KARAPANI IRRIGATION PROJECT
DETAIL PROJECT REPORT

1. SCOPE OF PROJECT:

This section of the project report covers the description of the project and its objectives. The section also covers hydrology. forest area involved in construction of the project, submergence of land and population, creation of reservoir, utilization in canal system, revenue returns and financial involvements etc.

2. INTRODUCTION:

a. Aim of the Project:

Karapani irrigation project envisages construction of a reservoir scheme across the Nalah Karapani, a tributary in the left tank of river Brahmani.

This medium irrigation project shall provide irrigation to 3500 Ha. CCA. This will provide irrigation to 3185 Ha. of land in kharif and 1470 Ha. in rabi respectively. The annual intensity of irrigation comes to 133 %.

b. Necessity of the project:

The dam, reservoir and ayacut area comes under Lahunipara Block of Sundargarh District. The agricultural yields in this area completely depend on the natural rainfall, which is erratic in nature since last decade. The inhabitants consisting of more than, 75 % as marginal farmers suffer year as agriculture is the only source of income for them. As such, the financial status every of the people is getting dilapidated year by year. So, development of water resources and providing assured, irrigation is absolutely necessary to improve the agriculture output and economy of the region to mitigate the misery of sizeable weaker section of the people. Moreover, the majority group of the population belongs to the Scheduled Cast and Scheduled Tribe group

c. Location and Access:

The project is located in Lahunipada Block of Sundargarh District near village Barghat at Lat 21°44 15" N and Long 85°02'42" E. The project area is covered in toposheet No F45N1 & F45N2. The location of the project is enclosed in the diversion proposal over the toposheet.

The dam site is about 35 Kms. from Lahunipara Block Headquarters. The nearest railway station is Rourkela which is about 85 Kms. from the proposed dam site. The length of road connecting from dam site to NH 23 is about 40 Kms

d. River & Basin

The nallah Karapani, a left tributary to river Brahmani originates from Kumrital Pahar at an elevation of 1000 M. It flows toward south direction for a length of about 4.00 Km at the beginning, then flows towards south west direction for a length of about 6.00 Km. Then it flows in west direction for a length of 10 Km. up to proposed dam site and run through an additional length of about 8.50 Km. before merging with the river Brahmani.

e. Catchment

The catchment area up to proposed dam site is 121.00 Sq. Km

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f. Climate

The climate can be mainly categorized by three distinct seasons namely Summer (March to mid of June), Rainy (mid of June to October) and winter (November to February).

i. Temperature

The area belongs to tropical climate zone the variation of temperature in summer is 40° C to 48° C and in winter it is 6 to 20° C.

ii. Rain Fall

Rainfall in the basin is mainly due to south west monsoon, which occurs during the period from mid-June to October About 85 % of the precipitation is available in these months the average annual rainfall in the catchment is 1286.01 MM (as computed from the observations taken in nearby R. G Stations)

iii. Relative Humidity

Relative humidity is minimum in April (approx. 34 %) and maximum in September (approx. 80 %).

iv. Wind velocity

The average wind velocity of the area is 6 km/hr.

v. Cloud cover

The maximum cloud cover is observed in the month of July & August and minimum cloud cover is observed in January & February.

g. Population

The catchment area is very thinly populated as the area lies in the hilly terrain. But the ayacut is moderately populated and the fast-growing population demands for some sort of protection to the cereal crops and an additional crop productivity to meet the needs. The population suffers from chronic drought condition every year resulting them to cry for their livelihood. If constructed this project will serve the population by transforming the area from rain fed to irrigable and thereby making them self-sufficient.

h. Mineral Resources

Though forest and water resources are in abundance, subsurface mineral deposits are found to be absent as revealed from topo study. Hence the area is very much underdeveloped so far Industrial growth is concerned and fully depend on agriculture to earn their livelihood.

i. Socio-Economic Aspects

The ayacut area of the project is in the hilly areas of Lahunipara Block which has very little scope of development so far as activities other than agriculture is concerned. The people of the proposed ayacut consisting of tribal families depend on agriculture which is subjected to ravages of nature due to erratic and uneven rainfall. The land holding of families being considerably low the per capita agricultural income is negligible and hence people are economically poor and backward the present land use practice and the traditional farming in the command area is also primitive since generation together. The modern methods of cultivation & use of technology as well as manures & fertilizers in cropping pattern is yet to be practiced. The potentiality of this project, when developed shall no doubt, accelerate the growth of economy in general and improve socio-economic status specially of the backward classes in the society.

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In absence of irrigation facility, the crop yield solely depends on the rainfall, which is unevenly distributed. Failure of crop is a common phenomenon in this area. Apart from drought, due to unevenly distributed rain fall, the crop output also suffers very badly. For this, the only solution is to provide irrigation from a storage reservoir and there by uplift the economy of the weaker sections of the society.

On completion of the project, the local people will immediately enjoy the facility of assured irrigation and thereby add to the socio-economic growth of the area.

3. BRIEF DESCRIPTION OF THE SCHEME:

This project aims at construction of a 1312 M. long and 30.50 M. high earth dam having a central ogee gated spillway of 60.50 M. length. All the alternatives of dam axis have been explored and the present one has been approved by the Engineer-in-Chief, P & D, Orissa. The total catchment area at the dam site is 121.00 Sq. Km. The total annual inflow into the reservoir is 5061.80 Ha. M, corresponding to a 75 % dependable year. The project has an average water utilization of 71.86 % considering 29 years ' data.

The earth dam is proposed to be of homogeneous section with provisions of vertical sand chimney to drain the seepage water through the filter drains and rock-toe.

The 605 M. long central spillway shall be ogee type & gated. The crest level of the spillway is 182.50 M. fitted with 4 Nos. of radial gates of 12m X 8m size. The spillway is designed to discharge maximum flood of 1240.00 Cumecs. The project shall provide irrigation to C.C.A of 3500 Ha. The project will irrigate 3325 Ha. in kharif and 2100 Ha, in rabi by means of two main canals. The length of left main canal is 12.00 Km. (approx.) and right main canal is 4.98 Km. Minors and Sub-minors' network shall be provided as per the requirement after detailed survey is done.

Besides creating above irrigation potential, 20 % of the water has reserved for riparian use at the downstream & upstream as per suggestion of Central Water Commission.

4. INTER- STATE ASPECTS:

The project is entirely in the state of Orissa and hence the question of interstate aspect does not arise.

5. IRRIGATION PLANNING:

a. General:

The project comes under Lahunipara Block of Sundargarh district which is a hilly and drought prone area. The present land use practice and the traditional farming is primitive and continuing from generations. The modern methods of cultivation are yet to be practiced due to the erratic behavior of the monsoon. Paddy is the principal crop generally grown by the people of this locality.

At present the area under cultivation is about 2734 Ha having very less yield. After completion of the project irrigation to an area of 3325 Ha. in Kharif and 2100 Ha. in Rabi with an annual irrigation

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of 5425 Ha shall be developed. Besides, the project will also provide drinking water and other riparian use at the downstream and upstream.

b. Main canal and distribution system:

There are two main canals i.e. left and right of length 12 Km. and 4.98 Km. respectively. Both the canals shall be contour canals.

c. Land Levelling:

Since a large area of the ayacut is undulated, land levelling in the command area cannot be done. This activity shall be automatically undertaken by the beneficiaries of the command area after development of the irrigation facilities. Also, other beneficiary-oriented schemes can be extended by the D.R.D.A at subsidized rates.

d. Cropping Pattern and crop water requirement

Before irrigation, paddy is the main crop generally grown by the people of this locality. Due to uncertainty of rainfall in the ayacut neither any high yielding variety paddy nor any cash crops are cultivated. After creating assured irrigation high yielding paddy as well as crops like vegetables, groundnuts, maize and other oilseeds will be cultivated. State Agricultural Department provides technical know-how as well as advice for better crop yields. Crop water requirement based on statement of State Agriculture Department for different months have been calculated as per guidelines of Ministry of Agriculture.

e. Reservoir Simulation Study:

Period of Simulation is 1977-78 to 2005-06 (hydrological year). First of all, sediment analysis is carried out with reference to I. S. Code No. IS-5477 (part I)-1969 (Methods for fixing the capacities of Reservoirs) for 50 years and 25 years. Revised Area Capacity are computed with assumption of new zero elevation. Finally, new zero elevation with reference to 50 year's silt loads is 171.65 M. and in case of 25 year's silt load is 170.50 M. Hence D.S. L is fixed at an elevation of 174.00M. Evaporation loss data is adopted from Rukura medium irrigation project report already approved by the C.W.C. F. R.L is finalized by hit & trial at an elevation of 190.50 M. which will take care to supply the irrigation needs to an area of 3500 Ha. of C.C.A. For simulation studies, 25 years sedimented revised area capacity curves are used. Simulation studies are carried for 29 years and the percentage of success is 86.20 %. The percentage of water utilization is 71.86 %.

f. Water Account Statement

The Water Account statement reflects the percentage of utilization of water potential maximum up - to 71.86 %. The project aims at maximum utilization of water by providing irrigation up - to 95 % of C.C.A. in kharif, 60 % of C.C.A. in rabi and 155 % of C.CA. as annual irrigation.

6. RESERVOIR SUBMERGENCE:

a. Forest Clearance Proposal

b. Reservoir, Dam Base & Canal

Forest Area	Non-Forest Land
113.075 Ha	366.859 Ha

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Abstract of forest land involved in Dam base & Reservoir

Sl No.	Name of the Village	Forest Area (Ha.)	Non-Forest Area (Ha.)	Total Area (Ha.)
1	Angul	14.504	44.553	59.057
2	Sulavadihi	27.867	116.293	144.160
3	Barghat	4.446	9.726	14.172
4	Dhanijam	11.218	65.297	76.515
5	Ranja	18.604	88.859	107.463
6	Lunga RF	3.626	0.000	3.626
7	Kundeibera RF	2.616	0.000	2.616
8	Nagaria PRF	8.474	0.000	8.474
	Total	**91.355**	**324.728**	**416.083**

Abstract of forest land involved in Canal

Sl No.	Name of the Village	Forest Area (Ha.)	Non-Forest Area (Ha.)	Total Area (Ha.)
1	Barghat	1.305	1.011	2.316
2	Dhanijam	0.652	1.222	1.874
3	Haldikudar	1.696	2.246	3.942
4	Jadibahal	0.275	6.625	6.900
5	Kantakudar	5.779	2.934	8.713
6	Sadhubahal	2.902	2.529	5.431
7	Khajurinali	0.000	2.233	2.233
8	Mahuldihi	4.508	10.603	15.111
9	Sialikudar	0.271	5.953	6.224
10	Sihidiha	2.614	6.775	9.389
11	Kundeibera RF	1.718	0.000	1.718
	Total	**21.720**	**42.131**	**63.851**

The FRL of this project has been kept at 190.50 M. MWL & FRL are the same as no difference has been allowed for flood lift. By creation of the reservoir total 400.59 Ha. of land will be submerged out of which 78.97 Ha. (approx.) is forest land.

7. Rehabilitation and Resettlement Plan:

The Reservoir will submerge 5nos. of villages namely Dhanijam, Sulabhdihi. Angul, Ranja and Barghat. Out of which first two shall be fully submerged and others three shall be partly submerged. In total 148 nos. of families will be displaced as per 2011 census (S.C-21 & S.T- 127).

Base line survey for displaced families shall be done and a comprehensive rehabilitation and resettlement plan shall be prepared basing on the latest policies of the Govt. of Orissa.

a. Property and Communication:

No National Highway or State Highway comes under submergence. No railway line is to be submerged. No transmission line or telephone line comes under the submergence area. Only about 8 Km. of other District Road category connecting Khuntagaon to Angul native villages shall be submerged.

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A periphery road, as a substitute shall be constructed to connect villages survey shall be in upstream of reservoir at the project's cost. Detailed survey shall be conducted to ascertain the quantum of private land & property, Govt. land, forest land etc. suitable compensation packages shall be paid charging to the conducted to ascertain

b. Mineral Deposits:

No useful Mineral deposits exist in the reservoir area as ascertained from the concerned topo sheet.

c. Archeological Monuments:

No archeological monuments shall be submerged by creation of the reservoir.

8. FINANCIAL ASPECTS:

a. General:

Karapani irrigation project will provide irrigation facilities to 3500 Ha. of C.C.A. On completion, it will provide irrigation to 5425 Ha. annually. The cost of the project is **Rs.14515.00** Lakhs. The cost per ha. of CC.A is Rs. 4.15 Lakhs. The cost of annual irrigation is Rs. 2.68 Lakhs/Ha.

b. Water Rates:

The water rates shall be collected as per the existing rates of Dept. of Water Resources, Govt of Orissa. Imposition of water rates will be made gradually depending on the year of irrigation. Since the cultivator will take time to acquaint themselves with the method of irrigation, full water rates shall be applicable only from the 4th year of commencement of irrigation facilities.

c. Benefit Cost Ratio:

The Benefit cost Ratio at 10 % interest rate has been worked out to be 1608 and is appended the state finance department will be moved to accord necessary financial concurrence to the estimated value of the project.

d. Internal Rate of Return (I.R.R.):

Internal rate of return has been calculated by iterative method and is appended. The internal rate of return is 15.43 %.

9. CONCLUSION AND RECOMMENDATION:

Karapani irrigation project will provide assured irrigation facility to 3325 Ha. in kharif and 2100 Ha. in rabi in tribal belt of Sundargarh District. Moreover, it will provide drinking water facilities and other riparian use to the local people. The water utilization is 71.86 %. Benefit Cost Ratio is 1.608 and internal rate of return is 15.43 % which are satisfactory. The irrigation facility available in Lahunipara and Bonai Blocks are very less. The socio-economic condition of the tribal area is in very distressed condition. To improve it and to add to the gross national productivity, the project should be taken up on priority basis.

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