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SI No.:11 of 2002-2003

GOVERNMENT OF INDIA

**CENTRAL WATER COMMISSION
PROJECT APPRAISAL ORGANISATION**

**NOTE FOR CONSIDERATION OF
THE ADVISORY COMMITTEE ON IRRIGATION
FLOOD CONTROL AND MULTIPURPOSE PROJECTS.**

NAME OF THE PROJECT:

**MARKANDEYA RESERVOIR PROJECT,
KARNATAKA.**

**NEW DELHI
MAY 2002**

NOTE ON MARKANDEYA RESERVOIR PROJECT (MAJOR) FOR CONSIDERATION OF THE TECHNICAL ADVISORY COMMITTEE

Estimated Cost : 209.85 crores (1999-2000)

CCA : 19,105 ha.

GCA : 23,881 ha.

1.0 INTRODUCTION:

The river Markandeya is a major tributary to Ghataprabha which is a tributary to Krishna river. This river originates in Western ghats and flows for a length of 66 km.

The proposed Markandeya Reservoir Project is located near Shirur village, Hukkeri Taluka of Belgaum District, Karnataka state. It envisages construction of a dam across river Markandeya in Krishna basin. Irrigation is proposed through two main canals. Contemplated benefits are irrigation in CCA of 19,105 ha in Belgaum District (Khariff: 10845 ha; Rabi: 6775 ha; Two seasonal: 1485 ha) and drinking water supply. 8.40 Mcum of water per annum has been earmarked for drinking water supply. *Belgaum District*

2.0 PROJECT PROPOSAL:

The project envisages construction of the following works :

2.1 475.0 m long main concrete dam, over flow section 93.70 m long and left and right side non over flow section 381.30 m long. The earthen dyke in saddle portion is 920.0 m long. The concrete dam has 26 blocks. There is a provision of six numbers of radial crest gates of size 12.70 m x 8.0 m.

The crest level of the dam is 696.0 m and full reservoir level (FRL) is 704.0 m. The top of dam is fixed at R.L. 707.0 m. The dam is designed for a flood discharge of 3728 cumec.

There are two main canals. The right bank main canal of 80.00 km in length has been designed to carry a discharge of 7.36 cumec and left bank canal, 12.00 km in length, has been designed to carry a discharge of 0.44 cumec. The CCA under right bank main canal is 18,125 ha and that under left bank main canal is 890 ha.

Salient feature of the project are given in Annexure-I. A location map and an index map indicating the position of the project and command area are enclosed.

3.0 HYDROLOGICAL PARAMETERS OF THE PROJECT PROPOSAL

3.1 WATER AVAILABILITY:

The catchment area of the river at Markandeya Dam site is 432 Sq km and lies entirely in Karnataka State. Rainfall data of five nearby rain gauge stations for the period from 1971-72 to 1994-95 have been considered for calculation of mean annual rainfall at the project site. These rain gauge stations are located at (1) Belgaum (2) Desur (3) Sutagatti (4) Jamboti and (5) Daddi influencing the catchment. Out of these Belgaum is an IMD station. The main annual rainfall in the catchment is of the order of 1495.80 mm. The Markandeya river is gauged from 1971 by current meter method at Pachapur which is situated about 10.00 km down stream of the proposed project site.

The finalized yield series adopted for hydrology purposes has been appended as Annex-II which needs to be reviewed at the time of detailed design.

3.2 DESIGN FLOOD STUDIES:

The river has been gauged by slope area method at Shirur site. The maximum flood discharge has been computed by triangular Hydrograph approach. The design flow of 3728 cumec is adopted for preliminary design purposes. The PMF has been worked out in view of non-availability of site-specific data and needs review before the detailed design stage.

3.3 SEDIMENTATION STUDIES:

The basic runoff data at Pachapur has been found inconsistent for the later years. In the absence of reliable sediment data, a reasonable sediment rate of 1Acft/year/sq.mile has been adopted.

4.0 **IRRIGATION, PLANNING AND WATER REQUIREMENT:**

Details of the command area and the irrigated area are as under :

Gross Command Area	: 23,881 ha.
Culturable Command Area	: 19,105 ha.
Annual Irrigation	: 19,105 ha.

The Success of the scheme with use of ground water for the month of June works out to be 76% which is more than acceptable value of 75%.

The Irrigation Planning aspect is acceptable.

5.0 **CONJUNCTIVE USE OF SURFACE AND GROUND WATER:**

The consumptive use of ground water and monitoring network will be planned as suggested by CGWB in consultation with ISRAD and Department of Mines and Geology of State.

6.0 **PROVISION FOR DRINKING WATER:**

Presently the drinking water requirement of habitants in the down stream of the dam and command is being met from ground water sources. Provision of 8.40 Mcum storage has been kept for the purpose of drinking water in command and d/s of dam.

7.0 **PROVISION FOR HYDRO-POWER GENERATION:**

No study has been carried out for assessing the scope of hydropower generation from the project.

8.0 **DRAINAGE:**

For Drainage arrangement an area equivalent to 10% of the CCA has been considered for cost estimate. In the estimate a provision of Rs. 17.86 lakh (at a rate of Rs. 935 per hectare for 1910 hectare of land) has been made for drainage.

9.0 **INTER-STATE ASPECT:**

There are certain discrepancies in 2002 Master Plan from the Master Plan of 1993 for utilization of Karnataka share of Krishna water. However, the water allocated /allotted to this project in the Master Plan of 1993 and January 2002 is the same i.e. 4 TMC. Thus as far as Markandeya project is concerned, the project is acceptable from inter state angle. However the future planning should be within the overall allocation without adversely affecting the existing projects.

10.0 **FOREST CLEARANCE:**

For this project, about 338.53 ha. of forest land is involved, 263.71 ha. of land is for submergence, 39.87 ha. of land is for Canal acquisition & 21.95 ha. of land for roads and buildings. The proposal of seeking prior approval of Ministry of Environment and Forest, Govt. of India, New Delhi has been submitted. The approval is awaited.

11.0 **REHABILITATION AND RESETTLEMENT ASPECTS:**

In this project 9 villages and 898 ha of land is going to be submerged. The compensation rate for the land coming under submergence has been fixed by the State Government. Population affected is 4030.100 Acres of land is required for rehabilitation, for acquisition of the same action has been initiated.

12.0 **ESTIMATE, ECONOMIC ANALYSIS & FINANCIAL RETURNS:**

The estimated cost of the project has been finalised at Rs.209.85 crore at 1999-2000 price level. Provision of Rs.5964.57 lakh has been made for canals, distributaries, minors and laterals. Provision of Rs.15020.24 lakh has been made for Dam and Allied works.

The State Finance Department has already given concurrence to the project. The project was also included in the 9th Five Year Plan and there is a provision for the outlay in current annual plan & 10th Five Year Plan.

The B.C. Ratio works out to 1.05:1 as per the calculations enclosed at Annexure-V & internal rate of return works out to 20.19% vide Annexure-VI.

13.0 **PLAN PROVISION:**

The Markandeya Reservoir Project is included in the 10th Five Year Plan of the State. Priority has been accorded to the project and there is also provision for the outlay in the current annual plan of the State.

14.0 **HISTORY OF TECHNICAL EXAMINATION:**

The DPR was received in CWC in May 1997. Based on the examination and clarifications from State Government the project was found acceptable from Embankment Design, Equipment Planning, Gates Design and Dam Design Aspects. For other aspects viz. Foundation Engineering, Hydrology, irrigation Planning, Canal Design, Instrumentation, Financial (USBT) and Cost, comments/further comments were sent between September 1997 and March 1999 and remained under correspondence since satisfactory replies to comments of CWC and other Central Agencies were not forthcoming from the State Government.

Part replies on Irrigation, Canal Design, Instrumentation and Foundation engineering aspects were received from Project Authorities/KNNL in December 2001. Working Table was received on 31.1.2002. Discussions with State engineers and exchange of replies from project authorities and further comments based on replies have taken place since then.

15.0 RECOMMENDATION:

The project has been appraised in Central Water Commission and other Central Agencies for assessing its technical feasibility and economic viability. The appraisal is based on the data furnished by the project authorities and clarifications furnished during examination. The scrutiny does not cover the examination of detailed designs, working drawings of individual components in regard to the structural, hydraulic and mechanical performances and safety, which have to be ensured by the project authorities.

The scheme is considered to be techno-economically viable being in drought prone area and is put up for consideration of Advisory Committee subject to following observations:

- ✓ 1. Environmental and Forest clearance from M/o Environment and Forest.
- ✓ 2. Submission of RR Plan if Tribal population is affected. — *Detail required from state Govt. Approved*
- ✓ 3. Revision of hydrology including sedimentation study at the time of detailed design. *para 3/2*
- ✓ 4. Study for hydropower generation should be carried out.
- ✓ 5. Observations of CGWB should be complied with. *para 5.0/3*
- ✓ 6. Observations on Design aspects should be complied with at the time of detailed design.
7. The discrepancy in 1993 and 2002 Master Plans for utilization should be clarified and removed. The Future planning should be within the over all allocation without adversely affecting the existing projects.
8. *What about state finance concurrence?*

CHECK LIST

NAME OF PROJECT : MARKANDEYA RESERVOIR PROJECT
ESTIMATED COST : Rs. 209.85 Crore
C.C.A. : 19105 ha.

PART – I

DATA SHEET

1	A) Name of project and state (Attach an Index Plan)	Markandeya Reservoir Project Belgaum Distt. Karnataka		
	B) Is the project included in the plan and what is the allocation for it?	It is included in the draft 10 th Five Year Plan of Govt. of Karnataka Outlay for the project in the current annual plan is Rs. 50 Crore.		
2	a) Total estimated cost of the project including credit/debit from connected projects and foreign exchange component.	Rs. 209.85 crore. No foreign exchange is involved.		
	b) Yearly optimum phasing of expenditure.			
	Expenditure and foreign Exchange (subject to reasonable equipment, personnel & finance being available)	Year	Rs (Crore)	% of expenditure
		1 st	18.40	8.70%
		2 nd	43.52	20.70%
		3 rd	45.80	21.80%
		4 th	50.00	23.80%
		5 th	32.96	15.70%
		6 th	19.17	9.30%
		Total	209.85	100%
3	Salient features of the works (Location, length, height and type of barrage, FRL, MWL, Length of canal, whether any lift involved)	As per Annexure-1 No lift is involved		
4	Command Area (GCA, CCA, Etc)	GGA 23,881 ha., CCA 19,105 ha.		
5	Expected irrigation (cropped area in ha.) power and other benefits	i) Annual irrigation – 19105 ha. ii) Drinking water provision of 8.40 MCM		
6	Cost per hectares of annual irrigation	Rs. 1.09 lakh		
7	Benefit cost Ratio with 10% rate of interest on capital outlay	1.05:1		

PART-II DESCRIPTIVE REPORT AND COMMENTS

A. WATER RESOURCES, ENGINEERING & OTHER TECHNICAL ASPECTS.

1	Assumption and data (Give broad details of hydrology, yields, utilisation etc.	The net water availability series have been finalised depending upon the unit hydro graph method. Water availability as per recent flow series is enclosed as Annexure II.
2	Salient features of physical programme and its phasing.	The project is phased for completion in 6 years period.
3	Does this project envisage interlining with other project now at future date.	No
4	Is the project self-contained or does it envisage further stages of development? If the later, describe their scope and relationship to the present project.	The project is self contained.
5	Has any curtailment or enhancement of the scheme been considered for greater advantages or economy and whether the scheme proposed will undergo any change on that account?	No
6	INTER STATE ASPECTS: a. Are there any inter state interests or issues involved such as U/S and D/S utilisation, submergence etc. b. If so, has the concurrence of other concerned states been obtained for implementation of the scheme with regard to question such as sharing of project water, costs, benefits etc.	As on item No. 9 Page 4.
7	Are there any special features peculiar to the project in regard to planning and design.	No

B. COST ESTIMATE AND FOREIGN EXCHANGE

1	Attach an abstract of cost	Attached at Annexure-IV.
2	Does the cost include necessary provision of drainage? If so, what is the amount provided.	Yes, An amount of Rs. 17.86 lakh has been kept under head X-Ecology.
3	Has the specific concurrence of the State	Yes, concurrence of the State Finance

	Finance Department been obtained for taking up the project.	Department has been obtained for the estimated cost of Rs. 120.00 crore.
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C. WATER UTILISATION :

1	Drainage Aspects	10% of CCA i.e. 1910 ha. of land has been treated for drainage arrangement wherever required for Rs. 17.86 lakh at Rs. 935 per ha.
2	Soil conservation in the catchment area	Soil conservation measures shall be taken in due course in consultation with State Agricultural Deptt.
3	Measures against salinity and Alkalinity	Does not arise
4	Colonization plans (if necessary)	-
5	Is there an Ayacut Development plan?	There is no ayacut development plan.
6	Are any minor irrigation project proposed in the Ayacut	No
7	Measures for construction of field channels and water courses	Provision of Rs. 429.86 lakh. has been kept for construction of water courses in the project estimate.

D. BENEFITS :

1	Are the command area and the annual irrigation estimates reliable?	Yes
2	What are the existing and proposed cropping patterns?	Statement attached vide Annexure-III (A) & III (B)
3	What is the net additional agricultural produce expected?	After canal irrigation 3396.10 lakh Before canal irrigation 733.65 lakh. Net profit 2662.45 lakh.(At same price base)
4	Are the cropping pattern and estimates of benefits sound and reasonable? Do they have the concurrence of the State Agriculture Department.	The cropping pattern and Estimates of benefits are sound and reasonable. Those are prepared by the State Agricultural Department.
5	What is the Benefit cost Ratio at 10% interest charges	1.05:1
6	What is the phasing of expected benefits?	The full development is expected to

		take about a span of 6 years. Phasing of benefits as has been proposed by the State Govt. is given below: <table><tr><td>Year</td><td>percentage</td></tr><tr><td>5th</td><td>10%</td></tr><tr><td>6th</td><td>50%</td></tr><tr><td>7th</td><td>100%</td></tr></table>		Year	percentage	5 th	10%	6 th	50%	7 th	100%
Year	percentage										
5 th	10%										
6 th	50%										
7 th	100%										
E. REVENUE :											
1	What are the rates of betterment levy proposed, the period for recovery year of commencement and estimated yield?	Betterment levy not proposed by the State Govt. at present.									
2	Are any charges proposed for irrigation facilities as distinct from water charges.	No									
3	Give the scale of water rates for the various crops.										
4	How do the rate of betterment levy and water charges compare with those obtained in the region ? Has the concurrence of State Revenue Deptt. Been obtained for these rates?	Betterment levy is not proposed by State Govt. Water rates are based on Karnataka Govt. Order No. ID-16-NPC-1-9-99 Part-III Bangalore dated 13-7-2000									
5	Give the phasing of revenue	<u>Year</u>	<u>Yearly net revenue</u> <u>In Rs. Lakh.</u>								
		1 st	Nil								
		2 nd	Nil								
		3 rd	-4.6650								
		4 th	-21.8602								
		5 th	-36.5752								
		6 th	-36.575								
F. OUTSTANDING COMMENTS:											
	Give outstanding comments of the CWC Ministry of Agriculture etc. (if any)	Please see conditions under item No. 16. 15									

MARKANDEYA RESERVOIR PROJECT KARNATAKA

Salient Features of the Project

I GENERAL

1	State	Karnataka
2	District	Belgaum
3	Taluka	Hukkeri
4	Nearest Village	Shirur
5	River	Markandeya
6	Basin	Krishna
7	Location (Co-ordinate)	Lat. 16°-2'-00" N Long. 74°-38'-30" E

II HYDROLOGY

1	Catchment area	432 Sq.km.
2	Rainfall	--
2.1	Maximum Annual Rainfall	2694.94 mm
2.2	Minimum Annual Rainfall	296.67 mm
2.3	Mean Annual Rainfall	1495.80
2.4	Dependable Year Monsoon Rainfall	} The average yield works out to 4.28 TMC.
2.5	75% Dependable Yield	
2.6	75% Dependable yield after keeping 10% reserve for upstream use	
2.7	50% Dependable yield	

III FLOOD

Design Flood at Barrage site	3728 Cumec
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IV PRINCIPAL LEVELS:

1	Top Level of Dam	707.0 m.
2	Full Reservoir Level	704.0 m
3	M.W.L.	704.0 m
4	Crest Level	696.0 m
5	Minimum River Bed Level	667.9 m

V	<u>DAM :</u>	
1	Location	Lat. 16°-2'-00" N Long. 74°-38'-30" E Village : Shirur
2	Type	Ogee Spillway and Non over flow section
3	Length of Dam	
	i. Over flow	93.70 m
	ii. Non overflow	381.30 m
	iii. Earthen Dyke	920.00 m
4	Number of Blocks	26 Nos.
5	Size of Gate	12.70 m x 8.0 m
6	Type of Gate & Nos.	Radial Crest Gates.6 Nos.

VI **DETAILS OF COMMAND**

1	GCA	23,881 ha.
2	CCA	19,105 ha
3	Irrigation	
3.1	Khariff	10,845 ha
3.2	Rabi	6,775 ha
3.3	Two seasonal	1,485 ha
3.4	Annual	19,105 ha
3.5	Talukas Benefitted	Belgaum, Hukkeri, Gokak & Saundatti Talukas of Belgaum Dist.

VII **CANAL:**

1	<u>Right Bank Main Canal:</u>	
1.1	Length	80.00 Km.
1.2	Discharge	7.36 cumec
1.3	GCA	22,768 ha.
1.4	CCA	18,125 ha
2	<u>Left Bank Main Canal:</u>	
2.1	Length	12.00 Km.
2.2	Discharge	0.44 cumec
2.3	GCA	1113 ha.
2.4	CCA	890 ha

13/12/20
890
1113
12.00
0.44

VIII **COST:**

1	Cost of Head works	Rs. 15020.24 lakh
2	Cost of Canal system	Rs. 5964.57 lakh
3	Total	Rs. 20984.81 lakh
4	Cost per ha. of CCA.	Rs. 1.098 lakh

IX **BENEFIT COST RATIO:**

1	B.C.Ratio at 10% rate of interest	1.05:1
2	Internal rate of return (50 years)	20.19%

ANNEXURE - II

MARKANDEYA RESERVOIR PROJECT
MONTHLY FLOW SERIES FOR MONSOON MONTHS AT DAM SITE

(Mm³)

S. No.	YEAR	JUNE	JULY	AUG	SEP	OCT	MONSOON
1	2	3	4	5	6	7	8
1	1971-72	8.95	37.14	20.02	20.96	6.04	93.12
2	1972-73	0.00	59.05	12.55	5.45	2.76	79.81
3	1973-74	9.08	65.86	24.53	7.71	3.49	110.67
4	1974-75	0.00	44.92	43.85	10.40	14.01	113.19
5	1975-76	10.79	90.33	42.39	31.19	18.24	192.94
6	1976-77	4.11	42.33	46.06	14.89	0.00	107.40
7	1977-78	5.09	58.75	26.53	15.61	12.02	118.00
8	1978-79	7.42	35.43	73.09	23.09	6.75	145.79
9	1979-80	3.22	10.64	106.42	16.87	7.54	144.70
10	1980-81	3.19	66.51	96.32	9.29	3.99	179.30
11	1981-82	2.10	75.17	81.89	20.98	0.58	180.72
12	1982-83	15.34	42.40	72.49	0.80	0.00	131.03
13	1983-84	66.08	72.16	87.16	5.54	0.61	231.55
14	1984-85	0.00	62.02	16.44	14.26	32.68	125.40
15	1985-86	1.75	5.16	23.62	0.00	0.00	30.54
16	1986-87	2.17	17.18	29.16	0.00	0.00	48.52
17	1987-88	0.00	2.83	0.00	0.00	0.00	2.83
18	1988-89	0.00	52.11	70.82	11.12	3.33	137.38
19	1989-90	0.60	44.32	26.01	75.99	13.98	160.90
20	1990-91	0.00	21.32	31.87	8.49	0.00	61.69
21	1991-92	18.57	65.79	51.87	42.73	12.39	191.35
22	1992-93	0.00	12.07	38.54	48.76	18.90	118.27
23	1993-94	0.00	28.28	57.11	16.77	1.46	103.61
24	1994-95	0.00	24.76	52.52	57.00	40.99	175.28
Avg		6.6027	43.18971	47.136	19.080	8.3239	124.33
SD		13.400	23.71897	27.739	18.952	10.515	53.701

Notes:

1. Based on Historical Data Observed at Pachapur Site and adjusted for Catchment Proportion and U/S Utilisations.

2. Nonmonsoon flows Negligible.

ANNEXURE-III(A)**A) EXISTING CROPPING PATTERN:**

Sl. No.	Name of crop	Area in ha.	%age CCA	Remarks.
1	2	3	4	5
I)	KHARIFF : (June to October)			
	1. Hy.Jowar	3714	24	
	2. Ground nut	1083	7	
	3. Sun Flower	619	4	
	4. Pulses	1857	12	
	Total :	7273	47	
II)	RABI: (November to February)			
	1. Hy.Jowar	2630	17	
	2. Bengal Gram	930	6	
	3. Sun Flower	309	6	
	4. Safflower.	309	2	
	Total :	4178	27	
III)	TWO SEASONAL: (June to December)			
	1. Cotton	1083	7	
	Total :	12534	81%	

ANNEXURE-III(B)

B) PROPOSED CROPPING PATTERN:

C.C.A: 19105 ha.

Sl. No.	Name of crop	Area in ha.	%age CCA	Remarks.
1	2	3	4	5
I)	KHARIFF :			
	1. Jowar	1500	7.84 %	
	2. Ground nut	3910	20.38 %	
	3. Hy. Maize	2000	10.42 %	
	4. Pulses	3435	17.91 %	
	Total :	10845	56.55 %	
II)	RABI:			
	1. Hy.Jowar	1465	7.63 %	
	2. Hy. Maize	1000	5.22 %	
	3. M.Wheat	2200	11.48 %	
	4. Bengal Gram	515	2.68 %	
	5. Green Gram	515	2.68 %	
	6. Sun Flower	1080	5.64 %	
	Total :	6775	35.33 %	
III)	TWO SEASONAL:			
	1. Cotton	1485	7.75 %	
	Total :	19105 ✓	99.63 %	

*Typography Unit
G.N.P.*

10845
6775
1485
19105 ✓

ANNEXURE-IV

MARKANDEYA RESERVOIR PROJECT
GENERAL ABSTRACT OF COST

(Amount in lakh)

Sub-Head of Classification	Unit-I	Unit-II	Total
(1)	(2)	(3)	(4)
I. WORKS:			
A- Preliminary 1% 1 – Works	44.00	32.61	126.61
B- Land	1660.53	412.34	2072.87
C- Works	12417.27	-	12417.27
D- Regulator	-	152.93	152.93
E- Fall	-	-	-
F- C.D. Works	-	839.90	839.90
G- Bridges	-	291.62	291.62
H- Escapes	-	8.03	8.03
K- Buildig (4% of I-Works less cost of existing building	8.79	-	8.79
L- Earth work	-	1509.95	1509.95
L1- Service Road and Boundary	-	-	-
L2- Lining	-	829.20	829.20
M- Plantation	1.00	15.12	16.12
O- Miscellaneous	72.37	44.18	116.55
P- Maintenance (1% of 1- Works) except (A + B + Q)	4.50	4.00	8.50
Q- Spl. Tools & Plants	12.44	6.00	18.44
R- Communication	140.66	32.22	172.88
T- Water Supply	-	-	-
U- Distributary & Minors	-	1197.11	1197.11
V- Water Courses & Field Channels	-	429.86	429.86
W- Drainage and Protective works (Clubbed under 'X' Ecology & Environment	-	-	-

(1)	(2)	(3)	(4)
X- Environment & Ecology	402.00	17.86	419.86
Y- Losses on Stocks 0.25% of I-Works) except (A+B+Q)	31.41	13.22	44.63
Z- Provision for power Generation.	-	-	-
TOTAL OF I- WORKS	14794.97	5886.15	20681.12

II. ESTABLISHMENT:

Establishment charges as per actual requirement @ 8% of unit-I and 11% of unit-II, less B-land of I-works

-	-	-

III. TOOLS & PLANTS

Small T & P 1% of I-works	14.79	5.88	20.67
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IV. SUSPENSE:

Receipt & Recoveries on capital account

Cost of inspection vehicle-
---,--- lakhs

a) Recoveries on account of K-building 15% salvage value of Temp. building cost.

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b) Recoveries towards resale trans of special T&P 75% of provision in I-Works on Q-Special T&P excluding cost of inspection of Vehicle.

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c) Recoveries towards resale/transfer of inspection vehicle (20% of inspection vehicle)

(-) 2.48	(-) 1.20	(-) 3.68
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Total Direct charges	14807.28	5890.23	20698.11
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(1)	(2)	(3)	(4)
INDIRECT CHARGES:			
a) Audit& Accounts charges (Generally 1% of I-works)	147.94	58.86	206.80
b) Capitalised value of abatement of land Revenue (5% of the cost of cultivable lands)	65.02	14.88	79.90
Total :-	212.96	73.74	286.70
Say :	15020.24	5964.57	20984.81
Total Estimated Cost of the Project : 20985 lakh.			

ANNEXURE-V

MARKANDEYA RESERVOIR PROJECT
Calculation of B.C. Ratio.

Figures are Rs.in lakh.

			Without Project	With Project
A	GROSS RECEIPT			
	1	Gross value of farm produce	1975.62	6290.18
	2	Dung receipts (30% of B-5)	88.90	188.70
	3	Total (A) Gross receipts.	2064.52	6478.88
B	EXPENSES			
	1	Expenditure on seeds	62.11	156.74
	2	Expenditure on manure	269.12	387.95
	3	Expenditure on fertiliser	116.23	166.70
	4	Expenditure on hired labour (20% of A1)	395.12	1258.04
	5	Fodder Expenses (15% for pre & 10% at post project of A1)	296.34	629.04
	6	Depreciation (2.7% of A1)	53.34	169.83
	7	Share & cash rent 5% for pre & 3% for post project	98.78	188.70
	8	Land revenue (2% of A1)	39.31	125.80
C	NET VALUE OF FARM PRODUCE			
	1	Total gross receipts	2064.52	6478.88
	2	Total expenses	1330.87	3082.78
	3	Net value (1-2)	733.65	3393.10
D	ANNUAL BENEFITS			
	1	Net value after irrigation		3396.10
	2	Net value before irrigation		733.65
	3	Net Annual Benefit (1-2)		2662.45
		TOTAL COST OF THE PROJECT*		
		Cost of Land Development for 30% of CCA 19105 ha at Rs.1000 = 191.05 + 20985		
		TOTAL COST OF PROJECT		21176.05
E	ANNUAL COST			
	1	Interest on capital @ 10% of capital cost		2117.60
	2	Depreciation of the project @ 2% of the cost (for new project)		211.76
	3	O& M charges @ Rs.300 per ha. for Annual irrigation of 19105 ha		57.32
	4	Maintenance of Head Works @1% of Rs. 15020.24 lakh		150.20
		TOTAL ANNUAL COST		2536.88
		B.C. RATIO – 2662.45/2536.88		1.05:1

Estimated value of Produce BEFORE, Canal Irrigation

Annexure - V(A)

Crops	Area (ha.)	Produce Per Ha. (Qtls)	Total Produce (Qtls.)	Rate/ Qtls.	Value of Total Produce (lakh)	Inputs per ha. (lakh)						
						Seeds Rate	Amt.	Manure Rate	Amt.	Pesticides Rate	Amt.	Hired labour (Human & Bul lock) (20% of total produce Co, 6)
1	2	3	4	5	6	7(a)	7(b)	8(a)	8(b)	9(a)	9(b)	10
KHARIF CROPS												
Jowar	4585	10	45850	950	435.57	110	5.04	1800	82.53	440	20.17	87.1
Sunflower	764	10	7640	1500	114.60	675	5.15	2175	16.61	800	6.11	22.92
Groundnut	1337	12	16044	1383	221.88	2250	30.08	1800	24.06	875	11.69	44.37
Pulses	2293	7	16051	2150	345.10	162	3.71	1000	22.93	400	9.17	69.03
RABI CROPS												
Hy. Jowar	3249	10	32490	956	308.65	62	2.01	1800	58.48	410	13.32	61.73
Sun flower	382	10	3820	1500	57.30	675	2.58	2175	8.30	800	3.05	11.46
Bengal Gram	1146	8	9168	2350	215.45	850	9.74	100	11.46	435	4.98	43.09
Saff flower	382	8	3056	1100	33.61	210	0.80	1300	4.96	425	1.62	6.72
Cotton Local)	1337	10	13370	1821	243.46	225	3.00	3000	40.11	3450	46.12	48.69
Total	15475				1975.62		62.11		269.44		116.23	395.12

Gross Receipt

Rs. in lakh

Gross value of form produce (according to Col.6)
Add Dung receipts at 30% of fodder
Expenditure (Sl. No.4, below)

1975.62
88.90
88.90

Total gross receipt.....

2064.52

Expenses

Expenditure on fertilizers
Expenditure on seeds (according to Col.7)
Expenditure on manure (according to Col.8)
Expenditure on hired labour & bullock (according to Col. 10)
Fodder expenses at 15% of gross value of produce
Depreciation on implements at 2.7% of gross value of form produce
Share & Cash rent at 5% of total gross produce
Land revenue at 2% of total gross produce

116.23
62.11
269.12
395.12
296.34
53.34
98.78
39.51

Total gross receipt

1330.87

Net Value of produce:

Total gross receipts
Minus Total expenses

2064.52
(-) 1330.87
733.65

Estimated value of Produce AFTER, Canal Irrigation

Annexure –V(B)

Crops	Area (ha.)	Produce Per Ha. (Qtls)	Total Produce (Qtls.)	Rate/ Qtls.	Value of Total Produce (lakh)	Inputs per ha. (lakh)						
						Seeds		Manure		Pesticides		Hired labour (Human & Bullock) (20% of total produce Co; 6)
						Rate	Amt.	Rate	Amt.	Rate	Amt.	
1	2	3	4	5	6	7(a)	7(b)	8(a)	8(b)	9(a)	9(b)	10
i) KHARIF CROPS (56.55%)												
1. Hybrid Jowar	1500	40	60000	950	570.00	110	1.65	2200	33.00	525	7.87	114.00
2. Hybrid Maize	2000	50	100000	500	500.00	150	3.00	2600	52.00	800	16.00	100.00
3. Groundnut	3910	25	97750	1383	1351.88	2250	87.98	1800	70.38	875	34.21	270.37
4. Pulses	3435	10	34350	2150	738.52	162	5.56	1000	34.35	400	13.74	147.70
	10845											
II) RABI CROPS (35.33%)												
5. Hy. Jowar	1465	40	58600	950	556.70	110	1.61	2200	32.23	525	7.91	111.34
6. Hybrid Maize	1000	50	50000	500	250.00	150	1.5	2600	26.00	800	8.00	50.00
7. M. wheat	2200	25	55000	1100	605.00	1200	26.40	2600	57.20	800	17.60	121.00
8. Bengal gram	515	20	10300	2350	242.05	850	4.38	1435	5.15	435	2.24	48.42
9. Green gram	515	20	10300	2300	236.90	850	4.38	1435	5.15	435	2.24	47.38
10. Sun flower	1080	20	21600	1500	324.00	675	7.29	2175	23.49	800	8.64	64.80
	6775											
III) Two Seasonal Crop (7.75%)												
11. Cotton	1485	25	37125	2465	915.13	875	12.99	3300	49.00	3400	50.49	183.02
	19105				629018		156.74		387.95		166.70	1258.04

Gross Receipt

Rs. In lakh

Gross value of form produce (according to Col.6)

6290.18

Add Dung receipts at 30% of fodder

188.70

Expenditure (Sl. No.4, below)

-

Total gross receipt.....

6478.88

Expenses

Expenditure on fertilizers

166.70

Expenditure on seeds (according to Col.7)

156.74

Expenditure on manure (according to Col.8)

387.95

Expenditure on hired labour & bullock (according to Col. 10)

1258.04

Fodder expenses at 15% of gross value of produce

629.04

Depreciation on implements at 2.7% of gross value of form produce

169.83

Share & Cash rent at 5% of total gross produce

188.70

Land revenue at 2% of total gross produce

125.80

Total gross receipt

3082.78

Net Value of produce:

Total gross receipts

6478.88

Minus Total expenses

(-) 3082.78

3396.10

Annexure -V(C)

BENEFIT COST RATIO

(Rs. in Lakh)

A)	Benefits: Primary (Direct)		
I)	Net Value of Produce Before Irrigation		733.65
II)	Net Value of Produce After Irrigation		<u>3396.10</u>
	Net Benefit		2662.45
B)	Annual Cost:		10%
1)	Interest on capital of (Rs. 21176.05 lakh) Cost of land development at Rs. 1000 per hectare Of CCA = 19105 1000 = 191.05 lakhs + 20985 = 21176.05		2117.60
2)	Depreciation at 1% (for new projects)		211.76
3)	Administrative expenses (O & M Charges) at Rs. 300/ha. for 19105 ha.		57.32
4)	Head work maintenance charges at 1% of cost of head work		1520.20
	Total		<u>2536.88</u>
C)	Benefit Cost Ratio	$\frac{2662.45}{2536.88}$	= 1.05

B.C. Ratio = 1.05:1

MARKANDEYA RESERVOIR PROJECT
IRR CALCULATIONS

ANNEXURE- VI

Year	Expenditure in Rs.lakhs	Benefit in Rs.lakhs	Net cash flow in Rs.lakhs
1	1840.00	0.00	-1840.00
2	4352.00	0.00	-4352.00
3	4580.00	0.00	-4580.00
4	5000.00	0.00	-5000.00
5	3296.00	269.80	-3026.20
6	1917.00	1334.50	-582.50
7	57.32	2662.45	2605.13
8	57.32	2662.45	2605.13
9	57.32	2662.45	2605.13
10	57.32	2662.45	2605.13
11	57.32	2662.45	2605.13
12	57.32	2662.45	2605.13
13	57.32	2662.45	2605.13
14	57.32	2662.45	2605.13
15	57.32	2662.45	2605.13
16	57.32	2662.45	2605.13
17	57.32	2662.45	2605.13
18	57.32	2662.45	2605.13
19	57.32	2662.45	2605.13
20	57.32	2662.45	2605.13
21	57.32	2662.45	2605.13
22	57.32	2662.45	2605.13
23	57.32	2662.45	2605.13
24	57.32	2662.45	2605.13
25	57.32	2662.45	2605.13
26	57.32	2662.45	2605.13
27	57.32	2662.45	2605.13
28	57.32	2662.45	2605.13
29	57.32	2662.45	2605.13
30	57.32	2662.45	2605.13
31	57.32	2662.45	2605.13
32	57.32	2662.45	2605.13
33	57.32	2662.45	2605.13
34	57.32	2662.45	2605.13
35	57.32	2662.45	2605.13
36	57.32	2662.45	2605.13
37	57.32	2662.45	2605.13
38	57.32	2662.45	2605.13
39	57.32	2662.45	2605.13
40	57.32	2662.45	2605.13

41	57.32	2662.45	2605.13
42	57.32	2662.45	2605.13
43	57.32	2662.45	2605.13
44	57.32	2662.45	2605.13
45	57.32	2662.45	2605.13
46	57.32	2662.45	2605.13
47	57.32	2662.45	2605.13
48	57.32	2662.45	2605.13
49	57.32	2662.45	2605.13
50	57.32	2662.45	2605.13

IRR = 20.19%

delh/mrkcrop3.wk1

Dated : 26.4.2002

To

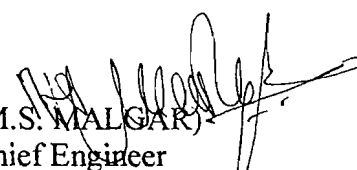
The Chief Engineer
Project Appraisal Organisation,
Central Water Commission,
Sewa Bhawan, R.K. Puram,
New Delhi - 110066

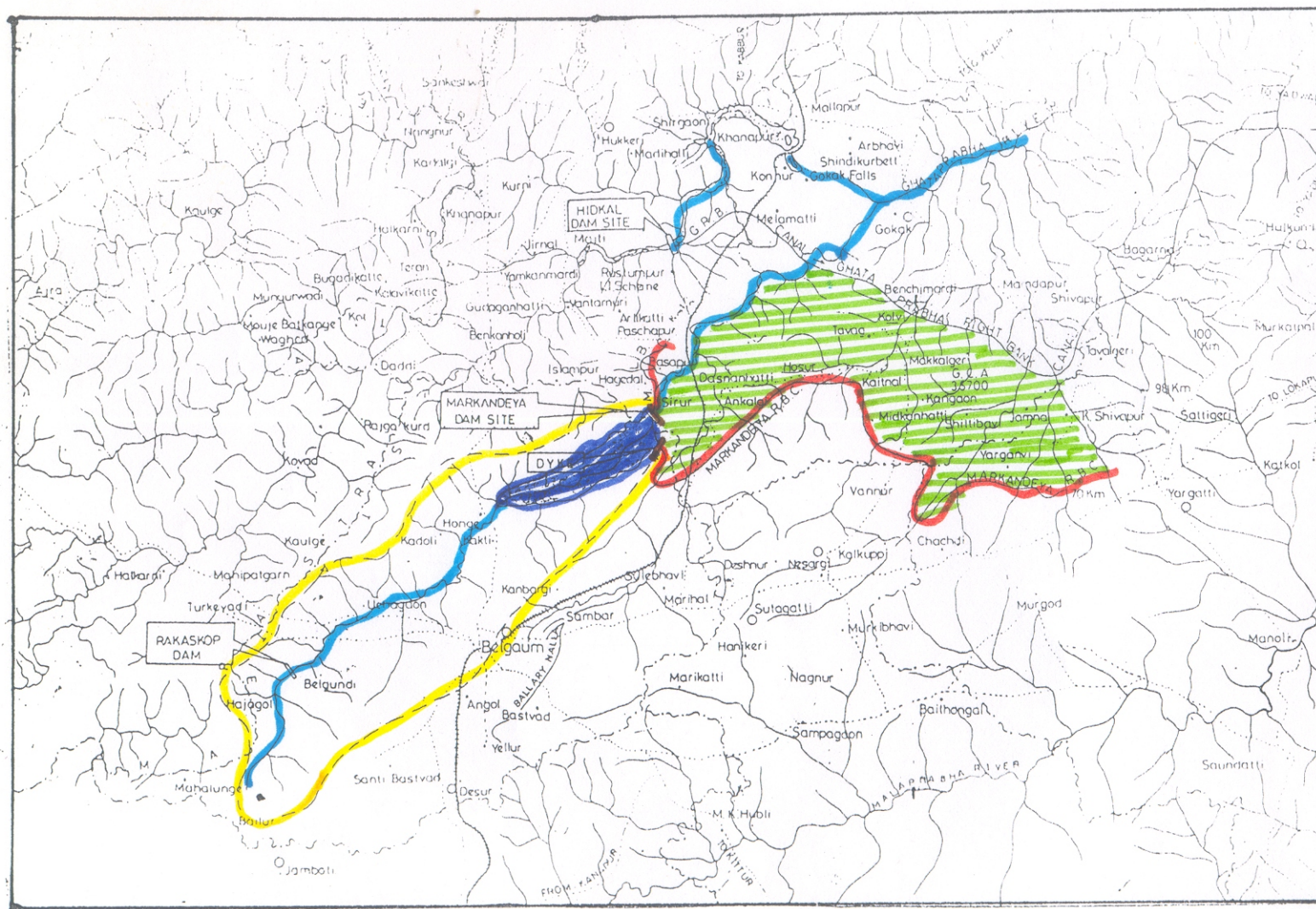
Subject : Clearance of Markandeya Reservoir Major Irrigation Project

The above project has been examined in the o/o Chief Engineer Irrigation (North) Belgaum and Office of Chief Engineer W.R.D.O. Bangalore with reference to the Check (list as per guidelines for preparation of DPR) (1980) and it is found that :

- (i) All necessary surveys and investigations for planning of the project and establishing its techno-economic feasibility have been carried out as per the guidelines issued by Govt. of India.
- (ii) 10% of the command area of the project or 5000 ha. Whichever is minimum has been investigated in full details in three patches representing terrain conditions in the command for estimation of the conveyance system upto the last farm gates.
- (iii) 10% of the Canal Structures have been investigated in full detail.
- (iv) Detailed Hydrological, geological, construction material investigations, have been carried out for all major structures i.e. dams, weirs, main canal. branch canal upto distributaries carrying a discharge of 10 cumecs.
- (v) Soil survey of the command has been carried out in detail as per IS 5510-1969.
- (vi) Necessary designs for the various components of the project have been done in accordance with the guidelines and relevant Indian standards.
- (vii) Necessary studies for utilisation of ground water have been done with special regard to problem of water logging and suitable provisions have been made for conjunctive use of ground water & drainage arrangements.

- (viii) The cropping pattern has been adopted in consultation with the State Agriculture Department and are based on soil surveys of the command keeping in view the national policy in respect of encouraging crops for producing oilseeds and pulses.
- (ix) The cost estimates & economic evaluations are carried out as per guidelines issued by the Central Water Commission.
2. The project has also been examined by the State level Project Appraisal Committee comprising representative of Irrigation, Agriculture, Fisheries, forests, Soil Conservation, Ground Water, Revenue and Finance Deptt. etc. and the techno-economic feasibility of the project has been established.
3. The project is recommended for clearance by Centre and approved by Planning Commission.


(M.S. MALGAR)
Chief Engineer
KNNL Irrigation (North)
Belgaum
Govt of Karnataka



LOCATION

LONGITUDE - 16° 02' 00" NORTH
 LATITUDE - 74° 38' 30" EAST
 TOPOSHEET NO. 47 L/12 & 47 I/9

INDEX

CANAL	
RIVER	
COMMAND AREA	
ROADS	
RAILWAY LINE	

GOVT. OF KARNATAKA - IRRIGATION DEPARTMENT
 MARKANDEYA RESERVOIR PROJECT

INDEX MAP

Scale: 1" = 4 Miles