Chanderi Pressurized Micro Irrigation Scheme

1.1 INTRODUCTION:-

(i) AIM(S) OF THE PROJECT WORK :

The main objective of **Chanderi Pressurized Micro Irrigation Scheme** is to provide irrigation facilities to the water-scare areas in upper reaches of Chambal Betwa basin where the level of irrigation is very much less as compare to national irrigation percentage. The **Chanderi Pressurized Micro Irrigation Scheme** has been conceived to catter irrigation water to about 20000 ha. of CCA in Ashok Nagar district. Total 28 village of Chanderi Tehsil and 53 village of mungawali Tehsil of district Ashok Nagar(M.P.)

In addition provision is also made in the scheme to cater future demands of Industrial and drinking water arising in the region at distribution chamber level.

1.2 Location of Project :

The project area is spreaded in this regions of M.P. The supply source i.e. Rajghat Left Bank Canal Project, lifting point, pump houses and rising main lie in Badera village of Ashoknagar District. Canal System (command area) lie in Chanderi and Mungawali block of Ashoknagar District.

1.3 Access & other Communication facilities:

As described above, the supply source and lifting point are about from Rajghat Dam which is 12 km away from Chanderi (M.P.).

1.4 Climatic Conditions : -

Since it is a lift scheme & the source of water is already constructed reservoir of Rajghat Dam, hence there is no necessity to explain every aspect of head works and only details of command area are elaborated. The command area of this project lies in Chanderi and Mungawali block of Ashok Nagar District which is lie on tributaries of Betwa River. Maximum part of rain fall occurs in the month of July and August. The annual average rainfall varies between 960 to 1054 mm and the distribution of rainfall is erratic. Maximum precipitation is in between the months Mid July to August. Occasional North-East Monsoon occurs in October to December, winter rains occurs in January and February and summer rains from March to May, which helps to some extent in raising of rained winter and summer crops.

1.5 Topography, Psychograph & Geology : -

The tributaries of Betwa river of chanderi and mungawali tehsil of Ashok Nagar District. This region is covered with thick cover of B.C. soil. The

catchment area up to Rajghat Dam is almost plain.

The command area is also covered with either B.C. Soil or yellow Soil with good drainage and gentle slope.

1.6 Population : -

The command area lies in Ashok Nagar district which have a grass population of 81882. The canal system will run in 2 tehsil of Ashok Nagar district the percentage of population in the above districts are as below :

Districts	Tehsil	Population			Remarks
		General	Schedule Cast	Schedule Tribe	
Ashok Nagar	i) Chanderi	84.29	13.46	2.25 %	About 25% beneficiaries are belonging to schedule caste & schedule tribe category & they are living below poverty line.
	ii) Mungawali	86.12	9.38	4.50 %	

1.7 Natural Resources:

In the entire command area i.e. in Ashok Nagar district irrigated by Govt. sources. Thus a major portion of command area is dependent only on rainfed condition. The study reveals that Ashok Nagar district are with an acute shortage of rainfall in last 30 year except some exceptional year. The minimum rainfall in Mugawali Tehsil is 484 mm. in year 2007 & maximum rainfall is 1625 mm. in the year The details are attached as annexure-2.

Hence to increase in agriculture production by way of assumed supply of irrigation water, the scheme appears to be essentially constructed.

1.8 History of Project :

It is a new concept derived looking to the scarce condition of water in Ashok Nagar District. The scheme on completion provide water for irrigation.

(f) Choice of Project :

Since there is no major scheme either constructed or under proposal to irrigate such a huge topographically rich command having scarcity of water, hence, Chandri LIS.

Total water available in Rajghat Dam is 1970 mcum out of this only 67.4 mcm for Rabi of water will be lifted.

The main objective of Chanderi lift irrigation scheme is to provide irrigation facilities to the water-short areas in upper reaches of Betwa basin, where the level of irrigation is very less as compared to available culturable area. The Chanderi lift irrigation scheme is conceived to cater irrigation water to about 20000 ha. of CCA in 81 village of 2 tehsil of Ashok Nagar district.

1.9 Stages / Phases of development of project:

It is proposed to construct the scheme in 4 years and the command will also be developed in 3 stages as detailed below :

	2015-16	2016-17	June 2018	2018-19
i) Construction of pump house & rising main	10%	70%	20%	-
ii) Construction of Main Canal	25%	50%	25%	-
iii) Construction of Disnet	Nil	25%	50%	25%
iv) Development of Irrigation (in Ha.)	Nil	-	10000 Ha.	20000

a Fitment of the scheme in overall development of the river basin:

The command area lies in betwa basin on full development of command area, the scheme will prove its fitment in respect of overall upliftment of status of cultivators.

1.10 Intimation to the other development authorities regarding this scheme :-

The scheme has been discussed at the highest level of State Government and every related authority is well known about its benefits and is ready to extend their co-operation at every level. The most related departments are Water Resources Department, Public Health Engineering, Road development corporation, Agriculture Department, local bodies, marketing societies, Panchayats. ***In facts the residents of villages of command area are anxiously waiting for this scheme to be taken up in hand.***

1.14.10 Public Announcement and Public Hearings:

It is a conceptual plan and as soon as mandatory clearances are obtained, public hearings & announcements shall be made before according Administrative Approval.

1.12 Inter-linking of the scheme with neighboring schemes:-

It is proposed to replenish all the existing reservoirs lying in the command area with canals systems.

1.13 Inter-state/International aspect(s) :

It is not a interstate project & the state is using water of its own allocated share, hence no interstate / international aspect is involved.

1.14 Cost & Benefit of the Scheme:

The scheme mainly comprise of construction of pump house at four various stages and laying of rising main & piped canal system to provide irrigation to 20000 Hectare command area in 2 tehsils of 1 district of the state as mentioned in salient features.

(A) Cost Estimates :-

The estimate has been prepared on the basis of U.S.R. of Water Resources Department enforced in the department w.e.f. 01.11. 2015 where, the rates for a particulars item is not available in departmental U.S.R., the rates of U.S.R. of other department. The unit wise cost is as below :

Cost of work (Unit II + Unit III) : Rs. 389.77 Crore The abstract of the cost is attached as annexure-6.

(j) Benefits :

The main objective of Chanderi LIS project is to provide irrigation facilities to the water-short areas in upper reaches of Chambal-Betwa basin where the level of irrigation is very less as compared to available culturable area and to the national percentage of irrigation. The Chanderi LIS Project is conceived to cater irrigation water to 20000 ha. Of CCA in 81 village of 2 tehsils of Ashok Nagar district. The list of tehsil wise benefited villages is attached as annexure-10.

V. Public Cooperation and Participation:-

The scheme shall be funded by state govt. The Public Co-operation & Participation shall be obtained in water management activities.

a) Provision for Domestic & Industrial Power supply :-

The ground water of this region has extremely gone down in most of the area of command, in these districts, due to which the rate of growth of overall development in these areas has not grown up to the mark, particularly in industrial sector. Also, these districts are facing acute shortage of drinking water.

(a) PHYSICAL FEATURES : -

(b) Geographical Disposition :

The tributaries of Betwa river originates near village Chanderi and Mungawali of district Ashok Nagar Covered with a thick cover of B.C. Soil. The catchment area up to Rajghat Dam is almost plain.

The command area is also covered with either B.C. Soil or yellow Soil with good drainage and gentle slope.

2.2 Topography of Command area :-

The topographical features of the routes of the conveyance system include

isolated low heighted hill tops, valleys, nallas, streams and rivers. The land slopes are gentle from south to north.

2.3 Geology of the basin, reservoir and Command area : -

The command of the scheme lies in Ashok Nagar district. The soil in the portion of this region is mostly riverine alluvium in nature. The soils are very deep and occur in the alluvial plains on flat to gentle sloping lands. They are finer in texture, alkaline in reaction and free of salts. There is an exidence accumulation of calcium carbonate in lower layers. Black soils (with a depth of 30 feet to 40 feet) cover 70% to 80% of the cultivable area, deep dark grey, or brown soils (more than 8 feet deep) cover an area of nearly 10% to 15% and remaining are red or reddish brown or yellowish brown soils. Practically all the sub-soils have a high content of clay and have fairly high water holding capacity and would absorb water slowly when surface soil become saturated.

3.0 <u>INTERSTATE/ INTERNATIONAL ASPECTS :</u>

Since it is a interstate project & the state is using water of its own allocated share, hence no interstate / international aspect is involved.

4.0 <u>SURVEYS & INVESTIGATION:</u>

4.1 Topographical Survey:-

b) **Head work**

The supply source is already constructed Rajghat Dam.

Topographical survey for alignment of rising main was conducted & the most economical, requiring less land acquisition has been selected and considered, as shown in the index map.

c) **Command Area**

The topographical survey in the Command has been conducted. In general the topography of the area is plain. Left Bank Canal mostly run on ridge hence it is the most economical alignment. A sample survey for 10% command area has also been conducted to decide pattern of disnet.

4.1.1 Canal & Water conductor System:-

The piped Canal will be designed for 7.44 cumecs discharge.

4.2 Geomorphology & Soil Type

Geomorphologically, the Ashok Nagar district is covered by medium black soils. These soils are 0.46 to 0.9 meters thick and are rich in lime and lime nodules. The sub-soil and the partially disintegrated rock below allow easy drainage and hence these medium black soils can be freely irrigated.

4.3 Geology – Geotechnical features & seismicity :

From the proposal, it is very obvious that no major scheme like dam or aquaduct is needed to be planned hence no detailed geological investigations are required at this stage.

The department has ready constructed pumps houses & rising main of about same magnitude and on the parallel alignment which needed no detailed geological investigations, hence it is not conducted at present. However the required investigations will be carried out before execution, if felt necessary.

4.4 Foundation Investigation

From the existing dug wells in the command, it is seen that most of the area in Command having B.C. soil in top layer approximately 1 mtr. Depth & below soil up to 3 m depth on an average moorum & DIR is found. The hard rock is available approximately below 3.0 m depth. Further from the experience of recent Chanderi water supply scheme of PHE it is seen the hard rock is met at reasonable depth for the construction of pump houses.

4.5 Construction Material Investigations:-

The project site & command area is in the near vicinity of Ashok Nagar district. The important construction materials like cement & steel required for construction purposes are in general available in this district. Further the soil/sand/aggregate is also available near work places. MS Pipe, Sluice gate & pump/motor-where available. The details are attached as annexure-1.

5.0 Hydrology:-

Under this project, the water source is the reservoir of already constructed Rajghat Dam, one of the major dam constructed on river Betwa, hence there is no need to repeat the hydrology studies again.

The water for CHANDERI LIFT IRRIGATION SCHEME will be lifted from Rajghat Left Bank Canal. The proposed utilization of lifted water is within the allocated share of the states.

6.0 Hydro-Geology:-

As described above under this project the water will be lifted from Rajghat Dam Project therefore study for hydro-geology is not needed.

7 DESIGN FEATURES & CRITERIA FOR DIFFERENT RIVER VALLEY STRUCTURES :-

(a) Head works :

Since the water is being lifted from already constructed Rajghat Dam reservoir hence no head work will be constructed under this project.

1 **(b) Lifting Arrangement :**

It is proposed to execute the work on turnkey basis, hence the construction agency will submit its own design and drawings for lifting arrangement such as pump houses, rising main etc. & which will be vetted either by BODHI or by department in accordance with relevant IS code, WRD circulars and CPHO manual, before execution.

7.1 **(c) Canal :**

Total 7.44 Cumecs of water lifted in this scheme which will be used for irrigating 20000 hectare of command area through Left Bank Piped Canal. The details of Canal system are as below:

	Left Bank Piped Canal
Discharge	7.44 cumecs
Command Area (Net C.C.A.)	20000 Ha.

7.2 Cut off Statement & Design discharge data :

Based on the topographical and command area survey, the alignment of LBC and distribution network has been planned & accordingly cut off statement for requirement of water for irrigation 0.30 lps/ha. demand. Further the irrigation demand at field has been worked out with 0.30 lps/ha & at Canal Head it is considered as 0.30 lps/ha. The irrigation demand table attached as annexure 5(a) & 5(c).

7.3 Canal operation & criteria :

To minimize the water losses in the command area the whole canal system is line. And Piped canal system will be released according to Warabandi system and this will be controlled by elected WUA.

(b) Canal Structure/ gates :

The complete system will be Piped canal system. The water in the distribution net work will be controlled by head regulators. The canal structures will be constructed as per requirements of topography.

8. Power House (Pump and Rising Main):

Presently, it is proposed to lay 14.10 km long rising main with 1 row of MS

pipe 2300 mm diameter of appropriate thickness to deliver 7.44 cumecs water.

The motor rating for 7.44 cumecs pumps capacity will be about 10.8 MW. However assessment of pipes and type of pumps/ motors shall be carried out at detailed design stage. The details of Pump Head and Power Calculations is attached as annexure – 9(a) & 9(b).

9. Land requirement:-

The rising main shall be aligned in such a way, that it traverses minimum in forest area and the total length from lifting to delivery point becomes shortest. The topo sheet study reveals that out of total 14.10 Km. length of Rising Main, 5.125 Km length shall be in forest area. And rest will be either in private or in government land. The affected forest land has been assessed on the basis of toposheet studies and there is a possibility of changes in the affected area specially in forest land.

For laying of Rising main, Electrical lines and Establishing Pump Houses in forest area about 1.95 hectare and 0.50 ha Private will be required. The entire pipe line either gravity or rising main shall be laid 1.00 m. below average ground level except in forest area where the pipe line will be passed through the tunnel and or on the pedestal above the ground level.

For ancillary work such as construction of pump houses and where canal passes through deep cutting, private land of about 2 hectares private land & 2.25 ha forest land shall also be acquired. Thus total forest land 4.20 ha and private land 12 Ha will be acquired.

10. RESERVOIR: -

No Reservoir Study is required as 7.44 Cumecs of water will be lifted from already constructed Rajghat Left Bank Canal Piped Canal System irrigation is through underground piped system only.

14.10. IRRIGATION PLANNING : -

As the irrigation system is piped canal, therefore irrigation duty at field outlet is Considered as 0.30 lps/ha. & at Canal Head it is considered as 0.30 lps/ha. Thus the water required for the irrigation for proposed 20000 hact. CCA works out to be 7.44 cumec. Thus total 7.44 cumec of water is proposed to be lifted from junction structure located at Rajghat Left Bank Canal Project. Thus the total water requirement at Canal head is considered as 0.30 lps/ha. for calculation purposes. The capacity statement of the Canal is attached annexure 5(b).

14.10.1 Proposed irrigation facilities in command area :

Total 20000 Ha. command of Ashok Nagar district will be benefited from this scheme. The details of the Proposed irrigation facilities in the command of this region of mungawali & Chanderi Tehsil of District Ashok Nagar.

In addition to above the water will be also be delivered to the existing tank coming in the vicinity of gravity main and in the command area by providing suitable outlets at various locations.

14.10.2 Crop pattern:

The existing cropping pattern of the this region is given below:

Existing Cropping Pattern :-

S. No.	Name of Crop	Total % of CCA.
	Kharif	
1	Soyabean	-
2	Jowar	-
3	Maize	-
4	Groundnut	-
5	Vegetable	-
6	Pulses	-
	Rabi	
1	Vegetable	-
2	Wheat	72.57%
3	Gram	16.39%
4.	Mustured	1.69%
5.	Lentil	9.35%
	Horticulture	
1	Aalu	-
2	Sugarcane	-
3	**Other**	-
	Total	**100%**

14.10.2.1 Existing area under rain fed cultivation :-

Presently mainly the 52% area in the command is under rain fed cultivation that is kharif crop. However, it appears that the most of the command area is irrigated but the yield per hectare is very less due to rain fed cultivation hence after systematic & planned irrigation, the per hectare yield will certainly increase which will raise the status of the cultivators.

14.10.3 Land irrigability classification:-

An important classification of land brought under irrigation is land irrigability classes. The classification is based on following :

(1) Quantity and quality of water

(a) Equilibrium salinity levels.

(b) Equilibrium, exchangeable, sodium, percentage levels.

(c) Availability of water to the land in relation to water requirement of crops.

(2) Drainage requirement

(a) Permeability of sub strata and feasibility of providing needed

drainage.

(b) Cost of drainage measures.

(3) Other economic considerations

(a) Production costs and yield potentials.

(b) Land development cost.

(c) Other factors affecting benefit cost ratio.

The factors affecting land irrigability classes are tabulated below :

Factors Affecting Land irrigability Classes

Table - 1

Land Characteristics	**Land Irrigability classes**					
	1	**2**	**3**	**4**	**5**	**6**
Soil irrigability	A	A to B	A to C	A to D	Further investigations needed	Land which doesn't meet maximum requirements as stated for other class.
Slope %	Less than 1	1 to 3	3 to 5	5 to 10	-	-
Surface and sub surface drainage	Well drainage	Moderately well drained	Moderately well drained	Imperfectly drained		
Depth of water table (meters)	More than 5	3 to 5	1.5 to 3	1.5 or below	-	-

	1	2	3	4
Quality of water			Specifications for class may be developed according to local and experience, considerations yield of crops and production cost and also cost of development	
Permeability of sub strata				
cost of drainage measures				
Land Development costs			Measures	

Based on the above criteria the classification of the command area of Chanderi LIS

Project CCA are tabulated below :

Classification of the Command Area as per Land Irrigability Classes

Table -2

S. No.	Land irrigability class & sub class	Area (ha)	Percentage
I	t	12436	**65**
2-I	2t	1394	**7**
II	2ts	500	**2**
III	2s	500	**2**
IV	Total Class 2	1440	**7**
3-I	3t	300	**1.5**
II	3ts	700	**3.5**
	Total Class 3	800	**4**
4-I	4st	520	**2**
	Total Class 4	500	**2**
5-I	6st	200	**1**
	Total Class 6	500	**2**
6	Miscellaneous	210	**1**
	Total	20000	100

I. Land Irrigability Class 1

Land that have few limitations for sustain use under irrigation. Lands of this class are capable of producing sustained and relatively high yield of a wide range of climatically adopted crops at a reasonable cost. There are few or no limitations of soil depth, texture, topography or drainage. The soils in this class are nearly leveled, have deep rooting zones, favorable permeability, texture and available moisture holding capacity and they easily maintain good width and depth of water table is more than 5 meters.

The area under this class is 13950 ha of land.

II. Land irrigability Class 2

Lands that have moderate limitations for sustained use under irrigation. Lands of this class have moderate limitation of soil depth or clayey in texture, topography or drainage, when used under irrigation. Limitation may arise singly or in combination with effects of :

- Very gentle slopes
- Less than ideal depth, texture, permeability or other properties
- Moderate salinity or alkalinity when in equilibrium with irrigation water
- Somewhat un-favorable topography or drainage conditions

In the project, limitations of topography in soils are seen. The limitations are present individually or in combination. Under the limitation of topography i.e. class (2t) is 1394 and of soil i.e. class (2s) is 300 and in combination of both limitations i.e. class (2ts) is 500 hectare respectively. The total area under this class is 2194 ha of land.

III. Land Irrigability class 3

Land of this class have severe limitations of soil depth and heavy clayey textures, topography as well as drainage, when used for irrigation, limitation may arise singly or in combination with effect of :

72. Gentle slopes
73. Unfavorable soil depth, heavy clay texture, permeability or other soil properties
74. Moderately severe salinity or alkalinity when in equilibrium with the irrigation water
75. Somewhat unfavorable topography and drainage conditions

In the project area the limitations of topography and soil texture, depth etc. are observed singly or in combination and the area proposed for irrigation under the different sub classes is as follows:

- 3t (topography)	300 ha
- 3s(Soil problems)	700 ha
- 3st (topography and soil)	800 ha
Total	1800 ha

IV. Land Irrigability class -4

Land that have severe limitations are marginal for sustained use under

`irrigation. Land for this class have severe limitations of soil depth, topography and drainage when used for irrigations, limitations may arise singly or in combination with effect of

73. Moderately steep slopes.
74. Very unfavorable soil depth, texture, permeability or other soil properties.
75. Severe salinity or alkalinity when in equilibrium with irrigation.
76. Very unfavorable topography and drainage conditions.

In the project the limitation of soil topography in combination are found 500 ha.

V. Land Irrigability class 6

This includes land not suitable for sustained use under irrigation. The lands of this do not meet the minimum requirements for irrigated agriculture. Lands of other classes are susceptible for delivery of irrigation water, having hazards of soil depth and topography. Under this class the sub – class is 6st which cover an area of 500 hectare of land is supposed to be unfit for irrigation.

14.10.4 Agro Climatic Conditions:

Since it is a lift scheme & the source of water is already constructed reservoir of Rajghat Dam, hence there is no necessity to explain every aspect of head works and therefore only details of command area are elaborated in earlier paragraphs.

14.10.5 Proposed cropping pattern :

The existing cropping pattern and its area under each crop in command is studied for designing the proposed cropping pattern in the project command area of the Chanderi LIS Project. Wheat is the predominant crop covering about 48% of the gross area sown, followed by Wheat and Gram crops covering 24% and 14% respectively of the gross area sown. The source wise existing irrigation details in the command area have also been studied.

It is seen from existing cropping pattern that Wheat, gram and mustered are predominant crops grown in the command area. However, after taking into account the soil quality, the agro-climatic conditions, availability of water by lift and the local practices. The existing and proposed cropping pattern has been approved by Dy. Director Agriculture Ashok Nagar and attached as an

annexure – 3(a) & 3(b). Which is given below. The crop intensity of 124.64% is proposed & accordingly the crop water requirement has been workout.

Proposed cropping pattern for command to be brought under irrigation.

S. No.	Crop	% of CCA
	Kharif	
1	Soyabean (5300 ha)	24.64
2	Jowar	-
3	Maize	-
4	Vegetables	-
5	Groundnut	-
6	Pulses	-
	Total	-
	Rabi	
1	Wheat Max (8000 ha)	37.18
2	Wheat local (8500 ha)	39.54
3	Gram (3000 ha)	20.91
4	Mustered (200 ha)	0.92
5	Lootil (300 ha)	1.45
	Total	**-**
	Perennial	
1	**Sugarcane**	-
2	**Horti culture**	-
	Total	**124.64**

14.10.6 Crop water requirement :-

The water requirements for irrigating the proposed area have been computed on climatologically basis. Normal monthly values of potential evapotranspiration as per IMD observatories computed by Penman's method are given in the IMD publication "Potential Evapotranspiration over India". These have been used for estimating the weighted average delta and gross water requirements of different crops considered in the suggested cropping pattern. Evaporation losses from the reservoirs have been considered in the simulation study, and therefore the provision for evaporation losses in the calculation for crop water requirement has not been considered. The gross irrigation requirement for different crops have been worked out considering an field irrigation efficiency of 84%. The computation of weighted average delta and net and gross water requirement for different crops proposed under the command has been carried out. The details of crop water requirement is attached as annexure – 3(c).

12. COMMAND AREA:-

The Command Area Covered under LBC Pipe Canal is 20000 ha. out of which 10% command area survey has been conducted and accordingly the alignment of distributaries has been marked on the topo sheet.

The Tehsil wise details of command area under Left Bank Pipe Canal are tabulated below :

Area are in Hectare

Name of tehsil	Geographic-al area under command	Gross command area GCA	Net culturable Command area (CCA)
1	2	3	4
Left Bank Canal (LBC)			
Mungawali	-	20560	13364
Chanderi	-	10440	6636
Total	**-**	**31000**	**20000**

12.1 Identification of problem's in command area :

12.1.1 Physical problems

There are no significant physical problem in the command area. The soils are suitable for growing the proposed crops. There is no problem of water logging in the command area. The Canal system has been aligned according to topography.

12.1.2 Financial problem :

There will be no financial problem for this project as sufficient funds will be made available by the Govt. of M.P.

It is further to explain that the farmers are already in the field of agriculture. With the introduction of assured irrigation water from this scheme, the finances will be provided by bank to the farmers for drip / sprinkler system.

(a) Land development works (proposals) :

Since it piped canal and water shall be delivered up to 5-7 ha. chack, hence beyond it, the cultivators shall install drip and sprinkler system at their own cost (of course subsidized) to irrigate their own fields. Hence provision for on farm development (OFD) works has not been made in the estimate.

However, the off farm development work shall be taken up by respective departments in due course of time as per state govt. policies.

There are sufficient numbers of village roads, which in turn are linked to district roads. Further, development in the road system will automatically take place as a sequence of the economic development of the area.

12.2.1 Cost estimates & cost/hacter for land development :

The total cost of the project comes Rs. 389.77 crores and the net CCA is 20000 Ha. thus the cost per ha. comes to 1.618 lacs.

13 FLOOD CONTROL :

This is not a storage project, hence no flood control arrangements are required.

14 DRAINAGE :

There are number of natural streams exist in the command area and therefore practically there would not be much drainage problem in the command area as the country has adequate slope along the cross section of the main canal, which will facilitate free flow of drainage water. However, due care shall be taken at time of detailed disnet planning.

14.1 Farm drainages

The farm drains will be constructed and this drains from agriculture field will join the nearby natural stream.

15 POWER :-

The power required to lift the 7.44 cumecs of water is approximate 11 MW. Which has been planned to be supplied from -Rajghat power station. The detail calculations of power requirement are attached as Annexure- 9(a) & 9(b).

16 NAVIGATION :

Under this project water will be lifted from already constructed Rajghat Dam and no reservoir will be formed, therefore study for navigation is not needed.

17 CONSTRUCTION PROGRAMME & MAN POWER & PLANT PLANNING

The scheme is proposed to be constructed under turnkey basis. It is proposed to commence the construction activities in the year 2015-2016 and the entire scheme will be completed within 48 months. The construction programme & phasing of expenditure is attached as Annexure 7 (a) & 7 (b)

18 FOREIGN EXCHANGE ELEMENT :

No Foreign Exchange is required for this project.

19 ENVIRONMENT, ECOLOGY & FOREST ASPECT OF THE PROJECT :

The rising main will cross forest land for about 5.125 km length and 1.95 ha. of forest land is proposed to be acquired in this area. The affected forest land has been assessed on the basis of toposheet studies and there is a possibility of changes in the affected area by the project specially in forest land. For logistic purposes like movement of long vehicles, welding plants, cranes etc. a strip of 3.80 m is required in the forest area. Forest land 2.25 ha for pipe canal also be required. Thus total Forest land of 4.20 hectare will be acquired for laying rising main for which provision in B-Land estimate is kept & shall be processed for diversion in the due course of time.

20 ESTIMATE:

The detail Estimate amounting Rs. 389.77 crores has been prepared and sub head wise abstract of Estimate is attach as annexure 6. The detailed estimate is attached separately as Vol-II.

21 FINANCIAL RESOURCES :

The Project will be funded by Govt. M.P.

REVENUE :-

The revenue for irrigation, drinking water and water supply to industry will be collected as per state Government policy.

BENEFIT COST RATIO, FINANCIAL RETURN & INTERNAL RATE OF RETURN :-

The Benefit Cost Ratio works out to be 2.17 as detailed below and is very enthusiastic being within permissible limits. The detailed calculation of B.C. Ratio is attached as annexure – 8a & 8b.

Total Annual Benefits - 146.10 Cr.

Total Annual Cost (Expenditure) - 67.16 Cr.

$$\text{Benefit Cost Ratio} = \frac{\text{Annual Benefits}}{\text{Annual costs}} \quad \frac{146.10}{67.16} = 2.17$$

The internal rate of return (IRR) has been calculated considering the life of project 50 years.

22 FUTURE UTILIZATION OF FACILITIES CREATED (BUILDINGS)

The buildings will be constructed at location pump houses and also at certain important location in the command area. The estimated life of the project is 50 years and these buildings will be utilized in future during operation and maintenance of the scheme.

23 APPORTIONMENT OF COST AMONG VARIOUS PURPOSES OF MULTIPURPOSE RIVER VALLEY PROJECT.

The Chanderi Lift Irrigation Project is a major lift irrigation project and 20000 Ha. Land will be irrigated through pipe network. Total 7.44 cumec of water will be lifted under this scheme. As it is only a irrigation project and therefore the total cost of Rs. 389.77 Crores will be charged only to this project. However, the revenue that will be realized by the cess collected from command area.

24 RECOMMENDATION :-

The Study of this region reveals that the region is suffering acute scarcity of water for Drinking, Industries & Agriculture field. Because of that, the overall development of the region has worstly affected. Further it is observed that day by day the ground water table is depleting and there is a possibility that in future the water may not be available even for drinking purpose also.

The study also reveals that the percentage of irrigation in Ashok Nagar district by Government Sources i.e. tanks & Canals is very much less as compared to national irrigation percentage.

To fulfill the requirement of in this region the Betwa Water is the only alternate. As described earlier, sufficient water i.e. 7.44 cumec is available in the Rajghat Dam Project which can be lifted for flurishment of this region and the utilization of Betwa water is being made as per Inter State award. Considering above facts & necessity of water in this draught prone area, the Chanderi lift irrigation scheme is proposed.

Further it is to state that it is proposed to float the tenders on turnkey basis and the contractor will be free to align the rising main & pipe canal system to meet the water requirement at its minimal within the agreement amount and in scheduled time frame.

The Government of Madhya Pradesh (GOMP) is keen to accord administrative approval (A.A.) at the earliest as soon as the mandatory clearances are accorded. As narrated above, the water is being lifted from already constructed Rajghat Dam reservoir into the proposed command area hence there is no reason to anticipate any impact on present ecology and environment of the area.

The most attractive feature of the project is that without displacing a single person, Irrigation will be provided to 20000 ha. of land as neither any new dam is being constructed & nor any submergence is being created.

The Benefit Cost Ratio is 2.17, which is well within norms of acceptance & thus the present proposal is submitted & recommended for approval.

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CHANDERI PRESSURIZED MICRO IRRIGATION SCHEME

SALIENT FEATURES

1.	Name of the Project.	:	Chanderi Pressurized micro Irrigation Scheme
2.	Type of Project (Irrigation or Multipurpose)	:	Major Lift Irrigation Project
3.	Location	:	
	ii) Supply Source	:	Rajghat Left Bank Canal in Ashok Nagar District (M.P)
	i) Lifting Point ;	:	Rajghat Left Bank Canal, Village Badera District Ashok Nagar (M.P.)
	iii) Feeder Reservoir	:	Rajghat Dam in Ashok Nagar District (M.P.)
	iv) Command		Ashok Nagar (M.P.)
3.1	River Basin		
	a) Name		
	i) Lifting	:	Betwa Basin
	ii) Command		Betwa Basin
	b) Located in	:	Madhya Pradesh

3.2 River / Tributaries **:** Betwa River

3.3 State(s) / District(s) or Tehsils in which following are located.

		State	District	Tehsil
(a) Reservoir (Supply Source)	**:**	M.P	Ashoknagar	Chanderi
(b) Lifting Point / Rising Main	**:**	M.P	Ashok Nagar	Chanderi

(c) Command Area : **Ashok Nagar District** Tehsil
(i) Mungawali
(ii) Chanderi

3.4 Name of Village near the Head-works

(i) Lifting Point : Village Badera of Ashok Nagar District

3.5 Location of Head-Works :

(i) Lifting Point : Rajghat Left Bank Canal
Near village Badera of Ashok Nagar (M.P.)

(a) Longitude : 78^0 13' 26"

(b) Latitude : 24^0 31' 52"`

(c) List in Earthquake Zone No. : Zone-III (Moderate Seismic)

(ii) Delivery Point : Village Naron District- Ashok Nagar

(a) Longitude : 78^U 7' 12"
(b) Latitude : 24^U 39' 56"
(c) List in Earthquake Zone : Zone-III (Moderate Seismic)

3.6 Project area reference : as detailed below

Project Area Reference :	Rajghat Dam	Lifting Point Rajghat Left Bank Canal Near Vill. Badera of Ashok Nagar	Rising Main	Canal & Command Area
Topo sheet No.	54L/1	54L/2	54L/2	54L/2 54L/3

Index Plan **:** Attached

3.7. Access to the Project.

a) Nearest Airport : 1) Raja Bhoj Airport Bhopal (M.P.)

b) Nearest Rail Head : Lalitpur (U.P.), and is

i) 22 km from Rajghat Dam

ii) 17 km from Lifting Point

iii) 34 km from Canal outlet

4. Interstate aspects of the project

(a) Catchment area of the basin. : It is a lift scheme hence no independent catchment is being harnessed.

(b) State-wise / Country-wise details of Catchment area. : Not applicable

(c) Submergence due to project : No submergence due to project, as it is a lift scheme

(d) Water allocation for the state (if any) : The Quantum of water being lifted for this project is included in the water share of M.P.

(e) Water allocation for other state : Not applicable

(f) committed utilization

(A) **Upstream Projects**

(i) Project Completed

(ii)Project under construction

(iii)Feature projects

(iv) Any other

As stated above it is as per committed utilization of share of Betwa Waters

(B) **Downstream Projects**

(i) Project Completed committed

(ii)Project under construction

(iii) Future projects

(iv) Any other

As stated above it is as per utilization of Betwa Waters

(g) Proposed annual utilization by the project : (67.40 Mcum for Rabi and 27.44 for Kharif)

(i) Irrigation (surface)	: 20000 Ha
(ii) Annual irrigation on intensity of irrigation @ 124.64%	: 25300 Ha
- Kharif	: 5300 Ha
- Rabi	: 20000 Ha
- Horticulture	: -
Total -	: 25300 Ha
(i) Irrigation	: 7.44 cumec

5. Estimated life of the project (years) : 50 Year

6. Irrigation (ha.)

(a) Gross command area (GCA)	: 31000 Ha
(b) Cultureable command area (CCA)	: 20000 Ha
(c) Area under Irrigation (break up)	
(i) Kharif	: 5300 Ha
(ii) Rabi	: 20000 Ha
(iii) Hot weather	: -
(iv) Gross irrigated area	: 25300Ha
(vi) Intensity of irrigation	: 124.64%

(d) Cost per hectare of gross area irrigated: 1.55 Lacs/Hact.

(e) Cost per 1000 cum of gross/live storage : Not required as it is not a storage scheme

(f) Water utilization (for irrigation only) : 7.44 cumecs

7. Project Performance

(a) Irrigation : 25300 Ha

8. Head Regulator(s) : Will be constructed at each outlet

9. Canal System

9.1 Main Canal : Left Bank Pipe Canal 24.00 Km

9.1.1 Purpose of Canal : Irrigation and raw water to every villages of command area

9.1.2 Type : Piped Canal

(a)Flow/ : Pressure

(b) Lined/unlined : Not applicable

(c) Discharge capacity of canal : 7.44 cumec

(d) Type of lining : Not applicable

9.1.3 Design data

		Left Bank Piped Canal
(a)	Length (km)	24.00 K.M.
(b)	Full supply level at head/tail (El-m)	Not applicable as the flow will be pressurized flow
(c)	Full supply depth at head/tail (El-m)	
(d)	Bed width at head/tail(El-m)	
e)	Side slope at head/tail (El-m)	
f)	Bed slope (range)	According to topography.
g)	Maximum discharge capacity at head/tail (El-m) (m^3/s)	7.44 cumecs 1.09 cumecs
h)	Total number of canal structures (LBC)	341 Nos

i)	Total assumed head losses the structure	-	17.59 M
j)	Gross command area (ha.)	-	31000
k)	Culturable command area (ha.) Net C.C.A.	-	20000

9.1.4 Distribution system (up to 40 hectares) : -

(a) Numbers Distributaries, Minors from L.B.C. : 14.10 Nos from Left Bank Piped Canal

(b)Total length (km) : 192.00 km

9.2 Efficiencies (percentage)

(a) Conveyance : 95%

(b) Field application : 84%

10. Cropping Pattern Proposed

10.1 Name of crop (season-wise) :

KHARIF	RABI
JUNE TO SEPTEMBER	OCTOBER TO FEBRUARY
(a) Soyabeen	(a) Wheat local
	(b) Wheat max
	(c) Gram
	(d) Mustered
	(e) Lentil

14.10 Cost :

14.10.1. Cost of the project (Rs.Crore) total : 389.77 Crores

14.10.2 Allocation cost (Rs.lakhs) :

Unit 2 : 323.77 Crores

	Unit 3	66.00 Crores.
Total	:	389.77 Crores
12. B.C. Ratio.	:	2.17

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चंदेरी प्रेशराइज्ड माइक्रो सिंचाई परियोजना

चंदेरी प्रेशराइज्ड माइक्रो सिंचाई परियोजना की संक्षिप्त टीप।

1. चंदेरी प्रेशराइज्ड माइक्रो सिंचाई परियोजना अषोक नगर जिले की चंदेरी तहसील के ग्राम बढेरा के पास राजघाट बायीं तट नहर पर प्रस्तावित है।
2. राजघाट अंर्तराज्यीय परियोजना में बेतवा नदी बोर्ड द्वारा मध्यप्रदेष राज्य को आवंटित 935 मि.घ.मी. जीवित जल में से 67.4 मि.घ.मी. जल का उपयोग कर 20000 हेक्टे. क्षेत्र में रबी सिंचाई की जाना प्रस्तावित है।
3. परियोजना के प्रस्ताव अंतर्गत मध्यप्रदेष पार्ष्व में स्थित राजघाट बायीं तट नहर के 400 मी. पर एक इनटेक स्ट्रेक्चर का निर्माण कर सिंचाई हेतु उद्वहन कर भूमिगत पाईप लाईन के माध्यम से सिंचाई उपलब्ध कराया जाना प्रस्तावित है। इस हेतु 2.3 मी. व्यास के 14.1 कि.मी. लम्बी राईजिंग मेन के लिए 10.6 मेगावाट के 6 नग पम्पों से 7.44 क्यूमेक्स जल को उद्वहन कर उच्चस्तरीय कमांड में सिंचाई हेतु उपलब्ध कराया जायेगा। प्रत्येक 0.6 से 1.2 हेक्ट. चक पर आउटलेट दिया जायेगा, जिससे कृषक स्वयं के व्यय पर अपने खेत में पानी ले जाकर सिंचाई कर सकेगा। इस परियोजना से अषोक नगर जिले की चंदेरी एवं मुगावली तहसील के 81 ग्रामों को सिंचाई सुविधा दी जाना प्रस्तावित है।
4. परियोजना अन्तर्गत इनटेक वेल एवं पाईप केनाल राईजिंग मेन के निर्माण हेतु आवष्यक 4.2 हेक्टे. वन भूमि के लिए राज्य वन मंत्रालय से प्रथम चरण की स्वीकृति बावत् प्रस्ताव भेजना हैं, एवं 0.5 हेक्टेयर निजी भूमि का अधिग्रहण किया जाना है।
5. उपलब्ध जल के इष्टतम उपयोग के उद्देष्य से यह उपयुक्त पाया गया है कि परियोजना से की जाने वाली समस्त सिंचाई नहरों मे जल प्रवाहित करने के बजाय भूमिगत पाईप लाईन बिछाकर उच्च दाब पर जल प्रवाहित कर सूक्ष्म सिंचाई (स्प्रिंकलर पद्धति) से की जाए। सूक्ष्म सिंचाई पद्धति अपनाने पर परियोजना में उपलब्ध जल से परियोजना का सैच्च क्षेत्र 20000 हे. हैं।
6. परियोजना से प्रस्तावित सैच्य क्षेत्र 20000 हेक्टर में कृषक के खेत तक (0.6 हेक्टर से लेकर 1.2 हेक्टर तक) उच्च दबाव पर भूमिगत पाईप लाईन से सूक्ष्म सिंचाई के लिए आऊटलेट देकर जल उपलब्ध कराने की स्वीकृति की दषा में परियोजना की लागत निम्नानुसार आकलित हैः–

राशि करोड़ में

अनु. क्र.	कार्य का विवरण यूनिट 2 नहर कार्य	लागत प्रस्ताव (करोड़ में)
1.	भू–अर्जन वन भूमि सहित	0.74
2.	जल उद्वहन हेतु इनटेक स्ट्रेक्चर एवं पम्प हाउस से लेकर राइजिंग मेन तक का कार्य	113.63
3.	उच्च दाब हेतु पाइप लाईन 20000 हेक्टर @ 1.00 लाख हे.	200.00
	योग परियोजना की कुल लागत	314.37
4.	सौर ऊर्जा संयत्र 11 मेगावाट @ 6 करोड़ पर मेगावाट	66.00
5.	भू–अर्जन एवं सौर ऊर्जा छोड़कर लागत का 3 प्रतिषत	9.40
	कुल योग	389.77

7. परियोजना की प्रति हेक्टर लागत रू. 161800 हैं। परियोजना संचालन के दौरान लगभग 10.80 मेगावाट विद्युत आवष्यक होकर रबी फसल के लिए लगभग 2.90 करोड़ यूनिट विद्युत की खपत अनुमानित है। प्रस्तावित योजना में कमाण्ड क्षेत्र की आवष्यकता नहीं होगी क्योंकि कृषकों के खेत

तक (0.6 हे. से 1.2 हे. पर आऊटलेट) उच्च दबाव पर भूमिगत पाईप लाईन से जल पहुंचाया जाएगा।

8. वर्तमान में राज्य शासन कृषकों को रियायती दर पर विद्युत प्रदाय कर रहा हैं जिसमें राज्य सरकार पर प्रति हेक्टर रू. 12,000 से अधिक के अनुदान का भार आ रहा है। परियोजना के लिए आवष्यक 10.80 मेगावाट विद्युत पर रबी सिंचाई के लिए 120 दिनों में अधिकतम 2.90 करोड़ यूनिट विद्युत लग सकती है। विद्युत कंपनी से उनकी औसत उत्पादन/क्रय कीमत रू. 3.80 प्रति यूनिट विद्युत मिलने की दषा में रबी फसल के लिए अधिकतम रू. 11.02 करोड़ का विद्युत भार आएगा जो प्रति हेक्टर प्रति फसल रू. 5510 होगा। मध्यप्रदेष विद्युत उत्पादन में अतिषेष में है और राज्य को निजी उत्पादकों से किए गये अनुबंधों में बिजली लिए बिना स्थाई प्रभार देना पड़ रहा है। इस पृष्ठभूमि में परियोजना के लिए चलित प्रभार (**variable cost**) लगभग रू. 2 प्रति यूनिट की दर से विद्युत मिलने की दषा में रबी फसल के लिए विद्युत भार रू. 5.80 करोड़ होकर प्रति हेक्टर प्रति फसल लगभग रू. 2900 होगा।
9. भारत सरकार की नवकरणीय ऊर्जा को बढ़ावा देने की नीति के अनुसरण में मध्यप्रदेष में भी गैर परंपरागत ऊर्जा को बढ़ावा दिया जा रहा है। इस दिषा में निजी कंपनियॉ प्रदेष में सौर ऊर्जा एवं पवन ऊर्जा संयत्र स्थापित कर रही हैं। इस पृष्ठभूमि में परियोजना में ऊर्जा की व्यवस्था के लिए परियोजना की लागत में सौर ऊर्जा संयंत्र का प्रावधान रखा गया है। परियोजना संचालन हेतु विद्युत व्यवस्था के लिए 11 मेगावाट का सौर ऊर्जा संयंत्र स्थापित कर विद्युत कम्पनी के ग्रिड से जोड़ा जाना प्रस्तावित है। वर्ष भर उत्पादित होने वाली सौर ऊर्जा विद्युत कम्पनी के ग्रिड में डाली जावेगी और रबी सिंचाई हेतु 100 से 120 दिन सतत् ऊर्जा विद्युत कम्पनी की ग्रिड से ली जाकर रबी सिंचाई की जावेगी।
10. परियोजना के लिए ऊर्जा की व्यवस्था राज्य के सर्वोपरि हित को देखते हुए ऊर्जा एवं वित्त विभाग के परामर्ष से की जाना प्रस्तावित है। परियोजना लागत में प्रस्तावित सौर ऊर्जा संयंत्र की स्थापना उसी दिषा में की जाएगी जब ऐसा करना राज्य के सर्वोच्च हित में आवष्यक समझा जावे और संयंत्र स्थापना के लिए व्यय करने के पूर्व वित्त विभाग की सहमति ली जाएगी।
11. अतः यह प्रस्तावित है कि उपरोक्त कंडिका 7 में दर्षाए अनुसार राषि रू. 389.77 करोड़ की प्रषासकीय स्वीकृति सैच्य क्षेत्र 20000 हेक्टर (रबी) सिंचाई के लिए प्रदाय की जावे।

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