

Environmental Assessment Document

Initial Environmental Examination: Rajsamand Sewerage & Sanitation Sub - Project
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
DSC	-	Design and Supervision Consultancy
EA	-	Executing Agency
EAC	-	Expert Appraisal Committee
FI	-	Financial Intermediary
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

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.	Existing Situation Assessment	4
D.	Description of the Sub-project	4
III.	DESCRIPTION OF THE ENVIRONMENT	11
A.	Physical Resources	11
B.	Ecological Resources	21
C.	Economic Development	21
D.	Social and Cultural Resources	26
IV.	ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES: LOCATION AND DESIGN	29
V.	POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES: INFRASTRUCTURE CONSTRUCTION	30
A.	Screening out areas of no significant impact	30
B.	Sewage Treatment Plant	31
C.	Sewerage Network and Trunk Sewer	33
VI.	POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES: OPERATION AND MAINTENANCE	39
A.	Screening out areas of no significant impact	39
B.	Operation and maintenance of the improved sewerage system	40
C.	Environmental impacts and benefits of the operating system	42
VII.	INSTITUTIONAL REQUIREMENTS AND ENVIRONMENTAL MONITORING PLAN	44

A.	Summary of environmental impacts and mitigation measures	44
B.	Institutional arrangements for project implementation	44
C.	Environmental Monitoring Plan	51
D.	Environmental management and monitoring costs	52
E.	Associated Facilities	56
VIII.	PUBLIC CONSULTATION AND INFORMATION DISCLOSURE	56
A.	Project stakeholders	56
B.	Consultation and disclosure to date	57
C.	Major Issues discussed during Public consultation are	58
D.	Future consultation and disclosure	59
IX.	FINDINGS AND RECOMMENDATIONS	60
A.	Findings	60
B.	Recommendations	63
X.	CONCLUSIONS	63

APPENDIXS

APPENDIX - 1	PHOTOGRAPHS	64
APPENDIX - 2	Chainage wise land use status	65
APPENDIX - 3	Rapid Environmental Assessment (REA) Check List	67
APPENDIX - 4	Up Flow Anaerobic Sludge Blanket (UASB)	71
APPENDIX -5	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 sewerage and sanitation 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 Rajsamand sewerage and sanitation 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 sewerage and sanitation 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 there is no underground sewage system in Rajsamand City at present. Only few households have covered with individual septic tank. The disposal of waste and effluent of septic tank is through the open drains. Presently the open drains, which have been constructed by Municipal Board, convey the sludge and sewage which is leading to unhygienic and unsanitary conditions.

15. From the demand gap analysis, 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.

B. Location, Size and Implementation Schedule

16. The sub-project is located in Rajsamand, the headquarters town of Rajsamand District, in the southern part of Rajasthan (**Figure 2.1**). The infrastructure will extend throughout many parts of the town, where pipes for new secondary and tertiary sewer networks will be buried within or alongside roadways. A new outfall sewer will be buried alongside the Road. There will

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

be a new Sewage Treatment Plant (STP), to be built on 47 bigha(12 ha.) of government land. **Figure 2.2** shows proposed outfall and trunk sewer and **Figure 2.3** shows location of STP. Environmental features around the STP are shown in **Figure 2.4**.

17. Detailed design will begin in the second quarter of 2008 and should be completed by the end of the year. Construction of all elements will begin in early 2009, and the treatment works will be built in around 6 months. Construction of the trunk sewer and networks will take up to 1½ years, so all work should be completed by the middle of 2010. Photographs of the project area are attached as **Appendix II – A**.

C. Existing Situation Assessment

18. The houses are, in general, connected to septic tank. The general drainage of town is through open drains in the town Rajsamand. Some soak pits of shallow depth and inadequate size are also in existence. These soak pits do not function properly and after some time is overflowing. Effluent from septic tank also flows directly in the road drains. There is no underground water carriage system and treatment works. About 25 km of surface storm water drains exist – some pucca (masonry construction), covered and uncovered. Remaining ones are of earthen channel. The effluent from septic tanks, partially treated and in some cases, even untreated sewage, being carried through street drains ultimately empties in low lying area or natural water channels flowing through the town. The main drainage conveyance system is Taledi Nadi, which ultimately meets Banas River.

19. The portion of the town considered to be benefited from the subproject is fairly densely populated. Out of 30 municipal wards, population density is more than 100 persons per hectare in at least 10 wards. Under the subproject it is proposed to cover a 2001 population of 43,751 in an area of 1,440 hectares encompassing 26 municipal wards. However, all these wards are not proposed to be covered by total collection system including branches and laterals and will be provided with trunk and interceptor sewers. Branch and lateral sewers will be provided in 24 of the above 26 wards, where necessary facilities for house service connections will also be provided under the Subproject. These 24 wards are ward nos. 1, 4 to 9, 14 to 30. Out of these 24 wards, 3 wards 8, 14 & 19 are partly covered and all the other 21 wards will be fully covered in an area of 1281 hectares with 2001 population of 40722. In the other 2 wards the downstream works, including house connections, are expected to be completed gradually by ULB either from their own fund or through other funding.

D. Description of the Sub-project

20. Rajsamand town is situated in south Rajasthan in western India. The city was named after Rajsamand Lake created, in 17th century, by Rana Rajsingh. Rajsamand town, having a municipal area of 22.5 sq. km., is the district head quarters of recently created district of Rajsamand. Being situated along NH-8 it is well connected with Delhi, Jaipur, Ajmer Udaipur, Ahmedabad and Mumbai. This town is also connected with Bhilwara Town through SH-12. Kankroli is the nearest railway station for this town.

21. The town lies in longitude E-73°88' and N-25°07' and forms a part of Mewar region. The general ground level is about 532.50 (GTS). The district (having an area of about 4768 sq. Km) lies in the water shed of Banas River and its Tributaries. The climate of the town is somewhat temperate throughout the year. The cold season from November to February is followed by hot season from March to the middle of June. The monsoon season stretches from mid June to September. The mean maximum temperature is 42°C in the month of May and June and mean

minimum in December - January 7°C. The bulk of the rainfall is received from South - West monsoon. The average annual rainfall is about 517 mm.

22. The proposed Subproject will comprise of construction of 5MLD sewage treatment plant (with UASB process), laying of Trunk sewers for a length of about 4 km diameter varying from 700mm to 1100mm and secondary and lateral sewers, diameter varying from 200-mm to 600mm, of about 30 km. For house service connection, it has been proposed to lay 110&160mm OD uPVC pipes (4 to 6 connections per manholes). The house service connection is normally to the manholes. However, provisions for required numbers of road side chambers are also made, which, if required, shall be used in wide roads for ease in construction and maintenance where 2 or 3 House service connections (HSC) shall be to Road side Chamber (RSC), which in turn will be connected with manholes. Also provision has been made in the cost estimate for dismantling cum refilling the septic tank / soak pit utilities for those who do not find space for effecting a separate connection.

23. The collection system is designed for waste water volume to be generated for the projected population of 2041. Per capita waste water generation is considered as 80% of the net water supply of 135 lpcd. Peak factor has been considered to design the sewer lines. Minimum velocity of 0.6 m/ sec to achieve self cleansing and maximum velocity of 2.5 m/ sec to avoid possible scouring have been considered for design purposes. For all the component designs standard design criteria and practices have been adopted. Minimum cover is 0.9m. Provision of manholes at suitable intervals is also considered.

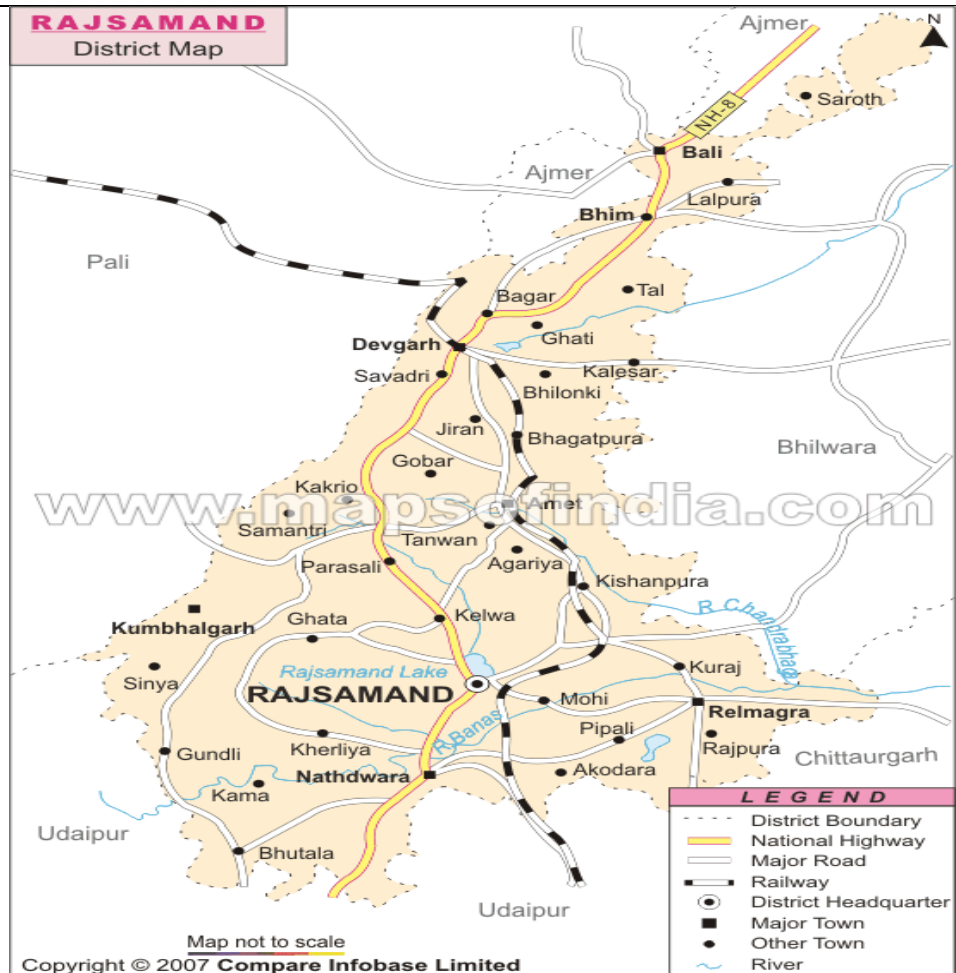
24. **Table 2.1** shows the nature and size of the various components of the subproject. As indicated above there are three main elements: provision of a network to collect sewage from different city part; a trunk sewer to transport waste to the STP; and a new STP to treat sewage to Indian legal standards. 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.

25. Under Tranche-II, works of the STP will be constructed comprising of secondary treatment by Conventional UASB process as the land requirement is limited and Sewerage Network of pipe line in the main old town including out fall and Trunk sewer, Laterals and house connection. Under Tranche-II, the work for sewerage network for the city including laying of laterals and sewer lines in surrounding developed areas of the town and house connections to be considered. Land identified for STP to an extent of 47 bigha (approx. 12 ha.) and in the process of acquisition by PHED, Rajsamand.

26. The network pipes will be of Reinforced Cement Concrete (RCC), and will be located alongside roads and streets, in the government-owned Right of Way (ROW). The secondary and tertiary network will collect sewage from individual houses have a sufficient water supply, These pipes will be of small diameter (200 to 600 mm) and will be located in shallow trenches (ca 1.5 m in depth).

27. The trunk sewer will also be of RCC pipes and will convey sewage from the secondary network to the STP These pipes will be 700 and 1100 mm in diameter

Figure 2.1: Map showing the location of the project area

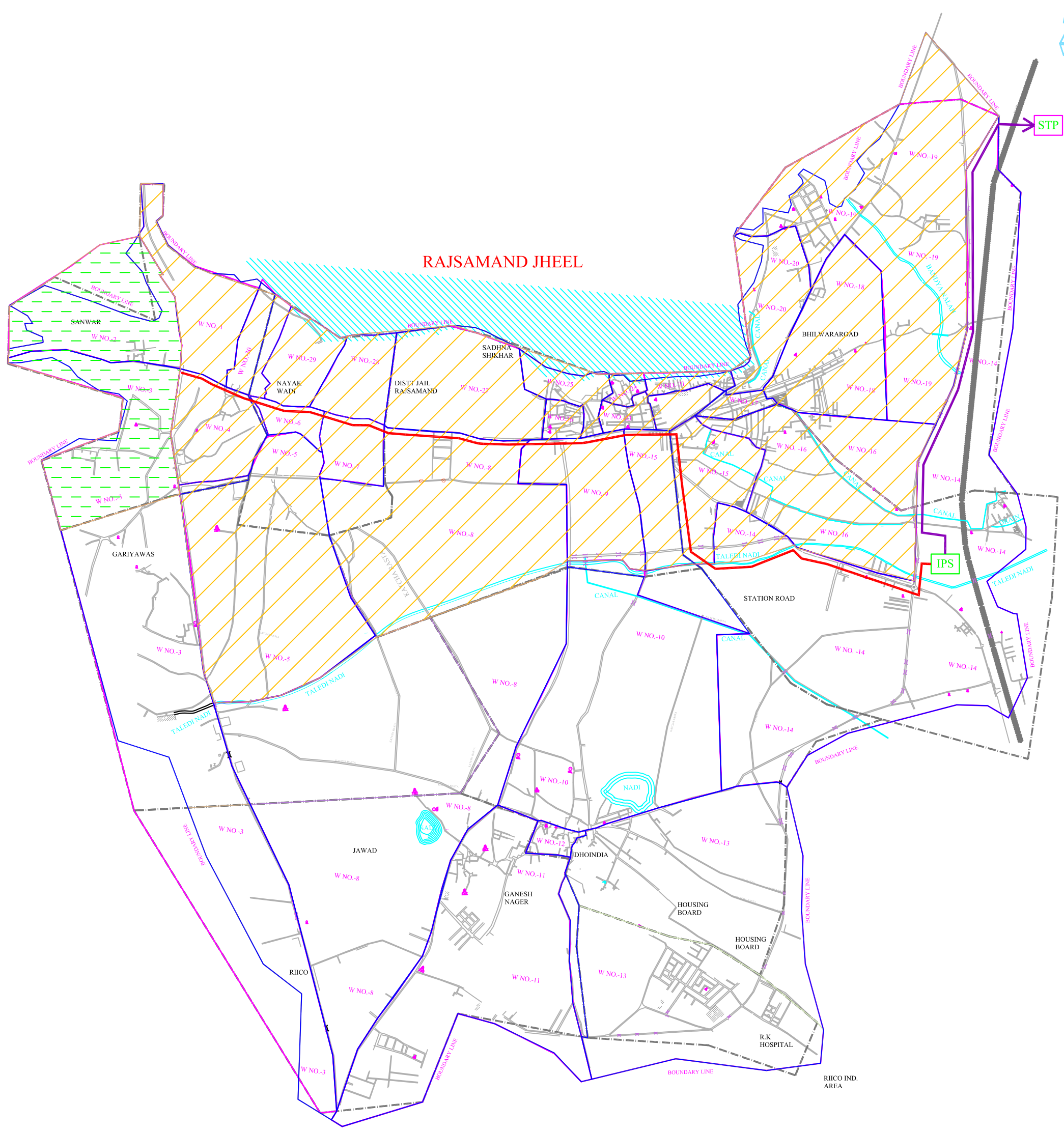


Rajasthan Urban Sector Development
Investment Program
ADB TA 4814-IND

Rajsamand Regional Map

Govt of Rajasthan
Asian Development Bank

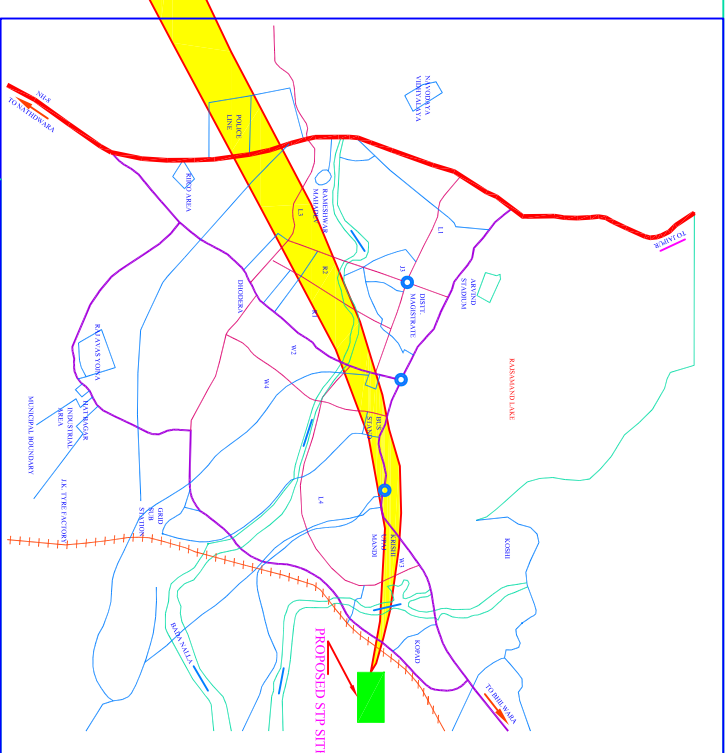
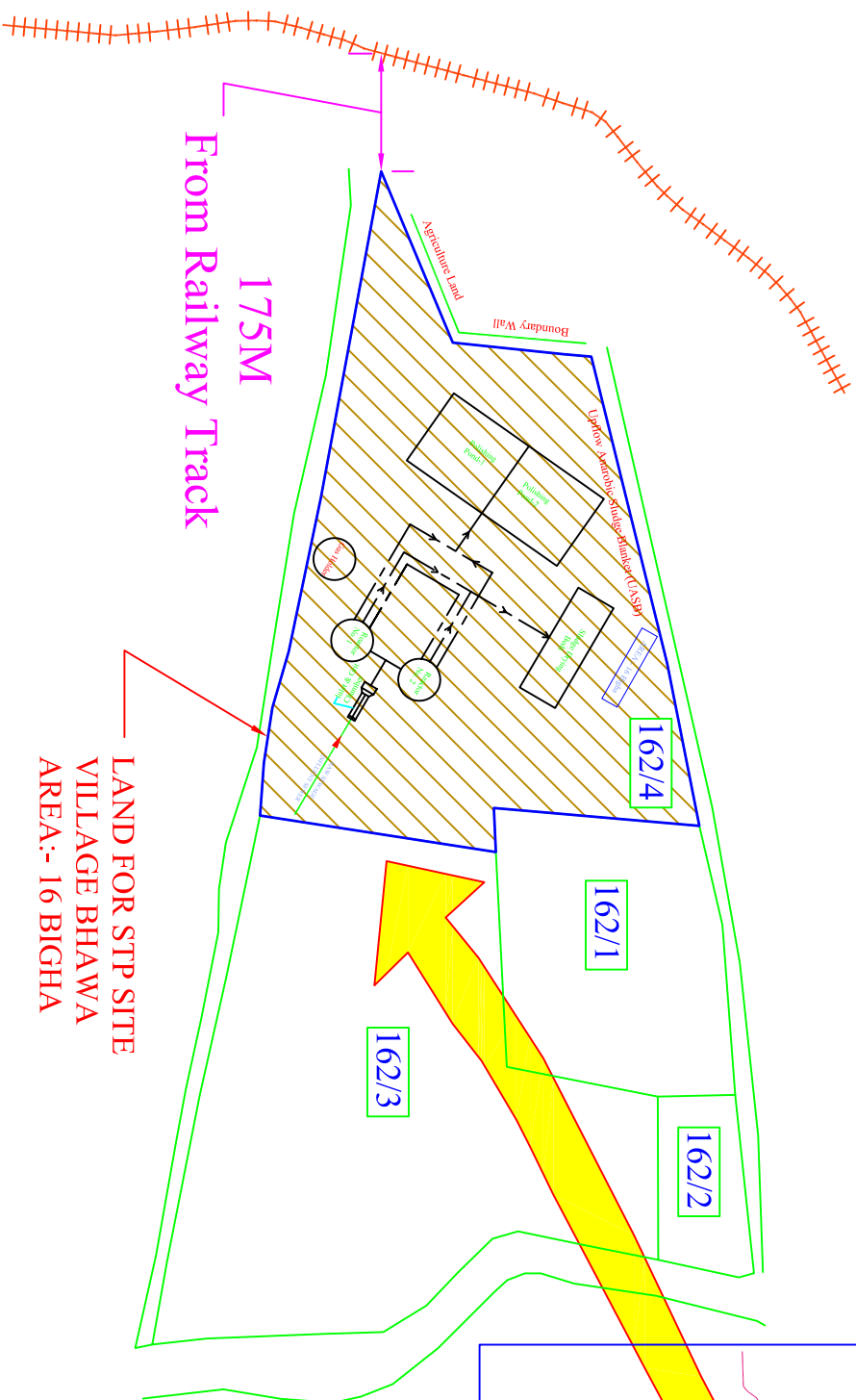
Figure 2.2: Map showing the proposed outfall and trunk sewer



LEGEND:-

-  24 WARDS FOR LATERALS & STP
(1, 4 TO 7, 9, 15 TO 18, 20 TO 30 FULLY COVERED & 8, 14 & 15 PARTIALY COVERED)
-  2 WARDS (FOR STP ALONE)
(2 FULLY & 3 PARTIALY)
-  STP
-  INTERMEDIATE PUMPING STATION
-  PUMPING MAIN
-  TRUNK MAIN

Figure 2.3: Location of Sewage Treatment Plant Site



LEGEND:-

- RAILWAY LINE AND YARD
- NATIONAL HIGHWAY
- STATE HIGHWAY AND OTHER
- SUB ARTERIAL ROAD
- ROAD JUNCTIONS
- STP SITE

RUSDIPI(RAJSAMAND)
RAJASTHAN URBAN SECTOR
DEVELOPMENT INVESTMENT PROGRAM

SECTOR:-
TITLE:-
PROPOSED STP SITE

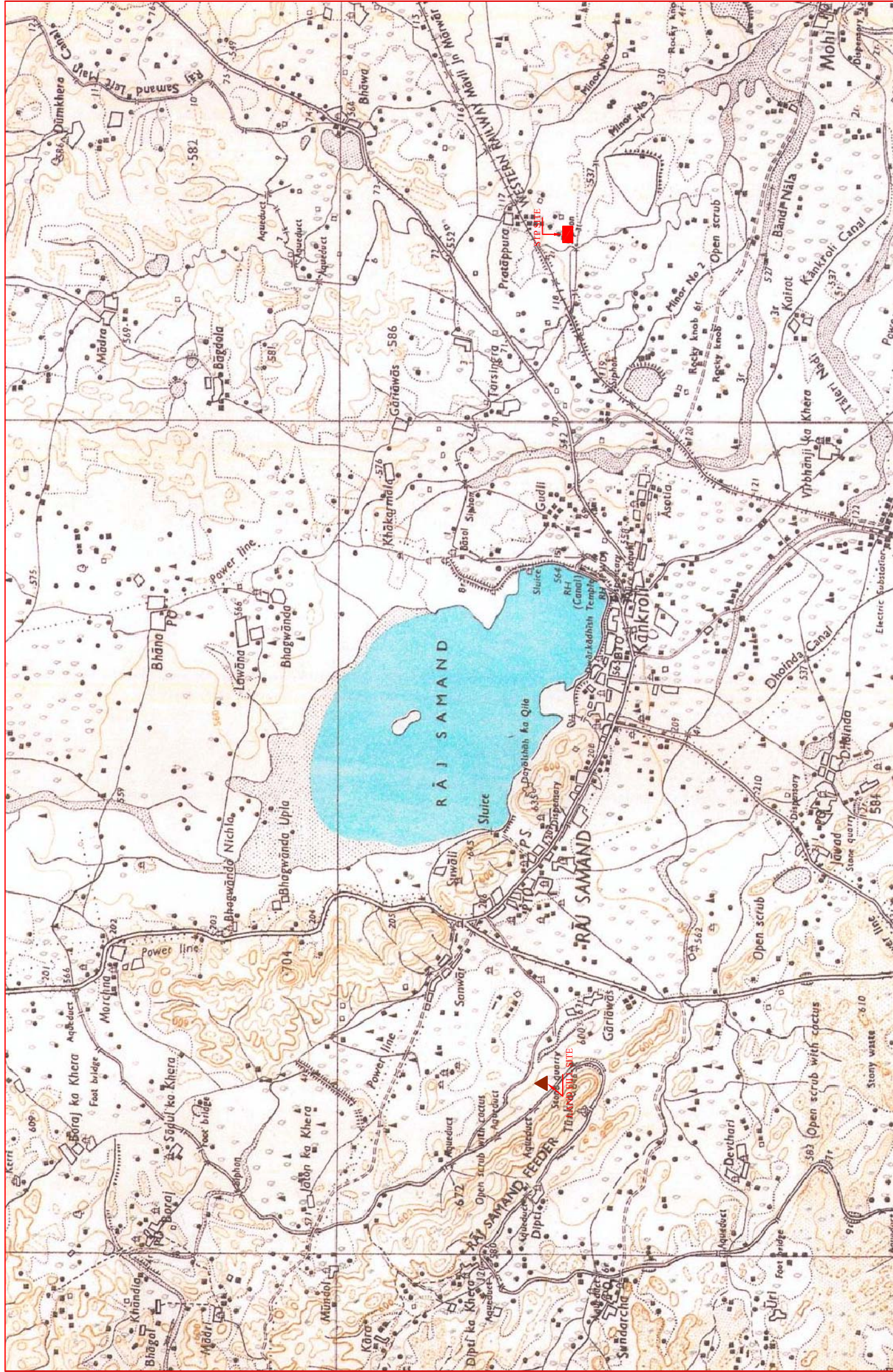
CONTENT:- CLIP DRAWING
DRAWING NO. RUSDIP/RJS/01
DATE:- MAR-2008

SCALE:- NOT TO SCALE

Table 2.1: Improvements in sewerage infrastructure proposed in Rajsamand

Infrastructure	Function	Description	Location
Sewage Treatment Plant (STP)	For Treatment of Raw Sewage.	Construction of STP to be built 5 MLD of UASB technology- 1 inlet chamber, 1 no. cross screen channel, 1 no. fine screen channel, 2 nos. grit channel, 1 distribution chamber, 2 nos. reactor, 2 nos. degassing aeration tanks and 2 nos. polishing tanks Intermediate Sewage Pumping Station pumping main for 10 MLD capacity for 3.00 km of 400 mm DI dia	47 bigha (12 ha.) land has been identified by district administration near Jhawar Navadoya Vidyalaya, village Bhawa Near Ayyappa Mandir near Taladi river , J. K. Circle
Trunk /Outfall Sewer	To connect collection network up to STP and STP to outfall	Trunk sewer to be laid – 700 mm to 1100 mm length of 4 km	Up to Village Bhawa and then to outfall direction
Lateral (Secondary) Sewers and tertiary network and house connection	Sewer network and to connect outfall sewer.	Sewer network from Different Dia , 200 to 600 mm of approx. 30 km	All around the town

Fig 2.4: Location of STP in SOI toposheet



III. DESCRIPTION OF THE ENVIRONMENT

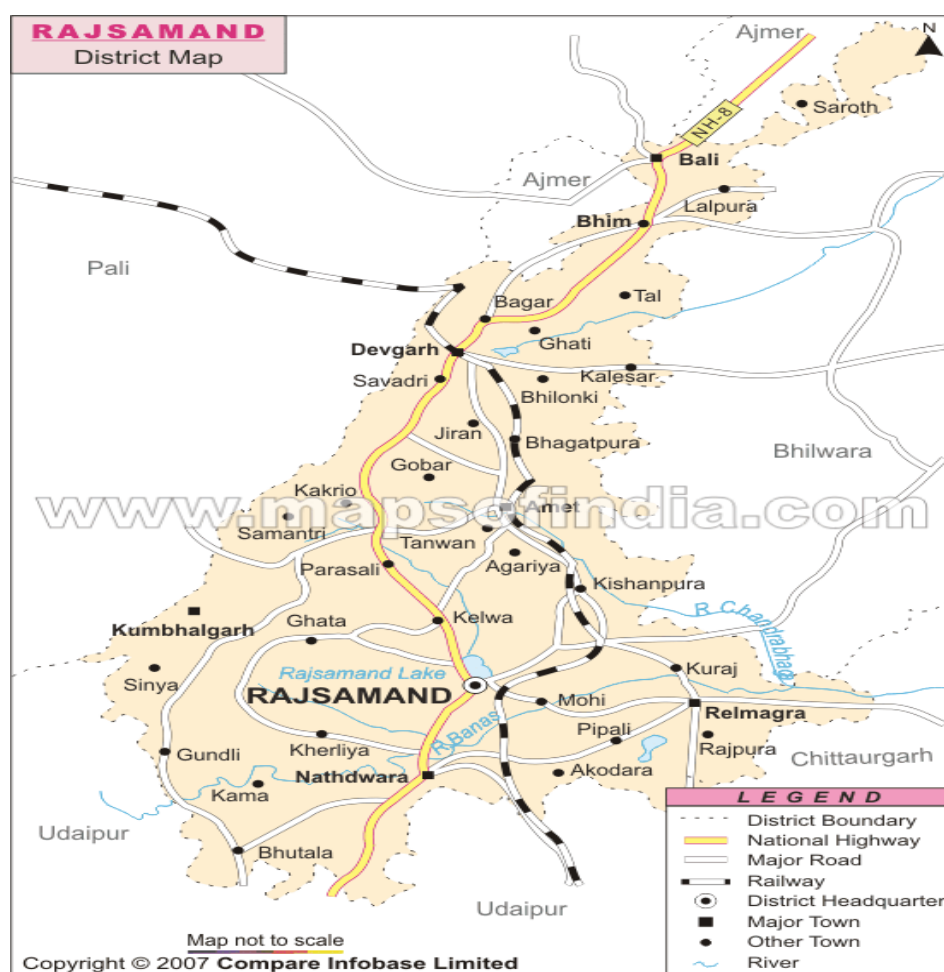
A. Physical Resources

1 Location

28. The Urban Agglomeration (UA) of Rajsamand is situated in South Rajasthan in western India. The City is named for Rajsamand Lake created in 17th century by Rana Raj Singh. In April 1991 Rajsamand was constituted as district before that it was tehsil of Udaipur district. Rajsamand will be developed for advanced industrial and other economic activities and will have concentration of administrative and higher order service functions, expected to exert an increasingly dynamic influence on attracting investment and creating a conducive living and working environment. Rajsamand is very famous because of its marble.

29. Rajsamand is situated 67Km north of Udaipur and 352 KM south of state capital - Jaipur on NH-8. In terms of connectivity, nearby city Udaipur is having Train and road connectivity with Delhi, Jaipur, and Ahmedabad, Kota and Agra on broad gauge line. For a long time, the railway line defined the eastern limit of the town's urban expansion. **Figure 3.1** shows district map of Rajsamand.

Figure 3.1: District map of Rajsamand



2 Topography, Natural hazard and Drought

30. **Topography** Rajsamand is located between latitudes $24^{\circ} 46'$ to $26^{\circ} 01'$ N and Longitudes $73^{\circ} 28'$ to $74^{\circ} 18'$ E. Rajsamand district is surrounded by Ajmer in North, Pali in West, Udaipur in South and Bhilwara in East. This district is a part of Mewar region. It is 532.50 Meter above sea Level. The district lies in watershed of the Banas River and its tributaries. The district has an area of 4768 Sq.Km.

31. **Natural Hazards- Earthquake:** Rajsamand town lies in low damage risk zone II. The area is less prone to earthquakes as it is located on comparatively stable geological plains based on evaluation of the available earthquake zone information. **Figure 3.2** depicts the earthquake zones of Rajasthan. **Figure 3.3** shows natural hazard zones of the Rajsamand district.

32. **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 2-3 meter on an annual basis combined with significant drawdown conditions.

Figure 3.2: Earthquake zones of Rajasthan

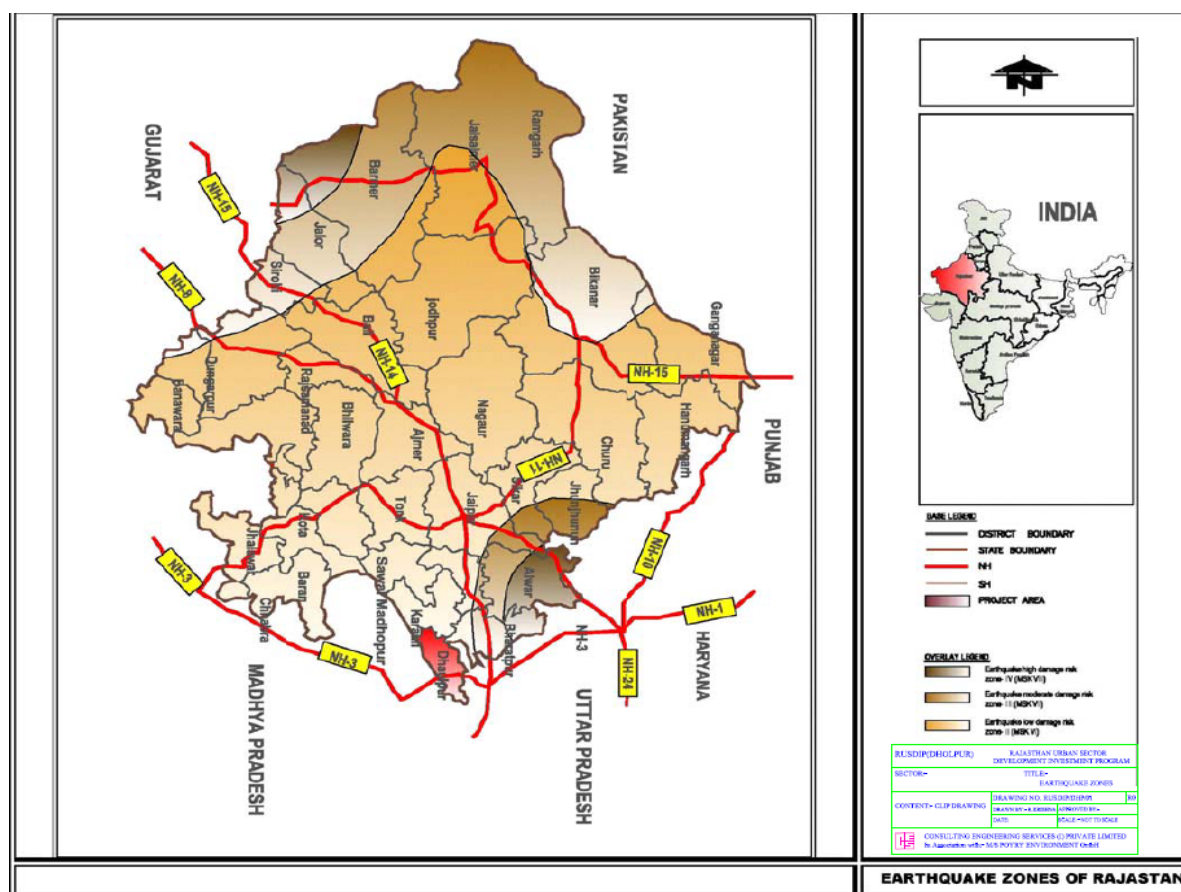
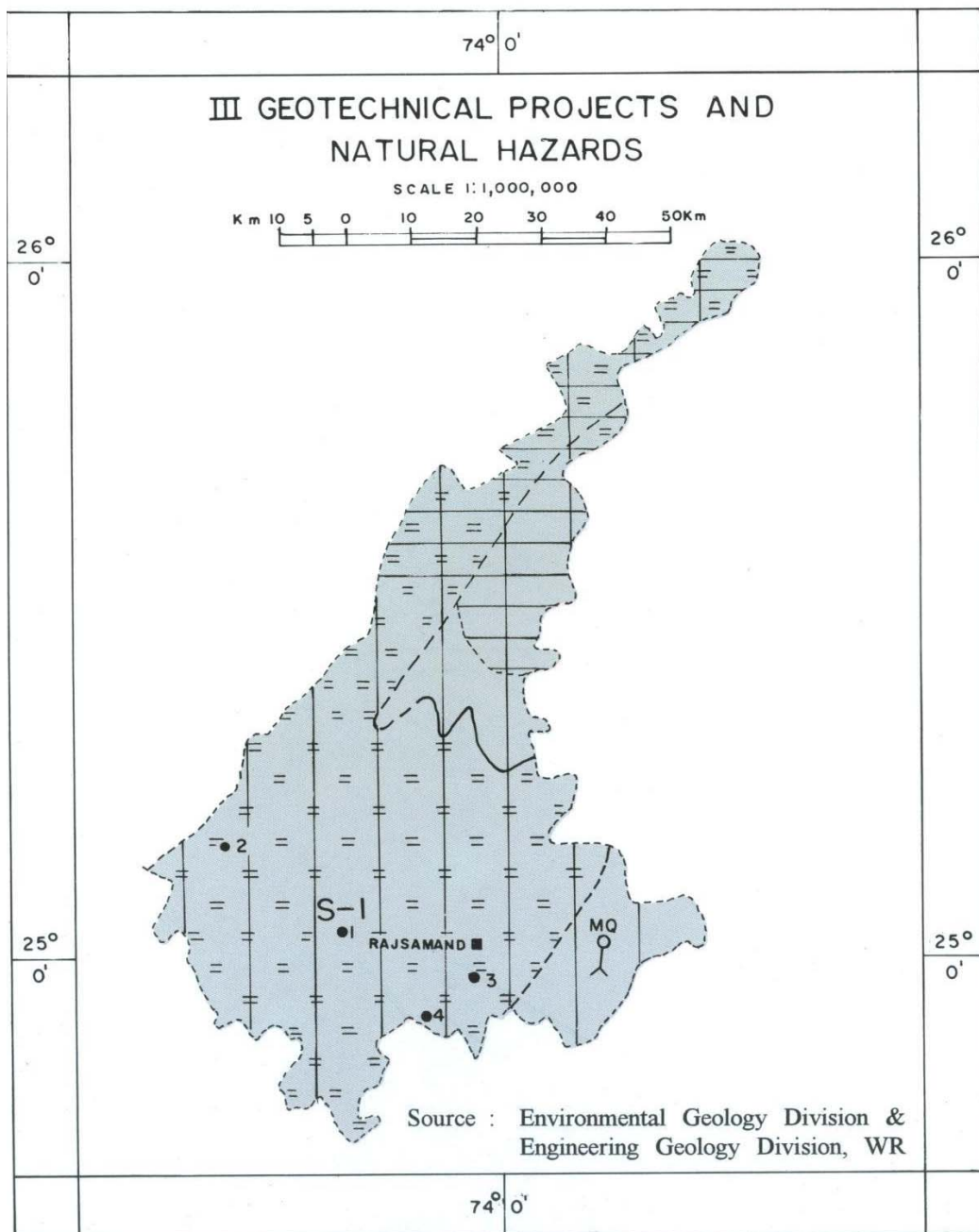


Figure 3.3: Natural Hazard map of Rajsamand (GSI Resource map)



3 Geology, geomorphology, mineral resources and soil

33. Geology and mineral map of the district is shown in **Figure 3,4** and geomorphological map of the district is depicted in **Figure 3.5**.

Figure 3.4: Geology and mineral map of Rajsamand district (Source: GSI Resource map)

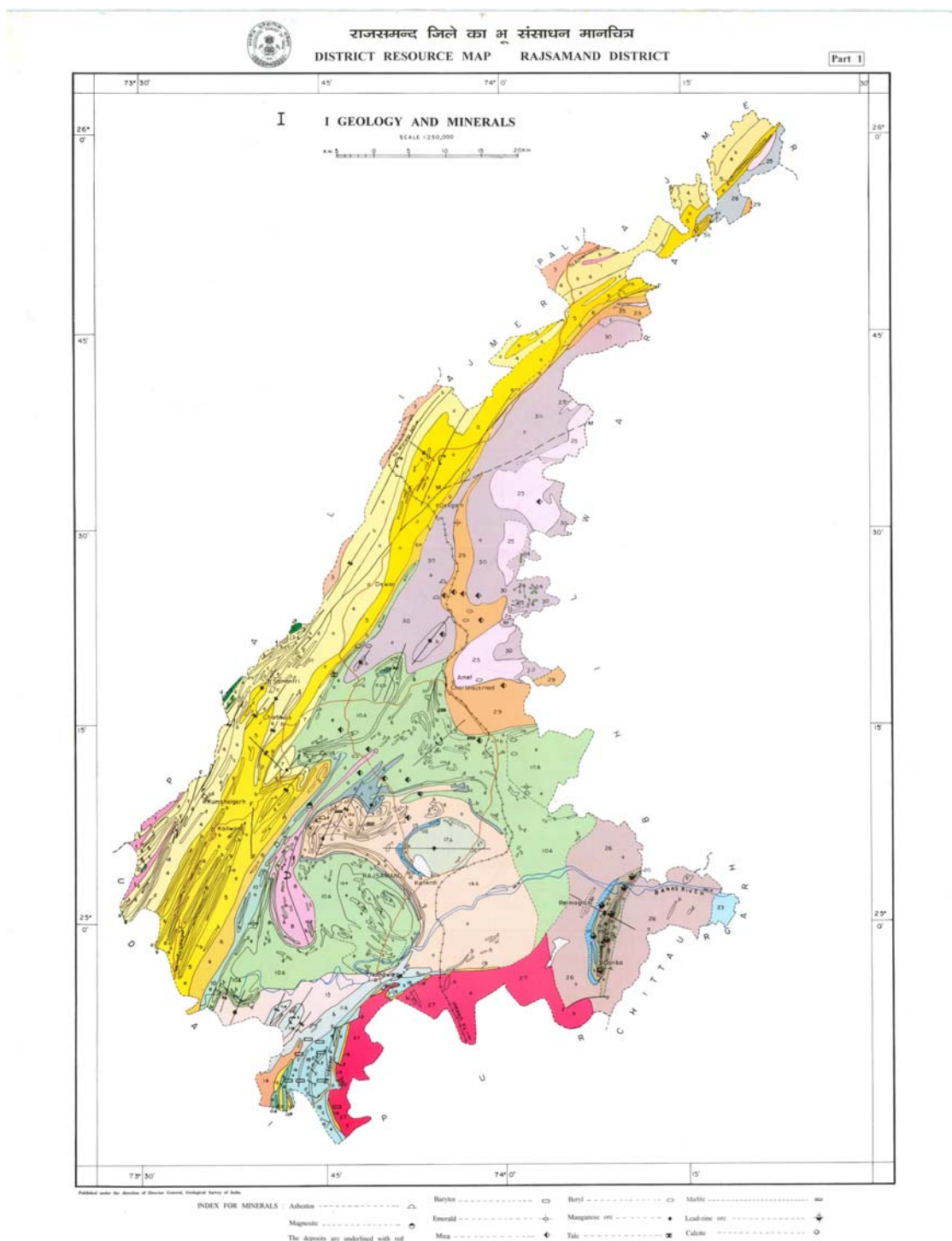
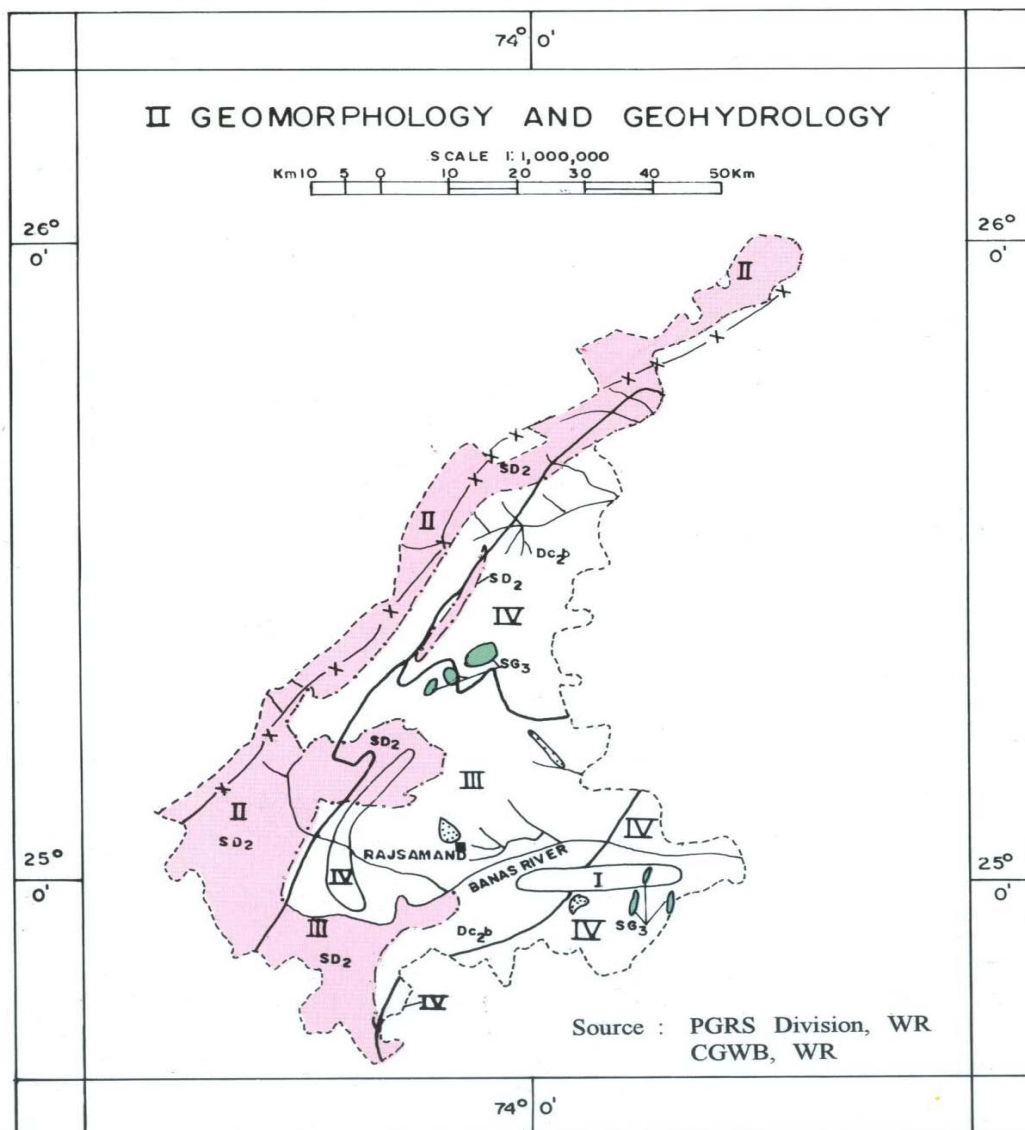


Figure 3.5: Geomorphology and Geohydrology of Rajsamand district
(source: GSI Resource map)



34. Soil characteristics: Soil of the region falls within low rainfall zone of 500- 900 mm. The soils are lithosols at foot hills and alluvials in plains. **Table 3.1** shows nutrient level in the Rajsamand soil including area coverage of saline and sodic soil. The nutrient status of the Rajsamand soil is graded as medium to high level.

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

	Nutrient			Saline Soil(Ha)	Sodic or Alkali(Ha)
	N	P	K		
Status	L	M	M	9922	6251

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

4 Climate

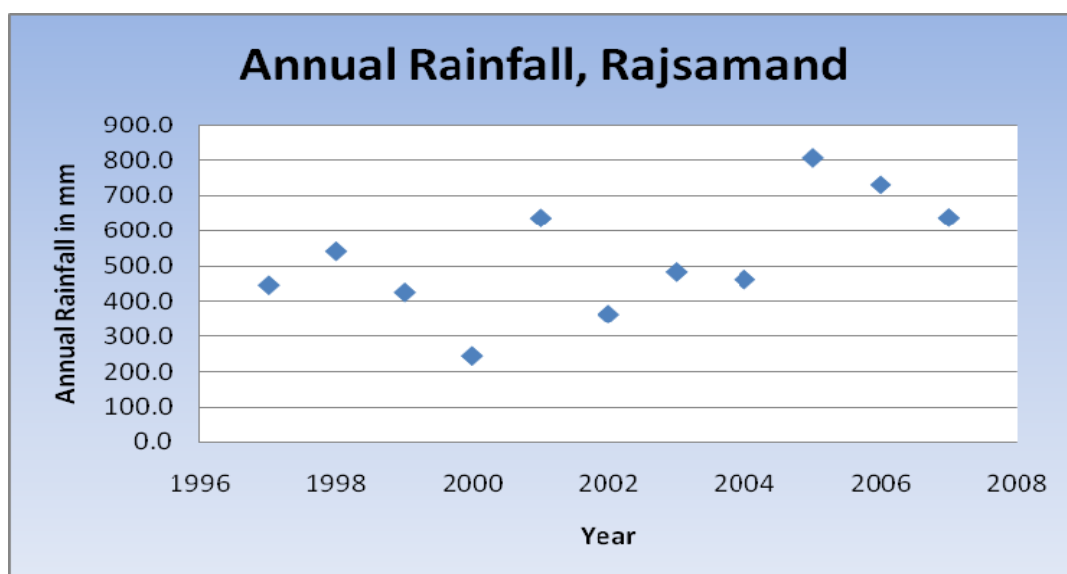
35. The district has moderate climate without significant seasonal variations. The mean temperature is 22 degrees celsius. Average rainfall at the district head quarter is 49.5 cms.

36. The rainfall over Rajsamand 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) is shown in **Table 3.2**. **Figure 3.6** shows yearly variation (1997-2007) of rainfall at Rajsamand.

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

S.No.	Months	Rainfall (mm)
1	June	18.0
2	July	192.0
3	August	269.0
4	September	152.0
5	October	0
6	November	0
7	December	0
8	January	0
9	February	0
10	March	6
11	April	6
12	May	0
13	Monsoon Rainfall	631
14	Non monsoon rainfall	12
15	Annual Rainfall	643

(Source: Irrigation Department, Govt. of Rajasthan)

Figure 3.6: Rainfall at Rajsamand during 1997 to 2007

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

5 Air Quality

37. There are no data on ambient air quality of Rajsamand Town, which is not subject to monitoring by the Rajasthan State Pollution Control Board (RPCB) as there are no major industries. The nearest station is located at Udaipur (68 km from Rajsamand). Traffic is the only significant pollutant in Rajsamand, 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 Udaipur (Annual Average, 2004; units in $\mu\text{g}/\text{m}^3$)

Monitoring Station	Land use	SOx	NOx	RSPM	SPM
Udaipur Residential, Rural and others area	Residential	6.95	41.57	72	205
NAAQ Standard	Residential	60	60	60	140
Udaipur Industrial area	Industrial	8.96	59.52	100	353
NAAQ Standard	Industrial	80	80	120	360

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

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

6 Surface Water

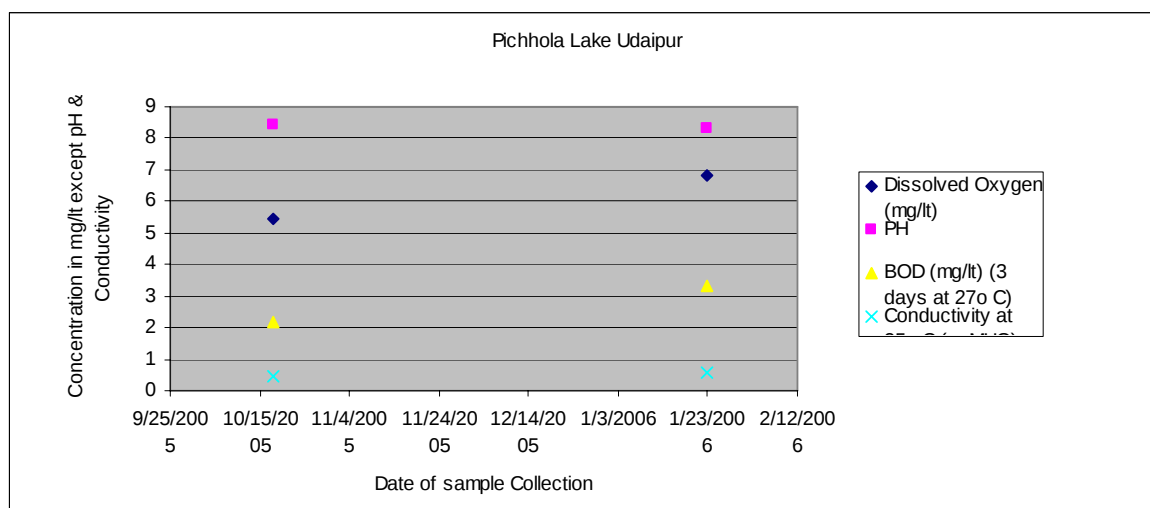
38. There is no water quality monitoring station at Rajsamand. The different lakes like Picchhola lake, Nakki lake, Fateh Sagar lake are located at Udaipur 68km Rajsamand. The monitoring has been carried out by Rajasthan Pollution Control Board at those lakes. The data on DO, pH, BOD and Electrical conductivity is given in **Table 3.4**. **Figure 3.7** shows variation of water quality at those lakes.

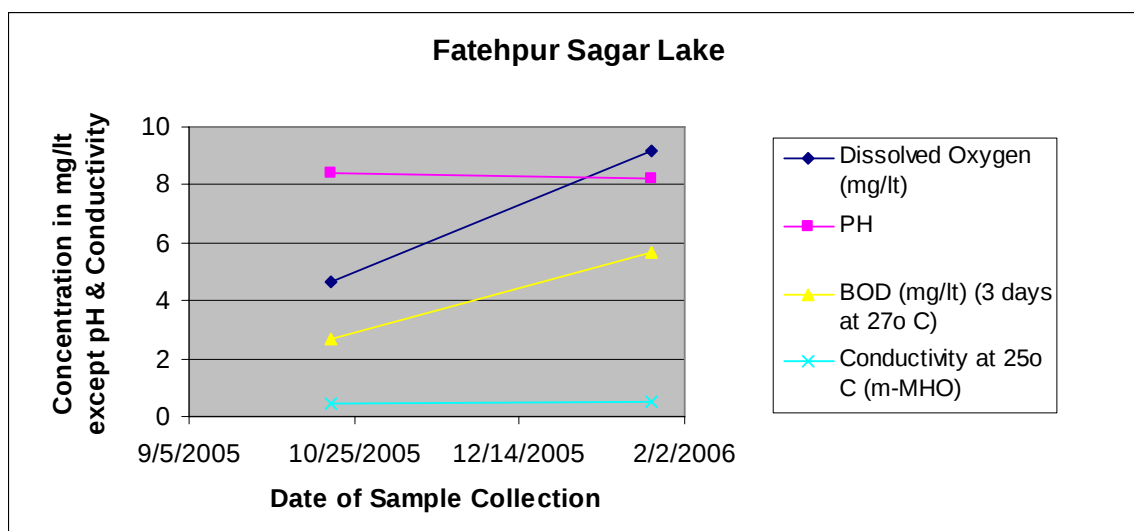
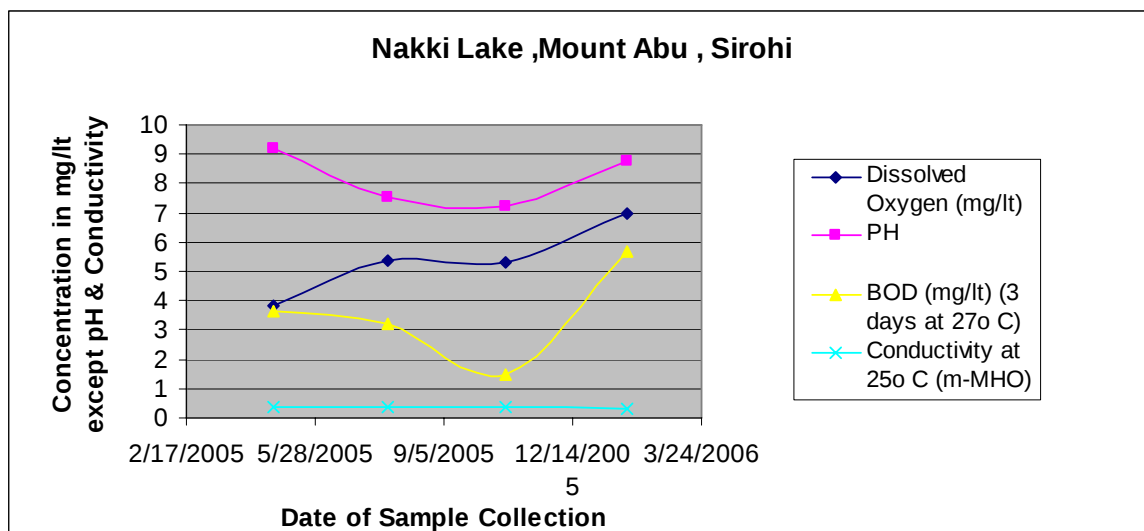
Table 3.4: Water quality data of different lakes at Udaipur

Location	Parameters				
	Date of Sample Collection	Dissolved Oxygen (mg/l)	pH	BOD (mg/l) (3 days at 27° C)	Conductivity at 25° C (m-MHO)
Picchhola Lake , Udaipur (Water Intake Point) – 68 km Rajsamand	10/18/2005	5.46	8.43	2.2	0.45
	1/23/2006	6.8	8.29	3.3	0.57
Nakki Lake , Mount Abbu , Sirohi– 68 km Rajsamand	4/25/2005	3.8	9.22	3.67	0.4
	7/24/2005	5.38	7.53	3.19	0.38
	10/23/2005	5.28	7.24	1.5	0.35
	1/25/2006	7	8.77	5.68	0.33
Fateh sagar Lake , Udaipur(PHED Water Intake Point) – 68 km Rajsamand	10/18/2005	4.66	8.39	2.68	0.44
	1/23/2006	9.2	8.2	5.7	0.5

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

Figure 3.7: Variation of water quality parameters in lake water





7 Geohydrology and Groundwater

39. There are number of National Hydrographic monitoring stations of Central Ground Water Board in and around Rajsamand. Fluctuation of ground water level is shown in **Table 3.5**. In most of the cases ground water table ranged between 5 - 20 m bgl.

Table 3.5: Number and Percentage of National Hydrograph Network Station (Rajsamand) with water fluctuation range

Period	No of wells analysed	Range		0-2 m		2-5 m		5-10m		10-20m		20-60m		>60 m	
		Min	Max	No	%	No	%	No	%	No	%	No	%	No	%
Jan-06	28	2.03	13.86	0	0	7	25	11	39.29	10	35.71	0	0	0	0
Nov-05	30	1.08	17.29	2	6.67	9	30	10	33.33	9	30	0	0	0	0
Aug-05	28	1.19	24.37	1	3.57	1	3.57	11	39.29	13	46.43	2	7.14	0	0
May-05	27	5.54	22.57	0	0	0	0	8	29.63	17	62.96	2	7.41	0	0

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

40. The Central Ground Water Board carried out chemical testing of tube well water seasonally. The average concentrations of major constituents are shown in **Table 3.6**. Geohydrological map of the district is shown in **Figure 3.5** (Geology Geomorphology section).

Table 3.6: Ground Water Quality in and around Rajsamand

Parameters	Maximum Level	Minimum Level	Standard of Drinking water (IS: 10500: 1991)	
			Desirable limit (mg/l)	Maximum Permissible limit (mg/l)
pH	8.12	7.1		
EC (micro-mhos/cm at 25 °C)	5140	520		
Cl (mg/l)	1234	28	250	1000
SO ₄ (mg/l)	549	28	200	400 (if Mg does not exceeds 30 ppm)
NO ₃ (mg/l)	1312	0	-	100
PO ₄ (mg/l)	1.9	0.1		
Total Hardness(mg/l)	1020	120	300	600
Ca(mg/l)	188	16	75	200
Mg(mg/l)	134	19	30	100
Na(mg/l)	1058	16	-	-
K(mg/l)	88	2.3	-	-
F(mg/l)	8.6	0.52	1.0	1.5
Fe(mg/l)	3.6	0.03	0.3	1.0
SiO ₂ (mg/l)	28	3		
TDS (mg/l)	4323	364	500	2000

Note: Total – 12 nos. samples

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

41. Supply water quality as measured by Public Health dept. is shown below. It is noted that ground water is potable for drinking purpose.

Table 3.7: Present supply water quality at Rajsamand

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
48	Surface	0	100	2	1	0.2	0.3	223	324	5	5

(All values in mg/l unless stated otherwise)

B Ecological Resources

42. **FLORA:** The Rajsamand district supports mahua , baheda , saded , aam and jhinjha. The endemic taxa or species found in the district are represented by papal, bad or banyan tree bael, dhak , kaith, datura, indrokdhav.

43. **FAUNA:** Rajsamand falls in Paleotropical –Oriental Region .It is needless to mention that India as a whole also falls in Oriental Region. Of the typical fauna of the Oriental region, the district harbours Mor, Bandar, Langur, Baghera and Kala hiran these days. No endangered flora and fauna are noted.

44. There is no forest plantation nearby the project sites.

C Economic Development

45. Rajsamand is the district headquarters for Rajsamand District and is also known as Kankroli. It performs all administrative and revenue functions required of a district center. Rajsamand has been a services and an administrative town, it was only in the late 70's that an induced industrial development coupled with development in the trade and commerce sector resulted in a diversification of the occupational profile and the worker participation rate of Rajsamand.

46. The Work Force Participation Rate (WFPR) is increasing but still it is much lower than the State average (42.11 percent) and the National average (39.10 percent).

Table 3.8: Work Force Participation Rate in Rajsamand

Sl.No.	Year	Total workers	WFPR
1	1971	3925	27.56
2	1981	7953	28.93
3	1991	11436	29.45

Source: City Development plan

47. Rajasthan's strong economic performance during the 80's and the early 90's reflected well in Rajsamand, which was largely driven by the robust growth in industry and service sectors, thereby creating a more diversified economy with a focus on infrastructure development.

48. The growth of the industries can be seen from following **Table 3.9**.

Table 3.9: Occupation Structure in Rajsamand UA

Occupational Structure	1971	Dist.	1981	Dist.	1991	Dist.
	Nos	%	Nos	%	Nos	%
Agriculture	769	19.60	2148	27.00	1990	17.40
Minerals & others	74	1.89	159	2.00	588	5.13
Industry	759	19.33	1591	20.00	3156	27.60
Construction	239	6.09	398	5.0	513	4.49
Commerce & Business	646	16.45	1352	17.00	2052	17.95
Transportation	207	5.27	477	6.00	809	7.07
Other Services	1231	31.37	1828	23.00	2328	20.36
Total	3925	100	7953	100	11436	100

Source: CDP.

49. As is evident from table, the occupational profile of Rajsamand undergone a transformation during the period from 1971-1991. The labour workforce involved in the agricultural sector however seen declined in 1981-1991. Thus the workforce moved towards factories and industries for employment. This resulted in overall growth of town. Now the town is a business hub attracting traders from all parts of country attracting traders from all parts of country in search of good marble.

50. **Power status of the area:** There is no power generation unit at Rajsamand. The consumption of electricity by different sectors is shown in Table below.

Table 3.10: Consumption of Electricity in Million Kwh (2003-04)

District	Domestic	Non- Domestic (Commercial)	Industrial	Public Lighting	Public Water Works	District	Domestic
			Small	Medium	Large		
Rajsamand	50.447	12.641	41.03	16.744	165.24	1.472	4.98

(Source: District Statistics Book)

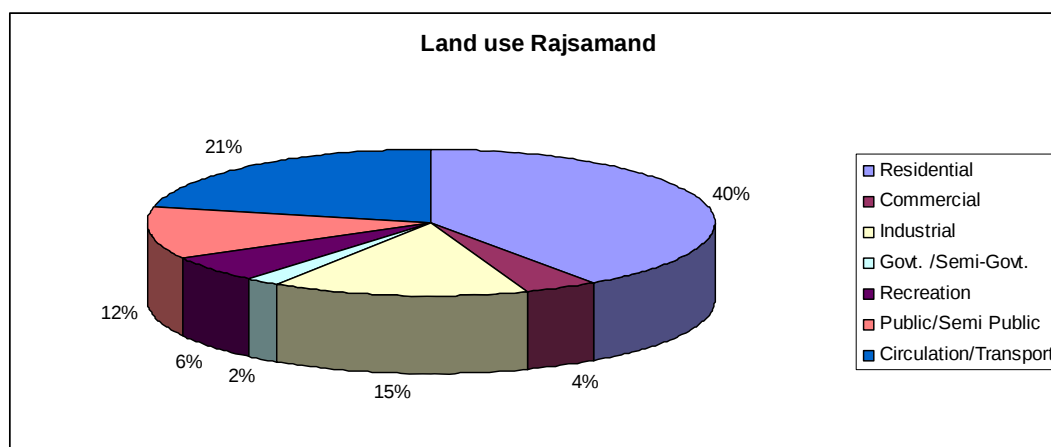
1 Land use

51. Rajsamand Municipal Corporation is extended in 55 Sq. Km. i.e. 13,590 Acre land Total urbanized land is 1,532 acre out of which 1,175 acre is developed urban area. Housing is covering 40% of the urban area. Present land use is as shown in **Table 3.11**

Table 3.11: Rajsamand UA Existing Land Use

Land Use	2001		
	Area in acres	% of developed area	% of urbanized area
Residential	471	40.38	30.74
Commercial	50	4.0	3.26
Industrial	172	14.65	11.22
Govt. /Semi-Govt.	25	2.1	1.63
Recreation	68	5.78	4.43
Public/Semi Public	139	11.82	9.07
Circulation/Transport	250	21.27	16.32
Developed Area	1175	100.00	76.67
Agriculture & other vacant land	172		
Hills	185		
Urbanized Area	1532		100.00

Source: CDP

Figure 3.8: Land use proportion for Rajsamand Developed area

52. Chainage wise land use in and around the sub –project site is shown in **Appendix- III- A**. It is noted that along the trunk sewer areas the major land use is the open land/ plantation areas. In some cases religious structures are noted. There is no major impact anticipated on religious places. Only in few cases tree felling will be required. Details regarding social impacts are described in a separate social impact assessment report.

2 Commerce, Industry and Agriculture

53. Rajsamand district's most industries are Marble based. The industrialization of Rajsamand also supported a large number of Marble industries. Rajsamand is very famous because of its marble cutting units, marble gang saw units, marble store godowns, Diamond tool factories, marble art and craft, marble and mineral industries. The RK marbles of Rajsamand is included in Guinness world record for its largest marble production. A unit of J.K. Tyre plant of Singhania group is located in Kankroli.

54. Major industries in the district are General Engineering Workshop, Handlooms, marble Slabs and Tiles, marble Chips and Powders, Marble Cutting, Miniature Silver Painting, oil Mills, Pichwal Painting, Silver Meenakari Items and Tyres and Tubes.

55. Rajsamand is upcoming as a main industrial town of the state. Many minerals mines are located towards western side of town. RIICO has established Marble factory between Dhoinda road and National Highway. Lot of marble industrial units are developed along NH-8 in approx. length of 10KM. Presently nearly 300 businessmen are engaged in marble business. Thus ribbon development is along national highway. However there is development along the Dhoinda road also. At the south of the bus stand there is proposal of development of 12 acre land. There will be commercial and residential development also.

56. Major export items are metallic decorative pieces, dyeing and printing items, fancy articles, marble decorative articles, marble slabs, pichwai paintings, silver miniature painting, stone chips and terrakota meenakari.

57. In and around the Rajsamand city area there are about 70-80% of lands used for agricultural purpose. Crop production statistics as depicted in **Table 3.12** indicates much more crop production in Kharif season in compared to Rabi season.

Table 3.12: Crop production in around Rajsamand

Type of Crops	Under Rabi Crops 2003-04 (Prod in Tonnes)	Under Kharif Crops 2003-04 (Prod in Tonnes)
Cereals	18359	157965
Pulses	312	1707
Food Grains	19265	159672
Oilseeds	1163	4386
Others	317	8816
Total	20745	172874

(Source: Vital Agricultural statistics 2004-05, Directorate of Agriculture and Statistics, Govt. of Rajasthan)

3 Infrastructure

58. Water supply: Rajsamand dam is a source of water supply to Rajsamand town. There are two headworks on the bank of this lake/ dam. The raw water from these head works is pumped to treatment plants. The source of Rajsamand dam is adequate and sufficient if the annual rainfall is received satisfactorily. However during the year 1987, 1998, 1999, 2000, 2002, 2003, 2004 the Rajsamand dam has not received sufficient water and therefore, water was required to be taken through pipelines laid from Nandsamand and Chikalwas dam. During dry season sometimes tube wells (5nos.) and open wells (3 nos.) are taken in the bed of dry portion of the Rajsamand bed of the dam to get water to meet the requirement.

59. The old treatment plant is consisting of pressure filters but it is not in operation. There is another waterworks of 3.67 mld capacity, at that location and is the only one in operation. This plant has all the treatment units such as flash mixer, clarifloculator, rapid sand gravity filters and chlorination unit and clear water reservoir 1.20 ML capacity. The water is then transported to pipeline by gravity to 3 GLSR and 5 OHSR in the town and finally distributed through distribution pipeline network. The present supply of the city is reported as 43 lpcd, which is much lower than the standard indicated in the CPHEEO manual i.e. 135 lpcd.

60. Sewerage System: Sewerage and drainage system in Rajsamand is not available and causing discharge untreated sewage into open drains or *nallahs*. There is no underground sewerage system as of now. The municipal drains are mostly open and overflowing causing problem in the raining reason. The water flow in drain is also dirty as it receives flow from toilets and sludge causing unsanitary condition.

61. Sanitation: Only 70 % of the households reportedly has septic tanks and soaks well as the system of sewerage disposal. The remaining accounted for cases of 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.

62. Drainage: Presently there exists a minimal network of storm water drains in the city. The existing network of (roadside) storm water drains in Rajsamand has been identified under three broad categories as follows: (i) open pucca (concrete drains), (ii) closed pucca, and (iii) kutcha (unlined clay drains). **Table 3.13** presents the total coverage of the existing drains in the city, and proportion of each of these categories of drains to the total road length in the city, in order to provide a snapshot of the existing level of service provision or coverage of storm water drains in Rajsamand.

Table 3.13: Storm Water Drain Coverage

Drain Type	Length in km
Open Pucca	10.00
Closed Pucca	2.0
Kutchha	15.00
Total Length	27.00

Source: Rajsamand Municipal Council

63. Industrial Effluents. Industries exists, which is out side the city area and effluent disposed scattered in local *nallahs*. As reported by the local MC, the responsibility of effluent disposal is under Industry's own and could not be connected to the proposed sewer network. The individual industry should treat their effluent to bring it to the required standard before final disposal.

64. Solid Waste: Municipal Board's jurisdiction is spread in 55sq.km, which includes core old city area and some rural parts at the fringes. 9.5 tons of solid waste is collected daily out of expected generation of 17 tonnes. In addition to household (domestic) solid waste, the main waste generation sources in the town are vegetable and fruit markets, commercial and institutional establishments including hotels and eateries, construction activities, and other tourism related activities. The MBC is using 2 loader/excavator and 4 tractors and 2 Tipper /Dumper placer for collecting and transporting the solid waste material. The capacity of 4 tractors is approximately 10 Tonnes.

65. The waste material is lifted by loaders and put on trolley for transportation to disposal site. 108 no staffs are engaged with the Municipal Corporation. Details of the quantity of garbage collected and disposed of are not available. Break up of the present (2007) quantity of MSW is given in **Table 3.14**.

Table 3.14: Break up of Present Waste Collection

Type of Waste Generation	Qty of Waste in T.P.D.
Tons	Tons
Residential Area (Domestic)	7.5
Commercial Area	1.5
Industrial	Nil
Hospital Area	0.50
Total	9.5

66. The MSW generated is transported to garbage dumping site of 5.6 hectare located at backside of Navodaya School which is located at nearly 5.0 Km from Rajsamand town.

4 Transportation

67. Rajsamand comprises a road network of 28 km, consisting of 2 km concrete roads, 15 km bituminous roads, and 6 km of water bound macadam roads and 5.0 Km earthen road. **Table 3.15** provides a breakdown of road surface composition in Rajsamand. 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. Due to water blockage in drains, the road drainage system has failed in low-lying areas of the city and resulted in deteriorating road surface condition.

Table 3.15: Road Surface Composition

Surface Type	Total (km)
Concrete	2
Bituminous	15
WBM	6
Earthen	5
Total	28

Source: Rajsamand MC.

68. **Table 3.16** shows different categories of road in Rajsamand district.

Table 3.16: Different categories of road within Rajsamand district

Category	BT	WBM	Gravel	FW	Total
National Highway	155.00	-	-	-	155.00
State Highways	262.20	-	-	-	262.20
Major District Roads	88.60	14.00	-	-	102.60
Other District Roads	259.55	5.00	14.00	10.00	288.55
Village Road	1008.50	197.70	109.90	134.77	1450.87
Total	1773.85	216.70	123.90	144.77	2259.22

(Source: Rajsamand district website)

D. Social and Cultural Resources

1 Demography

69. According to Census 2001, the population of Rajsamand Urban Agglomeration is 55687. Male constitute 52% and female 48%. Rajsamand population is 1.82% of state population. The UA witnessed a very high growth between 1951 and 1961 & 1971 to 1981. **Table 3.17** indicates the demographic characteristics for the UA. The population for the purpose of identifying and planning the infrastructure requirements for the urban settlement, the total population of the UA may be considered.

Table 3.17: Population Growth in Rajsamand City

Year	Population	Growth Rate
	Rajsamand City	(%)
1961	11272	107.5
1971	14242	26.35
1981	27492	93.03
1991	38831	41.24
2001	55687	43.40

Source: Census of India, 2001

70. With the rapid development of Rajsamand, the densification pattern across the city varies immensely. The city along with the contiguous residential settlements has a population density 118 persons per acre as per census of year 2001 and is categorized as high density areas.

71. Details of ward wise population are as shown **Table 3.18**.

Table 3.18: Details of Ward wise Population

Ward No	Ward Name	Population 2001
1	Sevali	1735
2	Sunwar	1991
3	Gadriyas	2073
4	Ragnagar Bazar	1761
5	Maliwada	1725
6	Maheshwari mohalla	1674
7	Kalalwati	1689
8	Civil lines	1669
9	Dhoinda	1663
10	Dhoinda	1781
11	Dhoinda	1883
12	Dhoinda	1906
13	Kankroli	1829
14	Railway Station	1836
15	Kankroli	1929
16	Chaitriyo ke pas	1849
17		1972
18	Nai abadi	2005
19	Gudali	1811
20	Harigen basti	1829
21	Inside surajpal	1893
22	Mandir marg	1990
23	Kankroli Bazaar	1952
24	Dhora Mohlla	1883
25	Santoshi Nagar	1827
26	Sulus Road	2054
27	Indra colony	1765
28	Kishor Nagar	1923
29	Now choki near colony	2026
30	Dhobi Gali	1764
	Total	55687

Source: PHED

2 Health and educational facilities

72. There are good educational facilities in Rajsamand district, which serve both townspeople and inhabitants of surrounding villages and towns in the hinterland. There are 1254 primary schools, 153 secondary and higher secondary schools, plus 6 general degree colleges, 4 technical college including industrial training institutes (ITI). **Table 3.19** shows education facility in the district.

Table 3.19: Educational facility of Rajsamand District

Type of Educational Institute	Total
Primary including RGP	1254
Upper Primary	526
Secondary	86
Senior Secondary	67
Colleges	6
Technical (with ITI)	4
Diet	1

(Source: Government website of the district)

73. There is 1 district hospital and 1 town hospital and 7 community centers in urban area of Rajsamand. There are also 35 primary public health centers and 215 sub –centers in Rajsamand district. **Table 3.20** shows detail of medical facility of Rajsamand.

Table 3.20: Medical facility at Rajsamand urban area and district

Allopathic		Ayurvedic	
District Hospital	1	Ayurvedic Hospitals	1
Town Hospital	1	Beds	10 Nathdwara
Community Health Centres	7	Dispensaries	92
Public Health Centres	35	Others	
		Homoeopathic	2
Sub Centres	215	Unani	-
T.B. Sanatorium	1	Private Hospitals	12

(Source: Official website of Rajasthan)

3 History, culture and tourism

74. Carved out from erstwhile Udaipur district, Rajsamand district was constituted on 10th April, 1991, and named after the famous lake "Rajsamand" built by Maharana Raj Singh. Rajsamand has moderate tourist inflows with main attractions being Lake and Fort.

75. Rajsamand is much rich district regarding history, religion, culture and mining industries. Among famous places of tourist interest Chetak Tomb, Kumbhalgarh - the birth place of Maharana Pratap, Haldighati the famous battle field, Shrinathji the chief deity of Vaishnav religion, Dwarikadheesh, Charbhuja and many Shiv temples are noted.

76. Rajsamand is very well known for its marble production as the largest producing district as well as the largest single unit in the whole country. Rajsamand also saw the vicissitudes of the freedom struggle between TANTYA TOPE and the British troops at 'Rakamgarh ka chhpar' in 1857. **Table 3.21** shows places of tourist attraction in Rajsamand.

Table 3.21: Places of tourist attraction at Rajsamand

Fort of Kumbhalgarh as a whole	Kumbhalgarh	Rajasamand
Ghat with inscriptions pavilions and toranas (together with adjacent area comprised in survey plot No. 344)	Nav Chowki Rajsamand	Rajasamand

Fort of Kumbhalgarh as a whole	Kumbhalgarh	Rajasamand
Archaeological Sites and Remains	Gilund	Rajasamand
Haldighati	Dara	Rajsamand
Badshahi Bagh	Nathdwara, Khemner	Rajsamand
Chetak Samadhi	Nathdwara, Khemner	Rajsamand
Rakta Talai	Nathdwara	Rajsamand

(Source: Official website of Rajasthan)

77. Numbers of fairs for tourist interest take place in Rajsamand. The details are given in **Table 3.22** below.

Table 3.22: Different attractive fairs for tourist at Rajsamand

Name Fair	Place of Celebration	Month of Celebration
Amaj Mata	Richher (Kumbhalgarh)	May
Pratap Jayanti	Haldi Ghati	May/June
Janmasthami	Nathdwara, Kankroli	August
AnnaKut	Nathdwara, Kankroli	Oct/November
Pashu Mela Amet	Amet	September
Jhohida Bheruji Pashu Mela	Kunvaria (Rajsamand)	October
Karni Mata	Deogarh	October
Chetak Horse Festival	Haldighati	December
Kumbhalgarh Festival	Kumbhalgarh Fort	December

(Source: Official website of Rajasthan)

IV. ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES: LOCATION AND DESIGN

78. 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 below and no other impacts are expected.

79. 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.

80. However in the case of this subproject it is not considered that there are any impacts that can clearly be said to result from either the design or location. 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 fields 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. POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES: INFRASTRUCTURE CONSTRUCTION

A. Screening out areas of no significant impact

81. From the descriptions given in Section III.C, it is clear that implementation of the project will affect a significant proportion of the town as branches of the new sewerage network will be built alongside many roads and streets.

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

- Most of the network and the trunk sewer will be built on unused ground alongside existing roads and can be constructed without causing major disruption to road users and any adjacent houses, shops and other businesses;
- The STP will be located on government-owned land that is not occupied or used for any other purpose;
- Most network 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 1.5-2 years.

83. 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.

84. These environmental factors have thus been screened out presently but will be assessed again before implementation of project.

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

Field	Rationale
	features
Fisheries & aquatic biology	No rivers or lakes will be affected by the construction work
Wildlife and rare or endangered species	There is no wildlife or rare or endangered species in the town or on the government owned areas outside the town on which facilities will be built
Coastal resources	Rajsamand is not located in a coastal area
Population and communities	Construction will not affect population numbers, location or composition

85. Rapid Environmental Impact Assessment checklist along with mitigation measures is given in **Appendix- V-A**.

B. Sewage Treatment Plant

1 Construction method

86. Work components of STP involve

- o 5MLD capacity of sewage treatment plant (STP) with Upflow Anaerobic Sludge Blanket Process and other ancillary facilities ,
- o Pump stations and pipes with valves to transfer material between ponds;
- o An outfall to discharge the treated wastewater.

87. Although the site is fairly large, the construction will be straightforward, involving mainly simple excavation and construction of reactor chambers. The polishing ponds will be dug by backhoe diggers and bulldozers, and soil will be transferred into trucks for offsite disposal. Clay will then be applied to the floor and sloping sides of each pond and after watering will be covered with low density poly-ethylene (LDPE) sheeting. A thin layer of cement mortar is then added, and concrete tiles are embedded into the surface by hand, with more cement grouting applied to seal joints between tiles.

88. Trenches for the pipe-work will also be dug by backhoe, and pipes will be brought to site on trucks, offloaded and placed into each trench by small cranes or pipe-rigs, after which soil will be replaced by hand to cover the trench.

89. Foundations for the small pump houses will be dug by backhoe, and concrete and aggregate will be tipped in to create the foundations and floor. The brick sides will then be built by hand by masons and pumps will be brought in on trucks and placed inside the pump house by crane. The roof material will then be attached by hand.

2 Physical Resources

90. Although the impacts of constructing the STP will be confined to a single site, because of its size and the invasive nature of the excavation work, physical impacts could be significant, so mitigation measures will be needed.

91. Ponds will be excavated to a depth of 2.5 m, and substantial waste soil will be generated. This is a very large amount of waste, which could not be dumped without causing further physical impacts on air quality (dust), topography, soil quality, etc. It will be important therefore to reduce the amount of dumping by finding beneficial uses for as much waste soil as possible. This will require:

- o Contacting the town authorities to arrange for the use of this material where 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;
- o Preventing 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.

92. Another physical impact associated with large-scale excavation is the effect on drainage and the local water table if groundwater and/or surface water collect in the voids. Given the difficulties of working in wet conditions the Contractor will almost certainly conduct all excavation in the dry season, so this should avoid any impacts on surface water drainage. If water collects in any quantity it will need to be pumped out, and it should then be donated to neighbouring farmers to provide a beneficial use to the communities most affected by this aspect of the work, and improve public perceptions of the project.

3 Ecological Resources

93. At proposed site, no ecological interests exist at the site, so construction will cause no ecological impacts. There are some trees that will need to be removed, and given global concerns regarding the loss of trees, the project should make a small positive ecological contribution by planting three native trees at a nearby site for every one that is removed.

4 Economic Development

94. The site of the proposed STP is owned by the government so there should be no need to acquire land from private owners, which might affect the income and assets of owners and tenants. The land is also not used for any purpose except for the unauthorized grazing of goats, and there is other suitable grazing nearby, so this activity should not be affected. The land is not farmed and there are no industries or housing in the vicinity so there should be no impact on income-generating activities. There is one farmland boundary about 400 m away from the STP site. At present no activity is noted within the farmland.

95. The only aspect of the work that has any economic implications is the transportation of waste material from the site to locations where it can be put to beneficial use as recommended above. This will require a large number of lorry movements, which could disrupt traffic near the site and particularly in Rajsamand if such vehicles were to enter the town. The transportation of waste will be implemented by the Construction Contractor in liaison with the town authorities, and the following additional precautions should be adopted to avoid effects on traffic:

- o Planning transportation routes so that heavy vehicles do not enter Rajsamand town and do not use narrow local roads, except in the immediate vicinity of delivery sites;

- o Scheduling transportation activities to avoid peak traffic periods.

5 Social and Cultural Resources

96. Although the STP will be built on an uninhabited and un-used site, with no residential areas nearby, there is a risk that the work could damage social and cultural resources, so careful mitigation and strict adherence by the EA and Contractor will be necessary.

97. 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 this particular location is uninhabited and shows no sign of having been used to any extent in the past, then it could be that there is a low risk of such impacts. 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:

- o Consulting historical and archaeological authorities at both national and state level to obtain an expert assessment of the archaeological potential of the site;
- o Selecting an alternative location if the site is considered to be of medium or high risk;
- o 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;
- o 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.

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

99. 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 the STP labour force from communities within a radius of say 2 km from the site, if sufficient people are available.

C. Sewerage Network and Trunk Sewer

1 Construction method

100. Provision of a sewerage system in part of the town during the second phase of investment (Tranche 2) will involve construction of:

- o The secondary and tertiary network will collect sewage from individual houses have a sufficient water supply, These pipes will be of small diameter (200 to 600 mm) and will be located in shallow trenches (ca 1.5 m in depth).
- o The trunk sewer will also be of RCC pipes and will convey sewage from the secondary network to the STP. These pipes will be 700 and 1100 mm in diameter.

101. These two elements of the project involve the same kinds of construction and will produce similar effects on the environment, so their impacts are considered together.

102. Most pipes will be buried in trenches immediately adjacent to roads, in the un-used area within the ROW, alongside the edge of the tarmac. The trunk main and secondary network will be located alongside main roads, where there is generally more than enough free space to accommodate the pipeline. However in parts of the tertiary network where roads are narrow, this area is occupied by drains or the edges of shops and houses etc., so the trenches may have to be dug into the edge of the road.

103. Trenches will be dug by backhoe digger, supplemented by manual digging where necessary. Excavated soil will be placed nearby, and the pipes (brought to site on trucks and stored on unused land nearby) will be placed in the trench by crane or using a small rig. After the pipes are joined, loose soil will be shovelled back into the trench, and the surface layer will be compacted by hand-operated compressor.

104. 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 therefore be quite large, a maximum of 2.3 m deep and 1.2 m wide for the trunk main, and a minimum of 1.5 m deep and 0.4 m wide for the tertiary network.

105. At intervals, small chambers (ca 1-2 m³) will be created to allow inspection and clearance of blockages and sediment during operation. These will be excavated by backhoe, and hardcore and concrete (mixed on site) will be tipped in to form the base. Brick sides will then be added by masons by hand, and the top will be sealed at ground level by a metal manhole cover.

106. As noted above, some of the narrower roads are constructed of concrete and have no available space at the edge because of the presence of drains, or shop- and house-fronts encroaching into the ROW. In these places, it may be necessary to break open the surface of the road using hand-held pneumatic drills, after which the trench and pipeline will be constructed as described above. On completion, a concrete layer will be re-applied to the surface to repair the road.

2 Physical Resources

107. Construction of trenches will have similar physical impacts to the excavation work at the STP, although their extent and significance will be different because trenches are linear

structures and the network is located in the town. Since length of the trunk main is not much the generation of waste will be less. Although this is <10% of the quantity produced at the STP it is still a significant amount of waste, and in this case there are additional considerations because piles of soil could impede traffic and other activities in the town (see below) and dust could affect inhabitants during dry weather. These impacts should be mitigated by applying the same measures as at the STP site to minimise waste and dust, and there will need to be some additional precautions to control dust. The Contractor should:

- o Contact the town authorities to find beneficial uses for the 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 Remove waste material as soon as it is excavated (by loading directly into trucks), to reduce the amount stockpiled on site;
- o Use tarpaulins to cover loose material when transported from the site by truck;
- o Cover or water stockpiled soil to reduce dust during windy weather.

108. The other important physical impact associated with large-scale excavation (effects on surface and groundwater drainage) should not be an issue in this case because of the very low rainfall in this area and the very low water table. In addition the Contractor will almost certainly conduct all excavation in the dry season, to avoid the difficult working conditions during the monsoon.

109. The physical impacts of trenching will also be reduced by the method of working, whereby the network and trunk sewer 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

110. There are no significant ecological resources in or outside the town (protected areas or rare or important species or habitats), so construction of the network and trunk sewer should have no ecological impacts. But actual impact can be assessed after finalisation of alignment. However, 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

111. As the network and trunk sewer pipelines will all be conducted within the ROW of existing roads (either adjacent to the road, or beneath the road surface in narrower streets) there will be no need to acquire land, so there should be no direct effect on the income or assets of landowners, or the livelihoods of tenants.

112. There could be some economic impacts however, if the presence of trenches, excavated material, workers and machinery discourage customers from visiting shops and businesses

adjacent to network construction sites, and the businesses lose income as a result. These losses will be short in duration as work at any one site should be completed in a week or less. However the loss of income could be significant for small traders and other businesses that exist on low profit margins. These impacts should therefore be mitigated by:

- 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 to inform them in advance when work will occur.

113. ADB policy on Involuntary Resettlement requires that no-one should be worse off as a result of an ADB-funded project, and a separate Resettlement Plan and Resettlement Framework have been prepared to examine these issues and provide appropriate mitigation. This establishes that, in addition to the above practical measures to reduce the economic impact of the construction work, owners and tenants of affected businesses will also be compensated in cash for any income they lose.

114. Excavation could also damage existing infrastructure, in particular storm drains and water supply pipes, both of which are located alongside roads in the town. 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 the public (see below). It will be important therefore to avoid these impacts by:

- o Obtaining details from the Municipal Council of the nature and location of all infrastructure, and planning the sewer networks so that all such sites are avoided;
- o Integrating the construction of the various Rajsamand subprojects (in particular water supply and sewerage) so that:
 - Different pipelines are located on opposite sides of the road wherever feasible;
 - Roads and inhabitants are not subject to repeated disturbance by trenching in the same area for different purposes.

115. Transport is another type of infrastructure that will be affected by some of the work, as in the narrower streets there is not enough space for excavated soil to be piled off the road. As noted above the road itself, may also be excavated in places where there is no available land 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.

116. It is inevitable that there will be an increase in the number of heavy vehicles in the town (particularly trucks removing waste and delivering pipes and other materials to site), 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

117. As was the case with the STP site, there is a risk that sewer construction, which involves extensive disturbance of the ground surface, could damage undiscovered archaeological and/or historical remains, or even unknown sites. The risks are in fact considerably higher in this case, because such artefacts are more likely to occur in areas that have been inhabited for a long period. The preventative measures described in Section V.B.5 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 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 trenching, to recognise, protect and conserve any chance finds (see Section V.B.5 for details).

118. Sewer construction will also disturb some modern-day social and cultural resources, such as schools, hospitals, temples, and sites that are of interest to tourists. Impacts will include noise, dust, and interrupted access for pedestrians and vehicles, and in cases where pneumatic drills are used to break the surface of concrete roads, there could be a risk of damage from vibration. Mitigation will therefore 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, covering and watering stockpiles, and covering soil with tarpaulins 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.

119. 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.

120. 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.

121. 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 is that:

- o The locations of all new infrastructures will be planned to avoid locations of existing AC pipes so AC pipes should not be discovered accidentally.

122. Given the dangerous nature of this material for both workers and the public, additional precautions should be taken to protect the health of all parties in the event (however unlikely) that AC pipes are encountered. The design consultant should therefore 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:

- o 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;

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>

- o Reporting procedures to inform management immediately if AC pipes are encountered;
- o 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:
 - Removal of all persons to a safe distance;
 - Usage of appropriate breathing apparatus and protective equipment by persons delegated to deal with the AC material;
 - Procedures for the safe removal and long-term disposal of all asbestos-containing material encountered.

123. 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 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

124. Although the sewerage system will need regular maintenance when it is operating, with a few simple precautions this can be conducted without major environmental impacts (see below). There are therefore several environmental sectors which should be unaffected once the system begins to function. 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 mentioned further. Presently most of the sub-project components are in design stage.

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

Field	Rationale
Climate, topography, geology, seismology	There are no known instances where the operation of a relatively small sewerage system has affected these factors
Fisheries & aquatic biology	The only local fishery is in local pond, which will not be affected
Wildlife, forests, rare species, protected areas	There are none of these features in or outside the town
Coastal resources	Rajsamand is not located in a coastal area

125. These environmental factors have thus been screened out presently but will be assessed again before implementation.

B. Operation and maintenance of the improved sewerage system

126. The new sewerage system will collect and treat all surface water, domestic wastewater and sewage produced by 60% of the town, and the remainder of the inhabited area and future expansion will be served by additional sewers provided via subsequent tranches of funds. Although treatment will not be to the standards of more developed countries, the technology is approved by the Central Public Health and Environmental Engineering Organization (CPHEEO) and Pollution Control Board attached as **Appendix VI-A** and the discharge after treatment will comply with Indian wastewater standards (**Table 6.2**).

Table 6.2: Waste Water Quality Discharge Standards

SL.no	Parameter	Standards			
		Inland surface water	Public sewers	Land irrigation	Marine/coastal areas
	(a)	(b)	(c)		(d)
1.	Colour and odour	remove as far as practicable			
2.	Suspended solids mg/l. max.	100	600	200	(a) For process waste water 100 (b) For cooling water effluent 10% above total suspended matter of influent.
3.	Particle size of suspended solids	shall pass 850 micron IS Sieve			(a) Floatable solids, max. 3mm. (b) Settable solids (max 850 micron)
4.	pH value	5.5. to 9.0	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
5.	Temperature	shall not exceed 5°C above the receiving water temperature			shall not exceed 5°C above the receiving water temperature
6.	Oil and grease, mg./l, max.	10	20	10	20
7.	Total residual chlorine, mg/l. max.	1.0			1.0
8.	Ammoniacal nitrogen (as N.) mg/l max	50	50		50
9.	Total Kjeldahl Nitrogen (as NH ₃) mg/l. max	100			100
10.	Free ammonia (as NH ₃), mg/l.max	5.0			5.0
11.	Biochemical oxygen demand (3 days at 27°C), mg/l. max.	30	350	100	100
12.	Chemical oxygen demand, mg/l, max.	250			250
13.	Arsenic (as As) mg/l, max.	0.2	0.2	0.2	0.2
14.	Mercury (As Hg),	0.01	0.01		0.01

SL.no	Parameter	Standards			
		Inland surface water	Public sewers	Land irrigation	Marine/coastal areas
	mg/l, max.				
15.	Lead (as Pb) mg/l, max	0.1	1.0		2.0
16.	Cadmium (as Cd) mg/l, max	2.0	1.0		2.0
17.	Hexavalent chromium (as Cr. +6). mg/l, max	0.1	2.0		1.0
18.	Total Chromium (as Cr) mg/l, max	2.0	2.0		2.0
19.	Copper (as Cu) mg/l, max	3.0	3.0		3.0
20.	Zinc (as Zn) mg/l, max	5.0	15		15
21.	Selenium (as Se) mg/l, max	0.05	0.05		0.05
22.	Nickel (as Ni) mg/l, max	3.0	3.0		5.0
23.	Cyanide (as CN) mg/l, max	0.2	2.0	0.2	0.2
24.	Fluoride (as F) mg/l, max	2.0	15		15
25.	Dissolved phosphates (as P) mg/l, max	5.0			
26.	Sulfide (as S) mg/l, max	2.0			5.0
27.	Phenolic compounds (as C ₆ H ₅ OH) mg/l, max	1.0	5.0		5.0

127. The sewer pipes will not function without maintenance, as silt inevitably collects in areas of low flow over time. The project will therefore provide equipment for cleaning the sewers, including buckets and winches to remove silt via the inspection manholes, diesel-fuelled pumps to remove blockages, and tankers to transport the waste hygienically to the STP.

128. Piped sewers are not 100% watertight and leaks can occur at joints. Any repairs will be conducted by sealing off the affected sewer and pumping the contents into tankers, after which the faulty section will be exposed and repaired following the same basic procedure as when the sewer was built. Trenches will be dug around the faulty section and the leaking joint will be re-sealed, or the pipe will be removed and replaced.

129. At the STP, sewage sludge will need to be removed from the active treatment ponds every four or five years. This is a simple process that does not require a Sludge Management Plan. Ponds are allowed to dry out naturally and the solid sludge is removed by manual digging. The treatment and drying processes kill enteric bacteria and pathogens, and because of its high content of nitrates, phosphates and other plant nutrients the sludge is an excellent organic fertilizer and farmers are normally allowed to remove the dry material for application to their land. Treated wastewater can be used in aquaculture by diverting it to the ponding systems.

C. Environmental impacts and benefits of the operating system

1 Physical Resources

130. The provision of an effective sewerage system in 40% of the town should improve the physical appearance and condition of the city area that will no longer be discharged to the *nallahs*. This measure and the fact that there will be fewer septic tanks and less sewage discharged to drains, should also improve the appearance of the town and the quality of surface water drainage and groundwater. Clearly there will be further significant improvements once the whole town is connected to sewer via the future funding.

131. There could also be small-scale physical benefits from the operating STP if the sewage sludge that is removed periodically from the treatment ponds is provided to farmers and applied to fields, as it will improve soil structure and fertility. There could be a useful cost-recovery element if a system was established to sell this material to farmers, so this should be considered by the EA. EA can also consider promoting aquaculture from the treated wastewater which is also an important resource.

132. There are also certain environmental risks from the operating system, most notably from leaking sewer pipes as untreated faecal material can damage human health and contaminate both soil and groundwater. It will be imperative therefore that the Government Agency (GA) responsible for operating the sewerage system establishes a procedure to routinely check the operation and integrity of the sewers, and to implement rapid and effective repairs where necessary. If trenches are dug to locate and repair leaks or remove and replace lengths of pipe, the work will follow the same procedure as occurred when the infrastructure was provided. However the impacts should be much less significant as the work will be infrequent, and will affect individual small locations for short periods only. Work will not be conducted during rainfall so there will be no effect on drainage, and the excavated soil will be replaced in the trench so there will be no waste. Physical impacts should thus be negligible.

133. Treated effluent from an STP is often discharged to a nearby water body, which may then become contaminated by the high levels of nitrate, phosphate and organic matter in the effluent. As there is a *nallah* (natural or man-made drainage channel) in the vicinity of the proposed STP site, effluent may be discharged into this channel, which may then pollute surface and groundwater and present a risk to the health of humans and animals if it is consumed via well water. This can be avoided by developing a system to sell the treated wastewater to farmers (delivered by tanker) to irrigate their fields. This would provide water and plant nutrients and thus improve agricultural productivity and farm incomes, as well as allowing further cost-recovery by the EA. This should be operated in conjunction with a scheme to sell inert sewage sludge as a farm fertilizer as recommended above, and some of the capacity building and training provided by the project should focus on providing the GA with the skills to operate these measures. This should be preceded by rigorous bacteriological tests to confirm that the treatment methods render all dried sludge and effluent free from enteric bacteria and pathogens, so that it is safe to humans, animals and crops (see Section VII.C below). The same tests can be applied to wastewater that is used for aqua-culture.

2 Ecological Resources

134. Although the new sewerage system will improve the environment of the town, there are unlikely to be significant ecological benefits as there are no natural habitats or rare or important species. If effluent from the STP was discharged into the nearby *nallah* there could be some

small ecological benefits as marsh plants and animals will colonise the small wetland that is likely to be formed. However the risks of contaminating groundwater are more significant, so it would be more appropriate to forego this ecological gain in favour of the better disposal method suggested above, whereby the effluent is supplied to farmers to irrigate and fertilize their fields.

3 Economic Development

135. Although repairs to the sewer network could result in shops losing some business if access is difficult for customers whilst the work is carried out, 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 repair 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.

136. As noted above, a by-product of the scheme could be to provide economic improvements in the agricultural sector if sewage sludge and treated wastewater provide farmers with a safe and affordable source of organic fertilizer, and crop yields increase as a result. The completed scheme should also contribute to improvements in environmental and community health in the town (discussed below), which could provide some knock-on benefits to business from healthier workers and consumers.

4 Social and Cultural Resources

137. 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 sewer network, as all work will be conducted in trenches that have already been disturbed when the infrastructure was installed.

138. Repair work could cause some temporary disruption of activities at sites of social and cultural importance such as schools, hospitals, temples, etc, so at these locations 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 to inform them of the work in advance, and avoid sensitive times, such as religious and cultural festivals.

139. The responsible authorities will employ local contractors to conduct repairs of the sewer network, 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.

140. 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, unskilled persons employed to maintain and operate the STP should be residents of the neighbouring area.

141. The citizens of the town will be the major beneficiaries of the new sewerage system, as human waste from those areas served by the new network will be removed rapidly and treated to an acceptable standard. This should improve the environment of these areas, and in conjunction with the development of other infrastructure (in particular water supply), should deliver major improvements in 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

142. **Table 7.1** lists the potential adverse impacts of the Rajsamand 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

143. 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.

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

Figure 7.1: Institutional Responsibility- RUSDIP

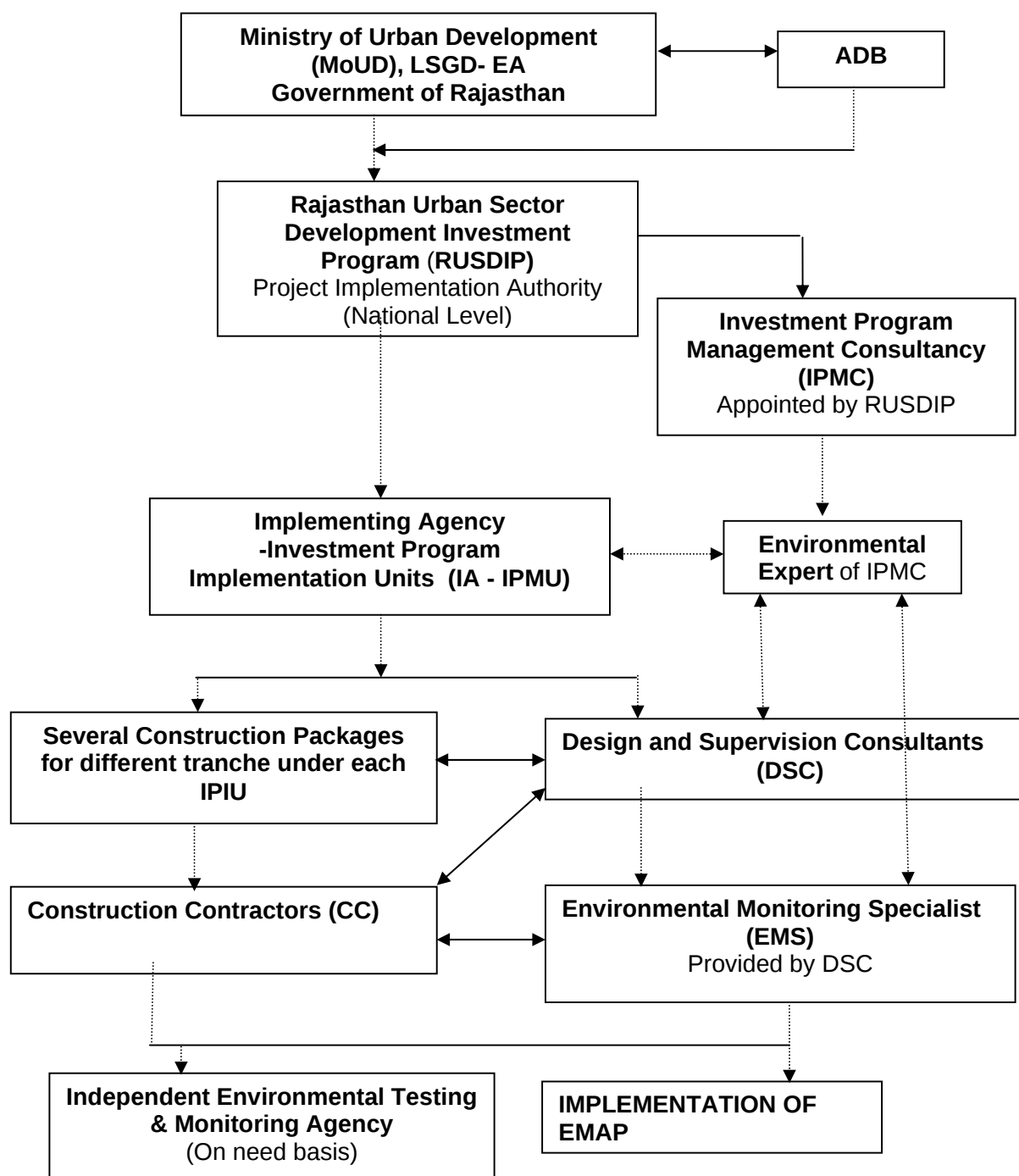


Table 7.1: Environmental impacts and mitigation for the Rajsamand subproject
(Black = continuous activity; Grey = intermittent)

Potential Negative Impacts	Sig	Dur	Mitigation Activities and Method	Responsibility	Location	2008				2009				Op ³
						D	D	3	4	1	2	3	Op	
Location & Design														
Discharge of treated effluent to <i>nallah</i> could pollute surface & groundwater with nitrate, phosphate, etc	M	P	Conduct bacteriological tests to ensure safety of effluent	GA	STP									0
			Sell treated wastewater to farmers for irrigation Use treated wastewater for aquaculture											+
Construction: Sewage Treatment Plant														
Excavation 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									+
Stockpiled soil could create dust in windy weather	M	T	Remove soil as soon as it is excavated	Contractor	All sites									0
Dust could also be produced when soil is transported	M	T	Use tarpaulins to cover dry soil when carried on trucks	Contractor										0
Rain and ground water could collect in excavated areas	M	T	Conduct all excavation in the dry season	Contractor	All sites									0
			Pump out groundwater & provide to farmers for irrigation	Contractor	STP site									+
Some trees will need to be removed from the site	M	P	Only remove trees if it cannot be avoided	Contractor	All sites									0
			Plant and maintain two trees for every one removed											0
Traffic may be disrupted by lorries carrying waste soil	M	T	Plan routes to avoid Rajsamand Town and narrow local roads	Contractor	From STP 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 proposed STP site	DSC	All sites									0
			Select alternative if site has medium-high potential	DSC										0
			Include state and town historical authorities as project stakeholders to benefit from their expertise	LSGD										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, see Section VII.B

[illegible]

[illegible]

[illegible]

145. Resettlement issues will be coordinated centrally by a Resettlement Specialist within the IPMU, 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.

146. 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

147. **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.

148. 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.

149. **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)

150. **Table 7.2** 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.

151. Given the scale of the investment in providing the infrastructure, LSGD will also wish to conduct monitoring during the operational period to ensure the correct functioning of the STP and confirm the long-term benefits of the scheme. There will also be bacteriological surveys when the STP is operating, to ensure the safety of dried sludge and treated effluent before sale to farmers to fertilize and irrigate fields. **Table 7.2** shows that these long-term surveys will monitor:

- o the chemical and bacteriological quality of treated STP effluent;
- o the bacteriological content of dried sewage sludge;
- o the health of the population and the prevalence of diseases of poor sanitation.

152. An accredited consulting laboratory will be appointed to collect and analyse samples of treated effluent and dried sludge once per month for the first five years of operation of the STP. A domestic social studies consultant will be appointed to monitor public health and the incidence of disease, once per year over the same five year period, after collecting baseline data during the construction period.

D. Environmental management and monitoring costs

153. 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 compensating shopkeepers for loss of business income during the construction period (**Table 7.1**) are calculated separately in the budgets for the Resettlement Framework and Resettlement Plans so are also excluded from this analysis.

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

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

155. 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 project as a whole (covering design,

1 ½ years of construction and the first five years of operation) is INR 2.25 million, ie US\$ 52,440.

Table 7.2: Environmental Monitoring Plan

Mitigation Activities and Method	Location	Responsible for Mitigation	Monitoring Method	Monitoring Frequency	Responsible for Monitoring
LOCATION AND DESIGN					
Sell treated wastewater to farmers for irrigation • Use treated wastewater for aquaculture in water ponding systems.	STP	GA	Site observation; farmer survey	Monthly	
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 soil when transported on trucks	All sites	Contractor	Site observations	Weekly	EMS
Avoid Rajsamand Town and narrow local roads when transporting soil	From STP	Contractor	Observations off site; CC record	Weekly	EMS
Avoid transporting soil during peak traffic periods	From STP	Contractor	Observations on and off site	Weekly	EMS
Cover or damp down stockpiled soil in dry weather	Inhabited areas	Contractor	Site observations	Weekly	EMS
Conduct all excavation work in the dry season	All sites	Contractor	Site observations	Monthly	EMS
Pump groundwater from excavated areas and provide to farmers	STP site	Contractor	Site observations; farmer survey	Monthly	EMS
Leave spaces for access between mounds of soil	Network sites	Contractor	Site observations	Weekly	EMS
Provide bridges to allow people & vehicles to cross open trenches	Network sites	Contractor	Site observations	Weekly	EMS
Only remove trees if it cannot be avoided	All sites	Contractor	Site observations	Weekly	EMS
Plant and maintain two trees for every one removed	All sites	Contractor	Observations on/off site; CC records	Monthly	EMS
*Compensate businesses for lost income	Where required	LSGD	Shopkeeper survey; LSGD record	As needed	IMA ⁶
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
Confirm location of infrastructure and avoid these sites	Network 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
If work will affect traffic, conduct when traffic is light	Network sites	Contractor	Site observations; CC records	Monthly	EMS
Ensure police provide traffic diversions when required	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
Plan transport routes to avoid narrow streets, important or fragile buildings, religious and tourism sites	Network sites	Contractor	Observations off site: CC record	Weekly	EMS
Plan work to avoid peak traffic and main tourism season	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
Avoid using pneumatic drills near buildings at risk from vibration	Network 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 key issues, avoid working at sensitive times	Network sites	Contractor	Site observations; CC records; resident surveys	Monthly	EMS
Prepare and implement a site H&S Plan (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					
Detect and repair sewer leaks rapidly and effectively	Network sites	GA	Site observation; resident survey	Monthly	
Sell dried inert sludge to farmers to fertilize land	STP	GA	Site observation; farmer survey	Monthly	
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 heavy vehicles near fragile buildings	Network sites	OM Contractor	Site observations	Monthly	
Finish work quickly in sensitive areas	Network sites	OM Contractor	Site observations; OMC records	Monthly	
Consult communities, avoid working during sensitive periods	Network sites	GA	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	
STP workers should be residents of neighbouring areas	STP	GA	Employer record; worker survey	Monthly	
LONG-TERM SURVEYS					
Survey of chemical and bacteriological quality of STP effluent	STP	GA	Water quality sampling/analysis	Monthly for	Consulting lab
Bacteriological surveys of dried STP sludge	STP	GA	Bacterial sampling/analysis	5 years	Consulting lab
Survey of public health and incidence of water borne disease	Rajsamand Town	GA	Hospital records; resident surveys	Annual for 6 years	Social studies consultant

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	Lumpsum	100,000	100,000	490,000
2. Survey of STP sludge and effluent (5 years)				
Domestic Consultant	5 x ½ month	130,000	325,000	
Sample Analysis	5 x 20	3,500 ⁸	350,000	
Other Expenses	Lumpsum	200,000	200,000	875,000
3. Survey of public health (6 years)				
Domestic Consultant	6 x ½ month	130,000	390,000	
Expenses	Lumpsum	200,000	200,000	590,000
4.Environmental mitigation cost including greenery development	Lump sum	300,000	300,000	300,000
TOTAL				2,255,000

E. Associated Facilities

156. There are no upstream associated facilities in this subproject; however, the downstream users of treated water can be considered associated to the facility.

157. If the Sewage Treatment Plant's (STP's) treated waste water is drained into a *nallah* or discharged into boreholes, care must be taken to properly treat it before it is discharged otherwise the infusion of contaminated waters in the ground aquifers can render the water permanently unfit for human consumption.

158. Inappropriate waste water disposal pollutes the receiving waters such as rivers, *nallahs*, water ponding systems for aquaculture and may render them unfit for abstraction and treatment if toxic in nature. These *nallahs*, rivers or farmers which "take away/use" this waste water are deemed to be end users of the wastewater from the STP. Therefore before disposal, all Indian wastewater discharge standards must be met in full and proper records must be maintained.

VIII. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Project stakeholders

159. 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

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

⁸ Cost of a standard bacteriological analysis (total and faecal coliforms, E.coli, enterococci, etc) is \$90 (INR 3,500) per sample

- 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.

160. 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, the Government of India, Ministry of Finance.

B. Consultation and disclosure to date

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

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

162. 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**.

163. Major concerns were made on the necessity of adequate access road during the laying of sewer lines and the possible dust and noise problems during construction phase. Also some concerns made on the necessity of proper safety arrangements with first aid facility at construction site are envisaged. Hence necessary provisions shall be provided to avoid the traffic snarl during the construction.

164. The public Consultation and group discussion meeting were conduct by RUIDP on Date 10 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 Rajsamand the environmental and social impacts of the proposed subprojects under Tranche 2 in Rajsamand were discussed.

165. 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 Rajsamand; and discussed the Government and ADB's Environment policies acts and potential environment impacts of the sub-projects in Rajsamand. 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.

C. Major Issues discussed during Public consultation are

- (i) Proposed waste water management project should ensure proper hygienic disposal of sewerage 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) Livelihood affected households should be given assistance in the mode of cash compensation;
- (iv) Local people should be employed by the contractor during construction work;
- (v) Adequate safety measures should be taken during construction work;

- (vi) Mobile kiosks/vendors/hawkers have shown willingness to shift in nearby places without taking any compensation and assistance from the Executing Agency;
- (vii) Local people have appreciated the waste water management proposal of the government and they have ensured that they will cooperate with the Executing Agency during project implementation.

D. Future consultation and disclosure

166. 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

167. 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 savings in health care costs.

168. 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.

169. The process described in this document has assessed the environmental impacts of all elements of the infrastructure proposed under the Rajsamand Sewerage and Sanitation Subproject. Potential negative impacts were identified in relation to construction and operation of the improved infrastructure, and the design and location of the subproject. Mitigation measures have been developed 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:

- o Locating the trunk main and sewerage networks within the ROW of existing roads, to avoid the need to acquire land or relocate people;
- o Locating sewers on unused land adjacent to roads wherever possible, to avoid damaging roads and disrupting traffic and other activities.

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

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

- o Locating the STP on government-owned land to avoid the need for land acquisition and relocation of people;
- o Locating the trunk main in the ROW alongside the Road, to avoid acquiring agricultural land and affecting the livelihoods of farmers and farm workers.

172. Regardless of these and various other actions taken during the IEE process and in developing the subproject, 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 work and the excavation of ponds at the STP site; because the sewer network is located in a town, some parts of which are densely populated; and because Rajasthan is an area with a rich

history, in which 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, and the cultural heritage.

173. During the construction phase, impacts mainly arise from the need to dispose of large quantities of waste soil; 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.

174. Although there will be no need to acquire land or relocate people, roadside businesses will lose some income as access will be difficult for customers when work is in their vicinity. ADB policy requires that no-one should be worse off as a result of an ADB-funded project, so these losses will be compensated through a Resettlement Plan and Framework prepared to comply with Bank policy on Involuntary Resettlement.

175. 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.

176. Special measures were also developed to protect workers and the public from exposure to carcinogenic asbestos fibres in the event that Asbestos Cement pipes used in the existing water supply system are encountered accidentally during excavation work. These are to:

- o Avoid all known sites of AC pipes when the locations of new infrastructure are planned in the detailed design stage;
- o Train all construction personnel to raise awareness of the dangers of AC and enable early recognition of such pipes if encountered;
- o Develop and apply a protocol 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).

177. 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 STP are residents of nearby communities.

178. 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 programme for its implementation.

179. On completion the sewerage system should operate with routine maintenance, which should not significantly affect the environment, providing certain pre-conditions are met. These are that:

- o The operation and integrity of sewers are checked regularly and any leaks are repaired rapidly and effectively to avoid public health risks and contamination of land and water;
- o Treated effluent from the STP is sold to farmers to fertilize and irrigate fields instead of being discharged into a nearby *nallah*. An aquaculture farm could be developed using the wastewater if ponding system is developed.

180. The repair of sewers will have fewer environmental impacts than the original sewer construction as the work will be infrequent and will affect 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.

181. The regular removal of sludge from the treatment ponds should also have no environmental impacts, and if tests show that the drying procedure removes bacterial contamination the material should be sold to farmers to fertilize soil, as this will provide an environmental gain and some cost recovery.

182. The main impacts of the operating sewerage system will be beneficial as human waste from those areas served by the new network will be removed rapidly and treated to an acceptable standard. This will improve the environment and appearance of these areas, and the health and quality of life of the citizens. Diseases of poor sanitation should be reduced, which should lead to economic gains as people will be away from work less and will spend less on healthcare, so their incomes should increase.

183. **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 scheme).

184. Mitigation will be assured by a program 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 ensure the safety of sewage sludge and treated effluent for use in agriculture, and to monitor the expected improvements in the health of the population.

B. Recommendations

185. 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 environmental status report (**Table 7.1**) are implemented in full, as described in the text above;
- o The Environmental Monitoring Plan proposed in Section VII.C of this report is also implemented in full.

X. CONCLUSIONS

186. The environmental status of the proposed improvements in sewerage and sanitation in Rajsamand 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.

187. The overall conclusion of both processes is 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.

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

APPENDIX- 1

PHOTOGRAPHS

Rajsamand Photo gallery



Site For Proposed STP



Site For Proposed STP



Site For Proposed STP



Proposed Alignment for Sewer Lines



Proposed Alignment for Sewer Lines

APPENDIX- 2

Rajsamand Wastewater Management

Chainage wise land use status

Table No. 1. From Rajasthan Housing Board to J.K.Circle (Along NH - 8)

S.No.	Chainage wise in Mts.	Right side	Left Side	Remarks
1	0	Hills, open land		No major impacts
2	0 - 500	Hill, Open land, Trees, Farms		No major impacts
3	500 - 1000	Trees, open land, farms, one small hotel, babools		No major impacts
4	1000 -1500	Some houses and shops, some trees, babools road side open land		No major impacts
5	1500 - 2000	Some houses, and shops and comm. bldgs., small trees and babools, circle in the centre		No major impacts

Table No. 2. from J.K.Circle to STP site – village Pratap pura

S.No.	Chainage wise in Mts.	Right side	Left Side	Remarks
6	0 - 500	Farms, open road side portion with babools and some open land, some trees(2 - 3)		No major impacts
7	500 - 1000	Farms, open road side portion with babools and some open land, some trees(2 - 3), One nullah on river Taledi		No major impacts
8	1000 - 1500	Farms, open road side portion with babools and some open land, some trees(2 - 3)		No major impacts
9	1500 - 2000	Farms and open land, open road side portion with babools, one small nullah some trees		No major impacts
10	2000 - 2500	Farms, open land with babools and some trees, reserved land of railways on RHS		No major impacts
11	2500 - 3000	Farms, open road side portion with babools and some open land, small trees		No major impacts
12	3000 - 3500	Farms and open land with babools with Kutcha road, land of railways on both the sides of track		Railway track is near and also a HTL line. But there are no major impacts due to this project.

Table No: 3. from NH – 8 Rameshwar Mahadev Temple to J K Circle (Along Taledi River)

S.No.	Chainage wise in Mts.	Right side	Left Side	Remarks
13	0	Some farms, some shops, open land	Farms and Shops	No major impacts
14	0 - 500	Farms with some houses and babools	Farms, babools and trees	No major impacts
15	500 - 1000	Farms with babools some trees		No major impacts
16	1000 - 1500	Farms with babools		No major impacts
17	1500 - 2000	Farms with some houses and babools		No major impacts
18	2000 - 2500	Farms with some houses and babools, Kankroli – Nathdwara – Udaipur road with one nullah on the river, shops and comm. bldgs., on both the sides		No major impacts
19	2500 - 3000	Farms with babools and some trees, some houses		No major impacts
20	3000 - 3500	Farms with some houses and babools		No major impacts
21	3500 - 4000	Farms with some houses and babools, some trees		No major impacts
22	4000 - 4275	Farms, some houses, some trees, circle at the end, babools		No major impacts

APPENDIX-3

Rapid Environmental Assessment (REA) Check List for

Rajsamand Waste Water Management

Project Title :Design, Construction, Supply, Erection testing, Commissioning and First five years Operation & Maintenance of STP near village Bhawa including all civil, electrical, mechanical, pumping and other allied works including supply, laying, jointing etc. Supply, laying, jointing, testing and commissioning of various trunk sewers, collecting and lateral sewers connecting to outfall, along with all necessary manholes, appurtenances, etc., at Rajsamand.

Sector Division : Wastewater Management - RSM/WW/01

Item	Screening Questions	Yes/ No	Remarks
A	Is the project area ...		
	Densely populated	No	The proposed STP site is away from human settlements in a 47 bigas land identified by district administration near Jhawar Navodaya Vidyalaya, at village Bhawa. The STP site is an uninhabited and un-used site, with no residential areas nearby the influence area of the project. One farm land is located about 400 m away from STP site The proposed collector and mains alignment is similar to that of any small urban area and adequate provisions have been incorporated in to the project design to mitigate those are unavoidable. Also the proposed project will improve the environmental conditions and quality of life in that area.
	Heavy with development activities	No	Only agricultural activity is being carried out near the proposed project site. Also a railway line exists near to the proposed STP location.
	Adjacent to or within to any environmentally sensitive area		No sensitive area
	Cultural heritage site	No	Some of cultural assets in the form of religious places or historically important sites present in the project area are the Pristine Rajsamand Lake, the Nauchowki Lake, and the pilgrimage center Kankroli with temples of Dwarakadhish. However, these cultural heritage sites may not come within the project influence area and also utmost care will be provided to the nearby areas during constructional phase with adequate protection measures and by effectively implementing Environmental Management Plan.
	Protected area	No	There is no designated protected area present near proposed project components.
	Wetland	No	There are no designated wetlands present in the

Item	Screening Questions	Yes/No	Remarks
			project area.
	▪ Mangrove	No	There are no mangroves present near to the project area.
	▪ Estuarine	No	There is no estuarine area present near to the project area.
	▪ Buffer zone of protected area	No	The proposed project area doesn't come near any buffer zone of protected area.
	▪ Special area of protecting biodiversity	No	The proposed project doesn't falls within any special area for protecting biodiversity.
	▪ Bay	No	Not applicable
B	Potential Environmental Impacts Will the project cause...		
	• Impairment of historical/cultural monuments/areas and loss/damage to these sites?	No	There is no cause of impairment to historical/cultural monuments/areas and loss/damage to these sites and no cultural heritage site present near the proposed STP site. Some religious sites identified in the proposed sewer line and adequate care will be provided to those sites during constructional period. Cultural assets in the form of religious places or historically important sites present in at Rajsamand is Pristine Rajsamand Lake, the Nauchowki Lake, and the pilgrimage center Kankroli with temples of Dwarakadhish. However, these cultural heritage sites may not come within the project influence area and also utmost care will be provided to the nearby areas during constructional phase with adequate protection measures and by effectively implementing Environmental Management Plan.
	• Interference with other utilities and blocking of access to buildings; nuisance to neighbouring areas due to noise, smell, and influx of insects, rodents, etc.?	Yes	The infrastructure will extend throughout many parts of the town, where pipes for new secondary and tertiary sewer networks will be buried within or alongside roadways. Where pipe laying activities shall affect existing access roads, alternative crossings shall be provided during the construction period. Existing access roads shall be restored to their existing or better condition following completion of the pipeline operations. The chances for nuisance to neighbouring areas due to noise, smell, and influx of insects, rodents, etc. are less. Because the sewer pipeline alignment has been designed as a buried conduit.
	• Dislocation of involuntary resettlement of people	No	The network pipes will be located alongside roads and streets, in the government-owned Right of Way (ROW). The site selection for STP and collector mains is devised in such a way to minimize land acquisition and avoid dislocation or resettlement of affected families. It is expected that the final alignment will not have

Item	Screening Questions	Yes/ No	Remarks
			substantial changes. If any changes are proposed, it has to be addressed and settled amicably.
	Impairment of downstream water quality due to inadequate sewage treatment or release of untreated sewage?	No	An adequate design criterion is adopted for the proper disposal of treated sewage as per CPCB/RPCB norms without causing any impairment to the downstream water quality
	Overflows and flooding of neighbouring properties with raw sewage?	No	All sewer lines are designed for the year 2041 peak flow and however the flow is mainly depending upon the number of house service connections. Hence chances for overflowing into the neighbour properties are less.
	Environmental pollution due to inadequate sludge disposal or industrial waste discharges illegally disposed in sewers	No	The system is designed for the collection and treatment of domestic sewage only. It can be monitored periodically to avoid any illegal disposal of industrial waste into the system.
	Noise and vibration due to blasting and other civil works?	Yes	Generation of noise during construction will not exceed normal emissions for general building construction activities. The contractor shall ensure that there shall be no noise problem to the residents. Nevertheless, the contractor shall carry out noise measurements at frequencies and locations to be agreed with the employer's representative and carryout measures to control it whenever and wherever needed.
	Discharge of hazardous materials into sewers, resulting in damage to sewer system and danger to works?	No	The sewer pipeline alignment has been designed as a buried conduit and hence chances for discharge of hazardous materials into sewers are less. Also regular monitoring programmes will be conducted.
	Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities?	No	Adequate buffer zones as per guidelines will be provided.
	Social conflicts between construction workers from other areas and community workers?	No	Only temporary settlement will be made. There is no permanent settlement and total project period is 30 months.
	Road blocking and temporary flooding due to land excavation during the rainy season?	Yes	Access roads and alternative crossings shall be provided during the construction period.
	Noise and dust from construction activities	Yes	There may be a moderate generation of noise and dust from construction activities, which will be mitigated by providing adequate measures during the constructional phase.
	Traffic disturbances due to construction material transport and wastes?	Yes	There may be a moderate increase of traffic during the construction activities, which cannot be avoided. Also adequate measures will be taken to avoid traffic disturbances during the constructional phase.

Item	Screening Questions	Yes/ No	Remarks
	Temporary silt runoff due to construction	No	There is no considerable runoff could be caused during the constructional activities.
	Hazards to public health due to overflow flooding, and groundwater pollution due to failure of sewerage system?	No	Hydro testing will be carried out to all sewer lines and manholes as per CPHEEO manual.
	Deterioration of water quality due to inadequate sludge disposal or direct discharge of untreated sewage water?	No	Sewage will be disposed after proper treatment as per CPHEEO Manual guidelines.
	Contamination of surface and ground waters due to sludge disposal on land?	No	The collected sludge cakes can be disposed at the designated site as per RPCB norms and also it can be used as manure.
	Health and safety hazards to workers from toxic gases and hazardous materials which may be contained in sewage flow and exposure to pathogens in sewage and sludge	No	Ventilation shaft will be provided at the trunk main and adequate safety measures are incorporated in the system design.

APPENDIX- 4

Up Flow Anaerobic Sludge Blanket (UASB)

UASB reactors are anaerobic type of reactors. These reactors operate in the absence of oxygen and generally anaerobic bacteria which eat up the bio mass from the incoming sewage. This bio mass accumulates and forms a blanket called Sludge Blanket (for a depth of 2 to 2.5 m) on the lower portion of the reactors. (The upflowing sewage itself forms millions of small 'granules' or particles which are held in suspension and provide a large surface area on which organic matter can attach and undergo biodegradation). The solids are thus supposed to stay there for several days, 30 -50 days (and digests).

The sewage after being retained in the reactor for about 8 to 10 hours over flows and shall be either retained in a tank for about 30 minutes or allowed to pass through an Cascade type aeration arrangements to give slight aeration to the effluent to destroy anaerobicity.

The effluent, if required, further may allowed to stay at Polishing Pond one day, after which, can be used for irrigation, horticulture or for washing purposes.

The effluent BOD can be expected to be about 60mg/l assuming influent BOD of 300mg/l with 75-80% efficiency of BOD removal. The irrigation standard (BOD<100 mg/l) are generally conveniently met by UASB

1. *Sludge Production and nutrient Requirement:*

In UASB system sludge is well stabilized and dries directly on sand. The excess sludge is remove time to time through separate pipe and sent to simple sand bed for drying. The nutrients nitrogen and phosphorus are conserved in the process and make the irrigational use of the effluent more valuable.

2. *Gas Recovery:*

Gas recovery is optional, though currently favoured. Gas produced can be collected and used of desired. The system functions satisfactory when temperatures inside reactor are above 18-20°C.

Gas production/ recovery in case of municipal waste, is relatively small. If gas is collected but not used, a flare may be installed to burn the biogas, it helps avoid odour nuisance from any H₂S present in gas.

In case gas recovery is to be practiced for municipal waste, it would be beneficial to find bulk consumers of gas and sell them the gas directly rather than try to produce electricity. Gas conversion to electricity requires the use of dual fuel engines and various controls. It is therefore important that economics and desirability of whole gas recovery is carefully reviewed in each individual case.

In terms of operating cost, generally the UASB process is cheaper than usual conventional process for municipal plants even when income from gas recovery is neglected.

THE TREATMENT PLANT SHALL CONSIST OF FOLLOWING UNITS

- 1) Initial Pumping
- 2) Screening and Degritting
- 3) Main UASB Reactor
- 4) Gas Collection and Holding
- 5) Sludge Drying Bed
- 6) Post treatment facility (Optional)

APPENDIX-5

RAJSAMND WASTE WATER PROJECT
PUBLIC CONSULTATION- ENVIRONMENT

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 within the village

Date & time of Consultation – 21/06/'08 and 9:30 am.

Location – Village Pratappura STP Site

.Table: Issues of the Public Consultation- Design phase

Sr. No.	Key Issues/Demands	Perception of community
1	Awareness of the project – including coverage area	Yes, aware about the proposed project
2	In what way they may associate with the project	As a Local Resident.
3	Presence of any forest, wild life or any sensitive / unique environmental components nearby the project area	There is no presence of such environmentally sensitive area near to the proposed project components.
4	Presence of historical/ cultural/ religious sites nearby	There is no presence of historical/ cultural/ religious sites nearby.
5	Un favorable climatic condition	There is no unfavourable climatic condition.
6	Occurrence of flood	No, but some water logging during rainy

Sr. No.	Key Issues/Demands	Perception of community
		season.
7	Drainage and sewerage problem facing	Lack of drainage and sewerage problem.
8	Present drinking water problem – quantity and quality	No issues
9	Present solid waste collection and disposal problem	Presently there is no proper system of MSW management.
10	Availability of labor during construction time	Yes, its locally available.
11	Access road to project site	No well paved road. A Kutcha approach road is existing.
12	Perception on tree felling and afforestation	Cutting down of trees and afforestation is very minimal.
13	Dust and noise pollution and disturbances during construction work	No issues. But some care should be provided during construction.
14	Setting up worker camp site within the project locality	Yes. There are no issues for setting up worker camps.
15	Safety of residents during construction phase and plying of vehicle for construction activities	No issues. Adequate protection to the railway line nearby to the STP site is highlighted.
16	Conflict among beneficiaries down stream users – water supply project using of river water	No applicable
17	Requirement of enhancement of other facilities	Approach road is essential.
18	Whether local people agreed to sacrifice their lands (cultivable or not) for beneficial project after getting proper compensation	No

NAME AND POSITION OF PERSONS CONSULTED

Madho Lal Kumawat – local resident

2. PUBLIC CONSULTATION- ENVIRONMENT

1. Date & time of Consultation - 21/06/08 and 10:30 am.
2. Location – Near STP site, Furniture Worker , Near Railway Track

.Table: Issues of the Public Consultation- Design phase

Sr. No.	Key Issues/Demands	Perception of community
1	Awareness of the project – including coverage area	No
2	In what way they may associate with the project	Local Residents and beneficiaries
3	Presence of any forest, wild life or any sensitive / unique environmental components nearby the project area	No such environmentally sensitive location nearby to the site.
4	Presence of historical/ cultural/ religious sites nearby	No such historical/ cultural/ religious sites nearby to the site
5	Un favorable climatic condition	No
6	Occurrence of flood	Not Known
7	Drainage and sewerage problem facing	Some issues prevail related to lack of adequate drainage and sewerage system.
8	Present drinking water problem – quantity and quality	There is no major issue.
9	Present solid waste collection and disposal problem	Proper MSW management is required.
10	Availability of labour during construction time	Yes, available locally.
11	Access road to project site	There is no proper access road existing.
12	Perception on tree felling and afforestation	No issues related to afforestation.
13	Dust and noise pollution and disturbances during construction work	There are no major concerns related to dust and noise pollution.
14	Setting up worker camp site within the project locality	Yes land is available
15	Safety of residents during construction phase and plying of vehicle for construction activities	No human/child movement near by Site, so no or very least chances of accident or human causality. Necessary care should be provided during constructional phase due to the proximity of the nearby railway track.
16	Conflict among beneficiaries down stream users – water supply project using of river water	Not applicable.
17	Requirement of enhancement of other facilities	Yes approach Road
18	Whether local people agreed to sacrifice their lands (cultivable or not) for beneficial project after getting proper compensation	No issue

NAME AND POSITION OF PERSONS CONSULTED

Bhura Bhai Lohar – Local Resident

Puran Gurger - Local Resident

Nand Lal Salvi – Shop owner & Local Resident

3. PUBLIC CONSULTATION- ENVIRONMENT

1. Date & time of Consultation – 21/06/'08 and 12:40 pm
2. Location – Near J.K. Mod – Station Road – Main Sewer Line

.Table: Issues of the Public Consultation- Design phase

Sr. No.	Key Issues/Demands	Perception of community
1	Awareness of the project – including coverage area	No
2	In what way they may associate with the project	Local Resident
3	Presence of any forest, wild life or any sensitive / unique environmental components nearby the project area	There is no presence of environmentally sensitive area near to the site.
4	Presence of historical/ cultural/ religious sites nearby	There is no presence of historical/ cultural/ religious sites area near to the site.
5	Un favorable climatic condition	No such conditions existing.
6	Occurrence of flood	No issues related to that.
7	Drainage and sewerage problem facing	No proper disposal of wastewater.
8	Present drinking water problem – quantity and quality	No issues
9	Present solid waste collection and disposal problem	No issues related to that.
10	Availability of labour during construction time	Yes, its available locally.
11	Access road to the project site	Yes, a Kutcha road is available. but there is no proper access road to the site.
12	Perception on tree felling and afforestation	No issues.
13	Dust and noise pollution and disturbances during construction work	Yes some problem could rise during constructional activities. It has to be mitigated properly.
14	Setting up worker camp site within the project locality	No land is available. Another option can be considered.
15	Safety of residents during construction phase and plying of vehicle for construction activities	Necessary safety and care is required particularly during the construction at the residential/commercial area.
16	Conflict among beneficiaries down stream users – water supply project using of river water	No issues
17	Requirement of enhancement of other facilities	Waste collection and disposal of wastewater is required.
18	Whether local people agreed to sacrifice their lands (cultivable or not) for beneficial project after getting proper compensation	No problem.

NAME AND POSITION OF PERSONS CONSULTED

Mangi lal ji Gadri – Business man & local Resident

4. PUBLIC CONSULTATION- ENVIRONMENT

1. Date & time of Consultation - 21/06/'08 and 4:00 pm.
2. Location – G.N. Mobile Repairing service, Near Hotel Raj Mahal opp. IDBI Bank, Sewer line

Table: Issues of the Public Consultation- Design phase

Sr. No.	Key Issues/Demands	Perception of community
1	Awareness of the project – including coverage area	No
2	In what way they may associate with the project	Local resident
3	Presence of any forest, wild life or any sensitive / unique environmental components nearby the project area	There are no such locations existing near the proposed project area.
4	Presence of historical/ cultural/ religious sites nearby	Mosque of Peer bawji. But there are no chances of impact and it can be mitigated by implementing proper constructional practices.
5	Un favorable climatic condition	No such conditions exist.
6	Occurrence of flood	No occurrence of flood in the recent past.
7	Drainage and sewerage problem facing	Serious problems exist and it has to be improved in future.
8	Present drinking water problem – quantity and quality	The quality is average and it is common in all parts of the town.
9	Present solid waste collection and disposal problem	Poor system exists. There is no proper disposal of Municipal solid waste.
10	Availability of labour during construction time	Yes available locally.
11	Access road to project site	Yes its available.
12	Perception on tree felling and afforestation	No. if any, it has to be compensated.
13	Dust and noise pollution and disturbances during construction work	Yes, it could be rise during construction.
14	Setting up worker camp site within the project locality	Presently there is no land is available for setting up of worker camp.
15	Safety of residents during construction phase and plying of vehicle for construction activities	Yes it has to be taken care.
16	Conflict among beneficiaries down stream users – water supply project using of river water	NA
17	Requirement of enhancement of other facilities	Proper collection and disposal of solid waste. Also concerned about water supply.
18	Whether local people agreed to sacrifice their lands (cultivable or not) for beneficial project after getting proper compensation	No issue

NAME AND POSITION OF PERSONS CONSULTED

Saied Akbar Ali – Modern Art Work Local Resident

Sharafat Ali – shop owner

PUBLIC CONSULTATION- ENVIRONMENT

1. Date & time of Consultation – 21/06/2008 Time 04.40 PM
2. Location – Sewerage Line, Near Peer Bawji Dargah, opp. to A. Ex. EN. RSEB office.

Table: Issues of the Public Consultation- Design phase

S. No.	Key Issues/Demands	Perception of community
1	Awareness of the project – including coverage area	Yes aware about the project from local media.
2	In what way they may associate with the project	Yes, as a local resident
3	Presence of any forest, wild life or any sensitive / unique environmental components nearby the project area	No such locations present near to the project locations.
4	Presence of historical/ cultural/ religious sites nearby	No such locations in the influence area of the project.
5	Un favorable climatic condition	No such climatic conditions.
6	Occurrence of flood	There is no flooding. But blockage or contamination of water because of improper drainage
7	Drainage and sewerage problem facing	Yes improper drainage due to which water blockage is happening in the stretch of this 15-20 ft opp. Office of AEN RSEB office.
8	Present drinking water problem – quantity and quality	General issues which are common throughout the town related to the quality.
9	Present solid waste collection and disposal problem	Proper and regular disposal
10	Availability of labour during construction time	Yes
11	Access road to project site	Yes
12	Perception on tree felling and afforestation	No issue
13	Dust and noise pollution and disturbances during construction work	Yes problem of dust will happen as it is a commercial plus residential area.
14	Setting up worker camp site within the project locality	No land is available
15	Safety of residents during construction phase and plying of vehicle for construction activities	Yes adequate steps for safety of residents are required during the constructional phase.
16	Conflict among beneficiaries down stream users – water supply project using of river water	No issue
17	Requirement of enhancement of other facilities	Broadening and repairing of Storm water drain/canal is required and due to this flooding in some area.
18	Whether local people agreed to sacrifice their lands (cultivable or not) for beneficial project after getting proper compensation	No issue

NAME AND POSITION OF PERSONS CONSULTED

Vishnu Lal Jingar – Tailor & local Resident.

6. PUBLIC CONSULTATION- ENVIRONMENT

1. Date & time of Consultation – 21/06/08 and 1:10 pm
2. Location – Near Bus stand opp. Paliwal Market sewer line

Table: Issues of the Public Consultation- Design phase

Sr. No.	Key Issues/Demands	Perception of community
1	Awareness of the project – including coverage area	No
2	In what way they may associate with the project	No help if possible they may direct for something but no much expectation
3	Presence of any forest, wild life or any sensitive / unique environmental components nearby the project area	There is no such environmentally sensitive place located near to the proposed project components.
4	Presence of historical/ cultural/ religious sites nearby	Mata Ji Temple opp. Kankroli Bus stand Hanuman Temple near Shrinath Travels Pedestal type of Mama. But no issues all are road side. This religious site has to be taken care during constructional phase.
5	Un favorable climatic condition	No such conditions.
6	Occurrence of flood	No issues related to flooding.
7	Drainage and sewerage problem facing	There is no issues related to drainage and sewerage.
8	Present drinking water problem – quantity and quality	Water quality is not appreciable level. Same problem faced in entire town.
9	Present solid waste collection and disposal problem	Not aware about the existing system
10	Availability of labour during construction time	Yes available locally
11	Access road to project site	Yes. also it has to be provided according to the necessity.
12	Perception on tree felling and afforestation	No issues
13	Dust and noise pollution and disturbances during construction work	Yes chances of dust and noise pollution will happen during constructional period and necessary care should be provided to the nearby local residents.
14	Setting up worker camp site within the project locality	There is no availability of land near to the Bus stand and Market area due to heavy congestion.
15	Safety of residents during construction phase and plying of vehicle for construction activities	Adequate safety should be provided at the congested residential & commercial area.
16	Conflict among beneficiaries down stream users – water supply project using of river water	No issues.
17	Requirement of enhancement of other facilities	Extra bypass road from main market and diversion of traffic.

Sr. No.	Key Issues/Demands	Perception of community
18	Whether local people agreed to sacrifice their lands (cultivable or not) for beneficial project after getting proper compensation	No issues

NAME AND POSITION OF PERSONS CONSULTED

Rajkumar Nirankari – Fruit Merchant – Local Resident

7. PUBLIC CONSULTATION- ENVIRONMENT

1. Date & time of Consultation - 21/06/'08 and 06:20 pm.
2. Location – A farm near STP site, Village Pratap pura

Table: Issues of the Public Consultation- Design phase

4	Presence of historical/ cultural/ religious sites nearby	No such locations
5	Un favorable climatic condition	No issues related to that.
6	Occurrence of flood	Yes water logging exists in this area.
7	Drainage and sewerage problem facing	There are no serious issues related to drainage and sewerage.
8	Present drinking water problem – quantity and quality	The quality of present drinking water is average.
9	Present solid waste collection and disposal problem	There is no proper MSW management.
10	Availability of labour during construction time	Yes it is available locally
11	Access road to project site	No access road.
12	Perception on tree felling and afforestation	No issues
13	Dust and noise pollution and disturbances during construction work	No major issues.
14	Setting up worker camp site within the project locality	Enough land is available
15	Safety of residents during construction phase and plying of vehicle for construction activities	No issues
16	Conflict among beneficiaries down stream users – water supply project using of river water	No issues
17	Requirement of enhancement of other facilities	Approach road
18	Whether local people agreed to sacrifice their lands (cultivable or not) for beneficial project after getting proper compensation	Not known to be asked to that farmers or land owners only.

NAME AND POSITION OF PERSONS CONSULTED

Rama Gameti – farmer – Local Resident

8. PUBLIC CONSULTATION- ENVIRONMENT

1. Date & time of Consultation - 21/06/'08 and 12:10 pm.
2. Location – Sewerage line Shanti Colony, Nayi abadi.

Table: Issues of the Public Consultation- Design phase

Sr. No.	Key Issues/Demands	Perception of community
1	Awareness of the project – including coverage area	No not fully aware of the project
2	In what way they may associate with the project	Can provide necessary help & association to the project.
3	Presence of any forest, wild life or any sensitive / unique environmental components nearby the project area	There is no such environmentally sensitive place located near to the proposed project components.
4	Presence of historical/ cultural/ religious sites nearby	There is no presence of historical/ cultural/ religious sites nearby.
5	Un favorable climatic condition	No issues.
6	Occurrence of flood	Yes
7	Drainage and sewerage problem facing	There was some problem on drainage and sewerage existing.
8	Present drinking water problem – quantity and quality	Common issues related to the quality of water
9	Present solid waste collection and disposal problem	Not proper system existing for the collection, transportation, treatment and disposal. Improvement of the existing system is necessary.
10	Availability of labour during construction time	Yes. Its locally available.
11	Access road to project site	Yes its available.
12	Perception on tree felling and afforestation	No issues
13	Dust and noise pollution and disturbances during construction work	Yes, there was a chance of dust and noise pollution during construction period. since it is residential area proper care should be required.
14	Setting up worker camp site within the project locality	Yes land is available.
15	Safety of residents during construction phase and plying of vehicle for construction activities	Proper steps for precautions must be required residential area.
16	Conflict among beneficiaries down stream users – water supply project using of river water	NA
17	Requirement of enhancement of other facilities	Adequate street lightening, proper MSW management and drainage facility.
18	Whether local people agreed to sacrifice their lands (cultivable or not) for beneficial project after getting proper compensation	No issues

NAME AND POSITION OF PERSONS CONSULTED

Gopal Gurger – Service man & local Resident
 Gopal Vaisnav – Flore Mill owner & local resident

9. PUBLIC CONSULTATION- ENVIRONMENT

1. Date & time of Consultation - 21/06/'08 and 11:40 am.
2. Location – Sundar Colony, Bhilwara Road - Sewerage network

Table: Issues of the Public Consultation- Design phase

Sr. No.	Key Issues/Demands	Perception of community
1	Awareness of the project – including coverage area	Yes, aware partially
2	In what way they may associate with the project	Yes as a local resident and beneficiary of the proposed project.
3	Presence of any forest, wild life or any sensitive / unique environmental components nearby the project area	There is no such environmentally sensitive place located near to the proposed project components.
4	Presence of historical/ cultural/ religious sites nearby	No such locations nearby
5	Un favorable climatic condition	No issues.
6	Occurrence of flood	There is no occurrence of flood.
7	Drainage and sewerage problem facing	There is no free & sufficient flow of water through open drains. The drainage and sewerage system has to be improved.
8	Present drinking water problem – quantity and quality	Both parameters are good
9	Present solid waste collection and disposal problem	No issues related to the existing system.
10	Availability of labour during construction time	Yes available
11	Access road to project site	Yes
12	Perception on tree felling and afforestation	No issue
13	Dust and noise pollution and disturbances during construction work	Yes. There will be a problem and necessary precautions should be provided.
14	Setting up worker camp site within the project locality	Yes land is available.
15	Safety of residents during construction phase and plying of vehicle for construction activities	Yes adequate safety should be provided to the residents of the local.
16	Conflict among beneficiaries down stream users – water supply project using of river water	Not applicable.
17	Requirement of enhancement of other facilities	No major requirements.
18	Whether local people agreed to sacrifice their lands (cultivable or not) for beneficial project after getting proper compensation	No

NAME AND POSITION OF PERSONS CONSULTED

Kalyan Singh – Shop owner & local Resident

10. PUBLIC CONSULTATION- ENVIRONMENT

1. Date & time of Consultation - 21/06/'08 and 11:10 am.
2. Location – Sewerage Network Near RCM Bazar, Near Nayi Abadi

Table: Issues of the Public Consultation- Design phase

Sr. No.	Key Issues/Demands	Perception of community
1	Awareness of the project – including coverage area	Yes well informed about the project
2	In what way they may associate with the project	Yes can give maximum association as a local resident to the project.
3	Presence of any forest, wild life or any sensitive / unique environmental components nearby the project area	There is no such environmentally sensitive place located near to the proposed project components.
4	Presence of historical/ cultural/ religious sites nearby	No such locations nearby to the project locations.
5	Un favorable climatic condition	No issues pertaining to climatic conditions.
6	Occurrence of flood	No flooding.
7	Drainage and sewerage problem facing	No serious issues related on drainage and sewerage.
8	Present drinking water problem – quantity and quality	No issues on the present drinking water quality and quantity.
9	Present solid waste collection and disposal problem	Presently the collection and disposal is good
10	Availability of labour during construction time	Yes available locally
11	Access road to project site	Yes available.
12	Perception on tree felling and afforestation	No issues
13	Dust and noise pollution and disturbances during construction work	Yes, required care for dust and noise pollution should be provided.
14	Setting up worker camp site within the project locality	Yes land is available
15	Safety of residents during construction phase and plying of vehicle for construction activities	Yes, its is essential to take care of the safety during constructional activities.
16	Conflict among beneficiaries down stream users – water supply project using of river water	NA
17	Requirement of enhancement of other facilities	No major concerns.
18	Whether local people agreed to sacrifice their lands (cultivable or not) for beneficial project after getting proper compensation	No issue

NAME AND POSITION OF PERSONS CONSULTED

Kamlesh ji Salvi – Local people

Bhanwar Singh – Local people

Kalu Kumar Kumawat – Tea stall Owner – local resident