

**GOVERNMENT OF MADHYA PRADESH
WATER RESOURCES DEPARTMENT**



**KUMBHRAJ MAJOR IRRIGATION PROJECT
PRE FEASIBILITY REPORT**

ESTIMATED COST (without S Power) : Rs.854.47 Crore
DESIGNED IRRIGATION : 27000 Ha.
COST PER HACT. (without S Power) : Rs 3.16 Lakhs Per Ha.

JULY 2018

"EVERY DROP MORE CROP"

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KUMBHRAJ MAJOR IRRIGATION PROJECT

TEHSIL : CHACHOURA

DISTRICT : GUNA/RAJGARH

REPORT

1. INTRODUCTION AND PROJECT DESCRIPTION

The KUMBHRAJ MAJOR Irrigation Project is proposed to be constructed in CHACHOURA block of Tehsil CHACHOURA District GUNA (M.P.) across the river PARBATI Chambal betwa basin having a catchment area 5623.55 Sq.Km the proposed Dam site can be seen on Toposheet no. 54H/3 , Longitude 77°-07'-43.69" E & latitude 24°-15'-27.07" N respectively. The site is approachable from District 80 Km from Rajgarh District, 45 Km from Guna District. The MAJOR IRRIGATION PROJECT Site is located on the River PARBATI which is directly tributary of the River Yamuna and it meets in river Yamuna in District Etawa U.P. in its total run of 470 kms. PARBATI river flows in length of 461 km in M.P. then its flows in length of 9 kms. In U.P. where it joins Yamuna river. The Dam site is located between village ghatakhedi and chachoura of District- Rajgarh/guna.

Madhya Pradesh at Latitude 24°-15'-27.07" N & Longitude 77°-07'-43.69" E. The project site can be approached by The site is approachable from District 80 Km from Rajgarh District 45 Km from Guna District –Sironze NH 3 and 190 km from Bhopal.

AIMS OF THE PROJECT

There is no water source in the Project area which is a part of GUNA/RAJGARH 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 geographical conditions are also suitable for harnessing the water resources.

LOCATION:

PROJECT Site is located on the River PARBATI which is directly tributary of the River Yamuna and it meets in river Yamuna in District Etawa U.P. in its total run of 470 kms. PARBATI river flows in length of 461 km in M.P. then its flows in length of 9 kms. In U.P. where it joins Yamuna river. The Dam site is located between village ghatakhedi and chittoda in Block- Biora of District- Rajgarh Madhya Pradesh at Latitude 24°-15'-27.07" N & Longitude 77°-07'-43.69" E.

Population

(a) Affected (no.) -	
Total	250
(b) No.of Houses	32
(c) No.of Families	250

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. 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.

2. SITE ANALYSIS

i. PHYSICAL FEATURES

Geography

KUMBHRAJ Dam is located at at Latitude 24°-15'-27.07" N & Longitude 77°-07'-43.69" E. In GUNA/RAJGARH district of Madhya Pradesh. It has an average elevation of 500 metres .

Climate

GUNA/RAJGARH 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 parbati river which is a tributary river of CHAMBAL BETWA Basin. The river traversed in GUNA/RAJGARH District . There may be any projects in the upstream side of the proposed dam.

3. **PLANNING BRIEF:**

i. **HYDROLOGY:**

The proposed KUMBHRAJ MAJOR project consists of construction of a dam across river parbati in CHAMBAL BETWA Basin. The KUMBHRAJ Project is situated in Teh. GUNA/RAJGARH of Distt. GUNA/RAJGARH with Latitude 24°-15'-27.07" N & Longitude 77°-07'-43.69" E. The Total catchment area of KUMBHRAJ dam is 5623.55 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 GUNA/RAJGARH and Jaisinghnagar rain gauge stations & applying the same R-R Equation at the proposed KUMBHRAJ dam site. This yield is arranged in descending order & 75 % dependable yield is worked out. The yield so obtained is 533.95MCM which gives a rate of yield as 0.37 mcum/sq.km of the catchment. The yield obtained from R-R equation for KUMBHRAJ dam is quite satisfactory & may be adopted. This rate of yield is also matches with yield rate mentioned in E-In-C's order no. 373/22/42/2011 dtd 11/08/2011. **Thus the adopted 75 % dependable yield as live storage for the KUMBHRAJ MAJOR Project is 533.95MCM.** 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 1726.06 Ha. of culturable area, 460.40 Ha. of govt. land and 0.00Ha. Forest land is coming under submergence. The total submergence area is 2186.46 Ha.

iii. **PRINCIPAL LEVELS;**

There is no observed data of silt rate in river parbati is available. Hence the nearest CWC pilukhedi G&D site silt rate data has been adopted for computation of silt load for proposed Dam site for 100 years is considered to get the silt 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 5623.55 Sq.Km the silt quantity comes out to 0.15 Mcm.

Moody's method to fix L.S.L. (New Zero Elevation) is adopted. Flood lift is taken as 0.00 mts and free board as 2.00 mts. accordingly the principal level are fixed as below:

- i) T.B.L = RL 412.00 M
- ii) F.R.L = RL 408.00 M
- iii) L.S.L = RL 396.00M

iv) River Bed Level = 391.80

CAPACITY:

Gross storage	106.320 MCM
Live storage	101.26 MCM
Dead Storage	5.06 MCM

PROPOSED INFRASTRUCTURE:

i. TYPE OF DAM:

In accordance with T.C.No. 42/ BODHI/R&C/TC Dated.17-1-2001 a zonal section has been adopted for the dam. The soil available for construction within the economical lead. While extracting earth from the basin care will be taken to locate quarry at a sufficient distance from the dam.

SALIENT FEATURES OF THE DAM:

(a) Length of Bund	:	4281.60 M
(b) Maximum height of bund	:	20.18 M
(c) Top width of bund	:	6.00 M
(d) Flood lift	:	1.50 M
(e) Free Board	:	2.00 M

Side Slopes:

S.No`	Hight Of Dam	Slopes U/S	Slopes D/S
1	0 to 5 M	2:1	2:1
3	5 M to 9 M	--	2.5:1
4	LSL to GL	4:1	--
5	9 M to 12 M	--	3:1
6	12 M and above	--	4:1

LOCATION OF RIVER:

The river is crossing the dam axis at R.D. 300 Meter.

SHRINKAGE ALLOWANCE:

Shrinkage allowance will be considered as per T.C. No. 40 i.e. of dam (0.625 cm./30 cm. height).

SLOPE PROTECTION:

22-cm. thick stone pitching over 15 cm. thick quarry spalls has been provided up to T.B.L from LSL to protect the U/S slopes from erosion due to wave action etc. The pitching is provided in the reach R.D. 0 M to R.D. 600 M of dam and for retaining pitching is U/S slope a 60 cm x 60 cm. base toe of stone is also provided. The D/S slope will be protected with turfing upto boulder Toe and from the top upto boulder toe drains are provided to drain out the water at every 90 Meter.

CUT OFF TRENCH:

Cut off will be provided with a depth of 1/2 (M.W.L-G.L.) with base width of 4.00 M. and side sloped 1:1 & minimum depth 2 meter.

The depth of Cutoff Trench will be decided at the time of construction on the basis of permeability tests.

BENCHING AND DAM SEAT CLEARANCE:

Proper benching and clearance of dam seat will be done to achieve bund between dam seat and work. The nalla will have to be cleared fully and banks to be cut in proper slopes before starting the work.

SEEPAGE DRAINS & BOULDER TOE:

Seepage drains of size 90 cm x 90cm. at 15 M. Interval at an inclination of 45° has been provided. Boulder toe as per T.C. has been provided (minimum height 1.0 Mts.) and maximum Height H/5.

OGEE WEIR:

A Ogee Spill way of 529.00 Mts. length in the right flank of bund is provided to pass the discharge 25186.60 Cumecs. Design of Ogee spill way is as per technical circular & ISI Code.

SUBMERGENCE:

Total submergence is 2186.46 Ha..

FOREST LAND:

There is 0.00 ha. Forest land coming under submergence .

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.

Reservoir:

Details of dam

- (i) Type of dam : Earthen Central spillway with Gated
- (ii) Length of dam : 600 mts
- (iii) Max. height of dam : 25.64 mts.
- (iv) Type of spillway flush bar/ : Ogee Weir (Gated)

Nala bed level R.L.	:	462.46 M.
L.S.L. R.L.	:	471.50 M.
F.T.L. R.L.	:	484.60 M.
M.W.L. R.L.	:	486.10 M.
T.B.L. R.L.	:	488.10 M.

CAPACITY:

Dead Storage	:	0.15 Mcum
Live Storage	:	21.967 Mcurn
Gross Storage	:	22.117 Mcurn

The percentage of gross storage to average annual yield 91.12 % and the dead storage is 0.68 % of gross storage.

ii. **IRRIGATION PLANNING:**

The area is predominantly of Rabi as the principle crop. Based on the existing cropping pattern the following good yielding crops are proposed to irrigate during Rabi season. The crop water requirements are worked out for 35 years as per Modified Pen-man method and based on the guide lines suggested by T.C No.25 (with upto date amendments), (MPWRD – Bodhi.) There is observed gauge & discharge data from Pilukhedi G.D. site available at upstream of the proposed dam site. Hence the yield is worked

Rabi	Particulars
Wheat H.Y.V	8400 Ha.
Wheat OLV	4500 Ha.
Gram	10500 Ha.
Pulse	3600 Ha.
Total	27000 Ha.
Annual Irrigation	27000 Ha.

Intensity of Irrigation	100%
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out R.R. relationship and adopted after comparing with other projects in the basin. Rainfall data is available for Pilukhedi G.D. station for period of 30years respectively. Weighted rainfall for the catchment is computed. This gives 75% dependable yield as 533.95 MCM .

The project has been designed for presuurrized system

CANAL SYSTEM:

Ample command is available in side wise of dam, so provision is made for Gravity main of D/s construction of 25 kms LBC Gravity main , 20 kms RBC Gravity main .

iii. FLOOD CONTROL

The dam is proposed on KUMBHRAJ River near village Hanota Khurd 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 1164.00 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 provision for solar power generation in this project.

vi. NAVIGATION

There is no navigation aspect in this project.

5. RESETTLEMENT 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:

Total submergence=2186.46 Ha..

Private Land	1726.06 Ha.
Revenue Land	460.40 Ha.

Forest Land	0 Ha.
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6. COST ESTIMATE & PROJECT SCHEDULE:

The estimate is prepared based on C.S.R. of M.P. Water Resources Department in force since 01.04.2016 Total cost works out to **Rs. 854.47 Crores** . Including 3% for establishment charges (except cost of 'B' Land) has been included in the estimates.

UNIT-I (Head Works):

'A' Preliminary':

The provision of **Rs.70.69 lakhs**. has been kept in this estimate for survey and investigation of the scheme.

'B' Land:

An amount of **Rs23600.00 lakhs** 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. 12923.00 lakhs** has been kept for construction of central spillway and scouring sluice.

'K' Buildings:

An amount of **Rs. 20.00 lakhs** has been kept for construction.

'L' Earth work :

An amount of **Rs. 1214.68 lakhs** has been kept for construction of earth dam.

'M' Plantation:

An amount of **Rs. 0.00 lakhs**.

'O' - Miscellaneous:

An amount of **Rs. 00.00 lakhs** has been kept under this sub head.

'P' Maintenance:

An amount of **Rs. 141.38 lakhs** has been kept under this sub head.

'Q'-SpL T&P:

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

'R' - Communication:

An amount of **Rs. 30.00**lakhs has been kept under this sub head.

'X' - Environment, Ecology:

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

UNIT-II (Canals):

'A' Preliminary:

The provision of **Rs. 75.00** lakhs has been kept in this estimate for command area survey and investigation of the scheme.

'B' Land:

An amount of **Rs. 80.00 lakhs** had been provided under this sub-head for payment of compensation of private land etc. coming under acquisition of Piped canal width.

'C' Works:

The provision of **Rs. 0.00** lakhs has been kept under this sub head.

'K' Buildings:

An amount of **Rs. 20.00** lakhs has been kept for construction of Pump Houses & Store sheds.

'L' Earth Work:

An amount of **Rs. 15966.00 lakhs** 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. 00.00 lakhs** has been kept under this sub head.

'O' - Miscellaneous:

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

'P' - Maintenance:

An amount of **Rs 692.73** lakhs 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. 60.00 lakhs** has been kept under this sub head.

'S'- Power plant :

No provision made for solar power plant in this project.

'U' - Distributory:

An amount of **Rs. 22519.00 lakhs** 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 **854.47 crore** for 27000 hectare CCA irrigation area without Solar power Plant .The cost per hectare works out to **Rs. 3.164** Lakh per ha.

i)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 27000 Ha.

ii.)BENEFIT COST RATIO

B.C. Ratio of the project is -

For 5% rate of Return is - 1.65%

lii)CONSTRUCTION PROGRAMME AND MAN POWER AND PLANT 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 110 kms. from the dam site. Pitching stone, Quarried Boulder and quarry spalls are available at a distance of 2 km. from the site.

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 GUNA/RAJGARH District which is a Normal Blocks of GUNA/RAJGARH district, 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. 547.47 Crores** for **27000** hectare Designed Irrigation area. The cost per hectare works out to **Rs. 3.16 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 **27000** Ha of Rabi designed Irrigation area of GUNA/RAJGARH and Banda block of GUNA/RAJGARH district.

(PC SANKLA)
Executive Engineer
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RAJGARH (M.P.)

KUMBHARAJ MAJOR IRRIGATION PROJECT
SALIENT FEATURES

I	Location	
	State	Madhya Pradesh

	District	Guna/Rajgarh
	Tehsil/Block	Biora /Chachoura
	Latitude	24°-15'-27.07" N
	Longitude	77°-07'-43.69" E
	River	PARBATI
	River Sub Basin	CHAMBAL
	River Basin	YAMUNA
	Tribal/Non-tribal	Non – Tribal
	Date of commencement	2018
	Distance from	80 Km from Rajgarh District 45 Km from Guna District
	Probable Estimated Cost	Rs.854.47 Crore
	CCA under project	27000Ha.
	Cost Per ha.	Rs 3.16 Lakhs Per Ha.
II	Hydrology	
	Catchment area	5623.55 Sq.Km
	Maximum Flood Discharge	25186.60 Cumecs
	75% dependable yield	533.95MCM
	Proposed Designed Flood	As per Norms.
III	Reservoir Data	
	Gross storage	106.320 MCM
	Live storage	101.26 MCM
	Dead Storage	5.06 MCM
	Gross Area Of Submergence at FR	2186.46 Ha..
	Private Land	1726.06 Ha.
	Revenue Land	460.40 Ha.
	Forest Land	0 Ha.
	No. of village Submerged	0 No.s Full/ 32 No.s Partially
	No.of family affected	250
IV	Dam Data	
	Type of Dam	Earthen
	Total Length of Dam	4281.60 M
	Height of Dam	20.18 M.
	Number of openings	29 Nos

	Size of Gates	15.00 M x 12.00 M
	Crest Level	396.00 M
	Thickness of Pier	3.00 M
V	Control Levels	
	Top Bund Level (TBL)	412.00 M
	Full Reservoir Level (FRL)	408.00 M
VI	Canals	
	Length of Rising Main (Left)	1.60KM
	Length of Rising Main (Right)	3.00 KM
	Dia. Of Rising Main (Left)	2.10 M
	Dia. Of Rising Main (Right)	1.70 M
	Lift (Left)	76.35 M
	Lift (Right)	69.80 M
VII	Area Proposed Under Irrigation	
	Crops proposed for irrigation	H.Y.V Wheat, O.L.V Wheat, Gram & Pulses
	GCA (Left)	25000 Ha.
	GCA (Right)	16600 Ha.
	Total GCA	41600 Ha.
	CCA (Left)	16200Ha.
	CCA (Right)	10800Ha.
	Total CCA	27000 Ha.
	Annual Irrigation	27000 Ha.
	Crop Kharif	00 ha.
	Crop Rabi	27000 Ha.
	Crop perennial	Nil
	Annual irrigation	27000 Ha.
VIII	Financial Aspects (Estimated Cost)	
	Unit – I	Rs.452.91 Crores
	Unit – II	Rs.401.55 Crores
	Total	Rs. 854.47 Crores

