

Environmental Assessment Document

Initial Environmental Examination: Sawai Madhopur Water Supply
Project Number: 40031
September 2008

India: Rajasthan Urban Sector Development Investment Program

Prepared by Local Self Government Department

For the Government of Rajasthan
Rajasthan Urban Infrastructure Development Project

The initial environmental examination is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

ABBREVIATION

ADB	Asian Development Bank
CWR	Clear Water Reservoir
DSC	Design and Supervision Consultancy
EA	Executing Agency
EAC	Expert Appraisal Committee
FI	Financial Intermediary
GLSR	Ground Level Service Reservoir
Goi	Government of India
GoR	Government of Rajasthan
GSI	Geological Survey of India
IA	Implementing Agency
IEE	Initial Environmental Examination
IPMC	Investment Programme Management Consultancy
IPMU	Investment Programme Management Unit
JNNURM	Jawaharlal Nehru National Urban Renewal Mission
LPCD	Litre Per Capita per Day
LPS	Litre Per Second
LSGD	Local Self-Government Department
MFF	Multitranchise Financing Facility
MLD	Million litre Per day
MoEF	Ministry of Environment and Forests
NAAQS	National Ambient Air Quality Standards
OD	Outer Diameter
OHSR	Over Head Service Reservoir
OM	Operations Manual
PHED	Public Health Engineering Department
PMU	Project Management Unit
RCC	Reinforced Cement Concrete
ROW	Right of Way
RPCB	Rajasthan State Pollution Control Board
RSPM	Respirable Suspended Particulate Matter

RUIDP	Rajasthan Urban Infrastructure Development Project
RUSDIP	Rajasthan Urban Sector Development Investment Program
SPM	Suspended Particulate Matter
STP	Sewerage Treatment Plant
ToR	Terms of Reference
UA	Urban Agglomeration
UIDSSMT	Urban Infrastructure Development Scheme for Small and Medium Towns
uPVC	Unplasticized Poly Vinyl Chloride
USEPA	United States Environmental Protection Agency
WC	Water Closets
WTP	Water Treatment Plant

WEIGHTS AND MEASURES

lakh	–	100 thousand = 100,000
crore	–	100 lakhs = 10,000,000
$\mu\text{g}/\text{m}^3$	–	micrograms per cubic meter
km	–	kilometer
lpd	–	liters per day
m	–	meter
mg/l	–	milligrams per liter
mm	–	millimeter
ppm	–	parts per million

NOTE{S}

- (i) In this report, "\$" refers to US dollars.
- (ii) "INR" and "Rs" refer to Indian rupees

CONTENTS

I. INTRODUCTION	1
A. Purpose of the report	1
B. Extent of the IEE study	1
II. DESCRIPTION OF THE PROJECT	3
A. Type, Category and Need	3
B. Location, Size and Implementation Schedule	3
C. Description of the Sub-project	3
III. DESCRIPTION OF THE ENVIRONMENT	12
A. Physical Resources	12
B. Ecological Resources	22
C. Economic Development	23
D. Social and Cultural Resources	29
IV. ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES: LOCATION AND DESIGN	32
V. ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES: INFRASTRUCTURE CONSTRUCTION	32
A. Screening out areas of no significant impact	32
B. Source and supply augmentation	33
C. Network improvement	35
VI. POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES: OPERATION AND MAINTENANCE	42
A. Screening out areas of no significant impact	42
B. Operation and maintenance of the improved water supply system	43
C. Environmental impacts and benefits of the operating system	43
VII. INSTITUTIONAL REQUIREMENTS AND ENVIRONMENTAL MONITORING PLAN	45
A. Summary of environmental impacts and mitigation measures	45

B. Institutional arrangements for project implementation	45
C. Environmental Monitoring Plan	51
D. Environmental management and monitoring costs	55
E. Associated Facilities	56
VIII. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE	56
A. Project stakeholders	56
B. Consultation and disclosure to date	57
C. Future consultation and disclosure	58
IX. FINDINGS AND RECOMMENDATIONS	59
A. Findings	59
B. Recommendations	62
X. CONCLUSIONS	62
APPENDIX - 1 PHOTOGRAPHS	64
APPENDIX - 2 PHED LETTER	65
APPENDIX – 3 Rapid Environmental Assessment (REA) Checklist	66
APPENDIX - 4 PUBLIC CONSULTATION- ENVIRONMENT	72

I. INTRODUCTION

A. Purpose of the report

1. Rajasthan Urban Sector Development Investment Program (RUSDIP) is intended to optimize social and economic development in 15 selected towns in the State, particularly district headquarters and towns with significant tourism potential. This will be achieved through investments in urban infrastructure (water supply; sewerage and sanitation; solid waste management; urban drainage; urban transport and roads), urban community upgrading (community infrastructure; livelihood promotion) and civic infrastructure (art, culture, heritage and tourism; medical services and health; fire services; and other services). RUSDIP will also provide policy reforms to strengthen urban governance, management, and support for urban infrastructure and services. The assistance will be based on the State-level framework for urban reforms, and institutional and governance reforms recommended by the Government of India (GoI) through the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) and Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT).

2. RUSDIP Phase II to be implemented over a seven year period beginning in 2008, and will be funded by a loan via the Multi-tranche Financing Facility (MFF) of the ADB. The Executing Agency (EA) is the Local Self-Government Department (LSGD) of the Government of Rajasthan (GoR); and the Implementing Agency (IA) is the Project Management Unit (PMU) of the Rajasthan Urban Infrastructure Development Project (RUIDP), which is currently in the construction stage.

3. RUSDIP will improve infrastructure through the design and implementation of a series of subprojects, each providing improvements in a particular sector (water supply, sewerage, solid waste etc) in one town. RUSDIP has been classified by ADB as environmental assessment category B (some negative impacts but less significant than category A). The impacts of subprojects prepared according to ADB Environment Policy (2002) and Environmental Assessment Guidelines (2003).

B. Extent of the IEE study

4. Indian law and ADB policy require that the environmental impacts of development projects are identified and assessed as part of the planning and design process, and that action is taken to reduce those impacts to acceptable levels. This is done through the environmental assessment process, which has become an integral part of lending operations and project development and implementation worldwide.

1 ADB Policy

5. ADB's Environment Policy requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for Environmental Assessment are described in Operations Manual (OM) 20: Environmental Considerations in ADB Operations. This states that ADB requires environmental assessment of all project loans, programme loans, sector loans, sector development programme loans, financial intermediation loans and private sector investment operations.

6. The nature of the assessment required for a project depends on the significance of its environmental impacts, which are related to the type and location of the project, the sensitivity, scale, nature and magnitude of its potential impacts, and the availability of cost-effective

mitigation measures. Projects are screened for their expected environmental impacts and are assigned to one of the following categories:

- Category A: Projects that could have significant environmental impacts. An Environmental Impact Assessment (EIA) is required.
- Category B: Projects that could have some adverse environmental impacts, but of less significance than those for category A. An Initial Environmental Examination (IEE) is required to determine whether significant impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report.
- Category C: Projects those are unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are reviewed.
- Category FI: Projects that involve a credit line through a financial intermediary (FI) or an equity investment in a FI. The FI must apply an environmental management system, unless all subprojects will result in insignificant impacts.

7. The Bank has categorised this program as Category B and following normal procedure for MFF loans has determined that one Environmental Examination will be conducted for each subproject, with a subproject being the infrastructure improvements in a particular sector (water supply, sewerage, etc) in one town.

2 National Law

8. The GoI EIA Notification of 2006 (replacing the EIA Notification of 1994), sets out the requirement for Environmental Assessment in India. This states that Environmental Clearance (EC) is required for specified activities/projects, and this must be obtained before any construction work or land preparation (except land acquisition) may commence. Projects are categorised as A or B depending on the scale of the project and the nature of its impacts.

9. Categories A projects require Environmental Clearance from the National Ministry of Environment and Forests (MoEF). The proponent is required to provide preliminary details of the project in the form of a Notification, after which an Expert Appraisal Committee (EAC) of the MoEF prepares comprehensive Terms of Reference (ToR) for the EIA study, which are finalized within 60 days. On completion of the study and review of the report by the EAC, MoEF considers the recommendation of the EAC and provides the EC if appropriate.

10. Category B projects require environmental clearance from the State Environment Impact Assessment Authority (SEIAA). The State level EAC categorises the project as either B1 (requiring EIA study) or B2 (no EIA study), and prepares TOR for B1 projects within 60 days. On completion of the study and review of the report by the EAC, the SEIAA issues the EC based on the EAC recommendation. The Notification also provides that any project or activity classified as category B will be treated as category A if it is located in whole or in part within 10 km from the boundary of protected areas, notified areas or inter-state or international boundaries.

11. The only type of infrastructure provided by the RUSDIP that is specified in the EIA Notification is solid waste management, where EC is required for all Common Municipal Solid

Waste Management Facilities (facilities that are shared by more than one town)¹. EC is thus not required for the water supply sub-project that is the subject of this Environmental Examination.

3 Review and Approval Procedure

12. For Category B projects the Draft Environmental Status report and its summary (SIEE) are reviewed by ADB's Regional Department sector division and Environment and Social Safeguards Division, and by the Executing Agency, and additional comments may be sought from project affected people and other stakeholders. All comments are incorporated in preparing the final documents, which are reviewed by the Executing Agency and the national environmental protection agency (MoEF in this case). The EA then officially submits the IEE and SIEE reports to ADB for consideration by the Board of Directors. Completed reports are made available worldwide by ADB, via the depository library system and the ADB website.

4 Scope of Study

13. This is the IEE report for the Sawai Madhopur water supply sector. It discusses the generic environmental impacts and mitigation measures relating to the location, design, construction and operation of physical works proposed under this subproject.

II. DESCRIPTION OF THE PROJECT

A. Type, Category and Need

14. This is a water supply sub-project, and as explained above it has been classified by ADB as Category B, because it is not expected to have major negative environmental impacts. Under ADB procedures such projects require an IEE to identify and mitigate the impacts, and to determine whether further study or a more detailed EIA may be required. The sub-project is needed because the present water supply infrastructure in Sawai Madhopur is inadequate for the needs of the growing population.

15. The provision is also unequal, with un-served areas being mainly the slums and newly-developed areas. This is one of a series of subprojects designed by the RUSDIP that are intended to raise the standards of the municipal infrastructure and services of Sawai Madhopur and the other urban centres to those expected of modern Asian towns.

B. Location, Size and Implementation Schedule

16. The sub-project is located in Sawai Madhopur, the headquarters town of Sawai Madhopur District, in the Eastern part of Rajasthan (**Figure 2.1**). Improvements in the distribution system will affect only certain parts of the town, such as slums and developing areas where a new network will be provided, and certain other locations where clear water reservoir and overhead storage reservoirs will be built. **Figure 2.2, 2.3** shows proposed water supply scheme of the city. **Figure 2.4** shows location of water supply scheme plotted on Google map. Photographs of the project area are attached as **Appendix II - A**

C. Description of the Sub-project

¹ According to the Rajasthan State Pollution Control Board, the MoEF intends to issue a clarification to the EIA Notification in due course, which will add all landfill facilities and Sewage Treatment Plants to the list of projects specified as requiring EC under the Notification. This has not yet been issued, so the text above indicates the correct legal position at the time of writing

1 Service Delivery, existing water supply arrangement

17. Present water supply for the town, is from both surface and ground water supply sources. There are 78 tube wells and 10 open wells to supply water to Sawai Madhopur town. Water is also lifted from Banas River through existing 5 nos. Open well connected to intake well constructed on the bank of Banas River. Total production from all these sources presently is 8.0 MLD. The present supply of the city is reported as 40 lpcd, which is much lower than the standard indicated in the CPHEEO manual i.e. 135 lpcd. These tube wells are being used for fulfilling the water demand of the entire city, either through direct boosting or by feeding the rising mains. Power availability of the city is for 20 hrs per day. Available water supply to the peoples of Sawai Madhopur town is approx. 40 lpcd for 2007 estimated population of 118,853 souls. Condition aggravates during summer when the per capita service level is further reduce. In addition to the inadequate production, the system suffers from old and leaking distribution lines, inequitable pressure distribution etc. At present, there are total 13,421 connections. Out of this, 11,473 connections are domestic. The rest are commercial and industrial. Most of the connections, though metered, are not functional in working condition. At present water is being disinfected through application of bleaching powder, which is rudimentary and inefficient. The existing situation warrants urgent source augmentation, rehabilitation/improvement of the existing distribution system including storage provision. The subproject is also expected, inter alia, to reduce the UFW by billing for actual quantity of water supply by applying volumetric rate. The subproject is designed for a net water supply of 135 lpcd with 20% losses for a design population of 2041. The source augmentation is being done by PHED in stages. Also included in the subproject is adequate disinfection arrangement. All civil works are designed to meet 2041 needs while all mechanical and electrical equipment are designed for 2026 requirement.

2 Sub-project description including detailed scope of work

18. The Sub-project will construct the downstream facilities and strengthen the existing water supply system for the town to receive and distribute the additional 24.79 MLD water supplied through the Chambal- Sawai Madhopur- Nadoti Project (CSNP) implemented by PHED. The Subproject is also expected, inter alia, to reduce the unaccounted for water (UFW) by billing for the actual quantity of water supplied, since the house connections will be expanded to cover at least 90% of the town population, with either new water meters or rehabilitated water meters which are proposed to installed with PHED. Disinfection facilities, in the form of chlorinator plants at the CWRs, are also proposed and the distribution network will be expanded and strengthened to fully absorb the additional water supply from the Chambal-Sawai Madhopur- Nadoti Project. Detailed plan and commitment to guarantee the required water supply for Sawai Madhopur is given in Appendix –II-B

19. Scope and components of the works consist of providing and laying of rising main, construction of CWRs, OHSRs, construction of pump houses including mechanical and electrical works, procurement and installation of bulk water meters and house meter, etc., detailed as follows:

- a. Providing rising mains of 100 to 600 mm dia of 27.21 km
- b. Providing and laying distribution main pipeline of approx. 57.23 Km length of dia 90 mm to 315 mm.
- c. Construction of 8 nos. of OHSRs of total capacity of 5800 KL at Bal Mandir (500 KL), Commerce College (1250 KL), Harijan basti (350 KL),

Hameer Nagar (500 KL), Maharana Pratap Colony (1000 KL), Raigar Basti (350 KL), School 72 Steps (1000 KL), Vigyan Nagar(750 KL).

- d. Construction of CWR 2 nos. of capacity 2500 KL at Bal Mandir and 1000 KL at 72 Steps Higher secondary school in walled city.
- e. Construction of Pump house at Chambal head works 3 nos.
- f. Construction of Pump house at Man town existing campus with provision of 2 nos. (1+1) pumps of 68 lps and 36 m head
- g. Construction of Pump house at Commerce College with provision of 4 nos. (2+2) pumps
- h. Construction of Pump house near Bal Mandir with provision of 6 nos. (3+3) pumps.
- i. Construction of Pump house near 72 steps, walled city with provision of 8 nos. (4+4) pumps
- j. Construction of 6 nos (3+3) pumps at existing pump house at Behru Darwaza
- k. 5 nos. Chlorinators at head works
- l. Procurement and installation of 12 nos. electro-magnetic Bulk Flow Meter
- m. Providing of new house connections 13400 nos.
- n. Rehabilitation of existing meter of approx. 3500 nos.

20. Water will be brought from Chambal- Sawai Madhopur- Nadoti Project to the proposed CWR of 3.61 ML capacity under PHED located at Transport Nagar near RTO office on Gangapur road. The construction of CWR is under progress and the cleared will be brought to Man town head work, Hanuman Mandir Head work and Walled city Head work by a feeder line of 500/450/350 mm dia. line i.e. feeder A. From RTO office Pump house one feeder B of dia 200 mm will feed two nos. OHSRs. From man town Pump house two feeder C & D of dia 250 mm will feed 4 nos. OHSRs each. From Hanuman Mandir Head work, Feeder E will feed 4 nos. OHSRs and from Walled city Pump house feeder F will feed to the 4 nos. walled city OHSRs. One line of 300 mm dia is also proposed to collect the tube well water from Mansinghpura to Man town CWR. There will be two nos Railway crossing, permission for which is to be avail from concern Railway department. From the OHSRs water will be distributed to the households through the rehabilitated or newly constructed distribution network. 100 % consumer metering will be carried out for the design population of 2011. The bulk meters will be provided at all supply points to measure the quantity of water supply and to enable system monitoring. The complete rehabilitation of the existing system will increase the efficiency of the system and reduce the losses and proportionate O& M cost. The existing sub-surface source will also be used in the system to meet the gap between the demand and the available surface water. Water from the tube wells yielding water with high Flouride and TDS content will be blended with surface water to meet the potable water quality standard as per the Indian standards.

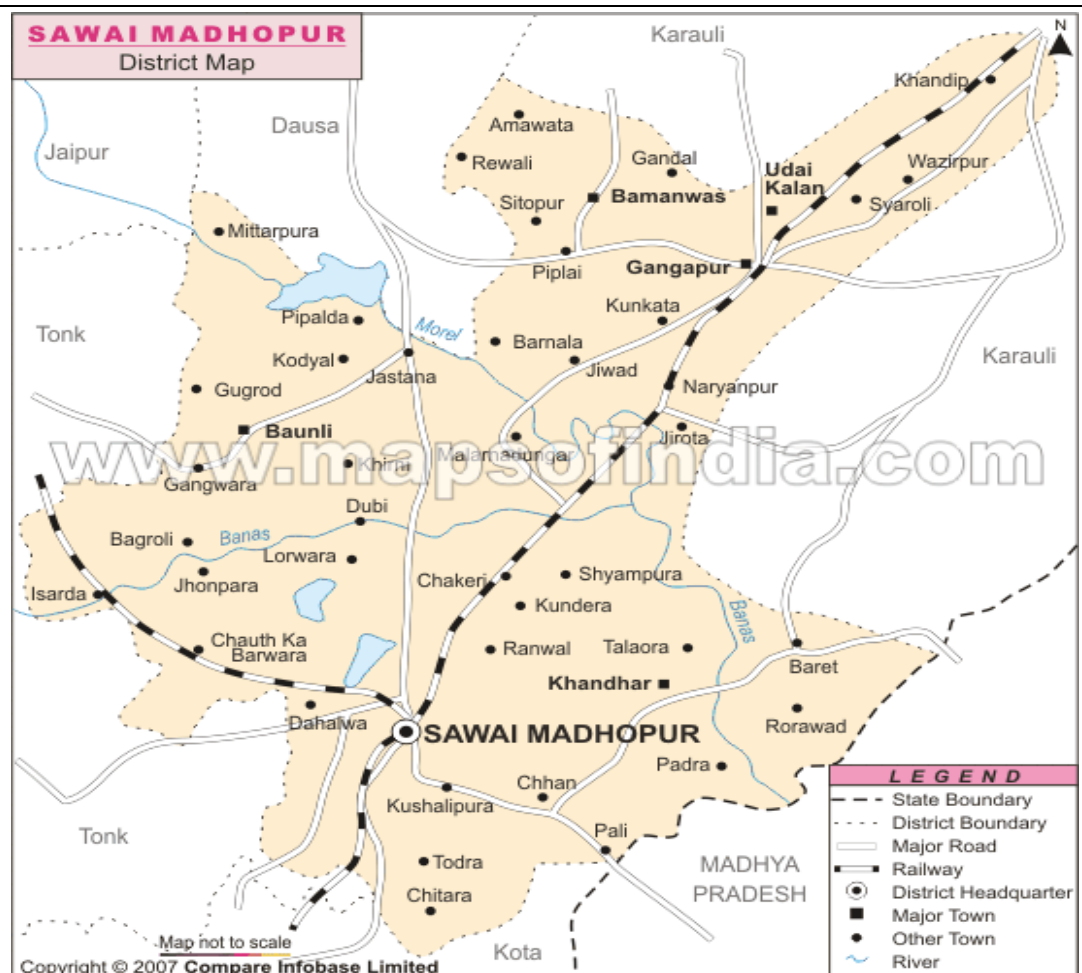
21. A schematic of the proposed water supply system and the proposed layout are shown in Figure 2.2 and 2.3, respectively.

22. The Subproject is designed for a net water supply of 135 lpcd at the household end, for a design population of 2041, and with physical or system losses maintained at 20% after the completion of the project. All civil works and pipe sizing are designed to meet 2041 (projected

population's) needs, while all mechanical and electrical equipment are designed for 2026 (projected population's) requirement.

23. Table 2.1 shows the nature and size of the various components of the subproject. There are three main elements: augmentation of the water source and supply; treatment facility; expansion/improvement of the distribution network; and reduction of non-revenue water (NRW). The descriptions shown in Table 2.1 are based on the present proposals, which are expected to be substantially correct, although certain details may change as development of the subproject progresses.

Figure 2.1: Map showing the location of the project



**Rajasthan Urban Sector Development
Investment Program
ADB TA 4814-IND**

Sawai Madhopur Regional Map

**Govt of Rajasthan
Asian Development Bank**

Table 2.1: Improvements in water supply infrastructure proposed in Sawai Madhopur

Infrastructure	Function	Description	Location
1. Source and Supply Augmentation			
Rising main	To connect OHSR	Providing and laying of DI rising main pipeline of approx. 27.21 Km length of dia 100 mm to 600 mm.	Underground along the main roads of the Town
2 Expansion of Distribution Network			
Distribution mains	Supply water to newly developed area	Providing and laying of DI/uPVC distribution pipe line of approximately 57.23 km length of dia 100 mm to 400 mm.	All over the city.
Clear Water Reservoirs	Storage of Clean and treated water	Construction of CWR 2 nos. of capacity 2500 KL at Bal Mandir and 1000 KL at 72 Steps Higher secondary school in walled city	At Bal Mandir and 1000 KL at 72 Steps Higher secondary school in walled city.
Overhead Reservoirs	Increase water supply to regulate water supply	Construction of 8 nos. OHSRs of total capacity of 5800 KL	Bal Mandir (500 KL), Commerce College (1250 KL), Harijan basti (350 KL), Hameer Nagar (500 KL), Maharana Pratap Colony (1000 KL), Raigar Basti (350 KL), School 72 Steps (1000 KL), Vigyan Nagar(750 KL)
Chlorination Plants	To disinfect of water by chlorination.	5 nos. Chlorinators to be installed	At head works
New pump houses	Improve water supply and Pressure	Construction of 6 Pump houses	At Chambal headworks, Bal Mandir, Commerce college, Man Town, Bheru Darwaza and Near Walled city(72 steps)
3. Meters and House Connections			
Repair of house connections	Repair leaks and increase the amount and pressure of water reaching consumers	Providing of new house connections 13400 nos. Rehabilitation of existing meter of approx. 3500 nos.	In and around the city.
Bulk flow meters	Monitor water flow in the improved network	Procurement of 12 nos. electro-magnetic Bulk Flow Meter	At required place.

Figure 2.2: Index plan on water supply system at Sawai Madhopur

PROPOSED WATER SUPPLY SYSTEM (INDEX PLAN) FOR SAWAI MADHOPUR

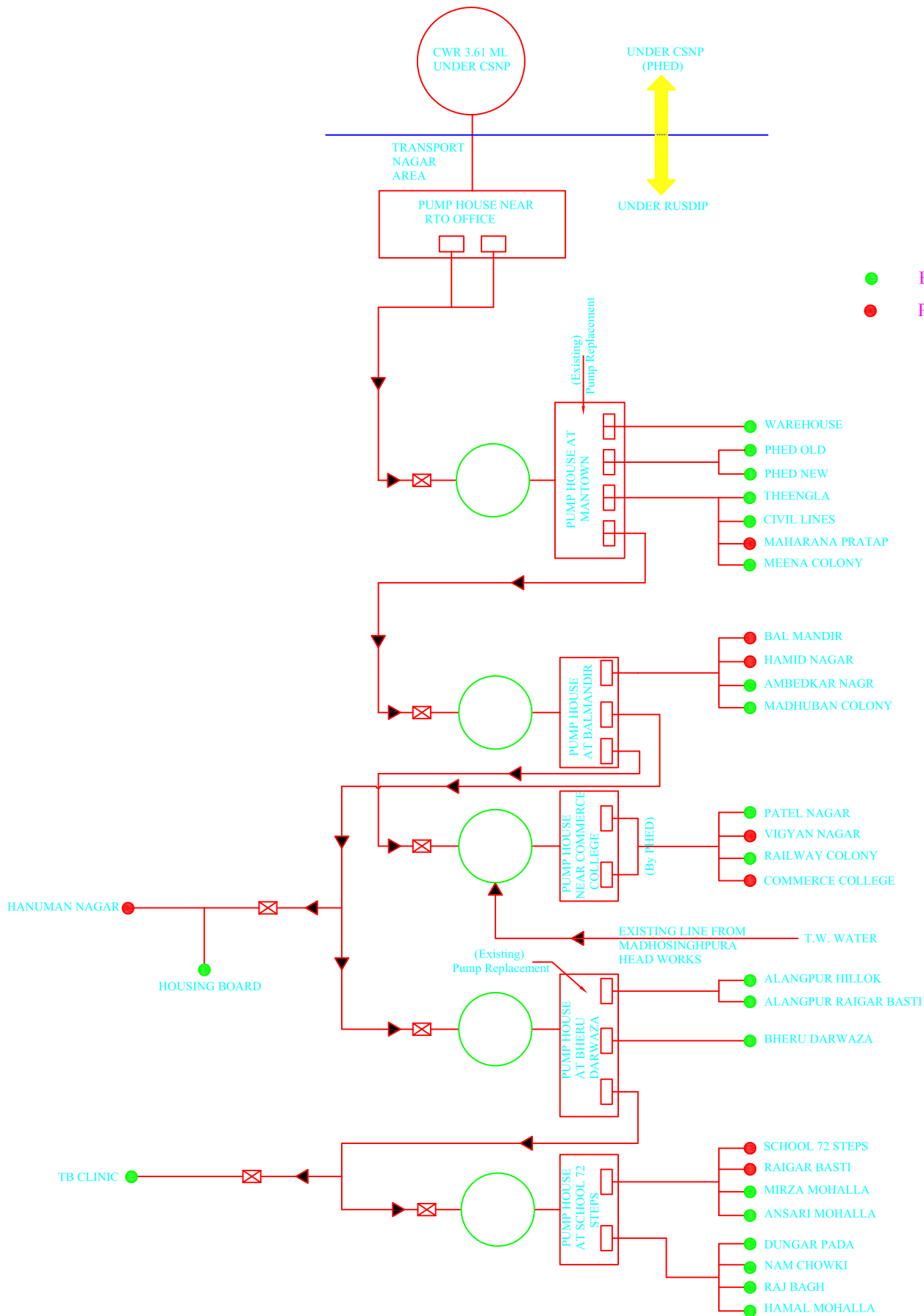
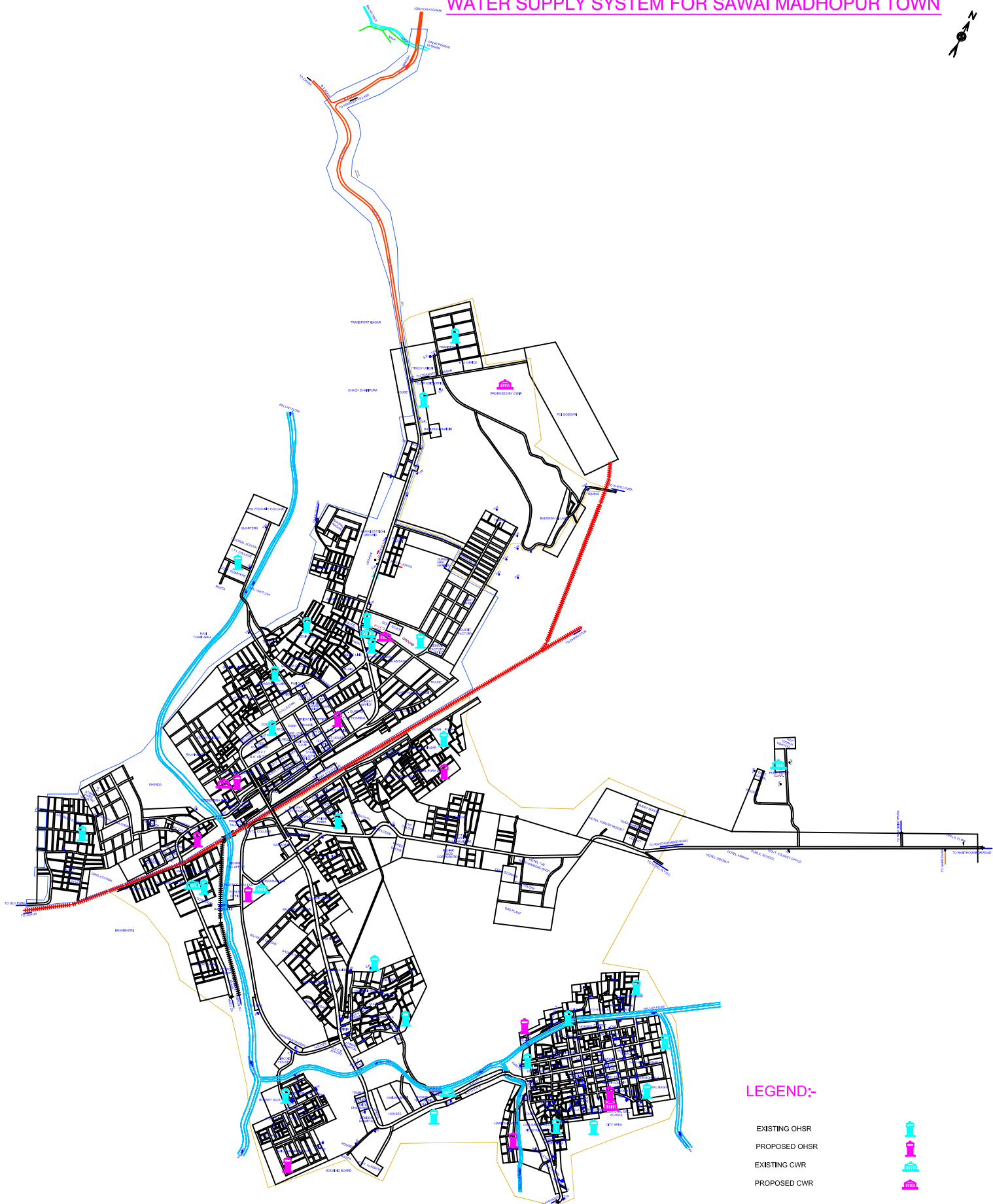


Figure 2.3: Proposed water supply system of Sawai Madhopur

WATER SUPPLY SYSTEM FOR SAWAI MADHOPUR TOWN



LEGEND:-

- EXISTING OHSR
- PROPOSED OHSR
- EXISTING CWR
- PROPOSED CWR



Figure 2.4: Location of water supply scheme in Google map

CHAMBAL-SAWAI MADHOPUR-NADAUTI PROJECT (CSNP) UNDER PHED



Image © 2008 TerraMetrics
Image © 2008 DigitalGlobe
© 2008 Europa Technologies

© 2007 Google™

Pointer 26°17'15.17" N 76°55'09.87" E elev 364 m

Streaming ||||| 100%

Eye all 143.18 km

III. DESCRIPTION OF THE ENVIRONMENT

A. Physical Resources

1 Location

24. The Urban Agglomeration (UA) of Sawai Madhopur district is located about 180 km in the north-eastern of Jaipur along the rolling hills of Vindhya and Aravalli ranges. It is surrounded by Kota, Tonk, Karauli districts. The total area of the district is 504,299 sq.km. Sawai Madhopur city is the administrative headquarter of the district. The district has been divided into 4 sub-divisions viz. Sawai Madhopur, Bonli, Gangapur City, Bamanwas. There are seven tehsil headquarter in this district. Viz. Sawai Madhopur, Khandar, Choth Ka Barwara, Bonli, Malarna Dungar, Gangapur City, Bamanwas.

25. Sawai Madhopur is well connected by road network and is connected with Jaipur, Delhi and other important cities. It is about 428 Kms from Delhi, 167 Kms from Jaipur. The nearest Airport is at Jaipur (190 km). The Delhi-Bombay broad-gauge railway lines pass through Sawai Madhopur, Gangapur and Hindaun towns of the district. A broad-gauge line connecting Jaipur with Sawai Madhopur passes through Isarda, Chauth-Ka-Barwara and Deopura stations. District map of Sawai Madhopur shown in **Figure 3.1**.

2 Topography, Drainage, Natural hazard and Drought

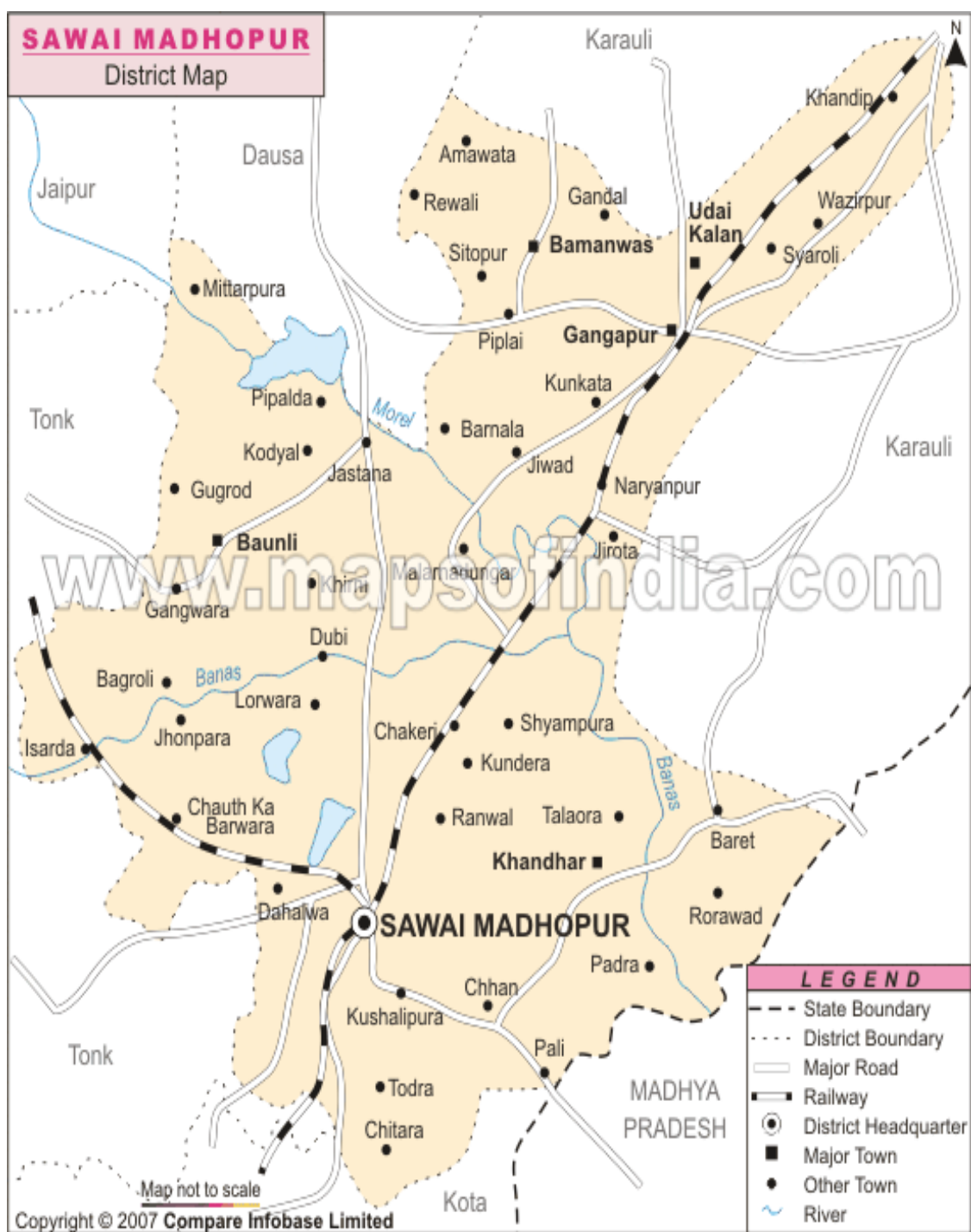
26. Topography Sawai Madhopur is the district headquarters. It is located at latitude 25°45' north and longitude 75°59' east, at a height of about 400-600m above the mean sea level.

27. Drainage: In the east of Aravalli ranges the main drainage is towards north east. The Chambal catchment occupies 21% of the total geographical area.

28. Natural Hazards- Earthquake: Sawai Madhopur town lies in low damage risk zone II. The area is less prone to earthquakes as it is located on relatively stable geological plains based on evaluation of the available earthquake zone information. Figure 3.2 depicts the earthquake zones of Rajasthan. Natural hazard zone of Sawai Madhopur district is shown in Figure 3.3.

29. Drought: Low rainfall coupled with erratic behavior of the monsoon in the State makes Rajasthan the most vulnerable to drought. Based upon the discussion with PHED officials the water table in the City continuously decreases by 1-2 meter on an annual basis combined with significant drawdown conditions.

Figure 3.1: District Map of Sawai Madhopur



INDIA

RAJASTHAN

PAKISTAN

GUJARAT

MADHYA PRADESH

UTTAR PRADESH

PUNJAB

HARYANA

Legend:

- BOUNDARY LINE:**
 - DISTRICT BOUNDARY
 - STATE BOUNDARY
 - NH
 - SH
 - PROJECT AREA
- OVERLAY LINE:**
 - Earthquake high damage risk zone - I (MR-VI)
 - Earthquake moderate damage risk zone - II (MR-V)
 - Earthquake low damage risk zone - III (MR-IV)

RAJASTHAN URBAN SECTOR DEVELOPMENT INVESTMENT PROGRAM	
SECTOR-	TITLE-
EARTHQUAKE ZONES	
CONTENT- CLP DRAWING	DRAWING NO. RUS/0000000000
PREPARED BY- DR. J. K. SHARMA	DATE-
DATE-	SCALE- 1:50,000
CONSULTING ENGINEERING SERVICES (P) PRIVATE LIMITED No. 1/1, 1/2, 1/3, 1/4, 1/5, 1/6, 1/7, 1/8, 1/9, 1/10, 1/11, 1/12, 1/13, 1/14, 1/15, 1/16, 1/17, 1/18, 1/19, 1/20, 1/21, 1/22, 1/23, 1/24, 1/25, 1/26, 1/27, 1/28, 1/29, 1/30, 1/31, 1/32, 1/33, 1/34, 1/35, 1/36, 1/37, 1/38, 1/39, 1/40, 1/41, 1/42, 1/43, 1/44, 1/45, 1/46, 1/47, 1/48, 1/49, 1/50, 1/51, 1/52, 1/53, 1/54, 1/55, 1/56, 1/57, 1/58, 1/59, 1/60, 1/61, 1/62, 1/63, 1/64, 1/65, 1/66, 1/67, 1/68, 1/69, 1/70, 1/71, 1/72, 1/73, 1/74, 1/75, 1/76, 1/77, 1/78, 1/79, 1/80, 1/81, 1/82, 1/83, 1/84, 1/85, 1/86, 1/87, 1/88, 1/89, 1/90, 1/91, 1/92, 1/93, 1/94, 1/95, 1/96, 1/97, 1/98, 1/99, 1/100, 1/101, 1/102, 1/103, 1/104, 1/105, 1/106, 1/107, 1/108, 1/109, 1/110, 1/111, 1/112, 1/113, 1/114, 1/115, 1/116, 1/117, 1/118, 1/119, 1/120, 1/121, 1/122, 1/123, 1/124, 1/125, 1/126, 1/127, 1/128, 1/129, 1/130, 1/131, 1/132, 1/133, 1/134, 1/135, 1/136, 1/137, 1/138, 1/139, 1/140, 1/141, 1/142, 1/143, 1/144, 1/145, 1/146, 1/147, 1/148, 1/149, 1/150, 1/151, 1/152, 1/153, 1/154, 1/155, 1/156, 1/157, 1/158, 1/159, 1/160, 1/161, 1/162, 1/163, 1/164, 1/165, 1/166, 1/167, 1/168, 1/169, 1/170, 1/171, 1/172, 1/173, 1/174, 1/175, 1/176, 1/177, 1/178, 1/179, 1/180, 1/181, 1/182, 1/183, 1/184, 1/185, 1/186, 1/187, 1/188, 1/189, 1/190, 1/191, 1/192, 1/193, 1/194, 1/195, 1/196, 1/197, 1/198, 1/199, 1/200, 1/201, 1/202, 1/203, 1/204, 1/205, 1/206, 1/207, 1/208, 1/209, 1/210, 1/211, 1/212, 1/213, 1/214, 1/215, 1/216, 1/217, 1/218, 1/219, 1/220, 1/221, 1/222, 1/223, 1/224, 1/225, 1/226, 1/227, 1/228, 1/229, 1/230, 1/231, 1/232, 1/233, 1/234, 1/235, 1/236, 1/237, 1/238, 1/239, 1/240, 1/241, 1/242, 1/243, 1/244, 1/245, 1/246, 1/247, 1/248, 1/249, 1/250, 1/251, 1/252, 1/253, 1/254, 1/255, 1/256, 1/257, 1/258, 1/259, 1/260, 1/261, 1/262, 1/263, 1/264, 1/265, 1/266, 1/267, 1/268, 1/269, 1/270, 1/271, 1/272, 1/273, 1/274, 1/275, 1/276, 1/277, 1/278, 1/279, 1/280, 1/281, 1/282, 1/283, 1/284, 1/285, 1/286, 1/287, 1/288, 1/289, 1/290, 1/291, 1/292, 1/293, 1/294, 1/295, 1/296, 1/297, 1/298, 1/299, 1/300, 1/301, 1/302, 1/303, 1/304, 1/305, 1/306, 1/307, 1/308, 1/309, 1/310, 1/311, 1/312, 1/313, 1/314, 1/315, 1/316, 1/317, 1/318, 1/319, 1/320, 1/321, 1/322, 1/323, 1/324, 1/325, 1/326, 1/327, 1/328, 1/329, 1/330, 1/331, 1/332, 1/333, 1/334, 1/335, 1/336, 1/337, 1/338, 1/339, 1/340, 1/341, 1/342, 1/343, 1/344, 1/345, 1/346, 1/347, 1/348, 1/349, 1/350, 1/351, 1/352, 1/353, 1/354, 1/355, 1/356, 1/357, 1/358, 1/359, 1/360, 1/361, 1/362, 1/363, 1/364, 1/365, 1/366, 1/367, 1/368, 1/369, 1/370, 1/371, 1/372, 1/373, 1/374, 1/375, 1/376, 1/377, 1/378, 1/379, 1/380, 1/381, 1/382, 1/383, 1/384, 1/385, 1/386, 1/387, 1/388, 1/389, 1/390, 1/391, 1/392, 1/393, 1/394, 1/395, 1/396, 1/397, 1/398, 1/399, 1/400, 1/401, 1/402, 1/403, 1/404, 1/405, 1/406, 1/407, 1/408, 1/409, 1/410, 1/411, 1/412, 1/413, 1/414, 1/415, 1/416, 1/417, 1/418, 1/419, 1/420, 1/421, 1/422, 1/423, 1/424, 1/425, 1/426, 1/427, 1/428, 1/429, 1/430, 1/431, 1/432, 1/433, 1/434, 1/435, 1/436, 1/437, 1/438, 1/439, 1/440, 1/441, 1/442, 1/443, 1/444, 1/445, 1/446, 1/447, 1/448, 1/449, 1/450, 1/451, 1/452, 1/453, 1/454, 1/455, 1/456, 1/457, 1/458, 1/459, 1/460, 1/461, 1/462, 1/463, 1/464, 1/465, 1/466, 1/467, 1/468, 1/469, 1/470, 1/471, 1/472, 1/473, 1/474, 1/475, 1/476, 1/477, 1/478, 1/479, 1/480, 1/481, 1/482, 1/483, 1/484, 1/485, 1/486, 1/487, 1/488, 1/489, 1/490, 1/491, 1/492, 1/493, 1/494, 1/495, 1/496, 1/497, 1/498, 1/499, 1/500, 1/501, 1/502, 1/503, 1/504, 1/505, 1/506, 1/50	

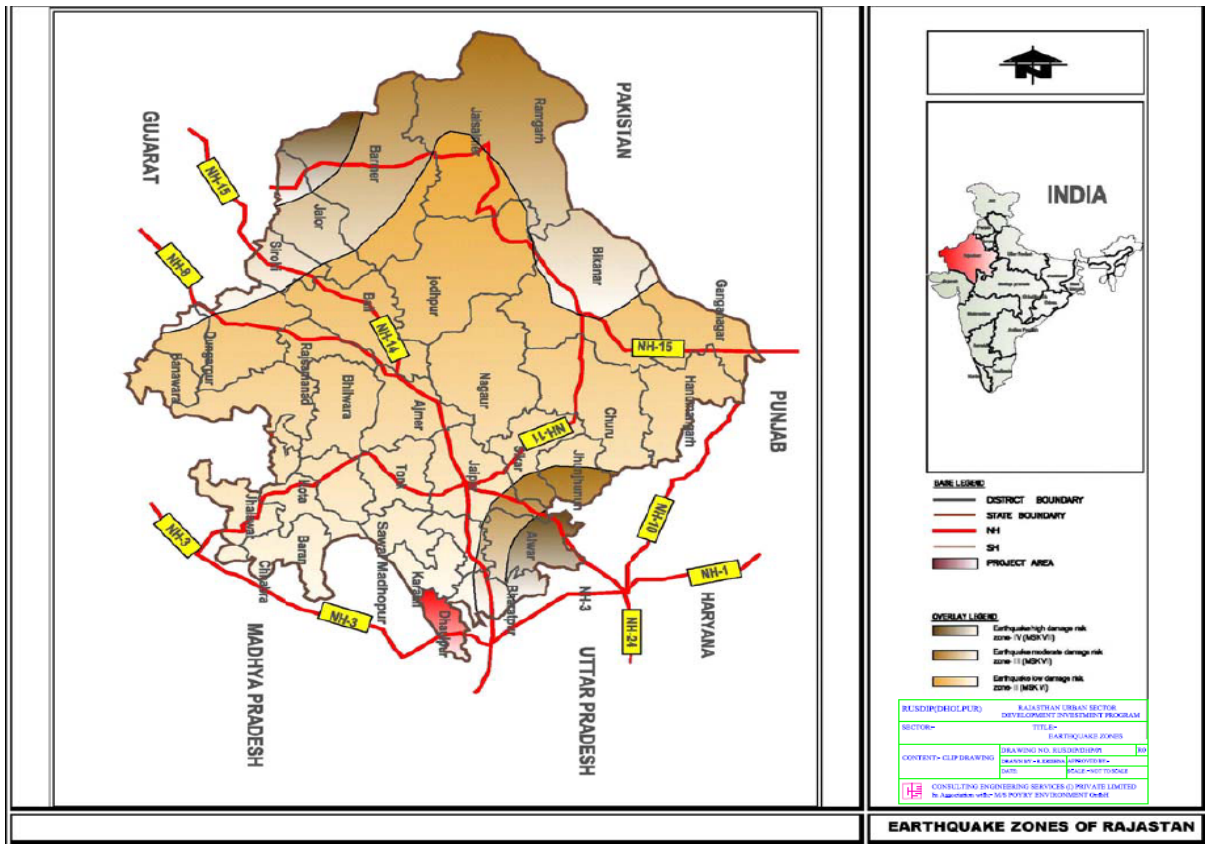
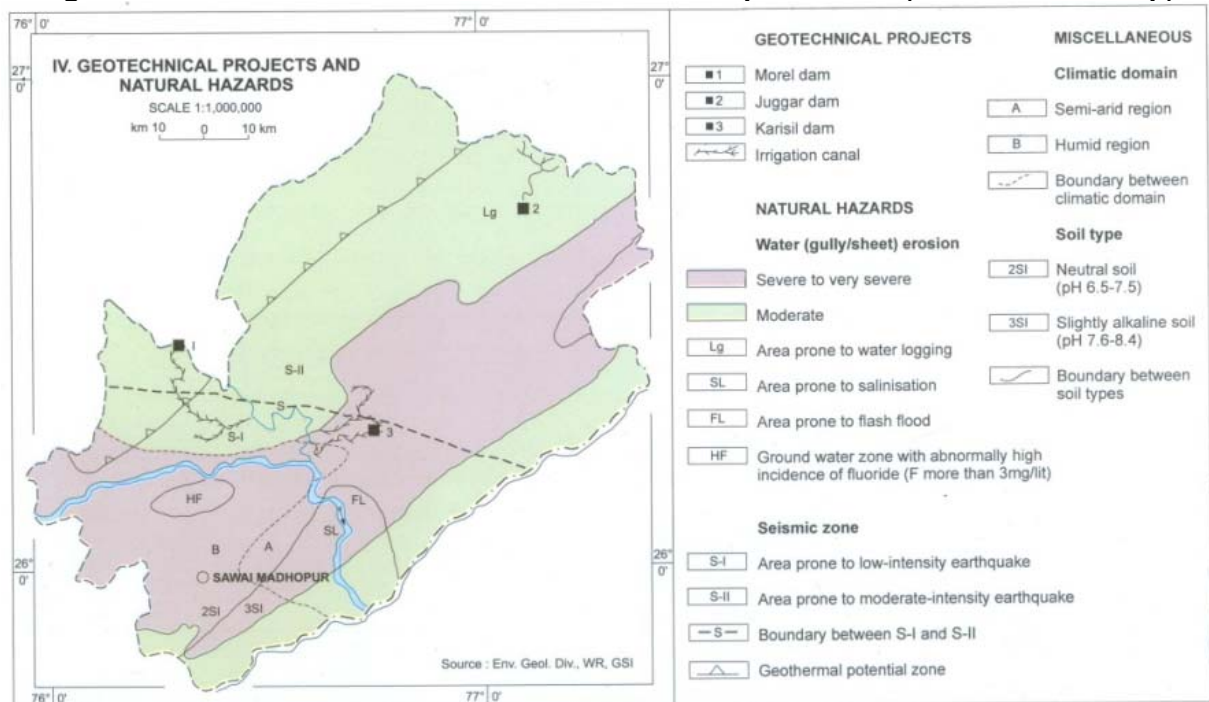


Figure 3.3: Natural Hazard zone within Sawai Madhopur District (GSI Resource map)



3 Geology, geomorphology, mineral resources and soil

30. The climate of the area is semi- arid to humid. The average rainfall is 684mm and the area is drained by Banas, the Gambhiri, the Moral and the Chambal river and their tributaries.

31. The various rocks type exposed in the area belong to Bhilwara, the Delhi and the Vindhyan Supergroups. The Bhilwara Supergroup represented by the Mangalwar Complex, the Hindoli Group and the Ranthambore group is in decreasing order of antiquity, is exposed in south western part. The NE-SW trending linear quartzite ridges between Baunli and Sarsop belong to the Mangalwar Complex. Low grade metamorphites of the Hindoli group indicate shale, slate, phyllite with mirror quartzite which are exposed NW of Jatwara. The overlaying Ranthambor quartzite occurs east of Jathwara and support luxuriant growth of vegetation and hosts game sanctuary. Several quartzite bands belonging to the Alwar Group (Delhi Supergroup) from strike- ridges between Toda Bhim and Gudha Chandraji in northwestern corner of the district. These are intruded by granite. The Vindhyan Supergroup Consist of various types of shale sandstone and limestone is represented by the Bhandar, Rewa, Kaimur, Sand and Satola Groups in increasing order of antiquity. These rocks occupy the eastern half the district and are separated from the older rocks by a major reverse fault, the great Boundary Fault. A major part of these districts is occupied by thick alluvium related to the various river systems.

32. Geomorphologically, the district is classified into nine geomorphic units namely bad land, sand sheet, alluvial plain, pediment, structural and denudational plateau and hills and valleys belonging to Vindhyan and pre-Vindhyan hills valleys are restricted to the western part of the district whereas those of Vindhyan occurs along a northeast – southeast strip through

the middle part of the district. The area classified into three hydro geological domains of unconsolidated porous Quaternary formation, consolidated fissured formation and hilly area with ground water potential ranging from < 1 to 10 LPS. Natural hazards include mainly water erosion which are moderate and severe to very severe. Other hazards include area prone to water logging salination, flash floods and fluorine (Ref. Figure 3.3).

33. Mineral Resources: Sizeable reserves of limestone, soapstone, silica sand china clay and building stones are found in these districts a large district of about 100 Million tones (Mt) of cement grade Vindhyan limestone occurs near Pahlodi (25°50' : 76°20'). The workable limestone bands vary in thickness from 1.5 to 2 m. Additional 100Mt of limestone are likely to be available from Naroli (26°20' : 76°39') and Jirota (26°18' : 76°39') areas. Soapstone, as veins and lenses up to 20m in width, Occurs in within dolomite in the area between Morara (26°48' : 76°44') and Dholeta (26°48' : 76°45') over a strike length of 8 km. the significant deposits are located at Rajauli (26°49' : 76°47'), Garhi (26°49' : 76°48') and Kampura (26°48' : 76°46'). Inferred reserves of 0.01Mt have been proved for these deposit. Good quality sand occurs near Sapotra (26°18' : 76°45'), Naroli, Tatwara Railway Station (26°21' : 76°37') and near Alanpur (26°00' : 76°21') China clay (Kaolin) associated with feldspathic quartzite occurs near Raisana (26°42' : 76°35'), Basu(26°10' : 76°33'), Phalodi and Matasor (26°42' : 76°55'). The estimated reserves in Raisana and Basu area are of the order of 3.17Mt. The Banjari mines at Chauth – ka – Barwara (26°44' : 76°06') is well known old working for Lead. Lead mineralization associated with fault zone, is exposed along an old 100m long and 8m deep open- cast working. Small iron ore deposit are located near karwari (26°44' : 76°06') and Hindaun (26°44' : 77°02'). A small bentonite deposit is located near Karauli (26°19' : 77°18'). Pink and white spotted Bhander sandstone is extensively quarried in Karauli and Hindaun area and has been used in many historical monuments and modern buildings

Figure 3.4: Geology and mineral map of Sawai Madhopur district (GSI Resource map)

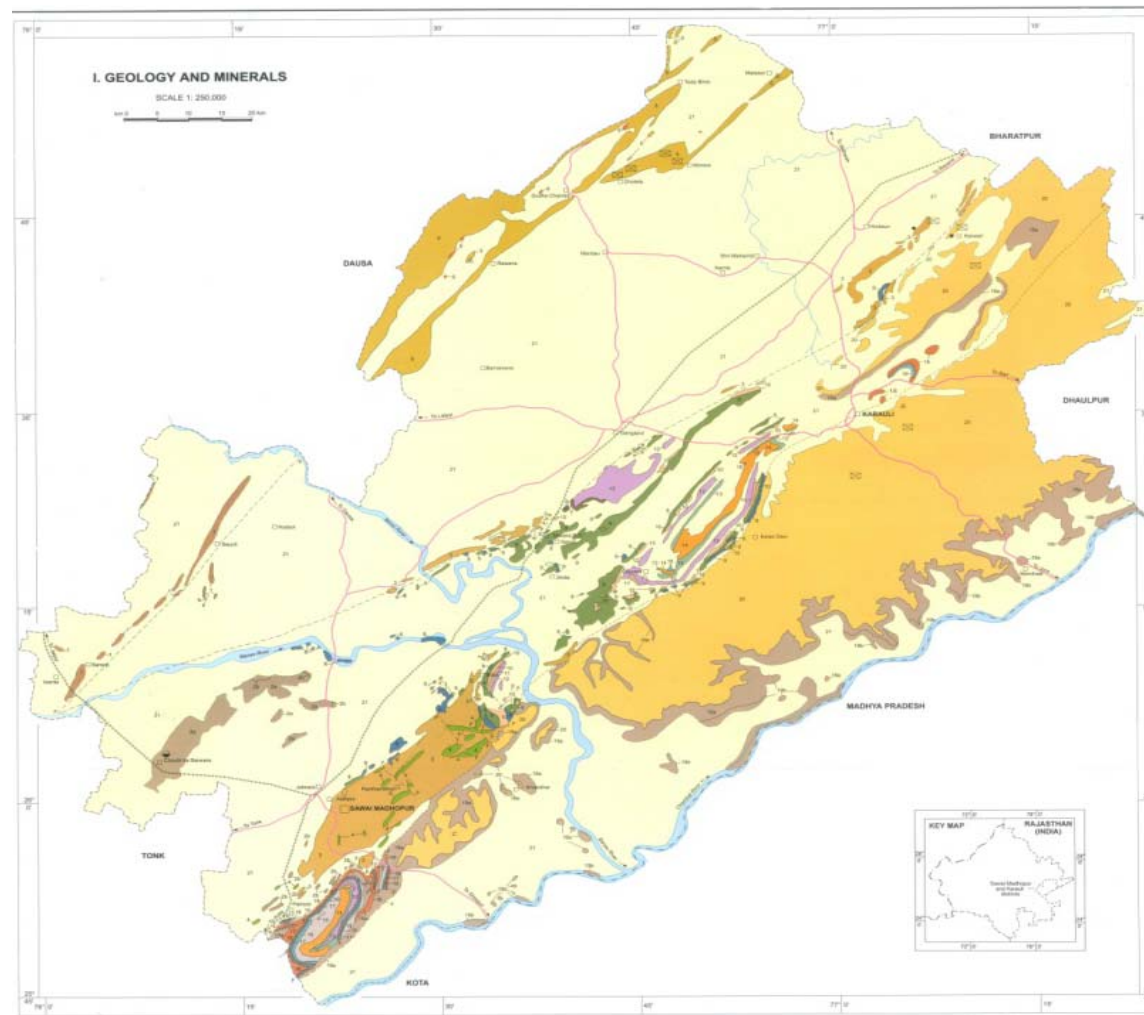
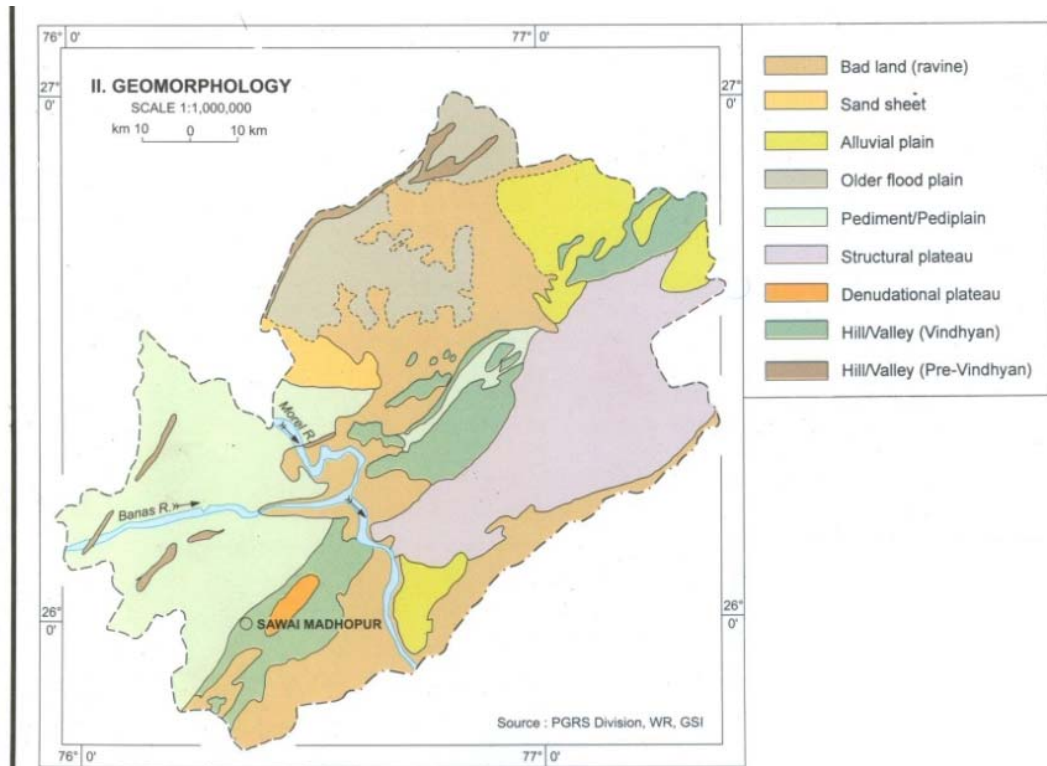


Figure 3.5: Geomorphology of Sawai Madhopur district (Source: GSI Resource map)



34. Figure 3.4 shows geology and mineral map of Sawai Madhopur and Figure 3.5 shows geomorphology of the district.

35. Soil characteristics: Soil of the region falls within rainfall zone of 500- 700 mm. The soil is generally alluvial in nature which prone to water logging. Also nature of recently alluvial calcareous has been observed. Table 3.1 shows nutrient level in the Sawai Madhopur soil including area coverage of saline and sodic soil. The nutrient status of the Sawai Madhopur soil is graded as low to medium level.

Table 3.1: Fertility status – major nutrients and problematic soils of Sawai Madhopur district

	Nutrient			Saline Soil(Ha)	Sodic or Alkali(Ha)
	N	P	K		
Status	L	M	M	12530	20027

(Source: Vital Agricultural Statistics 2004-05, Directorate of Agriculture, Rajasthan)

4 Climate

36. The climate of Sawai Madhopur city is hot and arid with large variation in temperature. Rainfall is scanty. The average temperature variation in summers and winters are 45o to 24.94o C and 20.05o C to 4o C respectively. The maximum and minimum temperature recorded is 45o C in summer and 4o C in winter. The south-west monsoon is active in the region from July to mid September, recording an annual rainfall of 837.40 mm. Dust storm and

thunder storm occur all through the summer and are particularly active in pre-monsoon period. In summer mean humidity as 60%. The predominant wind direction is from west and south-west.

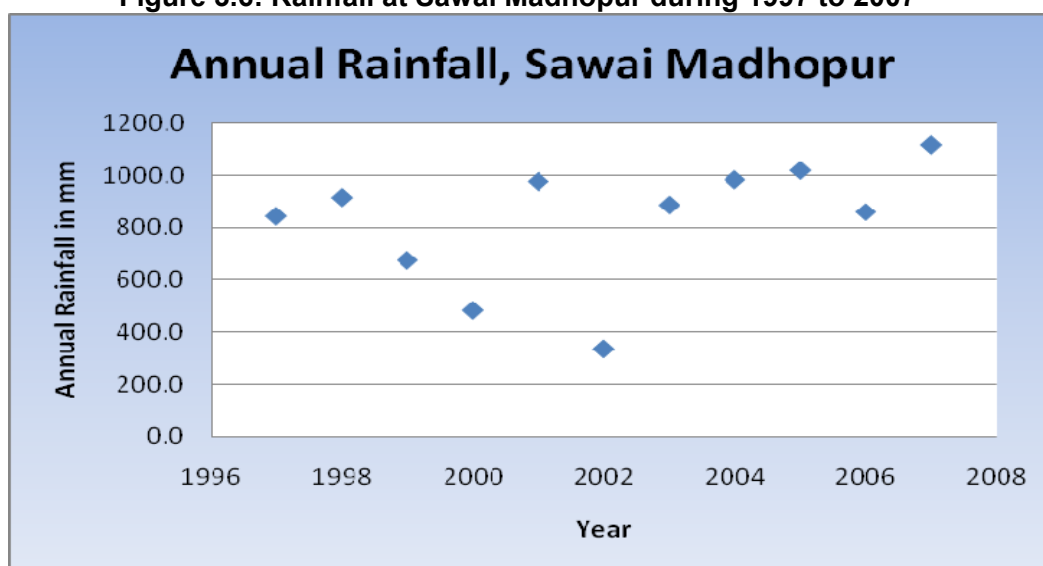
37. The rainfall over Sawai Madhopur is scanty and is concentrated over four month i.e. from June to September. The rains are erratic and so is the distribution of the rainfall. However agriculture and the animal wealth are dependent on rains to large extent. Seasonal Rainfall data for the recent year (2005-2006) shown in Table 3.2. Figure 3.6 shows yearly variation (1997-2007) of rainfall at Sawai Madhopur.

Table 3.2: Rainfall at Sawai Madhopur in recent years (2005-06)

S.No.	Months	Rainfall (mm)
1	June	220
2	July	578
3	August	74
4	September	107
5	October	0
6	November	0
7	December	0
8	January	0
9	February	0
10	March	8
11	April	0
12	May	25
13	Monsoon Rainfall	979
14	Non monsoon rainfall	33
15	Annual Rainfall	1012

(Source: Irrigation Department, Govt. of Rajasthan)

Figure 3.6: Rainfall at Sawai Madhopur during 1997 to 2007



Source: Deputy Director hydrology water resources ID and R, Jaipur

5 Air Quality

38. There are no data on ambient air quality of Sawai Madhopur town, which is not subject to monitoring by the Rajasthan Pollution Control Board (RPCB) as there are no major industries. The nearest station is located at Alwar (254 km from Sawai Madhopur). Traffic is the only significant pollutant in Sawai Madhopur, so levels of oxides of sulphur and nitrogen are likely to be well within the National Ambient Air Quality Standards (NAAQS). The ambient air quality data is depicted in **Table 3.3**.

Table 3.3: Ambient Air Quality in Alwar (Annual Average, 2004; units in $\mu\text{g}/\text{m}^3$)

Monitoring Station	Land use	SO _x	NO _x	RSPM	SPM
Alwar Residential, Rural and others area	Residential	8.1	11.6	175.0	302.0
<i>NAAQ Standard</i>	<i>Residential</i>	<i>60</i>	<i>60</i>	<i>60</i>	<i>140</i>
Alwar Industrial area	Industrial	7.6	12.4	107.0	182.0
<i>NAAQ Standard</i>	<i>Industrial</i>	<i>80</i>	<i>80</i>	<i>120</i>	<i>360</i>

RSPM: Respirable Suspended Particulate Matter; SPM: Suspended Particulate Matter

Source: Annual Report 2005-2006 Rajasthan State Pollution Control Board

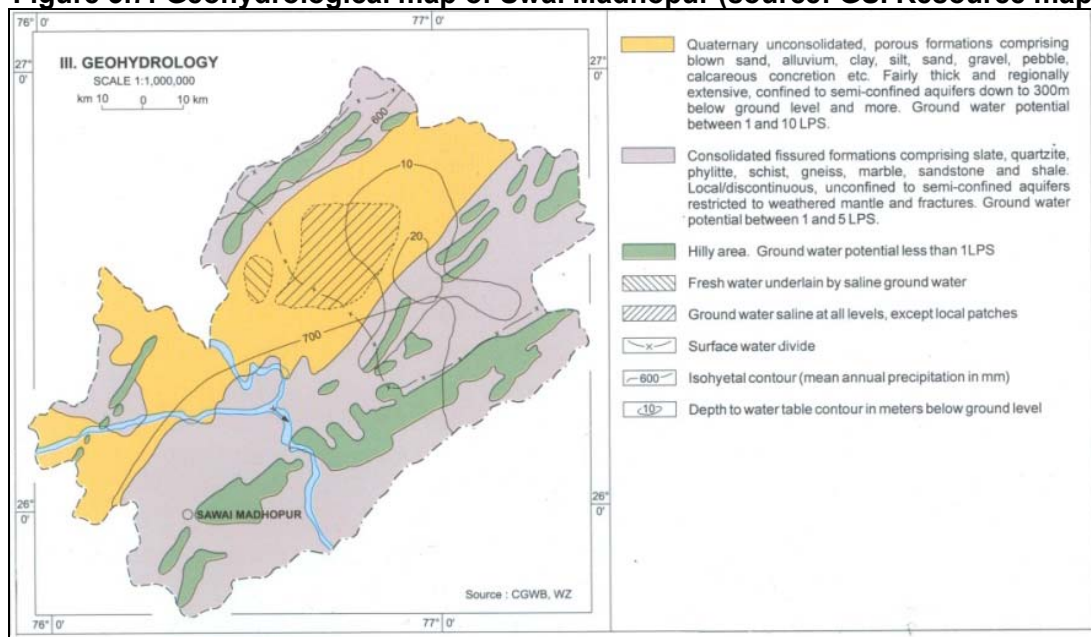
6 Surface Water

39. There is no secondary data of river water quality available. But it is expected that water quality is only deteriorate during monsoon due to TSS load. Due to high temperature at summer most of the surface water sources become dried.

7 Geohydrology and Groundwater

40. Geohydrological map of the Sawai Madhopur district is shown in Figure 3.7. For broadly grouping geological formations from ground water occurrence and movement considerations, the various lithological units have been classified into two groups on the basis of their degree of consolidation and related parameters. These are,

- Porous Formations- Quaternary unconsolidated formations
- Fissured formations – consolidated sedimentary rocks.

Figure 3.7: Geohydrological map of Swai Madhopur (source: GSI Resource map)

41. On an average 60-70 50% of the district area (mostly south and eastern part of the district) covered with consolidated fissured formation with some patches of hilly area.

42. There are number of National Hydrographic monitoring stations of Central Ground Water Board in and around Sawai Madhopur. Fluctuation of ground water level is shown in **Table 3.4**. In most of the cases ground water table ranged between 10-20m bgl.

Table 3.4: Number and Percentage of National Hydrograph Network Stations (Sawai Madhopur) with water fluctuation range

Period	No of wells analysed	Range		0-2m		2-5m		5-10m		10-20m		20-60m		>60m	
		Min	Max	No	%	No	%	No	%	No	%	No	%	No	%
Jan-06	24	1.99	35.77	1	4.17	1	4.17	6	25.0	11	45.83	5	20.83	0	0
Nov05	24	1.03	34.47	1	4.17	4	16.67	5	20.83	9	37.5	5	20.83	0	0
Aug05	24	2.41	33.18	0	0	6	25	6	25	10	41.67	2	8.33	0	0
May05	21	3.65	35.7	0	0	2	9.52	6	28.57	9	42.86	4	19.05	0	0

Source: Ground water year book 2005-06 Rajasthan, Central Ground Water Board, Jaipur (2007)

43. The Central Ground Water Board carried out chemical testing of tube well water seasonally. The average concentrations of major constituents are shown in Table 3.5.

Table 3.5: Ground Water Quality in and around Sawai Madhopur

Parameters	Maximum Level	Minimum Level	Standard of Drinking water (IS: 10500: 1991)	
			Desirable limit (mg/l)	Maximum Permissible limit (mg/l)
pH	8.8	7.2		
EC(micro mhos /cm at 25°C	6650	580		
Cl (mg/l)	1775	28	250	1000
SO ₄ (mg/l)	585	5	200	400 (if Mg does not exceeds 30 ppm)
NO ₃ (mg/l)	250	1	-	100
PO ₄ (mg/l)	2	0.11		
Total Hardness(mg/l)	1380	150	300	600
Ca(mg/l)	340	12	75	200
Mg(mg/l)	145	12	30	100
Na(mg/l)	1265	12	-	-
K(mg/l)	312	1	-	-
F(mg/l)	7.0	0.1	1.0	1.5
Fe(mg/l)	3.6	0.03	0.3	1.0
SiO ₂ (mg/l)	28.0	3.0		
TDS (mg/l)	4323	377	500	2000

Note: Total – 21 nos. samples

Source: Ground water year book 2005-06 Rajasthan, Central Ground Water Board, Jaipur (2007)

44. Groundwater quality of Sawai Madhopur city is not in conformity with the set norms of Government of Rajasthan. Supply water quality as measured by Public Health dept. is shown below. It is noted that ground water contains high level of TDS and nitrate.

Table 3.6: Present supply water quality at Sawai Madhopur

Total supply per day (lac liter)	Type of Sources Surface / Ground	Ground	Surface	No. of CWR	No. of SR	F ⁻ Min	F ⁻ Max	TDS Min	TDS Max	NO ₃ ⁻ Min	NO ₃ ⁻ Max
72.95	Ground	100	0	6	20	0.2	1.6	588	1351	10	324

B Ecological Resources

45. **FLORA** : The principal specie found here is Dhok (Anogeis pendula) .Some other species sparsely scattered are Raunj (Acacia leucophloea), Tendu (Diospyros melanoxylon). Acacia Cataechu Scrub: These scrubs exclusively occur in Deoli blocks of Uniara range in Tonk district. Small patches also occur in Rawanjna Doongar main and Sawai Madhopur 'B' blocks. The growing stock chiefly consists of stunted and crooked Khair (Accacia catechu), Raunj (Acacia lencophloea) and Krail (Capparies deciduas). The undergrowth is scanty and consists of Ber-Jhari (Zizyphus nummulana) and Papadhani (Fluggea Viscosa) .

46. **FAUNA** : Sawai Madhopur district is rich in wild life .The area particularly included in Tiger project has wide and evenly balance fauna. It has a large variety of animals birds and fish. In addition the recognised fauna of game is also found in the district. Tiger, leopard or panther and wild dog (Dhole) are found in this area. There are also tigers and panthers in the Ranthambhore Reserve (Project Tiger). Sloth bears are less uncommon here than in many other parts of India where they were once well known. The Chital in large numbers and Chinkara in small parties are the other main animals of the Reserve. Wild pigs are Plentiful, though of small size. The avifauna of the Reserve is rich and varied .The lakes attract many water birds and water side birds. Among the forest birds are the peafowl, doves, parakeets, owls and other birds of prey. Other birds seen here are egrets, pond herons, grey and purple herons.

47. There is no forest area (except Ranathambore Tiger reserve) nearby the sub-project site. No endangered flora and fauna is reported from the site. No works will be done within 500 m of the protected forest area. Air, Noise and water pollution shall be kept to a bare minimum within this periphery.

C. Economic Development

48. Sawai Madhopur being a desert district generally faces famines and drought. The bulk of population depends upon agriculture and animal husbandry. Being district headquarter, Sawai Madhopur town is the main regional centre for the entire district and is working as service centre for providing services like trade and commerce, transport, commercial and other higher level public facilities for the entire district.

49. The economic condition of people in Sawai Madhopur is not satisfactory. As per information in 1998 about 28% population comprised of families below poverty line. These people are mostly labour class working in industries, shops, restaurant, construction, transport and certain other. This aspect has to be given due consideration while designing the housing projects.

50. Total workers in the districts as per 2001 census are 109,248 out of which 86,836 are main workers and 22,412 are Marginal workers and 169,393 are non worker. The Work Participation Rate is 39 %. The occupational structure as per 2001 census is assessed as follows:

Table 3.7: Distribution of Work Force (2001)

Category	Nos.	% of Work Force
1. Main Workers		
Cultivators	3473	4.00
Agriculture Labourer	868	1.00
House Hold Industry	5210	6.00
Other Workers	77284	89.00
Sub-Total	86,836	
2. Marginal Workers		
Cultivators	2689	12.00
Agriculture Labourer	1792	8.00
House Hold Industry	2913	13.00
Other Workers	15016	67.00
Sub-Total	22,412	
Grand Total	109248	

Source: Compiled from District Census Handbook Data 2001

51. The detailed break-up of occupational structure is not available in 2001 census data. However, the occupational structure data for 1971, 1981 and 1991 are available on the basis of which the estimation for 2001 has been made as shown in the below **Table 3.8**.

Table 3.8: Occupational Structure, Sawai Madhopur 1971 to 2001

Occupation	1971		1991		2001	
	Workers	%	Workers	%	Workers	%
Agriculture ,Mining and allied activities	1220	9.80	2091	10.03	2466	8.50
Industrial	4124	33.10	4997	24.5	8125	28.00
Construction	400	3.20	1405	6.9	1742	6.00
Trade & Commerce	1958	15.72	4001	19.6	5804	20.00
Transport & Communication	1377	11.05	2229	10.9	3046	10.50
Other Services	3380	27.13	56.83	27.8	7835	27.00
Total	12459	100.00	20406	100.00	29018	100.00

Source: Census of India and Estimates

52. The occupational structure of people in Sawai Madhopur town shows that town is a commercial centre as well as service town. A number of district level offices are located in the town and as such about 23% workers are engaged in service sector. Industrial activity is not very significant due to lack of water and power. Therefore, employment in industrial sector is only 16%. It may be mentioned that Sawai Madhopur is famous for mason and construction workers. They are not only worked at Sawai Madhopur or other neighbouring states, but also in Gulf countries. The high percentage of workers of about 11.25% in construction justifies this fact.

53. Power status of the area: There is no power generating unit at Sawai Madhopur. The consumption of electricity by different sectors is shown in Table below.

Table 3.9: Consumption of Electricity in Million Kwh (2003-04)

District	Domestic	Non-Domestic (Commercial)	Industr ial	Public Lighting	Public Water Works	District	Domestic
			Small	Medium	Large		
S. Madhopur	32.948	7.875	4.36	1.7330	1.89	0.596	7.547

1 Land use

54. Total area within Municipal limits of Sawai Madhopur is 59 sq.kms or 14575acres. Out of which only 1220 acres is the developed area and the rest consists of water bodies hills, agricultural lands etc. Out of the total developed area 40.05 % is under residential use and 12.08 % under public and semi public use. Land under Govt offices is only 1.2% of the total

development area. About 15.04 % of the total development area is under industrial use, which includes large chunk under existing cement factory. Table 3.10 and Figure 3.8 shows land use break up of the Sawai Madhopur developed area. Land use of entire district is shown in Figure 3.9.

Table 3.10: Existing Land-use, Sawai Madhopur, 1985

S.No.	Use	Area in Acres	%age of Developed Area
1.	Residential	490	40.5
2.	Commercial	50	4.1
3.	Industrial	195	15.4
4.	Government	15	1.2
5.	Government Reserved Area	40	3.3
6.	Recreational	35	2.9
7.	Public & Semi-public	155	12.8
8.	Circulation	240	19.8
9.	Total developed area.	1220	100%

Figure 3.8: Existing Land-use and % of Developed Area

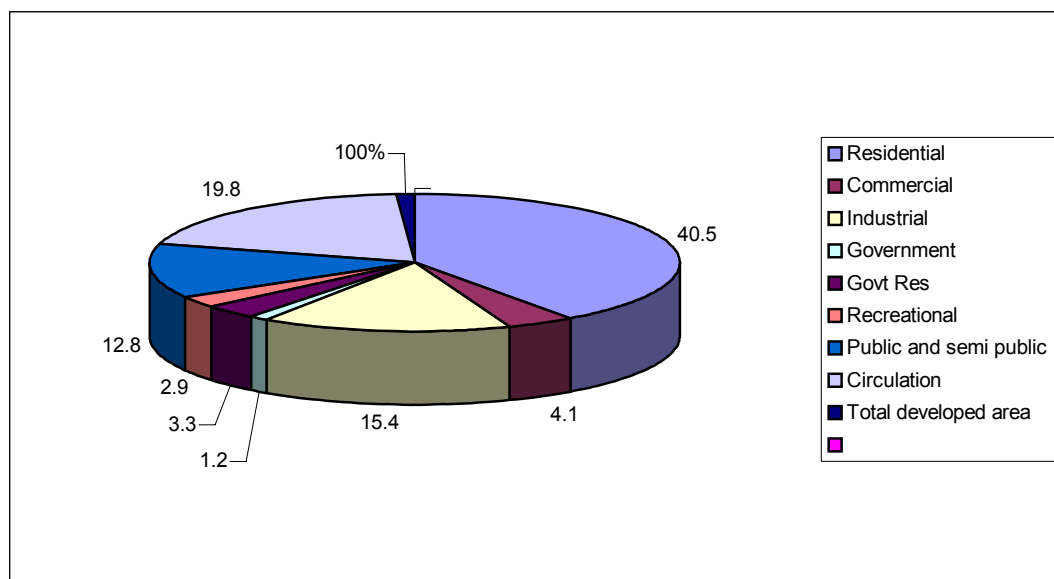
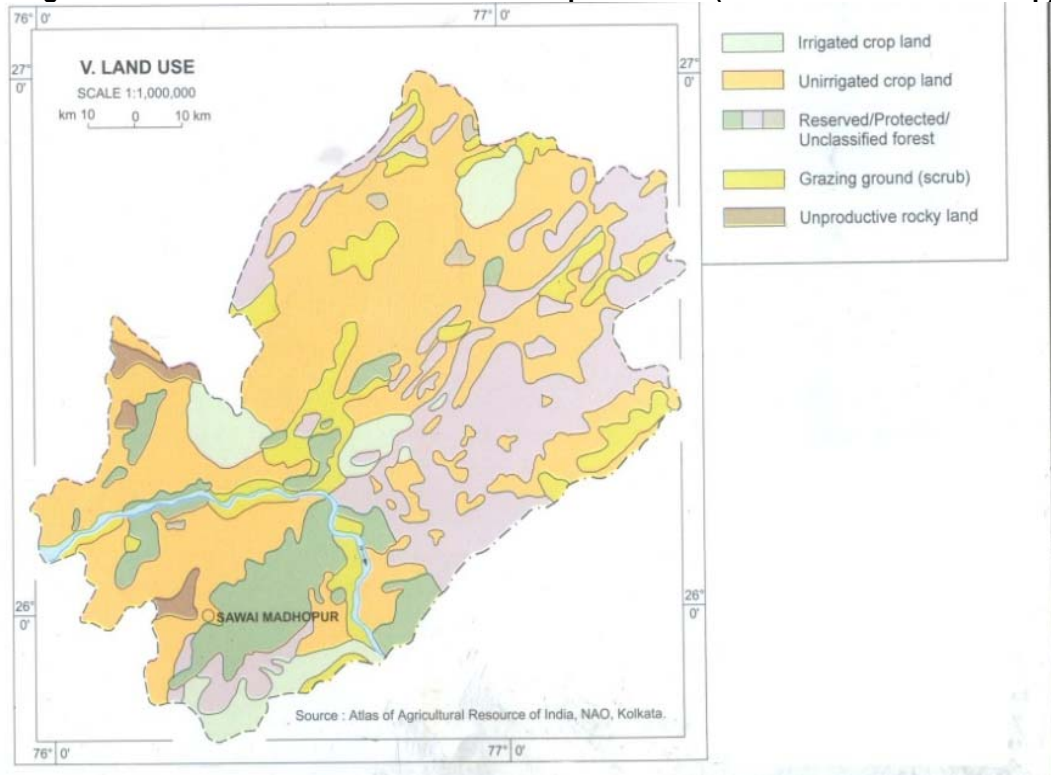


Figure 3.9: Current land use of Sawai Madhopur District (Source: GSI Resorce map)



2 Commerce, Industry and Agriculture

55. The main retail and wholesale business activities of the city are still carried out in the market of old Sawai Madhopur town. These traditional markets are the principle business areas of the city. Originally planned straight roads in this area have become narrower because of the continuous Chabutara type encroachments in front of the shops, bus stand and the business allied to transportation is located along khandar road in this area.

56. The newly development “Bazaria” is the main market street of main town where retail and transport oriented business is located. This causes overcrowding and congestion on this road because of intermingling of traffic. There is no parking facility for vehicles in these markets.

57. The grain Mandi located in the old town is a very congested area. However a new site has been constructed near village Alanpur along main road. The grain godowns are located at isolated location on Ranthambhore road and college road in old khasa kothi building. Food Corporation of India has taken up work of development of godowns which is located in the east of Jaipur Udyog Cement Factory.

58. Industrial Development: Sawai Madhopur town is a fast developing industrial town of Rajasthan mainly because of its nodal location at the junction of broad gauge railway lines. The city has one large scale industrial unit namely “Jaipur Udyog Cement Limited” which is located in the north town. The factory occupies an area of about 3020 workers and has got its own

railway sidings. There are two planned industrial areas by RIICO for small scale units, Kherda Industrial area is located on Tonk road in the west in an area of about 100 acres with 137 plots .The other industrial area is located on Ranthambhore road in the east in about 57 acres with 62 plots. Both industrial areas have been fully developed .The industrial employment has increased from 4,124 in 1971 to about 8,125 by 2001.

59. In and around the Sawai Madhopur city area there are about 60% of lands used for agricultural purpose. Crop production statistics as depicted in Table 3.11 indicates that total crop production during Rabi season is comparatively more than in Kharif season and that basically due to oilseed production during Rabi season.

Table 3.11: Crop production in around Sawai Madhopur

Type of Crops	Under Rabi Crops 2003-04 (Prod in Tonnes)	Under Kharif Crops 2003-04 (Prod in Tonnes)
Cereals	133823	199069
Pulses	28825	4591
Food Grains	162648	203660
Oilseeds	138480	12265
Others	1614	10391
Total	302742	226316

(Source: Vital Agricultural Statistics 2004-05, Directorate of Agriculture, Rajasthan)

3 Infrastructure

60. Water supply: Presently both surface and ground water supply sources are used for town. There are 63 tubewells and 10 open wells to supply water to Sawai Madhopur town. Water is also lifted from Banas River through existing intake well constructed on the Banas River. Total production from all these sources presently is 8.0 MLD. The water is supplied through zonal reservoirs 4 Nos. and various ward wise service reservoirs. The gross water supply through the piped system is currently estimated 67.79 lpcd and 40% of Transmission and Distribution Losses. This is much less than the standard norm of 135 lpcd. It is therefore, necessary to take up water supply works on priority. Water is supplied through 13,846 (year 2006) water connections. While most connections are metered,

61. Sewerage System: Sawai Madhopur town does not have underground sewerage system as of now. The municipal drains are mostly open & overflowing into the Nalla causing problem in rainy season.

62. The water flow in the drain is also dirty as it receives flow from toilets and sullage causing unsanitary condition. 14 slums pockets are identified in the township.

63. It is to be concluding that there is comprehensive need of UGD scheme for proper collection and treatment and disposal of sewage in the town. It is also to be seen from demand gap assessment that significant area of land will be required for installation of sewage treatment facilities. A module of 10 MLD STP plant considering 70% house connectivity by 2011 can be considered in this programme. The land (12 Ha) warrants only ASP technologies to be developed. If more land is available WSP can be taken up.

64. Sanitation: Only 50% of the households reportedly have septic tanks and soak-well systems for sewerage disposal. The remaining household practise open defecation which is an unacceptable and unhygienic practice. The raw settled sewage from septic tank is periodically flushed out by sanitary workers of the Municipal Board and discharge to open spaces, agricultural lands in an indiscriminate manner. Slum areas were also not equipped with requisite sanitation (LCS etc.) resulting in open defecation.

65. Drainage: The topography of Sawai Madhopur city is cup shaped. Due to scanty rains in the region, natural drainage system has not been so far evolved. In fact there is no river/rivulet in the entire Sawai Madhopur district. In Sawai Madhopur town itself no natural drainage system exists to drain away the rainwater or wastewater from the town. Presently there exists a minimal network of storm water drains in the city. The existing network of (roadside) storm water drains in Sawai Madhopur has been identified under three broad categories as follows: (i) open pucca (concrete drains 40 km) (ii) closed pucca.(48 km) and (iii) Kutchha.

66. Industrial Effluents. Small industries exists in under RIICO, which is out side the city area and small amount of effluent disposed scattered in local nallahs. As reported by the local MC, the responsibility of effluent disposal is under RIICO's own and could not be connected to the proposed sewer network. The individual industry must treat their effluent to bring it to the required standards before final disposal.

67. Solid Waste: The MSW generated in the Sawai Madhopur city (including slum area) mainly consist of domestic refuses, waste from commercial area, Vegetable-Fruit market, bio-medical waste, waste from Hotels and Restaurants, Industries etc. The waste collection system being followed is quite primitive, individual households/units throw the garbage on road side/open drains close to their houses and the sweepers collect the garbage in the form of small heaps on road sides. Similarly the open drains are also cleaned periodically and the sludge is heaped adjacent to the drain where it is left for 2-3 days to get dried and lifted. Tractor trolleys then lift these dumps the heaped garbage once or twice a day. In the process part of the garbage gets dispersed on the road or finds it way into to the open drains or open low lying pits.

68. The MSW generated is transported to garbage dumping site. The MSM has engaged one loader and three tractors and four private tractors for collecting and transporting the solid waste material. The capacity of 7 tractors is approximately 10 cum. The waste material is lifted by loaders and put on trolley for transportation to disposal site. Details of the quantity of garbage collected and disposed of are not available. However based on population density and spatial distribution of income groups in the Sawai Madhopur city the waste generation has been assessed as 30 Tons per day, which is close to approximate quantitative information provided by the Municipal Jr. Engineer. Breakup of the present (2006) quantity of MSW is given in **Table 3.12**.

Table 3.12: Break up of Present Waste Collection

Type	Tons
Residential Area (Domestic)	18
Commercial Area	6
Industrial	4
Hospital Area	2
Total	30

4 Transportation

69. **Table 3.13** provides a breakdown of road surface composition in physical growth of the city has resulted in a corresponding increase in vehicular traffic greater than that of the city's population growth due to improving economic status of the city.

Table 3.13 Road Surface Composition

Surface Type	Total (km)
Concrete	54
Black Topped	3500
WBM	10
Others/Earthen	10
Total	109.00

Source: PWD Sawai Madhopur

70. It is proposed a ROB on the State Highway 30 (Presently NH 116) connecting Sawai Madhopur to Tonk is crossing the broad gauge line (Sawai Madhopur – Jaipur) within the municipal area of Sawai Madhopur. To avoid congestion at level crossing, construction of 2-lane ROB with footpath at both sides for pedestrians at T/2-B Railway Crossing and its approaches are necessary.

D. Social and Cultural Resources

1 Demography

71. The population of the district is more than 1.11 million. The population density 248 persons per sq.km, which is more than the state's population density of 165 persons per sq. km. The literacy rate of the district is 57.347%, which is little higher than the state literacy rate (61.03%).

72. Sawai Madhopur city has population of 97,493 (2001 Census). This indicates that apart from Sawai Madhopur there are other dominant urban centers in the district.

73. Sawai Madhopur Municipal area comprises is 59 sq.km and of 36 wards.

Table 3.14 : Ward wise Population of Sawai Madhopur City, 2001

Ward No	Population			Sex Ratio
	Persons 2001	Male	Female	
1	2409	1257	1152	916
2	3386	1784	1602	898
3	3533	1921	1612	839
4	3830	1988	1842	927
5	2000	1081	919	850
6	1909	1075	834	776
7	3448	1936	1512	781
8	5244	2823	2421	858

Ward No	Population			Sex Ratio
	Persons 2001	Male	Female	
9	4120	2211	1909	863
10	5056	2692	2364	878
11	3543	1786	1757	984
12	1348	699	649	928
13	1874	995	879	883
14	2297	1198	1099	917
15	1608	818	790	966
16	3585	1902	1683	885
17	2005	1011	994	983
18	2669	1388	1281	923
19	1924	1005	919	914
20	1764	938	826	881
21	2339	1236	1103	892
22	2488	1300	1188	914
23	2217	1126	1091	969
24	2815	1441	1374	954
25	2613	1354	1259	930
26	2489	1294	1195	923
27	2128	1118	1010	903
28	2543	1327	1216	916
29	3144	1628	1516	931
30	3021	1596	1425	893
31	2075	1071	1004	937
32	4951	2634	2317	880
33	1897	1036	861	831
34	2862	1581	1281	810
35	2359	1260	1099	872
36	4505	2393	2111	882

Source: Census of India, 2001

2 Health and educational facilities

74. There are good educational facilities in Sawai Madhopur district, which serve both townspeople and inhabitants of surrounding villages and towns in the hinterland. There are 688 primary schools, 161 secondary schools and 58 higher secondary schools, plus five general degree colleges and one industrial training institute (ITI).

Table 3.15: Educational facility of Sawai Madhopur District

Primary School Govt.	575
Primary School Private	113
Upper Primary School Govt.	294
Upper Primary School Pvt.	320
Secondary School Govt.	74
Secondary School Pvt.	87
Senior Secondary School Govt.	38
Senior Secondary School Pvt.	20
Navodaya Vidyalaya	1
Kendriya Vidyalaya	2
College	5
I.T.I.	1
Rajeev Gandhi Pathshala	342

(Official website of Rajasthan govt.)

75. As the district headquarters town, Sawai Madhopur is the main centre for health facilities in the area and there is a district general hospital, 4 CHC, 22 primary health center in the district. The detail of the health facilities is given in Table 3.16.

Table 3.16: Health facility Sawai Madhopur District

General Hospital	1 at dist head quarter (150 beds)
Community Health Center (CHC)	4 (Gangapur city, Bamnawas, Bonli, Khandar)
Primary Health Center (PHC)	22
Sub Health Centre	194
T.B. Clinic	1
Private Hospital	14

(Official website of Rajasthan govt.)

3 History, culture and tourism

76. The Muslim conquest brought about major changes in the political map of northern India. In Rajasthan, the Chauhan kingdoms of sapadalaksa and Nodal dis-appeared, Govinda the grandson of Prithviraj Chauhan established himself at Ranthambhore and ruled as feudatory of the Sultan of Delhi. Following disturbances after the death of Iltumish, Vagbhatta besieged the fort of Ranthambhore. He then ruled from here for 12 years waging continuous battles against the Sultanate. Rao Hamir was yet another figure who carved a niche for himself. In the annals, it is only now and then do we come across men of such heroism. Rana Kumbha captured the Ranthambhore Fort the middle of the 15th century. After the death of Aurangzeb, the fort was taken over by the rulers of Jaipur.

77. Sawai Madhopur has moderate tourist inflows with main attractions being Ranthambore National Park, Ranthambore Fort, Ganesh Temple, Kala – Gaura Bhairwa Temple, Chamatkarji Jain Mandir, Man Sarovar Dam, Chouth Mata Temple, Shiwad Temple, Bhagwatghar Kunda, Ambreshwaram Temple, Rameshwaram, Khandar Fort., Persian inscriptions in a Baori.

78. Sawai Madhopur functions as an ideal weekend resort for inhabitants of the Delhi Metropolis in addition to being a place of interest for foreign tourists

IV. ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES: LOCATION AND DESIGN

79. ADB Environmental Assessment Guidelines require that an IEE should evaluate impacts due to the location, design, construction and operation of the project. Construction and operation are the two activities in which the project interacts physically with the environment, so they are the two activities during which the environmental impacts occur. In assessing the effects of these processes therefore, all potential impacts of the project are identified, and mitigation is devised for any negative impacts. This has been done in Sections V and VI and no other impacts are expected.

80. In many environmental assessments there are certain effects that, although they will occur during either the construction or operation stage, should be considered as impacts primarily of the location or design of the project, as they would not occur if an alternative location or design was chosen. For example, if a groundwater aquifer was depleted by excessive abstraction this would be an impact of both the location and design, because groundwater may not be depleted if the design had used surface water to augment the supply, and the specific aquifer would not have been depleted if the well field was located elsewhere.

81. However in the case, it is being considered that there are no impacts that can say to result from either the design or location of this subproject. This is because:

- o Most of the individual elements of the subproject are relatively small and involve straightforward construction and operation, so impacts will be mainly localised and not greatly significant;
- o Most of the predicted impacts are associated with the construction process, and are produced because that process is invasive, involving trenching and other excavation. However the routine nature of the impacts means that most can be easily mitigated;
- o In one of the major areas in which there could be significant impacts (archaeology), those impacts are clearly a result of the construction process rather than the project design or location, as they would not occur if this did not involve trenching or other ground disturbance.

V. ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES: INFRASTRUCTURE CONSTRUCTION

A. Screening out areas of no significant impact

82. From the descriptions given in Section III it is clear that implementation of the project will affect quite long tracts of land both inside and outside the town where the distribution main and network extensions will be constructed, and also a series of specific locations, some of which are quite large (clear water reservoir).

83. However it is not expected that the construction work will cause major negative impacts. This is mainly because:

- Pipelines will be mainly located on unused ground alongside existing roads and can be constructed without causing major disruption to road users and adjacent houses, shops and other businesses;
- New facilities within and outside the town (clear water reservoir, ORs, etc) will be located on government-owned land that is not occupied or used for any other purpose;
- Most pipeline construction will be conducted by small teams working on short lengths at a time so most impacts will be localised and short in duration;
- The overall construction programme will be relatively short for a project of this nature, and is expected to be completed in 3 years.

84. As a result there are several aspects of the environment that are not expected to be affected by the construction process and these can be screened out of the assessment at this stage as required by ADB procedure. These are shown in Table 5.1, with an explanation of the reasoning in each case.

Table 5.1: Fields in which construction is not expected to have significant impacts

Field	Rationale
Climate	Short-term production of dust is the only effect on atmosphere
Geology and seismology	Excavation will not be large enough to affect these features
Fisheries & aquatic biology	No rivers or lakes will be affected by the construction work
Wildlife and rare or endangered species	Ranathambore Tiger Reserve and National Park is located in the town (protected areas), so the network improvements will be not allowed within or outside the protected area
Coastal resources	Sawai Madhopur is not located in a coastal area
Population and communities	Construction will not affect population numbers, location or composition

These environmental factors have thus been screened out presently but will be assessed again before starting of the work.

Appendix- V-A shows Rapid Environmental Impact Assessment checklist (REA) for the said sub-project.

B. Source and supply augmentation

1 Construction method

85. As explained above, augmentation of the water source and supply will involve construction of the following:

- Rising main pipeline of approx. 27.21 Km of dia 100 mm to 600 mm.

2 Physical Resources

86. Excavation for gravity main and tube wells will generate waste soil and stone. There will therefore be less physical changes at the construction sites, and quantity of waste could not be dumped without causing further physical impacts (on air quality, topography, soil quality, etc) at the point of disposal. The work will probably be conducted in the dry season, so there is also a lot of potential for the creation of dust.

87. Action will therefore be needed to reduce physical impacts at both the construction and disposal sites, by controlling dust and reducing the amount of material to be dumped. The Contractor should therefore be required to:

- Contact the town authorities to find beneficial uses for as much waste material as possible, in construction projects, to raise the level of land prior to construction of roads or buildings, or to fill previously excavated areas, such as brickworks;
- Prevent the generation of dust (which could affect surrounding agricultural land and crops) by removing waste material as soon as it is excavated (by loading directly onto trucks), and covering with tarpaulins to prevent dust during transportation.

88. Another physical impact that is often associated with large-scale excavation is the effect on drainage and the local water table if groundwater and surface water collect in the voids. However, this should not be a problem in this case, given the low rainfall and deep water table (>20 m) in this area, and the fact that the Contractor will almost certainly plan excavation work to avoid the monsoon season.

3 Ecological Resources

89. There are no protected areas or locations of any ecological interest at or near any of the sites affected by these works, so it is unlikely that the construction process will have any ecological impacts. The only concern would be if trees were removed unnecessarily. To avoid this, the Contractor should be required to plant and maintain three new trees for every one that is removed.

4 Economic Development

90. It is expected that gravity main line will be located on government owned land, so there should be no need to acquire land from private owners, which might affect the income and assets of owners and tenants. There should also be no effects on other features with economic implications (such as infrastructure, industry and commerce), as there are none of these facilities on these sites.

91. There could however be significant disruption of traffic, business and other activities, if trucks carrying waste material were allowed to enter Sawai Madhopur town or other built-up areas. The transportation of waste will be implemented by the Contractor in liaison with the town authorities, and the following additional precautions should thus be adopted to avoid these impacts:

- Planning transportation routes so that heavy vehicles do not enter Sawai Madhopur Town or other built-up areas and do not use narrow local roads, except near delivery sites;

- Scheduling the transportation of waste to avoid peak traffic periods.

5 Social and Cultural Resources

92. Rajasthan is an area with a rich and varied cultural heritage that includes many forts and palaces from the Rajput and Mughal periods, and large numbers of temples and other religious sites, so there is a risk that any work involving ground disturbance could uncover and damage archaeological and historical remains. Given that the locations proposed for these facilities are uninhabited and show no obvious signs of having been used to any extent in the past, then it could be that there is a low risk of such impacts at these sites. Nevertheless, this should be ascertained by consulting the appropriate authorities, and appropriate steps should be taken according to the nature of the risk. This should involve:

- Consulting historical and archaeological authorities at both national and state level to obtain an expert assessment of the archaeological potential of all proposed sites;
- Selecting alternative sites for any work proposed in areas of medium or high risk;
- Including state and local archaeological, cultural and historical authorities and interest groups in consultation forums as project stakeholders so that their expertise can be made available to the project;
- Developing a protocol for use by the Contractor in conducting any excavation work, to ensure that any chance finds are recognised and measures are taken to ensure they are protected and conserved. This should involve:
 - o Having excavation observed by a person with archaeological field training;
 - o Stopping work immediately to allow further investigation if any finds are suspected;
 - o Calling in the state archaeological authority if a find is suspected, and taking any action they require ensuring its removal or protection in situ.

93. There are no modern-day social and cultural resources (such as schools and hospitals) on or near these sites, and no areas that are used for religious or other purposes, so there is no risk of other impacts on such community assets.

94. Finally, there could be some short-term socio-economic benefits from the construction work if local people are able to gain employment in the construction workforce. To ensure that such gains are directed towards communities most directly affected by this part of the scheme, the Contractor should be required to employ at least 50% of this labour force from communities within a radius of say 2 km from each site, if sufficient people are available.

C. Network improvement

1 Construction method

95. Expansion of the distribution network will involve construction of:

- Laying of new distribution pipe line (approx. 57.23 km) of different diameter
- Construction of 8 overhead reservoirs
- 2 nos. new R. C. C. clear water reservoir
- 5 chlorination plant located beneath
- Construction of 6 pump houses

96. Reduction of non-revenue water will involve:

- Replacement of old leakage pipeline
- Replacement of non functional water meter
- Installation of bulk flow meters at each storage reservoir and pump station;

97. These all involve the same kinds of construction and will produce similar effects on the environment, so their impacts are considered together.

98. It is expected that the distribution mains will be buried in trenches adjacent to roads, in the un-used area within the ROW, at the edge of the tarmac. However the distribution mains will be located in roads and streets in the town, where in some places this area is occupied by drains or the edges of shops and houses etc, so to avoid damage to property some trenches may be dug into the edge of the road.

99. Trenches will be dug using a backhoe digger, supplemented by manual digging where necessary. Excavated soil will be placed alongside, and the pipes (brought to site on trucks and stored on unused land nearby) will be placed in the trench by hand or using a small rig for the larger DI pipes. Pipes will be joined by hand, after which sand from local quarries will be shovelled into the trench beneath and around the pipe for support and protection. Soil will then be replaced manually on top of the pipe and compacted by a vibrating compressor. Where trenches are dug into an existing roadway, the bitumen or concrete surface will be broken by hand-held pneumatic drills, after which the trench will be excavated by backhoe, and the appropriate surface will be reapplied on completion.

100. Pipes are normally covered by 1.2 m of soil, and a clearance of 100 mm is left between the pipe and each side of the trench to allow backfilling. Trenches will be smaller for the distribution main (minimum of 1.4 m deep and 0.3 m wide). Old pipes will be replaced by new one after taken out old pipe by digging.

101. New pipes and connections to the distribution main will be provided to house connections, and these will run to individual dwellings in small hand-dug trenches, or on the surface. New consumer meters will be located outside houses, attached to a wall or set onto the ground. In slum areas water will be provided via communal taps from where people will collect their water.

102. Four clear water surface and twenty two overhead reservoirs will be built on government land and other various locations in the town. The cavity for the ground reservoirs (GR) and foundations for the overhead reservoirs (OR) will be excavated by backhoe, with soil being

loaded onto trucks for disposal. Aggregate and concrete will be tipped into each void to create the foundations and floor, after which metal reinforcing rods will be added to create the outline of the walls of the GR and the vertical supporting pillars of the OR. Sections of reinforcing will then be encased in wooden shuttering and concrete will be poured in, and this process will be repeated to gradually create each structure from RCC, including the tank of the OR and the above-ground portion of the GR. Surfaces will be smoothed and finished where necessary by hand.

103. Small brick rooms will be built to house the chlorination plant. The foundation will be dug and aggregate and concrete poured in to create the floors, after which the brick walls and roof materials will be added by hand. Chlorine cylinders and other equipment (including flow-meters) will be brought in on trucks and offloaded and attached by hand. A small cavity for the chlorination sump and trenches for pipe-work will also be dug, and the sump will be constructed from concrete and brick.

2 Physical Resources

104. Although replacement of parts at the pump house should not have noticeable environmental effects, the remainder of this component involves some quite large-scale excavation, so physical impacts could be significant and will need to be mitigated.

105. This work is similar to the source augmentation component in that construction will involve quite extensive excavation, although in this case it will be spread over various locations, many of which are in the town, so the nature and significance of the impacts could be different.

106. If average trench dimension 1.25 x 0.6 m for the 57 km distribution main, then trench construction will excavate around 42,750 m³ of material. After construction, approximately 8% of the trench will be occupied by the pipe, 15% by backfilled sand, and 77% by excavated soil replaced on top of the pipe. This means that around 6412 m³ of sand will be brought to site, 32,918 m³ of soil will be retained for replacement in the trench, and 9832 m³ of waste material will be left over. Additional smaller quantities of waste will be produced by the other excavation work, in particular the ground storage reservoirs. This is less material than produced by excavation of the CWR but it adds a further to the total waste produced by this subproject, and in this case the impact of dust will be more significant because much of the work will be conducted in inhabited areas. It will thus be very important to limit physical impacts by finding beneficial uses for waste material as recommended above, and to apply additional precautions to limit the production and spread of dust. The Contractor should therefore be required to:

- o Contact the town authorities to find beneficial uses for waste material, in construction projects, to raise the level of land prior to construction of roads or buildings, or to fill previously excavated areas, such as brickworks;
- o Prevent the generation of dust by removing waste soil as soon as it is excavated;
- o Plan the work carefully so that sand is only brought to site when it is needed;
- o Cover or damp down sand and soil retained on site to reduce dust in windy weather;
- o Use tarpaulins to cover loose material during transportation to and from the site.

107. The other important physical impact associated with excavation (effects on surface and groundwater drainage) should again be negated by the low rainfall and very low water table in this area, and the fact that the Contractor will almost certainly conduct the excavation work in the dry season.

108. Physical impacts will also be reduced by the method of working, whereby the network will probably be constructed by small teams working on short lengths at a time, so that impacts will be mainly localised and short in duration. Physical impacts are also mainly temporary as trenches will be refilled and compacted after pipes are installed, and any disturbed road surfaces will be repaired. Because of these factors and the mitigation measures proposed above, impacts on the physical environment are not expected to be of major significance.

3 Ecological Resources

109. There are ecological resources like Ranthambore Tiger Reserve and National Park located in the town (protected areas), so the network improvements should have to design without any ecological disturbances. Roadside trees should not be removed unnecessarily to build the trenches, and to mitigate any such losses the Contractor should be required to plant and maintain three new trees (of the same species) for each one that is removed.

4 Economic Development

110. Most of this work will be conducted on government owned land in the ROW of roads, where there is no need to acquire land from private owners. It may be necessary however to acquire small amounts of land in places along the transmission main route to avoid bends in the road and allow the pipeline to follow a more direct path. If this is the case, the government will purchase land through the mechanism of the Land Acquisition Act (1894), where prices are established on the basis of recent transactions. ADB policy on Involuntary Resettlement requires that the owners and users of acquired land do not suffer economically as a result of the project, and a separate Resettlement Plan and Resettlement Framework have been prepared to examine these and related issues. This establishes that no more than 10% of the land of any owner or occupant should be acquired, and that in addition to the price of the land, farmers should be compensated for any standing crops or trees they lose.

111. Although most of the work will not require land acquisition it could still have economic impacts, if the presence of trenches, excavated material, workers and machinery discourage customers from visiting shops and businesses, which lose income as a result. These losses should be short in duration as most of the pipeline work should last for only a few days at any one site. Nevertheless the loss of income could still be significant for small traders and other businesses that exist on low profit margins. These impacts should therefore be mitigated by:

- o Compensating shopkeepers and other affected businesses for lost income;
- o Leaving spaces for access between mounds of excavated soil, and providing footbridges so that pedestrians can cross open trenches;
- o Increasing the workforce in these areas to ensure that work is completed quickly;
- o Consulting affected businesspeople and informing them in advance when work will occur.

112. Excavation work could damage existing infrastructure located alongside roads, such as storm drains where present, and the sewer network inside the historic area. It will be particularly important to avoid damaging existing water pipes as these are mainly manufactured from Asbestos Cement (AC), which can be carcinogenic if inhaled, so there are serious health risks for both workers and citizens (see below). It will be important therefore to avoid these impacts by:

- o Obtaining details from the Municipal Board of the nature and location of all infrastructure, and planning pipeline routes (in and outside the town) to avoid any conflict;
- o Integrating construction of the various Sawai Madhopur subprojects (in particular water supply and sewerage) so that:
 - Different infrastructure is located on opposite sides of the road where feasible;
 - Roads and inhabitants are not subject to repeated disturbance by trenching in the same area at different times for different purposes.

113. Transport is another type of infrastructure that will be affected by some of the work, particularly construction of pipelines in the narrower streets where there is not enough space for excavated soil to be piled off the road. The road itself may also be excavated in places where there is no available land to locate pipelines alongside. Traffic will therefore be disrupted, and in some very narrow streets the whole road may need to be closed for short periods. The Contractor should therefore plan this work in conjunction with the town authorities and the police force, so that work can be carried out during periods when traffic is known to be lighter, and alternative routes and diversions can be provided where necessary. The Contractor should also increase the workforce in areas such as this, so that the work is completed in the shortest possible time.

114. It is inevitable that there will be an increase in the number of heavy vehicles in the town (particularly trucks removing waste material for disposal), and this could disrupt traffic and other activities, as well as damage fragile buildings if vibration is excessive. These impacts will therefore need to be mitigated by:

- o Careful planning of transportation routes with the municipal authorities to avoid sensitive areas as far as possible, including narrow streets, congested roads, important or fragile buildings and key sites of religious, cultural or tourism importance;
- o Scheduling the transportation of waste to avoid peak traffic periods, the main tourism season, and other important times.

5 Social and Cultural Resources

115. Similar to the case of source and supply augmentation works, there is a significant risk that the network improvements, which involve further extensive disturbance of the ground surface, could damage undiscovered remains, or even unknown sites. The risks are in fact very much higher in this case, as most of the work will be conducted in Sawai Madhopur town, which has been inhabited for a long period, and where there is therefore a greater risk of artefacts

being discovered. The preventative measures described in Section V will thus need to be employed and strictly enforced. These are:

- o Consulting national and state historical and archaeological authorities to assess the archaeological potential of all construction sites;
- o Selecting alternative routes or sites to avoid any areas of medium or high risk;
- o Including state and local archaeological, cultural and historical authorities and interest groups as project stakeholders to benefit from their expertise;
- o Developing a protocol for use in conducting all excavation, to recognise, protect and conserve any chance finds (see Section V.B.5 for details).

116. The network improvements will also disturb some more modern-day social and cultural resources, such as schools, hospitals, temples, and also sites that are of tourism importance (particularly inside the fort and walled city). Impacts could include noise, dust, and interrupted access for pedestrians and vehicles, and if pneumatic drills are used to break the surface of roads, there could be a risk of damage from vibration. Given the historical importance of Sawai Madhopur, any such damage or disruption could be highly significant, so very careful mitigation will be needed to protect these resources and to enable usage by local people and visitors to continue throughout the construction work. This will be achieved through several of the measures recommended above, including:

- o Consulting the town authorities to identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity;
- o Limiting dust by removing waste soil quickly, bringing sand to site only when necessary, covering and watering stockpiles, and covering soil and sand when carried on trucks;
- o Increasing the workforce in sensitive areas to complete the work quickly;
- o Providing wooden bridges for pedestrians and metal sheets for vehicles to allow access across open trenches where required (including access to houses);
- o Using modern vehicles and machinery with standard adaptations to reduce noise and exhaust emissions, and ensuring they are maintained to manufacturers' specifications.

117. In addition the Executing Agency and Contractor should:

- o Consult municipal authorities, custodians of important buildings, cultural and tourism authorities, and affected communities in advance of the work to identify and address key issues, and avoid working at sensitive times, such as religious and cultural festivals.

118. A different but no less significant impact is the effect on people and communities if water supplies are closed down for extended periods when work is conducted on the network. This would be inconvenient in the short term, and there could be health risks if the water supply was

unavailable for several successive days or longer. It will therefore be important to take the necessary measures to avoid such a situation. This will require:

- o Detailed planning of the construction program to keep the cessation of water supplies to the minimum possible (in both area and duration);
- o Provision of alternative potable water to affected households and businesses for the duration of the shut-down;
- o Liaison with affected persons to inform them of any cessation in advance, and to ensure that they are provided with an alternative supply.

119. There is invariably a safety risk when substantial construction such as this is conducted in an urban area, and precautions will thus be needed to ensure the safety of both workers and citizens. The Contractor will be required to produce and implement a site Health and Safety Plan, and this should include such measures as:

- o Excluding the public from the site;
- o Ensuring that all workers are provided with and use appropriate Personal Protective Equipment;
- o Health and Safety Training for all site personnel;
- o Documented procedures to be followed for all site activities;
- o Accident reports and records; Etc.

120. An additional, particularly acute health risk presented by this work derives from the fact that, as mentioned above, the existing water supply system comprises mainly AC pipes, so there is a risk of contact with carcinogenic material if these pipes are uncovered in the course of the work. Precautions have already been introduced into the design of the project to avoid this, of which the most important are that:

- o No work is proposed on those parts of the existing system that contains AC pipes (ring, carrier and distribution mains), and these will be left in situ undisturbed, so there will be no deliberate excavation of AC pipes;
- o The locations of the new network will be planned to avoid all locations of existing AC pipes so AC pipes should also not be discovered accidentally.

121. Given the dangerous nature of this material for both workers and citizens, one additional measure should be taken to protect the health of all parties in the event (however unlikely) that AC pipes are encountered. This is that, during design of the water supply system, the design consultant should develop a protocol to be applied in any instance that AC pipes are found, to ensure that appropriate action is taken. This should be based on the approach recommended by the United States Environmental Protection Agency (USEPA)², and amongst other things, should involve:

² In the USA, standards and approaches for handling asbestos are prescribed by the Occupational Health and Safety Administration (OHSA) and the Environmental Protection Agency (EPA) and can be found at <http://www.osha.gov/SLTC/asbestos>

- Training of all personnel (including manual labourers) to enable them to understand the dangers of AC pipes and to be able to recognise them in situ;
- Reporting procedures to inform management immediately if AC pipes are encountered;
- Development and application of a detailed H&S procedure to protect both workers and citizens. This should comply with national and international standards for dealing with asbestos, and should include:
 - o Removal of all persons to a safe distance;
 - o Usage of appropriate breathing apparatus and protective equipment by persons delegated to deal with the AC material;
 - o Procedures for the safe removal and long-term disposal of all asbestos-containing material encountered.

122. There could again be some short-term socio-economic benefits from the construction work if local people gain employment in the workforce. To ensure that these benefits are directed to communities that are affected by the work, as suggested in Section IV.B.5, the Contractor should be required to employ at least 50% of his labour force from communities in the vicinity of construction sites. Creating a workforce from mainly local people will bring additional benefits by avoiding problems that can occur if workers are imported; including social difficulties in the host community and issues of health and sanitation in poorly serviced temporary camps.

VI. POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES: OPERATION AND MAINTENANCE

A. Screening out areas of no significant impact

123. Because a water supply system should operate without the need for major repair and maintenance (see below), there are several environmental sectors which should be unaffected once the system becomes operational. These are identified in **Table 6.1** below, with an explanation of the reasoning in each case. These factors are thus screened out of the impact assessment and will not be discussed further.

Table 6.1: Fields in which operation and maintenance of the completed water supply system is not expected to have significant impacts

Field	Rationale
Climate	Extraction and use of water will not affect climate
Fisheries & aquatic biology	Intake of water do not support a significant aquatic flora or fauna
Wildlife, forests, rare species, protected areas	Ranthambore Tiger Reserve National park located in Sawai Madhopur city. Since no activity will be permitted within the Tiger Reserve, Operation and maintenance work within the sensitive area not arise. Hence no blasting, air/noise pollution will be allowed.
Coastal resources	Sawai Madhopur is not located in a coastal area

Field	Rationale
Industries	The water supplied by the new system will not be for industrial use

B. Operation and maintenance of the improved water supply system

124. The new source augmentation works (CWR) should operate with little maintenance beyond routine actions required to keep the pumps and other equipment in working order at the CWR. This will be straightforward, involving regular checking and recording of performance for signs of deterioration, servicing and replacement of parts, etc. Small manpower will be employed to operate and maintain the CWR site.

125. The main requirement for maintenance of the transmission main and distribution system will be for the detection and repair of leaks. The generally flat topography and the usage of good quality DI and MDPE/UPVC pipes should mean that pipeline breaks are very rare, and that leaks are mainly limited to joints between pipes. The repair of household connections and the provision of new connections to slums and developing areas to increase the number of people supplied should reduce the incidence of illegal connections, which are often a major source of leaks.

126. The bulk meters installed at storage reservoirs and pumping stations will allow amounts of water flowing through individual parts of the network to be monitored, which will pinpoint areas where there are leaks, and/or where water is being taken from the system illegally. A small Leak Detection Team will then visit these areas with audio devices to locate individual leaks, which will then be repaired in essentially the same way that the pipes were installed. Trenches will be dug to reveal the leaking area and the faulty connection will be re-fitted, or the pipe will be removed and replaced if necessary. If illegal connections are found these will be removed and the pipe will be re-sealed, or a new connection with a meter will be provided for the household.

127. There will also be some small scale maintenance required at the new OR sites, which will involve the same sort of checking of pumps and other equipment as conducted at the CWR, plus the regular replenishment of chlorination cylinders to maintain water treatment. Two or three men will be employed at each site for this purpose.

128. Proper disposal of solid sludge, chlorine cylinder from water treatment plant are most important

C. Environmental impacts and benefits of the operating system

1 Physical Resources

129. If trenches are dug to locate and repair leaks or remove and replace lengths of pipe or illegal connections, the work will follow the same procedure that was followed during construction phase. In this case, soil and backfilled sand will be removed to expose the leaking junction or pipe, and if necessary a new pipe will be brought to site and replaced. The trench will then be refilled and re-compacted. This work should be very infrequent, and will affect individual small locations for short periods only (an average of a few hours for most repairs). Physical impacts will therefore be negligible. Work will not be conducted during rainfall so there will be no effect on drainage, and the removed material will be replaced in the trench so there will be no waste.

130. One of the main risks of improving a water supply system through increased abstraction is that the source will be used unsustainably, at a rate that is above the level of natural replenishment, and that the source becomes depleted as a result. That should not be an issue in this case as the water will be extracted from river. There is downstream abstraction and some water is used by local farmers, this requires only a proportion of the volume available, and the Irrigation Department has granted approval for the abstraction for the municipal supply. It should also be noted that water conservation measures included in the subproject (in particular the replacement of leaking distribution mains and faulty house connections) should significantly reduce system losses, and thus limit the volume needed.

2 Ecological Resources

131. Since no work permitted within or near the protected area, so any repairs or maintenance work can be conducted without ecological impacts.

3 Economic Development

132. Although network repairs could result in shops losing some business if the work means that access is difficult for customers, any losses will be small and short-lived and will probably be at the level of normal business fluctuations. It should therefore not be necessary to compensate for such losses. Nevertheless simple steps should be taken to reduce the inconvenience of the works, including:

- o Informing all residents and businesses about the nature and duration of any work well in advance so that they can make preparations if necessary;
- o Requiring contractors employed to conduct these works to provide wooden walkways across trenches for pedestrians and metal sheets where vehicle access is required;
- o Consulting the local police regarding any such work so that it can be planned to avoid traffic disruption as far as possible, and road diversions can be organised if necessary.

133. The provision of an improved and expanded water supply system is not expected to have direct economic benefits for business or industry, as connections will only be provided to domestic users. However businesses will almost certainly benefit from the expected improvement in the health and wellbeing of their workforce (see below) as this should result in fewer days lost through illness, and overall increased productivity.

4 Social and Cultural Resources

134. Although there is a high risk of excavation in the town discovering material of historical or archaeological importance, there will be no need to take precautions to protect such material when areas are excavated to repair leaks in the network, as all work will be conducted in trenches that have already been disturbed when the infrastructure was installed.

135. Repair work could cause some temporary disruption of activities at locations of social and cultural importance such as schools, hospitals, temples, tourist sites etc, so the same precautions as employed during the construction period should be adopted. These include:

- o Consulting the town authorities to identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity;
- o Completing work in these areas quickly;
- o Providing wooden bridges for pedestrians and metal sheets for vehicles to allow access across open trenches where required;
- o Consulting municipal authorities, custodians of important buildings, cultural and tourism authorities and local communities in advance of the work to identify and address key issues, and avoid working at sensitive times, such as religious and cultural festivals.

136. The responsible authorities will employ local contractors to conduct network repairs, and contractors should be required to operate the same kinds of Health and Safety procedures as used in the construction phase (see Section V.C.5) to protect workers and the public. This should include application of the asbestos protocol if any AC pipes are encountered, and prohibition of the use of AC pipes for any repair or maintenance work.

137. The use of local contractors will provide economic benefits to the companies and the workers they employ. There is however little prospect of directing these benefits to persons affected by any maintenance or repair works as contractors will utilise their existing workforce. To provide at least some economic benefits to affected communities, persons employed to maintain the ORs and CWR should be residents of the neighbouring areas.

138. The citizens of the town will be the major beneficiaries of the improved water supply, as they will be provided with a constant supply of better quality water, piped into their homes. This should improve the social capital of the city, and individual and community health and well-being. Diseases of poor sanitation, such as diarrhoea and dysentery, should be reduced, so people should spend less on healthcare and lose fewer working days due to illness, so their economic status should also improve, as well as their overall health.

VII. INSTITUTIONAL REQUIREMENTS AND ENVIRONMENTAL MONITORING PLAN

A. Summary of environmental impacts and mitigation measures

139. Table 7.1 lists the potential adverse impacts of the Sawai Madhopur water supply subproject as identified and discussed in Sections IV, V and VI, and the mitigation proposed to reduce these impacts to acceptable levels. The table also shows how the mitigation will be implemented, who will be responsible, and where and when the mitigation activities will take place. The mitigation programme is shown as the quarter of each year in which each activity will occur, which relates to the project programme described in Section II.B. The final column assesses whether the proposed action will successfully mitigate the impact (shown as 0), and indicates that some of the measures will provide an additional benefit (shown as +).

B. Institutional arrangements for project implementation

140. The main agencies involved in managing and implementing the subproject are:

- LSGD is the Executing Agency (EA) responsible for management, coordination and execution of all activities funded under the loan.
- The Implementing Agency (IA) is the Project Management Unit of the ongoing RUIDP, which will be expanded to include a broader range of skills and representation from the Urban Local Bodies (ULB, the local government in each town). Assigned as the RUSDIP Investment Program Management Unit (IPMU), this body will coordinate construction of subprojects across all towns, and ensure consistency of approach and performance.
- The IPMU will be assisted by Investment Program Management Consultants (IPMC) who will manage the program and assure technical quality of design and construction; and Design and Supervision Consultants (DSC), who will design the infrastructure, manage tendering of Contractors and supervise the construction process.
- Investment Program Implementation Units (IPIU) will be established in seven zones across the State to manage implementation of subprojects in their area. IPIUs will be staffed by professionals seconded from government departments (PHED, PWD), ULBs, and other agencies, and will be assisted by consultants from the IPMC and DSC as necessary.
- The IPMU will appoint Construction Contractors (CC) to build elements of the infrastructure in a particular town. The CCs will be managed by the IPIU, and construction will be supervised by the DSC.
- LSGD will be assisted by an inter-ministerial Empowered Committee (EC), to provide policy guidance and coordination across all towns and subprojects. The EC will be chaired by the Minister of Urban Development and LSG, and members will include Ministers, Directors and/or representatives of other relevant Government Ministries and Departments.
- City Level Committees (CLCs) have also been established in each town, chaired by the District Collector, with members including officials of the ULB, local representatives of state government agencies, the IPIU, and local NGOs and CBOs. The CLCs will monitor project implementation in the town and provide recommendations to the IPIU where necessary.

141. **Figure 7.1** shows institutional responsibility for implementation of environmental safeguard at different level.

Figure 7.1: Institutional Responsibility- RUSDIP

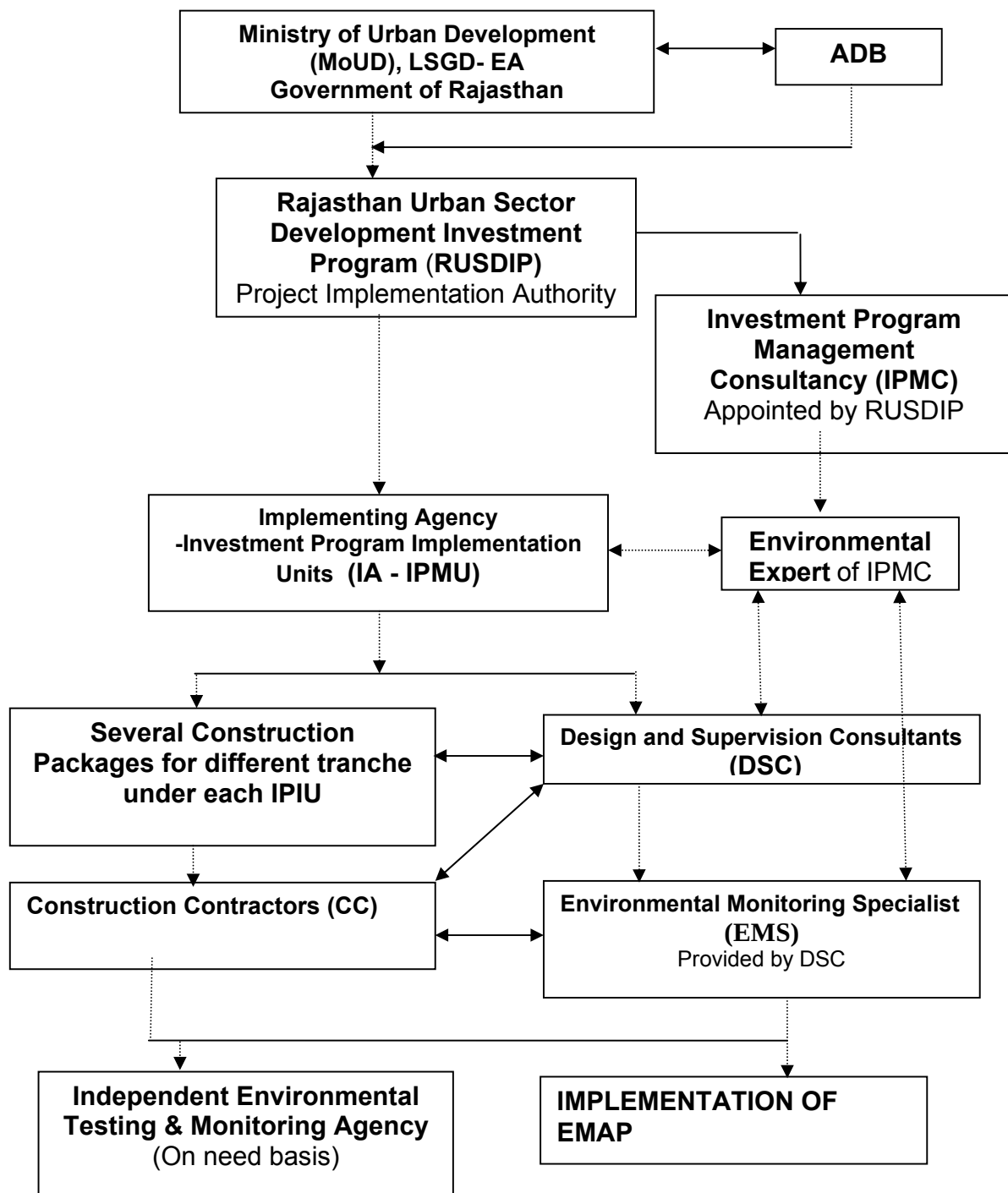


Table 7.1: Environmental impacts and mitigation for the Sawai Madhopur Water Supply Subproject (Black = continuous activity; Grey = intermittent)

Potential Negative Impacts	Sig	Dur	Mitigation Activities and Method	Responsibility	Location	2008				2009				
Construction: Source Augmentation Works						D	D	3	4	1	2	3	Op	³
Excavation for CWR will produce large amounts of waste soil	M	P	Find beneficial uses for waste soil in construction, land raising and infilling of excavated areas	Contractor	All sites									+
Waste soil could create dust in windy weather	M	T	Remove waste soil as soon as it is excavated, spray with water	Contractor	All sites									0
			Use tarpaulins to cover dry soil when carried on trucks											0
Trees may be removed at CWR site	M	P	Plant and maintain three trees for every one removed	Contractor	All sites									0
Traffic and activities may be disrupted by trucks carrying waste soil	M	T	Plan routes to avoid Sawai Madhopur Town and narrow roads	Contractor	From CWR site									0
			Schedule transportation to avoid peak traffic periods											0
Ground disturbance could damage archaeological and historical remains	S	P	Request state and local archaeological authorities to assess archaeological potential of all work sites	DSC	All sites									0
			Select alternatives if sites have medium-high potential	DSC										0
			Include state and town historical authorities as project stakeholders to benefit from their expertise	LSGD										0
			Develop and apply protocol to protect chance finds (excavation observed by archaeologist; stop work if finds are suspected; state authority to plan appropriate action)	DSC and Contractor										+
Economic benefits if local people are employed in Contractor's workforce	M	T	Contractor should employ at least 50% of workforce from communities in vicinity of work sites	Contractor	All sites									+
						2008				2009/2010				
Construction: Network Improvements						D	D	3	4	1	2	3	Op	
Trenching will produce additional amounts of waste soil	M	P	As above: find beneficial uses in construction or infill	Contractor	All sites									+
Disturbance to Tiger Reserve due to blasting, air pollution, water table disturbance due to digging	M	T	No blasting, avoidance of disturbance of aquifer, forest for firewood by workmen, no air pollution/blowing of soil in high winds, no dumping of muck near protected area	Contractor, RUIDP	All Sites									0
Waste soil and imported sand may create dust	M	T	As above: remove waste quickly, cover/spray stockpiles	Contractor	Network sites									0
			Only bring sand (for backfill) to site when needed											0
			Cover soil and sand when transported on trucks											0
Trees may be removed along pipeline routes	M	P	As above: avoid removing trees, plant 3 for every 1 cut	Contractor	Network									0
Some farm land may need to be acquired where route of transmission main diverges from alongside main road	M	P	*Purchase land as described in Resettlement Framework	LSGD	Where necessary									0
			*Avoid taking >10% of the land of any owner or tenant	DSC										0
			*Compensate farmers in cash for loss of crops and trees	LSGD										0
Shops may lose income if customers' access is impeded	M	T	*Compensate businesses for lost income	LSGD	Network sites									0
			Leave spaces for access between mounds of soil	Contractor										0

Sig = Significance of Impact (NS = Not Significant; M = Moderately Significant; S = Significant). Dur = Duration of Impact (T = Temporary; P = Permanent)

D = Detailed Design period; Op = Period when infrastructure is operating

³ This column shows impacts remaining after mitigation: 0 = zero impact (impact successfully mitigated); + = positive impact (mitigation provides a benefit)

* Mitigation of these impacts will be provided through a separate Resettlement Plan

[illegible]

142. Resettlement issues will be coordinated centrally by a Resettlement Specialist within the IPMU/ IPMC, who will ensure consistency of approach between towns. A local Resettlement Specialist will also be appointed to IPIUs of zones in which there are resettlement impacts and they will prepare and implement local Resettlement Plans following the framework established in Tranche 1.

143. Environmental issues will be coordinated by an Environmental Specialist within the IPMU/ IPMC, who will ensure that all subprojects comply with environmental safeguards. An Environmental Monitoring Specialist (EMS) who is part of the DSC team will implement the Environmental Monitoring Plan from each IEE (see below), to ensure that mitigation measures are provided and protect the environment as intended. Domestic Environmental Consultants (DEC) will be appointed by each IPIU to update the existing IEEs in the detailed design stage, and to prepare IEEs or EIAs for new subprojects, where required to comply with national law and/or ADB procedure.

C. Environmental Monitoring Plan

144. Table 7.1 shows that most mitigation activities are the responsibility of the Construction Contractors⁴ (CC) employed to build the infrastructure during the construction stage, or the O&M Contractors employed to conduct maintenance or repair work when the system is operating. Responsibility for the relevant measures will be assigned to the Contractors via the contracts through which they are appointed (prepared by the DSC during the detailed design stage), so they will be legally required to take the necessary action. There are also some actions that need to be taken by LSGD in their role as project proponent, and some actions related to the design that will be implemented by the DSC.

145. A program of monitoring will be conducted to ensure that all parties take the specified action to provide the required mitigation, to assess whether the action has adequately protected the environment, and to determine whether any additional measures may be necessary. This will be conducted by a qualified Environmental Monitoring Specialist (EMS) from the DSC. The EMS will be responsible for all monitoring activities and reporting the results and conclusions to the IPMU, and will recommend remedial action if measures are not being provided or are not protecting the environment effectively. The EMS may be assisted by environmental specialists in particular technical fields, and junior or medium-level engineers who can make many of the routine observations on site. Post-construction monitoring will be conducted by the relevant Government Agency (GA) to whom responsibility for the infrastructure will pass once it begins to operate⁵.

146. Table 7.1 shows that most of the mitigation measures are fairly standard methods of minimising disturbance from building in urban areas (maintaining access, planning work to avoid sensitive times, finding uses for waste material, etc), and experienced Contractors should be familiar with most of the requirements. Monitoring of such measures normally involves making observations in the course of site visits, although some require more formal checking of records and other aspects. There will also be some surveys of residents, as most of the measures are aimed at preventing impacts on people and the human environment.

⁴ During implementation the contractor will submit monthly progress reports, which includes a section on EMP implementation to the IPIU. The IPIU will submit reports to the IPMU for review. The IPMU will review progress reports to ensure that the all mitigation measures are properly implemented. The IPMU will consolidate monthly reports and submit quarterly reports to ADB for review

⁵ In the operational period some infrastructure will be the responsibility of the Municipal Boards/Councils, whilst others will be the responsibility of the appropriate branch of the State government (such as PWD, PHED, etc)

147. Table 7.1 shows the proposed Environmental Monitoring Plan (EMP) for this subproject, which specifies the various monitoring activities to be conducted during all phases. Some of the measures shown in Table 7.1 have been consolidated to avoid repetition, and there has been some re-ordering to present together those measures that relate to the same activity or site. The EMP describes: (i) mitigation measures, (ii) location, (iii) measurement method, (iv) frequency of monitoring and (v) responsibility (for both mitigation and monitoring). It does not show specific parameters to be measured because as indicated above, most measures will be checked by simple observation, by checking of records, or by interviews with residents or workers.

148. Given the scale of the investment in providing the infrastructure, LSGD will also wish to conduct monitoring during the operational period to confirm the long-term benefits of the scheme. Table 7.2 shows that this will cover two elements, which will monitor:

- o The chemical and bacteriological quality of water provided by the municipal system;
- o The health of the population and the prevalence of diseases of poor sanitation.

Table 7.2: Environmental Monitoring Plan

Mitigation Activities and Method	Location	Responsible for Mitigation	Monitoring Method	Monitoring Frequency	Responsible for Monitoring
CONSTRUCTION					
Find beneficial uses for waste soil (construction, land raising, infill)	All sites	Contractor	Site observations; CC records	Monthly	EMS
Remove waste soil as soon as it is excavated	All sites	Contractor	Site observations	Weekly	EMS
Use tarpaulins to cover dry soil and sand when carried on trucks	All sites	Contractor	Observations on and off site	Weekly	EMS
Cover or damp down soil and sand stockpiled on site	Inhabited areas	Contractor	Site observations	Weekly	EMS
Only bring sand (for backfill) to site when needed	Inhabited areas	Contractor	Site observations; CC records	Weekly	EMS
Leave spaces for access between mounds of soil	Network sites	Contractor	Site observations	Weekly	EMS
Plan truck routes to avoid Sawai Madhopur Town, narrow or congested roads, important or fragile buildings, religious and tourist sites	All sites	Contractor	Observations off site; CC record	Weekly	EMS
Plan transport of waste to avoid peak traffic and tourist season	All sites	Contractor	Observations on and off site	Weekly	EMS
No air/noise pollution near protected Tiger Reserve, no sourcing of firewood from forest, no water from water sources, no dumping of muck in protected area	All sites	Contractor, LSGD	Observations on site	Weekly	EMA
Plant and maintain three trees for every one removed	All sites	Contractor	Observations on/off site; CC records	Monthly	EMS
*Acquire land as described in Resettlement Framework	Where required	LSGD	Landowner surveys; LSGD record	As needed	IMA ⁶
*Avoid taking >10% of the land of any owner or tenant	Where required	DSC	Owner/tenant surveys; DSC records	As needed	IMA
* Compensate farmers in cash for loss of crops and trees	Where required	LSGD	Farmer surveys; LSGD records	As needed	IMA
*Compensate businesses for lost income	Where required	LSGD	Shopkeeper survey; LSGD record	As needed	IMA
Provide bridges to allow people & vehicles to cross trench	Network sites	Contractor	Site observation; resident survey	Weekly	EMS
Increase workforce in inhabited areas to finish work quickly	Network sites	Contractor	Site observations; CC records	Monthly	EMS
Inform shopkeepers and residents of work in advance	Network sites	LSGD	Resident surveys; CC records	Monthly	EMS
Consult town authority and avoid existing infrastructure	All sites	DSC	Site observation; design reports	Monthly	EMS
Locate water and sewer pipes on opposite sides of roads	Network sites	DSC	Site observation; design reports	Monthly	EMS
Integrate subprojects to conduct trenching at same time	Network sites	DSC/LSGD	Site observation; design reports	Monthly	EMS
Plan work with town authorities – work when traffic is light	Network sites	Contractor	Site observations; CC records	Monthly	EMS
Ensure police provide traffic diversions when necessary	Network sites	Contractor	Site observations; CC records	Monthly	EMS
Request archaeological authorities to assess potential of all sites	All sites	DSC	DSC records; design reports	As needed	EMS
Select alternatives if sites have medium or high potential	All sites	DSC	DSC records; design reports	As needed	EMS
Include state and town historical authorities as stakeholders	All sites	LSGD	CC records; observations at meetings	As needed	EMS
Develop and apply archaeological protocol to protect chance finds	All sites	DSC and CC	DSC and CC records; site observations	Weekly	EMS
Avoid using pneumatic drills near buildings at risk from vibration	All sites	Contractor	Site observations; CC records	Weekly	EMS
Use modern vehicles and machinery and maintain as specified	All sites	Contractor	Site observations; CC records	Monthly	EMS
Consult authorities, custodians of buildings, communities: address	Network sites	Contractor	Site observations; CC records;	Monthly	EMS

⁶ Resettlement issues (asterisked) will be monitored by an Independent Monitoring Agency (IMA) established under the Resettlement Framework

Mitigation Activities and Method	Location	Responsible for Mitigation	Monitoring Method	Monitoring Frequency	Responsible for Monitoring
key issues, avoid working at sensitive times			resident surveys		
Plan work to minimise shutdown of water supply system	All sites	DSC	Design reports; resident surveys	Monthly	EMS
Provide alternative water to affected residents	All sites	LSGD	Site observation; resident survey	Weekly	EMS
Inform communities of any shutdown in advance	All sites	LSGD	Site observation; resident survey	Weekly	EMS
Prepare and implement a site H&S Plan including personal protection from transmission of HIV/AIDS (safety of workers/public)	All sites	Contractor	Site observations; CC records	Monthly	EMS
Exclude public from the site	All sites	Contractor	Site observations; CC records	Monthly	EMS
Ensure that workers wear Personal Protective Equipment	All sites	Contractor	Site observations; CC records	Monthly	EMS
Provide Health and Safety training including process of transmission of HIV/AIDS for all personnel	All sites	Contractor	CC records; worker interviews	Monthly	EMS
Follow documented procedures for all site activities	All sites	Contractor	Site observations; CC records	Monthly	EMS
Keep accident reports and records	All sites	Contractor	CC records	Monthly	EMS
Design infrastructure to avoid known locations of AC pipes	Network sites	DSC	DSC records; design reports	As needed	EMS
Train all personnel in dangers and recognition of AC pipes	All sites	Contractor	Site observations; CC records	Monthly	EMS
Develop and apply protocol if AC pipes are encountered	All sites	DSC/CC	DSC & CC records; site observations	Weekly	EMS
If AC pipes are encountered, report to management immediately	All sites	Contractor	Site observations; CC records	Weekly	EMS
Remove all persons to safe distance	All sites	Contractor	Site observations; CC records	Weekly	EMS
Workers handling AC: wear breathing apparatus; protective suits	All sites	Contractor	Site observations; CC records	Weekly	EMS
All AC material must be removed and disposed of safely	All sites	Contractor	Observations on and off site; CC records	As needed	EMS
Employ at least 50% of workforce from communities near sites	All sites	Contractor	CC records; worker interviews	Monthly	EMS
OPERATION AND MAINTENANCE					
Inform shopkeepers and residents of work in advance	Network sites	GA	Resident surveys	Monthly	
Provide walkways and bridges for vehicles	Network sites	OM Contractor	Site observation; resident survey	Monthly	
Request police to divert traffic if necessary	Network sites	OM Contractor	Site observations	Monthly	
Avoid using drills or trucks near fragile buildings	Network sites	OM Contractor	Site observations	Monthly	
Complete work quickly in sensitive areas	Network sites	OM Contractor	Site observations; OMC records	Monthly	
Consult and inform authorities & people, avoid sensitive periods	Network sites	OM Contractor	Site observation; resident survey	Monthly	
Prepare and operate H&S plan to protect workers and citizens	All sites	OM Contractor	Site observations; OMC records	Monthly	
Apply AC protocol to protect all persons if AC pipes encountered	All sites	OM Contractor	Site observations; OMC records	Monthly	
Employ people who live nearby to maintain RWR, OR and GR	All sites	GA	Employer record; worker survey	Monthly	
LONG-TERM SURVEYS					
Survey of chemical and bacteriological quality of municipal water	Domestic sites	LSGD	Water quality sampling and analysis	Annual for 5 years	Consulting laboratory
Survey of public health and incidence of water borne disease	Sawai Madhopur	LSGD	Hospital records; resident surveys	Annual for 5 years	Social studies consultant

149. An accredited laboratory will be appointed to monitor the quality of water at the intake and at the point of supply to consumers (in houses and slums), and a domestic social studies consultant will be appointed to monitor public health and the incidence of disease. These surveys will be conducted annually over the first five years of operation of the system, and require the initial collection of baseline data on pre-project conditions, during the construction period.

D. Environmental management and monitoring costs

150. Most of the mitigation measures require the contractors to adopt good site practice, which should be part of their normal procedures already, so there are unlikely to be major costs associated with compliance. Regardless of this, any costs of mitigation by the contractors (those employed to construct the infrastructure or the local companies employed to conduct O&M when the system is operating) are included in the budgets for the civil works and do not need to be estimated separately here. Mitigation that is the responsibility of LSGD will be provided as part of their management of the project, so this also does not need to be duplicated here. Costs of acquiring land and compensating shopkeepers and farmers for loss of income (Table 7.1) are calculated separately in the budgets for the Resettlement Framework and Resettlement Plans so are also excluded from this analysis.

151. The remaining actions in the Environmental Management Plan are:

- o The environmental monitoring during construction, conducted by the EMS; and
- o The long-term post-construction surveys that will be commissioned by LSGD.

152. These have not been budgeted elsewhere, and their costs are shown in Table 7.3, with details of the calculations shown in footnotes beneath the table. The figures show that the total cost of environmental management and monitoring for the subproject as a whole (covering design, 1 ½ years of construction and the first five years of operation) is INR 2.62 million, ie US\$ 60,944.

Table 7.3: Environmental management and monitoring costs (INR)

Item	Quantity	Unit Cost	Total Cost	Sub-total
1. Implementation of EMP (2 years)				
Domestic Environmental Monitoring Specialist	1 x 3 month	130,000 ⁷	390,000	
Survey Expenses	Lump sum	120,000	120,000	5,10,000.00
2. Survey of municipal water quality (6 years)				
Domestic Consultant	6 x ½ month	130,000	390,000	
Sample Analysis	6 x 20	4,000 ⁸	480,000	
Other Expenses	Lump sum	200,000	200,000	10,70,000.00
3. Survey of public health (6 years)				
Domestic Consultant	6 x ½ month	130,000	390,000	
Other Expenses	Lump sum	250,000	250,000	6,40,000.00

⁷ Unit costs of domestic consultants include fee, travel, accommodation and subsistence

⁸ Cost of a standard suite of drinking water quality parameters (pH, turbidity, chlorinity, alkalinity, conductivity, TDS, DO, total and faecal coliforms, and selected metals) per sample

Item	Quantity	Unit Cost	Total Cost	Sub-total
4. Environmental mitigation measures including green belt development around PS	Lump sum	300,000	300,000	300,000.00
5. Wild life warden for review of impact on Tiger Reserve	Lump sum	100,000	100,000	100,000
TOTAL				26,20,000.00

E. Associated Facilities

153. 15. The RUIDP and the project authorities shall, at the time of connecting to the downstream water resource points of the Chambal- Sawai Madhopur- Nadoti Project (CSNP) would determine if the water supply storage/treatment facilities put up to ADB funded water supply would connect are also compliant with Indian Environmental Laws. This measure is required to be ensured by RUIDP for all ADB assisted projects because the way these water source facilities are operated and maintained can greatly affect the health of the population, the quality of the environment, and the benefits to the poor at the consumption point.

154. Environmentally safe, continuous and reliable water sources and adequate capacity for treatment, transmission, and distribution, as well as properly functioning pumps, reservoirs, and networks are a must for RUIDP to mandate a safe water supply service to the local population. If the water is sourced through the aquifer for drinking water supply, it must be ensured that design extraction/pumping rate must be less than the documented aquifer recharge rate because excessive pumping of aquifers can lower groundwater levels in this water scarce state.

VIII. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Project stakeholders

155. Most of the main stakeholders have already been identified preliminary. If any other stakeholders that are identified during project implementation will be brought into the process in the future. Primary stakeholders are:

- o Residents, shopkeepers and businesspeople who live and work alongside the roads in which network improvements will be provided and near sites where facilities will be built
- o Owners and users of any land that is acquired along the transmission main route;
- o Custodians and users of socially and culturally important buildings in affected areas;
- o State and local authorities responsible for the protection and conservation of archaeological relics, historical sites and artefacts;
- o State and local tourism authorities.

Secondary stakeholders are:

- o LSGD as the Executing Agency;
- o Other government institutions whose remit includes areas or issues affected by the project (state and local planning authorities, Department of Public Health Engineering, Local Government Dept, Ministry of Environment and Forests, Roads and Highways Division, etc);
- o NGOs and CBOs working in the affected communities;
- o Other community representatives (prominent citizens, religious leaders, elders, women's groups);
- o The beneficiary community in general; and
- o The ADB, and the Government of India, Ministry of Finance

B. Consultation and disclosure to date

156. Some informal discussion was held with the local people during site visit. Issues discussed are

- Awareness and extent of the project and development components
- Benefits of Project for the economic and social Upliftment of Community
- Labour availability in the Project area or requirement of outside labour involvement
- Local disturbances due to Project Construction Work
- Necessity of tree felling etc. at project sites
- Water logging and drainage problem if any
- Drinking water problem
- Forest and sensitive area nearby the project site
- Movement of wild animals near the project site

157. Local populations are very much interested on the project and they will help project authorities in all aspects. Public consultation results specifically on environmental issues are shown in Appendix- VIII-A.

158. The public Consultation and group discussion meeting were conduct by RUIDP on Date 30 June, 2008 after advertising in Local NEWS papers. The objective of the meeting was to appraise the stakeholders about the environmental and social impacts of the proposed program and the safeguards provided in the program to mitigate the same. In the specific context of Sawai Madhopur the environmental and social impacts of the proposed subprojects under Tranche 2 in Sawai Madhopur were discussed.

159. Meetings and individual interviews were held at potentially temporarily affected areas; and local informal interviews were conducted to determine the potential impacts of sub-project

construction to prepare the sample Environmental Framework. A town-wise stakeholder consultation workshop was conducted which provided an overview of the Program and sub-projects to be undertaken in Sawai Madhopur; and discussed the Government and ADB's Environment policies acts and potential environment impacts of the sub-projects in Sawai Madhopur. During the workshop, Hindi versions of the Environmental Framework were provided to ensure participants understood the objectives, policy principles and procedures related to Environment, English and Hindi versions of the Environmental Framework have been placed in the Urban Local Body (ULB) office and Environmental Framework will be provided later on. The NGO to be engaged to implement the Mitigation Measures will continue consultations, information dissemination, and disclosure. The Environmental Framework will be made available in the ULB office, Investment Program Project Management Unit and Implementation Unit (IPMU and IPIU) offices, and the town library. The finalized IEE containing Mitigation Measures will also be disclosed in ADB's website, the State Government website, the local government website, and the IPMU and IPIU websites. ADB review and approval of the RP is required prior to award of civil works contracts.

160. Major Issues discussed at Public consultation are

- (i) Proposed water supply project should ensure enough supply of drinking water in all wards of city.
- (ii) Executive agency should give preference to engage internationally reputed contractor like Gammon, HCC, etc as people do not faith about the local contractors in respect of quality of works as well as timely completion of work;
- (iii) Efforts should be made by government to supply drinking water round the clock;
- (iv) Livelihood affected households should be given assistance in the mode of cash compensation;
- (v) Local people should be employed by the contractor during construction work;
- (vi) Adequate safety measures should be taken during construction work;
- (vii) Mobile kiosks/vendors/hawkers have shown willingness to shift in nearby places without taking any compensation and assistance from the Executing Agency;
- (viii) Local people have appreciated the water supply proposal of the government and they have ensured that they will cooperate with the Executing Agency during project implementation

C. Future consultation and disclosure

161. LSGD will extend and expand the consultation and disclosure process significantly during implementation of RUSDIP. They will appoint an experienced NGO to handle this key aspect of the programme, who will conduct a wide range of activities in relation to all subprojects in each town, to ensure that the needs and concerns of stakeholders are registered, and are addressed in project design, construction or operation where appropriate. The programme of activities will be developed during the detailed design stage, and is likely to include the following:

- Consultation during detailed design:
 - o Focus-group discussions with affected persons and other stakeholders (including women's groups, NGOs and CBOs) to hear their views and concerns, so that these can be addressed in subproject design where necessary;
 - o Structured consultation meetings with the institutional stakeholders (government bodies and NGOs) to discuss and approve key aspects of the project.
- Consultation during construction:
 - o Public meetings with affected communities to discuss and plan work programmes and allow issues to be raised and addressed once construction has started;
 - o Smaller-scale meetings to discuss and plan construction work with individual communities to reduce disturbance and other impacts, and provide a mechanism through which stakeholders can participate in subproject monitoring and evaluation;
- Project disclosure:
 - o Public information campaigns (via newspaper, TV and radio) to explain the project to the wider city population and prepare them for disruption they may experience once the construction programme is underway;
 - o Public disclosure meetings at key project stages to inform the public of progress and future plans, and to provide copies of summary documents in Hindi;
 - o Formal disclosure of completed project reports by making copies available at convenient locations in the study towns, informing the public of their availability, and providing a mechanism through which comments can be made.

IX. FINDINGS AND RECOMMENDATIONS

A. Findings

162. The Project is designed to improve the quality of life of small town residents and enhance the small towns' roles as market, services, and manufacturing centers. . It has a strong community development focus reinforced by integrated poverty reduction, health and hygiene improvement investment projects. The towns' economies will benefit from enhanced productivity as a result of health improvement, time savings in collecting water, as well as from increased urban efficiency arising from improved roads, bridges, drainage, drinking water and sanitation. Residents in towns will also benefit from lower water costs and from savings in health care costs.

163. During project design, community meetings were held with beneficiaries to discuss sanitation, poverty, resettlement, affordability issues, and environmental concerns. Socioeconomic surveys obtained information and individual views on current situations and future preferences. Potential environmental impacts of urban infrastructure improvements are mainly short-term during the construction period and can be minimized by the proposed mitigating measures and environmentally sound engineering and construction practices.

164. The process described in this document has assessed the environmental impacts of all elements of the infrastructure proposed under the Sawai Madhopur Water Supply Subproject. Potential negative impacts were identified in relation to both construction and operation of the improved infrastructure, but no impacts were identified as being due to either the project design or location. Mitigation measures have been developed in generic way to reduce all negative impacts to acceptable levels. These were discussed with specialists responsible for the engineering aspects, and as a result some measures have already been included in the outline designs for the infrastructure. These include:

165. This means that the number of impacts and their significance has already been reduced by amending the design.

166. Changes have also been made to the location of elements of the project to further reduce impacts. These include:

- o Locating all facilities (OR, CWR) on government-owned land to avoid the need for land acquisition and relocation of people;
- o Locating the distribution main in the ROW alongside a main road, to reduce the acquisition of agricultural land and impacts on livelihoods of farmers and workers.

167. Regardless of these and various other actions taken during the IEE process and in developing the project, there will still be impacts on the environment when the infrastructure is built and when it is operating. This is mainly because of the invasive nature of trenching and other excavation; because the distribution network is located in an ancient town where there are densely populated areas and sites of historical and tourism interest; and because Rajasthan is an area with a rich history, so there is a high risk that ground disturbance may uncover important remains. Because of these factors the most significant impacts are on the physical environment, the human environment, tourism, and the cultural heritage.

168. During the construction phase, impacts mainly arise from the need to dispose of large quantities of waste soil and import a similar amount of sand to support the pipes in the trenches; and from the disturbance of residents, businesses, traffic and important buildings by the construction work. These are common impacts of construction in urban areas, and there are well developed methods for their mitigation. These include:

- o Finding beneficial uses for waste material;
- o Covering soil and sand during transportation and when stored on site;
- o Planning work to minimise disruption of traffic and communities;
- o Providing temporary structures to maintain access across trenches where required.

169. There could also be a need to acquire small amounts of farm land along the route of the distribution main, where it is impracticable for the pipeline to follow bends in the road. Such impacts are also frequently encountered and are dealt with by a combination of the legal process and additional measures required by ADB policy on Involuntary Resettlement. Actions are discussed in a separate Resettlement Plan and Resettlement Framework, and include:

- o Acquisition of land through the GOI Land Acquisition Act, through which the market value is paid, based on an analysis of recent transactions;
- o Ensuring that no more than 10% of the land of a single owner or tenant is acquired;
- o Providing additional compensation for loss of standing crops and productive trees.

170. One field in which impacts are much less routine is archaeology, and here a series of specific measures have been developed to avoid damaging important remains. These include:

- o Assessing the archaeological potential of all proposed construction sites, and selecting alternative locations to avoid any areas of medium or high risk;
- o Including archaeological, cultural and historical authorities and interest groups as project stakeholders to benefit from their expertise;
- o Developing a protocol for use in conducting all excavation to ensure that any chance finds are recognised, protected and conserved.

171. The use of AC pipes in the existing water distribution network presents a particular problem, as workers and the public will need to be protected from inhalation of asbestos dust, which can be carcinogenic. This will be addressed by a number of measures, including:

- o Limiting network improvements to expansion of the area covered, and leaving the existing AC system (ring, carrier and distribution mains) in situ undisturbed;
- o Training staff and workers to raise awareness of the dangers of AC and enable early recognition of such pipes if encountered accidentally;
- o Development of a protocol based on USEPA guidelines, to protect workers and the public if AC pipes are encountered (including evacuation of the immediate area, use of protective equipment by workers, and safe removal and disposal of AC material).

172. There were limited opportunities to provide environmental enhancements, but certain measures were included. For example it is proposed that the project will:

- o Employ in the workforce people who live in the vicinity of construction sites to provide them with a short-term economic gain;
- o Ensure that people employed in the longer term to maintain and operate the new facilities are residents of nearby communities.

173. These and the other mitigation and enhancement measures are summarised in Table 7.1, which also shows the location of the impact, the body responsible for the mitigation, and the program for its implementation.

174. Once the system is operating, most facilities (OR, CWGR) will operate with routine maintenance, which should not affect the environment. Leaks in the network will need to be repaired from time to time, but environmental impacts will be much less than those of the construction period as the work will be infrequent, affecting small areas only. It will also be conducted in areas that have already been excavated, so there will be no need to protect archaeological material.

175. The main impacts of the operating water supply system will be beneficial as the citizens of Sawai Madhopur will be provided with a constant supply of water, which will serve a greater proportion of the population, including slum-dwellers. This will improve the quality of life of people as well as benefiting both individual and public health as the improvements in hygiene should reduce the incidence of disease associated with poor sanitation. This should lead to economic gains as people will be away from work less and will spend less on healthcare, so their incomes should increase.

176. Table 7.1 also assesses the effectiveness of each mitigation measure in reducing each impact to an acceptable level. This is shown as the level of significance of the residual impact (remaining after the mitigation is applied). This shows that all impacts will be rendered at least neutral (successfully mitigated), and that certain measures will produce a benefit (in addition to the major benefits provided by the operating schemes).

177. Mitigation will be assured by a programme of environmental monitoring conducted during both construction and operation to ensure that all measures are provided as intended, and to determine whether the environment is protected as envisaged. This will include observations on and off site, document checks, and interviews with workers and beneficiaries, and any requirements for remedial action will be reported to the IPMU. There will also be longer-term surveys to monitor the expected improvements in the quality of domestic water and the health of the population.

B. Recommendations

178. There are two straightforward but essential recommendations that need to be followed to ensure that the environmental impacts of the project are successfully mitigated. These are that LSGD should ensure that:

- o All mitigation, compensation and enhancement measures proposed in this Status report (**Table 7.1**) and in the Resettlement Framework for the RUSDIP are implemented in full, as described in these two documents;
- o The Environmental Monitoring Plan proposed in Section VI of this report and the internal and external monitoring proposed in the Resettlement Framework are also implemented in full.

X. CONCLUSIONS

179. The environmental status of the proposed improvements in water supply and distribution infrastructure in Sawai Madhopur Town has been assessed. Issues related to Involuntary

Resettlement were assessed by a parallel process of resettlement planning and will be compensated by measures set out in detail in the Resettlement Framework for the subproject.

180. The overall conclusion of process is that provided that providing the mitigation, compensation and enhancement measures are implemented in full, there should be no significant negative environmental impacts as a result of location, design, construction or operation of the subproject. There should in fact be some small benefits from recommended mitigation and enhancement measures, and major improvements in quality of life and individual and public health once the scheme is in operation.

181. There are no uncertainties in the analysis, and no further studies are required to comply with ADB procedure or national law.

APPENDIX 1

PHOTOGRAPHS

Sawai Madhopur Photo Gallery



Proposed intake point for water supply sub project



Proposed intake point for water supply sub project



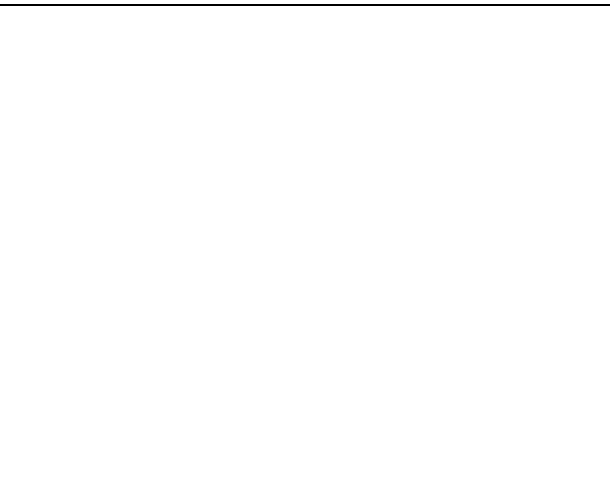
Discussion with local public about sub project



Discussion with local public about sub project



OHS Site



PHED LETTER

OFFICE OF THE CHIEF ENGINEER (SPECIAL PROJECT)

PUBLIC HEALTH ENGINEERING DEPARTMENT RAJASTHAN

F - 18, New Building, 1 Floor, 2, CIVIL LINES - JAIPUR - 302006

☎0141-2220553 Fax -0141-2222585 email: rj_cesp@water.nic.in

No. *CESP/PHED/ F. 231/ RUIDP/2007-08*

Dated : *11/7/08*

The Project Director,
Rajasthan Urban Infrastructure Development Project,
JLN Marg,
Jaipur (Raj)

SUB : Information required by ADB Mission regarding water supply projects under execution with PHED.

In the meeting held under the Chairmanship of Addl. Project Director, on 30th May 2008, in which the members of ADB Review Mission, Addl. Project Director I and II, Superintending Engineer (Water Supply), RUIDP, and other officers of RUIDP were present. The ADB Mission desired the details of surface water availability in water supply projects under execution with PHED which have been taken as source of water by RUIDP for their projects.

The town wise details are as under :-

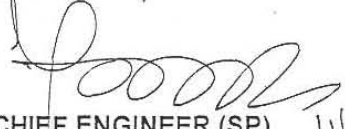
1. **Urban Water Supply Scheme, Bharatpur :-** Presently, Bharatpur water supply is dependent upon local tube wells and surface water from Bandh Baretha. PHED is implementing a multi village multi town drinking water supply project from Chambal River as source. The work of main transmission system consisting of intake works, raw water reservoir, raw water transmission main, filter plant etc. is under progress and is likely to be completed by June 2010. This project is designed to cater to a water demand of 43 MLD sufficient upto the year 2031.
2. **Urban Water Supply Scheme, Dholpur :-** Long term demand of Urban Water Supply Scheme, Dholpur, is proposed to be met from the intake works being constructed under Chambal-Dholpur-Bharatpur Drinking Water Supply Project. The total capacity of intake works is to lift 237 MLD of water against which the present system is sufficient to cater to a total water demand of 147 MLD. It is proposed to supply 15 MLD. of raw

water from the intake works to Dholpur Town, sufficient for the year 2031.

3. **Urban Water Supply Scheme, Churu :-** Urban Water Supply Scheme, Churu, is dependent upon local ground water as well as surface water brought through multi town multi village drinking water supply scheme namely; Churu-Bisau Scheme. The scheme provides for a water demand upto 12 MLD for the town likely to be sufficient upto the year 2021, in conjunction with the ground water.
4. **Urban Water Supply Scheme, Barmer :-** The present water supply of Barmer is dependent on ground water, brought to the town from the tube wells situated around Barmer. Ground water is depleting fast and it is difficult to maintain the service level. PHED has taken up a multi village multi town drinking water supply scheme and the work of main transmission system consisting of Intake works at Indira Gandhi Main Canal, raw water reservoir, filter plant, clear water storage, pumping station and pipeline upto Barmer has been awarded. Work is likely to be completed by September 2009. The transmission system provides for the water demand of 120 MLD of Barmer Town and 691 villages of Barmer and Jaisalmer for the year 2036. (Calculated)
5. **Urban Water Supply Scheme, Nagaur :-** Present water supply is dependent upon ground water being brought from a distance of 40 Kms. and source is depleting fast. PHED is implementing a multi town multi village drinking water supply scheme to bring surface water from the Indira Gandhi Canal. The work on main transmission system, consisting of Intake works, raw water reservoirs, WTP, transmission main etc. costing Rs.310.00 Crores is under progress and is likely to be completed by September 2009. The transmission system is sufficient to cater to water demand of Nagaur Town for the year 2031. Nagaur Lift Water Supply Project, Phase-I, is designed to cater 552 MLD demand of five towns namely; Nagaur, Basni, Moondwa, Kuchera and Riyanbari) and 502 villages of District Nagaur. (Calculated)
6. **Urban Water Supply Scheme, Karauli :-** Urban Water Supply Scheme, Karauli, is presently dependent upon ground water. As a long term solution, PHED is implementing a multi town multi village drinking water supply namely; Chambal Sawaimadhopur Nadauti Project with Chambal River as source (Calculated)

of water. The work of main transmission system consisting of Intake works, raw water reservoir, WTP, clear water reservoir, pumping station, main transmission pipeline etc. is under execution. The work is likely to be completed by March 2010. This project shall cater to the water demand of 23.26 MLD of Karauli Town for the year 2031.

7. **Urban Water Supply Scheme, Sawaimadhopur :-** Urban Water Supply Scheme, Sawaimadhopur, is presently dependent upon ground water. As a long term solution, PHED is implementing a multi town multi village drinking water supply namely; Chambal Sawaimadhopur Nadauti Project with Chambal River as source of water. The work of main transmission system consisting of Intake works, raw water reservoir, WTP, clear water reservoir, pumping station, main transmission pipeline etc. is under execution. The work is likely to be completed by March 2010. This project shall cater to the water demand of 37.66 MLD of Sawaimadhopur Town for the year 2031.


CHIEF ENGINEER (SP) 11/7/00
PUBLIC HEALTH ENGG. DEPTT.
RAJASTHAN, JAIPUR (RAJ)

APPENDIX – 3

Rapid Environmental Assessment (REA) Checklist			Water Supply		
Instructions:					
◆	This checklist is to be prepared to support the environmental classification of a project. It is to be attached to the environmental categorization form that is to be prepared and submitted to the Chief Compliance Officer of the Regional and Sustainable Development Department				
◆	This checklist is to be completed with the assistance of an Environment Specialist in a Regional Department.				
◆	This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB checklists and handbooks on (i) involuntary resettlement, (ii) indigenous peoples planning, (iii) poverty reduction, (iv) participation, and (v) gender and development.				
◆	Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. use the "remarks" section to discuss any anticipated mitigation measures.				
Country/Project Title:		RUSIDP			
Sector Division		Water supply-Sawai Madhopur			
SCREENING QUESTIONS			Yes	No	REMARKS
A.	Project Siting				
Is the project area			☐	☐	
◆	Densely populated ?		√	☐	
◆	Heavy with development activities?		☐	√	
◆	Adjacemnt to or within any environmentally sensitive area				

	●	Cultural heritage site		√	The famous Ramthambore Fort is located, about 12 km away from this town. This fort was constructed by 10th century A.D. by Chauhan rulers. It was the capital of Rao Hamira and was strongest fort of its time. Later on it came under possession of Allauddin Khilji in 1301 AD then passed into the hands of Mughals in 1528 AD. In 1765 the fort was assigned to Jaipur Rulers by Mughal Emperor Aurangzeb. The Maharaja Sawai Madhosingh of Jaipur founded Sawai Madhopur Town on grid Iron pattern. Similar to City Jaipur. In 1944 Mirza Asaf-ud-Daula the then Prime Minister of Jaipur State started its development of main town named after Sawai Man Singh II.
	●	Protected Area	☐	√	Ranthambhore National Park is at a distance of 12 km from the Sawai Madhopur town. The Ranthambhore National Park was once the hunting preserve of the Maharajas of Jaipur. The Ranthambhore National Park is bound by river Chambal in the South and river Banas in the North. Ranthambhore National park/wildlife sanctuary is one of the important Project tiger reserves in India
	●	Wetland	☐	√	
	●	Mangrove	☐	√	

	●	Estuarine	☐	√	
	●	Buffer zone of protected area	☐	√	
	●	Special area for protecting biodiversity	☐	√	
	●	Bay	☐	√	
B.		Potential Environmental Impacts			
Will the Project cause					
◆	pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff?		☐	√	No such source of pollution at the up stream of the intake point.
◆	impairment of historical/cultural monuments/areas and loss/damage to these sites?		☐	√	No impact on any such structures
◆	hazard of land subsidence caused by excessive ground water pumping?		☐	√	does not arise because the source of water is river water
◆	social conflicts arising from displacement of communities?		☐	√	No impact on community , so no social conflict.
◆	conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?		☐	√	No such conflict. Sufficient quantity of water in river is available for supply of water to this water supply system
◆	unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents) ?		☐	√	Raw water will be treated properly in WTP considering the characteristics of the water .Although provision will be made for regular water quality monitoring
◆	delivery of unsafe water to distribution system?		☐	√	Proper care has been taken during design of the system. O&M manual will be prepared, training will be given to the staffs operating the plant and to collect water sample time to time and to analyze the same to ensure the quality of the supplied water
◆	inadequate protection of intake works or wells, leading to pollution of water supply?		☐	√	No intake provision in this sub project
◆	over pumping of ground water, leading to Stalination and ground subsidence?		☐	√	Does not arise because the source of water is

				river water .
◆	excessive algal growth in storage reservoir?	☐	√	The storage reservoirs are covered from top and proper treatment like chlorination of water will not allow algal growth in the reservoirs.
◆	increase in production of sewage beyond capabilities of community facilities?	☐	√	Sewage volume will slightly increase but will not increase beyond the capabilities of the community facilities.
◆	inadequate disposal of sludge from water treatment plants?	☐	√	Not applicable , because this project does not include any water treatment plant
◆	inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities ?	√	☐	Proposed and existing pumping stations are away from settlements and provided with proper enclosures
◆	impairments associated with transmission lines and access roads?	☐	√	Impairments may be with access road but it is and can be minimized taking regulatory measures. Temporary in nature.
◆	health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.	☐	√	Not applicable , because this project does not include any water treatment plant
◆	health and safety hazards to workers from the management of chlorine used for disinfection and other contaminants?	☐	√	Not applicable , because this project does not include any water treatment plant
◆	dislocation or involuntary resettlement of people	☐	√	Water supply pipes will be layed along the road on government land and not impacting any structure , so no issue of R&R.
◆	social conflicts between construction workers from other areas and community workers?		√	Priority will be given to local labour for job as suggested in EMP
◆	noise and dust from construction activities?	√	☐	During civil work noise and dust will be generated but it will be localized and short-term in nature. Proper measure as suggested in EMP will minimize the problem.

◆	increased road traffic due to interference of construction activities?	√		Temporary in nature. Work will be carried out in night when traffic is least. Although a traffic management plan will be prepared for the same.
◆	continuing soil erosion/silt runoff from construction operations?	☐	√	The project area is urban area the proposed pipelines are underground .so there is no chance of soil erosion during operation. During laying of pipes trenching will be filled and compacted to restore original ground condition. Debris generated due to excavation will be disposed off in designated disposal site.
◆	delivery of unsafe water due to poor O&M treatment processes (especially mud accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?	☐	√	Only disinfected water from the WTP will be supplied to the OHSR and to the distribution system .O&M manual will be prepared , training will be given to the staffs operating the plant and to collect water sample time to time and to analyze the same to ensure the quality of the supplied water
◆	delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?	☐	√	Source of water for this subproject is treated water from WTP which is not corrosive in nature. Although AC, DI and PVC pipes has been proposed as a precautionary measures.
◆	accidental leakage of chlorine gas?	☐	√	Not applicable for this subproject
◆	excessive abstraction of water affecting downstream water users?		√	Not applicable to this subproject. Source of water for this subproject is treated water from WTP
◆	competing uses of water?	☐	√	No such competition is envisaged. Water demand has been calculated considering

				all types of demand.
◆	increased sewage flow due to increased water supply	√	☐	Water supply will slightly increase the sewage volume which will be taken care in the upcoming sewerage design and sewage treatment plant
◆	increased volume of sullage (wastewater from cooking and washing)and sludge from wastewater treatment plant	☐	√	The proposed Solid waste Management of the city shall take care of the problems channels.

PUBLIC CONSULTATION- ENVIRONMENT**Sub Project:- Water Supply (Sawai Madhopur)****Issues discussed**

- Awareness and extent of the project and development components
- Benefits of Project for the economic and social upliftment of Community
- Labour availability in the Project area or requirement of outside labour involvement
- Local disturbances due to Project Construction Work
- Necessity of tree felling etc. at project sites
- Water logging and drainage problem if any
- Drinking water problem
- Forest and sensitive area nearby the project site
- Movement of wild animal near the sub-project

1.Date & time of Consultation:- 06.06.08 at 10.30 AM

2. Location:- Karmuda near by old city

Table: Issues of the Public Consultation- Design phase

Sr. No.	Key Issues/Demands	Perception of community
1	Awareness of the project – including coverage area	People are aware of the project. DSC consultants were informed the People about the proposed projects and investment plan on different component of the project. People were also informed about the phase wise implementation schedule of the sub - projects.
2	In what way they may associate with the project	• They demand that local people of the area should be engaged during implementation of the same. • Local ward members should be informed during the implementation they will provide all types of assistance during implementation
3	Presence of any forest, wild life or any sensitive / unique environmental components nearby the project area	There is no sensitive area nearby the project site. Only Ranthambore tiger reserve located near core area of the city

Sr. No.	Key Issues/Demands	Perception of community
4	Presence of historical/ cultural/ religious sites	No historical or religious building comes on water supply lines.
5	Unfavourable climatic condition	May –to- June there is very hot season; otherwise the condition of climate is favorable for work. Local labour is ready to work in any climatic condition
6	Occurrence of flood	Due to poor drainage condition people suffer from water stagnancy in their area especially in the market area and road side areas. No report of Flood in the project area.
7	Drainage and sewerage problem facing	Due to poor drainage condition people suffer from water stagnancy in their area especially in the market area and road side areas. No sewerage system in the project area.
8	Present drinking water problem – quantity and quality	People get water supply from PHED. Quantity is not sufficient and quality is not good – hard water with high TDS. To meet the demand local people exploring ground water through hand pumps and wells.
9	Present solid waste collection and disposal problem	Municipality takes care of the Solid waste collection, which is manually & disposed off in disposal site.
10	Availability of labour during construction time	Sufficient labour will be available in this area.
11	Access road to project site	Road available.
12	Perception on tree felling and afforestation	It has been explained that during implementation of the Water supply scheme no tree is going to be affected.
13	Dust and noise Pollution and disturbances during construction work	People are aware of the problem. It has been explained that as per Safeguard policy of the project for abatement of pollution control system to minimize it. Vehicles movement will be controlled & appropriate measure will be taken to combat the same.
14	Setting up worker camp site within the village/ project locality	Labour will be engaged locally
15	Safety of residents During construction Phase and plying of vehicle for construction activities	People are aware of the problem. It has been explained that as per Safeguard policy of the project vehicles movement will be controlled & appropriate measure will be taken to combat the same

Sr. No.	Key Issues/Demands	Perception of community
16	Conflict among Beneficiaries down stream users – water supply project using of river water	The benefits should be equally shared to others. They concern that if PHED Chambal water project is not implemented in time then RUIDP project will be of no use.
17	Requirement of enhancement of other facilities	People want the conservation of the heritage structures,
18	Whether local people agreed to sacrifice their lands (cultivable or not) for beneficial project after getting proper compensation	Yes , people are ready to sacrifice their lands (cultivable or not) for beneficial project after getting proper Compensation.

NAME AND POSITION OF PERSONS CONSULTED:

Sartaj Khan: Local resident
 Mumtaj Khan: Local resident
 Saeeda : Businessman
 Dilkhush : Mason
 Sadda : Businessman
 Hansraj : Businessman
 Ravikumar : Painter
 Harron : Farmer
 Navi Bukli : Businessman
 Hariom : Businessman

Summary of out come:

People are well aware about the project through different sources. People are suffering from water supply problem in terms of quantity and quality of the supplied water. People are suffering from various health problems due to consumption of hard water. People are aware that this RUIDP project is dependent on PHED Chambal Bharatpur Dholpur water project. They are concern that if the PHED project will not be successful then RUIDP project has no use. People are ready to extend all types of support to during execution of the project. They also want that sewerage, drainage and solid waste management projects should be taken up as early as possible.