

ENVIRONMENTAL IMPACT ASSESSMENT STUDY
for
ISP KALISINDH MICRO LIFT IRRIGATION SCHEME
MADHYA PRADESH



Executive Summary
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Prepared for:
NARMADA VALLEY DEVELOPMENT AUTHORITY

Prepared by:



R. S. Envirolink Technologies Pvt. Ltd.
402, Bestech Chambers Commercial Plaza,
B-Block, Sushant Lok-I, Gurgaon
Phone: +91-124-4295383: www.rstechnologies.co.in

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EXECUTIVE SUMMARY

1. PROJECT PROFILE

The project is a micro-lift irrigation scheme; consisting of lifting water from ISP reservoir and distribution through a pressurized piped system to cultivators for irrigation during Rabi season. Water will be supplied up to 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 have following Components:

1. Pump Houses (6 numbers)
2. Break Pressure Tanks (2 nos.)
3. Distribution Chambers (4 nos.)
4. Sub station
5. 132/33 KV Transmission line
6. Rising main (7 numbers) - MS pipeline
7. Branch mains (MS/DI/HDPE) up to 20 ha Chak
8. Distribution Network (HDPE) from 20 ha chak to 2.5 ha chak
9. Flow & Pressure Control Valves, Air valves

In the proposed scheme, 32.04 cumec of water from existing Indira Sagar Project reservoir will be lifted by using 6 pumps through various combinations of twin line rising mains and gravity mains up to Distribution Chamber 3&4 located north to village Talod of Tonk Khurd tehsil of Dewas district. Water will be distributed to command area upto 2.5ha chak outlets by joining Rising mains and Gravity mains to the primary and secondary distribution networks.

The project is designed to irrigate a total of 1.00 lakh ha of CCA on both side of Kalisindh river covering 282 villages of 9 tehsils of Dewas, Sehore and Shajapur districts.

Details of pump houses and main pipelines are given at **Tables 1 & 2**.

2. LOCATION

The supply source i.e. Indira Sagar Project reservoir, lifting point, pump houses and rising main fall in Khandwa & Dewas districts while Piped canal system (command area) fall in Dewas, Sehore and Shajapur districts. Project Location Map is given at **Figure 1**.

Table 1: Details of Pump Houses

Pump House No.	Location	No. of Pumps	Total flow (m ³ /s)	Discharge per pump (m ³ /s)	Pump Head
PH-1	located north to Bakapalas village	4W+1S	32.04	8.010	39
PH-2	located north to Bakapalas village	8W+2S	32.04	4.005	65
PH-3	located in Borkhalya village	16W+4S	32.04	2.003	125
PH-4	located north to Bajrangarh village)	12W+3S	32.04	2.670	109
PH-5	Located at Chhayan village	4W+1S	16.02	4.005	39
PH-6	Located north to Talod village	2W+1S	4.646	2.323	57
		2W+1S	8.010	4.005	37

Table 2: Details of Main Pipelines

Description	Pipeline Name	Pipe dia (mm)	Pipe Length (m)		Flow through each pipe (m ³ /s)	Velocity (m/s)	Friction & Fitting Losses (m)	Pump Head (m)
			Above Ground (Forest)	Below ground (pvt/ govt. land)				
PH1 to PH2	RM-1 (Twin line)	3110	400		16.02	2.11	0.16	39
PH2 to BPT1	RM-2 (Twin line)	3110	1100		16.02	2.11	0.44	65
BPT1 to PH3	Gravity Main-1 (Twin line)	3110	53680	2020	16.02	2.11	22.5	-
PH3 to BPT2	RM-3 (Twin line)	3110	1100	7500	16.02	2.11	3.47	125
BPT2 to PH4	Gravity Main-2 (Twin line)	3110	4340	2360	16.02	2.11	2.7	-
PH4 to DC-1	RM-4 (Twin line)	3110	2440		16.02	2.11	0.99	109
DC-1 to PH-5	Gravity Main-3	3110	6560	2015	16.02	2.11	6.9	-
DC-1 to Command area	Gravity main 4	3110	6560	3015	16.02	2.11	7.7	-
PH5 to DC-2	RM-5	3110	100	200	16.02	2.11	0.24	39
PH-6 to DC-3	RM-6	1700	1000		4.646	2.05	1.54	57
PH-6 to DC-4	RM-7	2200	1000		8.01	2.11	1.21	37

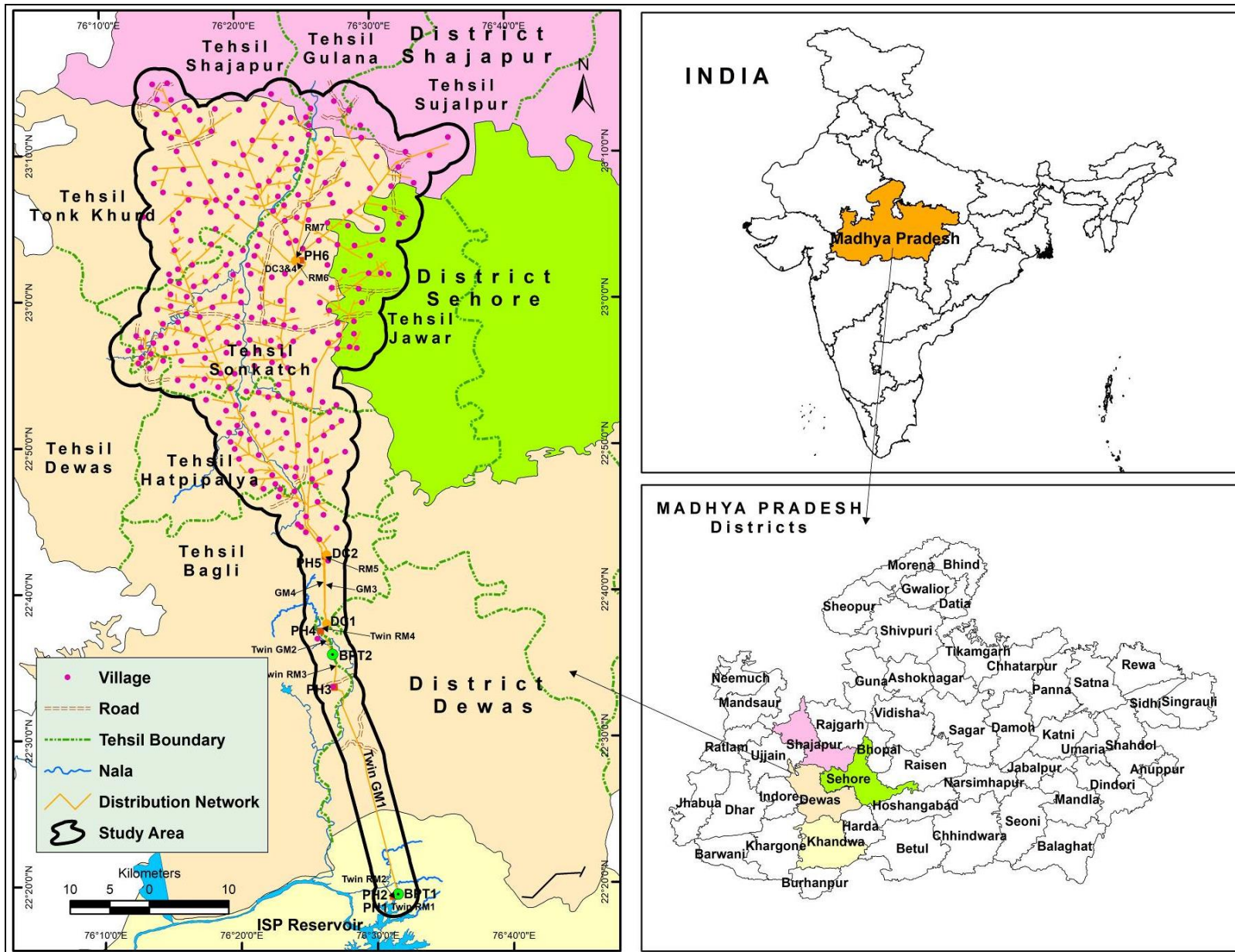


Figure 1: Location Map of the Project Area

3. LAND REQUIREMENT

Permanent Land Requirement

For the construction of pump-houses, sub-stations, valve chambers and staff quarters; land would be required permanently. Permanent land requirement has been worked out as 4.39 ha which would be met by private/ govt. land. The entire micro irrigation system has been aligned in such a way that it passes through minimum forest area. However, for laying of rising main, electrical lines and establishment of permanent structures 160.055 ha of forest land will be diverted.

Land for Transmission Lines

132 kv & 33 kv Power Lines will be brought from Moondi, Chapda and Sonkatch sub stations to the pump houses. Total length of the 132 kv and 33kv transmission lines are worked out as about 66.5 km and 26.8 km respectively. 75 ha of forest land shall be acquired for laying of electrical transmission line. About 4.05 ha of govt./ private land shall be required temporarily. Length of transmission line passing through forest and government /private land is tabulated below.

Description	Forest	Govt./ Pvt.	Total
132 kV Line length	25.5 Km	40.94 Km	66.5 Km
33 kV Line length	0.4 Km	26.36 Km	26.8 Km
132 kV Row	0.743 sq km	0.024 sq km	0.768 sq km
33 kV Row	0.007 sq Km	0.015 sq km	0.023 sq km

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. Wherever, the pipeline/ transmission line 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 3622.96 ha.

4. STUDY AREA

Main project components of the project are as follows:

Water Conductor System - The water conductor system is the piped network designed to lift water from the river and distribute in the command area. Water conductor system falls in Khandwa & Dewas districts.

Command Area - The command area of the project falls in three districts viz. Dewas, Sehore and Shajapur. In Dewas district command area falls in 5 tehsils viz. Tonk Khurd, Hatpipalya, Sonkatch, Bagli and Dewas. In Sehore district command area falls in Jawar tehsil and in Shajapur district it falls in 3 tehsils Shajapur, Awantipur Badodiya (Gulana), Polaykala (Sujalpur) tehsils. The command area is spread over an area of 1.00 lakh ha land which will be irrigated under the proposed irrigation scheme.

The Study area as per ToR was demarcated by generating 2.5 km buffer on either side of pipeline (water conductor system) as well as distributaries in the command 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 68.14% of agriculture/fallow land, 11.14% of scrub land, 14.48% of Forest, 2.21% of scrub forest, 1.84% water bodies, 0.14% Mining, 0.40% Barren land and 1.65% settlements.

In command area agriculture is the dominant land use pattern. Agriculture is main land use; with 68.14% of the study area under agriculture/fallow land. Among the agricultural crops wheat, chillis, cotton, pigeon pea, maize, lentil and linseed are most common. For vegetation sampling, 15 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

Water lifting point, pump houses, rising main, distributaries and command area falls in Dewas, Sehore and Shajapur. A total of 282 villages of command area of Dewas, Sehore and Shajapur districts will be benefited by this scheme (**Refer Table 3 for list of Benefited villages in Study area**).

Table 3: List of Villages (Study Area)

SL. No	DISTRICT	TEHSIL	VILLAGE NAME
LIST OF VILLAGE IN BAGLI TEHSIL			
1	Dewas	Bagli	Azizpur
2	Dewas	Bagli	Badi
3	Dewas	Bagli	Chayyan
4	Dewas	Bagli	Dehariya dama
5	Dewas	Bagli	Dostpur
6	Dewas	Bagli	Gajipura
7	Dewas	Bagli	Ismailkhedi
8	Dewas	Bagli	Kailod
9	Dewas	Bagli	Kamlapur
10	Dewas	Bagli	Karondiya
11	Dewas	Bagli	Khusai
12	Dewas	Bagli	Lalipipaliya
LIST OF VILLAGE IN DEWAS TEHSIL			
13	Dewas	Dewas	Jalodiya
14	Dewas	Dewas	Malendiya
15	Dewas	Dewas	Pipaliyarao
LIST OF VILLAGE IN HATPIPALYA TEHSIL			
16	Dewas	Hatpipalya	Amlataj
17	Dewas	Hatpipalya	Ankheli
18	Dewas	Hatpipalya	Badiyamandu
19	Dewas	Hatpipalya	Bamani
20	Dewas	Hatpipalya	Barkhedalad
21	Dewas	Hatpipalya	Baroli

SL. No	DISTRICT	TEHSIL	VILLAGE NAME
22	Dewas	Hatpipalya	Bhatoni
23	Dewas	Hatpipalya	Borkhedapurwiya
24	Dewas	Hatpipalya	Burhanpur
25	Dewas	Hatpipalya	Chilki
26	Dewas	Hatpipalya	Dehariya abha
27	Dewas	Hatpipalya	Deogad
28	Dewas	Hatpipalya	Dhanori
29	Dewas	Hatpipalya	Dhokiya
30	Dewas	Hatpipalya	Ghatiyagayasur
31	Dewas	Hatpipalya	Gola
32	Dewas	Hatpipalya	Guradiyahatu
33	Dewas	Hatpipalya	Gyaraspura
34	Dewas	Hatpipalya	Hamir khedi
35	Dewas	Hatpipalya	Hathiguradiya
36	Dewas	Hatpipalya	Hedarpur
37	Dewas	Hatpipalya	Hirapur
38	Dewas	Hatpipalya	Kanjhar
39	Dewas	Hatpipalya	Kawadi
40	Dewas	Hatpipalya	Kawadiya
41	Dewas	Hatpipalya	Kherkhedi
42	Dewas	Hatpipalya	Khokariya
43	Dewas	Hatpipalya	Kopla
44	Dewas	Hatpipalya	Lasudiyahatu
45	Dewas	Hatpipalya	Madiyaguradiya
46	Dewas	Hatpipalya	Mankundi
47	Dewas	Hatpipalya	Manpipliya
48	Dewas	Hatpipalya	Mendiya
49	Dewas	Hatpipalya	Merukhedi
50	Dewas	Hatpipalya	Muradpur
51	Dewas	Hatpipalya	Nanukheda
52	Dewas	Hatpipalya	Nasirabad
53	Dewas	Hatpipalya	Palasi
54	Dewas	Hatpipalya	Palkha
55	Dewas	Hatpipalya	Phangati
56	Dewas	Hatpipalya	Ponasa
57	Dewas	Hatpipalya	Ramalkhedi
58	Dewas	Hatpipalya	Sarkheda
59	Dewas	Hatpipalya	Semlibujurg
60	Dewas	Hatpipalya	Shamasbad
61	Dewas	Hatpipalya	Singawada
LIST OF VILLAGE IN SONKATCH TEHSIL			
62	Dewas	Sonkatch	Abhepur
63	Dewas	Sonkatch	Agera
64	Dewas	Sonkatch	Arniyajagir
65	Dewas	Sonkatch	Aser
66	Dewas	Sonkatch	Badiyaraysal
67	Dewas	Sonkatch	Baradi
68	Dewas	Sonkatch	Baroli
69	Dewas	Sonkatch	Bavai
70	Dewas	Sonkatch	Bawadiya
71	Dewas	Sonkatch	Berakhedi
72	Dewas	Sonkatch	Bhagsara
73	Dewas	Sonkatch	Bhalaikalan
74	Dewas	Sonkatch	Bhalaikhurd
75	Dewas	Sonkatch	Bhangardi
76	Dewas	Sonkatch	Bisakhedi
77	Dewas	Sonkatch	Bolasa
78	Dewas	Sonkatch	Budangaon
79	Dewas	Sonkatch	Chaubarajagir

SL. No	DISTRICT	TEHSIL	VILLAGE NAME
80	Dewas	Sonkatch	Chhayamenana
81	Dewas	Sonkatch	Dakachaya
82	Dewas	Sonkatch	Daulatpur
83	Dewas	Sonkatch	Dehariyapet
84	Dewas	Sonkatch	Dehri
85	Dewas	Sonkatch	Dhablajagir
86	Dewas	Sonkatch	Dhablakhallas
87	Dewas	Sonkatch	Dhandeda
88	Dewas	Sonkatch	Dharampur
89	Dewas	Sonkatch	Dharukhedi
90	Dewas	Sonkatch	Dhaturiararam
91	Dewas	Sonkatch	Dhaturiyarao
92	Dewas	Sonkatch	Dudlai
93	Dewas	Sonkatch	Elachpur
94	Dewas	Sonkatch	Enabad
95	Dewas	Sonkatch	Gadhajuriya
96	Dewas	Sonkatch	Gandharvpuri
97	Dewas	Sonkatch	Ganjpora
98	Dewas	Sonkatch	Ghatiyabhana
99	Dewas	Sonkatch	Ghatiyakalan
100	Dewas	Sonkatch	Ghichlay
101	Dewas	Sonkatch	Gunai
102	Dewas	Sonkatch	Guradiya rupa
103	Dewas	Sonkatch	Guradiyagujar
104	Dewas	Sonkatch	Guradiyakachi
105	Dewas	Sonkatch	Harnawada
106	Dewas	Sonkatch	Jagdishpur
107	Dewas	Sonkatch	Jaleria
108	Dewas	Sonkatch	Jalodiya
109	Dewas	Sonkatch	Jamgod
110	Dewas	Sonkatch	Jamodi
111	Dewas	Sonkatch	Jangipur
112	Dewas	Sonkatch	Jolay
113	Dewas	Sonkatch	Kachnariya
114	Dewas	Sonkatch	Kalukhedi
115	Dewas	Sonkatch	Kankadda
116	Dewas	Sonkatch	Karadiyagada
117	Dewas	Sonkatch	Karadiyamahore
118	Dewas	Sonkatch	Khajuriyakanka
119	Dewas	Sonkatch	Kharpadi
120	Dewas	Sonkatch	Kharsi
121	Dewas	Sonkatch	Kheriyajagir
122	Dewas	Sonkatch	Kheriyasahu
123	Dewas	Sonkatch	Khonpirpipaliya
124	Dewas	Sonkatch	Khoyara
125	Dewas	Sonkatch	Khuntkheda
126	Dewas	Sonkatch	Kothada
127	Dewas	Sonkatch	Kumardi
128	Dewas	Sonkatch	Kumariyabanbir
129	Dewas	Sonkatch	Kumariyao
130	Dewas	Sonkatch	Lakumdi
131	Dewas	Sonkatch	Lalakhedi
132	Dewas	Sonkatch	Londiya
133	Dewas	Sonkatch	Magriya
134	Dewas	Sonkatch	Mahudi
135	Dewas	Sonkatch	Malakpur
136	Dewas	Sonkatch	Malpura
137	Dewas	Sonkatch	Manasa
138	Dewas	Sonkatch	Mawada

SL. No	DISTRICT	TEHSIL	VILLAGE NAME
139	Dewas	Sonkatch	Mawarkhedi
140	Dewas	Sonkatch	Mhow
141	Dewas	Sonkatch	Mirpurkhedi
142	Dewas	Sonkatch	Mirzapur
143	Dewas	Sonkatch	Mitthukhedi
144	Dewas	Sonkatch	Modariya
145	Dewas	Sonkatch	Mohammadpur
146	Dewas	Sonkatch	Mundikhedi
147	Dewas	Sonkatch	Mundlana
148	Dewas	Sonkatch	Muramya
149	Dewas	Sonkatch	Nandharakhedi
150	Dewas	Sonkatch	Narana
151	Dewas	Sonkatch	Nipanya hurhur
152	Dewas	Sonkatch	Nosarabad
153	Dewas	Sonkatch	Oad
154	Dewas	Sonkatch	Odani
155	Dewas	Sonkatch	Padalyamohba
156	Dewas	Sonkatch	Pandajagir
157	Dewas	Sonkatch	Paradikheda
158	Dewas	Sonkatch	Patadiyataj
159	Dewas	Sonkatch	Patandiyanjadik
160	Dewas	Sonkatch	Peerpadalya
161	Dewas	Sonkatch	Phabda
162	Dewas	Sonkatch	Pilwani
163	Dewas	Sonkatch	Pipaliyabhachod
164	Dewas	Sonkatch	Pipalrawan
165	Dewas	Sonkatch	Pipalyabaks
166	Dewas	Sonkatch	Pipalyakhurd
167	Dewas	Sonkatch	Polayjagir
168	Dewas	Sonkatch	Rajoda
169	Dewas	Sonkatch	Ralayati
170	Dewas	Sonkatch	Rjapur
171	Dewas	Sonkatch	Rolupipliya
172	Dewas	Sonkatch	Roshnabad
173	Dewas	Sonkatch	Sadukhedi
174	Dewas	Sonkatch	Saktali
175	Dewas	Sonkatch	Samber
176	Dewas	Sonkatch	Sarsoda
177	Dewas	Sonkatch	Shadikheda
178	Dewas	Sonkatch	Sonkatch
179	Dewas	Sonkatch	Sonkatchi
180	Dewas	Sonkatch	Surakheda
181	Dewas	Sonkatch	Surakhedakhurd
182	Dewas	Sonkatch	Surjana
183	Dewas	Sonkatch	Taldi
184	Dewas	Sonkatch	Talod
185	Dewas	Sonkatch	Tungni
LIST OF VILLAGE IN TONK KHURD TEHSIL			
186	Dewas	Tonk Khurd	Agri
187	Dewas	Tonk Khurd	Amona
188	Dewas	Tonk Khurd	Arnya dhikana
189	Dewas	Tonk Khurd	Baddu
190	Dewas	Tonk Khurd	Bagwaikhoyara
191	Dewas	Tonk Khurd	Balon
192	Dewas	Tonk Khurd	Bhayagaon
193	Dewas	Tonk Khurd	Bhesakhedi
194	Dewas	Tonk Khurd	Bhilkhedi
195	Dewas	Tonk Khurd	Bhojpura
196	Dewas	Tonk Khurd	Bhutiabujurg

SL. No	DISTRICT	TEHSIL	VILLAGE NAME
197	Dewas	Tonk Khurd	Bhutiya khurd
198	Dewas	Tonk Khurd	Chandgarh
199	Dewas	Tonk Khurd	Chhayanhajjam
200	Dewas	Tonk Khurd	Chobaradhira
201	Dewas	Tonk Khurd	Deoguradiya
202	Dewas	Tonk Khurd	Devdharamrajpur
203	Dewas	Tonk Khurd	Develi
204	Dewas	Tonk Khurd	Dhutkhedi
205	Dewas	Tonk Khurd	Eklera
206	Dewas	Tonk Khurd	Elaskhedi
207	Dewas	Tonk Khurd	Gharat khedi
208	Dewas	Tonk Khurd	Girlakhedi
209	Dewas	Tonk Khurd	Guradiyadas
210	Dewas	Tonk Khurd	Jamodi
211	Dewas	Tonk Khurd	Jamoniya
212	Dewas	Tonk Khurd	Janoli khurd
213	Dewas	Tonk Khurd	Jirwaya
214	Dewas	Tonk Khurd	Jiyajigarh
215	Dewas	Tonk Khurd	Kallukhedi
216	Dewas	Tonk Khurd	Kamlapur
217	Dewas	Tonk Khurd	Kandarakhedi
218	Dewas	Tonk Khurd	Khedi
219	Dewas	Tonk Khurd	Khedirajpur
220	Dewas	Tonk Khurd	Khindrakhedi
221	Dewas	Tonk Khurd	Kunduriya
222	Dewas	Tonk Khurd	Lasudiya kulmi
223	Dewas	Tonk Khurd	Lasudiyabrahman
224	Dewas	Tonk Khurd	Lodakheda
225	Dewas	Tonk Khurd	Madhopur
226	Dewas	Tonk Khurd	Merkhedi
227	Dewas	Tonk Khurd	Mohammadkheda
228	Dewas	Tonk Khurd	Mundladangi
229	Dewas	Tonk Khurd	Mundladev
230	Dewas	Tonk Khurd	Nagpachlana
231	Dewas	Tonk Khurd	Pipalyakumar
232	Dewas	Tonk Khurd	Ralamandal
233	Dewas	Tonk Khurd	Ranyalkala
234	Dewas	Tonk Khurd	Ranyalkhurd
235	Dewas	Tonk Khurd	Raypur
236	Dewas	Tonk Khurd	Rehtiya
237	Dewas	Tonk Khurd	Richadiya
238	Dewas	Tonk Khurd	Salamkhedi
239	Dewas	Tonk Khurd	Samaskhedi
240	Dewas	Tonk Khurd	Samgi
241	Dewas	Tonk Khurd	Sedu
242	Dewas	Tonk Khurd	Senkali
243	Dewas	Tonk Khurd	Sundarpur
244	Dewas	Tonk Khurd	Tonk khurd
245	Dewas	Tonk Khurd	Updi
246	Dewas	Tonk Khurd	Vijayagharmurmya
LIST OF VILLAGE IN JAWAR TEHSIL			
247	Sehore	Jawar	Bamuliya raimal
248	Sehore	Jawar	Bhana khedi
249	Sehore	Jawar	Bhati kheda
250	Sehore	Jawar	Bisukhedi
251	Sehore	Jawar	Chhayan khurd
252	Sehore	Jawar	Himmatpur
253	Sehore	Jawar	Ismail khedi
254	Sehore	Jawar	Jawar

SL. No	DISTRICT	TEHSIL	VILLAGE NAME
255	Sehore	Jawar	Jhikdijawar
256	Sehore	Jawar	Jivapur mahodia
257	Sehore	Jawar	Kajlas
258	Sehore	Jawar	Karman khedi
259	Sehore	Jawar	Kundiya dhaga
260	Sehore	Jawar	Kundiya nathu
261	Sehore	Jawar	Metwara
262	Sehore	Jawar	Moondala mohaba
263	Sehore	Jawar	Paroliya chauhan
264	Sehore	Jawar	Semlibari
265	Sehore	Jawar	Tolkakheda
LIST OF VILLAGE IN SHAJAPUR TEHSIL			
266	Shajapur	Shajapur	Besrapur
267	Shajapur	Shajapur	Lalupura
268	Shajapur	Shajapur	Palsawad son
269	Shajapur	Shajapur	Sultanpura
270	Shajapur	Shajapur	Tandabanjari
271	Shajapur	Shajapur	Upda
LIST OF VILLAGE IN SUJALPUR TEHSIL			
272	Shajapur	Sujalpur	Binaya
273	Shajapur	Sujalpur	Dewan khedi
274	Shajapur	Sujalpur	Hannukhedi
275	Shajapur	Sujalpur	Pagrawad kalan
276	Shajapur	Sujalpur	Pagrawad khurd
277	Shajapur	Sujalpur	Tandakhurd
LIST OF VILLAGE IN GULANA TEHSIL			
278	Shajapur	Gulana	Aser
279	Shajapur	Gulana	Badodiya indore
280	Shajapur	Gulana	Chhapariya indore
281	Shajapur	Gulana	Kasam khedi
282	Shajapur	Gulana	Umrodh dewas
TOTAL VILLAGES IN BAGLI TEHSIL			12
TOTAL VILLAGES IN DEWAS TEHSIL			3
TOTAL VILLAGES IN HATPIPLYA TEHSIL			46
TOTAL VILLAGES IN SONKATCH TEHSIL			124
TOTAL VILLAGES IN TONK KHURD TEHSIL			61
TOTAL VILLAGES IN JAWAR TEHSIL			19
TOTAL VILLAGES IN SHAJAPUR TEHSIL			6
TOTAL VILLAGES IN SUJALPUR TEHSIL			6
TOTAL VILLAGES IN GULANA TEHSIL			5
TOTAL NUMBER OF VILLAGES			282

Demographic profile, literacy, occupation pattern, per capita income, socio-economic profiling of the project benefitted villages were studied on sample survey basis, 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 23 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 from primarily rising mains and gravity distributaries has been worked out as nearly 20.32 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 20,32,543 cum, however, this surplus quantity will be generated from 6477.548 km long trench excavated for laying of rising main and distributaries. This quantity will be spread linearly for 6477.548 km and per m dug material generation will be of the order of 0.31 cum 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. 175 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 160.055 ha of forest land shall be diverted for construction of permanent structures.

Compensatory Afforestation: The entire micro irrigation system has been aligned in such a way, that it requires only 160.055 ha of forest land for laying of rising mains. As per the guidelines of Forest Conservation Act, 1980 block plantation is to be taken up two times (320.11 ha) of the above ground component of forest land diversion in the denuded or degraded forest areas [160.055 ha x 2 = 320.11 ha]. It is estimated that an amount of approximately Rs 1760.6 lakh will be required for compensatory afforestation (320.11 ha @ Rs 5.5 lakh/ha = 1760.6 lakh) and Rs. 1001.9 lakh for Net Present Value (NPV) (160.055 ha @ Rs 6.26 lakh/ha = 1001.9 lakh) thus a total of Rs. 2762.54 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 200 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. 900 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. 161lakhs:

- 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. 215 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. 450 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. 4723.54 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	2032543 cum.	175.00							175.00
2	Compensatory Afforestation	160.055 ha	2762.54							2762.54
3	Plantation in Command Area	200 ha	600.00	90.00	70.00	70.00	50.00	20.00	300.00	900.00
4	Measures for Improvement in Public Health	200 peak manpower								

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	
a	Amenities for Workers			69.00	48.00				117.00	117.00
b	PPEs			10.00	10.00				20.00	20.00
c	Medical and Health Care Facilities		85.00	26.00	26.00	26.00	26.00	26.00	130.00	215.00
d	Occupational Health Check-up			12.00	12.00				24.00	24.00
5	Educational and Awareness Program for Farmers	spread in entire command		100.00	100.00	90.00	80.00	80.00	450.00	450.00
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			15.00	15.00				30.00	30.00
	TOTAL (Rs. in lakh)		3642.54	324.00	283.00	188.00	158.00	128.00	1081.00	4723.54

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;
- 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. 106 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	22 locations twice a year	--	4.00	4.00	4.00	4.00	4.00	20.00	20.00
2	Soil characteristics	15 locations	--	3.00	3.00	3.00	3.00	3.00	15.00	15.00
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

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	
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	24.00	24.00	24.00	16.50	16.50	105.00	106.00

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	2032543 cum.	175.00							175.00
2	Compensatory Afforestation	160.055 ha	2762.54							2762.54
3	Plantation in Command Area	200 ha	600.00	90.00	70.00	70.00	50.00	20.00	300.00	900.00
4	Measures for Improvement in Public Health	200 peak manpower								
a	Amenities for Workers			69.00	48.00				117.00	117.00
b	PPEs			10.00	10.00				20.00	20.00
c	Medical and Health Care Facilities		85.00	26.00	26.00	26.00	26.00	26.00	130.00	215.00
d	Occupational Health Checkup			12.00	12.00				24.00	24.00
5	Educational and Awareness Program for Farmers	spread in entire command		100.00	100.00	90.00	80.00	80.00	450.00	450.00
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			15.00	15.00				30.00	30.00
	SUB TOTAL (Rs. in lakh) (a)		3642.54	324.00	283.00	188.00	158.00	128.00	1081.00	4723.54
MONITORING BUDGET										
1	Surface & Ground Water	22 locations twice a year	--	4.00	4.00	4.00	4.00	4.00	20.00	20.00
2	Soil characteristics	15 locations	--	3.00	3.00	3.00	3.00	3.00	15.00	15.00
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

S. No.	Activities	Quantities	Capital Cost (Rs. in lakh)	Maintenance/Recurring (Rs. In lakh)						Grand
				I Yr	II Yr	III Yr	IV Yr	V Yr	Total	Total (Rs. in lakh)
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	24.00	24.00	24.00	16.50	16.50	105.00	106.00
	TOTAL (a+b)		3634.54	348.00	307.00	212.00	174.50	144.50	1186.00	4829.54

10. PROJECT BENEFITS

The project will bring water to 282 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 Larsen & Turbo Ltd.** 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.