigation has less advantage than gravity irrigation in terms of electricity fee.
ng reservoir.	10		Many 2pts, normal 5pts, little 10pts	10 High cost requires benefit corresponding to the cost.
	10		Lot 10pts, normal 5pts	11 Administrative facilities is necessary to promote the efficient use of water resource.
Sub-Total (2.)	100		Good 10pts, normal 5pts, bad 0 pts.	12 If on-farm facilities is already installed, it responds to new land ownership scheme smoothly.
		10		
	15		High 15pts, average 10pts, low 5pts	13 Project implementation have potential to improve high unemployment, therefore project will give more benefit to area with high unemployment rate.
	15		Alternative not exist 15pts, medium 10pts, alternative exists 5pts	14 If alternative employment opportunities exists, other sector can absorb labor. if not, agriculture sector and project implementation has importance in regional economy.
	15		High ability 15 pts, good ability 10 pts, normal 5 pts, poor 0 pts.	15 The ability is one of important factors to implement project easily and sustain the project effect.
	20		Advanced 20pts, average 10pts, slow 5pts, not at all 0 pts.	16 Quick process of land restitution contributes to the more benefit by project.
	15		Many and diverse 15 pts, common 10pts, not much 5pts, none 0 pts.	17 Agri processing factories can make agri products process and contributes to bring benefit to regional economy effectively.
	20		High 20pts, common 10 pts, low 5pts	18 The willingness shows the degree of participating to the project of the direct beneficiary. High willingness aligns the project effect.
Sub-Total (3.)	100			
		10		
	25		High 25pts, medium 18pts, Low 10pts	19 If the share is high, the project contributes the regional economy at high degree.
	25		High 25pts, medium 18pts, Low 11pts	20 The contribution of benefit to many agricultural workers help improve their income and prosperity of regional economy.
	25		Low 25pts, average 18pts, High 10pts	21 The implementation of the project in the area with low salary contributes the correction of difference of income between areas.
	25		Good plan exists 25pts, plan exists 15pts, None 0 pts.	22 Project can contribute the regional economy in the framework of the economic development plan.
Sub-Total (4.)	100			
		35		
	5		Have good facilities 5pts, normal 3pts, poor 1pts	23 If the industries have good facilities, rehabilitating those facilities to some degree contributes to the project effectively.
	5		Very good 5pts, good 3pts, common 1pts, poor 0 pts.	24 Finally, it contributes to the improvement of farmers.
	5		Very good 5pts, good 3pts, common 1pts, poor 0 pts.	25 Finally, it contributes to the improvement of farmers.
	7		Exists 7pts, under plan 4pts, doesn't exist 0 pts.	26 The markets (within 50 km diameter) makes to sell agri products possible in a efficient way.
	5		Exists 5pts, under plan 3pts, doesn't exist 0 pts.	27 The effective use of the system contributes the project effectively.
	5		Exists related projects and have high potential to cooperate 5 pts,	28 Can expect the mutual effect through cooperation with other donors.
			Exists related projects, but low potential to cooperate 2pts, none 0 pts.	
	5		Yield low 5pts, average 3pts, high 1pts	29 At area with low yield, can expect high project effect.
	6		Can procure inputs easily 6pts, medium 3pts, difficult 1pts	30 In purchasing them easily, can expect high project effect.
	5		High 5pts, average 3pts low 1pts compared with other areas	31 Area with high percentage, can expect the high project effect.
	5		High 5pts, average 3pts low 1pts compared with other areas	32 Area with high renting percentage means the existence of related organization and by strengthening them, can expect high project effect.
	7		Lot 7pts, average 4pts, a little 2pts, none 0 pts.	33 If already exists, can expect more project benefit through effective use and strengthening them.
	7		More than 5 ha in average 7pts, 2 to 5 ha 4pts, less than 2 ha 1pts	34 Large farms can show economies of scale according to Bulgarian typical agriculture and contribute the project in a more efficient way.
	5		High 5pts, medium 3pts, Low 1pts	35 In point of self-sufficiency, high pts mean the high necessity of the project.
	7		Balanced in number and acreage with private farmers in them 7pts, not balanced 2pts	36 Appropriateness as a pilot area
	7		Exists a lot 7pts, Exists a little 4pts, doesn't exist 0 pts.	37 High possibility to take advantage of them in the framework of the project.
	7		Exists a lot 7pts, Exists a little 4pts, doesn't exist 0 pts.	38 High possibility to take advantage of them in the framework of the project.
	7		Advanced and well functioning 7pts, medium 4pts, not well 2pts	39 Can expect project benefit through improving and strengthening the structure.
Sub-Total (5.-8.)	100			
		5		
Sub-Total (9.)	100		None 100pts, have modest impact 30pts, very high impact 0 pts.	40 Impossible to implement the project in area with high environmental impact.
Total		100		

CHAPTER 3. MASTER PLAN FOR THE STUDY AREAS

3-1 Petrich Study Area

3-1-1 Socio-Economic Development Potential

Development in Petrich study area is as follows:

Geographical superiority: Sofia District including the Petrich Study Area borders with Greece, Macedonia and Serbia, and is an important gate for Bulgaria, to the Balkans, Europe and the world. The Petrich study area is strategically located for international trade. Additionally, Petrich is only two hours distance by car from Sofia. The Petrich study area has the potential to become a production center selling to Sofia, the biggest consumer market in Bulgaria.

Economic development strategies: The municipality has a plan until the year 2000. The Plan was to be completed in September 1996. Foreign investment projects and agriculture development policy initiatives was to be included in this plan. In the agricultural development program, strengthening of production of fruit (grape and peach etc.) and vegetable (tomato and cucumber), early vegetation and grain planting are considered priority items. The target level of agricultural output is defined as 65% of the output of 1991. Implementation of new technology and modern agricultural machines are important steps to improve the production of agricultural products.

Agriculture in the total municipal economy: Currently, each sector's share of economic output in the total municipal economy is 45% industry, 30% services and trade and 25% agriculture. The main industries are light industry manufacturing (knit and clothing), water flow meter, safe box, electronics (joint-venture with German company), furniture. Many small size international trade companies have business with Greece and Macedonia. In the food processing industry, there are canning industries, meat processors, greenhouses of vegetable, fruit farming and a dairy. However, the number and size are relatively small. Management conditions in these companies are bad.

Conclusion: In the short term, it may be better to develop the Petrich area as a vegetable and fruit production area for major domestic markets like Sofia. In the long term, the area may engage in foreign trade in agricultural products with neighboring countries. The climate of this area is warm and moderate, creating opportunities for

producing profitable early and greenhouse vegetables during the off-season.

3-1-2 Agricultural Development Plan

(1) Marketing Potential

Production of wine grapes and tobacco which have great export potential can be further increased without additional investment in the existing procurement and processing facilities. Vegetables and fruit would have competitiveness among domestic as well as foreign markets taking into account the geographical and topographical advantages of the Petrich region. Grouping of private producers and establishment of a collecting point which links to EBRD's wholesale market at Sandanski is proposed in order to reactivate the export oriented vegetable and fruit production. Producers groups enable small scale dispersed farmers to sell large amounts to traders. The planned EU-PHARE's rehabilitation project of the existing producers market for vegetables and fruit at Karanovo is expected to connect the region to the wholesale market rehabilitation project at Sandanski in the future. By improving the bargaining power of producers in terms of group selling, improved post harvest practices such as grading, packaging, and regional specifications can be achieved.

(2) Proposed Land Use

Petrich with its high population density, limited area of fertile irrigable land, and shortages of low cost water, presents a particular problem in terms of land use. The location has its advantages and its disadvantages. On the one hand the access to the border could potentially allow exports of fruit and vegetables, however neither Greece nor Macedonia represent promising markets, and the unsettled conditions in former Yugoslavia limit access to the European markets. Sofia is one market, albeit with somewhat limited purchasing power for higher value products. The two things that are in Petrich's favor that should be developed, are its experience with tobacco and vegetables, and its potential for early season production. Regaining its former markets and re-developing these potentials will not be easy, requiring investments of time, money and technology, but the potential rewards are great. Tobacco, fruit and vegetables dominate the proposed cropping system, with c. 55% of the cropped area. The only way that this level of intensity can be reached in the future is if specialization occurs and producers group themselves into cooperatives to grow a particular set of crops for target markets. Tobacco already has the cooperatives established, whereas vegetables and fruit production is highly fragmented, with many small competing producers. Without producer coops and WUA's it will not be possible to reach the target areas and yields proposed and the economic benefits will not be realized.

(3) Proposed Cropping Pattern

In Table D-2 (1), Appendix D, the proposed "with" and "without" project areas and yields for Petrich are presented. These are based on estimates made in the field, combined with consultations with knowledgeable local staff and comparisons with similar conditions elsewhere.

(4) Target Yield and Production

a) Cereals

With full project development, it is assumed that all areas under wheat and barley will be flood irrigated. As currently none of the winter cereals are assumed to be irrigated, this should result in yield increases of 700 kg/ha for the wheat and 400 kg/ha for the barley. With 3.5% of the area under wheat and 7.5% under barley, this will give a production of 1,400 ton of wheat and 2,400 ton of barley. The larger area under barley is because of the greater stability of the market price of barley. Petrich will never be a major cereal producer, because of the size of the land holdings, but 10% of the cropped area under winter cereals will allow rotations for disease control and also allow farmers to take advantage of the comparatively better rainfall in the winter season. For the summer crop of maize, for the purposes of the calculations, it has been assumed that all of the existing maize is being irrigated. This is conservative, and it is likely that the existing maize area is not fully irrigated. Because of the comparatively high water requirement of maize (300 cu.m./dca) the area with project has been reduced. With 7.5% of the area under maize, yields are likely to increase by 750 kg/ha, up to an average of 3,500 kg/ha, for a production of grain maize of 2,900 tons.

b) Fodder Crops

The fodder maize area on the other hand is doubled, to 3%, and is included, along with alfalfa and pasture to ensure adequate fodder resources for the animal population in the area, which is projected to increase. Yields under irrigation of 9 ton/ha are certainly possible. The alfalfa area which is currently assumed to be very low, at around 1.5%, the majority of which is un-irrigated (1.1%) is increased to 4% for the same reason. With flood irrigation, yield increases of 400 kg/ha over non-irrigated alfalfa are possible, to give a total project production of 1,430 ton. Currently, little or none of the local pasture is being irrigated, with 2.5% of the project area under irrigation, and yield increases of 500 kg/ha, this could potentially give 413 ton of fodder material for the local animals, as well as allowing a break in the cultivation of vegetables.

c) Fruit and Vegetables

Fruit production is in deep decline at present, the peach orchards are undermanaged and under irrigated, the massive investment into kiwi is almost totally neglected, and the grapes have huge areas of dead or dying vines. The area under fruit has to be rationalized, currently it is assumed that 8.5% of the area is under grapes, 6.4% non-irrigated, and 4.5% under fruit, 3.4% non-irrigated. With the project, the total area of grapes will decline to at least 7.5%, and the fruit area will remain constant, but the total area will be irrigated. Yields of 5.5 ton/ha of grapes and 4.5 ton/ha of fruit are certainly possible with good husbandry, giving a production of 4,500 ton of grapes and 2,400 ton of fruit. Quality fruit production is not possible without massive investment rehabilitation. Early vegetables are Petrich's comparative advantage, particularly early season production, so a massive doubling of this part of the cropping system is proposed, from 4.5% of the area without the project to 9% with the project. Assuming the problems of organizing the small producers and selling their output can be resolved, then potentially 22,000 ton of these higher value products can be grown. With improved seeds and technology, plus water, yields can probably be doubled. These improvements, plus specialization in particular crops and organization of farmers groups should also allow the main crop vegetable production to increase, although perhaps not as radically. Yield increases to 5 ton/ha should be possible, and with an area of 19.5% under vegetables, then production could be up to 30,000 ton of main season vegetables.

d) Tobacco and Other Crops

Petrich is the only study area currently producing tobacco. Because of its high profitability, the proposed cropping pattern for the project increases the area under tobacco from 12% to 20%. This would give a production of 3,500 ton of tobacco from the irrigated area, assuming the labor required is available in the area. With nearly 50% of the area under intensive crops, mechanization and labor saving practices will be essential. It is possible that Petrich could attract seasonal labor during the peak months, but labor bottlenecks would need to be carefully examined before the final cropping pattern is established. The 'Other crops' proposed for Petrich are mainly legumes, peanuts, peas and beans, to provide a break crop from the vegetables and to restore soil fertility.

(5) Farmers' Management Plan

a) Farm Management

On the basis of the cropping pattern, land use, and past cropping performance, the farm management plan is formulated as follows:

- Cropping pattern: No major alteration of the current cropping pattern would be applied due to climatic and other conditions. Accordingly, cropping pattern is 1 crop per year with a maximum cropping intensity of 108 percent.
- Land use: Vegetable area and vineyards are expanded taking into account market demands.
- Management: Private farmer. Land preparation work use mechanized services.

b) Farm Labor Demand

Farm households in the area are assumed 6,300 with a total farm population of 25,200 (EAP: 16,080). Farm family labor force is estimated at 393,750 man-day per month. Monthly labor requirements calculated on the basis of cropping pattern and cropping intensity under the proposed farm management are as follows: (see Table F-1-2-2(2), Appendix F)

<u>Month</u>	<u>Labor Requirement</u>
February	155,441
March	118,470
April	214,533
May	179,993
June	257,252
July	419,821
August	387,816
September	288,118
October	125,829
November	605
Total	2,147,877

On the basis of the above, peak labor demand occurs in July. Employed labor must be relied upon during this period. The requirement in the peak month of July under the proposed plan represents a 2 fold increase in employment opportunities over the current requirement of 203,900 man-day. Also, labor shortage will occur in this month.

c) Balance of Farm Management

Increased productivity as a result of irrigated cultivation and strengthened extension activities under the plan will be total US\$ 9.6 million annually. The balance of farm management is calculated on the basis of production amount (revenues) and expenditure of farm management for each crop under the project "without" and "with" conditions. The net production profit for crops is 141 percent. The balance of farm management is

summarized as follows (see Table F-I-1-13, 14 and 15, Appendix F):

	Unit: US\$ 1,000		
	<u>Revenues</u>	<u>Expenditure</u>	<u>Profits</u>
With Project	16,053	5,282	10,771
Without Project	6,462	3,313	3,149
Balance	9,591	1,969	7,622

d) Farm Household Economy

The analysis of farm household economy was carried out on the typical farmers in the area. The result is summarized as follows: (see Table F-I-3-1(2), Appendix F)

<u>Category</u>	<u>Amount</u>
Farm Size (ha)	2.0 ha
Farm Income	Lev 331,450
Production Costs	Lev 118,050
Return	Lev 213,400
Living Expenses	Lev 194,869
Reserves	Lev 18,531

After implementing of the project, farm income is considerably increased. However, the farmer will have difficulty maintaining his living by on farm income, so additional income from non-farm works will be required. Although water fees for crop production are included in this calculation, most farmers are unable to pay water fees from farming income alone.

(6) Farmers' Organizations and Support Services

Producer cooperatives are an option for organizing small landholders and facilitating supply of inputs for these producers. Open lines of communication among farmers, and the motivation to organize around a task such as input supply and common machinery use will strengthen cooperation and breakdown the mistrust that prevails. Private farming is also promising, and may be supported through stable access to input suppliers, credit, and established marketing channels. Encouragement of marketing cooperatives for distribution and sale of fruits and vegetables will be important to raising incomes for farm producers. This may be done through advisory services and encouraging access to and rehabilitation of storage and distribution facilities.

WUAs are best kept limited in number and focused on areas where irrigation facilities

are in active use. Rapid registration of groups, without access or interest in irrigation will make a mockery of the new initiative.

The Extension service in the Petrich and Sandansky area will require continuing effort to energize their interest toward to support of small producers in the region. Visits to active extension offices like the one in Yambol, might offer a useful role model. Particular attention to outreach to provide advice on pest control, fertilizer application and marketing will be of the highest priority. Efforts to support availability of seedlings for vineyards and orchards will help restore lost resources, and promote investment in profitable agriculture.

3-1-3 Infrastructure Development Plan

(1) Water Resources Development Plan

a) Water Resources

As mentioned in section 1-2-4 of Part II, present conditions of water resources of this Study Area are divided into the following three categories:

The water source of the Pirinska Bistritza irrigation district is compensator with storage capacity of 75,000 cu.m at the downstream of dam-type hydro-power generator. The catchment area of the dam for hydro-power generation is small and the storage capacity of compensator is not large enough for compensation of irrigation requirement, accordingly irrigation water shortage occurs once every two or three years, to secure the irrigation water supply, it is necessary to develop new water resources or enlarge the existing compensator.

The Petrich district takes irrigation water from the Struma and the Strumeshnitza rivers. However, the storage dams were constructed on the upstream of the Strumeshnitza river in the territory of Macedonia, accordingly the river runoff at Strumeshnitza town is reduced from 3.41 cu.m/s to 1.84 cu.m/s during the irrigation period as shown on Table I-3-2 and Fig. I-3-2, Appendix I. Mean annual runoff of the river such as 2.53 cu.m/s after completion of the dams in Macedonia is only for maintenance flow of the river, then it is very hard to consider the Strumeshnitza river as a water resource for irrigation purposes. Although runoff of the Struma river reduced from 81.10 cu.m/s to 46.36 cu.m/s during the irrigation period as shown on Table I-3-1 and Fig. I-3-1, Appendix I, only the Struma river is a source of irrigation water. However, since agricultural land is higher than the river water level, pumping is required for the intake of water.

Samuilova Krepost district is located at the north slope between the Strumeshnitza river and Belasitza mountains which is the boundary of Bulgaria. This irrigation district collected irrigation water from the runoff of the mountains. For this purpose, one storage dam was constructed and other new dam is under construction, however the water availability of this district is also unstable.

For supplemental water supply to Prinska Bistritza irrigation district and securing the stable irrigation water supply to Petrich irrigation district, the Nikudin dam under new Prinska Bistritza Irrigation Project was planned at the 1980's on the Lebnitza river. The annual mean river runoff is 1.31 cu.m/s as given on Table I-3-3, Appendix I and the total mean annual runoff can be estimated at 40.7 mcm at village of Nikudin.

The principal dimensions of new Nikudin dam area shown below:

Catchment Area	215.70 sq.km
Total Storage Volume	27.30 mcm
Height of Dam	69.85 m
Length of Dam	273.00 m
Spillway Discharge	606.58 cu.m/sec

Since, the river runoff is adequate to supply irrigation water to the Petrich district and supplemental irrigation water supply to Prinska Bistritza district, the development plan mentioned below will discuss development "without" the Nikudin Dam construction.

b) Irrigation Area

Facilitated agricultural land of the country were classified as four (4) categories; Class I & II, Class III, Class IV-1 and Class IV-2 in 1994. The irrigation area for development including Class I & II, Class III and Class IV-1 of each case is given as follows. (For detail refer to Table J-1-2)

<u>Description</u>	<u>Case I</u>	<u>Case II</u>
Study Area	6,584.6 ha	11,000.0 ha
Total Developing Area	6,584.6 ha	11,000.0 ha
Pirinska Bistritza district	1,940.7 ha	2,496.4 ha
Petrich district	4,170.1 ha	5,889.6 ha
Samuilova Krepost district	473.8 ha	2,614.0 ha

c) Irrigation Water Requirement

Irrigation water requirement is estimated by the method of "Regionalization of the Irrigation Regime of Agricultural Crops" based on the proposed cropping pattern and efficiency of the irrigation system—65 % with furrow irrigation, 85 % with sprinkler irrigation and 10% conveyance loss of water passing through canals. Annual water requirement of the Study Area is estimated at 44.754 mcm and calculations are provided in Table J-2-1, Appendix J.

(2) Irrigation and Drainage Facilities

Irrigation and drainage facilities for implementation and rehabilitation of this Study Area are as follows:

		<u>CASE I</u>	<u>CASE II</u>
Main & Secondary Canal	Rehabilitation	44,333 m	23,916 m
	Concrete lining	12,416 m	55,833 m
Pipe Line	Replacement	0 m	0 m
Pumping Station	New Installation	0 sta.	0 sta.
	Replacement	8 sta.	8 sta.
Compensator	Rehabilitation of Lining	3,000 sq.m	2,400 sq.m

(3) On-farm Development Facilities

The irrigation method applied for this Study Area is only the gravity method. Accordingly, on-farm facilities, open canals and on-farm road with 6.0 m in width will be considered. The ratio of the on-farm road is 2 % of agricultural land based on the standard of on-farm development.

(4) Investment Cost

Investment cost for irrigation facilities are estimated based on the unit cost at August, 1996 equal to 180.14 Lev/US\$, and total estimated investment cost of each Block are summarized below, and detailed estimations are given in K-5, Appendix K.

<u>Description</u>	<u>Study Area</u>	<u>Total cost</u>	<u>Cost/ha</u>
Case I	6,584.6 ha	\$ 8,120,000	1,233 \$/ha
Case II	11,000.0 ha	\$ 12,657,000	1,151 \$/ha

3-1-4 Environmental Impact

No new construction works such as canals, reservoirs, pumping stations etc. have been

proposed in the development plans formulated for two project areas in the Petrich study area. Only rehabilitation of the existing pumping stations and distribution canals have been proposed. Therefore, no significant impact from the implementation of the project is expected. However, for a better environmental management in the area the following is recommended.

- i) for a better water quality management, more monitoring points should be established
- ii) early establishment of sewage water treatment facilities in the municipal cities
- iii) early measures such as river training against the river bed raising
- iv) stricter enforcement of existing pollution related acts
- v) coordination between development authorities and ministry of culture for protecting the cultural heritage

3-2 Rositza Study Area

3-2-1 Socio-Economic Development Potential

The socio-economic development potential in Rositza study area is summarized as:

Location: The Rositza study area is located at the center of the country and has an advantage in access to the biggest markets such as Sofia and the Black Sea coast resorts. The distance from Sofia to Veliko Turnovo is 247 km. The distance from Veliko Turnovo to important port cities of Varna and to Burgas is 220 km and 233 km, respectively. International and main domestic traffic routes such as the European Corridor and main railway between Sofia and Varna pass through this area.

Management condition of the industry: Electronics and teleprocessing are the main industries around the study area. Veliko Tarnovo, the biggest city of this area, is the center of these industries. Management conditions in these industries are poor. The production level has fallen to half of 1989 level. Economic delegations from South Korea and Russia have visited these factories, but foreign investment contents have not been completed.

Food processing companies: The agricultural product mix of this area is cereals, sunflower, sugar beet, fruit (plums, pears, apples, raspberries, strawberries), vineyards and fodder crops. In Veliko Tarnovo and Gorna Oryahovitsa, food processing

companies are based on these products.

Tourism: Veliko Tarnovo is a famous historical city and is appointed as a national reserve area. There are many resources for tourism and it is one potential industry of the study area.

Communication between municipalities: The study area is administered by 7 municipalities. Out of these municipalities, only Veliko Tarnovo, the biggest municipality in the study area, has the power and ability to establish economic development programs. The other six municipalities also have an interest in establishing economic development programs (including recovery of agricultural sector), however, they cannot establish their own programs because their size and administration power is small. At this moment, these municipalities do not have a system or a network to communicate and cooperate for regional development. In order to develop this region, these 7 municipalities should not try to do things by municipality, but also aim to cooperate with each other and form a regional development system.

Conclusion: As climate and soil conditions are good, the potential for agricultural development is strong. While restructuring of industry is difficult and a longer period is needed. If agriculture and the food processing industry recover, this might bring a large economic impact to the economic development of the study area. Development for agriculture and tourism such as an orchard for tourists is considered to be promising. In the study area, the cooperation of the municipalities seems necessary for the development of agriculture.

3-2-2 Agricultural Development Plan

(1) Marketing Potential and Development Strategy of Rositza

Considering that many cooperative type producers still exist and vertical distribution and marketing systems constructed around food processing companies more or less remain, future development possibility of Rositza Study Area is likely to lie in promotion of export oriented food processing industries. Taking into account that large scale state owned oil extraction company is located at Polski Trambesh which is along the international road connecting Turkey and Romania, export promotion of sunflower oil is worth considering such as export of sunflower seed oil instead of raw material. In order to reactivate livestock sector, production of feed at home is crucial issue for the Bulgarian economy. Currently, the export destination of Bulgarian maize is Europe, but future diversification of importing countries is likely to happen provided

that future demand from China is expected to break balanced world demand and supply condition of maize. Considering that Rositza Study Area is located close to major wine importing countries such as Romania, Ukraine and Russia, further increase in wine grape production is also proposed.

(2) Proposed Land Use

Rositza Study Area has a tradition of cereal production, and a suitable climate and soils. Currently, the two major problems of the existing land use and cropping pattern are the over reliance on sunflower, because of its drought tolerance and its favorable price; and the presence of large numbers of perennial weeds in the area.

(3) Proposed Cropping Pattern

Refer to Table D-2 (2), Appendix D for the proposed cropping pattern for the Rositza study area.

(4) Target Yield and Production

a) Cereals

With full project development, it is assumed that some of the available irrigation water will be used to irrigate the area under wheat and barley. As currently none of the winter cereals are assumed to be irrigated, this should result in yield increases of 550 kg/ha for the wheat and 200 kg/ha for the barley. With 30% of the area under wheat and 12% under barley, and with 5% of the area (wheat) irrigated and 2.4% of the area (barley) irrigated this can potentially give production levels from the 21,000 ha of about 52,000 ton of wheat (9,400 ton from the irrigated area) and 18,000 ton of barley, (4,000 ton from the irrigated area). The large area under wheat and barley (42%) is because of the topography and land holdings in the area and the availability of winter rains to supplement the irrigation. Rositza has the potential to be a major cereal producer, assuming the smaller landholdings are organized into viable mechanized farming units. With 42% of the cropped area under winter cereals, this will allow tillage practices that can control the weeds in the area. For the summer crop of maize, for the purposes of the calculations, it has been assumed that all of the existing grain maize is being irrigated, and 25% of the forage maize. Once again this is being conservative, it is likely that the existing maize area is not fully irrigated. Because of the comparatively high water requirement of maize (300 cu.m/dca) the area with project of grain maize has been reduced, while because of the projected need for animal feed, the area under fodder maize has been increased slightly. With 7.5% of the area under irrigated grain maize, yields are likely to increase by up to 1,600 kg/ha, up to an average of 4,200

kg/ha, which will give a production of grain maize of 16,000 tons.

b) Fodder Crops

The fodder maize area on the other hand is doubled to 3%, and is included, along with alfalfa and pasture to ensure adequate fodder resources for the animal population in the area, which if it is to increase will need more fodder. Yields under irrigation of 3,400 kg/ha are certainly possible. The alfalfa area which is currently assumed to be at 5% of the total area with the majority un-irrigated (3.7%) is reduced to 2%, but all irrigated. With flood irrigation, yield increases of 900 kg over non-irrigated alfalfa are possible, to give a total project production of 3,400 ton. Currently, little or none of the local pasture is being irrigated, with 3% of the project area under irrigation, and yield increases of 850 kg/ha, this could potentially give 2,600 ton of fodder material for the local animals, as well as allowing a break in the cultivation of sunflower and cereals and utilizing the low lying land along the river valley which is prone to flooding.

c) Fruit and Vegetables

Like the rest of Bulgaria grape production is in disarray at present, and the apple orchards are neglected, undermanaged and under irrigated. The area under fruit has to be rationalized, currently it is assumed that 2.5% of the area is under grapes (1.9% un-irrigated) and 3% under fruit (2.2% non-irrigated). With the project, the total area of grapes will increase to 7%, to take advantage of the local facilities for wine production, and the possibilities for one person to manage an economic unit of wine grapes. On the other hand the fruit area is projected to decline slightly to 2.5%, because of the input costs, the size of the economic unit required and the current domestic oversupply, but at full development the total area will be well managed and irrigated. Yields of 6.25 ton of grapes and 6 ton of fruit are certainly possible with good husbandry, giving a potential production of 22,700 ton of grapes and 7,700 ton of fruit. Quality wine grape production is not possible. Vegetables for processing have traditionally been produced in Rositza, but the processing industry is suffering from cash flow problems, declining markets and obsolete equipment, furthermore vegetables require labor, which appears to be in short supply in the area, with its aging population. So the area under vegetables is kept constant, at 4.5% of the area. Assuming the problems of organizing the small producers and linking them to the processing industry to sell their output can be resolved, then potentially 41,000 ton of these higher value products can be grown. With improved seeds and technology, plus water the existing vegetable yields can probably be doubled.

d) Other Crops

No tobacco is projected for Rositza, despite its high profitability, the climate is not particularly well suited to tobacco production and there is no tradition of production in the area. On the other hand there is a tradition of sugar beet production, on the upland areas, by the cooperatives, and the area under this crop has been increased from 1% to 2.5%. It is likely that the government will continue to subsidize the industry, and yield increases of 2-3 ton per hectare should be possible. Sunflower area on the other hand has been reduced from 16.5% to 15% to allow rotations and to ensure that soil borne diseases do not build up and become limiting. The other crops proposed for Rositza are mainly legumes, beans and soy, (because of the presence of the soy research station at Pavlikeni) and potatoes, which should do well in this climate and on these soils, oats are also included in the rotation (1% of the area) as they will probably do well unirrigated in the better rainfall years.

(5) Farm Management Plan

a) Farm Management

On the basis of the cropping pattern, land use, and past cropping performance, the farm management plan is formulated applying the following assumptions:

- Cropping pattern: No major alteration of the current cropping pattern would be applied due to climatic and other conditions. Accordingly, cropping pattern is 1 crop per year with a maximum cropping intensity of 100 percent.
- Land use: Maize area and vineyards are expanded.
- Management: Production cooperatives and private farmers. Cooperatives operate mechanized farming. Private farmer use mechanized services for land preparation works.

b) Farm Labor Demand

Farm households in the area are assumed 17,440 with a total farm population of 52,320 (EAP: 20,710). Farm family labor force is estimated at 517,750 man-day per month.

Monthly labor requirements calculated on the basis of cropping pattern and cropping intensity under the proposed farm management are as follows:

(see Table F-I-2-2(3), Appendix F)

<u>Month</u>	<u>Labor Requirement</u>
February	23,265
March	300,077
April	436,568
May	317,253
June	227,243
July	312,264
August	228,455
September	524,893
October	123,765
November	10,573
Total	2,504,354

On the basis of the above, peak labor demand occurs in September. Employed labor must be relied upon during this period. The requirement in the peak month under the proposed agricultural development plan represents a 3 fold increase in employment opportunities over the current requirement of 164,000 man-day. However, this demand is in accord with the present labor supply.

c) Balance of Farm Management

Increased productivity as a result of irrigated cultivation and strengthened extension activities under the plan will be total US\$ 9.2 million annually. The balance of farm management is calculated on the basis of production revenues and farm expenditures for each crop under the project "without" and "with" conditions. The net production profit for crops is 183 percent. The balance of farm management is summarized as follows:

(see Table F-I-1-13, 14 and 15, Appendix F)

	Unit: US\$ 1000		
	Revenues	Expenditure	Profits
With Project	26,012	11,251	14,761
Without Project	16,764	10,083	6,681
Balance	9,248	1,168	8,080

d) Farm Household Economy

The analysis of farm household economy was carried out on the typical farmers in the area. The result is summarized as follows: (see Table F-I-3-2(2), Appendix F)

<u>Category</u>	<u>Amount</u>
Farm Size (ha)	1.9 ha
Farm Income	Lev 213,630
Production Costs	Lev 67,420
Return	Lev 146,210
Living Expenses	Lev 140,885
Reserves	Lev 5,325

After implementing of the project, farm income of this farmer is increased. The living conditions of the farmers will be substantially improved, but farm income alone may not be adequate. For this calculation, the water fee for crop production is included. It can be said that the farmer will be able to pay water fee for his farming.

e) Income and Expenditure of Production Cooperatives

On the basis of the proposed agricultural development plan, estimation of the balance of farm management was made. The result is summarized as follows:

(see Table F-I-4-1(2), Appendix F)

Unit: Lev 1,000		
<u>Revenues</u>	<u>Expenditure</u>	<u>Net Reserve</u>
117,745	73,199	44,546

From the above, farm management of the cooperatives is improved remarkably. This situation will produce better maintenance and improvement of farming facilities and machinery and equipment. Furthermore, improvement of their farming techniques will be expected.

(6) Farmers' Organizations and Support Services

Access to credit, and common facilities will be vital to supporting the cooperative movement that is well underway. Producer cooperatives are now operating for organizing small landholders. The supply of inputs at affordable prices for these producers continues to be a constraint. Producers could further expand cooperative roles into marketing functions as well. Private farming is promising particularly for mixed farming with feedcrops and livestock. The encouragement of marketing associations for distribution and sale of feeds and livestock is the most important constraint depressing incomes for producers and discouraging use of idle farm lands.

The organization of WUAs is advisable where producers require irrigation. With the advanced age of this irrigation system, rehabilitation of existing facilities will be vital

before the transfer of on-farm facilities to WUAs. Adaptation of on-farm facilities will encourage expanded use further to justify the establishment of water user groups.

The Extension offices in the Lovich region will require strong leadership and financial help to direct staff interests toward support of small producers in the region. Particular attention on livestock breeding, crop rotation, revolving and investment credit, and machinery purchase and lease will be of the highest priority given prevailing conditions in the area.

3-2-3 Infrastructure Development Plan

(1) Water Resources Development Plan

a) Available Water

In the Study Area, there are two rivers; the Rositza river running from west to east, and the Juntra river flowing from south to north, however there is only one storage dam, the Aleksandar Stamboliiski Dam, and there is no possibility to develop new storage dam on either river.

The Aleksandar Stamboliiski Dam was completed in 1958, and operation and maintenance have been carried out by the NEC. Mean annual inflow to the reservoir from 1991 to 1995 is 254.76 mcm, and annual inflow of these years is tabulated in Table I-3-6, Appendix I. On other hand, a ten year return period for drought inflow to the reservoir is very hard to estimate with five years records, but it can be said as more 124.03 mcm, the same as a result of the probability analysis of inflow to the Jrebchevo dam of Sredna Tundja Study Area, because the precipitation of the Aleksandar Stamboliiski dam (Suhindol as representative) is bigger than that of the Jrebchevo dam (Sadievo as representative)

b) Irrigation Area

Facilitated irrigation land of the country were classified as four (4) categories. The irrigation area for development can include Class I & II, Class III and Class IV-1 is given below. (refer to Table J-1-2, Appendix J)

<u>Description</u>	<u>Area</u>
Study Area	50,700.0 ha
Total developing Area	50,347.7 ha
Main Lower Right Canal Block	12,010.6 ha
Main Left Nikyupski Canal Block	9,377.5 ha
Northern Main Canal Block	28,959.6 ha

c) Irrigation Water Requirement

Irrigation water requirement is estimated by the method of "Regionalization of the Irrigation of Agricultural Crops" based on the proposed cropping pattern and efficiency of the irrigation system—65 % with furrow irrigation, 85 % with sprinkler irrigation and 10% conveyance loss of water passing through canals. Annual water requirement of the Study Area is estimated at 68.586 mcm and calculations are shown in Table J-2-2, Appendix J. As mentioned above, irrigation is assumed in the proposed cropping pattern.

(2) Irrigation and Drainage Facilities

Irrigation and drainage facilities for implementation and rehabilitation of this Study Area are as follows:

		<u>ML.R.C.</u>	<u>ML.N.C.</u>	<u>N.M.C.</u>
Main & Secondary Canal	Rehabilitation	18,806 m	0 m	38,347 m
	Concrete lining	15,222 m	40,023 m	54,949 m
Pipe Line	Replacement	1,500 m	500 m	4,000 m
Pumping Station	New Installation	3 sta.	0 sta.	9 sta.
	Replacement	4 sta.	3 sta.	11 sta.
Compensator	Rehabilitation	3,000 sq.m	2,400 sq.m	7,300 sq.m

Note: M.L.R.C = Main Lower Right Canal Block
 M.L.N.C = Main Left Nikyupski Canal Block
 N.M.C = Northern Main Canal Block

(3) On-farm Development Facilities

Irrigation methods applied in this Study Area are divided into two types: gravity irrigation and sprinkler irrigation. The irrigation area facilitated by sprinkler systems of each Block is given as follows:

<u>Description</u>	<u>Sprinkler Irrigation Area</u>
Main Lower Right Canal Block	3,500.0 ha
Main Left Nikyupski Canal Block	2,200.0 ha
Northern Main Canal Block	8,616.8 ha

However, the facilitated area was constructed for large farming practices. The pipes

are laid at 300 to 400 meter intervals. Since, the present pipe system is not fit for the new land ownership structure, additional pipe systems fitting for 20 - 40 dca is required.

On-farm roads with 6.0 m in width will be considered over 2 % of agricultural land.

(4) Investment Cost

Investment costs for irrigation facilities are estimated based on the unit cost as of August, 1996 equal to 180.14 Lev/US\$. The total estimated investment cost of each Block is summarized below, and detailed estimations are given in K-5, Appendix K.

<u>Description</u>	<u>Study Area</u>	<u>Total cost</u>	<u>Cost/ha</u>
Main Lower Right Canal Block	12,010.6 ha	\$ 6,590,000	549 \$/ha
Main Left Nikyupski Canal Block	9,377.5 ha	\$ 11,094,000	1,183 \$/ha
Northern Main Canal Block	28,959.6 ha	\$ 22,892,000	790 \$/ha

3-2-4 Environmental Impact

No new facilities such as construction of canals, or pumping stations for the improvement of the all three areas have been proposed. Only rehabilitation of existing facilities will be the main activities in this area. Therefore, no significant impact on the environment due to the implementation of the project is expected. However, for an overall environment improvement or for checking degradation the following may be mentioned.

- i) maintenance of industrial waste water quality standard more strictly
- ii) precaution to avoid scouring in the irrigation canals
- iii) better management of municipal solid waste dumping sites
- iv) coordination between the development authorities and ministry of culture for avoiding any damage to the hidden cultural heritage

3-3 Sredna Tundja Study Area

3-3-1 Socio-Economic Development Potential

The socio-economic development potential of the Sredna Tundja study area is summarized as follows;

Location: The study area is close to Burgas port which is the main port for international trade, notably for the export of agricultural products. The distance from Sliven to Burgas is about 120 km. Sliven and Yambol are connected to Burgas by railway. Shipping and railway are cost-efficient transportation methods suitable for low value and large volume goods such as agricultural grain product. Good access to shipping and railway transportation is one of the strengths of this study area.

Agriculture production: The study area is suitable for development of large scale agriculture because the study area has a history of large scale agriculture and farm land per farmer is larger than the other two study areas. Economic efficiency rates for agriculture are potentially high.

Food industrial center: The food processing industry is one of the main industries in Sliven, Jambol and Nova Zagora, as many big food processing factories are concentrated in the study area making the food processing capacity of this study area large. Limited supply of good quality agricultural products is a common complaint among food processors.

Economic development program: The Sliven municipality has already determined its economic development program and Jambol municipality has started to prepare its program. Nova Zagora municipality is defined as a food processing center in Burgas District programs. Municipal policy for development of the study area is comparatively clear. Administrative potential of the municipalities is considered higher than capacity in the other two study areas. Sliven municipality manages to keep the budgetary balance in the black.

Conclusion: From the viewpoint of location, current industry and agriculture structure, the study area has a possibility to be develop as a processing and export center of agriculture in the long term. Promotion of food processing and export is one of the key factors to accumulate a value added in Bulgaria and to attain the GDP growth in agriculture.

3-3-2 Agricultural Development Plan

(1) Marketing Potential and Development Plan of Sredna Tundja

Improvement of post harvest practices of cereal is proposed under the condition that new types of farmers organizations emerge after the liquidation of former cooperatives. Facilitating on-farm storehouses is one of the procedures to improve private producers'

post harvest practices. In addition, taking into account of on-going EBRD/GTZ' wholesale market project at Sliven, facilitating collecting points for vegetables and fruit in the region is likely to contribute to diversify farm management in the long run. Furthermore, sunflower production has great market potential in export markets considering the advantage of study area's location which is on the way to Turkey. Production of fodder crops needs to be encouraged in order to reactivate livestock sector, provided that livestock market in Sliven located next to the future vegetable and fruit wholesale market was established and a private milk processing company in Nova Zagora is procuring milk from Sredna Tundja through a network of 274 collecting points. Wine grapes production is also encouraged based on the fact that wine is one of the important export items of Bulgaria.

(2) Proposed Farm Land Use

The topography in Sredna Tundja is large areas of plain, with deep fertile soils, ideal for large scale mechanized grain production. The land in Sredna Tundja has not been neglected to the same extent as Rositza, plus the climate is slightly drier so weeds are not as big a problem. The settlement pattern on the lowlands, particularly in the eastern portion of the scheme is large villages, separated by large expanses of large fields. On the gentle slopes of the adjacent hills, vines are typically grown. The irrigation is all by gravity. In this study area, private farmers and partnerships are renting land to obtain an economic sized parcel, for the mechanized production of crops. Furthermore, some of the cooperatives have retained their capital equipment and are operating successfully. The main issue here in Sredna Tundja is what amount of land can and should be irrigated with the limited amount of water that is available. If the entire area is irrigated, then the requirement to spread the water use and rotations results in a lesser area of the more productive crops. If only a reduced area is irrigated, and the remainder of the land used for dryland crops, then it is possible that the total returns will be maximized. In the cropping patterns presented below, both scenarios are considered. The main difference between the two patterns is that under the reduced area scenario the water is diverted towards main season vegetable production.

(3) Proposed Cropping Pattern

The cropping patterns are presented in Table D-2 (3) and (4), Appendix D. The first assumes that the entire area is considered for irrigation, a total of 94,932 ha. The second only considers a reduced area for irrigation, 62,973 ha. This reduced area excludes the non-facilitated land in the Mlekaevo Padarevo Block (20,000 ha) and also in the Kermen Roza Block (11,959 ha).

(4) Target Yield and Production

a) Cereals

With full project development, it is assumed that none of the available irrigation water will be used to irrigate the area under wheat and barley. This means that yield increases with the project will be modest and due only to the improved inputs and husbandry, rather than irrigation. Possible increases are in the order of 300 kg/ha wheat and 150 kg/ha barley. In the reduced area model 5% and 2.4% of the total area respectively of the wheat and the barley can be irrigated. As currently none of the winter cereals are assumed to be irrigated, this should result in yield increases of 650 kg/ha for the wheat and 350 kg/ha for the barley. In the full area model, with 35% of the area under wheat and 15% under barley, production is potentially 113,000 ton of wheat and 45,000 ton of barley. In the reduced area model, with 30% of the area under wheat and 12% under barley, and with 5% of the area (wheat) irrigated and 2.4% of the area (barley) irrigated this can potentially give production levels from the 19,000 ha of about 65,000 ton of wheat (12,000 ton from the irrigated area) and 24,000 ton of barley, (5,000 ton from the irrigated area). Add to this the production available from the unirrigated wheat and barley on the 22,000 ha of unirrigated crops on the non-facilitated area and this is a significant increase over the non project condition. The large area under wheat and barley (50-42%) is because of the ideal topography and soils for winter grain production, and comparatively large land holdings in the area, combined with the availability of winter rains to supplement the irrigation. Sredna Tundja has the potential to be a major cereal producer once again, assuming that the problems of organizing, training and supplying the equipment for mechanized farming units can be resolved. With 50% of the cropped area under winter cereals, this will allow tillage practices that can control weeds and allow rotations with summer crops. For the summer crop of maize, for the purposes of the calculations, it has been assumed in both cases, (full area and reduced area scenarios) that all of the existing grain maize is being irrigated, and 50% of the forage maize. Once again this is being conservative, it is likely that the existing maize area is not fully irrigated. Because of the projected demand for grain and fodder from the expanding large and medium scale livestock enterprises in the area, the area under grain maize has been expanded from 5% to 7.5% in both the reduced and the full scenarios. Because of the comparatively high water requirement of maize (300 cu.m./dca) the area with project of fodder maize has been reduced slightly in the full area scenario, from 1.5% to 1%. In the reduced area scenario, because of the greater availability of water per unit area, and because of the projected need for animal feed, the area under fodder maize has been increased, doubling from 1.5% to 3%. For irrigated grain maize, yields are likely to increase by

up to 4,000 kg/ha, which will give a production of grain maize of 30,000 tons in the full area scenario and 20,000 tons in the reduced area scenario.

b) Fodder Crops

In the reduced area scenario, the fodder maize area doubles to 3%, and is included, along with alfalfa and pasture to ensure adequate fodder resources for the animal population in the area, which if it is to increase will need more fodder. Yields under irrigation of 11 ton/ha are certainly possible. The alfalfa area which is currently assumed to be at 4% of the total area, but the majority un-irrigated (3%) is reduced to 2%, but all irrigated. With flood irrigation, yield increases of 750 kg/ha over non-irrigated alfalfa are easily achievable, to give a total project production of 47,000 ton. Currently, little or none of the local pasture is being irrigated, with an increase in area from 1% to 3% of the project area under irrigation, and yield increases of 500 kg/ha over unirrigated, this could potentially give 4,300 (full area) or 2,800 ton (reduced area) of fodder material for the local animals, as well as allowing a break in the cultivation of cereals and other crops, as well as using the marginal areas and controlling weeds.

c) Fruits and Vegetables

Grape production in the Sredna Tundja area is starting to be rehabilitated, and well irrigated, pruned and tended orchards are visible in the area. The peach orchards, due to the cost of imported inputs and the domestic price of peaches are somewhat more neglected, undermanaged and under irrigated. Frequently, they are being intercropped. The area under fruit has to be rationalized, currently it is assumed that 6.5% of the area is under grapes, most 1.9% un-irrigated, and 6.5% under fruit, 4.9% non-irrigated. With the project, the total area of grapes will increase to 7% or even 9%, (if water is available under the reduced area scenario), to take advantage of the comparative profitability of grape production, the existing local facilities for wine production, and the possibilities for one person to manage an economic unit of wine grapes. On the other hand, under the full area scenario, the fruit area is projected to decline slightly to 5.5%, because of the input costs, the size of the economic unit required and the current domestic oversupply, but at full development the total area under both scenarios will be well managed and irrigated. Yields of 6.5 ton/ha of grapes and 6.25 ton/ha of fruits are certainly possible with good husbandry, giving a potential production of 43,000 ton of grapes and 34,000 ton of fruit under the full area scenario, falling to 37,000 ton of grapes and 27,000 ton of fruit under the reduced area scenario. Quality wine grape and fruit production can be expanded, allowing Sredna Tundja Study Area to specialize, once again, in grape and fruit production. Tomatoes for processing have traditionally been produced in this area, but the processing industry is suffering from cash flow

problems, declining markets and obsolete equipment. There are fresh market possibilities, with the Black sea resorts close by. Under the full area scenario, the area under vegetables is kept constant, at 4.5% of the area, with the increased availability of water under the reduced area scenario, this area is expanded to 8%. Assuming the problems of organizing the input supply, and linking producers to markets and the processing industry to sell the output can be resolved, then potentially 72-73,000 ton of these higher value products can be grown. With improved seeds and technology, plus water, the existing vegetable yields can probably be doubled.

d) Other Crops

A variety of other crops, cotton, potato, peas, beans, etc. are projected for Sredna Tundja, and experience may show that the area of 2.5 -4% can be expanded as experience is gained with these crops and the markets develop.

(5) Farm Management Plan

a) Farm Management

On the basis of the cropping pattern, land use, and past cropping performance, the farm management plan is formulated as follows:

- Cropping pattern: No major alteration of the current cropping pattern would be applied due to climatic and other conditions. Accordingly, cropping pattern is 1 crop per year with a maximum cropping intensity of 100 percent.
- Land use: Vegetable (tomato) area, orchard (peaches) and vineyards are expanded.
- Management: Production cooperatives and private farmers. Cooperatives operate mechanized farming. Private farmer use hired labor and mechanization for land preparation, harvesting and weeding works.

b) Farm Labor Demand

Farm households in the area are assumed 27,600 with a total farm population of 110,450 (EAP: 52,700). Farm family labor force is estimated at 1,317,500 man-day per month.

Monthly labor requirements calculated on the basis of cropping pattern and cropping intensity under the proposed farm management are as follows:

(see Table F-I-2-2(4), Appendix F)

<u>Month</u>	<u>Labor Requirement</u>
February	21,826
March	496,369
April	797,340
May	462,305
June	356,908
July	441,366
August	353,134
September	820,116
October	216,437
November	23,709
Total	3,989,511

On the basis of the above, peak labor demand occurs in July. Employed labor must be relied upon during this period. The requirement in the peak months of September under the proposed plan represents a 3 fold increase in employment opportunities over the current requirement of 0.8 million man-day. Such labor demand in the peak month harmonizes with the actual rural population.

c) **Balance of Farm Management**

Increased productivity as a result of irrigated cultivation and strengthened extension activities under the plan will total US\$ 31.0 million annually. The balance of farm management is calculated on the basis of production revenues and expenditure of farm management for each crop under the project "without" and "with" conditions. The net production profit for crops is 41.5 percent. The balance of farm management is summarized as follows: (see Table F-I-1-13, 14 and 15, Appendix F)

	Unit: US\$ 1,000		
	Revenues	Expenditure	Profits
With Project	48,494	19,135	29,359
Without Project	38,154	17,412	20,742
Balance	10,340	1,723	8,617

d) **Farm Household Economy**

The analysis of farm household economy was carried out on the typical farmers in the area. The result is summarized as follows: (see Table F-I-3-3(2), Appendix F)

<u>Category</u>	<u>Amount</u>
Farm Size (ha)	13.7 ha
Farm Income	Lev 1,954,520
Production Costs	Lev 546,030
Return	Lev 1,408,490
Living Expenses	Lev 477,880
Net Reserve	Lev 930,610

After implementing the project, net reserve of this farmer is considerably increased. Consequently, the living condition of farmer will be substantially improved and he can afford to manage the farm sufficiently.

e) **Income and Expenditure of Production Cooperatives**

On the basis of the proposed agricultural development plan, estimation of the balance of farm management was made. The result is summarized as follows:
(see Table F-1-4-2(2), Appendix F)

Unit: Lev 1,000		
<u>Revenues</u>	<u>Expenditure</u>	<u>Net Reserve</u>
83,281	50,794	32,487

From the above, farm management of the cooperatives is improved remarkably as well as the cooperatives in the Rositza study area. As a result, the cooperatives will be more active in their farming through better maintenance and improvement of farming facilities and machinery and equipment. Furthermore, strengthening of farming environment by the improvement of their farming techniques will be expected.

(6) **Farmers' Organizations and Support Services**

Completion of land titling will spur changes in farm organizations. Producer cooperatives are a means to organize small landholders and ease supply of inputs for these producers. Private farming is also promising in fruits and vineyards, and some closed cycle private operations are emerging in the study area. Operational irrigation facilities, storage and distribution points, and access to credit and investment finances are priorities, if met, will help encourage private entrepreneurship. The lost market in former COMECON countries for fruits (e.g., peaches, apricots) has depressed production and left many tracts of land abandoned. The encouragement of marketing cooperatives for distribution and sale of tree crops and grapes, after land restitution, will encourage restoration of large tracts of orchards and vineyards.

MAFI notes the Extension service in Yambol as the model for the country given its active outreach to small and medium-sized producers. Sustained funding for the motivated and trained staff will further encourage expansion of this important resource. Particular attention is placed on outreach, focused on services such as advice on fertilizer applications, crop rotations, and financial and credit issues. Efforts to support availability of seedlings for vineyards and orchards will help restore lost and dying plant resources, and promote investment in profitable agriculture.

3-3-3 Infrastructure Development Plan

(1) Water Resources Development Plan

a) Available Water

There is only one river in the Study Area, the Tundja river running from west to east, and to south, however there is one storage dam, the Jrebchevo Dam. There is no possibility to develop a new storage dam on the river.

The Jrebchevo Dam was completed at 1968, and operation and maintenance have been carried out by the ISC. Mean annual inflow to the reservoir from 1970 to 1995 is 269.117 mcm, and annual inflow of these years are tabulated in Table I-3-6, Appendix I. On other hand, one in ten years return period for drought inflow to the reservoir can be estimated as 124.03 mcm based on the probability analysis of inflow to the Jrebchevo dam of Sredna Tundja Study Area.

b) Irrigation Area

Facilitated irrigation land was classified as four (4) categories. The irrigation area for development can include Class I & II, Class III and Class IV-1 is given below. (refer to Table J-1-2, Appendix J)

Description	Area
Study Area	97,000.0 ha
Total developing Area	94,932.4 ha
Nova Zagora Block	22,400.0 ha
Mlekaevo Padarevo Block	20,000.0 ha
Binkos Marash Block	33,174.3 ha
Kernen Rosa Block	19,358.1 ha

c) Irrigation Water Requirement

The irrigation water requirement is estimated by the method of "Regionalization of the

Irrigation Regime of Agricultural Crops” based on the proposed cropping pattern and efficiency of the irrigation system—65% with of furrow irrigation, 85% with of sprinkler irrigation and 10% conveyance loss of water passing through canals. Annual water requirement of the Study Area is estimated as 114.431 mcm as given in Table J-2-3, Appendix J. Potential irrigation area is only 32,277 ha.

Annual water requirement in case of development in only Binkos Marash Block and west side of Nova Zagora Block as a alternative, is estimated as 114.494 mcm, and potential irrigation area is 34,887 ha. (refer to Table J-2-4, Appendix J)

(2) Irrigation and Drainage Facilities

Irrigation and drainage facilities for implementation and rehabilitation of this Study Area are as follows:

	<u>N.G.B.</u>	<u>M.P.B.</u>	<u>B.M.B.</u>	<u>K.R.B.</u>
Main & Secondary Canal				
Rehabilitation of canal	0 m	0 m	14,670 m	2,000 m
Placing concrete lining	0 m	0 m	22,670 m	12,000 m
Pipe Line				
Replacement	10,000 m	0 m	3,700 m	4,200 m
Pumping Station				
New Installation of Equipment	0 sta.	3 sta.	4 sta.	0 sta.
Replacement of Equipment	0 sta.	0 sta.	17 sta.	5 sta.
Compensator				
Rehabilitation of Lining	0 sq.m	0 sq.m	8,700 sq.m	4,900 m

Note : N.G.B. = Nova Zagora Block
 M.P.B. = Mlekaevo Padarevo Block
 B.M.B. = Binkos Marash Block
 K.R.B. = Kermen Rosa Block

(3) On-farm Development Facilities

Irrigation methods applied in this Study Area are divided into two methods: gravity irrigation and sprinkler irrigation. The irrigation area facilitated by sprinkler systems of each Block is given as follows:

<u>Description</u>	<u>Sprinkler Irrigation Area</u>
Nova Zagora Block	9,700 ha
Mlekaevo Padarevo Block	0 ha
Binkos Marash Block	26,400 ha
Kermen Rosa Block	5,100 ha

However, these facilitated area was constructed for large farming practices. The pipes

are laid at 300 to 400 meter intervals. Since, the present pipe system will not fit the new land ownership structure, additional pipe systems fitting for 20 - 40 dca are required.

On-farm road with 6.0 m in width will be considered as 2 % of agricultural land.

(4) Investment Cost

Investment costs for irrigation facilities are estimated based on the unit cost at August, 1996, equal to 180.14 Lev/US\$. The total estimated investment cost of each Block is summarized as tabulated below and detail estimation are given in K-5, Appendix K.

<u>Description</u>	<u>Study Area</u>	<u>Total cost</u>	<u>Cost/ha</u>
Nova Zagora Block	22,400.0 ha	\$ 21,291,000	950 \$/ha
Mlekaevo Padarevo Block	20,000.0 ha	\$ 44,263,000	2,213 \$/ha
Binkos Marash Block	33,174.3 ha	\$ 16,950,000	511 \$/ha
Kermen Rosa Block	19,358.1 ha	\$ 14,409,000	744 \$/ha
Nova Zagora Block (M-3)	13,200.0 ha	\$ 5,200,000	394 \$/ha

3-3-4 Environmental Impact

According to the development plan proposed for the four project areas in this area, two are involved with new construction of canals and other distribution facilities. Among them Nova Zagora involves 18 km of canal (M2) construction and Mlekaevo involves 20.7 km of canal (M4&M5) construction. Major concern for this area is the presence of valuable cultural heritage that are hidden in the region. If canal alignment is done without prior consultation with the ministry of culture or museum authorities, construction of canals may destroy the hidden heritage as happened before. The other minor impacts that may be envisioned are:

- i) disturbance to the wild life during the construction period
- ii) social conflict in the process of acquisition of land for 'right of way'
- iii) water scarcity for downstream maintenance

and for the overall management of environment in the area measures should be taken in the following items:

- i) control of gully erosion
- ii) improvement of drainage system

- iii) stricter implementation of the pollution act for maintaining industrial/municipal waste water quality standards**
- iv) control on upland crop residue burning and improvement of solid waste management**
- v) control on discharge of sewage water from private pig farms and proper management of solid waste at all levels**

CHAPTER 4. SELECTION OF THE PILOT PROJECT AREA

Selection of the pilot project area has next three steps.

1. First Selection

Comparison of 3 Study Areas and Selection of 2 Study Area

2. Second Selection

Comparison of irrigation blocks and Selection of 3 irrigation blocks

3. Third Selection

Economic Evaluation of the Potential Blocks

4-1 Selection of the Study Areas : First Selection

4-1-1 Characteristics of the Study Areas

- (1) Petrich Study Area

The Study Area extends along the narrow Struma river valley and the adjacent hill slopes. The temperature is a slightly higher than the other two study areas, which makes it possible to produce vegetables and fruits about 10 to 15 days earlier than the other areas.

Most of the irrigation water is pumped directly from the rivers, so the operation and maintenance costs are high. In recent years, due to the upstream water use on both rivers, particularly the Strumenitza has reduced the river flows. Water availability for the irrigation is not promising because there are only small reservoirs which have not enough storage capacity to supply the whole area. Also the on-farm facilities are very limited.

Land restitution has progressed to the point that 61% of the land area has temporary use rights, while only 2% has notary deeds and the rest of the area is still under resignation procedures. The topography combined with the population pressure means that land ownership per farm household is comparatively small, about 2.0 ha. There are two existing tobacco cooperatives, and farmers have expressed a willingness to organize cooperatives for wheat and wine grapes in the future, but much of the vineyard area especially around Mitinovo has been badly neglected.

The major crops are vegetables, tobacco, wine and fruits. The general characteristics

of the agriculture in the area are small farms and highly intensive land use mainly using hand labor. These small individual producers of vegetables and fruits will be rather difficult to organize for the production of the consistent volume of high quality product required to compete on the export markets.

Cheap imported products from Greek and other Southern European countries are beginning to replace Petrich in its traditional domestic markets. There are two wholesale markets located along the main road without shade, or other facilities. Cold and shock freezing storage facilities, a local custom offices, a canning factory and a dairy factory are located in the municipality. The EBRD/GTZ wholesale market rehabilitation project includes Danyanitzia in Sandanski Municipality. The EBRD is giving high priority to the Danyanitzia Wholesale Market, which is expected to start functioning in 1997.

(2) Rositza Study Area

The topography of this Study Area is gently rolling, with areas of flat or gently sloping plain along the river valleys, with areas of steeper sloping upland dividing the area. The temperature in the winter is slightly lower than Sredna Tundja and thus the first frosts come earlier. The area has fertile alluvial and black earth soils, combined with less fertile gray forest soils away from the lowlands. The water supply for the Rositza irrigation system, which was constructed in the 1950's, comes from the Aleksandar Stamboliiski dam, built on the Rositza river. Originally designed to cover 50,700 ha, only 36,025 ha are currently ready to irrigate, a further 12,599 ha require some kind of rehabilitation of their facilities. Only a portion of the facilitated area can be served by gravity irrigation, and two of the three Blocks, Main Lower Right Canal Block and the North Main Canal Block have pumping stations installed to boost the water to irrigate the upland areas. Many of these systems require rehabilitation.

According to the survey data, land restitution in the area is comparatively advanced, with 55.0% of the 150 farmers surveyed having temporary use permits, and 24.8% with notary deeds. The land ownership per farm is comparatively small, giving the predominance of grain and fodder farming in the area. The average size is 1.9 ha and the farms in the area are mainly operated by some sort of cooperative. There are 45 cooperatives operating in the Study Area and they are strongly supported by the local municipal authorities. Eighty percent of the farmers in this area belong to a production cooperative.

The main crops are wheat, barley, sunflower, with some maize and alfalfa, vineyards for wine are found in the western area, and small amounts of other vegetable and technical crops, such as soy (around Pavlikeni) and sugar beet. The cropland in the area was possibly in the worse condition of the three Study Areas, with respect to weeds. Extensive areas are infested with perennial weeds. The settlement pattern, which consists of numerous small well established villages has encouraged the development of small subsistence plots around the villages, with mechanized farming between the settlements, usually with machinery operated by the cooperative. Only 10% of the farms in this area own tractors. The potential for increases in production are limited somewhat by the general state of the land and the irrigation system, and the comparatively older age of the farmers in this Study Area.

The main markets for grain in the Area are the State milling company in Veliko Tarnovo, private millers in Pavlikeni, and the stock market for grain in Dobrich, which also handles sunflower. The other main market for sunflower is the State processing facility at Polski Trambesh. The export market for the grain from the Study Area is Varna, which has port facilities for handling grain.

The EBRD/GTZ wholesale market rehabilitation project had plans to rehabilitate the Pleven wholesale fruit and vegetable market, but this is currently of low priority as the municipality has shown little interest in pursuing the project. The main food processing centers in the Study area are Polski Trambesh, which has vegetable processing and oil extraction plants, and Pavlikeni, which have a range of processing industries including wine, and flour milling. The sugar beet processing factory is in Gorna Oryahovitza.

The Study Area was divided into three Blocks.

The Main Lower Right Canal Block, which has an area of 12,020 ha, a mixture of flat, alluvial soils in the bottom land, and a larger area of undulating and gently sloping forest soils, of which a total of 9,850 ha are ready to irrigate. The system combines gravity supply with pumping stations. More than 65% of the water in this system requires pumping prior to its delivery to the field.

The Main Left Nikyupsky Canal Block is less undulating than the Main Lower Right Canal Block. The canals that irrigate this area are all supplied by gravity. The facilitated area is 9,151 ha, of which 7,596 ha are ready to irrigate. The soils in this area are alluvial along the river or black earth in the eastern part.

The North Main Canal Block, a mixture of mainly undulating land, north of Pavlikeni. It has 18,579 ha ready to irrigate, and a further 9,164 ha that needs rehabilitation. The area is primarily supplied using a series of pumping stations, although many of them have not operated for some time. The agriculture in this area is mainly sunflower and dry-land grain.

(3) Sredna Tundja Study Area

The topography of this Study Area is extensive areas of flat or gently sloping plain, with intermingled areas of higher land. The temperature in the winter is slightly higher than Rositza Study Area and thus the growing season is slightly longer. The extensive plain of fertile soils, combined with the climate provide ideal conditions for irrigated crop production. The water supply for the irrigation system comes from the Jrebchevo dam, built on the Tundja river. Originally designed to cover 97,000 ha, only 49,157 ha have had their facilities completed, so water is currently not limiting. The entire facilitated area can be served by gravity irrigation, although one of the four Blocks, Binkos Marash has pumping stations installed to boost the pressure in the system to allow the use of pressurized delivery systems.

Land restitution in the area is comparatively lagging. According to the survey data of 150 farmers, 84% of them had temporary use rights of land but only 2% received notary deeds. The farm management size is comparatively large, with an average size of 137 decares (13.7 ha) and there is also a rental market operating with 17% of the farmers renting an average area of 196 decares (19.6 ha) each. Out of the 80 cooperatives in the Study Area, 13 have legally finalized their land restoration process on a total of 249,189 decares (24,919 ha) of land.

The main crops are wheat, barley, maize, peach orchards, vineyards for wine and dessert grapes, and a variety of other vegetable and technical crops. The region has perhaps the most diversified cropping pattern of the three Study Areas, growing most of the main crops of Bulgaria. The topography and the settlement pattern have encouraged the development of mechanized farming, and 60% of the farmers in this area own tractors. The potential for increases in production are large.

The main market for the grain from the Study Area is Burgas, which has two terminals at the port for handling grain. The EBRD/GTZ wholesale market rehabilitation project plans to rehabilitate the Sliven wholesale fruit and vegetable market, serving the surrounding area up to 45-50 km. The municipality will hold 51% of the market management company, and they have already allocated 23.1 ha of land. They expect

to issue the tender for this project in September 1996. Concurrently with this project, a nursery for producing new peach variety seedlings is going forward. The main food processing centers in the Study Area are Nova Zagora and Yambol, which have a range of processing industries including dairy, wine, flour milling, feed, and meat processing. The sunflower oil processing factory is in Burgas.

The Study Area was divided into four Blocks.

The Nova Zagora Block, has an area of 22,400 ha, mainly flat, black earth soils, of which 12,940 ha are ready to irrigate. There is a further 9,179 ha which could be irrigated if the M-2 Main canal was completed. Part of this area is currently irrigated by a temporary canal which takes water from the outlet of the Kovachite tunnel. The major food processing center of Nova Zagora is in this Block.

The Mlekaevo Padarevo Block is more undulating than the Nova Zagora Block. The M-4 and M-5 canals that were planned to irrigate this area have not been constructed, so the facilitated area is zero.

The Binkos Marash Block is the flat land along the base of the Balkan range to the east of Sliven. It has 26,352 ha ready to irrigate, a further 2,318 ha that needs rehabilitation, and 4,504 ha that is potentially irrigable. The area can be irrigated using gravity, though the installed pumping stations would need to be operated if pressurized irrigation is used. The most eastern portion of this area has drainage problems.

The Kermen-Roza Block is similar to Mlekaevo Padarevo, mainly flat land with occasional upland areas in the south. Out of 19,600 ha it currently only has 6,777 ha ready to irrigate due to the non-completion of the M-1-3 main canal. The agriculture in this area is mainly sunflower and dryland grain.

4-1-2 Selection of the Study Areas

Based on the Criteria of Selection in 2-3, the potentiality of the Study Areas was evaluated.

First Selection

P: petrich, R: Bositzka, SR: Sredna Tunja

	Sub scores	Weights (C)	Sub scores			Weighted scores		
			P	R	ST	P	R	ST
NATURAL AND PHYSICAL CONDITIONS								
<i>1. Natural Conditions</i>								
		5						
1 Topographical conditions: Slope, extent	50		15	50	50	0.75	2.50	2.50
2 Soil conditions: Fertility	50		50	35	35	2.50	1.75	1.75
	100		Subtotal			3.25	4.25	4.25
<i>2. Irrigation Conditions</i>								
		35						
3 Availability of the water resources	10		5	10	5	1.75	3.50	1.75
4 Possible irrigation acreage under the existing irrigation facilities without rehabilitation	10		5	5	10	1.75	1.75	3.50
5 Possible irrigation acreage with the rehabilitation of the existing facilities	10		5	5	5	1.75	1.75	1.75
6 Drainage problem area	10		5	10	5	1.75	3.50	1.75
7 Area without irrigation facilities	10		5	5	5	1.75	1.75	1.75
8 Irrigation area and percentage of facilitated area by gravitational irrigation	10		5	5	10	1.75	1.75	3.50
9 Irrigation area and percentage of facilitated area by pump irrigation	10		5	5	10	1.75	1.75	3.50
10 Problems of the main irrigation facilities and their rehabilitation cost	10		5	5	5	1.75	1.75	1.75
11 Providing facilities for water management system such as check gate, regulating reservoir	10		5	5	10	1.75	1.75	3.50
12 Condition of on-farm irrigation facilities	10		5	5	10	1.75	1.75	3.50
	100		Subtotal			17.50	21.00	28.25
SOCIAL CONDITIONS								
<i>3. Socioeconomy</i>								
		10						
13 Percentage of unemployment in the area	15		10	15	15	1.00	1.50	1.50
14 Alternative employment opportunities outside of agriculture	15		10	10	10	1.00	1.00	1.00
15 Local government ability for implementing project	15		10	10	10	1.00	1.00	1.00
16 Land restitution conditions	20		10	10	20	1.00	1.00	2.00
17 Number and varieties of the food processing factories	15		5	10	15	0.50	1.00	1.50
18 Willingness to agriculture	20		15	10	20	1.50	1.00	2.00
	100		Subtotal			6.00	6.50	9.00
ECONOMIC CONDITIONS								
<i>4. Economy</i>								
		10						
19 Share of agriculture in the regional economy	25		13	25	25	1.20	2.50	2.50
20 Share of agricultural workers	25		18	18	18	1.80	1.80	1.80
21 Average annual salary (Rev) in 1994	25		18	18	18	1.80	1.80	1.80
22 Economic development program of municipality	25		10	25	25	1.00	2.50	2.50
	100		Subtotal			5.90	8.60	8.60
AGRICULTURAL CONDITIONS								
<i>5. Marketing</i>								
		35						
23 Major agro-processing industries in the region	5		3	3	5	1.05	1.05	1.75
24 Accessibility from/to domestic transportation condition	5		3	3	5	1.05	1.05	1.75
25 Accessibility from/to international transportation condition	5		5	5	5	1.75	1.75	1.75
26 Existence or planning of wholesale market or consumer market near the area	7		7	4	7	2.45	1.40	2.45
27 Existence or planning of market information system	5		0	0	0	0.00	0.00	0.00
28 Foreign assistance agriculture related projects	5		3	5	5	1.05	1.75	1.75
			Subtotal			7.35	7.00	9.45
<i>6. Agriculture</i>								
29 Major crop production yield and unit production amount	5		1	3	3	0.35	1.05	1.05
30 Farm inputs supply	6		6	3	6	2.10	1.05	2.10
31 Possession of farm machinery	5		1	3	5	0.35	1.05	1.75
32 Percentage of rented machinery	5		3	1	5	1.05	0.35	1.75
33 Existence of extension and supporting services	7		2	2	2	0.70	0.70	0.70
			Subtotal			4.55	4.20	7.35
<i>7. Farm management and economics</i>								
34 Major crop producing farm size	7		2	7	7	0.70	2.45	2.45
35 Farmers expenditure for food	5		5	5	3	1.75	1.75	1.05
			Subtotal			2.45	4.20	3.50
<i>8. Cooperative and MCA</i>								
36 Number of cooperatives and their acreage of farm land	7		2	7	7	0.70	2.45	2.45
37 Existence of private producer's organization	7		0	4	7	0.00	1.40	2.45
38 Existence or planning of water user's association	7		0	4	4	0.00	1.40	1.40
39 Organizational structure of cooperative	7		2	2	2	0.70	0.70	0.70
			Subtotal			1.40	5.95	7.00
ENVIRONMENTAL CONDITIONS								
<i>9. Environmental Impact</i>								
		5						
40 Impact of the Project implementation to the environment	100		100	100	100	5.00	5.00	5.00
	100		Subtotal			5.00	5.00	5.00
	100		TOTAL			53.40	66.70	80.40

The Pilot Potentiality of the Study Areas

		(pts)		
SELECTION CRITERIA		Petrich	Rositza	Sredna Tundja
1	Natural conditions	3.25	4.25	4.25
2	Irrigation conditions	17.50	21.00	26.25
3	Social conditions	6.00	6.50	9.00
4	Economic conditions	5.90	8.60	8.60
5	Marketing	7.35	7.00	9.45
6	Agriculture	4.55	4.20	7.35
7	Farm management and economics	2.45	4.20	3.50
8	Cooperative and WUA	1.40	5.95	7.00
9	Environmental conditions	5.00	5.00	5.00
TOTAL SCORE (Full 100)		53.40	66.70	80.40

The potentiality was measured by 9 sections with 40 "Selection criteria". As a result, Sredna Tundja Study Area had the highest points 80.40 and Rositza Study Area with 66.70 points was second. The main reasons why the points of Petrich Study Area are low is that the farmers of the Petrich Study Area are mainly engaging in small-scale farming; the number of organization is less than other Study Areas, and the other Study Areas have better irrigation conditions, so the pilot potentiality of Petrich Study Area is low. Thus, Rositza and Sredna Tundja Study Areas were selected for further analysis.

4-2 Selection of Potential Blocks : Second Selection

This step selects several irrigation blocks which are suitable for a pilot project area by evaluating the irrigation related factors through the use of "Selection Criteria" of irrigation.

The result of this selection is summarized in the table below.

Irrigation Block	Rositza			Sredna Tundja			
	North Main	Main Left Nikyupski	Main Lower Right	Nova Zagora	Mlekaevo Paderevo	Binkos Marash	Kermen Roza
Points	49	67	60	69	51	67	57
Rank	7	2	4	1	6	2	5

The result shows that Nova Zagora Block has highest points of 69 and Left Nikyupski Canal Block and Binkos Marash Canal Block has second highest points of 67. Thus,

Nova Zagora Block, Main Left Nikyupski Canal Block and Binkos Marash Canal Block are considered to be candidates for a pilot project area. However, in Nova Zagora Block, as the construction of M2 main canal locating at east part of the Block isn't completed yet, in next selection, economic viability will be evaluated for two pattern, that is, whole Block Area and M3 canal related Area locating at west side of the Block.

4-3 Economic Evaluation of the Potential Blocks : Third Selection

This last selection will evaluate the economic viability of blocks by adopting the benefit-cost ratio method on 4 irrigation blocks: Nova Zagora Block, Binkos Marash Canal Block, Nova Zagora M3 Block of Sredna Tundja Study Area and Main Left Nikyupski Canal Block of Rositza Study Area.

4-3-1 Basic Sets and Methods of Analysis

Several development plans such as Marketing Association Establishment, Supporting Service Strengthening, Storage Facilities Building besides irrigation rehabilitation will give high economic impact on each irrigation block. However, those plans will bring benefit not only on one irrigation block but also on whole Study Area and neighboring areas. Thus, in selecting one potential irrigation block by comparing with the degree of the incremental economic benefit, this section will evaluate the benefit only from irrigation rehabilitation project.

(1) "Current" Condition of Agriculture

In macro view, the production in Bulgarian agriculture decreased less than 50 % since the era of central planned system and is now getting to recover little by little. In livestock sector, it still continues to shrink because of lack of proper management and high price of fodder. Land restitution process which is key issue of telling the future of Bulgarian agriculture is proceeding very slowly and few farmers have received notary deeds which make it possible to have eligibility for borrowing credit for their own land. Also former collective farms and agri-processing factories were privatized and liquidated for paying back their debt for last five years since the collapse of Socialist economy. But still many state-owned agri-process factories have huge debts and are in low operation due to decrease of input supply and uncertainty of demand. Furthermore, sudden change of political and economic environment from socialist system to market-oriented system are exposing unsuitable institutional structure and weak administrative capabilities of local and central agriculture-related governments.

Second Selection

	Full Score	Rositzza				Sredna Tunja				
		North Main Canal Block	Main Left Nikyups Canal Block	Main Lower Right Canal Block	Nova Zagora Block	Mikaevno Padereno Block	Binkos Marash Block	Kermen Roza Block		
2. Irrigation Conditions		10	10	10	5	5	5	5	5	
3. Availability of the water resources.		10	5	5	10	5	10	5	5	
4. Possible irrigation acreage under the existing irrigation facilities without rehabilitation.		10	5	5	5	5	5	5	5	
5. Possible irrigation acreage with the rehabilitation of the existing facilities.		5	5	5	2	2	2	2	2	
6. Drainage problem area.		10	5	5	5	2	2	2	2	
7. Area without irrigation facilities.		15	15	10	15	10	10	10	10	
8. Irrigation area and percentage of facilitated area by gravitational irrigation.		10	2	5	10	5	5	5	5	
9. Irrigation area and percentage of facilitated area by pump irrigation.		10	2	2	5	5	2	5	5	
10. Problems of the main irrigation facilities and their rehabilitation cost.		10	5	5	5	5	5	5	5	
11. Providing Facilities for Water management system such as check gate, regulating reservoir.		10	5	5	5	10	10	10	10	
12. Condition of on-farm irrigation facilities.		100	49	67	60	69	51	67	57	
Total		7	2	4	1	6	2	6	2	
RANK										

Those leaders' lack of ability to handle agriculture makes the future of Bulgarian agriculture uncertain.

Current conditions at field level, that is, at project level were clarified through rural socioeconomic survey and direct interviews with farmers and cooperative members. Those are summarized as follows.

- Low use of irrigation due to old system
- Low productivity with low use of agricultural inputs and inadequate supporting service
- Inadequate and old marketing facilities, lack of marketing association, and marketing route
- Inadequate agricultural machinery which aren't suitable for small scale farming and low use of machinery due to high fuel price
- Lack of farm labor and aging farmer labor
- Lack of agricultural credit

Those current conditions are depressing agriculture in the Study Areas.

(2) "Without Project" and "With Project" Situations of Agriculture

In the future, at macro level, Bulgarian agriculture will have to earn foreign currency through agricultural products exports and sustain its self-sufficiency in food and contribute to the national economy through such activities. Also at project level, before-mentioned current problems need to be solved to develop agriculture.

The irrigation rehabilitation project to be proposed will help improve the current situation if it were implemented. The irrigation rehabilitation and water users associations will be one of the core factors to develop agriculture. Because private farmer-centered agriculture give more incentives to themselves and encourage them to engage in agriculture.

At that time, in "without project" situation, the team assumed that "without project" situation is same with "current" situation. In "with project" situation, future yield and land use were set as the reflection of the result by rehabilitating current irrigation system and functioning water user association in a more efficient manner.

(3) The Basic Sets of Economic Evaluation

- The benefits expected by the implementation of the project are composed by direct and indirect benefits. However, the evaluation focuses on the tangibly direct

- benefit "crop production" from irrigation rehabilitation project.
- The cost of the project will generate for 5 years and the cost of operation and maintenance generates from second project year according to the recovered irrigation parts.
 - The "without project" situation is assumed to be same with the "current" one.
 - All prices of inputs and outputs are expressed by hard currency US\$ because of the unstable and fluctuating exchange rate of domestic currency.
 - Estimation of project benefit will generate for project period 30 years.
 - For crops which could be exported and substituted for imports, the latter reflects more accurate value of additional agricultural output because the value of domestic currency Lev is highly distorted and doesn't reflect the real exchange rate. Therefore international prices by "World Bank commodity market review" and "the Public Ledger" were used for calculating farmgate price. As for fruits and vegetables, those are consumed in domestic market, those are treated as non-tradables and the prices of non-tradable were presented by adjusting market prices provided by SAPI.
 - The cropping pattern and unit target yield are based on the Agricultural Development Plan, as presented in Part II 3-2-2, 3-3-2.
 - Up to now, any agricultural investment projects haven't used appropriate standard conversion factor (SCF). In this report, SCF was calculated by considering the import and export tax and 0.91 is used to convert financial benefit to economic benefit.
 - The discount rate, which reflects the average annual percent yield obtained by the best performing public sector investments adopted the rate of 10 % in this evaluation.
 - Farm labor wage was considered to reflect correctly their economic value.

(4) Analysis Method of Economic Evaluation

Project benefit in crop production is generated by both irrigation rehabilitation and water users association's efficient work. The project incremental benefit is computed based on the unit production yield, price, cropping pattern, unit production cost including agricultural input and labor at year of "with project" and "without project" and financial value was converted to economic value.

Project cost is assumed that financial value is equal to economic value.

Annual incremental benefit is presented by the difference between project benefit and project cost for project period and by considering discount rate of 10%, benefit cost ratio was computed on each irrigation block.

4-3-2 Project Costs

Capital costs are summarized as follows.

Study Area	Block	Investment Cost (\$ 000')	Unit Cost (\$/ha)
Rositza	Main Left Nikyupski Canal Block	11,094	1,183
Sredna Tundja	Nova Zagora Block	21,291	950
Sredna Tundja	Binkos Marash Block	16,950	511
Sredna Tundja	Nova Zagora M3 Block	5,200	442

Recurrent costs are summarized as follows.

Study Area	Block	Annual Recurrent Costs (\$)
Rositza	Main Left Nikyupski Canal Block	4,179
Sredna Tundja	Nova Zagora Block	9,408
Sredna Tundja	Binkos Marash Block	21,063
Sredna Tundja	Nova Zagora M3 Block	5,552

Above tables show the estimated capital costs and annual recurrent costs in 1996 current prices. Capitals costs are divided in supply, distribution system which are composed of Canal, Pipe, Compensator, Pumping Station, Delivery System, On-farm equipment installation and Expense for institutional development of WUA with a miscellaneous works of 10 % and engineering fee at 10 % of sub total cost. Recurrent costs include repairs and maintenance, labor, machinery, management costs.

4-3-3 Project Benefits

Farmlanduse (ha)

	Rositza			Sredna Tundja		
	without	with	Incremental	without	with	Incremental
Wheat	12,587	15,104	2,517	31,517	31,280	-237
Barley	5,538	6,042	503	17,088	16,138	-950
Maize	6,042	3,776	-2,266	9,493	12,341	2,848
Sunflower	8,307	7,552	-755	14,240	12,341	-1,899
Sugarbeet	503	1,259	755	120	949	829
Tabacco	0	0	0	0	0	0
Vegetables	2,266	2,266	0	4,769	3,797	-972
Fruit	2,266	2,266	0	3,892	1,899	-1,993
Grapes	1,259	3,524	2,266	4,746	2,848	-1,898
Alfalfa	6,797	4,028	-2,769	2,754	2,848	94
Other crops	1,259	2,014	755	1,519	4,747	3,228
Unplanted	3,524	2,517	-1,007	4,794	5,744	950

Annual Crop Benefits (US\$ / ha)

	Rositza			Sredna Tundja		
	Without	With	Incremental	Without	With	Incremental
Wheat	300	350	50	321	343	23
Barley	339	338	Δ 1	360	358	Δ 2
Maize	194	349	155	376	350	Δ 26
Sunflower	245	321	76	190	298	108
Sugar beet	377	429	52	177	203	26
Tobacco	2,059	2,780	721	2,061	2,782	721
Vegetables	1,052	1,985	933	1,255	2,430	1,175
Fruits	144	356	211	246	499	253
Grapes	585	1,171	586	520	1,031	511
Alfalfa	331	454	123	385	524	139
Other crops	199	262	63	815	1,059	244

In "without project" situation in Sredna Tundja, agriculture will be grain-oriented. Wheat and barley contribute 50% of total benefits. After implemented the project, grains are also important crops and other crops, for example, vegetables and grapes which expands the cultivating area and improves the yield, contribute to benefits in the "with project" situation.

In Rositza, "without project" situation, grain and oilseed crops will be planted on 50% of Rositza Study area and wheat, vegetables, and fodder bring benefits of 10 to 15% benefit of total benefits on project area equally. In "with project" situation, vegetables and grapes which receives irrigation bring more benefit. However, due to unchanged cropping area of vegetable and more grain intensive agriculture bring less benefit than in Sredna Tundja.

4-3-4 Economic Evaluation of the Potential Blocks

Study Area	Block	B/C ratio
Rositza	Main Left Nikyupski Canal Block	1.239
Sredna Tundja	Nova Zagora Block	0.890
Sredna Tundja	Binkos Marash Block	1.660
Sredna Tundja	Nova Zagora M3 Block	2.090

As the result of economic evaluation for 4 irrigation Blocks, Nova Zagora M3 had the highest benefit cost ratio. In Rositza Study Area, benefit only slightly exceeded the investment cost. In Sredna Tundja, Nova Zagora M3 which requires rather low rehabilitation cost was brought about the highest ratio. If economic returns of Blocks were measured and project area were selected only by the benefit cost ratio, Nova Zagora M3 will be most suitable block.

4-4 Selection of a Pilot Project Area

In considering all selection procedures through 4-1 to 4-3, finally, Nova Zagora M3 Block is decided as a Pilot Project Area for the Feasibility Study.