ZHANGHEWAN PUMPED STORAGE PLANT PROJECT

RESETTLEMENT ACTION PLAN

Zhanghewan Pumped Storage Power Project Office(ZHWPO)

May 2002

Contents

Chapter 1 Project Background

The proposed Zhanghewan Pumped Storage Project (the Project) will consist of six components. They include (1) the Zhanghewan Pumped Storage Power Plant (ZPSPP); (2) the 63-km, 500-kV transmission line to connect the power plant to the Hebei South Power Grid (HSPG); (3) decommissioning of 20 generating units at five coal-fired power plants; (4) rural electrification for 23 counties in the HSPG area; (5) an increase of the irrigation area from 1,467 ha to 8,167 ha in Jingxing County (JC); and (6) planting of 16,330 ha of trees in JC.

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1.1 Zhanghewan Pumped Storage Power Plant

1.1.1 Brief Description of the Plant

The Zhanghewan Pumped-Storage Power Plant (ZPSPP) is located on the main stream of the Gantao River in southwestern Hebei Province (see Figures 1-1 to 1-2). The site is near the Zhanghewan Village, approximately 54 km southwest of Shijiazhuang City, the Capital of Hebei Province. It is between Ceyu and Nanhaoting Towns in Jingxing County, approximately 45 km west of the seat of Jingxing County. It is located at the south of the Shijiazhuang-Taiyuan railway linking Shijiazhuang with Taiyuan (the Capital City of Shanxi Province), and can be easily accessed from Shijiazhuang by the recently completed Shijiazhuang-Taiyuan Expressway.

1.1.1.1 Power Station and Structures

The ZPSPP will consist of two impoundments and an underground powerhouse. The Lower Reservoir will include a check dam and an open channel for guiding sediment. Other components include a headrace, an underground powerhouse, and the switch chamber of the main transformer and take-off yard. For the construction of the plant, about 4,900 laborers (about 2,230 for the Lower Reservoir and the Powerhouse and 2,670 for the Upper Reservoir) will work in the construction area at the peak labor demand period, although the number of laborers will vary during different construction period.

Dam and Reservoir: The existing dam was constructed in the late 1970's for providing a source of irrigation water for the lower Gantao River Valley. The dam is a masonry gravel dam with a height of 54 m and an elevation of 466.65 m above sea level (ASL). The reservoir covers about 1.65 km^2. The construction of the dam was suspended in 1980 due to the lack of financial resources.

As a result of the flooding in 1996 in the middle & southern parts of Hebei Province, a new investigation of flooding and a re-examination for the design of flooding and check standards[1] of flooding for the Lower Reservoir have been carried out in order to guarantee the safety of the ZPSPP. The location and scale for the discharge of the flooding were changed by taking into account of the new flooding design. The design has been increased from 480.5 m to 481.26 m, and the check standard of flooding was increased from 488.34 m to 488.98 m. There is no change in the Normal Storage Level (NSL). Since the inundation area depends on the NSL, the variation of the design will cause no impacts in the inundated area.

[1] Different Inundation Lines around the reservoir, according to flood frequency standards. For instance, for relocating villages at a 1 in 20 year design flood standard or acquiring farmland at a 1 in 5 year design flood standard. The power station is designed to withstand a 1 in 100 year flood.

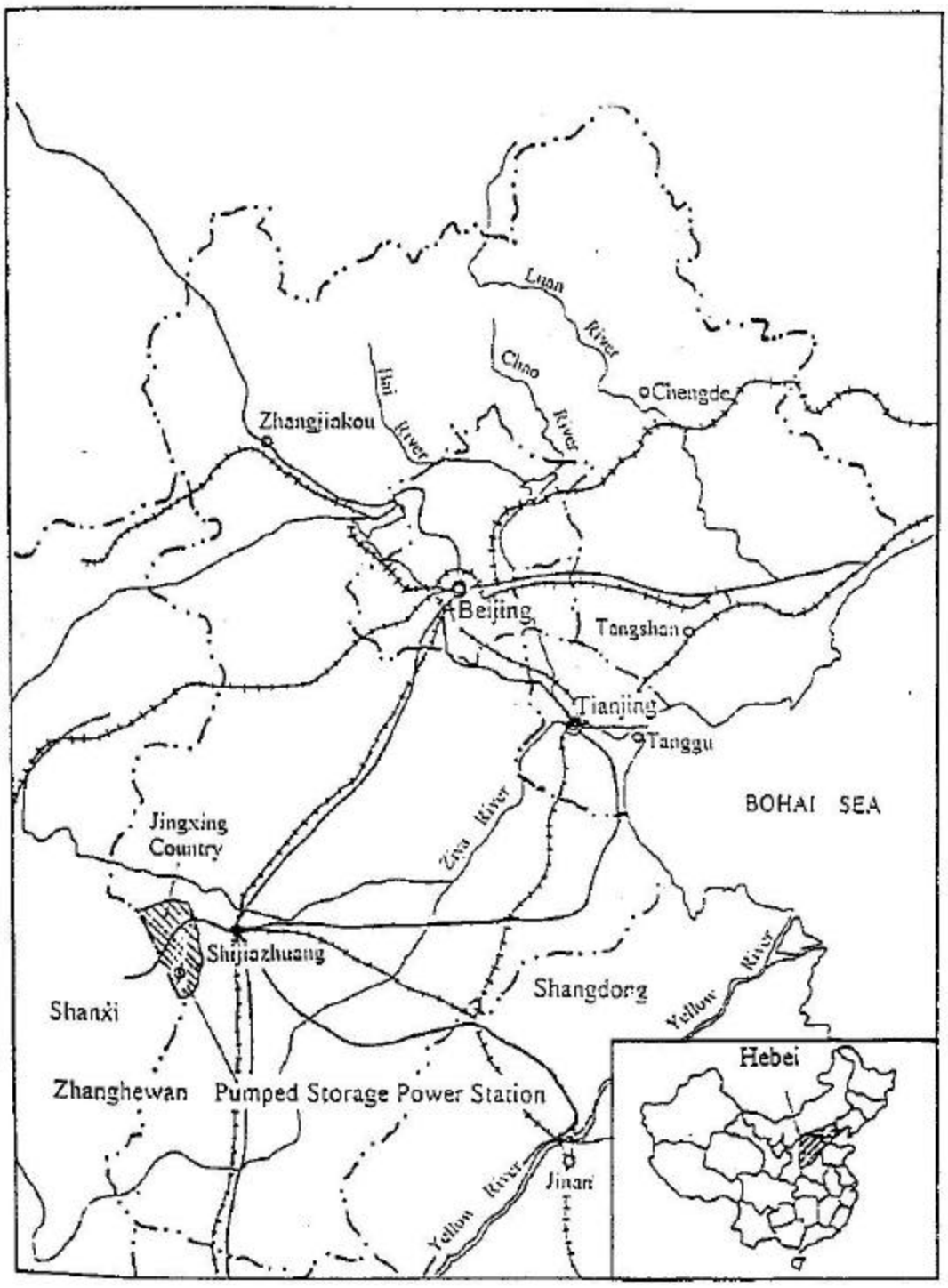

Figure1-1: ZPSPP, Jingxing County, Hebei Province

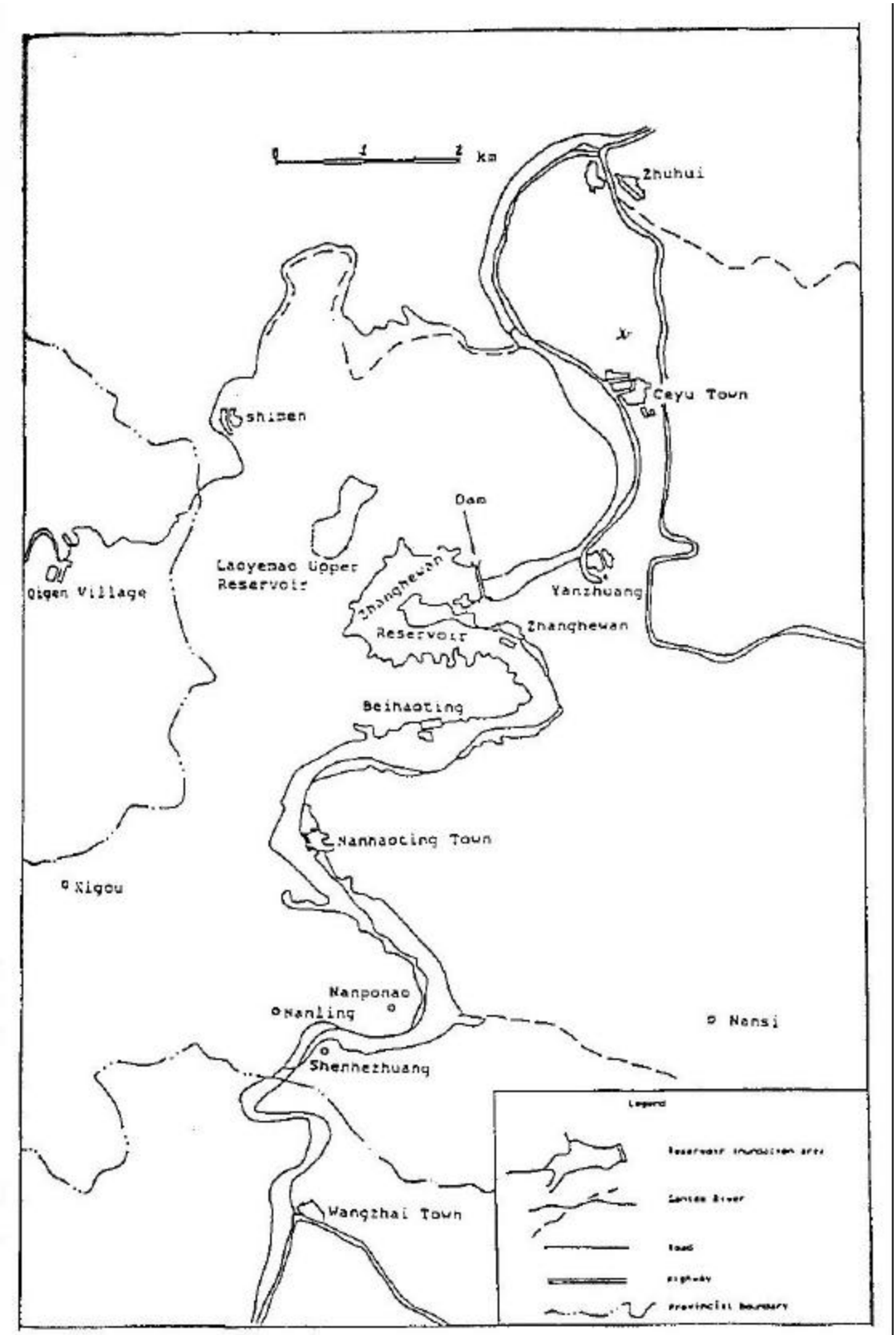

Figure 1-2: Inundated Area of ZPSPP

Powerhouse: The powerhouse will be constructed underground, with the lower intake/tailrace structure located approximately 1.2 km upstream from the Zhanghewan Dam. Four pump-turbines will be installed in the powerhouse. The total generating capacity is 1000 MW at peak demand, with a generating capacity of 250 MW for each unit. Each pump-turbine unit will have a generating hydraulic capacity of 95 m^3/s and a pumping capacity of 61 - 84 m^3/s, depending upon the water levels in the upper and lower reservoirs. The pump-turbines will be housed in an underground cavern, excavated in the rocks underlying Laoyemiao Mountain, adjacent to the Zhanghewan Reservoir on the Gantao River's left bank.

Sediment Control Dam: Soil excavated from the tunnels and powerhouse cavern will be used to construct a sand-trap barrage in the Zhanghewan Reservoir, which will minimize the wear and tear on the pump-turbines caused by sediment from the Gantao River. The Sediment Control Dam will be approximately 1 km upstream from the intake/tailrace structure and 2.2 km from the ZPSPP dam. The Sediment Control Dam will be a rockfill one, with a crest elevation of El 481 m, higher than the estimated 100 year flooding level of 480.5 m. Water and silt will pass through an open channel formed by extending the existing pass that begins upstream of the sediment control dam, at about 450 m in elevation, to 200 m upstream of the ZPSPP dam, where the silt will be flushed downstream.

The construction of the underground facilities will be accomplished from a location on a gentle slope immediately upstream from the access tunnel and intake/tailrace sites on the left bank of the Reservoir. The construction of the underground powerhouse and water conveyance tunnels will require aggregate processing areas, concrete mixing sites, erection room for mechanical equipment, and living areas for workers.

The Upper Reservoir: The Upper Reservoir will consist of a perched impoundment located on the top of Laoyemiao Mountain. The water surface area of the Upper Reservoir will be 0.31 km^2, The impoundment will be constructed through a cut-and-fill process. Materials excavated from the higher side of the site will be used to construct an embankment on the lower side of the site. The entire impoundment will be lined with a concrete/asphalt mixture to prevent leakage.

The Upper Reservoir construction areas are located at the southern ends of Laoyemiao Mountain. The construction features include the asphalt concrete mixing, concrete mixing, artificial aggregate processing, and water supply systems, as well as a 35 kV substation for electrical supply to the construction site, a storage area and a worker housing area.

Spoil Disposal Areas: In addition to the construction sites, six spoil disposal areas have been identified to accommodate disposal of excavated materials that cannot be used for construction of other Project components. Three spoil disposal areas have been identified near the top of Laoyemiao Mountain. Filling of the valleys located adjacent to the reservoir with spoil materials will provide an additional measure of safety for the embankments of the Upper Reservoir.

Spoil areas for placement of materials excavated from the powerhouse and lower dam foundations are located within one km from each construction site. There are two spoil dumps for the construction site of the lower reservoir dam, at either side of a submerged bridge one-two km from the dam.

1.1.1.2 External Access Roads

The external access roads include the main trunk access Road from Shijiazhuang to Zhuhui and branch access roads from Zhuhui to all the main ZPSPP construction zones, as well as the access roads for large equipment transportation from the railway line transit point to the construction site.

The access roads from Shijiazhuang to Zhuhui are the grade 2 highway from Shijiazhuang to Xiulin and the Pingshe Highway from Xiulin to Zhuhui. The existing 83 km grade 3 highway from the Yuanshi Railway Station on the Jing-Guang Line to Zhuhui will be the access road for transporting large equipment transportation.

Access roads totaling 32.3 km will branch out from Zhuhui to all the main ZPSPP construction sites. The Road No. 2 will be a simply built highway. The others will be built or rebuilt grade 3 or above. The bidding of these six access roads has been completed, and construction is ready to proceed.

1.1.1.3 Transmission Line and Substation

The transmission and transformation contains three components: substation for the power station, 63.12-km transmission line and Shinan substation. The power station will be installed near the dam site. The Shinan substation near Gaocheng has already been established, and the land acquisition and relocation in connection with the Shinan substation has been completed. Therefore, the land acquisition and relocation for the construction of transmission and transformation components will mainly include the 63.12 km 500kV -transmission line.

The transmission line will be bi-directional. ZPSPP will supply electricity during peak load periods and absorb power for pumping during valley periods. The electricity used for the pumping will come from the Shangan and Xibaipo Thermal Power Plants, which are 42 and 63 km away, respectively. The transmission line will pass through Jingxing, Yuanshi, Luancheng and Gaocheng counties, with population densities between 60-1000 persons/km^2.

Permanent land acquisition for the transmission line will mainly result from the construction of 161 towers' pedestal, totaling 0.73 ha of land, including 0.602 ha of farmland. The affected persons will be 86. In addition, 1.86 ha of temporary land acquisition will be involved, including 0.48 ha farmland. A total of 325 trees will also be affected. The land acquisition will affect 29 villages, 12 towns, 4 counties in the project area. No house demolition and population resettlement will be required.

1.1.2 Benefits of the Project

1.1.2.1 Benefits of ZPSPP

In addition to the power generation of the Project for Hebei Province, the completion of the ZPSPP will complement the ADB's policy priorities of poverty alleviation, energy efficiency, environmental improvement and promotion of economic growth. The Jingxing County will benefit the most, the Hebei South Power Grid (HSPG) area will also benefit from peak regulation through the electricity generated from the Project. In addition, the ZPSPP will provide water supply benefits for irrigation and domestic drinking water, enhanced rural electrification, ecological and environmental improvement, and development of tourism.

Power Benefits: The primary objective of the Project is to provide 1000 MW peak generating capacity to the HSPG in accordance with the estimated requirements for the year 2010, thereby increasing the flexibility and reliability of the system. This will also increase the efficiency of the system's thermal power generating capacity, which currently comprises over 95 percent of the Hebei generating capacity.

Once operational, the Project will meet the electricity demand of the Hebei Electric Power Grid on a daily basis during peak hours. During non-peak hours, excessive energy generated from HEPC's thermal generating stations will be used to pump water from the Lower Reservoir to the Upper Reservoir. The ratio of energy recoverable during generation periods (1.7 GWh annually) to energy expended during pumping periods (2.2 GWh annually) is estimated to be 0.76.

Irrigation Benefits: A total of 47 km of irrigation canal was constructed along the Dam in 1977 as the first phase of the Xiyue Canal irrigation system. The proposed project will provide irrigation water for approximately 1,467 ha of farmland. The Dam will be raised from 23.35 m to 490 m ASL to provide adequate storage capacity of the lower reservoir for safe operation of the Pumped-Storage Project. The area of the reservoir water surface will be 3.57 km^2 when the storage level is at 488.00 m. With a total storage capacity of 83,300,000 m^3, the reservoir will have the capacity to irrigate 8,167 ha downstream. According to the agreement between ZPSC and the Jingxing County Government and other concerned departments, the ZPSPP will supply irrigation water to 92 administration villages downstream of the reservoir, which will increase the agricultural production and income of local farmers.

Drinking Water Benefits: The Project will have the potential of supplying some 2.4 million m^3 of drinking water for people and livestock downstream. The Xiyue Canal currently provides domestic water for more than 32,000 people and 11,000 head of livestock. The water supply benefit will be RMB 3 million yuan per year.

Reservoir Fish Breeding Benefits: To preserve the reservoir water quality, the Zhanghewan Reservoir Administration Office (ZRAO) under the Jingxing County Hydrology Bureau (JCHB) will reserve an area of 0.5 ha for fishing, with production of 600 tons per ha per year. The marketable fish will be farmed in the reservoir with an amount of 45 tons per year. The breeding benefits of Zhanghewan Reservoir will be about RMB 3.18 million per year.

Environmental Improvement: Environmental improvement will be achieved through: (a) closure of old, inefficient and polluting units of coal-fired plants and (b) through afforestation in Jingxing County to improve the environment.

For (a), HEPC has prepared a list of units that could be considered for closure. The list includes such factors as age, installed capacity, unit coal consumption and emissions of CO_2, NO_x and SO_x. HEPC has obtained statistics on air pollution levels at or near the power plants and has prepared a cost estimate for such closures (dismantling costs, staff relocation costs, environmental mitigation costs) and a time-bound measurable action plan.

Tourism Benefits: The enlargement of the Lower Reservoir and the building of the Upper Reservoir combined with the accessibility provided by the Shijiazhuan-Taiyuan Expressway will create a new source of recreation for Shijiazhuang City. A landscaped Administration and Protection Zone (APZ) will protect the environment around the ZPSPP station so that the area

will become more attractive. Vistas of the nearby Cangyan Mountain, the Baishan Mountain and the Qianfo Rocks will provide a weekend attraction for urban people as well as business opportunities for local people.

Flood Control Benefits: While the reservoir does not have an overt flood control purpose, the reservoir will nevertheless detain floodwaters during periods when this may be critical for flood control downstream.

1.1.2.2 Project Impacts and Mitigation Measures

Reservoir Inundation and Mitigation Measures

Impacts of reservoir inundation: The Lower Reservoir surface area under NSL is 3.57 km^2 and the Upper Reservoir is 0.31 km^2. The ZPSPP inundation will affect seven villages, with a total population of 5,657 and farmland area of 459.82 ha, under three townships of Jingxing County (See Figure1-2).

The Upper and Lower Reservoirs will inundate an area of 330 ha, of which 202.87 ha is farmland. A total of 2,942 persons will be affected (2001 figure). The affected popula tion is estimated to be 3,123 in the Design Level Year of 2006 (including an agricultural population of 2,926, and a non-agricultural population of 197). The inundation will also affect houses with a floor area of 86,179.2 m^2 as well as water conservancy facilities, electric power facilities, communication facilities and transportation facilities and so on.

The proposed mitigation measures are as follows:

- As part of the resettlement strategy, 453 persons will be moved to new resettlement sites around the reservoir based on an analysis of the environmental carrying capacity in the reservoir area, and the remaining 2,670 persons to the northern area of the county, where an environmental carrying capacity analysis was also carried out. According to the resettlement plan, 0.087 ha of farmland will be allotted per person, including irrigated land of 0.047 ha per person, and an additional 0.067 ha per person of grazing land. This is higher than the average land holding in Jingxing County (0.082 ha of farmland, and 0.039 ha of irrigation) and is also higher than that in the immediate reservoir area prior to resettlement (0.077 ha and 0.021 ha).

- The Project will construct new terraces and improve the soil for a total of 84.3 ha, of which 8.4 ha will be in the reservoir area itself. Some 74.2 ha, of which 20.6 ha is in the reservoir area, will be converted from dry land to irrigated land. To supplement the existing irrigation area, the Project will drill 6 deep bore irrigation wells in the resettlement area, three of which will also be for domestic water. Resettlers will receive technical training to develop new cropping system, and the skills to plant economic crops and aquaculture techniques. Besides, the receiving areas have convenient traffic, and the chances to find a new job will increase.

- The resettlers will be compensated for the loss of houses at replacement value. The housing plot in the new resettlement sites will include an average household plot area of 40.0 m^2 per person and 27.5 m^2 of living space per person. The construction of new houses may be carried out by one or several families jointly.

- The main infrastructure provisions for the planned resettlement villages will be completed prior to resettlement. The Project will construct five new schools in the new resettlement villages with a total floor area of 1,230 m^2, as well as 4 clinics at 155 m^2 and five cultural centers at 205 m^2 in total. This standard is generally equal to the current situation in the ZPSPP Reservoir area. Five domestic water towers and three wells for both irrigation and domestic water supply will also be constructed.

- The Project will renovate seven km of inundated highways, build 2 motor-able bridges across the Gantao River, and construct eight km of access roads between the townships and the receiving villages. In the Reservoir Area, the Project will renovate 14 km of telecommunication lines and ten km of power lines. Similarly, 13.4 km of telecommunication line and ten km of power line will be set up in the receiving area.

- The total cost for resettlement is RMB173.72 million yuan, which will be financed by domestic funding. The relocation work, which will be carried out in well planned stages, will be finished in six years.

Land Occupation Impacts and Mitigation Measures

Land occupation in the construction area will involve permanent and temporary land acquisition for the project construction, and access roads within the construction site, Project Administration and Protection Zone (APZ), and a substation for the construction power supply.

Permanent land occupation within the construction area will affect five villages, i.e. Ceyu Village, Shimen, Zhuhui, Beihaoting and Zhanghewan. The permanent land acquisition will total 245.33 ha. It will include 21.47 ha of farmland. The permanent land acquisition will affect 45 agricultural people. Population affected by the permanent land acquisition in Beihaoting and Zhanghewan villages will be resettled together with the population affected by the reservoir inundation. Forty-five (45) persons of the other villages will be resettled in their own village and the land will be adjusted within each affected village. Per-capita farmland will decrease by 0.0007ha ~ 0.002ha after the adjustment and this will have relatively little impact on the villagers' agricultural production. The affected village collectives will receive compensation for the acquisitioned land as well as relocation allowance. To develop production, the collectives will use the compensation to acquire new land. The villagers whose farmland is affected prior to harvest will also receive compensation for young crops.

Temporary land occupation within the construction area will impact six villages, i.e., Ceyu Village, Shimen, Zhuhui, Beihaoting and Zhanghewan in Hebei Province and Qigen Village in Shanxi Province. The occupied land area is 84.07 ha, including 36.6 ha of farmland.

According to the new Land Administration Law, for each year of land occupation, there shall be one year's compensation for loss of agricultural output. After construction is completed, the occupied land shall be restored by the Project to cultivation to mitigate the effect on the villages.

The cost of land acquisition for the construction activities is included in the Project budget. Land occupation in the construction area will have relatively little impact on the villages. The permanent loss of land can be mitigated through land re-adjustment, and temporary loss of land will be compensated for the agricultural output for that year and land restoration.

Impacts on Receiving Area and Mitigation Measures

A total of 3,123 people will be resettled in the Design Year of 2006, including 2,670 agricultural populations to be resettled to Weizhou Town in the northern part of Jingxing County and five resettlement villages in Beizheng Township. The farmland for the above resettlement area will be requisitioned from twelve villages, including seven villages in Weizhou Town, four villages in Beizheng Township and Yizi Village. The total area of requisitioned land for the five-resettlement sites is 227.9 ha and 1,634 people will be affected.

For those who will be relocated to the resettlement villages or relocated to the same villages, land will be re-adjusted within the villages. The host village collectives will get the land compensation and relocation allowances from the inundated villages. The land compensation and relocation allowance will be used to restore the income of the affected villages.

The environmental impacts are as follows:

- Project construction will occupy a certain amount of land both permanently and temporarily. The ground soil and vegetation will be damaged, resulting in the loss of water and soil.

- During the construction phase, a large number of workers will enter into the construction site, with an expected 4,900 workers during the construction peak period. As a result, the existing ecological environment will be affected. There may be potential exposure to various intestinal diseases and hepatitis caused by poor food, domestic water and sanitation, as well as other unsanitary conditions resulting from high population density and high volume of solid wastes and unsanitary toilet conditions.

- As the habitat is inundated in the initial period of reservoir inundation, mice will move into the residential areas, resulting in a possible increase in the incidence of rodent-borne diseases. Also, if the reservoir is not cleared thoroughly prior to inundation, there may be an increase in other water-borne infectious diseases.

- Resettlers may be in a relatively vulnerable and poor state of health during their resettlement because of the stress and fatigue brought on by the move itself and through having to adapt to a new environment.

- With an increase in the population density in the new resettlement areas, soil and vegetation will be damaged creating erosion, a possibly unsustainable high level of extraction of underground water resources, and the creation of a large quantity of rubbish, all causing adverse impacts on the local environment.

The following mitigation measures are proposed:

- The primary measures for the recovery and development of agricultural production are: improving the soil; building water conservancy facilities; transforming dry land to irrigated land; optimizing the cropping structure;, spreading scientific farming and developing various business, as well as restoring such infrastructure as highways and communication and broadcasting lines. During this period of rebuilding the production base, cultivable land will be protected and water and soil shall be preserved to avoid soil erosion.

- The ZPSPP Project Office will prepare a water and soil conservation plan to restore the vegetation on the land occupied by the Project.

- The Project will supply domestic water to the workforce and to the local population through a centralized distribution system.

- The relevant districts and townships have set up to preventative health measures against the spread of disease. A physical examination of both resettlers and construction workers will be carried out regularly by local hospitals. When necessary, those with infectious diseases will be quarantined.

- The Project will stipulate sanitary regulations in the resettlement areas and will conduct a public health campaign to improve community knowledge about the importance of sanitation. The township's Sanitary and Epidemic Prevention Station will carry out regular inspections of the food services, including small food booths and restaurants, in the construction area. Those without a health license will not be allowed to open.

- To carry out reservoir bed clearance, all structures below the NSL will be removed before the impoundment. Clinics, veterinary stations, toilets, rubbish cans and tombs will be moved out of the reservoir, disinfected, or buried *in situ* to prevent water-borne infectious diseases.

- The communities around the reservoir and in nearby resettlement areas will carry out a mice-killing campaign and will quarantine, as necessary, any infected persons.

- In the resettlement sites, the locations will be prepared before the resettlers move in, and the Project will build new simple sewage treatment facilities in the new resettlement villages. The measures will include installation of sewage purifiers (septic tanks).

The Public Security Bureau of Jingxing County will deploy an increased police force at Ceyu Town to raise its capability and to strengthen safety management on site during the Project construction.

1.1.3 Social and Economic Background of the Project Area

1.1.3.1 Environmental Profile of the ZPSPP

The Reservoir inundation area is located on the southwest boundary of Hebei Province, where the North China Plain abuts the Taihang Mountain Range. The area is about 330 km away from Beijing and belongs to Jingxing County, Hebei Province (see Figure 1-1)

The resettlement areas are all situated in Jingxing County. The resettlement areas were selected because of their relatively sufficient land, good conditions of transportation and water conservancy and favorable conditions to develop the tertiary industry.

The population to be resettled at the Design Level Year of 2006 will total 3,123. Of these, 453 people will be moved to new resettlement sites around the reservoir. The rest will be relocated to Weizhou Town and Beizheng Township. These townships are about 2-10 km away from an urban center known as the “Mining Area” of Shijiazhuang City. These semi-

urban areas will provide good opportunities for employment in, and development of, tertiary industries and other businesses.

Resettlers who moved to the resettlement area during the 1977 construction of the Zhanghewan Dam and Reservoir have lived and worked in the ZPSPP resettlement area for some twenty years and have found many opportunities there to increase their income.

Hebei Province

Hebei Province has an advantageous geographical location in Northeastern China (See Figure 1-1). The Province surrounds the centrally administered municipalities of Beijing, China's capital, and Tianjin, a major seaport on the Bohai Sea to the east. Hebei has a total area of 187,693 km^2 and a population of 66.74 million.

Northern Hebei Province is mountainous and is the section of the Great Wall most visited by tourists. Southern and Central Hebei, where the ZPSPP is located, is part of the North China Plain adjacent to, and west of, the Taihang Mountains. Hebei province is situated in the warm temperate zone, with a continental monsoon climate. The differences among the four seasons are clear, and precipitation is comparatively concentrated in the summer months, resulting in an obvious distinction between dry and rainy seasons. The climate is well-suited for growing grains, principally wheat, and other economic crops.

The province is also rich in mineral resources, but short of water. The availability of water on a per-capita basis is lower than that for the rest of the country. The main crops are wheat, corn and cotton. Agriculture is hampered periodically by drought. Coal is Hebei's major resource. Most of it is shipped through Qinhuangdao port in Northeast Hebei. The GDP of Hebei Province in 2000 was 508.896 billion RMB yuan.

Southern Hebei Province is on the North China Plain and includes not only the provincial capital of Shijiazhuang City but also five other administrative divisions, Handan, Xingtai, Baoding, Cangzhou and Hengshui, with a total area of 84461.85 km^2, or 45 percent of Hebei Province's land mass. The main industries of the region are metallurgy, textiles, coal, building materials, chemicals, machinery, electronics, and petroleum. As a main production base for both grain and cotton, Southern Hebei is of regional importance within China.

The population of Southern Hebei is estimated at 48,000,000 persons or 76 percent of the Province. The cultivated land totals 4,142,000 hectares (63 percent of the provincial total).

Shijiazhuang

Shijiazhuang, the capital city of Hebei, is located near the middle of the Province. It is a relatively new city arising from a population of approximately 500 persons around 1900 to its current population of over 1,000,000. The rapid growth of Shijiazhuang was stimulated by the construction of the railway system in Hebei Province. Since then it has become a major transportation hub in Hebei Province and northern China.

Shijiazhuang is located approximately 283 km southwest of Beijing, with an integrated transportation system combining highway, railway and airline facilities. Two newly constructed, four-lane, limited access expressways intersect at Shijiazhuang, providing access to major metropolitan, seaport, mining and manufacturing areas of northern China. The north-south Beijing-Guangzhou railway and Beijing-Shenzhen Highway provide access to

the capital city of Beijing and the major industrial center of Guangzhou. The east-west Shijiazhuang-Taiyuan Highway provides access to the seaport city of Tianjin and the major coal mining and manufacturing centers in Shanxi Province. The City of Shijiazhuang is a major railway hub with rail lines paralleling the highways. The GNP of Shijiazhuang in 2000 is RMB100.311 billion yuan.

Because of the new proximity to the new Shijiazhuang-Taiyuan Highway, the ZPSPP Reservoir area has potential for becoming a weekend tourist site, potentially benefiting the local people, particularly the resettlers who will be offered support in taking advantage of this new opportunity.

Jingxing County

Jingxing County is located east of the Taihang Mountains, in western Hebei Province. Most of the county is remote mountains, along the spine of the Taihang Mountains. The hilly land, crosscut by rivers and canyons, slopes from southwest to northeast. The total land area of the whole county is 1,381 km^2.

Jingxing's GNP was RMB2.74 billion yuan in 2000. The industrial productions are mainly located in the County Seat and the Townships (Town), with convenient traffic and a better economic foundation. Cropping as a main agricultural production and is 48 percent of the gross output of agriculture. The average income of the agricultural population in the County was RMB2,602 yuan in 2000.

Jingxing County belongs to Shijiazhuang City and consists of 17 townships and towns, 318 administrative villages, and 616 natural villages. The population is 330,964, of which 294,172 persons, or 88.9 percent, are agricultural. The county has 11,351 ha of irrigated land, or 47.3 percent of the total cultivated area. The average cultivated land per capita is 0.082 ha, and irrigated land per capita is 0.039ha.

The various land formations in Jingxing County are complex and contain many types of soil. The western and southern parts are middle and low mountains, where forestry, animal husbandry and food grain areas are predominant. The central and eastern parts of the county are low mountains, with many rivers. Many kinds of fruits and vegetables are grown here. Most of the lands above 700 m with slopes of 35 degrees or over are left forested for the sake of water and soil conservation. The major part of this is for windbreak forest, firewood trees and bushes. Most lower and gentle valley areas or low hilly regions are cultivated land and fishponds.

From the standpoint of population distribution, Nanhengkou on the Mian and Gantao rivers, constitute the population center, with population decreasing towards the west, north and south. The middle northern part of the county is the most densely populated area, with 430-700 persons per km^2. Cangyanshan Town is also at the lower end of the scale, at 67 persons/km^2. The population density is closely related to the level of economic development and to soil quality. The areas with a higher density have relatively better quality soil and a higher degree of land utilization and development.

Jingxing County Seat

Jingxing County Seat is a large urban center administratively located in Weishui Township in the center of Jingxing County. The County Seat is surrounded by mountains on three sides and the Ye River to the west. The city is situated on a plain at about 400 m elevation, with an

annual average temperature of 13.5^{0}C, a frost free period lasting about 190 days throughout the year, and an annual rainfall of 500-600 mm. Both the Shijiazhuang-Taiyuan Railway and Shijiazhuang-Taiyuan Highway pass by the County Seat, making it a major transportation link between Hebei and Shanxi Provinces.

The County Seat is about 4 km^2, within an overall area for Weishui Town of 54.54 km^2. The population of Weishui Township is 60,006, including an agriculture population of 35,660. The County Seat is the political, economic, cultural and educational center of Jingxing County, having not only the county government but also many of the county's major schools and hospitals, a cultural center, stadium, libraries, cinemas, broadcasting and TV stations, and various financial and commercial service facilities.

The industries in the County Seat include electric power, farm machinery, chemical fertilizer, print, paper-making, food processing, and metal casting. Wheat and corn are the main grains, with vegetables also being an important part of agriculture. Both the County Seat's heavy industrial and its agricultural production play an important role in the economy of Jingxing County, and numerous secondary and tertiary industries are rapidly being developed.

Mining Area of Shijiazhuang City

The "Mining Area" comes directly under the administration of Shijiazhuang City but is located 50 km to the west of the city. It has an urban population of 54,000 and a total population of 97,000. The townships of surrounding Jingxing County are the 'neighbors' of the "Mining Area".

The "Mining Area" is located on the transportation artery between Hebei and Shanxi Provinces, with convenient traffic, rich minerals and a wealthy industrial base. The "Mining Area" provides urban services to coal mines allotted to the Jingxing County Mineral Bureau (JCMB) and to a variety of large and medium-sized industrial enterprises belonging to the various ministries of the Central Government, to Hebei Province, and to Shijiazhuang City. At Present, the "Mining Area" constitutes a comprehensive industrial complex, with coal, construction material, chemicals, and heavy machinery as mainstay activities, along with the production of electric power, leather, food processing, ceramics, textile, and garments. Organic food crops and tourism also enjoy bright development prospects.

1.1.3.2 Natural Conditions

Geography and Topography of the ZPSPP Area

The ZPSPP Reservoir will have an "S" shape, 10.7 km long, and an average of 0.35 km in width. The region is in the middle section of the Taihang Mountains, adjacent to the North China Plain to the East and to the Shanxi Plateau in the West. It is a mountain region of moderate to low height, with a top elevation of 600-1,000 m. The reservoir will be located in an area of canyons with moderate and lower height. The two banks of the Reservoir will be asymmetrical, with a steeper left bank of 20^{0}C-35^{0}C and a flatter right bank of 20^{0}C -25^{0}C. The valley will comprehend an incised, bending reach of the Gantao River originating from Xiyang County in Shanxi Province, having numerous terraces covered with loam accumulation along the convex bank. The first, second, and third terraces will be 15-20 m, 40-60 m, and 80-90 m above the water surface of the river, respectively. Most of the bedrock in the Reservoir Area is exposed, and there may be some collapsing of terraces on the left bank between Beihaoting and Zhanghewan, or near Nanponao. However, these are not

expected to affect the safety of the Reservoir or Dam or of the villages, nor to decrease the farmland index after the initial inundation.

The Upper Reservoir is located at the top of the Laoyemiao Mountain, on the left side of the Lower Reservoir. The Upper Reservoir will be formed by cutting and filling a rock fill dam. The topographical feature here shows, at an elevation of about 742-846 m, a northeast-southwest decline. The west end of the plane presents a complex topography, because of a 130 m incision of a deep gully, where the plane has a minimum width of only 250 m. Between the Upper and Lower Reservoirs, the horizontal distance is about 540 m with a height difference of 340 m.

Climate

The Gantao River catchment has a continental monsoon climate, characterized by dry and windy days in the Spring; dry and hot days in the Summer, as well as concentrated rainfall, sometimes accompanied by windstorms and hail, sunny Autumns, and cold and windy Winter.

The amount of rainfall in the catchment generally decreases southeast to northwest and occurs mainly in May-October, with 90 percent of the whole year's rain, although this can change from year to year. The mean annual and maximum (1963) and minimum (1973) annual precipitation are 527 mm, 986 mm, and 254 mm. The mean annual temperature is 12.8^0C, high and low temperatures 42.8^0C and -17.9^0C. While the overall conditions are favorable to agriculture, drought in summer and frost in winter are the two aspects of the climate that can be most adverse.

Soil

The farmland is generally distributed over slope land and scattered terraces, which are difficult to irrigate. Erosion is a serious problem, because of the hot and dry climate, the low vegetation cover -- due in large part to human activities -- and the monsoon climate. The Gantao River is therefore heavily sediment-laden.

There are three categories of soil scattered from high to low elevations: brown, cinnamon and meadow. Cinnamon soil has five subcategories: leached cinnamon, cinnamon, calcareous cinnamon, soil with a cinnamon nature and cinnamon with a meadow nature. Influenced by groundwater, some areas along the margins of the river (1.9 percent of the area) have meadow soils, which have high moisture content. The land along the riverbanks and the flood plain is fertile. Alluvial brown soils predominate at elevations above 1000 m ASL. Leached cinnamon soil is scattered between 800 m and 1200 m ASL and comprises approximately 17 percent of the area. For the soil distribution in the Reservoir Area see Figure 1-12.

Primary crops include wheat and corn, which are somewhat resistant to the harsh conditions of the region. Cultivated soil is scattered in the valley and along the two banks of the river. It is composed of alluvial deposits, calcareous drab soil and alluvium meadow soil. The soil in the lower sloping fields and alluvial plain is fertile. In the higher sloping fields and rock-wall supported terraces, the potash content is moderate to high, and the organic, nitrogenous and phosphate amounts are small. As in mountain areas generally, the soil surface nutrients vary widely, however, depending on the topography, rock type, hydro-thermal condition and degree of soil erosion.

Utilization of Water Resources

The ZPSPP is located on the Gantao River. The catchment area above the Dam site is 1,834

km^2. The Gantao, within the Ziya River system, originates in Xiyang County, Shanxi Province. Its upstream reach is called the Songxi River. Downstream from the ZPSPP it joins with the Mian River at Weishui Town and becomes the Ye River, which runs through the ZPSPP Resettlement Area, and finally runs into the Huangbizhuang Reservoir on the Hutuo River.

The storage capacity of Zhanghewan Reservoir is 23,000,000 m^3. The irrigation system within the Reservoir Area contains the Yuejin Canal on the Right Bank of the Gantao River, the Beihaoting Canal on the Left Bank, and a few pump stations. The Xiyue Canal diverts water from the Reservoir to irrigate a region further downstream, as does the Yinganjimiao Canal which provides water supplementing the main sources providing for the Mianyou irrigation zone.

Approximately 36 km long and with a design diversion flow of 1.2 m^3/s, the Yuejin Canal diverts Gantao River water in the vicinity of Nansigoukou to irrigate 533 ha of farmland belonging to 15 villages under Nanhaoting, Ceyu, Jingzhuang and Cangyanshan townships. It also provides domestic water for about 12,000 people and 500 head of livestock.

Some 7.2 km long and with a diversion flow of 1.0 m^3/s, the Beihaoting Canal is located on the Left Bank of the Gantao River and diverts water in the vicinity of Nansigoukou to irrigate about 66.7 ha of farmland belonging to Nansi, Nanhaoting and Beihaoting villages.

Some 47 km long and with a design diversion flow for its main channel of 7.5 m^3/s, the Xiyue Canal was constructed during the first phase of the Zhanghewan Reservoir construction, in the 1970s. The canal benefits an area covering 34 villages of Ceyu, Jingzhuang, Zhangchang, Yujia and Tiancheng townships. It has the potential to irrigate up to about 1,467 ha, although currently it irrigates 867 ha of farmland. It also provides domestic water for more than 20,000 people and 6,000 head of livestock.

Starting in the vicinity of Jingzhuang, utilizes water released by Zhanghewan Reservoir to supplement water to the right Channel of the Mianyou Canal. It is 20.64 km long, with a design diversion flow of 4 m^3/s.

In addition, there is a small-sized pump station built in Nanhaoting within the Reservoir Area, which may irrigate 13.4 ha of farmland, but is not fully used due to high pumping costs.

When the ZPSPP is completed, the Yuejin Canal within the Reservoir Area will be submerged Provision will be made to provide a water intake for this in the Dam itself, ensuring irrigation and domestic water to Ceyu, Jingzhuang and Cangyanshan townships. The Yuejin Canal will be linked up with the Xiyue Canal to ensure the available irrigation water to the downstream of the Dam.

Forest Resources

Though the mountain area surrounding the Reservoir is large, the forest cover rate is only 5.3 percent, and the canopy density is 0.4-0.7. The distribution of vegetation changes along with the elevation and has obvious vertical zoning. Since the topography is complex and there are many different soils. In the higher elevations, there is secondary forest. In the lower ones, there are natural shrubs and herbages. Many varieties of fruit or fodder trees grow in the thick earth slope of the valley.

Since most of the Reservoir Area is mountainous, with large barren areas and sparse vegetation, and rates of forest cover and resources utilization are low, economic development plans for the Area stress the gradual transference of farmland to forest, keeping a minimal subsistence grain-raising capability. Local plans devote their major effort to developing forestry and stockbreeding to create a diversified economy and to utilize the existing resources more fully to reverse the human action that has led to serious soil and water loss.

1.1.4 Measures to Minimize Resettlement

The impacts of displacement on the villagers affected by the ZPSPP construction are considerable. The resettlers are expected to undergo a long period of recovering their production and livelihood. Also, since Chinese law mandates that resettlement costs be an internalized part of any infrastructure project's budget, so there is a great incentive the ZPSPP to minimize, to the extent possible, the numbers to be resettled. For these reasons, the ZPSPP has sought to minimize the number of people to be resettled, through the project design itself or in the course of resettlement planning. Two instances of this effort to minimize resettlement include:

- The ZPSPP was designed to keep the reservoir backwater within Hebei Province's boundaries, reducing inundation losses, avoiding as much as possible larger numbers of resettlers, and avoiding inter-Provincial relocation that would otherwise have involved Shanxi Province.

- ZPSPP resettlement planning avoided moving Xigou Village's population of 455 by building a bridge to restore access to the village that was lost through the inundation of its main access road. This is a less expensive alternative to moving the village and allows the continued use of Xigou's farmland, which is not inundated by the ZPSPP reservoir. At the same time, the construction of the Project and to increase the lower dam can avoid inundating Shanxi Province.

1.1.5 Project Design Procedure

In China the main organizations for Project construction and operation are the Construction Organization (the Employer or Investor), the Designer, the Contractor and the Supervision Organization.

Based on hydropower planning for river basins and regional economic development planning, the Designer shall carry out the design of project planning according to the specifications and requirements of the Construction Organization, taking into account the construction conditions under which a project will be carried out.

The State issued new specifications for the Design Stage in 1994. According to these new specifications, the design of large and medium-sized hydropower projects is divided into four stages: 1) a Pre-feasibility Study; 2) Feasibility Study; 3) Bidding; and 4) Construction Drawing Design.

In order to ensure the design quality of the projects, the Hydropower and Water Resources Planning and Design General Institute (HWRPDGI) was entrusted by the Ministry of Electric Power (MEP), which was abolished in March, 1998 and its duties replaced by the State Economic and Trade Commission (SETC) to carry out the technical review of large and

medium-scale hydropower projects throughout the country. At the same time the International Engineering Consulting Company of China (IECC) was entrusted by the State Development Planning Commission (SDPC) to supply technical information and to carry out technical consultation to ensure that the projects are necessary for the development of the national and local economies. The projects can only be commenced after passing examination of the Feasibility Study Report and agreed to by SDPC and the State Economic and Trade Commission (SETC).

The ZPSPP Pre-feasibility Study Report was completed in 1990 and passed the State's examination in 1992, at which point the Preliminary Design ('Feasibility Study') followed. The Preliminary Design was completed in 1994 and passed the State examination in 1995. The Designer's Resettlement Planning Report was also accepted.

Currently, the Project is in the Bidding Design Stage for the Main Works. The Construction Drawing Design for the Access Roads from Zhuhui to all the main construction sites and for the Construction Water and Electric Power Supply Systems has already been completed.

1.1.6 Preparation of Resettlement Action Plan

The Reservoir Inundation Treatment and Resettlement Action Plan (the 'RAP') is an important component of the ZPSPP Feasibility Study. The Beijing Investigation Design and Research Institute (BHIDRI) was entrusted by the ZPSPP Project Office to start preparation of the RAP in August 1992, and the RAP was included in the Pre-feasibility Study Report.

During the Preliminary Design Stage, the ZPSPP Project Office, BHIDRI, the People's Government of Jingxing County, and the representatives of the affected villages carried out an investigation of the Reservoir Area's population and property list (physical assets) lost to inundation as well as a land environmental capacity study of Jingxing County October through December of 1993, and based on these studies compiled a Resettlement Action Report. The Report was modified after adopting the suggestions of the affected Collective and villagers. The Report and the Feasibility Study Report (original Preliminary Design Report) passed the State examination in January of 1995.

According to the Asian Development Bank's (ADB) requirement for public consultation, the ZPSPP Project Office and the Resettlement Office of Jingxing County undertook a socioeconomic and AP survey, as well as extensive discussions of the proposed resettlement scheme with the affected villages between July and August of 1995. Based on these consultations, a revised RAP report was completed in December 1997. Another survey was carried between January and February 1999. The RAP Report was finalized in May 1999.

`The ZPSPP Project Office, BHIDRI, the Resettlement Office of Shijiazhuang City and the Resettlement Office of Jingxing County updated the property list and undertook additional survey in inundation affected areas and resettlement areas, further revised the RAP Report in May through July 2001. The ZPSPP Project Office completed this updated RAP Report in September 2001 for review by the ADB Appraisal Mission.

1.1.7 Socio-Economic Survey

1.1.7.1 Detailed Site Investigation

An Investigation Team was organized by Jingxing County Government during the ZPSPP Preliminary Design Stage to conduct a Detailed Site Investigation of the population, property, productive assets and public infrastructure affected by the ZPSPP construction and reservoir inundation. The Detailed Site Investigation was carried out by the Land Administration, Civil Administration, and Water Resources, and the Hebei Provincial Electric Power bureaus, in conjunction with the Beijing Investigation, Design and Research Institute (BIDRI). The Investigation Team was assisted by representatives of the townships, towns, villages, groups and individual project affected villagers.

The site investigation, which lasted for about 70 days, began in mid October and ended in mid December 1993. It was conducted in accordance with the requirements of the State regulation "Standards and Stipulations for Reservoir Inundation Investigation for Water Conservancy and Hydroelectric Power Projects". The Investigation Team compiled property lists and inundation material index tables for the population, property, productive assets and public infrastructure below the inundation line and to be affected by ZPSPP. The detailed investigation arrived at a total affected population of 2,805, 201.6 ha of farmland to be inundated, and 86,005.32 m^2 affected housing floor space below the reservoir inundation line. The investigation results were reported to the Jingxing County government and approved both by the County Government as well as through confirmation of the survey results by the affected villagers.

The ZPSPP Project Office, BHIDRI and the Resettlement Office of Jingxing County updated the land acquisition scope of March 1998 and updated the property list of March-April 1998. The figures for the population, land, houses and special facilities affected by the ZPSPP have been updated and the results analyzed with the participation of the township (town) and village cadres as well as the representatives of the affected villagers, the collectives and the local governments. The detailed results arrived at a total affected population of 2,878, 202.93 ha of farmland to be inundated, and 86,005.32 m^2 affected housing floor space below the reservoir inundation line.

The ZPSPP Project Office, BHIDRI, the Resettlement Office of Shijiazhuang City and the Resettlement Office of Jingxing County re-evaluated the land acquisition scope of May-July 2001 and updated the property list. The figures for the population, land, houses and special facilities have been verified and the results analyzed with the participation of the township (town) and village cadres as well as the representatives of the affected villages, and the collectives. The resulted have been confirmed with local governments.

1.1.7.2 Socioeconomic Surveys

Socioeconomic surveys were undertaken in October-December 1993, July 1995 and January-February 1999 in the inundation affected area and in resettlement affected villages. The surveys covered, in more detail than earlier investigations, household income, both with respect to amount and source of income, as well as other basic demographic data. The use of Participatory Rapid Assessment (PRA) techniques (e.g., informal discussion and household visits) yielded additional information on the socioeconomic condition of the villages, on, *inter alia* , family patterns, the production structure, and income and expenditure composition of the surveyed households. The RAP Report was revised with reference to suggestion of the village cadres and affected family representatives.

In accordance with ADB requirements, the ZPSPP Project Office carried out further socioeconomic surveys in the six villages affected by the Reservoir inundation and the thirteen host villages affected by the ZPSPP resettlement, with participation of the Jingxing County Resettlement Office and BHIDRI staff as well as Township (Town) cadres. The survey staff was trained in the Jingxing County Seat. These surveys were conducted from May to July 2001. Assisting with the townships (towns) cadres, the surveys were carried via household visits and interviews. During the surveys, PRA techniques were again used to consult with affected villagers on the proposed RAP. These included interviews and informal discussions with, among others, village heads, village committee members, the Directors of the women's federations, the heads of public health clinics, school principals, as well as household visits, visiting and talking with the disabled, women , elders, and youth.

1.1.8 Ownership and Organization of the Project

The ZPSPP is an electric power development project invested by the Hebei Provincial Electric Power Company (HPEPC) and the Hebei Provincial Construction and Investment Company (HPCIC). Some 55 percent of the investment is from HPEPC, and 45 percent is from the HPCIC. Total investment is RMB6,431.6 million yuan, of which domestic funding is expected to be RMB5,059.6 million yuan and the ADB loan to be US$ 144 million.

The ZPSPP Project Office of Hebei is the legal owner, and the Resettlement Planning Design has been undertaken by BHIDRI. The People's Government of Shijiazhuang City will be in charge of the land requisition and the relocation of the resettlers.

The ZPSPP Project Office will appoint a special department to take charge of the resettlement program. The Resettlement Office of the Shijiazhuang City will be responsible for coordinating the execution of the resettlement program, and the Resettlement Office of Jingxing County will undertake its execution. The ZPSPP Project Office through the local bank will draw the funds necessary for the resettlement out of the Project's investment budget.

1.1.9 Schedule of Project Construction and Implementation

The ZPSPP proposes to begin the power and water supply connections, road construction, and land leveling in December of 2002, to commence the main work in December 2003, and to impound water in the Lower Reservoir in 2006. The construction of the ZPSPP will be fully completed in 2009. The land acquisition and resettlement schedule will be decided according to the Project's construction schedule with the RAP linked to the Project Construction Plan.

The resettlement activities will start in July 2002 and will last for 5 years for completion in 2006. The reconstruction of the special facilities will be completed in 2004. Each component will be divided into several phases and then commence in sequence.

1.1.10 Relevant Laws and Regulations

China's laws and regulations on resettlement are based on China's social system and practical conditions and are formulated on the basis of relevant experience and lessons learned from international resettlement practice. The main legal basis for resettlement is China's constitution and the Land Administration Law.

The Stipulations of Compensation for Land Acquisition and Resettlement for Large-and Medium-Sized Water Conservancy and Hydroelectric Power Projects, issued by the State Council in 1991, is the current and most up to date basis for resettlement work. It establishes a balance between the need for resettlement in China and assurance of the rights and interests of displaced peoples. The laws issued by the central government are applicable to all of China's provinces and cities. These are supplemented by regulations and directives issued by Provincial and local governments in the spirit of the law:

- "The Land Administration Law of the People's Republic of China (amended and passed on Aug. 29, 1998)"
- "The Implementing Stipulations of the Land Administration Law the People's Republic of China (revised and passed on Dec. 17th, 1998)"
- "The Stipulations of Compensation for Land Requisition and Resettlement for Large- and Medium-Sized Water Conservancy and Hydroelectric Power Projects"
- "Notification of Setting Up fund for Later Period Support for Hydroelectric Power Project and Reservoir Area"
- "The Law of Villagers Commission Organization in the People's Republic of China"
- "The Law of Environment Protection of the People's Republic of China"
- "Regulation for Environment Protection Design for Construction Projects"
- "Hebei Province Farmland Occupation Tax and Implementation Methods"
- "Hebei Provincial People's Government's Notification of Implementing Support Policy for Resettlers of Large-Sized Reservoirs"
- "The Principle for Village and Township Planning", "The Standard for Village and Township Planning", "Planning and Construction Management Regulations for Village and Town"
- "The Specifications for Inundation Treatment Design for Reservoir of Water Conservancy and Hydroelectric Power Projects"
- "The Stipulations of Inundated Material Index Investigation of Reservoir of Water Conservancy and Hydroelectric Power Projects"
- "Reservoir Bed Clearance Methods", "Laws for Sanitation and Anti-Epidemics".

1.1.11 Ethnic Minorities

In order to identify the issue of ethnic minorities to be potentially affected by ZPSPP, Resettlement staff visited the Hebei Province Minority Committee, the Shijiazhuang City Minority Committee and the Jingxing County Minority Committee.

Official data shows that the total population in Hebei Province was 66.74 million in 2000, of which the ethnic minority population was 2,606,800, accounting for 3.9 percent of the total population. Those minority nationalities which have lived for generations in Hebei Province are the *Machurian, Hui, Mongolian, Zhuang,* and Korean. There are 72,100 minority people living in Shijiazhuang City, accounting for 0.78 percent of the City's total population.

The total population of Jingxing County is 331,000. Jingxing County contains 17 towns and 318 villages. There are only 208 minority people living in Jingxing County in 10 villages within eight towns, accounting for 0.0062 percent of the total County population. Most of these have come only recently, and some 63 percent are non-agricultural. None of them live in the Reservoir Area or within the host villages of the Resettlement Area. The socioeconomic survey of 2001 confirms that the project will not affect minority nationalities.

1.1.12 Resettlers of Zhanghewan Reservoir Constructed in 1977

The 1,273 resettlers of the Zhanghewan Reservoir constructed in 1977 are not included in the RAP for the ZPSPP. The current ZPSPP resettlement will not directly affect the resettlers of 1977, whose production and living standard has been restored and improved upon.

1.1.12.1 Inundation Impacts and Resettlement

In 1977, the construction of Zhanghewan Reservoir affected parts of the Zhanghewan and Yanzhuang Villages (under the jurisdiction of Ceyu Town), the entire 'natural village' (hamlet) of Puyu of Yanzhuang Village, and parts of Beihaoting Village (under the jurisdiction of Nanhaoting Township). Puyu was entirely inundated, while the other villagers were only partially inundated. The resettlers in 1977 numbered 1,273 residing in 385 households.

Table 1-1 Relocation by the Zhanghewan Reservoir in 1977

Affected Villages	Relocated Households	Resettled Population (Persons)	Place of Resettlement
Zhanghewan	98	374	New Zhanghewan
Beihaoting	138	425	New Haoting
Yazhuang	120	389	Yanzhuang
Puyu (natural village)	29	85	Ceyu
Total	385	1,273	

The Jingxing County Government was in charge of the relocation of the resettlers during the construction of Zhanghewan Reservoir in 1977. The County Government allotted land, supplied moving tools, organized their movement, and provided them with compensation. The County Government supplied the materials for constructing new houses at the resettlement sites, and the labor was supplied by those villages benefiting from the Zhanghewan Reservoir's irrigation schemes. The water supply facilities, electric power supply facilities and the agricultural irrigation facilities were built to restore the production base and living standards for the new resettlement sites. About 51,600 m^2 of new houses were constructed in the resettlement area (including the collective buildings of the villages).

The Jingxing County Government helped to build schools, clinics and access roads for each resettlement village.

1.1.12.2 Evaluation

In 2000, the per capita housing area of new Zhanghewan Village was 16.5 m^2, and the net income per capita was RMB2,583 yuan or 154 percent of the pre-resettlement level. The per capita housing area of the new Beihaoting Village was 22.5 m^2, and the per capita net income was RMB2,404 yuan or 105 percent of the pre-resettlement level.

1.1.12.3 Expectations of Resettlers and Responses

After the resettlement program was completed, the resettlers of 1977 put forward several requests for the Government's consideration. The main problems to be solved included, for instance, the poor quality of some houses, and need for repair of the canals and infrastructure built after the 1977. The Shijiazhuang Resettlement Office supported New Zhanghewan and

Beihoating Villages by allotting RMB200,000 yuan to the former and RMB20,000 yuan to the latter from a Fund for Post-Resettlement Support to develop their production base. By 1998, the resettlement villages relocated in 1997 had a great deal of support and assistance from governments at different levels, completely recovered their production base and former living standard.

1.2 Rural Electrification

1.2.1 Overview

As in other parts of the PRC, the urban and rural power distribution networks in Hebei Province have several shortcomings. First, since the emphasis was on connecting industries, the network for connecting households is poor and weak, which has made rural power supply unreliable and of poor quality. Second, the rural network comprises two-wire, ground return, 10 kV sub-transmission systems that usually lead to technical losses of up to 50 percent in some counties and can be unsafe during electrical fault conditions. Third, the rural tariff on average is 62 percent higher than that for urban consumers. The power distribution networks and reliability of power supply to rural areas needs to be enhanced to improve the quality of life and agricultural and rural industrial productivity.

The project covers 23 counties in 4 municipalities in Hebei Province, including Shijiazhuang, Xingtai, Handan and Baoding. There are 11,776.5 km of transmission lines in total, including a 110-kV line of 197 km, 35-kV line of 378.5 km, 10-kV line of 4715 km and lower voltage line of 6,486 km. Seventy-two (72) substations (including nineteen 110-kV substations and fifty-three 35-kV substations) will be built newly or rebuilt in the 23 counties. The total investment is estimated at RMB1,121.9 million yuan. The beneficial population is estimated to be 9.56 million, including those who live in the areas serviced by the 10-kV and 35-kV transmission lines, those who live in the areas serviced by the rural electrification, and those who live in the areas serviced by the rebuilt of 10-kV line. The rural electrification will be implemented between 2002 and 2005.

The 23 beneficiary counties are:

- 7 counties in Shijiazhuang City: Zanhuang, Pingshan, Jingxing, Lingshou, Yuanshi, Xingtang and Wuji County;
- 5 counties in Xingtai City: Lincheng, Xingtai, Xinhe, Guangzong and Shahe County
- 6 counties in Handan City: Guangping, Guantao, Linzhang, Shexian, Daming and Weixian County;
- 5 counties in Baoding City: Laiyuan, Fuping, Tangxian, Shunping and Dingzhou County.

1.2.1.1 Shijiazhuang City

- Zanhuang County

  A 110-kV transmission line will be constructed in Zanhuang County. The line will have a total length of 15.2 km and will pass through 9 villages in two counties (Zanhuang and Yuanshi). Two 31.5-MVA transformers will be added to the Zanhuang 110-kV substation. Three 35-kV transmission lines will be constructed in Zanhuang County. The total length of these lines will be 37 km and will pass through 12 villages. A new 35-kV substation will be built at Yuantou and a 35-kV transformer will be added to the Yecaowan Substaion. The construction and rehabilitation of the 10-kV transmission

lines will improve service to 17 villages. The 10-kV transmission lines will be 37 km long.

- Pingshan County
  Three 35-kV transmission lines will be constructed in Pingshan County, including one line from Huishe to Wentang. The total length of the lines will be 37 km and they will pass through 12 villages. Four 35-kV substations will be constructed at Wentang, Gangnan, Sanji and Muchang. A total of 105 km of 10-kV transmission lines will also be constructed to serve the rural communities. These lines will benefit 16 villages. An additional 745 km of low-voltage distribution lines will be rehabilitated to service 68 villages.

- Jingxing County
  A 110-kV transmission line with 27 km in length will be constructed in Jingxing County and will pass through 14 villages. Two 31.5-MVA main transformers will be installed at the Xiulin and Qingquan 110-kV substations. Eleven kilometers of 35-kV transmission lines will also be constructed to provide power to 9 villages. A new 35-kV substation will be constructed at Weizhou, and the Shizhuang 35-kV substation will be expanded. In addition, 68 km of 10-kV transmission lines will be constructed in Jingxing County.

- Lingshou County
  A 110-kV transmission line will be constructed between Shangfang and Tanzhuang in Lingshou County. The total length of this line will be 31 km and it will pass through 9 villages. A new 110-kV substation will be constructed at Tanzhuang. Three hundred forty km of 10-kV transmission line will be rehabilitated or constructed in Lingshou County. These lines will service 32 villages. Additionally, 612 km of low voltage lines that service 49 villages will be rehabilitated.

- Yuanshi County
  In Yuanshi County, a 22-km long, 110-kV single circuit transmission line will be constructed in Nanzuo. This line will pass through 8 villages. A new 110-kV substation will be constructed at Nanzuo. In addition, two 35-kV substations will be constructed at Songcao and Macun. Approximately 246 km of 10-kV transmission lines, benefiting 25 villages, will either be constructed or rehabilitated. Twenty-five transformers servicing 25 villages that are known to cause considerable loss of power will be rehabilitated.

- Xingtang County
  In Xingtang County, the 110-kV Tiantang 2-circuit transmission line will be constructed. This line has a total length of 32 km and will pass through 13 villages. Two 35-kV substations will be constructed at Liuying and Zhaiying. In addition, 23 km of 35-kV transmission lines will be constructed and 658 km of 10-kV transmission line will be rehabilitated. The rehabilitation of these lines will benefit 53 villages. Service to 62 villages will be improved through the rehabilitation of 604 km of low voltage lines.

- Wuji County
  In Wuji County, 35 kV substations will be constructed at Zhangduangu, Gaotou, and Donghou. Three 35 kV transmission lines, with a total length of 45 km, will be constructed. These lines will affect 22 villages. Electricity supply to 38 villages will be improved through the construction and rehabilitation of 367 km of 10-kV transmission lines.

1.2.1.2 Xingtai City

- Xingtai County

  In Xingtai County, a 110-kV transmission line will be constructed from Changzheng to Zhougong. This line will be 19 km long and will pass through 11 villages. A new 110-kV substation will be constructed at Changzheng, and the Jiangshui 110-kV substation will be expanded. Two 35-kV substations at Huining and Wangkuai will be rehabilitated and two 35-kV transmission lines with a total length of 23 km will be built. These will affect 13 villages. Also in Xingtai County, 638 km of low voltage power lines will be rehabilitated. These lines will improve the power supply for 62 villages.

- Xinhe County

  In Xinhe County, the 110-kV Xinhe Substation will be expanded. Both the Shenzhua ng and Renli 35-kV substations will be rehabilitated and one 29-km-long, 35-kV transmission line will be constructed. Approximately 228 km of-10 kV transmission lines servicing 16 villages will be constructed or existing lines rehabilitated. Power service to 67 villages will be improved through the rehabilitation of 694 km of low voltage distribution lines.

- Guangzong County

  In Guangzong County, two 35-kV substations will be constructed at Changfu and Dongzhao and the 35-kV Chengguan substation will be rehabilitated. A 35-kV transmission line will be constructed from Guangzong to Suncun, with a distance of 24 km. Power service to 18 villages will be improved through the construction or rehabilitation of 61 km of 10-kV transmission lines.

- Lincheng County

  In Lincheng County, the 35-kV Yageying and Gangtou substations will be expanded. The 12-km long, 35-kV Lingang transmission line will be constructed. This line will pass through 7 villages. In addition, 163 km of 10-kV transmission and distribution lines will be constructed or rehabilitated. This construction and rehabilitation will improve power service to 15 villages. The distribution lines in 61 villages will be rehabilitated. This will include 508 km of low-voltage distribution and transmission lines.

- Shahe City

  In Shahe City, a 25 km long, 110-kV transmission line will be constructed between Yulu and Suting. This line will pass through 8 villages. A new 110-kV substation will be constructed at Yulu, and the Suting and Dalian 110-kV substations will be expanded. Two 35-kV substations will be constructed at Wulibei and Donghu and the 35-kV Liucun substation will be rehabilitated. Thirteen km of 35-kV transmission line will be rehabilitated and 440 km of 10-kV transmission line will be built or rehabilitated This will improve electricity service to 43 villages.

1.2.1.3 Handan City

- Guangping County

  In Guangping County, a 10 km long, 110-kV transmission line will be constructed from Guangping to Feixiang. This line will pass through 8 villages. Three 35-kV substations will be built at Nanyang, Menggu and Nanshuangmiao.. Three 35-kV transmission lines,

with a total length of 42 km, will be built or rehabilitated. In addition, 138 km of 10-kV transmission line will be constructed or rehabilitated. These lines will improve service to 13 villages. Moreover, 25 transformers that are known to cause significant power losses will be rehabilitated or replaced. These transformers supply the electricity services to 25 villages.

- Guantao County

  In Guantao County, a new 110-kV substation will be constructed at Weizengzhai. Two 35-kV substations will be rehabilitated and two 35-kV transmission lines with a total length of 28 km will be constructed. Electricity service to 14 villages will be improved by the construction or rehabilitation of 162 km of 10-kV transmission lines. Furthermore, power service to 61 villages will be improved through the rehabilitation of 650 km of low voltage distribution lines.

- Linzhang County

  In Linzhang County, a new 110-kV substation will be built at Liuyuan and the capacity of the 110-kV Luocun substation will increased. A new one-circuit Liuyuan transmission line, 8 km in length, will pass through 9 villages. Two 35-kV substations will be constructed at Ducun and Chengou and the 35-kV Linni substation will be rehabilitated. Two 35-kV transmission lines, 12 km in length, will be rehabilitated and 238 km of 10-kV transmission line will be built or rehabilitated. These lines supply power to 13 villages. Service to 67 villages will be improved through the rehabilitation of 652 km of low voltage distribution lines.

- Shexian County

  In Shexian County, a 110-kV substation will be constructed at Guanfang along with two 35-kV substations at Guxin and Qingta. The 35-kV substations at Xida and Shimen will be rehabilitated. A 12 km long, one-circuit 35-kV transmission line, the Guxin Line, will be built. Power service to 13 villages will be improved through the construction or rehabilitation of 159 km of 10-kV transmission lines.

- Daming County

  In Daming County, two 110-kV substations will be constructed at Huangjindi and Weidong and a 35-kV substation will be constructed at Shageda. The 35-kV Beifeng substation will be rehabilitated and 7 km of 35-kV transmission line will be constructed or rehabilitated. Power service to 14 villages will be improved through the construction or rehabilitation of 198 km of 10-kV transmission lines. Moreover, 316 km of low voltage distribution lines will be rehabilitated to improve power service to 42 villages.

- Weixian County

  In Weixian County, a 35-kV substation will be constructed at Yuanbao, and the 35-kV Huilong substation will be rehabilitated. Thirteen km of 35-kV transmission lines will be rehabilitated and 304 km of 10-kV transmission lines will be built or rehabilitated which will improve electricity service to 24 villages. In addition, 38 transformers in 33 villages will be replaced or rehabilitated to reduce power loss.

1.2.1.4 Baoding City

- Laiyuan County

In Laiyuan County, a 120-MVA transformer will be installed in the 110-kV Laiyuan substation located 0.5 km west of the Laiyuan County seat. From the Laiyuan substation, 28 km of 10-kV distribution lines will be constructed and 395 km of low-voltage power network will be rehabilitated. This will improve power service for 39 villages.

- Fuping County
  In Fuping County, a 35-kV substation will be constructed at a location about 13 km south of the Fuping County seat. In addition, 15 km of 35-kV distribution line will be constructed from the Dongxiaguan Substation.

- Tangxian County
  In Tang County, an existing 110-kV substation will be expanded and the capacity of the Baihe and Dayang Substations will be increased to 35-kV. Power service to 16 villages will be improved by the construction and rehabilitation of 112 km of 10-kV distribution lines.

- Shunping County
  In Shunping County, a 110-kV substation will be constructed at Baiyun. Two 35 kV substations will be constructed at Yutai and Qingxing. and the capacity of the 35-kV Anyang Substation will be increased. The project will also include rehabilitation of 8.5 km of 35-kV transmission lines, and 65 km of 10-kV distribution lines will be constructed or rehabilitated to improve power service to 12 villages.

- DingZhou City
  In DingZhou City, a 110-kV substation will be constructed at Dongting. An 18 km long, 110-kV transmission line, the Dongting line, will be constructed. This line will pass through 10 villages. Two 35-kV substations will be constructed at Dongwang and Dalu. Power service to 18 villages will be improved through the construction or rehabilitation of 175 km of 10-kV transmission lines. To reduce network loss, 30 transformers will be rehabilitated or replaced to benefit 30 villages. Power service to 59 villages will be improved with the rehabilitation of 514 km of low-voltage lines.

1.2.2 Design Procedures

HEPC entrusted Hebei Electric Power Design Institute (HBED) to conduct the design and plan for the rural electrification program in 1997. The experts prepared the detailed design of the project. From May to October 2001, the representatives from county land bureaus, civil administration bureaus and affected villagers, together with each county power supply company, conducted investigations into the physical and engineering conditions of the project areas. The draft detailed rural electrification plan was then completed with the participation of the county and village representatives. During the planning and design period, HEPC asked the 23 county power supply companies to disseminate information on the electric power regulations, knowledge on the use of electric power and so on. The design on the rural electrification was later modified according to the comments and suggestions from the affected villagers. The rural electrification plan was finalized in December 2001.

1.2.3 Description of Beneficiary Areas

The rural electrification program targets 23 beneficiary counties, including twelve state-designated and three province-designated poverty counties. The twelve national poverty

counties include Zanhuang, Pingshan, Lingshou, Guangping, Shexian, Daming, Weixian, Guangzhong, Lincheng, Laiyuan, Fuping, Shunping County. The three provincial poverty counties include Xingtang, Guantao and Tangxian. These counties are located in the four cities of Shijiazhuang, Handan, Xingtai and Baoding of the Hebei South Power Grid area. The land area totals 2.74 million square kilometers. In 2000, the population in the counties was 9.55 million, of which 49.19% or 4.70 million were female. People living in the rural areas of the counties will benefit from the reduction of transmission line loss and associated tariff reduction as a result of the Project. The average per-capita income for rural residents in 23 countries was RMB 2,238 in 2001, which was 9.7% lower than provincial average income per capita which was RMB 2479. The socio-economic condition of the project area, please shows in Table 1-2,

1.2.4 Areas Affected and Served by the Project

1.2.4.1 Rural Electrification Benefits

The project includes rural electrification in 23 counties. The total investment is RMB1,121,941 million yuan. The construction of the project would have a number of benefits on society, economy and environment.

- Improving the quality and reliability of power supply

After the rebuild of the rural power network of 23 counties, the structure of the network will become rational. It is in line for the transmission, transformer and power supply. Indirect transmission line is deleted. Power supply ability is improved greatly. Advanced equipment and administrative technique is used in the rural power network and the reliability will be improved more. At the same time, power supply increased is $8.104X10^8$kw.h.

- Reducing line lose

  Through newly build and rebuild of the transmission lines and power stations, the structure of the network will become rational, the power supply radius shortened and electric-magnetism change decreased. The line loss will reduce from more than 20% to 12%.

- Contributing to socioeconomic development

  The project will promote the development of economy and production in the construction areas. About 9.56 million people will directly benefit from reduction of transmission line loss and tariff reduction through rural electrification. The rehabilitation of the low-voltage transmission lines leads to a great reduction of line losses in the rural area, and less electricity charges will be paid for the same energy consumed. About 5.95 million people will directly benefit from this. Most of the beneficiaries' incomes are below the average level of the province or the county, they are considered to be poor. Consequently, the construction of the project would help them to change their living situations.

1.2.4.2 Impacts and Mitigation Measures

Land Acquisition by Construction of Transmission Line

The transmission line passes through agricultural land area. The tower and pole foundations will occupy land permanently. Altogether 3.18 hm^2 of land will be needed. Of this, 1.55 hm^2 is farmland. It will affect 1,387 villages, 50,270 families and 153,690 people.

The land occupation ratio for each affected village is lower than 0.05%, per capita farmland area will not change significantly. Land area of 58 m^2 is the most severely affected for the family's farmland, accounts for 3.8% of the family's farmland. The number of affected households whose land will be taken from 0.12 to 0.25 m^2 is 45,332, accounting for 90 percent of all the affected households. There is neither house demolition nor villager move.

The transmission lines will be strung between poles using a tension method so that traffic on the roads will not be significantly affected. The potential effects to humans, livestock, plants and wildlife will be minimized. The transmission line corridors will not affect areas which were minority nationalities are residing. Consequently, no impacts to cultural resources are anticipated.

Substation

The newly built substation will occupy land permanently, but the rehabilitated substation will not occupy any additional land. The project will affect 79 villages and occupy land 8.56 ha, including 4.31 ha farmland. All the land occupation percentage is lower than 0.38% of the affected villages. There is neither house demolition nor villagers needing to be resettled.

The internal land adjustment will be conducted in the affected villages. The average land area per capita will be reduced by 15.9 m^2 - 3 m^2 after the adjustment, which is believed to result in little effect on agriculture production. The village government will receive permanent land acquisition compensation and relocation compensation, which will be used to recover the income of the affected persons. The land acquisition compensation will be used to develop collective production; it can be also used for production with the consensus of 2/3 of the villagers so as to compensate the cost for the loss of farmland. The villagers whose farmland is occupied will receive compensation for young crops.

The above mentioned land acquisition compensation cost has be included in the project cost estimate. The Land acquisition compensation cost for the rural electrification is RMB696,686 yuan. Of the total cost, the land acquisition compensation for transmission line is RMB113,937 yuan, the land acquisition compensation for substation is RMB582,749 yuan.

Table 1-2Socio-Economic Conditions in the Project Area

County		Total area (km^2)	Population ($\times 10^4$)	Agricultural population ($\times 10^4$)	GNP ($\times 10^4$ yuan)	Per capita GNP (yuan/person)	National Minorities
A	**Shijiazhuang City**						
1	Jingxing County	1381	33.09	29.4	274053	8316	The minorities have a sparse population and no centralized housing area.
2	Zanhuang County	1210	22.96	20.98	116080	5100	The minorities have a sparse population and no centralized housing area.
3	Pingshan County	2951	45.67	42.05	304941	6743	The minority population is over 70, most of which are the Zhuangzu and Huizu people.
4	Lingshou County	1546	31.38	27.4	179829	5700	The minorities have a sparse population and no centralized housing area.
5	Yuanshi County	849	38.73	35.8	314926	8100	The minorities have a sparse population and no centralized housing area.
6	Wuji County	524	48.5	44.8	337381	7000	The minorities have a sparse population and no centralized housing area.
7	Xingtang County	1025	41.05	37.4	228367	5600	The minorities have a sparse population and no centralized housing area.
B	**Xingtai City**						
1	Lincheng County	797	19.07	17.27	108156	5700	A population of less than 20.
2	Xingtai County	1983	45.35	43.3	260418	5700	The minorities have a sparse population and no centralized housing area.

Continue Table1-2

County		Total area (km^2)	Population ($\times 10^4$)	Agricultural population ($\times 10^4$)	GNP ($\times 10^4$ yuan)	Per capita GNP (yuan/person)	National Minorities
3	Xinhe County	366	16.55	15.2	78822	4800	The minorities have a sparse population and no centralized housing area.
4	Guangzong County	493	26.76	25.4	95507	3600	The minorities have a sparse population and no centralized housing area.
5	Shahe City	999	47.09	39.8	371726	7900	The minorities have a sparse population and no centralized housing area.
C	Handan City						
1	Guangping County	320	24.74	23.2	129166	5200	The minorities have a sparse population and no centralized housing area.
2	Guantao County	456	27.83	25.7	143696	5200	The minorities have a sparse population and no centralized housing area.
3	Lincheng County	744	57.16	54.1	211170	3700	The minorities have a sparse population and no centralized housing area.
4	Shexian County	1489	37.89	34.4	201239	5300	The minorities have a sparse population and no centralized housing area.
5	Daming County	1056	73.18	69.1	262494	3600	The minorities have a sparse population and no centralized housing area.
6	Weixian County	851	79.03	74.9	270101	3400	The minorities have a sparse population and no centralized housing area.

Continue Table1-2

County		Total area (km^2)	Population ($\times 10^4$)	Agricultural population ($\times 10^4$)	GNP ($\times 10^4$ yuan)	Per capita GNP (yuan/person)	*National Minorities*
D	**Baoding Cyty**						
1	Laiyuan County	2448	26.25	22.1	99890	3800	The minority population is about 200, most of which are the Manzu and Huizu people. The minorities have no centralized housing area.
2	Fuping County	2476	20.5	18.1	73348	3600	The minority population is about 280, most of which are the Manzu and Huizu people. The minorities have no centralized housing area.
3	Tangxian County	1402	52.1	48.3	147764	2800	The minority population is about 200, most of which are the Manzu and Huizu people. The minorities have no centralized housing area.
4	Shunping County	708	29.3	27.1	141386	4800	The minority population is about 480, most of which are the Manzu and Huizu people. The minorities have no centralized housing area.
5	Dingzhou City	1284	111.62	100.4	615311	5500	The minorities have a sparse population and no centralized housing area.

1.3 Closure of Small Old Coal-Fired Units

1.3.1 Brief Description of Project

The project includes the to-be-closed small units at five coal-fired power plants of south Hebei. The units will be closed by Hebei Electric Power Corporation (HEPC) from 2002 to 2005(See Table1-3). There will be 20 units, with the total retiring capacity of 505MW. They include nine units at Shijiazhuang Thermal Power Plant (unit No. 1, No.3 to 10, total capacity of 135MW), three units at Xingtai Power Plant (unit No.1 to 3, total capacity of 90MW), three units at Baoding Thermal Power Plant (unit No.1 to 3, total capacity of 100MW), 3 units at Handan Thermal Power Plant (unit No.3, 7 and 8, total capacity of 80MW), two units at Shexian Power Plant (unit No.3 and 4, total capacity of 100MW).

Shijiazhuang Thermal Power Plant is located in Shijiazhuang City, Xingtai Power Plant in Xingtai City, Handan Thermal Power Plant in Handan city. Shexian Power Plant 10 km south of Shexian County town and Baoding Thermal Power Plant in Baoding City.

Table 1-3 Plan for Closure of Small Thermal Power Units

Name	Unit No.	Capacity (MW)	Year of Closure
Shijiazhuang Thermal Power Plant	1#	12	2002
	3#	12.5	2002
	4#	12.5	2002-2003
	5#	12	2002-2003
	6#	12	2003-2004
	7#	12	2004-2005
	8#	12	2004-2005
	9#	25	2004
	10#	25	2004
Xingtai Power Plant	1#	25	2002-2003
	2#	25	2002-2003
	3#	40	2002-2003
Handan Thermal Power Plant	3#	25	2002-2003
	7#	25	2002-2003
	8#	30	2002-2003
Baoding Thermal Power Plant	1#	25	2003-2004
	2#	25	2003-2004
	3#	50	2003-2004
No. 150 Power Plant	3#	50	2005
	4#	50	2005

1.3.2 Design Procedure

Zhanghewan Pump Storage Power Station Project Office (ZHWPO) entrusted Hebei Electric Power Investigation, Design & Research Institute (HEDI) for the environment impact assessment. The professionals of the Institute gathered data and investigated the site from December, 2001 to February, 2002. They will complete the report at the end of March.

1.3.3 Environmental Profile

The coal-fired plants which include the to-be-closed units are all in Hebei province. Four are in the cities, and the No. 150 power plant is at the edge of the county town. The socio-economic conditions of the project areas are shown in Table 1-4. No land acquisition and resettlement will be involved. All affected employees will be redeployed at existing or new power plants, or reassigned to non-core business units of the power company. The Hebei Electric Power Corporation (HEPC) will ensure that no job loss will take place during the closure process. Specifically, 17.2 percent of the affected employees will be re-assigned to newly constructed power plants or units; 78.2 percent will be re-trained and re-assigned to new positions of new plants; and the remaining 4.6 percent will be re-trained and re-assigned to other service departments and enterprises within the power sector.

Table 1-4 Socio-Economic Situation

Plant Name/Location	Per Capita GDP (yuan/person)	Population within 30 km Radius of Plant ($\times 10^4$)	Population within 30-80 km Radius of Plant ($\times 10^4$)	Mean Annual Growth of Population in the County (‰)
Shijiazhuang Thermal Power Plant	9,753	196.7	228.0	3.10
Shijiazhuang City				
Xingtai Power Plant	5,107	96.6	107.0	3.71
Xingtai City				
Baoding Thermal Power Plant	6,077	94.2	166.7	3.21
Baoding City				
Handan Thermal Power Plant	5,726	37.8	68.4	3.24
Handan City				
150 Power Plant	4,885	32.6	35.3	3.20
She County				
Total		467.8	525.4	

1.3.4 Project Impact

The small units will be dismantled by the personnel organized according to HEPC's plan. The dismantling personnel include the employees from Hebei Electric Power Construction Company and the local. All the dismantling personnel will live within the Power Plants or nearby temporary house. There are dining room, shower room, club and other living facilities in the temporary house area, so the dismantling personnel will have no negative influence on the local residents. The dismantling personnel will be organized, managed and dispatched by the contractor. They will draft dismantling plan, procedures, safety and environment protection measures, so as to ensure the security of the workers and reduce the influence on the social security and local environment.

After the closure of the small units, there will be 2283 personnel should be redeployed (Table1-5). Some of them will choose their job again. HEPC and the power plants have three ways to arrange the personnel:

- 392 personnel will be arranged to the newly built or rebuilt units with the position they are familiar with after 1 month training.
- 1,536 personnel will be trained for 6 months training and sent to the new position for the newly built or rebuilt units.
- 251 personnel will be trained and sent to the administrative position for the newly built plants.
- The remaining 104 personnel will be trained and re-deployed to other departments (service department).

New units will be built to replace the closed ones. The total capacity of the new units will amount to 1830MW. Through training, 2,203 personnel will be redeployed, and 2,179 personnel will work for the newly built units or rebuilt units and adapt to the new positions fully.

Through training, 104 personnel will be arranged to work at other department of the power plants, (e.g., Bottled Drink Water Factory (belonging to Shijiazhuang Thermal Power Plant), Electric Equipment Factory (belonging to Baoding Thermal Power Plant), and a restaurant (belonging to Shexian Power Plant). No change in income is expected.

Table1-5 Number of Workers Needing Redeployment

	Name	Total Number of Staff
1	Shijiazhuang Thermal power plant	728
2	Xingtai power plant	431
3	Handan Thermal power plant	326
4	Baoding Thermal power plant	594
5	150 Power Plant	204
	Total	2,283

1.4 Irrigation

1.4.1 Brief Description of Project

There are three irrigation areas in the downstream of the Zhanghewan Lower Reservoir. They include the Mianyou, Renmin and Xiyu (first stage). The Mianyou and Renmin irrigation

areas divert water from the Mian River which is a branch of the Ye River. The Mianyou irrigation area consists of the left and the right canal. The Renmin irrigation area consists of Renmin canal and Minzhu canal. The Xiyu irrigation area is irrigating land from the Zhanghewan Lower Reservoir directly, with a length of108 km. About 47 km has been completed in the first stage. It can offer water for the areas located in the south of Mian River and the west of the Gantao River. The irrigation area is 1,476 ha.

A new canal in Jingzhuang is under planning. In order to obtain a high guarantee ratio, water will be diverted from the Xiyu canal to the Mianyou canal through this new canal. The irrigation area is 2,500 ha. After the completion of the second phase, the irrigation area of the Xiyu canal will increase to 3,467 ha.

In summary, with the ZPSPP, the irrigation area will increase from 1,467 ha to 8,167 ha, including 2200 ha in the Dongyu irrigation area, 3,467 ha in the Xiyu irrigation area and 2,500 in the Mianyou irrigation area.

1.4.2 Benefits

In addition power generation, the reservoir will also be used for downstream irrigation purposes in JC. At present, a large proportion of land is dry land. Of the 318 administrative villages in JC, 34 villages have no irrigated land. In these villages, the grain output is low and the villagers have to rely on the purchase of grain or government relief to maintain their minimum food consumption, with most of them living under poverty. With the Project, the irrigation water supply to the downstream area will be increased from the present 6.6 million cubic meters to 61.9 million cubic meters annually. The effective irrigation area will be increased to 8,167 ha from current 1,467 ha, which will contribute to the development of agricultural production and increase agricultural production value in the project area. The increased irrigation area covers 92 administrative villages in JC. The cost for the rehabilitation works of the existing canals is included in the Project cost. The number of beneficiaries of the irrigation component will amount to 69,340.

Neither land acquisition nor population resettlement will be involved.

1.5 Afforestation Program

As part of the environmental mitigation measures, the afforestation component of the Project will involve the planting of 16,330 ha of various types of trees in JC between 2002 and 2008. As a result, the forested area will increase from 64,126 ha to 80,456 ha in Jingxing County. More specifically, 60,000 peach trees, 31,980 apple trees, 139,800 poplar trees, 99,600 candlenut trees, 159,600 pine trees, and 688,200 other types of trees will be planted, such that the forest cover of JC will increase from 46 to 58 percent. The afforestation program will be implemented by JC. The JC Environmental Protection Bureau will issue a certification indicating the completion of the afforestation program and the environmental benefits achieved under the afforestation program. The afforestation program will provide opportunities to the local communities to generate income.

There will be 3 types of people benefit from the project, those planting orchards and selling the fruits, those planting timber trees and selling the woods, those planting and tendering the forests and receiving payment for labor. The population who will benefit from the afforestation program will amount to 58,230 in 15 towns, 246 villages.

Neither land acquisition nor population resettlement will be involved.