

ENVIRONMENTAL IMPACT ASSESSMENT STUDY for NARMADA-KSHIPRA MULTIPURPOSE PROJECT MADHYA PRADESH



Executive Summary

December, 2018

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

CONTENTS

	Page No.
1. PROJECT PROFILE	1
2. LOCATION	3
3. LAND REQUIREMENT	5
4. STUDY AREA	5
5. ENVIRONMENTAL BASELINE STATUS	5
6. SOCIO ECONOMIC PROFILE OF THE STUDY AREA	6
7. IMPACT ASSESSMENT AND MITIGATION	9
8. FINANCIAL REQUIREMENT FOR MITIGATION & MANAGEMENT MEASURES	12
9 ENVIRONMENTAL MONITORING PROGRAMME	12
10. PROJECT BENEFITS	14
11. ENVIRONMENTAL MANAGEMENT PLAN (EMP)	14

EXECUTIVE SUMMARY

1. PROJECT PROFILE

The project is a micro-lift irrigation scheme with drinking and industrial water supply component. It consists of lifting water from OSP reservoir and distributing through a pressurized piped system to cultivators for irrigation during Rabi season along with a water supply scheme for Ujjain district. Water for irrigation will be supplied up to 2.5 ha chak size under adequate pressure (minimum 20m head) for drip/sprinkler system. The project consists of piped system controlled by Supervisory Control and Data Acquisition (SCADA) and has following Components:

1. Pump Houses (6 numbers)
2. Break Pressure Tanks (3 nos.)
3. Distribution Chambers (2 nos.)
4. Sub stations (5 nos.)
5. 132 KV and 33 KV Transmission lines
6. Rising and Gravity Main - MS pipeline
7. Distribution Network (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, 15.0 cumec water from existing OSP reservoir will be lifted using 6 pump through various combinations of Rising Mains and Gravity Mains of over 200 Km length. Out of 15 cumec discharge, 10 cumec is planned to be utilized for irrigation purpose and balance 5 cumec is planned to be utilised for drinking water and industrial use.

15 cumec discharge will be lifted upto DC1 through 5 Pump houses (PH1 to PH5), thereafter it will be bifurcated through two gravity mains - one will carry 12 cumec of water to Maksi and another 3 cumec to Taping Junction at Ujjain for water supply. From Taping junction, 1.5 cumec will be further lifted through PH6 for distribution in Nagda. Rest of the distribution will be by gravity.

Out of 12 cumec, carried upto Maksi, 10 cumec will be utilised for irrigation of total 30,000 ha of CCA in 100 villages of Ujjain and Shajapur districts and 2 cumec will be used as water supply - 0.25 cumec of water in each tehsil (Tarana, Jhangra, Ghatia & Guradia Gujar) of Ujjain district and 0.5 cumec of water in each tehsil (Makshi and Shajapur) of Shajapur district.

Schematic line diagram is given in **Figure 1**, details of main pipelines is given at **Table 1**, details of Pump houses are given at **Table 2**.

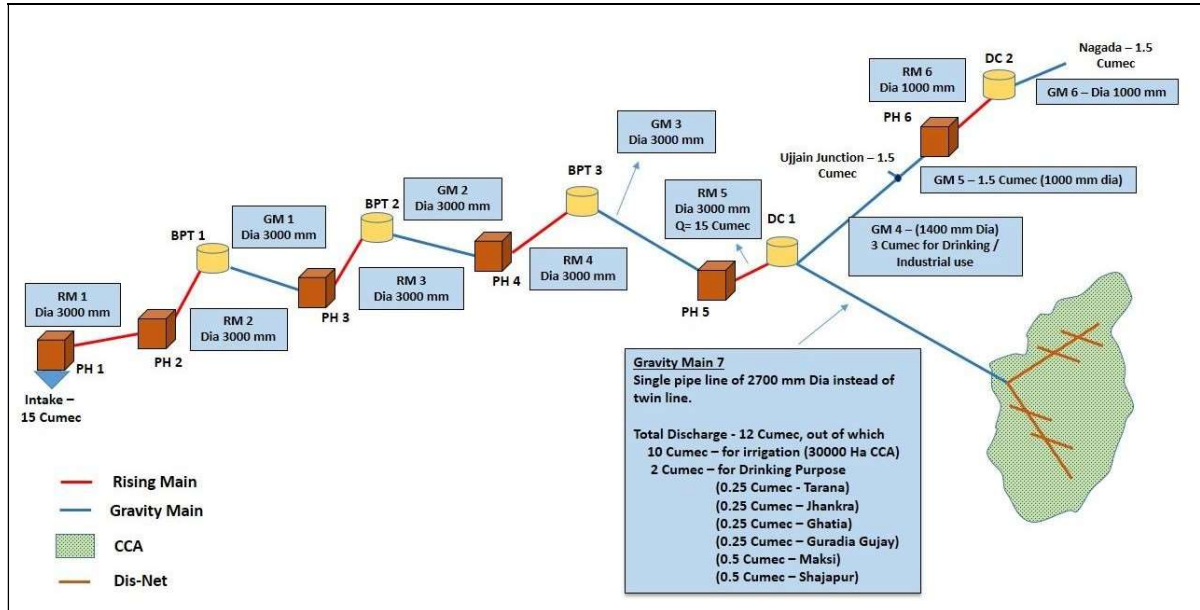


Figure 1: Schematic line diagram of the project

Table 1: Details of Main Pipelines

For	Pipeline Name	Pipe dia (mm)	Total Length (m)		Flow through each pipe (m ³ /s)	Velocity (m/s)	Friction & Fitting Losses (m)	Pump Head (m)
			Above Ground (Forest)	Below ground (private/ govt. land)				
PH1 to PH2	RM-1	3000	425		15	2.123	0.18	39
PH2 to BPT1	RM-2	3000	2050		15	2.123	2.23	118
BPT1 to PH3	GM-1	3000	17525		15		16.04	-
PH3 to BPT2	RM-3	3000	2550		15	2.123	2.05	108
BPT2 to PH4	GM-2	3000	4775		15		6.1	-
PH4 to BPT3	RM-4A	3000	725		15	2.123	1.43	159
	RM-4B	3000	3025		15	2.123		
BPT3 to PH5	GM-3	3000		31775	15		32.17	-
PH5 to DC1	RM-5	3000		450	15	2.123		75
DC1 to Tapping Junction at Ujjain	GM-4	1400		49250	3		1.85	-
Tapping Junction at Ujjain to PH6	GM-5	1000		15425	1.5		0.98	-

For	Pipeline Name	Pipe dia (mm)	Total Length (m)		Flow through each pipe (m ³ /s)	Velocity (m/s)	Friction & Fitting Losses (m)	Pump Head (m)
			Above Ground (Forest)	Below ground (private/ govt. land)				
PH6 TO DC2	RM-6	1000		23950	1.5	2.123		90
DC2 to Nagada	GM-6	1000		11800	1.5			-
DC1 to Maksi	GM-7	2700		40625	12			-

Table 2: Details of Pump Houses

Pumping Station No.	Location	No. of Pumps	Total flow (m ³ /s)	Discharge per pump (m ³ /hr)	Pump Head (m)
PH-1	Near OSP Reservoir, Lifting point OSP reservoir near to South West of Badel village, District-Khargaoon, Tehsil-Barwah	8 (6W+2S)	15	9000	39
PH-2	Near to South West of Badel village, District-Khargaoon, Tehsil-Barwah	8 (6W+2S)	15	9000	108
PH-3	At Anjankhunt village, District-Dewas Tehsil- Udayanagar	8 (6W+2S)	15	9000	113
PH-4	Near to South West of Pedmi village, District- Dewas, Tehsil- Bagli	15 (12W+3S)	15	4500	164
PH-5	At Bhangarh Village District-Dewas Tehsil-Dewas	8 (6W+2S)	15	9000	72
PH-6	At Goyala Buzurg village District-Ujjain Tehsil-Ghatiya	3 (2W+1S)	1.5	2700	90

2.LOCATION

The project is spread across 5 districts viz. Khargone, Indore, Dewas, Shajapur and Ujjain. The supply source i.e. Omkareshwar Project reservoir, lifting point, pump houses and rising main lie in Khargone district; while Piped canal will pass through Dewas and Indore districts; command area is in Ujjain and Shajapur districts. Project Location Map is given at **Figure 2**.

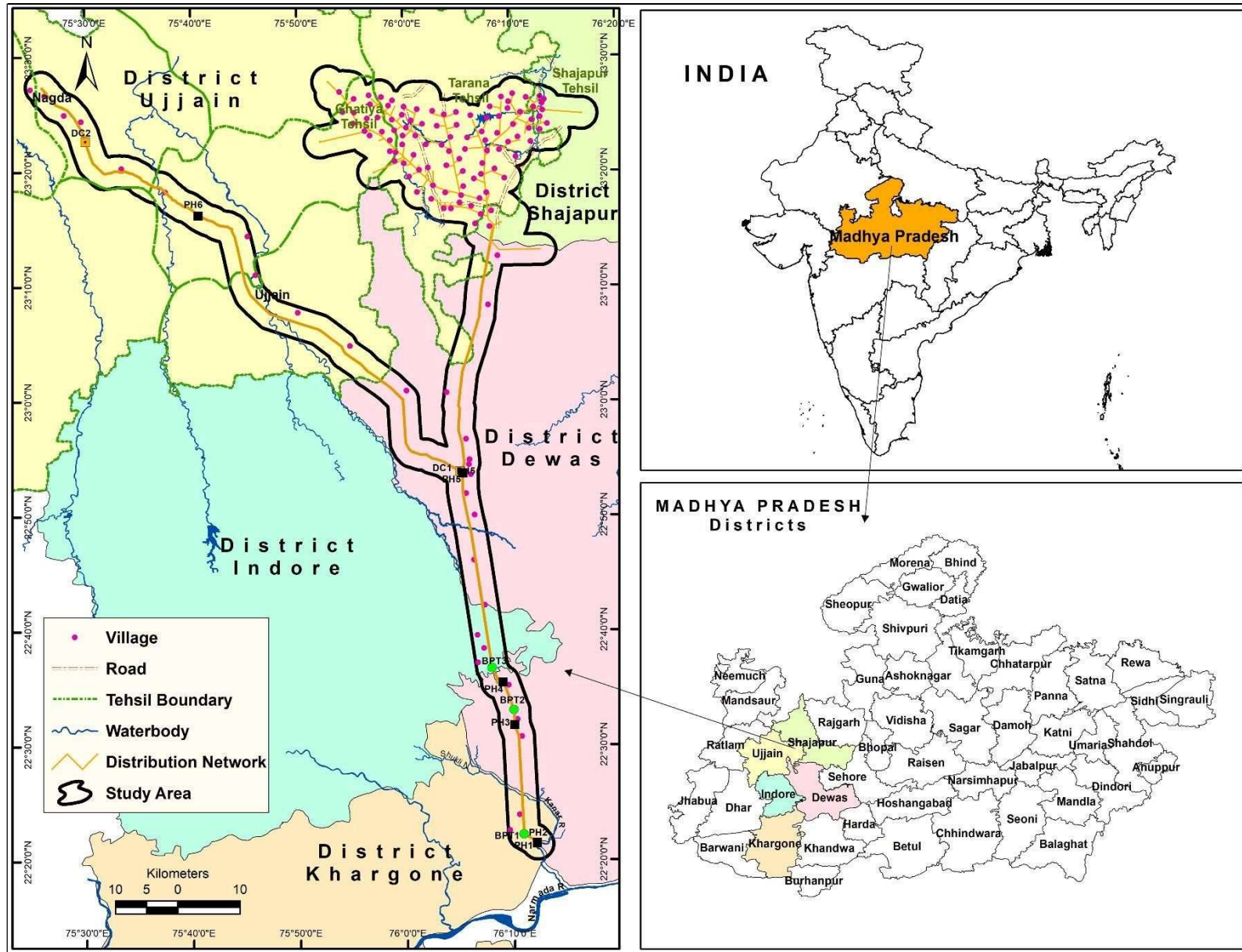


Figure 2: Location Map of the Project Area

3. LAND REQUIREMENT

Permanent Land Requirement

For the construction of pump-houses, break pressure tanks and surge tanks; land would be required permanently. Permanent land requirement has been worked out as 3.08 ha which would be met by private/Govt. land. The entire micro irrigation system has been aligned to avoid forest area, however, for laying of rising main, electrical lines and establishment of permanent structures, 79.934 ha of forest land will be diverted.

Land for Transmission Lines

132 kv Power Line will be brought from Barwaha sub station for PH-1 and PH-2, from Chapda sub-station for PH-3 and PH-4, from Shankargarh Sub-Station for PH-5, and 33 kv Power Line will be brought from Bherugarh sub station for PH-6. The total length of 132kv will be 70.36 km. 33kv transmission line will be 6.22 km, 50.25 ha of forest land shall be acquired for laying of electrical transmission line. About 3.5 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. 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 1567 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 consists of two main components i.e.

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

Command Area - The command area is the area of Tarana and Ghatia tehsil of Ujjain district and Shajapur tehsil of Shajapur district covering 30,000 ha land which will be irrigated 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 76.95% of agriculture/fallow land, 9.99% of scrub land, 6.09% of Deciduous Forest, 1.87% of scrub forest, 0.26% Mining, 0.86% water bodies and 3.98% settlement.

In command area agriculture is the dominant land use pattern. Agriculture is main land use; with 76.95% 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, 11 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 Ujjain, Shajapur, Dewas, Indore and Khargone districts. Study area comprises of 128 villages, out of the total, 100 are project benefited villages. All the project benefited villages fall in Ujjain and Shajapur districts, 92 villages are in Ujjain district, 8 villages are in Shajapur district (**Refer Table 3 for list of study area villages**)

Table 3: List of Villages (Study Area)

SL.NO	DISTRICT	TEHSIL	VILLAGE NAME	VILLAGE CATEGORY
LIST OF VILLAGE IN TARANA TEHSIL				
1	Ujjain	Tarana	Abadkhedi	Benefited Village
2	Ujjain	Tarana	Anklakhedi	Benefited Village
3	Ujjain	Tarana	Baghera	Benefited Village
4	Ujjain	Tarana	Bagoda	Benefited Village
5	Ujjain	Tarana	Beejpadi	Benefited Village
6	Ujjain	Tarana	Berchhi	Benefited Village
7	Ujjain	Tarana	Birgod	Benefited Village
8	Ujjain	Tarana	Bordagujar	Benefited Village
9	Ujjain	Tarana	Chhadawad	Benefited Village
10	Ujjain	Tarana	Chhapri	Benefited Village
11	Ujjain	Tarana	Dilodri	Benefited Village
12	Ujjain	Tarana	Dubli	Benefited Village
13	Ujjain	Tarana	Fanya	Benefited Village
14	Ujjain	Tarana	Ganga Talab	Benefited Village
15	Ujjain	Tarana	Gawdi	Benefited Village
16	Ujjain	Tarana	Gujarkheda	Benefited Village
17	Ujjain	Tarana	Hajikhedi	Benefited Village
18	Ujjain	Tarana	Halukhedi	Benefited Village
19	Ujjain	Tarana	Itawa	Benefited Village
20	Ujjain	Tarana	Jawaharnagar	Benefited Village
21	Ujjain	Tarana	Jharnawada	Benefited Village
22	Ujjain	Tarana	Jhirnyabuzurg	Benefited Village
23	Ujjain	Tarana	Junapani	Benefited Village
24	Ujjain	Tarana	Kakariyachand	Benefited Village
25	Ujjain	Tarana	Kanardi	Benefited Village
26	Ujjain	Tarana	Kanasiya	Benefited Village
27	Ujjain	Tarana	Karanj	Benefited Village
28	Ujjain	Tarana	Karedi	Benefited Village
29	Ujjain	Tarana	Khambukhedi	Benefited Village
30	Ujjain	Tarana	Kharkhadi	Benefited Village
31	Ujjain	Tarana	Khodrinipaniya	Benefited Village
32	Ujjain	Tarana	Krishna Nagar	Benefited Village
33	Ujjain	Tarana	Lunyakhedi	Benefited Village

SL.NO	DISTRICT	TEHSIL	VILLAGE NAME	VILLAGE CATEGORY
34	Ujjain	Tarana	Malikhedi	Benefited Village
35	Ujjain	Tarana	Merkhedi	Benefited Village
36	Ujjain	Tarana	Mundli	Benefited Village
37	Ujjain	Tarana	Murdawan	Benefited Village
38	Ujjain	Tarana	Natakhedi	Benefited Village
39	Ujjain	Tarana	Noganwa	Benefited Village
40	Ujjain	Tarana	Palduna	Benefited Village
41	Ujjain	Tarana	Sadikhedi	Benefited Village
42	Ujjain	Tarana	Salakhedi	Benefited Village
43	Ujjain	Tarana	Samgi	Benefited Village
44	Ujjain	Tarana	Shankarpura	Benefited Village
45	Ujjain	Tarana	Siddhipurnipanya	Benefited Village
46	Ujjain	Tarana	Surajpura	Benefited Village
47	Ujjain	Tarana	Suwagaon	Benefited Village
48	Ujjain	Tarana	Tobrikheda	Benefited Village
49	Ujjain	Tarana	Yashwantgarh	Benefited Village
50	Ujjain	Tarana	Barkheda Tarana	Benefited Village
51	Ujjain	Tarana	Barnawad	Benefited Village
52	Ujjain	Tarana	Bisankheda	Benefited Village
53	Ujjain	Tarana	Bisankhedi	Benefited Village
54	Ujjain	Tarana	Chunakhedi	Benefited Village
55	Ujjain	Tarana	Devikheda	Benefited Village
56	Ujjain	Tarana	Devli	Benefited Village
57	Ujjain	Tarana	Dobdagujar	Benefited Village
58	Ujjain	Tarana	Dudhli	Benefited Village
59	Ujjain	Tarana	Gangalyakhedi	Benefited Village
60	Ujjain	Tarana	Guthlai	Benefited Village
61	Ujjain	Tarana	Hanumanti	Benefited Village
62	Ujjain	Tarana	Kachnariya	Benefited Village
63	Ujjain	Tarana	Kesarpurnipanya	Benefited Village
64	Ujjain	Tarana	Khamli	Benefited Village
65	Ujjain	Tarana	Khankrisultan	Benefited Village
66	Ujjain	Tarana	Lalakhedi	Benefited Village
67	Ujjain	Tarana	Lasurdiya Hameer	Benefited Village
68	Ujjain	Tarana	Lodh	Benefited Village
69	Ujjain	Tarana	Naharkhedi	Benefited Village
70	Ujjain	Tarana	Palkhanda	Benefited Village
71	Ujjain	Tarana	Ranchikhedi	Benefited Village
72	Ujjain	Tarana	Samanera	Benefited Village
73	Ujjain	Tarana	Shekhpur	Benefited Village
74	Ujjain	Tarana	Tanda	Benefited Village
75	Ujjain	Tarana	Tilawad	Benefited Village
76	Ujjain	Tarana	Tilawadi	Benefited Village
77	Ujjain	Tarana	Umarajhar	Benefited Village
78	Ujjain	Tarana	Tarana kasba	Benefited Village
LIST OF VILLAGE IN GHATIYA TEHSIL				
79	Ujjain	Ghatiya	Bhimpura	Benefited Village
80	Ujjain	Ghatiya	Gadrolia	Benefited Village
81	Ujjain	Ghatiya	Kherkhedi	Benefited Village
82	Ujjain	Ghatiya	Kumhardi	Benefited Village
83	Ujjain	Ghatiya	Amarpura	Benefited Village

SL.NO	DISTRICT	TEHSIL	VILLAGE NAME	VILLAGE CATEGORY
84	Ujjain	Ghatiya	Bhensa Khedi	Benefited Village
85	Ujjain	Ghatiya	Bichhadod Istamurar	Benefited Village
86	Ujjain	Ghatiya	Biramkhedi	Benefited Village
87	Ujjain	Ghatiya	Chitawalya Kheda	Benefited Village
88	Ujjain	Ghatiya	Daulatpur	Benefited Village
89	Ujjain	Ghatiya	Koyalkhedi	Benefited Village
90	Ujjain	Ghatiya	Ralayata Haibat	Benefited Village
91	Ujjain	Ghatiya	Salamata	Benefited Village
92	Ujjain	Ghatiya	Sulya	Benefited Village
93	Ujjain	Ghatiya	Gudha	Study area Village
94	Ujjain	Ghatiya	Ganeshnagar	Study area Village
LIST OF VILLAGE IN NAGDA TEHSIL				
95	Ujjain	Nagda	Banbana	Study area Village
96	Ujjain	Nagda	Makla	Study area Village
97	Ujjain	Nagda	Madhavgarh	Study area Village
98	Ujjain	Nagda	Unhel	Study area Village
LIST OF VILLAGE IN UJJAIN TEHSIL				
99	Ujjain	Ujjain	Jabsinghpura	Study area Village
100	Ujjain	Ujjain	Nagziri	Study area Village
101	Ujjain	Ujjain	Kachneriya	Study area Village
LIST OF VILLAGE IN SHAJAPUR TEHSIL				
102	Shajapur	Shajapur	Bamanya Khedi	Benefited Village
103	Shajapur	Shajapur	Bordi	Benefited Village
104	Shajapur	Shajapur	Jadmi	Benefited Village
105	Shajapur	Shajapur	Khakri	Benefited Village
106	Shajapur	Shajapur	Mirpura	Benefited Village
107	Shajapur	Shajapur	Tandabordi	Benefited Village
108	Shajapur	Shajapur	Barwa	Benefited Village
109	Shajapur	Shajapur	Makshi	Benefited Village
LIST OF VILLAGE IN BAGLI TEHSIL				
110	Dewas	Bagli	Anjankhunt	Study area Village
111	Dewas	Bagli	Narsingpura	Study area Village
112	Dewas	Bagli	Putlipura	Study area Village
LIST OF VILLAGE IN DEWAS TEHSIL				
113	Dewas	Dewas	Amlawati	Study area Village
114	Dewas	Dewas	Singawada	Study area Village
115	Dewas	Dewas	Bangarda	Study area Village
116	Dewas	Dewas	Bhangarh	Study area Village
117	Dewas	Dewas	Lasurdiyanajdeek	Study area Village
118	Dewas	Dewas	Baloda	Study area Village
119	Dewas	Dewas	Rajoda	Study area Village
120	Dewas	Dewas	Kelod	Study area Village
121	Dewas	Dewas	Tinoniya	Study area Village
122	Dewas	Dewas	Dabalchooki	Study area Village
LIST OF VILLAGE IN TONK KHURD TEHSIL				
123	Dewas	Tonk Khurd	Alari	Study area Village
LIST OF VILLAGE IN INDORE TEHSIL				
124	Indore	Indore	Kharadiya	Study area Village
125	Indore	Indore	Khandel	Study area Village
126	Indore	Indore	Pedmi	Study area Village

SL.NO	DISTRICT	TEHSIL	VILLAGE NAME	VILLAGE CATEGORY
LIST OF VILLAGE IN BARWAHA TEHSIL				
127	Khargaone	Barwaha	Mendhi Kheda	Study area Village
128	Khargone	Barwaha	Badel	Study area Village
TOTAL VILLAGES IN TARANA TEHSIL				78 Benefited
TOTAL VILLAGES IN GHATIYA TEHSIL				16 (14 Benefited and 2 Study area villages)
TOTAL VILLAGES IN NAGDA TEHSIL				4 (Study area villages)
TOTAL VILLAGES IN UJJAIN TEHSIL				3 (Study area villages)
TOTAL VILLAGES IN SHAJAPUR TEHSIL				8 (Benefited Villages)
TOTAL VILLAGES IN BAGLI TEHSIL				3 (Study area villages)
TOTAL VILLAGES IN DEWAS TEHSIL				10 (Study area villages)
TOTAL VILLAGES IN TONK KHURD TEHSIL				1 (Study area villages)
TOTAL VILLAGES IN INODRE TEHSIL				3 (Study area villages)
TOTAL VILLAGES IN BARWAHA TEHSIL				2 (Study area villages)
TOTAL NUMBER OF VILLAGES				128

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 111 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 16.92 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 1692510 m³, however, this surplus quantity will be generated from 2657.036 km long trench excavated for laying of rising main and distributaries. This quantity will be spread linearly for 2657.036 km and per m dug material generation will be of the order of 0.64 m³ 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. This quantity is estimated as 74871 m³.

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. 150 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 79.934 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 79.934 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 (159.868 ha) of the above ground component of forest land diversion in the denuded or degraded forest areas [79.934 ha x 2 = 159.868 ha]. It is estimated that an amount of

approximately 879.274 lakh will be required for compensatory afforestation (159.868 ha @ Rs 5.5 lakh/ha = 879.274 lakh) and Rs. 500.38 lakh for Net Present Value (NPV) (79.934 ha @ Rs 6.26 lakh/ha = 500.38 lakh) thus a total of Rs. 1379.654 lakh or Rs. 1380 lakh is budgeted. However, site specific detailed scheme for Compensatory afforestation shall be prepared and undertaken by State Forest Department and expenditure will be based on actual compensation calculated by them.

Plantation in Command Area: To improve green cover for floral and faunal improvement in the command, it is proposed that plantation in 150 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. 675 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. 2730.00 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	1692510 cu.m.	150.00							150.00
2	Compensatory Afforestation	79.934 ha	1380.00							1380.00
3	Plantation in Command Area	150 ha	400.00	70.00	70.00	50.00	50.00	35.00	275.00	675.00
4	Measures for Improvement in Public Health	200 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			15.00	15.00				30.00	30.00
	TOTAL (Rs. in lakh)		1985.00	227.00	203.00	120.00	110.00	85.00	745.00	2730.00

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	17 locations twice a year	--	4.00	4.00	4.00	4.00	4.00	20.00	20.00
2	Soil characteristics	13 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
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	1692510 cu.m.	150.00							150.00
2	Compensatory Afforestation	79.934 ha	1380.00							1380.00
3	Plantation in Command Area	150 ha	400.00	70.00	70.00	50.00	50.00	35.00	275.00	675.00
4	Measures for Improvement in Public Health	200 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 Checkup			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			15.00	15.00				30.00	30.00

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)		1985.00	227.00	203.00	120.00	110.00	85.00	745.00	2730.00
MONITORING BUDGET										
1	Surface & Ground Water	17 locations twice a year	--	4.00	4.00	4.00	4.00	4.00	20.00	20.00
2	Soil characteristics	13 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
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)		1986.00	251.00	227.00	144.00	126.50	101.50	850.00	2836.00

10. PROJECT BENEFITS

The project will bring water to 100 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.

Out of total planned discharge of 15 cumec for the project, 1/3rd or 5 cumec is dedicated to industrial and domestic water supply to serve areas in Ujjain and Shahjapur district. This will bring substantial benefits to the villages where drinking water availability is cause of concern. Industrial water supply shall also bring benefits in terms of establishment of industrial units bringing employment opportunities and other indirect benefits to the area.

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.