

## Executive Summary

On the basis of water availability, demand and other socio-economic factors, **Maa Ratangarh Multipurpose project** is designed to sustain all the possible uses for next decades. An 31.00 m high barrage is proposed to be constructed across sind river near seonda town of datia District. The estimated Gross storage of barrage is 252.23MCM. The estimated regeneration on the basis of observed flow and actual measurement of flow on 3/2/2016 by director hydro metrology wing of BODHI is 410 MCM for non monsoon months (oct-may).The net availability is 560 MCM .In initial phase,it is proposed to irrigate 78484 hectares of land by efficient pressurized piped network to facilitate farmers with assured water and head for adopting micro irrigation techniques. The project ensures the use of micro-irrigation techniques (drip/ sprinkler) by the users by irrigate 78484 hectares of land with annual irrigation 165 %.and 9 MW power Generation is also proposed

The total submergence at full reservoir level is 3337.63hectares, out of which 799.59 hectares is forest land and 1302.79 hectares is private land and rest 1235.25Ha is Govt. Land.766 Family of 8 no. Villages namely village Khamroli i/c Dheemarpura (368 Family), Medhapura(17 Family), Dhubhiai(211 Family), Jigania (13 Family), Barkari (157Family),Nanat and Madhikheda (0 Family) are coming under submergence. Expected numbers of families needs to be rehabilitated are around766.

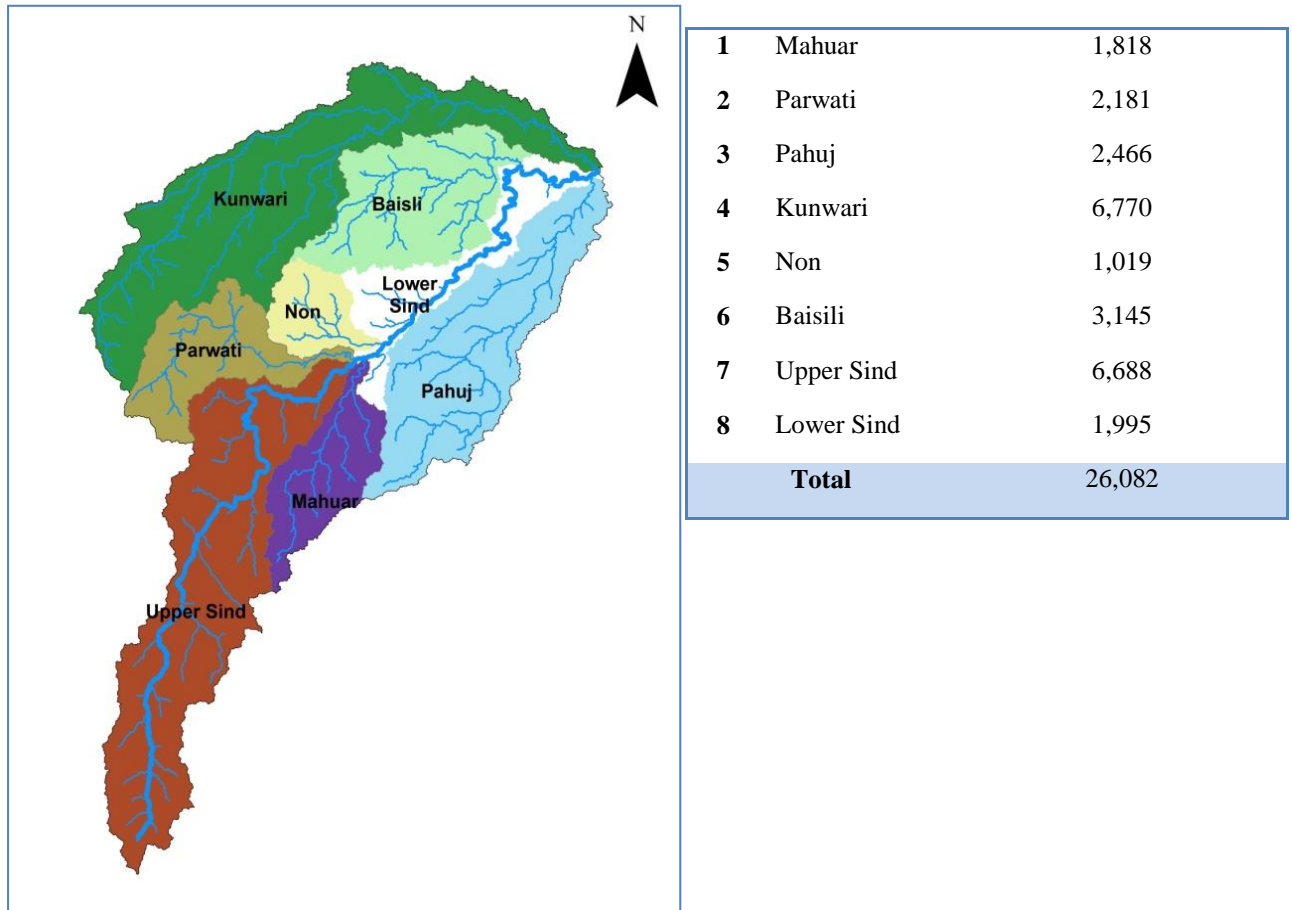
The project is designed on the principles of integrated water resource management to maximize the water productivity. The project ensures multiple use of water like Irrigation, Power production, Drought mitigation, Subsistence (Drinking & domestic),Land reclamation, fisheries and tourism .The background study of soil ,agro-climatic zone and ground water conditions helps a lot in selecting a suitable site for accurate and use huge regeneration.

The estimated cost of Project is. 2244.97 crores with Benefit-cost ratio of 2.86and ERR of 37%.The Project is vulnerable from environmental and ecological aspect. Insurance of e flow round the year and assured water for animals in summers to rehabilitate nearby reserve forest (Ratva and devgarh).

### 1. Background

Maa Ratangarh Multipurpose project lies in sindh sub basin of Madhya Pradesh. The first and foremost requirement for any sizable water resources project to be implemented is the river basin Planning. River Basin plan of Sindh is prepared by in house trained water resources professionals with the support of eminent water management institute, Unesco-IHE, Delft, the Netherlands. The basin plan study reveals that the basin is unharnessed to 65% of its gross yield of 6.1 BCM. The spatial

and temporal variation throughout the basin is closely analyzed on the corners of integrated water resources management principles in Plan. The basin is subdivided into 8 major sub basin namely Upper Sindh, Parwati, Mahuar, Non, Lower sindh, Pahuj, Baisili and kunwari. The map demarcating sub-basins and a table featuring there catchment areas as below:



Upper sind basin is almost harnessed by Atal sagar (manikheda major project),Harsi major project lies in Parwati sub basin.The lower sind project receives yield of upper sindh, parwati,mahuar,non and lower sind sub basins comprising of 12739 sq km catchment at proposed site.

## 2.0 Project

### 2.1 Location

The Proposed barrage site is located near the village Dangdiroli which are nearly 10 km from Seodha tehsil District Datia Madhya Pradesh. The proposed site for barrage can be

approachable from seodha-Bercha road. The Latitude and Longitude of the proposed site are 26<sup>0</sup>08'29" and 78<sup>0</sup>44'20"respectively.

## 2.2 Water availability

The rain fall data (from year 1982 to 2014 ) of 16 rain gauge stations affecting the catchment are used to compute the 75 % dependable rainfall data of proposed dam. The rain fall data has been taken from WRD website.

The names of influencing stations are given below along with their Thiessen weights:-

S.No.	R. G. STATION	INFLUENCE AREA IN SQ M	IF
1	Aron	918881798	0.07213
2	Ashooknagar	546959544	0.04294
3	Dabra	1570324759	0.12327
4	Datia	255253355	0.02004
5	Guna	579512902	0.04549
6	Gwalior	261517306	0.02053
7	Harsi	1754886487	0.13776
8	Isagarh	816919141	0.06413
9	Kanyadhana	463813592	0.03641
10	Karera	1499297747	0.11769
11	Kolaras	1129367537	0.08865
12	Lateri	280844218	0.02205
13	Narwar	906758992	0.07118
14	Pohari	610248215	0.04790
15	Shivpuri	1007941282	0.07912
16	sironj	136473125	0.01071
	Total	12739000000.0000	1.00000

Using above weights weighted rainfall have been computed for the period 1982 to 2014 for gross catchment of 12739sqkm.

Mohini pick up and Mohini sagar dam on Sindh river is in u/s of proposed dam site .Water awalibility of Mohini sagar dam site has been approved by CWC in 1991 vide no. CWC hydrology north no 7/67/77 dtd 9.5.1991using discharge data for the period 1961-61 to 1989-90 at seondha GD site maintained by CWC in d/s of Mohinisagar and proposed dam site. Regression equation derived for this study for monsoon months have been

considered appropriate to compute water availability for weighted rainfall of **Maa Ratangarh Multipurpose project** **Rainfall - Runoff**

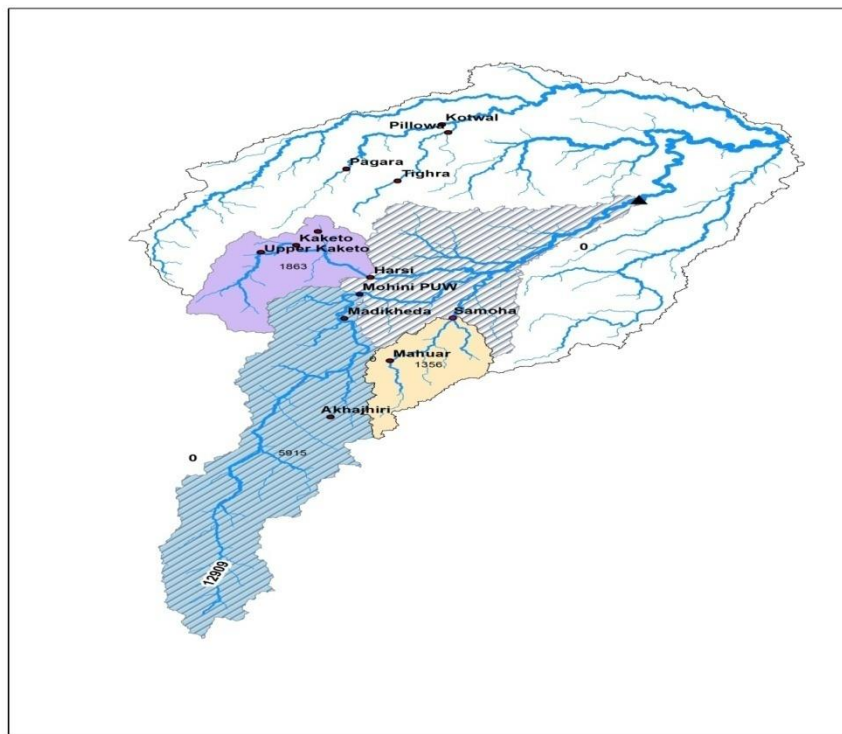
**Relationship :-**

The month wise Rainfall - runoff relationships for monsoon season at Mohini pick up and Mohini sagar dam site are tabulated below and used for computation of flow series for project.

No.	Month	Equation
1.	June	$Y = 0.789 X - 1.087$
2.	July	$Y = 0.722 X - 11.799$
3.	August	$Y = 0.8448X_1 + 0.622X_2 - 18.337$
4.	September	$Y = 0.617 X - 1.078$
5.	October	$Y = 0.617 X - 1.078$

\*X1 Rainfall (mm) of current Month, X2 - Rainfall (mm) of previous month and Y- Runoff (mm)

75% dependable runoff for monsoon months and considering non monsoon runoff @2 % annual runoff for gross catchment of project site (12739sqkm.) has been computed as 4113.55 Mcum , which gives a yield factor of 0.323. Deducting 1300.79 Mcum u/s use net available yield at project site is 2812.76Mcum



This project is located in drought prone and socio-economical backward Bundelkhand region. Creation of such assured storage with high dependable yield is a boon to the region and can mitigate severe droughts.

### 2.3 Subsistence Use

Subsistence use comprises of drinking and all other domestic use. The dam with high dependable storage and non monsoon month base flow yield suffice the irrigation and other demands. The reserve of more than 100 Mcm in the month of summers (April-June) in even severely drought year makes this Project as a boon to this region. The project after utilizing all the uses can cater as a Subsistence solution for one million population.

### 2.4 Irrigation use and area

There are two areas identified to be irrigated in Bhind, Datia and Gwalior District.

Area	GCA	CCA	Benefited Villages
Area I (Ratva-Amayen)	48655	39200	215 villages of Bhind ,Datia and Gwalior District
Area II(Billoa-devgarh)	28200	18984	
<b>Bhind Canal</b>	<b>32160</b>	<b>20300</b>	
Total	109015	78484	

# **Government of Madhya Pradesh Water Resources Department**



## **Environmental Impact Assessment Project of MAA RATANGARH MULTIPURPOSE PROJECT Distt. DATIA (M.P.)(Form-I) 2018**

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**Chief Engineer  
Rajghat Canal Project  
Water Resources Department  
Datia(M.P.)**

**FORM 1****(1) Basic Information**

<b>S. N.</b>	<b>Item</b>	<b>Details</b>
01	Name of the Projects	<b>MAA RATANGARH MULTIPURPOSE PROJECT</b>
02	<i>S. N. in the schedule</i>	<i>1( C )</i>
03	Proposed capacity/area/ tonnage to be handled/ command area/ lease area/number of wells to be drilled	Gross capacity- 252.23 Mcum Cultivable Command Area – 78484 ha Catchment Area –12739 sq km Length of Barrage –1740M Spillway-578M Maximum height of Dam –31.00M
04	New/Expansion/Modernization	New
05	Existing Capacity/Area etc.	Not applicable
06	Category of Project i.e. "A" or "B"	"A"
07	Does it attract the general condition? If yes, please specify	No
08	Does it attract the specific condition? If yes, please specify	No
09	Location	Latitude 26 <sup>0</sup> 08'29" Longitude 78 <sup>0</sup> 44'20"
	Plot/Survey/Khasra No.	P-14 & P-26
	Village	Dangdiroli
	Tehsil	Seondha
	District	Datia
	State	Madhya Pradesh
10	Nearest Railway Station/Airport along with distance in km.	Nearest Railway station Datia 65 Km from site and Airport Gwalior 120 km from site .
11	Nearest town, city, district headquarters along with distance in km.	Datia, 65 km
12	Village Panchayats, Zilla Parishad, Municipal Corporation, Local body (complete postal addresses with telephone nos. to be given)	1.GramPanchyat- Bisor 2. Tehsil –Seondha 3. Janpad Panchayat –Seondha 4. Zila Panchayat- Datia
13	Name of the applicant	Water Resources Department, Government of M.P.
14	Registered address	Water Resources Department Government of M.P. ,Mantralaya, Vallabh Bhavan, Bhopal (M.P.)

15	Address for correspondence	Engineer- in- Chief Water Resources Department , Tulsi Nagar , Bhopal (M.P.)		
	Name	Shri Rajiv Kumar Suklikar		
	Designation (Owner/Partner/CEO)	Engineer- in- Chief		
	Address	Engineer- in- Chief Water Resources Department , Tulsi Nagar, Bhopal (M.P.)		
	Pin Code	462003		
	E-mail	<a href="mailto:encwrbpl-mp@nic.in">encwrbpl-mp@nic.in</a>		
	Telephone No.	0755-2552646 , 2552878		
	Fax No.	0755-2552406		
16	Details of Alternative Sites Examined , if any Location of these sites should be shown on a topo sheet	Village	District	State
		Jara & Shikarpura	Datia	M.P.
17	Inter linked Projects	Independent Project		
18	Whether separate application of interlinked project has been submitted	NA		
19	If yes, date of submission	NA		
20	If no, reason	Independent Project		
21	Whether the proposal involves approval /clearance under: if yes, details of the same and their status to be given. a. The Forest (Conservation) Act, 1980 ? b. The Wildlife (Protection Act, 1972 ? c. The C.R.Z. Notification,1991?	Yes	No	No
22	Whether there is any Government Order/ Policy relevant/relating to the site?	Vide GoMP Water Resources department order no 3441200/04/2016MPS/31/701 Bhopal dated 22/03/2016		
23	Forest land involved (hectares )	799.59ha For Dam sheet, Rising main ,colony camp, Road, Bridge ,Balancing Reservoir,Canal etc.)		
24	Whether there is any litigation pending against the project and /or land in which the project is proposed to be set up? a. Name of the Court b. Case No. c. Orders/directions of the Court, if any and its relevance/with the Proposed project.	No litigation pending against the project and/ or land in which the project is proposed to set up.	N A	N A
			N A	N A

## (II) Activity

Construction operation or decommissioning of the project involving actions which will cause physical changes in the locality (topography, land use, changes in water bodies, etc.)

S. N.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
1.1	Permanent or temporary change in land use, land cover or topography including increase in intensity of land use (with respect to local land use plan)	Yes	The submergence area at FRL is 3278.63ha. The present land in the submergence area is revenue, forest, agricultural which will be converted into water body (reservoir). The C.C.A. is 78484ha and the irrigation intensity works out to be 165 %.
1.2	Clearance of existing land, vegetation and building?	Yes	Total area affected in project is 3337.63 and the details are as below :- i. Forest- 799.59 ha ii. Cultivable land 302.79 ha iii. Uncultivable land 1000.00 ha iv. Revenue land- 1235.25 ha
1.3	Creation of new land uses?	Yes	Pressure irrigation through rising main & Distributory pipe line about 70.40Km. long will irrigate 78484 ha by gravity flow through pipe system.
1.4	Pre-construction investigations e.g. bore holes, soil testing?	Yes	Bore hole drilling, construction materials testing, soil sampling etc. to be completed as a part of investigation-activities.
1.5	Construction works?	Yes	The project comprises of the following :- Barrage having Earthen dam, spillway, and Energy Dissipater in the form of Dumping Rock in D/S at Barrage toe. Maximum height of MAA RATANGARH barrage is 31.00m. Construction and development of Rest house complex and temporary camp offices etc.
1.6	Demolition works?	No	Not required
1.7	Temporary sites used for construction works or housing of construction workers?	Yes	About 2 ha for construction of housing for construction workers and related activities.
1.8	Above ground buildings, structures or earthworks including linear structures, cut and fill or excavations.	Yes	Same as mentioned under 1.5
1.9	Underground works including mining or tunneling?	No	Not applicable here.
1.10	Reclamation works?	No	Reclamation of land, if required, will be

			done as per site specific requirement to integrate with natural surroundings.
1.11	Dredging?	No	-
1.12	Offshore structures?	No	-
1.13	Production and manufacturing processes?	Yes	This will enhance the agricultural productivity and fish cultivation in the project area.
1.14	Facilities for storage of goods or materials?	Yes	Facility for temporary storage of cement, steel, E&M HM equipment, aggregate/sand, etc. shall be created.
1.15	Facilities for treatment or disposal of solid waste or liquid effluents	Yes	<p>During construction phase, labour colonies are proposed to be located closer to construction sites. About 250 labourers and 25 technical staff are likely to congregate in the area during construction phase. The average per capita solid waste generated will be of the order of about 210 gm/day/person. Thus, the solid generated from labour camps shall be of the order of 0.06 tons/day. Adequate facilities for collection, conveyance, and disposal of solid waste will be developed. For solid waste collection, number of masonry storage tanks will be constructed at appropriate locations in various labour camps. These tanks will be emptied at regular intervals and the collected waste will be transported to landfill sites.</p> <p>Covered trucks to collect the solid waste from common collection point and its transfer to the disposal sites will be put in practice. Suitable land fill site will be identified, to contain municipal waste from various project township, and labour colonies etc., in consultation with the local administration. One community latrine shall be provided per 20 persons. The sewage from the community latrines will be treated at sewage treatment plant (STP). The drinking water facilities and water disposal sites shall be located at safe distance from each other.</p>
1.16	Facilities for long-term housing of operational workers?	No	A chaukidar hutment for long term, besides a temporary colony of about 20 quarters for workers will be provided with basic infrastructure facilities like potable water supply and solid waste management etc.
1.17	New road rails or sea traffic during construction or operation?	Yes	During construction stage, road traffic will increase for transportation of construction material, equipment, machines and laborers and to cater for this, temporary roads shall be provided to the minimum

			extent possible. However, most of the sites are now a days connected with PMGSY roads. Road and Bridge Ratangrah Mata Mandir need to reconstructed.
1.18	New road, rail, air waterborne or other transport infrastructure including new or altered routes and stations, ports, airports, etc?	Yes	As per details given in para 1.17
1.19	Closure or diversion of existing transport infrastructure leading to changes in traffic movements?	Yes	Roads coming under submergence will be connected to other existing roads, and road-plan will be prepared accordingly.
1.20	New or diverted transmission lines or pipelines?	Yes	Transmission lines for villages will be provided separately, if required.
1.21	<i>Impoundment, damming, culverting, realignment or other changes to the hydrology of water courses or aquifers?</i>	Yes	Anticipated adverse changes in the hydrology of watercourses/aquifers will be bare minimum being non-perennial river. However, hydrology changes will be beneficial in light of ensuring the release of environmental flows (e-flow).
1.22	Stream crossings?		The same shall be identified during the detailed investigations and stream crossings will be provided accordingly as per requirement.
1.23	Abstraction or transfers of water form ground or surface waters?	Yes	In the project, conjunctive use of water shall be insured.
1.24	Changes in water bodies or the land surface affecting drainage or run-off?	Yes	The proposed project will change the water bodies on account of reservoir formation as a result of construction of dam. The land use will also change on account of increased water availability for irrigation. Green cover will improve on account of increased soil-moisture availability. The probability of water-logging in the nearby lands is remote as good natural drainage already exists. This aspect will be covered in detail as a part of the EIA/EMP study.
1.25	Transport of personnel or materials for construction, operation or decommissioning?	Yes	The construction materials will be brought from the local sources in trucks/dumpers. The workers required for construction activities are available in the vicinity of the project area and will be using existing mode of communication i.e. bus, two wheelers, three wheelers, tempo, etc.

1.26	Long-term dismantling or decommissioning or restoration works?	No	N.A.
1.27	On-going activity during decommissioning which could have an impact on the environment?	No	N.A.
1.28	Influx of people to an area in either temporarily or permanently?	Yes	About 25 technical and 250 construction laborers will be employed during construction phase. The workers required for construction activities are available in the vicinity of the project area. Technical staff shall stay in various camps or colonies close to the major construction sites.
1.29	Introduction of alien species?	No	-
1.30	Loss of native species or genetic diversity?	Yes	The existing floral and faunal species in the specified zone will be affected. The nature, extent and magnitude of such losses will be covered in detail as a part of the EIA/EMP study.
1.31	Any other actions?	No	Forest and other losses incurred due to construction shall be recovered through compensatory afforestation and other measures as given in EMP.

**2. Use of Natural resources for construction or operation of the project (such as land, water, materials or energy, especially any resources which are non-renewable or in short supply):**

<b>S. No.</b>	<b>Information/Checklist confirmation</b>	<b>Yes /No</b>	<b>Details there of (with approximate quantities/rates, wherever possible) with source of information data</b>
2.1	Land especially un-developed or agricultural land (ha)	Yes	Land will be acquired for construction of various project appurtenances including submergence area. Land coming under submergence is revenue land, forest land, and agricultural land. The details of the land to be acquired for project shall be assessed as a part the CEIA study.
2.2	Water (expected source & competing users) unit KLD	Yes	The quantity of water required during construction would be 40 kld. During construction and operation phases, potable water for laborers and technical staff would be provided.
2.3	Minerals (MT)	Yes	Construction material in the form of metal manufactured from rocks and sand will be used in dam and canal network. The

			quantum of the minerals is given below – Metal -88944 Cum Sand -44995Cum
2.4	Construction material-stone, aggregates, and soil (expected source-MT)	Yes	The quantity of aggregate / rock required to be produced for the construction of Earthen dam and other estimated structures of the project has been estimated to be around 0.13 million cubic meter. Estimated requirement of various construction materials is under: <ul style="list-style-type: none"> <li>• Coarse Aggregate : 88944 m3</li> <li>• Fine aggregate : 44995 m3</li> <li>• Clay for earthen dam : 282756m3</li> </ul> Borrow areas and rock queries have been identified near the project vicinity to provide construction materials in the form of soil, coarse and fine aggregate the sand deposits and its tributaries in the close proximity of projects will also be used for construction purpose.
2.5	Forest and timber (source-MT)		Mixed forest having min. timber value having a forest density of 0.1 to 0.4.
2.6	Energy including electricity and fuels (source, competing users) Unit: fuel (MT), energy (MW)		The total requirement of construction power will be about 50 KW at different sites, are :- construction sites : 50KW Existing arrangement Substation near Barrage site to meet the complete load requirements of the Barrage construction is situated near village Dangdiroli
2.7	Any other natural resources (use appropriate standard units)	No.	-

**3. Use, storage, transport, handling or production of substance or materials, which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health**

S. No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
3.1	Use of substance or materials, which are hazardous (as per MSIHC rules) to human health or the environment (flora, fauna and water supplies)	No	N. A.
3.2	Changes in occurrence of affect disease vectors	Yes	Normally an irrigation project increases the incidence of water-borne diseases due to

	(e.g. insect or water borne disease)		<p>increased water availability, owing to stagnant pools of water in submergence area, command area, canals, etc. It may result in preponderance of mosquitoes, leading to increased frequency and incidence of water-borne diseases, especially malaria.</p> <p>This aspect will be studied as a part of CEIA and adequate measures to be implemented during project construction and operation phases.</p>
3.3	Affect the welfare of people e.g. by changing living conditions?	Yes	The details of various welfare schemes for locals shall be outlined as a part of area development activities and the details will be outlined in the CEIA report.
3.4	Vulnerable groups of people who could be affected by the project e.g. hospital patients, children, the elderly, etc.	Yes	Vulnerable groups/individuals will be identified and suitable protection measures will be taken to insulate them from any possible adverse effects.
3.5	Any other causes	Yes	Majority of people living in the proposed project area belong to BPL, whose primary livelihood is sustenance farming/ daily wagers. So relocation of these people on the adjoining government land will not be a problem and extra care will be taken for their rehabilitation.

**Production of solid wastes during construction or operation or decommissioning (MT/month)**

<b>S. N.</b>	<b>Information/Checklist confirmation</b>	<b>Yes /No</b>	<b>Details thereof (with approximate quantities/rates, wherever possible) with source of information data</b>
4.1	Spoil, overburden or mine wastes	Yes	<p>In this project, it is proposed to collect the construction waste from various construction sites, and disposed at sites identified in consultation with the district administration.</p> <p>Various construction sites would be properly leveled. The leveling or reclamation of various construction sites, shall be made mandatory for the contractor, involved in the construction work.</p> <p>The details of the same shall be covered as a part of EMP to be presented as a part of the EIA report.</p>
4.2	Municipal waste (domestic and or commercial wastes)	Yes	About 250 labour and 25 technical staff is likely to congregate in the area during construction phase. The average per capita solid waste generated is of the order of 210

			<p>gm/day/person. The solid waste likely to be generated from camps shall be of the order of 0.06 ton/day. Adequate facilities for collection, conveyance and disposal of solid waste will be developed.</p> <p>For solid waste collection, number of masonry storage tanks will be constructed at appropriate locations in camps. These tanks will be emptied at regular intervals and the collected waste will be transported to landfill sites.</p> <p>The details will be suggested as a part of CEIA study.</p>
4.3	Hazardous wastes (as per Hazardous Waste Management Rules)	No	No hazardous waste will be generated.
4.4	Other industrial process wastes	No	No
4.5	Surplus product	No	No
4.6	Sewage sludge or other sludge from effluent treatment	YES	<p>During construction phase, sludge generated from secondary settling tank will be dried in sludge drying beds. The dried sludge will be disposed at land filling sites or sold to the farmers, to be used as fertilizers.</p> <p>Sewage generated from camps will be treated in septic tanks and soak pits, designed and constructed as per IS 2470 Pt-1 &amp; Pt-2 specifications.</p>
4.7	Construction or demolition wastes	N.A.	Construction waste from various construction sites will be disposed at sites identified in consultation with the District Administration.
4.8	Redundant machinery or equipment	YES	Redundant machinery equipments will be taken out from the project sites, after completion of construction activities.
4.9	Contaminated soils or other materials	No	No contamination of soil is foreseen in the project.
4.10	Agricultural wastes	YES	<p>The proposed project envisages enhancement of irrigation intensity in the CCA of 78484 ha in Datia, Bhind &amp; Gwalior District, Madhya Pradesh, which will increase agriculture-production, thereby increasing agricultural waste.</p> <p>Appropriate measures for the reuse and recycling of agricultural waste will be suggested as a part of the CEIA study.</p>
4.11	Other solid wastes	No	Nil

**5. Release of pollutants or any hazardous, toxic or noxious substances to air (Kg/hr)**

<b>S. N.</b>	<b>Information/Checklist confirmation</b>	<b>Yes/No</b>	<b>Details thereof (with approximate quantities/rates, wherever possible) with source of information data</b>
5.1	Emissions from combustion of fossil fuels from stationary or mobile sources	YES	The major air-pollutant, emitting from diesel-combustion are SPM, SO <sub>2</sub> and NO <sub>x</sub> . The SPM emission is minimum due to low ash content in diesel. The short-term increase in SO <sub>2</sub> is expected to be quite low, even assuming all the equipments are operating at a common point. Thus no adverse impacts on ambient air quality are anticipated. Emission from labour camps, due to use of fuel wood, will also add to emissions.
5.2	Emissions from production processes	No	Production process of concrete/mortar and earthwork are mostly emission-free except feeble emissions from diesel operated machineries.
5.3	Emissions from materials handling including storage or transport	YES	During construction phase vehicular movement will increase. Construction materials will be brought and stored at various sites. Prevailing wind may carry these materials in the atmosphere, especially during dry environment. However, its scale is not expected to be significant.
5.4	Emissions from construction activities including plant and equipment	YES	The operation of various construction equipments requires combustion of fuels, commonly diesel. The major pollutant, emitting from diesel-combustion is SO <sub>2</sub> . The SPM emission will be minimum due to low ash content in diesel. The short-term increase in SO <sub>2</sub> is expected to be quite low, even assuming all the equipments are operating at a common point. Thus no adverse impacts on ambient air quality are anticipated.
5.5	Dust or odours from handling of materials including construction materials, sewage and waste	YES	Dust will be generated additionally during excavation, blasting, drilling and construction works .appropriate measure will be adopted as per CEIA study.
5.6	Emissions from incineration of waste	No	No incinerator/s are planned to be installed in the project
5.7	Emissions from burning of waste in open air (e.g. slash materials, construction debris)	No	No burning of any construction-waste is required.
5.8	Emissions from any	No	NO

	other sources		
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## 6. Generation of Noise and Vibration, and Emissions of Light and Heat:

S. No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data																				
6.1	From operation of equipment e.g. engines, ventilation plant, crushers	Yes	<p>The use of various construction equipments will generate noise. Detailed non-use modeling study will be conducted under CEIA to determine increase in noise level due to various construction activities (like operation of various construction equipments, increased vehicular traffic, etc). The specification of noise generation from various equipments are given below -</p> <table border="1"> <thead> <tr> <th>Equipment</th> <th>Sound level (DB)</th> </tr> </thead> <tbody> <tr> <td>Compressors</td> <td>75-85</td> </tr> <tr> <td>DG Set</td> <td>72-82</td> </tr> <tr> <td>Concrete places</td> <td>70-80</td> </tr> <tr> <td>Batching plant</td> <td>75-85</td> </tr> <tr> <td>Pneumatically operated Jack Hammer</td> <td>70-80</td> </tr> <tr> <td>Drilling machine</td> <td>85-95</td> </tr> <tr> <td>Crusher</td> <td>68-70</td> </tr> <tr> <td>Pump</td> <td>68-70</td> </tr> <tr> <td>Vibrators</td> <td>69-81</td> </tr> </tbody> </table>	Equipment	Sound level (DB)	Compressors	75-85	DG Set	72-82	Concrete places	70-80	Batching plant	75-85	Pneumatically operated Jack Hammer	70-80	Drilling machine	85-95	Crusher	68-70	Pump	68-70	Vibrators	69-81
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Batching plant	75-85																						
Pneumatically operated Jack Hammer	70-80																						
Drilling machine	85-95																						
Crusher	68-70																						
Pump	68-70																						
Vibrators	69-81																						
6.2	From industrial or similar processes	No	At present there is no generation of noise and vibration, and emissions of light and heat but it may change after the availability of water through this project.																				
6.3	From construction or demolition	Yes	As per 6.1																				
6.4	From blasting or piling	Yes	80 to 90 DB (A)																				
6.5	From construction or operational traffic	Yes	During construction, there will be an increase in vehicular movement due to transportation of construction materials. Based on past experiences, impacts on ambient noise levels due the operation of construction equipment, and increased vehicular movement is not expected to be significant. Though this aspect is only temporary, it will be covered in detail as a part of the CEIA.																				
6.6	From lighting or cooling systems	Yes	For lightening purpose at the project sites, small units of silent DG sets will be installed. The project																				

			does not envisage involvement of any cooling systems.
6.7	From any other sources	No	-

**7. Risks of contamination of land or water from releases of pollutants into the ground or into sewers, surface waters, groundwater, costal waters or the sea:**

<b>S. N.</b>	<b>Information/Checklist confirmation</b>	<b>Yes/No</b>	<b>Details thereof (with approximate quantities/rates, wherever possible) with source of information data</b>
7.1	From handling, storage, use or spillage of hazardous materials	Yes	Hazardous waste like used oil, generated from the use of diesel in DG sets, will be handled as per the norms and specifications of MPPCB guidelines.
7.2	From discharge of sewage or other effluents to water or the land (expected mode and place of discharge)	Yes	Sewage generated from camp will be treated through aerated lagoons, secondary setting tank, and disposed on land or water (post treatment) at sites identified in consultation with the respective district administration.
7.3	By depositions of pollutants emitted to air into the land or into water	Yes	The solid waste generated from the camps shall be suitably collected, disposed by land filling as mentioned earlier. The details of the solid waste disposal facilities will be covered as a part of the CEIA.
7.4	From any other sources	No	No pollutants are expected from any other sources.
7.5	Is there a risk of long-term build up of pollutants in the environment from these sources?	No	Since the gestation period is confined to 3 to 4 years, during which pollutants from make-shift arrangements will be disposed as per the prevailing rules and regulations. Hence, there is no potential risk of any long-term build up of pollutants in the environment.

**Risk of accidents during construction or operation of the project, which could affect human health or the environment**

<b>S No.</b>	<b>Information/Checklist confirmation</b>	<b>Yes/No</b>	<b>Details thereof (with approximate quantities/rates, wherever possible) with source of information data</b>
8.1	From explosions, spillages, fires etc from storage, handling, use or production of hazardous substances	Yes	Explosives will be used carefully by the experienced licensed persons. Blasting will be done in accordance with the existing provisions of Indian Explosives Act 1884, and all necessary precautions, will be taken as per aforesaid law. First-Aid centers/Health camps, with qualified medical professionals will be held from time to time.
8.2	From any other causes	No	All mandatory safety provisions for labour work-force, technical staff and villagers

			inhibiting nearby areas will be strictly enforced.
8.3	Could the project be affected by natural disasters causing environment damages (e.g. floods, earthquakes, landslides, cloudburst etc.)	Yes	The proposed project is located in ZONE II, as per Seismic Zoning Map of India (IS 1893:2002) and thereby falls in least risk zone or safe zone. There are no records of earthquakes, landslides etc. in the area.

**9. Factors which should be considered (such as consequential development) which could lead to environmental effects or the potential for cumulative impacts with other existing or planned activities in the locality**

<b>S. No.</b>	<b>Information/Checklist confirmation</b>	<b>Yes/ No</b>	<b>Details thereof (with approximate quantities/rates, wherever possible) with source of information data</b>
9.1	<p>Lead to the development of supporting facilities, ancillary development or development stimulated by the project which could have impact on the environment e.g.:</p> <ul style="list-style-type: none"> <li>• Supporting infrastructure (roads, power supply, waste or waste water treatment, etc.)</li> <li>• housing development</li> <li>• extractive industries</li> <li>• supply industries</li> <li>• other</li> </ul>	YES	The development of supporting facilities, ancillary development or development stimulated by the project having impacts on the environment, will be a part of Environment Management Plan, especially the issues of subsequent pollution from the use of chemicals in farming and salinity & water-logging due to increased irrigation.
9.2	Lead to after-use of the site, which could have an impact on the environment	-	Mostly make-shift arrangements will be made at the site during the construction phase which will be dismantled after completion of the project as per the prevailing norms and guidelines. Very little permanent creation will be done and that will be utilized for post-construction operation and management.
9.3	Set a precedent for later developments	Yes	<p><b>Increase in agriculture production</b></p> <p>The significant increase in cropping and irrigation intensities during project operation phase will lead to the increase in agricultural production, accompanied with an increased</p>

economic return from agriculture. The increased income levels will have a quantitative effect on the quality of demand for various facilities, eventually improving the infrastructure sector. The increased income levels will also lead to demands for better communication, health, education and other services. The increased income levels could also provide an impetus for development of these facilities.

### **Improvement in livestock**

The improvement in the socio- economic status of the population in the command area will indirectly improve the quality of livestock. The betterment in the infrastructure facilities in the area will also lead to the supply and availability of the veterinary services.

During project operation phase, food production will increase significantly. The Increase in agriculture would correspondingly increase the availability of agricultural by products. Assuming even 20-30% of agriculture by product is usable as fodder, a large quantity of fodder will be available. It will reduce the pressure of the existing forests or vegetation of the area in a significant positive manner. The Project will also improve the waste availability for livestock. This is likely to improve the overall livestock status of the area.

### **Employment generation**

The increase in the irrigation intensity in the command area would improve the employment scenario to a large extent. The introduction of irrigation requires a greater amount of labour in fields. This would improve the employment scenario for the local farmers, on the one hand, and will increase the demand for agricultural labours, on the other hand as it is a well established fact that with the introduction of irrigation, the manpower requirement per unit of agricultural land increases. On an average, labour demand in irrigated and un-irrigated agricultural fields is 200 man-days/year/ha and 100 man-days/year/ha, respectively. Thus the increased irrigation intensity will ensure employment to a large number of rural populations, which is a significant positive impact.

**Urbanization**

The commissioning of the project will increase the gross money-flow in the command area, leading to significant impacts in the project area. The area will have increased demands for services, such as sewerages system communication transportation, medical and educational facilities etc. It is presumed that all these developments would result in the generation of additional employment in secondary and ancillary sectors. Thus with the increased income level, there will be a greater impact of urbanization in the command area.

**Industrialization**

The area is suitable for industrial development. There is no big industry at present in Datia district. Commencement of this project will attract Agro Based industries in nearby areas.

The cropping pattern proposed for the command area envisages significant increase in the production of wheat and horticultural crops. The increased production will lead to mushrooming of small scale agro-industries.

The increased level of industrialization would provide greater employment opportunities. The industrialization will also increase the demands for improvement in infrastructure facilities. This will lead to improvement in roads, communication, markets, storage yards, service yards etc. as ancillary benefits.

**Other Changes**

With the improvement in irrigation intensity, there will be an increase in the agricultural production of the command area. This, subsequently, will increase the money-flow in the command area as well as in the surrounding areas, as spill-over effects. The increased agricultural production will automatically lead to industrialization and demand for better infrastructural facilities. There will be an increased migration towards the command areas, as it will provide better

			<p>economic avenues, compared to the surrounding areas. The influx of migrants in the area will slightly change the population. The influx of migrants, along with the increasing pressure on land and greater influx of money in the command area, will lead to diversification of occupational profits. Small scale industrial units and commercial units are likely to be established in the area.</p> <p>The command area will have increased demands for services, such as sewerage system, communication, transportation, recreation, schools, hospital etc. The benefits of all these developmental activities will be generation of additional employment. This array of services can provide amenities hitherto lacking and stimulate changes in the tasks performed by women in society and to the status of women within the society. The details of the above referred impacts will be assessed and quantified to the extent possible as part of CEIA.</p>
9.4	Have cumulative effects due to proximity to other existing or planned projects with similar effects	No	

### (III) Environmental Sensitivity

<b>S. No.</b>	<b>Areas</b>	<b>Name/ Identity</b>	<b>Aerial distance (within 15 km.) Proposed project location boundary</b>
1	Areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value	No	There are no sites in the proposed project under international conventions, national or local legislation for their ecological, landscape, cultural or other related value.
2	Areas which are important or sensitive for ecological reasons- Wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests	Yes	The project will submerge 799.59ha forest land in Datia district.
3	Areas used by protected, important or sensitive species of flora or fauna for breeding, nesting,	N A	Identified during the process of detailed investigation .

	foraging, resting, over wintering, migration		
4	Inland, coastal, marine or underground waters	N A	There is no coastal or marine water body. Underground water table in the area specified exists at 70-100 meters depth. There are no natural lakes, springs or any other water bodies
5	State, National boundaries	No	No state or national boundary exists within 30 km radius of proposed project location boundary.
6	Routes or facilities used by the public for access to recreation or other tourist, pilgrim areas	No	Routes or facilities to recreation or other tourist, pilgrim areas do not fall within 15 km zone of the proposed project location boundary. Furthermore, the proposed creation of reservoir will not obstruct any routes or facilities even beyond 15 km zone of the proposed project location boundary.
7	Defence installations	No	There are no defense installations within 15 km zone of the proposed project location boundary.
8	Densely populated or built up area	No	There are no densely populated or built up areas, within 15 km zone of the proposed project location boundary. However, nearest village Seondha falls in downstream within the specified zone of 15 km. The town of Seondha has a low population density.
9	Areas occupied by sensitive man-made land uses ( <i>hospitals, schools, places of worship, community facilities</i> )		The township Seondha within 15 km zone has hospitals, schools, places of worship, community facilities but they will not be affected by the proposed project. Furthermore, the creation of water body will improve the prevailing overall ecological and environmental situation, thereby addressing the environmental sensitivity of the area. Land of 24 Villages will be affected in submergences of proposed Barrage.
10	Areas containing important, high quality or scarce resources ( <i>ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals</i> )	No	<p>The groundwater table in the specified zone of 15 km area is at 70-100 meters depth. The creation of reservoir will address the scarcity of groundwater through natural recharge.</p> <ul style="list-style-type: none"> <li>The mother surface resource i.e., the land, in the specified 20 km in left flank, at present is under-productive: feeble humus content, low agricultural yield, devoid of major natural vegetation, rocky outcrops, etc. Creation of water body will immensely improve the land quality and its 'land use capability' class. 799.59ha of forest land is affected , largely mixed forests. Proposed project</li> </ul>

			<p>will enrich the humid-content of soil moisture zone and will lead to qualitative improvement of forest, within the vicinity of the reservoir. Moreover, the chances of compensatory afforestation to survive will be more, owing to the availability of water.</p> <ul style="list-style-type: none"> <li>• At present most of the agriculture in the proposed project area is rain-fed having very low per unit yield and poor agriculture-intensity. Creation of the water body will lead to the qualitative and quantitative improvement of agricultural yield, eventually leading to sustainable family economy. This acquires greater significance in the light of the fact that Datia district falls within the Bundelkhand region of Madhya Pradesh, which has been reeling under severe droughts and famine since last one decade.</li> <li>• At present, river Sindh has only seasonal flow and hence non-perennial in nature. Creation of reservoir with assured release of environmental flows in non-flowing periods will transform the river into perennial one. This will lead to development of fisheries as well as promotion of aquatic flora and fauna.</li> <li>• The proposed project does not have any tourism spot within 15 km of proposed project location boundary. The creation of a reservoir has potential to develop it as a tourism center.</li> <li>• There is no surface or sub-surface minerals within 15 km of proposed project location boundary. It is corroborated by the geological map of the area.</li> <li>•</li> </ul>
11	<i>Areas already subjected to pollution or environmental damage. (those where existing legal environmental standards are exceeded)</i>	No	<p>The specified area of 15 km of proposed project location boundary does not have any polluted or environmentally damaged patch. Due to lack of water resources there is no major industry in the area, which is considered a 'backward' area. So no existing legal environmental standards are exceeded.</p> <p>.</p>
12	Areas susceptible to natural hazard which could cause the project to present environmental problems (earthquakes, subsidence, landslides,	No	<ul style="list-style-type: none"> <li>• The area falls in the 'Seismic Zone II' considered as one of the safest seismic zones. Furthermore, the site-specific seismic investigations will be conducted and appropriate seismic safety measure will be incorporated in the project design, after the seismic investigation and specific requirement.</li> </ul>

	<p><i>erosion, flooding or extreme or adverse climatic conditions)</i></p>		<p>Secondly, in terms of water storage and depth of column, It is a Multi Purpose major project. Thirdly, the Barrage is to be built on expose rocks, good for the foundation. Thus ample precautions are being taken to insulate barrage from seismic event in future, if any.</p> <ul style="list-style-type: none"><li>• There have been no recorded cases of subsidence in the area. Similarly, no landslides have been reported from the area in the past.</li><li>• Adequate protection against water-erosion will be taken up by adopting soil and water conservation measures in the command area.</li><li>• The area is occasionally affected by floods during extra-ordinarily excessive monsoon. Creation of the project will provide as a buffer against the flooding.</li></ul>
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## **IV Proposed Terms of Reference for EIA studies**

- (1) The project envisages construction of a Barrage having total length of 1740 M, with maximum height 31.00 M. of river bed level Out of this, 1162M is earthen portion and 578M long Spillway. Total live storage is 242.87MCM
- (2) Total 3337.63Ha. land will be affected in the project.
  - a. Total Submergence area is 3337.63Ha .
  - b. Submerged Forest land – 799.59Ha,
  - c. Submerged Government land-1235.25Ha
  - d. Submerged private land 1302.79HaSubmergence is about 4.25% of total proposed CCA of 78484 Ha.  
Forest clearance is under Progress.
- (3) The complete canal system is pressurized Irrigation system to achieve the optimum of utilization of water .
- (4) The command area development plan will be prepared and submitted soon.
- (5) The plan for catchment Area Treatment will be submitted soon.
- (6) Eight number villages are coming under full submergence counting approximate 766 houses.
- (7) The noise created due to various construction activities will be nominal as it is not an industrial Development project. Explosives, required, will be used carefully by the experienced licensed persons.
- (8) Standard terms of reference shall be followed –additional terms of reference directed by Expert Appraisal committee shall be adhered to strictly.

"I hereby given undertaking that the data and information given in the application and enclosures are true to the best of my knowledge and belief and I am aware that if any part of the data and information submitted is found to be false or misleading at any stage, the project will be rejected and clearance given, if any, to the project will be revoked at our risk and cost.

Date: -----

**(R.B.Dixit)**  
**Executive Engineer**  
Harsi High Level Canal  
Division no 2 DaSbra

**(R.K.Shrivastava)**  
**Superintendent Engineer**  
Sindh Project Canal Circle  
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**(N.P.KORI)**  
**Chief Engineer**  
Rajghat Canal Project  
Datia (M.P.)

**(Rajeev Kumar Sukalika)**  
Engineer-in-chief  
Department of weater Resources  
Tulsi nagar Bhopal (M.P.)



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## Executive Summary

On the basis of water availability, demand and other socio-economic factors, **Maa Ratangarh Multipurpose Project** is designed to sustain all the possible uses for next decades. An 31.00 m high barrage is proposed to be constructed across sindh river near seonda town of datia District. The estimated Gross storage of barrage is 252.23MCM. The estimated regeneration on the basis of observed flow and actual measurement of flow on 3/2/2016 by director hydro metrology wing of BODHI is 410 MCM for non monsoon months (oct-may).The net availability is 560 MCM .In initial phase, it is proposed to irrigate 78484 hectares of land by efficient pressurized piped network to facilitate farmers with assured water and head for adopting micro irrigation techniques. The project ensures the use of micro-irrigation techniques (drip/ sprinkler) by the users by irrigate 78484 hectares of land with annual irrigation 165 %.and 9MW power generation is also proposed

The total submergence at full reservoir level is 3337.63hectares, out of which 799.59 hectares is forest land and 1302.79 hectares is private land and rest 1235.25Ha is Govt. Land.766 Family of 8 no. Villages namely village Khamroli i/c Dheemarpura (368 Family), Medhapura(17 Family), Dhubhiai(211 Family), Jigania (13 Family), Barkari (157Family),Nanat and Madhikheda (0 Family) are coming under submergence. Expected numbers of families needs to be rehabilitated are aroun766.

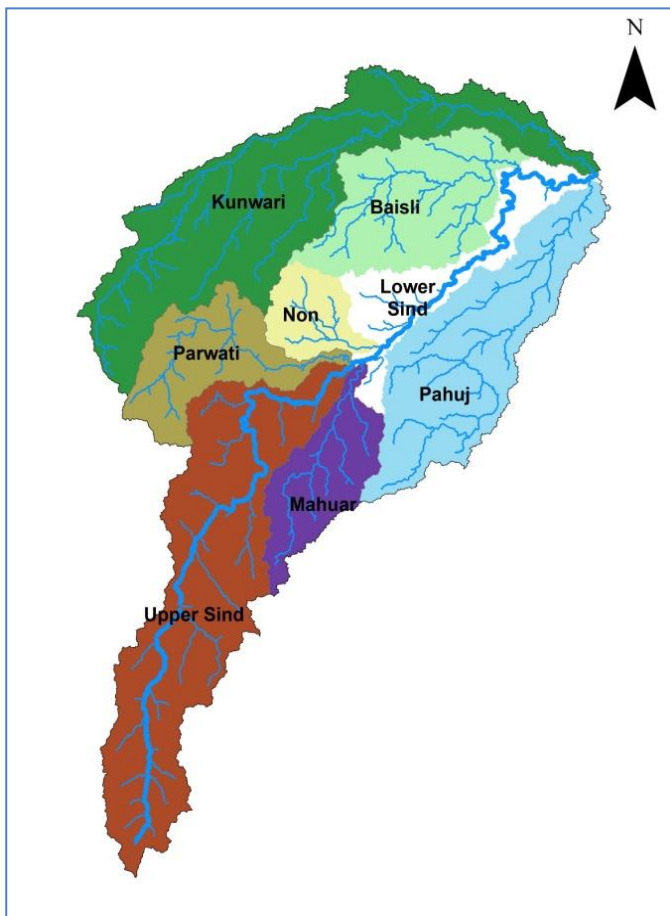
The project is designed on the principles of integrated water resource management to maximize the water productivity. The project ensures multiple use of water like Irrigation, Power production, Drought mitigation, Subsistence (Drinking & domestic),Land reclamation, fisheries and tourism. The background study of soil ,agro-climatic zone and ground water conditions helps a lot in selecting a suitable site for accurate and use huge regeneration.

The estimated cost of Project is 2244.97crores with Benefit-cost ratio of 2.86and ERR of 37%.The Project is vulnerable from environmental and ecological aspect. Insurance of e flow round the year and assured water for animals in summers to rehabilitate nearby reserve forest (Ratva and devgarh).

### 1. Background

**Maa Ratangarh Multipurpose Project** lies in sindh sub basin of Madhya Pradesh. The first and foremost requirement for any sizable water resources project to be implemented is the river basin Planning. River Basin plan of Sind is prepared by in house trained water resources professionals with the support of eminent water management institute, Unesco-IHE, Delft, the Netherlands. The basin plan study reveals that the basin is unharnessed to 65% of its gross yield of 6.1 BCM. The spatial and temporal variation throughout the basin is closely analyzed on the corners of integrated water resources management principles in Plan. The basin is subdivided into 8 major sub basin namely Upper Sind,

Parwati, Mahuar, Non, Lower sindh, Pahuj, Baiseli and kunwari. The map demarcating sub-basins and a table featuring there catchment areas as below:



1	Mahuar	1,818
2	Parwati	2,181
3	Pahuj	2,466
4	Kunwari	6,770
5	Non	1,019
6	Baisili	3,145
7	Upper Sind	6,688
8	Lower Sind	1,995
<b>Total</b>		<b>26,082</b>

Upper sindh basin is almost harnessed by Atal sagar (manikheda major project),Harsi major project lies in Parwati sub basin.The lower sindh project receives yield of upper sindh, parwati, mahuar,non and lower sind sub basins comprising of 12739 sq km catchment at proposed site.

## 2.0 Project

### 2.1 Location

The Proposed barrage site is located near the village Dangdiroli which are nearly 10 km from Seodha tehsil District Datia Madhya Pradesh. The proposed site for barrage can be approachable from seodha-Bercha road. The Latitude and Longitude of the proposed site are 26<sup>0</sup>08'29" and 78<sup>0</sup>44'20"respectively.

## 2.2 Water availability

The rain fall data (from year 1982 to 2014 ) of 16 rain gauge stations affecting the catchment are used to compute the 75 % dependable rainfall data of proposed dam. The rain fall data has been taken from WRD website.

The names of influencing stations are given below along with their Thiessen weights:-

S.No.	R. G. STATION	INFLUENCE AREA IN SQ M	IF
1	Aron	918881798	0.07213
2	Ashooknagar	546959544	0.04294
3	Dabra	1570324759	0.12327
4	Datia	255253355	0.02004
5	Guna	579512902	0.04549
6	Gwalior	261517306	0.02053
7	Harsi	1754886487	0.13776
8	Isagarh	816919141	0.06413
9	Kanyadhana	463813592	0.03641
10	Karera	1499297747	0.11769
11	Kolaras	1129367537	0.08865
12	Lateri	280844218	0.02205
13	Narwar	906758992	0.07118
14	Pohari	610248215	0.04790
15	Shivpuri	1007941282	0.07912
16	sironj	136473125	0.01071
	Total	12739000000.0000	1.00000

Using above weights weighted rainfall have been computed for the period 1982 to 2014 for gross catchment of 12739sqkm.

Mohini pick up and Mohini sagar dam on Sindh river is in u/s of proposed dam site .Water availability of Mohini sagar dam site has been approved by CWC in 1991 vide no. CWC hydrology north no 7/67/77 dtd 9.5.1991using discharge data for the period 1961-61 to 1989-90 at seondha GD site maintained by CWC in d/s of Mohinisagar and proposed dam site. Regression equation derived for this study for monsoon months have been considered appropriate to compute water availability for weighted rainfall of Maa Ratangarh Multipurpose project

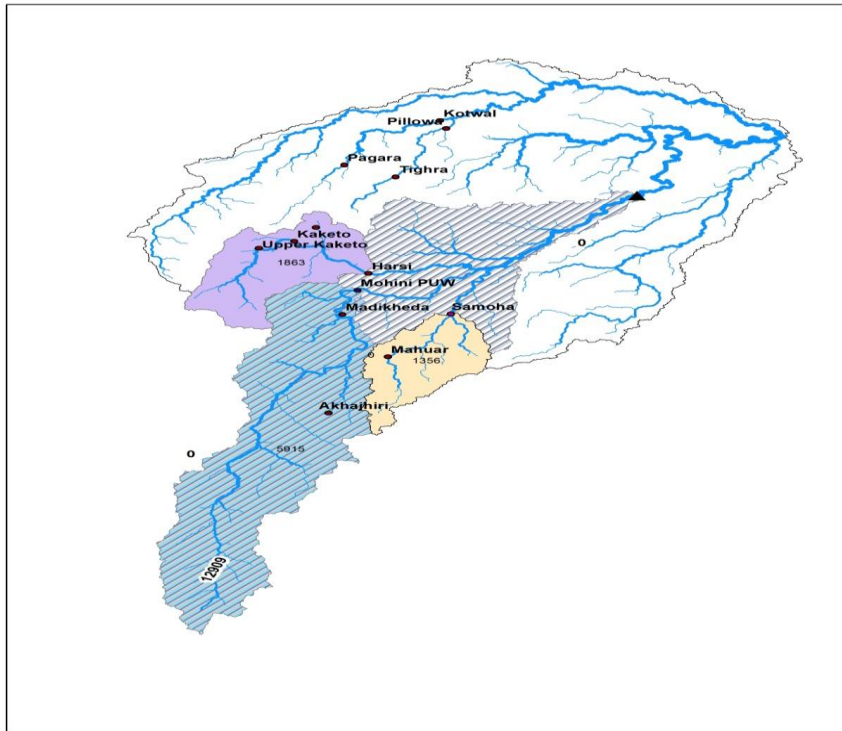
## Rainfall - Runoff Relationship :-

The month wise Rainfall - runoff relationships for monsoon season at Mohini pick up and Mohini sagar dam site are tabulated below and used for computation of flow series for project.

No.	Month	Equation
1.	June	$Y = 0.789 X - 1.087$
2.	July	$Y = 0.722 X - 11.799$
3.	August	$Y = 0.8448X_1 + 0.622X_2 - 18.337$
4.	September	$Y = 0.617 X - 1.078$
5.	October	$Y = 0.617 X - 1.078$

\*X1 Rainfall (mm) of current Month, X2 - Rainfall (mm) of previous month and Y- Runoff (mm)

75% dependable runoff for monsoon months and considering non monsoon runoff @2 % annual runoff for gross catchment of project site (12739sqkm.) has been computed as 4113.55 Mcum , which gives a yield factor of 0.323. Deducting 1300.79 Mcum u/s use net available yield at project site is 2812.76Mcum



This project is located in drought prone and socio-economical backward Bundelkhand region. Creation of such assured storage with high dependable yield is a boon to the region and can mitigate severe droughts.

## 2.3 Subsistence Use

Subsistence use comprises of drinking and all other domestic use. The dam with high dependable storage and non monsoon month base flow yield suffice the irrigation and other demands. The reserve of more than 100 Mcm in the month of summers (April-June) in even severely drought year makes this Project as a boon to this region. The project after utilizing all the uses can cater as a Subsistence solution for one million population.

## 2.4 Irrigation use and area

There are two areas identified to be irrigated in Bhind, Datia and Gwalior District.

Area	GCA	CCA	Benefited Villages
Area I (Ratva-Amayen)	48655	39200	215 villages of Bhind ,Datia and Gwalior District
Area II(Billoa-devgarh)	28200	18984	
Bhind Canal	32160	20300	
<b>Total</b>	<b>109015</b>	<b>78484</b>	

Details of lifting and power is tabulated below for the Area -I (Ratva-Amayen)

Design Of Maa Ratangarh Project			
1	CCA	59500	ha
2	Duty	0.35	lit./sec/hr
3	Discharge	20.83	Cumecs
4	Velocity in Rising main	1.50	m/s
5	Length of Rising Main	4400	m
6	Diameter of Rising main	3.00	m
7	Level to be pumped	202.50	m
8	MDDL	140	m
9	Static Head	62.48	m
10	Frictional loss	1.79	m
11	Total losses	64.27	m
12	Average level of command area	160.0	m
13	Available head	42.50	m
14	Length of Gravity Main	39000	m
15	Friction Loss in GM of command area including bend and valve losses	13.45	m
16	Command area loss	4.04	m
17	Provision for exit gradient and filter losses	25	m
18	Total head required for pressurised irrigation	42.49	
19	Design Head	64.27	m
20	Power Requirement	16013	KW
21	<b>Total Power Requirement</b>	<b>16013</b>	<b>KW</b>
		16.01	<b>MW</b>

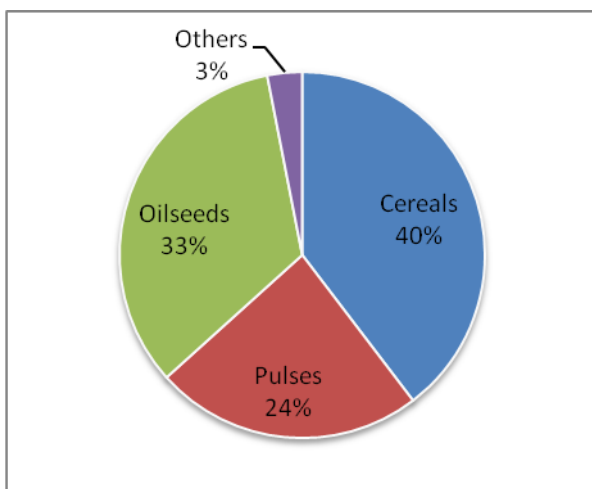
**Details of lifting and power is tabulated below for the Area-II (Billowa-Devgarh)**

**BOOSTER POWER CALCULATION**

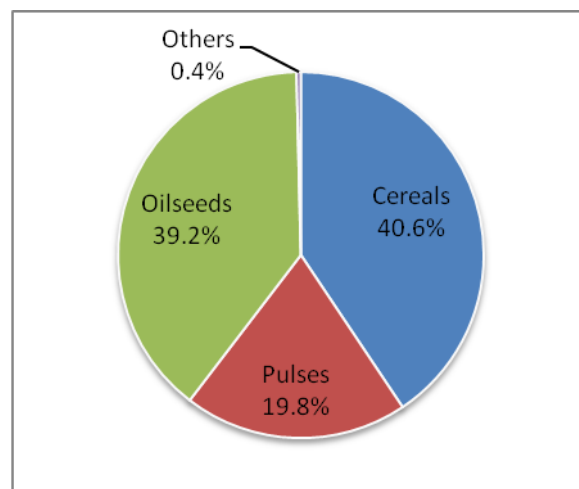
<b>Sr. No.</b>	<b>Particulars</b>	<b>RM + Manifold/DC @ 270m</b>	
1	CCA	3000	ha
2	Duty	0.35	lit./sec/hr
3	Discharge	1.05	Cumecs
4	Velocity in Rising main	1.2	m/s
5	Length of Rising Main	6000	m
6	Diameter of Rising main	0.70	m
7	Level to be pumped	208.40	m
8	MDDL	187.00	m
9	Static Head	21.40	m
10	Frictional loss	8.43	m
11	Provision for existing gradient and filter losses	25	m
12	Average level of command area	200.0	m
13	Design head	46.43	m
14	Power requirement	583	kw
<b>15</b>	<b>Total Power requirement</b>	<b>583</b>	<b>KW</b>

**2.5 Agriculture:**

Madhya Pradesh has about 72% rural population, which largely depends on agriculture. Approximately 66% of total geographical area is under cultivation. Out of the total cropped area in the state, the share of cereals is 40%, pulses 24%, oilseed 33% and the remaining area is covered by other crops like vegetables, fruits, fodder etc (Figure 1).



**Figure 1: Area under different Crops in Madhya Pradesh**



**Figure 2: Area under different Crops in Sind sub-basin**

In the Sind sub-basin, approximately 52% of the total geographical area is under cultivation. Out of the total cropped area in the sub-basin, cereals cover 40.5%, pulses 20% and oilseed 39% and the remaining are under other crops like vegetables, fruits, fodder etc (Figure 2).



Figure 3: Mustard crop in the sub-basin (Morena district)



Rabi crop (winter crop), which is sown in November and harvested in March, is the main crop in Sind sub-basin. Kharif crop, which is a rainfed crop, is sown in July and harvested in October. Major crops grown in Kharif season in the sub-basin are Paddy, Soyabean and in Rabi season are Pulses, wheat, mustard, and gram.

## 2.6 Tourism

A perennial storage in the heart and foothills of Devgarh and seonda forest creates a potential for eco-tourism in the area. Around one million people visit twice in a year to Ratnagarh Temple in the vicinity of Dam site. The elongated stretch banks of river 10 km both sides (non forest area) can be developed as recreation parks, water sports and tourist resorts.



Figure 4: Madhav National Park, Shivpuri

Water assurance all round the year gives the potential to convert Devgarh (Ratnagarh) and Ratva reserve forest into Tiger sanctuary as they have a history of having lots of tigers and lions in the forests. Presently one tiger has made a territory for last two years in this forest.

## 2.6 Environment and Forest

The project ensures the e flow all round the year. The abundant storage and project is so designed that the power generation and sub-surface flow accumulated the sufficient natural flow, which is more than the requisite e flow. The abundant and elongated all round the year storage in the foothills of forest is a gross valuable reserve for forest abutants / animals.

## 2.7 Fisheries

An elongated all season storage with ensured e-flow is the highly potential water body for fish breeding. The Spread area of 3149.63Ha at full reservoir level and approximately all season spread area of 1200 hectares is available for fisheries all over the year.

### Alternates of Dam site

After carrying out the topographical survey of the proposed basin three dam alignment have been marked and studied with merits demerits of each.

**Alignment No.1** Alternate alignment No.1 is located at 21 km upstream of the proposed site along the river. In this proposal major town Seondha of historical importance ,Seondha Fort and pilgram (holy) place Sankuwa comes under submergence.

**Alignment No.2** Alternate alignment No.2 is located at 3.5 km. upstream of proposed site along the river. In this proposal the available flank height impounds 110 mcm water which is less than the proposed site, further prima facia the river bed does not have rocky foundation.

**Alignment No. 3** Alignment No.3 is located across deep gorge and river bed & left flank have visible exposed rock strata suitable for foundation. The available flank impounds 153.515 mcm of water. But comparatively slightly larger forest area comes under submergence as compare to alignment no 02 .

A comparative of broad features of each alignment are shown in the table for comparison and making a suitable choice.

Proposal	Lat/Long	Net catchment area in (sq.km.)	yield (MCM) as per sindh R-R relation	Total sub. Area	Forest Area
Alignment No.1(jara)	26 <sup>0</sup> 13'03" & 78 <sup>0</sup> 48'2"	7330	1393	3842	614
Alignment No.2 (shikarpura)	26 <sup>0</sup> 08'00" & 78 <sup>0</sup> 42'43"	6915	1313	1912	315
Alignment No.3 (Proposed)	26 <sup>0</sup> 08'29" & 78 <sup>0</sup> 44'20"	6985	1327	3149.63	799.59

Three alternates have been studied for Barrage alignment near Jara, Shikarpura, and Dangdiroli vilage. The proposed barrage alignment near Dangdiroli village is found feasible from the storage point of view and command area served.

### **3.0 Conclusion/ *Recommendation***

There are many reasons which makes this project the most feasible .the five important reasons to conclude with this report are enumerated below:-

1. Site selection- Smart site selection makes the project most feasible as by submerging less and utilizing more yield by efficient water use planning.
2. Higher Returns- With the Lower barrage, the annual proposed irrigation is 165 %, which ultimately maximize the economic returns.
3. All season storage- The project is so engineered that the regeneration is utilized all along the Use perios by saving the buffer (252.23Mcm) for summers. This special features makes the highly feasible in terms of drinking water source in summers
4. Drought mitigation- The project is designed on highly dependable yield more than 500 %.The average rainfall in basin is 875 mm. due to the high dependable yield at barrage site ,in a severely drought year of rainfall less than 250 mm ,the storage is Full reservoir level in the project. It can mitigate Drought to the thirst of more than one million population of Lower Sindh Basin major towns Gwalior, Bhind and Datia District.
5. Green Project:-The project is environment friendly and hardly changes land use of Forest as the submergence is along the banks. It ensures the e flow to the downstream ravines areas of Bhind district in M. P. and Etawa, Jalon Distt. In Uttar Pradesh.

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## SALIENT FEATURE

### MAA RATANGARH MULTIPURPOSE PROJECT

<b>1 Name of project</b>	<b>Maa Ratangarh Multipurpose Project</b>				
<b>3 Location</b>					
a) State	Madhya Pradesh				
b) District	Datia				
c) Tehsil/Block	Seondha/Seondha				
d) Village	Dangdiroli				
e) Longitude	78° 44'20"				
f) Latitude	26°08'29"				
g) Topo Sheet No.	14J/12 scale 1:50000				
<b>4 Hydrology</b>					
a) Catchment area	1278739 Sq.km.				
b) Average annual rainfall	875 mm (Datia)				
<b>c) Annual yield</b>					
i) Total Yeild	4113.15 Mcum				
ii) Yield available at site (deducting U/S use)	2812.76 Mcum				
<b>5 Reservoir Data</b>					
<b>A) Capacity</b>	DAM	BR-1	Total		
a) Gross Capacity	246.95Mcum	5.28	252.23		
b) Dead Storage	9.08Mcum	0.28	9.36		
c) Live Capacity	237.87Mcum	5.00	242.87		
<b>B) Principal Level</b>					
a) Nalla bed level (N.B.L.)	135.00 m				
b) Lowest sill level (L.S.L.)	142.00 m				
c) Max.Draw down level (MDDL)	142.00 m				
d) Full tank level (F.T.L.)	161.00 m				
e) Max. water level (M.W.L.)	162.80 m				
e) Top bund level (T.B.L.)	166.00 m				
<b>C) Water spread area</b>					
a) Water spread area at L.S.L.	249.61 ha.				
b) Water spread area at F.T.L.	3149.63 ha.				
c)Villages Coming under Submergence	24 No.				
d) Fully submerged	8No:- Khamroli,Dheemarpura,Medhpura,Nanat Dhubiyai ,Madikhera,Jigania And Barkari				
e)Partially Submerged	16No:- dangdiroli, Shikarpur, Bisor, Berchha , Atreta ,basaimalak, mershenikhurd, Pali Mershenibuzurg ,Dhorri, Dhorra, Rubha ,Pahadi, Chitai,Dangseondha,Dongarpur				
e)Family Affected	766 No.				
f) Total Area under submergence	3337.63 Ha				
S.N	Particular	Govt land	Pvt land	Forest land	Total Area
1	For barrage	1235.25	1302.79	640.59	3178.63
2	for BR-1	0.00	0.00	129.00	129.00

3	Canal	0.00	0.00	30.00	30.00
TOTAL		1235.25	1302.79	799.59	3337.63
i)	Percentage of Submergence (culturable land)				1.84%
ii)	% of forest Land				1.13%
<b>D) DAM DATA</b>					
a)	Length of Dam				1740 M
b)	Length of Earthen Dam				1162M
c)	Length of spillway				578 M
d)	Height of Dam				31.00M
e)	No. and size of Gate				29nos,12mx15mEach
<b>6- Irrigation</b>				<b>RATWA AMAYAN</b>	<b>BILAU DEVGARH</b>
<b>Gross Command area(G.C.A)</b>				<b>48655 Ha</b>	<b>28200 Ha</b>
b)	Culturable command area (CCA)				39200ha
c)	No. of benefitted villages				156nos-15in Datia,141 nos inBhind
f)	Length of Rising Main				4.4 Km(2.2m dia 2 row
g)	Length of pipe line for Pressurized irrigation system				35.5Km
h)	Total Power Requirement				16.60M W
i)	Proposed power generation				3*3=9M W
l)	Average Level of Command Area				160m
ESTIMATED COST				2244.97 crores	
7)	Cost Per Hectare				2.86Lakh/ha
8)	B C Ratio				1.85

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**MAA RATANGARH MULTIPURPOSE PROJECT**  
**ABSTRACT OF COST**

DISTRICT :- DATIA

SEONDHA

S.No.	Sub- Head	Unit-I Head Works	Unit-II Canals	Total
<b>I</b>	<b>Direct Charges</b>			
1	A- Preliminary	72.15	148.96	221.11
2	B- Land	44368.17	2610.00	46978.17
3	C- Works	36074.31	-	36074.31
4	K- Buildings	166.75	20.00	186.75
5	L- Earth Work	0.00	60653.94	60653.94
6	M- Plantation	4.53	10.00	14.53
7	O- Miscellaneous	20.20	50.00	70.20
8	P- Maintenance	360.74	0.00	360.74
9	Q Special T&P	0.00	-	0.00
10	R- Communication	150.00	0.00	150.00
11	S-Power Plant	0.00	5400.00	5400.00
12	U- Distributaries and Minors / Sub- Minors	-	51202.97	51202.97
13	V- Water Courses & field Channels	-	-	-
14	W- Drainage	-	-	-
15	X- Environment & Ecology	30.22	-	30.22
	<b>Total</b>	<b>81247.07</b>	<b>120095.88</b>	201342.95
II	Establishment Charges (3% of cost of Unit - I works less B- Land and X Enviornment Cost)	1105.46	3524.58	4630.04
	<b>Total Direct Charges</b>	<b>82352.53</b>	<b>123620.45</b>	<b>205972.98</b>
	<b>G.S.T@12% of I works Except B land</b>	4425.47	14098.31	18523.78
	<b>Total</b>	<b>86778.00</b>	<b>137718.76</b>	<b>224496.76</b>
	Rs in Crores	867.78	1377.19	2244.97

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