GOVERNMENT OF MADHYA PRADESH
WATER RESOURCES DEPARTMENT

KOPRA MEDIUM IRRIGATION PROJECT

PRE FEASIBILITY REPORT

ESTIMATED COST (without Power)	**:**	**Rs. 292.38 Crores**
DESIGNED IRRIGATION	**:**	**9990 Ha.**
COST PER HACT. (without Power)	**:**	**Rs. 2.93 Lakhs**

''EVERY DROP MORE CROP''

(AKHIL BIRTHARE)
EXECUTIVE ENGINEER
WATER RESOURCES DIVISION NO. 1
SAGAR(MP)

KOPRA MEDIUM PROJECT

TEHSIL : REHLI **DISTRICT : SAGAR**

1. EXECUTIVE SUMMARY OF THE PROJECT

Kopra Medium Project is located across river Kopra near village Badarchuwan Tehsil Rehli, District Sagar of Madhya Pradesh. The site is located on topo sheet no 55 M/2 with latitude 23°36'22" N and longitude 79°10'13" E. The site is situated about 60 km away from Sagar district headquarters.

River Kopra is a tributary of river Sonar ultimate part of Ken Sub Basin. The river Kopra originates near village Gopalpura of Tehsil Deori District Sagar. The catchment area up to the proposed Dam site is 231.80 sq km.

Dam is proposed with FRL 403.00 m, having design gross capacity 48.43 MCM, live capacity 41.29 MCM and dead storage 7.19 MCM. Total submergence area of the project is 1044.72 Ha. After construction of this dam, 9990 Ha will be provided with the Rabi irrigation facility in drought prone land of Rehli Tehsil of Sagar district will be irrigated through pressurized pipe irrigation system. The project cost is 292.38 Crores.

REPORT

2. INTRODUCTION AND PROJECT DESCRIPTION

The Kopra Medium Irrigation Project is proposed dam site is located across river Kopra near village Badarchuwan Tehsil Rehli, District-Sagar of Madhya Pradesh. The site is located on toposheet no 55 M/2 with latitude 23˚36'22" N and longitude 79˚10'13" E. The site is situated about 60 km away from Sagar district headquarters.

Kopra River is a tributary of Sonar River ultimate part of Ken Sub Basin. The Kopra River originates near village Gopalpura of Tehsil Deori and finally joins Sonar river. The catchment area up to the proposed Dam site is 231.80 sq km.

Dam is proposed with FRL 403.00 m, having design gross capacity 48.43 MCM, live capacity 41.24 MCM and dead storage 7.19 MCM. After construction of this dam, 9990 Ha will be provided with the Rabi irrigation facility in drought prone land of Garhakota & Rehli Tehsil of Sagar district will be irrigated through pressurized pipe irrigation system.

The main river borders in the State are the Chambal, Betwa, Dhasan and Ken (tributaries of Yamuna river), Son and Tons (tributaries of Ganga river), Narmada, Tapti, Mahanadi and Godavari. The main river of the project is Kopra River, tributary of Sonar river.

AIMS OF THE PROJECT

There is no water source in the Project area which is a part of Sagar district. At present irrigation in the project area from all sources is only 08.10 % of net cropped area. Since the area is dependent on rains, scarcity conditions exist all the time. Crop yields are low. People in the area are poor. The Project area needs water for domestic and agriculture purposes. Studies carried out earlier show that the some unutilized flows are available and the physiographical conditions are also suitable for harnessing the water resources. The project shall also enhance the economic status of the residents of the area by providing employment (direct and indirect) in executing the project.

LOCATION:

1. LOCATION:-

S. No	PARTICULARS	DETAILS
1	Name of Project	KOPRA MEDIUM PROJECT
2	Latitude	23˚36'22" N
3	Longitude	79˚10'13" E
4	Toposheet No.	55 M/2
5	State	Madhya Pradesh
6	District	Sagar
7	Tehsil & Block	Rehli
8	River	Kopra
9	Accessibility	At a distance of 60 Km from Sagar On Sagar-Rehli-Jabalpur road up to Chhirari then 4 Km up to Bagaspura on Chhirari Baleh road.

Population

(a) Affected (no.) -
13 villages (1 fully submerged & 12 Partially Submerged) namely - 1. Bandarchua, 2. Chirari, 3. Hinoti, 4. Motipar, 5. Madkheda, 6. Khaikheda, 7. Samnapur Barkhedi, 8. Hardua Baleh, 9. Ghugri, 10. Khurd, 11. Bhohari, 12. Hardua Rehli, 13. Saliya.

(b) No.of Families affected- 897

(c) Benefited (no.)
28 villages benefited- 1. Kansal Pipariya, 2.Renvjha, 3.Bamura Kunj, 4.Chhirari, 5.Bagaspura, 6.Mahuna, 7.Barkhera Sikandar, 8.Ratanpura, 9.Mainai, 10.Madiya, 11.Sandai, 12.Padariya, 13.Mahesha Kalan, 14.Ghat Pipariya, 15.Gunjora, 16.Pipariya Kurman, 17.Gopalpura, 18.Gurha, 19.Baleh, 20.Mahesha Khurd, 21.Gurha Khurd, 22.Berkheri Khurd, 23.Khaira, 24.Tal Semra, 25.Mahua Semra, 26.Badipura, 27.Dundkheda and 28.Vijaypura.

Land-use and socio-economic aspects – The habitants of the command area are very poor and they totally depend on rain water for their agriculture. The area is drought prone and construction of this project will facilitate them a reliable source of irrigation and thus more production, which will increase their socio economic position. The recently launched Pradhan Mantri Krishi Sichai Yojna says "**every drop more crop**", this project fulfills the meaning of above slogan.
The project was proposed by Hon. Shri **Pt. Gopal Bhargava Ji** MLA Rehli constituency in the year 2015. Necessary survey was carried out and the DPR is approved by E-in-C Bodhi and necessary administrative approval has been accorded. The best alternative of the dam site has been selected by the authorities. The dam is proposed on Kopra river, which is in Dhasan Ken basin, and the command area is in the both sides of Kopra River. The concerned development authorities like Revenue, Agriculture, Forest, PWD, RES and PHE departments have been intimated regarding this scheme. The local public representatives are well informed with the benefits of the project. There is no inter-state or international aspect of the project.
Cost and benefit ratio has been calculated and is within the norms. Also, Provision for upstream and downstream utilization of water has been made in the project.

3. SITE ANALYSIS

i. PHYSICAL FEATURES

Geography

Kopra Dam is located at a longitude 79˚10'13" E & latitude 23˚36'22" N In Sagar district of Madhya Pradesh. It has an average elevation of 500 metres .The project is situated in Rehli Block at an average elevation of 500.00 m

Climate

SAGAR has a humid subtropical climate, typical of North-Central (Madhya Pradesh and southern Uttar Pradesh) India. Summer starts in late March and last up to June. May is the hottest month with average temperatures reaching up to and beyond 45°C. They are followed by monsoon season, which lasts until early October, with a total precipitation of nearly 40 inch (1000 mm). Winter starts in late November and lasts until early March. The coldest temperatures are in January with average daily temperature near 15.

ii. SURVEY AND INVESTIGATION –

Topographic survey - The topographic survey for Dam, basin, submergence has been done.

Geological survey - The geological survey for dam sheet diamond drilling in sluice ,waste weir, nalla for required depth will be done during construction stage.

iii. INTER STATE / INTER NATIONAL ASPECTS

The dam is situated on Kopra river which is a tributary of Sonar river of Dhasan Ken Basin. The river traversed in Sagar District . There are no inter state/international aspects issues involve.

PLANNING BRIEF:

i. HYDROLOGY:

The proposed Kopra Medium project consists of construction of a dam across river Kopra in Dhasan Ken Basin. The Kopra Project is situated in Teh. Rehli of Distt. Sagar with at a Longitude 79°10'13" E & Latitude 23°36'22" N. The Total catchment area of Kopra dam is 231.80 sq.km.

There is no observed gauge-discharge data available at the proposed dam site or nearby vicinity. Hence data of CWC Gauroulli G&D site have been taken to derive Rainfall-Runoff relationship using the rain gauge data of Sagar and Rehli rain gauge stations & applying the same R-R Equation at the proposed Kopra dam site.

This yield is arranged in descending order & 75 % dependable yield is worked out. The yield so obtained is 52.21 Mcum which gives a rate of yield as 0.225mcum/sq.km of the catchment. The yield obtained from R-R equation for KOPRA dam is quite satisfactory & may be adopted.This rate of yield is also matches with yield rate mentioned in E-ln-C's order no. 373/22/42/2011 dtd 11/08/2011. **Thus the adopted 75 % dependable yield as live storage for the Kopra Medium Project is 52.21 Mcum.** The detailed computations of deriving R-R equations, monthly runoff, dependable yield computations etc. are enclosed.

ii. BASIN AND SUBMERGENCE:

The Basin is surrounded by semi hillocks. Area of about 772.52.00 Ha of culturable area, and 272.00 Ha. Forest land is coming under submergence. The total submergence area is 1044.52Ha

iii. PRINCIPAL LEVELS;

There is no observed data of silt rate in river Kopra river Dam site is available. Hence as per present practice a silt rate of 0.75 Acre Ft/Sq.mile/ Year is considered to get the silt load to be deposited during the life of reservoir.

Assuming the life of reservoir as 100 years and taking the independent C.A. of project as 200.08 sq.km the silt load comes out to be 7.14 MCM.

Moody's method to fix L.S.L. (New Zero Elevation) is adopted.

NaIa bed level	R.L.	:	383.99 M.
L.S.L.	R.L.	:	396.25 M.
F.T.L.	R.L.	:	403.00 M.
M.W.L.	R.L.	:	403.00 M.
T.B.L.	R.L.	:	406.80 M.

CAPACITY:

Dead Storage	:	7.19 Mcum
Live Storage	:	41.24 Mum
Gross Storage	:	48.43 Mcurn

The percentage of gross storage to average annual yield 100 % and the dead storage is 14.85 % of gross storage.

4. PROPOSED INFRASTRUCTURE:

i. TYPE OF DAM:

MAIN COMPONENTS OF KOPRA MEDIUM PROJECT :-

The main components of the Kopra Medium Project are as below:-

KOPRA Gravity Dam (Side Spillway)

- A Composite dam length of 1620.00 m.
- Concrete side spillway 82.50 m having capacity to pass the flood discharges 1597.69 Cumecs
- 5 Nos. of Radial gates of size 11.00m × 6m are proposed over the crest level. With 1 no. stand by.
- Non overflow dam is 20.00 m on left and 10.00 m on right flank.

SALIENT FEATURES OF THE DAM:

Total Length of dam	1. Main dam of (on Kopra River) :**-1620.00 m**
Maximum height of dam	1. Main dam of (on Kopra River) :**-23.81 m**

SUBMERGENCE:

13 villages are affected by this scheme. Water spread area at F.R.L. is 1044.52Ha. Submergence Area of about 772.52 Ha of culturable area, 0.00 Ha of govt. land and 272.00Ha. forest land is coming under submergence. The total submergence area is 1044.52Ha

FOREST LAND:

There is 272.00Ha. Forest land coming under submergence and 15.00 lakhs/Ha. cost is taken for compensation and catchment area treatment plan.

Design Features and Criteria for different river valley structures

A separate volume discussing in details relevant to the projects' structural and design calculation for the important components of the project like, earthen dam, spillway, canal sluice and pressurized pipe irrigation system is adopted for the project. The proposed Irrigation to Garhakota & Rehli block will be done by a Common pressurized Piped Canal system originating from the dam.

Reservoir:

Details of dam

(i)	Type of dam	:	Central Spellway with Earthen Band
(ii)	Length of dam	:	1620.00 mts
(iii)	Max. height of dam	:	23.81 mts.
(iv)	Type of spillway flush bar/	:	Ogee Weir (Gated)

Nala bed level	R.L.	:	383.99 M.
L.S.L.	R.L.	:	396.25 M.
F.T.L.	R.L.	:	403.00 M.
M.W.L.	R.L.	:	403.00 M.
T.B.L.	R.L.	:	406.80 M.

CAPACITY:

Dead Storage	:	7.19 Mcum
Live Storage	:	41.24 Mum
Gross Storage	:	48.43 Mcurn

The percentage of gross storage to average annual yield 100 % and the dead storage is 14.85 % of gross storage.

ii. **IRRIGATION PLANNING**:

The scheme will irrigate the area of Wheat Ord.- 3100 Ha, Gram Ord - 6890 Ha. Total Rabi of 9990 Ha and so Annual Irrigation as 9990 Ha with Irrigation Intensity as 100 %.

The project has been designed for Piped canal system up to 0.6 Ha area and 85% efficiencies have been adopted.

Annual Irrigation 9990 Ha

CANAL SYSTEM:

PRESSURE IRRIGATED CANAL SYSTEM

- It consists of a pressurized pipe system of approx 20 km. with micro network system to irrigate 9990 Ha.

After gravity mains water will be supplied by disnet system

Climate of Command Area

(a) Average annual rainfall (weighted) - 1100 mm

(b) Temperature - 35^0 C.

(c) Humidity - 17 %

Present source of the irrigation in the command area depend upon: Monsoon/Tubewell Methods of irrigation followed: By pump from local nallah / tube well.

iii. FLOOD CONTROL

The dam is proposed on Kopra River near village Kopra which is a tributary of Sonar River. No historical flood data or flood damage has been observed in last 30 years. Peak flood at dam site for 100 years frequency comes out as 1597.69 Cumecs which is under safe carrying capacity of the river.

iv. DRAINAGE

Depending on the slope of the land, underline rock structure and climate of the area the river channel develops dendritic drainage pattern.

v. **POWER**

There is no power generation in this project.

vi. **NAVIGATION**

There is no navigation aspect in this project.

5. RESSETLEMENT AND REHABILITATION PLAN:

Sufficient provision, as per the latest norms, for the Rehabilitation and Resettlement plan and all other clearances has been made in the project estimates.

Details of land coming under submergence are as follows:

1.	Government Land:	0.00 Ha
2.	Private Land:	772.52 Ha
3.	Forest Land:	272.00Ha
		1044.52 Ha

6. COST ESTIMATE & PROJECT SCHEDULE:

The estimate is prepared based on U.C.S.R. of M.P. Water Resources Department in force since 01.09.2017 Total cost works out to Rs. 29238 Lakhs, 12 % GST & 3% Establishment charges has been included in the estimates.

UNIT-I (Head Works):

'A' Preliminary':

The provision of **Rs. 0.23** Crores. has been kept in this estimate for survey and investigation of the scheme.

'B' Land:

An amount of **Rs. 142.04** Crores had been provided under this sub-head for payment of compensation of private land, forest land tower line etc. coming under submergence in dam seat and basin.

'C' Works:

An amount of **Rs. 40.81** Crores has been kept for construction of central spillway and scouring sluice.

'K' Buildings:

An amount of **Rs. 0.50** Crores has been kept for construction.

'L' Earth work :

An amount of **Rs. 00.00** Crores has been kept for construction of earth dam.

'M' Plantation:

An amount of **Rs. 0.00** Crores.

'O' - Miscellaneous:

An amount of **Rs. 0.20** Crores has been kept under this sub head.

'P' Maintenance:

An amount of **Rs. 0.65** Crores has been kept under this sub head.

'Q'-SpL T&P:

An amount of **Rs. 0.00** Crores has been kept under this sub head.

'R' - Communication:

An amount of **Rs. 0.30** Crores has been kept under this sub head.

'X' - Environment, Ecology:

An amount of **Rs. 0.20** Crores has been kept under this sub head.

UNIT-II (Canals):

'A' Preliminary:

The provision of **Rs. 0.24** Crores has been kept in this estimate for command area survey and investigation of the scheme.

'B' Land:

An amount of **Rs. 0.32** Crores had been provided under this sub-head for payment of compensation of private land etc. coming under acquisition of Piped canal width.

'C' Works:

No provision has been made under this sub head.

'K' Buildings:

An amount of **Rs. 00.20** Crores has been kept for construction of Pump Houses & Store sheds.

'L' Earth Work:

An amount of **Rs. 18.62** Crores has been provided for earthwork, transmission line, pump house, rising main, earthwork for rising main , CD works, surge protection and valves.

'M' Plantation:

An amount of **Rs. 0.00** Crores has been kept under this sub head.

'O' - Miscellaneous:

An amount of **Rs. 0.00** Crores has been kept under this sub head.

'P' - Maintenance:

An amount of **Rs 2.54** Crores has been kept under this sub head.

'Q'-SpI. T&P:

An amount of **Rs. 0.00** Crores has been kept under this sub head.

'R' - Communication:

An amount of **Rs. 0.0** Crores has been kept under this sub head.

'U' - Distributory:

An amount of **Rs. 65.96** Crores has been kept under this sub head which includes cost of Pipe Distribution network such as distributaries minors & subminors.

Total cost of the scheme is worked out to **Rs. 292.38** Crores for 9990 hectare CCA irrigation area. The cost per hectare works out to **Rs. 2.93** Lakh per ha.

REVENUES

Irrigation : The water rates for per hectare of irrigation is Rs.350.00 and irrigation Cess is Rs.25.00 per Ha for rabi irrigation, The total Rabi irrigation of the project after completion will be 9990 Ha.

ii. **BENEFIT COST RATIO**

B.C. Ratio of the project is -

For 5% rate of Return is - 3.61% without Power Plant

For 10% rate of Return is - 2.17% without Power Plant

iii. CONSTRUCTION PROGRAMME AND PLANNING

The stipulated time of completion of the project is 24 months. The detail construction programme will be prepared during fixation of the agency.

The dam section proposed is Homogeneous type as good quality of soil is available for hearting and casing in sufficient quantity & sand is available at a distance of 120 kms. from the dam site. Pitching stone, Quarried Boulder and quarry spalls are available at a distance of 2 km. from the site. And metal from 28 Km.

Depending on the schedule of construction various facilities and assets ,as required in the project, will be developed in different phases. During the planning stage a judicial planning will be done as per the requirements so as to avoid wasteful expenditure and thus maximum utilization of the resources.

7. RECOMMENDATION:

Peoples of the command area, especially of SAGAR District which is a Normal Blocks of Sagar, are in acute need of water for irrigation. The water table of nearby area will be raised after construction of dam. Seepage water will be useful for D/S area. It will generate employment for a period of 24 months during construction period. The total cost of the project works out to Rs. **292.38** Crores for **9990** hectare Designed Irrigation area. The cost per hectare works out to Rs. **2.93** Lakh per Ha.

Looking to the current price, the cost of scheme is reasonable. Therefore the scheme is feasible and suitable for construction.

Due to above facts the project is strongly recommended to accord the Administrative approval for the project for irrigation benefits in **9990** Ha. of Rabi designed Irrigation area of Rehli block of Sagar district.

KOPRA MEDIUM PROJECT

SAILENT FEATURES

I	Location	
	State	Madhya Pradesh
	District	Sagar
	Tehsil / Block	Rehli
	Toposheet No	55 M/2,
	Latitude	23˚36’22” N
	Longitude	79˚10'13" E
	River	Kopra
	River Sub Basin	Ken
	River Basin	Yamuna
	Tribal/ Non Tribal	Non Tribal
	Distance From	60 Km From Sagar
	Probable Estimated Cost	330.15 Crore
	Irrigation Proposed	9990 Ha
	Cost Per Hectare	3.42 Lakh
II	Hydrology	
	Catchment Area	231.80 Sq.km
	Maximum Flood Discharge (SPF)	1597.69 Cumecs
	75% Dependable Yield	52.00 Mcum Intercepted yield 9.011 Net Yield 42.989 Mcm
	Proposed Design Flood	As per Norms
III	Reservoir Data	
	Gross Storage	48.43 Mcum
	Live storage	41.24 Mcum
	Dead Storage	7.19 Mcum
	Gross Area of Submergence at F.R.L	1044.52Ha
	Private Land	772.52 Ha
	Government Land	0.00 Ha.
	Forest Land	272.00Ha.
	No. of Village Submerged	1 No. fully & 12 Nos Only partial Land
	Population Affected	897

IV	Dam Data	
	Type Of Dam	Composite Dam
	Total length including earthen bund	1620.00 M
	Saddle 1NOS	1470.00 M Length
	Length of Spillway	82.50 M
	Height	23.81 M
	No. of openings	5 (1 Stand by Total 6)
	Size Of Gates	11M X6.00 M
	Crest Level	397.00 M
	Thickness of Peir	2.75 M
V	Control Level	
	Top Level of Dam (TBL)	406.80 M
	Top Level of Dam Gates	403.00 M
	Creast Level	397.00 M
VI	Canal	
	Lenth of Rising Main (Left)	7000 M
	Max. Dia of Rising Main	1.6 M
	Length of Gravity Main	7.435 Kms
	Max. Dia of Gravity Main	1.0 M
	Power Required.	1.98 MW
VII	Area Proposed Under Irrigatioin	9990 Ha.
	Annual Irrigation	9990 Ha.
	Crop Kharif	NIl
	Crop Rabi	9990 Ha.
	Crop Perennial	0
	Total	9990 Ha.
VIII	Financial Aspects (Estimated Cost)	
	Unit -I Head Works	191.37 crore
	Unit -II Canal	101.01 crore
	Total	292.38 crore

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