PRE-FEASIBILITY REPORT

FOR

Sondur Dam Project
District, Dhamtari,
Chhattisgarh.

Project Proponent

Water Resource Department
Chhattisgarh

Envronmental Consultant

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EXECUTIVE SUMMARY

1.0 EXECUTIVE SUMMARY

SondurDam Project across river Sondur, a right bank tributary of Mahanadi, was contemplated by the erstwhile Madhya Pradesh Government in 1972, with a view to augment supplies in Ravi Shankar Sagar Project (RSP) under the ambitious Mahanadi Reservoir Project Complex (MRP). From its evolution, the project was conceived on Sondur river, in Tehsil and Block Nagri, District Dhamtari with a view to impound water of the river for feeding/ augmenting supplies in Dudhawa reservoir and downstream RSP reservoir both on Mahanadi. The intervention of Sondur River at present site ,with FRL 471.065 mamslmade it plausible for providing *en-route* irrigation to proposed command area of kharif (12260 ha) in Nagri Tehsil ,besides augmenting supplies in RSP reservoir *enroute* Dudhawa reservoir otherwise it would have confluence with Mahanadi near Raipur, a place afar downstream of the location of RSP ,without contributing to RSP for providing irrigation facilities to CCA (26210 ha) in Bhatapara Branch (km 45 to 85 km) . The location and vicinity map of Sondur Reservoir Project and other components of Mahanadi Reservoir Project Complex are shown in **Annexure-1**

After having carried out the appraisal of the project proposal, which was submitted in December 1976, the then Government accorded the administrative approval of Rs 1086.84 lakh on 4th March, 1977 and the Technical sanction issued by the competent authority on 26th April,1979. The revised Administrative Approval was accorded for Rs. 3399 lakh by the erstwhile M.P. Government on 20th November, 1982, which encompassed the following components:

- Construction of Sondur Reservoir , as per original design, with FRL at 471.065 mamsl by constructing 3360 m long composite dam of homogeneous earthen section with central masonry dam section
- Construction of Sondur Feeder Canal (15 km)
- Construction of Nagri Distributary (30.48 km) ; Sihawa Distributary (22.31 km) and Sankra Sub-Distributary (6.43 km)
- Minors and Sub-minors of these distributaries
- Re-sectioning of TegdiNala to conduct feeder discharge into Mahanadi.

The work of the project continued un-interrupted as per original design .The composite dam with homogeneous earthen section with top bund level 474.265 mamsl and the masonry dam section with 5 bays of spillway, crest level 461.07mamsl fitted radial gates (15mX10m) to pass the probable maximum flood of 5163.12 cumecs ,was completed in 1988. The work of feeder canal and excavation of the distributaries and sub - distributary was completed by June, 1997. However, the cement concrete lining in Nagri and Sihawa distributaries was completed 52% and 88% respectively by June, 1997. At present all civil and mechanical works are complete under the project, except works of B.K. minor under Nagri distributary. The photograph of the completed masonry dam and part of earthen dam, head regulater and Sondur Feeder Canal is exhibited in **Annexure-2.**The line diagram of SFC system showing works completed; under progress and works to be completed is shown in **Annexure-3.**

Status of diversion of Forest Land for the Project

The forest land requirement of the forest land upto FRL (El. 471.065 mamsl) was assessed as 2025.14 ha and the Irrigation Department of Madhya Pradesh demanded for its transfer in 1977. But the Forest Department in November, 1979, clear felled and transferred only 944.92 ha out of the total demand. Compensation for 944.92 ha of forest land was paid to Forest Department on two occasions in November1979 and February 1984. Since full forest land was not transferred the Irrigation Department in 1991 submitted the revised proposal for diversion of balance 1080.22 haforest land (529.70 ha under Sitanadi WLS and 550.52 under territorial forest). However, Government of India considering the fact that 529.70 ha of forest land of Sitanadi Sanctuary will come under submergence rejected the proposal.

State Government in 2003 resubmitted the proposal indicating that in lieu of 529.70 of forest land of Sitanadi Sanctuary, an another area of 671.983 ha of forest land will be included in the sanctuary. After the case was reconsidered, the Standing Committee of National Board for Wild Life, Government of India in 2004 communicated the consent for this transfer of area from the sanctuary subject the various conditions. In compliance to the conditions laid, the following actions have already been taken by the executing department:-

- Water Resources Department has already deposited an amount of 127.16 Crore with Forest Department.
- The proposed area of 671.983 ha area has already been included in Sitanadi Sanctuary.
- Sitanadi and Udanti Sanctuaries have already been notified as Tiger Reserve.

The Government of Chhattisgarh had filed an application in 25.02.2005 to the Honourable Supreme Court of India seeking permission for the use of 529.70 ha of the forest land falling within Sitanadi Wild Life sanctuary for the Sondhur Reservoir Project.This matter was heard by the Honourable Apex Court and it was referred to the Central Empowered Committee (CEC).The CEC prepared report after examining the matter and recommended following to the Honourable Apex Court:-

- 5% of the revised project cost be deposited for the conservation & protection of wild life sanctuary.
- Net present value for the forest land required for the project shall be deposited by the User Agency.
- The requisite approval under the FC Act will be obtained.
- 671.983 ha of the forest land will be added to the Sitanadi Wild Life sanctuary to compensate the 529.70 ha of forest land.

Hon'ble Supreme Court granted permission by its order dated,5.7.2012 in IANos 1370-1370A for diversification/denotification of 529.70 ha of Sita Nadi WLS and for compensating the forest area coming under the said sanctuary by the forest area adjacent to the sanctuary of the same ecology.

In view of the above permission, the State Government requested the Government of India for stage–I clearance under Forest Conservation Act. The Forest Advisory Committee, in its meeting in February and April 2013, was of the view that the proposal involves certain issues which need further clarification. These issues include number of trees affected due to diversion, resettlement and rehabilitation of persons likely to be displaced, involvement of large area of the project, location of compensatory afforestation in catchment area. The MoEF, in view of recommendation of FAC, asked the State Government to submit a fresh application In addition Addl. P.C.C.F. (Land Management) has asked for:-

- Scheme for compensation afforestation .
- Wild Life Management Plan approved by Chief Wild Life Warden.
- Catchment Area Treatment Plan approved by CCF and Field Director Udanti-Sitanadi Tiger Reserve.

For submitting fresh application, the State Government has embarked upon the task of preparation of the desired plans/schemes.
Thus, though the project proponent had been trying since inception of project for diversion of 2025.14ha forest land, diversion of 1080.22 ha forest land is still pending.

Status of Environmental Clearance for the Project

The execution of the project commenced in 1978 i.e., prior to the enactment of the Forest (Conservation) Act,1980, which came into force w.e.f. 25th October,1980 , and also before the Environment (Protection) Act,1986, was enacted and which came into force w.e.f.19th November,1986. Under the Environment (Protection), Act, 1986, the MoEF, vide Notification S.O.60 (E) dt.27th January, 1994, directed that on and from the date of publication of this Notification in the official Gazette, expansion or modernization of any activity (if pollution load is to exceed the existing one) or a new project listed in Schedule-1 of Notification shall not be undertaken unless it has been accorded environmental clearance. Since the project construction activities started in 1978 and by 1988 the dam was complete as per original design for FRL 471.065 mamsl and that by 1996 the construction of SFC and distributaries was completed save the minors, the project did not attract the provision under clause 1 and 2 of Notification dated 27.01.1994. Otherwise also as per provision under clause 3(b) of the Notification it would not have been applicable on the subject-matter project activity i.e., Major Irrigation Projects which were covered under entry number 2 of Schedule-1, and investment in respect of which is less than 100 crores (new project) as the cost of project as per revised DPR, at that point of time, was Rs.7326 lakh i.e., less than the stipulated limit of Rs. 100 crores set forth for seeking environmental clearance.
The balance works under the project are still continuing. The work under compensatory afforestation scheme in forest and non-forest area, catchment area treatment plan, wildlife conservation and management plan in impact zone, though to be executed by the Forest Department, are yet to commence. Therefore, in terms of provisions laid down under EIA Notification, 14th November, 2006, the project

falls under category 1(c), being major irrigation project, shall require prior environmental clearance. Thus it is a peculiar situation that till November 2006 or the point of time investment on it did not exceed Rs 100 crores, whichever was earlier, the requirement of environmental clearance was not there, in other terms there was no violation of any EIA notification under EC, Act.

Now major balance works involved (compensatory afforestation, catchment area treatment plan, wildlife conservation and management plan in impact zone) are such which can be construed for betterment of the environment and are strictly by their nature are remediation plan for mitigating damage/ loss to ecology. Therefore, in pursuance of philosophy behind the EIA Notifications, it is expedient to bring Sondur Dam Project ,an infra-structure project in tribal area of the state, in compliance with the environmental laws at the earliest, rather than bringing the situation to an embarrassing fiasco. Therefore, the EAC is requested to consider the case as per provision under para 13 (4) and prescribe the appropriate ToR, under para13 (5), for carrying out EIA study and preparation of environment Management plan.

1.1 SALIENT FEATURES OF THE PROJECT

Sr. No.	Particular	Details
1	**NAME OF PROJECT**	SondurReservior Project
2	**STATE/DIST./TEHSIL**	Chattisgarh/Dhamtari/Nagri
3	**RIVER**	Sondur River
4	**PROJECT SITE**	Near Mechka village
5	**GEOGRAPHICAL CO- ORDINATES**	
(i)	Latitude	20^{o} - 14’ N
(ii)	Longitude	82^{o} - 6’ E
6	**HYDROLOGY**	
(i)	Length of river up to dam site	34.00 km
(ii)	Width of river at dam site	120.00 m
(iii)	Catchment Area	512.00 sq km
(iv)	Annual Rainfall	
	(max)	1955.54 mm
	(min)	585.72 mm
	(avg)	1419.70
(v)	Monsoon Rainfall	
	(max)	1850.89 mm
	(min)	519.17 mm
	(avg)	1295.90 mm
(vi)	Monsoon Yield	
	(max)	0.58 TM CUM
	(min)	0.042 TM CUM
	(avg)	0.29 TM CUM
	(75% dependable)	0.225 TM CUM

7	**FLOOD**	
(i)	Maximum observed near dam site at RL – 452.06 m	2320.00 cumecs
(ii)	Design Flood	5163.12 cumecs
(iii)	Flood Lift	10.70 m
8	**RESERVIOR**	
(i)	Gross Storage Capacity at FRL (471.065 mamsl)	198.10 MCM
(ii)	Dead Storage capacity at LSL (459.765 mamsl)	18.49 MCM
(iii)	Live Storage Capacity at RL (471.065 mamsl)	179.61 MCM
(iv)	Water Spread area at LSL (459.765 mamsl)	675.70 ha
(vi)	Water Spread area at FRL (471.065 mamsl)	2416.32 ha
(v)	Water spread area at MWL (472.595 mamsl)	2520.4 ha
9	**PRINCIPAL LEVELS**	
(i)	Lowest River bed level	El - 447.065 mamsl
(ii)	Sill level of L/bank head regulator	El - 459.765 mamsl
(iii)	Crest level of spillway	El - 461.065 mamsl
(iv)	Full Reservoir level (FRL)	El - 471.065 mamsl
(v)	Maximum water level (MWL)	El - 472.595 mamsl
(vi)	Top of Bank Level (TBL)	El - 474.265 mamsl
10	**DAM**	
(i)	Earth Dam	Homogeneous rolled earth fill
(ii)	Length	3231.25 m
(iii)	Top width	4.57 m
(iv)	Maximum height above Lowest ground level	26.70 m
11	**MASONARY DAM**	Straight gravity
(i)	Length	173.75 m
(ii)	Maximum height	37.70 m
(iii)	Foundation	
(iv)	Top Width	4.57 m
(v)	Spillway gates	Radial ,5 No (15mx10m)
(vi)	L.B. Canal regulator	2 bays (1.75x2.50 m)
12	**Feeder Canal**	
(i)	Length	15.00 km

(ii)	Discharge	28.30 cumecs
(iii)	Bed width	4.60 m
	Full supply depth	
(a)	Unlined	3.05 m
(b)	Lined	2.95 m
(iv)	Bed Slope	1:5600
(v)	Side Slope	2:1
(vi)	Value of'n'	0.018
(vii)	Top width of banks L/R	6.10m /3.05m
(viii)	Velocity	
(a)	Unlined	0.875 m/s
(b)	Lined	1.025 m/s
13	**Design Irrigation potential (38470 ha)**	
(i)	Kharif (in own command)	12,260 ha
(ii)	Kharif (outside its command in command of Bhatapara Branch)	26210 ha

1.2 PROPOSED PLANNING

The project was formulatedand designed after careful detailed survey ,planning and realistic approach for facilitatingenroute irrigation in kharif (12260 ha) in Nagri tehsil of Dhamtari district, besides augmenting supplies in Dudhawa and Ravi Shankar Sagar reservoirs under Mahanadi Reservoir Project Complex for irrigation of 26210 ha in BhataparaBranch (km 45 to 85) through Mahanadi Main Canal. All benefits under the project would have accrued only if the reservoir were allowed to be filled upto designed FRL (471.065 mamsl).

2.0 INTRODUCTION OF THE PROJECT/ BACKGROUND INFORMATION

2.1 Identification of Project and Project Proponent

As per nomenclature set forth by the Central Water Commission, New Delhi, projects with CCA exceeding 10000 ha was classified as Major Irrigation Scheme. The onerous task of judiciously harnessing the available water resources of the state for benefitting agriculture, industrial and domestic water for overall development of all region of the state, was entrusted to the Water Resource Department /Irrigation Department of the state.

The IrrigationDepartment of erstwhile undivided M.P State, after re-organization of the state ,transferred the created assets falling under the territorial administration of new carved out state to Water Resource Department of Chhattisgarh State, represented through the Executive Engineer, W.M. Division Rudri, CodeNo.38,district

Dhamtari ,Chhattisgarh , is the project Proponent.

2.2 Brief Information about the Project

The project *inter-alia* included the construction of 3360 m long composite dam of homogeneous earthen section with central masonry dam section with "ogee" shaped spillway with 5 bays fitted with radial gates (15mx10m) having non overflow section to its left and right; Head regulator with two bays for conveying authorized head discharge of 28.3 cumecs to 15 km long Sondur Feeder Canal (SFC); two distributaries viz.,Nagri and Sihawa distributaries off-taking at RD 12.5km and 13.6km respectively of SFC. Total length of distributaries and minors is 159.78 km.

2.3 Need for the Project and its Importance to the Country or Region

The ever increasing population in the state led to the demand for increasing in food and fiber production along with opportunity for opening vista of employment in rural areas by harnessing the available water resources of Mahanadi and its tributaries to the optimum.

The need for the Sondur dam project in the Mahanadi Basin has therefore been considered in context of food grain shortage in the region in general and in the country as whole. The project as a component of Mahanadi Reservoir Project Complex would provide irrigation facility to its command besides stabilizing irrigation in CCA of Bhatapara through Mahanadi canal system which shall create employment opportunity.

2.4 Demand-Supply Gap

Though there is large tract of cultivable and fertile land in Nagri Tehsil of district Dhamtri, yet lack of irrigation facility has been depriving farmers of better yield, prior to bringing their area under command of distribution networks of Sondur Feeder Canal .Due to introduction of canal water supply, due to the project, there had been an increase in pre-project irrigated area (through tanks/pond and ground water)from 27.6% to 203.4 % which led to higher productivity and better yield.

2.5 Imports Vs. Indigenous Production

The project has led to enhancement of indigenous food grain production in Kharifand Rabi crops.

2.6 Export Possibility

In wake of the Central Policy Food for all, the state has to become self sustainable for meeting its demand of food and fabric. Thus neither any export possibility is plausible or there is any such demand.

2.7 Domestic/ Export Markets

The food grains, vegetables produced in project area have impacted the local market as these are available for sale to the non-growers. No export from the project produce was envisaged.

2.8 Employment Generation

The implementation of Irrigation scheme had created employment opportunities in the project area. The employment was associated with improved farming practices as well as the construction of thedam, feeder canal and distribution networks over the period of construction spanning for more than two decades. As per estimate of project proponent upto year 2002 about non-recurring 7, 56,728 man days were generated besides2,52,143 recurring man days/year.

With irrigation additional farm labour would also be required as a result of higher cropping intensity through double cropping providing employment opportunities to local people within and outside the vicinity of the project area Further establishment of agro and ancillary industries would give rise to employment to the local people.

3.0 PROJECT DESCRIPTION

3.1 Type of Project Including Interlinked and Interdependent Projects, If any

The project is basically a major irrigation project, construction of which commenced in 1978 and the major component like composite dam, feeder canal and distributaries , sub-distributary, minors and sub-minors were constructed were completed by June,1997 save cement concrete lining in some reaches of distributary and minors. It is an intervention on Sondurriver and *per se*an independent project. However, the tail of feeder canal discharges into TegdiNala which is a sub-tributary of Mahanadi. Thus, it acts as an interlinking canal to SRP reservoir at Gangrel via sDudhawa reservoir.

3.0 Location

The project has been constructed on Sondur river at geo-graphical coordinates at latitude 20.14'N and longitude 82.06' E near Mechka village in Nagri tehsil, district Dhamtari. The project site is about 90 km from district head quarter and about 167

km from state capital, Raipur. It is approachable from Dhamtari via SH-6 and is about 20 km from Nagri. Geographical locations of project area are covered under Survey of India Toposheet No. 64L /3 ; 64 L/4 ; 64H/15 and 64H/16.

3.1 Details of Alternate Sites

The Sondur dam project is fait -accompli in so far as the dam was completed in 1988, after detailed investigation and realistic planning. The hill ranges on eastern and western bounds presented the most natural and suitable site for aligning a dam. The FRL of the reservoir could have been achieved at this location with minimum submergence. Shifting the dam a little downstream would have increased the height of the dam besides increasing the submergence area. Besides this at this location the fixation of the present FSL of feeder canal, a contour canal was sufficient to irrigate the command area without sacrificing the cultivable area in both distributaries by gravity flow.

3.2 Size or Magnitude of Operation

Categorization of Irrigation projects has been prescribed by the Central Water Commission, New Delhi, on the basis of the culturable command area (CCA).All projects having CCA less than 2000ha belong to minor; above 2000to less than 10000ha as medium and above this threshold limit major irrigation projects. The current project is a major irrigation project. The outcome of an irrigation project is fathomed by the irrigation potential create and achieved.

Irrigation projects make consumptive use of water by application to the command area. Thus as such unlike manufacturing /industrial/mining projects these do not bring out discrete production. However, the area benefitted under their command in different crop season as a corollary drawn from sectors mentioned ibid, could be termed as the production. The area brought under irrigation in different crop season during last ten years is given below:

Year	Actual irrigation in Kharif (ha)	Actual irrigation in Rabi (ha)
2007-08	7412	134
2008-09	7434	-
2009-10	7524	-
2010-11	7483	5412

2011-12	7643	-
2012-13	7685	481
2013-14	5129	5361
2014-15	8177	5510
2015-16	8411	-
2016-17	8555	5198
Total	**75453**	**22096**

3.3 Project Description with Process Details

The project was conceived as infra-structure project for benefit of the people as a well fare scheme. It involved construction of a dam to impound available discharge of the river in the reservoir created for the purpose and releasing water through feeder canal and distribution networks for providing enroute irrigation under its own command besides augmenting supplies to Dudhawa and RSP reservoirs on the Mahanadi.

The process involved is regulation of the reservoir, as per regulation manual, by gradually filling the discharge in the reservoir upto different levels but not exceeding the FRL, and also by spilling the flood waters through operation of spillway radial gates without bringing a sudden drawdown in the reservoir levels from the dam safety consideration. Utmost round the clock vigil is carried out during monsoon season by inspecting the downstream slope of the dam, flow in longitudinal and lateral seepage drains and the regular inspection of downstream counter berms to see, if any, sweating of the surface or boiling is noticed and immediately carrying out the mitigating measure by resorting to sand and filter loading at affected place till clear water appears. Operation of feeder canal and distribution system is carried out as per irrigation demand and as per roaster.Regular watch and maintenance of hydro-dynamic structures are some of the process details.

Though it is tried to maintain reservoir level near 463.065 mamsl, yet during August and September months on account of heavy rains in the catchment and flah floods the reservoir water level shoots up to 470.9 mamsl more often than not.The increased water level is allowed to fall down gradually by operating the spillway gates so that the sudden drawdown of the reservoir level is obveited from safety of the dam and regulated flood water is escaped downstream in the rivertoavoil inundation of lower ares and interruption to the traffic

3.4 Raw Material Required along with Estimated Quantity, Likely Source, Marketing area of Final Product/S, Mode of Transport of Raw Material and Finished Product

The raw material involved in shall be coarse aggregate and sand for preparing cement concrete lining. These are locally available. Cement shall be transported from Dhamtari by existing road network.

3.5 Resource Optimization/ Recycling and Reuse

Resource Optimization / recycling and reuse is not envisaged in this project at present as the construction work is not involved as the major works are complete .However during construction phase the huge quantity of excavated material obtained from excavation of canal, dam foundation and canal structures was reused to about 85% extent in consumptive use by providing in dam section ,rip-rap on slope surfaces and The excavated soil and rubble from the excavate areas was utilized for filling of low lying areas and also as revetment, riprap & filters of the earthen dam.

3.6 Availability of Water Its Source, Energy / Power Requirement and Source

3.6.1 Water Requirement

The meager water requirement (14kld) for domestic consumption in the small headwork colony is being maintained.

3.6.2 Power

Electrical power is being utilized for illumination of project area specially composite dam and the top of dam for facilitating the regulation of reservoir and feeder canal and from the point of view of dam safety ,besides for operation of hydrodynamic structure i.e., radial gates.

3.7 Quantity of Wastes to be Generated (Liquid and Solid) and Scheme for their Management/ Disposal

3.7.1 Solid Waste Generation& its Disposal

The project activities are over and thus no solid waste is envisaged.

3.7.2 Liquid Effluent

There will be no waste water generation from project activities as regulation of reservoir and feeder canal involves no effluent *per se*. The surplus water from the reservoir during flood shall be spilled through the spillway into the river course. The liquid effluent resulting through the Headwork colony is being treated through septic tank and soak pit.

4.0 SITE ANALYSIS

4.1 Connectivity :

The project site is approachable from Dhamtari via Nagri by SH-3 upto CRPF camp at Mechka and then by project road. It can be also accessed through NH-130 C from Gariaband- Deobhog road.

4.2 Landform, Landuse and Land Ownership

4.2.1 Landform

The project area lies in famous Chhattisgarh plain and is a saucer shaped depression drained by the upper basin of Mahanadi river.

4.2.2 Land Use

The predominant land use of the area is agriculture land (kharif crop land) followed by forests/plantation, barren rocky and stony waste area, river body and water body (ponds).

4.2.3 Land Ownership

The ownership of the private land acquired from villagers vests with the state. The ownership of forest land transferred to the department for non-forestry purpose still vests with the government. The ownership of the revenue land transferred to the forest shall vests with forest after the notification for declaring it as forest land.

4.3 Topography

The physiographical location of the project area is in south eastern part of district Dhamtari of Chattisgarh state covered under Chattisgarh Plain. The command area of the feeder canal, a contour canal, is bounded by Nagri distributary on right and Sihawa distributary on left of Mahanadi. The altitude of the terrain ranges from446mamsl in the north to 424mamsl towards south west of the project. The average gradient of project area is gentle sloping towards Mahanadi.
The reservoir area and the catchment area is generally flat with some areas having undulating tracts with hillock of medium and small sizes. The adjoining areas of Pharasgaon, forest villages Amjhar ,Khallari ,Mukhot and Bahigaon contain small and high hillock .The eastern and western flanks of the reservoir have hillocks ,making the site naturally suitable for damming the river.

4.4 Geology

The project area has two distinct type of oldest geological formations viz.,Archean and Cudapph (Chattisgarh group)
The Archean consists of granites, gneiss and their metamorphosed parts. This formation has been intruded by younger dykes; sills of basic and ultra basic rocks like dolerite, gabbro, kimberlites .Quartz veins are also predominant in these areas. The

eastern part of has similar Dharwar group of rocks. These areas have fertile soil.

The second major rock formation is upper Proterozoic group of rocks equivalent to Chhattisgarh groups which contain lime stone, dolomite ,sand –stone and shales including ferruginous shales.

The sequence of the starta in the project and adjoining area is given below:

Rock grade	Rock group	Rock system	Road types
Upper proterozoic	Raipur group	Chandi system	Stomalatic lime, stone, sand
		Gunderdehi system	Stone, purple shale, dark grey bounded lime stone
		Charmuria system	Shale, dark grey bounded lime stone
	Chandrapur group	Conspire system	Ferruginous silt stone, quartz aerolite silt stone and sand stone
		Chhoparadeeh system	Sand stone and conglomerates
		Lohardeeh system	Sand stone
	Pairy groups	Lingdongri system	Sand stone
		Tarjhar system	Shale, silt stone
		Galighat system	Sand stone
		Niyore system	Shale, silt stone sand stone
		Khulhadi-ghat system	Shale chert dolomite, lime stone, black shale
		Deodhara system	Sand stobne conglomerates
Upper precambrian	Amapani group	Bundeli granite	Sand stone, ferruginous shale, quartz veins, dolomite, gabbro dykes granite pink to grey
		Bionesic complex	Amphibol-biotite gneiss and magnetite Malabotix amphibolite, banded magnetite
		Toni. Dongri	Quartz pyrite,quartz, garnet, silimenatite, schist, garnotiferrous schist quartzite
		Eastern ghat super	Pyroxene, granusutite, varno-dykes, biotitic schist with sapphire

4.5 EXISTING LAND USE PATTERN

The predominant land use of the area is agriculture land (kharif crop land) followed by forests/plantation, barren rocky and stony waste area, river body and water body (ponds).

4.6 EXISTING INFRASTRUCTURE &SENSITIVE ECOLOGICAL LOCATIONS

S. No.	Sensitive Ecological Features	Name	Aerial Distance (in km.) from project boundary
1.	National Park/Wildlife Sanctuary	Sitanadi WLS	0.00
2.	Tiger Reserve/Elephant Reserve / Turtle Nesting Ground	UdantiSitanadi Tiger reserve	0.00
3.	Core Zone of Biosphere Reserve	None	-
4.	Habitat for migratory birds	Sondur reservoir	0.00
5.	Lakes/Reservoir/Dams	Sondur Dam	0.00
6.	Stream/Rivers	Sondur	0.00
7.	Estuary/Sea	None	-
8.	Mangroves	None	-
9.	Mountains/Hills	Satpura range	-
10.	Notified Archaeological sites	None	-
11.	Industries/Thermal Power Plants	None	-
12.	Defense Installation	None	-
13.	Airports	Raipur	160
14.	Railway Lines	Dhamtari	90
15.	National / State Highways	SH-6	4
		NH-130C	25

4.7 Soil Classification

The soil of the area has texture varying from sandy loam to loamy formed from parent rocks granitic gneiss. In some areas with hematite, quartzite and ferruginous shale, the soil is reddish grey.

4.8 Climatic Data from Secondary Sources

The climate of the project area is characterized by intensely hot dry summer and well distributed rainfall, in south-west monsoon season and winter. Generally, the project area experiences the following four seasons in a year: The summer season (also known as pre-monsoon season) starts around Holi festival in March but the mercury rises to the peak in May and first week of June with the mean daily maximum temperature at about 40^0C, and the mean daily minimum at about 26^0C. The rainy season starts around mid-June and continues up to September. The winter season starts around the last week of November and continues up to February. The intervening period October and November, is the Post-monsoon season or retreating monsoon period.

- **Temperature and Relative Humidity**

The mean daily maximum temperature varies from 27.3^0C to 42.0^0C, while the mean daily minimum temperature varies from 13.2^0C to 28.3^0C. Data collected from IMD

indicates that May is hottest month.Relative humidity is highest during July to September months (85 to 87% at 8:30 hr and 76 to 78% at 17:30 hr) and lowest during April and May months (39% at 8:30 hr and 23% at 17:30 hr).

- **Wind Pattern**

Wind pattern in the project area shows that the prevailing winds are blown from SW – W sector towards NE – E sector during morning and evening hours from March to September. During February to October months, wind blow from NE and E direction to SW and W direction. Calm period is low and observed for 6 to 57% of the time.

- **Cloudiness and Special Weather Phenomena**

The skies are generally moderately to heavily cloud during the monsoon season and in winter season. The skies are mainly clear or lightly clouded during the December to March months. The highest incidences of thunderstorms occur in the period March to October. Hail, dust storm, squalls are rare in the region. Occasional fog occurs in the winter season. More than 0.3 mm precipitation is occurred on 90.2 days in a year

- **Rainfall**

Rainfall data was collected for Raipur IMD station, which is nearest IMD station in the project area. On an average, 1289 mm of rainfall is received annually mainly from south-east monsoon. The region is classified as heavy rainfall area. Normally rains start in June and continue up to October. Nearly 94.5 % of annual rainfall is received during June to October months. About 2.3% of the normal rainfall is received during the winter season. On an average there are about 62.3 rainy days in a year.

4.9 Social Infrastructure

The social infrastructure like educational facilities (primary and higher secondary schools), drinking water supply, post and telegraph, public transportation and hospitals are by and large are available in the study area.

5.0 PLANNING BRIEF

5.1 Planning Concept

Based on the criterion fixed by the Central Water Commission, New Delhi, Sondur dam, with capacity 198.1 MCM at FRL, was covered under large dam category. Therefore, for planning and design all relevant code of practices as laid down under various BIS codes and guidelines fixed for hydrological studies by the CWC were followed. The principal levels were fixed on the basis of detail studies for sedimentation and governing levels of the command area etc keeping in mind the

least submergence area and the least displacement principle. The following specifications have been followed:
IS: 7894 – 1975- Code of Practice for Stability Analysis of Earth Dams
IS: 8826 – 1978 -Guidelines for Design of Large Earth and Rock Fill Dams
IS:9429–1980 –Code of Practice for Drainage System for Earth and Rock Fill Dams

5.2 Assessment of Infrastructure Demand (Physical & Social)

The socio-economic assessment will be made at the time of socio economic survey during EIA study.

5.3 Amenities/Facilities

Residential/Non residential buildings

Under sub-head "K-Building" these facilities have been created at project colony at Rudri where the offices of the Superintending Engineer, Executive Engineers and other engineers have been functional since beginning of the construction work. A well planned project colony exists at *Rudri*. Besides this small colonies and offices have been developed at other location for the staff looking after the operation and maintenance of the works created.

Water Supply

Potable water is being supplied for human consumption.

Power Supply

Domestic power/ lighting arrangement has been made in the project colonies as well as site.

Transport of Men and Material

Most of the employee stay put in the colony which is very near to the project site and those who live outside report to the duty on own means.

Communication

Land line and Mobile phones are being used for communication.

6.0 PROPOSED INFRASTRUCTURE

6.1 Industrial Area (Processing Area)

Arrangements like site office, control cabin,project road from SH-6, service roads of feeder canal and distributary etc. Have been provided. No infrastructure is proposed now.

6.2 Residential Area (Non Processing Area)

A well planned project colony exists at Rudri. Besides, small colonies and offices have been developed at other location for the staff looking after the operation and maintenance of the works created. For execution of balance works under Bhatapara branch system, the existing residential/non-residential facilities are adequate.

6.3 Green Belt

The green belt has been developed along service road of feeder and distributaries. The spoil banks have stabilized with vegetal cover. The places where the vegetal cover is less, avenue plantation shall be carried out along service roads and on spoil banks.

6.4 Social Infrastructure

Social infrastructure was created at Resettlement and Rehabilitation site developed at Saloni village. The following infrastructure facilities were developed:

- Construction of Aanganwadibhavan
- Construction of community hall
- Construction of market sheds(20)
- Construction of co-operative store
- Construction of temple
- Construction of village tank
- Construction of tar road
- Construction of playground
- Construction of tube wells
- Pasture development for cattle
- Construction of primary school.
- Construction of hospital

6.5 Connectivity

Project site is well connected to existing road and rail network. There is no proposal to developing new road and rail links.

6.6 Drinking Water Management

Water requirement for drinking in colonies is being met from ground water resource (bore well)

6.7 Sewerage System

The size of head works colony is not big (40 H-type and 6 G-type buildings) as at present only one sub-divisional office is functional. There is no STP. The sewerage system consists of individual septic tank and soak pit for each residential/non-residential unit.

6.8 Industrial Waste Management

Not applicable, as the operation and maintenance of the completed project components do not generate any overburden, waste water and industrial waste.

6.9 Solid Waste Management

The balance works are basically excavation of distribution and lining works. Theexcess soil received from excavation shall be used either in making dowlas section, counter berms and spoil banks.

6.10 Power Requirement & Supply/ Source

Electrical power requirement for operation of radial gates, lighting on the top bund of the dam and domestic power in colonies is being met from the Chhattisgarh State Electricity Board..

7.0 Rehabilitation and Resettlement (R&R) Plan

The private land requirement under the project covered under five revenue villages was assessed as 304.43 ha. Out of these revenue villages three villages (Kaslore, Boirgaon and Barpader) were fully submerged while two (Belarbahra and Mechka) were partially submerged. Due to submergence 200 families from these villages were displaced. At that time there was no laid down National R&R Policy and also no state policy. R&R grants were paid as per World Bank norms prevalent at that time PAF, did not agree to settle in R&R site but wished to settle at their own, were compensated for the assets acquired and grants as mentioned under:

- Compensation for land and other assets as per government norms.
- R&R grant @Rs 150/month for 18 months.
- Transportation grant @200/family
- Compensation for trees.

Besides the revenue villages, three forest villages (Amamuda, Ujrawan and Karka) were fully submerged, on account of which 102 families were displaced. They were paid compensation for their properties (Rs.131.75 lakh) Resettlement and Rehbililitation site was developed at Saloni village for 102 families. However, only 46 families agreed to resettle at this site whereas 56 PAFs did not consent to resettle there. They were awarded cash compensation for purchasing five acres of agriculture land and compensation for property and other basic facilities.

8.0 PROJECT SCHEDULE & COST ESTIMATES

8.1 Likely Date of Start of Construction and Likely Date of Completion

The works under the project has started in 1978. The works under SFC and its distributaries are complete except for B.K Minor taking off from Nagri distributary and balance works being carried out under “AbhiyanLakshya Bhagirathi Scheme” , in

command of Bhatapara Branch, which takes off from RD 102 km of Mahanadi Main Canal system, and likely to be completed within 3 years.

8.2 Estimated Project Cost along with Analysis in terms of Economic Viability of The Project

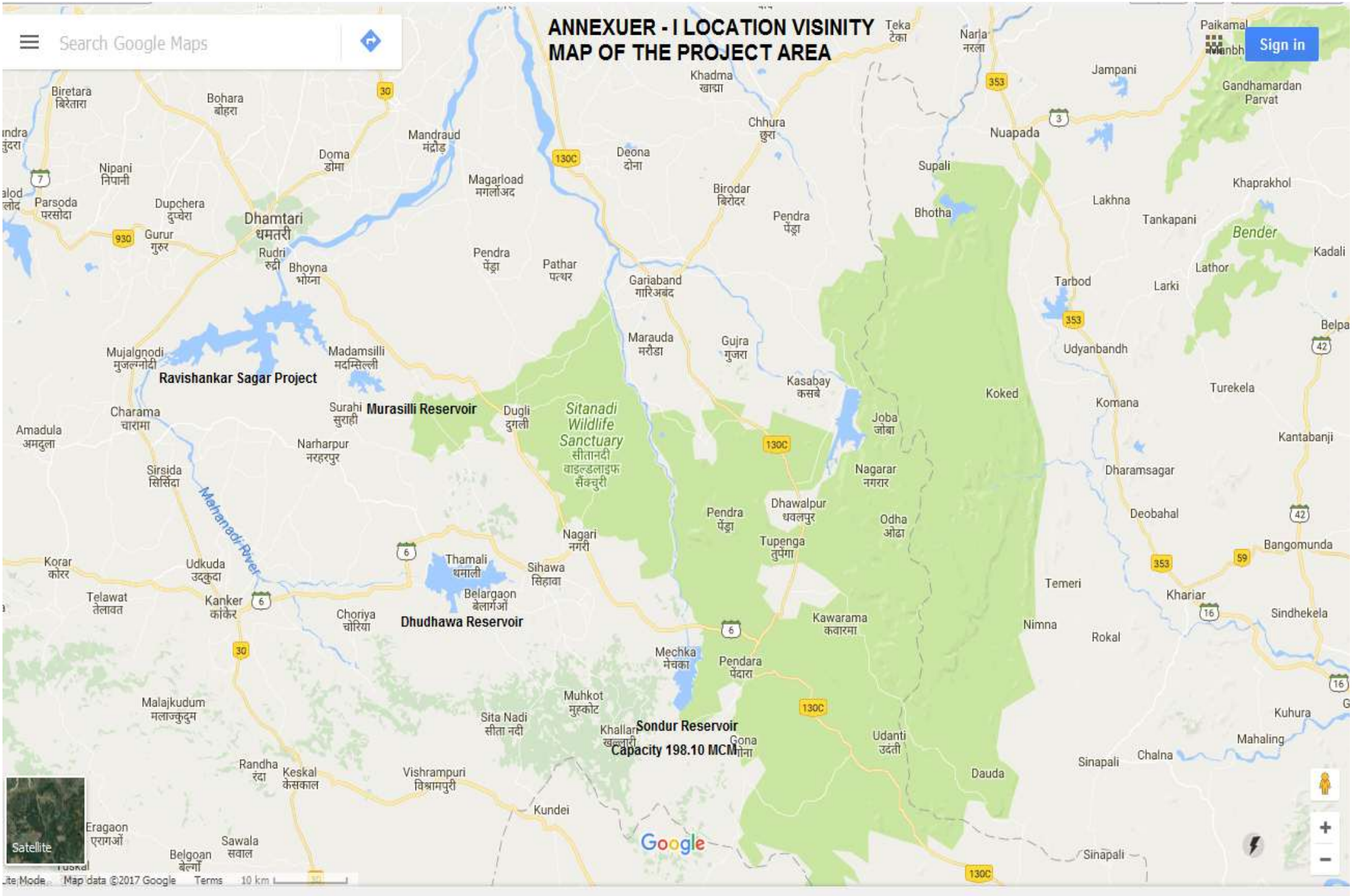
The status of Administrative approval to the project and revised administrative approvals from time to time are shown below:

- The administrative approval of Rs 1086.84 lakh on 4th March, 1977.
- The Technical sanction issued by the competent authority on 26th April, 1979.
- The revised Administrative Approval was accorded for Rs. 3445 lakh by the erstwhile M.P. Government on 20th November, 1982.
- In view of the increased cost of project, the case for revised administrative approval for Rs 557.11 lakh was submitted on 17.12.2013 to the competent authority for grant of approval, but it is pending at the Government level for want of grant of diversion forest land .

9.0 ANALYSIS OF PROPOSAL

9.1 Financial and Social Benefits with Special Emphasis on the Benefit to the Local People Including Tribal Population, If any, In the Area

The benefits from the project in terms of increase in irrigated area and increased production have already been accruing to 66 villages under command of SFC andThe implementation of Irrigation scheme had created employment opportunities in the project area. The employment was associated with improved farming practices as well as the construction of the dam, feeder canal and distribution networks over the period of construction spanning for more than two decades. As per estimate of project proponent upto year 2002 about non-recurring 7, 56,728 man days were generated besides2,52,143 recurring man days/year. The balance works under the project ,which are labour oriented, like catchment area treatment plan ;compensatory afforestation scheme and habitat improvement works under wildlife management and bio-diversity conservation programme ,which shall be carried out by the Forest Department of the State in the project catchment area and adjoining areas , are expected to provide employment to local people of the tribal area in plantation and other forestry allied activities. The project activity will have positive major impact on the environment.


ANNEXUER - I LOCATION VISINITY
MAP OF THE PROJECT AREA
Search Google Maps
Sign in
Ravishankar Sagar Project
Murasilli Reservoir
Dhudhawa Reservoir
Sondur Reservoir
Capacity 198.10 MCM
Sitanadi Wildlife Sanctuary
Mahanadi River
Dhamtari
Mujalgnodi
Madamsilli
Surahi
Dugli
Charama
Amadula
Narharpur
Sirsida
Korar
Udkuda
Telawat
Kanker
Choriya
Thamali
Belargaon
Nagari
Sihawa
Khadma
Chhura
Deona
Magarload
Mandraud
Doma
Nipani
Parsoda
Dupchera
Gurur
Rudri
Bhoyna
Pendra
Pathar
Gariaband
Marauda
Gujra
Kasabay
Joba
Nagarar
Dhawalpur
Odha
Tupenga
Kawarama
Mechka
Pendara
Muhkot
Sita Nadi
Khallari
Gona
Udanti
Dauda
Sinapali
Kundei
Vishrampuri
Randha
Keskal
Malajkudum
Eragaon
Sawala
Belgoan
Biretara
Bohara
Nuapada
Supali
Bhotha
Lakhna
Tankapani
Jampani
Gandhamardan Parvat
Khaprakhol
Bender
Kadali
Lathor
Larki
Tarbod
Udyanbandh
Belpa
Turekela
Komana
Kantabanji
Dharamsagar
Deobahal
Bangomunda
Temeri
Khariar
Sindhekela
Nimna
Rokal
Kuhura
Mahaling
Chalna
Sinapali
Koked
Narla
Teka
Paikamal
Satellite
Google
Map data ©2017 Google
Terms
10 km

Annexure – 2: Site Photographs of Dam/ Reservoir/ Feedar Canal

Sondur Masonry Dam

Right Flank of Earthern Dam

Left Flank of Earthern Dam

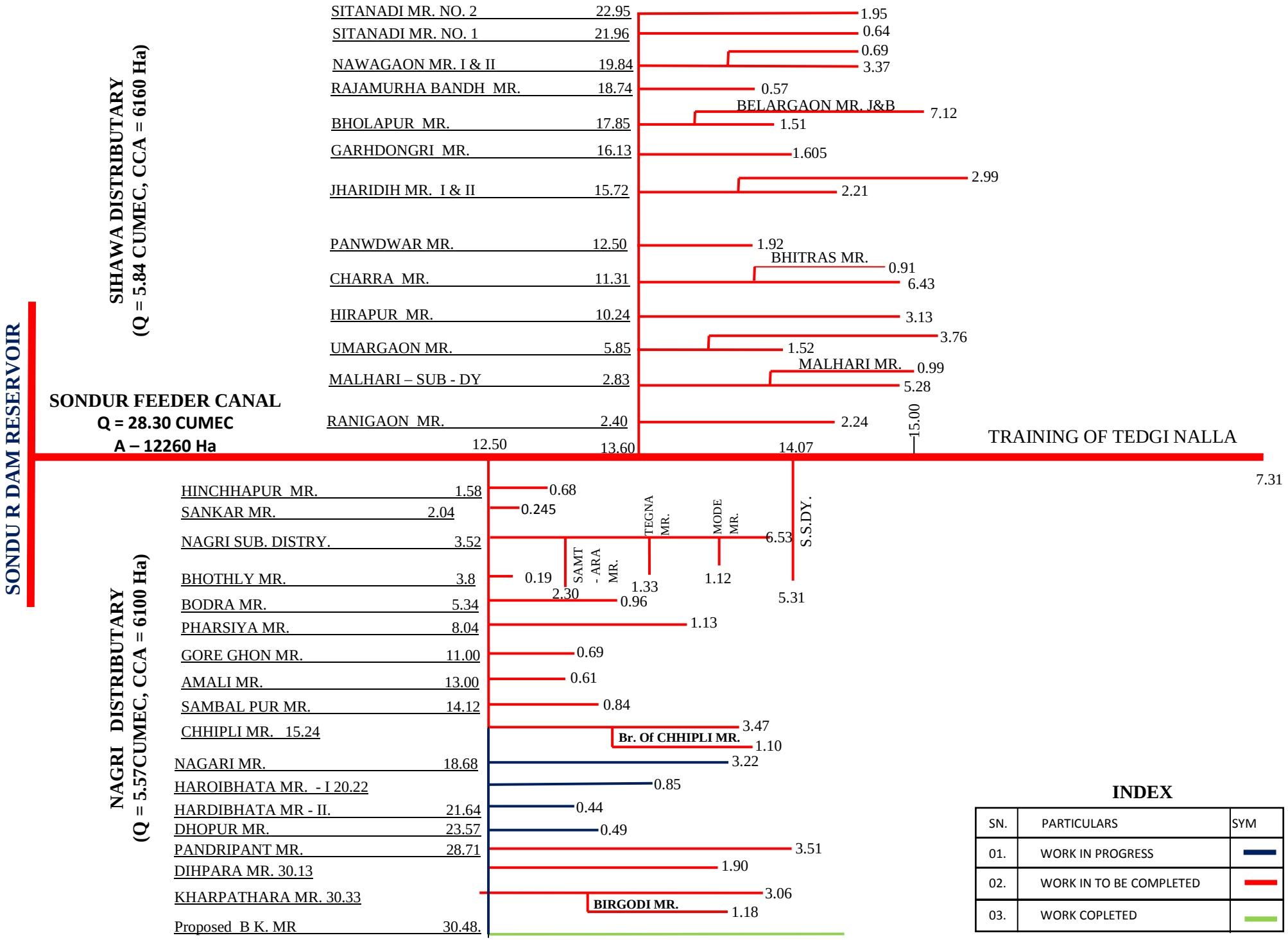
View of Reservoir

View of SondurFeedar Canal at Head Regulator

View of Canal Head Regulator

Annexure - 3

LINE DIAGRAM FOR SONDUR FEEDER CANAL OF SONDUR RESERVOIR PROJECT



INDEX

SN.	PARTICULARS	SYM
01.	WORK IN PROGRESS	
02.	WORK IN TO BE COMPLETED	
03.	WORK COPLETED	