ENVIRONMENTAL IMPACT ASSESSMENT STUDY
for
JAWAR MICRO LIFT IRRIGATION SCHEME, MADHYA PRADESH

Executive Summary

December, 2018

Prepared for:

NARMADA VALLEY DEVELOPMENT AUTHORITY

GVPR ENGINEERS LTD. SANAWAD

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1. PROJECT PROFILE

The project is a lift irrigation scheme; consisting of lifting water from ISP reservoir's back water and distribution through a pressurized piped system to cultivators for irrigation during Rabi season. Water will be supplied upto 2.5 ha chak size under adequate pressure (minimum 20m head) for drip/sprinkler system to be installed by cultivators. The Project consists of piped system with Supervisory Control and Data Acquisition (SCADA) and has following Components:

1. Pump Houses (2)
2. Rising mains (5) (56.619 Km total length)
3. Distribution Network (HDPE) up to 2.5 ha chak
4. Flow & Pressure Control Valves, Air valves
5. Power Transmission Line

In Jawar Micro Lift Irrigation Scheme water will be lifted from ISP reservoir's back water near Sukhadiya village, where Pumhouse 1 is located with two sections viz. PH1 and PH1a. PH1 will lift water to PH2 through a rising main of length of 12.936 km. PH1a will take the water to distribution network through a tail end Rising Main of length 10.647 Km, connected to distribution network lines branching out of rising main. PH2 with 3 sections viz. PH2a, b and c will lift water through 3 tail end Rising Mains of length 8.224km, 12.396 km and 12.416 km; each connected to distribution network to ensure coverage of full command and maintain 20m at delivery points. Pumping locations and Rising Mains details are tabulated below.

S. No.	Description	Village Name	Coordinates		Discharge cum/sec	Pump Head (m)	Power MW	Rising Main length (Km)	CCA (ha)
			Latitude	Longitude					
1.	PH1	Sukhadiya	21°55'55.05"N	76°35'46.42"E	9.040	103	10.92	12.936	5638.70
	PH1a	Sukhadiya	21°55'55.05"N	76°35'46.42"E				10.647	
2.	PH2a	Jawar	21°55'54.07"N	76°28'28.56"E		44.5	0.72	8.224	3963.30
3.	PH2b	Jawar	21°55'54.07"N	76°28'28.56"E		69.5	3.09	12.396	10955.00
4.	PH2c	Jawar	21°55'54.07"N	76°28'28.56"E		44.5	1.01	12.416	5571.00
Total					**9.040**		**15.74**	**56.619**	**26128.00**

2. LOCATION

The project area is spread in Khandwa District of MP. Project Location Map is given at **Figure 1**.

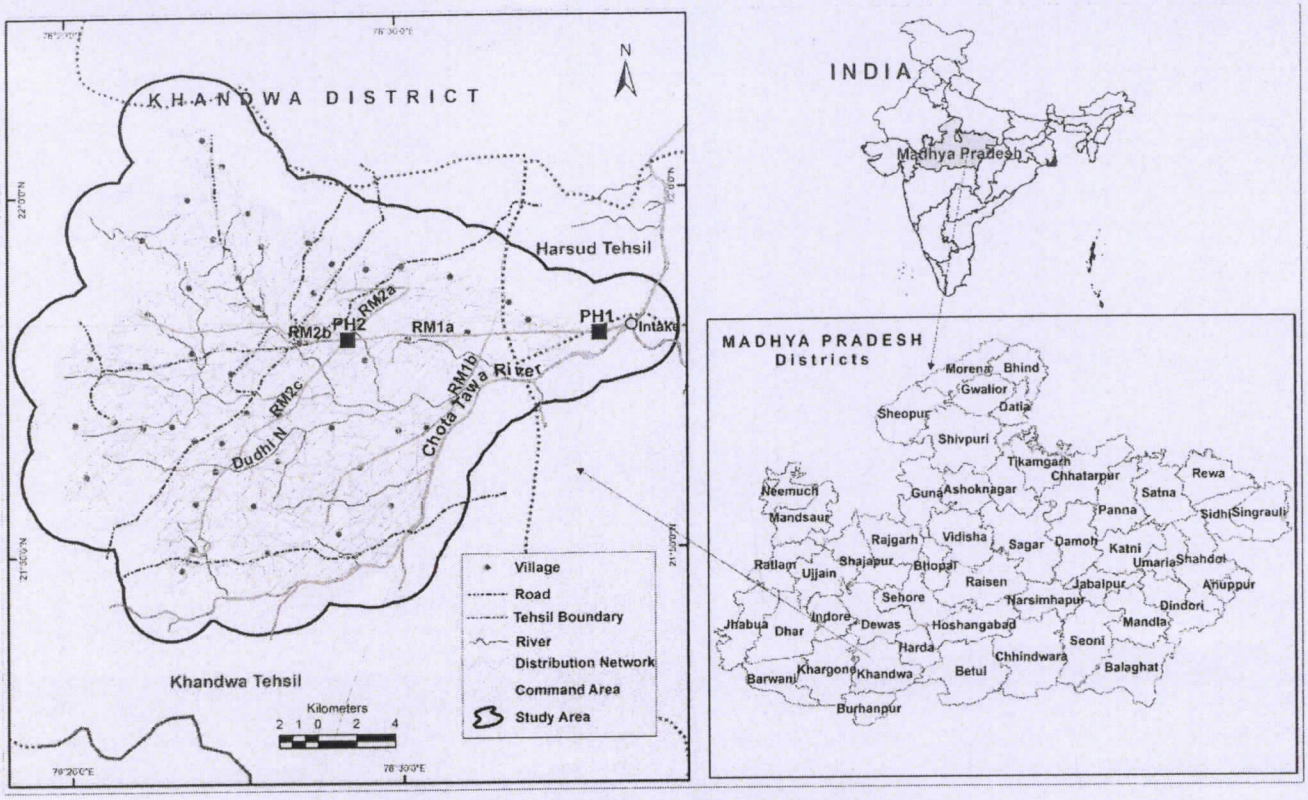

Figure 1: Location Map of the Project Area

3. LAND REQUIREMENT

Permanent Land Requirement

For the construction of pump-houses, sub-stations, valve chambers and staff quarters; land would be required permanently. These locations are so planned to avoid any forest land diversion for the purpose. Permanent land requirement has been worked out as 1.197 ha, the entire requirement would be met from the private/ government land. However, for laying of pipeline/transmission line 4.6 ha of forest land will be diverted.

Land for Transmission Lines

132 kv Power Line will be brought from Chhanera Village to PS1 with total length of 14.57 km. Further 33kv transmission line is required to bring power to the PS2, total length of the 33kv transmission line is worked out as about 13.022 km. 4.6 ha of forest land shall be acquired for laying of electrical transmission line. About 0.042 ha of govt./private land shall be required temporarily.

Temporary Land for Laying of Pipeline

The pipe shall be laid 1.00 m below average ground level and land will be restored immediately on completion of the work, therefore, no land for laying of pipes shall be acquired permanently. Wherever, the pipeline will be pass through private land, temporary land acquisition will be done as per the applicable law. Total temporary land requirement is worked out as 617.666 ha.

4. STUDY AREA

Study area comprises of area within 2.5 km buffer on either side of pipeline (water conductor system). The study area comprises of:

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Water Conductor System - The water conductor system is the piped network designed to lift water from the ISP Reservoir and distribute in the command area.

Command Area - The command area is the area of Jawar micro lift irrigation scheme covering 26,128 ha land which will be irrigated by drip/sprinkler irrigation under the proposed micro lift irrigation scheme. Entire command falls within the study area.

5. ENVIRONMENTAL BASELINE STATUS

Environmental baseline status has been ascertained using secondary as well primary data. Secondary data has been presented for meteorology, geomorphology, ground water, cropping pattern, socio-economic parameters etc. Primary data has been collected for soil, surface & ground water, air, noise, traffic and vegetation. Data has been presented in EIA report in detail. Analysis Results of surface as well as ground water samples are within permissible limits as per Inland surface water quality and drinking water standards. As per land use map, study area has 72.58% of agriculture/fallow land, 7.75% of scrub land, 2.25% water bodies, 2.05% settlement, 3.00% scrub forest and 12.36% deciduous forest.

In command area agriculture is the dominant land use pattern. Agriculture is main land use; with 72.58% of the study area under agriculture/fallow land. Among the agricultural crops wheat, cotton, gram, soyabean, pigeon pea, chillis, maize, caster seed, lentil and linseed are most common. For vegetation sampling, 6 locations have been identified. In order to understand the general vegetation in the study area, inventory of plant species belonging to different groups found in the study area was prepared and community structure in the crop fields as well as scattered patches of trees was assessed through quadrat sampling. No rare or endangered flora/fauna species are found in study area. Data has been presented in EIA report.

6. SOCIO ECONOMIC PROFILE OF THE STUDY AREA

The project area is spread in East Nimar regions of MP. Water lifting point, pump houses, rising main, distributaries and command area falls in 2 tehsils (Khandwa and Harsud). A total of 52 villages of command area of Khandwa district will be benefited by this scheme **(refer Table 1).**

Table 1: List of Villages (Command Area)

S.No	Village Code	Village Name	S.No	Village Code	Village Name
Tehsil - Khandwa					
1	505747	Amalpura	26	505704	Khutpal
2	505725	Atoot Bhikari	27	505697	Kolgaon
3	505734	Badgaon Bhila	28	505758	Kotwada
4	505738	Badgaon Mali	29	505726	Lalwada
5	505736	Badiya Tula	30	505744	Mathani Buzurg
6	505746	Baldua Dongri	31	505729	Mathela
7	505722	Bamangaon Bhila	32	505737	Mundwada
8	505745	Benpura Kurwada	33	505757	Nahalda
9	505724	Bhakarada	34	505742	Palkana
10	505759	Bhandariya	35	505714	Pipalkota
11	505748	Bhawsinghpura	36	505730	Piplya Tahar

S.No	Village Code	Village Name	S.No	Village Code	Village Name
12	505732	Bijora Bhil	37	505705	Piplyafool
13	505761	Birpur Kundeshwar	38	505698	Rangaon
14	505701	Chichli Buzurg	39	505716	Rohani
15	505720	Dhangaon	40	505760	Rudhy
16	505727	Dhodwada	41	505713	Sahejala
17	505703	Dhorani	42	505740	Satwada
18	505708	Fatepur Mundi	43	505741	Sawkheda
19	505719	Gohlari	44	505735	Sihada
20	505728	Gokulgaon	45	505743	Siwana
21	505707	Jamli Mundi	46	505739	Sunderbel
22	505718	Jawar	47	505717	Surgaon Banjari
23	505706	Kahalari	48	505731	Surgaon Nipani
24	505700	Kaweshwar	49	505721	Talwadiya
25	505723	Khedi Kitta	50	505803	Lakhangaon
Tehsil - Harsud					
51	505532	Undel	52	505531	Undel Ryt

Demographic profile, literacy, occupation pattern, per capita income, socio-economic profiling of the project benefitted villages and brief description of villagers' opinion/perception regarding the project, have been presented in EIA report. The analysis shows a clear picture that the construction of this project will be able to bring improved quality of life paving a path of development for the present and future generation which in turn can improve their life and prevailing circumstances. This Project may open new avenues for giving an opportunity to the people for accessing their rights on health, education, livelihood and other empowerments. The increased yield due to assured irrigation will lead to integrated development of agriculture in the region.

7. IMPACT ASSESSMENT AND MITIGATION

Noise and air quality: In a water resources project, air and noise pollution occurs mainly during project construction phase. During operation phase, no major impacts are envisaged.

Mitigation measures have been recommended to control dust emissions and other sources of air pollution such as emissions from DG sets and construction equipment, etc. to have minimum impact in the surrounding of construction sites. Similarly, mitigation measures have been recommended for control of noise for workers at construction sites as well as for residents of surrounding areas.

Water resources: Water conductor system shall be crossing some small seasonal nalas. These will be crossed on culverts or underground by push method; in both the cases, course of the drainage will not be altered. Conservation of water should be implemented at construction sites to minimize the generation of wastewater.

Improved availability of irrigation water during Rabi season in the area shall lead to reduced extraction of ground water for irrigation and domestic uses thus reversing ground water decline in the region and increasing availability of ground water for drinking and irrigation use during summer.

Muck Management: The tentative quantity required to be disposed off form primarily rising mains and gravity distributaries has been worked out as nearly 1.08 lakh cum.

The excavated material will be utilized for refilling of the trenches and the approach road proposed to be constructed for carrying the pipes at site and preparation of platform for crane. Total excavated surplus material requiring disposal is estimated as 1,07,999.50 m^3, however, this surplus quantity will be generated from 563.115 km long trench excavated for laying of rising main and distributaries. This quantity will be spread linearly for 563.115 km and per m dug material generation will be of the order of 1.34 m^3 only.

During excavation, care will be taken that top fertile soil is kept aside and will be used for re-filling the top area after laying pipe line. This top soil will be spread on adjoining farming fields with consent of farmers or alternatively will be used for green belt development.

Balance muck will be managed by spreading along the route in the low lying areas. As the topography is undulating, such low lying areas are available along the route. Any further surplus muck, shall be laid in the community undulating area of the connected villages with the consent of concerning Gram-panchayat or Janpad Panchayat. The muck may also be used by nearby Gram Panchayats for construction of village roads etc.

A lump sum provision of capital expenditure of Rs. 50 lakh has been made for muck disposal.

Construction Waste Management: Construction activities are associated with 3 types of waste generation:

- Construction and Demolition Waste
- Hazardous Waste
- Municipal Solid Waste from labour camps/colonies

Mitigation measures have been recommended in line with Construction & Demolition Waste Management Rules, 2016 to have minimum impact on this count.

Change in cropping pattern: There would be change in cropping pattern. More area would come under crops because of increase in irrigation intensity. Apart from additional crops, project will also have positive impacts in terms of improved efficiency leading to bumper crops in otherwise water scarce area.

Flora and fauna: No significant impact is envisaged on flora and fauna due to absence of significant vegetation/forest in the region. Only 4.6 ha of forest land shall be diverted for laying of rising mains.

Compensatory Afforestation: The entire micro irrigation system has been aligned in such a way, that it requires only 4.6 ha of forest land for laying of pipeline. Forest clearance has already been applied for diversion of forest land. As per the guidelines of Forest Conservation Act, 1980 block plantation is to be taken up two times (9.2 ha) of the above ground component of forest land diversion in the denuded or degraded forest areas [4.6 ha x 2 = 9.2 ha]. It is estimated that an amount of approximately 50.60 lakh will be required

for compensatory afforestation (9.2 ha @ Rs 5.5 lakh/ha = 50.60 lakh) and Rs. 28.796 lakh for Net Present Value (NPV) (4.6 ha @ Rs 6.26 lakh/ha = 28.796 lakh) thus a total of Rs. 79.396 lakh is budgeted. However, site specific detailed scheme for Compensatory afforestation shall be prepared and undertaken by State Forest Department.

Plantation in Command Area: To improve green cover for floral and faunal improvement in the command, it is proposed that plantation in 50 hectare in several patches in non-forest waste land will be done subject to availability of suitable land. These plantations will be maintained for five years & will be handed over to Panchayat for management. The plantations may be done by forest wing of NVDA, forest department or local Panchyats. A provision of Rs. 225 lakh has been made for the same.

Amenities for Workers: Construction phase of projects is generally associated with impacts related to labor congregation in an area, where labour camps/colonies are constructed and such phases last for a few years. However, micro irrigation schemes require laying of pipeline, where labour is scattered and mobile. Therefore, such construction phase impacts are not envisaged. Keeping in view the health concerns and reduce the impact of sanitation and hygiene of local area, where temporary labour camps will be set up, following minimum facilities are proposed at these locations with a budget of Rs. 100 lakhs:

- Potable drinking water
- Temporary shelters with sanitation facilities
- Mobile toilets
- Crèche for female workers
- First aid facilities
- Occupational health check up
- Personal Protective Equipment (PPEs), as required

Medical Facilities: Medical facility will be provided in the project area at a budget of Rs. 125 lakh to combat water and vector borne diseases and also at construction site to ensure safety and health of workers during the entire construction phase:

- One fully equipped ambulance need to be procured to provide pre-hospital care to accident victims during construction phase. The ambulance should always be stationed near major construction sites or the sites where risky operations are taking place.
- Provisions have been made for strengthening existing PHCs and PHSCs in the area.
- Provisions have been made to assist health department to combat outbreak of water/vector borne diseases due to implementation of the project.

Education and Awareness of farmers: Micro irrigation by lift irrigation is being introduced on large scale involving pumping and conveying water through pipe line, it is felt that awareness must be created amongst farmers through dissipation of information, training and motivated to adopt new technology. Thus farmers will be trained to adopt new technology by organizing awareness and training camps at village Water User Association (WUA), Panchayat and Jan Pad level. In awareness camps there will be emphasis on limited use of

chemical fertilizers and increased use of bio fertilizers. An amount of Rs. 240 lakh has been provided to be spread over a period of 5 years for this purpose.

Preventive measures for leakages, bursting and corrosion in pipeline: The entire system is closed conduit for conveyance of water up to farm level. The arrangement for leak detection; preventive action for bursting of pipeline and preventive/ control measures for the various components like desilting arrangements, anti-corrosion measures, have been prescribed. A provision of two number of chassis mounted dewatering pumps of adequate capacity has been made in the project budget for the purpose of clearing the water logged areas during emergency. A budgetary provision of Rs 30 lakh has been made for the same.

8. FINANCIAL REQUIREMENT FOR MITIGATION & MANAGEMENT MEASURES

Financial requirement has been assessed for above aspects as **Rs. 873.40 lakh** and same have been tabulated below:

S. No.	Activities	Quantities	Capital Cost (Rs. in lakh)	Maintenance/Recurring (Rs. In lakh)						Grand Total (Rs. in lakh)
				I Yr	II Yr	III Yr	IV Yr	V Yr	Total	
1	Muck Disposal	107999.50 cu.m.	50.00							50.00
2	Compensatory Afforestation	4.6 ha	79.40							79.40
3	Plantation in Command Area	50 ha	150.00	25.00	20.00	10.00	10.00	10.00	75.00	225.00
4	Measures for Improvement in Public Health	100 peak manpower								
a	Amenities for Workers			48.00	29.00				77.00	77.00
b	PPEs			10.00	5.00				15.00	15.00
c	Medical and Health Care Facilities		35.00	18.00	18.00	18.00	18.00	18.00	90.00	125.00
d	Occupational Health Check-up			4.00	4.00				8.00	8.00
5	Educational and Awareness Program for Farmers	spread in entire command		60.00	60.00	50.00	40.00	30.00	240.00	240.00
6	Dewatering pumps (for leakage management)	2 numbers	20.00	2.00	2.00	2.00	2.00	2.00	10.00	30.00
7	Control of dust emission during construction			12.00	12.00				24.00	24.00
	TOTAL (Rs. in lakh)		***334.40***	***179.00***	***150.00***	***80.00***	***70.00***	***60.00***	***539.00***	***873.40***

9. ENVIRONMENTAL MONITORING PROGRAMME

The monitoring program for the Project will be undertaken to meet the following objectives:

- To monitor the environmental conditions of nearby area;

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- To check on whether mitigation and benefit enhancement measures have actually been adopted, and are proving effective in practice

Plan for surface & ground water, soil, land use /land cover, air quality, noise, and ecological monitoring have been suggested and cost provisions of **Rs. 93.00 lakh** have been made accordingly, as tabulated below.

S. No.	Activities	Quantities	Capital Cost (Rs. in lakh)	Maintenance/Recurring (Rs. In lakh)						Grand Total (Rs. in lakh)
				I Yr	II Yr	III Yr	IV Yr	V Yr	Total	
1	Surface & Ground Water	12 locations twice a year	--	2.40	2.40	2.40	2.40	2.40	12.00	12.00
2	Soil characteristics	10 locations	--	2.00	2.00	2.00	2.00	2.00	10.00	10.00
3	Land use/Land cover	once a year for 3 years	--	7.50	7.50	7.50	0.0	0	22.50	22.50
4	Air Quality	5 locations thrice a year		4.00	4.00	4.00	4.00	4.00	20.00	20.00
5	Noise	once a month for 2 years	1.00	0.50	0.50	0.50	0.50	0.50	2.50	3.50
6	Ecological	once a year	--	5.00	5.00	5.00	5.00	5.00	25.00	25.00
	Total		***1.00***	***21.4***	***21.4***	***21.4***	***13.9***	***13.9***	***92.00***	***93.00***

Total financial requirement for mitigation/management and monitoring is tabulated below:

S. No.	Activities	Quantities	Capital Cost (Rs. in lakh)	Maintenance/Recurring (Rs. In lakh)						Grand Total (Rs. in lakh)
				I Yr	II Yr	III Yr	IV Yr	V Yr	Total	
	EMP BUDGET									
1	Muck Disposal	107999.50 cu.m.	50.00							50.00
2	Compensatory Afforestation	4.6 ha	79.40							79.40
3	Plantation in Command Area	50 ha	150.00	25.00	20.00	10.00	10.00	10.00	75.00	225.00
4	Measures for Improvement in Public Health	100 peak manpower								
a	Amenities for Workers			48.00	29.00				77.00	77.00
b	PPEs			10.00	5.00				15.00	15.00
c	Medical and Health Care Facilities		35.00	18.00	18.00	18.00	18.00	18.00	90.00	125.00
d	Occupational Health Check-up			4.00	4.00				8.00	8.00
5	Educational and Awareness Program for Farmers	spread in entire command		60.00	60.00	50.00	40.00	30.00	240.00	240.00
6	Dewatering pumps (for leakage management)	2 numbers	20.00	2.00	2.00	2.00	2.00	2.00	10.00	30.00
7	Control of dust			12.00	12.00				24.00	24.00

S. No.	Activities	Quantities	Capital Cost (Rs. in lakh)	Maintenance/Recurring (Rs. In lakh)						Grand Total (Rs. in lakh)
				I Yr	II Yr	III Yr	IV Yr	V Yr	Total	
	emission during construction									
	Sub Total (Rs. in lakh) (a)		***334.40***	***179.00***	***150.00***	***80.00***	***70.00***	***60.00***	***539.00***	***873.40***
	MONITORING BUDGET									
1	Surface & Ground Water	12 locations twice a year	--	2.40	2.40	2.40	2.40	2.40	12.00	12.00
2	Soil characteristics	10 locations	--	2.00	2.00	2.00	2.00	2.00	10.00	10.00
3	Land use/Land cover	once a year for 3 years	--	7.50	7.50	7.50	0.0	0	22.50	22.50
4	Air Quality	5 locations thrice a year		4.00	4.00	4.00	4.00	4.00	20.00	20.00
5	Noise	once a month for 2 years	1.00	0.50	0.50	0.50	0.50	0.50	2.50	3.50
6	Ecological	once a year	--	5.00	5.00	5.00	5.00	5.00	25.00	25.00
	Sub Total (b)		***1.00***	***21.40***	***21.40***	***21.40***	***13.90***	***13.90***	***92.00***	***93.00***
	TOTAL (a+b)		**335.40**	**200.40**	**171.40**	**101.40**	**83.90**	**73.90**	**631.00**	**966.40**

10. PROJECT BENEFITS

The project will bring water to 52 villages, which are presently water scarce and cannot irrigate their land efficiently due to shortage of water. The project will bring direct environment and social benefits, which in turn will bring prosperity to the area and increase spending power of farmers, bringing economic benefits to the region. Direct benefits include public health infrastructure, awareness and training programs for farmers, etc.

11. ENVIRONMENTAL MANAGEMENT PLAN (EMP)

EMP deals with the description of the administrative aspects of ensuring that mitigation measures are implemented and their effectiveness monitored. NVDA is the project proponent/implementing agency for the entire scheme. NVDA has engaged M/s GVPR Engineers Limited, Hyderabad for design and execution of the work including its operation post commissioning. Institutional arrangement for planning and implementing various mitigation and management measures along with carrying out environment monitoring are discussed in detail in EIA report.

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