

APPENDIX-11 COST RECOVERY AND PROJECT EVALUATION

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CHAPTER 1 INTRODUCTION

Justification of the project is discussed in this chapter from the viewpoints of economy. The evaluation is made applying both quantitative and qualitative methods. Direct and tangible effects are evaluated from the viewpoint of national and farm economies. Indirect and intangible impacts are discussed qualitatively.

The economic analysis of the project is carried out by the discounted cash flow analysis using shadow prices, which reflect economic efficiency in the national economy. The economic internal rate of return (EIRR) is used as a measure to determine the economic feasibility of the project. Possible risks are assessed by several case studies as well as sensitivity analysis.

Economic evaluation is principally conducted with the major projects, which target on the realization of irrigated agriculture by Sunsari river water. Of the six projects proposed in this Study, the said major projects include four projects, which are SRIP as the core, supporting infrastructures, agriculture supporting and environmental mitigation. Integration of these four projects will enhance the realization of the expected project benefit, thus they should be implemented in close relation.

As for the remaining, the project of groundwater development is excluded from the analysis, since the project will be independently implemented in the southern most part of the Study area, where the Sunsari river water cannot be given by gravity. Another project of drainage re-use is also excluded from the major ones due to uncertainty of the realization of the project benefit. Table 1.1 summarizes the costs of the major projects.

Table 1.1 The Major Projects Cost (Financial Price excluding Tax)

| Description | Project Cost | | Remarks |
|---|----------------------|--------------|------------------|
| | (Rs) | (mil US\$) | |
| 1. SRIP | | | |
| 1.1 Hardware | | | |
| 1) Headwoks/Intake | 330,875,000 | 4.24 | 1)+2)= |
| 2) Main Canal | 323,271,000 | 4.14 | (Rs) 654,146,000 |
| 3) Secondary Canal | 146,495,000 | 1.88 | (mil US\$) 8.39 |
| 4) Tertiary Canal | 116,590,000 | 1.50 | |
| 5) Canal Protection Works | 5,662,000 | 0.07 | |
| 6) Drainage Structure | 15,297,000 | 0.20 | 3)~9)= |
| 7) Office Building | 1,155,000 | 0.02 | (Rs) 318,420,000 |
| 8) Quality Testing Lab | 3,465,000 | 0.04 | (mil US\$) 4.08 |
| 9) Farm Development Works (Watercourse) | 29,756,000 | 0.38 | |
| Sub Total (1) | 972,566,000 | 12.47 | |
| 1.2 Software | | | |
| 1) Institution Development | 58,443,000 | 0.75 | |
| 2) Consultant Services | 108,638,000 | 1.39 | |
| Sub Total (2) | 167,081,000 | 2.14 | |
| 1.3 Others | | | |
| 1) Land Acquisition | 113,808,000 | 1.46 | |
| 2) Administration | 21,728,000 | 0.28 | |
| Sub Total (3) | 135,536,000 | 1.74 | |
| Main Component Total | 1,275,183,000 | 16.35 | |
| 2. SUPPORTING INFRASTRUCTURES | 23,318,000 | 0.30 | |
| 3. AGRICULTURE SUPPORTING | 42,465,000 | 0.54 | |
| 4. ENVIRONMENTAL MITIGATION MEASURES | 45,874,000 | 0.59 | |
| Grand Total | 1,386,840,000 | 17.78 | |

The supporting infrastructures include improvement of access roads and preparation of

collection point of vegetables. Extension program for vegetable production and promotion program for vegetable marketing will be implemented as the agriculture supporting program. As for the environmental mitigation measures, fishponds are planned to construct as hardware, and also extension services, environmental monitoring and auditing will be carried out as software. Contents and costs before taxes are added are summarized as Table 1.1.

CHAPTER 2 ECONOMIC AND FINANCIAL ANALYSIS

2.1 Basic Assumptions

The following assumptions are assumed in the economic evaluation procedure. As for monetary terms, all prices are given in 2002 constant prices with an exchange rate of US\$ 1.0 = Rs 78.0.

1) Assumptions on Period

Assumptions on the periods related to the cost disbursement and benefit accrual are as follows:

1.1) The economic life of the respective project is assumed basically to be 50 years from the start of implementation. The evaluation of the Sunsari River Irrigation Project is evaluated in the term from 2004/05 to 2053/54.

1.2) The project activities including preparatory works, survey and detailed design, construction, water users group formation and support are set according to the project implementation schedule. The project cost stream is made from the survey and detailed design at the first year to the completion of construction at the seventh year. After the construction the project benefit is expected according to the progress of the command area development. Yields of vegetables are assumed to increase 10 % a year, and others are 20 % a year.

1.3) The irrigation benefit is presumed to increase year by year. The build-up period to achieve the full benefits is based on the present agricultural status such as the level of cropping intensity, farming practices and crop productivity. In the command area, proportion of drought area is higher compared with northern part of Sunsari basin and sandy soil is extending more. The annual benefit will reach to its full value at the 17th year from the commencement of the Project.

2) Economic Factors

In economic evaluation, all of the costs and benefits are converted to economic value (shadow price or efficiency price), which embodies resource endowment of the national economy. In determining or estimating the economic prices, the following methods and assumptions are applied.

2.1) Standard Conversion Factors

A standard conversion factor (SCF) of 0.90 is ever used in Nepal to adjust the foreign exchange premium or trade distortion. In Nepal, trade interventions have been reduced

along with the liberalization policy of the Government. In accordance with such environmental change, it might be required to revise the SCF. However, to keep consistency with the analyses of the other projects, SCF of 0.90 is employed in this Study.

2.2) Traded Commodities

The economic farm gate prices of traded agricultural inputs and outputs are to be given in form of their import or export parity prices. These values are derived from the World Bank Global Commodity Markets in June 2000. Adjustments for quality difference, freight and insurance, handling, processing and transportation are made in deriving the farm gate prices. Paddy, wheat and sugarcane are assumed to be import substitutes in view of increasing trend of import amounts. Jute is treated as an export commodity. Derivation process of economic prices is given in Table 2.1.1.

2.3) Non-traded Commodities

The SCF of 0.90 is multiplied for converting financial prices to economic prices. Financial and economic prices of commodities to be produced or consumed in the project area are summarized in Table 2.1.2.

Pulses (Mungbean, Lentil), Potato, Oilseed (Mustard) and Vegetables (Cucumber family, Cauliflower) are valued at adjusted farm gate prices in 2002 after modifying with SCF of 0.90. Agro-chemicals have been traded by private traders, though AIC also deals with them. The economic values are estimated in the same value of financial prices.

2.4) Labor Wage Rate

A shadow wage rate of Rs 39.4 /day is used for farm labor cost. The project area is regarded as of labor excess economy. The average wage rate at Rs 58.4 /day for farm labor is not the one that represents seasonal unemployment and underemployment broadly observed in the area. A conversion factor of 0.75 for unskilled laborers together with SCF of 0.90 is applied to get a shadow wage rate (SMIP III *Detailed Feasibility and Design*, 1995). The same conversion factor ($0.75 \times 0.90 = 0.675$) is applied to unskilled common labor cost in construction works, of which rate is Rs 70 /day.

2.5) Transfer Payment and Investment Costs

Transfer payment such as tax, duty, royalty, subsidy, interest, etc. are considered as a domestic monetary movement without direct goods and services. These transfer payments are excluded in estimating economic costs and benefits.

The financial construction costs are first divided into foreign exchange costs and domestic currency costs. The later is divided into transfer payment, unskilled labor and others. Foreign exchange costs are valued as they are. Domestic components are converted using construction conversion factors (CCFs), which are the economic cost ratios to the respective financial cost components. The CCFs are estimated on the basis of the proportion of the foreign and local costs including transfer payment and other local cost items applying by SCF (0.90), conversion factor for unskilled laborers (0.675) and for Land (1.13) as shown in Table 2.1.3.

2.6) Discount Rate

The discount rate or the opportunity cost of capital used for calculation of the net present value (NPV) and sensitivity analysis is assumed to be 12 %.

2.2 Case Study

For the economic evaluation of the Project, following four cases are examined. In monsoon season, all cases will execute Surface Water Irrigation (SWI) for the whole command area, and achieve to full yield expected by the Project. In Case 0, which this Study proposes as the Base Case, the Sunsari river water will not be diverted at all during winter season in order to maintain the current volume of the river flow at lean period, considering the adverse affect to the fishery in the river. The entire area during winter season would be covered by Tube Well Irrigation (TWI) as practiced at present. Therefore, the yields of winter crop will not change by the Project.

In Case 1, the river water is distributed into about a half of the command area during winter season, through either Suksena or Shankarpur canal by every year rotation assuming that paper factories located down stream reaches of the river should establish a treatment plant reducing the effluent by 80%. However, the amount of water extracted from the river is 50 %, only to be the level of enabling preventive irrigation to meet the requirement of the downstream river water quality, according to the degree of reduction of the effluent from the paper factories and the compensation to the fishermen whose occupation will be affected by the project (50 % of whole compensation cost is appropriated). This case would not allow the increase of the crop yields from the present level but only to save the pumping cost of shallow tube well by alternating the source of water.

As for Case 2, the command area covered by the SWI would be same as the Case 1, namely about a half of the area would be irrigated by the rotational irrigation. But the system can extract 80 % of the river water and provide the water onto the farm by the level of conventional irrigation, assuming the establishment of treatment plant in the paper factories meeting with Nepal Standard, and agreement of compensation to the concerned fishermen (100 % of whole compensation cost is appropriated). In this case, the increase of yields at full extent can be realized by the Project.

Table 2.2.1 Description of Cases

| Case | Spring Monsoon | Winter | | Water Extraction during Winter | Conditions |
|---------------|-------------------------------|--|-----------------------------------|---|---|
| Case 0 (Base) | SWI Full Yield 10,147ha | TWI No Yield Change 10,147ha | | No extraction from Sunsari River | No condition is required. |
| Case 1 | SWI Full Yield 10,147ha | SWI No Yield Change 5,074ha (Diesel cost reduction is the benefit.) | TWI No Yield Change 5,074ha | 50% extraction (Min. 1.8 cum/s DS release) | 1. Paper factories should establish a treatment plant reducing the effluent by 80%. 2. 50% of aquaculture promotion in Maria Dhar or any form of compensation including farm land provision is agreed with and arranged for the concerned fishermen (about 180 HHs). |
| Case 2 | SWI Full Yield 10,147ha | SWI Full Yield 5,074ha | TWI No Yield Change 5,074ha | 80% extraction (Min. 0.7 cum/s DS release) | 1. Paper factories should establish a treatment plant meeting with Nepal Standard. 2. Aquaculture promotion in Maria Dhar or any form of compensation including farm land provision is agreed with and arranged for the concerned fishermen (about 180 HHs). |
| Case 3 | SWI Full Yield 10,147ha | SWI Full Yield 7,131ha | TWI No Yield Change 3,016ha | Min. 3.8 - 5.0 cum/s water release from SMIP, and min. 1.8 cum/s DS release | No condition is required. |

Note: SWI = Surface Water Irrigation, TWI = Tube Well Irrigation

For Case 3, the case assumes that the irrigation water from SMIP through Suksena and Shakarpur canals could serve the command area in winter season with 3.8 to 5.0 cum/s. In this case, about 70 % of the command area would be serviced by the surface water and therefore, surplus O & M cost for SMIP is required. Every year, 70 % of the command area could enjoy the sufficient surface irrigation water accruing the full extent of crop yield increase and saving of the pumping cost. The conditions of each case are summarized as above Table 2.2.1.

2.3 Project Cost

2.3.1 Initial Investment Cost

The total initial investment cost at financial price with taxes included is estimated at 1,509 million Rs (19.3 million US\$) in the Base Case. In Case 2, the cost of which amounts to the largest sum among the four cases due to full compensation for fishermen, it is estimated at 1,560 million Rs (20.0 million US\$). The cost of the Base Case is converted to 1,160 million Rs (14.9 million US\$) at economic price by applying the respective construction conversion factors (CCFs) according to the components and eliminating the transfer payments. In Case 2, the cost is converted to 1,200 million Rs (15.4 million US\$) at economic price.

Table 2.3.1 Initial Investment Cost (Financial Price including Tax / Economic Price)

| Description | Case 0 (Base Case) | | | | Case 2 | | | |
|--------------------------------------|--------------------|--------------|----------------|--------------|-----------------|--------------|----------------|--------------|
| | Financial Price | | Economic Price | | Financial Price | | Economic Price | |
| | (mil Rs) | (mil US\$) | (mil Rs) | (mil US\$) | (mil Rs) | (mil US\$) | (mil Rs) | (mil US\$) |
| 1. MAIN COMPORNT | 1,275 | 16.35 | 1,104 | 14.15 | 1,275 | 16.35 | 1,104 | 14.15 |
| 2. SUPPORTING INFRASTRUCTURES | 23 | 0.30 | 19 | 0.25 | 23 | 0.30 | 19 | 0.25 |
| 3. AGRICULTURE SUPPORTING | 42 | 0.54 | 37 | 0.47 | 42 | 0.54 | 37 | 0.47 |
| 4. ENVIRONMENTAL MITIGATION MEASURES | - | - | - | - | 46 | 0.59 | 40 | 0.51 |
| 5. Tax | 169 | 2.15 | - | - | 174 | 2.22 | - | - |
| Total | 1,509 | 19.34 | 1,160 | 14.87 | 1,560 | 20.00 | 1,200 | 15.38 |

2.3.2 Replacement Cost

The machineries and equipments need to be replaced when their useful lives end. The construction or procurement costs together with the useful lives by component are shown in the following Table 2.3.2.

Table 2.3.2 Summary of Replacement Cost

| Component | Useful life (Years) | Financial Cost (mil. Rs) | Economic Cost (mil. Rs) |
|------------------------|---------------------|--------------------------|-------------------------|
| Headworks/Electric | 10 | 15 | 11 |
| Main Canal | 30 | 368 | 277 |
| Secondary Canal | 15 | 133 | 101 |
| Tertiary Canal | 15 | 191 | 144 |
| Farm Development Works | 15 | 105 | 67 |
| Canal Protection Works | 15 | 7 | 5 |
| Drainage Structure | 30 | 19 | 15 |
| Access Road | 20 | 24 | 18 |
| Collection Point | 35 | 2 | 1 |

Note: Each component is a title of its items, which need to replace in the economic life.

Replacement costs for the facilities of headworks, canals and roads etc. are shown in Table 2.3.3 and 2.3.4, which also shows disbursement plan.

2.3.3 Operation & Maintenance Cost

As it has been mentioned in Chapter 9, operation and maintenance costs consist of salaries of the government staff in charge of the SRIP and administrative cost of WUCs such as employment of book keeper and honorarium of the committee members, as well as the physical maintenance for the headworks, main canals etc. The total O & M cost of the SRIP is estimated at 10.1 million Rs per year and then its economic cost comes up at 8.0 million Rs per year as shown in Table 2.3.5.

2.4 Project Benefit

2.4.1 Crop Production Benefit

The primary benefit of the project accrues from the increase of agricultural production, namely increase of yields and cropping intensity, and also introduction of diversified crops will bring the increase of agricultural profit. To estimate the economic benefit of the crop production, the economic price of crops and inputs shown in Table 2.4.1 below are applied;

Table 2.4.1 Prices of Inputs and Outputs

| Item | Fin. Price | Eco. Price |
|--------------------------|------------|------------|
| Paddy | 8.7 | 16.9 |
| Wheat | 9.0 | 19.9 |
| Oilseed/Mustard | 16.6 | 14.9 |
| Pulses/Lentil | 18.4 | 16.6 |
| Potato | 8.8 | 7.9 |
| Cucumber family | 10.5 | 9.5 |
| Cauliflower | 5.0 | 4.5 |
| Sugarcane | 1.3 | 2.4 |
| Jute | 9.7 | 18.3 |
| Urea | 13.0 | 19.0 |
| DAP | 17.8 | 25.7 |
| Potash | 13.1 | 20.7 |
| Unskilled Labor (Rs/day) | 58.4 | 39.4 |

(Unit: Rs/kg)

Incremental benefit is derived from the difference of net production values between with and without project conditions. The economic benefits at Base Case and Case 2 are given in Table 2.4.2 below;

Table 2.4.2 Economic Incremental Benefit of Crop Production

| Items | Net Production Value in Base Case | | | Net Production Value in Case 2 | | |
|-----------------|-----------------------------------|---------|-------------|--------------------------------|---------|-------------|
| | Without | With | Incremental | Without | With | Incremental |
| | Project | Project | Benefit | Project | Project | Benefit |
| Paddy | 179,016 | 312,699 | 133,682 | 179,016 | 312,699 | 133,682 |
| Cucumber Family | 19,325 | 166,264 | 146,939 | 19,325 | 166,264 | 146,939 |
| Wheat | 123,415 | 123,415 | 0 | 123,415 | 189,318 | 65,903 |
| Lentil | 1,910 | 1,910 | 0 | 1,910 | 6,619 | 4,709 |
| Mustard | 231 | 231 | 0 | 231 | 943 | 711 |
| Potato | 87,120 | 87,120 | 0 | 87,120 | 108,188 | 21,068 |
| Cauliflower | 4,919 | 4,919 | 0 | 4,919 | 36,265 | 31,346 |
| Jute | 46,873 | 49,849 | 2,976 | 46,873 | 49,849 | 2,976 |
| Mungbean | 1,236 | 5,365 | 4,129 | 1,236 | 5,365 | 4,129 |
| Sugarcane | 11,339 | 78,456 | 67,117 | 11,339 | 78,456 | 67,117 |
| Total | 475,384 | 830,228 | 354,844 | 475,384 | 953,966 | 478,581 |

(Unit: thousand Rs)

The project activities including preparatory works, survey and detailed design, construction, water users group formation and relative support are scheduled at the beginning of the

implementation. The project commenced with the survey and detailed design is planned to complete in 7 years. After the completion of the headworks and the main canal within the first 4 years (Stage-I), a quarter of command area will be able to start using the water every year. Since the beginning of surface water irrigation, the benefit of the vegetables production is assumed to realize 10 % of the full benefit every year. Therefore, the full benefit of the vegetable production will be realized upon 10 years. For other crops including cereals, sugarcane and jute, the benefits are assumed to realize 20 % of the full benefits every year, namely, reach to the full benefits upon 5 years.

2.4.2 Saving Cost of STW's Operation

Another expected benefit of the project is a saving of STW operation cost. For the proposed Case 1, due to limited water supply from Sunsari river during winter season, the situation would force farmers to practice preventive irrigation. Under such condition, the crop production would not increase during winter season, but what can be expected is the saving of the STW operation cost. In the Case 1, about a half of the whole command area would receive the water from Sunsari river, so that the farmers receiving the surface water could save the operation cost of STW totaling 15.7 million Rs at economic price for winter crops.

2.5 Economic Evaluation

2.5.1 EIRR

EIRR calculation is carried out for the four cases and the EIRRs from Case 0 (Base Case), 1, 2, and 3 come up at 15.6 %, 16.1 %, 18.9 % and 20.2 % respectively. EIRRs of all the cases are over the opportunity cost of capital in Nepal, which is 12 %. It is, therefore, evaluated that the Project is economically feasible in each case as well as the Base Case. The NPV of the Base Case is estimated at 343 million Rs or 4.4 million US dollar. Table 2.5.1 summarizes the results of economic analysis. On the basis of the economic cost and benefit stream, the calculation was done as shown in Table 2.5.2 ~ 5.

Table 2.5.1 EIRR of 4 Cases

| Case | Case 0 (Base) | Case 1 | Case 2 | Case 3 |
|----------------------|------------------|--------|--------|--------|
| EIRR (%) | 15.6 | 16.1 | 18.9 | 20.2 |
| PV Cost (mil. Rs) | 822 | 835 | 848 | 847 |
| (mil. US\$) | (10.5) | (10.7) | (10.9) | (10.9) |
| PV Benefit (mil. Rs) | 1,165 | 1,235 | 1,587 | 1,735 |
| (mil. US\$) | (14.9) | (15.8) | (20.3) | (22.2) |
| NPV B - C (mil. Rs) | 343 | 400 | 738 | 888 |
| (mil. US\$) | (4.4) | (5.1) | (9.5) | (11.4) |
| B / C (12%) | 1.42 | 1.48 | 1.87 | 2.05 |

2.5.2 Sensitivity Analysis

A sensitivity analysis of the Project is carried out for the Base Case with several conditions; increase of initial cost, or O & M cost, decrease of vegetable prices and reduction of crop yield. Table 2.5.6 shows the results of the analysis, indicating that the feasibility of the Project would be the most sensitive to the failure of achieving the expected crop yield increase among the factors.

Table 2.5.6 Results of Sensitivity Analysis

| Items | Change In variable | EIRR (%) | Sensitivity Indicator (%) | Switching Value EIRR; 12% |
|--------------------------------|--------------------|----------|---------------------------|---------------------------|
| Base Case | | 15.6 | | |
| 1. Cost increased | | | | |
| Initial cost Increased (a) | + 20 % | 13.8 | 9.0 | + 46 % |
| O&M cost Increased (b) | + 20 % | 15.5 | 0.5 | + 950 % |
| 2. Benefit reduced | | | | |
| Vegetable prices decreased (c) | - 20 % | 14.7 | 4.5 | - 72 % |
| Crop yield lowered (d) | - 20 % | 9.2 | 32.0 | - 13 % |

Note: Sensitivity indicator is % change in EIRR over % change in variable.
Switching value is change in variable, with which the EIRR will be 12 %.

2.6 Farm Budget Analysis

2.6.1 Farm Models

According to the household survey, total average of farm size is 1.84 ha and average family size is 6.4 people. Five strata, which are Marginal, Small, Medium, Medium-Large and Large, were set up by farm size using the conclusion of the survey. Basic information of each class is shown in the following Table 2.6.1;

Table 2.6.1 Farm Model Divided by Farm Size

| Stratum | Category (ha) | Average Farm Size (ha) | Average Family Size (people) | Household Distribution (%) |
|--------------|---------------|------------------------|------------------------------|----------------------------|
| Marginal | Below 0.4 | 0.21 | 6.0 | 13.9 |
| Small | 0.4 ~0.9 | 0.75 | 5.9 | 26.2 |
| Medium | 0.9~1.8 | 1.59 | 6.4 | 25.2 |
| Medium-Large | 1.8~3.0 | 2.54 | 7.0 | 20.3 |
| Large | 3.0 and above | 5.33 | 6.9 | 14.4 |
| Overall | | 1.84 | 6.4 | 100.0 |

2.6.2 Incremental Net Income

Incremental benefit of overall is about 293 million Rs, in the Base Case of financial analysis, and about 410 million Rs in Case 2. The average per hectare is expected 28.9 thousand Rs in Base Case, and 40.4 thousand Rs in Case 2. Incremental benefit and the percentage of total income and agricultural income are summarized in following Table 2.6.2;

Table 2.6.2 Incremental Net Income in Each Farm Model

| Category | Present | | | Base Case | | | | | |
|--------------|------------|----------|-------------|------------|------------|-------------|------------------|----------------------|-------|
| | Net Income | | | Net Income | | | Incremental | | |
| | Crops a | Others b | Total c=a+b | Crops d | Others e=b | Total f=d+e | Net Income g=d-a | Proportion (%) h=g/c | i=g/a |
| Marginal | 12.5 | 44.2 | 56.7 | 15.3 | 44.2 | 59.5 | 2.8 | 4.9 | 22.4 |
| Small | 20.4 | 27.6 | 48.0 | 28.8 | 27.6 | 56.4 | 8.4 | 17.5 | 41.2 |
| Medium | 32.5 | 33.8 | 66.3 | 59.5 | 33.8 | 93.3 | 27.0 | 40.7 | 83.1 |
| Medium-Large | 40.2 | 38.6 | 78.8 | 70.3 | 38.6 | 108.9 | 30.1 | 38.2 | 74.9 |
| Large | 93.5 | 56.3 | 149.8 | 245.5 | 56.3 | 301.8 | 152.0 | 101.5 | 162.6 |
| Category | Present | | | Case 2 | | | | | |
| | Net Income | | | Net Income | | | Incremental | | |
| | Crops a | Others b | Total c=a+b | Crops d | Others e=b | Total f=d+e | Net Income g=d-a | Proportion (%) h=g/c | i=g/a |
| Marginal | 12.5 | 44.2 | 56.7 | 17.0 | 44.2 | 61.2 | 4.5 | 7.9 | 36.0 |
| Small | 20.4 | 27.6 | 48.0 | 40.1 | 27.6 | 67.7 | 19.7 | 41.0 | 96.6 |
| Medium | 32.5 | 33.8 | 66.3 | 94.3 | 33.8 | 128.1 | 61.8 | 93.2 | 190.2 |
| Medium-Large | 40.2 | 38.6 | 78.8 | 143.9 | 38.6 | 182.5 | 103.7 | 131.6 | 258.0 |
| Large | 93.5 | 56.3 | 149.8 | 330.0 | 56.3 | 386.3 | 236.5 | 157.9 | 252.9 |

(thou Rs/household)

The Small model is considered as an average category of whole command area since total average farm size per household including landless family is estimated 0.77 ha. In the Base Case, 48 thousand Rs, at present annual net income will increase to 56 thousand Rs (about 20 % increase). For the Case 2, it will be expected to increase up to 68 thousand Rs (about 40 % up).

Incremental net income per hectare in Base Case is estimated at; Marginal = 13 thousand Rs, Medium = 17 thousand Rs, Large = 29 thousand Rs, namely, the bigger the farm size is, the higher the incremental net income per hectare because the marginal-scale farmer is already practicing high crop intensity even at present (191 %), there are less surpluses for expansion of cropping area, but large-scale farmer has low crop intensity at present (156 %), so that irrigation water can make a big raise in agricultural income.

To get the project effects as high as possible, active expansion of cropping area is required in more than medium size of farm household, which means the farmers should try to increase cropping area by employment of farm labor, since the current cropping plot is so small that it is difficult for them to apply farm machines rapidly in their command area. This increase of farm labor employment would lead to creating opportunity of employment for landless people, which can make poor class enjoy the project benefit.

CHAPTER 3 FINANCIAL VIABILITY ANALYSIS OF O&M

3.1 Principle of Cost Recovery for Sustainable O&M

Very often said not only in Nepal but also in any other countries is that most irrigation systems fall behind the expected performance level in terms of almost every aspect such as water distribution, operation and maintenance, cost recovery, irrigated agriculture production, etc. Among them, sustainable O & M may be the issue any funding agency or donor countries are the most concerned.

Without sustainable O & M, periodical monetary input has to be made under the name of rehabilitation work. However, that kind of rehabilitation is not an actual rehabilitation by definition, rather just a liquidation of debt that has been accumulated during the many days the organization in charge of O & M, whether the government or the WUAs, have passed over.

The government is withdrawing from the heavy task of directly operating and maintaining irrigation systems since the government can no longer bear heavy financial burden required for the O & M. The government is reducing the workforce; one example is putting Jhapa and Ilam DIOs together with Kankai irrigation office. Officers who are to come to Kankai irrigation office have to look after not only Kankai but also irrigation activities of the two districts.

Faced with the situation above, how could sustainable O & M be realized? The answer is no longer at the government side simply because the government can no longer keep on giving heavy subsidy for the O & M. Two answers, then, come into sight; 1) involve the farmers in the O & M resulting in a joint management, and 2) establish cost recovery mechanism. The former would reduce the government burden in terms of O & M. The latter should be much focused because the water is now an economy good, thereby requiring any irrigation system of being financially sustainable.

Cost recovery has not yet been achieved even at a minimal level in Nepal. There is an Asian country, where irrigation service fee is the principal revenue for the irrigation agency not only for carrying out O & M but also for running the agency itself. This means even recurrent cost including the staff salaries should come from the irrigation service fee that the farmers pay. Though the actual situation is not so easy as planned, the principal has to be well taken into account in irrigation development projects.

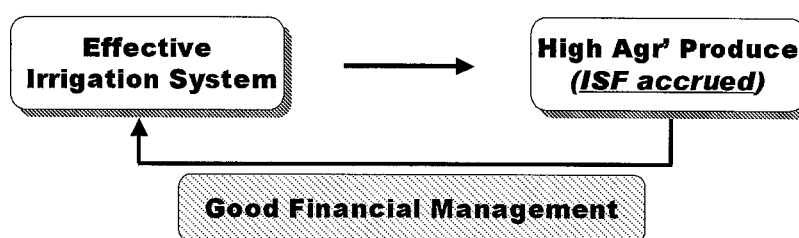
Against a suggested 700 Rs/ha for O & M in a cost recovery study¹ under NISP, the present level is just 100 Rs/ha in SMIP (total 200 Rs but half retained by the WUAs) and the collection efficiency is below 20 %. The money to operate and maintain the irrigation system is on the ground and not in the government coffer. The money required for sustainable O & M is in the farmers' pockets. With increased agriculture production by irrigation, the farmers' income will increase. A part of the incremental benefit will be the source of operating and maintaining the irrigation system. Financial sustainability based on

¹ "Nepal Irrigation Sector Project Irrigation Operation and Maintenance Cost and Water Charge Recovery Study Phase II: Main Report"

full cost recovery mechanism should be pursued, that is the foundation to realize the sustainable operation and maintenance.

Flow of financial resource will be created within the irrigation system. The project will provide effective irrigation system leading to higher agricultural produce, in which the source of fund for O & M, namely Irrigation Service Fee (ISF), accrues. Institutional set up will mobilize the flow of finance and to make the system really operational, a good financial management should be incorporated in the institution taking account the following aspects.

- Consider the system as a service industry: Water as commodity, Self-supporting account
- Pursue fairness: Fare share of cost and water according to circumstances
- Transparency: Government must be accountable to WUC and WUC must be accountable to farmer members under joint system management



3.2 Irrigation Service Fee (ISF)

The Irrigation Policy revised in 1997 provides in the clause 2.6.7, that the service charge rate can be different by the project and fixing the irrigation service charge should take into account the geographical setting, water resources, type of irrigation, and repair & maintenance as the base. Necessary rate of ISF for SRIP following the Irrigation Policy is, therefore, to be estimated independently from other existing irrigation systems.

3.2.1 Necessary O&M Cost of the Irrigation System

In principle as a self-supporting account, all the O & M cost of the irrigation system ought to be covered by the Irrigation Service Fee (ISF), so that the system can be financially viable. The O & M cost should include salaries of the government staff, honorarium for committee members of the Water Users' Committee, and fund for replacement, as well as the physical operation and maintenance expense.

It is estimated for the Sunsari River Irrigation System that the total annual O & M cost will be 10.1 million Rs or 998 Rs/ha. The breakdown of the O&M expenses is shown Table 3.2.1. The amount in the bracket on the table shows the cost in case that desilting and grass cutting of the canals under WUC jurisdiction are carried out by labor contribution. In such case, the total annual O&M cost expended in cash will become 8.4 million Rs or 826 Rs/ha.

ISF rate should be set enough to cover the estimated cost, though this required O & M cost per ha counts four times of the present ISF rate of 200 Rs/ha/year in SMIP or even higher than the rate of 700 Rs/ha/year recommended for SMIP in the Nepal Irrigation Sector Project Cost

Recovery Study in 2001. Feasibility or practicality of the principle to cover all the O & M cost by ISF collection will be discussed hereafter.

Table 3.2.1 Proposed O&M Expenses of Sunsari River Irrigation System

| Party | Item | Annual O&M cost (Rs) | | Share (%) | |
|------------|---|--|----------------------------|------------|------------|
| | | Total | per ha | in. labor | ex. labor |
| Government | Government administration recurrent cost | 2,857,000 | 282 | 28 | 34 |
| | Replacement cost | 1,181,000 | 116 | 12 | 14 |
| | Desilting at main canal | 411,000 | 41 | 4 | 5 |
| | Other maintenance at main canal | 610,000 | 60 | 6 | 7 |
| | Sub-total (1) | 5,059,000 | 499 | 50 | 60 |
| WUC | Command area structures under WUC jurisdiction (Excluding labor) | 2,467,000 (727,000) | 243 (72) | 24 | 9 |
| | WUC administration recurrent cost | 2,592,000 | 255 | 26 | 31 |
| | Sub-total (2) (Excluding labor) | 5,059,000 (3,319,000) | 499 (327) | 50 | 40 |
| | Grand Total (Excluding labor) | 10,118,000 (8,378,000) | 998 (826) | 100 | 100 |

Irrigable area: 10,147 ha, Main canal length: 35,700 m

(Cost estimate)

| | |
|---|---|
| Government administration recurrent cost: | Salary of 37 staff (1 senior eng., 4 eng., 8 junior eng. Class, 14 gateoperator, 10 others, salaries of some staff are allocated among concerning irrigation systems.) |
| Replacement cost: | 3 4WD(456thou.Rs/yr), 4motorbike(128thou.Rs/yr), 10bicycle (13thou.Rs/yr), Gate(HW, MC head gate, SC head gate: 594thou.Rs/yr) |
| Desilting at main canal: | Desilting 8,800 m ³ /yr (canal length 5.5km×H8m×D1m×1/5yrs; assumed that the canal is silted up in 5 years.) |
| Other maintenance at main canal: | Grass cutting (43.2km/yr: 100thou.Rs/yr), Concrete lining (70m/yr repair (0.2% of total length) : 240thou.Rs/yr, Embankment of main canal(equivalent to new const. of 120m/yr: 175thou.Rs/yr), Road maintenance(equivalent to new const. of 120m/yr: 95thou.Rs/yr) |
| Command area structures under WUC jurisdiction: | Structures under SC (727thou.Rs/yr), Desilting (123thou.Rs/yr(30% of main canal)), Grass cutting (53.2km of SC: 124thou.Rs/yr, 172.4km of TC: 241thou.Rs/yr), Other maintenance of SC (equivalent to new const. of 180m (0.3% of total length) : 191thou.Rs/yr), Other maintenance of TC (equivalent to new const. of 580m (0.3% of total length) : 311thou.Rs/yr), Maintenance of watercourse (20ha/WC: 750thou.Rs/yr) |
| WUC administration recurrent cost: | 5.97Rs/WUC×44WUC (1 bookkeeper employment, honorarium, stationary, transport cost etc.) |

3.2.2 Proposed ISF Rate by Crop Season

To set ISF rate of the irrigation system as a service industry, there arises another principal, namely payment according to the service rendered. The O & M cost must be covered by the ISF collection and at the same time ISF must be charged for the service rendered. This Study proposes the distribution of surface water into 100 % of the irrigable area in monsoon season and only 50% of the irrigable area in winter season due to the water availability in Sunsari River. Therefore, it is proposed to set the ISF rate by crop season and those who do not receive irrigation water during winter season do not have to pay ISF.

Setting ISF rate according to crop is also another aspect to consider. This Study, however, proposes to apply for same ISF rate to different crops in the same crop season. One reason for it is to make the system as simple as possible so that the system can be more operational. Another reason is that the significance of irrigation water will be equal to each crop, though

the water requirement of crops is different from each other. In monsoon season, it is planned that the summer vegetables should start planting in early time like April to avoid the damage from heavy rainfall in July and August. Although vegetables require less water than paddy, farmers wishing to crop summer vegetables need to rely on more irrigation water than rainfall since there is little rainfall in April.

As estimated, the necessary cost for proper O & M of the irrigation system is around 1,000 Rs/ha. As it will be proposed hereafter, the regulation of exemption in ISF payment in case of crop damage will be introduced in the ISF collection system. Assuming that 10% of exemption would take place during a year, the necessary cost will become 1,100Rs/ha. Then it has to be considered that only a half of the irrigable area is serviced and charged for ISF payment during winter season.

Because effectiveness of the irrigation is much more visible during winter season due to the meager rain, farmers would pay ISF more willingly in winter season than in monsoon season. The ISF rate is, therefore, proposed to set higher amount in winter season than in monsoon season, but lower than the cost of STW enough for farmers to willingly use the surface irrigation water. In conclusion, the proposed ISF rate is set to be 600 Rs/ha in monsoon season and 1,000 Rs/ha in winter season as shown Table 3.2.2.

The proposed rate is very high comparing with the current rate of SMIP (200 Rs/ha/year). In case the government administration recurrent cost will be supported by the central treasury as current condition, the necessary O & M cost of the irrigation system including 10% of exemption is estimated at 790 Rs/ha/year. In this case, ISF rates would be proposed at 430 Rs/ha in monsoon season and 720 Rs/ha in winter season.

Table 3.2.2 Proposed ISF Rate by Crop Season in SRIP

| Crop Season | Monsoon | Winter | Remark |
|-------------------------------|--------------|--------------|---|
| Irrigated area (ha) | 10,147 | 5,074 | Yearly rotation between Sukusena & Shankarpur |
| Cropping intensity (%) | 100 | 50 | Under irrigation by SRIP |
| ISF (Rs/ha) | 600 | 1,000 | 1,100Rs/ha/yr on average |
| Excluding administration cost | (430) | (720) | 790Rs/ha/yr on average |

On the basis of proposed ISF, those who receive the surface irrigation water only in monsoon will pay 600 Rs/ha per year and those who receive the water both in monsoon and winter will have to pay 1,600 Rs/ha per year. Though it seems that the proposed ISF rates are very high, the relevance of the proposed rates shall be examined from the viewpoints of farmer's affordability and willingness.

3.2.3 Farmer's Affordability

As per comparison with the irrigation systems in the world, the present ISF rate in SMIP is very low. Figure 3.2.1 shows the comparisons of ISF rate to gross income converted into paddy yield in Japan, Philippines and Nepal. As the figure shows, the ISF rate to gross crop production in each country is 11 mon to 190 mon in Japan (per year), 2.5 mon to 110 mon in the Philippines (per crop) and 0.8 mon to 105 mon in Nepal (per annum). Hence the ratio of ISF to the gross crop production in Japan, the Philippines and Nepal are calculated at 5.8 %, 2.5 % and 0.8 % respectively.

2.3 % and 0.8 % respectively. It is confirmed, from the comparison, that the ISF rate in SMIP is much lower than the other countries.

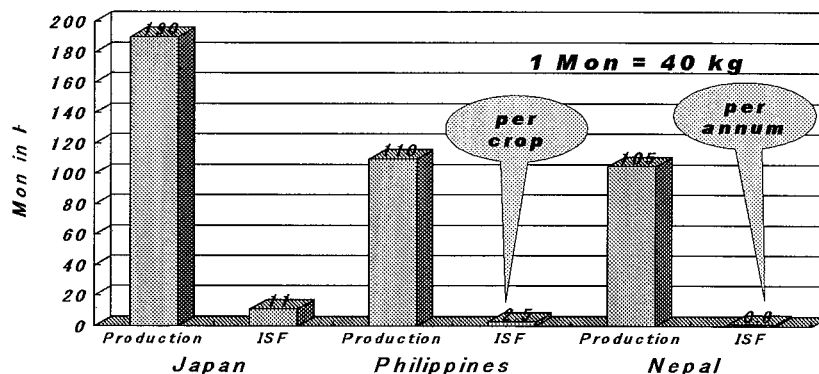


Figure 3.2.1 Crop Production and ISF Rate in Japan, Philippines and Nepal

Even to consider the proposed ISF rate of 600 Rs/ha (equivalent to 1.7 mon of paddy) in monsoon season and 1,000 Rs/ha (5.0 mon of cauliflower) in winter season, it is still as low as 1.6 % of gross yield of paddy in monsoon and 1.0 % of gross yield of cauliflower in winter season². Therefore, it can be said, that the required ISF rate in this Study is still affordable for farmers.

The affordability of the farmer can be considered from the incremental income of the irrigation development project, as well. Logically thinking, the affordability of the farmers for ISF payment will be, at maximum, the amount of the incremental income with the project situation, although the incremental income will be distributed into reinvestment in economic activities, expenses for raising living standard, etc.

Incremental income of monsoon paddy and winter cauliflower by the project is estimated at 11,500 Rs/ha and 13,100 Rs/ha respectively. The share of the ISF rates in monsoon and winter seasons to the incremental income of the respective crops are, therefore, estimated at 5.2 % and 7.6 %. It is evaluated that these rates are low enough to confirm that the farmers are affordable to pay the required ISF rate. It is, therefore, considered that the required O & M cost is promisingly withdrawn from the incremental income by the project.

3.2.4 Farmer's Willingness

Though it is analyzed that the proposed ISF rates are affordable for farmers taking into account the world trend and the benefit of the project giving incremental income to the farmer beneficiaries, there are some aspects, which would discourage farmers to pay ISF. Although the rates are affordable for farmers, farmers may not be willing to pay such amount by several reasons.

Possible reasons for creating unwillingness of farmers are: 1) lack of assurance that the ISF collected is utilized in farmers' sole benefit, 2) norm that farmers are so poor that the government should give subsidy to them, 3) lack of justice, transparency and objectivity of

² Proposed yields of paddy and cauliflower in the Study area are 4.2t (105 mon) and 20t (500 mon) respectively.

ISF collection, 4) more reliable water supply by shallow tube well than surface irrigation water, and 5) farmers' feeling for fairness and equality in comparison to SMIP status.

The first three reasons would have to be handled with institutional aspects. However, the issue here in this chapter is not to discuss if farmers pay ISF or not, but how much farmer can avail for ISF payment in terms of their economic status. The above latter two reasons of unwillingness can be assessed by quantitative comparison. Therefore, here these two issues are particularly discussed to examine farmer's willingness to pay.

1) Farmer's Willingness Based on the Operation Cost of Shallow Tube Well

Application of shallow tube well (STW) to supplement required water for crop has been prevailing in the Study area. As the water resources assessment reveals, the groundwater in the Study area is abundant and it is considered that STW can provide more reliable, timely and controllable water compared to surface water irrigation, though the operation cost of the shallow tube well is certainly more expensive than that of surface water irrigation as it is estimated that the water price per cu.m is 0.56 to 0.80Rs for STW, 0.45 to 0.50Rs for deep tube well and 0.04Rs for surface irrigation water.

The Study team has conducted a questionnaire survey covering 78 farmers in the Study area about the operation cost of shallow tube well. The results of the survey are summarized in Table 3.2.3. Considering the fixed cost of pump set, which is 3 Rs/hr³, it is estimated that the pumping cost on average by crop ranges from 1,280 Rs/ha/crop to 1,940 Rs/ha/crop. Weighed average pumping cost of the samples for winter crops is calculated at 1,640 Rs/ha. As for monsoon crop represented by paddy, provide that farmers irrigate paddy during monsoon season for only one time or half of volume of potato by STW, the pumping cost for it will be 640 Rs/ha.

Table 3.2.3 Average Pumping Cost of Shallow Tube well

| Location | Sample No. | Wheat | | | | | | Potato | | | | | | |
|----------------------------|------------|----------------------|----------------|--------------------|-------------------------|---------------------|---------------------------|------------|----------------------|----------------|--------------------|-------------------------|---------------------|---------------------------|
| | | Area Planted (katha) | Time Irrigated | Duration (hr/time) | Total Operation (hr/ha) | Volume of water(cm) | Fuel (Diesel) Cost(Rs/ha) | Sample No. | Area Planted (katha) | Time Irrigated | Duration (hr/time) | Total Operation (hr/ha) | Volume of water(cm) | Fuel (Diesel) Cost(Rs/ha) |
| Upstream | 12 | 46 | 3 | 21 | 49 | 35 | 1,905 | 11 | 11 | 2 | 5 | 34 | 25 | 1,342 |
| Midstream | 23 | 98 | 3 | 51 | 50 | 36 | 1,804 | 18 | 16 | 2 | 8 | 37 | 27 | 1,350 |
| Downstream | 42 | 78 | 3 | 33 | 42 | 30 | 1,772 | 35 | 19 | 2 | 6 | 26 | 18 | 1,065 |
| Total | 77 | 79 | 3 | 37 | 46 | 33 | 1,802 | 64 | 17 | 2 | 7 | 30 | 22 | 1,193 |
| Fixed Cost | 3 Rs/hr x | | 46 hr/ha | | = | 138 | | 3 Rs/hr x | | 30 hr/ha | | = | 90 | |
| Total Pumping Cost (Rs/ha) | 1,940 | | | | | | 1,283 | | | | | | | |

| Location | Sample No. | Vegetable(Cauliflower) | | | | | | Vegetable(Cabbage) | | | | | | |
|----------------------------|------------|------------------------|----------------|--------------------|-------------------------|---------------------|---------------------------|--------------------|----------------------|----------------|--------------------|-------------------------|---------------------|---------------------------|
| | | Area Planted (katha) | Time Irrigated | Duration (hr/time) | Total Operation (hr/ha) | Volume of water(cm) | Fuel (Diesel) Cost(Rs/ha) | Sample No. | Area Planted (katha) | Time Irrigated | Duration (hr/time) | Total Operation (hr/ha) | Volume of water(cm) | Fuel (Diesel) Cost(Rs/ha) |
| Upstream | 7 | 6 | 3 | 3 | 52 | 37 | 2,006 | 3 | 4 | 3 | 2 | 40 | 29 | 1,620 |
| Midstream | 13 | 8 | 3 | 4 | 45 | 33 | 1,655 | 2 | 6 | 2 | 3 | 33 | 24 | 1,170 |
| Downstream | 20 | 6 | 3 | 2 | 34 | 25 | 1,326 | 6 | 2 | 3 | 1 | 31 | 22 | 1,080 |
| Total | 40 | 7 | 3 | 3 | 44 | 30 | 1,558 | 11 | 3 | 3 | 1 | 38 | 24 | 1,244 |
| Fixed Cost | 3 Rs/hr x | | 44 hr/ha | | = | 132 | | 3 Rs/hr x | | 38 hr/ha | | = | 114 | |
| Total Pumping Cost (Rs/ha) | 1,690 | | | | | | 1,358 | | | | | | | |

Source: JICA Study Team

The proposed ISF rates for monsoon and winter seasons are, then, calculated at 94 % and 61 % of the pumping cost in each season. For monsoon paddy, though ISF rate does not make difference from using STW, the yield with project situation will be 180 % of the present paddy yield (from 2.3t/ha at present to 4.2t/ha). If farmers fully irrigate paddy by STW to achieve as much as the target yield with this project, the pumping cost will be enormous. Farmers know and hardly practice it. Therefore, ISF rate of 600 Rs/ha in monsoon can still

³ Refer to Appendix-11

be competitive with STW.

For the winter crop, from the viewpoints of reliability and controllability, farmers may prefer to use STW even though the cost is higher than that of surface irrigation water. To attract farmers to apply for surface irrigation water, the proposed ISF has to be convincing farmers of the fact that the cost is worth paying, even considering the less reliability and controllability of the water than the STW water. The proposed ISF rate nearly halving the pumping cost of STW seems low enough to elicit farmer's willingness. This point is also examined from the following results of the field surveys

2) Bargaining Willingness

According to the results of the consultation meetings facilitated by the Study Team, most of the farmers are willing to pay ISF but reluctant to pay higher rate. Voices are raised as, the farmers think that the Government should provide the surface water free of charge and they also do not think that they should pay ISF more than the rate of SMIP, which is 200 Rs/ha/year. After all, farmers' willingness to pay ISF expressed during the consultation meetings ranged from 200 Rs/ha/year to 500 Rs/ha/year much lower than the proposed ISF rate.

But this announced willingness might not include the labor contribution to the desilting and grass cutting work for watercourse and tertiary canal since it is observed that labor contribution of farmers for canal maintenance has been practiced regardless of the ISF payment in SMIP and Chanda Mohana irrigation system. Farmers' perception might be only on cash payment.

Another findings, during a series of field interviews conducted by the Study Team, are the fact that there are some farmers who expressed their willingness up to 1,500 Rs/ha/year, though these farmers are considered to be advanced farmers frequently applying STW. It is conceivable that the farmers answering such high willingness would have compared to the cost of the shallow tube well in their mind.

Having observed that, some farmers may have the willingness to pay ISF close to the pumping cost of shallow tube well, although the farmers attended the consultation meetings were not with such enthusiasm. For the case of the consulting meetings, it might be considered that facing to the government staff (counterparts), the executive agency of the SMIP, the farmers, as a group having in mind the current ISF rate in SMIP, had got an opportunity of negotiation, namely they could start bargaining the rate to the government side with the rate in SMIP at bedrock price.

It is understandable that farmers' willingness can be inclined to the major state of their surroundings. It is, however, indicated from the survey that, if the surface irrigation water is reliably supplied close to the reliability of water from STW, farmers could be convinced to pay the necessary cost for the surface water distribution.

3.2.5 Evaluation of Proposed ISF Setting

Having discussed the relevance of the proposed ISF from the viewpoints of farmers'

affordability and willingness, it can be said that the proposed ISF rates in monsoon and winter seasons are affordable for farmers, but rather debatable in terms of farmers' willingness. All the same, it is proved that the surface irrigation water is still advantageous to STW in terms of cost. It is, therefore, evaluated that the proposed ISF rates in both monsoon and winter seasons are relevant in operating and maintaining the Sunsari River Irrigation System.

The rates proposed may be ambitious referring to the current ISF collection efficiency on the ground. Taking into consideration the situation, it is proposed to apply for a temporary legislation prior to the enforcement of the proposed ISF, namely ISF would be partially collected like only for the cost of desilting of the main canal, adjusting to be the same ISF rate of current SMIP until the expected crop yields with project situation are realized. The duration of the legislation will be 5 years for monsoon crop (paddy) and 10 years for winter crop (vegetables).

It is also proposed that even after the enforcement of the proposed ISF rates, approval of exemption should be set according to the crop yield to secure the social justice. For example, if the yield of paddy is less than the current yield of 2.5 t/ha, 100% of the exemption will be approved and if the yield is 2.5t/ha to 3.5t/ha, 50% of ISF will be exempted and if the yield reaches more than 3.5t/ha, no exemption will be considered.

SMIP experience shows that salaries of association organizer (AO), who is hired by the SMIP project office and carrying out ISF collection, exceed the amount they collect as ISF throughout a year. If the salaries of AO are not provided by the project office, the task of ISF collection stops and the farmers' contribution to the O&M will be none. It comes, therefore, into a need to establish functional ISF collection system for better ISF collection performance.

3.2.6 ISF Sharing

Irrigation Policy in the clause 2.6.3 provides that under joint management, from the amount collected as service charge, concerned Water Users' Association can keep their share and the remaining balance amount shall be deposited in the government's revenue account. Also the policy stipulates, in index-3, the sharing ratio between the government and Water Users' Association according to the arrangement of joint management system.

In case of SRIP, the sharing ratio between the government and Water Users' Association guided by the policy will be 25 % and 75 % respectively⁴. It seems, however, from the estimation, that the O&M cost demarcated to the government side along the policy may not be able to cover all the cost by the ISF share. That may lead to the situation that the government may have to disburse some subsidy to cover the O&M cost of their responsibility.

Therefore, this Study would like to propose that the ISF share between the government and WUC in SRIP is estimated in proportion to its managerial responsibilities enough to cover the necessary O&M cost for both parties (see Figure 3.2.2). From this approach of defining ISF rate and the share between the government and WUC, the cost recovery will be attained as far

⁴ Applied Index-3 of Irrigation Policy in case the management for all canals below the main course is taken by WUA and the rest by HMGN.

as ISF is collected properly from the farmer members of the WUC. As the result of the O & M cost estimation for both the government and WUC shown above Table 9.1.1, it is proposed that ISF sharing ratio between the government and WUC is 50% and 50%. This sharing ratio will have to be stipulated when WUC enters into the contract of joint system management with the government.

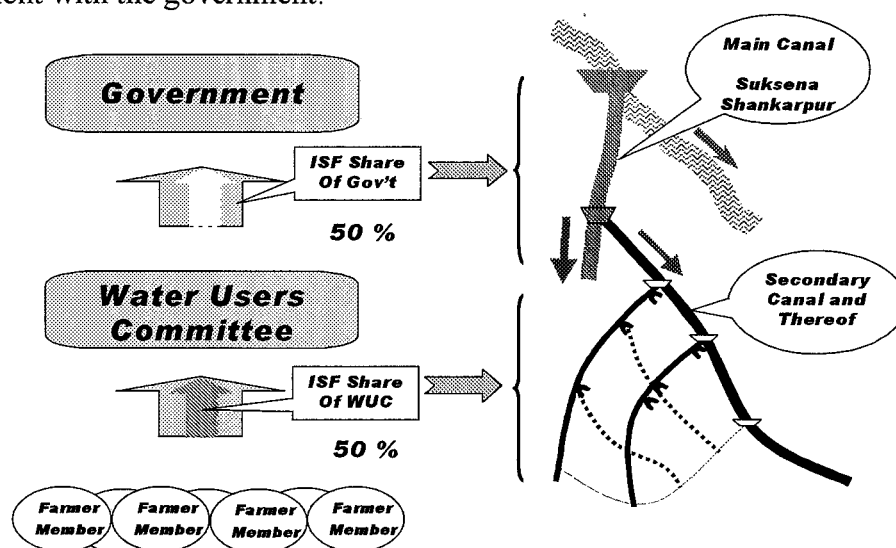


Figure 3.2.2 ISF Sharina and O & M Jurisdiction between Government

CHAPTER 4 FINANCIAL SYSTEM UNDER JOINT MANAGEMENT

4.1 Basic Concept of Financial Management under JM

For the better performance of financial management of the irrigation system, importance of transparency has been pointed out in several studies such as National Irrigation Sector Project (NISP) Cost Recovery Study funded by the World Bank in 2001 and a Study⁵ in Irrigation Management Project (IMP) in 1992. Particularly, the IMP study emphasizes the transparency of not the WUA but of the government for the better management. IMP study states, "The government agents expect the farmers to keep their records and activities open for review, but they do not let farmers review government records and operations."

Here it is suggested that the government and the WUC should have better communication including the disclosure of the government's income and expenditure statement based on the ISF collection and the O&M of the irrigation system. Aside that, taking account of current low ISF collection efficiency of AMIS in Nepal, here in this chapter ISF collection system under joint system management will be proposed having a foundation of securing transparency of the system.

Fairness among the members of WUC as well as between the government and WUC will also be incorporated as a part of the transparent and effective financial management system. IMP study shows a lesson in Bangeri irrigation system saying, "These farmers are organized to

⁵ "Creating a Supportive Policy Environment for Irrigation System Turn Over and Joint Management" by David M. Freeman, A Study in Irrigation Management Project, 1992

control water in a way that serves productivity within their constraints and maintains a rough sense of social justice among the irrigators.” Upon the lesson learned, the ISF collection system in this study also pursues some measures to accommodate social justice or fairness to circumstances.

4.2 Irrigation Service Fee Collection System

4.2.1 Present ISF Collection System in the Adjoining Irrigation Systems

As NISP study points out, ISF collection mechanism has some variations within the irrigation systems. Prior to describe the proposed ISF collection system, ISF collection mechanisms practiced on the ground in SMIP and Chanda Mohana Irrigation System are reviewed and some key items to discuss in establishing a functional ISF collection mechanism will be picked up.

1) WUCC in SMIP

In SMIP, WUCC is the apex of the ISF collection from the members and also WUCC opens their bank account and submit the government’s share of ISF. WUCC is supposed to collect ISF from their members upon the transfer of the secondary canal concerned. However, it has been observed during the field survey that there are few WUCCs which collect ISF by themselves, but in general, association organizers (AO) hired temporarily by the executive agency has been collecting ISF from irrigation users.

The mechanism of ISF collection by AO is, 1) AO collects ISF from irrigation users, 2) AO deposits ISF collected to WUCC bank account every time after 10,000Rs is collected, 3) WUCC chairman gives AO a check to pay ISF share of the government, which is 50% in SMIP, and 4) AO bring the check to deposit ISF share of the government in the national bank account.

AO has also kept the individual record of ISF payment on his farmers list, but this list is not kept by WUCC. NISP study assesses the role of AO, as “The AO deployed from the projects neither possesses knowledge nor incentive and commitment for higher ISF collection. Because of the lack of authority with the WUCs and incentive and commitment with AOs, the efficiency of ISF collection has been affected adversely.”

Here the key issue is who collects ISF in what sense. The practice in SMIP implies the question for it that as far as external body deals with the matter of money, sense of ownership to the irrigation system will not be perceived by the farmer members of WUC. Therefore, the mechanism should be built on the foundation that WUC themselves collects ISF for their own sake and so does the individual record keeping.

So many tiers of water users’ association in SMIP from WUG to WUCCC has been pointed out to be an obstacle to high ISF collection efficiency in SMIP. Farmer member looks up to water users’ group in water course level, water users’ committee in sub-secondary level and water users’ coordination committee (WUCC), which has the bank account where farmers’ money is deposited.

Many tiers would limit the transparency and cause disconnection of information flow and also farmers become less acquainted with each other, which might ferment discontent to the management board. It is, therefore, proposed that the foundation should be fewer tiers to make the flow of money simpler. It is an understanding that more intervenient, less transparency. In line with this SMIP Stage III is studying to propose to step the apex of the financial autonomy down to sub-secondary level, namely WUC will open their bank account and manage ISF collection.

Project is creating dependency syndrome. Sometimes the project goes down to the watercourse level for O&M where canal is already transferred to the farmers. Even corruption by AO in collecting ISF is heard during the field survey. This information, at least, indicates that the credibility of ISF collection and its use has been ruined on the ground. Dual land ownership also spoils the ISF collection. In general large-scale landowners including absentee landowners are not paying ISF and the small-scale farmers are the one who pay ISF better. Non-existence of incentives and penalizing mechanism might hinder reversing the current situation.

2) Chanda Mohana WUA

Another example to extract lessons is Chanda Mohana Irrigation System just next to SRIP. The system has two features in its two main canals, namely the east and west canals. It has been observed that the performance of O&M for both main canals has difference. According to the field observation, the system is better managed in the east main canal system than the west main canal system. Illegal outlets are observed much more along the west main canal and its branch canals and the team also met more farmers who had not paid ISF and raised complaints on water allocation in the west main canal command area.

One reason for this could be borne to the designing for some extent. The length of idle canal in the west canal is so long that the first branch canal appears after 4.5 km long from the head intake of Bhudi River, giving some frustration to the farmers upstream who cannot legally divert the canal water onto their farmland. Inadequate number of outlets in the branch canals is also heard from the farmers, making a difficulty of not receiving timely and adequate water. Unwillingness of owners providing their land for facility construction during the implementation would have been an underlying cause of it.

From the east main canal system, we could see how farmers are managing the irrigation canal. Farmers in upper part of the east canal has been paying ISF and showed their knowledge on the Water Users' Association as they know somehow where and how the money collected was kept and used. In their system, the chairman of each branch canal committee collects ISF, so the farmers even do not request the receipt. The current status in the WUA at the east canal is giving a possibility for practicing the concept of "collection by themselves for their sake". ISF collection efficiency was, however, as low as about 25% last winter crop season, according to the committee members of Chanda Mohana WUA.

Chanda Mohana irrigation system has just passed only for three crop seasons and it was the first time for them to collect ISF last winter. WUA is now planning to build a system of farmers to come to the office to pay ISF and if a farmer fails to show a receipt of ISF payment

to the committee, water distribution into his farmland will be disconnected. This penalty is not for sure technically, but the WUA committee aims at creating social pressure to delinquent farmers by this way.

According to the field observation, the ISF collection efficiency seems getting lower as going down to the lower part of the main canal. Farmers in the tail end have not paid ISF yet, but told that they were going to discuss if they pay ISF. Even though they have not paid ISF in cash, they have done desilting work of the main canal as long as 1 km from the tail end to upward and grass cutting of more than 2 km⁶. This cooperative work can be counted as their ISF payment.

Each branch canal has formed their own rotational irrigation rule according to their circumstances and the rules are maintained by themselves, as it was observed that in a branch canal a few farmers in charge are patrolling by bicycle along the branch canal. Here we can quote a lesson that as long as within their permission, farmers' group should be able to form their own rules under their circumstances such as scarcity of water and form of ISF etc.

The virtue of relatively small-scale may as well work in the irrigation system of Chnada Mohana east main canal, whose command area covers 1,000 ha. Mutual arrangement among the farmer members has been taken place in the east main canal. For example, a branch canal committee agreed to close their head gate earlier than their given time against the rotation rule to divert more water into downstream reaches, because the command area of the branch canal was mainly occupied by sugarcane requiring less water than paddy fields.

In the midstream reaches of the east main canal, there found a farmer who provided his part of land for the canal construction and even remaining of his farmland is affected by the seepage of the canal. For this reason, he was exempted from ISF payment, though it is informal agreement. This arrangement will not destroy the fairness or social justice but create it. Exemption or any other regulations agreed among members can be a device for maintaining fairness of farmer members.

4.2.2 Basic Flow of Proposed ISF Collection System

NISP study summarizes the ISF collection system as "Appropriate incentives and penalties should be developed and transparency on resource use should be ensured. For this, action relating up-to-date record keeping, regular auditing, notifying people paying and not paying, and getting the statement of accounts approved by the general assembly are necessary." These summarized points and the lessons learned from the ground around the Study area will be incorporated in establishing the functional ISF collection system.

Under the joint system management, sharing of ISF collected between the government and WUC and ISF collection by WUC will be the basis of establishing the basic flow of ISF collection. Figure 4.2.1 below shows the basic-flow of the ISF collection under joint management. In this concept, WUC will bill and collect ISF from farmer members through the respective WUG. Record keeping of individual ISF payment performance, so called

⁶ Total length of the east main canal is 7.5km and there are 6 check gates with 2 branch canals on both sides of their upstream reaches.

Irrigation Fee Register (IFR), will be kept and maintained by the WUC, as well. This IFR will be the basis of the financial management of WUC. The government, under the joint system management, only bills to WUC and collect its share of ISF from WUC.

As the Irrigation Policy clause 2.6.3 provides, it is proposed that WUG will be responsible to collect ISF from its members and WUC can appoint or employ person to support WUG for ISF collection upon agreement of the WUC by-law. Although for the SMIP, the executive agency contracts out AO personnel to collect ISF directly from farmers in most cases, for the genuine joint system management, WUC should take this responsibility.

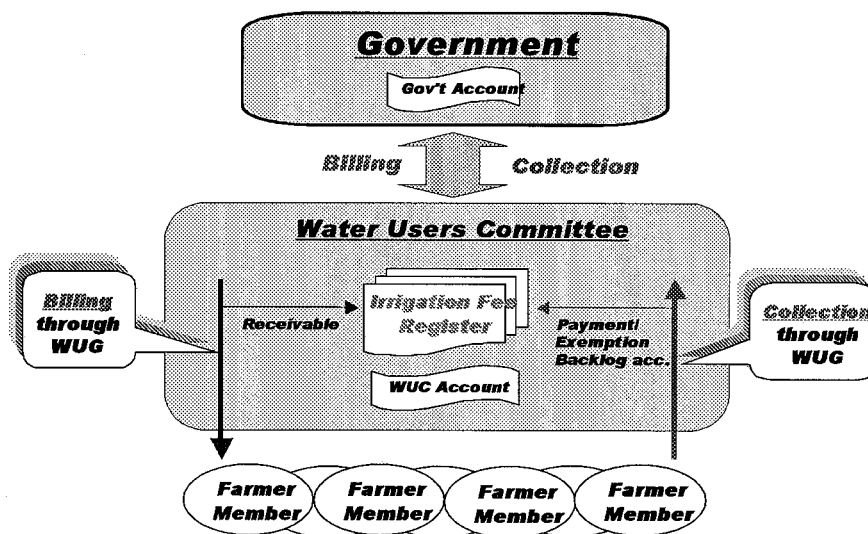


Figure 4.2.1 Basic Concept of ISF Collection System

4.2.3 Procedure of ISF Collection

In this section, the basic procedure of ISF collection mechanism according to the above basic flow is described. The procedure is classified in order of tasks such as 1) billing, 2) exemption, and 3) collection. For each task, the role of WUG and its farmer members, WUC, and the government will be defined.

1) Billing in every planting season prior to ISF collection

It has been found on the ground that, as NISP study reveals, “The officials deployed for collecting information on cropped area do not contact all the concerned farmers, which leads to taxing of fallow land and land swept away by the river, simply because such land is in the record” and the same case is observed in SMIP area, as well. To countermeasure this discontents as one reason, it is proposed that the billing procedure shall be done by the WUG deputized personnel with farmer members in every planting season prior to ISF collection.

By assessing the planted or irrigated area in every planting season, acceptance of ISF payment by the farmer members would be affirmed. WUG chairman or personnel deputized by WUC committee goes to the fields concerned and notifies the members about the area receiving irrigation service. The area receiving the service must be agreed between the members and WUG personnel. It is the only way of assessing the irrigated area accurate to work with the farmer members who actually receive the irrigation water. After the agreement the bill of ISF rendered to the member according to the service area will be prepared and the information is sent to WUC. The bill on this season is recorded in the Individual Irrigation Fee Register by WUC.

2) Exemption

Although it seems that enforcement of exemption has not been in practice very much on the ground, this could be applied for securing the social justice and fairness within WUC. During the crop season, if the calamity causes the damage of the crop seemingly resulting in very low yield, the farmer member in question could have right to request exemption. As damage or low yield can come from various reasons, WUG and the farmer member upon request must agree to identify the damage caused of failure of irrigation service.

After agreement, WUG will send the request to WUC and WUC also recommends the exemption to the irrigation agency. The irrigation agency will approve the exemption. Or as long as WUC can have ability to pay the fixed share of the irrigation agency, WUC can manage within the committee to arrange the payment. In such case, this procedure of exemption could be undertaken as a mutual rule within WUC.

3) ISF Collection

As long as farmers have cash to pay, WUG can collect ISF at the same time of billing in every planting season. But the deadline of ISF payment should be set at the end of harvesting season, since farmers may think to pay ISF from the produce of the season. For those who did not pay ISF at a time of billing, WUG chairman or deputized ISF collector will visit farmer members to collect ISF in harvesting time, when farmers can mostly have money in his pocket.

WUG chairman or deputized collector gives receipt to farmer members upon their payment and submit to WUC treasurer and the treasure deposit the ISF collected in their bank account. After the deadline of the ISF payment, WUC will submit the share to the government. It has been an established custom that a minimum balance of 5,000 Rs is required to deposit an amount in the government revenue account. As NISP study indicates that there should be flexibility in limit of amount to be deposited. ISF collection left after the deadline is recorded as backlog account in IFR.

Mobility in collection is an aspect in formulating the collection procedure. In common practice like SMIP, ISF collector (AO in SMIP) is visiting door to door to collect ISF. There will be another idea, as Chanda Mohana WUA, that farmer members go to certain place like WUC office to pay for ISF. It is a matter of once or twice per year for farmers and also visiting WUC office will facilitate the farmer members to know the status of WUC activity to date. Maybe collection should be done by both directions of door to door collection and farmer's to come to the office.

Method of combining ISF payment with land tax has been a recommended idea in the Nepal context⁷. VDC is in charge of collecting land tax and the tax delinquent is forbidden to sell their land, to borrow a loan and even to get any official certificate like a visa. With these rigorous regulations, the collection efficiency of land tax in the Study area is said to reach almost 100%. If the ISF payment combining with land tax is carried out, VDC will be the one to collect ISF and there is an expectation that ISF collection efficiency will rise in

⁷ Idea of collecting ISF with land tax is existent in Japan. Actually Land Improvement Act in Japan stipulates the tax office to collect ISF together with land tax. In such case, the tax office takes 4% of commission.

accordance with the land tax collection.

However, improvement of ISF collection efficiency may not be expected by the mean of combining ISF collection with land tax, because 1) Process of ISF collection by themselves will be the mean of empowering solidarity of the organization and WUC may be able to find a way of payment arrangement according to the circumstance of each member formalizing their own agreeable social justice, 2) The fact that VDC administrative boundary does not meet the boundary of WUC will hinder the transparent flow of money in and out within WUC or flow of money corresponding to the flow of water, and 3) the rate of land tax is much lower than the rate of ISF. The rate of land tax is only 5Rs per year for the land holding of less than 1ha and 6.8Rs per year for 1 to 2 ha. Adding ISF collection to land tax bring a big difference from the current tax payment. It might as well cause of arrears with land tax. Since this Study suggests that better institutional set up is the most effective way of increasing ISF collection efficiency, the combination of ISF and land tax collection is not recommended.

There will be three cases for ISF sharing. The first case is to divide the ISF collected according to the determined sharing ratio no matter how much collected. The second way is to submit fixed amount to the government no matter how much ISF is collected and the third case is to secure the WUC share at fixed amount and submit the remaining of ISF no matter how much collected. In the third case, the bill of delinquent will be sent to the government.

In the first case, the government and WUC will share the risk of deficit in O&M expenses. For the second case, if the ISF collection efficiency is low, the share retained to WUC will be less than they expect, namely the risk of arrears will be endured by WUC, but WUC has the right to collect and retain the arrears in their account. In the third case, ISF as receivable is transferred from WUC to the government and the government enforces to collect the arrears. The government could exercise the enforcement of regulations and sanctions in its legitimacy, more powerful than what WUC can do against delinquency. The government and WUC

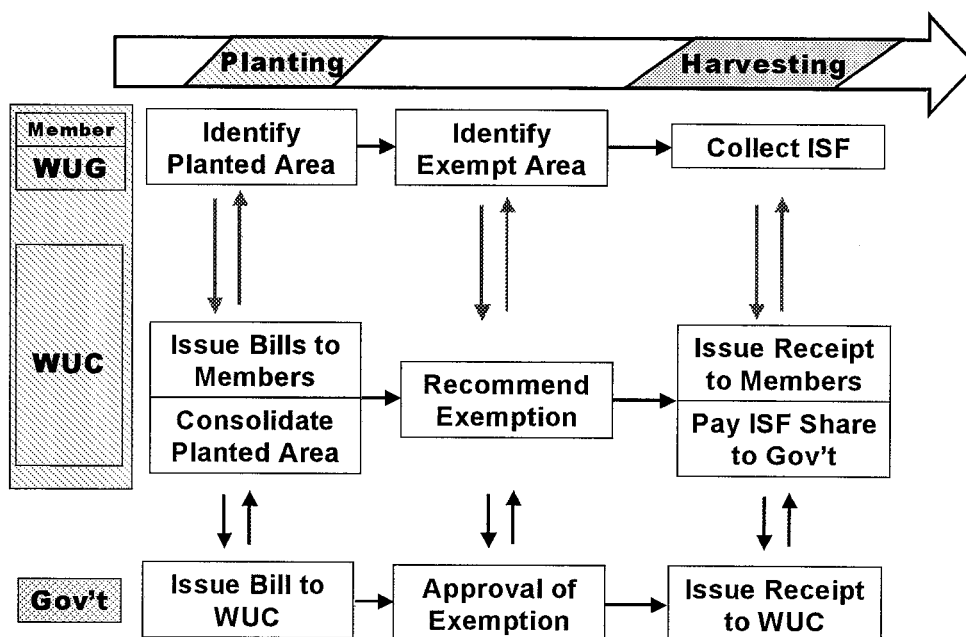


Figure 4.2.2 Basic Flow of ISF Collection

should agree on the issue of ISF sharing arrangement prior to enter the joint system management.

Considering the effective irrigation system, it is proposed that the government will take their share in fixed amount determined prior to enter into the joint system management with the respective WUC. This arrangement could urge WUC to collect ISF as much as possible and also the subsidy from the government for the O&M expenses could be saved. WUC will keep the individual record (IFR) of payment and those who failed to pay ISF up to deadline will be asked continuously to pay their arrears. Figure 4.2.2 illustrates the ISF collection procedure.

4.3 Record Keeping System of Water Users' Committee

4.3.1 Basis of Record Keeping

According to the Irrigation Policy clause 2.6.5, record keeping of the farmer members for ISF payment performance will be borne by the WUC. The government will have to assist WUC to practice such responsibility by providing a series of trainings and day to day supporting on the ground in the course of the irrigation practice.

NISP study says that the updated list of water users and the details of their irrigated land holdings are non-existent in almost all irrigation schemes. But there are such records in each irrigation system and the issue is the fact that the record is not well organized. This will create difficulties not only in ascertaining the real extent of the irrigated area in a particular season and annually, but also justifying the collection fairly done. To avoid the difficulties, it has been proposed above that individual record, so called Irrigation Fee Register, containing of billing, payment, exemption and arrears will be kept and updated by WUC.

Proposed form of IFR is shown in Figure 4.3.1. IFR will be made of a hard paper durable enough to store for long years. On the top of the paper, individual profile of the water user is recorded and if any change of ownership or tenancy, the IFR will be closed and a new one for new registration will be prepared. Each one line is to enter a record of one crop season.

| Owner: K. Suresta | | | | | Tenant: | | | | | | | | |
|--------------------------|--------|---------------------|------------------|-----------|----------------------|-------------|-----------|-------------|---------|-----------------|-------|-----------|------------|
| WUG: S-1 | | | | | Plot No. 1234 | | | | | | | | |
| WUC: Dewanganj-1 | | | | | Area: 1.5 ha | | | | | | | | |
| Billing | | | | | Payment | | Exemption | | Balance | Backlog Account | | | |
| Crop Year | Date | Area Irrigated (ha) | ISF rate (Rs/ha) | Bill (Rs) | Date | Amount (Rs) | Date | Amount (Rs) | (Rs) | Cumulated (Rs) | Date | Paid (Rs) | Total (Rs) |
| 2002 Summer | 5-Jun | 1.5 | 400 | 600 | 22-Sep | 600 | | | 0 | 0 | | | 0 |
| 2003 Winter | 25-Nov | 0.7 | 400 | 280 | 10-Mar | 200 | | | 80 | 80 | | | 80 |
| 2003 Summer | 31-May | 1.5 | 400 | 600 | 20-Sep | | 15-Jul | 600 | 0 | 80 | | | 80 |
| 2004 Winter | 1-Dec | 0.9 | 400 | 360 | 25-Mar | 300 | | | 60 | 140 | | | 140 |
| 2004 Summer | 1-Jun | 1.5 | 400 | 600 | 3-Oct | 600 | | | 0 | 140 | 3-Oct | 140 | 0 |
| | | | | | | | | | | | | | |
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Figure 4.3.1 Sample Form of Irrigation Fee Register

Billing, payment and exemption done during the crop season will be recorded with the respective date. Accumulated backlog account as well as the balance of each crop season will be calculated on this IFR. Based on this IFR, WUC will demand the arrears to the delinquent farmer members.

4.3.2 Accounting of WUC Income and Expenditure

Apart from IFR, WUC, of course, must have their accounting system. It is just same as any business entity. Therefore, WUC will settle their account in every accounting period. WUC shall prepare their balance sheet at the period and prepare a statement of income and expenditure. Income of WUC will be ISF collected and sometimes may be membership fee and expenditure will be the desilting cost, honorarium, wage for employment, fund for replacement etc. Backlog account of each member will be accounted as receivable on WUC's balance sheet and remain as asset of WUC. Income and expenditure statement and balance sheet will be the basis of decision making for WUC in running the irrigation system.

To operationalize the financial management, necessary documents should be prepared by WUC, such as bill, receipt, disbursement voucher, income and expenditure statement, balance sheet etc. These documents should be printed by WUC on their expenses with the assistance of the government. To deal with accounting, WUC may have to employ a bookkeeper. Disbursement voucher and other documents, which summarize the financial status of the WUC, must be certified by the signing of the WUC chairman. This practice will serve the securing of accountability of the WUC.

4.4 Regulations for ISF Collection

NISP study indicates the regulatory arrangement among existing water resources related laws and mostly the provisions made in the existing legal framework are not brought into practice. Here from the viewpoints of practicality, some regulation to consider will be proposed though they might not be clearly stipulated in the national regulations.

4.4.1 Exemption

As discussed above, it is recommended to apply for exemption in the irrigation system to those who suffer from calamity causing of lower yield of a certain level agreed among the WUC members. This exemption system can be enforced duly based on Irrigation Regulation, or WUC could apply for it within the organization as a mutual rule, in case of which, WUC should submit the share of ISF at fixed amount given prior to harvesting season to the irrigation agency. By this arrangement the government can fulfill their share, while WUC takes all the risks of crop damage. Arrangement should be discussed and agreed between the irrigation agency and WUC upon the joint management.

4.4.2 Incentives

Measure using incentives can be a way of contributing to high ISF collection efficiency if it is felt necessary. Incentives are given by WUC as its own budget in such ways as ISF collector can be given an incentive for their ISF collection task, and farmer members who pay ISF in early time or pre-payment can be given a discount of ISF due etc. To make it practical,

incentives have to be counted as part of O&M cost to collect necessary amount to sustain the O&M activities. Also as long as the irrigation water delivery is effective, these incentives may not be needed in practice.

4.4.3 Penalty against Delinquency

According to the Irrigation Regulation, the government can stop the service to a farmer who does not pay ISF, but this is impractical since the parcel of a land belonging to the delinquent farmer cannot be isolated from the water delivery through the canals. Considering the practicality, the penalty for delinquent farmer is suggested as follows:

- If farmer fails to pay ISF before deadline, additional penalty can be charged to the one.
- Farmer cannot transfer their ownership of land without clearing their backlog account.

4.4.4 Discretion of WUC

1) Form of ISF

Form of ISF within WUC does not only have to be cash but also labor or kind as far as WUC submits ISF in cash to the government. For instance, WUC will have to maintain water courses. WUC can hire some laborers for desilting and grass cutting. But the members can also contribute their labor to the maintenance. In this case, the contribution of labor can be counted as a part of their ISF payment.

The clause 2.6.9 of the Irrigation Policy provides that while collecting irrigation service charge, concerned water users' association may collect commodity, labor, cash or all of these from all the users' getting water; after calculating the amount needed to handle the responsibility for repair & maintenance, operation and management. ISF in kind may also work for collective marketing by WUC if they develop their organization toward multipurpose one.

2) Additional Levy

Irrigation Policy in the clause 2.6.8 as well provides that if the amount of ISF collected is insufficient for the O & M expenses of the canal system of WUA's share, the WAU may collect extra tax in accordance to the decision made by the association under the limitation of the principle of WUA. For this case still, the government's share of ISF should be fixed prior to the collection and the government firstly secure their share and with the remaining WUC will make decision whether they collect additional fee from members.

3) Business Management

If WUC is to engage in some activities apart from irrigation management such as collective marketing, micro-credit, etc., their accounting system will be much more complicated. For such reason, WUC may have to hire an accountant. Also to start with business operation, WUC should make regulations including the distribution of profit or deficit by the business into the members.

CHAPTER 5 INDIRECT AND INTANGIBLE EFFECTS

In addition to the direct benefit from the increase of agricultural production and saving cost of STW's operation, the project will bring various effects, which are indirect and intangible so that it is difficult to grasp them quantitatively, but there are a lot of related effects as described below.

1) Solution of Confusion in Chanda Mohana

In the middle of the east side of Shankarpur canal, some farmer beneficiaries of SRIP (about 300 ha) take water illegally from Chanda Mohana irrigation area, which is adjoining land of the east side of SRIP. They have bored holes in the upper part of the west main canal in Chanda Mohana, which causes shortfall of the irrigation water and difficulty in the management in the lower part of the area. Implementation of SRIP would stop the farmers in question taking water from Chanda Mohana. Therefore, the confusion in the stricken area would be solved.

2) Increase in Employment Opportunity

In a short term, a large number of farmers will be involved in construction works, which are spread over seven years. Average annual employment for construction labor will be about 630 man-year in the hard ware of the main component alone. They are equivalent to about 10 % of landless population in the Study area, supposing the number of landless household is 6,640.

In a long term, with the irrigation development, crop yield will increase and cropping intensity will also be intensified. Increase of crop production creates job opportunities for harvesting labor and crop diversification proposed in this Study as well contributes to creating opportunities for farm labor. Other way of job creation with the proposed project is a canal maintenance work. Canal maintenance works such as desilting and grass cutting in some canals can be done by hired labor and the source of wage could be born to ISF. The distribution of the benefit from irrigation development is illustrated the right Figure 5.1.

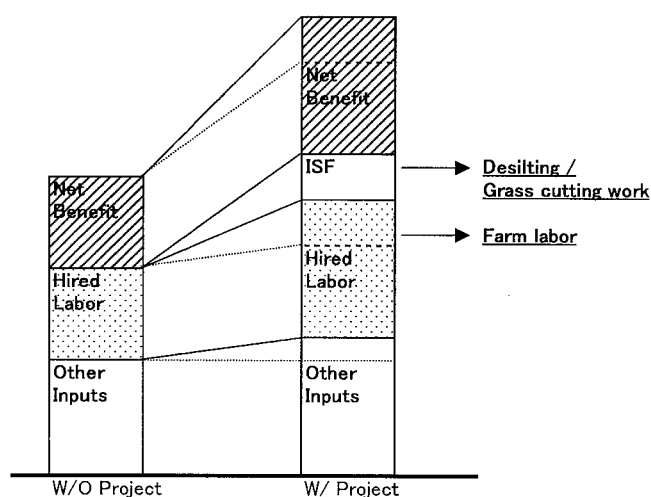


Figure 5.1 Benefit Distribution into Landless

The major projects will generate incremental annual farm employment of about 400 man-years for the Base Case, as agriculture production will increase in the command area, and about 570 man-year for the Case 2. They mean new employment creation of 6.0 % of landless household in Base Case, and 8.6 % in Case 2 every year.

In addition, the major projects will also increase labor hour of family in their own land, as rising crop production and O & M works for the irrigation. It generates an income opportunity instead of being employed, like a migrant worker during the slack season. Even desilting and grass cutting under WUC's jurisdiction need about 14 thousand man-day every year, which is equivalent to about one man-day share for all households in command area.

3) Improvement of Transportation

SRIP includes the improvement of canal maintenance roads from main canals to watercourses, which will be mainly used for the maintenance and transport of agriculture inputs and products, and commute between a house and a field. On the other hand, they will be also used as community roads so that they will reduce time of commute to a school or a hospital etc.

Especially, the maintenance roads of the main canals are used as main community roads even now, but sometimes a flood interrupts the traffic in monsoon season. Therefore, SRIP will be able to contribute to securing transport capacity in rainy season since the project reduces damage of canals and roads from a flood.

Also, the major projects propose road network in western parts of the Study area, illustrated the right Figure 5.2. It is indicated from the figure that the western parts of the Study area have got little attention from development support agencies. UNDP has implemented VDP consists of saving scheme, skill development and organization development in north and south part of the Study area. PLAN International has struggled health sector, education sector and human resource development etc. in east part of the area. Poor transportation conditions to access to these areas could be one reason for the situation.

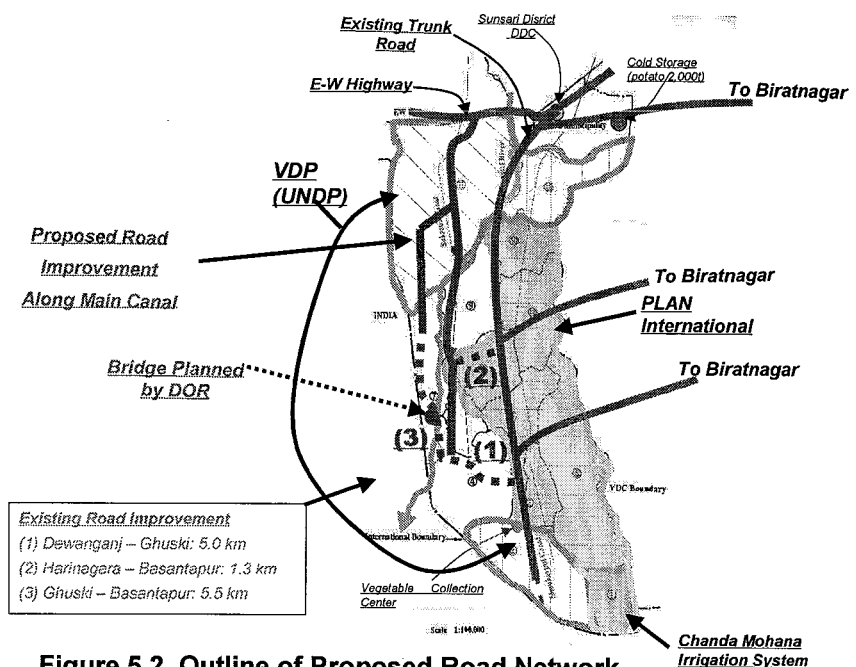


Figure 5.2 Outline of Proposed Road Network

The calculation of the above IRR includes the proposed road improvement. If the road improvement was implemented as a single project, the EIRR with the benefit from time saving of the transportation would be estimated at about 3 % (Table 5.1). Though its internal rate of return as a single project is low, implementing the road improvement combined with the irrigation project is proved to get high EIRR, and these access roads are indispensable for the marketing of the crop production, which is expected to improve by the irrigation project.

4) Enhancement of Living Condition

An increase in income will bring about better-off farmers. They can spend more on their housing, clothing, health care, sanitation, education, and others. These will collectively improve social and cultural amenities of villages and give an impetus to further development within the region.

Table 5.1 Saturation of Industrial Goods in the Study Area in 1998

| | | | | |
|-----------|-----------------|-------------|----------------------|--------------|
| Iron roof | Toilet facility | Piped water | Kerosene for cooking | Radio |
| 15% | 1% | Almost none | 1% | 23% |
| TV set | Bicycle | Motorbike | Thresher | Tractor |
| 2% | 43% | 1% | 2% | Less than 1% |

Source: "LGP Household Survey" in 1998

5) Linkage Effects

A production increase in agriculture sector will induce economic activities in other sectors through linkage effects. The secondary and tertiary benefits will accrue in any sector related to agriculture. Farm inputs suppliers and laborers are those having backward linkage effects and traders and millers are those having forward linkage effects.

6) Increase in Land Value

Financial value of farmland and residential land will be increased by the major projects implementation. This means the value of land assets as a mortgage and the larger class farmers will have more monetary power in the future. On the contrary, the condition of tenant and marginal class farmers will be hard to acquire own farm land due to increase in land prices.

7) Saving of Foreign Exchange

Paddy, wheat and sugarcane out of the increased agricultural products by the major projects are regarded as import substitutes and then contribute to reduction of the country's chronic trade deficit. In total it is estimated that Rs 209 million or US\$ 2.7 million equivalent can be saved annually from Nepal's foreign exchange payment (increment in gross production value of traded farm products) in Base Case. The savings for Case 2 is estimated that Rs 261 million or US\$ 3.4 million.

Table 2.1.1 Economic Price Estimate for Tradable Goods

| Farm Products | | (Unit: /ton) | | | | |
|--|------|--------------|--------|-----------|--------|--|
| Item | Unit | Paddy | Wheat | Sugarcane | Jute | |
| 1) Projected 2002 World Price (in 1990 price) /1 | US\$ | 242 | 125 | 235 | 292 | |
| 2) Projected 2002 World Price (in 2002 price) /1 | US\$ | 270 | 140 | 262 | 304 | |
| 3) Quality Adjustment /2 | % | 90 | 95 | 95 | 100 | |
| 4) Projected Price Adjusted for Quality Difference /2 | US\$ | 243 | 133 | 249 | 304 | |
| 5) International Shipping and Handling (in 1994 price) /2 | US\$ | 38 | 70 | 66 | 0 | |
| 6) International Shipping and Handling (in 2002 price) /3 | US\$ | 42 | 77 | 72 | 0 | |
| 7) CIF/FOB Price at Calcutta Port | US\$ | 285 | 210 | 321 | 304 | |
| 8) Transport and Handling to/from Nepal Border (in 1994 price) /2 | US\$ | 37 | 37 | 37 | -37 | |
| 9) Transport and Handling to/from Nepal Border (in 2002 price) /3 | US\$ | 40 | 40 | 40 | -40 | |
| 10) Price at Biratnagar | US\$ | 325 | 250 | 361 | 264 | |
| 11) Equivalent in Rs /4 | Rs | 25,350 | 19,500 | 28,158 | 20,592 | |
| 12) Domestic Transport and Handling to/from Wholesale Point (in 1994 price) /2 | Rs | 340 | 340 | 340 | 0 | |
| 13) Domestic Transport and Handling to/from Wholesale Point (in 2002 price) /5 | Rs | 562 | 562 | 562 | 0 | |
| 14) Wholesale Point Price | Rs | 25,912 | 20,062 | 28,720 | 20,592 | |
| 15) Processing Ratio /2 | % | 65 | 100 | 9 | 90 | |
| 16) Processing Cost (in 1994 price) /2 | Rs | -162 | 0 | -90 | -45 | |
| 17) Processing Cost (in 2002 price) /5 | Rs | -268 | 0 | -149 | -74 | |
| 18) By-Product through Processing (in 1994 price) /2 | Rs | 280 | 0 | 50 | 0 | |
| 19) By-Product through Processing (in 2002 price) /5 | Rs | 463 | 0 | 83 | 0 | |
| 20) Transport and Handling to/from Farm Gate (in 1994 price) /2 | Rs | -81 | -81 | -81 | -81 | |
| 21) Transport and Handling to/from Farm Gate (in 2002 price) /5 | Rs | -134 | -134 | -134 | -134 | |
| 22) Farm Gate Price /6 | Rs | 16,904 | 19,928 | 2,385 | 18,325 | |

| Farm Inputs | | (Unit: /ton) | | | | |
|---|------|--------------|--------|--------|--------|--|
| Item | Unit | Urea | T.S.P | P.C. | DAP | |
| 1) Projected 2002 World Price (in 1990 price) /1 | US\$ | 99 | 139 | 111 | 161 | |
| 2) Projected 2002 World Price (in 2002 price) /1 | US\$ | 111 | 155 | 124 | 180 | |
| 3) International Shipping and Handling (in 1994 price) /2 | US\$ | 60 | 66 | 66 | 66 | |
| 4) International Shipping and Handling (in 2002 price) /3 | US\$ | 66 | 72 | 72 | 72 | |
| 5) FOB/CIF Price at Calcutta Port | US\$ | 177 | 227 | 196 | 252 | |
| 6) Transport and Handling from/to Nepal Border (in 1994 price) /2 | US\$ | 37 | 37 | 37 | 37 | |
| 7) Transport and Handling from/to Nepal Border (in 2002 price) /3 | US\$ | 40 | 40 | 40 | 40 | |
| 8) FOB/CIF Price at Biratnagar | US\$ | 217 | 267 | 236 | 292 | |
| 9) Equivalent in Rs /4 | Rs | 16,926 | 20,826 | 18,408 | 22,776 | |
| 10) Domestic Transport and Handling to Inarwa (in 1994 price) /2 | Rs | 140 | 140 | 140 | 140 | |
| 11) Domestic Transport and Handling to Inarwa (in 2002 price) /5 | Rs | 231 | 231 | 231 | 231 | |
| 12) Transport and Handling to Farm Gate (in 1994 price) /2 | Rs | 81 | 81 | 81 | 81 | |
| 13) Transport and Handling to Farm Gate (in 2002 price) /5 | Rs | 134 | 134 | 134 | 134 | |
| 14) Farm Gate Price /7 | Rs | 17,291 | 21,191 | 18,773 | 23,141 | |

Note: /1 Based on the World Bank, Global Commodity Markets, Jun 2000.

The IBRD estimates are given in 1990 constant US\$, in which have been adjusted by the factor of 1.1163 to allow for price escalation between 1990 and 2002.

Paddy : Rice: Thai, milled, 5% broken, FOB Bangkok

Wheat : FOB US

Sugarcane: Commodity Markets, Feb 1995: Sugar: FOB Caribbean Ports

Jute : Commodity Markets, Feb 1995: White, FOB Chittagong/Chaina

Urea : Bagged, FOB Europe

T.S.P : FOB

P.C. : Potassium Chloride, FOB

DAP : FOB

/2 SUNSARI MORANG IRRIGATION III DETAILED FEASIBILITY AND DESIGN ANNEX-I, Apr 1995

/3 Adjusted by the factor of 1.0933 to allow for price escalation between 1994 and 2002 in the world

/4 Exchange rate: US\$ 1.00 = Rs 78

/5 Adjusted by the factor of 1.6529 to allow for price escalation between 1994 and 2002 in Nepal

/6 22) = 14) x 15) + 17) + 19) + 21)

/7 14) = 9) + 11) + 13)

ATTACHMENT 1

Table 2.1.2 Financial and Economic Prices

| Item | Unit | Financial Price (2002) | | Conversion | | Economic Price (2002) | |
|----------------------|--------|---------------------------|------------|------------|------------|--------------------------|------------|
| | | Crop/Goods | By-product | Crop/Goods | By-product | Crop/Goods | By-product |
| Crops | | | | | | | |
| | Rs/ton | | | | | | |
| Paddy | | 8,660 /1 | 600 /2 | /3 | /4 | 16,904 | 540 |
| Wheat | | 9,000 /1 | 400 /2 | /3 | /4 | 19,928 | 360 |
| Oilseed/Mustard | | 16,600 /1 | | /4 | | 14,940 | |
| Pulse/Lentil | | 18,400 /1 | | /4 | | 16,560 | |
| Pulse/Mungbean | | 23,500 /7 | | /4 | | 21,150 | |
| Potato | | 8,790 /1 | | /4 | | 7,911 | |
| Cucumber family | | 10,500 /7 | | /4 | | 9,450 | |
| Okra | | 4,920 /7 | | /4 | | 4,428 | |
| Cauliflower | | 5,040 /7 | | /4 | | 4,536 | |
| Cabbage | | 4,750 /7 | | /4 | | 4,275 | |
| Sugarcane | | 1,330 /1 | | /3 | | 2,385 | |
| Jute | | 9,730 /1 | 500 /2 | /3 | /4 | 18,325 | 450 |
| Seed/Seedling | | | | | | | |
| | Rs/kg | | | | | | |
| Paddy | | 10.1 /1 | | /4 | | 9.1 | |
| Wheat | | 12.1 /1 | | /4 | | 10.9 | |
| Oilseed/Mustard | | 24.0 /2 | | /4 | | 21.6 | |
| Pulse/Lentil | | 20.2 /1 | | /4 | | 18.2 | |
| Pulse/Mungbean | | 25.8 /7 | | /4 | | 23.2 | |
| Potato | | 17.3 /1 | | /4 | | 15.6 | |
| Cucumber family | | 2,000.0 /2 | | /4 | | 1,800.0 | |
| Okra | | 1,000.0 /2 | | /4 | | 900.0 | |
| Cauliflower | | 1,000.0 /2 | | /4 | | 900.0 | |
| Cabbage | | 1,000.0 /2 | | /4 | | 900.0 | |
| Sugarcane | | 1.5 /1 | | /4 | | 1.4 | |
| Jute | | 95.1 /1 | | /4 | | 85.6 | |
| Fertilizer | | | | | | | |
| | Rs/kg | | | | | | |
| Urea | | 13.0 /1 | | /3 | | 19.0 | |
| DAP | | 17.8 /1 | | /3 | | 25.7 | |
| Potash | | 13.1 /1 | | /3 | | 20.7 | |
| Organic Manure | Rs/ton | 200.0 /2 | | /4 | | 180.0 | |
| Chemicals | | | | | | | |
| | Rs/kg | | | | | | |
| Insecticide | | 302 /1 | | /5 | | 302 | |
| Herbicide | | 587 /1 | | /5 | | 587 | |
| Hired Labor | | | | | | | |
| | Rs/day | | | | | | |
| Hired Labor | | 58.4 /1 | | /6 | | 39.4 | |
| Bullock Labor | | | | | | | |
| | Rs/day | | | | | | |
| Bullock Labor | | 110.9 /1 | | /4 | | 99.8 | |

Note: /1 SRIP Questionnaire Survey, 2002

/2 SMIP Agri-economic Analysis, 2002

/3 Derived from the data of WB Global Commodity Markets, Jun 2000

/4 Financial value is converted to economic value multiplying by SCF of 0.90

/5 Economic values are estimated in the same value of financial prices

/6 Multiplied by SCF of 0.90 and shadow wage rate of 0.75

/7 Estimation from SRIP Questionnaire Survey, 2002 & Statistics of Sunsari District, 2001

Table 2.1.3 Construction Conversion Factor (CCF)

| Main Component (SRIP) | | (thou.Rs) | | | | | | | | | |
|---------------------------------------|-----------|------------------|-----------------|--------|---------|---------|---------|--------------|--------------|-----------|--|
| Description | Cost | Local Cost | | | | | | foreign cost | Foreign Cost | Total | |
| | | Transfer Payment | Unskilled Labor | Land | Skilled | others | Others | | | | |
| 1. Hardware | | | | | | | | | | | |
| A. Headworks/Intake | 286,472 | 22,918 | 4,584 | 0 | 6,875 | 45,836 | 52,711 | 229,178 | 206,260 | 286,472 | |
| B. Main Canal | 279,888 | 16,793 | 12,315 | 0 | 10,076 | 89,564 | 99,640 | 167,933 | 151,140 | 279,888 | |
| C. Secondary Canal | 126,835 | 8,878 | 4,566 | 0 | 3,044 | 30,440 | 33,484 | 88,785 | 79,906 | 126,835 | |
| D. Tertiary Canal | 100,944 | 8,076 | 2,423 | 0 | 1,615 | 16,151 | 17,766 | 80,755 | 72,680 | 100,944 | |
| E. Farm Development Works (Watercours | 25,763 | 258 | 17,390 | 0 | 1,159 | 4,637 | 5,797 | 2,576 | 2,319 | 25,763 | |
| F. Canal Protection Works | 4,902 | 343 | 221 | 0 | 74 | 1,176 | 1,250 | 3,431 | 3,088 | 4,902 | |
| G. Drainage Structure | 13,244 | 927 | 477 | 0 | 318 | 3,179 | 3,496 | 9,271 | 8,344 | 13,244 | |
| H. Office Building | 1,000 | 30 | 119 | 0 | 56 | 525 | 581 | 300 | 270 | 1,000 | |
| I. Quality Testing Lab | 3,000 | 180 | 204 | 0 | 96 | 900 | 996 | 1,800 | 1,620 | 3,000 | |
| J. Land Acquisition | 98,535 | 0 | 0 | 98,535 | 0 | 0 | 0 | 0 | 0 | 98,535 | |
| Sub-total (1) | 940,583 | 58,403 | 42,298 | 98,535 | 23,313 | 192,409 | 215,722 | 584,029 | 525,626 | 940,583 | |
| 2. Software | | | | | | | | | | | |
| K. Institutional Development | 50,600 | 2,024 | 6,072 | 0 | 15,180 | 9,108 | 24,288 | 20,240 | 18,216 | 50,600 | |
| L. Consultant Services (1)x10% | 94,059 | 5,644 | 3,762 | 0 | 30,099 | 3,762 | 33,861 | 56,435 | 50,792 | 94,059 | |
| M. Administration (1)x2% | 18,812 | 0 | 3,762 | 0 | 11,287 | 3,762 | 15,050 | 0 | 0 | 18,812 | |
| Sub-total (2) | 163,471 | 7,668 | 13,597 | 0 | 56,566 | 16,633 | 73,199 | 76,675 | 69,008 | 163,471 | |
| Sub-total (1+2) | 1,104,054 | 66,070 | 55,894 | 98,535 | 79,879 | 209,041 | 288,921 | 660,704 | 594,634 | 1,104,054 | |
| 3. Contingency (1+2)x10% | 110,406 | | | | | | | | | 110,406 | |
| Total (1+2+3) | 1,214,460 | | | | | | | | | 1,214,460 | |

| Supporting Infrastructures | | (thou.Rs) | | | | | | | | | |
|--------------------------------|--------|------------------|-----------------|------|---------|--------|--------|--------------|--------------|--------|--|
| Description | Cost | Local Cost | | | | | | foreign cost | Foreign Cost | Total | |
| | | Transfer Payment | Unskilled Labor | Land | Skilled | others | Others | | | | |
| 1. Hardware | | | | | | | | | | | |
| A. -Access Road | 16,666 | 500 | 2,333 | 0 | 1,167 | 8,166 | 9,333 | 5,000 | 4,500 | 16,666 | |
| B. -Collection Point | 1,154 | 35 | 121 | 0 | 40 | 646 | 687 | 346 | 312 | 1,154 | |
| J. Land Acquisition | 204 | 0 | 0 | 204 | 0 | 0 | 0 | 0 | 0 | 204 | |
| Sub-total (1) | 18,024 | 535 | 2,454 | 204 | 1,207 | 8,813 | 10,020 | 5,346 | 4,811 | 18,024 | |
| 2. Software | | | | | | | | | | | |
| L. Consultant Services (1)x10% | 1,803 | 108 | 72 | 0 | 577 | 72 | 649 | 1,082 | 974 | 1,803 | |
| M. Administration (1)x2% | 361 | 0 | 72 | 0 | 217 | 72 | 289 | 0 | 0 | 361 | |
| Sub-total (2) | 2,164 | 108 | 144 | 0 | 794 | 144 | 938 | 1,082 | 974 | 2,164 | |
| Sub-total (1+2) | 20,188 | 643 | 2,599 | 204 | 2,001 | 8,957 | 10,957 | 6,428 | 5,785 | 20,188 | |
| 3. Contingency (1+2)x10% | 2,019 | | | | | | | | | 2,019 | |
| Total (1+2+3) | 22,207 | | | | | | | | | 22,207 | |

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| Main Component (SRIP) | | | | | | | | | | | | | | (%) |
|---|----------------------------------|-------|---------------------|--------------------|-------|--------|-----------------|---------------|---------------------|--------------------------|-------|--------|---|-----------------|
| Description | Cost Proportion (1+2) (1+2+3) | | Financial Cost | | | | | Economic Cost | | | | | Construction Conversion Factor (CCF) | |
| | | | Local Cost | | | | Foreign Cost | Total | Local Cost | | | | | Foreign Cost |
| | | | Transfer Payment | Unskilled Labor | Land | Others | | | Transfer Payment | Unskilled Labor | Land | Others | | |
| 1. Hardware | | | | | | | | | | | | | | |
| A. Headworks/Intake | 25.9 | 23.6 | 8.0 | 1.6 | 0.0 | 18.4 | 72.0 | 100.0 | 0.0 | 1.1 | 0.0 | 16.6 | 72.0 | 89.6 |
| B. Main Canal | 25.4 | 23.0 | 6.0 | 4.4 | 0.0 | 35.6 | 54.0 | 100.0 | 0.0 | 3.0 | 0.0 | 32.0 | 54.0 | 89.0 |
| C. Secondary Canal | 11.5 | 10.4 | 7.0 | 3.6 | 0.0 | 26.4 | 63.0 | 100.0 | 0.0 | 2.4 | 0.0 | 23.8 | 63.0 | 89.2 |
| D. Tertiary Canal | 9.1 | 8.3 | 8.0 | 2.4 | 0.0 | 17.6 | 72.0 | 100.0 | 0.0 | 1.6 | 0.0 | 15.8 | 72.0 | 89.5 |
| E. Farm Development Works (Watercourse) | 2.3 | 2.1 | 1.0 | 67.5 | 0.0 | 22.5 | 9.0 | 100.0 | 0.0 | 45.6 | 0.0 | 20.3 | 9.0 | 74.8 |
| F. Canal Protection Works | 0.4 | 0.4 | 7.0 | 4.5 | 0.0 | 25.5 | 63.0 | 100.0 | 0.0 | 3.0 | 0.0 | 23.0 | 63.0 | 89.0 |
| G. Drainage Structure | 1.2 | 1.1 | 7.0 | 3.6 | 0.0 | 26.4 | 63.0 | 100.0 | 0.0 | 2.4 | 0.0 | 23.8 | 63.0 | 89.2 |
| H. Office Building | 0.1 | 0.1 | 3.0 | 11.9 | 0.0 | 58.1 | 27.0 | 100.0 | 0.0 | 8.0 | 0.0 | 52.3 | 27.0 | 87.3 |
| I. Quality Testing Lab | 0.3 | 0.2 | 6.0 | 6.8 | 0.0 | 33.2 | 54.0 | 100.0 | 0.0 | 4.6 | 0.0 | 29.9 | 54.0 | 88.5 |
| J. Land Acquisition | 8.9 | 8.1 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 113.0 | 0.0 | 0.0 | 113.0 |
| Sub-total (1) | 85.2 | 77.4 | 6.2 | 4.5 | 10.5 | 22.9 | 55.9 | 100.0 | 0.0 | 3.0 | 11.8 | 20.6 | 55.9 | 91.4 |
| 2. Software | | | | | | | | | | | | | | |
| K. Institutional Development | 4.6 | 4.2 | 4.0 | 12.0 | 0.0 | 48.0 | 36.0 | 100.0 | 0.0 | 8.1 | 0.0 | 43.2 | 36.0 | 87.3 |
| L. Consultant Services (1)x10% | 8.5 | 7.7 | 6.0 | 4.0 | 0.0 | 36.0 | 54.0 | 100.0 | 0.0 | 2.7 | 0.0 | 32.4 | 54.0 | 89.1 |
| M. Administration (1)x2% | 1.7 | 1.5 | 0.0 | 20.0 | 0.0 | 80.0 | 0.0 | 100.0 | 0.0 | 13.5 | 0.0 | 72.0 | 0.0 | 85.5 |
| Sub-total (2) | 14.8 | 13.5 | 4.7 | 8.3 | 0.0 | 44.8 | 42.2 | 100.0 | 0.0 | 5.6 | 0.0 | 40.3 | 42.2 | 88.1 |
| Sub-total (1+2) | 100.0 | 90.9 | 6.0 | 5.1 | 8.9 | 26.2 | 53.9 | 100.0 | 0.0 | 3.4 | 10.1 | 23.6 | 53.9 | 90.9 |
| 3. Contingency (1+2)x10% | | 9.1 | | | | | | | | Weighted Average (1+2) | | | | 90.9 |
| Total (1+2+3) | | 100.0 | | | | | | | | Weighted Average (1+2+3) | | | | 90.9 |

Note: $113\%(\text{Economic Cost of Land}) = 338\text{thouRs}(\text{Economic Price}) / 300\text{thouRs}(\text{Financial Price})$, $338\text{thouRs}(\text{Economic Price}) = 40.5\text{thouRs}(\text{Annual Net Income}) / 12.0\%(\text{Interest rate})$
 $300\text{thouRs}(\text{Financial Price}) = \text{Cost Estimation of Environmental Mitigation Measures}$

| Supporting Infrastructures | | | | | | | | | | | | | | (%) |
|--------------------------------|----------------------------------|-------|---------------------|--------------------|-------|--------|-----------------|---------------|---------------------|--------------------------|-------|--------|---|-----------------|
| Description | Cost Proportion (1+2) (1+2+3) | | Financial Cost | | | | | Economic Cost | | | | | Construction Conversion Factor (CCF) | |
| | | | Local Cost | | | | Foreign Cost | Total | Local Cost | | | | | Foreign Cost |
| | | | Transfer Payment | Unskilled Labor | Land | Others | | | Transfer Payment | Unskilled Labor | Land | Others | | |
| 1. Hardware | | | | | | | | | | | | | | |
| A. Access Road | 82.6 | 75.0 | 3.0 | 14.0 | 0.0 | 56.0 | 27.0 | 100.0 | 0.0 | 9.5 | 0.0 | 50.4 | 27.0 | 86.9 |
| B. Collection Point | 5.7 | 5.2 | 3.0 | 10.5 | 0.0 | 59.5 | 27.0 | 100.0 | 0.0 | 7.1 | 0.0 | 53.6 | 27.0 | 87.6 |
| C. Land Acquisition | 1.0 | 0.9 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 113.0 | 0.0 | 0.0 | 113.0 |
| Sub-total (1) | 89.3 | 81.2 | 3.0 | 13.6 | 1.1 | 55.6 | 26.7 | 100.0 | 0.0 | 9.2 | 1.3 | 50.0 | 26.7 | 87.2 |
| 2. Software | | | | | | | | | | | | | | |
| D. Consultant Services (1)x10% | 8.9 | 8.1 | 6.0 | 4.0 | 0.0 | 36.0 | 54.0 | 100.0 | 0.0 | 2.7 | 0.0 | 32.4 | 54.0 | 89.1 |
| E. Administration (1)x2% | 1.8 | 1.6 | 0.0 | 20.0 | 0.0 | 80.0 | 0.0 | 100.0 | 0.0 | 13.5 | 0.0 | 72.0 | 0.0 | 85.5 |
| Sub-total (2) | 10.7 | 9.7 | 5.0 | 6.7 | 0.0 | 43.3 | 45.0 | 100.0 | 0.0 | 4.5 | 0.0 | 39.0 | 45.0 | 88.5 |
| Sub-total (1+2) | 100.0 | 90.9 | 3.2 | 12.9 | 1.0 | 54.3 | 28.7 | 100.0 | 0.0 | 8.7 | 1.1 | 48.8 | 28.7 | 87.3 |
| 3. Contingency (1+2)x10% | | 9.1 | | | | | | | | Weighted Average (1+2) | | | | 87.3 |
| Total (1+2+3) | | 100.0 | | | | | | | | Weighted Average (1+2+3) | | | | 87.3 |

| Agriculture Supporting | | | | | | | | | | (thou.Rs) |
|---|------------------|-----------------|------|---------|--------|--------|--------|--------------|--------------|---------------|
| Description | Local Cost | | | | | | | foreign cost | Foreign Cost | Total |
| | Transfer Payment | Unskilled Labor | Land | Skilled | others | Others | | | | |
| 2. Software | | | | | | | | | | |
| K. -Extension Program for Vegetable Prodi | 19,395 | 151 | 0 | 0 | 4,320 | 13,568 | 17,888 | 1,508 | 1,357 | 19,395 |
| L. -Promotion Program for Vegetable Mark | 17,370 | 33 | 0 | 0 | 1,020 | 16,023 | 17,043 | 327 | 294 | 17,370 |
| Sub-total (2) | 36,765 | 183 | 0 | 0 | 5,340 | 29,591 | 34,931 | 1,835 | 1,651 | 36,765 |
| 3. Contingency (1+2)x10% | 3,677 | | | | | | | | | 3,677 |
| Total (1+2+3) | 40,442 | | | | | | | | | 40,442 |

| Environmental Mitigation Measures | | | | | | | | | | (thou.Rs) |
|-----------------------------------|------------------|-----------------|-------|---------|--------|--------|--------|--------------|--------------|---------------|
| Description | Local Cost | | | | | | | foreign cost | Foreign Cost | Total |
| | Transfer Payment | Unskilled Labor | Land | Skilled | others | Others | | | | |
| 1. Hardware | | | | | | | | | | |
| A. -Fish Pond | 8,640 | 173 | 1,382 | 0 | 691 | 4,838 | 5,530 | 1,728 | 1,555 | 8,640 |
| B. -Initial cost for operation | 1,144 | 11 | 0 | 0 | 0 | 1,030 | 1,030 | 114 | 103 | 1,144 |
| J. Land Acquisition | 4,320 | 0 | 0 | 4,320 | 0 | 0 | 0 | 0 | 0 | 4,320 |
| Sub-total (1) | 14,104 | 184 | 1,382 | 4,320 | 691 | 5,868 | 6,559 | 1,842 | 1,658 | 14,104 |
| 2. Software | | | | | | | | | | |
| L. -Extension service | 15,756 | 32 | 0 | 0 | 13,897 | 1,544 | 15,441 | 315 | 284 | 15,756 |
| M. -Environmental monitoring | 7,756 | 23 | 0 | 0 | 7,298 | 226 | 7,523 | 233 | 209 | 7,756 |
| M. -Environmental auditing | 2,101 | 19 | 0 | 0 | 1,740 | 172 | 1,912 | 189 | 170 | 2,101 |
| Sub-total (2) | 25,613 | 74 | 0 | 0 | 22,934 | 1,942 | 24,876 | 737 | 663 | 25,613 |
| Sub-total (1+2) | 39,717 | 258 | 1,382 | 4,320 | 23,625 | 7,810 | 31,435 | 2,579 | 2,321 | 39,717 |
| 3. Contingency (1+2)x10% | 3,972 | | | | | | | | | 3,972 |
| Total (1+2+3) | 43,689 | | | | | | | | | 43,689 |

ATTACHMENT 1

| Agriculture Supporting | | | | | | | | | | | | | | (%) |
|--|-----------------|---------|------------------|-----------------|------|--------|--------------|---------------|------------------|-----------------|------|--------|--------------------------|-------------------------|
| Description | Cost Proportion | | Financial Cost | | | | | Economic Cost | | | | | Construction | |
| | (1+2) | (1+2+3) | Local Cost | | | | Foreign Cost | Total | Local Cost | | | | Foreign Cost | Conversion Factor (CCF) |
| | | | Transfer Payment | Unskilled Labor | Land | Others | | | Transfer Payment | Unskilled Labor | Land | Others | | |
| 1. Software | | | | | | | | | | | | | | |
| A. Extension Program for Vegetable Productio | 52.8 | 48.0 | 0.8 | 0.0 | 0.0 | 92.2 | 7.0 | 100.0 | 0.0 | 0.0 | 0.0 | 83.0 | 7.0 | 90.0 |
| B. Promotion Program for Vegetable Marketin | 47.2 | 43.0 | 0.2 | 0.0 | 0.0 | 98.1 | 1.7 | 100.0 | 0.0 | 0.0 | 0.0 | 88.3 | 1.7 | 90.0 |
| Sub-total (1) | 100.0 | 90.9 | 0.5 | 0.0 | 0.0 | 95.0 | 4.5 | 100.0 | 0.0 | 0.0 | 0.0 | 85.5 | 4.5 | 90.0 |
| 2. Contingency (1)x10% | | 9.1 | | | | | | | | | | | Weighted Average (1+2) | 90.0 |
| Total (1+2) | | 100.0 | | | | | | | | | | | Weighted Average (1+2+3) | 90.0 |

| Environmental Mitigation Measures | | | | | | | | | | | | | | (%) |
|-----------------------------------|-----------------|---------|------------------|-----------------|-------|--------|--------------|---------------|------------------|-----------------|-------|--------|--------------------------|-------------------------|
| Description | Cost Proportion | | Financial Cost | | | | | Economic Cost | | | | | Construction | |
| | (1+2) | (1+2+3) | Local Cost | | | | Foreign Cost | Total | Local Cost | | | | Foreign Cost | Conversion Factor (CCF) |
| | | | Transfer Payment | Unskilled Labor | Land | Others | | | Transfer Payment | Unskilled Labor | Land | Others | | |
| 1. Hardware | | | | | | | | | | | | | | |
| A. Fish Pond | 21.8 | 19.8 | 2.0 | 16.0 | 0.0 | 64.0 | 18.0 | 100.0 | 0.0 | 10.8 | 0.0 | 57.6 | 18.0 | 86.4 |
| B. Initial cost for operation | 2.9 | 2.6 | 1.0 | 0.0 | 0.0 | 90.0 | 9.0 | 100.0 | 0.0 | 0.0 | 0.0 | 81.0 | 9.0 | 90.0 |
| C. Land Acquisition | 10.9 | 9.9 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 113.0 | 0.0 | 0.0 | 113.0 |
| Sub-total (1) | 35.5 | 32.3 | 1.3 | 9.8 | 30.6 | 46.5 | 11.8 | 100.0 | 0.0 | 6.6 | 34.6 | 41.9 | 11.8 | 94.8 |
| 2. Software | | | | | | | | | | | | | | |
| D. Extension service | 39.7 | 36.1 | 0.2 | 0.0 | 0.0 | 98.0 | 1.8 | 100.0 | 0.0 | 0.0 | 0.0 | 88.2 | 1.8 | 90.0 |
| E. Environmental monitoring | 19.5 | 17.8 | 0.3 | 0.0 | 0.0 | 97.0 | 2.7 | 100.0 | 0.0 | 0.0 | 0.0 | 87.3 | 2.7 | 90.0 |
| F. Environmental auditing | 5.3 | 4.8 | 0.3 | 0.0 | 0.0 | 97.0 | 2.7 | 100.0 | 0.0 | 0.0 | 0.0 | 87.3 | 2.7 | 90.0 |
| Sub-total (2) | 64.5 | 58.6 | 0.9 | 0.0 | 0.0 | 91.0 | 8.1 | 100.0 | 0.0 | 0.0 | 0.0 | 81.9 | 8.1 | 90.0 |
| Sub-total (1+2) | 100.0 | 90.9 | 0.6 | 3.5 | 10.9 | 79.1 | 5.8 | 100.0 | 0.0 | 2.3 | 12.3 | 71.2 | 5.8 | 91.7 |
| 3. Contingency (1+2)x10% | | 9.1 | | | | | | | | | | | Weighted Average (1+2) | 91.7 |
| Total (1+2+3) | | 100.0 | | | | | | | | | | | Weighted Average (1+2+3) | 91.7 |

Table 2.3.3 Financial Replacement Cost
Financial Cost

| Description | Commission Year in Order /1 | Useful Life /2 (Years) | Financial Cost (thou.Rs) /3 | | | | | | | | | |
|---|--------------------------------------|---------------------------------|-----------------------------|---------------------------------|------------------------|--------------|-----------------------------|--------------|----------------------|--------------|----------------|---------|
| | | | Construction | Consultant Services (10%) | Administrative (2%) | Sub Total | Price Escalation (5%) | Sub Total | Contingency (10%) | Sub Total | Tax (12.5%) | Total |
| A. Headworks/Intake | | | | | | | | | | | | |
| (1) Electric | 5 | 10 | 10,320 | 1,032 | 206 | 11,558 | 578 | 12,136 | 1,214 | 13,350 | 1,669 | 15,019 |
| B. Main Canal | | | | | | | | | | | | 368,227 |
| (1) Canal | 5 | 30 | 249,354 | 24,935 | 4,987 | 279,276 | 13,964 | 293,240 | 29,324 | 322,564 | 40,321 | 362,885 |
| (2) Escape Structure | 5 | 30 | 2,071 | 207 | 41 | 2,320 | 116 | 2,435 | 244 | 2,679 | 335 | 3,014 |
| (3) Temporary Works | 5 | 30 | 1,600 | 160 | 32 | 1,792 | 90 | 1,882 | 188 | 2,070 | 259 | 2,328 |
| C. Secondary Canal | | | | | | | | | | | | 133,356 |
| (1) Canal | 7 | 15 | 89,235 | 8,924 | 1,785 | 99,943 | 4,997 | 104,940 | 10,494 | 115,434 | 14,429 | 129,864 |
| (2) Temporary Works | 7 | 15 | 2,400 | 240 | 48 | 2,688 | 134 | 2,822 | 282 | 3,105 | 388 | 3,493 |
| D. Tertiary Canal | | | | | | | | | | | | 190,755 |
| (1) Canal | 7 | 15 | 127,922 | 12,792 | 2,558 | 143,273 | 7,164 | 150,436 | 15,044 | 165,480 | 20,685 | 186,165 |
| (2) Canal Crossing Road | 7 | 35 | 3,154 | 315 | 63 | 3,532 | 177 | 3,709 | 371 | 4,080 | 510 | 4,590 |
| E. Farm Development Works (Watercourse) | 7 | 15 | 72,155 | 7,216 | 1,443 | 80,814 | 4,041 | 84,854 | 8,485 | 93,340 | 11,667 | 105,007 |
| F. Canal Protection Works | 5 | 15 | 4,902 | 490 | 98 | 5,490 | 275 | 5,765 | 576 | 6,341 | 793 | 7,134 |
| G. Drainage Structure | | | | | | | | | | | | 19,274 |
| (1) Drainage Crossing Box Culvert | 7 | 30 | 10,095 | 1,010 | 202 | 11,306 | 565 | 11,872 | 1,187 | 13,059 | 1,632 | 14,691 |
| (2) Drainage Crossing Pipe Culvert | 7 | 35 | 448 | 45 | 9 | 502 | 25 | 527 | 53 | 580 | 72 | 652 |
| (3) Outfall | 7 | 30 | 2,701 | 270 | 54 | 3,025 | 151 | 3,176 | 318 | 3,494 | 437 | 3,931 |
| H. Access Road | | | | | | | | | | | | 24,254 |
| (1) Surface Course | 7 | 15 | 9,602 | 960 | 192 | 10,754 | 538 | 11,292 | 1,129 | 12,421 | 1,553 | 13,974 |
| (2) Sub-base/ Sub-grade | 7 | 40 | 7,064 | 706 | 141 | 7,912 | 396 | 8,307 | 831 | 9,138 | 1,142 | 10,280 |
| I. Collection Point | 5 | 35 | 1,154 | 115 | 23 | 1,292 | 65 | 1,357 | 136 | 1,493 | 187 | 1,679 |

Note: Replacement costs of Gates, Distributors and Outlets are considered in a section of O&M Cost, therefore this table excludes them.

| Year in Order | Annual Disbursement | | | | | | Total |
|------------------|---------------------|-------------|-------------|-------------|-------------|-----------|---------|
| | 10 Years | 15 Years | 30 Years | 35 Years | 40 Years | (thou.Rs) | |
| 1 | | | | | | | 0 |
| 2 | | | | | | | 0 |
| 3 | | | | | | | 0 |
| 4 | | | | | | | 0 |
| 5 | | | | | | | 0 |
| 6 | | | | | | | 0 |
| 7 | | | | | | | 0 |
| 8 | | | | | | | 0 |
| 9 | | | | | | | 0 |
| 10 | | | | | | | 0 |
| 11 | | | | | | | 0 |
| 12 | | | | | | | 0 |
| 13 | | | | | | | 0 |
| 14 | | | | | | | 0 |
| 15 | 15,019 | | | | | | 15,019 |
| 16 | | | | | | | 0 |
| 17 | | | | | | | 0 |
| 18 | | | | | | | 0 |
| 19 | | | | | | | 0 |
| 20 | | | 7,134 | | | | 7,134 |
| 21 | | | | | | | 0 |
| 22 | | | 438,502 | | | | 438,502 |
| 23 | | | | | | | 0 |
| 24 | | | | | | | 0 |
| 25 | | | | | | | 0 |
| 26 | 15,019 | | | | | | 15,019 |
| 27 | | | | | | | 0 |
| 28 | | | | | | | 0 |
| 29 | | | | | | | 0 |
| 30 | | | | | | | 0 |
| 31 | | | | | | | 0 |
| 32 | | | | | | | 0 |
| 33 | | | | | | | 0 |
| 34 | | | | | | | 0 |
| 35 | | | 368,227 | | | | 368,227 |
| 36 | | | 7,134 | | | | 7,134 |
| 37 | 15,019 | | 18,622.0 | | | | 33,641 |
| 38 | | | 438,502 | | | | 438,502 |
| 39 | | | | | | | 0 |
| 40 | | | | 1,679 | | | 1,679 |
| 41 | | | | | | | 0 |
| 42 | | | | 5,242 | | | 5,242 |
| 43 | | | | | | | 0 |
| 44 | | | | | | | 0 |
| 45 | | | | | | | 0 |
| 46 | | | | | | | 0 |
| 47 | | | | | 10,280 | | 10,280 |
| 48 | 15,019 | | | | | | 15,019 |
| 49 | | | | | | | 0 |
| 50 | | | | | | | 0 |

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Table 2.3.4 Economic Replacement Cost
Economic Cost

| Description | Commission Year in Order /1 | Useful Life /2 (Years) | Financial Cost (thou.Rs) /3 | | | | | Contingency (10%) | Total | CCF /4 (%) | Economic Cost (thou.Rs) |
|---|-----------------------------|------------------------|-----------------------------|---------------------------|---------------------|-----------|--------|-------------------|-------|------------|-------------------------|
| | | | Construction | Consultant Services (10%) | Administration (2%) | Sub Total | Total | | | | |
| A. Headworks/Intake | | | | | | | | | | | |
| (1) Electric | 5 | 10 | 10,320 | 1,032 | 206 | 11,558 | 1,156 | 12,714 | 89.6 | 11,397 | |
| B. Main Canal | | | | | | | | 311,727 | | 277,468 | |
| (1) Canal | 5 | 30 | 249,354 | 24,935 | 4,987 | 279,276 | 27,928 | 307,204 | 89.0 | 273,442 | |
| (2) Escape Structure | 5 | 30 | 2,071 | 207 | 41 | 2,320 | 232 | 2,551 | 89.0 | 2,271 | |
| (3) Temporary Works | 5 | 30 | 1,600 | 160 | 32 | 1,792 | 179 | 1,971 | 89.0 | 1,755 | |
| C. Secondary Canal | | | | | | | | 112,894 | | 100,690 | |
| (1) Canal | 7 | 15 | 89,235 | 8,924 | 1,785 | 99,943 | 9,994 | 109,938 | 89.2 | 98,053 | |
| (2) Temporary Works | 7 | 15 | 2,400 | 240 | 48 | 2,688 | 269 | 2,957 | 89.2 | 2,637 | |
| D. Tertiary Canal | | | | | | | | 161,486 | | 144,465 | |
| (1) Canal | 7 | 15 | 127,922 | 12,792 | 2,558 | 143,273 | 14,327 | 157,600 | 89.5 | 140,989 | |
| (2) Canal Crossing Road | 7 | 35 | 3,154 | 315 | 63 | 3,532 | 353 | 3,886 | 89.5 | 3,476 | |
| E. Farm Development Works (Watercourse) | 7 | 15 | 72,155 | 7,216 | 1,443 | 80,814 | 8,081 | 88,895 | 74.8 | 66,505 | |
| F. Canal Protection Works | 5 | 15 | 4,902 | 490 | 98 | 5,490 | 549 | 6,039 | 89.0 | 5,374 | |
| G. Drainage Structure | | | | | | | | 16,317 | | 14,553 | |
| (1) Drainage Crossing Box Culvert | 7 | 30 | 10,095 | 1,010 | 202 | 11,306 | 1,131 | 12,437 | 89.2 | 11,093 | |
| (2) Drainage Crossing Pipe Culvert | 7 | 35 | 448 | 45 | 9 | 502 | 50 | 552 | 89.2 | 492 | |
| (3) Outfall | 7 | 30 | 2,701 | 270 | 54 | 3,025 | 303 | 3,328 | 89.2 | 2,968 | |
| H. Access Road | | | | | | | | 20,533 | | 17,832 | |
| (1) Surface Course | 7 | 15 | 9,602 | 960 | 192 | 10,754 | 1,075 | 11,830 | 86.9 | 10,274 | |
| (2) Sub-base/ Sub-grade | 7 | 40 | 7,064 | 706 | 141 | 7,912 | 791 | 8,703 | 86.9 | 7,558 | |
| (3) Land Acquisition | 6 | 100 | 204 | 20 | 4 | 228 | 23 | 251 | 113.0 | 284 | |
| I. Collection Point | 5 | 35 | 1,154 | 115 | 23 | 1,292 | 129 | 1,422 | 87.6 | 1,246 | |

Note: Replacement costs of Gates, Distributors and Outlets are considered in a section of O&M Cost, therefore this table excludes them.

| Annual Disbursement (thou.Rs) | | | | | | | |
|-------------------------------|----------|----------|----------|----------|----------|---------|--|
| Year in Order | 10 Years | 15 Years | 30 Years | 35 Years | 40 Years | Total | |
| 1 | | | | | | 0 | |
| 2 | | | | | | 0 | |
| 3 | | | | | | 0 | |
| 4 | | | | | | 0 | |
| 5 | | | | | | 0 | |
| 6 | | | | | | 0 | |
| 7 | | | | | | 0 | |
| 8 | | | | | | 0 | |
| 9 | | | | | | 0 | |
| 10 | | | | | | 0 | |
| 11 | | | | | | 0 | |
| 12 | | | | | | 0 | |
| 13 | | | | | | 0 | |
| 14 | | | | | | 0 | |
| 15 | 11,397 | | | | | 11,397 | |
| 16 | | | | | | 0 | |
| 17 | | | | | | 0 | |
| 18 | | | | | | 0 | |
| 19 | | | | | | 0 | |
| 20 | | 5,374 | | | | 5,374 | |
| 21 | | | | | | 0 | |
| 22 | | 318,458 | | | | 318,458 | |
| 23 | | | | | | 0 | |
| 24 | | | | | | 0 | |
| 25 | | | | | | 0 | |
| 26 | 11,397 | | | | | 11,397 | |
| 27 | | | | | | 0 | |
| 28 | | | | | | 0 | |
| 29 | | | | | | 0 | |
| 30 | | | | | | 0 | |
| 31 | | | | | | 0 | |
| 32 | | | | | | 0 | |
| 33 | | | | | | 0 | |
| 34 | | | | | | 0 | |
| 35 | | | 277,468 | | | 277,468 | |
| 36 | | 5,374 | | | | 5,374 | |
| 37 | 11,397 | | 14,061 | | | 25,458 | |
| 38 | | 318,458 | | | | 318,458 | |
| 39 | | | | | | 0 | |
| 40 | | | | 1,246 | | 1,246 | |
| 41 | | | | | | 0 | |
| 42 | | | | 3,968 | | 3,968 | |
| 43 | | | | | | 0 | |
| 44 | | | | | | 0 | |
| 45 | | | | | | 0 | |
| 46 | | | | | | 0 | |
| 47 | | | | | 7,558 | 7,558 | |
| 48 | 11,397 | | | | | 11,397 | |
| 49 | | | | | | 0 | |
| 50 | | | | | | 0 | |

Table 2.3.5 O & M Cost

(Unit: thou.Rs)

| Description | Conversion Factor (%) | Financial Cost | | | | | Economic Cost | | | | |
|---|-----------------------|----------------|------------------|-----------------|--------------|--------------|---------------|------------------|-----------------|--------------|--------------|
| | | Total | Local Cost | | | Foreign Cost | Total | Local Cost | | | Foreign Cost |
| | | | Transfer Payment | Unskilled Labor | Others | | | Transfer Payment | Unskilled Labor | Others | |
| A. Administrative Structure | 81.8 | 2,857 | 260 | 0 | 2,597 | 0 | 2,338 | 0 | 0 | 2,338 | 0 |
| B. Replacement Cost (Vehicles, Gates and Equipments) | 90.8 | 1,181 | 95 | 0 | 141 | 945 | 1,072 | 0 | 0 | 127 | 945 |
| C. Desilting Works at Main Canal | 61.4 | 411 | 37 | 374 | 0 | 0 | 252 | 0 | 252 | 0 | 0 |
| D. Other Maintenance Works for Main Canal | 69.5 | 610 | 55 | 337 | 218 | 0 | 424 | 0 | 228 | 196 | 0 |
| E. Command Area Structures under WUC's Jurisdiction | 71.7 | 2,467 | 66 | 1,740 | 661 | 0 | 1,769 | 0 | 1,175 | 595 | 0 |
| F. Administrative Cost for WUC | 81.8 | 2,592 | 236 | 0 | 2,356 | 0 | 2,121 | 0 | 0 | 2,121 | 0 |
| Total | 78.8 | 10,118 | 748 | 2,451 | 5,974 | 945 | 7,976 | 0 | 1,654 | 5,376 | 945 |

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Table 2.4.3 Economic Crop Budget under without Project Condition

| (Unit: /ha) | | | | | | | | | | | | | |
|-------------------------------|----------------|---------|------------|---------------|-----------------|------------|----------------|---------|------------|---------------|--------|------------|---------------|
| Description | Unit | Paddy | | | Cucumber Family | | | Wheat | | | Lentil | | |
| | | Qty | Price (Rs) | Value (Rs) | Qty | Price (Rs) | Value (Rs) | Qty | Price (Rs) | Value (Rs) | Qty | Price (Rs) | Value (Rs) |
| A) Gross Return | | | | <u>43,750</u> | | | <u>175,364</u> | | | <u>44,030</u> | | | <u>13,116</u> |
| Production | kg | 2,508 | 16.90 | 42,395 | 18,557 | 9.45 | 175,364 | 2,178 | 19.93 | 43,403 | 792 | 16.66 | 13,116 |
| By Products | kg | 2,508 | 0.54 | 1,354 | | | | 1,742 | 0.36 | 627 | | | |
| | | (x1.00) | | | | | | (x0.80) | | | | | |
| B) Production Cost | | | | <u>18,817</u> | | | <u>35,327</u> | | | <u>22,589</u> | | | <u>5,023</u> |
| Farm Input | | | | <u>6,333</u> | | | <u>15,370</u> | | | <u>11,873</u> | | | <u>382</u> |
| 1.Seed | kg | 74 | 9.10 | 673 | 3 | 1,800.00 | 5,400 | 145 | 10.90 | 1,581 | 21 | 18.20 | 382 |
| 2.Fertilizer | | | | | | | | | | | | | |
| Urea | kg | 54 | 19.00 | 1,026 | 84 | 19.00 | 1,596 | 81 | 19.00 | 1,539 | | | |
| DAP | kg | 69 | 25.70 | 1,773 | 179 | 25.70 | 4,600 | 105 | 25.70 | 2,699 | | | |
| Potash | kg | 31 | 20.70 | 642 | 73 | 20.70 | 1,511 | 32 | 20.70 | 662 | | | |
| Organic Manure | kg | 17 | 0.18 | 3 | | | | 9 | 0.18 | 2 | | | |
| 3.Agro-chemicals | | | | 210 | | | 1,408 | | | 127 | | | |
| 4.Irrigation by STW | m ³ | 756 | 2.12 | 1,603 | 403 | 2.12 | 854 | 2,318 | 2.12 | 4,914 | | | |
| 5.Threshing | hr | 8.14 | 49.50 | 403 | | | | 7.07 | 49.50 | 350 | | | |
| Labor and Animal Power | | | | <u>12,484</u> | | | <u>19,957</u> | | | <u>10,716</u> | | | <u>4,641</u> |
| 1.Human Labor | | | | | | | | | | | | | |
| Family | M/D | 104 | 39.40 | 4,098 | 251 | 39.40 | 9,889 | 90 | 39.40 | 3,546 | 46 | 39.40 | 1,812 |
| Hired | M/D | 71 | 39.40 | 2,797 | 139 | 39.40 | 5,477 | 68 | 39.40 | 2,679 | 11 | 39.40 | 433 |
| 2.Animal Labor | | | | | | | | | | | | | |
| Family | A/D | 50 | 99.80 | 4,990 | 41 | 99.80 | 4,092 | 40 | 99.80 | 3,992 | 21 | 99.80 | 2,096 |
| Hired | A/D | 6 | 99.80 | 599 | 5 | 99.80 | 499 | 5 | 99.80 | 499 | 3 | 99.80 | 299 |
| Net Return per ha | | | | <u>24,933</u> | | | <u>140,037</u> | | | <u>21,441</u> | | | <u>8,092</u> |

| Description | Unit | Mustard | | | Potato | | | Cauliflower | | |
|-------------------------------|----------------|---------|------------|--------------|--------|------------|----------------|-------------|------------|---------------|
| | | Qty | Price (Rs) | Value (Rs) | Qty | Price (Rs) | Value (Rs) | Qty | Price (Rs) | Value (Rs) |
| A) Gross Return | | | | <u>7,067</u> | | | <u>141,844</u> | | | <u>89,495</u> |
| Production | kg | 473 | 14.94 | 7,067 | 17,930 | 7.91 | 141,844 | 19,730 | 4.54 | 89,495 |
| By Products | kg | | | | | | | | | |
| B) Production Cost | | | | <u>4,704</u> | | | <u>40,069</u> | | | <u>39,305</u> |
| Farm Input | | | | <u>302</u> | | | <u>29,941</u> | | | <u>19,350</u> |
| 1.Seed | kg | 14 | 21.60 | 302 | 1,319 | 15.60 | 20,576 | 1 | 900.00 | 900 |
| 2.Fertilizer | | | | | | | | | | |
| Urea | kg | | | | 85 | 19.00 | 1,615 | 133 | 19.00 | 2,527 |
| DAP | kg | | | | 140 | 25.70 | 3,598 | 308 | 25.70 | 7,916 |
| Potash | kg | | | | 31 | 20.70 | 642 | 111 | 20.70 | 2,298 |
| Organic Manure | kg | | | | 51 | 0.18 | 9 | | | |
| 3.Agro-chemicals | | | | | | | 295 | | | 1,008 |
| 4.Irrigation by STW | m ³ | | | | 1,512 | 2.12 | 3,205 | 2,218 | 2.12 | 4,702 |
| 5.Threshing | hr | | | | | | | | | |
| Labor and Animal Power | | | | <u>4,402</u> | | | <u>10,128</u> | | | <u>19,954</u> |
| 1.Human Labor | | | | | | | | | | |
| Family | M/D | 47 | 39.40 | 1,852 | 101 | 39.40 | 3,979 | 277 | 39.40 | 10,914 |
| Hired | M/D | 9 | 39.40 | 355 | 75 | 39.40 | 2,955 | 118 | 39.40 | 4,649 |
| 2.Animal Labor | | | | | | | | | | |
| Family | A/D | 19 | 99.80 | 1,896 | 20 | 99.80 | 1,996 | 39 | 99.80 | 3,892 |
| Hired | A/D | 3 | 99.80 | 299 | 12 | 99.80 | 1,198 | 5 | 99.80 | 499 |
| Net Return per ha | | | | <u>2,362</u> | | | <u>101,776</u> | | | <u>50,191</u> |

| Description | Unit | Jute | | | Mungbean | | | Sugarcane | | |
|-------------------------------|----------------|---------|------------|---------------|----------|------------|---------------|-----------|------------|----------------|
| | | Qty | Price (Rs) | Value (Rs) | Qty | Price (Rs) | Value (Rs) | Qty | Price (Rs) | Value (Rs) |
| A) Gross Return | | | | <u>38,519</u> | | | <u>11,400</u> | | | <u>104,940</u> |
| Production | kg | 1,914 | 18.33 | 35,074 | 539 | 21.15 | 11,400 | 44,000 | 2.39 | 104,940 |
| By Products | kg | 7,656 | 0.45 | 3,445 | | | | | | |
| | | (x4.00) | | | | | | | | |
| B) Production Cost | | | | <u>13,836</u> | | | <u>5,221</u> | | | <u>28,323</u> |
| Farm Input | | | | <u>3,664</u> | | | <u>580</u> | | | <u>9,772</u> |
| 1.Seed | kg | 8 | 85.60 | 685 | 25 | 23.20 | 580 | 5,724 | 1.40 | 8,014 |
| 2.Fertilizer | | | | | | | | | | |
| Urea | kg | 42 | 19.00 | 798 | | | | 44 | 19.00 | 836 |
| DAP | kg | 58 | 25.70 | 1,491 | | | | 22 | 25.70 | 565 |
| Potash | kg | 32 | 20.70 | 662 | | | | 11 | 20.70 | 228 |
| Organic Manure | kg | | | | | | | 101 | 0.18 | 18 |
| 3.Agro-chemicals | | | | 28 | | | | | | 111 |
| 4.Irrigation by STW | m ³ | | | | | | | | | |
| 5.Threshing | hr | | | | | | | | | |
| Labor and Animal Power | | | | <u>10,173</u> | | | <u>4,641</u> | | | <u>18,551</u> |
| 1.Human Labor | | | | | | | | | | |
| Family | M/D | 94 | 39.40 | 3,704 | 46 | 39.40 | 1,812 | 180 | 39.40 | 7,092 |
| Hired | M/D | 73 | 39.40 | 2,876 | 11 | 39.40 | 433 | 149 | 39.40 | 5,871 |
| 2.Animal Labor | | | | | | | | | | |
| Family | A/D | 20 | 99.80 | 1,996 | 21 | 99.80 | 2,096 | 50 | 99.80 | 4,990 |
| Hired | A/D | 16 | 99.80 | 1,597 | 3 | 99.80 | 299 | 6 | 99.80 | 599 |
| Net Return per ha | | | | <u>24,683</u> | | | <u>6,179</u> | | | <u>76,617</u> |

Note: Organic manure cost is included in labor cost.

Table 2.4.4 Economic Crop Budget under with Project Condition

| | | | | | | | | | | | | | (Unit: /ha) | | | |
|-------------------------------|----------------|---------|------------|---------------|-----------------|------------|----------------|---------|------------|---------------|--------|------------|---------------|----------------|---------------|---------------|
| Description | Unit | Paddy | | | Cucumber Family | | | Wheat | | | Lentil | | | | | |
| | | Qty | Price (Rs) | Value (Rs) | Qty | Price (Rs) | Value (Rs) | Qty | Price (Rs) | Value (Rs) | Qty | Price (Rs) | Value (Rs) | | | |
| A) Gross Return | | | | | | | | | | | | | <u>73,265</u> | <u>189,000</u> | <u>70,756</u> | <u>21,528</u> |
| Production | kg | 4,200 | 16.90 | 70,997 | 20,000 | 9.45 | 189,000 | 3,500 | 19.93 | 69,748 | 1,300 | 16.56 | 21,528 | | | |
| By Products | kg | 4,200 | 0.54 | 2,268 | | | | 2,800 | 0.36 | 1,008 | | | | | | |
| | | (x1.00) | | | | | | (x0.80) | | | | | | | | |
| B) Production Cost | | | | | | | | | | | | | <u>21,902</u> | <u>25,193</u> | <u>20,456</u> | <u>10,368</u> |
| Farm Input | | | | | | | | | | | | | <u>7,430</u> | <u>10,957</u> | <u>8,768</u> | <u>4,222</u> |
| 1.Seed | kg | 50 | 9.10 | 455 | 3 | 1,800.00 | 4,500 | 120 | 10.90 | 1,308 | 40 | 18.20 | 728 | | | |
| 2.Fertilizer | | | | | | | | | | | | | | | | |
| Urea | kg | 140 | 19.00 | 2,660 | 96 | 19.00 | 1,824 | 175 | 19.00 | 3,325 | 9 | 19.00 | 171 | | | |
| DAP | kg | 87 | 25.70 | 2,236 | 87 | 25.70 | 2,236 | 109 | 25.70 | 2,801 | 87 | 25.70 | 2,236 | | | |
| Potash | kg | 50 | 20.70 | 1,035 | 67 | 20.70 | 1,387 | 33 | 20.70 | 683 | 33 | 20.70 | 683 | | | |
| Organic Manure | kg | 0 | 0.18 | 0 | | | | 0 | 0.18 | 0 | | | | | | |
| 3.Agro-chemicals | | | | 505 | | | 1,010 | | | 202 | | | 404 | | | |
| 4.Irrigation by STW | m ³ | | | | | | | | | | | | | | | |
| 5.Threshing | hr | 13.64 | 39.50 | 539 | | | | 11.36 | 39.50 | 449 | | | | | | |
| Labor and Animal Power | | | | | | | | | | | | | <u>14,472</u> | <u>14,236</u> | <u>11,688</u> | <u>6,146</u> |
| 1.Human Labor | | | | | | | | | | | | | | | | |
| Family | M/D | 110 | 39.40 | 4,334 | 167 | 39.40 | 6,580 | 100 | 39.40 | 3,940 | 65 | 39.40 | 2,561 | | | |
| Hired | M/D | 80 | 39.40 | 3,152 | 93 | 39.40 | 3,664 | 70 | 39.40 | 2,758 | 15 | 39.40 | 591 | | | |
| 2.Animal Labor | | | | | | | | | | | | | | | | |
| Family | A/D | 60 | 99.80 | 5,988 | 36 | 99.80 | 3,593 | 40 | 99.80 | 3,992 | 26 | 99.80 | 2,595 | | | |
| Hired | A/D | 10 | 99.80 | 998 | 4 | 99.80 | 399 | 10 | 99.80 | 998 | 4 | 99.80 | 399 | | | |
| Net Return per ha | | | | <u>51,363</u> | | | <u>163,807</u> | | | <u>50,300</u> | | | <u>11,160</u> | | | |

| Description | Unit | Mustard | | | Potato | | | Cauliflower | | | | | |
|-------------------------------|----------------|---------|------------|--------------|--------|------------|----------------|-------------|------------|---------------|---------------|----------------|---------------|
| | | Qty | Price (Rs) | Value (Rs) | Qty | Price (Rs) | Value (Rs) | Qty | Price (Rs) | Value (Rs) | | | |
| A) Gross Return | | | | | | | | | | | <u>14,940</u> | <u>174,042</u> | <u>90,720</u> |
| Production | kg | 1,000 | 14.94 | 14,940 | 22,000 | 7.91 | 174,042 | 20,000 | 4.54 | 90,720 | | | |
| By Products | kg | | | | | | | | | | | | |
| B) Production Cost | | | | | | | | | | | <u>11,677</u> | <u>48,697</u> | <u>24,108</u> |
| Farm Input | | | | | | | | | | | <u>5,137</u> | <u>32,461</u> | <u>9,872</u> |
| 1.Seed | kg | 8 | 21.60 | 173 | 1,500 | 15.60 | 23,400 | 1 | 900.00 | 630 | | | |
| 2.Fertilizer | | | | | | | | | | | | | |
| Urea | kg | 97 | 19.00 | 1,843 | 106 | 19.00 | 2,014 | 167 | 19.00 | 3,173 | | | |
| DAP | kg | 87 | 25.70 | 2,236 | 174 | 25.70 | 4,472 | 130 | 25.70 | 3,341 | | | |
| Potash | kg | 33 | 20.70 | 683 | 100 | 20.70 | 2,070 | 83 | 20.70 | 1,718 | | | |
| Organic Manure | kg | | | | 0 | 0.18 | 0 | | | | | | |
| 3.Agro-chemicals | | | | 202 | | | 505 | | | 1,010 | | | |
| 4.Irrigation by STW | m ³ | | | | | | | | | | | | |
| 5.Threshing | hr | | | | | | | | | | | | |
| Labor and Animal Power | | | | | | | | | | | <u>6,540</u> | <u>14,236</u> | <u>14,236</u> |
| 1.Human Labor | | | | | | | | | | | | | |
| Family | M/D | 76 | 39.40 | 2,994 | 149 | 39.40 | 5,871 | 182 | 39.40 | 7,171 | | | |
| Hired | M/D | 14 | 39.40 | 552 | 111 | 39.40 | 4,373 | 78 | 39.40 | 3,073 | | | |
| 2.Animal Labor | | | | | | | | | | | | | |
| Family | A/D | 26 | 99.80 | 2,595 | 25 | 99.80 | 2,495 | 35 | 99.80 | 3,493 | | | |
| Hired | A/D | 4 | 99.80 | 399 | 15 | 99.80 | 1,497 | 5 | 99.80 | 499 | | | |
| Net Return per ha | | | | <u>3,263</u> | | | <u>127,345</u> | | | <u>66,612</u> | | | |

| Description | Unit | Jute | | | Mungbean | | | Sugarcane | | | | | |
|-------------------------------|----------------|---------|------------|---------------|----------|------------|---------------|-----------|------------|----------------|---------------|---------------|----------------|
| | | Qty | Price (Rs) | Value (Rs) | Qty | Price (Rs) | Value (Rs) | Qty | Price (Rs) | Value (Rs) | | | |
| A) Gross Return | | | | | | | | | | | <u>50,313</u> | <u>21,150</u> | <u>190,800</u> |
| Production | kg | 2,500 | 18.33 | 45,813 | 1,000 | 21.15 | 21,150 | 80,000 | 2.39 | 190,800 | | | |
| By Products | kg | 10,000 | 0.45 | 4,500 | | | | | | | | | |
| | | (x4.00) | | | | | | | | | | | |
| B) Production Cost | | | | | | | | | | | <u>17,560</u> | <u>10,568</u> | <u>36,054</u> |
| Farm Input | | | | | | | | | | | <u>4,401</u> | <u>4,422</u> | <u>17,458</u> |
| 1.Seed | kg | 8 | 85.60 | 685 | 40 | 23.20 | 928 | 5,000 | 1.40 | 7,000 | | | |
| 2.Fertilizer | | | | | | | | | | | | | |
| Urea | kg | 81 | 19.00 | 1,539 | 9 | 19.00 | 171 | 275 | 19.00 | 5,225 | | | |
| DAP | kg | 35 | 25.70 | 900 | 87 | 25.70 | 2,236 | 130 | 25.70 | 3,341 | | | |
| Potash | kg | 40 | 20.70 | 828 | 33 | 20.70 | 683 | 67 | 20.70 | 1,387 | | | |
| Organic Manure | kg | | | | | | | 0 | 0.18 | 0 | | | |
| 3.Agro-chemicals | | | | 450 | | | 404 | | | 505 | | | |
| 4.Irrigation by STW | m ³ | | | | | | | | | | | | |
| 5.Threshing | hr | | | | | | | | | | | | |
| Labor and Animal Power | | | | | | | | | | | <u>13,159</u> | <u>6,146</u> | <u>18,596</u> |
| 1.Human Labor | | | | | | | | | | | | | |
| Family | M/D | 124 | 39.40 | 4,886 | 65 | 39.40 | 2,561 | 175 | 39.40 | 6,895 | | | |
| Hired | M/D | 96 | 39.40 | 3,782 | 15 | 39.40 | 591 | 145 | 39.40 | 5,713 | | | |
| 2.Animal Labor | | | | | | | | | | | | | |
| Family | A/D | 25 | 99.80 | 2,495 | 26 | 99.80 | 2,595 | 54 | 99.80 | 5,389 | | | |
| Hired | A/D | 20 | 99.80 | 1,996 | 4 | 99.80 | 399 | 6 | 99.80 | 599 | | | |
| Net Return per ha | | | | <u>32,752</u> | | | <u>10,582</u> | | | <u>154,746</u> | | | |

Note: Organic manure cost is included in labor cost.

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Table 2.4.5 Incremental Economic Net Crop Production Value

| Case 0 (Base Case) | | | | | | | | | |
|---------------------------------|---------------------------|--------------------|---------------|------------------------|--------------------|---------------|-----------------|---------------------|----------------------|
| Items | Without Project Condition | | | With Project Condition | | | Incremental NPV | | |
| | NPV per ha (Rs/ha) | Cropping Area (ha) | NPV (thou Rs) | NPV per ha (Rs/ha) | Cropping Area (ha) | NPV (thou Rs) | Total (thou Rs) | Vegetables (mil Rs) | Other Crops (mil Rs) |
| Paddy | 24,933 | 7,180 | 179,016 | 51,363 | 6,088 | 312,699 | 133,682 | | 133.7 |
| Cucumber Family | 140,037 | 138 | 19,325 | 163,807 | 1,015 | 166,264 | 146,939 | 146.9 | |
| Wheat | 21,441 | 5,756 | 123,415 | 21,441 | 5,756 | 123,415 | 0 | | 0.0 |
| Lentil | 8,092 | 236 | 1,910 | 8,092 | 236 | 1,910 | 0 | | 0.0 |
| Mustard | 2,362 | 98 | 231 | 2,362 | 98 | 231 | 0 | | 0.0 |
| Potato | 101,776 | 856 | 87,120 | 101,776 | 856 | 87,120 | 0 | | 0.0 |
| Cauliflower | 50,191 | 98 | 4,919 | 50,191 | 98 | 4,919 | 0 | 0.0 | |
| Jute | 24,683 | 1,899 | 46,873 | 32,752 | 1,522 | 49,849 | 2,976 | | 3.0 |
| Mungbean | 6,179 | 200 | 1,236 | 10,582 | 507 | 5,365 | 4,129 | | 4.1 |
| Sugarcane | 76,617 | 148 | 11,339 | 154,746 | 507 | 78,456 | 67,117 | | 67.1 |
| Total | | 16,609 | 475,384 | | 16,683 | 830,228 | 354,844 | 146.9 | 207.9 |
| Total per ha (/10,147ha) | | | 46.8 | | | 81.8 | 35.0 | | |

Note: NPV; Net Production Value

| Case 1 | | | | | | | | | | |
|---------------------------------|---------------------------|--------------------|---------------|------------------------|--------------------|---------------|-----------------|---------------------|----------------------|-----------------------------|
| Items | Without Project Condition | | | With Project Condition | | | Incremental NPV | | | Cost Saving of STW (mil Rs) |
| | NPV per ha (Rs/ha) | Cropping Area (ha) | NPV (thou Rs) | NPV per ha (Rs/ha) | Cropping Area (ha) | NPV (thou Rs) | Total (thou Rs) | Vegetables (mil Rs) | Other Crops (mil Rs) | |
| Paddy | 24,933 | 7,180 | 179,016 | 51,363 | 6,088 | 312,699 | 133,682 | | 133.7 | |
| Cucumber Family | 140,037 | 138 | 19,325 | 163,807 | 1,015 | 166,264 | 146,939 | 146.9 | | |
| Wheat | 21,441 | 5,756 | 123,415 | 26,355 | 5,756 | 151,701 | 14,143 | | | 14.1 |
| Lentil | 8,092 | 236 | 1,910 | 8,092 | 236 | 1,910 | 0 | | 0.0 | |
| Mustard | 2,362 | 98 | 231 | 2,362 | 98 | 231 | 0 | | 0.0 | |
| Potato | 101,776 | 856 | 87,120 | 104,981 | 856 | 89,864 | 1,372 | | | 1.4 |
| Cauliflower | 50,191 | 98 | 4,919 | 54,893 | 98 | 5,379 | 230 | | | 0.2 |
| Jute | 24,683 | 1,899 | 46,873 | 32,752 | 1,522 | 49,849 | 2,976 | | 3.0 | |
| Mungbean | 6,179 | 200 | 1,236 | 10,582 | 507 | 5,365 | 4,129 | | 4.1 | |
| Sugarcane | 76,617 | 148 | 11,339 | 154,746 | 507 | 78,456 | 67,117 | | 67.1 | |
| Total | | 16,609 | 475,384 | | 16,683 | 861,719 | 370,589 | 146.9 | 207.9 | 15.7 |
| Total per ha (/10,147ha) | | | 46.8 | | | 84.9 | 36.5 | | | |

Note: NPV; Net Production Value

| Case 2 | | | | | | | | | |
|---------------------------------|---------------------------|--------------------|---------------|------------------------|--------------------|---------------|-----------------|---------------------|----------------------|
| Items | Without Project Condition | | | With Project Condition | | | Incremental NPV | | |
| | NPV per ha (Rs/ha) | Cropping Area (ha) | NPV (thou Rs) | NPV per ha (Rs/ha) | Cropping Area (ha) | NPV (thou Rs) | Total (thou Rs) | Vegetables (mil Rs) | Other Crops (mil Rs) |
| Paddy | 24,933 | 7,180 | 179,016 | 51,363 | 6,088 | 312,699 | 133,682 | | 133.7 |
| Cucumber Family | 140,037 | 138 | 19,325 | 163,807 | 1,015 | 166,264 | 146,939 | 146.9 | |
| Wheat | 21,441 | 5,756 | 123,415 | 50,300 | 5,074 | 255,222 | 65,903 | | 65.9 |
| Lentil | 8,092 | 236 | 1,910 | 11,160 | 1,015 | 11,327 | 4,709 | | 4.7 |
| Mustard | 2,362 | 98 | 231 | 3,263 | 507 | 1,654 | 711 | | 0.7 |
| Potato | 101,776 | 856 | 87,120 | 127,345 | 1,015 | 129,255 | 21,068 | | 21.1 |
| Cauliflower | 50,191 | 98 | 4,919 | 66,612 | 1,015 | 67,611 | 31,346 | 31.3 | |
| Jute | 24,683 | 1,899 | 46,873 | 32,752 | 1,522 | 49,849 | 2,976 | | 3.0 |
| Mungbean | 6,179 | 200 | 1,236 | 10,582 | 507 | 5,365 | 4,129 | | 4.1 |
| Sugarcane | 76,617 | 148 | 11,339 | 154,746 | 507 | 78,456 | 67,117 | | 67.1 |
| Total | | 16,609 | 475,384 | | 18,265 | 1,077,703 | 478,581 | 178.3 | 300.3 |
| Total per ha (/10,147ha) | | | 46.8 | | | 106.2 | 47.2 | | |

Note: NPV; Net Production Value

| Case 3 | | | | | | | | | |
|---------------------------------|---------------------------|--------------------|---------------|------------------------|--------------------|---------------|-----------------|---------------------|----------------------|
| Items | Without Project Condition | | | With Project Condition | | | Incremental NPV | | |
| | NPV per ha (Rs/ha) | Cropping Area (ha) | NPV (thou Rs) | NPV per ha (Rs/ha) | Cropping Area (ha) | NPV (thou Rs) | Total (thou Rs) | Vegetables (mil Rs) | Other Crops (mil Rs) |
| Paddy | 24,933 | 7,180 | 179,016 | 51,363 | 6,088 | 312,699 | 133,682 | | 133.7 |
| Cucumber Family | 140,037 | 138 | 19,325 | 163,807 | 1,015 | 166,264 | 146,939 | 146.9 | |
| Wheat | 21,441 | 5,756 | 123,415 | 50,300 | 5,074 | 255,222 | 89,101 | | 89.1 |
| Lentil | 8,092 | 236 | 1,910 | 11,160 | 1,015 | 11,327 | 6,366 | | 6.4 |
| Mustard | 2,362 | 98 | 231 | 3,263 | 507 | 1,654 | 962 | | 1.0 |
| Potato | 101,776 | 856 | 87,120 | 127,345 | 1,015 | 129,255 | 28,484 | | 28.5 |
| Cauliflower | 50,191 | 98 | 4,919 | 66,612 | 1,015 | 67,611 | 42,380 | 42.4 | |
| Jute | 24,683 | 1,899 | 46,873 | 32,752 | 1,522 | 49,849 | 2,976 | | 3.0 |
| Mungbean | 6,179 | 200 | 1,236 | 10,582 | 507 | 5,365 | 4,129 | | 4.1 |
| Sugarcane | 76,617 | 148 | 11,339 | 154,746 | 507 | 78,456 | 67,117 | | 67.1 |
| Total | | 16,609 | 475,384 | | 18,265 | 1,077,703 | 522,137 | 189.3 | 332.8 |
| Total per ha (/10,147ha) | | | 46.8 | | | 106.2 | 51.5 | | |

Note: NPV; Net Production Value

Table 2.4.6 Incremental NPV in Each Factor of Effect

| Crops | Planted Area | | | Factor of Effect | Object Area of Effect | Unit Yield | | | |
|-------------------------------------|--------------|-------|---------------------------|---------------------------|-----------------------|------------|-----------------------------------|-------------------------|--------|
| | Without | With | Difference | | | Without | Percent of Incremental Unit Yield | Incremental per hectare | With |
| Paddy | ha | ha | ha | | ha | kg/ha | % | kg/ha | kg/ha |
| | 7,180 | 6,088 | -1,092 | Decrease of Planted Area | -1,092 | 2,508 | 67.5 | 1,692 | 4,200 |
| | | | | Increase of Unit Yield | 6,088 | 2,508 | 67.5 | 1,692 | 4,200 |
| Jute | | | | Increase/Decrease of Cost | 6,088 | 2,508 | 67.5 | 1,692 | 4,200 |
| | 1,899 | 1,522 | -377 | Decrease of Planted Area | -377 | 1,914 | 30.6 | 586 | 2,500 |
| | | | | Increase of Unit Yield | 1,522 | 1,914 | 30.6 | 586 | 2,500 |
| Summer Vegetables (Cucumber Family) | | | | Increase/Decrease of Cost | 1,522 | 1,914 | 30.6 | 586 | 2,500 |
| | 138 | 1,015 | 877 | Increase of Planted Area | 877 | 18,557 | 7.8 | 1,443 | 20,000 |
| | | | | Increase of Unit Yield | 138 | 18,557 | 7.8 | 1,443 | 20,000 |
| Pulse (Mungbean) | | | | Increase/Decrease of Cost | 138 | 18,557 | 7.8 | 1,443 | 20,000 |
| | 200 | 507 | 307 | Increase of Planted Area | 307 | 539 | 85.5 | 461 | 1,000 |
| | | | | Increase of Unit Yield | 200 | 539 | 85.5 | 461 | 1,000 |
| Sugarcane | | | | Increase/Decrease of Cost | 200 | 539 | 85.5 | 461 | 1,000 |
| | 148 | 507 | 359 | Increase of Planted Area | 359 | 44,000 | 81.8 | 36,000 | 80,000 |
| | | | | Increase of Unit Yield | 148 | 44,000 | 81.8 | 36,000 | 80,000 |
| | | | Increase/Decrease of Cost | 148 | 44,000 | 81.8 | 36,000 | 80,000 | |
| Total | 9,565 | 9,639 | 74 | | | | | | |

| Crops | Planted Area | | | Increase/Decrease of Product | | | Net Income of Product | Incremental Net Income | Total |
|-------------------------------------|--------------|-------|------------|------------------------------|------------------------|-----------------------------------|-----------------------|------------------------|---------|
| | Without | With | Difference | Increase/Decrease of Cost | Increase of Unit Yield | Increase/Decrease of Planted Area | | | |
| Paddy | ha | ha | ha | t | t | t | Rs/kg | thou Rs | thou Rs |
| | 7,180 | 6,088 | -1,092 | | 10,301 | -2,739 | 9.94 | -27,226 | 133,682 |
| | | | | 15,269 | | | 12.23 | 125,973 | |
| Jute | | | | | | | 2.29 | 34,936 | |
| | 1,899 | 1,522 | -377 | | 892 | -722 | 12.90 | -9,305 | 2,976 |
| | | | | 2,913 | | | 13.10 | 11,685 | |
| Summer Vegetables (Cucumber Family) | | | | | | | 0.20 | 597 | |
| | 138 | 1,015 | 877 | | | 17,540 | 8.19 | 143,659 | 146,939 |
| | | | | | 199 | | 8.19 | 1,631 | |
| Pulse (Mungbean) | | | | | | | 0.64 | 1,649 | |
| | 200 | 507 | 307 | | | 307 | 10.58 | 3,249 | 4,129 |
| | | | | | 92 | | 10.58 | 976 | |
| Sugarcane | | | | | | | -0.88 | -95 | |
| | 148 | 507 | 359 | | | 28,720 | 1.93 | 55,554 | 67,117 |
| | | | | | 6,512 | | 1.93 | 10,306 | |
| Total | 9,565 | 9,639 | 74 | 27,362 | 16,812 | 43,107 | | 354,844 | 354,844 |

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Table 2.4.7 Cost Estimation of Irrigation Water by STW

| Item | Unit | Financial Price | Conversion Factor (%) | Economic Price | Note |
|---------------|-----------------|-----------------|-----------------------|----------------|------------------|
| Initial Cost | a (Rs) | 62,636 | 87.6 | 54,869 | |
| Useful Life = | b (years) | 5 | | | |
| Depreciation | c=a/b (Rs/year) | 12,527 | | 10,974 | |
| O&M Cost | d (Rs/year) | 6,933 | 90.0 | 6,239 | |
| Annual Cost | e=c+d (Rs/year) | 19,460 | | 17,213 | |
| Water Amount | f (cum) | 8,114 | | | 161hr*50.4cum/hr |
| Water Cost | g=e/f (Rs/cum) | 2.40 | | 2.12 | |

Table 2.4.8 Cost of STW

| Description | Total Cost | Financial Cost | | | | Foreign Cost | Total |
|--|---------------|------------------|-----------------|--|--------|--------------|---------------|
| | | Local Cost | | | Others | | |
| | | Transfer Payment | Unskilled Labor | | | | |
| Initial Cost (Rs) | | | | | | | |
| 1. Construction Cost of STW | | | | | | | |
| A. Drilling, Installation, Development Aquifer, Test | 11,440 | 0 | 6,635 | | 4,805 | 0 | 11,440 |
| B. Material Cost | 28,490 | 2,849 | 0 | | 0 | 25,641 | 28,490 |
| Sub-total | 39,930 | 2,849 | 6,635 | | 4,805 | 25,641 | 39,930 |
| 2. Engine for Pump (Diesel) | 22,706 | 2,271 | 0 | | 0 | 20,435 | 22,706 |
| Total (1+2) | 62,636 | | | | | | 62,636 |

| Description | Total Cost | Financial Cost | | | | Foreign Cost | Total |
|------------------------------|--------------|------------------|-----------------|--|--------|--------------|--------------|
| | | Local Cost | | | Others | | |
| | | Transfer Payment | Unskilled Labor | | | | |
| O & M Cost (Rs) | | | | | | | |
| 1. Operating Cost for Pump | 4,267 | 427 | 0 | | 0 | 3,840 | 4,267 |
| 2. Maintenance Cost for STW | 1,597 | 160 | 0 | | 0 | 1,437 | 1,597 |
| 3. Maintenance Cost for Pump | 1,069 | 107 | 0 | | 0 | 962 | 1,069 |
| Total (1+2+3) | 6,933 | | | | | | 5,864 |

Table 2.4.9 Conversion Factor for STW

| Description | Cost Proportion (1+2) | Financial Cost | | | | Economic Cost | | | | Construction Conversion Factor (CCF) | |
|--|-----------------------|------------------|-----------------|--------|--------------|------------------|-----------------|-------------------------------|--------------|--------------------------------------|-------------|
| | | Local Cost | | | Foreign Cost | Local Cost | | | Foreign Cost | | |
| | | Transfer Payment | Unskilled Labor | Others | | Transfer Payment | Unskilled Labor | Others | | | |
| Main Component (%) | | | | | | | | | | | |
| 1. Construction Cost | | | | | | | | | | | |
| A. Drilling, Installation, Development Aquifer, Test | 18.3 | 0.0 | 58.0 | 42.0 | 0.0 | 100.0 | 0.0 | 39.2 | 37.8 | 0.0 | 77.0 |
| B. Material Cost | 45.5 | 10.0 | 0.0 | 0.0 | 90.0 | 100.0 | 0.0 | 0.0 | 0.0 | 90.0 | 90.0 |
| Sub-total | 63.7 | 7.1 | 16.6 | 12.0 | 64.2 | 100.0 | 0.0 | 11.2 | 10.8 | 64.2 | 86.3 |
| 2. Engine for Pump (Diesel) | 36.3 | 10.0 | 0.0 | 0.0 | 90.0 | 100.0 | 0.0 | 0.0 | 0.0 | 90.0 | 90.0 |
| Total (1+2) | 100.0 | | | | | | | Weighted Average (1+2) | | | 87.6 |

| Description | Cost Proportion (1+2+3) | Financial Cost | | | | Economic Cost | | | | Construction Conversion Factor (CCF) | |
|--------------------------------|-------------------------|------------------|-----------------|--------|--------------|------------------|-----------------|---------------------------------|--------------|--------------------------------------|-------------|
| | | Local Cost | | | Foreign Cost | Local Cost | | | Foreign Cost | | |
| | | Transfer Payment | Unskilled Labor | Others | | Transfer Payment | Unskilled Labor | Others | | | |
| Supporting Infrastructures (%) | | | | | | | | | | | |
| 1. Operating Cost for Pump | 61.5 | 10.0 | 0.0 | 0.0 | 90.0 | 100.0 | 0.0 | 0.0 | 0.0 | 90.0 | 90.0 |
| 2. Maintenance Cost for STW | 23.0 | 10.0 | 0.0 | 0.0 | 90.0 | 100.0 | 0.0 | 0.0 | 0.0 | 90.0 | 90.0 |
| 3. Maintenance Cost for Pump | 15.4 | 10.0 | 0.0 | 0.0 | 90.0 | 100.0 | 0.0 | 0.0 | 0.0 | 90.0 | 90.0 |
| Total (1+2+3) | 100.0 | | | | | | | Weighted Average (1+2+3) | | | 90.0 |

Table 2.4.10 Cost Estimation of Threshing

| Item | Unit | Financial Price | Conversion Factor (%) | Economic Price | Note |
|------------------------|----------------|-------------------|-----------------------|----------------|-------------------------------------|
| Thresher/ Equipment | Initial Cost | a (Rs) | 7,595 | 90.0 | 6,836 |
| | Useful Life = | b (years) | 10 | | |
| | Depreciation | c=a/b (Rs/year) | 760 | | 684 |
| Engine | Initial Cost | d (Rs) | 2,539 | 90.0 | 2,285 |
| | Useful Life = | e (years) | 5 | | |
| | Depreciation | f=d/e (Rs/year) | 508 | | 457 |
| Without Project | O&M Cost | g (Rs/year) | 2,083 | 90.0 | 1,875 |
| | Annual Cost | h=c+f+g (Rs/year) | 3,351 | | 3,016 |
| | Operating Time | i (hr) | 60.9 | | 32.6hr/4ha(Paddy)+28.3hr/4ha(Wheat) |
| | Threshing Cost | j=h/i (Rs/hr) | 55.0 | | 49.5 |
| With Project | O&M Cost | k (Rs/year) | 3,119 | 90.0 | 2,807 |
| | Annual Cost | l=c+f+k (Rs/year) | 4,387 | | 3,948 |
| | Water Amount | m (hr) | 100.0 | | 54.6hr/4ha(Paddy)+45.4hr/4ha(Wheat) |
| | Water Cost | n=l/m (Rs/hr) | 43.9 | | 39.5 |

Table 2.4.11 Cost of Threshing under Without Project

| Initial Cost | | (Rs) | | | | | |
|--------------------|------------|------------------|-----------------|---------|--------|--------------|--------|
| Description | Total Cost | Financial Cost | | | | Foreign Cost | Total |
| | | Local Cost | | | Others | | |
| | | Transfer Payment | Unskilled Labor | Skilled | | | |
| 1. Thresher | 7,000 | 0 | 0 | 0 | 7,000 | 0 | 7,000 |
| 2. Equipment | 595 | 0 | 0 | 0 | 595 | 0 | 595 |
| 3. Engine (Diesel) | 2,539 | 0 | 0 | 0 | 0 | 2,539 | 2,539 |
| Total (1+2+3) | 10,134 | | | | | | 10,134 |

| O & M Cost | | (Rs) | | | | | |
|----------------------------------|------------|------------------|-----------------|---------|--------|--------------|-------|
| Description | Total Cost | Financial Cost | | | | Foreign Cost | Total |
| | | Local Cost | | | Others | | |
| | | Transfer Payment | Unskilled Labor | Skilled | | | |
| 1. Operating Cost | 1,614 | 0 | 0 | 0 | 0 | 1,614 | 1,614 |
| 2. Maintenance Cost for Thresher | 350 | 0 | 0 | 0 | 350 | 0 | 350 |
| 3. Maintenance Cost for Engine | 119 | 0 | 0 | 0 | 0 | 119 | 119 |
| Total (1+2+3) | 2,083 | | | | | | 2,083 |

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Table 2.4.12 Cost of Threshing under With Project

| Initial Cost | | | | | | | | (Rs) |
|----------------------|---------------|------------------|-----------------|---------|--|--------|--------------|---------------|
| Description | | Financial Cost | | | | | | Total |
| | | Local Cost | | | | Others | Foreign Cost | |
| | | Transfer Payment | Unskilled Labor | Skilled | | | | |
| 1. Thresher | 7,000 | 0 | 0 | 0 | | 7,000 | 0 | 7,000 |
| 2. Equipment | 595 | 0 | 0 | 0 | | 595 | 0 | 595 |
| 3. Engine (Diesel) | 2,539 | 0 | 0 | 0 | | 0 | 2,539 | 2,539 |
| Total (1+2+3) | 10,134 | | | | | | | 10,134 |

| O & M Cost | | | | | | | | (Rs) |
|----------------------------------|--------------|------------------|-----------------|---------|--|--------|--------------|--------------|
| Description | | Financial Cost | | | | | | Total |
| | | Local Cost | | | | Others | Foreign Cost | |
| | | Transfer Payment | Unskilled Labor | Skilled | | | | |
| 1. Operating Cost | 2,650 | 0 | 0 | 0 | | 0 | 2,650 | 2,650 |
| 2. Maintenance Cost for Thresher | 350 | 0 | 0 | 0 | | 350 | 0 | 350 |
| 3. Maintenance Cost for Engine | 119 | 0 | 0 | 0 | | 0 | 119 | 119 |
| Total (1+2+3) | 3,119 | | | | | | | 3,119 |

Table 2.4.13 Conversion Factor for Threshing

| Main Component | | | | | | | | | | | | (%) |
|----------------------|-----------------------|------------------|-----------------|--------|--------------|-------|------------------|-----------------|-------------------------------|--------------|--------------------------------------|-----|
| Description | Cost Proportion (1+2) | Financial Cost | | | | | Economic Cost | | | | Construction Conversion Factor (CCF) | |
| | | Local Cost | | | Foreign Cost | Total | Local Cost | | | Foreign Cost | | |
| | | Transfer Payment | Unskilled Labor | Others | | | Transfer Payment | Unskilled Labor | Others | | | |
| A. Thresher | 69.1 | 0.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 0.0 | 90.0 | 0.0 | 90.0 | |
| B. Equipment | 5.9 | 0.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 0.0 | 90.0 | 0.0 | 90.0 | |
| Equipment | 25.1 | 10.0 | 0.0 | 0.0 | 90.0 | 100.0 | 0.0 | 0.0 | 0.0 | 90.0 | 90.0 | |
| Total (1+2+3) | 100.0 | | | | | | | | Weighted Average (1+2) | | 90.0 | |

| Supporting Infrastructures | | | | | | | | | | | | (%) |
|----------------------------|--------------|------------------|-----------------|--------|--------------|-------|------------------|-----------------|-------------------------------|--------------|--------------------------------------|-----|
| Description | (1+2+3) | Financial Cost | | | | | Economic Cost | | | | Construction Conversion Factor (CCF) | |
| | | Local Cost | | | Foreign Cost | Total | Local Cost | | | Foreign Cost | | |
| | | Transfer Payment | Unskilled Labor | Others | | | Transfer Payment | Unskilled Labor | Others | | | |
| A. Operating | 75.7 | 10.0 | 0.0 | 0.0 | 90.0 | 100.0 | 0.0 | 0.0 | 0.0 | 90.0 | 90.0 | |
| B. Maintenance | 18.1 | 0.0 | 0.0 | 100.0 | 0.0 | 100.0 | 0.0 | 0.0 | 90.0 | 0.0 | 90.0 | |
| B. Maintenance | 6.2 | 10.0 | 0.0 | 0.0 | 90.0 | 100.0 | 0.0 | 0.0 | 0.0 | 90.0 | 90.0 | |
| Total (1+2+3) | 100.0 | | | | | | | | Weighted Average (1+2) | | 90.0 | |

Table 2.5.2 Economic Cost and Benefit Stream of Case 0

| Year in Order | Cost | | | | | | Benefit (Mil.Rs) | | | Benefit - Cost | Present Value Factor | Present Value | | | |
|---------------------|--------------------|-------------------------------|---------------------------|------------------|-------|---------|----------------------|----------------|----------|-------------------|----------------------------|----------------|---------|------|---------|
| | Initial Investment | | | | | | Summer Vegetables | Other Crops | Total | | | Discount Rate= | 12.0% | Cost | Benefit |
| | Main Component | Supporting Infrastructures | Agriculture Supporting | Replace -ment | O&M | Total | | | | | | | | | |
| 1 | 39.7 | | | | | 39.7 | | | | -39.7 | 0.893 | 35.5 | 0.0 | | |
| 2 | 199.8 | | | | | 199.8 | | | | -199.8 | 0.797 | 159.3 | 0.0 | | |
| 3 | 256.1 | | | | | 256.1 | | | | -256.1 | 0.712 | 182.3 | 0.0 | | |
| 4 | 239.6 | 3.2 | | | | 242.8 | | | | -242.8 | 0.636 | 154.3 | 0.0 | | |
| 5 | 135.8 | 4.9 | 7.3 | | 2.0 | 149.9 | 3.7 | 10.4 | 14.1 | -135.9 | 0.567 | 85.1 | 8.0 | | |
| 6 | 143.5 | 6.5 | 7.3 | | 4.0 | 161.2 | 11.0 | 31.2 | 42.2 | -119.0 | 0.507 | 81.7 | 21.4 | | |
| 7 | 89.4 | 4.8 | 7.3 | | 6.0 | 107.5 | 22.0 | 62.4 | 84.4 | -23.1 | 0.452 | 48.6 | 38.2 | | |
| 8 | | | 7.3 | | 8.0 | 15.3 | 36.7 | 104.0 | 140.7 | 125.4 | 0.404 | 6.2 | 56.8 | | |
| 9 | | | 7.3 | | 8.0 | 15.3 | 51.4 | 145.5 | 197.0 | 181.7 | 0.361 | 5.5 | 71.0 | | |
| 10 | | | | | 8.0 | 8.0 | 66.1 | 176.7 | 242.8 | 234.9 | 0.322 | 2.6 | 78.2 | | |
| 11 | | | | | 8.0 | 8.0 | 80.8 | 197.5 | 278.3 | 270.4 | 0.287 | 2.3 | 80.0 | | |
| 12 | | | | | 8.0 | 8.0 | 95.5 | 207.9 | 303.4 | 295.4 | 0.257 | 2.0 | 77.9 | | |
| 13 | | | | | 8.0 | 8.0 | 110.2 | 207.9 | 318.1 | 310.1 | 0.229 | 1.8 | 72.9 | | |
| 14 | | | | | 8.0 | 8.0 | 124.9 | 207.9 | 332.8 | 324.8 | 0.205 | 1.6 | 68.1 | | |
| 15 | | | | 11.4 | 8.0 | 19.4 | 135.9 | 207.9 | 343.8 | 324.5 | 0.183 | 3.5 | 62.8 | | |
| 16 | | | | | 8.0 | 8.0 | 143.3 | 207.9 | 351.2 | 343.2 | 0.163 | 1.3 | 57.3 | | |
| 17 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.146 | 1.2 | 51.7 | | |
| 18 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.130 | 1.0 | 46.1 | | |
| 19 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.116 | 0.9 | 41.2 | | |
| 20 | | | | 5.4 | 8.0 | 13.4 | 146.9 | 207.9 | 354.8 | 341.5 | 0.104 | 1.4 | 36.8 | | |
| 21 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.093 | 0.7 | 32.8 | | |
| 22 | | | | 318.5 | 8.0 | 326.4 | 146.9 | 207.9 | 354.8 | 28.4 | 0.083 | 27.0 | 29.3 | | |
| 23 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.074 | 0.6 | 26.2 | | |
| 24 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.066 | 0.5 | 23.4 | | |
| 25 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.059 | 0.5 | 20.9 | | |
| 26 | | | | 11.4 | 8.0 | 19.4 | 146.9 | 207.9 | 354.8 | 335.5 | 0.053 | 1.0 | 18.6 | | |
| 27 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.047 | 0.4 | 16.6 | | |
| 28 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.042 | 0.3 | 14.9 | | |
| 29 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.037 | 0.3 | 13.3 | | |
| 30 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.033 | 0.3 | 11.8 | | |
| 31 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.030 | 0.2 | 10.6 | | |
| 32 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.027 | 0.2 | 9.4 | | |
| 33 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.024 | 0.2 | 8.4 | | |
| 34 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.021 | 0.2 | 7.5 | | |
| 35 | | | | 277.5 | 8.0 | 285.4 | 146.9 | 207.9 | 354.8 | 69.4 | 0.019 | 5.4 | 6.7 | | |
| 36 | | | | 5.4 | 8.0 | 13.4 | 146.9 | 207.9 | 354.8 | 341.5 | 0.017 | 0.2 | 6.0 | | |
| 37 | | | | 25.5 | 8.0 | 33.4 | 146.9 | 207.9 | 354.8 | 321.4 | 0.015 | 0.5 | 5.4 | | |
| 38 | | | | 318.5 | 8.0 | 326.4 | 146.9 | 207.9 | 354.8 | 28.4 | 0.013 | 4.4 | 4.8 | | |
| 39 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.012 | 0.1 | 4.3 | | |
| 40 | | | | 1.2 | 8.0 | 9.2 | 146.9 | 207.9 | 354.8 | 345.6 | 0.011 | 0.1 | 3.8 | | |
| 41 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.010 | 0.1 | 3.4 | | |
| 42 | | | | 4.0 | 8.0 | 11.9 | 146.9 | 207.9 | 354.8 | 342.9 | 0.009 | 0.1 | 3.0 | | |
| 43 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.008 | 0.1 | 2.7 | | |
| 44 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.007 | 0.1 | 2.4 | | |
| 45 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.006 | 0.0 | 2.2 | | |
| 46 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.005 | 0.0 | 1.9 | | |
| 47 | | | | 7.6 | 8.0 | 15.5 | 146.9 | 207.9 | 354.8 | 339.3 | 0.005 | 0.1 | 1.7 | | |
| 48 | | | | 11.4 | 8.0 | 19.4 | 146.9 | 207.9 | 354.8 | 335.5 | 0.004 | 0.1 | 1.5 | | |
| 49 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.004 | 0.0 | 1.4 | | |
| 50 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.003 | 0.0 | 1.2 | | |
| Total | 1,103.9 | 19.4 | 36.4 | 997.6 | 354.9 | 2,512.2 | 5,877.6 | 8,836.0 | 14,713.5 | 12,201.3 | | 821.9 | 1,164.7 | | |

EIRR = 15.6%

B/C = 1.42

ATTACHMENT 1

Table 2.5.3 Economic Cost and Benefit Stream of Case 1

(Mil.Rs)

| Year in Order | Cost | | | | | | | Benefit (Mil.Rs) | | | | Benefit - Cost | Present Value Factor | Present Value | | |
|---------------------|--------------------|-------------------------------|---------------------------|------------------|------------------|-------|---------|----------------------|----------------|------------------------------------|----------|-------------------|----------------------------|----------------------|---------|---------|
| | Initial Investment | | | | | | | Summer Vegetables | Other Crops | Cost Saving of STW in Winter | Total | | | Discount Rate= 12.0% | Cost | Benefit |
| | Main Component | Supporting Infrastructures | Agriculture Supporting | Environ- ment | Replace- ment | O&M | Total | | | | | | | | | |
| 1 | 39.7 | | | | | | 39.7 | | | | | -39.7 | 0.893 | 35.5 | 0.0 | |
| 2 | 199.8 | | | 4.4 | | | 204.2 | | | | | -204.2 | 0.797 | 162.8 | 0.0 | |
| 3 | 256.1 | | | 5.9 | | | 262.0 | | | | | -262.0 | 0.712 | 186.5 | 0.0 | |
| 4 | 239.6 | 3.2 | | 2.4 | | | 245.2 | | | | | -245.2 | 0.636 | 155.8 | 0.0 | |
| 5 | 135.8 | 4.9 | 7.3 | 4.4 | | 2.0 | 154.3 | 3.7 | 10.4 | 3.9 | 18.0 | -136.3 | 0.567 | 87.6 | 10.2 | |
| 6 | 143.5 | 6.5 | 7.3 | 1.5 | | 4.0 | 162.7 | 11.0 | 31.2 | 7.9 | 50.1 | -112.6 | 0.507 | 82.4 | 25.4 | |
| 7 | 89.4 | 4.8 | 7.3 | 1.5 | | 6.0 | 109.0 | 22.0 | 62.4 | 11.8 | 96.2 | -12.8 | 0.452 | 49.3 | 43.5 | |
| 8 | | | 7.3 | | | 8.0 | 15.3 | 36.7 | 104.0 | 15.7 | 156.4 | 141.2 | 0.404 | 6.2 | 63.2 | |
| 9 | | | 7.3 | | | 8.0 | 15.3 | 51.4 | 145.5 | 15.7 | 212.7 | 197.5 | 0.361 | 5.5 | 76.7 | |
| 10 | | | | | | 8.0 | 8.0 | 66.1 | 176.7 | 15.7 | 258.6 | 250.6 | 0.322 | 2.6 | 83.3 | |
| 11 | | | | | | 8.0 | 8.0 | 80.8 | 197.5 | 15.7 | 294.1 | 286.1 | 0.287 | 2.3 | 84.5 | |
| 12 | | | | | | 8.0 | 8.0 | 95.5 | 207.9 | 15.7 | 319.2 | 311.2 | 0.257 | 2.0 | 81.9 | |
| 13 | | | | | | 8.0 | 8.0 | 110.2 | 207.9 | 15.7 | 333.9 | 325.9 | 0.229 | 1.8 | 76.5 | |
| 14 | | | | | | 8.0 | 8.0 | 124.9 | 207.9 | 15.7 | 348.5 | 340.6 | 0.205 | 1.6 | 71.3 | |
| 15 | | | | | | 8.0 | 19.4 | 135.9 | 207.9 | 15.7 | 359.6 | 340.2 | 0.183 | 3.5 | 65.7 | |
| 16 | | | | | | 8.0 | 8.0 | 143.3 | 207.9 | 15.7 | 366.9 | 358.9 | 0.163 | 1.3 | 59.9 | |
| 17 | | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 15.7 | 370.6 | 362.6 | 0.146 | 1.2 | 54.0 | |
| 18 | | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 15.7 | 370.6 | 362.6 | 0.130 | 1.0 | 48.2 | |
| 19 | | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 15.7 | 370.6 | 362.6 | 0.116 | 0.9 | 43.0 | |
| 20 | | | | | | 8.0 | 13.4 | 146.9 | 207.9 | 15.7 | 370.6 | 357.2 | 0.104 | 1.4 | 38.4 | |
| 21 | | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 15.7 | 370.6 | 362.6 | 0.093 | 0.7 | 34.3 | |
| 22 | | | | | | 318.5 | 8.0 | 326.4 | 146.9 | 207.9 | 15.7 | 370.6 | 44.2 | 0.083 | 27.0 | 30.6 |
| 23 | | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 15.7 | 370.6 | 362.6 | 0.074 | 0.6 | 27.3 | |
| 24 | | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 15.7 | 370.6 | 362.6 | 0.066 | 0.5 | 24.4 | |
| 25 | | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 15.7 | 370.6 | 362.6 | 0.059 | 0.5 | 21.8 | |
| 26 | | | | | | 8.0 | 19.4 | 146.9 | 207.9 | 15.7 | 370.6 | 351.2 | 0.053 | 1.0 | 19.5 | |
| 27 | | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 15.7 | 370.6 | 362.6 | 0.047 | 0.4 | 17.4 | |
| 28 | | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 15.7 | 370.6 | 362.6 | 0.042 | 0.3 | 15.5 | |
| 29 | | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 15.7 | 370.6 | 362.6 | 0.037 | 0.3 | 13.9 | |
| 30 | | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 15.7 | 370.6 | 362.6 | 0.033 | 0.3 | 12.4 | |
| 31 | | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 15.7 | 370.6 | 362.6 | 0.030 | 0.2 | 11.0 | |
| 32 | | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 15.7 | 370.6 | 362.6 | 0.027 | 0.2 | 9.9 | |
| 33 | | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 15.7 | 370.6 | 362.6 | 0.024 | 0.2 | 8.8 | |
| 34 | | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 15.7 | 370.6 | 362.6 | 0.021 | 0.2 | 7.9 | |
| 35 | | | | | | 277.5 | 8.0 | 285.4 | 146.9 | 207.9 | 15.7 | 370.6 | 85.1 | 0.019 | 5.4 | 7.0 |
| 36 | | | | | | 5.4 | 8.0 | 13.4 | 146.9 | 207.9 | 15.7 | 370.6 | 357.2 | 0.017 | 0.2 | 6.3 |
| 37 | | | | | | 25.5 | 8.0 | 33.4 | 146.9 | 207.9 | 15.7 | 370.6 | 337.2 | 0.015 | 0.5 | 5.6 |
| 38 | | | | | | 318.5 | 8.0 | 326.4 | 146.9 | 207.9 | 15.7 | 370.6 | 44.2 | 0.013 | 4.4 | 5.0 |
| 39 | | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 15.7 | 370.6 | 362.6 | 0.012 | 0.1 | 4.5 | |
| 40 | | | | | | 1.2 | 8.0 | 9.2 | 146.9 | 207.9 | 15.7 | 370.6 | 361.4 | 0.011 | 0.1 | 4.0 |
| 41 | | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 15.7 | 370.6 | 362.6 | 0.010 | 0.1 | 3.6 | |
| 42 | | | | | | 4.0 | 8.0 | 11.9 | 146.9 | 207.9 | 15.7 | 370.6 | 358.6 | 0.009 | 0.1 | 3.2 |
| 43 | | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 15.7 | 370.6 | 362.6 | 0.008 | 0.1 | 2.8 | |
| 44 | | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 15.7 | 370.6 | 362.6 | 0.007 | 0.1 | 2.5 | |
| 45 | | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 15.7 | 370.6 | 362.6 | 0.006 | 0.0 | 2.3 | |
| 46 | | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 15.7 | 370.6 | 362.6 | 0.005 | 0.0 | 2.0 | |
| 47 | | | | | | 7.6 | 8.0 | 15.5 | 146.9 | 207.9 | 15.7 | 370.6 | 355.1 | 0.005 | 0.1 | 1.8 |
| 48 | | | | | | 11.4 | 8.0 | 19.4 | 146.9 | 207.9 | 15.7 | 370.6 | 351.2 | 0.004 | 0.1 | 1.6 |
| 49 | | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 15.7 | 370.6 | 362.6 | 0.004 | 0.0 | 1.4 | |
| 50 | | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 15.7 | 370.6 | 362.6 | 0.003 | 0.0 | 1.3 | |
| Total | 1,103.9 | 19.4 | 36.4 | 20.0 | 997.6 | 354.9 | 2,532.2 | 5,877.6 | 8,836.0 | 700.7 | 15,414.2 | 12,881.9 | | 835.0 | 1,235.2 | |

EIRR = 16.1%

B / C = 1.48

Table 2.5.4 Economic Cost and Benefit Stream of Case 2

(Mil.Rs)

| Year in Order | Cost | | | | | | Benefit (Mil.Rs) | | | Benefit - Cost | Present Value Factor | Present Value | | | |
|---------------------|--------------------|-------------------------------|---------------------------|------------------|------------------|-------|------------------|------------|----------|-------------------|----------------------------|----------------|-------|---------|------|
| | Initial Investment | | | | Replace -ment | O&M | Total | Other | | | | Discount Rate= | 12.0% | | |
| | Main Component | Supporting Infrastructures | Agriculture Supporting | Environ- ment | | | | Vegetables | Crops | | | | | Total | Cost |
| 1 | 39.7 | | | | | | 39.7 | | | | -39.7 | 0.893 | 35.5 | 0.0 | |
| 2 | 199.8 | | | 8.7 | | | 208.5 | | | | -208.5 | 0.797 | 166.2 | 0.0 | |
| 3 | 256.1 | | | 11.9 | | | 268.0 | | | | -268.0 | 0.712 | 190.7 | 0.0 | |
| 4 | 239.6 | 3.2 | | 4.8 | | | 247.6 | | | | -247.6 | 0.636 | 157.3 | 0.0 | |
| 5 | 135.8 | 4.9 | 7.3 | 8.7 | | 2.0 | 158.7 | 4.5 | 15.0 | 19.5 | -139.2 | 0.567 | 90.0 | 11.0 | |
| 6 | 143.5 | 6.5 | 7.3 | 3.0 | | 4.0 | 164.2 | 13.4 | 45.0 | 58.4 | -105.8 | 0.507 | 83.2 | 29.6 | |
| 7 | 89.4 | 4.8 | 7.3 | 3.0 | | 6.0 | 110.5 | 26.7 | 90.1 | 116.8 | 6.4 | 0.452 | 50.0 | 52.8 | |
| 8 | | | 7.3 | | | 8.0 | 15.3 | 44.6 | 150.1 | 194.7 | 179.5 | 0.404 | 6.2 | 78.6 | |
| 9 | | | 7.3 | | | 8.0 | 15.3 | 62.4 | 210.2 | 272.6 | 257.4 | 0.361 | 5.5 | 98.3 | |
| 10 | | | | | | 8.0 | 8.0 | 80.2 | 255.3 | 335.5 | 327.5 | 0.322 | 2.6 | 108.0 | |
| 11 | | | | | | 8.0 | 8.0 | 98.1 | 285.3 | 383.3 | 375.4 | 0.287 | 2.3 | 110.2 | |
| 12 | | | | | | 8.0 | 8.0 | 115.9 | 300.3 | 416.2 | 408.2 | 0.257 | 2.0 | 106.8 | |
| 13 | | | | | | 8.0 | 8.0 | 133.7 | 300.3 | 434.0 | 426.0 | 0.229 | 1.8 | 99.5 | |
| 14 | | | | | | 8.0 | 8.0 | 151.5 | 300.3 | 451.8 | 443.9 | 0.205 | 1.6 | 92.5 | |
| 15 | | | | | 11.4 | 8.0 | 19.4 | 164.9 | 300.3 | 465.2 | 445.8 | 0.183 | 3.5 | 85.0 | |
| 16 | | | | | | 8.0 | 8.0 | 173.8 | 300.3 | 474.1 | 466.1 | 0.163 | 1.3 | 77.3 | |
| 17 | | | | | | 8.0 | 8.0 | 178.3 | 300.3 | 478.6 | 470.6 | 0.146 | 1.2 | 69.7 | |
| 18 | | | | | | 8.0 | 8.0 | 178.3 | 300.3 | 478.6 | 470.6 | 0.130 | 1.0 | 62.2 | |
| 19 | | | | | | 8.0 | 8.0 | 178.3 | 300.3 | 478.6 | 470.6 | 0.116 | 0.9 | 55.6 | |
| 20 | | | | | 5.4 | 8.0 | 13.4 | 178.3 | 300.3 | 478.6 | 465.2 | 0.104 | 1.4 | 49.6 | |
| 21 | | | | | | 8.0 | 8.0 | 178.3 | 300.3 | 478.6 | 470.6 | 0.093 | 0.7 | 44.3 | |
| 22 | | | | | 318.5 | 8.0 | 326.4 | 178.3 | 300.3 | 478.6 | 152.1 | 0.083 | 27.0 | 39.6 | |
| 23 | | | | | | 8.0 | 8.0 | 178.3 | 300.3 | 478.6 | 470.6 | 0.074 | 0.6 | 35.3 | |
| 24 | | | | | | 8.0 | 8.0 | 178.3 | 300.3 | 478.6 | 470.6 | 0.066 | 0.5 | 31.5 | |
| 25 | | | | | | 8.0 | 8.0 | 178.3 | 300.3 | 478.6 | 470.6 | 0.059 | 0.5 | 28.2 | |
| 26 | | | | | 11.4 | 8.0 | 19.4 | 178.3 | 300.3 | 478.6 | 459.2 | 0.053 | 1.0 | 25.1 | |
| 27 | | | | | | 8.0 | 8.0 | 178.3 | 300.3 | 478.6 | 470.6 | 0.047 | 0.4 | 22.4 | |
| 28 | | | | | | 8.0 | 8.0 | 178.3 | 300.3 | 478.6 | 470.6 | 0.042 | 0.3 | 20.0 | |
| 29 | | | | | | 8.0 | 8.0 | 178.3 | 300.3 | 478.6 | 470.6 | 0.037 | 0.3 | 17.9 | |
| 30 | | | | | | 8.0 | 8.0 | 178.3 | 300.3 | 478.6 | 470.6 | 0.033 | 0.3 | 16.0 | |
| 31 | | | | | | 8.0 | 8.0 | 178.3 | 300.3 | 478.6 | 470.6 | 0.030 | 0.2 | 14.3 | |
| 32 | | | | | | 8.0 | 8.0 | 178.3 | 300.3 | 478.6 | 470.6 | 0.027 | 0.2 | 12.7 | |
| 33 | | | | | | 8.0 | 8.0 | 178.3 | 300.3 | 478.6 | 470.6 | 0.024 | 0.2 | 11.4 | |
| 34 | | | | | | 8.0 | 8.0 | 178.3 | 300.3 | 478.6 | 470.6 | 0.021 | 0.2 | 10.2 | |
| 35 | | | | | | 277.5 | 8.0 | 285.4 | 178.3 | 300.3 | 478.6 | 193.1 | 0.019 | 5.4 | 9.1 |
| 36 | | | | | | 5.4 | 8.0 | 13.4 | 178.3 | 300.3 | 478.6 | 465.2 | 0.017 | 0.2 | 8.1 |
| 37 | | | | | | 25.5 | 8.0 | 33.4 | 178.3 | 300.3 | 478.6 | 445.1 | 0.015 | 0.5 | 7.2 |
| 38 | | | | | 318.5 | 8.0 | 326.4 | 178.3 | 300.3 | 478.6 | 152.1 | 0.013 | 4.4 | 6.5 | |
| 39 | | | | | | 8.0 | 8.0 | 178.3 | 300.3 | 478.6 | 470.6 | 0.012 | 0.1 | 5.8 | |
| 40 | | | | | 1.2 | 8.0 | 9.2 | 178.3 | 300.3 | 478.6 | 469.4 | 0.011 | 0.1 | 5.1 | |
| 41 | | | | | | 8.0 | 8.0 | 178.3 | 300.3 | 478.6 | 470.6 | 0.010 | 0.1 | 4.6 | |
| 42 | | | | | 4.0 | 8.0 | 11.9 | 178.3 | 300.3 | 478.6 | 466.6 | 0.009 | 0.1 | 4.1 | |
| 43 | | | | | | 8.0 | 8.0 | 178.3 | 300.3 | 478.6 | 470.6 | 0.008 | 0.1 | 3.7 | |
| 44 | | | | | | 8.0 | 8.0 | 178.3 | 300.3 | 478.6 | 470.6 | 0.007 | 0.1 | 3.3 | |
| 45 | | | | | | 8.0 | 8.0 | 178.3 | 300.3 | 478.6 | 470.6 | 0.006 | 0.0 | 2.9 | |
| 46 | | | | | | 8.0 | 8.0 | 178.3 | 300.3 | 478.6 | 470.6 | 0.005 | 0.0 | 2.6 | |
| 47 | | | | | 7.6 | 8.0 | 15.5 | 178.3 | 300.3 | 478.6 | 463.0 | 0.005 | 0.1 | 2.3 | |
| 48 | | | | | 11.4 | 8.0 | 19.4 | 178.3 | 300.3 | 478.6 | 459.2 | 0.004 | 0.1 | 2.1 | |
| 49 | | | | | | 8.0 | 8.0 | 178.3 | 300.3 | 478.6 | 470.6 | 0.004 | 0.0 | 1.9 | |
| 50 | | | | | | 8.0 | 8.0 | 178.3 | 300.3 | 478.6 | 470.6 | 0.003 | 0.0 | 1.7 | |
| Total | 1,103.9 | 19.4 | 36.4 | 40.1 | 997.6 | 354.9 | 2,552.3 | 7,131.4 | 12,762.6 | 19,894.0 | 17,341.7 | | 848.1 | 1,586.5 | |

EIRR = 18.9%

B / C = 1.87

ATTACHMENT 1

Table 2.5.5 Economic Cost and Benefit Stream of Case 3

(Mil.Rs)

| Year in Order | Cost | | | | | | | Benefit (Mil.Rs) | | | Benefit - Cost | Present Value Factor | Present Value | |
|---------------|--------------------|----------------------------|------------------------|---------------|--------------|--------------|----------------|------------------|-----------------|-----------------|-----------------|----------------------|----------------------|----------------|
| | Initial Investment | | | Replace -ment | O&M for SRIP | O&M for SMIP | Total | Vegetables | Other Crops | Total | | | Discount Rate= 12.0% | |
| | Main Component | Supporting Infrastructures | Agriculture Supporting | | | | | | | | | | Cost | Cost |
| 1 | 39.7 | | | | | | 39.7 | | | | -39.7 | 0.893 | 35.5 | 0.0 |
| 2 | 199.8 | | | | | | 199.8 | | | | -199.8 | 0.797 | 159.3 | 0.0 |
| 3 | 256.1 | | | | | | 256.1 | | | | -256.1 | 0.712 | 182.3 | 0.0 |
| 4 | 239.6 | 3.2 | | | | | 242.8 | | | | -242.8 | 0.636 | 154.3 | 0.0 |
| 5 | 135.8 | 4.9 | 7.3 | | 2.0 | 1.4 | 151.3 | 4.7 | 16.6 | 21.4 | -130.0 | 0.567 | 85.9 | 12.1 |
| 6 | 143.5 | 6.5 | 7.3 | | 4.0 | 2.8 | 164.0 | 14.2 | 49.9 | 64.1 | -99.9 | 0.507 | 83.1 | 32.5 |
| 7 | 89.4 | 4.8 | 7.3 | | 6.0 | 4.2 | 111.7 | 28.4 | 99.8 | 128.2 | 16.5 | 0.452 | 50.5 | 58.0 |
| 8 | | | 7.3 | | 8.0 | 5.6 | 20.9 | 47.3 | 166.4 | 213.7 | 192.9 | 0.404 | 8.4 | 86.3 |
| 9 | | | 7.3 | | 8.0 | 5.6 | 20.9 | 66.3 | 233.0 | 299.2 | 278.4 | 0.361 | 7.5 | 107.9 |
| 10 | | | | | 8.0 | 5.6 | 13.6 | 85.2 | 282.9 | 368.1 | 354.5 | 0.322 | 4.4 | 118.5 |
| 11 | | | | | 8.0 | 5.6 | 13.6 | 104.1 | 316.2 | 420.3 | 406.7 | 0.287 | 3.9 | 120.8 |
| 12 | | | | | 8.0 | 5.6 | 13.6 | 123.1 | 332.8 | 455.9 | 442.3 | 0.257 | 3.5 | 117.0 |
| 13 | | | | | 8.0 | 5.6 | 13.6 | 142.0 | 332.8 | 474.8 | 461.2 | 0.229 | 3.1 | 108.8 |
| 14 | | | | | 8.0 | 5.6 | 13.6 | 160.9 | 332.8 | 493.7 | 480.1 | 0.205 | 2.8 | 101.0 |
| 15 | | | | 11.4 | 8.0 | 5.6 | 25.0 | 175.1 | 332.8 | 507.9 | 482.9 | 0.183 | 4.6 | 92.8 |
| 16 | | | | | 8.0 | 5.6 | 13.6 | 184.6 | 332.8 | 517.4 | 503.8 | 0.163 | 2.2 | 84.4 |
| 17 | | | | | 8.0 | 5.6 | 13.6 | 189.3 | 332.8 | 522.1 | 508.5 | 0.146 | 2.0 | 76.0 |
| 18 | | | | | 8.0 | 5.6 | 13.6 | 189.3 | 332.8 | 522.1 | 508.5 | 0.130 | 1.8 | 67.9 |
| 19 | | | | | 8.0 | 5.6 | 13.6 | 189.3 | 332.8 | 522.1 | 508.5 | 0.116 | 1.6 | 60.6 |
| 20 | | | | 5.4 | 8.0 | 5.6 | 19.0 | 189.3 | 332.8 | 522.1 | 503.2 | 0.104 | 2.0 | 54.1 |
| 21 | | | | | 8.0 | 5.6 | 13.6 | 189.3 | 332.8 | 522.1 | 508.5 | 0.093 | 1.3 | 48.3 |
| 22 | | | | 318.5 | 8.0 | 5.6 | 332.1 | 189.3 | 332.8 | 522.1 | 190.1 | 0.083 | 27.4 | 43.2 |
| 23 | | | | | 8.0 | 5.6 | 13.6 | 189.3 | 332.8 | 522.1 | 508.5 | 0.074 | 1.0 | 38.5 |
| 24 | | | | | 8.0 | 5.6 | 13.6 | 189.3 | 332.8 | 522.1 | 508.5 | 0.066 | 0.9 | 34.4 |
| 25 | | | | | 8.0 | 5.6 | 13.6 | 189.3 | 332.8 | 522.1 | 508.5 | 0.059 | 0.8 | 30.7 |
| 26 | | | | 11.4 | 8.0 | 5.6 | 25.0 | 189.3 | 332.8 | 522.1 | 497.1 | 0.053 | 1.3 | 27.4 |
| 27 | | | | | 8.0 | 5.6 | 13.6 | 189.3 | 332.8 | 522.1 | 508.5 | 0.047 | 0.6 | 24.5 |
| 28 | | | | | 8.0 | 5.6 | 13.6 | 189.3 | 332.8 | 522.1 | 508.5 | 0.042 | 0.6 | 21.9 |
| 29 | | | | | 8.0 | 5.6 | 13.6 | 189.3 | 332.8 | 522.1 | 508.5 | 0.037 | 0.5 | 19.5 |
| 30 | | | | | 8.0 | 5.6 | 13.6 | 189.3 | 332.8 | 522.1 | 508.5 | 0.033 | 0.5 | 17.4 |
| 31 | | | | | 8.0 | 5.6 | 13.6 | 189.3 | 332.8 | 522.1 | 508.5 | 0.030 | 0.4 | 15.6 |
| 32 | | | | | 8.0 | 5.6 | 13.6 | 189.3 | 332.8 | 522.1 | 508.5 | 0.027 | 0.4 | 13.9 |
| 33 | | | | | 8.0 | 5.6 | 13.6 | 189.3 | 332.8 | 522.1 | 508.5 | 0.024 | 0.3 | 12.4 |
| 34 | | | | | 8.0 | 5.6 | 13.6 | 189.3 | 332.8 | 522.1 | 508.5 | 0.021 | 0.3 | 11.1 |
| 35 | | | | 277.5 | 8.0 | 5.6 | 291.1 | 189.3 | 332.8 | 522.1 | 231.1 | 0.019 | 5.5 | 9.9 |
| 36 | | | | 5.4 | 8.0 | 5.6 | 19.0 | 189.3 | 332.8 | 522.1 | 503.2 | 0.017 | 0.3 | 8.8 |
| 37 | | | | 25.5 | 8.0 | 5.6 | 39.1 | 189.3 | 332.8 | 522.1 | 483.1 | 0.015 | 0.6 | 7.9 |
| 38 | | | | 318.5 | 8.0 | 5.6 | 332.1 | 189.3 | 332.8 | 522.1 | 190.1 | 0.013 | 4.5 | 7.0 |
| 39 | | | | | 8.0 | 5.6 | 13.6 | 189.3 | 332.8 | 522.1 | 508.5 | 0.012 | 0.2 | 6.3 |
| 40 | | | | 1.2 | 8.0 | 5.6 | 14.8 | 189.3 | 332.8 | 522.1 | 507.3 | 0.011 | 0.2 | 5.6 |
| 41 | | | | | 8.0 | 5.6 | 13.6 | 189.3 | 332.8 | 522.1 | 508.5 | 0.010 | 0.1 | 5.0 |
| 42 | | | | 4.0 | 8.0 | 5.6 | 17.6 | 189.3 | 332.8 | 522.1 | 504.6 | 0.009 | 0.2 | 4.5 |
| 43 | | | | | 8.0 | 5.6 | 13.6 | 189.3 | 332.8 | 522.1 | 508.5 | 0.008 | 0.1 | 4.0 |
| 44 | | | | | 8.0 | 5.6 | 13.6 | 189.3 | 332.8 | 522.1 | 508.5 | 0.007 | 0.1 | 3.6 |
| 45 | | | | | 8.0 | 5.6 | 13.6 | 189.3 | 332.8 | 522.1 | 508.5 | 0.006 | 0.1 | 3.2 |
| 46 | | | | | 8.0 | 5.6 | 13.6 | 189.3 | 332.8 | 522.1 | 508.5 | 0.005 | 0.1 | 2.8 |
| 47 | | | | 7.6 | 8.0 | 5.6 | 21.2 | 189.3 | 332.8 | 522.1 | 501.0 | 0.005 | 0.1 | 2.5 |
| 48 | | | | 11.4 | 8.0 | 5.6 | 25.0 | 189.3 | 332.8 | 522.1 | 497.1 | 0.004 | 0.1 | 2.3 |
| 49 | | | | | 8.0 | 5.6 | 13.6 | 189.3 | 332.8 | 522.1 | 508.5 | 0.004 | 0.1 | 2.0 |
| 50 | | | | | 8.0 | 5.6 | 13.6 | 189.3 | 332.8 | 522.1 | 508.5 | 0.003 | 0.0 | 1.8 |
| Total | 1,103.9 | 19.4 | 36.4 | 997.6 | 354.9 | 250.0 | 2,762.3 | 7,572.8 | 14,144.8 | 21,717.5 | 18,955.3 | | 847.0 | 1,735.0 |

EIRR = 20.2%

B / C = 2.05

Table 2.5.7 Sensitivity Analysis under Initial Cost Increased

(Mil.Rs)

| Year in Order | Cost | | | | | | Benefit (Mil.Rs) | | | Benefit - Cost | Present Value Factor | Present Value | | |
|---------------------|--------------------|-------------------------------|---------------------------|------------------|-------|---------|------------------|---------|----------|-------------------|----------------------------|----------------------|---------|---------|
| | Initial Investment | | | | | | Summer | Other | Total | | | Discount Rate= 12.0% | Cost | Benefit |
| | Main Component | Supporting Infrastructures | Agriculture Supporting | Replace -ment | O&M | Total | Vegetables | Crops | | | | | | |
| 1 | 47.7 | | | | | 47.7 | | | | -47.7 | 0.893 | 42.6 | 0.0 | |
| 2 | 239.8 | | | | | 239.8 | | | | -239.8 | 0.797 | 191.1 | 0.0 | |
| 3 | 307.3 | | | | | 307.3 | | | | -307.3 | 0.712 | 218.8 | 0.0 | |
| 4 | 287.5 | 3.9 | | | | 291.4 | | | | -291.4 | 0.636 | 185.2 | 0.0 | |
| 5 | 162.9 | 5.9 | 8.7 | | 2.0 | 179.5 | 3.7 | 10.4 | 14.1 | -165.5 | 0.567 | 101.9 | 8.0 | |
| 6 | 172.2 | 7.7 | 8.7 | | 4.0 | 192.7 | 11.0 | 31.2 | 42.2 | -150.5 | 0.507 | 97.6 | 21.4 | |
| 7 | 107.3 | 5.8 | 8.7 | | 6.0 | 127.8 | 22.0 | 62.4 | 84.4 | -43.4 | 0.452 | 57.8 | 38.2 | |
| 8 | | | 8.7 | | 8.0 | 16.7 | 36.7 | 104.0 | 140.7 | 124.0 | 0.404 | 6.7 | 56.8 | |
| 9 | | | 8.7 | | 8.0 | 16.7 | 51.4 | 145.5 | 197.0 | 180.3 | 0.361 | 6.0 | 71.0 | |
| 10 | | | | | 8.0 | 8.0 | 66.1 | 176.7 | 242.8 | 234.9 | 0.322 | 2.6 | 78.2 | |
| 11 | | | | | 8.0 | 8.0 | 80.8 | 197.5 | 278.3 | 270.4 | 0.287 | 2.3 | 80.0 | |
| 12 | | | | | 8.0 | 8.0 | 95.5 | 207.9 | 303.4 | 295.4 | 0.257 | 2.0 | 77.9 | |
| 13 | | | | | 8.0 | 8.0 | 110.2 | 207.9 | 318.1 | 310.1 | 0.229 | 1.8 | 72.9 | |
| 14 | | | | | 8.0 | 8.0 | 124.9 | 207.9 | 332.8 | 324.8 | 0.205 | 1.6 | 68.1 | |
| 15 | | | | 11.4 | 8.0 | 19.4 | 135.9 | 207.9 | 343.8 | 324.5 | 0.183 | 3.5 | 62.8 | |
| 16 | | | | | 8.0 | 8.0 | 143.3 | 207.9 | 351.2 | 343.2 | 0.163 | 1.3 | 57.3 | |
| 17 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.146 | 1.2 | 51.7 | |
| 18 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.130 | 1.0 | 46.1 | |
| 19 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.116 | 0.9 | 41.2 | |
| 20 | | | | 5.4 | 8.0 | 13.4 | 146.9 | 207.9 | 354.8 | 341.5 | 0.104 | 1.4 | 36.8 | |
| 21 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.093 | 0.7 | 32.8 | |
| 22 | | | | 318.5 | 8.0 | 326.4 | 146.9 | 207.9 | 354.8 | 28.4 | 0.083 | 27.0 | 29.3 | |
| 23 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.074 | 0.6 | 26.2 | |
| 24 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.066 | 0.5 | 23.4 | |
| 25 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.059 | 0.5 | 20.9 | |
| 26 | | | | 11.4 | 8.0 | 19.4 | 146.9 | 207.9 | 354.8 | 335.5 | 0.053 | 1.0 | 18.6 | |
| 27 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.047 | 0.4 | 16.6 | |
| 28 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.042 | 0.3 | 14.9 | |
| 29 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.037 | 0.3 | 13.3 | |
| 30 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.033 | 0.3 | 11.8 | |
| 31 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.030 | 0.2 | 10.6 | |
| 32 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.027 | 0.2 | 9.4 | |
| 33 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.024 | 0.2 | 8.4 | |
| 34 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.021 | 0.2 | 7.5 | |
| 35 | | | | 277.5 | 8.0 | 285.4 | 146.9 | 207.9 | 354.8 | 69.4 | 0.019 | 5.4 | 6.7 | |
| 36 | | | | 5.4 | 8.0 | 13.4 | 146.9 | 207.9 | 354.8 | 341.5 | 0.017 | 0.2 | 6.0 | |
| 37 | | | | 25.5 | 8.0 | 33.4 | 146.9 | 207.9 | 354.8 | 321.4 | 0.015 | 0.5 | 5.4 | |
| 38 | | | | 318.5 | 8.0 | 326.4 | 146.9 | 207.9 | 354.8 | 28.4 | 0.013 | 4.4 | 4.8 | |
| 39 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.012 | 0.1 | 4.3 | |
| 40 | | | | | 1.2 | 8.0 | 9.2 | 146.9 | 207.9 | 354.8 | 345.6 | 0.011 | 0.1 | 3.8 |
| 41 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.010 | 0.1 | 3.4 | |
| 42 | | | | 4.0 | 8.0 | 11.9 | 146.9 | 207.9 | 354.8 | 342.9 | 0.009 | 0.1 | 3.0 | |
| 43 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.008 | 0.1 | 2.7 | |
| 44 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.007 | 0.1 | 2.4 | |
| 45 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.006 | 0.0 | 2.2 | |
| 46 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.005 | 0.0 | 1.9 | |
| 47 | | | | 7.6 | 8.0 | 15.5 | 146.9 | 207.9 | 354.8 | 339.3 | 0.005 | 0.1 | 1.7 | |
| 48 | | | | 11.4 | 8.0 | 19.4 | 146.9 | 207.9 | 354.8 | 335.5 | 0.004 | 0.1 | 1.5 | |
| 49 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.004 | 0.0 | 1.4 | |
| 50 | | | | | 8.0 | 8.0 | 146.9 | 207.9 | 354.8 | 346.9 | 0.003 | 0.0 | 1.2 | |
| Total | 1,324.7 | 23.3 | 43.7 | 997.6 | 354.9 | 2,744.2 | 5,877.6 | 8,836.0 | 14,713.5 | 11,969.4 | | 971.2 | 1,164.7 | |

EIRR = 13.8%

B / C = 1.20

ATTACHMENT 1

Table 2.5.8 Sensitivity Analysis under O & M Cost Increased

(Mil.Rs)

| Year in Order | Cost | | | | | | Benefit (Mil.Rs) | | | Benefit - Cost | Present Value Factor | Present Value | | |
|---------------------|--------------------|-------------------------------|---------------------------|------------------|--------------|----------------|----------------------|----------------|-----------------|-------------------|----------------------------|----------------------|----------------|---------|
| | Initial Investment | | | Replace -ment | O&M | Total | Summer Vegetables | Other Crops | Total | | | Discount Rate= 12.0% | Cost | Benefit |
| | Main Component | Supporting Infrastructures | Agriculture Supporting | | | | | | | | | | | |
| 1 | 39.7 | | | | | 39.7 | | | | -39.7 | 0.893 | 35.5 | 0.0 | |
| 2 | 199.8 | | | | | 199.8 | | | | -199.8 | 0.797 | 159.3 | 0.0 | |
| 3 | 256.1 | | | | | 256.1 | | | | -256.1 | 0.712 | 182.3 | 0.0 | |
| 4 | 239.6 | 3.2 | | | | 242.8 | | | | -242.8 | 0.636 | 154.3 | 0.0 | |
| 5 | 135.8 | 4.9 | 7.3 | | 2.4 | 150.3 | 3.7 | 10.4 | 14.1 | -136.3 | 0.567 | 85.3 | 8.0 | |
| 6 | 143.5 | 6.5 | 7.3 | | 4.8 | 162.0 | 11.0 | 31.2 | 42.2 | -119.8 | 0.507 | 82.1 | 21.4 | |
| 7 | 89.4 | 4.8 | 7.3 | | 7.2 | 108.7 | 22.0 | 62.4 | 84.4 | -24.3 | 0.452 | 49.2 | 38.2 | |
| 8 | | | 7.3 | | 9.6 | 16.9 | 36.7 | 104.0 | 140.7 | 123.8 | 0.404 | 6.8 | 56.8 | |
| 9 | | | 7.3 | | 9.6 | 16.9 | 51.4 | 145.5 | 197.0 | 180.1 | 0.361 | 6.1 | 71.0 | |
| 10 | | | | | 9.6 | 9.6 | 66.1 | 176.7 | 242.8 | 233.3 | 0.322 | 3.1 | 78.2 | |
| 11 | | | | | 9.6 | 9.6 | 80.8 | 197.5 | 278.3 | 268.8 | 0.287 | 2.8 | 80.0 | |
| 12 | | | | | 9.6 | 9.6 | 95.5 | 207.9 | 303.4 | 293.8 | 0.257 | 2.5 | 77.9 | |
| 13 | | | | | 9.6 | 9.6 | 110.2 | 207.9 | 318.1 | 308.5 | 0.229 | 2.2 | 72.9 | |
| 14 | | | | | 9.6 | 9.6 | 124.9 | 207.9 | 332.8 | 323.2 | 0.205 | 2.0 | 68.1 | |
| 15 | | | | 11.4 | 9.6 | 21.0 | 135.9 | 207.9 | 343.8 | 322.9 | 0.183 | 3.8 | 62.8 | |
| 16 | | | | | 9.6 | 9.6 | 143.3 | 207.9 | 351.2 | 341.6 | 0.163 | 1.6 | 57.3 | |
| 17 | | | | | 9.6 | 9.6 | 146.9 | 207.9 | 354.8 | 345.3 | 0.146 | 1.4 | 51.7 | |
| 18 | | | | | 9.6 | 9.6 | 146.9 | 207.9 | 354.8 | 345.3 | 0.130 | 1.2 | 46.1 | |
| 19 | | | | | 9.6 | 9.6 | 146.9 | 207.9 | 354.8 | 345.3 | 0.116 | 1.1 | 41.2 | |
| 20 | | | | 5.4 | 9.6 | 14.9 | 146.9 | 207.9 | 354.8 | 339.9 | 0.104 | 1.5 | 36.8 | |
| 21 | | | | | 9.6 | 9.6 | 146.9 | 207.9 | 354.8 | 345.3 | 0.093 | 0.9 | 32.8 | |
| 22 | | | | 318.5 | 9.6 | 328.0 | 146.9 | 207.9 | 354.8 | 26.8 | 0.083 | 27.1 | 29.3 | |
| 23 | | | | | 9.6 | 9.6 | 146.9 | 207.9 | 354.8 | 345.3 | 0.074 | 0.7 | 26.2 | |
| 24 | | | | | 9.6 | 9.6 | 146.9 | 207.9 | 354.8 | 345.3 | 0.066 | 0.6 | 23.4 | |
| 25 | | | | | 9.6 | 9.6 | 146.9 | 207.9 | 354.8 | 345.3 | 0.059 | 0.6 | 20.9 | |
| 26 | | | | 11.4 | 9.6 | 21.0 | 146.9 | 207.9 | 354.8 | 333.9 | 0.053 | 1.1 | 18.6 | |
| 27 | | | | | 9.6 | 9.6 | 146.9 | 207.9 | 354.8 | 345.3 | 0.047 | 0.4 | 16.6 | |
| 28 | | | | | 9.6 | 9.6 | 146.9 | 207.9 | 354.8 | 345.3 | 0.042 | 0.4 | 14.9 | |
| 29 | | | | | 9.6 | 9.6 | 146.9 | 207.9 | 354.8 | 345.3 | 0.037 | 0.4 | 13.3 | |
| 30 | | | | | 9.6 | 9.6 | 146.9 | 207.9 | 354.8 | 345.3 | 0.033 | 0.3 | 11.8 | |
| 31 | | | | | 9.6 | 9.6 | 146.9 | 207.9 | 354.8 | 345.3 | 0.030 | 0.3 | 10.6 | |
| 32 | | | | | 9.6 | 9.6 | 146.9 | 207.9 | 354.8 | 345.3 | 0.027 | 0.3 | 9.4 | |
| 33 | | | | | 9.6 | 9.6 | 146.9 | 207.9 | 354.8 | 345.3 | 0.024 | 0.2 | 8.4 | |
| 34 | | | | | 9.6 | 9.6 | 146.9 | 207.9 | 354.8 | 345.3 | 0.021 | 0.2 | 7.5 | |
| 35 | | | | 277.5 | 9.6 | 287.0 | 146.9 | 207.9 | 354.8 | 67.8 | 0.019 | 5.4 | 6.7 | |
| 36 | | | | 5.4 | 9.6 | 14.9 | 146.9 | 207.9 | 354.8 | 339.9 | 0.017 | 0.3 | 6.0 | |
| 37 | | | | 25.5 | 9.6 | 35.0 | 146.9 | 207.9 | 354.8 | 319.8 | 0.015 | 0.5 | 5.4 | |
| 38 | | | | 318.5 | 9.6 | 328.0 | 146.9 | 207.9 | 354.8 | 26.8 | 0.013 | 4.4 | 4.8 | |
| 39 | | | | | 9.6 | 9.6 | 146.9 | 207.9 | 354.8 | 345.3 | 0.012 | 0.1 | 4.3 | |
| 40 | | | | 1.2 | 9.6 | 10.8 | 146.9 | 207.9 | 354.8 | 344.0 | 0.011 | 0.1 | 3.8 | |
| 41 | | | | | 9.6 | 9.6 | 146.9 | 207.9 | 354.8 | 345.3 | 0.010 | 0.1 | 3.4 | |
| 42 | | | | 4.0 | 9.6 | 13.5 | 146.9 | 207.9 | 354.8 | 341.3 | 0.009 | 0.1 | 3.0 | |
| 43 | | | | | 9.6 | 9.6 | 146.9 | 207.9 | 354.8 | 345.3 | 0.008 | 0.1 | 2.7 | |
| 44 | | | | | 9.6 | 9.6 | 146.9 | 207.9 | 354.8 | 345.3 | 0.007 | 0.1 | 2.4 | |
| 45 | | | | | 9.6 | 9.6 | 146.9 | 207.9 | 354.8 | 345.3 | 0.006 | 0.1 | 2.2 | |
| 46 | | | | | 9.6 | 9.6 | 146.9 | 207.9 | 354.8 | 345.3 | 0.005 | 0.1 | 1.9 | |
| 47 | | | | 7.6 | 9.6 | 17.1 | 146.9 | 207.9 | 354.8 | 337.7 | 0.005 | 0.1 | 1.7 | |
| 48 | | | | 11.4 | 9.6 | 21.0 | 146.9 | 207.9 | 354.8 | 333.9 | 0.004 | 0.1 | 1.5 | |
| 49 | | | | | 9.6 | 9.6 | 146.9 | 207.9 | 354.8 | 345.3 | 0.004 | 0.0 | 1.4 | |
| 50 | | | | | 9.6 | 9.6 | 146.9 | 207.9 | 354.8 | 345.3 | 0.003 | 0.0 | 1.2 | |
| Total | 1,103.9 | 19.4 | 36.4 | 997.6 | 425.9 | 2,583.2 | 5,877.6 | 8,836.0 | 14,713.5 | 12,130.3 | | 829.0 | 1,164.7 | |

EIRR = 15.5%

B / C = 1.40

Table 2.5.9 Sensitivity Analysis under Vegetable Price Decreased

(Mil.Rs)

| Year in Order | Cost | | | | | | Benefit (Mil.Rs) | | | Benefit - Cost | Present Value Factor | Present Value | | |
|---------------------|--------------------|-------------------------------|---------------------------|------------------|-------|---------|----------------------|----------------|----------|-------------------|----------------------------|----------------------|---------|---------|
| | Initial Investment | | | Replace -ment | O&M | Total | Summer Vegetables | Other Crops | Total | | | Discount Rate= 12.0% | Cost | Benefit |
| | Main Component | Supporting Infrastructures | Agriculture Supporting | | | | | | | | | | | |
| 1 | 39.7 | | | | | 39.7 | | | | -39.7 | 0.893 | 35.5 | 0.0 | |
| 2 | 199.8 | | | | | 199.8 | | | | -199.8 | 0.797 | 159.3 | 0.0 | |
| 3 | 256.1 | | | | | 256.1 | | | | -256.1 | 0.712 | 182.3 | 0.0 | |
| 4 | 239.6 | 3.2 | | | | 242.8 | | | | -242.8 | 0.636 | 154.3 | 0.0 | |
| 5 | 135.8 | 4.9 | 7.3 | | 2.0 | 149.9 | 2.8 | 10.4 | 13.2 | -136.7 | 0.567 | 85.1 | 7.5 | |
| 6 | 143.5 | 6.5 | 7.3 | | 4.0 | 161.2 | 8.5 | 31.2 | 39.7 | -121.5 | 0.507 | 81.7 | 20.1 | |
| 7 | 89.4 | 4.8 | 7.3 | | 6.0 | 107.5 | 17.0 | 62.4 | 79.4 | -28.1 | 0.452 | 48.6 | 35.9 | |
| 8 | | | 7.3 | | 8.0 | 15.3 | 28.4 | 104.0 | 132.3 | 117.0 | 0.404 | 6.2 | 53.4 | |
| 9 | | | 7.3 | | 8.0 | 15.3 | 39.7 | 145.5 | 185.2 | 170.0 | 0.361 | 5.5 | 66.8 | |
| 10 | | | | | 8.0 | 8.0 | 51.0 | 176.7 | 227.8 | 219.8 | 0.322 | 2.6 | 73.3 | |
| 11 | | | | | 8.0 | 8.0 | 62.4 | 197.5 | 259.9 | 251.9 | 0.287 | 2.3 | 74.7 | |
| 12 | | | | | 8.0 | 8.0 | 73.7 | 207.9 | 281.6 | 273.6 | 0.257 | 2.0 | 72.3 | |
| 13 | | | | | 8.0 | 8.0 | 85.1 | 207.9 | 293.0 | 285.0 | 0.229 | 1.8 | 67.1 | |
| 14 | | | | | 8.0 | 8.0 | 96.4 | 207.9 | 304.3 | 296.3 | 0.205 | 1.6 | 62.3 | |
| 15 | | | | 11.4 | 8.0 | 19.4 | 104.9 | 207.9 | 312.8 | 293.4 | 0.183 | 3.5 | 57.1 | |
| 16 | | | | | 8.0 | 8.0 | 110.6 | 207.9 | 318.5 | 310.5 | 0.163 | 1.3 | 52.0 | |
| 17 | | | | | 8.0 | 8.0 | 113.4 | 207.9 | 321.3 | 313.3 | 0.146 | 1.2 | 46.8 | |
| 18 | | | | | 8.0 | 8.0 | 113.4 | 207.9 | 321.3 | 313.3 | 0.130 | 1.0 | 41.8 | |
| 19 | | | | | 8.0 | 8.0 | 113.4 | 207.9 | 321.3 | 313.3 | 0.116 | 0.9 | 37.3 | |
| 20 | | | | 5.4 | 8.0 | 13.4 | 113.4 | 207.9 | 321.3 | 308.0 | 0.104 | 1.4 | 33.3 | |
| 21 | | | | | 8.0 | 8.0 | 113.4 | 207.9 | 321.3 | 313.3 | 0.093 | 0.7 | 29.7 | |
| 22 | | | | 318.5 | 8.0 | 326.4 | 113.4 | 207.9 | 321.3 | -5.1 | 0.083 | 27.0 | 26.6 | |
| 23 | | | | | 8.0 | 8.0 | 113.4 | 207.9 | 321.3 | 313.3 | 0.074 | 0.6 | 23.7 | |
| 24 | | | | | 8.0 | 8.0 | 113.4 | 207.9 | 321.3 | 313.3 | 0.066 | 0.5 | 21.2 | |
| 25 | | | | | 8.0 | 8.0 | 113.4 | 207.9 | 321.3 | 313.3 | 0.059 | 0.5 | 18.9 | |
| 26 | | | | 11.4 | 8.0 | 19.4 | 113.4 | 207.9 | 321.3 | 301.9 | 0.053 | 1.0 | 16.9 | |
| 27 | | | | | 8.0 | 8.0 | 113.4 | 207.9 | 321.3 | 313.3 | 0.047 | 0.4 | 15.1 | |
| 28 | | | | | 8.0 | 8.0 | 113.4 | 207.9 | 321.3 | 313.3 | 0.042 | 0.3 | 13.5 | |
| 29 | | | | | 8.0 | 8.0 | 113.4 | 207.9 | 321.3 | 313.3 | 0.037 | 0.3 | 12.0 | |
| 30 | | | | | 8.0 | 8.0 | 113.4 | 207.9 | 321.3 | 313.3 | 0.033 | 0.3 | 10.7 | |
| 31 | | | | | 8.0 | 8.0 | 113.4 | 207.9 | 321.3 | 313.3 | 0.030 | 0.2 | 9.6 | |
| 32 | | | | | 8.0 | 8.0 | 113.4 | 207.9 | 321.3 | 313.3 | 0.027 | 0.2 | 8.5 | |
| 33 | | | | | 8.0 | 8.0 | 113.4 | 207.9 | 321.3 | 313.3 | 0.024 | 0.2 | 7.6 | |
| 34 | | | | | 8.0 | 8.0 | 113.4 | 207.9 | 321.3 | 313.3 | 0.021 | 0.2 | 6.8 | |
| 35 | | | | 277.5 | 8.0 | 285.4 | 113.4 | 207.9 | 321.3 | 35.9 | 0.019 | 5.4 | 6.1 | |
| 36 | | | | 5.4 | 8.0 | 13.4 | 113.4 | 207.9 | 321.3 | 308.0 | 0.017 | 0.2 | 5.4 | |
| 37 | | | | 25.5 | 8.0 | 33.4 | 113.4 | 207.9 | 321.3 | 287.9 | 0.015 | 0.5 | 4.9 | |
| 38 | | | | 318.5 | 8.0 | 326.4 | 113.4 | 207.9 | 321.3 | -5.1 | 0.013 | 4.4 | 4.3 | |
| 39 | | | | | 8.0 | 8.0 | 113.4 | 207.9 | 321.3 | 313.3 | 0.012 | 0.1 | 3.9 | |
| 40 | | | | 1.2 | 8.0 | 9.2 | 113.4 | 207.9 | 321.3 | 312.1 | 0.011 | 0.1 | 3.5 | |
| 41 | | | | | 8.0 | 8.0 | 113.4 | 207.9 | 321.3 | 313.3 | 0.010 | 0.1 | 3.1 | |
| 42 | | | | 4.0 | 8.0 | 11.9 | 113.4 | 207.9 | 321.3 | 309.4 | 0.009 | 0.1 | 2.8 | |
| 43 | | | | | 8.0 | 8.0 | 113.4 | 207.9 | 321.3 | 313.3 | 0.008 | 0.1 | 2.5 | |
| 44 | | | | | 8.0 | 8.0 | 113.4 | 207.9 | 321.3 | 313.3 | 0.007 | 0.1 | 2.2 | |
| 45 | | | | | 8.0 | 8.0 | 113.4 | 207.9 | 321.3 | 313.3 | 0.006 | 0.0 | 2.0 | |
| 46 | | | | | 8.0 | 8.0 | 113.4 | 207.9 | 321.3 | 313.3 | 0.005 | 0.0 | 1.7 | |
| 47 | | | | 7.6 | 8.0 | 15.5 | 113.4 | 207.9 | 321.3 | 305.8 | 0.005 | 0.1 | 1.6 | |
| 48 | | | | 11.4 | 8.0 | 19.4 | 113.4 | 207.9 | 321.3 | 301.9 | 0.004 | 0.1 | 1.4 | |
| 49 | | | | | 8.0 | 8.0 | 113.4 | 207.9 | 321.3 | 313.3 | 0.004 | 0.0 | 1.2 | |
| 50 | | | | | 8.0 | 8.0 | 113.4 | 207.9 | 321.3 | 313.3 | 0.003 | 0.0 | 1.1 | |
| Total | 1,103.9 | 19.4 | 36.4 | 997.6 | 354.9 | 2,512.2 | 4,536.5 | 8,836.0 | 13,372.4 | 10,860.2 | | 821.9 | 1,070.1 | |

EIRR = 14.7%

B/C = 1.30

ATTACHMENT 1

Table 2.5.10 Sensitivity Analysis under Crop Yield Lowered

(Mil.Rs)

| Year in Order | Cost | | | | | | Benefit (Mil.Rs) | | | Benefit - Cost | Present Value Factor | Present Value | | |
|---------------|--------------------|----------------------------|------------------------|--------------|--------------|----------------|-------------------|----------------|-----------------|----------------|----------------------|----------------------|--------------|---------|
| | Initial Investment | | Agriculture Supporting | Replace-ment | O&M | Total | Summer Vegetables | Other Crops | Total | | | Discount Rate= 12.0% | Cost | Benefit |
| | Main Component | Supporting Infrastructures | | | | | | | | | | | | |
| 1 | 39.7 | | | | | 39.7 | | | | -39.7 | 0.893 | 35.5 | 0.0 | |
| 2 | 199.8 | | | | | 199.8 | | | | -199.8 | 0.797 | 159.3 | 0.0 | |
| 3 | 256.1 | | | | | 256.1 | | | | -256.1 | 0.712 | 182.3 | 0.0 | |
| 4 | 239.6 | 3.2 | | | | 242.8 | | | | -242.8 | 0.636 | 154.3 | 0.0 | |
| 5 | 135.8 | 4.9 | 7.3 | | 2.0 | 149.9 | 3.1 | 6.3 | 9.3 | -140.6 | 0.567 | 85.1 | 5.3 | |
| 6 | 143.5 | 6.5 | 7.3 | | 4.0 | 161.2 | 9.2 | 18.9 | 28.0 | -133.2 | 0.507 | 81.7 | 14.2 | |
| 7 | 89.4 | 4.8 | 7.3 | | 6.0 | 107.5 | 18.3 | 37.8 | 56.1 | -51.4 | 0.452 | 48.6 | 25.4 | |
| 8 | | | 7.3 | | 8.0 | 15.3 | 30.5 | 63.0 | 93.5 | 78.2 | 0.404 | 6.2 | 37.8 | |
| 9 | | | 7.3 | | 8.0 | 15.3 | 42.7 | 88.2 | 130.9 | 115.6 | 0.361 | 5.5 | 47.2 | |
| 10 | | | | | 8.0 | 8.0 | 54.9 | 107.1 | 162.0 | 154.0 | 0.322 | 2.6 | 52.2 | |
| 11 | | | | | 8.0 | 8.0 | 67.1 | 119.7 | 186.8 | 178.8 | 0.287 | 2.3 | 53.7 | |
| 12 | | | | | 8.0 | 8.0 | 79.3 | 126.0 | 205.3 | 197.3 | 0.257 | 2.0 | 52.7 | |
| 13 | | | | | 8.0 | 8.0 | 91.5 | 126.0 | 217.5 | 209.5 | 0.229 | 1.8 | 49.8 | |
| 14 | | | | | 8.0 | 8.0 | 103.7 | 126.0 | 229.7 | 221.7 | 0.205 | 1.6 | 47.0 | |
| 15 | | | | 11.4 | 8.0 | 19.4 | 112.9 | 126.0 | 238.8 | 219.5 | 0.183 | 3.5 | 43.6 | |
| 16 | | | | | 8.0 | 8.0 | 119.0 | 126.0 | 244.9 | 237.0 | 0.163 | 1.3 | 40.0 | |
| 17 | | | | | 8.0 | 8.0 | 122.0 | 126.0 | 248.0 | 240.0 | 0.146 | 1.2 | 36.1 | |
| 18 | | | | | 8.0 | 8.0 | 122.0 | 126.0 | 248.0 | 240.0 | 0.130 | 1.0 | 32.2 | |
| 19 | | | | | 8.0 | 8.0 | 122.0 | 126.0 | 248.0 | 240.0 | 0.116 | 0.9 | 28.8 | |
| 20 | | | | 5.4 | 8.0 | 13.4 | 122.0 | 126.0 | 248.0 | 234.6 | 0.104 | 1.4 | 25.7 | |
| 21 | | | | | 8.0 | 8.0 | 122.0 | 126.0 | 248.0 | 240.0 | 0.093 | 0.7 | 23.0 | |
| 22 | | | | 318.5 | 8.0 | 326.4 | 122.0 | 126.0 | 248.0 | -78.4 | 0.083 | 27.0 | 20.5 | |
| 23 | | | | | 8.0 | 8.0 | 122.0 | 126.0 | 248.0 | 240.0 | 0.074 | 0.6 | 18.3 | |
| 24 | | | | | 8.0 | 8.0 | 122.0 | 126.0 | 248.0 | 240.0 | 0.066 | 0.5 | 16.3 | |
| 25 | | | | | 8.0 | 8.0 | 122.0 | 126.0 | 248.0 | 240.0 | 0.059 | 0.5 | 14.6 | |
| 26 | | | | 11.4 | 8.0 | 19.4 | 122.0 | 126.0 | 248.0 | 228.6 | 0.053 | 1.0 | 13.0 | |
| 27 | | | | | 8.0 | 8.0 | 122.0 | 126.0 | 248.0 | 240.0 | 0.047 | 0.4 | 11.6 | |
| 28 | | | | | 8.0 | 8.0 | 122.0 | 126.0 | 248.0 | 240.0 | 0.042 | 0.3 | 10.4 | |
| 29 | | | | | 8.0 | 8.0 | 122.0 | 126.0 | 248.0 | 240.0 | 0.037 | 0.3 | 9.3 | |
| 30 | | | | | 8.0 | 8.0 | 122.0 | 126.0 | 248.0 | 240.0 | 0.033 | 0.3 | 8.3 | |
| 31 | | | | | 8.0 | 8.0 | 122.0 | 126.0 | 248.0 | 240.0 | 0.030 | 0.2 | 7.4 | |
| 32 | | | | | 8.0 | 8.0 | 122.0 | 126.0 | 248.0 | 240.0 | 0.027 | 0.2 | 6.6 | |
| 33 | | | | | 8.0 | 8.0 | 122.0 | 126.0 | 248.0 | 240.0 | 0.024 | 0.2 | 5.9 | |
| 34 | | | | | 8.0 | 8.0 | 122.0 | 126.0 | 248.0 | 240.0 | 0.021 | 0.2 | 5.3 | |
| 35 | | | | 277.5 | 8.0 | 285.4 | 122.0 | 126.0 | 248.0 | -37.4 | 0.019 | 5.4 | 4.7 | |
| 36 | | | | 5.4 | 8.0 | 13.4 | 122.0 | 126.0 | 248.0 | 234.6 | 0.017 | 0.2 | 4.2 | |
| 37 | | | | 25.5 | 8.0 | 33.4 | 122.0 | 126.0 | 248.0 | 214.6 | 0.015 | 0.5 | 3.7 | |
| 38 | | | | 318.5 | 8.0 | 326.4 | 122.0 | 126.0 | 248.0 | -78.4 | 0.013 | 4.4 | 3.3 | |
| 39 | | | | | 8.0 | 8.0 | 122.0 | 126.0 | 248.0 | 240.0 | 0.012 | 0.1 | 3.0 | |
| 40 | | | | 1.2 | 8.0 | 9.2 | 122.0 | 126.0 | 248.0 | 238.8 | 0.011 | 0.1 | 2.7 | |
| 41 | | | | | 8.0 | 8.0 | 122.0 | 126.0 | 248.0 | 240.0 | 0.010 | 0.1 | 2.4 | |
| 42 | | | | 4.0 | 8.0 | 11.9 | 122.0 | 126.0 | 248.0 | 236.1 | 0.009 | 0.1 | 2.1 | |
| 43 | | | | | 8.0 | 8.0 | 122.0 | 126.0 | 248.0 | 240.0 | 0.008 | 0.1 | 1.9 | |
| 44 | | | | | 8.0 | 8.0 | 122.0 | 126.0 | 248.0 | 240.0 | 0.007 | 0.1 | 1.7 | |
| 45 | | | | | 8.0 | 8.0 | 122.0 | 126.0 | 248.0 | 240.0 | 0.006 | 0.0 | 1.5 | |
| 46 | | | | | 8.0 | 8.0 | 122.0 | 126.0 | 248.0 | 240.0 | 0.005 | 0.0 | 1.4 | |
| 47 | | | | 7.6 | 8.0 | 15.5 | 122.0 | 126.0 | 248.0 | 232.5 | 0.005 | 0.1 | 1.2 | |
| 48 | | | | 11.4 | 8.0 | 19.4 | 122.0 | 126.0 | 248.0 | 228.6 | 0.004 | 0.1 | 1.1 | |
| 49 | | | | | 8.0 | 8.0 | 122.0 | 126.0 | 248.0 | 240.0 | 0.004 | 0.0 | 1.0 | |
| 50 | | | | | 8.0 | 8.0 | 122.0 | 126.0 | 248.0 | 240.0 | 0.003 | 0.0 | 0.9 | |
| Total | 1,103.9 | 19.4 | 36.4 | 997.6 | 354.9 | 2,512.2 | 4,880.0 | 5,354.8 | 10,234.9 | 7,722.7 | | 821.9 | 798.8 | |

EIRR = 11.7%

B / C = 0.97

Table 2.6.3 Financial Crop Budget under without Project Condition

| Description | Unit | Paddy | | | Cucumber Family | | | Wheat | | | Lentil | | |
|-------------------------------|----------------|---------|------------|---------------|-----------------|------------|----------------|---------|------------|---------------|--------|------------|---------------|
| | | Qty | Price (Rs) | Value (Rs) | Qty | Price (Rs) | Value (Rs) | Qty | Price (Rs) | Value (Rs) | Qty | Price (Rs) | Value (Rs) |
| A) Gross Return | | | | <u>23,224</u> | | | <u>194,849</u> | | | <u>20,299</u> | | | <u>14,573</u> |
| Production | kg | 2,508 | 8.66 | 21,719 | 18,557 | 10.50 | 194,849 | 2,178 | 9.00 | 19,602 | 792 | 18.40 | 14,573 |
| By Products | kg | 2,508 | 0.60 | 1,505 | | | | 1,742 | 0.40 | 697 | | | |
| | | (x1.00) | | | | | | (x0.80) | | | | | |
| B) Production Cost | | | | <u>10,371</u> | | | <u>22,282</u> | | | <u>15,702</u> | | | <u>1,399</u> |
| Farm Input | | | | 5,559 | | | 13,610 | | | 11,177 | | | 424 |
| 1.Seed | kg | 74 | 10.10 | 747 | 3 | 2,000.00 | 6,000 | 145 | 12.10 | 1,755 | 21 | 20.20 | 424 |
| 2.Fertilizer | | | | | | | | | | | | | |
| Urea | kg | 54 | 13.00 | 702 | 84 | 13.00 | 1,092 | 81 | 13.00 | 1,053 | | | |
| DAP | kg | 69 | 17.80 | 1,228 | 179 | 17.80 | 3,186 | 105 | 17.80 | 1,869 | | | |
| Potash | kg | 31 | 13.10 | 406 | 73 | 13.10 | 956 | 32 | 13.10 | 419 | | | |
| Organic Manure | kg | 17 | 0.20 | 3 | | | | 9 | 0.20 | 2 | | | |
| 3.Agro-chemicals | | | | 210 | | | 1,408 | | | 127 | | | |
| 4.Irrigation by STW | m ³ | 756 | 2.40 | 1,814 | 403 | 2.40 | 967 | 2,318 | 2.40 | 5,563 | | | |
| 5.Threshing | hr | 8.14 | 55.00 | 448 | | | | 7.07 | 55.00 | 389 | | | |
| Labor and Animal Power | | | | 4,812 | | | 8,672 | | | 4,526 | | | 975 |
| 1.Human Labor | | | | | | | | | | | | | |
| Family | M/D | 104 | 0.00 | 0 | 251 | 0.00 | 0 | 90 | 0.00 | 0 | 46 | 0.00 | 0 |
| Hired | M/D | 71 | 58.40 | 4,146 | 139 | 58.40 | 8,118 | 68 | 58.40 | 3,971 | 11 | 58.40 | 642 |
| 2.Animal Labor | | | | | | | | | | | | | |
| Family | A/D | 50 | 0.00 | 0 | 41 | 0.00 | 0 | 40 | 0.00 | 0 | 21 | 0.00 | 0 |
| Hired | A/D | 6 | 110.90 | 665 | 5 | 110.90 | 555 | 5 | 110.90 | 555 | 3 | 110.90 | 333 |
| Net Return per ha | | | | <u>12,853</u> | | | <u>172,567</u> | | | <u>4,597</u> | | | <u>13,174</u> |

| Description | Unit | Mustard | | | Potato | | | Cauliflower | | |
|-------------------------------|----------------|---------|------------|--------------|--------|------------|----------------|-------------|------------|---------------|
| | | Qty | Price (Rs) | Value (Rs) | Qty | Price (Rs) | Value (Rs) | Qty | Price (Rs) | Value (Rs) |
| A) Gross Return | | | | <u>7,852</u> | | | <u>157,605</u> | | | <u>99,439</u> |
| Production | kg | 473 | 16.60 | 7,852 | 17,930 | 8.79 | 157,605 | 19,730 | 5.04 | 99,439 |
| By Products | kg | | | | | | | | | |
| B) Production Cost | | | | <u>1,194</u> | | | <u>36,487</u> | | | <u>23,442</u> |
| Farm Input | | | | 336 | | | 30,756 | | | 15,997 |
| 1.Seed | kg | 14 | 24.00 | 336 | 1,319 | 17.30 | 22,819 | 1 | 1,000.00 | 1,000 |
| 2.Fertilizer | | | | | | | | | | |
| Urea | kg | | | | 85 | 13.00 | 1,105 | 133 | 13.00 | 1,729 |
| DAP | kg | | | | 140 | 17.80 | 2,492 | 308 | 17.80 | 5,482 |
| Potash | kg | | | | 31 | 13.10 | 406 | 111 | 13.10 | 1,454 |
| Organic Manure | kg | | | | 51 | 0.20 | 10 | | | |
| 3.Agro-chemicals | | | | | | | 295 | | | 1,008 |
| 4.Irrigation by STW | m ³ | | | | 1,512 | 2.40 | 3,629 | 2,218 | 2.40 | 5,323 |
| 5.Threshing | hr | | | | | | | | | |
| Labor and Animal Power | | | | 858 | | | 5,711 | | | 7,446 |
| 1.Human Labor | | | | | | | | | | |
| Family | M/D | 47 | 0.00 | 0 | 101 | 0.00 | 0 | 277 | 0.00 | 0 |
| Hired | M/D | 9 | 58.40 | 526 | 75 | 58.40 | 4,380 | 118 | 58.40 | 6,891 |
| 2.Animal Labor | | | | | | | | | | |
| Family | A/D | 19 | 0.00 | 0 | 20 | 0.00 | 0 | 39 | 0.00 | 0 |
| Hired | A/D | 3 | 110.90 | 333 | 12 | 110.90 | 1,331 | 5 | 110.90 | 555 |
| Net Return per ha | | | | <u>6,658</u> | | | <u>121,138</u> | | | <u>75,997</u> |

| Description | Unit | Jute | | | Mungbean | | | Sugarcane | | |
|-------------------------------|----------------|---------|------------|---------------|----------|------------|---------------|-----------|------------|---------------|
| | | Qty | Price (Rs) | Value (Rs) | Qty | Price (Rs) | Value (Rs) | Qty | Price (Rs) | Value (Rs) |
| A) Gross Return | | | | <u>22,451</u> | | | <u>12,667</u> | | | <u>58,520</u> |
| Production | kg | 1,914 | 9.73 | 18,623 | 539 | 23.50 | 12,667 | 44,000 | 1.33 | 58,520 |
| By Products | kg | 7,656 | 0.50 | 3,828 | | | | | | |
| | | (x4.00) | | | | | | | | |
| B) Production Cost | | | | <u>8,824</u> | | | <u>1,620</u> | | | <u>19,192</u> |
| Farm Input | | | | 2,786 | | | 645 | | | 9,825 |
| 1.Seed | kg | 8 | 95.10 | 761 | 25 | 25.80 | 645 | 5,724 | 1.50 | 8,586 |
| 2.Fertilizer | | | | | | | | | | |
| Urea | kg | 42 | 13.00 | 546 | | | | 44 | 13.00 | 572 |
| DAP | kg | 58 | 17.80 | 1,032 | | | | 22 | 17.80 | 392 |
| Potash | kg | 32 | 13.10 | 419 | | | | 11 | 13.10 | 144 |
| Organic Manure | kg | | | | | | | 101 | 0.20 | 20 |
| 3.Agro-chemicals | | | | 28 | | | | | | 111 |
| 4.Irrigation by STW | m ³ | | | | | | | | | |
| 5.Threshing | hr | | | | | | | | | |
| Labor and Animal Power | | | | 6,038 | | | 975 | | | 9,367 |
| 1.Human Labor | | | | | | | | | | |
| Family | M/D | 94 | 0.00 | 0 | 46 | 0.00 | 0 | 180 | 0.00 | 0 |
| Hired | M/D | 73 | 58.40 | 4,263 | 11 | 58.40 | 642 | 149 | 58.40 | 8,702 |
| 2.Animal Labor | | | | | | | | | | |
| Family | A/D | 20 | 0.00 | 0 | 21 | 0.00 | 0 | 50 | 0.00 | 0 |
| Hired | A/D | 16 | 110.90 | 1,774 | 3 | 110.90 | 333 | 6 | 110.90 | 665 |
| Net Return per ha | | | | <u>13,627</u> | | | <u>11,046</u> | | | <u>39,328</u> |

Note: Organic manure cost is included in labor cost.

Table 2.6.5 Incremental Financial Net Production Value

| Case 0 (Base Case) | | | | | | | | | | |
|--------------------------|---------------------------|--------------------|---------------|------------------------|--------------------|---------------|-----------------|---------------------|----------------------|-------|
| Items | Without Project Condition | | | With Project Condition | | | Incremental NPV | | | |
| | NPV per ha (Rs/ha) | Cropping Area (ha) | NPV (thou Rs) | NPV per ha (Rs/ha) | Cropping Area (ha) | NPV (thou Rs) | Total (thou Rs) | Vegetables (mil Rs) | Other Crops (mil Rs) | |
| Paddy | 12,853 | 7,180 | 92,285 | 27,479 | 6,088 | 167,290 | 75,005 | | 75.0 | |
| Cucumber Family | 172,567 | 138 | 23,814 | 194,441 | 1,015 | 197,358 | 173,543 | 173.5 | | |
| Wheat | 4,597 | 5,756 | 26,459 | 4,597 | 5,756 | 26,459 | 0 | | 0.0 | |
| Lentil | 13,174 | 236 | 3,109 | 13,174 | 236 | 3,109 | 0 | | 0.0 | |
| Mustard | 6,658 | 98 | 652 | 6,658 | 98 | 652 | 0 | | 0.0 | |
| Potato | 121,138 | 856 | 103,694 | 121,138 | 856 | 103,694 | 0 | | 0.0 | |
| Cauliflower | 75,997 | 98 | 7,448 | 75,997 | 98 | 7,448 | 0 | 0.0 | | |
| Jute | 13,627 | 1,899 | 25,878 | 18,090 | 1,522 | 27,533 | 1,655 | | 1.7 | |
| Mungbean | 11,046 | 200 | 2,209 | 18,647 | 507 | 9,454 | 7,244 | | 7.2 | |
| Sugarcane | 39,328 | 148 | 5,821 | 82,495 | 507 | 41,825 | 36,004 | | 36.0 | |
| Total | | 16,609 | 291,369 | | 16,683 | 584,821 | 293,451 | 173.5 | | 119.9 |
| Total per ha (/10,147ha) | | | 28.7 | | | 57.6 | 28.9 | | | |

Note: NPV; Net Production Value

| Case 1 | | | | | | | | | | |
|--------------------------|---------------------------|--------------------|---------------|------------------------|--------------------|---------------|-----------------|---------------------|----------------------|-----------------------------|
| Items | Without Project Condition | | | With Project Condition | | | Incremental NPV | | | Cost Saving of STW (mil Rs) |
| | NPV per ha (Rs/ha) | Cropping Area (ha) | NPV (thou Rs) | NPV per ha (Rs/ha) | Cropping Area (ha) | NPV (thou Rs) | Total (thou Rs) | Vegetables (mil Rs) | Other Crops (mil Rs) | |
| Paddy | 12,853 | 7,180 | 92,285 | 27,479 | 6,088 | 167,290 | 75,005 | | 75.0 | |
| Cucumber Family | 172,567 | 138 | 23,814 | 194,441 | 1,015 | 197,358 | 173,543 | 173.5 | | |
| Wheat | 4,597 | 5,756 | 26,459 | 10,160 | 5,756 | 58,480 | 16,011 | | | 16.0 |
| Lentil | 13,174 | 236 | 3,109 | 13,174 | 236 | 3,109 | 0 | | 0.0 | |
| Mustard | 6,658 | 98 | 652 | 6,658 | 98 | 652 | 0 | | 0.0 | |
| Potato | 121,138 | 856 | 103,694 | 124,767 | 856 | 106,800 | 1,553 | | | 1.6 |
| Cauliflower | 75,997 | 98 | 7,448 | 81,320 | 98 | 7,969 | 261 | | | 0.3 |
| Jute | 13,627 | 1,899 | 25,878 | 18,090 | 1,522 | 27,533 | 1,655 | | 1.7 | |
| Mungbean | 11,046 | 200 | 2,209 | 18,647 | 507 | 9,454 | 7,244 | | 7.2 | |
| Sugarcane | 39,328 | 148 | 5,821 | 82,495 | 507 | 41,825 | 36,004 | | 36.0 | |
| Total | | 16,609 | 291,369 | | 16,683 | 620,470 | 311,276 | 173.5 | 119.9 | 17.8 |
| Total per ha (/10,147ha) | | | 28.7 | | | 61.1 | 30.7 | | | |

Note: NPV; Net Production Value

| Case 2 | | | | | | | | | | |
|--------------------------|---------------------------|--------------------|---------------|------------------------|--------------------|---------------|-----------------|---------------------|----------------------|--|
| Items | Without Project Condition | | | With Project Condition | | | Incremental NPV | | | |
| | NPV per ha (Rs/ha) | Cropping Area (ha) | NPV (thou Rs) | NPV per ha (Rs/ha) | Cropping Area (ha) | NPV (thou Rs) | Total (thou Rs) | Vegetables (mil Rs) | Other Crops (mil Rs) | |
| Paddy | 12,853 | 7,180 | 92,285 | 27,479 | 6,088 | 167,290 | 75,005 | | 75.0 | |
| Cucumber Family | 172,567 | 138 | 23,814 | 194,441 | 1,015 | 197,358 | 173,543 | 173.5 | | |
| Wheat | 4,597 | 5,756 | 26,459 | 20,623 | 5,074 | 104,640 | 39,091 | | 39.1 | |
| Lentil | 13,174 | 236 | 3,109 | 19,291 | 1,015 | 19,580 | 8,235 | | 8.2 | |
| Mustard | 6,658 | 98 | 652 | 11,703 | 507 | 5,933 | 2,640 | | 2.6 | |
| Potato | 121,138 | 856 | 103,694 | 152,994 | 1,015 | 155,289 | 25,797 | | 25.8 | |
| Cauliflower | 75,997 | 98 | 7,448 | 88,408 | 1,015 | 89,734 | 41,143 | 41.1 | | |
| Jute | 13,627 | 1,899 | 25,878 | 18,090 | 1,522 | 27,533 | 1,655 | | 1.7 | |
| Mungbean | 11,046 | 200 | 2,209 | 18,647 | 507 | 9,454 | 7,244 | | 7.2 | |
| Sugarcane | 39,328 | 148 | 5,821 | 82,495 | 507 | 41,825 | 36,004 | | 36.0 | |
| Total | | 16,609 | 291,369 | | 18,265 | 818,635 | 410,359 | 214.7 | 195.7 | |
| Total per ha (/10,147ha) | | | 28.7 | | | 80.7 | 40.4 | | | |

Note: NPV; Net Production Value

| Case 3 | | | | | | | | | | |
|--------------------------|---------------------------|--------------------|---------------|------------------------|--------------------|---------------|-----------------|---------------------|----------------------|--|
| Items | Without Project Condition | | | With Project Condition | | | Incremental NPV | | | |
| | NPV per ha (Rs/ha) | Cropping Area (ha) | NPV (thou Rs) | NPV per ha (Rs/ha) | Cropping Area (ha) | NPV (thou Rs) | Total (thou Rs) | Vegetables (mil Rs) | Other Crops (mil Rs) | |
| Paddy | 12,853 | 7,180 | 92,285 | 27,479 | 6,088 | 167,290 | 75,005 | | 75.0 | |
| Cucumber Family | 172,567 | 138 | 23,814 | 194,441 | 1,015 | 197,358 | 173,543 | 173.5 | | |
| Wheat | 4,597 | 5,756 | 26,459 | 20,623 | 5,074 | 104,640 | 52,851 | | 52.9 | |
| Lentil | 13,174 | 236 | 3,109 | 19,291 | 1,015 | 19,580 | 11,134 | | 11.1 | |
| Mustard | 6,658 | 98 | 652 | 11,703 | 507 | 5,933 | 3,570 | | 3.6 | |
| Potato | 121,138 | 856 | 103,694 | 152,994 | 1,015 | 155,289 | 34,878 | | 34.9 | |
| Cauliflower | 75,997 | 98 | 7,448 | 88,408 | 1,015 | 89,734 | 55,626 | 55.6 | | |
| Jute | 13,627 | 1,899 | 25,878 | 18,090 | 1,522 | 27,533 | 1,655 | | 1.7 | |
| Mungbean | 11,046 | 200 | 2,209 | 18,647 | 507 | 9,454 | 7,244 | | 7.2 | |
| Sugarcane | 39,328 | 148 | 5,821 | 82,495 | 507 | 41,825 | 36,004 | | 36.0 | |
| Total | | 16,609 | 291,369 | | 18,265 | 818,635 | 451,510 | 229.2 | 222.3 | |
| Total per ha (/10,147ha) | | | 28.7 | | | 80.7 | 44.5 | | | |

Note: NPV; Net Production Value

ATTACHMENT 2

Estimation of O&M Cost for SRIP

A. Administrative Structure and Annual Recurrent Cost in '000Rs

| S Nr | Description | Number | Annual Salary, in Rs '000 | Others* | Weight Factor to SRIP | Total Rs. '000 | Remarks |
|------|---|-----------|---------------------------|---------|-----------------------|----------------|---------|
| 1 | Senior Divisional Engineer (SDE) | 1 | 144 | 80 | 50% | 112 | |
| 2 | Engineer | 1 | 120 | 40 | 100% | 160 | |
| 3 | Agriculture Engineer | 1 | 120 | 40 | 50% | 80 | |
| 4 | Institutional Development Officer | 1 | 120 | 40 | 100% | 160 | |
| 5 | Account Officer | 1 | 120 | 40 | 50% | 80 | |
| 6 | Administrative Clerk | 1 | 84 | 30 | 50% | 57 | |
| 7 | Junior Technician (JT) | 1 | 84 | 30 | 50% | 57 | |
| 8 | Association Organizer (AO) | 1 | 84 | 30 | 100% | 114 | |
| 9 | Field Surveyor | 1 | 50 | 20 | 100% | 70 | |
| 10 | Overseer | 4 | 84 | 30 | 100% | 456 | |
| 11 | Accountant | 1 | 84 | 30 | 50% | 57 | |
| 12 | Assistant Account | 1 | 60 | 20 | 50% | 40 | |
| 13 | Computer Operator | 1 | 60 | 20 | 50% | 40 | |
| 14 | Gate Operator | 14 | 60 | 20 | 100% | 1120 | |
| 15 | Driver | 3 | 72 | 20 | 50% | 138 | |
| 16 | Watchman/ Officeboy | 4 | 48 | 10 | 50% | 116 | |
| | Sub Total | 37 | | | | 2857 | |
| | Total / acreage (10147), Rs per ha | | | | | 282 | |

* Others include cost like travelling allowance, administrative allowance, office running cost etc.

B. Replacement Cost (Vehicles, Gates and Equipments) in '000Rs

| S Nr | Description | Life (yrs) | Initial Cost in '000Rs | Salvage Value (15%) | Depreciation Cost per year | Maint Cost per year @ 5% | Operation Cost per year | | | Total Nr | Total cost per year in '000Rs | Remarks |
|------|---|------------|------------------------|---------------------|----------------------------|--------------------------|-------------------------|--------------|-----------|----------|-------------------------------|---|
| | | | | | | | Run per day | per | Fuel cost | | | |
| 1 | Vehicles | | | | | | | | | | | |
| 1.1 | Jeep/ Pickup | 10 | 2000 | 300 | 170 | 100 | 30 | km | 33.7 | 3 | 456 | 50% charge |
| 1.2 | Motorcycle | 5 | 100 | 15 | 17 | 5 | 20 | km | 10.0 | 4 | 128 | |
| 1.3 | Cycles | 3 | 4 | 0.6 | 1 | 0.2 | 5 | km | | 10 | 13 | |
| 2 | Gates (HW, MC, SC) | 20 | 6124 | 1837 | 214 | 306 | 30 | (50 KWh) min | 63.9 | 1 | 584 | Salvage Value 30% Maintenance 5% 20% leaf |
| | Sub Total | | | | | | | | | | 1181 | |
| | Total / acreage (10147ha), Rs/ha | | | | | | | | | | 116 | |

C. Desilting Works at Main Canal

| S Nr | Description | life (yrs) | Length (m) | Average Breadth (m) | Average Height (m) | Volume (cum) | desilting Rate/manday | Labour cost/manday | Cost per Year, in '000Rs | Remarks |
|------|---|------------|------------|---------------------|--------------------|--------------|-----------------------|--------------------|--------------------------|--|
| 1 | Volume of Main Canal (Conveyance part) | 5 | 5500 | 8 | 1 | 44000 | 1.5 | 70 | 411 | assumed that all the two conveyance canals are silted up every 5 years |
| | Total / acreage (10147ha), Rs/ha | | | | | | | | 40 | |

D. Maintenance Works for Main Canal

| S Nr | Description | L, m | m/day | Rs/day | Cost per Year, in '000Rs | Remarks |
|------|---|-------|--------------|-----------|--------------------------|---|
| 1 | Grass cutting | 43180 | 30 | 70 | 101 | |
| | | vs | Cost, '000Rs | '000Rs/yr | 10% replace | |
| 2 | Concrete canal | 50 | 120000 | 2400 | 240 | Equivalent to 70m new concrete lining per year (Total Length=35700m) |
| | | vs | Cost, '000Rs | '000Rs/yr | 10% replace | |
| 3 | Main canal | 30 | 52454 | 1748 | 175 | Embankment cost only considered. Equivalent to 120m new construction per year |
| 4 | Road maintenance | 30 | 28400 | 947 | 95 | Equivalent to 120m new construction per year |
| | Sub Total | | | | 610 | |
| | Total / acreage (10147ha), Rs/ha | | | | 60 | |

| | |
|---|---------------------|
| Total of A, B, C, D | 5,059,404 Rs |
| Total / acreage (10147ha), Rs/ha | 499 Rs/ha |

E. Command Area Structures under WUC's Jurisdiction

| S Nr | Description | life (yrs) | Total Nr | Per Unit Cost (Rs) | Applicable Percentage of replacement | Total Cost in '000Rs | Cost per Year in '000Rs | Remarks |
|------|-----------------------------|------------|--------------|--------------------|--------------------------------------|----------------------|-------------------------|--|
| 1 | Precast outlet Structures | 30 | 426 | 9033 | 100% | 3848 | 128 | |
| 2 | Distributor 1 | 30 | 31 | 248772 | 100% | 7712 | 257 | |
| 3 | Distributor 2 | 30 | 36 | 230823 | 100% | 8310 | 277 | |
| 4 | Distributor 3 | 30 | 4 | 199395 | 100% | 798 | 27 | |
| 5 | Ancillary Facilities (drop) | | | | | | 38 | above 1 x 30% |
| | Sub total of above | | | | | | 727 | 72 Rs/ha |
| 6 | Desiltation | | | | | | 123 | main desiltation x 30% |
| | | L, m | m/day | Rs/day | | | | |
| 7 | Grass Cutting (Secondary) | 53170 | 30 | 70 | | | 124 | |
| 8 | Grass Cutting (Tertiary) | 172410 | 50 | 70 | | | 241 | |
| | | L, m | Cost, '000Rs | vs | '000Rs/yr | | 10% replacement | |
| 9 | Secondary Maintenance | 53170 | 57289 | 30 | 1910 | | 191 | excluding 4SRR, No LA, equivalent to 180m new cons. per year |
| 10 | Tertiary Maintenance | 172410 | 93143 | 30 | 3105 | | 310 | equivalent to 580m new construction per year |
| | | Nr | Unit Cost | Cost, '000Rs | vs | '000Rs/yr | 50% replacement | |
| 11 | Water Course | 500 | 60000 | 30000 | 20 | 1500 | 750 | Appr. Number (20ha/WC), LA Excluded |
| | Sub-total of above | | | | | | 1740 | 171 Rs/ha |

Estimation of WUC Administrative Cost

| | |
|------------------------|--------|
| Average WUC area | 231 ha |
| No. Of Committee membe | 20 |
| No. of WUG | 12 |
| No. of Member: | 231 |

Total Cost **44 WUCs** **2,591,820 Rs/yr**

Expense per ha **255 Rs/ha**

Annual Expense Estimate

| Expense | Unit Cost | Unit | Amount | Cost | Remark | % |
|------------------------------|-----------|-------------------|--------|---------------|---------------|---------------|
| Salaries | | | | 36,000 | | 61.1% |
| Bookkeeper | 3,000 | Rs/capita/month | 12 | 36,000 | | 61.1% |
| Incentive for ISF Collection | 5 | Rs/ha | 231 | 1,155 | | 2.0% |
| Office Supplies | | | | 750 | | 1.3% |
| Printing Cost of OR etc. | 50 | Rs/50page | 5 | 250 | | 0.4% |
| Stationaries etc. | | | | 500 | | 0.8% |
| Honorarium | | | | 18,600 | | 31.6% |
| WUC Chairman | 200 | Rs/capita/month | 12 | 2,400 | | 4.1% |
| WUC Vice-chairman | 150 | Rs/capita/month | 12 | 1,800 | | 3.1% |
| WUC Treasurer | 100 | Rs/capita/month | 12 | 1,200 | | |
| WUC Secretary | 100 | Rs/capita/month | 12 | 1,200 | | |
| WUC Auditor | 100 | Rs/capita/month | 12 | 1,200 | | |
| WUC Other Officials | 50 | Rs/capita/month | 216 | 10,800 | 15 personnels | 18.3% |
| Transportation Fee | | | | 1,800 | 1) | 3.1% |
| Meals & Snacks | 50 | Rs/meeting/capita | 12 | 600 | | 1.0% |
| Total | | | | 58,905 | | 100.0% |

1) To Inarwa: 12 times/yr x 2 persons x 50R + To Biratnagar: 6 times/yr x 2 persons x 50Rs

ATTACHMENT 2

Table Fixed Cost of Pump Set for STW

| Crop | Intensity % | Area ha | Irrigation hr/ha | Threshing hr/ha | Total hr/ha | 20ha hr |
|------------------|-------------|---------|------------------|-----------------|-------------|---------|
| Paddy | 68.1 | 13.6 | 15 | 8 | 23 | 313 |
| Jute | 19.3 | 3.9 | 0 | 0 | 0 | 0 |
| Summer Vegetable | 1.4 | 0.3 | 8 | 0 | 8 | 2 |
| Pulse | 1.9 | 0.4 | 0 | 0 | 0 | 0 |
| Wheat | 58.5 | 11.7 | 46 | 8 | 54 | 632 |
| Potato | 8.7 | 1.7 | 30 | 0 | 30 | 51 |
| Winter Vegetable | 1.0 | 0.2 | 44 | 0 | 44 | 9 |
| Oilseed | 1.0 | 0.2 | 0 | 0 | 0 | 0 |
| Pulse | 2.4 | 0.5 | 0 | 0 | 0 | 0 |
| Sugarcane | 1.4 | 0.3 | 0 | 0 | 0 | 0 |
| Total | 163.7 | 32.8 | | | | 1,007 |

Fixed cost of pump set

Purchasing price/duration/operating hour = 27,000Rs/10yr/1,007hr =

3 Rs/hr

Fixed cost by Crop

| Crop | Irrigation hr/ha | Fixed cost Rs/ha |
|------------------|------------------|------------------|
| Paddy | 15 | 45 |
| Jute | 0 | 0 |
| Summer Vegetable | 8 | 24 |
| Pulse | 0 | 0 |
| Wheat | 46 | 138 |
| Potato | 30 | 90 |
| Winter Vegetable | 44 | 132 |
| Oilseed | 0 | 0 |
| Pulse | 0 | 0 |
| Sugarcane | 0 | 0 |

Table 5.1 Economic Cost and Benefit Stream of Access Road

(Thou. Rs)

| Year in Order | Cost | | | | | Benefit | | Present Value Factor | Present Value Discount Rate= 12.0% | |
|---------------------|------------------------|----------------------------|--------------------------|------------------|--------------------|-----------------|-------------------|----------------------------|---------------------------------------|----------------|
| | Surface Course a | Sub-base Sub-grade b | Land Acquisition c | Maintenance d | Total e=a+b+c+d | Total f | Benefit - Cost | | Cost | Benefit |
| 1 | | | | | 0.0 | 0.0 | 0.0 | 0.893 | 0.0 | 0.0 |
| 2 | | | | | 0.0 | 0.0 | 0.0 | 0.797 | 0.0 | 0.0 |
| 3 | | | | | 0.0 | 0.0 | 0.0 | 0.712 | 0.0 | 0.0 |
| 4 | | | 85.2 | | 85.2 | 0.0 | -85.2 | 0.636 | 54.1 | 0.0 |
| 5 | 3,082.2 | 2,267.4 | 113.6 | | 5,463.2 | 0.0 | -5,463.2 | 0.567 | 3,100.0 | 0.0 |
| 6 | 4,109.6 | 3,023.2 | 85.2 | 26.8 | 7,244.8 | 414.3 | -6,830.5 | 0.507 | 3,670.4 | 209.9 |
| 7 | 3,082.2 | 2,267.4 | | 62.4 | 5,412.0 | 966.7 | -4,445.3 | 0.452 | 2,448.1 | 437.3 |
| 8 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.404 | 36.0 | 557.8 |
| 9 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.361 | 32.2 | 498.0 |
| 10 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.322 | 28.7 | 444.6 |
| 11 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.287 | 25.6 | 397.0 |
| 12 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.257 | 22.9 | 354.5 |
| 13 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.229 | 20.4 | 316.5 |
| 14 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.205 | 18.3 | 282.6 |
| 15 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.183 | 16.3 | 252.3 |
| 16 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.163 | 14.6 | 225.3 |
| 17 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.146 | 13.0 | 201.1 |
| 18 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.130 | 11.6 | 179.6 |
| 19 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.116 | 10.4 | 160.3 |
| 20 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.104 | 9.2 | 143.2 |
| 21 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.093 | 8.3 | 127.8 |
| 22 | 10,274.0 | | | 89.2 | 10,363.2 | 1,381.0 | -8,982.2 | 0.083 | 856.4 | 114.1 |
| 23 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.074 | 6.6 | 101.9 |
| 24 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.066 | 5.9 | 91.0 |
| 25 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.059 | 5.2 | 81.2 |
| 26 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.053 | 4.7 | 72.5 |
| 27 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.047 | 4.2 | 64.8 |
| 28 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.042 | 3.7 | 57.8 |
| 29 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.037 | 3.3 | 51.6 |
| 30 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.033 | 3.0 | 46.1 |
| 31 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.030 | 2.7 | 41.2 |
| 32 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.027 | 2.4 | 36.7 |
| 33 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.024 | 2.1 | 32.8 |
| 34 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.021 | 1.9 | 29.3 |
| 35 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.019 | 1.7 | 26.2 |
| 36 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.017 | 1.5 | 23.4 |
| 37 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.015 | 1.3 | 20.9 |
| 38 | 10,274.0 | | | 89.2 | 10,363.2 | 1,381.0 | -8,982.2 | 0.013 | 139.7 | 18.6 |
| 39 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.012 | 1.1 | 16.6 |
| 40 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.011 | 1.0 | 14.8 |
| 41 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.010 | 0.9 | 13.3 |
| 42 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.009 | 0.8 | 11.8 |
| 43 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.008 | 0.7 | 10.6 |
| 44 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.007 | 0.6 | 9.4 |
| 45 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.006 | 0.5 | 8.4 |
| 46 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.005 | 0.5 | 7.5 |
| 47 | | 7,558.0 | | 89.2 | 7,647.2 | 1,381.0 | -6,266.2 | 0.005 | 37.2 | 6.7 |
| 48 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.004 | 0.4 | 6.0 |
| 49 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.004 | 0.3 | 5.4 |
| 50 | | | | 89.2 | 89.2 | 1,381.0 | 1,291.8 | 0.003 | 0.3 | 4.8 |
| Total | 30,822.0 | 15,116.0 | 284.0 | 3,924.8 | 50,146.8 | 60,764.0 | 10,617.2 | | 10,630.7 | 5,813.1 |

Note: a,b,c = Table 2.3.4

d = (a+b) / 20years x 10%

f = Table 5.3

EIRR = 3.3%

B / C = 0.55

ATTACHMENT 2

Table 5.2 Saving Time of Access Road

| Item | 10minutes | 1year | Without | | | With | | | Saving Time i=e-h hr |
|--------------|------------|----------------|------------|----------------|-------------------|------------|-------------|-------------------|----------------------------|
| | | | Speed | Unit | Total | Speed | Unit | Total | |
| | | | c km/hr | d=1/c hr/km | e=dx11.8kmb hr | f km/hr | g=1/f hr | h=gx11.8kmb hr | |
| Walk | 3.0 | 51,840 | 2 | 0.50 | 305,856 | 4 | 0.25 | 152,928 | 152,928 |
| Bicycle | 1.5 | 25,920 | 5 | 0.20 | 61,171 | 10 | 0.10 | 30,586 | 30,585 |
| Motorcycle | 1.0 | 17,280 | 10 | 0.10 | 20,390 | 15 | 0.07 | 13,594 | 6,796 |
| Oxcart | 0.5 | 8,640 | 2 | 0.50 | 50,976 | 4 | 0.25 | 25,488 | 25,488 |
| Total | 6.0 | 103,680 | | | 438,393 | | | 222,596 | 215,797 |

Note: a, c = observation of the field

b = a x 6 x 12 hr/day x 20 days/month x 12 months

f = estimation value

Table 5.3 Saving Cost of Access Road

| Item | Saving Time j=i hr | Saving Day k=j/8hr days | Economic Price l Rs/day | Saving Cost m=lk/1000 Thou.Rs |
|-------------------|--------------------------|-------------------------------|-------------------------------|-------------------------------------|
| Agriculture Labor | 215,797 | 26,975 | 39.4 | 1,063 |
| Ox Labor | 25,488 | 3,186 | 99.8 | 318 |
| Total | 241,285 | 30,161 | | 1,381 |

APPENDIX-12 PROJECT COST

CHAPTER 1 INTRODUCTION 12-1

CHAPTER 2 PROJECT COST 12-1

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CHAPTER 1 INTRODUCTION

This APPENDIX-12, PROJECT COST shows the project cost of construction, land acquisition, institutional development, consulting services, supporting infrastructure, agriculture supporting services and environmental mitigation measures. In the compilation of this Appendix, inputs like unit rate of materials and/or labors have been obtained from concerned office such as Department of Irrigation (DOI), Sunsari-Morang Irrigation Project Office (SMIP), Eastern Regional Irrigation Directorate (ERID), Sunsari District Irrigation Office (DIO), etc.

This Appendix consists of this CHAPTER 1 INTRODUCTION, CHAPTER 2 PROJECT COST and ATTACHMENTS indicating the cost estimation of each item. CHAPTER 2 PROJECT COST describes the basic concept for cost estimation and the constitution of project cost and so on.

CHAPTER 2 PROJECT COST

2.1 Summary of the Cost

The project cost is composed of main components, supporting infrastructures, agriculture supporting, environmental mitigation measures, others and ground water development. The grand total cost is arrived at Rs.1,412, 812, 000(US\$ 18,084,000) as follows.

Table 2.1.1 GRAND TOTAL

| | Total Cost | Contents | | Remarks |
|--------------------------------------|----------------------|----------------------|-----------------------|---------|
| | (Rs) | Construction (Rs) | Land Acquisition (Rs) | |
| 1. MAIN COMPORNENT | 1,275,183,000 | 1,161,375,000 | 113,809,000 | |
| 2. SUPPORTING INFRASTRUCTURES | 23,318,000 | 23,083,000 | 237,000 | |
| 3. AGRICULTURE SUPPORTING | 42,465,000 | 42,465,000 | 0 | |
| 4. ENVIRONMENTAL MITIGATION MEASURES | 45,874,000 | 40,884,000 | 4,990,000 | |
| 5. OTHERS | 14,273,000 | 13,743,000 | 531,000 | |
| 6. GROUND WATER DEVELOPMENT | 11,699,000 | 11,699,000 | 0 | |
| Grand Tota Rs | 1,412,812,000 | 1,293,249,000 | 119,567,000 | |
| US\$ | 18,084,000 | 16,554,000 | 1,531,000 | |

2.2 Basic Criteria

Following basic criteria were adapted for the cost estimation. The unit rate, material and labor cost are determined based on the district rate analysis of fiscal year 2001/2002.

- The exchange rate considered is
1 Rupees = 0.0128US\$
- An international contractor selected through international bidding process will carry out construction.
- Construction cost is composed of local and foreign currency.
- The price contingency is considered as 5% of foreign and local currency respectively.
- The physical contingency is estimated at 10% of the cost for each.

2.3 Project Cost

2.3.1 Main Component

Main Component is composed of construction cost, land acquisition, institutional development, consulting service charges and administration. The construction cost is calculated based on the items and quantities of work from the design, and unit rate. Farm development work (watercourse) will be the part of farmers' contribution. Summary of Main component is shown in table 2.3.1. The total cost is arrived at Rs.1, 275,183,000 (US\$16,323,000)

Table 2.3.1 MAIN COMPONENT: SUNSARI RIVER IRRIGATION PROJECT

| Description | Total Direct Cost (Rs) | Contents | | Remarks |
|---------------------------------------|---------------------------|----------------------|--------------------------|------------------------------------|
| | | Construction (Rs) | Land Acquisition (Rs) | |
| Hard Component | | | | |
| -Headwoks/Intake | 288,152,000 | 286,472,000 | 1,680,000 | |
| -Main Canal | 285,816,000 | 279,888,000 | 5,928,000 | including temporary works |
| -Secondary Canal | 136,591,000 | 126,835,000 | 9,756,000 | including temporary works |
| -Tertiary Canal | 135,723,000 | 100,944,000 | 34,779,000 | |
| -Farm Development Works (Watercourse) | 72,155,000 | 25,763,000 | 46,392,000 | on-farm facilities, 20 ha Block |
| -Canal Protection Works | 4,902,000 | 4,902,000 | 0 | |
| -Drainage Structure | 13,244,000 | 13,244,000 | 0 | Box Culvert, Pipe Culvert, Outfall |
| -Office Building | 1,000,000 | 1,000,000 | 0 | |
| -Quality Testing Lab | 3,000,000 | 3,000,000 | 0 | |
| Sub Total (1) | 940,583,000 | 842,048,000 | 98,535,000 | |
| | 100% | 90% | 10% | |
| Soft Component | | | | |
| -Institution Development | 50,600,000 | 50,600,000 | 0 | |
| -Consultant Services (1)* 10 % | 94,059,000 | 94,059,000 | 0 | |
| -Administration (1)* 2 % | 18,812,000 | 18,812,000 | 0 | |
| Sub Total (2) | 163,471,000 | 163,471,000 | 0 | |
| Sub Total (3)=(1)+(2) | 1,104,054,000 | 1,005,519,000 | 98,535,000 | |
| Price Escalation 5 % | 55,203,000 | 50,276,000 | 4,927,000 | |
| Total | 1,159,257,000 | 1,055,795,000 | 103,462,000 | |
| Contingency 10 % | 115,926,000 | 105,580,000 | 10,347,000 | |
| Grand Total | Rs 1,275,183,000 | 1,161,375,000 | 113,809,000 | |
| | US\$ 16,323,000 | 14,866,000 | 1,457,000 | |

2.3.2 Supporting Infrastructure

Supporting infrastructure consists of access roads, collection points of agriculture products, institution development, consultation service and administration. The total cost reaches Rs.23, 318,000 (US\$299,000) as follows.

Table 2.3.2 SUPPORTING INFRASTRUCTURES

| Description | Total Direct Cost (Rs) | Contents | | Remarks |
|--------------------------------|---------------------------|----------------------|--------------------------|--|
| | | Construction (Rs) | Land Acquisition (Rs) | |
| Hard Component | | | | |
| -Access Road 11.8 km | 16,870,000 | 16,666,000 | 204,000 | 30% of Total length for Land Acquisition |
| -Collection Point 1 place | 1,154,000 | 1,154,000 | 0 | 1place=6units, 1unit=50m2 |
| Sub Total (1) | 18,024,000 | 17,820,000 | 204,000 | |
| Soft Component | | | | |
| -Institution Developme(1)* 0 % | 0 | 0 | 0 | |
| -Consultant Services (1)* 10 % | 1,803,000 | 1,803,000 | 0 | |
| -Administration (1)* 2 % | 361,000 | 361,000 | 0 | |
| Sub Total (2) | 2,164,000 | 2,164,000 | 0 | |
| Sub Total (3)=(1)+(2) | 20,188,000 | 19,984,000 | 204,000 | |
| Price Escalation 5 % | 1,010,000 | 1,000,000 | 11,000 | |
| Total | 21,198,000 | 20,984,000 | 215,000 | |
| Contingency 10 % | 2,120,000 | 2,099,000 | 22,000 | |
| Grand Total | Rs 23,318,000 | 23,083,000 | 237,000 | |
| | US\$ 299,000 | 296,000 | 4,000 | |

-A bridge on sunsari river is under construction.

-River training is included in Headworks as main compornent.

-Supplimental emankment of Suksena canals is estimated in canal protection works as main compornent.

2.3.3 Agriculture Supporting Services

The component agriculture supporting services' comprises of two components, which are extension program for vegetable production and promotion program for vegetable marketing. The table-2.3.3 shows the details of the cost.

Table 2.3.3 AGRICULTURE SUPPORTING

| Description | | Total Direct Cost | Contents | | Remarks |
|----------------------|--|-------------------|-------------------|-----------------------|---------|
| | | (Rs) | Construction (Rs) | Land Acquisition (Rs) | |
| Soft Component | -Extention Program for Vegetable Productio | 19,395,000 | 19,395,000 | 0 | |
| | Contents: Required Personnel | 4,320,000 | 4,320,000 | 0 | |
| | Equipment | 15,075,000 | 15,075,000 | 0 | |
| | -Promotion Program for Vegetable Marketin | 17,370,000 | 17,370,000 | 0 | |
| | Contents: Required Personnel | 1,020,000 | 1,020,000 | 0 | |
| | Equipment | 16,350,000 | 16,350,000 | 0 | |
| Sub Total | | 36,765,000 | 36,765,000 | 0 | |
| Price Escalation 5 % | | 1,839,000 | 1,839,000 | 0 | |
| Total | | 38,604,000 | 38,604,000 | 0 | |
| Contingency 10 % | | 3,861,000 | 3,861,000 | 0 | |
| Grand Total Rs | | 42,465,000 | 42,465,000 | 0 | |
| US\$ | | 544,000 | 544,000 | 0 | |

2.3.4 Environmental Mitigation Measures

Environmental mitigation measures are composed of two components. One is hard component, namely the construction of fishpond. The other is soft component; extension service, environmental monitoring and environmental auditing. The total cost reaches Rs.45,874,000 (US\$588,000) as follows.

Table 2.3.4 ENVIRONMENTAL MITIGATION MEASURES

| Description | | Total Direct Cost | Contents | | Remarks |
|----------------------|------------------------------|-------------------|-------------------|-----------------------|---------------------------------------|
| | | (Rs) | Construction (Rs) | Land Acquisition (Rs) | |
| Hard Component | -Fish Pond 43 ha | 12,960,000 | 8,640,000 | 4,320,000 | Case1-Semi-intensive aquacultures |
| | -Initial cost for operation | 1,144,000 | 1,144,000 | 0 | estimated at 1143720Rs, say 1144000Rs |
| | Sub Total (1) | 14,104,000 | 9,784,000 | 4,320,000 | |
| Soft Component | -Extention service | 15,756,000 | 15,756,000 | 0 | for 3 years |
| | -Environmental monitoring | 7,756,000 | 7,756,000 | 0 | |
| | Contents: Required Personnel | 7,556,000 | 7,556,000 | 0 | |
| | Equipment | 200,000 | 200,000 | 0 | |
| | -Environmental auditing | 2,101,000 | 2,101,000 | 0 | estimated at 2100800Rs, say 2101000Rs |
| | Contents: Required Personnel | 2,080,800 | 2,080,800 | 0 | |
| | Equipment | 20,000 | 20,000 | 0 | |
| Sub Total (2) | 25,613,000 | 25,613,000 | 0 | | |
| Sub Total =(1)+(2) | | 39,717,000 | 35,397,000 | 4,320,000 | |
| Price Escalation 5 % | | 1,986,000 | 1,770,000 | 216,000 | |
| Total | | 41,703,000 | 37,167,000 | 4,536,000 | |
| Contingency 10 % | | 4,171,000 | 3,717,000 | 454,000 | |
| Grand Total Rs | | 45,874,000 | 40,884,000 | 4,990,000 | |
| US\$ | | 588,000 | 524,000 | 64,000 | |

2.3.5 Others

The cost of others is shown in table-2.3.5 below. The hard component covers the development of Mariya Dhar scheme, construction of drainage re-use structures and plantation in spoil bank taking into consideration environmental aspect. In addition, institutional development, consultant services and administration as soft components are estimated.

Table 2.3.5 OTHERS

| Description | Total Direct Cost (Rs) | Contents | | Remarks |
|-----------------------|--------------------------------|----------------------|--------------------------|---------|
| | | Construction (Rs) | Land Acquisition (Rs) | |
| Hard Component | -Mariya Dhar Scheme | 9,303,000 | 8,844,000 | 459,000 |
| | -Drainage Re-use Structures | 1,429,000 | 1,429,000 | 0 |
| | -Plantation in spoil banks | 300,000 | 300,000 | 0 |
| | Sub Total (1) | 11,032,000 | 10,573,000 | 459,000 |
| Soft Component | -Institution Developme(1)* 0 % | 0 | 0 | 0 |
| | -Consultant Services (1)* 10 % | 1,104,000 | 1,104,000 | 0 |
| | -Administration (1)* 2 % | 221,000 | 221,000 | 0 |
| | Sub Total (2) | 1,325,000 | 1,325,000 | 0 |
| Sub Total (3)=(1)+(2) | | 12,357,000 | 11,898,000 | 459,000 |
| Price Escalation | 5 % | 618,000 | 595,000 | 23,000 |
| Total | | 12,975,000 | 12,493,000 | 482,000 |
| Contingency | 10 % | 1,298,000 | 1,250,000 | 49,000 |
| Grand Total | Rs | 14,273,000 | 13,743,000 | 531,000 |
| | US\$ | 183,000 | 176,000 | 7,000 |

2.3.6 Ground water Development

Kaptanganj VDC is located at high altitude compared with other VDCs in the Study area, so that it will be very difficult to use the water from the Suksena Canal through gravity even after complete of the project. Therefore, ground water development by means of shallow and deep tube well is needed for productive agriculture. The cost of introduction of them in the VDC is estimated at Rs. 11,699,000 (US\$150,000).

Table 2.3.6 GROUND WATER DEVELOPMENT

| Description | Total Direct Cost (Rs) | Contents | | Remarks |
|------------------|---------------------------|----------------------|--------------------------|---------|
| | | Construction (Rs) | Land Acquisition (Rs) | |
| Hard Component | -Shallow Tube Well | 10,128,000 | 10,128,000 | 0 |
| | Contents: Construction | 1,664,000 | 1,664,000 | 0 |
| | Equipment | 8,464,000 | 8,464,000 | 0 |
| Total | | 10,128,000 | 10,128,000 | 0 |
| Price Escalation | 5 % | 507,000 | 507,000 | 0 |
| Total | | 10,635,000 | 10,635,000 | 0 |
| Contingency | 10 % | 1,064,000 | 1,064,000 | 0 |
| Grand Total | Rs | 11,699,000 | 11,699,000 | 0 |
| | US\$ | 150,000 | 150,000 | 0 |

2.4 Details of the Construction Cost

The construction cost is divided into the cost of personnel and material procurements. It is possible to obtain enough labors from local people. On the other hand, the project needs materials from foreign in addition to local one. The breakdown of local currency portion and foreign currency portion is as follows:

Local currency Portion

- Skilled and Unskilled Labor
- Local Materials
- Project Administration expenses during construction
- Institutional Development
- Consultancy Services

Foreign Currency Portion

- Cost of imported materials and foreign portion of local materials
- Cost of imported special machinery equipment and spare parts
- Institutional Development
- Consultancy services

The local and foreign currency portion is summarized below. In these tables, the construction cost excludes land acquisition cost.

Table 2.4.1 LOCAL PORTION & FOREIGN PORTION of MAIN COMPONENT

| Description | Construction Cost (Rs) | Foreign Portion | | Local Portion | | Contents of Local Portion | | | | | | |
|----------------|---------------------------|-----------------|--------------------|---------------|--------------------|---------------------------|-------------------|------------|-------------------|------------|--------------------|-------------|
| | | Ratio | Amount | Ratio | Amount | Skilled | | Unskilled | | Others | | |
| | | (%) | (Rs) | (%) | (Rs) | Ratio (%) | Amount (Rs) | Ratio (%) | Amount (Rs) | Ratio (%) | Amount (Rs) | |
| Hard Component | -Headwoks/Intake | 286,472,000 | 80 | 229,177,600 | 20 | 57,294,400 | 12 | 6,875,328 | 8 | 4,583,552 | 80 | 45,835,520 |
| | -Main Canal | 279,888,000 | 60 | 167,932,800 | 40 | 111,955,200 | 9 | 10,075,968 | 11 | 12,315,072 | 80 | 89,564,160 |
| | -Secondary Canal | 126,835,000 | 70 | 88,784,500 | 30 | 38,050,500 | 8 | 3,044,040 | 12 | 4,566,060 | 80 | 30,440,400 |
| | -Tertiary Canal | 100,944,000 | 80 | 80,755,200 | 20 | 20,188,800 | 8 | 1,615,104 | 12 | 2,422,656 | 80 | 16,151,040 |
| | -Farm Development Work | 25,763,000 | 10 | 2,576,300 | 90 | 23,186,700 | 5 | 1,159,335 | 75 | 17,390,025 | 20 | 4,637,340 |
| | -Canal Protection Works | 4,902,000 | 70 | 3,431,400 | 30 | 1,470,600 | 5 | 73,530 | 15 | 220,590 | 80 | 1,176,480 |
| | -Drainage Structure | 13,244,000 | 70 | 9,270,800 | 30 | 3,973,200 | 8 | 317,856 | 12 | 476,784 | 80 | 3,178,560 |
| | -Office Building | 1,000,000 | 30 | 300,000 | 70 | 700,000 | 8 | 56,000 | 17 | 119,000 | 75 | 525,000 |
| | -Quality Testing Lab | 3,000,000 | 60 | 1,800,000 | 40 | 1,200,000 | 8 | 96,000 | 17 | 204,000 | 75 | 900,000 |
| | Sub Total (1) | 842,048,000 | 69 | 584,028,600 | 31 | 258,019,400 | 9 | 23,313,161 | 16 | 42,297,739 | 75 | 192,408,500 |
| Soft Component | -Institution Development | 50,600,000 | 40 | 20,240,000 | 60 | 30,360,000 | 50 | 15,180,000 | 20 | 6,072,000 | 30 | 9,108,000 |
| | -Consultant Services | 94,059,000 | 60 | 56,435,400 | 40 | 37,623,600 | 80 | 30,098,880 | 10 | 3,762,360 | 10 | 3,762,360 |
| | -Administration | 18,812,000 | 0 | 0 | 100 | 18,812,000 | 60 | 11,287,200 | 20 | 3,762,400 | 20 | 3,762,400 |
| | Sub Total (2) | 163,471,000 | 47 | 76,675,400 | 53 | 86,795,600 | 65 | 56,566,080 | 16 | 13,596,760 | 19 | 16,632,760 |
| Total | 1,005,519,000 | 66 | 660,704,000 | 34 | 344,815,000 | 23 | 79,879,241 | 16 | 55,894,499 | 61 | 209,041,260 | |

Remarks:

-Construction cost excepts land acquisition.

Table 2.4.2 LOCAL PORTION & FOREIGN PORTION of SUPPORTING INFRASTRUCTURES

| Description | Construction Cost (Rs) | Foreign Portion | | Local Portion | | Contents of Local Portion | | | | | | |
|----------------|---------------------------|-----------------|------------------|---------------|-------------------|---------------------------|------------------|-----------|------------------|-----------|------------------|-----------|
| | | Ratio | Amount | Ratio | Amount | Skilled | | Unskilled | | Others | | |
| | | (%) | (Rs) | (%) | (Rs) | Ratio (%) | Amount (Rs) | Ratio (%) | Amount (Rs) | Ratio (%) | Amount (Rs) | |
| Hard Component | -Access Road | 16,666,000 | 30 | 4,999,800 | 70 | 11,666,200 | 10 | 1,166,620 | 20 | 2,333,240 | 70 | 8,166,340 |
| | -Collection Point | 1,154,000 | 30 | 346,200 | 70 | 807,800 | 5 | 40,390 | 15 | 121,170 | 80 | 646,240 |
| | Sub Total (1) | 17,820,000 | 30 | 5,346,000 | 70 | 12,474,000 | 10 | 1,207,010 | 20 | 2,454,410 | 71 | 8,812,580 |
| Soft Component | -Institution Development | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | -Consultant Services | 1,803,000 | 60 | 1,081,800 | 40 | 721,200 | 80 | 576,960 | 10 | 72,120 | 10 | 72,120 |
| | -Administration | 361,000 | 0 | 0 | 100 | 361,000 | 60 | 216,600 | 20 | 72,200 | 20 | 72,200 |
| | Sub Total (2) | 2,164,000 | 50 | 1,081,800 | 50 | 1,082,200 | 73 | 793,560 | 21 | 144,320 | 21 | 144,320 |
| Total | 19,984,000 | 32 | 6,427,800 | 68 | 13,556,200 | 15 | 2,000,570 | 19 | 2,598,730 | 66 | 8,956,900 | |

Remarks:

-Construction cost excepts land acquisition.

Table 2.4.4 LOCAL PORTION & FOREIGN PORTION of ENVIRONMENTAL MITIGATION MEASURES

| Description | Construction Cost (Rs) | Foreign Portion | | Local Portion | | Contents of Local Portion | | | | | | |
|----------------|-----------------------------|-----------------|------------------|---------------|-------------------|---------------------------|-------------------|------------|------------------|-----------|------------------|-----------|
| | | Ratio | Amount | Ratio | Amount | Skilled | | Unskilled | | Others | | |
| | | (%) | (Rs) | (%) | (Rs) | Ratio (%) | Amount (Rs) | Ratio (%) | Amount (Rs) | Ratio (%) | Amount (Rs) | |
| Hard Component | -Fish Pond | 8,640,000 | 20 | 1,728,000 | 80 | 6,912,000 | 10 | 691,200 | 20 | 1,382,400 | 70 | 4,838,400 |
| | -Initial cost for operation | 1,144,000 | 10 | 114,400 | 90 | 1,029,600 | 0 | 0 | 0 | 0 | 100 | 1,029,600 |
| | Sub Total (1) | 9,784,000 | 19 | 1,842,400 | 81 | 7,941,600 | 9 | 691,200 | 17 | 1,382,400 | 74 | 5,868,000 |
| Soft Component | -Extention service | 15,756,000 | 2 | 315,120 | 98 | 15,440,880 | 90 | 13,896,792 | 0 | 0 | 10 | 1,544,088 |
| | -Environmental monitoring | 7,756,000 | 3 | 232,680 | 97 | 7,523,320 | 97 | 7,297,620 | 0 | 0 | 3 | 225,700 |
| | -Environmental auditing | 2,101,000 | 9 | 189,090 | 91 | 1,911,910 | 91 | 1,739,838 | 0 | 0 | 9 | 172,072 |
| | Sub Total (2) | 25,613,000 | 3 | 736,890 | 97 | 24,876,110 | 92 | 22,934,251 | 0 | 0 | 8 | 1,941,860 |
| Total | 35,397,000 | 7 | 2,579,290 | 93 | 32,817,710 | 72 | 23,625,451 | 4 | 1,382,400 | 24 | 7,809,860 | |

Remarks:

-Construction cost excepts land acquisition.

Table 2.4.5 LOCAL PORTION & FOREIGN PORTION of OTHERS

| Description | Construction Cost (Rs) | Foreign Portion | | Local Portion | | Contents of Local Portion | | | | | | |
|----------------|---------------------------|-----------------|------------------|---------------|------------------|---------------------------|----------------|-----------|----------------|-----------|------------------|-----------|
| | | Ratio | Amount | Ratio | Amount | Skilled | | Unskilled | | Others | | |
| | | (%) | (Rs) | (%) | (Rs) | Ratio (%) | Amount (Rs) | Ratio (%) | Amount (Rs) | Ratio (%) | Amount (Rs) | |
| Hard Component | -Maridhar Scheme | 8,844,000 | 70 | 6,190,800 | 30 | 2,653,200 | 8 | 212,256 | 12 | 318,384 | 80 | 2,122,560 |
| | -Drainage Re-use Struc | 1,429,000 | 70 | 1,000,300 | 30 | 428,700 | 8 | 34,296 | 12 | 51,444 | 80 | 342,960 |
| | -Plantation in spoil bank | 300,000 | 20 | 60,000 | 80 | 240,000 | 5 | 12,000 | 15 | 36,000 | 60 | 144,000 |
| | Sub Total (1) | 10,573,000 | 69 | 7,251,100 | 31 | 3,321,900 | 8 | 258,552 | 12 | 405,828 | 79 | 2,609,520 |
| Soft Component | -Institution Developmen | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | -Consultant Services | 1,104,000 | 60 | 662,400 | 40 | 441,600 | 80 | 353,280 | 10 | 44,160 | 10 | 44,160 |
| | -Administration | 221,000 | 0 | 0 | 100 | 221,000 | 60 | 132,600 | 20 | 44,200 | 20 | 44,200 |
| | Sub Total (2) | 1,325,000 | 50 | 662,400 | 50 | 662,600 | 73 | 485,880 | 13 | 88,360 | 13 | 88,360 |
| Total | 11,898,000 | 67 | 7,913,500 | 33 | 3,984,500 | 19 | 744,432 | 12 | 494,188 | 68 | 2,697,880 | |

Remarks:

-Construction cost excepts land acquisition.

Table 2.4.6 LOCAL PORTION & FOREIGN PORTION of GROUND WATER DEVELOPMENT

| Description | Construction Cost (Rs) | Foreign Portion | | Local Portion | | Contents of Local Portion | | | | | | |
|----------------|---------------------------|-----------------|------------------|---------------|------------------|---------------------------|----------------|-----------|----------------|-----------|----------------|---------|
| | | Ratio | Amount | Ratio | Amount | Skilled | | Unskilled | | Others | | |
| | | (%) | (Rs) | (%) | (Rs) | Ratio (%) | Amount (Rs) | Ratio (%) | Amount (Rs) | Ratio (%) | Amount (Rs) | |
| Hard Component | -Shallow Tube Well | 10,128,000 | 75 | 7,617,600 | 25 | 2,510,400 | 28 | 698,880 | 38 | 965,120 | 34 | 846,400 |
| | Construction | 1,664,000 | 0 | 0 | 100 | 1,664,000 | 42 | 698,880 | 58 | 965,120 | 0 | 0 |
| | Equipment | 8,464,000 | 90 | 7,617,600 | 10 | 846,400 | 0 | 0 | 0 | 0 | 100 | 846,400 |
| Total | 10,128,000 | 75 | 7,617,600 | 25 | 2,510,400 | 28 | 698,880 | 38 | 965,120 | 34 | 846,400 | |

Remarks:

-Construction cost excepts land acquisition.

2.5 Annual Disbursement Plan

The investment disbursement schedule is shown below. The disbursement plan is based on the overall development timeframe.

Table 2.5.1 DISBURSEMENT PLAN of MAIN COMPONENT

| Description | Total Year | 1 | 2 | 3 | 4 | 5 |
|---------------------------------|----------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | Constru'n Stage-I | 1 | 2 | 3 | 4 | |
| | Constru'n Stage-II | | | | 1 | 2 |
| % | 100 | 40 | 20 | 20 | 20 | 0 |
| -Consultant Services (St.I) Rs | 56,441,000 | 22,576,400 | 11,288,200 | 11,288,200 | 11,288,200 | 0 |
| % | 100 | 0 | 0 | 0 | 40 | 20 |
| -Consultant Services (St.II) Rs | 37,628,000 | 0 | 0 | 0 | 15,051,200 | 7,525,600 |
| % | 100 | 20 | 20 | 20 | 20 | 20 |
| -Institution Development Rs | 50,600,000 | 10,120,000 | 10,120,000 | 10,120,000 | 10,120,000 | 10,120,000 |
| % | 100 | 25 | 25 | 25 | 25 | 0 |
| -Administration Rs | 18,812,000 | 4,703,000 | 4,703,000 | 4,703,000 | 4,703,000 | 0 |
| % | 100 | 0 | 30 | 40 | 30 | 0 |
| -Construction Stage-I Rs | 570,360,000 | 0 | 171,108,000 | 228,144,000 | 171,108,000 | 0 |
| % | 100 | 30 | 40 | 30 | 0 | 0 |
| -Land Acquisition (Stage-I) Rs | 7,608,000 | 2,282,400 | 3,043,200 | 2,282,400 | 0 | 0 |
| % | 100 | 0 | 0 | 0 | 0 | 30 |
| -Construction Stage-II Rs | 271,688,000 | 0 | 0 | 0 | 0 | 81,506,400 |
| % | 100 | 0 | 0 | 0 | 30 | 40 |
| -Land Acquisition (Stage-II) Rs | 90,927,000 | 0 | 0 | 0 | 27,278,100 | 36,370,800 |
| % | 100.0 | 3.6 | 18.1 | 23.2 | 21.7 | 12.3 |
| Total Rs | 1,104,064,000 | 39,681,800 | 200,262,400 | 256,537,600 | 239,548,500 | 135,522,800 |
| Description | Total Year | 6 | 7 | 8 | 9 | 10 |
| | Constru'n Stage-I | | | | | |
| | Constru'n Stage-II | 3 | 4 | | | |
| % | | 0 | 0 | 0 | 0 | 0 |
| -Consultant Services (St.I) Rs | | 0 | 0 | 0 | 0 | 0 |
| % | | 20 | 20 | 0 | 0 | 0 |
| -Consultant Services (St.II) Rs | | 7,525,600 | 7,525,600 | 0 | 0 | 0 |
| % | | 0 | 0 | 0 | 0 | 0 |
| -Institution Development Rs | | 0 | 0 | 0 | 0 | 0 |
| % | | 0 | 0 | 0 | 0 | 0 |
| -Administration Rs | | 0 | 0 | 0 | 0 | 0 |
| % | | 0 | 0 | 0 | 0 | 0 |
| -Construction Stage-I Rs | | 0 | 0 | 0 | 0 | 0 |
| % | | 0 | 0 | 0 | 0 | 0 |
| -Land Acquisition (Stage-I) Rs | | 0 | 0 | 0 | 0 | 0 |
| % | | 40 | 30 | 0 | 0 | 0 |
| -Construction Stage-II Rs | | 108,675,200 | 81,506,400 | 0 | 0 | 0 |
| % | | 30 | 0 | 0 | 0 | 0 |
| -Land Acquisition (Stage-II) Rs | | 27,278,100 | 0 | 0 | 0 | 0 |
| % | | 13.0 | 8.1 | 0.0 | 0.0 | 0.0 |
| Total Rs | | 143,478,900 | 89,032,000 | 0 | 0 | 0 |

Remarks:

-The items of construction stage-I are headworks, main canal including head

-The items of construction stage-II are secondary canal, tertiary canal, farm development works(watercourse), canal protection and drainage structures.

Table 2.5.2 DISBURSEMENT PLAN of SUPPORTING INFRASTRUCTURES

| Description | Total Year | 1 | 2 | 3 | 4 | 5 |
|--------------------------|----------------------|------------------|----------|----------|------------------|------------------|
| | Constru'n Stage-I | 1 | 2 | 3 | 4 | |
| | Constru'n Stage-II | | | | 1 | 2 |
| % | 100 | 0 | 0 | 0 | 100 | 0 |
| -Consultant Services | Rs 1,803,000 | 0 | 0 | 0 | 1,803,000 | 0 |
| % | 0 | 0 | 0 | 0 | 0 | 0 |
| -Institution Development | Rs 0 | 0 | 0 | 0 | 0 | 0 |
| % | 100 | 0 | 0 | 0 | 100 | 0 |
| -Administration | Rs 361,000 | 0 | 0 | 0 | 361,000 | 0 |
| % | 100 | 0 | | | 0 | 30 |
| -Construction (Road) | Rs 16,666,000 | 0 | 0 | 0 | 0 | 4,999,800 |
| % | | 0 | 0 | 0 | 100 | 0 |
| -Construction (C. Point) | Rs 1,154,000 | 0 | 0 | 0 | 1,154,000 | 0 |
| % | 100 | 0 | 0 | 0 | 30 | 40 |
| -Land Acquisition | Rs 204,000 | 0 | 0 | 0 | 61,200 | 81,600 |
| % | 100.0 | 0.0 | 0.0 | 0.0 | 16.7 | 25.2 |
| Total | Rs 20,188,000 | 0 | 0 | 0 | 3,379,200 | 5,081,400 |
| Description | Total Year | 6 | 7 | 8 | 9 | 10 |
| | Constru'n Stage-I | | | | | |
| | Constru'n Stage-II | 3 | 4 | | | |
| % | | 0 | 0 | 0 | 0 | 0 |
| -Consultant Services | Rs 0 | 0 | 0 | 0 | 0 | 0 |
| % | | 0 | 0 | 0 | 0 | 0 |
| -Institution Development | Rs 0 | 0 | 0 | 0 | 0 | 0 |
| % | | 0 | 0 | 0 | 0 | 0 |
| -Administration | Rs 0 | 0 | 0 | 0 | 0 | 0 |
| % | | 40 | 30 | | 0 | 0 |
| -Construction (Road) | Rs 6,666,400 | 4,999,800 | 0 | 0 | 0 | 0 |
| % | | 0 | 0 | 0 | 0 | 0 |
| -Construction (C. Point) | Rs 0 | 0 | 0 | 0 | 0 | 0 |
| % | | 30 | 0 | 0 | 0 | 0 |
| -Land Acquisition | Rs 61,200 | 0 | 0 | 0 | 0 | 0 |
| % | | 33.3 | 24.8 | 0.0 | 0.0 | 0.0 |
| Total | Rs 6,727,600 | 4,999,800 | 0 | 0 | 0 | 0 |

Table 2.5.3 DISBURSEMENT PLAN of AGRICULTURE SUPPORTING

| Description | Total Year | 1 | 2 | 3 | 4 | 5 |
|--------------------------|----------------------|------------------|------------------|------------------|------------------|------------------|
| | Constru'n Stage-I | 1 | 2 | 3 | 4 | |
| | Constru'n Stage-II | | | | 1 | 2 |
| % | 0 | 0 | 0 | 0 | 0 | 0 |
| -Consultant Services | Rs 0 | 0 | 0 | 0 | 0 | 0 |
| % | 0 | 0 | 0 | 0 | 0 | 0 |
| -Institution Development | Rs 0 | 0 | 0 | 0 | 0 | 0 |
| % | 0 | 0 | 0 | 0 | 0 | 0 |
| -Administration | Rs 0 | 0 | 0 | 0 | 0 | 0 |
| % | 100 | 0 | 0 | 0 | 0 | 20 |
| -Imprementation | Rs 36,765,000 | 0 | 0 | 0 | 0 | 7,353,000 |
| % | 0 | 0 | 0 | 0 | 0 | 0 |
| -Land Acquisition | Rs 0 | 0 | 0 | 0 | 0 | 0 |
| % | 100 | 0.0 | 0.0 | 0.0 | 0.0 | 20.0 |
| Total | Rs 36,765,000 | 0 | 0 | 0 | 0 | 7,353,000 |
| Description | Total Year | 6 | 7 | 8 | 9 | 10 |
| | Constru'n Stage-I | | | | | |
| | Constru'n Stage-II | 3 | 4 | | | |
| % | | 0 | 0 | 0 | 0 | 0 |
| -Consultant Services | Rs 0 | 0 | 0 | 0 | 0 | 0 |
| % | | 0 | 0 | 0 | 0 | 0 |
| -Institution Development | Rs 0 | 0 | 0 | 0 | 0 | 0 |
| % | | 0 | 0 | 0 | 0 | 0 |
| -Administration | Rs 0 | 0 | 0 | 0 | 0 | 0 |
| % | | 20 | 20 | 20 | 20 | 0 |
| -Imprementation | Rs 7,353,000 | 7,353,000 | 7,353,000 | 7,353,000 | 7,353,000 | 0 |
| % | | 20 | 0 | 0 | 0 | 0 |
| -Land Acquisition | Rs 0 | 0 | 0 | 0 | 0 | 0 |
| % | | 20.0 | 20.0 | 20.0 | 20.0 | 0.0 |
| Total | Rs 7,353,000 | 7,353,000 | 7,353,000 | 7,353,000 | 7,353,000 | 0 |

Table 2.5.4 DISBURSEMENT PLAN of ENVIRONMENTAL MITIGATION MEASURES

| Description | Total Year | 1 | 2 | 3 | 4 | 5 |
|--------------------------------|--------------------|-----------|-----------|------------|-----------|-----------|
| | Constru'n Stage-I | 1 | 2 | 3 | 4 | |
| | Constru'n Stage-II | | | | 1 | 2 |
| % | 100 | 0 | 50 | 50 | 0 | 0 |
| -Construction Rs | 8,640,000 | 0 | 4,320,000 | 4,320,000 | 0 | 0 |
| % | 100 | 0 | 0 | 100 | 0 | 0 |
| -Initial Cost for Operation Rs | 1,144,000 | 0 | 0 | 1,144,000 | 0 | 0 |
| % | 100 | 0 | 0 | 40 | 30 | 30 |
| -Extention Service Rs | 15,756,000 | 0 | 0 | 6,302,400 | 4,726,800 | 4,726,800 |
| % | 100 | 0 | 0 | 0 | 0 | 40 |
| -Environmental Monitorin Rs | 7,756,000 | 0 | 0 | 0 | 0 | 3,102,400 |
| % | 100 | 0 | 0 | 0 | 0 | 40 |
| -Environmental Auditing Rs | 2,101,000 | 0 | 0 | 0 | 0 | 840,400 |
| % | 100 | 0 | 100 | 0 | 0 | 0 |
| -Land Acquisition Rs | 4,320,000 | 0 | 4,320,000 | 0 | 0 | 0 |
| % | 100 | 0.0 | 21.8 | 29.6 | 11.9 | 21.8 |
| Total Rs | 39,717,000 | 0 | 8,640,000 | 11,766,400 | 4,726,800 | 8,669,600 |
| Description | Total Year | 6 | 7 | 8 | 9 | 10 |
| | Constru'n Stage-I | | | | | |
| | Constru'n Stage-II | 3 | 4 | | | |
| % | | 0 | 0 | 0 | 0 | 0 |
| -Construction Rs | | 0 | 0 | 0 | 0 | 0 |
| % | | 0 | 0 | 0 | 0 | 0 |
| -Initial Cost for Operation Rs | | 0 | 0 | 0 | 0 | 0 |
| % | | 0 | 0 | 0 | 0 | 0 |
| -Extention Service Rs | | 0 | 0 | 0 | 0 | 0 |
| % | | 30 | 30 | 0 | 0 | 0 |
| -Environmental Monitorin Rs | | 2,326,800 | 2,326,800 | 0 | 0 | 0 |
| % | | 30 | 30 | 0 | 0 | 0 |
| -Environmental Auditing Rs | | 630,300 | 630,300 | 0 | 0 | 0 |
| % | | 0 | 0 | 0 | 0 | 0 |
| -Land Acquisition Rs | | 0 | 0 | 0 | 0 | 0 |
| % | | 7.4 | 7.4 | | | |
| Total Rs | | 2,957,100 | 2,957,100 | | | |

Table 2.5.5 DISBURSEMENT PLAN of OTHERS

| Description | Total Year | 1 | 2 | 3 | 4 | 5 |
|-----------------------------|--------------------|-----------|-----|-----|-----------|-----------|
| | Constru'n Stage-I | 1 | 2 | 3 | 4 | |
| | Constru'n Stage-II | | | | 1 | 2 |
| % | 100 | 0 | 0 | 0 | 50 | 50 |
| -Consultant Services Rs | 1,104,000 | 0 | 0 | 0 | 552,000 | 552,000 |
| % | 0 | 0 | 0 | 0 | 0 | 0 |
| -Institution Development Rs | 0 | 0 | 0 | 0 | 0 | 0 |
| % | 100 | 0 | 0 | 0 | 0 | 50 |
| -Administration Rs | 221,000 | 0 | 0 | 0 | 0 | 110,500 |
| % | 100 | 0 | 0 | 0 | 0 | 50 |
| -Construction Rs | 10,573,000 | 0 | 0 | 0 | 0 | 5,286,500 |
| % | 100 | 0 | 0 | 0 | 100 | 0 |
| -Land Acquisition Rs | 459,000 | 0 | 0 | 0 | 459,000 | 0 |
| % | 100 | 0.0 | 0.0 | 0.0 | 8.2 | 48.1 |
| Total Rs | 12,357,000 | 0 | 0 | 0 | 1,011,000 | 5,949,000 |
| Description | Total Year | 6 | 7 | 8 | 9 | 10 |
| | Constru'n Stage-I | | | | | |
| | Constru'n Stage-II | 3 | 4 | | | |
| % | | 0 | 0 | 0 | 0 | 0 |
| -Consultant Services Rs | | 0 | 0 | 0 | 0 | 0 |
| % | | 0 | 0 | 0 | 0 | 0 |
| -Institution Development Rs | | 0 | 0 | 0 | 0 | 0 |
| % | | 50 | 0 | 0 | 0 | 0 |
| -Administration Rs | | 110,500 | 0 | 0 | 0 | 0 |
| % | | 50 | 0 | 0 | 0 | 0 |
| -Construction Rs | | 5,286,500 | 0 | 0 | 0 | 0 |
| % | | 0 | 0 | 0 | 0 | 0 |
| -Land Acquisition Rs | | 0 | 0 | 0 | 0 | 0 |
| % | | 43.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Rs | | 5,397,000 | 0 | 0 | 0 | 0 |

Table 2.5.6 DISBURSEMENT PLAN of GROUND WATER DEVELOPMENT

| Description | Total Year | 1 | 2 | 3 | 4 | 5 |
|--------------------------|--------------------|------------|-----|------|-----------|-----------|
| | Constru'n Stage-I | 1 | 2 | 3 | 4 | 5 |
| | Constru'n Stage-II | | | | 1 | 2 |
| % | 0 | 0 | 0 | 0 | 0 | 0 |
| -Consultant Services | Rs | 0 | 0 | 0 | 0 | 0 |
| % | 0 | 0 | 0 | 0 | 0 | 0 |
| -Institution Development | Rs | 0 | 0 | 0 | 0 | 0 |
| % | 0 | 0 | 0 | 0 | 0 | 0 |
| -Administration | Rs | 0 | 0 | 0 | 0 | 0 |
| % | 100 | 0 | 0 | 40 | 30 | 30 |
| -Construction | Rs | 10,128,000 | 0 | 0 | 4,051,200 | 3,038,400 |
| % | 0 | 0 | 0 | 0 | 100 | 0 |
| -Land Acquisition | Rs | 0 | 0 | 0 | 0 | 0 |
| % | 100 | 0.0 | 0.0 | 40.0 | 30.0 | 30.0 |
| Total | Rs | 10,128,000 | 0 | 0 | 4,051,200 | 3,038,400 |

Summary of Cost Estimate

| S No | Particulars | Nr | Unit Cost | Total Amount |
|------|---|------|-------------|---|
| A | 1 Headworks/Intake | 1 | 288,151,489 | 288,151,489 |
| B | 1 Main Canal Suksena | 1 | 127,113,936 | 127,113,936 |
| B | 2 Main Canal Shankarpur | 1 | 122,239,845 | 122,239,845 |
| B1 | 3 Main Canal Structures | | | |
| B1 | 1.1 Cross Regulators Type A (4-9 m3/s) | 5 | 908,666 | 4,543,328 |
| B1 | 1.2 Cross Regulators Type B (2-4 m3/s) | 4 | 618,552 | 2,474,209 |
| B1 | 1.3 Cross Regulators Type C (0.3-2 m3/s) | 4 | 392,984 | 1,571,936 |
| B1 | 2 Main Canal outlets | 7 | 27,091 | 189,635 |
| B1 | 3 Main Canal Syphon | 1 | 4,669,038 | 4,669,038 |
| B1 | 4 Main Canal Aqueducts | 1 | 2,610,958 | 2,610,958 |
| B1 | 5.1 Main Canal Escape Structure (5 m3/s) | 2 | 575,627 | 1,151,253 |
| B1 | 5.2 Main Canal Escape Structure (2.5 m3/s) | 2 | 459,069 | 918,137 |
| B1 | 6.1 Pipe Underpass (Head Race Crossing by existing SMIP canal - Double Pipe | 4 | 345,313 | 1,381,253 |
| B1 | 6.2 Pipe Underpass (Head Race Crossing by existing SMIP canal - Single Pipe | 4 | 198,974 | 795,897 |
| B1 | 7.1 Main Canal Crossing Two Lane Road-Type A Bridge | 4 | 1,746,807 | 6,987,229 |
| B1 | 7.2 Main Canal Crossing Village Road-Type B Bridge | 5 | 1,321,806 | 6,609,030 |
| B1 | 7.3 Foot Bridge (1.8m wide)-Type C | 10 | 95,253 | 952,530 |
| C | 1 Secondary Canal | 1 | 89,234,896 | 89,234,896 |
| C1 | 2 Secondary Head Regulator | 45 | 130,006 | 5,850,250 |
| C1 | 3.1 Proportional Distributor offtaking one side only (SC to SC and TC) | 31 | 248,772 | 7,711,928 |
| C1 | 3.2 Proportional Distributor offtaking both side (SC to two TCs) | 36 | 230,823 | 8,309,611 |
| C1 | 4 Secondary Canal outlets | 163 | 11,861 | 1,933,396 |
| C1 | 5 Secondary Canal Bridges-Type B Bridge | 16 | 1,321,806 | 21,148,895 |
| D | 1 Tertiary/Sub Tertiary Canal | 1 | 127,921,588 | 127,921,588 |
| D1 | 2 Proportional Distributor offtaking (TC to Sub TCs) | 4 | 199,395 | 797,580 |
| D1 | 3 Farm outlets(Tertiary to Water course) | 426 | 9,033 | 3,848,176 |
| D1 | 3.1 Tertiary Canal (Canal crossing Road) Type A -Pipe Culvert | 9 | 30,231 | 272,083 |
| D1 | 3.2 Tertiary Canal (Canal crossing Road) Type B- Pipe Culvert | 29 | 36,221 | 1,050,396 |
| D1 | 3.3 Tertiary Canal (Canal crossing Road) Type C -Pipe Culvert | 24 | 45,934 | 1,102,414 |
| D1 | 3.4 Tertiary Canal (Canal crossing Road) Type D- Pipe Culvert | 13 | 55,896 | 726,645 |
| E | 1 Canal Protection Works | 1 | 4,901,787 | 4,901,787 |
| E | 2 Temporary Works in Main and Secondary Canals | 1 | 4,000,000 | 4,000,000 |
| F | 1 Maridhar scheme | 1 | 9,302,495 | 9,302,495 |
| G | 1 Drainage Reuse Structures | 5 | 285,636 | 1,428,182 |
| G | 2.1 Drainage crossing Culverts Type A -Box Culvert (Q>5cumec) | 4 | 884,122 | 3,536,490 |
| G | 2.2 Drainage crossing Culverts Type B- Box Culvert(3<Q<5cumec) | 4 | 784,122 | 3,136,490 |
| G | 2.3 Drainage crossing Culverts Type C -Box Culvert(2<Q<3cumec) | 5 | 684,122 | 3,420,612 |
| G | 2.4 Drainage crossing Culverts Type D- Pipe Culvert - double pipe | 8 | 55,896 | 447,166 |
| G | 3 Drainage Outfall | 42 | 64,308 | 2,700,932 |
| H | Construction of small scale fish ponds | 36 | 300,000 | 10,800,000 |
| I | 1 Ground Water System - STW (Shallow Tube Well) | 160 | 63,300 | 10,128,000 |
| I | 2 Ground Water System - DTW (Deep Tube Well) | 14 | 875,000 | 12,250,000 |
| J | Farm development works (with in 20 ha Block) | 426 | 169,376 | 72,154,121 |
| K | Infrastructure development | | | |
| K | 1 Collection Point | 6 | 192,186 | 1,153,114 |
| K | 2 Access Road | 11.8 | 1,412,318 | 16,870,000 |
| K | 3 Office Building | 1 | 1,000,000 | 1,000,000 |
| K | 4 Institutional Development | 1 | 1,500,000 | 1,500,000 |
| K | 5 Agriculture Extension | 1 | 1,000,000 | 1,000,000 |
| K | 6 Quality Testing Lab for construction material | 1 | 3,000,000 | 3,000,000 |
| | | | NRs. | 1,004,996,952 |
| | | | M US \$ | 12.88 |
| | Grand Total | | | Including Farmers Participation and |

Abstract of Cost (Alternate # a, headworks as Barrage)

Bill No 2. Headworks

| S No | Items | Unit | Quantity | Rate per Unit | Amount in NRs. | Remarks |
|--------|--|-------|-----------|---------------|----------------|---------|
| 2. 1 | Site Clearance including cutting,uprooting, and disposal of grasses with light compaction, levelling & cleaning the site | sqm | 36,000 | 1.85 | 66,654.00 | |
| 2. 2 | Earth work in excavation in foundation in dry/wet condition and disposing upto a haulage distance of 250 m and lift upto 5m | cu m | 31,380 | 87.45 | 2,744,055.48 | |
| 2. 3 | Earth work in excavation in foundation/ structure under water condition and disposing upto a haulage distance of 250 m and lift upto 5m | cu m | 8,000 | 116.43 | 931,408.00 | |
| 2. 5 | Earth work in backfill in structures including compaction | cu m | 18,960 | 99.90 | 1,894,113.48 | |
| 2. 6 | Mass Concrete of Grade M10 | cu m | 660 | 2740.01 | 1,808,407.54 | |
| 2. 6 | Mass Concrete of Grade M15 | cu m | 420 | 3760.97 | 1,579,605.51 | |
| 2. 7 | Mass Concrete of Grade M20 | cu m | 12,140 | 3981.68 | 48,337,572.27 | |
| 2. 11 | Supplying and using 250mm wide rubber waterstop(ISI Standard) in construction joint | r m | 1,450 | 2500 | 3,625,000.00 | |
| 2. 11a | Supplying and making 25mm * 25mm joint sealer as per the drawing | rm | 1,450 | 200 | 290,000.00 | |
| 2. 11b | Suppluing and using 12 m mm thick joint filler as per the drawing | sqm | 1,813 | 500 | 906,250.00 | 1.25 |
| 2. 12 | Fe 415 Tor steel reinforcement :including Cutting bending binding, placing in position etc all complete | kg | 1,092,600 | 34.6955 | 37,908,303.30 | |
| 2. 14 | Form works: Making wooden forms including supplying and selection of materials, fixing, nailing, according to drawingsall complete | sqm | 15,450 | 419.22 | 6,476,960.56 | |
| 2. 15 | Precast concrete blocks for riprap | sqm | 8,390 | 3019.42 | 25,332,961.35 | |
| 2. 25 | Supplying and making Boulder filled gabion Box (Rectengular box size 3 * 1.5 * 1 m, mesh size 100mm * 100mm, GI wire 10 SWG) | sqm | 980 | 1052.17 | 1,031,123.96 | |
| 26 a | Supply and fix Spillway gates dually operable by electricity and hand with all necessary arrangements complete, Size of gates 3.6m *6.2 m | Set | 5 | 2126400.00 | 10,632,000.00 | |
| 26 b | Supply and fix Under Sluice gates dually operable by electricity and hand with all necessary arrangements complete, Size of gates 3.85m *6.2 m | set | 4 | 2302500.00 | 9,210,000.00 | |
| 2. 28 | Supply and fix Intake gates dually operable by electricity and hand with all necessary arrangements complete, Size of gates 1.6m *3.0 m | Set | 3 | 583000.00 | 1,749,000.00 | |
| 2. 29 | Supply and fix Intake gates dually operable by electricity and hand with all necessary arrangements complete, Size of gates 1.6m * 2.50 m | Set | 3 | 486000.00 | 1,458,000.00 | |
| 2. 30 | Supply and fix Neoprane bearing plates (size ?) | Nr | 15 | 34983.00 | 524,745.00 | |
| 2. 32 | Supply and fix operation bridge made up of iron bars as per the drawings complete | kg | 6,900 | 118.55 | 818,019.15 | |
| 2. 33 | Supply and fix operation ladder made up of iron bars as per the drawings complete | kg | 1,450 | 118.55 | 171,902.58 | |
| 2. 34 | Supplying and driving of 8.5 m deep sheet piles confirming IS standard or equivalent | lin m | 3,519 | 7360.00 | 25,899,840.00 | |
| 2. 35 | Supplying and driving of 6.0 m deep sheet piles confirming IS standard or equivalent | lin m | 7,707 | 6000.00 | 46,242,000.00 | |
| 2. 36 | Foundation for concrete piling or foundation consolidation works | sum | | | 6,000,000.00 | |
| 2. 37 | Others (Gate Utilities) | sum | | | 10,320,000.00 | |
| 2. 38 | Provision for Temporary Water Diversion | sum | | | 2,500,000.00 | |
| 39 | Provision for dewatering | sum | | | 5,000,000.00 | |
| 2. 40 | Supply and provide Trash Rack (Screen) at Intake, Sukasena, size 3 *1.6 m | Nr | 3 | 19200 | 57,600.00 | |
| 2. 41 | Supply and provide Trash Rack (Screen) at Intake, Sankarpur, size 2.50 *1.6 m | Nr | 3 | 16000 | 48,000.00 | |
| 2. 42 | Land Acquisition | ha | 6 | 300000 | 1,680,000.00 | |

3.0 River Training

| | | | | | | |
|------|--|------|--------|---------|----------------|------|
| 3. 1 | Excavate in foundation and form embankment including compaction etc all complete | cum | 67,725 | 78.17 | 5,293,758.49 | |
| 3. 2 | Excavate from borrow and form embankment with compaction etc all complete | cu m | 93,680 | 78.17 | 7,322,544.04 | |
| 3. 3 | Grass turving on both side slope | sq m | 24,623 | 4.03 | 99,107.58 | |
| 3. 4 | Gravel pavement for Embankmnt as O/M road | cu m | 675 | 1270.41 | 857,529.43 | |
| 3. 5 | Gabion Box protection works of 0.30 m thick over 10 cm river shingle | sq m | 33,300 | 580.63 | 19,335,027.54 | |
| | Sub Total | | | | 288,151,489.24 | 3.69 |
| | | | | | | MS |

Abstract of Cost

| Bill No | 3a. Suksena Main Canal | | | | | |
|----------------|--|--------------|---------------------------|---------------|----------------------|-----------|
| S No | Items | Unit | Quantity | Rate per Unit | Amount in NRs. | Remarks |
| 3a.1. | Canal type | SS C1 | Total Length (m) = | | 1270 | Head Race |
| 3a.1. 1 | Clear site within wayleave, including removal and stacking of bush as directed | m2 | 20 | 1.85 | 37.03 | |
| 3a.1. 2 | Strip top soil to a depth of 150mm including stock piling and spreading or disposal | m2 | 1.65 | 12.88 | 21.25 | |
| 3a.1. 3 | Excavate in canal and dispose, haulage not exceeding 250m | m3 | 13.44 | 58.04 | 780.06 | |
| 3a.1. 4 | Excavate in Canal and form embankment including compaction, sprinkling of water haulage not exceeding 250m | m3 | 16.07 | 78.17 | 1256.12 | |
| 3a.1. 5 | Grass turfing on both canal banks and service road | m2 | 3.25 | 4.03 | 13.08 | |
| 3a.1. 6 | 10 cm thick Canal Lining Works of Grade M10 concrete lining with Nom. Reinf | m3 | 1.2 | 4212.95 | 5055.54 | |
| 3a.1. 7 | Supply and place gravel filter (river bed materials) in service road (3m wide, 0.15m thick) and drainage channel under lining with proper compaction | m3 | 0.574 | 1356.17 | 778.44 | |
| 3a.1. 8 | Supply and fix perforated 100mm dia PVC pipe in drainage channel under lining | lin m | 1 | 80 | 80.00 | |
| 3a.1. 9 | Supply and fix bitumen joint filler 10mm thick in construction joints | m2 | 1.1 | 300 | 330.00 | |
| 3a.1. 10 | Supply and fix 25 mm * 25 mm bitumenous joint sealer along the joints of lining works | lin m | 4 | 30 | 120.00 | |
| 3a.1. 11 | Land acquisition | m2 | 40 | 30 | 1200.00 | |
| | Sub Total (Per linear m) | | | | 9,671.53 | |
| | Total (for total length of this type) | lin m | 1270 | 9,671.53 | 12,282,841.66 | |
| 3a.2. | Canal type | SS C2 | Total Length (m) = | | 1370 | Headrace |
| 3a.2. 1 | Clear site within wayleave, including removal and stacking of bush as directed | m2 | 20 | 1.85 | 37.03 | |
| 3a.2. 2 | Strip top soil to a depth of 150mm including stock piling and spreading or disposal | m2 | 1.65 | 12.88 | 21.25 | |
| 3a.2. 3 | Excavate in canal and dispose, haulage not exceeding 250m | m3 | 12.64 | 58.04 | 733.63 | |
| 3a.2. 4 | Excavate in Canal and form embankment including compaction, sprinkling of water haulage not exceeding 250m | m3 | 21.36 | 78.17 | 1669.62 | |
| 3a.2. 5 | Grass turfing on both canal banks and service road | m2 | 4.32 | 4.03 | 17.39 | |
| 3a.2. 6 | 10 cm thick Canal Lining Works of Grade M10 concrete with Nom. Reinf | m3 | 1.14 | 4212.95 | 4802.76 | |
| 3a.2. 7 | Supply and place gravel filter (river bed materials) in service road (3m wide, 0.15m thick) and drainage channel under lining with proper compaction | m3 | 0.574 | 1356.17 | 778.44 | |
| 3a.2. 8 | Supply and fix perforated 100mm dia PVC pipe in drainage channel under lining | lin m | 1 | 80 | 80.00 | |
| 3a.2. 9 | Supply and fix bitumen joint filler 10mm thick in construction joints | m2 | 1.1 | 300 | 330.00 | |
| 3a.2. 10 | Supply and fix 25 mm * 25 mm bitumenous joint sealer along the joints of lining works | lin m | 4 | 30 | 120.00 | |
| 3a.2. 11 | Land acquisition | m2 | 40 | 30 | 1200.00 | |
| | Sub Total (Per linear m) | | | | 9,790.12 | |
| | Total (for total length of this type) | lin m | 1370 | 9,790.12 | 13,412,466.92 | |
| 3a. .3. | Canal type | SS C3 | Total Length (m) = | | 678 | Head Race |
| 3a. .3. 1 | Clear site within wayleave, including removal and stacking of bush as directed | m2 | 20 | 1.85 | 37.03 | |
| 3a. .3. 2 | Strip top soil to a depth of 150mm including stock piling and spreading or disposal | m2 | 1.95 | 12.88 | 25.12 | |
| 3a. .3. 3 | Excavate in canal and dispose, haulage not exceeding 250m | m3 | 12 | 58.04 | 696.49 | |
| 3a. .3. 4 | Excavate in Canal and form embankment including compaction, sprinkling of water haulage not exceeding 250m | m3 | 22.82 | 78.17 | 1783.74 | |
| 3a. .3. 5 | Grass turfing on both canal banks and service road | m2 | 4.69 | 4.03 | 18.88 | |
| 3a. .3. 6 | 10 cm thick Canal Lining Works of Grade M10 concrete with Nom. Reinf | m3 | 1.1 | 4212.95 | 4634.24 | |
| 3a. .3. 7 | Supply and place gravel filter (river bed materials) in service road (3m wide, 0.15m thick) and drainage channel under lining with proper compaction | m3 | 0.574 | 1356.17 | 778.44 | |
| 3a. .3. 8 | Supply and fix perforated 100mm dia PVC pipe in drainage channel under lining | lin m | 1 | 80 | 80.00 | |
| 3a. .3. 9 | Supply and fix bitumen joint filler 10mm thick in construction joints | m2 | 1.1 | 300 | 330.00 | |
| 3a. .3. 10 | Supply and fix 25 mm * 25 mm bitumenous joint sealer along the joints of lining works | lin m | 4 | 30 | 120.00 | |
| 3a. .3. 11 | Land acquisition | m2 | 40 | 30 | 1200.00 | |
| | Sub Total (Per linear m) | | | | 9,703.93 | |
| | Total (for total length of this type) | lin m | 678 | 9,703.93 | 6,579,266.50 | |
| 3a.4. | Canal type | SS C4 | Total Length (m) = | | 500 | |
| 3a.4. 1 | Clear site within wayleave, including removal and stacking of bush as directed | m2 | 25 | 1.85 | 46.29 | |
| 3a.4. 2 | Strip top soil to a depth of 150mm including stock piling and spreading or disposal | m2 | 0 | 12.88 | 0.00 | |
| 3a.4. 3 | Excavate in canal and dispose, haulage not exceeding 250m | m3 | 10.88 | 58.04 | 631.48 | |
| 3a.4. 4 | Excavate in Canal and form embankment including compaction, sprinkling of water haulage not exceeding 250m | m3 | 24.7 | 78.17 | 1930.69 | |
| 3a.4. 5 | Grass turfing on both canal banks and service road | m2 | 5 | 4.03 | 20.13 | |
| 3a.4. 6 | 10 cm thick Canal Lining Works of Grade M10 concrete with Nom. Reinf | m3 | 1.1 | 4212.95 | 4634.24 | |
| 3a.4. 7 | Supply and place gravel filter (river bed materials) in service road (3m wide, 0.15m thick) and drainage channel under lining with proper compaction | m3 | 0.574 | 1356.17 | 778.44 | |
| 3a.4. 8 | Supply and fix perforated 100mm dia PVC pipe in drainage channel under lining | lin m | 1 | 80 | 80.00 | |
| 3a.4. 9 | Supply and fix bitumen joint filler 10mm thick in construction joints | m2 | 1.1 | 300 | 330.00 | |
| 3a.4. 10 | Supply and fix 25 mm * 25 mm bitumenous joint sealer along the joints of lining works | lin m | 4 | 30 | 120.00 | |
| | Sub Total (Per linear m) | | | | 8,571.27 | |
| | Total (for total length of this type) | lin m | 500 | 8,571.27 | 4,285,633.96 | |

Abstract of Cost

Bill No 3a. Suksena Main Canal

| S No | Items | Unit | Quantity | Rate per Unit | Amount in NRs. | Remarks |
|--------------|--|--------------|---------------------------|---------------|----------------------|---------|
| 3a.5. | Canal type | SS C5 | Total Length (m) = | | 400 | |
| 3a.5. 1 | Clear site within wayleave, including removal and stacking of bush as directed | m2 | 25 | 1.85 | 46.29 | |
| 3a.5. 2 | Strip top soil to a depth of 150mm including stock piling and spreading or disposal | m2 | 0 | 12.88 | 0.00 | |
| 3a.5. 3 | Excavate in canal and dispose, haulage not exceeding 250m | m3 | 9.76 | 58.04 | 566.48 | |
| 3a.5. 4 | Excavate in Canal and form embankment including compaction, sprinkling of water haulage not exceeding 250m | m3 | 29.19 | 78.17 | 2281.65 | |
| 3a.5. 5 | Grass turfing on both canal banks and service road | m2 | 5.83 | 4.03 | 23.47 | |
| 3a.5. 6 | 10 cm thick Canal Lining Works of Grade M10 concrete with Nom. Reinf | m3 | 0.96 | 4212.95 | 4044.43 | |
| 3a.5. 7 | Supply and place gravel filter (river bed materials) in service road (3m wide, 0.15m thick) and drainage channel under lining with proper compaction | m3 | 0.574 | 1356.17 | 778.44 | |
| 3a.5. 8 | Supply and fix perforated 100mm dia PVC pipe in drainage channel under lining | lin m | 1 | 80 | 80.00 | |
| 3a.5. 9 | Supply and fix bitumen joint filler 10mm thick in construction joints | m2 | 1.1 | 300 | 330.00 | |
| 3a.5. 10 | Supply and fix 25 mm * 25 mm bitumenous joint sealer along the joints of lining works | lin m | 4 | 30 | 120.00 | |
| | Sub Total (Per linear m) | | | | 8,270.75 | |
| | Total (for total length of this type) | lin m | 400 | 8,270.75 | 3,308,301.48 | |
| 3a.6. | Canal type | SS C6 | Total Length (m) = | | 950 | |
| 3a.6. 1 | Clear site within wayleave, including removal and stacking of bush as directed | m2 | 20 | 1.85 | 37.03 | |
| 3a.6. 2 | Strip top soil to a depth of 150mm including stock piling and spreading or disposal | m2 | 0 | 12.88 | 0.00 | |
| 3a.6. 3 | Excavate in canal and dispose, haulage not exceeding 250m | m3 | 9.12 | 58.04 | 529.33 | |
| 3a.6. 4 | Excavate in Canal and form embankment including compaction, sprinkling of water haulage not exceeding 250m | m3 | 18.62 | 78.17 | 1455.44 | |
| 3a.6. 5 | Grass turfing on both canal banks and service road | m2 | 4.31 | 4.03 | 17.35 | |
| 3a.6. 6 | 10 cm thick Canal Lining Works of Grade M10 concrete with Nom. Reinf | m3 | 0.92 | 4212.95 | 3875.91 | |
| 3a.6. 7 | Supply and place gravel filter (river bed materials) in service road (3m wide, 0.15m thick) and drainage channel under lining with proper compaction | m3 | 0.574 | 1356.17 | 778.44 | |
| 3a.6. 8 | Supply and fix perforated 100mm dia PVC pipe in drainage channel under lining | lin m | 1 | 80 | 80.00 | |
| 3a.6. 9 | Supply and fix bitumen joint filler 10mm thick in construction joints | m2 | 1.1 | 300 | 330.00 | |
| 3a.6. 10 | Supply and fix 25 mm * 25 mm bitumenous joint sealer along the joints of lining works | lin m | 4 | 30 | 120.00 | |
| | Sub Total (Per linear m) | | | | 7,223.51 | |
| | Total (for total length of this type) | lin m | 950 | 7,223.51 | 6,862,329.79 | |
| 3a.7. | Canal type | SS C7 | Total Length (m) = | | 2100 | |
| 3a.7. 1 | Clear site within wayleave, including removal and stacking of bush as directed | m2 | 20 | 1.85 | 37.03 | |
| 3a.7. 2 | Strip top soil to a depth of 150mm including stock piling and spreading or disposal | m2 | 0 | 12.88 | 0.00 | |
| 3a.7. 3 | Excavate in canal and dispose, haulage not exceeding 250m | m3 | 8.48 | 58.04 | 492.18 | |
| 3a.7. 4 | Excavate in Canal and form embankment including compaction, sprinkling of water haulage not exceeding 250m | m3 | 15.9 | 78.17 | 1242.83 | |
| 3a.7. 5 | Grass turfing on both canal banks and service road | m2 | 3.52 | 4.03 | 14.17 | |
| 3a.7. 6 | 10 cm thick Canal Lining Works of Grade M10 concrete with Nom. Reinf | m3 | 0.88 | 4212.95 | 3707.39 | |
| 3a.7. 7 | Supply and place gravel filter (river bed materials) in service road (3m wide, 0.15m thick) and drainage channel under lining with proper compaction | m3 | 0.574 | 1356.17 | 778.44 | |
| 3a.7. 8 | Supply and fix perforated 100mm dia PVC pipe in drainage channel under lining | lin m | 1 | 80 | 80.00 | |
| 3a.7. 9 | Supply and fix bitumen joint filler 10mm thick in construction joints | m2 | 1.1 | 300 | 330.00 | |
| 3a.7. 10 | Supply and fix 25 mm * 25 mm bitumenous joint sealer along the joints of lining works | lin m | 4 | 30 | 120.00 | |
| | Sub Total (Per linear m) | | | | 6,802.05 | |
| | Total (for total length of this type) | lin m | 2100 | 6,802.05 | 14,284,307.73 | |
| 3a.8. | Canal type | SS C8 | Total Length (m) = | | 1285 | |
| 3a.8. 1 | Clear site within wayleave, including removal and stacking of bush as directed | m2 | 25 | 1.85 | 46.29 | |
| 3a.8. 2 | Strip top soil to a depth of 150mm including stock piling and spreading or disposal | m2 | 0 | 12.88 | 0.00 | |
| 3a.8. 3 | Excavate in canal and dispose, haulage not exceeding 250m | m3 | 11.65 | 58.04 | 676.17 | |
| 3a.8. 4 | Excavate in Canal and form embankment including compaction, sprinkling of water haulage not exceeding 250m | m3 | 17.49 | 78.17 | 1367.11 | |
| 3a.8. 5 | Grass turfing on both canal banks and service road | m2 | 4.83 | 4.03 | 19.44 | |
| 3a.8. 6 | 10 cm thick Canal Lining Works of Grade M10 concrete with Nom. Reinf | m3 | 0.73 | 4212.95 | 3075.45 | |
| 3a.8. 7 | Supply and place gravel filter (river bed materials) in service road (3m wide, 0.15m thick) and drainage channel under lining with proper compaction | m3 | 0.574 | 1356.17 | 778.44 | |
| 3a.8. 8 | Supply and fix perforated 100mm dia PVC pipe in drainage channel under lining | lin m | 1 | 80 | 80.00 | |
| 3a.8. 9 | Supply and fix bitumen joint filler 10mm thick in construction joints | m2 | 1.1 | 300 | 330.00 | |
| 3a.8. 10 | Supply and fix 25 mm * 25 mm bitumenous joint sealer along the joints of lining works | lin m | 4 | 30 | 120.00 | |
| | Sub Total (Per linear m) | | | | 6,492.91 | |
| | Total (for total length of this type) | lin m | 1285 | 6,492.91 | 8,343,390.52 | |

Abstract of Cost

Bill No 3a. Suksena Main Canal

| S No | Items | Unit | Quantity | Rate per Unit | Amount in NRs. | Remarks |
|---------------|--|-----------------------|---------------------------|---------------|-----------------------|---------|
| 3a.9. | Canal type | SS C9 | Total Length (m) = | | 100 | |
| 3a.9. 1 | Clear site within wayleave, including removal and stacking of bush as directed | m2 | 25 | 1.85 | 46.29 | |
| 3a.9. 2 | Strip top soil to a depth of 150mm including stock piling and spreading or disposal | m2 | 0 | 12.88 | 0.00 | |
| 3a.9. 3 | Excavate in canal and dispose, haulage not exceeding 250m | m3 | 9.99 | 58.04 | 579.82 | |
| 3a.9. 4 | Excavate in Canal and form embankment including compaction, sprinkling of water haulage not exceeding 250m | m3 | 14 | 78.17 | 1094.32 | |
| 3a.9. 5 | Grass turfing on both canal banks and service road | m2 | 4.15 | 4.03 | 16.70 | |
| 3a.9. 6 | 10 cm thick Canal Lining Works of Grade M10 concrete with Nom. Reinf | m3 | 0.69 | 4212.95 | 2906.93 | |
| 3a.9. 7 | Supply and place gravel filter (river bed materials) in service road (3m wide, 0.15m thick) and drainage channel under lining with proper compaction | m3 | 0.574 | 1356.17 | 778.44 | |
| 3a.9. 8 | Supply and fix perforated 100mm dia PVC pipe in drainage channel under lining | lin m | 1 | 80 | 80.00 | |
| 3a.9. 9 | Supply and fix bitumen joint filler 10mm thick in construction joints | m2 | 1.1 | 300 | 330.00 | |
| 3a.9. 10 | Supply and fix 25 mm * 25 mm bitumenous joint sealer along the joints of lining works | lin m | 4 | 30 | 120.00 | |
| | Sub Total (Per linear m) | | | | 5,952.51 | |
| | Total (for total length of this type) | lin m | 100 | 5,952.51 | 595,251.12 | |
| 3a.10. | Canal type | SS C10 | Total Length (m) = | | 3300 | |
| 3a.10. 1 | Clear site within wayleave, including removal and stacking of bush as directed | m2 | 20 | 1.85 | 37.03 | |
| 3a.10. 2 | Strip top soil to a depth of 150mm including stock piling and spreading or disposal | m2 | 0 | 12.88 | 0.00 | |
| 3a.10. 3 | Excavate in canal and dispose, haulage not exceeding 250m | m3 | 5.25 | 58.04 | 304.71 | |
| 3a.10. 4 | Excavate in Canal and form embankment including compaction, sprinkling of water haulage not exceeding 250m | m3 | 19.85 | 78.17 | 1551.59 | |
| 3a.10. 5 | Grass turfing on both canal banks and service road | m2 | 4.72 | 4.03 | 19.00 | |
| 3a.10. 6 | 10 cm thick Canal Lining Works of Grade M10 concrete with Nom. Reinf | m3 | 0.68 | 4212.95 | 2864.80 | |
| 3a.10. 7 | Supply and place gravel filter (river bed materials) in service road (3m wide, 0.15m thick) and drainage channel under lining with proper compaction | m3 | 0.574 | 1356.17 | 778.44 | |
| 3a.10. 8 | Supply and fix perforated 100mm dia PVC pipe in drainage channel under lining | lin m | 1 | 80 | 80.00 | |
| 3a.10. 9 | Supply and fix bitumen joint filler 10mm thick in construction joints | m2 | 1.1 | 300 | 330.00 | |
| 3a.10. 10 | Supply and fix 25 mm * 25 mm bitumenous joint sealer along the joints of lining works | lin m | 4 | 30 | 120.00 | |
| | Sub Total (Per linear m) | | | | 6,085.57 | |
| | Total (for total length of this type) | lin m | 3300 | 6,085.57 | 20,082,396.35 | |
| 3a.11. | Canal type | SS C11,C12,C13 | Total Length (m) = | | 6450 | |
| 3a.11. 1 | Clear site within wayleave, including removal and stacking of bush as directed | m2 | 15 | 1.85 | 27.77 | |
| 3a.11. 2 | Strip top soil to a depth of 150mm including stock piling and spreading or disposal | m2 | 0 | 12.88 | 0.00 | |
| 3a.11. 3 | Excavate in canal and dispose, haulage not exceeding 250m | m3 | 4.29 | 58.04 | 248.99 | |
| 3a.11. 4 | Excavate in Canal and form embankment including compaction, sprinkling of water haulage not exceeding 250m | m3 | 19.04 | 78.17 | 1488.27 | |
| 3a.11. 5 | Grass turfing on both canal banks and service road | m2 | 5.18 | 4.03 | 20.85 | |
| 3a.11. 6 | 10 cm thick Canal Lining Works of Grade M10 concrete with Nom. Reinf | m3 | 0.63 | 4212.95 | 2654.16 | |
| 3a.11. 7 | Supply and place gravel filter (river bed materials) in service road (3m wide, 0.15m thick) and drainage channel under lining with proper compaction | m3 | 0.574 | 1356.17 | 778.44 | |
| 3a.11. 8 | Supply and fix perforated 100mm dia PVC pipe in drainage channel under lining | lin m | 1 | 80 | 80.00 | |
| 3a.11. 9 | Supply and fix bitumen joint filler 10mm thick in construction joints | m2 | 1.1 | 300 | 330.00 | |
| 3a.11. 10 | Supply and fix 25 mm * 25 mm bitumenous joint sealer along the joints of lining works | lin m | 4 | 30 | 120.00 | |
| | Sub Total (Per linear m) | | | | 5,748.49 | |
| | Total (for total length of this type) | lin m | 6450 | 5,748.49 | 37,077,749.69 | |
| Stretch | SUMMARY | | | | | |
| 3a.1. | SS C1 | lin m | 1270 | 9671.53 | 12282841.66 | |
| 3a.2. | SS C2 | lin m | 1370 | 9790.12 | 13412466.92 | |
| 3a.3. | SS C3 | lin m | 678 | 9703.93 | 6579266.50 | |
| 3a.4. | SS C4 | lin m | 500 | 8571.27 | 4285633.96 | |
| 3a.5. | SS C5 | lin m | 400 | 8270.75 | 3308301.48 | |
| 3a.6. | SS C6 | lin m | 950 | 7223.51 | 6862329.79 | |
| 3a.7. | SS C7 | lin m | 2100 | 6802.05 | 14284307.73 | |
| 3a.8. | SS C8 | lin m | 1285 | 6492.91 | 8343390.52 | |
| 3a.9. | SS C9 | lin m | 100 | 5952.51 | 595251.12 | |
| 3a.10. | SS C10 | lin m | 3300 | 6085.57 | 20082396.35 | |
| 3a.11. | SS C11,C12,C13 | lin m | 6450 | 5748.49 | 37077749.69 | |
| | Total (Sukasena Main Canal) | km | 18.403 | | 127,113,935.72 | |

Abstract of Cost

Bill No 3a. Suksena Main Canal

| S No | Items | Unit | Quantity | Rate per Unit | Amount in NRs. | Remarks |
|---------------|---|------|----------|---------------|------------------|---------|
| 3a.12. | Canal side protection at various places | | | | | |
| 3a.12. 1 | 0.30 m thick gabion mattress protection laid over 10cm thick river shingles | m2 | 7100 | 677.24 | 4,808,379 | |
| 3a.12. 2 | Sullpimental embankment | m3 | 1195 | 78.17 | 93,408 | |
| | Total | | | | 4,901,787 | |

Suksena Side Canal Side Protection (Details)

| Sl.no | Particulars | length (m) | Width | Qty (m2) | Remarks |
|-------|--|-------------|-------|-------------|---------|
| 1 | Suksena: Main Canal (Between Intake 10 to Intake 11) | 200 | 5.5 | 1100 | |
| 2 | 5SRR: Secondary Type | 300 | 5 | 1500 | |
| 3 | 6SRR: Secondary Type | 400 | 5 | 2000 | |
| 4 | 6SRR-TC2: Tertiary Type | 300 | 5 | 1500 | |
| 5 | 7SRR-TC3 | 200 | 5 | 1000 | |
| | Total | 1400 | | 7100 | |

Abstract of Cost

Bill No 3 b. Shankarpur Main Canal

| S No | Items | Unit | Quantity | Rate per Unit | Amount in NRs. | Remarks |
|--------------|--|--------------|---------------------------|---------------|----------------------|-----------|
| 3b.1. | Canal type | SP C1 | Total Length (m) = | | 2,012.00 | Head Race |
| 3b.1. 1 | Clear site within wayleave, including removal and stacking of bush as directed | m2 | 20 | 1.85 | 37.03 | |
| 3b.1. 2 | Strip top soil to a depth of 150mm including stock piling and spreading or disposal | m2 | 1.6 | 12.88 | 20.61 | |
| 3b.1. 3 | Excavate in canal and dispose, haulage not exceeding 250m | m3 | 17.94 | 58.04 | 1,041.25 | |
| 3b.1. 4 | Excavate in Canal and form embankment including compaction, sprinkling of water haulage not exceeding 250m | m3 | 7.34 | 78.17 | 573.73 | |
| 3b.1. 5 | Grass turfing on both canal banks and service road | m2 | 2.99 | 4.03 | 12.03 | |
| 3b.1. 6 | 10 cm thick Canal Lining Works of Grade M10 concrete lining with Nom. Reinf | m3 | 1.11 | 4,212.95 | 4,676.37 | |
| 3b.1. 7 | Supply and place gravel filter (river bed materials) in service road (3m wide, 0.15m thick) and drainage channel under lining with proper compaction | m3 | 0.574 | 1,356.17 | 778.44 | |
| 3b.1. 8 | Supply and fix perforated 100mm dia PVC pipe in drainage channel under lining | lin m | 1 | 80.00 | 80.00 | |
| 3b.1. 9 | Supply and fix bitumen joint filler 10mm thick in construction joints | m2 | 1.1 | 300.00 | 330.00 | |
| 3b.1. 10 | Supply and fix 25 mm * 25 mm bitumenous joint sealer along the joints of lining works | lin m | 4 | 30.00 | 120.00 | |
| 3b.1. 11 | Land acquisition | m2 | 30 | 30.00 | 900.00 | |
| | Sub Total (Per linear m) | | | | 8,569.47 | |
| | Total (for total length of this type) | lin m | 2012 | 8,569.47 | 17,241,774.64 | |
| 3b.2. | Canal type | SP C2 | Total Length (m) = | | 150.00 | |
| 3b.2. 1 | Clear site within wayleave, including removal and stacking of bush as directed | m2 | 25 | 1.85 | 46.29 | Head Race |
| 3b.2. 2 | Strip top soil to a depth of 150mm including stock piling and spreading or disposal | m2 | 0 | 12.88 | - | |
| 3b.2. 3 | Excavate in canal and dispose, haulage not exceeding 250m | m3 | 13.63 | 58.04 | 791.09 | |
| 3b.2. 4 | Excavate in Canal and form embankment including compaction, sprinkling of water haulage not exceeding 250m | m3 | 9.16 | 78.17 | 716.00 | |
| 3b.2. 5 | Grass turfing on both canal banks and service road | m2 | 2.12 | 4.03 | 8.53 | |
| 3b.2. 6 | 10 cm thick Canal Lining Works of Grade M10 concrete lining with Nom. Reinf | m3 | 0.96 | 4,212.95 | 4,044.43 | |
| 3b.2. 7 | Supply and place gravel filter (river bed materials) in service road (3m wide, 0.15m thick) and drainage channel under lining with proper compaction | m3 | 0.574 | 1,356.17 | 778.44 | |
| 3b.2. 8 | Supply and fix perforated 100mm dia PVC pipe in drainage channel under lining | lin m | 1 | 80.00 | 80.00 | |
| 3b.2. 9 | Supply and fix bitumen joint filler 10mm thick in construction joints | m2 | 1.1 | 300.00 | 330.00 | |
| 3b.2. 10 | Supply and fix 25 mm * 25 mm bitumenous joint sealer along the joints of lining works | lin m | 4 | 30.00 | 120.00 | |
| 3b.2. 11 | Land acquisition | m2 | 30 | 30.00 | 900.00 | |
| | Sub Total (Per linear m) | | | | 7,814.78 | |
| | Total (for total length of this type) | lin m | 150 | 7,814.78 | 1,172,217.41 | |
| 3b.3. | Canal type | SP C3 | Total Length (m) = | | 1,950.00 | |
| 3b.3. 1 | Clear site within wayleave, including removal and stacking of bush as directed | m2 | 25 | 1.85 | 46.29 | |
| 3b.3. 2 | Strip top soil to a depth of 150mm including stock piling and spreading or disposal | m2 | 0 | 12.88 | - | |
| 3b.3. 3 | Excavate in canal and dispose, haulage not exceeding 250m | m3 | 19.92 | 58.04 | 1,156.17 | |
| 3b.3. 4 | Excavate in Canal and form embankment including compaction, sprinkling of water haulage not exceeding 250m | m3 | 10.18 | 78.17 | 795.72 | |
| 3b.3. 5 | Grass turfing on both canal banks and service road | m2 | 2.92 | 4.03 | 11.75 | |
| 3b.3. 6 | 10 cm thick Canal Lining Works of Grade M10 concrete lining with Nom. Reinf | m3 | 0.91 | 4,212.95 | 3,833.78 | |
| 3b.3. 7 | Supply and place gravel filter (river bed materials) in service road (3m wide, 0.15m thick) and drainage channel under lining with proper compaction | m3 | 0.574 | 1,356.17 | 778.44 | |
| 3b.3. 8 | Supply and fix perforated 100mm dia PVC pipe in drainage channel under lining | lin m | 1 | 80.00 | 80.00 | |
| 3b.3. 9 | Supply and fix bitumen joint filler 10mm thick in construction joints | m2 | 1.1 | 300.00 | 330.00 | |
| 3b.3. 10 | Supply and fix 25 mm * 25 mm bitumenous joint sealer along the joints of lining works | lin m | 4 | 30.00 | 120.00 | |
| | Sub Total (Per linear m) | | | | 7,152.16 | |
| | Total (for total length of this type) | lin m | 1950 | 7,152.16 | 13,946,709.85 | |
| 3b.4. | Canal type | SP C4 | Total Length (m) = | | 3,200.00 | |
| 3b.4. 1 | Clear site within wayleave, including removal and stacking of bush as directed | m2 | 25 | 1.85 | 46.29 | |
| 3b.4. 2 | Strip top soil to a depth of 150mm including stock piling and spreading or disposal | m2 | 0 | 12.88 | - | |
| 3b.4. 3 | Excavate in canal and dispose, haulage not exceeding 250m | m3 | 9.79 | 58.04 | 568.22 | |
| 3b.4. 4 | Excavate in Canal and form embankment including compaction, sprinkling of water haulage not exceeding 250m | m3 | 15.93 | 78.17 | 1,245.18 | |
| 3b.4. 5 | Grass turfing on both canal banks and service road | m2 | 3.46 | 4.03 | 13.93 | |
| 3b.4. 6 | 10 cm thick Canal Lining Works of Grade M10 concrete lining with Nom. Reinf | m3 | 0.86 | 4,212.95 | 3,623.14 | |
| 3b.4. 7 | Supply and place gravel filter (river bed materials) in service road (3m wide, 0.15m thick) and drainage channel under lining with proper compaction | m3 | 0.574 | 1,356.17 | 778.44 | |
| 3b.4. 8 | Supply and fix perforated 100mm dia PVC pipe in drainage channel under lining | lin m | 1 | 80.00 | 80.00 | |
| 3b.4. 9 | Supply and fix bitumen joint filler 10mm thick in construction joints | m2 | 1.1 | 300.00 | 330.00 | |
| 3b.4. 10 | Supply and fix 25 mm * 25 mm bitumenous joint sealer along the joints of lining works | lin m | 4 | 30.00 | 120.00 | |
| | Sub Total (Per linear m) | | | | 6,805.19 | |
| | Total (for total length of this type) | lin m | 3200 | 6,805.19 | 21,776,596.37 | |

Abstract of Cost

Bill No 3 b. Shankarpur Main Canal

| S No | Items | Unit | Quantity | Rate per Unit | Amount in NRs. | Remarks |
|--------------|--|--------------|---------------------------|---------------|----------------------|---------|
| 3b.5. | Canal type | SP C5 | Total Length (m) = | | 1,436.00 | |
| 3b.5. 1 | Clear site within wayleave, including removal and stacking of bush as directed | m2 | 25 | 1.85 | 46.29 | |
| 3b.5. 2 | Strip top soil to a depth of 150mm including stock piling and spreading or disposal | m2 | 0 | 12.88 | - | |
| 3b.5. 3 | Excavate in canal and dispose, haulage not exceeding 250m | m3 | 18 | 58.04 | 1,044.73 | |
| 3b.5. 4 | Excavate in Canal and form embankment including compaction, sprinkling of water haulage not exceeding 250m | m3 | 23.87 | 78.17 | 1,865.81 | |
| 3b.5. 5 | Grass turfing on both canal banks and service road | m2 | 5.28 | 4.03 | 21.25 | |
| 3b.5. 6 | 10 cm thick Canal Lining Works of Grade M10 concrete lining with Nom. Reinf | m3 | 0.8 | 4,212.95 | 3,370.36 | |
| 3b.5. 7 | Supply and place gravel filter (river bed materials) in service road (3m wide, 0.15m thick) and drainage channel under lining with proper compaction | m3 | 0.574 | 1,356.17 | 778.44 | |
| 3b.5. 8 | Supply and fix perforated 100mm dia PVC pipe in drainage channel under lining | lin m | 1 | 80.00 | 80.00 | |
| 3b.5. 9 | Supply and fix bitumen joint filler 10mm thick in construction joints | m2 | 1.1 | 300.00 | 330.00 | |
| 3b.5. 10 | Supply and fix 25 mm * 25 mm bitumenous joint sealer along the joints of lining works | lin m | 4 | 30.00 | 120.00 | |
| | Sub Total (Per linear m) | | | | 7,656.88 | |
| | Total (for total length of this type) | lin m | 1436 | 7,656.88 | 10,995,281.94 | |
| 3b.6. | Canal type | SP C6 | Total Length (m) = | | 1,300.00 | |
| 3b.6. 1 | Clear site within wayleave, including removal and stacking of bush as directed | m2 | 25 | 1.85 | 46.29 | |
| 3b.6. 2 | Strip top soil to a depth of 150mm including stock piling and spreading or disposal | m2 | 0 | 12.88 | - | |
| 3b.6. 3 | Excavate in canal and dispose, haulage not exceeding 250m | m3 | 13.51 | 58.04 | 784.13 | |
| 3b.6. 4 | Excavate in Canal and form embankment including compaction, sprinkling of water haulage not exceeding 250m | m3 | 11.62 | 78.17 | 908.28 | |
| 3b.6. 5 | Grass turfing on both canal banks and service road | m2 | 3.95 | 4.03 | 15.90 | |
| 3b.6. 6 | 10 cm thick Canal Lining Works of Grade M10 concrete lining with Nom. Reinf | m3 | 0.72 | 4,212.95 | 3,033.32 | |
| 3b.6. 7 | Supply and place gravel filter (river bed materials) in service road (3m wide, 0.15m thick) and drainage channel under lining with proper compaction | m3 | 0.574 | 1,356.17 | 778.44 | |
| 3b.6. 8 | Supply and fix perforated 100mm dia PVC pipe in drainage channel under lining | lin m | 1 | 80.00 | 80.00 | |
| 3b.6. 9 | Supply and fix bitumen joint filler 10mm thick in construction joints | m2 | 1.1 | 300.00 | 330.00 | |
| 3b.6. 10 | Supply and fix 25 mm * 25 mm bitumenous joint sealer along the joints of lining works | lin m | 4 | 30.00 | 120.00 | |
| | Sub Total (Per linear m) | | | | 6,096.36 | |
| | Total (for total length of this type) | lin m | 1300 | 6,096.36 | 7,925,272.26 | |
| 3b.7. | Canal type | SP C7 | Total Length (m) = | | 1,500.00 | |
| 3b.7. 1 | Clear site within wayleave, including removal and stacking of bush as directed | m2 | 25 | 1.85 | 46.29 | |
| 3b.7. 2 | Strip top soil to a depth of 150mm including stock piling and spreading or disposal | m2 | 0 | 12.88 | - | |
| 3b.7. 3 | Excavate in canal and dispose, haulage not exceeding 250m | m3 | 11.73 | 58.04 | 680.82 | |
| 3b.7. 4 | Excavate in Canal and form embankment including compaction, sprinkling of water haulage not exceeding 250m | m3 | 26.17 | 78.17 | 2,045.59 | |
| 3b.7. 5 | Grass turfing on both canal banks and service road | m2 | 6.58 | 4.03 | 26.48 | |
| 3b.7. 6 | 10 cm thick Canal Lining Works of Grade M10 concrete lining with Nom. Reinf | m3 | 0.69 | 4,212.95 | 2,906.93 | |
| 3b.7. 7 | Supply and place gravel filter (river bed materials) in service road (3m wide, 0.15m thick) and drainage channel under lining with proper compaction | m3 | 0.574 | 1,356.17 | 778.44 | |
| 3b.7. 8 | Supply and fix perforated 100mm dia PVC pipe in drainage channel under lining | lin m | 1 | 80.00 | 80.00 | |
| 3b.7. 9 | Supply and fix bitumen joint filler 10mm thick in construction joints | m2 | 1.1 | 300.00 | 330.00 | |
| 3b.7. 10 | Supply and fix 25 mm * 25 mm bitumenous joint sealer along the joints of lining works | lin m | 4 | 30.00 | 120.00 | |
| | Sub Total (Per linear m) | | | | 7,014.56 | |
| | Total (for total length of this type) | lin m | 1500 | 7,014.56 | 10,521,834.79 | |
| 3b.8. | Canal type | SP C8 | Total Length (m) = | | 900.00 | |
| 3b.8. 1 | Clear site within wayleave, including removal and stacking of bush as directed | m2 | 25 | 1.85 | 46.29 | |
| 3b.8. 2 | Strip top soil to a depth of 150mm including stock piling and spreading or disposal | m2 | 0 | 12.88 | - | |
| 3b.8. 3 | Excavate in canal and dispose, haulage not exceeding 250m | m3 | 6.96 | 58.04 | 403.96 | |
| 3b.8. 4 | Excavate in Canal and form embankment including compaction, sprinkling of water haulage not exceeding 250m | m3 | 30.29 | 78.17 | 2,367.63 | |
| 3b.8. 5 | Grass turfing on both canal banks and service road | m2 | 7.52 | 4.03 | 30.27 | |
| 3b.8. 6 | 10 cm thick Canal Lining Works of Grade M10 concrete lining with Nom. Reinf | m3 | 0.66 | 4,212.95 | 2,780.55 | |
| 3b.8. 7 | Supply and place gravel filter (river bed materials) in service road (3m wide, 0.15m thick) and drainage channel under lining with proper compaction | m3 | 0.574 | 1,356.17 | 778.44 | |
| 3b.8. 8 | Supply and fix perforated 100mm dia PVC pipe in drainage channel under lining | lin m | 1 | 80.00 | 80.00 | |
| 3b.8. 9 | Supply and fix bitumen joint filler 10mm thick in construction joints | m2 | 1.1 | 300.00 | 330.00 | |
| 3b.8. 10 | Supply and fix 25 mm * 25 mm bitumenous joint sealer along the joints of lining works | lin m | 4 | 30.00 | 120.00 | |
| | Sub Total (Per linear m) | | | | 6,937.14 | |
| | Total (for total length of this type) | lin m | 900 | 6,937.14 | 6,243,426.24 | |

Abstract of Cost

Bill No 3 b. Shankarpur Main Canal

| S No | Items | Unit | Quantity | Rate per Unit | Amount in NRs. | Remarks |
|---------------|--|-------|------------------------|---------------|---------------------------|-------------|
| 3b.9. | Canal type | | SP C9, C10, C11 | | Total Length (m) = | 4800 |
| 3b.9. 1 | Clear site within wayleave, including removal and stacking of bush as directed | m2 | 25 | 1.85 | 46.29 | |
| 3b.9. 2 | Strip top soil to a depth of 150mm including stock piling and spreading or disposal | m2 | 0 | 12.88 | - | |
| 3b.9. 3 | Excavate in canal and dispose, haulage not exceeding 250m | m3 | 14.31 | 58.04 | 830.56 | |
| 3b.9. 4 | Excavate in Canal and form embankment including compaction, sprinkling of water haulage not exceeding 250m | m3 | 24.16 | 78.17 | 1,888.48 | |
| 3b.9. 5 | Grass turfing on both canal banks and service road | m2 | 6.35 | 4.03 | 25.56 | |
| 3b.9. 6 | 10 cm thick Canal Lining Works of Grade M10 concrete lining with Nom. Reinf | m3 | 0.63 | 4,212.95 | 2,654.16 | |
| 3b.9. 7 | Supply and place gravel filter (river bed materials) in service road (3m wide, 0.15m thick) and drainage channel under lining with proper compaction | m3 | 0.574 | 1,356.17 | 778.44 | |
| 3b.9. 8 | Supply and fix perforated 100mm dia PVC pipe in drainage channel under lining | lin m | 1 | 80.00 | 80.00 | |
| 3b.9. 9 | Supply and fix bitumen joint filler 10mm thick in construction joints | m2 | 1.1 | 300.00 | 330.00 | |
| 3b.9. 10 | Supply and fix 25 mm * 25 mm bitumenous joint sealer along the joints of lining works | lin m | 4 | 30.00 | 120.00 | |
| | Sub Total (Per linear m) | | | | 6,753.49 | |
| | Total (for total length of this type) | lin m | 4800 | 6,753.49 | 32,416,731.57 | |
| | | | | | | |
| | SUMMARY | | | | | |
| 3b.1. | SP C1 | lin m | 2012 | 8,569.47 | 17,241,774.64 | |
| 3b.2. | SP C2 | lin m | 150 | 7,814.78 | 1,172,217.41 | |
| 3b.3. | SP C3 | lin m | 1950 | 7,152.16 | 13,946,709.85 | |
| 3b.4. | SP C4 | lin m | 3200 | 6,805.19 | 21,776,596.37 | |
| 3b.5. | SP C5 | lin m | 1436 | 7,656.88 | 10,995,281.94 | |
| 3b.6. | SP C6 | lin m | 1300 | 6,096.36 | 7,925,272.26 | |
| 3b.7. | SP C7 | lin m | 1500 | 7,014.56 | 10,521,834.79 | |
| 3b.8. | SP C8 | lin m | 900 | 6,937.14 | 6,243,426.24 | |
| 3b.9. | SP C9, C10, C11 | lin m | 4800 | 6,753.49 | 32,416,731.57 | |
| | TOTAL (SHANKARPUR) | KM | 17.248 | | 122,239,845.07 | |
| | | | | | | |
| 3b.11. | Temporary Works in Main and Secondary Canals | | | | | |
| 3b.10. 1 | Temporary Works like river diversion, dewatering etc in Main and Secondary Canals | Job | 1 | 4,000,000.00 | 4,000,000.00 | |

Abstract of Cost

4 Secondary Canal

| S No | Items | Unit | Quantity | Rate per Unit | Amount in NRs. | Remarks |
|--------|--|------|------------|---------------|----------------------|---------------------------------------|
| 4.1. 1 | E/W in excavation in cutting | m3 | 103,489.50 | 58.04 | 6,006,582.32 | |
| 4.1. 2 | Earth work in filling in embankment works (filling with compaction only) | m3 | 625,978.25 | 78.17 | 48,929,902.90 | |
| 4.1. 3 | Concrete lining works of grade M10 with nominal reinforcement (in 4SRR) | m3 | 5,267.09 | 4,212.95 | 22,189,975.26 | |
| 4.1. 4 | Land acquisition | ha | 81.30 | 300,000.00 | 9,756,000.00 | Approx 60% already acquired by (SMIP) |
| 4.1. 5 | Grass turfing works | m2 | 584,456.00 | 4.03 | 2,352,435.40 | |
| | Total | | | | 89,234,895.88 | |

5 Tertiary Canal

| S No | Items | Unit | Quantity | Rate per Unit | Amount in NRs. | Remarks |
|--------|--|------|--------------|---------------|-----------------------|---------------------------------------|
| 4.1. 1 | E/W in excavation in cutting | m3 | 211,530.00 | 58.04 | 12,277,306.97 | |
| 4.1. 2 | Earth work in filling in embankment works (filling with compaction only) | m3 | 967,197.00 | 78.17 | 75,601,437.10 | |
| 4.1. 3 | Grass turfing works | m2 | 1,308,011.00 | 4.03 | 5,264,744.28 | |
| 4.1. 4 | Land acquisition | ha | 165.61 | 300,000.00 | 34,778,100.00 | Approx 30% already acquired by (SMIP) |
| | Total | | | | 127,921,588.34 | |

Abstract of Cost

6. Canal Structures

| S No | Particulars | Unit | Quantity | Rate per Unit | Amount in NRs. | Remarks |
|------|---|---|------------------|---------------|----------------|---------|
| A1 | Division Works - Main Canal to Secondary Canal B3 = 3.9m | | | | | |
| | Reference Drawings | CN 21, | | | | |
| | Total Nr of structures | 4 | | | | |
| 1 | Clear site within wayleave, including removal and stacking of bush as directed | Sq m | 48.43 | 1.85 | 89.67 | |
| 2 | Excavate in canal and dispose, haulage not exceeding 250m | l | 19.52 | 58.04 | 1,132.95 | |
| 3 | Mass Concrete of Grade M15 | | 2.10 | 4,024.75 | 8,451.97 | |
| 4 | Mass Concrete of Grade M20 | | 5.60 | 4,243.95 | 23,766.13 | |
| 5 | Form works: Making wooden forms including supplying and selection of materials, fixing, nailing, according to drawings all complete | | 52.92 | 419.22 | 22,185.16 | |
| 6 | Fe 415 Tor steel reinforcement :including Cutting bending binding, placing in position etc all complete | | 532.45 | 34.70 | 18,473.62 | |
| 7 | Supplying and laying NP3 pipe of Dia 900 mm with appropriate joint connection as per given direction all complete | r. m. | 12.00 | 3,874.72 | 46,496.64 | |
| 8 | Earth work in backfill in structures including compaction | cu m | 13.66 | 41.86 | 571.81 | |
| 9 | Supply and fix gates operable by hand with all necessary arrangements complete of various sizes | set | 2.00 | 35,000.00 | 70,000.00 | |
| | Sub Total | | | | 191,167.94 | |
| | Total | 4 | Nr of Structures | NRs. | 764,671.77 | |
| A2 | Division Works - Main Canal to Secondary Canal B3 = 2.7m | | | | | |
| | Reference Drawings | CN 21, | | | | |
| | Total Nr of structures | 7 | | | | |
| 1 | Clear site within wayleave, including removal and stacking of bush as directed | Sq m | 40.00 | 1.85 | 74.06 | |
| 2 | Excavate in canal and dispose, haulage not exceeding 250m | cu m | 18.75 | 58.04 | 1,088.26 | |
| 3 | Mass Concrete of Grade M15 | cu m | 1.08 | 4,024.75 | 4,346.73 | |
| 4 | Mass Concrete of Grade M20 | cu m | 5.35 | 4,243.95 | 22,705.14 | |
| 5 | Form works: Making wooden forms including supplying and selection of materials, fixing, nailing, according to drawings all complete | Sq m | 49.80 | 419.22 | 20,877.19 | |
| 6 | Fe 415 Tor steel reinforcement :including Cutting bending binding, placing in position etc all complete | kg | 471.04 | 34.70 | 16,342.97 | |
| 7 | Supplying and laying NP3 pipe of Dia 600 mm with appropriate joint connection as per given direction all complete | r. m. | 10.50 | 2,419.79 | 25,407.81 | |
| 8 | Earth work in backfill in structures including compaction | cu m | 13.13 | 41.86 | 549.41 | |
| 9 | Supply and fix gates operable by hand with all necessary arrangements complete of various sizes | set | 2.00 | 30,000.00 | 60,000.00 | |
| | Sub Total | | | | 151,391.57 | |
| | Total | 7 | Nr of Structures | NRs. | 1,059,740.98 | |
| A | Secondary Canal Head Regulator B3 = 2.1 m | | | | | |
| | Reference Drawings | CN 21, (Original Name: Division Works - Main Canal to Secondary Canal B3 = 2.1 m) | | | | |
| | Total Nr of structures | 45 | | | | |
| 1 | Clear site within wayleave, including removal and stacking of bush as directed | Sq m | 40.00 | 1.85 | 74.06 | |
| 2 | Excavate in canal and dispose, haulage not exceeding 250m | cu m | 7.47 | 58.04 | 433.56 | |
| 3 | Mass Concrete of Grade M15 | cu m | 1.11 | 4,024.75 | 4,467.47 | |
| 4 | Mass Concrete of Grade M20 | cu m | 5.09 | 4,243.95 | 21,601.71 | |
| 5 | Form works: Making wooden forms including supplying and selection of materials, fixing, nailing, according to drawings all complete | Sq m | 46.68 | 419.22 | 19,569.22 | |
| 6 | Fe 415 Tor steel reinforcement :including Cutting bending binding, placing in position etc all complete | kg | 451.56 | 34.70 | 15,667.10 | |
| 7 | Supplying and laying NP3 pipe of Dia 500 mm with appropriate joint connection as per given direction all complete | r. m. | 9.00 | 1,997.06 | 17,973.51 | |
| 8 | Earth work in backfill in structures including compaction | cu m | 5.23 | 41.86 | 218.93 | |
| 9 | Supply and fix gates operable by hand with all necessary arrangements complete of various sizes | set | 2.00 | 25,000.00 | 50,000.00 | |
| | Sub Total | | | | 130,005.56 | |
| | Total | 45 | Nr of Structures | NRs. | 5,850,250.34 | |
| B1 | Division Works - Main Canal Outlet Foot Bridge Span = 10.5 m | | | | | |
| | Reference Drawings | CN 22 | | | | |
| | Total Nr of structures | 50 | | | | |
| 1 | Clear site within wayleave, including removal and stacking of bush as directed | Sq m | 40.00 | 1.85 | 74.06 | |
| 2 | Excavate and dispose, haulage not exceeding 250m | cu m | 205.49 | 58.04 | 11,926.74 | |
| 3 | Mass Concrete of Grade M15 | cu m | 7.29 | 4,024.75 | 29,340.41 | |
| 4 | Mass Concrete of Grade M20 | cu m | 3.94 | 4,243.95 | 16,721.17 | |
| 5 | Form works: Making wooden forms including supplying and selection of materials, fixing, nailing, according to drawings all complete | Sq m | 50.94 | 419.22 | 21,355.10 | |
| 6 | Fe 415 Tor steel reinforcement :including Cutting bending binding, placing in position etc all complete | kg | 315.00 | 34.70 | 10,929.08 | |
| 8 | Earth work in backfill in structures including compaction | cu m | 143.84 | 41.86 | 6,021.14 | |
| | Sub Total | | | | 96,367.71 | |
| | Total | 50 | Nr of Structures | NRs. | 4,818,385.27 | |
| B2 | Division Works - Main Canal Outlet for Max H1 = 1.6m | | | | | |
| | Reference Drawings | CN 22 | | | | |

Abstract of Cost

6. Canal Structures

| S No | Particulars | Unit | Quantity | Rate per Unit | Amount in NRs. | Remarks |
|------|---|-------|------------------|---------------|----------------|---------|
| | Total Nr of structures | | 50 | | | |
| 1 | Clear site within wayleave, including removal and stacking of bush as directed | Sq m | 30.00 | 1.85 | 55.55 | |
| 2 | Excavate and dispose, haulage not exceeding 250m | cu m | 88.80 | 58.04 | 5,154.00 | |
| 3 | Mass Concrete of Grade M15 | cu m | 0.72 | 4,024.75 | 2,897.82 | |
| 4 | Mass Concrete of Grade M20 | cu m | 4.37 | 4,243.95 | 18,546.07 | |
| 5 | Form works: Making wooden forms including supplying and selection of materials, fixing, nailing, according to drawings all complete | Sq m | 53.06 | 419.22 | 22,243.85 | |
| 6 | Fe 415 Tor steel reinforcement :including Cutting bending binding, placing in position etc all complete | kg | 378.91 | 34.70 | 13,146.47 | |
| 7 | Supplying and laying NP3 pipe of Dia 200mm with appropriate joint connection as per given direction all complete | r. m. | 9.50 | 1,439.31 | 13,673.48 | |
| 8 | Supply and fix gates operable by hand with all necessary arrangements complete of various sizes | set | 2.00 | 20,000.00 | 40,000.00 | |
| 9 | Stoplogs | set | 6.00 | 3,000.00 | 18,000.00 | |
| 10 | Earth work in backfill in structures including compaction | cu m | 62.16 | 34.70 | 2,156.67 | |
| | Sub Total | | | | 135,873.90 | |
| | Total | 50 | Nr of Structures | NRs. | 6,793,695.03 | |
| C1 | Division Works - Secondary to Tertiary - Foot Bridge | | | | | |
| | Reference Drawings | CN 23 | | | | |
| | Total Nr of structures | | 52 | | | |
| 1 | Clear site within wayleave, including removal and stacking of bush as directed | Sq m | 30.00 | 1.85 | 55.55 | |
| 2 | Excavate and dispose, haulage not exceeding 250m | cu m | 24.51 | 58.04 | 1,422.57 | |
| 3 | Mass Concrete of Grade M15 | cu m | 1.48 | 4,024.75 | 5,956.63 | |
| 4 | Mass Concrete of Grade M20 | cu m | 0.80 | 4,243.95 | 3,395.16 | |
| 5 | Form works: Making wooden forms including supplying and selection of materials, fixing, nailing, according to drawings all complete | Sq m | 12.96 | 419.22 | 5,433.10 | |
| 6 | Fe 415 Tor steel reinforcement :including Cutting bending binding, placing in position etc all complete | kg | 64.00 | 34.70 | 2,220.51 | |
| 7 | Earth work in backfill in structures including compaction | cu m | 17.16 | 41.86 | 718.32 | |
| | Sub Total | | | | 19,201.83 | |
| | Total | 52 | Nr of Structures | NRs. | 998,495.40 | |
| C2 | Division Works - Secondary to Tertiary - Division Works | | | | | |
| | Reference Drawings | CN 23 | | | | |
| | Total Nr of structures | | 52 | | | |
| 1 | Clear site within wayleave, including removal and stacking of bush as directed | Sq m | 30.00 | 1.85 | 55.55 | |
| 2 | Excavate and dispose, haulage not exceeding 250m | cu m | 9.06 | 58.04 | 525.85 | |
| 3 | Mass Concrete of Grade M15 | cu m | 0.83 | 4,024.75 | 3,340.54 | |
| 4 | Mass Concrete of Grade M20 | cu m | 5.58 | 4,243.95 | 23,681.25 | |
| 5 | Form works: Making wooden forms including supplying and selection of materials, fixing, nailing, according to drawings all complete | Sq m | 88.70 | 419.22 | 37,184.88 | |
| 6 | Fe 415 Tor steel reinforcement :including Cutting bending binding, placing in position etc all complete | kg | 479.37 | 34.70 | 16,631.98 | |
| 7 | Supplying and laying NP3 pipe of Dia 300mm with appropriate joint connection as per given direction all complete | r. m. | 6.10 | 1,462.91 | 8,923.77 | |
| 8 | Supply and fix gates operable by hand with all necessary arrangements complete of various sizes | set | 3.00 | 20,000.00 | 60,000.00 | |
| 9 | Earth work in backfill in structures including compaction | cu m | 20.23 | 41.86 | 846.83 | |
| | Sub Total | | | | 151,190.64 | |
| | Total | 52 | Nr of Structures | NRs. | 7,861,913.28 | |
| D1 | On Farm Irrigation Outlets | | | | | |
| | Reference Drawings | CN 24 | | | | |
| | Total Nr of structures | | 370 | | | |
| 1 | Clear site within wayleave, including removal and stacking of bush as directed | Sq m | 15.00 | 1.85 | 27.77 | |
| 2 | Excavate and dispose, haulage not exceeding 250m | cu m | 81.94 | 58.04 | 4,755.84 | |
| 3 | Mass Concrete of Grade M15 | cu m | 0.20 | 4,024.75 | 804.95 | |
| 4 | Mass Concrete of Grade M20 | cu m | 2.61 | 4,243.95 | 11,076.71 | |
| 5 | Form works: Making wooden forms including supplying and selection of materials, fixing, nailing, according to drawings all complete | Sq m | 23.74 | 419.22 | 9,952.30 | |
| 6 | Fe 415 Tor steel reinforcement :including Cutting bending binding, placing in position etc all complete | kg | 209.02 | 34.70 | 7,252.05 | |
| 7 | Supplying and laying NP3 pipe of Dia 300mm with appropriate joint connection as per given direction all complete | r. m. | 4.50 | 1,439.31 | 6,476.91 | |
| 9 | Earth work in backfill in structures including compaction | cu m | 57.36 | 41.86 | 2,401.09 | |
| | Sub Total | | | | 42,747.63 | |
| | Total | 370 | Nr of Structures | NRs. | 15,816,622.07 | |

Abstract of Cost

6. Canal Structures

| S No | Particulars | Unit | Quantity | Rate per Unit | Amount in NRs. | Remarks |
|------|---|-------|------------------|---------------|----------------|---------|
| B1 | Cross Regulators Q= 4 to 9 m3/s | | | | | |
| | Reference Drawings | CN 25 | | | | |
| | Total Nr of structures | 5 | | | | |
| 1 | Clear site within wayleave, including removal and stacking of bush as directed | Sq m | 200.00 | 1.85 | 370.30 | |
| 2 | Excavate and dispose, haulage not exceeding 250m | cu m | 225.14 | 58.04 | 13,067.24 | |
| 4 | Mass Concrete of Grade M20 | cu m | 73.71 | 4,243.95 | 312,821.65 | |
| 5 | Form works: Making wooden forms including supplying and selection of materials, fixing, nailing, according to drawings all complete | Sq m | 351.10 | 419.22 | 147,188.40 | |
| 6 | Fe 415 Tor steel reinforcement :including Cutting bending binding, placing in position etc all complete | kg | 5,896.96 | 34.70 | 204,597.98 | |
| 7 a | Supply and fix gates operable by hand with all necessary arrangements complete at cross regulator | set | 2.00 | 80,000.00 | 160,000.00 | |
| 7 b | Supply and fix gates operable by hand with all necessary arrangements complete at pipe culvert | set | 2.00 | 30,000.00 | 60,000.00 | |
| 8 | Stone pitching work (0.30m thick) | m2 | 11.25 | 357.61 | 4,023.06 | |
| 9 | Earth work in backfill in structures including compaction | cu m | 157.60 | 41.86 | 6,597.05 | |
| | Sub Total | | | | 908,665.68 | |
| | Total | 5 | Nr of Structures | NRs. | 4,543,328.41 | |
| B2 | Cross Regulators Q= 2 to 4 m3/s | | | | | |
| | Reference Drawings | CN 25 | | | | |
| | Total Nr of structures | 4 | | | | |
| 1 | Clear site within wayleave, including removal and stacking of bush as directed | Sq m | 150.00 | 1.85 | 277.73 | |
| 2 | Excavate and dispose, haulage not exceeding 250m | cu m | 137.02 | 58.04 | 7,952.71 | |
| 4 | Mass Concrete of Grade M20 | cu m | 44.72 | 4,243.95 | 189,789.50 | |
| 5 | Form works: Making wooden forms including supplying and selection of materials, fixing, nailing, according to drawings all complete | Sq m | 216.84 | 419.22 | 90,903.83 | |
| 6 | Fe 415 Tor steel reinforcement :including Cutting bending binding, placing in position etc all complete | kg | 3,577.89 | 34.70 | 124,136.68 | |
| 7 a | Supply and fix gates operable by hand with all necessary arrangements complete at cross regulator | set | 2.00 | 70,000.00 | 140,000.00 | |
| 7 b | Supply and fix gates operable by hand with all necessary arrangements complete at pipe culvert | set | 2.00 | 30,000.00 | 60,000.00 | |
| 8 | Stone pitching work (0.30m thick) | m2 | 4.13 | 357.61 | 1,476.91 | |
| 9 | Earth work in backfill in structures including compaction | cu m | 95.91 | 41.86 | 4,014.96 | |
| | Sub Total | | | | 618,552.32 | |
| | Total | 4 | Nr of Structures | NRs. | 2,474,209.27 | |
| B3 | Cross Regulators Q= 0.3 to 2.0 m3/s | | | | | |
| | Reference Drawings | CN 25 | | | | |
| | Total Nr of structures | 4 | | | | |
| 1 | Clear site within wayleave, including removal and stacking of bush as directed | Sq m | 150.00 | 1.85 | 277.73 | |
| 2 | Excavate and dispose, haulage not exceeding 250m | cu m | 52.51 | 58.04 | 3,047.71 | |
| 4 | Mass Concrete of Grade M20 | cu m | 26.52 | 4,243.95 | 112,549.59 | |
| 5 | Form works: Making wooden forms including supplying and selection of materials, fixing, nailing, according to drawings all complete | Sq m | 122.30 | 419.22 | 51,270.70 | |
| 6 | Fe 415 Tor steel reinforcement :including Cutting bending binding, placing in position etc all complete | kg | 2,121.38 | 34.70 | 73,602.34 | |
| 7 a | Supply and fix gates operable by hand with all necessary arrangements complete at cross regulator | set | 2.00 | 50,000.00 | 100,000.00 | |
| 7 b | Supply and fix gates operable by hand with all necessary arrangements complete at pipe culvert | set | 2.00 | 25,000.00 | 50,000.00 | |
| 8 | Stone pitching work (0.30m thick) | m2 | 1.95 | 357.61 | 697.33 | |
| 9 | Earth work in backfill in structures including compaction | cu m | 36.76 | 41.86 | 1,538.65 | |
| | Sub Total | | | | 392,984.04 | |
| | Total | 4 | Nr of Structures | NRs. | 1,571,936.15 | |

Abstract of Cost

6. Canal Structures

| S No | Particulars | Unit | Quantity | Rate per Unit | Amount in NRs. | Remarks |
|-----------|---|---------------|------------------|---------------|----------------|---------|
| C | Syphon (Sukasena) | | | | | |
| | Reference Drawings | CN 26 | | | | |
| | Total Nr of structures | 1 | | | | |
| 1 | Clear site within wayleave, including removal and stacking of bush as directed | Sq m | 500.00 | 1.85 | 925.75 | |
| 2 | Dismantling existing syphon and disposing at safe place as directed | Job | 1.00 | 200,000.00 | 200,000.00 | LS |
| 3 | Excavate earth and dispose, haulage not exceeding 250m - dry condition | cu m | 2,013.79 | 58.04 | 116,881.38 | |
| 4 | Excavate earth and dispose, haulage not exceeding 250m - Wet condition | cu m | 8,055.17 | 116.43 | 937,831.22 | |
| 5 | Blinding Concrete of Grade M10 | cu m | 41.81 | 3,016.95 | 126,138.59 | |
| 6 | Mass Concrete of Grade M20 | cu m | 246.15 | 4,243.95 | 1,044,648.62 | |
| 7 | Form works: Making wooden forms including supplying and selection of materials, fixing, nailing, according to drawings all complete | Sq m | 2,271.34 | 419.22 | 952,192.85 | |
| 8 | Fe 415 Tor steel reinforcement :including Cutting bending binding, placing in position etc all complete | kg | 19,692.19 | 34.70 | 683,230.38 | |
| 9 | Supply and fix screens with all necessary arrangements complete | set | 2.00 | 10,000.00 | 20,000.00 | |
| 10 | River diversion work | Job | 1.00 | 50,000.00 | 50,000.00 | LS |
| 11 | Dewatering during construction | Job | 1.00 | 200,000.00 | 200,000.00 | LS |
| 12 | Earth work in backfill in structures including compaction | cu m | 8,055.17 | 41.86 | 337,189.42 | |
| | Sub Total | | | | 4,669,038.21 | |
| | Total | 1 | Nr of Structures | NRs. | 4,669,038.21 | |
| D | Aqueduct | | | | | |
| | Reference Drawings | CN 27 | | | | |
| | Total Nr of structures | 1 | | | | |
| 1 | Clear site within wayleave, including removal and stacking of bush as directed | Sq m | 300.00 | 1.85 | 555.45 | |
| 2 | Dismantling existing syphon and disposing at safe place as directed | Job | 1.00 | 100,000.00 | 100,000.00 | LS |
| 3 | Excavate earth and dispose, haulage not exceeding 250m - dry condition | cu m | 433.06 | 58.04 | 25,135.02 | |
| 4 | Excavate earth and dispose, haulage not exceeding 250m - Wet condition | cu m | 1,732.25 | 116.43 | 201,678.94 | |
| 5 | Blinding Concrete of Grade M10 | cu m | 10.00 | 3,016.95 | 30,169.48 | |
| 6 | Mass Concrete of Grade M20 | cu m | 232.11 | 4,243.95 | 985,063.54 | |
| 7 | Form works: Making wooden forms including supplying and selection of materials, fixing, nailing, according to drawings all complete | Sq m | 1,075.00 | 419.22 | 450,662.30 | |
| 8 | Fe 415 Tor steel reinforcement :including Cutting bending binding, placing in position etc all complete | kg | 18,568.55 | 34.70 | 644,245.13 | |
| 9 | River diversion work | Job | 1.00 | 30,000.00 | 30,000.00 | LS |
| 10 | Dewatering during construction | Job | 1.00 | 80,000.00 | 80,000.00 | LS |
| 11 | Earth work in backfill in structures including compaction | cu m | 1,515.72 | 41.86 | 63,448.04 | |
| | Sub Total | | | | 2,610,957.90 | |
| | Total | 1 | Nr of Structures | NRs. | 2,610,957.90 | |
| E1 | Single Lane Road bridge (Type - A), B = 7.2 m | | | | | |
| | Reference Drawings | CN 29, 2 of 3 | | | | |
| | Total Nr of structures | 4 | | | | |
| 1 | Clear site within wayleave, including removal and stacking of bush as directed | Sq m | 1,200.00 | 1.85 | 2,221.80 | |
| 2 | Excavate earth and dispose, haulage not exceeding 250m - dry condition | cu m | 814.00 | 58.04 | 47,244.97 | |
| 3 | Excavate earth and dispose, haulage not exceeding 250m - Wet condition | cu m | 400.00 | 116.43 | 46,570.40 | |
| 4 | Blinding Concrete of Grade M10 | cu m | 34.72 | 3,016.95 | 104,748.43 | |
| 5 | Mass Concrete of Grade M15 | cu m | 200.82 | 4,024.75 | 808,249.68 | |
| 6 | Mass Concrete of Grade M20 | cu m | 49.67 | 4,243.95 | 210,797.06 | |
| 7 | Form works: Making wooden forms including supplying and selection of materials, fixing, nailing, according to drawings all complete | Sq m | 452.10 | 419.22 | 189,529.70 | |
| 8 | Fe 415 Tor steel reinforcement :including Cutting bending binding, placing in position etc all complete | kg | 3,973.33 | 34.70 | 137,856.67 | |
| 9 | Gravel Filter | cu m | 38.38 | 1,356.17 | 52,049.99 | |
| 10 | Supplying and placing bearing neoprane bearing plate (thickness 10 mm) | Set | 2.00 | 34,983.00 | 69,966.00 | |
| 11 | Supply and placing of PVC pipe (dia 75mm) for rain water drainage | m | 20.00 | 100.00 | 2,000.00 | |
| 12 | Supply and place movable ends | Set | 2.00 | 20,000.00 | 40,000.00 | LS |
| 13 | Earth work in backfill in structures including compaction | cu m | 849.80 | 41.86 | 35,572.63 | |
| | Sub Total | | | | 1,746,807.32 | |
| | Total | 4 | Nr of Structures | NRs. | 6,987,229.29 | |

Abstract of Cost

6. Canal Structures

| S No | Particulars | Unit | Quantity | Rate per Unit | Amount in NRs. | Remarks |
|------|---|---------------|------------------|---------------|----------------|---------|
| G2 | Single Lane Road bridge (Type - A), B=6.5m | | | | | |
| | Reference Drawings | CN 29, 2 of 3 | | | | |
| | Total Nr of structures | | 10 | | | |
| 1 | Clear site within wayleave, including removal and stacking of bush as directed | Sq m | 800.00 | 1.85 | 1,481.20 | |
| 2 | Excavate earth and dispose, haulage not exceeding 250m - dry condition | cu m | 814.00 | 58.04 | 47,244.97 | |
| 3 | Excavate earth and dispose, haulage not exceeding 250m - Wet condition | cu m | 400.00 | 116.43 | 46,570.40 | |
| 4 | Blinding Concrete of Grade M10 | cu m | 34.72 | 3,016.95 | 104,748.43 | |
| 5 | Mass Concrete of Grade M15 | cu m | 200.82 | 4,024.75 | 808,249.68 | |
| 6 | Mass Concrete of Grade M20 | cu m | 46.95 | 4,243.95 | 199,253.51 | |
| 7 | Form works: Making wooden forms including supplying and selection of materials, fixing, nailing, according to drawings all complete | Sq m | 479.27 | 419.22 | 200,919.93 | |
| 8 | Fe 415 Tor steel reinforcement :including Cutting bending binding, placing in position etc all complete | kg | 3,755.87 | 34.70 | 130,311.79 | |
| 9 | Gravel Filter | cu m | 38.38 | 1,356.17 | 52,049.99 | |
| 10 | Supplying and placing bearing neoprene bearing plate (thickness 10 mm) | Set | 2.00 | 34,983.00 | 69,966.00 | |
| 11 | Supply and placing of PVC pipe (dia 75mm) for rain water drainage | m | 20.00 | 100.00 | 2,000.00 | |
| 12 | Supply and place movable ends | Set | 2.00 | 20,000.00 | 40,000.00 | LS |
| 13 | Earth work in backfill in structures including compaction | cu m | 850.00 | 41.86 | 35,581.00 | |
| | Sub Total | | | | 1,738,376.89 | |
| | Total | 10 | Nr of Structures | NRs. | 17,383,768.90 | |
| E2 | Single Lane Road bridge (Type - A), B = 3m | | | | | |
| | Reference Drawings | CN 29, 2 of 3 | | | | |
| | Total Nr of structures | | 5 | | | |
| 1 | Clear site within wayleave, including removal and stacking of bush as directed | Sq m | 600.00 | 1.85 | 1,110.90 | |
| 2 | Excavate earth and dispose, haulage not exceeding 250m - dry condition | cu m | 720.00 | 58.04 | 41,789.16 | |
| 3 | Excavate earth and dispose, haulage not exceeding 250m - Wet condition | cu m | 300.00 | 116.43 | 34,927.80 | |
| 4 | Blinding Concrete of Grade M10 | cu m | 31.03 | 3,016.95 | 93,615.89 | |
| 5 | Mass Concrete of Grade M15 | cu m | 144.01 | 4,024.75 | 579,603.80 | |
| 6 | Mass Concrete of Grade M20 | cu m | 31.00 | 4,243.95 | 131,562.49 | |
| 7 | Form works: Making wooden forms including supplying and selection of materials, fixing, nailing, according to drawings all complete | Sq m | 402.98 | 419.22 | 168,937.58 | |
| 8 | Fe 415 Tor steel reinforcement :including Cutting bending binding, placing in position etc all complete | kg | 2,482.13 | 34.70 | 86,118.74 | |
| 9 | Gravel Filter | cu m | 31.18 | 1,356.17 | 42,285.53 | |
| 10 | Supplying and placing bearing neoprene bearing plate (thickness 10 mm) | Set | 2.00 | 34,983.00 | 69,966.00 | |
| 11 | Supply and placing of PVC pipe (dia 75mm) for rain water drainage | m | 20.00 | 100.00 | 2,000.00 | |
| 12 | Supply and place movable ends | Set | 2.00 | 20,000.00 | 40,000.00 | LS |
| 13 | Earth work in backfill in structures including compaction | cu m | 714.00 | 41.86 | 29,888.04 | |
| | Sub Total | | | | 1,321,805.93 | |
| | Total | 5 | Nr of Structures | NRs. | 6,609,029.67 | |
| E3 | Single Lane Road bridge | | | | | |
| | Reference Drawings | CN 29, 1 of 3 | | | | |
| | Total Nr of structures | | 10 | | | |
| 1 | Clear site within wayleave, including removal and stacking of bush as directed | Sq m | 300.00 | 1.85 | 555.45 | |
| 2 | Excavate earth and dispose, haulage not exceeding 250m - dry condition | cu m | 300.00 | 58.04 | 17,412.15 | |
| 3 | Excavate earth and dispose, haulage not exceeding 250m - Wet condition | cu m | 139.76 | 116.43 | 16,271.70 | |
| 4 | Blinding Concrete of Grade M10 | cu m | 6.10 | 3,016.95 | 18,403.38 | |
| 5 | Mass Concrete of Grade M15 | cu m | 123.29 | 4,024.75 | 496,211.05 | |
| 6 | Mass Concrete of Grade M20 | cu m | 32.06 | 4,243.95 | 136,061.08 | |
| 7 | Form works: Making wooden forms including supplying and selection of materials, fixing, nailing, according to drawings all complete | Sq m | 353.01 | 419.22 | 147,989.12 | |
| 8 | Fe 415 Tor steel reinforcement :including Cutting bending binding, placing in position etc all complete | kg | 2,564.90 | 34.70 | 88,990.49 | |
| 9 | Gravel Filter | cu m | 13.02 | 1,356.17 | 17,657.40 | |
| 10 | Supplying and placing bearing neoprene bearing plate (thickness 10 mm) | Set | 2.00 | 34,983.00 | 69,966.00 | |
| 11 | Stone Pitching for lining | cu m | 13.02 | 1,192.02 | 15,520.07 | |
| 12 | Supply and place movable ends | Set | 2.00 | 20,000.00 | 40,000.00 | LS |
| 13 | Elastic filler | m | 18.80 | 3,000.00 | 56,400.00 | |
| 13 | Earth work in backfill in structures including compaction | cu m | 312.78 | 41.86 | 13,093.05 | |
| | Sub Total | | | | 1,134,530.93 | |
| | Total | 10 | Nr of Structures | NRs. | 11,345,309.29 | |

Abstract of Cost

6. Canal Structures

| S No | Particulars | Unit | Quantity | Rate per Unit | Amount in NRs. | Remarks |
|------------------------------|---|----------------|------------------|---------------|----------------|---------|
| I1 | Foot bridge (Type - A) B = 3m | | | | | |
| | Reference Drawings | CN 29, 2 of 3 | | | | |
| | Total Nr of structures | | 20 | | | |
| 1 | Clear site within wayleave, including removal and stacking of bush as directed | Sq m | 200.00 | 1.85 | 370.30 | |
| 2 | Excavate earth and dispose, haulage not exceeding 250m - dry condition | cu m | 280.80 | 58.04 | 16,297.77 | |
| 3 | Mass Concrete of Grade M15 | cu m | 9.55 | 4,024.75 | 38,436.33 | |
| 4 | Mass Concrete of Grade M20 | cu m | 3.30 | 4,243.95 | 14,005.04 | |
| 5 | Form works: Making wooden forms including supplying and selection of materials, fixing, nailing, according to drawings all complete | Sq m | 75.95 | 419.22 | 31,839.82 | |
| 6 | Fe 415 Tor steel reinforcement :including Cutting bending binding, placing in position etc all complete | kg | 264.00 | 34.70 | 9,159.61 | |
| 7 | Earth work in backfill in structures including compaction | cu m | 196.56 | 41.86 | 8,228.00 | |
| | Sub Total | | | | 118,336.87 | |
| | Total | 20 | Nr of Structures | NRs. | 2,366,737.49 | |
| E3 | Foot bridge (Type - A) B = 1.8 m | | | | | |
| | Reference Drawings | CN 29, 2 of 3 | | | | |
| | Total Nr of structures | | 10 | | | |
| 1 | Clear site within wayleave, including removal and stacking of bush as directed | Sq m | 200.00 | 1.85 | 370.30 | |
| 2 | Excavate earth and dispose, haulage not exceeding 250m - dry condition | cu m | 203.92 | 58.04 | 11,835.62 | |
| 3 | Mass Concrete of Grade M15 | cu m | 2.25 | 4,024.75 | 9,055.68 | |
| 4 | Mass Concrete of Grade M20 | cu m | 8.16 | 4,243.95 | 34,630.64 | |
| 5 | Form works: Making wooden forms including supplying and selection of materials, fixing, nailing, according to drawings all complete | Sq m | 64.74 | 419.22 | 27,140.35 | |
| 6 | Fe 415 Tor steel reinforcement :including Cutting bending binding, placing in position etc all complete | kg | 180.00 | 34.70 | 6,245.19 | |
| 7 | Earth work in backfill in structures including compaction | cu m | 142.74 | 41.86 | 5,975.26 | |
| | Sub Total | | | | 95,253.05 | |
| | Total | 10 | Nr of Structures | NRs. | 952,530.47 | |
| Summary of Structures | | | | | | |
| S No | Name of structures | Nr | Rate per No | | Total Amount | |
| A1 | Division Works - Main Canal to Secondary Canal B3 = 3.9m | 4 | 191,167.94 | | 764,671.77 | |
| A2 | Division Works - Main Canal to Secondary Canal B3 = 2.7m | 7 | 151,391.57 | | 1,059,740.98 | |
| A | Secondary Canal Head Regulator B3 = 2.1 m | 45 | 130,005.56 | | 5,850,250.34 | |
| B1 | Cross Regulators Q= 4 to 9 m ³ /s | 5 | 908,665.68 | | 4,543,328.41 | |
| B2 | Cross Regulators Q= 2 to 4 m ³ /s | 4 | 618,552.32 | | 2,474,209.27 | |
| B3 | Cross Regulators Q= 0.3 to 2.0 m ³ /s | 4 | 392,984.04 | | 1,571,936.15 | |
| C | Syphon (Sukasena) | 1 | 4,669,038.21 | | 4,669,038.21 | |
| D | Aqueduct | 1 | 2,610,957.90 | | 2,610,957.90 | |
| E1 | Single Lane Road bridge (Type - A), B = 7.2 m | 4 | 1,746,807.32 | | 6,987,229.29 | |
| E2 | Single Lane Road bridge (Type - A), B = 3m | 5 | 1,321,805.93 | | 6,609,029.67 | |
| E3 | Single Lane Road bridge | 10 | 1,134,530.93 | | 11,345,309.29 | |
| E3 | Foot bridge (Type - A) B = 1.8 m | 10 | 95,253.05 | | 952,530.47 | |
| | | | | | 49,438,231.75 | |
| F | Farm Turnout (Tertiary to Water Courses) | | | | | |
| 1 | Earthwork in Excavation | cu m | 6.75 | 58.04 | 391.77 | |
| 2 | Supplying and placing of 250 mm dia NP2 Hume pipe | m | 5.00 | 600.97 | 3,004.83 | |
| 3 | Precast concrete outlet unit | cu m | 1.30 | 4,024.75 | 5,232.17 | |
| 4 | E/W in backfill | cu m | 5.18 | 78.17 | 404.51 | |
| | Sum | | | | 9,033.28 | |
| G1 | Proportional Distributors (Secondary to Tertiary) One side | | | | | |
| 1 | Earthwork in Excavation | cu m | 66.73 | 58.04 | 3,872.75 | |
| 2 | Blinding Concrete of M10 Grade | cu m | 2.93 | 3,016.95 | 8,842.67 | |
| 3 | Reinforced Concrete of M20 Grade | cu m | 24.03 | 4,243.95 | 101,975.78 | |
| 4 | Form works (centring and shuttering works) | m ² | 60.07 | 419.22 | 25,183.11 | |
| 5 | Fe415 Reinforcement bars | Kg | 1,730.05 | 34.70 | 60,025.02 | |
| 6 | Concrete works in lining of Grade M15 | cu m | 10.01 | 4,024.75 | 40,271.62 | |
| 7 | 0.30m thick Gabion mattress protection over 10 cm thick gravel | sq m | 12.70 | 677.24 | 8,600.90 | |
| | Sum | | | | 248,771.87 | |

Abstract of Cost

6. Canal Structures

| S No | Particulars | Unit | Quantity | Rate per Unit | Amount in NRs. | Remarks |
|-----------|--|------|----------|---------------|-------------------|---------|
| G2 | Proportional Distributors at the end of Secondary (SC to two TCs) | | | | | |
| 1 | Earthwork in Excavation | cu m | 41.20 | 58.04 | 2,391.27 | |
| 2 | Blinding Concrete of M10 Grade | cu m | 1.31 | 3,016.95 | 3,946.17 | |
| 3 | Reinforced Concrete of M20 Grade | cu m | 21.67 | 4,243.95 | 91,949.45 | |
| 4 | Form works (centring and shuttering works) | m2 | 54.17 | 419.22 | 22,707.09 | |
| 5 | Fe415 Reinforcement bars | Kg | 1,559.95 | 34.70 | 54,123.31 | |
| 6 | Concrete works in lining of Grade M15 | cu m | 12.16 | 4,024.75 | 48,932.87 | |
| 7 | 0.30m thick Gabion mattress protection over 10 cm thick gravel | sq m | 10.00 | 677.24 | 6,772.36 | |
| | Sum | | | | 230,822.53 | |
| G3 | Proportional Distributors at the end of Secondary (and TC to SUB-TC) | | | | | |
| 1 | Earthwork in Excavation | cu m | 37.20 | 58.04 | 2,159.11 | |
| 2 | Blinding Concrete of M10 Grade | cu m | 0.95 | 3,016.95 | 2,860.07 | |
| 3 | Reinforced Concrete of M20 Grade | cu m | 18.04 | 4,243.95 | 76,543.91 | |
| 4 | Form works (centring and shuttering works) | m2 | 45.09 | 419.22 | 18,902.66 | |
| 5 | Fe415 Reinforcement bars | Kg | 1,298.59 | 34.70 | 45,055.30 | |
| 6 | Concrete works in lining of Grade M15 | cu m | 11.70 | 4,024.75 | 47,101.61 | |
| 7 | 0.30m thick Gabion mattress protection over 10 cm thick gravel | sq m | 10.00 | 677.24 | 6,772.36 | |
| | Sum | | | | 199,395.02 | |
| H1 | Pipe Underpass (Canal crossing existing SMIP canals) - Single 900mm NP2 Hume Pipe | | | | | |
| 1 | Earthwork in Excavation | cu m | 111.60 | 58.04 | 6,477.32 | |
| 2 | Blinding Concrete of M10 Grade | cu m | 12.20 | 3,016.95 | 36,806.76 | |
| 3 | Reinforced Concrete of M20 Grade | cu m | 16.09 | 4,243.95 | 68,285.18 | |
| 4 | Form works (centring and shuttering works) | m2 | 40.23 | 419.22 | 16,863.15 | |
| 5 | Fe415 Reinforcement bars | Kg | 50.00 | 34.70 | 1,734.78 | |
| 6 | 0.30m thick Gabion mattress protection over 10 cm thick gravel | sq m | 13.50 | 677.24 | 9,142.69 | |
| 7 | Supplying and placing of 900 mm diameter NP2 Hume pipe | m | 20.00 | 2,015.92 | 40,318.41 | |
| 8 | Earthwork in filling in embankment | cu m | 247.50 | 78.17 | 19,345.96 | |
| | Sum | | | | 198,974.26 | |
| H2 | Pipe Underpass (Canal crossing existing SMIP canals) - Double 900mm NP2 Hume Pipe | | | | | |
| 1 | Earthwork in Excavation | cu m | 249.20 | 58.04 | 14,463.69 | |
| 2 | Blinding Concrete of M10 Grade | cu m | 22.12 | 3,016.95 | 66,734.89 | |
| 3 | Mass Concrete of M15 Grade | cu m | 25.74 | 4,243.95 | 109,239.31 | |
| 4 | Form works (centring and shuttering works) | m2 | 64.35 | 419.22 | 26,976.86 | |
| 5 | Fe415 Reinforcement bars | Kg | 50.00 | 34.70 | 1,734.78 | |
| 6 | 0.30m thick Gabion mattress protection over 10 cm thick gravel | sq m | 22.50 | 677.24 | 15,237.82 | |
| 7 | Supplying and placing of 900 mm diameter NP2 Hume pipe | m | 40.00 | 2,015.92 | 80,636.83 | |
| 8 | Earthwork in filling in embankment | cu m | 387.50 | 78.17 | 30,289.13 | |
| | Sum | | | | 345,313.30 | |
| I | Drain Underpass (Box Culvert) Capacity 2 - 3 m3/s | | | | | |
| 1 | Earthwork in Excavation | cu m | 69.60 | 58.04 | 4,039.62 | |
| 2 | Blinding Concrete of M10 Grade | cu m | 9.40 | 3,016.95 | 28,359.31 | |
| 3 | Reinforced Concrete of M20 Grade | cu m | 74.06 | 4,243.95 | 314,319.77 | |
| 4 | Form works (centring and shuttering works) | m2 | 185.16 | 419.22 | 77,621.87 | |
| 5 | Fe415 Reinforcement bars | Kg | 5,332.54 | 34.70 | 185,015.00 | |
| 6 | 0.30m thick Gabion mattress protection over 10 cm thick gravel | sq m | 110.40 | 677.24 | 74,766.91 | |
| | Sum | | | | 684,122.47 | |
| J | Structure Main Canal Outlets (MCO) | | | | | |
| 1 | Earthwork in excavation | cum | 5.29 | 58.04 | 306.89 | |
| 2 | Reinforced Concrete of M20 Grade | cum | 1.23 | 4,243.95 | 5,200.96 | |
| 3 | Form works (centring and shuttering works) | m2 | 3.06 | 419.22 | 1,284.39 | |
| 4 | Fe415 Reinforcement bars | kg | 88.24 | 34.70 | 3,061.39 | |
| 5 | Supplying and placing of NP2 Hume pipe of 200mm dia | m | 5.00 | 406.10 | 2,030.50 | |
| 6 | Supply and place of gates with all controlling arrangement 0.5 *0.5 m | Nr | 1.00 | 15,000.00 | 15,000.00 | |
| 7 | Earthwork in filling in embankment | cum | 2.64 | 78.17 | 206.65 | |
| | Sum | | | | 27,090.78 | |

Abstract of Cost

6. Canal Structures

| S No | Particulars | Unit | Quantity | Rate per Unit | Amount in NRs. | Remarks |
|-----------|--|---------------|----------|---------------|-------------------|---------|
| K | Secondary Canal Outlets (SCO) | | | | | |
| 1 | Earthwork in excavation | cum | 2.93 | 58.04 | 169.77 | |
| 2 | Reinforced Concrete of M20 Grade | cum | 1.23 | 4,243.95 | 5,200.96 | |
| 3 | Form works (centring and shuttering works) | m2 | 3.06 | 419.22 | 1,284.39 | |
| 4 | Fe415 Reinforcement bars | kg | 88.24 | 34.70 | 3,061.39 | |
| 5 | Supplying and placing of NP2 Hume pipe of 200mm dia | m | 5.00 | 406.10 | 2,030.50 | |
| 6 | Earthwork in filling in embankment | cum | 1.46 | 78.17 | 114.32 | |
| | Sum | | | | 11,861.33 | |
| L1 | Tertiary Canal Bridge Type A | | | | | |
| | | Pipe Diameter | | 0.45 | m | |
| 1 | Earthwork in excavation | cum | 4.75 | 58.04 | 275.69 | |
| 2 | Foundation Concrete M10 | cum | 0.95 | 3,016.95 | 2,866.10 | |
| 3 | NP3 Hume pipe | m | 10.00 | 1,874.00 | 18,740.00 | |
| 4 | 0.30 m thick Gabion Mattress Protection | m2 | 12.00 | 677.24 | 8,126.84 | |
| 5 | Earthwork in filling in embankment | cum | 2.85 | 78.17 | 222.77 | |
| | Sum | | | | 30,231.40 | |
| L2 | Tertiary Canal Bridge Type B | | | | | |
| | | Pipe Diameter | | 0.60 | m | |
| 1 | Earthwork in excavation | cum | 5.50 | 58.04 | 319.22 | |
| 2 | Foundation Concrete M10 | cum | 1.10 | 3,016.95 | 3,318.64 | |
| 3 | NP3 Hume pipe | m | 10.00 | 2,419.79 | 24,197.91 | |
| 4 | 0.30 m thick Gabion Mattress Protection | m2 | 12.00 | 677.24 | 8,126.84 | |
| 5 | Earthwork in filling in embankment | cum | 3.30 | 78.17 | 257.95 | |
| | Sum | | | | 36,220.56 | |
| L3 | Tertiary Canal Bridge Type C | | | | | |
| | | Pipe Diameter | | 0.75 | m | |
| 1 | Earthwork in excavation | cum | 6.25 | 58.04 | 362.75 | |
| 2 | Foundation Concrete M10 | cum | 1.25 | 3,016.95 | 3,771.18 | |
| 3 | NP3 Hume pipe | m | 10.00 | 3,338.00 | 33,380.00 | |
| 4 | 0.30 m thick Gabion Mattress Protection | m2 | 12.00 | 677.24 | 8,126.84 | |
| 5 | Earthwork in filling in embankment | cum | 3.75 | 78.17 | 293.12 | |
| | Sum | | | | 45,933.90 | |
| L4 | Tertiary Canal Bridge Type D | | | | | |
| | | Pipe Diameter | | 0.90 | m | |
| 1 | Earthwork in excavation | cum | 7.00 | 58.04 | 406.28 | |
| 2 | Foundation Concrete M10 | cum | 1.40 | 3,016.95 | 4,223.73 | |
| 3 | NP3 Hume pipe | m | 10.00 | 3,874.72 | 38,747.20 | |
| 4 | 0.30 m thick Gabion Mattress Protection | m2 | 18.00 | 677.24 | 12,190.26 | |
| 5 | Earthwork in filling in embankment | cum | 4.20 | 78.17 | 328.30 | |
| | Sum | | | | 55,895.76 | |
| M | Drainage Outfall | | | | | |
| 1 | Earthwork in excavation | cum | 8.80 | 58.04 | 510.76 | |
| 2 | Bed bar concrete M10 grade | cum | 8.80 | 3,016.95 | 26,549.14 | |
| 3 | 0.30 m thick Gabion Mattress Protection | m2 | 55.00 | 677.24 | 37,248.01 | |
| | Sum | | | | 64,307.90 | |
| N | Onfarm development Cost per 20 ha block | | | | | |
| 1 | Earthwork in filling in embankment | cum | 754.50 | 78.17 | 58,975.87 | |
| 2 | Precast concrete Division Box | Nr | 3.00 | 500.00 | 1,500.00 | |
| 3 | Land acquisition | ha | 0.36 | 300,000.00 | 108,900.00 | |
| | Sum | | | | 169,375.87 | |
| O | Market Center (1 unit of 10m * 5m) | | | | | |
| 1 | Earthwork in excavation | cu m | 8.64 | 58.04 | 501.47 | |
| 2 | Foundation concrete M10 grade | cu m | 1.44 | 3,016.95 | 4,344.40 | |
| 3 | Earth work in filling in floor | cu m | 25.00 | 78.17 | 1,954.14 | |
| 4 | Brick soling in floor | sq m | 50.00 | 600.00 | 30,000.00 | |
| 5 | Floor Concrete of M15 Grade | cu m | 7.50 | 4,024.75 | 30,185.60 | |
| 6 | MS Post (1 section of 150 * 150 * 20mm) of 4.5 m length | nr | 4.00 | 18,800.00 | 75,200.00 | |
| 7 | CGI Sheet roofing with all accessories like truss etc all complete | sq m | 50.00 | 1,000.00 | 50,000.00 | |
| | Sum | | | | 192,185.61 | |

Abstract of Cost

6. Canal Structures

| S No | Particulars | Unit | Quantity | Rate per Unit | Amount in NRs. | Remarks |
|--|---|------|-----------|---------------|---------------------|---------|
| P | | | | | | |
| Village Road including drainage structures (per unit Length) | | | | | | |
| 1 | Stripping works 0.15m thickness | m2 | 6.00 | 12.88 | 77.28 | |
| 2 | Earth work in filling in preparing subbase | m3 | 2.50 | 78.17 | 195.41 | |
| 3 | 0.15 m thick gravel | m3 | 0.60 | 1,356.17 | 813.70 | |
| | Sum | | | | 1,086.40 | |
| P1 | Drainage structures @ 30% of road | | | | 325.92 | |
| | Total | | | | 1,412.32 | |
| Q | | | | | | |
| Escape Structure (Capacity 5 cumecs) | | | | | | |
| 1 | Earthwork in excavation | cu m | 144.93 | 58.04 | 8,411.69 | |
| 2 | Blinding Concrete of M10 Grade | cu m | 4.24 | 3,016.95 | 12,797.89 | |
| 3 | Reinforced Concrete of Grade M20 | cu m | 63.98 | 4,243.95 | 271,544.98 | |
| 4 | Form works (centring and shuttering works) | sq m | 159.96 | 419.22 | 67,058.55 | |
| 5 | Fe415 Reinforcement bars | kg | 4,606.85 | 34.70 | 159,836.89 | |
| 6 | Supply and fixing of MS Gates (1.5*1.5 m) opening | Nr | 2.00 | 20,000.00 | 40,000.00 | |
| 7 | 0.30 m thick Gabion Mattress Protection | sq m | 16.90 | 677.24 | 11,445.30 | |
| 8 | E/W in back filling @ 40% of excavation quantity | cu m | 57.97 | 78.17 | 4,531.35 | |
| | Sum | | | | 575,626.66 | |
| Q1 | | | | | | |
| Escape Structure (Capacity 2.5 cumecs) | | | | | | |
| 1 | Earthwork in excavation | cu m | 107.49 | 58.04 | 6,238.66 | |
| 2 | Blinding Concrete of M10 Grade | cu m | 2.73 | 3,016.95 | 8,227.22 | |
| 3 | Reinforced Concrete of Grade M20 | cu m | 52.94 | 4,243.95 | 224,691.76 | |
| 4 | Form works (centring and shuttering works) | sq m | 132.36 | 419.22 | 55,488.06 | |
| 5 | Fe415 Reinforcement bars | kg | 3,811.97 | 34.70 | 132,258.14 | |
| 6 | Supply and fixing of MS Gates (1.5*1.5 m) opening | Nr | 1.00 | 20,000.00 | 20,000.00 | |
| 7 | 0.30 m thick Gabion Mattress Protection | sq m | 13.00 | 677.24 | 8,804.07 | |
| 8 | E/W in back filling @ 40% of excavation quantity | cu m | 43.00 | 78.17 | 3,360.74 | |
| | Sum | | | | 459,068.64 | |
| R | | | | | | |
| Estimation of Typical Drainage Reuse Structures (2 cumec. Discharge) | | | | | | |
| 1 | Earthwork in excavation | cu m | 100.00 | 58.04 | 5,804.05 | |
| 2 | Concrete qty for Abutment and Floor of M15 Grade | cu m | 55.00 | 4,024.75 | 221,361.08 | |
| 3 | 1 m thick Gabions | cu m | 16.00 | 1,332.45 | 21,319.12 | |
| 4 | 30 cm thick Stone Pitching | cu m | 6.00 | 1,192.02 | 7,152.11 | |
| 5 | Gate | Nr | 2.00 | 15,000.00 | 30,000.00 | |
| | Total | | | | 285,636.36 | |
| S | | | | | | |
| Mariadhar | | | | | | |
| a | | | | | | |
| Headworks | | | | | | |
| 1 | Earthwork in excavation in wet condition | m3 | 2,182.61 | 87.45 | 190,860.51 | |
| 2 | Earth work in filling in embankment | m3 | 4,552.34 | 78.17 | 355,835.93 | |
| 3 | P.C.C. For Base Slab M10 (5cm thick) | m3 | 31.80 | 3,016.95 | 95,938.94 | |
| 4 | Stone Boulder Pitching 30 cm thick | m3 | 190.80 | 1,192.02 | 227,436.95 | |
| 5 | Concrete M20 | m3 | 494.41 | 4,243.95 | 2,098,251.97 | |
| 6 | Fe 415 reinforcement steel | kg | 35,597.52 | 34.70 | 1,235,073.76 | |
| 7 | Gabion Works | m3 | 919.89 | 1,332.45 | 1,225,703.12 | |
| 8 | Formwork | m2 | 1,395.93 | 419.22 | 585,202.82 | |
| 9 | Gravel Pavement 15cm thick | m3 | 105.75 | 1,356.17 | 143,415.49 | |
| 10 | Grass Turfing | m2 | 1,000.00 | 4.03 | 4,025.00 | |
| 11 | Steel Gates | | - | | - | |
| | 1. 1.3*1.3m type - 1nos. | Nr | 1.00 | 15,000.00 | 15,000.00 | |
| | 2. 2.7*1.0m type- 1nos. | Nr | 1.00 | 30,000.00 | 30,000.00 | |
| 12 | Hume Pipe NP3 1000mm dia | m | 5.00 | 3,874.72 | 19,373.60 | |
| | Sub - Total | | | | 6,226,118.08 | |
| b | | | | | | |
| Canal | | | | | | |
| 1 | E/W in Excavation in Open cut | m3 | 10,710.00 | 58.04 | 621,613.76 | |
| 2 | E/W in filling in Embankment (canal) using soil from canal excavation | m3 | 2,805.00 | 78.17 | 219,254.23 | |
| 3 | M10 lean concrete (6 cm thick) | m3 | 513.06 | 3,016.95 | 1,547,875.24 | |
| 4 | E/W in embankment in Road (50 cm thick, 4.5 m average width) | m3 | 2,925.00 | 78.17 | 228,634.09 | |
| 5 | Land Acquisition (Canal) | ha | 2.30 | 200,000.00 | 459,000.00 | |
| | Sub - Total | | | | 3,076,377.31 | |
| | Total NRs. | | | | 9,302,495.39 | |
| T | | | | | | |
| Fish Ponds (Developing in one Ha) | | | | | | |
| 1 | Land acquisition | ha | 1.00 | 100,000.00 | 100,000.00 | |
| 2 | Construction | ha | 1.00 | 200,000.00 | 200,000.00 | |
| | Sum | | | | 300,000.00 | |

Rate analysis for FY 2001/02 (Applicable to Command Area)

| SN | Description | Refer | Labour | | Lead Km | | Metal | Royalty /trip | Truck Time | | Total Amount without CPCT | Rate/ Unit | |
|----|--|-----------------------------|----------------------------|---------|---------|--|-------|---------------|------------|---------|---------------------------|------------|-----------|
| | | | Unskill | Skilled | Rough | | | | Idle Hr | Work hr | | | |
| a | Sand Truck Capacity : 6mt Collection Screening and providing of sand (haulage < 10m Quarry capacity <65%) Loading Unloading and transportation | m3 3-1-d 21-a&b | 7.69 1.19 | | | | | | | | | | |
| | | 5.38 | 621.49 | 0.00 | | | | 250.00 | 0.75 | 3.55 | 2828.488 | Rs 525.74 | |
| b | Aggregate Truck Capacity : 6mt Collection Screening and providing of Aggregate(haulage < 10m. (5 to 20mm size) Loading Unloading and transportation | m3 3-2-c 21-a&b | 26.93 1.26 | | | | | | | | | | |
| | | 4.58 | 1973.3 | 0.00 | | | | 250.00 | 0.75 | 3.55 | 4180.328 | Rs 912.74 | |
| c | Boulder Truck Capacity : 6mt Collection Screening and providing of Boulder (haulage < 10m. (70 to 100mm size) Loading Unloading and transportation | m3 3-3-b 21-a&b | 4.90 1.6705 | | | | | | | | | | |
| | | 3.5 | 459.9 | 0.00 | | | | 250.00 | 0.75 | 3.9 | 2838.435 | Rs 810.98 | |
| d | Soil Truck Capacity : 6mt Excavate in foundation dry/ wet condition under water including haulage up to 250m and lift 5m. Excavation 10m lead and 1.5m lift Extra labour additional 3.5m lift Loading Unloading and transportation 250m | m3 2.1 21-a&b | 3.5 0.75 0.21 | | | | | | | | | | |
| | | 5 | 312.2 | 0.00 | | | | 0.25 | 0 | 0.15 | 0.05 | 380.2 | Rs 76.04 |
| e | Soil for structure foundation Truck Capacity : 6mt Excavate in foundation dry/ wet condition under water including haulage up to 250m and lift 5m. Excavation 10m lead and 1.5m lift Additional Labour for under water works Extra labour additional 3.5m lift Loading Unloading and transportation 250m | m3 2.1 2-38 21-a&b | 3.5 1.8 0.75 0.21 | | | | | | | | | | |
| | | 5 | 438.2 | 0.00 | | | | 0.25 | 0 | 0.15 | 0.05 | 506.2 | Rs 101.24 |

Rate analysis FY 2001/02 (Applicable to Command Area)

| SN | Description | Unit | Resource | | | | | | | | | | Total Amt | Overhead Charge | Total Amt | Rate/ Unit | |
|----|---|------|-----------------------|-----------|---------------------------------------|------------------------------|----------------------|--------------------------------------|--|-----------|-----|------|-----------|-----------------|-----------|------------|---------|
| | | | Labour Rate Rs. / day | | | Construction Materials | | | | Machinery | | | | | | | |
| | | | Unskill 70 | Skill 140 | Type | Qty | Unit | Rate | Amt | Type | Qty | Amt | | | | | |
| 1 | Excavation of soft clay & silty soils including disposal upto 10m lead and 1.5m lift. Refer 2-1. | | 0.7 | | | | | | | | | | | | | | |
| | | 1 | 49.00 | 0.00 | | | | | | | | 1.47 | 50.47 | 7.57 | 58.04 | Rs. | 58.04 |
| 2 | Excavate in foundation dry/ wet condition and dispose including haulage up to 250m and lift 5m. Refer: d above | | | | | | | | | | | | | | | | |
| | | 1 | 0.00 | 0.00 | | | | | | | | 0.00 | 76.04 | 11.41 | 87.45 | Rs. | 87.45 |
| 3 | Excavate in foundation dry/ wet condition under water including haulage up to 250m and lift 5m. Refer: e above | | | | | | | | | | | | | | | | |
| | | 1 | 0.00 | 0.00 | | | | | | | | 0.00 | 101.24 | 15.19 | 116.43 | Rs. | 116.43 |
| 4 | Cutting, uprooting & disposal of grasses with light compaction, levelling & cleaning the site Refer: 1-5 | sq m | 0.023 | | | | | | | | | | | | | | |
| | | 1 | 1.61 | 0.00 | | | | | | | | | 1.61 | 0.24 | 1.85 | Rs. | 1.85 |
| 5 | Earth filling in trench with ordinary soils in 15 cm thick layers and hand compaction (Haulage< 10m) Refer: 2-25 | | 0.25 | | | | | | | | | | | | | | |
| | | 1 | 17.50 | 0.00 | | | | | | | | | 17.50 | 2.63 | 20.13 | Rs. | 20.13 |
| 6 | Back filling in Structure including compaction Backfilling with all type of soil in 22 cm thick compaction all complete (Haulage< 10m and lift 1.5m) Refer: 2-43 b | | 0.5 | 0.01 | | | | | | | | | | | | | |
| | | 1 | 35.00 | 1.40 | | | | | | | | | 36.40 | 5.46 | 41.86 | Rs. | 41.86 |
| 7 | Each additional haulage of extra 10 m Refer: 2-27 | cu m | 0.12 | | | | | | | | | | | | | | |
| | | 1 | 8.40 | 0.00 | | | | | | | | | 8.40 | 1.26 | 9.66 | Rs. | 9.66 |
| 8 | Concreting of foundations vert. faces walls (cement conc) including supply of materials and haulage upto 30m PCC 1:3:6 or equivalent M10 Refer: 7-2-c | m3 | 4 | 1 | Cement Aggregate sand | 0.22 0.89 0.47 | mt m3 m3 | 5200.00 912.74 525.74 | 1144.00 812.33 247.10 | | | | | | | | |
| | | 1 | 280.00 | 140.00 | | | | | | | | | 2623.43 | 393.51 | 3016.95 | Rs. | 3016.95 |
| 9 | Concreting for lining works (cement conc) including supply of materials and haulage upto 30m with nominal reinf @ 39 kg/m3 PCC 1:3:6 or equivalent M10 Refer: 7-2-c | m3 | 4 | 1 | Cement Aggregate MS bar sand | 0.22 0.89 0.04 0.47 | mt m3 mt m3 | 5200.00 912.74 26000 525.74 | 1144.00 812.33 1040.00 247.10 | | | | | | | | |
| | | 1 | 280.00 | 140.00 | | | | | | | | | 3663.43 | 549.51 | 4212.95 | Rs. | 4212.95 |
| 10 | Reinforced Concrete Class M 15 including supply of material and haulage distance upto 30 m Refer: 7-4-a | m3 | 10 | 0.9 | Cement Aggregate sand | 0.32 0.85 0.445 | mt m3 m3 | 5200.00 912.74 525.74 | 1664.00 775.83 233.95 | | | | | | | | |
| | | 1 | 700.00 | 126.00 | | | | | | | | | 3499.78 | 524.97 | 4024.75 | Rs. | 4024.75 |

| Rate analysis FY 2001/02 (Applicable to Command Area) | | | | | | | | | | | | | | | | | | |
|---|--|------|-----------------------|--------------|--|-----------------------------------|----------------------|---------------------------------------|---|-----------|-----|----------|-----------|-----------------|-----------|------------|----------|---|
| SN | Description | Unit | Resource | | | | | | | | | | Total Amt | Overhead Charge | Total Amt | Rate/ Unit | | |
| | | | Labour Rate Rs. / day | | | Construction Materials | | | | Machinery | | | | | | | | |
| | | | Unskill 70 | Skill 140 | Type | Qty | Unit | Rate | Amt | Type | Qty | Amt | | | | | | |
| 11 | Reinforced Concrete Class M 20 including supply of material and haulage distance upto 30 m Refer: 7-4-a | m3 | 7 | 0.8 | Cement Aggregate sand | 0.4 0.86 0.425 | mt m3 m3 | 5200.00 912.74 525.74 | 2080.00 784.95 223.44 | | | | | | | | | |
| | | 1 | 490.00 | 112.00 | | | | | | | | 3088.39 | | | 3690.39 | 553.56 | 4243.95 | Rs. 4243.95 |
| 12 | Precast riprap materials: PCC works for riprap materials including concrete preparation and hauling upto 30 m distance and pouring in place of M15 grade (including form works etc all) Refer: 7-9 1 Nr contains 4.68m2 in plan and 3.74 m3 in volume approximately | m2 | 25.432 | 4.488 | Cement Aggregate sand Formworks | 1.1968 1.1514 1.6643 6.2 | mt m3 m3 m2 | 5200.00 912.74 525.74 356.34 | 6223.36 1050.92 874.99 2209.29 | | | | | | | | | Each no covers sq 4.68 m in plan. So rate per sq m is |
| | | 3.74 | 1780.24 | 628.32 | | | | | | | | 10358.57 | | | 12767.13 | 1915.07 | 14682.20 | Rs. 3137.22 |
| 13 | Form works: Making wooden forms including supplying and selection of materials, fixing, nailing, according to drawings, placing separatoras dismantling forms and hauling upto 30m distance (25 % salvage value after using 6 times) Vertical surface wall etc (4.5m high and and 0.5m wide) Refer: 8-2-c | Sqm | 3.1 | 3.19 | Timber Nails | 0.685 3.13 | m3 kg | 4193.1 35.00 | 2872.25 109.55 | | | | | | | | | |
| | | 10 | 217.00 | 446.60 | | | | | | | | 2981.80 | | | 3645.40 | 546.81 | 4192.21 | Rs. 419.22 |
| 14 | Fe 415 Tor steel reinforcement : Cutting bending binding, placing in position as shown in the drawing & binding by GI wire of reinforcement steel bars for RCC works including haulage distance of 30 m Refer : 7-5 | MT | 12.00 | 12.00 | MS Bars Binding wire | 1.05 10.00 | MT kg | 26000.0 35.0 | 27300.00 350.00 | | | | | | | | | |
| | | 1 | 840.00 | 1680.00 | | | | | | | | 27850.00 | | | 30170.00 | 4525.50 | 34695.50 | Rs. 34695.50 |
| 15 | Making rectangular gabion box with two way knot incl. wire cutting, netting, etc complete Gabion -10 SWG, Medium coated Box Size 3 * 1.5* 1.0 m Mesh Size 10cm * 10 cm square Refer : 16-10 b Supply and packing of boulder Refer: 16-11, 3-3-b, 21-a,b | m3 | 0.5 | 0.8 | 10 SWG GI Wire 10 SWG Selvage Wire Boulder | 33 3 4.5 | kg KG m3 | 35 35.00 810.98 | 1155.00 105.00 3649.42 | | | | | | | | | Each no covers 4.5 sq m in plan. So rate per |
| | | 4.5 | 192.50 | 112.00 | | | | | | | | 4909.42 | | | 5213.92 | 782.09 | 5996.00 | Rs. 1332.45 |
| 14 | Making rectangular gabion mattress with 30 cm thick laid over 10 cm river shingle with two way knot incl. wire cutting, netting, etc complete Gabion -10 SWG, Medium coated Box Size 3 * 1.5* 0.30 m Mesh Size 10cm * 10 cm square Refer : 16-10 b Supply and packing of boulder Refer: 16-11, 3-3-b, 21-a,b | m3 | 0.5 | 0.8 | 10 SWG GI Wire 10 SWG Shingle Boulder | 22 2 0.45 1.35 | kg KG m3 m3 | 35 35.00 912.74 810.98 | 770.00 70.00 410.73 1094.82 | | | | | | | | | Each no covers 4.5 sq m in plan. So rate per sq m is |
| | | 4.5 | 192.50 | 112.00 | | | | | | | | 2345.56 | | | 2650.06 | 397.51 | 3047.56 | Rs. 677.24 |
| 16 | Stone pitching work 30 cm thick Refer ; 16-10 b Supply and packing of boulder Refer: 16-11, 3-3-b, 21-a,b | m2 | 0.5 | 0.80 | Boulder | 1.35 | m3 | 810.98 | 1094.82 | | | | | | | | | Each no covers sq m 4.5 in plan. So rate per sq m is |
| | | 4.5 | 192.50 | 112.00 | | | | | 1094.82 | | | | | | 1399.32 | 209.90 | 1609.22 | Rs. 357.61 |
| 17 | Supply and fix all complete set of operation bridge made iron bars or ladder for operation (Refer : 25-1.1 d) Paint etc (lump sum) and handling | kg | 0.20 0.10 | 0.06 0.01 | Iron paint Sundries | 1.00 0.15 | kg ltr | 40.00 150.00 | 40.00 22.50 10.00 | | | | | | | | | |
| | | 1 | 20.65 | 9.94 | | | | | 72.50 | | | | | | 103.09 | 15.46 | 118.55 | Rs. 118.55 |
| 18 | Supply of steel sheet pile Confirming ISI or equivalent and driving at site as per approved details: Refer Chanda Mohana | m | 8 | 6 | Sheet piles | 1 | m | 5000 | 5000.00 0.00 0.00 0.00 | | | | | | | | | |
| | | 1 | 560.00 | 840.00 | | | | | 5000.00 | | | | | | 6400.00 | 960.00 | 7360.00 | Rs. 7360.00 |
| 19 | Supply and fix Neoprene bearing plates | each | 2 | 2.00 | Neoprene Bearing | 1 | Nr | 30000 | 30000.00 0.00 | | | | | | | | | |
| | | 1 | 140.00 | 280.00 | | | | | 30000.00 | | | | | | 30420.00 | 4563.00 | 34983.00 | Rs. 34983.00 |
| 20 | Grass Turfing on both sides slope: Grass sodding works including sod cutting, transporting, placing in position and water sprinkling and spreading manure on the grass turf Refer ; 2-40, | sqm | 5.00 | | | | | | | | | | | | | | | |
| | | 100 | 350.00 | 0.00 | | | | | 0.00 | | | | | | 350.00 | 52.50 | 402.50 | Rs. 4.03 |
| 21 | Stripping top soil: Removal of top soils & disposal away from the construction site (thickness = 15 cm) Refer ; 1-8 | sqm | 0.16 | | | | | | | | | | | | | | | |
| | | 1 | 11.20 | 0.00 | | | | | 0.00 | | | | | | 11.20 | 1.68 | 12.88 | Rs. 12.88 |

| Rate analysis FY 2001/02 (Applicable to Command Area) | | | | | | | | | | | | | | | | | |
|---|--|------|-----------------------|--------------|--|--|-----------------------|---------------------------------------|--|--------------------------------|------|------|--------------|--------------------|--------------|---------------|---------|
| SN | Description | Unit | Resource | | | | | | | | | | Total Amt | Overhead Charge | Total Amt | Rate/ Unit | |
| | | | Labour Rate Rs. / day | | | Construction Materials | | | | Machinery | | | | | | | |
| | | | Unskill 70 | Skill 140 | Type | Qty | Unit | Rate | Amnt | Type | Qty | Amt | | | | | |
| 22 | Gravel pavement for Embankment:Laying sub-base course of sand mixed gravel including loading and transporting materials, levelling surface and hauling up to 10 m distance - 15 cm solid depth refer 15-9-c | cum | 1.20 | | Gravel | 1.20 | m3 | 912.74 | 1095.28 | 10 MT Roller 1500 Rs /hr | 0.00 | 0.00 | | | | | |
| | | 1 | 84.00 | 0.00 | | | | | 1095.28 | | | 0.00 | 1179.28 | 176.89 | 1356.17 | Rs. | 1356.17 |
| 23 | Supplying and laying NP3 pipe and its accessories with 1:2 cement sand mortar, jute etc including haulage up to 100m distance Pipe dia 900 mm refer 17-1-h | m | 50.00 | 11.00 | NP3 pipe 900 mm Cement Sand Jute bitumen | 32.00 0.29 0.40 12.00 approx | m mt cu m kg | 3140 5200 525.74 40.00 | 100480.00 1508.00 210.30 480.00 100.00 | | | | | | | | |
| | | 32 | 3500.00 | 1540.00 | | | | | 102778.30 | | | 0.00 | 107818.30 | 16172.74 | 123991.04 | Rs. | 3874.72 |
| 24 | Supplying and laying NP3 pipe and its accessories with 1:2 cement sand mortar, jute etc including haulage up to 100m distance Pipe dia 600 mm refer 17-1-f | m | 35.00 | 9.00 | NP3 pipe 600 mm Cement Sand Jute bitumen | 32.00 0.22 0.30 7.00 approx | m mt cu m kg | 1936.00 5200.00 525.74 40.00 | 61952.00 1133.60 157.72 280.00 100.00 | | | | | | | | |
| | | 32 | 2450.00 | 1260.00 | | | | | 63623.32 | | | 0.00 | 67333.32 | 10100.00 | 77433.32 | Rs. | 2419.79 |
| 25 | Supplying and laying NP3 pipe and its accessories with 1:2 cement sand mortar, jute etc including haulage up to 100m distance Pipe dia 500 mm refer 17-1-he | m | 30.00 | 8.00 | NP3 pipe 500 mm Cement Sand Jute bitumen | 32.00 0.14 0.22 5.40 approx | m mt cu m kg | 1600.00 5200.00 525.74 40.00 | 51200.00 743.60 115.66 216.00 75.00 | | | | | | | | |
| | | 32 | 2100.00 | 1120.00 | | | | | 52350.26 | | | 0.00 | 55570.26 | 8335.54 | 63905.80 | Rs. | 1997.06 |
| 26 | Supplying and laying NP3 pipe and its accessories with 1:2 cement sand mortar, jute etc including haulage up to 100m distance Pipe dia 200 mm refer 17-1-b | m | 20.00 | 4.00 | NP3 pipe 200 mm Cement Sand Jute bitumen | 32.00 0.05 0.08 2.40 approx | m mt cu m kg | 1176.00 5200.00 525.74 40.00 | 37632.00 270.40 42.06 96.00 50.00 | | | | | | | | |
| | | 32 | 1400.00 | 560.00 | | | | | 38090.46 | | | 0.00 | 40050.46 | 6007.57 | 46058.03 | Rs. | 1439.31 |
| 27 | Supplying and laying NP3 pipe and its accessories with 1:2 cement sand mortar, jute etc including haulage up to 100m distance Pipe dia 300 mm refer 17-1-b | m | 22.00 | 6.00 | NP3 pipe 300 mm Cement Sand Jute bitumen | 32.00 0.08 0.13 3.63 approx | m mt cu m kg | 1176.00 5200.00 525.74 40.00 | 37632.00 431.60 68.35 145.20 50.00 | | | | | | | | |
| | | 32 | 1540.00 | 840.00 | | | | | 38327.15 | | | 0.00 | 40707.15 | 6106.07 | 46813.22 | Rs. | 1462.91 |
| 28 | Supplying and laying NP2 pipe and its accessories with 1:2 cement sand mortar, jute etc including haulage up to 100m distance Pipe dia 900 mm refer 17-1-h | m | 50.00 | 11.00 | NP3 pipe 900 mm Cement Sand Jute bitumen | 32.00 0.29 0.40 12.00 approx | m mt cu m kg | 1570 811 0.00 40.00 | 50240.00 235.18 0.00 480.00 100.00 | | | | | | | | |
| | | 32 | 3500.00 | 1540.00 | | | | | 51055.18 | | | 0.00 | 56095.18 | 8414.28 | 64509.46 | Rs. | 2015.92 |
| 29 | Supplying and laying NP2 pipe and its accessories with 1:2 cement sand mortar, jute etc including haulage up to 100m distance Pipe dia 600 mm refer 17-1-f | m | 35.00 | 9.00 | NP3 pipe 600 mm Cement Sand Jute bitumen | 32.00 0.22 0.30 7.00 approx | m mt cu m kg | 934.00 810.98 0.00 40.00 | 29888.00 176.79 0.00 280.00 100.00 | | | | | | | | |
| | | 32 | 2450.00 | 1260.00 | | | | | 30444.79 | | | 0.00 | 34154.79 | 5123.22 | 39278.01 | Rs. | 1227.44 |
| 30 | Supplying and laying NP2 pipe and its accessories with 1:2 cement sand mortar, jute etc including haulage up to 100m distance Pipe dia 500 mm refer 17-1-he | m | 30.00 | 8.00 | NP3 pipe 500 mm Cement Sand Jute bitumen | 32.00 0.14 0.22 5.40 approx | m mt cu m kg | 738.00 810.98 0.00 40.00 | 23616.00 115.97 0.00 216.00 75.00 | | | | | | | | |
| | | 32 | 2100.00 | 1120.00 | | | | | 24022.97 | | | 0.00 | 27242.97 | 4086.45 | 31329.42 | Rs. | 979.04 |
| 31 | Supplying and laying NP2 pipe and its accessories with 1:2 cement sand mortar, jute etc including haulage up to 100m distance Pipe dia 200 mm refer 17-1-b | m | 20.00 | 4.00 | NP3 pipe 200 mm Cement Sand Jute bitumen | 32.00 0.05 0.08 2.40 approx | m mt cu m kg | 286.00 810.98 0.00 40.00 | 9152.00 42.17 0.00 96.00 50.00 | | | | | | | | |
| | | 32 | 1400.00 | 560.00 | | | | | 9340.17 | | | 0.00 | 11300.17 | 1695.03 | 12995.20 | Rs. | 406.10 |
| 32 | Supplying and laying NP2 pipe and its accessories with 1:2 cement sand mortar, jute etc including haulage up to 100m distance Pipe dia 300 mm refer 17-1-b | m | 22.00 | 6.00 | NP3 pipe 300 mm Cement Sand Jute bitumen | 32.00 0.08 0.13 3.63 approx | m mt cu m kg | 440.00 810.98 0.00 40.00 | 14080.00 67.31 0.00 145.20 50.00 | | | | | | | | |
| | | 32 | 1540.00 | 840.00 | | | | | 14342.51 | | | 0.00 | 16722.51 | 2508.38 | 19230.89 | Rs. | 600.97 |

Rate analysis for FY 2001/02 (Applicable to Headworks)

| SN | Description | Refer | Labour | | Lead Km | | Royaltel /trip | Truck Time | | Total Amount without CPCT | Rate/ Unit |
|----|---|-------------|---------|---------|---------|-------|----------------|------------|---------|---------------------------|------------|
| | | | Unskill | Skilled | Rough | Metal | | Idle Hr | Work hr | | |
| a | Sand Truck Capacity : 6mt Collection Screening and providing of sand (haulage < 10m Quarry capacity <65%) Loading Unloading and transportation | m3 3-1-d | 7.69 | | | | | | | | |
| | | 21-a&b | 1.57 | | | 3 | 23 | 0.75 | 1.75 | | |
| | | 5.38 | 648.58 | | | | | 250.00 | 217.50 | 857.50 | 1973.578 |
| b | Aggregate Truck Capacity : 6mt Collection Screening and providing of Aggregate(haulage < 10m. (5 to 20mm size) Loading Unloading and transportation | m3 3-2-c | 26.93 | | | | | | | | |
| | | 21-a&b | 1.647 | | | 3 | 23 | 0.75 | 1.75 | | |
| | | 4.58 | 2000.4 | | | | | 250.00 | 217.50 | 857.50 | 3325.418 |
| c | Boulder Truck Capacity : 6mt Collection Screening and providing of Boulder (haulage < 10m. (70 to 100mm size) Loading Unloading and transportation | m3 3-3-b | 4.90 | | | | | | | | |
| | | 21-a&b | 2.0845 | | | 3 | 30 | 0.75 | 2.1 | | |
| | | 3.5 | 488.9 | | | | | 250.00 | 217.50 | 1029.00 | 1985.415 |
| d | Soil Truck Capacity : 6mt Excavate in foundation dry/ wet condition under water including haulage up to 250m and lift 5m. Excavation 10m lead and 1.5m lift Extra labour additional 3.5m lift Loading Unloading and transportation 250m | m3 2.1 | 3.5 | | | | | | | | |
| | | 21-a&b | 0.75 | | | 0.25 | | 0.15 | 0.05 | | |
| | | 5 | 312.2 | | | | | 43.50 | 24.50 | | 380.2 |
| e | Soil for struture foundation Truck Capacity : 6mt Excavate in foundation dry/ wet condition under water including haulage up to 250m and lift 5m. Excavation 10m lead and 1.5m lift Additional Labour for under water works Extra labour additional 3.5m lift Loading Unloading and transportation 250m | m3 2.1 | 3.5 | | | | | | | | |
| | | 2-38 | 1.8 | | | | | | | | |
| | | 21-a&b | 0.75 | | | 0.25 | | 0.15 | 0.05 | | |
| | | 5 | 438.2 | | | | | 43.50 | 24.50 | | 506.2 |
| | | | | | | | | | | | 101.24 |

Rate analysis FY 2001/02 (Applicable to Headworks)

| SN | Description | Unit | Resource | | | | | | | | | | Total Amt | Overhead Charge | Total Amt | Rate/ Unit | |
|----|---|------|-----------------------|--------|------|------------------------|-------|------|---------|-----------|-----|-----|-----------|-----------------|-----------|------------|-------------|
| | | | Labour Rate Rs. / day | | | Construction Materials | | | | Machinery | | | | | | | |
| | | | Unskill | Skill | Type | Qty | Unit | Rate | Amnt | Type | Qty | Amt | | | | | |
| 1 | Excavation of soft clay & silty soils including disposal upto 10m lead and 1.5m lift. Refer 2-1. | | 0.7 | | | | | | | | | | | | | | |
| | | 1 | 49.00 | | | | | | | | | | 1.47 | 50.47 | 7.57 | 58.04 | Rs. 58.04 |
| 2 | Excavate in foundation dry/ wet condition and dispose including haulage up to 250m and lift 5m. Refer: d above | | | | | | | | | | | | | 76.04 | 11.41 | 87.45 | Rs. 87.45 |
| 3 | Excavate in foundation dry/ wet condition under water including haulage up to 250m and lift 5m. Refer: e above | | | | | | | | | | | | | 101.24 | 15.19 | 116.43 | Rs. 116.43 |
| 4 | Cutting, uprooting & disposal of grasses with light compaction, levelling & cleaning the site Refer: 1-5 | sq m | 0.023 | | | | | | | | | | | | | | |
| | | 1 | 1.61 | | | | | | | | | | | 1.61 | 0.24 | 1.85 | Rs. 1.85 |
| 5 | Earth filling in trench with ordinary soils in 15 cm thick layers and hand compaction (Haulage< 10m) Refer: 2-25 | | 0.25 | | | | | | | | | | | | | | |
| | | 1 | 17.50 | | | | | | | | | | | 17.50 | 2.63 | 20.13 | Rs. 20.13 |
| 6 | Back filling in Structure including compaction Backfilling with all type of soil in 22 cm thick compaction all complete (Haulage< 10m and lift 1.5m) Refer: 2-43 b | | 0.5 | 0.01 | | | | | | | | | | | | | |
| | | 1 | 35.00 | 1.40 | | | | | | | | | | 36.40 | 5.46 | 41.86 | Rs. 41.86 |
| 7 | Each additional haulage of extra 10 m Refer: 2-27 | cu m | 0.12 | | | | | | | | | | | | | | |
| | | 1 | 8.40 | | | | | | | | | | | 8.40 | 1.26 | 9.66 | Rs. 9.66 |
| 8 | Concreting of foundations vert. faces walls (cement conc) including supply of materials and haulage upto 30m PCC 1:3:6 or equivalent M10 Refer: 7-2-c | m3 | 4 | | 1 | Cement | 0.22 | mt | 5200.00 | 1144.00 | | | | | | | |
| | | | | | | Aggregate | 0.89 | m3 | 726.07 | 646.21 | | | | | | | |
| | | | | | | sand | 0.47 | m3 | 366.84 | 172.41 | | | | | | | |
| | | 1 | 280.00 | 140.00 | | | | | | 1962.62 | | | | 2382.62 | 357.39 | 2740.01 | Rs. 2740.01 |
| 9 | Reinforced Concrete Class M 15 including supply of material and haulage distance upto 30 m Refer: 7-4-a | m3 | 10 | | 0.9 | Cement | 0.32 | mt | 5200.00 | 1664.00 | | | | | | | |
| | | | | | | Aggregate | 0.85 | m3 | 726.07 | 617.16 | | | | | | | |
| | | | | | | sand | 0.445 | m3 | 366.84 | 163.24 | | | | | | | |
| | | 1 | 700.00 | 126.00 | | | | | | 2444.40 | | | | 3270.40 | 490.56 | 3760.97 | Rs. 3760.97 |

Rate analysis FY 2001/02 (Applicable to Headworks)

| SN | Description | Unit | Resource | | | | | | | | | Total Amt | Overhead Charge | Total Amt | Rate/ Unit | | |
|----|---|------|-----------------------|--------------|--|-----------------------------------|----------------------|---------------------------------------|--|-----------------------------------|------|--------------|--------------------|--------------|---------------|----------|---|
| | | | Labour Rate Rs. / day | | | Construction Materials | | | Machinery | | | | | | | | |
| | | | Unskill | Skill | Type | Qtty | Unit | Rate | Amnt | Type | Qtty | | | | | Amnt | |
| | | | 70 | 140 | | | | | | | | | | | | | |
| 10 | Reinforced Concrete Class M 20 including supply of material and haulage distance upto 30 m Refer: 7-4-a | m3 | 7 | 0.8 | Cement Aggregate sand | 0.4 0.86 0.425 | mt m3 m3 | 5200.00 726.07 366.84 | 2080.00 624.42 155.91 | | | | | | | | |
| | | 1 | 490.00 | 112.00 | | | | | 2860.33 | | | 3462.33 | 519.35 | 3981.68 | Rs. | 3981.68 | |
| 11 | Precast riprap materials: PCC works for riprap materials including concrete preparation and hauling upto 30 m distance and pouring in place of M15 grade (including form works etc all) Refer: 7-9 1 Nr contains 4.68m2 in plan and 3.74 m3 in volume approximately | m2 | 25.432 | 4.488 | Cement Aggregate sand Formworks | 1.1968 1.1514 1.6643 6.2 | mt m3 m3 m2 | 5200.00 726.07 366.84 356.34 | 6223.36 836.00 610.53 2209.29 | | | | | | | | Each no covers sq 4.68 m in plan. So rate per sq m is |
| | | 3.74 | 1780.24 | 628.32 | | | | | 9879.18 | | | 12287.74 | 1843.16 | 14130.90 | Rs. | 3019.42 | |
| 12 | Form works: Making wooden forms including supplying and selection of materials, fixing, nailing, according to drawings, placing separatoras dismantling forms and hauling upto 30m distance (25 % salvage value after using 6 times) Vertical surface wall etc (4.5m high and and 0.5m wide) Refer: 8-2-c | Sqm | 3.1 | 3.19 | Timber Nails | 0.685 3.13 | m3 kg | 4193.1 35.00 | 2872.25 109.55 | | | | | | | | |
| | | 10 | 217.00 | 446.60 | | | | | 2981.80 | | | 3645.40 | 546.81 | 4192.21 | Rs. | 419.22 | |
| 13 | Fe 415 Tor steel reinforcement : Cutting bending binding, placing in position as shown in the drawing & binding by GI wire of reinforcement steel bars for RCC works including haulage distance of 30 m Refer : 7-5 | MT | 12.00 | 12.00 | MS Bars Binding wire | 1.05 10.00 | MT kg | 26000.0 35.0 | 27300.00 350.00 | | | | | | | | |
| | | 1 | 840.00 | 1680.00 | | | | | 27650.00 | | | 30170.00 | 4525.50 | 34695.50 | Rs. | 34695.50 | |
| 14 | Making rectangular gabion box with two way knot incl. wire cutting, netting, etc complete Gabion -10 SWG, Medium coated Box Size 3 * 1.5* 1.0 m Mesh Size 10cm * 10 cm square Refer ; 16-10 b Supply and packing of boulder Refer: 16-11, 3-3-b, 21-a,b | m3 | 0.5 | 0.8 | 10 SWG GI Wire 10 SWG Selvage Wire Boulder | 33 3 4.5 | kg KG m3 | 35 35.00 567.26 | 1155.00 105.00 2552.68 | | | | | | | | Each no covers sq 4.5 m in plan. So rate per sq m is |
| | | 4.5 | 192.50 | 112.00 | | | | | 3812.68 | | | 4117.18 | 617.58 | 4734.75 | Rs. | 1052.17 | |
| 14 | Making rectangular gabion matress with 30 cm thick laid over 10 cm river shingle with two way knot incl. wire cutting, netting, etc complete Gabion -10 SWG, Medium coated Box Size 3 * 1.5* 0.30 m Mesh Size 10cm * 10 cm square Refer ; 16-10 b Supply and packing of boulder Refer: 16-11, 3-3-b, 21-a,b | m3 | 0.5 | 0.8 | 10 SWG GI Wire 10 SWG Shingle Boulder | 22 3 0.45 1.35 | kg KG m3 m3 | 35 35.00 726.07 567.26 | 770.00 105.00 326.73 765.80 | | | | | | | | Each no covers sq m in plan. So rate per sq m is |
| | | 4.5 | 192.50 | 112.00 | | | | | 1967.54 | | | 2272.04 | 340.81 | 2612.84 | Rs. | 580.63 | |
| 15 | Supply and fix all complete set of operation bridge made iron bars or ladder for operation (Refer : 25-1.1 d) Paint etc (lump sum) and handling | kg | 0.20 0.10 | 0.06 0.01 | Iron paint Sundries | 1.00 0.15 | kg ltr | 40.00 150.00 | 40.00 22.50 10.00 | | | | | | | | |
| | | 1 | 20.65 | 9.94 | | | | | 72.50 | | | 103.09 | 15.46 | 118.55 | Rs. | 118.55 | |
| 16 | Supply of steel sheet pile Confirming ISI or equivalent and driving at site as per approved details: Refer Chanda Mohana | m | 8 | 6 | Sheet piles | 1 | m | 5000 | 5000.00 5000.00 | | | | | | | | |
| | | 1 | 560.00 | 840.00 | | | | | | | | 6400.00 | 960.00 | 7360.00 | Rs. | 7360.00 | |
| 17 | Supply and fix Neoprene bearing plates Refer; 16-5 f | each | 2 | 2.00 | Neoprane Bearing | 1 | Nr | 30000 | 30000.00 | | | | | | | | |
| | | 1 | 140.00 | 280.00 | | | | | 30000.00 | | | 30420.00 | 4563.00 | 34983.00 | Rs. | 34983.00 | |
| 18 | Grass Turfing on both sides slope: Grass sodding works including sod cutting, transporting, placing in position and water sprinkling and spreading manure on the grass turf Refer; 2-40, 2-41 | sqm | 5.00 | | Chemical manure | | kg | 10.00 | | | | | | | | | |
| | | 100 | 350.00 | | | | | | | | | 350.00 | 52.50 | 402.50 | Rs. | 4.03 | |
| 19 | Gravel pavement for Embankment:Laying sub-base course of sand mixed gravel including loading and transporting materials, levelling surface and hauling up to 10 m distance - 15 cm solid depth refer 15-9-c | sqm | 0.19 | | Gravel | 0.19 | m3 | 726.07 | 139.41 | 10 MT Roller 1000 Rs /hr | 0.01 | 13.00 | | | | | Each no covers cu m in plan. So rate per cu m is |
| | | 1 | 13.30 | | | | | | 139.41 | | | 13.00 | 24.86 | 190.56 | Rs. | 1270.41 | |

Sunsari District Approved Rate for FY 2001/02

| Item No | Particulars | Unit Rate Rs | Unit |
|---------|-------------------------------|--------------|---------|
| 1 | Skilled Labour | 140.00 | /day |
| 2 | Unskilled Labour | 70.00 | /day |
| 3 | Truck Idle Charge | 290.00 | /hr |
| 4 | Truck Work charge | 490.00 | /hr |
| 5 | Truck avg speed in Metal Road | 40.00 | km/hr |
| 6 | Truck avg speed in Rough Road | 10.00 | km/hr |
| 7 | Royaltee/ trip | 250.00 | Rs/trip |
| 8 | Cement | 260.00 | Rs/bag |
| 9 | Cost of sal wood | 33544.50 | Rs/m3 |
| 10 | Ordinary wood | 17655.00 | Rs/m3 |
| 11 | Cost of bricks | 2.90 | Rs/nr |
| 12 | Reinforcement | 26000.00 | Rs/mt |
| 13 | MS Plate 3mm x 20mm | 33.00 | Rs/kg |
| 14 | Mosquito Net | 13.33 | Rs/ft2 |
| 15 | PVC pipe 1.5" | 16.50 | Rs/ft |
| 16 | Polyethene pipe 4" | 22.92 | Rs/ft |
| 17 | Plain Glass 4mm | 225.96 | Rs/m2 |
| 18 | Lime (white) | 6.50 | Rs/kg |
| 19 | Snowcem Paint | 52.00 | Rs/kg |
| 20 | Distemper (washable) | 170.00 | Rs/ltr |
| 21 | Brush for distemper) | 170.00 | Rs/nr |
| 22 | Painting brush | 46.00 | Rs/nr |
| 23 | 10 SWG GI wire | 35 | Rs/kg |
| 24 | Land Acquisition | 300000 | Rs/ha |
| | | | |