

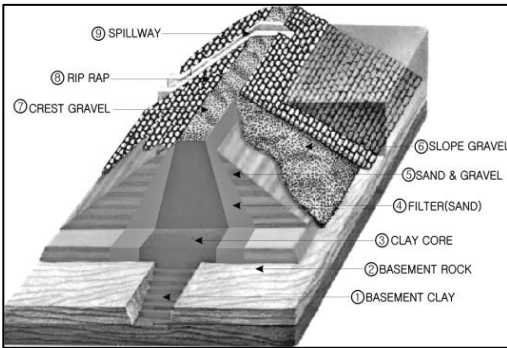
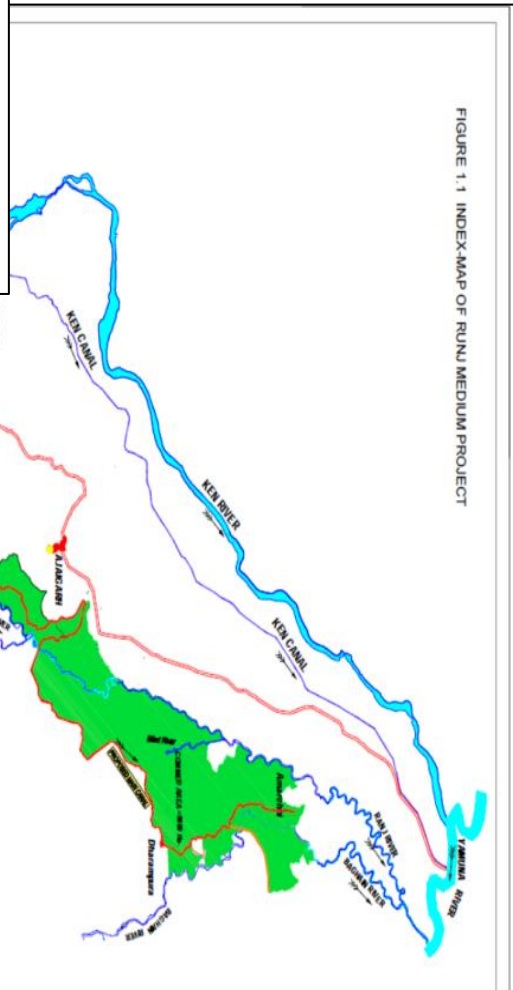
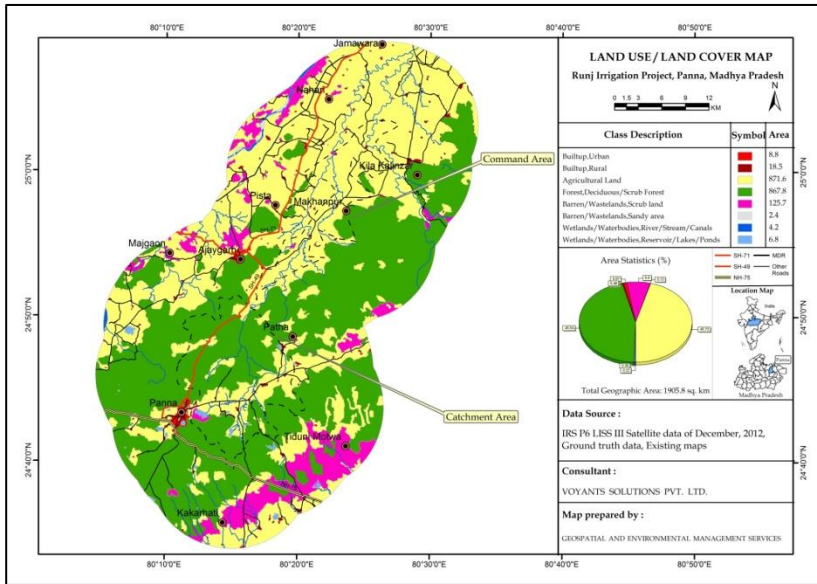
Executive Summary

(Environmental Impact Assessment Report)

Runj Medium Irrigation Project Panna, Madhya Pradesh

Catchment Area – 226.17 Sq.Km

Gross Command Area– 13795.00 Ha



Prepared For

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SUMMARY AND CONCLUSIONS OF EIA

1. Introduction

Runj Medium Irrigation Scheme shall be located in Ajaygarh tehsil of district Panna, Madhya Pradesh. The proposed scheme consists of 1182 m long composite dam across river Runj which is a tributary of Bhagain river which ultimately confluences with the Yamuna. The dam shall be located 250 m u/s of Aramganj village and can be approached by traveling 20 km on Panna-Ajaigarh road. The nearest railway station to project site is Satna which is 90 km away from dam site. The storage dam shall comprise of 124.75 m long overflow section comprising of 8 bays of size 12.5 m x 5.75 m to pass a PMF of 3382.62 cumec. Non-overflow section with maximum height 43.35 m above foundation level in 15 m length on either side of the spillway has been proposed. On left and right of the non-overflow section earthen dam of maximum height 34.43 m has been conceived in 855 and 172 m respectively. A canal sluice at RD 120 of left flank of earthen dam section shall be provided from which 41.94 km long left main canal, PCC lined trapezoidal in section with authorized head discharge 6.2 cumec, shall off-take to provide flow irrigation in 9940 ha CCA lying in 39 vilalges of Ajaygarh block. The scheme shall provide irrigation during Kharif and Rabi in 2750 and 9800 ha area with crop intensity of 27.65% and 98.60%. Thus, the annual irrigation shall be 12550 ha, with intensity of irrigation 126.25%. The distribution system shall comprise of 03 distributaries, 27 minors and 30 number direct outlets from main canal. For proper negotiation of the drains intercepted in command area, cross drainage works comprising of 04 aqueducts, 04 drainage siphons, 12 drainage culverts and 04 pipe culverts have been proposed. The cost of the project, as per price level February 2009, has been estimated as Rs. 269.79 crore with BC ratio of 1.65:1. The cost per ha on designed irrigation has been assessed as Rs. 2.75 lac.

2. PROJECT LOCATION:

Runj dam site is proposed at village Aramganj in Ajaigarh Tehsil in Panna District of Madhya Pradesh.

The Geographical Coordinate of Dam Site is:

Latitude: 24° 50'31.70"

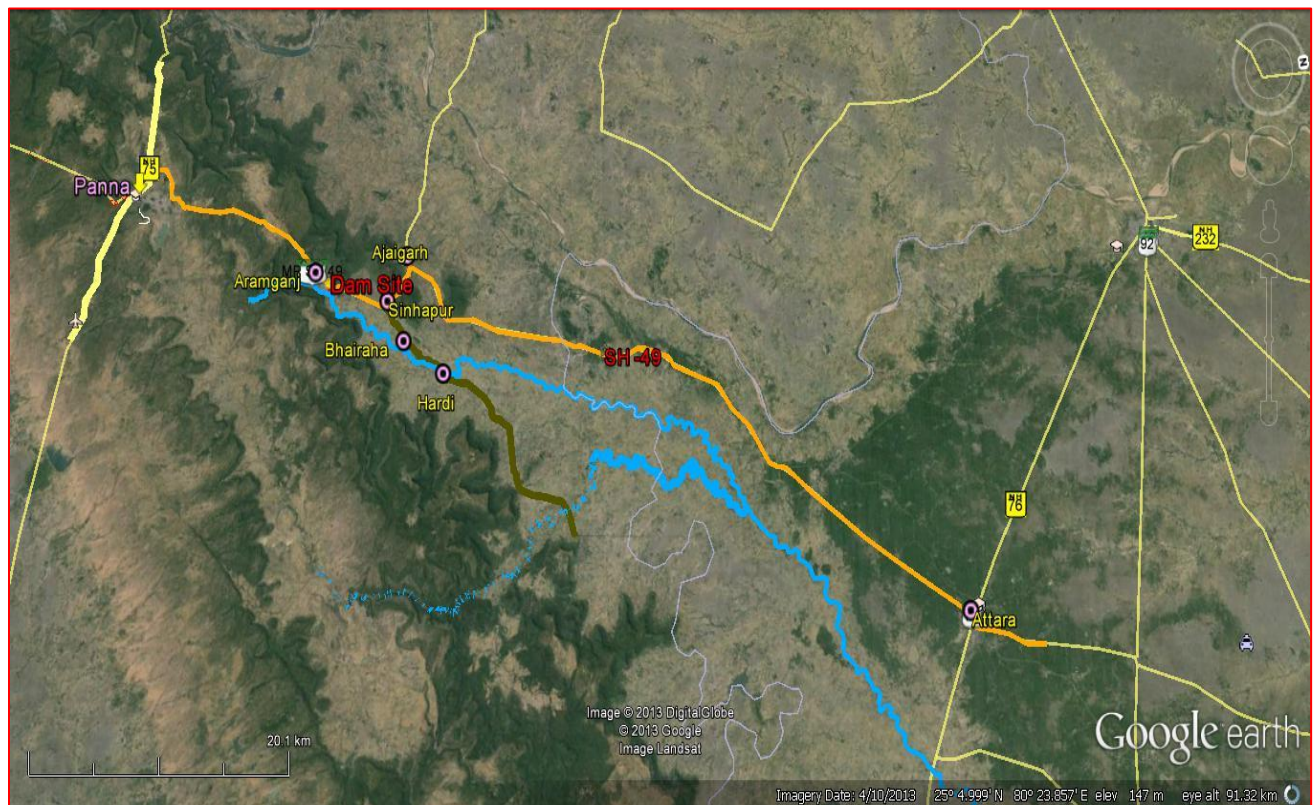
Longitude: 80° 16'29.6"

3. Accessibility:

The dam site is located at village Aramganj of Ajaigarh Tehsil. The dam site is accessible by fair weather road from Panna town (District head quarter). The proposed dam site is about 20 km (road distance) towards North of Panna. The site is about 6.79 km (aerial Distance) towards south of Ajaigarh Tehsil. The nearest settlement is Armganj village which is near Dam site and lies in submergence area.

The proposed dam site and command area is connected by State Highway- 49. Towards South SH – 49 connect the site with Panna district and further with National Highway – 75. This NH – 75 connect the site with whole of Madhya Pradesh state. Towards North the SH – 49 connect the site with Ajaigarh Tehsil and at Attara Town it is connected with National Highway – 76. This NH-76 is further connects the site with Utter Pradesh.

Figure 1: Connectivity of Project Site in Panna district



Salient Features of Pawai Medium Irrigation Scheme

Sl. No	Description	Runj Dam
Location		
1	State	Madhya Pradesh
2	District	Panna
3	Topo Sheet No	63D/5
4	Lattitude	24 50' 31.70" N
5	Longitude	80 16' 29.6E
6	River	Runj
7	Situation	At a Distance of 250m U/s side of Aramganj village
Hydrology		
1	Catchment Area	226.17
2	Maximum Annual Rain Fall	744.26mm (Year 1965)
3	Minimum Annual Rain fall	1241.65mn
4	Average Annual Rain fall	1241.65mm
5	Design flood (PMF) as per Flood Hydrograph	3382.62 Cumec
6	75% Dependable Yield	75.77 M Cum.
7	U/S Utilization	3.98 M Cum.
Reservoir Data		
1	T.B.L.	225.35MM
2	M.W.L	222.35M
3	F.R.L.	221.50M
4	Dead Storage Level	197.00m
5	River Bed at FRL	189.87M
6	Gross Storage at FRL	72.04 m Cum
7	Live Storage	64.70 M Cum
8	Dead Storage	7.34 M Cum
9	Tehsils in which Submergence area lies	Ajaigarh
10	No. of villages affected	1.
11	No. of families affected	219
12	No of persons affected	1236
13	Water Spread Area at FRL	482.10 Ha
14	Revenue submergence area	327.19 Ha
15	Forest submergence area	154.91 Ha.

Sl. No	Description	Runj Dam
Dam		
	Total Length of Dam	1182.00m
(a)	Overflow Dam	Crest level of weir (R.L.)215.75 M
1	Crest level of Weir (R.L)	215.75m
2	Length of spil way	124.75
3	No. of Gates	8 gates of size(12.5mx5.75m)
4	Top width of dam	6.00mm
5	Top of Dam (R.L.)	215.75
6	Deepest oundation level	182.00mm
7	Maximum height above foundation	45.35m/43.35m
Non Over Flow Dam		
1	Top of Dam (R.L)	225.35 m
2	Maximum height above foundation	43.35m
3	Length of Dam (15m on either side)	30.00m
Earthen Dam		
	Length of Dam	
	Left Flank	855.00m
	Right Flank	172.00m
	Maximum height above G.L	34.43m
Canal System		
1	Type of Canal	Flow canal with CC lining
2	G.C.A available	13795 Ha
3	C.C.A available	9940 Ha
4	Proposed Irrigation	
	Kharif	2750 Ha
	Rabi	9800 Ha

Catchment Area:

The proposed project will ensure the utilization of water of Runj river (Seasonal river) for irrigating the lands downstream of dam site. The catchment area is covered partly by medium and thick forest land and partly by agricultural lands. The Gross catchment area upto the project site is about 226.17 Sq.Km which entirely lies in M.P.

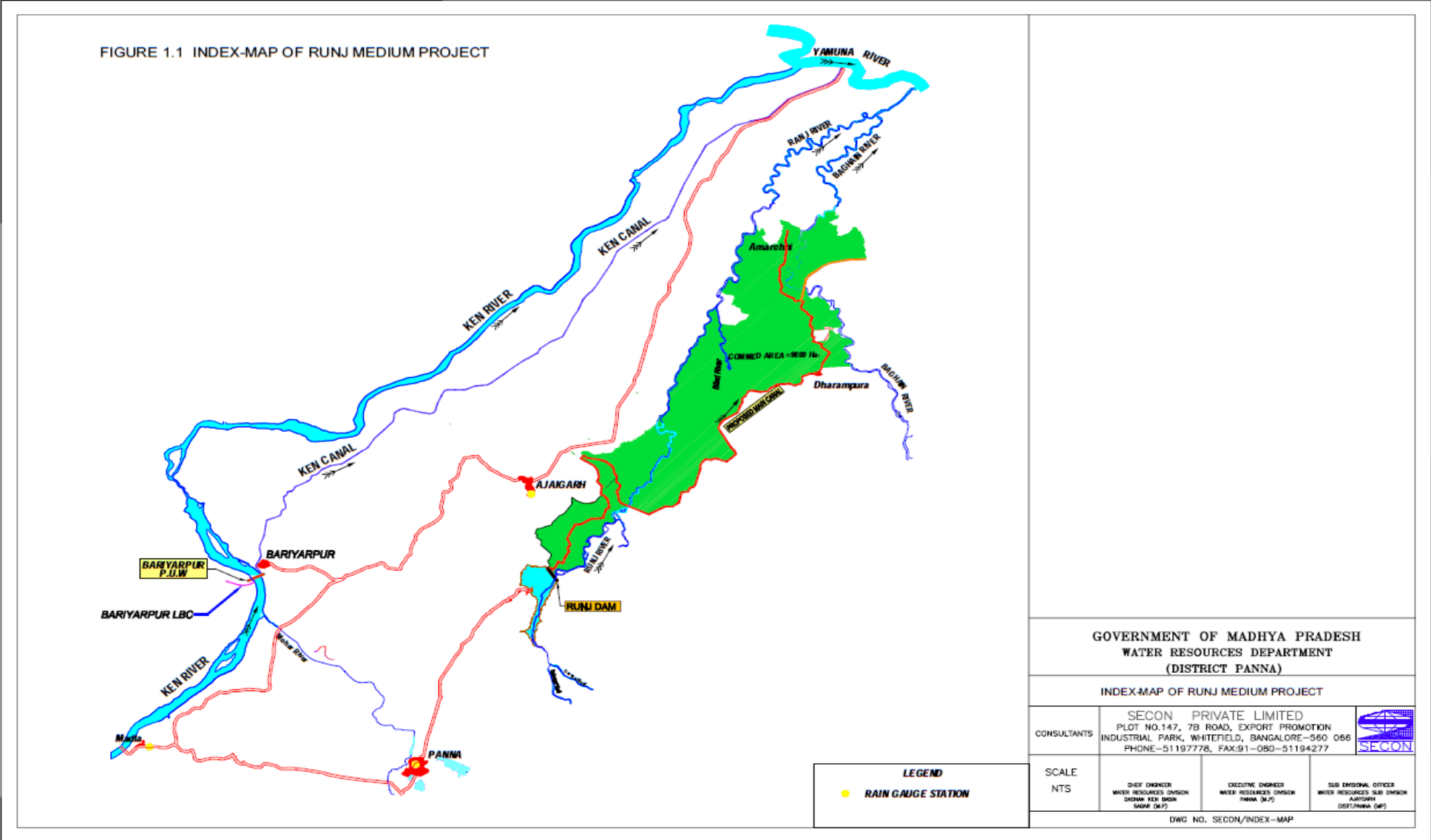
Command Area:

Runj Medium Irrigation project will have main canal of length 41.941 km. The total number of blocks in the command area is 60. The major portion of the command is available in the plain terrain. The main canal along with seven distributies will irrigate about 12550 Ha of land annual. Irrigation is mainly by gravity flow. The gross command area and cultivable command area available under this project are 13795 Ha & 9940 Ha respectively. As per the availability of water it is proposed to irrigate 2750 ha of land in kharif and 9800 ha of land in rabi.

Submergence Area: The submergence area at FRL of Pawai dam is 482.82 Ha. The present landuse in the submergence area is either under forest, Agriculture or barren which will be converted into water body reservoir on account of construction of Runj dam.

- ❖ Forest Land – 154.91 Ha
- ❖ Government Reserve – 87.0 Ha
- ❖ Private Land – 240.91.00 Ha

Figure 2.3: Command Area of Pawai Irrigation Project



4. Benefits of Pawai Medium Irrigation Project

The following are the anticipated benefits from the Pawai Medium Irrigation Project-

- With provision of assured quantum of water this project will restore irrigation facility in command area of 13795 Ha (GCA) and 9940 Ha CCA irrigable under this Runj Irrigation Project;
- The project shall provide irrigation and water facilities for drinking water to villages of district Panna and will boost the economy of the region;
- This project would transform lives of about 39 villages people in this drought prone area and enrich their quality of living;
- Percolation of surface water into sub-soil will recharge the deep groundwater tables and raise groundwater levels to some extent; The feeder canal alignment passes through gently sloping terrain without any major undulations; hence the shallow canal construction does not envisage deep cuttings or major embankments that may result in water seepage;
- The distributaries were provided with lining, hence seepage from canals is not anticipated;
- Water logging problems are not anticipated good terrain slopes, moderate percolation rates and deep groundwater tables.
- This project will provide immense benefits in the command area and facilitate multiplier effect for comprehensive infrastructure and economic development of Bundelkhand region.
- The increased yield of crops with the introduction of irrigation is expected to for food, other crops and cash crops. This additional yield will increase the national wealth and improve the financial condition of the poor cultivators.
- Cultivators and unskilled farm labour form major part work force. With increased productions, opportunity of employment in agricultural activities shall also go up.

5. Necessity of EIA & EMP for Pawai Project

Panna district is located in Bundelkhand region of MP and has faced drought conditions in last two decades during 1991-92, 1995-96, 2002-03, 2004-05, 2005-06, 2006-07. The district has faced drought in consecutive three years i.e. 2004-05 to 2006-07. The irrigation development is below the state's average figure. The agriculture in this district is totally dependent on the rainfall and thus subject to the vagaries of monsoon. Providing irrigation will improve the economic condition of the farmers and result in efficient utilization of soil and water resources of the region.

To improve the scenario and to have overall development of the Bundelkhand, Govt of Madhya Pradesh has planned Runj Medium Irrigation project to provide irrigation in areas of Ajaigarh block by storing the river flow from Runj River. The water allotted to the project is 64.70 MCM, out of which, allocation for irrigation for future use in industry and domestic purpose has been apportioned 3MCM after excluding the evaporation losses.

6. Baseline Environmental Status

The existing baseline environmental conditions in the project area have been established through review of secondary data and primary field surveys covering aspects related to land use, micro-meteorology, ambient air quality, water quality, soil quality, noise levels, aquatic and terrestrial ecology, socio-economic conditions of people, healthcare facilities and infrastructure development. The primary surveys for assessing the surface and groundwater quality, air, water, noise and soil has been completed for three consecutive seasons in year 2012. The socio-economic surveys of the Project displaced persons were conducted once during the EIA period.

a. Physiography of the Project Area

Panna district of Bundelkhand Madhya Pradesh and has common border with Banda District of Uttar Pradesh and Chhatarpur, Damoh, Jabalpur and Satna Districts of Madhya Pradesh. It comprises of 7108 km² of geographical area. The climate of the area is warm, sub humid, sub-tropical, monsoonic type. May is generally hottest month and January is coldest. Geologically the area belongs to the Arehaeans and Vindhyan system, granite and gneiss occupy the northern part while sandstone covers the central and southern parts of the district.

The elevation ranges from 150 to 450m above MSL. The district has heterogeneously geomorphic units viz hills and hill ranges, escarpment, ridges, table – land, pediment, piedmont plain and their sub units which were identified and delineated on the imageries. The district comprises of hill region, ridges and elongated hills and ridges.

b. Geology

The project lies in the Vindhyan Basin, which is one of the largest intracratonic basins of the world of Proterozoic Eon. The Vindhyan rocks crop out over an area of 1,04,000 sq.km. With cumulative thickness of about 4,500m in the central peninsular region. It uncomfortably overlies the *Bundelkhand* massif and slightly metamorphosed rocks of Bijawar Group and Gwalior Groups. The rocks of Vindhyan Super Group are un metamorphosed and undergone minor tectonic deformation. The rocks of Vindhyan Super Group are considered to have been deposited from Palaeoproterozoic to Neoproterozoic (between 1700 and 600 Ma). Moreover, No minerals of economic importance are known to occur in any part of submergence and command area.

c. Seismicity

The Pawai project dam is located in Zone II (Least Active Zone) Seismo – Tectonic zone as per the bureau of Indian Standards (BIS) 2000 seismic zone map of India.

d. Meteorology & Climate of Project Area

To access the long-term climate trend of climatic condition of project area, the secondary data was collected from the IMD station located at Supdt. of Police, Satna. Moreover, the primary data was collected during the three season of study has been used in air dispersion modeling. The climatologically summary for station at Satna is given in below table.

TABLE: CLIMATOLOGICAL SUMMARY FOR IMD STATION AT SATNA (1951-1980)

Month	Mean max. temp (0 C)	Mean min. temp (0 C)	Total rainfall (mm)	Mean wind speed (Km/h)	Predominant wind direction
January	32.8	0.6	30.8	3.6	W
February	36.7	1.1	15.3	4.3	W
March	41.1	4.4	12.7	5.3	W
April	45.0	12.2	5.4	6.0	W

Month	Mean max. temp (0 C)	Mean min. temp (0 C)	Total rainfall (mm)	Mean wind speed (Km/h)	Predominant wind direction
May	46.7	18.3	7.9	7.3	W
June	47.8	19.4	119.0	9.2	W
July	45.0	17.8	338.6	7.6	W
August	39.3	21.1	330.9	6.6	W
September	38.3	16.7	181.9	5.5	W
October	38.9	10.0	40.1	3.4	C
November	35.5	4.8	14.9	2.8	C
December	32.9	0.4	9.0	2.8	C
Average total	47.8	0.4	1106.5	5.4	W

Source: Government of India, Indian Meteorological Department, Climatologically Tables (1951-1980), 1999.

e. Air Environment

The proposed Runj Medium Irrigation project is an irrigation project hence air pollution by means of burning fuels, emitting large volume of gases, etc. are not anticipated. The air pollutants causing some minor impacts in the local area around the construction sites are dust generated due to excavation, blasting, movements of vehicles and dumping of muck at disposal sites; and marginal gaseous emissions resulting from to operation of DG sets, de watering pumps and movements of vehicles. These pollutants are anticipated to be minimal mostly confining to the construction sites and along roads and feeder canal.

In order to establish the prevailing ambient air quality and to assess the impact of project construction activities on the local environment, baseline ambient air quality monitoring was conducted in pre-monsoon, monsoon and winter seasons of 2012 - 2013 at the proposed barrage site and feeder canal alignment, as these are the only air quality impacting areas in the entire project area. For accessing the background concentration of particulate and gaseous pollutants eight monitoring station was selected. The outcome of these surveys in both seasons revealed that all air quality parameters such as SPM, RPM, SO₂ and NO_x are within permissible limits and in conformity with the National Ambient Air Quality standards prescribed by CPCB for rural/residential areas.

f. Noise Environment

In order to establish the prevailing ambient noise levels and to assess the impacts of noise generation due to construction activities, the noise monitoring was carried out in 4 locations covering the barrage site, canal alignment, muck disposal site and transportation corridor during Pre-monsoon, Monsoon and winter seasons of 2012 - 2013. The baseline noise levels ranged from 50.16-56.55 dB (A) which are well within the permissible levels for rural and residential areas.

g. Water Environment

Runj River is tributary of Bhaghain River which finally drains into Yamuna River. At different locations are the important water courses in the free catchment area of project. All these rivers are non- perennial and the flows mostly confine to monsoon and some part of post monsoon. During pre-monsoon season all the streams practically go dry or towards the end of dryness. On account of prevailing virgin natural settings along Runj River, no industrial effluents or mine wastes are dumped in this river; hence the water quality of this river is good and suitable for irrigation.

h. Soil Environment

A soil of the project catchment and command area varies at micro level but mostly they are sandy silt and are brown in color. In order to assess the quality of soil, 6 soil samples each were collected and analyzed during Pre-Monsoon Post-Monsoon and winter season of 2012 - 2013. These showed slight/ moderate alkaline conditions with reference to pH, which is a common phenomenon in drought prone areas. .

i. Land Use Pattern

Land use pattern has a significant influence on the quality and quantity of runoff available from it. It plays an important role in determining the various hydrological phenomena like Infiltration rate, overland flow, evaporation and interception. In detailed about type of land and their uses pattern is highlighted in below table.

Table: Land use of the study area

S.No	Class Description	Area (Sq.km)	%
1	Built-up, Urban	8.8	0.97
2	Built-up, Rural	18.5	0.46

2	Agricultural Land	871.6	46.73
3	Forest	867.8	45.54
4	Barren/Wastelands ,Scrub land	125.7	6.6
5	Barren/Wastelands ,Sandy area	2.4	0.35
6	Wetlands/Waterbodies,River/Stream/Canals	4.2	0.13
7	Wetlands/Waterbodies,Reservoir/Lakes/Ponds	6.8	0.22

j. Ecological Environment

Panna District has 7135 km² of geographical area of this 85 km² is under very dense forest, 1501 km² moderate dense forest and 1072km² under open forest. The district has 189 km² under scrub cover (Source: State Forest Report – 2011). As per Champion & Seth Classification district has Tropical Dry Deciduous forest.

About 154.91 Ha of forest land will be diverted for Pawai Irrigation project. These forests are declared protected under the “The Indian Forest Act – 1927 and Forest Conservation Act -1980”.

There are no wildlife sanctuaries or wildlife protected areas in the project affected area. The nearest wildlife sanctuary is Panna Tiger Reserve which is outside the study area (10 km from project boundary).

The existing ecological conditions in the project area have been established based on review of secondary information and also by conducting detailed primary ecological field surveys during the Pre-Monsoon, Mansoon and winter seasons of 2012 -13.

Altogether a rich diversity of flora has been recorded during the primary sampling studies. The vegetation studies showed highly degraded landscapes due to anthropogenic disturbances. Although clear cutting was not observed in the sampling sites, disturbance in terms of heavy grazing is found to be common. The tree cover is sparse and mostly consists of exotic and invasive species. The submergence and command areas do not contain any endangered or threatened species of plants having significant conservation value.

The fauna of the study area mostly consists of commonly occurring species; and no endangered species have been reported. An approx. 24 avifauna are reported from the area, mostly around the rivers. Most of the birds belong to Schedule IV. No birds belonging to i.e. endangered, threatened, vulnerable categories are observed in the study area.

There are about 9 species of mammals in the area and all of them belong to Schedule-II to IV. Only House rat, Grew musk shrew and bat have been found to be in the Schedule-V category. About 6 species of reptiles and about 2 types of amphibians are reported from the project area.

k. Socioeconomic Environment

The Runj Irrigation Project is proposed across river Runj near village Vishramganj of Ajaigarh Tehsil of District Panna. The dam site is located about 22 Km. from Panna Town. The project lies in backward area of Panna District and about 90% of the affected population belongs to Scheduled Tribe. The proposed beneficiaries in the command area live in 39 villages and belong to Scheduled Tribes, Scheduled Castes and OBC Categories.

RUNJ Irrigation Project is a Medium Level Irrigation Project for providing irrigation facility to 12550 Ha of land in 39 villages in Ajaigarh Tehsil of Panna District Madhya Pradesh. Out of 12550 Hactare land due for irrigation, there will be irrigation in 9800 Hactare of Rabi Crop and 2750 Hactare of Kharif Crop.

The estimated cost of the project is Rs. 26979.12 lakhs. The project comprises of construction of an earthen dam on Runj River. The Dam site is located near village Vishram Ganj which is about 22 kms from Ajaigarh tehsil of Panna District. The location is situated in a valley and can be approached through Ajaigarh –Panna road. The total length of the dam will be 1182 M and maximum height will be 35.48 M. Total Reservoir capacity will be 72.04 MQM.

There will be effect of submergence only in one village (Vishram Gunj). There are 219 Project Affected Families comprising population of 1236 and 183 Tribal Families comprising population of 913 living in this village. Total affected land due for submergence is 482.82 Hactare comprising of 154.91 Hactare Forest Land, 87 Hactare Government Land and 240.91 Hectare Private land. The total percentage of the submergence area is 3.84% which is 15%

less than the standard percentage as only one village is under the threat of submergence.

There are 88 landless families, 28 families holding less than 1 Hactare of land, 21 families holding land between 1-2 Hactare and 46 families holding more than 2 Hactare but less than 5 Hactare of agricultural land in Vishramganj Village.

The Commanad Area of the Project will be in 39 villages of Ajaigarh Tehsil of District Panna. Total number of Beneficiaries will be 49542 and there will be 14524 Cultivators to be benefitted by this Project. There will be 4446 people belonging to General Category, 6669 of Other Backward Caste (OBC), 3046 of Scheduled Caste and 287 of Scheduled Tribes. The expected time to start getting the benefits of the Project will be in the year 2013.

1. Places of Historical and Archaeological Importance

There are no temples or monuments notified by the Archaeological Survey of India as well as the Madhya Pradesh State Archeological Department, within the submergence and command area of the project.

7. Environmental Impact Assessment

Runj Medium Irrigation Project will provide immense benefits to the drought prone area by means of restoring irrigation facility in the severely affected command area, 3MCM water is reserve for drinking purpose through LMC. While giving only benefits to the existing command area of Runj Medium Irrigation Project, this project will not have any adverse impact on this command area. Due to its moderate submergence area this project is not anticipated to cause major environmental impacts, though some minor impacts related with land acquisition and submergence of private, government and forest land would take place; which however would be mitigated with appropriate management measures.

a. Impacts during Construction Phase

This being an Earthen Dam development project not involving mammoth concrete dam structures the only moderate levels of construction activities would take place and are not anticipated to be very high. Leveling of site for construction of earthen dam,

excavation of feeder canal, transportation of excavated material from the project sites, stacking the surplus muck etc will be undertaken during construction phase and all these will have some short-time impacts that will be confined only to the construction phase. These impacts would be permanently ceased after the barrage construction.

During construction period on account of blasting, drilling, operation of DG sets and dewatering pumps and plying of heavy earth moving vehicles, trucks and dumpers, etc. The dust levels in the atmosphere will be increased. Also the gaseous emissions from vehicles, DG sets and oil engines will cause for minor increase in gaseous pollutants at the project sites. Hence these would have some temporary impacts on the ambient air quality in the area, though these are not anticipated to be high. No village including the nearest will be affected due to air pollution, as this village is located at about 0.5 km from Dam. The nearest village is Pandevpurwa in Ajaigarh Tehsil.

Burning of firewood/fuel by the construction workers for their cooking may have minor impact on the local air quality, which however can be avoided with provision of alternate cooking fuel such as kerosene or LP gas, if feasible.

Construction of earthen dam will be taken-up during lean period when there little water in the river, hence water pollution due to construction activities will not take place. Cofferdam will be installed on the river bed to prevent water pollution and soil erosion during construction phase. Though some minor streams is reported near construction site, which will be diverted away from the active construction site and will be conveyed through well-defined channels. Hence contamination of river water due to construction activities is not likely to take place.

The major noise generating activities during dam and canal construction phase would be the drilling, excavation, operation of construction equipment, plying of construction vehicles and blasting. During the construction phase, the construction activities would have some noise impacts on people and wildlife. The anticipated noise levels would be around 80-90 dB(A) at the project site during the peak hour construction period. As controlled blasting would be undertaken, this will have only marginal impact on the nearest Pandevpura village located at about 0.5 km distance. However, this would have some temporary impact on the wildlife in

vicinities of the dam site and may cause their temporary shifting to other areas either to the upstream or downstream of the barrage site.

The barrage construction and transportation activities during the construction phase would cause some disturbances to the local fauna, hence temporary shifting of fauna from the barrage site to the upstream or downstream areas along the river slightly away from the barrage site may take place. As there are plenty of similar habitat areas along the river in upstream and downstream, the impact on fauna will be minimal.

In the dam construction and excavation of feeder canal considerable extent of employment will be generated and this will be a major positive impact. For the unskilled and semi-skilled workers, preference will be given to the local people; hence these will be the most beneficial ones due to project construction, which is a positive impact.

Impact during Operational Phase

During the post-construction phase all environmental impacts occurred during construction stage would be ceased. During this phase most positive impacts due to water supply for industrial, drinking and irrigation purposes will be resulted. Adverse environmental impacts including the drainage impacts in the command area are not anticipated during this phase the full-fledged command area development works including drainage works have already been completed long ago.

Positive Impacts

Impact on Social Environment

During the operational phase Runj Medium Irrigation Project would provide immense benefits to farmers of this drought prone area by means of dependable and assured irrigation facilities. This will enable the farmers who at present are hardly taking a single crop to take at least 2 crops with enhanced cropping pattern and crop yields. A large number of agricultural labourers who are getting wage labour only for a few weeks in a year at present will secure assured employment for about 6-9 months in a year. The fisheries development in the reservoir and rivers would lead to

enhanced income to the fisher-folk having access to the fisheries. All these are positive impacts due to the project and would transform the living conditions of people in the command area and fisher-folk having approach to the reservoir.

Besides providing irrigation facility and direct employment to the entire command area, this project would indirectly create impetus to the development of agro based and allied ancillary industries and infrastructure development in the region and provide direct and indirect employment to a large number of people. This will lead for overall economic development with a multiplier-effect in the backward area and will enhance revenue accruals to the State exchequer.

Impact on Surface Water Resources

By formation of reservoir and storing the water which otherwise was draining-out to the downstream areas, this project will enhance surface water resources in the region, which is a positive impact. Due to release of controlled water flows from the barrage in the non-monsoon seasons the downstream areas of River River will contain adequate water for most part of year due to finally draining of irrigation water downstream in the river.

Impact on Groundwater Resources

Due to presence of water for longer duration in the river, reservoir, feeder canal, irrigation canals and fields of command area; percolation of water into the sub-surface will take place. This will recharge the groundwater tables which are very deep at present to some extent. It will also dilute the concentration of fluoride concentration and will make water fit for drinking.

Impact on Ecology and Bio-Diversity

Due to formation of a moderate size reservoir and feeder canal and presence of water for long duration in these water bodies and command area many birds from the adjoining drought prone areas and also from faraway places are likely to be attracted to this region. Drinking water for wild mammals will be available throughout the year. This area is draught prone and water are scanty during summer season.

The negative impact is diversion of forest land in the submergence area. Afforestation program is being carried out by the forest department. Village and social forest development will be boosted in the farm and scrub land. Village forest development will be supported by the irrigation department.

Impact on Climate

Due to presence of water in the reservoir, rivers, canals and irrigated fields for more duration of the year, relative humidity in atmosphere will be increased and this would bring-down ambient temperatures in this summer-scorch region.

Impact on Aesthetics

Construction of dam and formation of reservoir and canals will create water fronts in the region and will improve the aesthetic values in this otherwise dry area. The reservoir may facilitate boating and water sports. The proposed tree plantations around the dam and canal, and development of gardens at the dam-foot will enhance scenic beauty in the project area. These will serve as picnic spots in the region and may attract many tourists.

Likely Adverse Impacts

Impact on Soil

In the long-term, one of the most frequent problems of irrigation schemes is the rise in the local water-table (waterlogging). Low irrigation efficiencies (as low as 20 to 30% in some areas) are one of the main causes of rise of water table. Poor water distribution systems, poor main system management and archaic in-field irrigation practices are the main reason. Groundwater rising under capillary action will evaporate, leaving salts in the soil. The problem is of particular concern in arid and semi-arid areas with major salinity problems. A high water table also makes the soil difficult to work.

Good irrigation management, closely matching irrigation demands and supply, can reduce seepage and increase irrigation efficiency, thereby reducing the groundwater recharge. The provision of drainage will alleviate the problem locally but may create problems if the disposal water is of a poor quality. Rise in salinity is the major issue related with irrigation.

Proposer drainage and timely monitoring, crop rotation and used of ground water and irrigation water will reduce the salinity effect in command area.

Impact on Ambient Air Quality

During the operation phase of the project, no air quality impacts would be involved.

Impact on Wildlife

After formation of reservoir the wildlife in the submergence area will move to other nearby areas, as the habitat requirements of the local wildlife are general; and ample numbers of suitable sites for their habitats are available in the nearby areas.

No wildlife habitat is reported in the command area. Therefore no impact is anticipated during operation phase.

Impact due to Excess Use of Fertilizers and Pesticides

In the post-irrigation scenario, if farmers tend to use more fertilizers and pesticides these may result in soil and water pollution. Hence, it should be essential to use the fertilizers and pesticides in a judicious manner without causing soil and water pollution. Awareness program will be conducted and specialist will interact with the local people and who will guide them on the quantity and proper application of fertilizer and Pesticides.

Impact on Human Health

With presence of water for more duration, the humidity levels in the atmosphere will be increased and this may lead to some water related vector borne diseases. Also due to possible proliferation of mosquitoes and snails, some water borne diseases are likely to be resulted during the monsoon and post-monsoon seasons in the command area.

8. ENVIRONMENT MANAGEMENT PLAN

Runj Medium Irrigation Project would have some social and environmental implications though they are anticipated to be the minimum. To further minimize the environmental losses and negating adverse impacts to the possible extent through technical judgment and

implementation of appropriate mitigation measures, an Environmental Management Plan has been developed.

Environment Management Plan during Construction Phase

The following mitigation measures during construction period would be needed:

- Undertaking excavations and construction activities at the project sites with utmost care to the environmental aspects and safety measures;
- Using the generated muck from project sites for constructing the earthen dam if suitable, or filling the low-lying areas; stacking the surplus material in identified muck disposal sites away from the project site, with appropriate slopes, in a systematic manner;
- Compacting of muck dumps, covering them with topsoil excavated from construction sites and undertaking plantations on them for minimizing erosion;
- Adopting appropriate measures for minimizing vibrations and noise levels during blasting;
- Carrying out construction activities only during daytime in order to avoid noise impacts on the surrounding areas;
- Undertaking dust control measures such as water sprinkling on the haul roads;
- Maintaining the diesel powered construction vehicles properly, for minimizing smoke emissions;
- Providing noise protection devices like earmuffs and earplugs to the workers operating the high noise generating equipment;
- Providing adequate numbers and sizes of road bridges wherever the canal severs the existing road/cart tracks;
- Providing footbridges wherever the traditional paths are severed due to canal construction;
- Provision of cooking fuel to construction workers through contractors to prevent felling of trees for fire wood for their cooking; and
- Provision of separate and adequate sanitation facilities for male and female workers and providing septic tanks to toilets at construction camps.

Management Plan during Operational Phase

The following mitigation measures would be required during the operational phase of the project:

- Undertaking tree plantations at the dam-foot, around the dam and along the canal;
- Growing grasses on the muck dumps formed along the canals for their strengthening, and preventing from erosion;
- Nurturing the plantations through the Social Forestry Department, at least for 3 years till the plants become self-sufficient;
- Providing sub-soil drainage at places where water logging is anticipated;
- Imparting training to farmers for optimal use of fertilizers and pesticides as per the actual requirements of crops based on scientific evaluation of fertility status; and preventing their excessive use, which otherwise may adversely affect the crops;
- Implementing crop-cycling for improving organic matter in soils and giving slight inputs of nutrients to enhance the crop pattern and crop yields;
- Undertaking periodic water quality testing of Runj River and Bhagain River, and if the water quality is not meeting the standards, appropriate treatment measures would be undertaken for ensuring proper water quality;
- Ensuring no illegal felling of trees takes place in the vicinity of project sites;
- Minimizing movement of project vehicles and excessive blowing of horn and lighting during night time to avoid disturbances to wildlife in project area;
- Undertaking strict law enforcement measures for conservation of wildlife near the dam and along canal;
- Undertaking appropriate measures for development of fisheries and aquatic life in the reservoir;
- Preventing excessive growth of aquatic weeds in reservoir for controlling nutrition levels, and to allow free-flow of water in canals;
- Creating fisheries hatcheries and culturing fish in existing tanks of the command area and reservoir for creating employment to people and improving water quality in water bodies;

- Undertaking catchment area treatment plans and soil conservation measures in critical areas prone to soil erosion by means of watershed management plans by the Soil Conservation wing of Agriculture Department and Forest Department of Government of Maharashtra for minimizing sedimentation in reservoir and other water bodies; and
- Flushing out silt from the reservoir by opening gates during monsoon.

9. Command Area Development

The command area of Pawai Irrigation Project is an integral part of Runj Medium Irrigation Project, where adequate command area development measures have already been implemented. These include development of water resources, judicious method of water application, suitable soil and crop management practices and scientific scheduling of irrigation. These mainly included:

Conservation measures such as land leveling, land shaping, and smoothening, grading, land development and forming earth bunds;

Field drains with appropriate sizes;

Efficient surface drainage for removal of excess water due to heavy rains/seepage from canals or excessive irrigation;

Efficient sub-soil drainage for removing the excess water from the sub-soil areas; and Stabilizing, strengthening and deepening the existing main drains to the possible extent for enabling them to carry excess water from fields, rapidly.

10. Public Health Management

Public Health management measures include:

- Undertaking adequate curative and preventive measures for eliminating the risk of outbreak of any water borne and parasitic disease in the area;
- Strengthening the existing healthcare facilities by appointing adequate number of medical and paramedical staff;
- Maintaining good environmental, health and sanitation conditions at the construction camps; and

- Carrying out regular surveillance and health improvement programs by the Health Department for preventing health disorders in command area

11. Post-Project Monitoring and Management

During post-project monitoring stage, for effective environmental management soil and water quality in some critical areas of the command area may need to be monitored. Developing an Environmental Management Program under the Coordination Committee of the Water Resources and Agriculture Departments and implementing the identified mitigation measures in the identified environmentally problem areas, if any would safeguard environmental conditions in the project command area.

Organization for Environment Management

The Superintending Engineer and Administrator Command Area Development Authority would implement the proposed Environment Management Plan in coordination with various departments of GoMP

12. Budgetary Allocation for Environmental Measures

The total cost of Runj Medium Irrigation Project is estimated to be about Rs. 269.79 Crore. Costs on environmental aspects such as plantations along the feeder canal and downstream of dam is Rs. 14 lakhs.

Conclusions

The proposed Pawai Irrigation Project will provide assured surface water irrigation facility to 12550 ha ICA. With provision of its immense benefits to the irrigation scarce drought prone area of Pawai Tehsil in Panna district, this project would lead for overall socio-economic and infrastructure development of the region. By supplying considerable quantities of food and non-food products, this project would be beneficial even to the other areas.