Initial Environmental Examination

(New Additional Scope)

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India: Rajasthan Urban Sector Development Investment Program - Sikar Urban Transport and Roads Sub-Project (Tr-02)

Prepared by Local Self Government Department

For the Government of Rajasthan
Rajasthan Urban Infrastructure Development Project

ABBREVIATION

ADB	-	Asian Development Bank
DSC	-	Design and Supervision Consultancy
EA	-	Executing Agency
EAC	-	Expert Appraisal Committee
FI	-	Financial Intermediary
GLSR	-	Ground Level Service Reservoir
GoI	-	Government of India
GoR	-	Government of Rajasthan
GSI	-	Geological Survey of India
IA	-	Implementing Agency
IEE	-	Initial Environmental Examination
IPMC	-	Investment Programme Management Consultancy
IPMU	-	Investment Programme Management Unit
JNNURM	-	Jawaharlal Nehru National Urban Renewal Mission
LSGD	-	Local Self-Government Department
MFF	-	Multitranche Financing Facility
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
USEPA	-	United States Environmental Protection Agency

WEIGHTS AND MEASURES

Lakh	–	100 thousand = 100,000
crore	–	100 lakhs = 10,000,000
$\mu g/m^3$	–	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

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EXECUTIVE SUMMARY

1. **Introduction and Regulatory Framework:** 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. RUSDIP Phase II to be implemented over a seven year period beginning in 2008, and will be funded by a loan via the Multitranche Financing Facility (MFF) of the ADB. RUSDIP will improve infrastructure through the design and implementation of a series of subprojects, each providing improvements in a particular sector (water supply, sewerage, drainage, road, solid waste etc) in one town.

2. The impacts of subprojects prepared according to ADB Environment Policy (2002) and Indian National Law. Projects are screened for their expected environmental impacts and are assigned to Category A, B, C and F1. RUSDIP has been classified by ADB as environmental assessment category B (some negative impacts but less significant than category A). The only type of infrastructure provided by the RUSDIP that is specified in the EIA Notification (2006) of Govt. Of India is solid waste management, where Environmental Clearance (EC) is required for all Common Municipal Solid Waste Management Facilities. EC is thus not required for Sikar road sub project and but subject to Environmental Examination. This is the Initial Environmental Examination (IEE) report for the Sikar road-transport 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.

Project Description: The sub-project is located in Sikar, the headquarters town of Sikar district, in the north eastern part of Rajasthan. This is a transportation sub-project and the sub-project is needed to help alleviate road congestion in the Sikar town. The original scope of work of this sub-project is widening and straightening of 5 roads namely 1. Fatehpur Road (Length-185m) including development of Dak Bungalow Circle) 2. Beed Road (Length- 840m) 3. Devipura Road (Length-300m), 4.Station Road (Length-2273m), 5. Salasar Road (Vikram School area) (Length-310m) of Sikar town. The work of these 5 roads is being implemented. The original scope of the sub-project has been enhanced adding 25 new roads under package no. ST / 05 for which Letter of Acceptance (LOA) have been issued. The 25 additional roads of Sikar town which have been considered under this package are; 1. From Ajit Computers to Housing Board, 2. From Tehsil to District Collectrate office, 3. From Fatehpur road to Buchyani via, Bakra mandi & Mohalla Khatikan, 4. From Chokdi ka bhawan to Din Mohd. Road via Islamiya School, 5. From Shanitar mandir to Gayatri mandir via kumharo ka mohallaha Nageshwar Bagichi , Maru balika school, 6. From Lakshmi Market to S.K College via Saini dharmshala, 7. Sharamdan marg & road behind hospital, 8. From Silver jubli rd. Dhanvantri to R.T.O till bypass, 9. From Sheetla chowk to Ranisati mandir, 10. Durga Colony, Jiya colony, Shekhawat colony, 11. Bismillah colony, in Jakriya masjid area, 12. From Bhanwarji saini ki dukan to bidami's house, to jhunjhnu bypass, 13. Pologround area, 14. Rani sati road, Shastri nagar area, 15. From From Mohallah Narvan to Nehru park via swamiyan, 16. From Asrar house to Fatehpur rd. via Roshangunj masjid, 17. From Police line to Purohit ki Dhani, 18. From Saini dharamshala to Prem ji saini ki gali, 19. From Radhakishpura govt quarter to Piprali Road, 20. From Nawalgarh rd, Janta colony to Surya nagar, 21. From Tagore School to Bhartiya School, 22. Housing Board Zone, 23. From Erom bhujiya factory to Railway line, 24. Charansingh nagar near Railway line, 25. Bharupura Road (New). One more road i.e. “Jhunjhnu bypass to bus stand” has been taken for widening under package ST/04, which is under evaluation stage.

3. **Description of Environment:** Sikar lies between the East longitude $75^{o}16$'and North latitude 27^{o} 30'. It is situated at the center of Sikar District at 437 meters above MSL. Sikar **t**own lies in Low damage risk Zone – II. The area is less prone to earthquakes as it is located on relatively stable geological plains based on evaluation of the available earthquake zone information. Geologically, the district is not of much significance as the major part of the district is covered by Aeolian sand and sand dunes. Hard rock exposures are mainly confined to the eastern part of the district as isolated outcrop or as thin linear ridges. Soil of the region falls within rainfall zone of 300 – 500 mm. The soil is sandy loam, sallow depth red soils in depressions. The district has a hot summer, scanty rainfall, a chilly winter season and general dryness of the air except in brief monsoon season. The average maximum & minimum temperature are 46 & zero degree celsius respectively. The normal rainfall, mostly received from south-west monsoon is averaging 46.60 cms. Traffic is the only significant pollutant in Sikar. Levels of oxides of sulphur and nitrogen are well within the National Ambient Air Quality Standards (NAAQS). Groundwater in Sikar generally occurs under confined to semi confined conditions. The principal aquifers of the district are Quartzite, Schist, Phyllites, Limestone and Dolomite Limestone constitutes important water bearing formation in the district. The average depth of ground water in the Sikar district varies from 4.59 m below land surface to 64.50 m below land surface. It is noted that ground water contains high level of total dissolved solid and nitrate. There is no protected area, forest nearby the sub-project site.

4. Economic base of a town reflects its prosperity. Sikar being district headquarter, has been functioning as administrative city with sustained growth in tertiary economic activities. The major economic activities are trade and commerce, thus it offers a number of wholesale and retail markets which act as a distribution center for nearby towns and villages. The workforce participation rate of the town was about 25.2 percent of the total population as per 2001 census. The following table shows that out of this total workforce only about 3.5 percent were employed in the primary sector (Agriculture, mining and quarrying etc) followed by 6.7percent in secondary sector (industry and construction). Municipal limit of Sikar encompassed and area of about 9800 acres out of which 2680 acres was urbanized as per Master Plan 1985 -2011. The remaining land was vacant comprising of sandy area with fair cultivation. About 63% of developed urban area is under residential use, which is high in comparison to other towns in the region. The state Government of Rajasthan Industrial Investment Corporation is providing various incentive and facilities for promoting Industrial activities. There is no large scale Industry in Sikar. Only small scale industries such as Granite industry, plywood industry, dal and oil mill industry, cattle feed industry, PVC pipe industry and Electric Transformers industry are functioning with very little workforce

5. Water supply of Sikar is wholly drawn from local tube wells, which are situated in almost whole city i.e. around the water work compound on Harsh Road and Udaipurwati Road. Ground water is the only source of water supply in Sikar. The water supply in the town is intermittent during morning and evening only. The per capita water supply of the town is about 89 lpcd, which is merely adequate and as per the recently sanction reorganization water supply scheme of Sikar, which is under execution it would be upgraded to 135 lpcd. Sikar town does not have underground sewerage system. Out of the occupied residential houses only about 55% have some kind of latrines. Most of the houses have adopted the practice of providing onsite disposal by constructing water seal / bore hole latrines or by providing septic tank with effluent discharge into soak pits or open surface drains. The existing drainage system in Sikar is piecemeal construction of open *Nallah* as per local and temporary requirements without proper whole to part designs. The town has mainly open drains. The waste water along with sewage is discharged into the fields towards west of the town through open drains. The total waste generation in the town is about 103 T / day. Sikar is well connected with all the important towns of the state. It is situated on the National Highway No.11 running from Bikaner to Agra at the junction of State Highway No.20 and

State Highway No.8 connecting Sikar to Salasar and Jhunjhnu respectively. It is also connected to Delhi via Jhunjhnu and Neem Ka Thana.

6. According to Census 2011, the population of Sikar Municipal area is 237,579 (Provisonal). The total spread of the Urban Agglomeration is approximately 39.00 sq. km, Municipal Council. There are good educational facilities in Sikar district, which serve both townspeople and inhabitants of surrounding villages and towns in the hinterland. As the district headquarters town, Sikar is the main centre for health facilities in the area and there is a 1 district general hospital, primary health center in the Sikar town. Sikar has rich heritage sites. Today Sikar is the most important town of Shekhawati region of Rajasthan. Sikar town being the capital of the district, functions as the administrative town and hub of the tertiary economic activities like services, trade and commerce.

7. **Potential environmental impacts and mitigation measure:** All pre-construction (design), construction, and operation activities that are likely to cause environmental impacts were identified, and evaluated to assess their magnitude, duration, and potential receptors in consultation with the stakeholders. 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 during design phase.

8. There are few religious structure and educational institute comes in the vicinity of project; all preventive measures will be taken care off during construction phase. There is no settlement in Right of way (ROW) hence there is no need of compulsory resettlement.

9. During project implementation the impacts are consider on physical environment like water, air, soil, noise; on biological environment, like flora and socio-economic environment (which is positive in some extent) and sensitive receptors. All the impacts are temporary and for short duration. In all the cases mitigation measures i.e. control of air, dust pollution, checking of water and noise pollution, protection of biological environment and minimize the social impacts are taken care. Safety measures, both occupational and social are considered and those are depicted in this report. Traffic management plan will be implemented during construction of roads. During operation phases there are few positive socio-economic impacts will be anticipated.

10. **Institutional responsibility and Environmental management and monitoring plan:** LSGD is the Executing Agency (EA) responsible for management, coordination and execution of all activities funded under the loan. 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, to ensure that mitigation measures are provided and protect the environment as intended.

11. Implementation of Environmental management plan and monitoring frequency will be taken care during construction phase. Most the mitigation activities are the responsibility of the Construction Contractors (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. Mitigation measures are fairly standard methods of minimizing 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. Environmental management and monitoring cost for the sub-project has been estimated as INR 1.65 million.

12. **Public consultation, information disclosure and grievance redress mechanism:** Public consultation with primary and secondary stakeholders has been conducted to understanding the local issues and public views regarding the possible impact. The group discussion meeting was conduct by RUIDP after advertising in Local NEWS papers. The issues like, 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 etc. On the basis of outcome of consultation the action plan has been developed. 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.

13. The project authority will establish a mechanism to receive and facilitate resolution of affected persons' concerns, complaints and grievances about the project's environmental performance.

14. **Recommendation and Conclusion:** 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, all mitigation, compensation and enhancement measures proposed in this IEE report and in the Resettlement Framework for the RUSDIP are implemented in full, as described in these two documents and the Environmental Monitoring Plan proposed in IEE and the internal and external monitoring proposed in the Resettlement Framework are also implemented in full.

15. This initial environmental examination (IEE) ascertains that the subproject is unlikely to cause any significant environmental impacts. Few impacts were identified attributable to the proposed subproject, all of which are localized and temporary in nature and can be easily mitigated with minor to negligible residual impacts. There are no uncertainties in the analysis, and no additional work is required to comply with ADB procedure.

II. 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 (2002) 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: Section F1/BP (2006) 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, urban transport and roads etc) in one town.

2. National Law

8. The GoI EIA Notification of 2006 and 2009 (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 categorizes 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 summary of environmental regulations and mandatory requirements for the proposed subproject is shown in **Table 1.1.** Since most of the places of Rajasthan including Sikar fall within red zone on the basis of ground water availability, during construction extraction of ground water will be avoided.

Table 1.1: Applicable Environmental Regulations & Legislations and its applicability

Acts/Guidelines	Purpose	Applicability to subproject
The EIA notification, 2006 (and its subsequent amendments in 2009) provides for categorization of projects into category A and B, based on extent of impact	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 categorized as A or B depending on the scale of the project and the nature of its impacts. Categories A projects require Environmental Clearance from the National Ministry of Environment and Forests (MoEF). Category B projects require environmental clearance from the State Environment Impact Assessment Authority (SEIAA).	Not applicable The sub project is not included in schedule of environmental impact assessment notification 2006 and its subsequent amendments till dates so it is not categories as either Category A or Category B. As a result, environmental clearance is not required, either from the state or the central Government.
The Wildlife Conservation Act, 1972,	Clearance from state and national wildlife boards, Central Empowered Committee of Hon'ble Supreme Court of India and the State Wildlife Department, as applicable.	Not Applicable
Rajasthan Forest (Conservation) Act, 1953	Clearance from Forest department for cutting of trees, if any. Clearance from ULB for cutting of road side trees	Applicable for road side tree cut only
The Ancient Monuments and Archaeological Sites and Remains Act, 1958, and the rules, 1959 provide guidance for carrying out activities, including conservation, construction and reuse in and around the protected monuments.	Permission from the Archaeological Survey of India for carrying out any construction activities within the prohibited and regulated areas of the ancient monuments and archaeologically protected sites.	Not Applicable
Water (Prevention and control of pollution) Act, 1974, as amended Air (prevention and control of pollution) Act, 1981, as amended	Consent to Establish (CTE) and Consent to Operate (CTO) from the RSPCB for setting up hot mix plants, wet mix plants, stone crushers and diesel generators (if installed for construction). To be obtained by the Contractor, prior to construction.	Applicable
Water (Prevention and Control of Pollution) Cess Act, 1977 including Rules	Applicable to all activities, which discharge effluents as a result of process or operations	Not Applicable
Public Liability and Insurance Act 1991	Protection form hazardous materials and accidents.	Applicable
Noise Pollution (Regulation and Control Act) , 2000	The standards for noise for day and night have been promulgated by the MoEF for various land uses. DG sets at construction sites should be provided with acoustics enclosures.	Applicable
Central Motor Vehicle Act 1988 and Central Motor Vehicle Rules1989	To check vehicular air and noise pollution. All vehicles in Use shall obtain Pollution Under Control (PUC) certificates by the contractor	Applicable

Acts/Guidelines	Purpose	Applicability to subproject
Child Labour Act 1986	No child shall be employed or permitted to work in any of the scheduled occupations	Applicable
Ground Water (Regulation, Development and Management) Rules, 2007	For development and withdrawal of ground water	Applicable in few locations in case of non availability of ground water

3. Review and Approval Procedure

12. In each tranche ADB review at least one subproject (as a sample) of the sectors being implemented under respective tranche. In addition, the updated and finalized IEE/EIA reports of all tranche subprojects to be reviewed and approved by ADB during detailed design stage. For Category B projects the Draft Environmental assessment report (Initial Environmental Examination) and its summary (SIEE) are reviewed by ADB's Regional Department sector division and Environment and Social Safeguards Division, and by the Executing Agency(EA). Executing Agency may requested project affected people and primary & secondary stakeholders for any comments on IEE. All comments are incorporated in final documents, which are reviewed by the Executing Agency. The EA then officially submits the IEE and SIEE reports as per ADB's Environment Policy (2002) to ADB for consideration by the Board of Directors. The summary IEE reports are required to be circulated worldwide by ADB, via the depository library system and are placed on the ADB website. The full IEE reports are also made available to the interested parties upon request.

4. Scope of Study

13. This is the IEE for the Sikar road 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.

III. DESCRIPTION OF THE SUB PROJECT

A. Type, Category and Need

14. This is a transportation 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 to help alleviate road congestion in the town, where the capacity of the network has not expanded to cope with increased traffic demand. This is one of a series of subprojects designed by the RUSDIP that are intended to raise the standards of the municipal infrastructure and services of Sikar and the other urban centers to those expected of modern Asian towns.

B. Location, Size and Implementation Schedule

15. The sub-project is located in Sikar, the headquarters town of Sikar district, in the northeastern part of Rajasthan **(Figure 1.1).** The infrastructure will consist of widening of roads within the Sikar town **(Figure 1.2).**

16. Detailed design started in 2010 & 2012 and construction will be completed by the end of the year 2013.

17. Photographs of the project area are attached as **Annexure I**

C. **Existing Road and traffic at Sikar**

18. Sikar comprises a road network of 225.0 km, consisting of 30 km bituminous roads, 133 km cement concrete roads and 12 km WMM road. Thirty one (31) road stretches have been selected under RUSDIP for widening and Strengthening under different packages in Sikar which are as below:

1 Earlier Scope of Work

- **Five Roads (under Package ST-02)**

I. Fatehpur Road (Length-185m) including development of Dak Bungalow Circle)
II. Beed Road (Length- 840m)
III. Devipura Road (Length-300m)
IV. Station Road (Length-2273m)
V. Salasar Road (Length-310m)

2 Enhanced Scope of Work

- **Twenty Five Roads (under Package ST/03 retender as ST/05)**

I. Ajit Computers to Housing Board (Length-1000 m)
II. Tehsil to District Collectrate office (Length-2300 m)
III. Fatehpur road to Buchyani via ,Bakra mandi & Mohalla Khatikan(Length-1650 m)
IV. Chokdi ka bhawan to Din Mohd. rd via Islamiya School(Length-500 m)
V. Shanitar mandir to Gayatri mandir via kumharo ka mohallaha Nageshwar Bagichi , Maru balika school(Length-900 m)
VI. Lakshmi Market to S.K College via Saini dharmshala(Length-800 m)
VII. Sharamdan marg & road behind hospital(Length-500 m)
VIII. Silver jubli rd. Dhanvantri to R.T.O till bypass(Length-3200 m)
IX. Sheetla chowk to Ranisati mandir(Length-900 m)
X. Durga Colony, Jiya colony,Shekhawat colony(Length-3000 m)
XI. Bismillah colony, in Jakriya masjid area(Length-2200 m)
XII. From Bhanwarji saini ki dukan to bidami's house, to jhunjhnu bypass (Length-2400m)
XIII. Drain construction in Pologround area(Length-3000 m)
XIV. Drain construction in Rani sati road, Shastri nagar area(Length-4300 m)
XV. From Mohallah Narvan to Nehru park via swamiyan(Length-700 m)
XVI. From Asrar house to Fatehpur rd. via Roshangunj masjid(Length-1600 m)
XVII. From Police line to Purohit ki Dhani-Construction of Road & Drain(Length-3500 m)
XVIII. From Saini dharamshala to Prem ji saini ki gali(Length-800 m)

XIX. From Radhakishpura govt quarter to Piprali Road(Length-1200 m)

XX. From Nawalgarh rd, Janta colony to Surya nagar construction of Rd & Drain(Length-1800 m)

XXI. Construction of Road & Drain from Tagore School to Bhartiya School(Length-600 m)

XXII. Housing Board Zone(Length-1600 m)

XXIII. Construction of drain & Road from bhujiya factory to Railway line(Length-1000 m)

XXIV. Construction of drain & Road Charansingh nagar near Railway line(Length-1300 m)

XXV. Bharupura Road (Length-5000 m) and From Jatiya bazar ,Shikhpura to S.K College(Length-900 m)

- **Jhunjhunu by pass to Bus stand road (under Package ST/04)**

19. The identified roads pass through Flat terrain and have mainly commercial and residential land use on both sides of roads. Encroachment on the right of way by residents in form of steps and chabutar as is a common feature. These roads are having an unpaved shoulder of 1.5 meter width on both side of the road. The condition of shoulders is not good.

20. Road inventory of proposed roads are given in table below.

Table 2.1: Road inventory of 5 Proposed Road (As per earlier scope under ST-02)

S.N.	Road description	Length	Carriage way width	Drainage condition	Footpath	Right of way	Remarks
Earlier Scope of Work							
1	Fatehpur Road	185 M	13.0 m	Both side of road	Not available	25.0 m	Median N.A.
2	Beed Road	840M	3.5 m	L.H.S.	Not available	23.0 m	Median N.A.
3	Devipura Road	300M	5.5 m	Both side of road	Not available	7.5 to 12.5 m	Median N.A.
4	Station Road	2273M	7.0 m	Both side of road	Partially	6.0 to 30.0 m	Partial median
5	Salasar Road	310M	7.0 M	L.H.S.	Not available	6.0 to 30.0 m	Median N.A.

Table 2.2: Road inventory of 25 Proposed Road (As per revised scope as ST/05 and ST/04)

Following roads to be taken for widening and strengthening, road inventory of these roads are as follows:

S. No.	Proposed Road Name	Kachha road				WBM road				BT road				CC road				Drain
		length	Carrige way(Existing)	Carrige way (Proposed)	Avg.width/ R.O.W.	length	Carrige way(Existing)	Carrige way(Proposed including exst.)	Avg.width/R.O. W.	length	Carrige way(Existing)	Carrige way(Proposed including exst.)	Avg.width/ R.O.W.	length	Carrige way(Existing)	Carrige way(Proposed including exst.)	Avg.width/R.O. W.	Existing
1	From Ajit Computers to Housing Board colony	350.00	0.00	3.75	5.50	0.00	0.00	0.00	0.00	635.0	5.00	5.00	6.50	480.0	3.00	5.00	6.50	0.60,Partially one side
2	Tehsil to District Collectrate office	0.00	0.00	0.00	0.00	1510	3.75	5.00	6.00	0.00	0.00	0.00	0.00	908.0	4.00	4.00	5.50	Partially
3	Fatehpur road to Buchyani via ,Bakra mandi & Mohalla Khatikan	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1585	4.00	4.00	8.00	Both side Drain available
4	Chokdi ka bhawan to Din Mohd. rd via Islamiya School	250.00	0.00	5.00	6.00	250.0	3.75	5.00	6.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Partially
5	Shanitar mandir to Gayatri mandir via kumharo ka mohallaha Nageshwar Bagichi , Maru balika school	0.00	0.00	0.00	0.00	200.0	3.75	3.75	6.00	0.00	0.00	0.00	0.00	1516	3.00	3.00	6.00	Partially
6	Lakshmi Market to S.K College	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	212.0	5.00	7.00	7.00	550.0	3.75	5.00	7.00	Available(212mtr.),

S. No.	Proposed Road Name	Kachha road				WBM road				BT road				CC road				Drain
		length	Carrige way(Existing)	Carrige way (Proposed)	Avg.width/ R.O.W.	length	Carrige way(Existing)	Carrige way(Proposed including exst.)	Avg.width/R.O. W.	length	Carrige way(Existing)	Carrige way(Proposed including exst.)	Avg.width/ R.O.W.	length	Carrige way(Existing)	Carrige way(Proposed including exst.)	Avg.width/R.O. W.	Existing
	via Saini dharmshala																	One side (550mtr),
7	Sharamdan marg & road behind hospital	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	173.0	2.50	5.00	7.00	82.00	3.00	5.00	11.0	Not available
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	238.0	7.00	7.00	11.0	Not available
8	Silver jubli rd. Dhanvantri to R.T.O till bypass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3100	0.00	3.75	5.5 to 7.5	0.00	0.00	0.00	0.00	Not available
9	Sheetla chowk to Ranisati mandir	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	900.0	5.00	5.00	7.5 to 11	0.00	0.00	0.00	0.00	Available both side 0.90mtr
10	Durga Colony, Jiya colony, Shekhawat colony	2645.0	0.00	3.75	4.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	No any drain
11	Bismillah colony, in Jakriya masjid area(11/1;to 11/19)	1884.0	0.00	3.75	4.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	600.0	3.00	3.00	4 to 6	Not available
12	From Bhanwarji saini ki dukan to bidami's house, to jhunjhnu bypass	1000.0	0.00	3.75	5.50	600.0	3.75	3.75	5 to 7	460.0	3.75	3.75	5.00	286.0	3.50	3.50	5.00	Partially available
13	Drain construction in	260.00	0.00	3.75	5.25	200.0	3.75	3.75	5 to 8	200.0	5.50	5.50	25.0	450.0	3.75	3.75	4.50	Partially

S. No.	Proposed Road Name	Kachha road				WBM road				BT road				CC road				Drain
		length	Carrige way(Existing)	Carrige way (Proposed)	Avg.width/ R.O.W.	length	Carrige way(Existing)	Carrige way(Proposed including exst.)	Avg.width/R.O.W.	length	Carrige way(Existing)	Carrige way(Proposed including exst.)	Avg.width/ R.O.W.	length	Carrige way(Existing)	Carrige way(Proposed including exst.)	Avg.width/R.O.W.	Existing
	Pologround area	772.00	0.00	3.75	6.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	174.0	2.75	3.75	6.50	
		269.00	0.00	5.00	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	290.0	3.75	3.75	6.00	
14	Drain construction in Rani sati road, Shastri nagar area	990.00	0.00	3.75	5 to 8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	276.0	10.00	10.00	13.00	Available at rd.no.1,3 &4
		210.00	0.00	3.00	3.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	121.0	6.00	6.00	7.00	
		457.00	0.00	3.00	4 to 4.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	506	3	3	5 to 7	
		310.00	0.00	2.50	2 to3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	66.0	3.00	3.00	4.00	
15	From Mohallah Narvan to Nehru park via swamiyan	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	605.0	4.00	4.00	5 to 10	Both side Drain available
16	From Asrar house to Fatehpur rd. via Roshangunj masjid	625.00	0.00	3.75	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1000	4.00	4.00	6 to 7.5	Both side Drain available
17	From Police line to Purohit ki Dhani- Construction of Road & Drain	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Earthan & WBM
18	Saini dharmsala to premji saini ki Gali	334.00	0.00	3.75	7.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	74.0	3.00	3.00	7.00	Partially
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	331.0	3 to 8	3 to 8	3 to 8	

S. No.	Proposed Road Name	Kachha road				WBM road				BT road				CC road				Drain
		length	Carrige way(Existing)	Carrige way (Proposed)	Avg.width/ R.O.W.	length	Carrige way(Existing)	Carrige way(Proposed including exst.)	Avg.width/R.O. W.	length	Carrige way(Existing)	Carrige way(Proposed including exst.)	Avg.width/ R.O.W.	length	Carrige way(Existing)	Carrige way(Proposed including exst.)	Avg.width/R.O. W.	Existing
19	From Radhakishpura govt quarter to Piprali Road	354.00	0.00	3.75	5.00	362.0	0.00	0.00	0.00	103.0	5.00	5.00	8.50	227.0	3.00	3.00	3.75	Partially
20	From Nawalgarh rd, Janta colony to Surya nagar construction of Rd & Drain	1380.0	0.00	3.75	4.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	605.0	2.50	2.50	4.00	Available in c.c.section
21	Construction of Road & Drain from Tagore School to Bhartiya School	482.00	0.00	3.75	6.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.0	4.00	4.00	7.00	Drain available along with c.c.road
22	Housing Board Zone	420.00	0.00	3.00	4.00	0.00	0.00	0.00	0.00	120.0	4.00	4.00	8.00	500.0	5.00	5.00	8.00	Not available
		585.00	0.00	3.75	7 to 4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	143.0	3.00	3.00	4.00	
23	Construction of drain & Road from bhujiya factory to Railway line	1050.0	0.00	3.75	4.5 to 6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Partially
24	Construction of drain & Road Charansingh nagar near Railway line	0.00	0.00	0.00	0.00	1020	3.00	3.00	3.50 to 4.0	100.0	2.50	2.50	3.50	188.0	3.00	3.00	5.50	B.T & Earthan
25	Bherupura road New	1700.0	0.00	3.75	6.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Not available

S. No.	Proposed Road Name	Kachha road				WBM road				BT road				CC road				Drain
		length	Carrige way(Existing)	Carrige way (Proposed)	Avg.width/ R.O.W.	length	Carrige way(Existing)	Carrige way(Proposed including exst.)	Avg.width/R.O. W.	length	Carrige way(Existing)	Carrige way(Proposed including exst.)	Avg.width/ R.O.W.	length	Carrige way(Existing)	Carrige way(Proposed including exst.)	Avg.width/R.O. W.	Existing
	TOTAL	17077																
Road inventory of Proposed Road under package ST/04																		
1	From Bus stand to Jhunjhunu by pass road	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4025	7.0	14.0		0.00	0.00	0.00	0.00	Partially both side
	Total	4025																

D. Description of the Sub-project including detail scope of works

21. **Table 2.3** & **Table 2.4** show the nature of the subproject. The descriptions shown in **Table 2.3** & **Table 2.4** are based on the present proposals, which are expected to be substantially correct, although certain details may change as development of the subproject progresses.

Table 2.3: Improvements in transportation infrastructure proposed in Sikar (Earlier scope under ST-02)

Infrastructure	Function	Description	Location
Earlier Scope of Work			
Roads in Sikar	Reduction of traffic congestion above the present road	Widening of 5 roads, **1. Fatehpur Road:** This road connects Churu city with Sikar (SH 28). This road is having heavy traffic and passes through high density population area. Therefore it is required to upgrade and widen the road especially at densely populated & crowded area near Power house circle. The power house circle is very important junction which connects two other important roads i.e. Nawalgarh Road and Udaipurwati Road and is an accident prone location. The upgradation of the circle is also justified due to the fact that the two lane Railway over bridge on Udaipurwati road just cut off at the circle. The available Right of way is 25.0 meter and carriageway width is 13.0 meter. 1.2m wide median is available at Fatehpur road having kerb stone in partial length. There is horizontal curve of almost 90 degree at Dak bungalow circle. Street lights are also available. The existing surface and underground utilities comprise of Water Supply line and Telephone /electric Poles. **2. Beed Road:** This road connects Palwas road to Salasar road via Kumawat Nagar, Yojana Nagar and Shastri Nagar. Though this road is of small length and having less traffic but needs to be developed as a useful link between Palwas road and Salasar road. Considering the congestion at Salasar circle and Salasar road there is no alternate but to develop it as a link road to Salasar road which may be used as one way street to Salasar road in later stage. The available right of way at Beed road varies from 20.0 meter to 25.0 meter and carriageway width is only 3.5 meter. The existing surface and underground utilities comprise of Telephone /electric Poles. **3**. **Devipura Road:** This road connects Bajaj circle to Ajmer Stand and act as an alternate to reach at busy commercial area Ghantaghar from Bajaj Circle to the station Road. This road is located in centre of the city and needs to be developed in order to ease the heavy traffic of Ghantaghar. The available right of way at Devipura road varies from 7.5 meter to 12.5 meter. The average width of existing carriageway is 5.5 meter and median do not exists. There is no existing carriage way after Dujod Gate. Street lights are available on this road. The existing surface and underground utilities comprise of Water Supply line and electric Poles.	Fatepur area, Dak bungalow area Kumawat Nagar, Yojana Nagar and Shastri Naga Palwas road and Salasar road. Ghantaghar, Bajaj Circle, Dujod Gate

Infrastructure	Function	Description	Location
	Reduction of traffic congestion above the present road	**4. Station Road:** This corridor starts from Kalyan Circle and connects Ajmer Stand via Surajpole gate and up to Ghantaghar,Chandpole to Slasarstand.This is the major central corridor and has already converted into a highly commercialized corridor with various commercial activities. This will be one of the major corridors once one way traffic arrangement will be implemented inside city. A loop will be generated between Rajshree cinema, Dujod gate, Ghantaghar and Surajpole. One way traffic will be enforced between Rajshree cinema to Ghantaghar (via Dujod gate) and Ghantaghar to Rajshree cinema (viaSurajpole). **5. Salasar Road:** This is one of the major arterial roads running from centre of the city to the north west side commencing from Bus stand and connecting important establishments/locations like Nagar Parishad Bhawan, Fire Brigade station etc. The corridor also passing through the area which is rapidly developing as residential area and hence going to be a densely populated portion of the city. Some of the residential scheme like Balaji Nagar yojna is going to be completed in very near future. Besides the corridor connects the city with National Highway no. 11 road.	Ghantaghar, Chandpole Nagar Parishad Bhawan Area

Table 2.4: Improvements in transportation infrastructure proposed Roads in Sikar (Enhanced scope under ST-05 and ST-04)

Infrastructure	Function	Description- Design criteria	Location
Enhanced Scope of Work (Roads under Package ST / 05)			
25 Roads in Sikar	Reduction of traffic congestion above the present road	Widening of 25 new roads **1. <u>Road No. 1 From Ajit Computers to Housing Board</u>** This road connects Devipura road to Shastri Nagar housing board colony. This road is already carrying heavy traffic and considering the high density population alongside the road it is the urgent need of the hour to upgrade and widen the cement concrete road, from 3.0 meter to 5.0 meter, for a length of 480 meter. Similarly the initial stretch of existing BT road of 600 meter length required to be widening from 2.5 meter to 5.0 meter. Besides there are two kachha road opposite Jaipur Golden transport office, of total length 350 meter which needs to be converted into BT road. **2. <u>Road No. 2 From Tehsil to District Collectrate office</u>** This road connects the stretch opposite Sikar Hotel to collectorate office, near Idgah. This road is also a busy street which runs parallel to Bajaj road and carries the traffic connected with Bajaj road which is a very busy street. Considering the high density population alongside the road it is the urgent need of the hour to upgrade and widen, from 3.75 meter to 5.0 meter, the already laid WBM road for a length of 1510 meter. Existing cement concrete road with total length of 908	Devipura road and Shastri Nagar Sikar Hotel and collectorate

Infrastructure	Function	Description- Design criteria	Location
		meter has worn out at many places and needs to be repaired with patch work. **3 Road No. 3 From Fatehpur road to Buchyani via ,Bakra mandi & Mohalla Khatikan** This road connects Fatehpur road (Nageshwar bagichi and DMB) to Buchyani via Bakra mandi. The complete stretch is of cement concrete road but a stretch of 512 meter is having carriage way of 2.50 meter. This road is situated at densely populated area and the existing road requires repairing with patch work. The right of way does not permit widening of existing roads. 4. **Road No. 4 From Chokdi ka bhawan to Din Mohd. road via Islamiya School** This road connects the road no. 2 and road no. 3 and known as kargil marg. The total length of the stretch is 500 meter out of which 250 meter is kachha road and remaining 250 meter is WBM road. Considering the importance of this link road it is the urgent need of the hour to convert the existing kachha road into BT road and widen, from 3.75 meter to 5.0 meter, the already laid WBM road for a length of 250 meter and conversion into BT road. 5. **Road No. 5 From Shanitar mandir to Gayatri mandir via kumharo ka mohallaha Nageshwar Bagichi , Maru balika school.** This road connects the Shanitar temple, near collectorate to Gayatri temple at Fatehpur road. The complete stretch consists of WBM road (200 meter) and cement concrete road (1516 meter). This road also passes through densely populated area and hence very important. Considering the right of way it is not possible to widen the existing WBM road. The WBM road is required to be converted into BT road and the existing cement concrete road requires repairing in the form of patch work 6. **Road No. 6 From Lakshmi Market to S.K College via Saini dharmshala** This road connects Laxmi market to S.K. college via Saini dharmshala. This road is very busy street and filled with all the visitors of markets. The existing carriageway of BT road (5.0 meter) and cement concrete road (3.75) is insufficient considering the vehicular load. Considering the urgency the existing BT road (212 m) requires widening from 5.00 meter to 7.00 meter and cement concrete road (550 meter) requires widening from 3.75 meter to 5.0 meter. The condition of existing road is good and does not require much work except repairing of side drainage at some places.	Fatehpur road (Nageshwar bagichi) to Buchyani Chokdi ka bhawan, Din Mohd. road and Islamiya School Shanitar temple, near collectorate to Gayatri temple and Fatehpur road Laxmi market and S.K.College area

Infrastructure	Function	Description- Design criteria	Location
		7. **Road No. 7 From Shramdan marg & road behind hospital** This road connects the Shri Kalyan government hospital on Bajaj circle-Kalyan circle road to station road. The road is known as Shramdan marg. As the road is situated near hospital and considering the vehicular movement in the area it is required that the existing road carriageway of BT road (173 meter) be widened from 2.50 meter to 5.0 meter and existing cement concrete road stretch (82 meter) be widened from 3.00 meter to 5.00 meter. The condition of existing road is good.	Shri Kalyan government hospital on Bajaj circle-Kalyan circle road to station road area
		8. **Road No. 8 From Silver Jubli rd. Dhanvantri to R.T.O till bypass** This road connects the silver Jubli road near Kalyan circle to Sikar By pass road to Jhunjhunu. The complete stretch road is 3100 meter of bituminous surface. This is very important road as it takes out the traffic of city to outer area of Sikar. Besides many government offices like Forest department, Irrigation Department and RTO is situated on this road. The existing road requires strengthening for entire length. This road is undulated and also requires profile correction of existing road.	Silver Jubli road near Kalyan circle to Sikar By pass road to Jhunjhunu area
		9. **Road No. 9 From Sheetla chowk to Ranisati mandir** This road connects the Sheetla chowk to Ranisati mandir and extension of this road which finally meets Sikar- Bikaner By pass. The complete stretch road is 900 meter of bituminous surface. This is very important road as it takes out the traffic of city to outer area of Sikar. The existing road requires strengthening for entire length.	Sheetla chowk to Ranisati mandir
		10. **Road No. 10 Durga Colony, Jiya colony, Shekhawat colony** This is internal road of residential colonies which includes Durga Colony, Jiya Colony and Shekhawat colony. The entire stretches of the road are kachha roads with a total length of 2645 meter. Considering the rapidly occupying status of colonies it is urgent need of the time to upgrade these roads and convert these stretches into BT road. The available right of way is 4.25 meter and it is proposed to keep a carriageway of 3.75 meter.	Durga Colony, Jiya Colony and Shekhawat colony
		11. **Road No. 11 Bismillah colony, in Jakriya masjid area** This is internal road of residential colony which is known as Bismillah colony. The entire stretches of the road are kachha roads with a total length of 1884 meter and cement concrete road with a total length of 600 meter. Considering the rapidly occupying status of colony it is urgent need of the time to upgrade these kachha roads and convert these stretches into BT road. The available right of way is 4.25 meter	Bismillah colony area

Infrastructure	Function	Description- Design criteria	Location
		and it is proposed to keep a carriageway of 3.75 meter. The condition of existing cement concrete road is good.	
		12. **Road No. 12 From Bhanwarji Saini ki dukan to bidami's house, to Jhunjhnu bypass** This road connects Bhanwarji Saini ki dukan near Appollo Public School to Sikar By pass road to Jhunjhunu. The complete stretch road is conglomerate of various types of road surfaces. There is a kachha road of 1000 meter length, 600 meter WBM road, 460 meter BT road and 286 meter of cement concrete road. This is very important road as it takes out the traffic of city to outer area of Sikar. It is required to upgrade existing kachha road and WBM road into BT road with a carriageway of 3.75 meter. The existing BT road requires strengthening for entire length. This road also requires cross drainage works at one site for ensuring proper drainage of the road.	Bhanwarji Saini ki dukan near Appollo Public School to Sikar By pass road
		13. **Road No. 13 From Polo ground area** This is internal road of residential colony which is known as Polo ground colony. The total length of the kachha roads is 1301 meter out of which a stretch of 269 meter has 12.0 meter right of way. These kachha roads require upgradation into BT road with a carriageway of 3.75 meter and 5.00 meter for the stretch of 269 meter. Similarly existing WBM road (200 meter) with carriageway of 3.75 meter also requires upgradation into BT road. The existing BT road (200 meter) also requires to be strengthened. The existing cement concrete road (740 meter) with a carriageway of 3.75 meter is quite good but a stretch of 174 meter requires to be widened from 2.75 meter to 3.75 meter.	Polo ground colony
		14. **Road No. 14 Ranisati road, Shastri Nagar area** This is internal road of residential colony which is known as Shastri Nagar colony. The total length of the kachha roads is 1967 meter which has different available right of way. Existing cement concrete road with total length 969.00 meter has also different carriageway. Considering the importance of road it is proposed to upgrade kachha road with BT road with carriage way ranging from 2.50 meter to 3.75 meter as per availability of right of way. The existing concrete road is in good condition and requires repair work.	Ranisati road, Shastri Nagar area
		15. **Road No. 15 From Mohallah Narvan to Nehru park via swamiyan** This road connects the Nehru park situated on salasar road to Mohallan Narvan. The entire stretch is of concrete road with a total length of 605 meter with a carriageway of 4.0 meter. The existing concrete road requires strengthening with a layer of 100 mm on the	Nehru park and Mohallan Narvan Asrar house and

Infrastructure	Function	Description- Design criteria	Location
		existing concrete road. Minor repairing of side drain is aslso required to be performed.	Fatehpur road.
		16. **Road No. 16 From Asrar house to Fatehpur rd. via Roshangunj masjid** This road extends the road no. 15 to Fatehpur road. Various public places like mosque and crematory lies alongside the road. The road consists of a stretch of 615 meter kachha road and 1000 meter cement concrete road. As the road passes through the densely populated area it is need of the hour to upgrade the kachha road with BT road. The carriageway of the proposed BT road is kept as 3.75 meter. The existing concrete road with a carriageway of 4.0 meter is in bad condition and requires strengthening by an extra cement concrete layer of 100 mm thick over existing layer. Besides, minor repairing of road side drain is also required to be done.	Bajaj circle- Kalyan circle road and Jhunjhunu bypass road
		17. **Road No. 17 From Police line to Purohit ki Dhani** This road connects the Bajaj circle- Kalyan circle road to Jhunjhunu bypass road. The road consists of 170 meter Kachha road, 749 WBM road and 115 meter bituminous road. This road is very important road as it connects the core of the city with bypass road. Considering the importance of the road it is require to upgrade the existing Kachha road and WBM road with BT road with a carriage way of 3.0 meter considering the restricted right of way available. Besides, the existing BT road with a carriageway of 3.0 meter is required to be widened from 3.0 meter to 5.0 meter. As the entire stretch is much undulated, profile correction of the existing BT road is required. An interlocking tile pavement is also proposed for an initial stretch of 500 meter.	Prem ji saini ki gali and saini dharamshala near Bajaj circle - Kalyan circle road.
		18. **Road No. 18 From Saini dharamshala to Prem ji saini ki gali** This road connects Prem ji saini ki gali and saini dharamshala near Bajaj circle- Kalyan circle road. The entire length of the road is 739 meter out of which 334 meter is kachha road. Being a busy street it is required to upgrade the existing kachha road with BT road. The carriage way of BT road is kept as 3.75 meter. The remaining stretch of the road, 405 meter, is cement concrete road with 3.0 meter (74 meter length)and 5.0 meter (331 meter length) is in good condition.	Radhakishpura govt quarter and Piprali Road area
		19. **Road No. 19 From Radhakishpura govt quarter to Piprali Road** This road connects the Radhakishpura government quarter at Udaipurwati road to road no. 8. The road has 354 meter as kachha road, 362 meter as WBM road, 103 meter as BT road and 227 meter as concrete road. As it is a link road it is required to upgrade exsting kachha road with BT road with 3.75 meter carriageway and existing	Janta colony

Infrastructure	Function	Description- Design criteria	Location
		WBM road with carriageway of 3.0 meter with BT road. The existing BT road requires strengthening and existing cement concrete road is in good condition.	and Surya colony
		20. **Road No. 20 From Nawalgarh rd, Janta colony to Surya nagar** This is internal road of residential colonies which includes Janta colony and Surya colony. These colonies are rapidly growing colonies. The total length of the kachha roads is 1380 meter which has 4.50 meter available right of way. Existing cement concrete road with total length 605 meter has also 4.50 meter right of way. Considering the importance of road it is proposed to upgrade kachha road with BT road with carriage way of 3.75 meter. The existing concrete road is in good condition and due to restriction of right of way existing carriageway 2.50 meter cannot be widened. Road side drains require minor repair work.	Kisan colony and Tagore colony
		21. **Road No. 21 From Tagore School to Bhartiya School** This is internal road of residential colonies which includes kisan colony and Tagore colony. These colonies are rapidly growing colonies. The total length of the kachha roads is 482 meter which has 6.00 meter available right of way. Existing cement concrete road with total length 54 meter has 7.00 meter right of way. Considering the importance of road it is proposed to upgrade kachha road with BT road with carriage way of 3.75 meter. The existing concrete road is not in good condition and minor repair work is required to be done. Cross drainage work is also required to be done for proper drainage at depression.	Housing board colony
		22. **Road No. 22 From Housing Board Zone** This is internal road of residential colony which is known as housing board colony. This colony is developed by Rajasthan Housing Board and it is a planned colony. The total length of the kachha roads is 1005 meter which has 4.00 to 7.00 meter available right of way. Existing cement concrete road with total length 643 meter has 4.0 to 8.0 meter right of way. Existing BT road has a carriageway of 4.0 meter. Considering the importance of road it is proposed to upgrade kachha road with BT road with carriage way of 3.00 to 3.75 meter as per availability of right of way. The existing concrete road is not in good condition and minor repair work is required to be done. Existing BT road requires strengthening.	Bhujiya factory to Railway line
		23. **Road No. 23 From bhujiya factory to Railway line** This road connects the railway line at road no. 8 to bhujiya factory. The ntire stretch 1050 meter is kachha road with available right of way 4.50 meter to 6.00 meter. As the road is located in the residential area of city it is required that the earthen road is upgraded to BT road	Charan Singh nagar

Infrastructure	Function	Description- Design criteria	Location
		with a carriageway of 3.75 meter. 24. **Road No. 24 Charansingh nagar near Railway line** This road runs parallel to the railway track at Charan Singh nagar. The road has a WBM road portion of 1020 meter, BT road of 100 meter and cement concrete road of 188 meter length. As the road is situated in residential colony it is proposed to upgrade existing WBM road with BT road with a carriage way of 3.00 meter. The existing BT road with 2.50 meter carriageway requires strengthening but the carriageway cannot be sidened due to restricted availability of the right of way. The existing cement concrete road is in good condition. 25. **Road No. 25 Bharupura Road (New)** This road is known as Bharupura road and has a stretch of 1700 meter. The entire stretch is a kachha road with 6.0 meter right of way. Considering the importance of the road it is required to be upgraded with BT road with a carriageway of 3.75 meter.	Bharupura Road Bus Stand circle to Gokulpura near Jhunjhunu By pass
Enhanced Scope of Work (Road under Package ST / 04)			
One road in Sikar	Reduction of traffic congestion above the present road	Widening of road **1. Jhunjhunu by pass to Bus stand** This road connects Jhunjhunu by pass, Gokulpura and surrounding area to Sikar city via circuit house.	

22. **Expected Subproject Outputs:** The expected subproject outputs for the said work is given below

a. Up gradation and widening of all roads identified under the project
b. Provision of footpath, provision of drain, utility space, Road appurtenances
c. Predominant traffic will be served
d. Avoid any accident
e. Saving of time
f. Fuel saving
g. Traffic congestion will be eased
h. Social & Environmental hazards to be improved
i. No psychological barrier

23. ***Design Criteria for roads***

- Discussed the detail in **Table 2.4** above

24. ***Design Features***: Salient design features for the project Roads are discuss below,

- **Design Life**

The design life for urban roads as laid down in IRC: 86-1983 in 15 years. However, it is proposed to resort to stage construction and the pavement is designed to cater the design life of 5 years so that more and more roads can be covered within the available funds.

- **Classification of Road**

These roads carries through and continuous traffic but offering somewhat lower level of mobility and as such is classified as sub arterial road as per IRC: 86-1983 "Geometric Design Standards for Urban Roads in Plains" for the purpose of geometric design and space standard. The road passes through plain terrain.

- **Design Speed**

Being an sub arterial road, a design speed of 60 km/hour has been adopted as per IRC: 86-1983

- **Geometric Design- Horizontal Alignment**

There are no sharp curves on the existing alignment. The existing horizontal curves are considered adequate for the design speed of 60 km/hour. As mentioned earlier, the achievable practical speed on road will be around 50 km/hour keeping in view of numerous cross-roads by the road side.

- **Geometric Design -Vertical Alignment**

The gradient of the existing road is fairly flat. No major change in the vertical alignment of the road is therefore proposed.

- **Design of Junction**

The Dak bungalow Circle is a junction of three stretches. The design of junction has been done on the basis of IRC- 65– 1976 –Recommended Practice for Traffic Rotaries-An Indian Road Congress Publication.

- **Growth Rate**

The classified traffic volume count was not undertaken in past on this road and it is not possible to extrapolate the growth rates from the past trends. The growth rate has been taken as 7.5 per cent per year as per IRC: 37-2001 for the fast moving vehicles such as Cars, Jeeps, Two wheelers, Light Commercial Vehicles, Buses, Trucks, Agricultural Tractor Trailers and Auto-rickshaws as given in the guidelines of the Indian Road Congress.

The recommendations made for crust thickness as per IRC: 37-2001 has sown in **Table 2.5**. in case of road no. 3, 5 15 and 24 the existing concrete road is adequate in thickness and the only improvement required is filling up of pot holes and patch repair of existing crust.

Table 2.5: Details of Pavement cross-section for proposed roads of Sikar

Road Name	Proposed Portion (mm)				Existing Portion (mm)	
	BC/SDBC	DBM/BM	WMM	GSB	BC/SDBC	DBM/BM
Scope of Work under Package ST-02						
Fatehpur Road	40	90	250	200	20	45
Beed Road	25	50	250	150	25	50
Devipura Road	25	50	250	150	25	50
Station Road	40	90	250	200	-	-
Salasar Road	40	50	250	200	-	-
Scope of Work under Package ST / 05						
Road No.1	40	50	250	200	25	50
Road No.2	25	50	225	150	25	50
Road No.3	-	-	-	-	-	-
Road No.4	40	75	250	200	25	50
Road No.5	-	-	-	-	25	50
Road No.6	40	85	250	200	25	50
Road No.7	40	90	250	200	25	50
Road No.8	-	-	-	-	25	50
Road No.9	-	-	-	-	25	50
Road No.10	25	50	250	200	-	-
Road No.11	25	50	250	150	-	-
Road No.12	40	80	250	200	25	50
Road No.13	40	60	250	200	25	50
Road No.14	25	50	250	200	-	-
Road No.15	-	-	-	-	-	-

Road Name	Proposed Portion (mm)				Existing Portion (mm)	
	BC/SDBC	DBM/BM	WMM	GSB	BC/SDBC	DBM/BM
Road No.16	40	60	250	200	-	-
Road No.17	40	90	250	200	25	50
Road No.18	40	85	250	200	-	-
Road No.19	40	75	250	200	25	50
Road No.20	25	50	250	200	-	-
Road No.21	25	50	250	200	-	-
Road No.22	25	50	250	200	25	50
Road No.23	40	75	250	200	-	-
Road No.24	-	-	-	-	-	-
Road No.25	40	60	250	200	-	-
Scope of Work under Package ST-04						
Jhunjhunu bypass road	40	60	250	200	40	60

Figure 2.1: Map showing the location of the project area

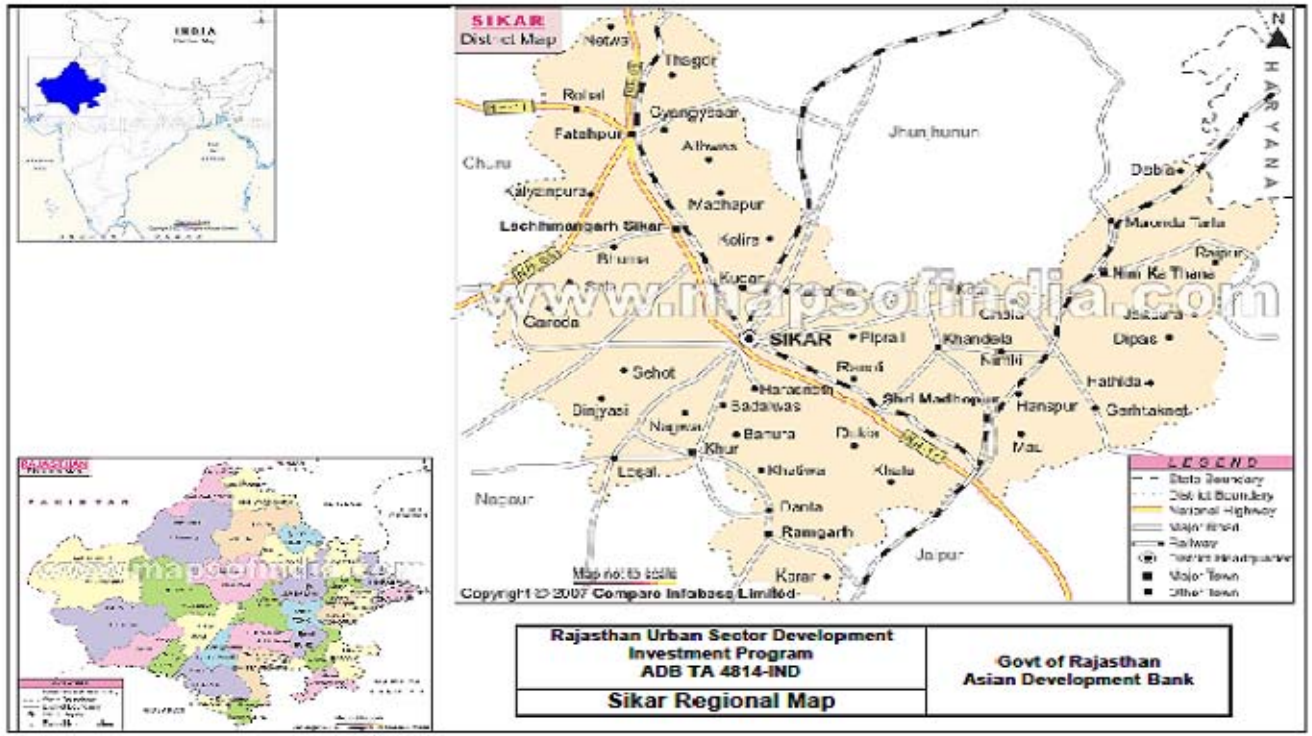
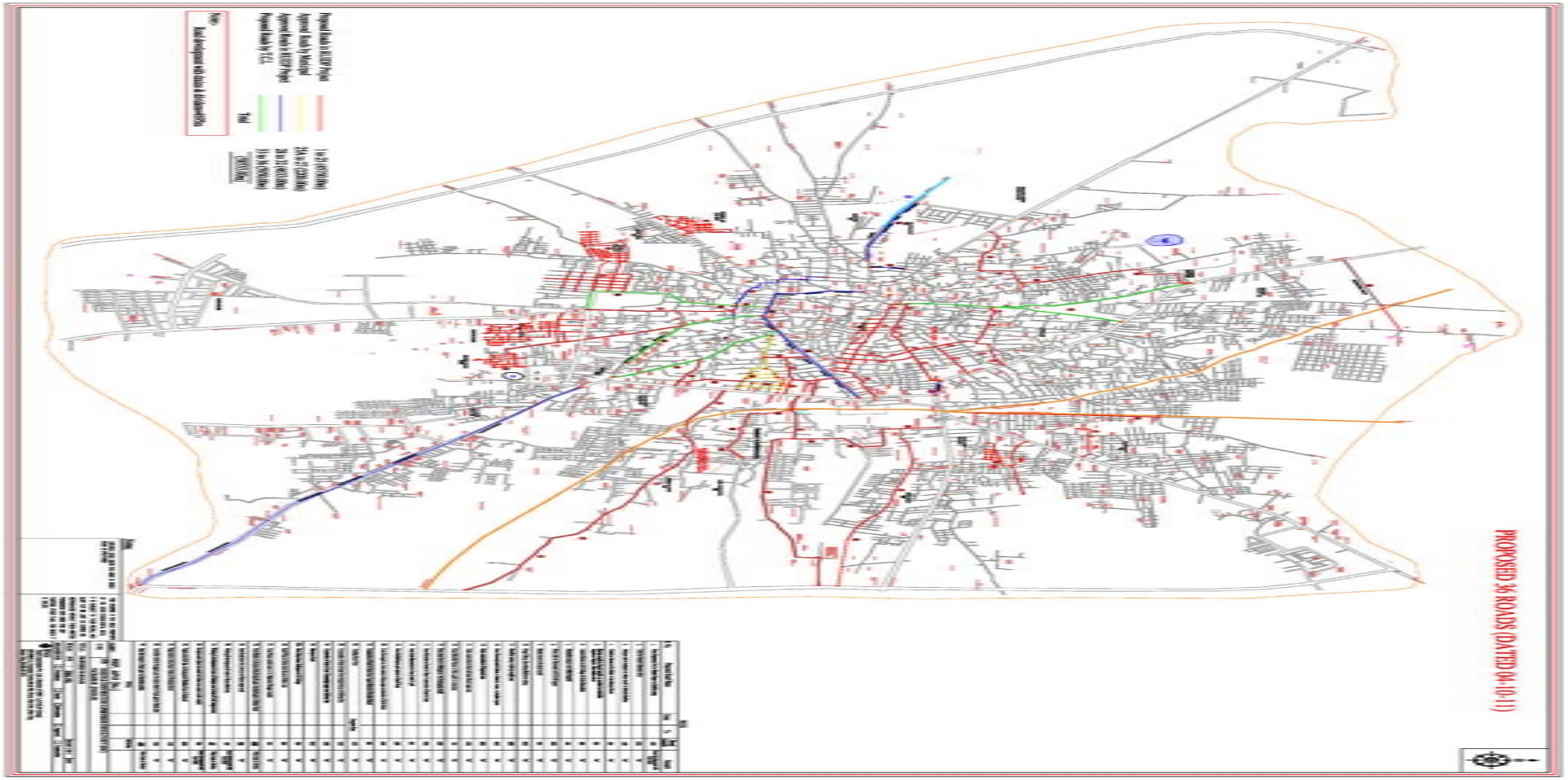


Figure 2.2: Road section of Sikar under proposed Sub-project



IV. DESCRIPTION OF THE ENVIRONMENT

A. Physical Resources

1 Location

25. The Urban Agglomeration (UA) of Sikar is situated at the foothills of the Aravalli Mountain series and is strategically located between the State capital of Jaipur and the National Capital of New Delhi. Sikar town is one of the Historical city of the Rajasthan state and it is also a Railway Junction. Historical monuments such as Victoria Diamond jubili hall Tatya Tope Samadhi, Rani Mahal Madhav Niwas are some of the places of Tourist's attractions. This town is Origin of rich Marwaris and is known as Sekhawati Region. Colourful frescoes on the walls of Forts, Palaces Havelis, Baoris depict daily rich life & Culture, religion and Architecture.

26. The district is located in the north-eastern part of the state. It is bound in the north by Jhunjhunun District, in the north-west by Churu district, in the south-west by Nagaur district and in the south-east by Jaipur district. It also touches Mehandergarh district of Haryana on its north-east corner.

27. Sikar is situated at the junction of National Highways (NH-11), State Highways (SH -8), & (SH -20) and, provides connectivity to Delhi via Jhunjhnu. It is also having the connectivity to Jabalpur & Bikaner, state via Jaipur state capital . District map of Sikar shown in **Figure 3.1.**

2 Topography, Natural hazard and Drought

28. **Topography**: Sikar lies between the East longitude 75^{o}16'and North latitude 27^{o} 30'. It is situated at the center of Sikar District at 437 meters above MSL.

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

30. **Drought:** Low rainfall coupled with erratic behaviour 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 3-4 meter on an annual basis combined with significant drawdown conditions.

Figure 3.1: District Map of Sikar

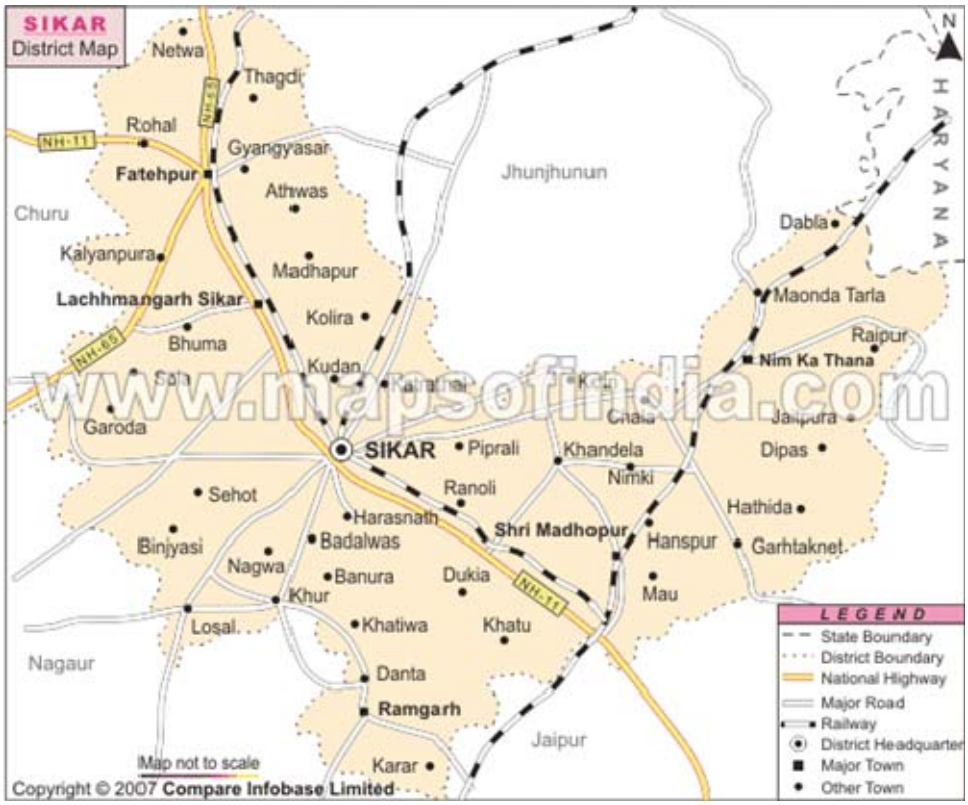


Figure 3.2: Earthquake zones of Rajasthan

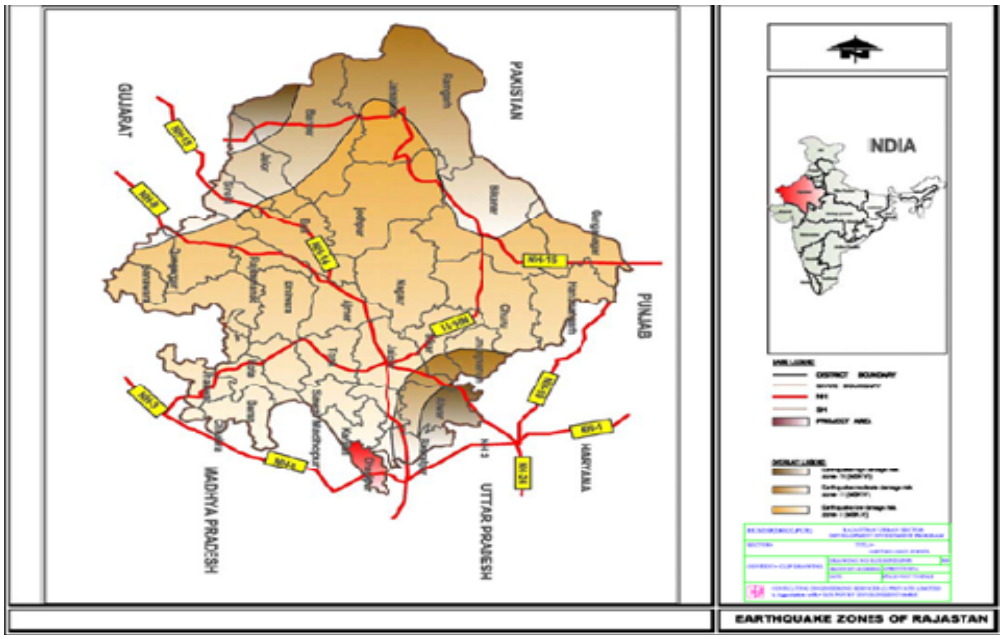
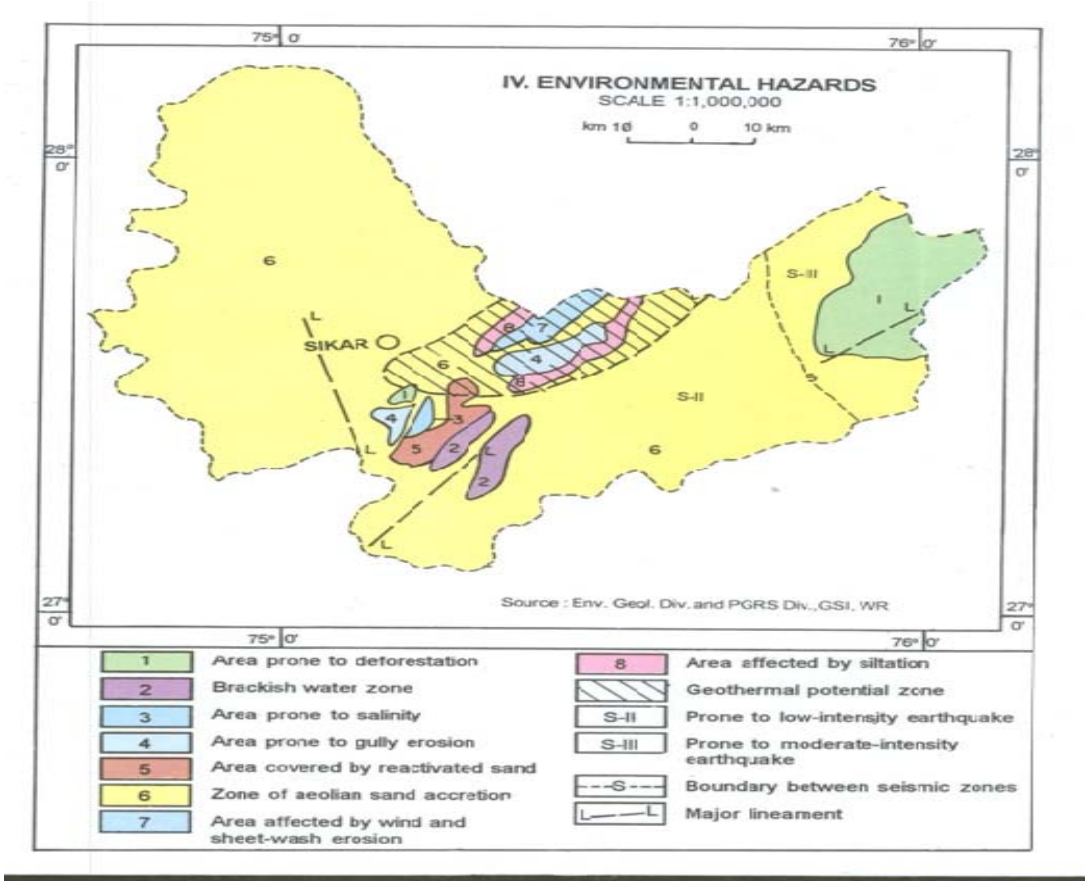


Figure 3.3: Natural Hazard map of Sikar (Source: Resource map GSI)



3 Geology, geomorphology, mineral resources and soil

31. Sikar district in north-central of Rajasthan, covers an area of 7732 km^2. The district has six tehsils namely Fatehpur, Lachhmangarh, Sikar, Danta Ramgarh, Shri Madhopur and Nim – ka – Thana. There is network of railways and Roads in the area. Semi arid to arid climate prevails in the district. The average annual rainfall is 460mm. The district can be divided into two main topographic units the western half characterized by dunal country and waste land, and the eastern half characterized by NE-SW trending hill ranges. These hill ranges act as natural barriers and restrict large scale sand migration from the west.

32. Geologically, the district is not of much significance as the major part of the district is covered by Aeolian sand and sand dunes. Hard rock exposures are mainly confined to the eastern part of the district as isolated outcrop or as thin linear ridges. The Saladipura Group (Archaean) comprisin quartzite, paragneiss dolomatic marble and schist, exposed in the central part of the Khetri Copper belt (Lower Proterozoic age) tappers down in the northcentral part of the district. The lithounits of the Khetri Copper belt mainly include quartize, phyllite, calc – silicate and marble. Quartzite, staurolite – garnet – biotite schist and marble belonging to Shyangarh Group of Delhi Supergroup are juxtaposed with the Saladipura Group in the southern and eastern part of the district, the scanty outcrops of the Ajabgarh Groups of the Delhi Supergroup (Lower to Middle proterozoic). Granite, pegmatites quartz veins gabbro are the acid and basic intrusive. Faults, shears, fold axis are the manifestation of deep- seated tectonic in the area.

33. Geomophologically the district is classified into seven geomorphic units namely longitudinal dune, transverse dune, obstacle dunes, sand sheet, piedmont, ridge and valley and pediment. The shadow zones behind ridge and valley acting as sand barriers, are the only areas used for cultivation of seasonal crops. The area is characterized by two hydrogeological domains unconsolidated porous Quaternary formations and consolidated fissured formations with ground water potential ranging from less than 1 to 100 LPS, The district forms the catchment areas for various river valleys. These are Dohan in the northeast, Sabi, Sota and Banganga in the east and Mendha in the south. Although, these river systems originate from Sikar district, they remain dry for the most part of the year due to scanty rainfall and sand migration. As the district is prone to sand accumulation and migration, the effects of environmental hazards related to desertification is visible at most of the places these includes disorganisation of river valley, salinity of ground water and over-stepping of recent dunes over the cultivated lands.

34. ***Mineral*** **Resources:** Huge deposit of pyrite - pyrrhotites is recorded from Saladipura (27°40':75°31') which is mined extensively for sulphur extraction. The estimated reserves of 111.62 million tonne (Mt) of pyrite -pyrrhotite with an average of 21.63% Sulphur. Extensive ancient mining activities for copper in the form of old Working and slag, dump are recorded from a number of places within the South Khetri Belt namely Baleshwar (27°43':75°55') South of Mavanda (27°48':75°50').NW of Ghata (27°35':75°50')etc. Apatite is found In Kerpura (27°39' - 75°34') Salwari (27°39':75°36') area In post Delhi - granite as veins. P_2O_5 contains is nearly 41%. Fluorite occurs as siringers, veins and pockets in quartz veins, amphibole rich rock and granite Limestone deposit near Patan (27°50': 75°58') is estimated to contain 6.98 Mt of limestone with 46.54% CaO. Other occurrences are reported from Raipur Jhingar (27°38' : 76°01') and Saladipura. The Khandela area has revealed the presence of moderately radioactive zones in quartz - biotite schist aplitic rocks and quartz-tourmaline veins. The Uranium zone contains 0.04 to 0.11% O_3U_8. The mineralised zone also contain molybdenum and copper mineralization. Barytes occurrences are reported from Kalakhera of Gaonri (27°42':75°50'). Iron ore occurrene

from Kalakhera (27°42':75°59') and NW of Jhalra (27°52':75°52') Clay deposit is located NE- of Churla (27°34':75°56') Calcite occurrences are located at Mavanda, Raipur. West of Kalakhera north of Saladipura and many other places' Calcite occurs as veins, pockets and lenses in the marble and gneisses of Delhi Supergroup.

35. Geology and mineral map of Sikar shown in **Figure 3.4** while geomorphological map of Sikar depicted in **Figure 3.5.**

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

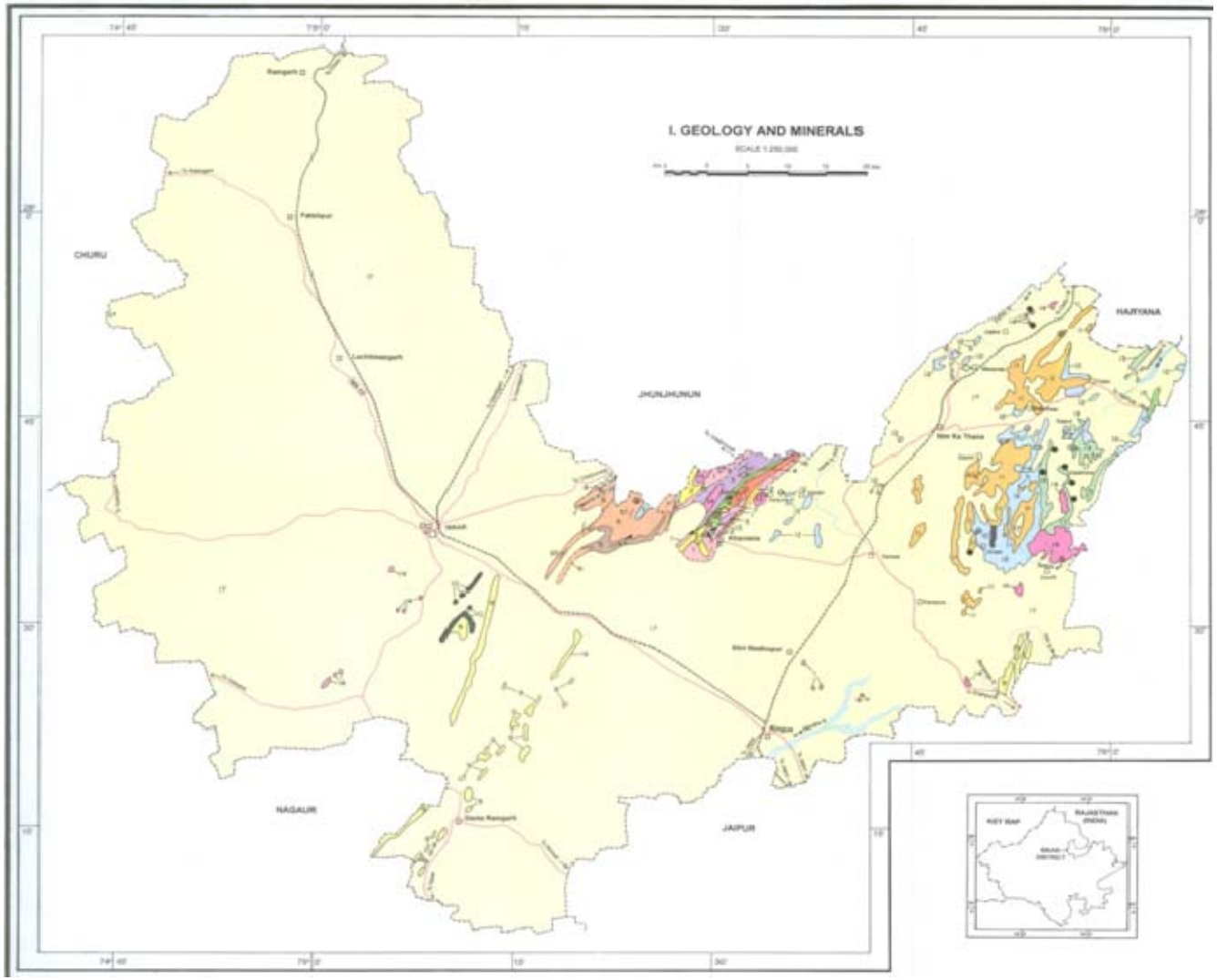
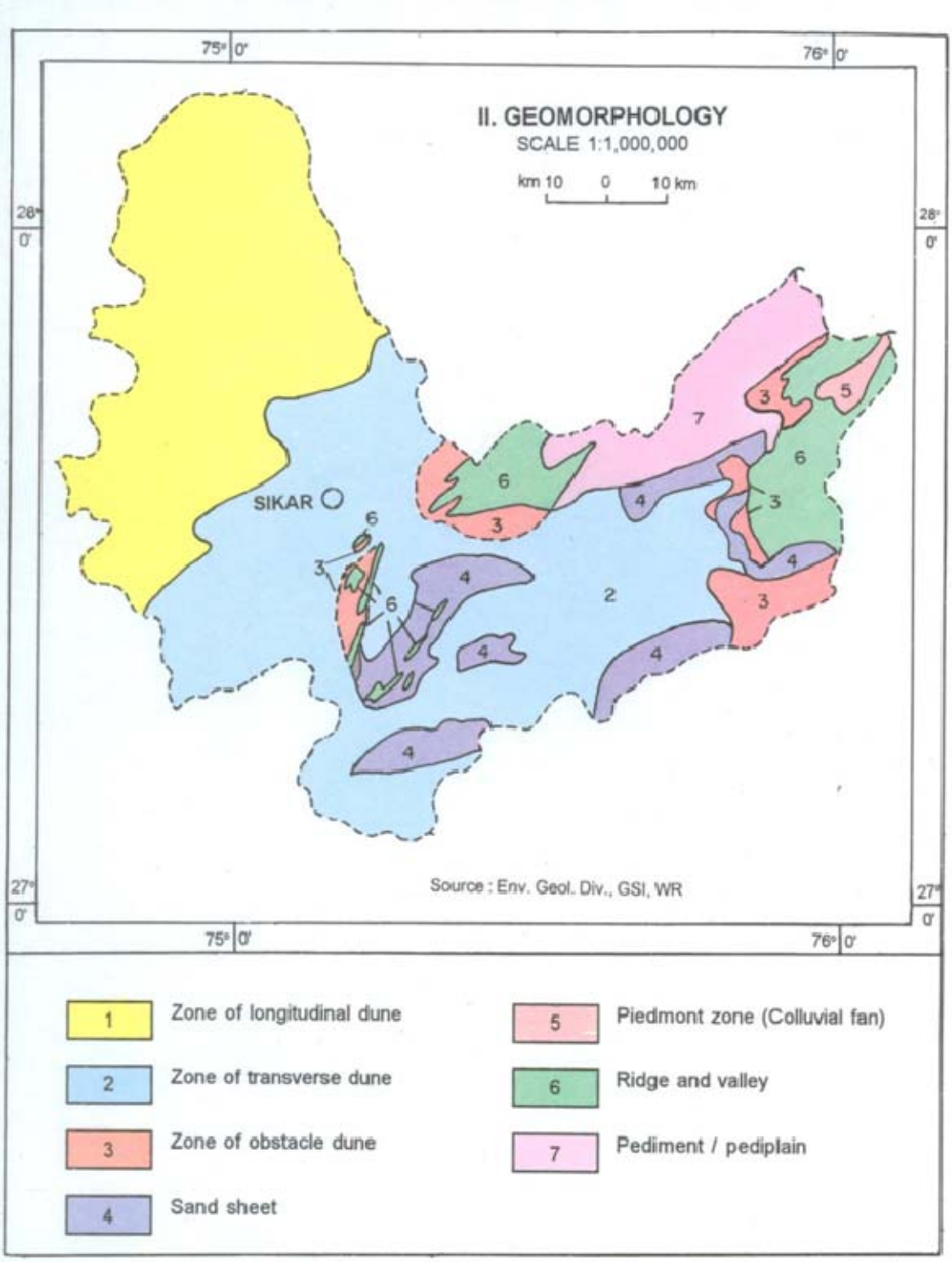


Figure 3.5: Geomorphology of Sikar district (source: GSI Resource map)



36. Soil characteristics: Soil of the region falls within rainfall zone of 300 – 500 mm. The soil is sandy loam, sallow depth red soils in depressions. **Table 3.1** shows nutrient level in the Sikar soil including area coverage of saline and sodic soil. The nutrient status of the Sikar soil is graded as low to medium level.

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

	Nutrient				
	N	P	K	Saline Soil(Ha)	Sodic or Alkali(Ha)
Status	L	M	M	59936	30036

(Source: Vital Agricultural Statistics 2004-05, Directorate of Agriculture, Rajasthan, 2007)

4 Climate

37. The district has a hot summer, scanty rainfall, a chilly winter season and general dryness of the air except in brief monsoon season. The average maximum & minimum temperature are 46 & zero degree Celsius respectively. The normal rainfall, mostly received from south-west monsoon is averaging 46.60 cms.

38. The rainfall over Sikar 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 (2011) shown in **Table 3.2**.

Table 3.2: Rainfall at Sikar in recent years (2011)

	Months	Rainfall (mm)
1	January	0
2	February	49
3	March	0
4	April	0
5	May	13
6	June	100
7	July	68
8	August	210
9	September	76
10	October	0
11	November	0
12	December	0
13	**Monsoon Rainfall**	**378.0**
14	**Non monsoon rainfall**	**138.0**
15	**Annual Rainfall**	**516.00**

(Source: District Website, Govt. of Rajasthan, 2012)

5 Air and Noise Quality

39. Ambient Air Quality Monitoring was carried out at three locations in Sikar town in April-May 2012. The monitoring locations are within 0-2.5 Km from the project roads. The results of air quality monitoring are shown below in **Table 3.3**. It may be observed from the Table 3.3 that levels of particulate matter (size<10µ) are higher than the standards which is due to semi-arid climate of the study area. Traffic is the only significant pollutant in Sikar. Levels of oxides of sulphur and nitrogen are within the National Ambient Air Quality Standards (NAAQS). Similarly Noise Level Monitoring was done in the April-May 2012, as shown in **Table 3.4.** The location of Air and Noise monitoring stations has shown in **Annexure-VI**.

Table-3.3: Ambient Air Quality Monitoring (Average value in µg/m^3)

SL. N0.	Monitoring Location	Monitoring Location	RPM or PM $_{10}$ µg /m^3	PM $_{2.5}$ µg /m^3	NO_2 µg /m^3	SO_2 µg /m^3	CO mg/m^3
1	Near Krishi Mandi, Sikar	AQ1	352	20.3	27.8	7.75	<1.15
2	Udai Lal Ki Dhani, Sikar	AQ2	193.6	17.4	16.6	5.8	<1.15
3	Sitla Chowk	AQ3	400.4	22.4	24.3	6.85	<1.15
Permissible limits as per CPCB Notification, New Delhi, 18th November, 2009 for Industrial, Residential, Rural and Other area			100	60	80	80	02*, 04#

Where: *= Maximum limits for 8 hourly monitoring, #= Maximum limits for 1 hourly monitoring.
Source: Onsite Monitoring done by RUIDP

Table-3.4: Noise Monitoring at Different Locations

Location Name	Location	Land Use	Noise Level Leq in dB(A)	
			Day	Night
Near Krishi Mandi	NQ1	Commercial	62.8	53.3
Udai Lal Ki Dhani	NQ2	Residential	60.0	51.3
Sitla Chowk	NQ3	Residential	60.9	53.2
Standard Limits in dB(A) Leq, [THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000]		Commercial	65	55
		Residential	55	45

Source: -On site monitoring done by RUIDP (2012)

6. Surface Water

40. There is no as such prominent water body near the project roads.

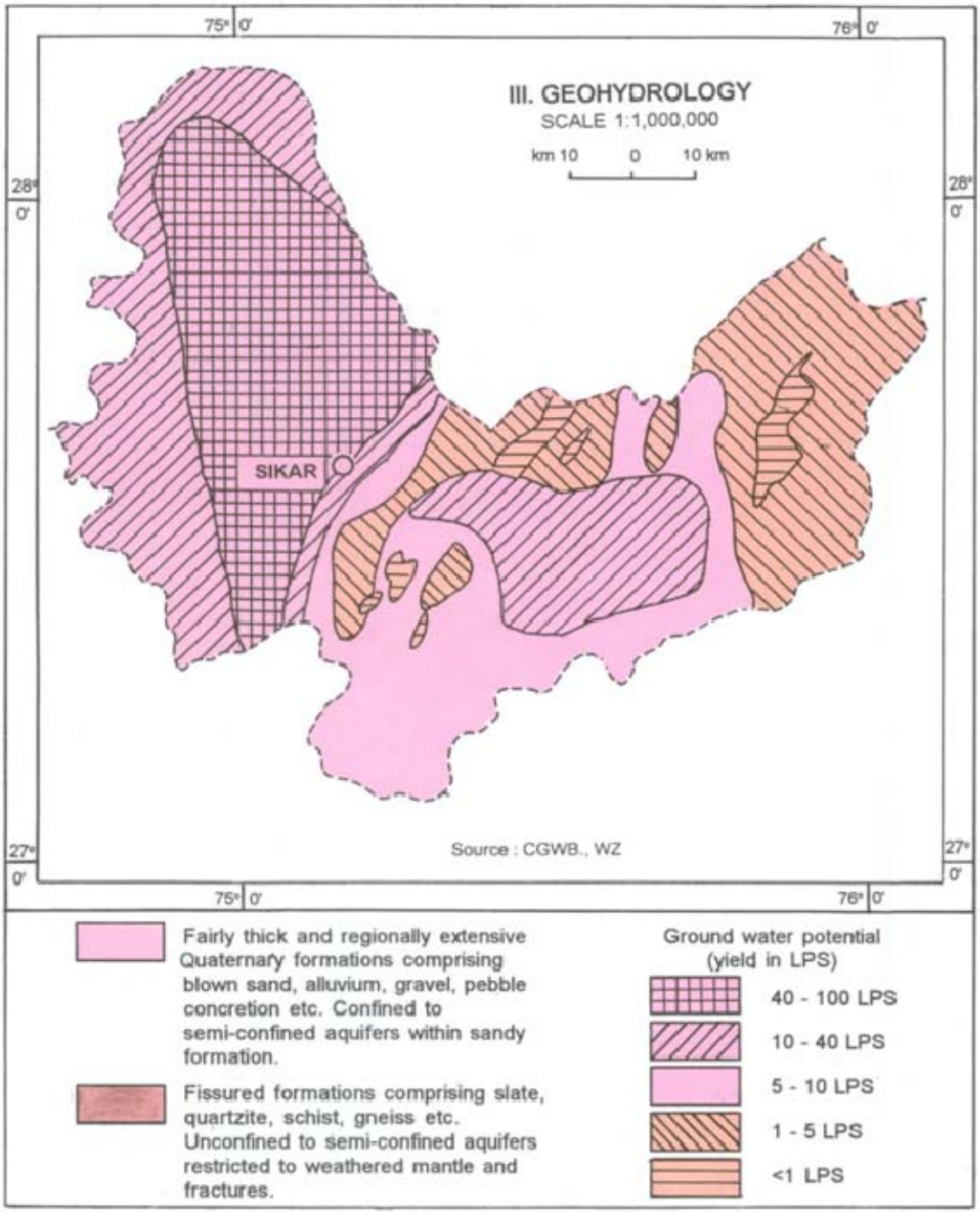
7 Geohydrology and Groundwater

41. Geohydrological map of the Sikar district is shown in **Figure 3.6** for broadly grouping geological formations from ground water occurrence and movement considerations, the various lithological units have been classified into two groups on the basis of their degree of consolidation and related parameters. These are,

- Fairly thick regionally extensive quaternary formations
- Fissured formations – consolidated protereozoic formations.

42. On an average 70 % of the district area covered with Fissured formations.

Figure 3.6: Geohydrological map of Sikar (Source- GSI Resource map)



43. Groundwater in Sikar generally occurs under confined to semi confined conditions. The principal aquifers of the district are Quartzite, Schist, Phyllites, Limestone and Dolomite Limestone constitutes important water bearing formation in the district. As per Central Ground Water Board the average depth of ground water in the Sikar district varies from 4.59 m below land surface to 64.50 m below land surface.

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

Table 3.5: Ground Water Quality in and around Sikar

Parameters	Maximum Level	Minimum Level	Standard of Drinking water (IS: 10500: 1991)	
			Desirable limit (mg/l)	Maximum Permissible limit (mg/l)
pH	8.7	7.56		
EC (micro mhos/cm at 25°C)	4900	560		
Cl (mg/l)	1250	7	250	1000
SO_4(mg/l)	300	10	200	400 (if Mg does not exceeds 30 ppm)
NO_3(mg/l)	610	7.7	-	100
PO_4(mg/l)	1.82	0.07		
Total Hardness(mg/l)	620	60	300	600
Ca(mg/l)	72	8	75	200
Mg(mg/l)	114	10	30	100
Na(mg/l)	863	8	-	-
K(mg/l)	55	0.78	-	-
F(mg/l)	2.78	0.17	1.0	1.5
Fe(mg/l)	6.52	0.05	0.3	1.0
SiO_2(mg/l)	30	5		
TDS (mg/l)	3185	364	500	2000

Note: Total – 15 nos. samples

Source: Ground water year book 2005-06 Rajasthan, Central Ground Water Board, Jaipur (2007-08)

45. Ground water samples collected from Sikar town in April 2012 and results will be submitted as base line data during monitoring.

46. Supply water quality as measured by Public Health dept. is shown **Table 3.6.** It is noted that ground water contains high level of total dissolved solid and nitrate.

Table 3.6: Present supply water quality at Sikar

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
214.8	Ground	100	0	10	10	0.1	0.9	460	1390	Trace	185

(Source PHED- 2008-09 average)

B. Biological Resources

47. FLORA : The flora of the district consists of a considerable variety. In 1972, 73, 1.46 per cent of the total area of the district was classified as forests. The forest area in Sikar district may be broadly divided into four botanical divisions, some details of which are as follows.

- Anogeissus pendula Type: In this type *Anogeissus pendula* (Dhok) usually occurs as pure stands. Its common associates are *Acacia senega* (Kumtha) , *Dischrostachys cinerea* (Buiya).

- Anogeissus pendula Degraded Type: The *Anogeissus pendula* degraded type is most commonly found on the hill slopes. Due to continuous biotic interferences, this has been reduced to a spreading and creeping form.

- Throny Type: These forests are found on the marginal lands , foothills and consolidated sandy plains or sand-dunes and ravine lands.

- Tree Savannah Type: This type of botany is found in plains which are sandy or which contain sandy loam soils. The specie is specially managed for grass production. The tree layer is composed of *Acacia leucophloe* (Ronjh) and *Acacia senegal* (Kumtha) etc.

48. FAUNA : The common mongoose and the hedge hog are seen in the entire area of the district due to their adaptability to varied surroundings. Besides, domesticated animals such as cows, oxen , horses , buffaloes and camels are found everywhere in the district. Birds commonly found in the district may be listed as house sparrow, house crow, jungle crow, blue rock common teal and brahminy duck.

49. There is no protected area, forest nearby the sub-project site.

C. Economic Development

50. Economic base of a town reflects its prosperity. Sikar being district headquarter, has been functioning as administrative city with sustained growth in tertiary economic activities. The major economic activities are trade and commerce, thus it offers a number of wholesale and retail markets which act as a distribution center for nearby towns and villages. Tourism income contributes very less towards economic generation of the town on the contrary household industries play a big role in providing employment and income generation. As per the master plan new town centers and community centers have been proposed .This section focuses on number of workers, their category, and occupational pattern of the town in general. Also .attempt has been made to define the market centers and industrial activities of the town .The town has look of business-hub indicating fast growth.

51. The workforce participation rate of the city was about 25.2 percent of the total population as per 2001 census. The following table shows that out of this total workforce only about 3.5 percent were employed in the primary sector (Agriculture, mining and quarrying etc) followed by 6.7percent in secondary sector (industry and construction). It is observed that tertiary sector including commercial activities, trade and commerce and related activities dominate with about 89.7 percent workers engaged in the sector. The workforce participation ratio in Sikar (UA) and Sikar (MA) is 25.2 as per 2001 census **(Table 3.7)**

Table 3.7: Number of Workers, Work Force Participation Ratio and percentage of workers in Sikar Town

Economic Profile	Total Workers	WPR	Primary Workers	Primary Workers %	Secondary Workers	Secondary Workers %	Tertiary Workers	Tertiary Workers %
Sikar (MCL)	46690	25.2	1647	3.5	3149	6.7	41894	89.7
Sikar (MCL+OG)	46845	25.2	1661	3.5	3153	6.7	42031	89.7

Source: Census of India 2001
Note: Census 2011 not yet published

52. Rajasthan's strong economic performance during the 80's and the early 90's reflected well in Sikar, However although at present Industrial Sector in Sikar is not so strong as compare to other economic sector like services, trade and commerce, construction, etc yet the recent trend have shown fast development in Industrial activities.

53. Sikar falls on the National Highway No.11 connecting Jaipur to Bikaner and has been most important trade center on this route. Sikar will therefore continue to grow as principal commercial and Distribution center. A continuous rise is expected in number of workers and this will increase population. It is therefore desirable that Industries are distributed rationally in conformity with the Infrastructure Developments of the Town .In summary to the aforementioned the following issues can be mentioned;

- All commercial nodes are too congested and overcrowded.
- Industrial sector in Sikar is deteriorating day by day.
- Most of the Industries that were established in beginning are declared sick today.
- Effective Planning strategy in locating various Industrial units is needed to decongest the present position.
- Proper internal roads for industries need to be planned.
- As there is no demarcated site for disposal of Industrial waste, all Industrial waste is being dumped on the Forest land without any treatment.
- Continuous disposal of Granite slurry on social forest land, in Debipura block near RIICO industrial complex, is destroying vegetation / plantation on one hand and breathing problem among residents in nearby colonies on the other hand thus has become a major threat to environment in the city.
- Artesian / Household industry is creating noise, water and air pollution in the core residential area of the town.
- Tourism Industry is very much neglected and underdeveloped.
- Lack of Tourism Infrastructure.

Land use

54. The Municipal council of Sikar is implementing a Master Plan which has been notified by the Government of Rajasthan on 07.03.1999. This plan is aimed at integrated and balanced development of entire notified urban area and provides guidelines for future growth of the town. It has been kept in proportion with socioeconomic need of the citizens and financial resources of the state. As per land use survey conducted in 1985 the Municipal limit of Sikar encompassed and area of about 9800 acres out of which 2680 acres was urbanized as per Master Plan 1985 -2011. The remaining land was vacant comprising of sandy area with fair cultivation. About 63% of developed urban area is under residential use, which is high in comparison to other towns in the region. This is due to lack of industrial area, parks and open spaces and other community facilities. The percentage of recreational use is only 1.6% against 3-7 percent normal in other towns. The table below shows land use area based on the survey **(Table 3.8).**

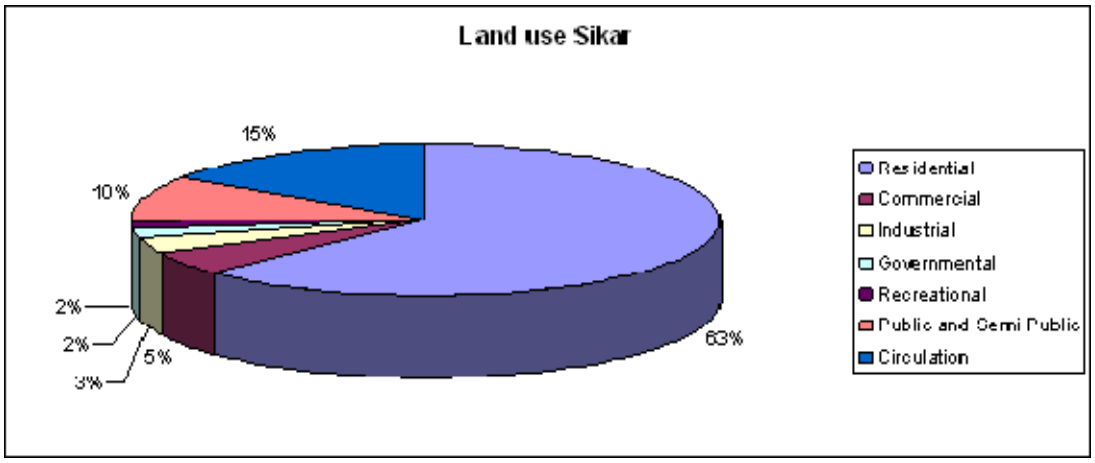
Table 3.8: Existing Land Use Sikar

Sl No.	Land use	Area in Acres	Percentage of Developed area	Percentage of urban area
1	Residential	1580	62.70	58.98
2	Commercial	130	5.16	4.85
3	Industrial	80	3.17	2.98
4	Governmental	50	1.98	1.86

Sl No.	Land use	Area in Acres	Percentage of Developed area	Percentage of urban area
5	Recreational	40	1.60	1.49
6	Public and Semi Public	250	9.92	9.32
7	Circulation	390	15.47	14.55
Total Developed Area		**2520**	**100**	-
8	Government Reserved	30	-	1.12
9	Agricultural	40	-	1.49
10	Vacant land	90	-	3.36
Urban Area		**2680**	-	**100**

Source – Master Plan of Sikar

Figure 3.7: Land use percentage- Sikar Urban developed area



Commerce, Industry and Agriculture

55. The state Government of Rajasthan Industrial Investment Corporation is providing various incentive and facilities for promoting Industrial activities. There is no large scale Industry in Sikar. Only small scale industries such as Granite industry, plywood industry, dal and oil mill industry, cattle feed industry, PVC pipe industry and Electric Transformers industry are functioning with very little workforce **(Table 3.9).**

Table 3.9: Type and Number of Industrial Units

Sl No.	Type of Industry	No. of Units
1	Granite	40
2	Plywood	8
3	Dal and Oil Mill	8
4	Cattle Feed	10
5	PVC pipe	6
6	Electric Transformers	9

Source: DIC- Sikar August 2006

56. Artesian /Household Industry provides for employment to a large no. of people These Industries are mainly Tie and Dyeing of cloth and leather tanning chemicals. These Industries are causing a lot of Noise Pollution, nuisance, traffic hazards and problem of waste disposal in Residential zones **(Table 3.10).**

Table 3.10: Type and Number of Artesian/Household Industries

Sl No.	Type of Household Industry	No. of Units	Location (ward No.)
1	Leather	200	2,6,7
2	Tie and Die	200	2,6,7
3	Bangles	200	Ajmer Bus Stand (near Suraj Pole Gate)

Source: DIC- Sikar August 2006

57. In and around the Sikar city area there are about 50-60% of lands used for agricultural purpose. Crop production statistics as depicted in **Table 3.11** indicates that crop production is more in Rabi season in compared to Kharif season.

Table 3.11: Crop production in around Sikar (2008-09)

Type of Crops	Under Rabi Crops	Under Kharif Crops
Cereals	384526	444871
Pulses	30117	35769
Food Grains	**414643**	**480586**
Oilseeds	74369	40779
Others	524231	39067
Total	**1013243**	**560432**

(Source: Rajasthan Agriculture Statistical at a glance, 2009-10)
(Web site:http://www.rajasthankrishi.gov.in/Departments/Agriculture/main)

Infrastructure

58. **Water supply**: Water supply of Sikar is wholly drawn from local tube wells, which are situated in almost whole city i.e. around the water work compound on Harsh Road and Udaipurwati Road. Ground water is the only source of water supply in Sikar. The water supply in the town is intermittent during morning and evening only. The per capita water supply of the town is about 89 lpcd, which is merely adequate and as per the recently sanction reorganization water supply scheme of Sikar, which is under execution it would be upgraded to 135 lpcd. Tube wells are largest sources of water supply in the town. The average depth of water table in Sikar is about 54.65 m. The supply timing is one hour i.e. morning 6-7 a.m. All the wards in the town are connected either partially or fully by piped water network. The Sikar town is firstly growing important town and its water supply projects are to be based on reliable sources of water supply. Therefore it is necessary to propose surface water sources which are perennial sources. The present water supply sources are Tube wells (146 Nos.) and open wells (34 Nos.).

59. **Sewerage System**: Sikar town does not have underground sewerage system. Out of the occupied residential houses only about 55% have some kind of latrines. Most of the houses have adopted the practice of providing onsite disposal by constructing water seal / bore hole latrines or by providing septic tank with effluent discharge into soak pits or open surface drains. Economically weaker section generally defecates into the open field. No sewerage treatment facility is there in the town and the drains having combined drainage and sewage are having outfall discharge in open fields towards west of the town on forest land. In the absence of any sewerage facility, the major mode of disposal is through individual septic tanks and low cost sanitation.

60. The city has around five thousands population as floating population that depends of public or community toilets. In core city area, market areas there are very few public toilet for men, but there is no public toilet for females. PHED division Sikar has recently prepared a Sewerage scheme for Sikar town. Components covered in it are as follows. As per

topography of the Sikar town whole area is divided into following two zones based on the ground level and feasibility of laying of sewer at required depth and are denoted as-

A North-East zone

- Area surrounding Nawalgadh Road
- Area surrounding Udaipurwati Road up to railway line
- Area surrounding Fathepur Road
- Area surrounding Bajaj Road, Bakra mandi and Kabristan

B South-West zone

- Area surrounding Jaipur Road
- Area surrounding Fathepur Bye- Pass Road

61. **Sanitation**: Only 50-60% 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**: The existing drainage system in Sikar is piecemeal construction of open *Nallah* as per local and temporary requirements without proper whole to part designs. The town has mainly open drains. The waste water along with sewage is discharged into the fields towards west of the town through open drains. Storm water drainage is expressed in terms of its coverage with respect to the total road length. Ideally length of the storm water drain should be twice that of the total road length. The open drain system in the town is irregular and mismanaged. The improper construction and maintenance of open drains cause spillage of rain water mixed with sewage and gets collected in local depressions at following core places of the town and requires pumping for several days.

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

64. **Solid Waste**: Sikar town spreads over 9800 acres of which 4600 acres is developed. The total waste generation in the town is about 103 T / day. It is important to note that no initiatives has been taken till now in terms of door to door collection of solid waste in Sikar. Presently most of the city wastes are simply dumped without any treatment in depressions, ditches or by the sides of the road flank in an unscientific manner. This practice may lead to air and water pollution, releases foul smell and this situation may cause major threat to the public health. Primarily, the sweeping is done by municipal staffs and collection and disposal is performed by the contractor. The garbage is collected and stored in a common point in every ward and the transportation is done by the tractor. There are 157 open points within the town demarcated by Sikar municipal council for garbage disposal in the wards. The average number of trips performed by vehicles ranges from 3-5 trips per vehicle per day and the average collection performance of 50-60 percent for SNP.

65. **Transportation.** Sikar is well connected with all the important towns of the state. It is situated on the National Highway No.11 running from Bikaner to Agra at the junction of State Highway No.20 and State Highway No.8 connecting Sikar to Salasar and Jhunjhnu respectively. It is also connected to Delhi via Jhunjhnu and Neem Ka Thana.

66. Road Network (**Table 3.12**) provides a breakdown of road network within Sikar municipal areas. Physical growth of the city has resulted in a corresponding increase in vehicular traffic greater than that of the city's population growth due to improving economic status of the city.

Table 3.12: Jurisdiction of Authorities Responsible for the Road of the Town

Type	Maintaining Authority	Length in km	%
Bitumen road	MBB	30	13.33
Cement-concrete road	MBB	133	59.11
WBM (Metalled)	MBB	12	5.33
NH & State Highway	PWD	50	22.22
Total		**225.00**	

Source: PWD Sikar (2007-08)

67. **Traffic Management:** The road network capacity has not expanded commensurate with increased traffic demand, resulting in frequent traffic congestion. The congestion is worsened due to poor road conditions coupled with the absence of effective traffic management and enforcement measures. Certain busy intersections are managed by traffic rotaries / roundabouts, which are often controlled by traffic police. Most junctions lack adequate free left turn facilities due to improper closure of drainage system. Additionally, most intersections are occupied by cycle-rickshaws and auto-rickshaws in a disorganized fashion due to inadequate parking and stopping facilities.

68. *Parking:*- Significant on-street parking is also observed on narrow streets in the city. Traffic carrying capacity of the streets has reduced due to on-street parking at shops and other commercial areas. There is a need to provide adequate off-street parking facilities to restore capacity of streets in old city area. Bus and Railway terminals are provided with adequate parking facilities. Railway station area has auto rickshaw and cycle rickshaw parking facilities. Additionally, two-wheeler and cycle parking lots are available in the railway station area.

69. *Traffic Survey:* The 7 days Traffic Survey, Demand Assessment, Traffic Projection Analysis were done to assess and establish the need for upgradation and widening of project roads.

70. *Demand Assessment for all project Roads as below:-* The 7 days (21.09.11 to 27.09.11) traffic Survey is conducted at all project roads to determine the ADT (Average Daily Traffic) in terms of Nos & PCUs on entire road. **Table 3.13** shows the average daily traffic in Nos. passing through the Roads. From the below table, it may be observed that peak hour are broadly 10.00 to 11.00 in the morning and 16.00 to 17.00 in the evening.

Table 3.13: Average Daily Traffic in Nos.

SN	Name of Road	Nos. of Different Vehicles										Traffic Peak Hrs
		Cycle /2-Wheelers	Car, Jeep	LCV	Mini Bus	Std. Bus	2-axle Truck	Multi-axle Truck	Agri-Tractor	Camel /Horse Cart	Total	
1	Fatehpur Road											
a	Kalyan circle stretch	7751	14246	7456	127	521	105	109	300	310	23469	10-11am &5-6pm
b	Shiv Cinema Stretch	7717	6476	7291	115	340	111	190	326	259	22825	10-11am &5-6pm
c	Bridge stretch	7858	7114	7853	118	377	128	177	270	283	24178	10-11am &5-6pm
2	Beed Road	1115	213	388	8	11	4	7	43	61	1850	6-7pm
3	Devipura Road	3214	936	1167	8	56	7	8	38	120	5554	10-11am &5-6pm
4	Station Road	15285	5555	6511	19	18	26	14	55	261	27744	5-6pm
5	Salasar Road	3328	1350	1869	7	178	9	49	86	105	6981	9-10am
6	Road No.-1	802	280	350	2	17	2	0	11	36	1500	17.00 to 18.00
7	Road No. -2	550	298	92	2	0	0	0	2	55	999	20.00 to 21.00
8	Road No.-3	718	592	725	2	1	0	0	7	20	2065	16.00 to 17.00
9	Road No.-4	566	474	600	1	0	0	0	1	24	1666	16.00 to 17.00
10	Road No.-5	718	582	725	2	1	0	0	7	20	2055	16.00 to 17.00
11	Road No.-6	1018	702	896	5	1	1	0	9	18	2650	17.00 to 18.00
12	Road No.-7	998	692	870	2	0	1	0	8	16	2587	17.00 to 18.00
13	Road No.-8	814	562	716	4	2	1	0	10	14	2123	17.00 to 18.00
14	Road No.-9	780	260	325	2	7	0	0	5	16	1395	17.00 to 18.00
15	Road No.-10	358	218	218	3	0	0	0	4	30	831	18.00 to 19.00
16	Road No.-11	364	151	148	3	0	1	0	6	30	703	16.00 to 17.00
17	Road No.-12	912	638	538	3	1	1	0	8	10	2111	17.00 to 18.00
18	Road No.-13	598	360	362	4	1	0	0	5	25	1355	18.00 to 19.00
19	Road No.-14	410	140	180	1	5	1	0	3	15	755	17.00 to 18.00
20	Road No.-15	496	270	374	1	0	0	0	3	15	1159	09.00 to 10.00
21	Road No.-16	260	480	365	1	0	0	0	1	12	1119	09.00 to 10.00

22	Road No.-17	1020	700	902	5	1	1	0	9	16	2654	17.00 to 18.00
23	Road No.-18	810	560	708	3	1	1	0	9	15	2107	17.00 to 18.00
24	Road No.-19	908	628	542	3	1	1	0	8	10	2101	17.00 to 18.00
25	Road No.-20	565	275	190	1	0	0	0	2	6	1039	09.00 to 10.00
26	Road No.-21	550	265	211	1	0	0	0	2	8	1037	09.00 to 10.00
27	Road No.-22	420	150	200	2	6	2	0	4	20	804	17.00 to 18.00
28	Road No.-23	612	422	538	2	1	0	0	6	11	1592	17.00 to 18.00
29	Road No.-24	848	412	286	2	1	0	0	3	10	1562	13.00 to 14.00
30	Road No.-25	354	296	376	1	0	0	0	2	15	1044	16.00 to 17.00.
31	Jhunjunu by pass	8215	3345	2298	98	840	97	293	333	302	15821	10.00 to 11.00

71. **Traffic Projection & Justification.** The road width in urban areas is designed to accommodate the design peak hour traffic. The design peak hour traffic is estimated based on a simple projection of present peak hour traffic for a design period of 15 years (adopted for arterial roads as per IRC-86:1984). The growth rate of different vehicles is estimated by Transport Demand Elasticity Method considering past traffic data, vehicle registration data, change of socio-economic pattern in urban areas, future development plan etc. In absence of such data, it is very difficult to estimate the actual growth rate for different vehicles.

72. In general, the average traffic growth rate for this type of urban areas (Sikar) is around 5%. The growth rate as per IRC 37-2001 is 7.5% which is higher than the actual growth at present. The present traffic is projected for both the growth rates i.e. 7.5% for design period of 20 years.

73. Details traffic survey study and demand assessment are shown in Detail Project Report.

D. Social and Cultural Resources

1 Demography

74. According to Census 2001, the population of (Sikar Municipal area is 185323) Sikar Urban Agglomeration is 185,925 and spreads over Sikar Municipal Council` (organized into 45 wards). The total spread of the Urban Agglomeration is approximately 39.00 sq. km, Municipal Council. The UA supports an average density of 4767 persons per sq. km. Of the total population the males constitute 96,379 and females 88,944 with sex ratio of 923 females per 1000 males. The number of Schedule Castesin Sikar Municipal Area and Sikar Urban Area is 17207 & 17377 respectively. Whereas The number of Schedule Tribes in Sikar Municipal area and Sikar urban area are 1413 and 1418 respectively. Thus the percentage of vulnerable population to the total population is 10%. The UA witnessed a high growth between 1971 and 1981 on account of induced industrial development, the growth rate fell during the last decade i.e. 1991-2001..this remarkable growth can be ascribed to various reasons, which includes increase due to natural growth, concentration of developmental activities like establishments of more government offices, trade and commerce, services and other activities, colleges and residential colonies **(Table 3.14)**. Population projection of Sikar town is shown in **Table 3.14.**

Table 3.14: Population Growth in Sikar town

Year	Population of Sikar town
1961	50,636
1971	70,987
1981	102,970
1991	143,900
2001	185,925
2011 (Provisional)	237,579

Source: Census of India, 2011 and projection on the basis of calculation

Table 3.15: Population Projection of Sikar

Year / Stage	Census Population	Recommended Projected Population
1961	50,636	
1971	70,987	
1981	102,970	
1991	143,900	
2001	185,925	

2011	237,579 (Provisional)	
2007		217,136
2011		240,783
2021		311,749
2026		354,765
2041		523,840

Source: Census of India, 2011 and projection on the basis of calculation

2 Health and educational facilities

75. There are good educational facilities in Sikar district, which serve both townspeople and inhabitants of surrounding villages and towns in the hinterland. There are 2363 educational institutes and 2 ITIs in Sikar district (Ref. Official website district Sikar, 2012).

76. As the district headquarters town, Sikar is the main centre for health facilities in the area and there is a 1 district general hospital, primary health center in the Sikar town. The detail of the health facilities given in **Table 3.16.**

Table 3.16: Health facility Sikar Urban area

S.No.	Facilities	Number
1	Hospital	1
2	Primary Health Center and Maternity Center	1
3	TB Hospital	1
4	Mother and Child Care Center	2
5	**Total**	**4**

(Source: Statistical Abstract, Govt. of Rajasthan, 2009)

3 History, culture and tourism

77. Sikar has rich heritage sites. A detailed inventory of some important religious and tourist spots in Sikar are given below-

- 17^{th} century a Fort
- The Painted Biyani, Murarka
- Bawri (Step Well)
- Digamber Jain Temple
- Somani Havelis
- Sagarmal Sodhani Havelis
- Madho Niwas Kothi
- The Jubilee Hall
- Devi Singh Cenotaph
- Temple of Gopinath
- Laxman Singh Cenotaph
- Raghunath Temple
- Madan Mohan ji Temple
- Shekhawati Museum
- Bara Talab Madhave Sagar

78. Today Sikar is the most important city of Shekhawati region of Rajasthan. Sikar city being the capital of the district, functions as the administrative city and hub of the tertiary economic activities like services, trade and commerce.

V. ANTICIPATED IMPACTS AND MITIGATION MEASURES

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

80. In many environmental assessments there are certain effects that, although they will occur during either the construction or operation stage, should be considered as impacts primarily of the location or design of the project, as they would not occur if an alternative location or design was chosen.

81. 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:

- Most of the individual elements of the subproject are relatively small and involve straightforward construction and operation, so impacts will be mainly localized and not greatly significant;
- 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;
- In one of the major fields in which there could be significant impacts (archaeological), 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.

A. Pre Construction Phase -Screening out areas of no significant impact

82. From the descriptions given in Section II.C, it is clear that implementation of the subproject should not have major negative impacts because it will affect only one site, at which all construction will be conducted within a relatively small area.

83. Because of this 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 4.1**, with an explanation of the reasoning in each case

Table 4.1: Fields in which construction is not expected to have significant impacts

Field	Rationale
Climate	Short-term production of dust is the only effect on atmosphere
Geology and seismology	Excavation will not be large enough to affect these features
Fisheries & aquatic biology	No rivers or lakes will be affected by the construction work
Wildlife and rare or endangered species	No wildlife and endangered species nearby
Coastal resources	Sikar is not located in a coastal area
Development of agriculture, minerals and tourism	There are none of these developments near the site

Field	Rationale
Population and communities	Construction will not affect population numbers, location or composition If there any impact that will be deal in social impact assessment report

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

85. Rapid Environmental Impact Assessment checklist along with mitigation measures is given in **Annexure- II.**

B. Road Construction

1. Construction method

86. Road construction is generally started with Clearing and Grubbing of the area of construction. Thereafter Survey work will be carried out including fixing of TBM. After survey earthwork will be done including items like excavation, cutting, loosening & re-compacting, filling vide embankment /sub grade. Then Sub base will be prepared i.e. Granular sub base / Drainage layer. Thereafter Base course will be prepared i.e. Wet Mix Macadam /Water Bound Macadam. Dense Bituminous Macadam and finally wearing course will be laid. Then finally road marking, road signage, road furniture is fixed.

87. The operation will be conducted by a team of around one hundred men, roughly 50% unskilled labour and 50% with various skills including truck drivers, vehicle and machine operatives, surveyors, foremen and supervisors, etc. The operation should be completed in around 18 months.

2. Physical Resources

88. Although all work will be conducted at a single, relatively small site, construction will involve a great deal of excavation and earth moving over a period of approximately six months, so physical impacts could be quite considerable.

89. During construction time great deal of material, which could cause significant changes in topography, drainage, air quality (dust), soil quality and other features at the extraction site if it were sourced from adjacent land. However these impacts can be avoided relatively easily by utilizing readily available source of waste sand and stone, which is:

- Material excavated to create the sub base of the road

90. Using these sources would have the additional benefit of providing a beneficial use for what would otherwise be large quantities of waste material, so it will be very important to coordinate these activities to enable this to be done.

91. Moving such a large quantity of material could cause further physical impacts, including the creation of dust during dry weather and silt-laden runoff during rainfall, both of which would affect people who live and work near the site and reduce the quality of adjacent land. The Contractor will almost certainly plan the work to ensure that all earthworks are conducted during the dry season to avoid the difficult working conditions that prevail during the monsoon, so this will avoid any problems from runoff. It will however be necessary to prevent dust, so the Contractor should be required to:

- Excavate the earth through cutting and filling up for embankment should be done at the same time for using the earth materials, avoiding the need to stockpile on site;

- Damp down exposed soil and any sand stockpiled on site by spraying with water when necessary during dry weather;

- Use tarpaulins to cover sand and other loose material when transported by truck.

92. Conducting the work in the dry season should avoid any drainage problems from rainfall during excavation, and although groundwater often collects in deeper voids, this should also not be a problem at this site because of the very low water table in Sikar.

3. Ecological Resources

93. There are no protected areas in or around project site of Sikar, and no known areas of ecological interest. The work should therefore have no ecological impacts.

4. Economic Development

94. Although there is no land acquisition proposed for the sub-project and work will be conducted within the ROW of the existing roads, but in some un-avoidable circumstances there is a need to acquire some land at the periphery of the site and for the construction of temporary access roads, it will be obtained through the relevant line agency involved in the project. As such RUIDP is not directly acquiring land in any of the sub projects. However, after acquiring land (if required), the line agency would hand over the unencumbered land to RUIDP for its implementation works. ADB policy on Involuntary Resettlement requires that no-one should be worse-off as a result of the project, so a Resettlement Plan and Resettlement Framework have been prepared to examine these issues. If any business premises have to be removed, the owners or tenants should be provided with:

- Compensation equivalent to the amount of business income lost;

- Compensation at replacement cost for any income-generating assets (eg. shop premises) that have to be removed.

95. Certain roadside shops that are not purchased may still lose income because the presence of the construction site will deter customers, and access will be impeded by road closures, the presence of heavy vehicles and machinery, etc. These issues are also dealt with by the Resettlement Plan and Framework, which indicate that these impacts will be mitigated by:

- Keeping road closures to the minimum in terms of frequency, duration and extent;

- Maintaining vehicle and pedestrian access to roadside businesses wherever possible;

- Providing owners and tenants with financial compensation equivalent to the amount of business income lost.

96. Transportation is the other principal economic activity that will be impeded by this work, as the existing road will be removed at the location of the access ramps and gradually replaced by the new embankments. These impacts will need to be mitigated by careful planning of the construction program, in conjunction with the road, and municipal authorities and the police, in order to:

- Maintain safe passage for vehicles and pedestrians throughout the construction period;

- Provide effective, well signposted diversions and alternative routes when required;

- Conduct work that requires the closure of roads at times of low traffic volume;

- Schedule truck deliveries of soil to the site for periods of low traffic volume.

97. Excavation could also damage existing infrastructure (such as water distribution pipes, electricity pylons, etc) located alongside the roads. It will be particularly important to avoid damaging existing water pipes as these are mainly manufactured from Asbestos Cement (AC), which can be carcinogenic if inhaled, so there are serious health risks for both workers and citizens (see below). It will be important therefore to avoid these impacts by:

- Obtaining details from the Municipal Council of the nature and location of all existing infrastructure, and planning excavation carefully to avoid any such sites if possible;

- Integrating construction of the various infrastructure subprojects conducted in Sikar (transport, water supply, sewerage) so that:

    - Different infrastructure is located on opposite sides of the road where feasible;

    - Roads and inhabitants are not subject to repeated disturbance by construction in the same area at different times for different purposes.

5. Social and Cultural Resources

98. 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. In this case the excavation will occur in and around an existing roadway, so it could be that there is a low risk of such impacts. Nevertheless this should be ascertained by consulting the appropriate authorities and steps should be taken according to the nature of the risk. This should involve:

- Consulting historical and archaeological authorities at both national and state level to obtain an expert assessment of the archaeological potential of the site;

- Considering an alternative transportation sub-project if the site is found to be of medium or high risk;

- Including state and local archaeological, cultural and historical authorities and interest groups in consultation forums as project stakeholders so that their expertise can be made available to the project;

- Developing a protocol for use by the Contractor in conducting any excavation work, to ensure that any chance finds are recognized and measures are taken to ensure they are protected and conserved. This should involve:

- Having excavation observed by a person with archaeological field training;

- Stopping work immediately to allow further investigation if any finds are suspected;

- Calling in the state archaeological authority if a find is suspected, and taking any action they require ensuring its removal or protection in situ.

99. There is no archeologically and historically protected area nearby the project sites.

100. There are few modern-day social and cultural resources (such as schools and hospitals) e.g Islamia College, Gayatri Mandir, Balika School, S.K. Govt. College, Medicine Market and Sabitri College etc. located near the project road. All precautionary measures will be taken during construction work to avoid any damage to these public utilities.

101. Although this is not a major residential area, there are some living quarters in the vicinity of the site, so action should be taken to minimize disturbance as far as possible. This will require:

- Consultation with the local community to inform them of the nature, duration and likely effects of the construction work, and to identify any local concerns so that these can be addressed;
- Involving the community in planning the work programme so that any particularly noisy or otherwise invasive activities can be scheduled to avoid sensitive times;
- Avoiding conducting noise-generating activities at night;
- Implementing the measures described above to reduce dust;
- Utilising modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions, and ensuring that these are maintained to manufacturers' specifications at all times.

102. 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:

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

103. During construction of roads green house gas (GHG) emission may result from burning of fuel in hot/spot mix plant. Proper safety arrangement, measurement of GHG emitted and moreover plantation in and around the road site is necessary for protection of environment and control of global warming.

104. An additional, particularly acute health risk 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:

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

105. 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)[1], and amongst other things, should involve:

- Training of all personnel (including manual labourers) to enable them to understand the dangers of AC pipes and to be able to recognize them in situ;
- Reporting procedures to inform management immediately if AC pipes are encountered;
- Development and application of a detailed H&S procedure to protect both workers and citizens. This should comply with national and international standards for dealing with asbestos, and should include:
  - 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.

106. 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 direct these benefits to the communities directly affected by the work, the Contractor should be required to employ at least 50% of his labour force from communities in the vicinity of the site. This will have the added benefit of avoiding social problems that sometimes occur when workers are imported into host communities, and avoiding environmental and social problems from workers housed in poorly serviced camp accommodation.

C. Operation and maintenance of new widened road

107. The widened road will have a design life of 10-15 years, during which time it should require no major repair or refurbishment, beyond routine maintenance, which will include:

- Small scale *ad hoc* repairs of surface damage caused by traffic use or accidents;
- Repairs and replacement of damaged safety barriers and signs;
- Regular unblocking of drains to prevent damage from flooding in the monsoon.

108. These operations will be the responsibility of the municipal highway department, who will be given training by this programme and provided with an operating budget for these purposes.

[1] 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

D. Environmental impacts and benefits of the operating road

1. Physical Resources

109. Once the new road (after widening to 3 to 4-6 lanes) is completed and under operation, it will improve the physical environment by removing the severe traffic congestion which is at present major problem of this town. That ultimately leads to increase in concentration of vehicular and Noise pollution.

110. This would be necessary of planting large-growing native trees at the road periphery which would also provide a natural barrier to noise, dust and exhaust gases so the planting of trees should be incorporated into the scheme.

111. When routine repairs are conducted to the road and ancillary facilities (signage, etc), the work will be very small in scale, and conducted manually by small teams of men with simple equipment (shovels, wheelbarrows, tarmac blender, etc). Even if larger vehicles are used to refurbish larger portions of the road, the work will be very short in duration and will not cause significant physical impacts.

112. Although the road is located in an area of low seismic risk, it will be designed according to standard Indian Engineering Design Codes, which include measures to allow the structure to withstand tremors of the expected magnitude and above. There should therefore be little risk of the structure failing, even if the area is subject to seismic events of greater magnitude than those that have occurred over recent years.

2. Ecological Resources

113. As there are no significant ecological resources in or around the town, the operation of the road and the routine maintenance and repair of the road and surroundings will have no ecological impacts. In fact by planting trees near the road, there would be some small ecological gain from the planting of trees to improve aesthetic environment.

3. Economic Development

114. The widened 31 roads will improve the infrastructure of the town by providing a more efficient and effective transportation route, and this should have positive impacts on the overall economy by reducing time spent idle in stationary traffic by delivery vehicles, employees and customers. It may also make further positive contributions to the development of particular sectors, for example by making the area more attractive to tourists and allowing the more efficient transportation of agricultural produce and other goods to and from the town.

115. Traffic may be interrupted temporarily if the road is repaired and maintained, but this work will be very small in scale, infrequent, and short in duration, so there should be no economic or other implications. To maintain the safety of workers and road-users, such work should be coordinated with the local police department so that adequate warning signs and traffic diversions can be set up when necessary.

4. Social and Cultural Resources

116. Effects of the operating road on social and cultural resources in the town will be relatively small in scale and intangible in nature, and are thus difficult to assess and quantify.

117. The citizens of the town will benefit from a more effective transportation route as they will spend less time in stationary traffic exposed to noise, pollution and the associated physical and psychological stresses. Since people commuting on this road will save time, they will socially much better off than before. People may also benefit from an improvement in the economy of the town, although it would require much larger improvements in transportation and other infrastructure for this to be recordable.

118. There are few modern-day social and cultural resources (such as schools and hospitals) e.g Islamia College, Gayatri Mandir, Balika School, S.K. Govt. College, Medicine Market and Sabitri College etc. near the project site. Repairing of the road will not be physically invasive because contractor will make suitable arrangement to avoid any damage to these public utilities.

VI. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Project stakeholders

119. 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:

- Residents, shopkeepers and businesspeople who live and work alongside the roads in which improvements will be provided and near sites where facilities will be built
- Custodians and users of socially and culturally important buildings in affected areas;
- State and local authorities responsible for the protection and conservation of archaeological relics, historical sites and artefacts;
- State and local tourism authorities.

120. Secondary stakeholders are:

- LSGD as the Executing Agency;
- Other government institutions which handle 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);
- NGOs and CBOs working in the affected communities;
- Other community representatives (prominent citizens, religious leaders, elders, women's groups);
- The beneficiary community in general; and
- The ADB and the Government of India, Ministry of Finance.

B. Consultation and disclosure to date

121. 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 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

- Drinking water problem
- Forest and sensitive area nearby the project site
- Movement of wild animal etc.

122. 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 **Annexure III.**

123. The major outcomes from the public consultation were related to traffic interference during construction and the possible dust and noise problems during constructional phase. Some comments made on the construction vehicles which may create some disturbances to their day to day activities. Also some concerns made on the necessity of proper safety arrangements at constructional site and widening of road before starting constriction.

124. Hence necessary provisions shall be provided to avoid the traffic snarl during the construction. Sprinkling of water at frequent intervals will avoid and curtail the dust emission. Good constructional practices and proper work timings shall avoid noise disturbances to the neighborhood.

125. The public Consultation and group discussion meeting were conduct by RUIDP on Date 31st May 2010 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 Sikar, the environmental and social impacts of the proposed subprojects in Sikar were discussed. Public Consultation was conducted on 05.03.2012 for additional scope of work under package ST-04 & ST-05.

126. 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 Sikar; and discussed the Government and *ADB's Environment Policy (2002)* acts and potential environment impacts of the sub-projects in Sikar. In future meetings Hindi versions of the Environmental Framework will be provided to ensure participants understood the objectives, policy principles and procedures related to Environment, English and Hindi versions of the Environmental Framework will be 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 SIEE will be disclosed on ADB's website. The finalized IEE and SIEE will also be disclosed on RUIDP website.

127. **Major Issues discussed during Public consultation are**

- Proposed road sub project is to ensure proper movement of city traffic round the clock
- 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;

- Livelihood affected households should be given assistance in the mode of cash compensation;
- Local people should be employed by the contractor during construction work;
- Adequate safety measures should be taken during construction work;
- Mobile kiosks/vendors/hawkers have shown willingness to shift in nearby places without taking any compensation and assistance from the Executing Agency;
- Local people have appreciated the road widening proposal of the government and they have ensured that they will cooperate with the Executing Agency during project implementation.

C. **Future consultation and disclosure**

128. 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:

129. 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.

130. 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;

131. Project disclosure:

- 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;

- 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;

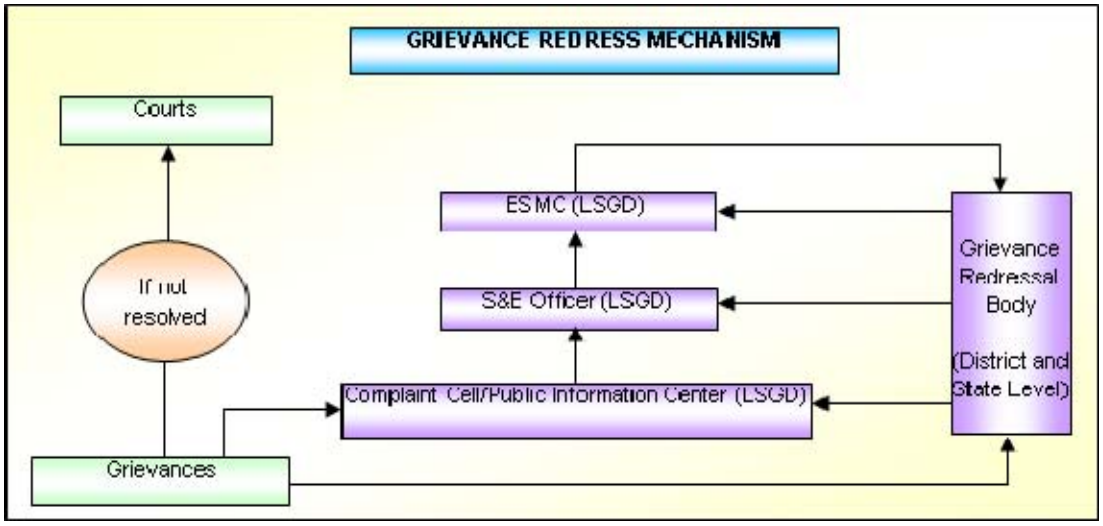
- Formal disclosure of completed project reports by making copies available at convenient locations in the study towns, informing the public of their availability, and providing a mechanism through which comments can be made.

VII. GRIEVANCE REDRESS MECHANISM

132. The project authority will establish a mechanism to receive and facilitate resolution of affected persons' concerns, complaints and grievances about the project's environmental performance. The grievances mechanism should be scaled to the risks and adverse impacts of the project. It will be addressed affected peoples' concerns and complaints promptly, using an understandable and transparent process that is gender responsive, culturally appropriate, and readily accessible to all the affected people at no cost and without retribution. The affected people will be informed by appropriate mechanism. The figure given below indicates the grievance redress mechanism for this purpose.

133. During implementation process performance monitoring fact sheet will be prepared against each possible environmental impacts.

Figure 6.1: Grievance redress mechanism - RUSDIP



Environment and Social Management Committee (ESMC)

VIII. ENVIRONMENTAL MANAGEMENT PLAN

A. Institutional Arrangements

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

(i) LSGD is responsible for management, coordination, and execution of all activities funded under the loan;
(ii) IPMU is responsible for coordinating construction of subprojects across all towns, and for ensuring consistency of approach and performance;
(iii) IPMC assists IPMU in managing the program and assures technical quality of design and construction;
(iv) DSCs design the infrastructure, manage tendering of Contractors and supervise the construction process;
(v) IPIUs appoint and manage Construction Contractors to build elements of the infrastructure in a particular town.
(vi) An inter-ministerial Empowered Committee[2] (EC) assists LSGD in providing policy guidance and coordination across all towns and subprojects.; and
(vii) City Level Committees[3] (CLCs) have also been established in each town to monitor project implementation in the town and provide recommendations to the IPIU where necessary.

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

1. Responsible for carrying out mitigation measures

136. During construction stage, implementation of mitigation measures is the construction contractor's responsibility while during operation stage (O & M), contractor and PWD Department will be responsible for the conduct of maintenance or repair works.

137. To ensure implementation of mitigation measures during the construction period, contract clauses (**Annexure VII**) for environmental provisions will be part of the civil works contracts. Contractors' conformity with contract procedures and specifications during construction will be carefully monitored by IPIU.

2. Responsible for carrying out monitoring measures

138. During construction, DSC's Environment Safeguards Officer and the designated representative of IPIU will monitor the construction contractor's environmental performance. In IPIU one Engineer is also look after the Social and Environmental Safeguards at site.

139. During the operation stage, monitoring will be the responsibility of PWD department.

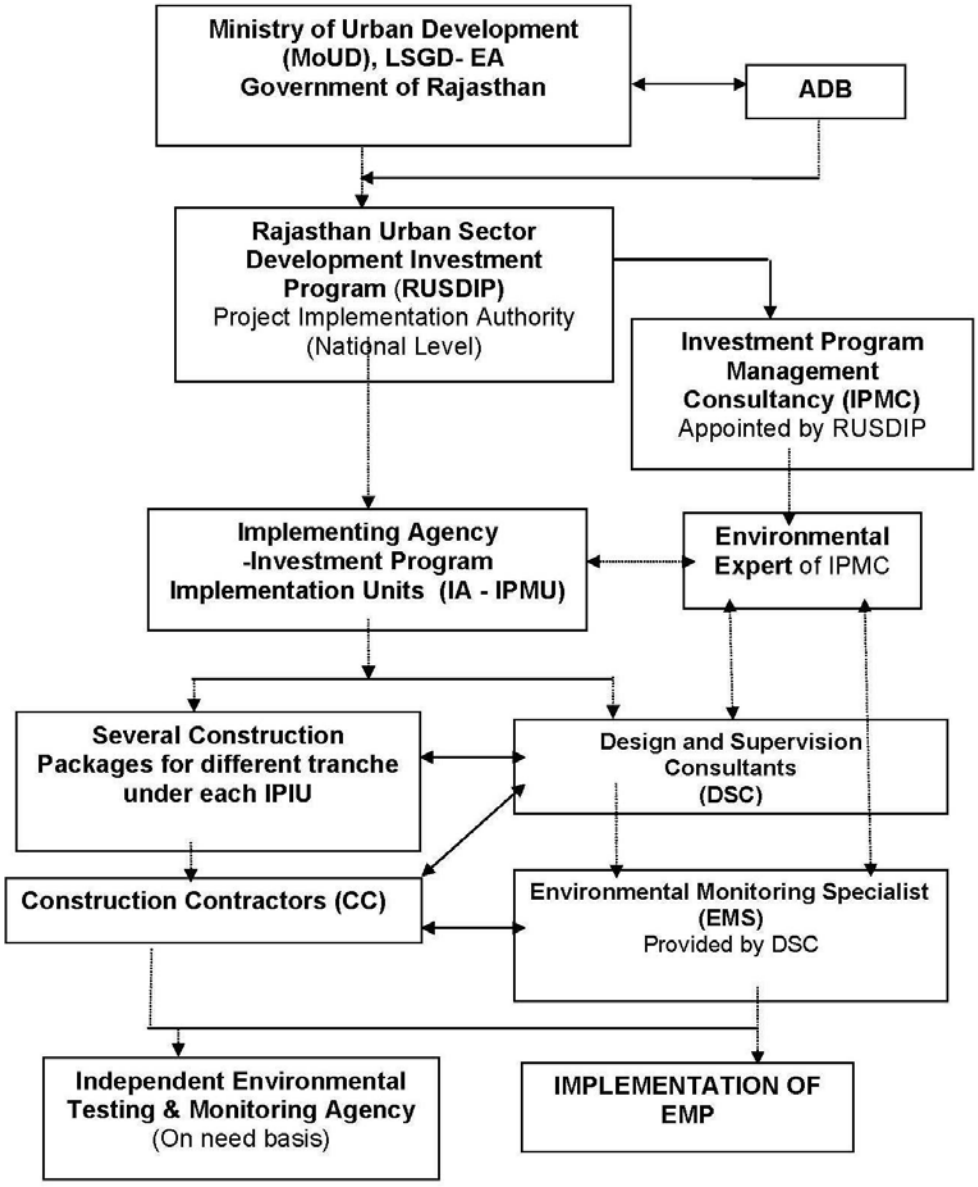
3. Responsible for reporting

140. LSGD will submit Bi-annually reports to ADB on implementation of the EMP and ADB Mission will review in detail the environmental aspects of the Project on need basis. Any major accidents having serious environmental consequences will be reported

[2] The EC is chaired by the Minister of Urban Development and LSG, and members include Ministers, Directors and/or representatives of other relevant Government Ministries and Departments.
3 CLCs are chaired by District Collectors, with members including officials of the ULB, local representatives of state government agencies, the IPIU, and local NGOs and CBOs.

immediately. Presently construction work for ST-02 has already been started and biannually reports being sent to ADB regularly.

Figure 7.1: Institutional Arrangement



B. Environmental Mitigation Plan

141. **Tables 7.1 to 7.3** shows the potential adverse environmental impacts, proposed mitigation measures, responsible parties, and estimated cost of implementation. This EMP will be included in the bid documents and will be further reviewed and updated during implementation.

C. Environmental Monitoring Program

142. **Tables 7.4 to 7.5** show the proposed environmental monitoring program for this sub-project. It includes all relevant environmental parameters, description of sampling stations, applicable standards, and responsible parties. Monitoring activities during the detailed engineering design stage will from part of the baseline conditions of the subproject sites and will be used as the reference for acceptance of restoration works by the construction contractors.

Table 7.1: Anticipated Impacts and Mitigation Measures – Pre-construction Environmental Mitigation Plan

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
Environmentally-sensitive Areas	A few trees will be cut and vegetation (mostly shrubs and grasses) will be cleared in the sub-project area	(i) Inventory the trees to be cut; (ii) Obtain tree-cutting permit from Municipal Board/Council and/or District Collector; and (iii) Include in the bid documents provisions on replacement of 3 trees for every one tree cut during construction.	Design and Supervision Consultants (DSC) in close coordination with the Municipal Board/ Council Investment Program Implementation Unit (IPIU)	(i) Inventory of trees; (ii) Tree-cutting permit; (iii) Location and number of trees replaced for every one tree cut
Utilities	Telephone lines, electric poles and wires, water and sewer lines within the existing bridge right-of-way (ROW) will be removed.	(i) Integrate utility ducts to the proposed road designs; (ii) Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction phase; and (iii) Require construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services.	DSC	(i) design specification showing utility ducts if necessary; (ii) list of affected utilities and operators; (iii) bid document to include requirement for a contingency plan for service interruptions
Access Roads	Disruption to traffic flow and sensitive receptors	(i) Include entry and exit points plan drawings; and (ii) Consult affected communities prior to finalizing subproject lay-out and design. (iii) plan in such a manner that access should not be hindered by any construction activity/ material/equipment	DSC and Non-government Organization in charge of public consultation and disclosure	(i) plan drawings showing entry and exit points; (ii) records of future public consultations
Social and Cultural Resources	Ground disturbance can uncover and damage archaeological and historical remains	(i) Consult Archaeological Survey of India (ASI) to obtain an expert assessment of the archaeological potential of the site; (ii) Consider alternatives if the site is found to be of medium or high risk; (iii) Include 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; and (iv) Develop a protocol for use by the construction contractors in conducting any excavation work, to ensure that any chance finds are recognized and measures are taken to ensure they are protected and conserved.	IPIU and DSC	Chance Finds Protocol

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	Disruption to traffic flow and sensitive receptors	(i) Prioritize areas within or nearest possible vacant space in the subproject sites; (ii) If it is deemed necessary to locate elsewhere, consider sites that will not promote instability and result in destruction of property, vegetation, irrigation, and drinking water supply systems; (iii) Do not consider residential areas; (iv) Take extreme care in selecting sites to avoid direct disposal to *nallah/water body* or in areas which will inconvenience the community.	IPIU and DSC to determine locations prior to award of construction contracts.	List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.
Sources of Materials	Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution.	(i) Prioritize sites already permitted by the Mining Department; (ii) If other sites are necessary, inform construction contractor that it is their responsibility to verify the suitability of all material sources and to obtain the approval of IPIU; and (iii) If additional quarries will be required after construction is started, inform construction contractor to obtain a written approval from IPMU.	IPIU and DSC to prepare list of approved quarry sites and sources of materials	(i) list of approved quarry sites and sources of materials; (ii) bid document to include requirement for verification of suitability of sources and permit for additional quarry sites if necessary.

Table 7.2: Anticipated Impacts and Mitigation Measures – Construction Environmental Mitigation Plan

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
Sources of Materials	Extraction of rocks and material from *nallah* may cause general scouring resulting in endangerment of bridges and continuous degradation of *nallah* regime.	(i) Use quarry sites and sources permitted by government; (ii) Verify suitability of all material sources and obtain approval of investment Program Implementation Unit (IPIU); (iii) If additional quarries will be required after construction has started, obtain written approval from IPMU; and; (iv) Submit to DSC on a monthly basis documentation of sources of materials.	Construction Contractor	Construction Contractor documentation

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
Air Quality	Emissions from construction vehicles, equipment, and machinery used for excavation and construction resulting to dusts and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons)	(i) Consult with IPIU/DSC on the designated areas for stockpiling of clay, soils, gravel, and other construction materials; (ii) Damp down exposed soil and any stockpiled on site by spraying with water when necessary during dry weather; (iii) Carry out air quality monitoring for ambient air for respirable particulate matter (RPM) and PM 2.5, Sox, NOx and CO; (iv) Use tarpaulins to cover sand and other loose material when transported by trucks; and (v) Fit all heavy equipment and machinery with air pollution control devices which are operating correctly.	Construction Contractor	(i) Location of stockpiles; (ii) complaints from sensitive receptors; (iii) heavy equipment and machinery with air pollution control devices (iii) ambient air for respirable particulate matter (RPM) and PM 2.5; (iv) vehicular emissions such as sulphur dioxide (SO_2), nitrous oxides (NOx), carbon monoxide (CO), and hydrocarbons
Surface water quality	Mobilization of settled silt materials, run-off from stockpiled materials, and chemical contamination from fuels and lubricants during construction works can contaminate downstream surface water quality.	(i) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets; (ii) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with IPIU/DSC on designated disposal areas; (iii) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies; (iv) Place storage areas for fuels and lubricants away from any drainage leading to water bodies; (v) Dispose any wastes generated by construction activities in designated sites;	Construction Contractor	(i) Areas for stockpiles, storage of fuels and lubricants and waste materials; (ii) number of silt traps installed along drainages leading to water bodies;
Noise Levels	Increase in noise level due to earth-moving and excavation equipment, and the transportation of equipment, materials, and people	(i) Plan activities in consultation with IPIU/DSC so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance; (ii) Require horns not be used unless it is necessary to warn other road users or animals of the vehicle's approach; (iii) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and portable street barriers the sound impact to surrounding sensitive receptor; and (iv) Maintain maximum sound levels not exceeding 80 decibels (dbA) when measured at a distance of 10 m or more from the vehicle/s.(v)	Construction Contractor	(i) Complaints from sensitive receptors; (ii) use of silencers in noise-producing equipment and sound barriers; (iii) equivalent day and night time levels

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		monitoring of noise level		
Existing Infrastructure and Facilities	Disruption of service and damage to existing infrastructure located alongside roads, in particular water supply pipes and sewer lines.	(i) Obtain from IPIU and/or DSC the list of affected utilities and operators; (ii) Prepare a contingency plan to include actions to be done in case of unintentional interruption of services; and (iii) Develop and implement an Asbestos Cement Pipes Management Plan	Construction Contractor	(i) Existing Utilities Contingency Plan; (ii) Asbestos Cement Pipes Management Plan
Flora and Fauna	Land-clearing activities and presence of workers in the sites can damage or cause loss of existing flora	(i) Minimize removal of vegetation and disallow cutting of trees if not required for the construction activities; (ii) If tree-removal will be required, obtain tree-cutting permit from the Municipal Council or District Collector; (iii) Earth-ball trees and transplant to IPIU-approved areas; (iv) Require to plant three native trees for every one that is removed; and (v) Prohibit employees from cutting of trees for firewood.	Construction Contractor	(i) tree-cutting permit for affected trees; (ii) number of replanted trees
Landscape and Aesthetics	solid wastes as well as excess construction materials	(i) Prepare and implement Waste Management Plan; (ii) Recover used oil and lubricants and reuse or remove from the sites; (iii) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas; (iv) Remove all wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and (v) Request IPIU/DSC to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.	Construction Contractor	(i) Waste Management Plan; (ii) complaints from sensitive receptors; (iii) IPIU/DSC to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.
Transportation – Accessibility	traffic problems and conflicts in right-of-way (ROW)	(i) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites; (ii) Schedule transport and hauling activities during non-peak hours; (iii) Locate entry and exit points in areas where there is low potential for traffic congestion; (iv) Keep the site free from all unnecessary obstructions; (v) Drive vehicles in a considerate manner; (vi) Coordinate with Municipal Traffic Office for temporary road diversions and with for provision of traffic aids if transportation activities cannot be avoided during peak hours; and (vii) Notify	Construction Contractor	(i) Traffic Management Plan; (ii) complaints from sensitive receptors; (iii) number of signages placed at subproject sites.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		affected sensitive receptors by providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints. (Viii)Provide wooden or metal sheet across the trenches for easy access wherever is required (ix) plan in such a manner that access should not be hindered by any construction activity/ material/equipment		
Socio-Economic	generation of contractual employment and increase in local revenue	(i) Employ at least 50% of the labour force, or to the maximum extent, local persons within the 2-km immediate area if manpower is available; and (ii) Secure construction materials from local market.	Construction Contractor	(i) employment records; (ii) records of sources of materials
Occupational Health and Safety	occupational hazards which can arise from working in infrastructures like roads and bridges	(i) Develop and implement site-specific Health and Safety (H and S) Plan which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use Personal Protective Equipment; (c) H and S Training for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents; (ii) Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site; (iii) Provide medical insurance coverage for workers; (iv) Secure all installations from unauthorized intrusion and accident risks; (v) Provide supplies of potable drinking water; (vi) Provide clean eating areas where workers are not exposed to hazardous or noxious substances; (vii) Provide H and S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; (viii) Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted; (ix) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; (x) Ensure moving equipment is outfitted with audible back-up alarms; (xi) Mark and provide sign boards for hazardous areas such as energized	Construction Contractor	(i) site-specific Health and Safety (H and S) Plan; (ii) Equipped first-aid stations; (iii) Medical insurance coverage for workers; (iv) Number of accidents; (v) Supplies of potable drinking water; (vi) Clean eating areas where workers are not exposed to hazardous or noxious substances; (vii) record of H and S orientation trainings (viii) personal protective equipments; (ix) % of moving equipment outfitted with audible back-up alarms; (xi) sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and (xii) Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.		
Community Health and Safety.	traffic accidents and vehicle collision with pedestrians	(i) Plan routes to avoid times of peak-pedestrian activities. (ii) Liaise with IPIU/DSC in identifying high-risk areas on route cards/maps. (iii) Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure. (iv) Provide road signs and flag persons to warn of dangerous conditions.	Construction Contractor	(i) Traffic Management Plan; (ii) complaints from sensitive receptors
Work Camps	temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants	(i) Consult with IPIU/DSC before locating project offices, sheds, and construction plants; (ii) Minimize removal of vegetation and disallow cutting of trees; (iii) Provide water and sanitation facilities for employees; (iv) Prohibit employees from poaching wildlife and cutting of trees for firewood; (v) Train employees in the storage and handling of materials which can potentially cause soil contamination; (vi) Recover used oil and lubricants and reuse or remove from the site; (vii) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas; (viii) Remove all wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and (ix) Request IPIU/DSC to report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work.	Construction Contractor	(i) complaints from sensitive receptors; (ii) water and sanitation facilities for employees; and (iii) IPIU/DSC report in writing that the camp has been vacated and restored to pre-project conditions
Social and Cultural Resources	(i)risk of archaeological chance finds; (ii)access lose or hindrance of sensitive receptors	(i) Strictly follow the protocol for chance finds in any excavation work; (ii) Request IPIU/DSC or any authorized person with archaeological field training to observe excavation; (iii) Stop work immediately to allow further investigation if any finds are suspected;	Construction Contractor	(i) records of chance finds (ii)visual inspection (iii) complaints from sensitive receptors

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		and (iv) Inform IPIU/DSC if a find is suspected, and take any action they require ensuring its removal or protection in situ.(v)access to any sensitive receptors close to the site should not be stuck		

Table 7.3: Anticipated Impacts and Mitigation Measures – Operation and Maintenance Environmental Mitigation Plan

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
Noise Level	noise levels tend to increase with vehicular traffic	Put signages and implement "no blowing of horns" zones where there are sensitive receptors	Municipal Road Department (MRD)	complaints from sensitive receptors
Accessibility	Portions of the roads may be affected during routine repairs	Coordinate with the Municipal Police Department so that warning signs and traffic diversions can be set up when necessary	MRD	complaints from sensitive receptors
Ecological Resources	ecological gain from the planting of replacement trees	Coordinate with the Municipal Council for the continuous care of the planted trees.	MRD	% survival of planted trees

Table 7.4: Pre-construction Environmental Monitoring Program

Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
Permits – Trees and Vegetation	not applicable	Design and Supervision Consultants (DSC) in close coordination with the town	(i) Inventory of trees; (ii) Tree-cutting permit; (iii) Location and number of trees replaced for every one tree cut	checking of records	(i) Inventory of trees prepared; (ii) Tree-cutting permit obtained from Municipal Council or District Collector; (iii) Location identified and number of	once	IPMU

Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
		Investment Project Implementation Unit (IPIU)			trees estimated		
Utilities		DSC	(i) design specification showing utility ducts if necessary; (ii) list of affected utilities and operators; (iii) bid document to include requirement for a contingency plan for service interruptions	checking of records	(i) utility ducts included in the design; (ii) list of affected utilities and operators prepared; (iii) requirement for a contingency plan for service interruptions included in bid documents	once	IPMU
Access Roads	not applicable	DSC and Non-government Organization in charge of public consultation and disclosure	(i) plan drawings showing entry and exit points; (ii) records of future public consultations	checking of records	(i) plan drawings include entry and exit points; (ii) stakeholders consulted; (iii) updated IEE and EMP disclosed	once	IPMU
Social and Cultural Resources	not applicable	IPIU and DSC	Chance Finds Protocol	checking of records	Chance Finds Protocol provided to construction contractors prior to commencement of activities	once	IPMU
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	not applicable	IPIU and DSC to determine locations prior to award of construction contracts.	List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	checking of records	List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas provided to construction contractors prior to commencement of works.	once	IPMU

Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
Sources of Materials	not applicable	IPIU and DSC to prepare list of approved quarry sites and sources of materials	(i) list of approved quarry sites and sources of materials; (ii) bid document to include requirement for verification of suitability of sources and permit for additional quarry sites if necessary.	checking of records	(i) list of approved quarry sites and sources of materials provided to construction contractors (ii) bid document included requirement for verification of suitability of sources and permit for additional quarry sites if necessary.	once	IPMU
Baseline Environmental Condition – Ambient Air Quality	Subproject sites	DSC	Establish baseline values of respirable particulate matter (RPM) and (ii) PM 2.5 (iii) oxide of sulphur (SO_x), nitrogen (NOx), carbon monoxide (CO)	Air sample collection and analyses by in-house laboratory or accredited 3rd party laboratory	GOI Ambient Air Quality Standards	Once prior to start of construction	IPMU

Table 7.5: Construction Environmental Monitoring Program

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
Sources of Materials	quarries and sources of materials	Construction Contractor	Construction Contractor documentation	(i) checking of records; (ii) visual inspection of sites	(i) sites are permitted; (ii) report submitted by construction contractor monthly (until such time there is excavation work)	Monthly submission for construction contractor as needed for DSC	DSC
Air Quality	construction sites and areas designated	Construction Contractor	(i) Location of stockpiles; (ii) complaints from sensitive receptors; (iii) heavy equipment and machinery	(i) checking of records; (ii) review of generated air	(i) stockpiles on designated areas only; (ii) complaints from sensitive receptors satisfactorily	monthly for checking records	DSC

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
	for stockpiling of materials		with air pollution control devices (iii) ambient air for respirable particulate matter (RPM) and PM2.5, SOx, NOx and CO at 3 locations at a frequency of 1 day 24 Hrs. basis- Semi-annually for 2 years; (iv) vehicular emissions such as sulphur dioxide (SO_2), nitrous oxides (NOx), carbon monoxide (CO), and hydrocarbons (HC)	quality data	addressed; (iii) air pollution control devices working properly; (iv) GOI Ambient Quality Standards for ambient air quality; (iv) GOI Vehicular Emission Standards for SO_2, NOx, CO and HC.		
Water Quality	(i) construction sites; (ii) areas for stockpiles, storage of fuels and lubricants and waste materials;	Construction Contractor	(i) Areas for stockpiles, storage of fuels and lubricants and waste materials; (ii) number of silt traps installed along drainages leading to water bodies; (iii)	visual inspection	(i) designated areas only; (ii) silt traps installed and functioning; (iii) no noticeable increase in suspended solids and silt from construction activities	monthly	DSC
Noise Levels	(i) construction sites; (ii) areas for stockpiles, storage of fuels and lubricants and waste materials; (iii) work	Construction Contractor	(i) Complaints from sensitive receptors; (ii) use of silencers in noise-producing equipment and sound barriers; (iii) equivalent day and night time levels at 3 locations at a frequency of 1 day 24 Hrs. basis- Semi-annually for 2 year	(i) checking of records; (ii) review of generated data	(i) complaints from sensitive receptors satisfactorily addressed; and (ii) silencers in noise-producing equipment functioning as design; and (iii) sound barriers installed where necessary	Monthly	DSC

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
	camps						
Existing Infrastructure and Facilities	(i) construction sites; (ii) alignment of affected utilities	Construction Contractor	(i) Existing Utilities Contingency Plan; (ii) Asbestos Cement Pipes Management Plan	(i) checking of records; (ii) visual inspection	implementation according to Utilities Contingency Plan and Asbestos Cement Plan	as needed	DSC
Flora and Fauna	(i) construction sites; (ii) location where replacement trees will be planted	Construction Contractor	(i) tree-cutting permit for affected trees; (ii) number of replanted trees	(i) checking of records; (ii) visual inspection	number of trees cut, replanted and location according to the tree-cutting permit	as needed	DSC
Landscape and Aesthetics	(i) construction sites; (ii) areas for stockpiles, storage of fuels and lubricants and waste materials; (iii) work camps	Construction Contractor	(i) Waste Management Plan; (ii) complaints from sensitive receptors; (iii) IPIU/DSC to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.	(i) checking of records; (ii) visual inspection	(i) No accumulation of solid wastes on-site; (ii) implementation of Waste Management Plan; (iii) complaints from sensitive receptors satisfactorily addressed.	Monthly	DSC
Transportation	(i) constructio	Construction	(i) Traffic Management Plan; (ii) complaints from sensitive receptors;	visual inspection	(i) implementation of Traffic Management Plan;	Monthly	DSC

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
– Accessibility	n sites; (ii) traffic routes	Contractor	(iii) number of signages placed at subproject sites.		(ii) complaints from sensitive receptors satisfactorily addressed; (iii) signages visible and located in designated areas		
Socio-Economic	construction sites	Construction Contractor	(i) employment records; (ii) records of sources of materials	checking of records	number of employees from town equal or greater than 50% of total workforce	Quarterly	DSC
Occupational Health and Safety	construction sites	Construction Contractor	(i) site-specific Health and Safety (H and S) Plan; (ii) Equipped first-aid stations; (iii) Medical insurance coverage for workers; (iv) Number of accidents; (v) Supplies of potable drinking water; (vi) Clean eating areas where workers are not exposed to hazardous or noxious substances; (vii) record of H and S orientation trainings (viii) personal protective equipments; (ix) % of moving equipment outfitted with audible back-up alarms; (xi) sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal.	(i) checking of records; (ii) visual inspection	(i) implementation of H and S plan; (ii) number of work-related accidents; (iii) % usage of personal protective equipment; (iv) number of first-aid stations, frequency of potable water delivery, provision of clean eating area, and number of sign boards are according to approved plan; (v) % of moving equipment outfitted with audible back-up alarms	Quarterly	DSC
Community Health and Safety.	construction sites	Construction Contractor	(i) Traffic Management Plan; (ii) complaints from sensitive receptors	visual inspection	(i) implementation of Traffic Management Plan; (ii) complaints from sensitive receptors satisfactorily addressed	Quarterly	DSC

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
Work Camps	work camps	Construction Contractor	(i) complaints from sensitive receptors; (ii) water and sanitation facilities for employees; and (iii) IPIU/DSC report in writing that the camp has been vacated and restored to pre-project conditions	visual inspection	(i) designated areas only; (ii) complaints from sensitive receptors satisfactorily addressed	Quarterly	DSC
Social and Cultural Resources	construction sites	Construction Contractor	(i)records of chance finds; (ii) complaints from sensitive receptors	checking of records	Implementation of Chance Finds Protocol	as needed	DSC

Table 7.6: Operation and Maintenance Environmental Monitoring Program

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
Noise Levels	subproject sites	Municipal Road Department (MRD)	complaints from sensitive receptors	checking of records	complaints from sensitive receptors satisfactorily addressed	as needed	PMU
Accessibility	subproject sites	MRD	complaints from sensitive receptors	checking of records	complaints from sensitive receptors satisfactorily addressed	as needed	PMU
Ecological Resources	subproject sites	MRD	% survival of planted trees	checking of records	at least 80% survival rate	quarterly	PMU

D. Environmental Management and Monitoring Costs

143. Most of the mitigation measures require the Construction Contractors (CC) 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 CC or DSC are included in the budgets for the civil works and do not need to be estimated separately here. Mitigation that is the responsibility of LSGD will be provided as part of their management of the project, so this also does not need to be duplicated here. Costs of acquiring land and compensating businesses for loss of income during the construction period are calculated separately in the budgets for the Resettlement Framework and Resettlement Plans so are also excluded from this analysis.

144. The remaining actions in the Environmental Management Plan are the various environmental monitoring activities to be conducted by the EMS. These have not been budgeted elsewhere, and their costs are shown in **Table 7.7**. The figures show that the total cost of environmental management and monitoring for this subproject as a whole (covering design and construction) is INR 1.65 million.

Table 7.7: Estimated Environmental management and monitoring costs (INR) - as per Initial Environmental Examination

Item	Quantity	Unit Cost	Total Cost	Sub-total	Source of Funds
1. Implementation of EMP (2 years)					
Environmental Monitoring Specialist of DSC	1 x 3 month	150,000[4]	450,000		DSC
Survey and monitoring expenses - air and noise quality	Lump Sum	600,000	600,000	10,50,000	Contractor
2. Improvement of aesthetics along the road including plantation	Lump Sum	600,000	600,000	600,000	Contractor
TOTAL				16,50,000	

[4] Unit costs of domestic consultants include fee, travel, accommodation and subsistence

IX. FINDINGS AND RECOMMENDATIONS

A. Findings

145. 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. Moreover, urban residents including nearby the rural residents in surrounding hinterland will benefit from improved roads and bridges allowing better access to urban markets and social services provided in the Project towns. 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.

146. 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.

147. The process described in this document has assessed the environmental impacts of the road proposed under the Sikar Urban Transport and Roads Subproject. Potential negative impacts were identified in relation to both construction and operation of the improved infrastructure, but no impacts were identified as being due to either the project design or location. Mitigation measures have been developed 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:

- Locating all activities within the ROW of existing roads, to avoid the need to acquire land or relocate people;

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

149. Regardless of these and various other actions taken during the IEE process and in developing the project, there will still be impacts on the environment when the road is built and when it is operating.

150. The proposed work will inevitably cause some disruption to road traffic. These are common impacts of construction in urban areas, and there are well developed methods for their mitigation. These include:

- Covering soil during transportation and when stored on site;
- Watering exposed soil during dry and windy weather;
- Planning work with the appropriate authorities to minimize disruption of road traffic.

151. There could also be a need to acquire a small amount of land at the periphery of the site, which includes a thin strip inside the boundary of some establishments. However there is no need of any land acquisition for the sub-project but such impacts are also frequently encountered and are dealt (if any) with by a combination of the legal process and additional measures required by ADB policy on Involuntary Resettlement. Actions are discussed in a separate Resettlement Plan and Resettlement Framework.

152. 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:

- Assessing the archaeological potential of the site, and selecting an alternative subproject if the site is considered to be of medium or high risk;
- Including archaeological, cultural and historical authorities and interest groups as project stakeholders to benefit from their expertise;
- Developing a protocol for use in conducting all excavation to ensure that any chance finds are recognized, protected and conserved.

153. 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 uncovered accidentally during excavation work. These are to:

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

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

- Employ in the workforce people who live in the vicinity of the construction site to provide them with a short-term economic gain;
- Plant large-growing trees at the periphery of the site to mask it from view and give it a more natural and pleasing appearance.

155. These and the other mitigation and enhancement measures are summarized in **Table 7.1 to 7.3,** which also shows the location of the impact, the body responsible for the mitigation, and the programme for its implementation.

156. Once the road widening is completed, it will operate with routine maintenance (such as occasional repairs of the road, safety barriers and signs), which will be small-scale, infrequent and short in duration and should not affect the environment. The only mitigation required in this period is to plan any maintenance work with the town authorities and police to ensure adequate precautions are taken to maintain the safety of workers and road users.

157. The main impacts of the operating road will be beneficial in improving the infrastructure of the town by providing a more efficient and effective transport route, which should improve the overall economy by reducing time spent idle in traffic by delivery vehicles, employees and customers. The general environment will also be improved at this location as the daily concentration of vehicular noise and pollution from exhaust gases will be reduced.

158. **Table 7.1 to 7.3** also assesses the effectiveness of each mitigation measure in reducing each impact to an acceptable level. This is shown as the level of significance of the residual impact (remaining after the mitigation is applied). This shows that all impacts will be rendered at least neutral (successfully mitigated), and that certain measures will produce a benefit (in addition to the major benefits provided by the operating schemes).

159. Mitigation will be assured by a programme of environmental monitoring conducted during both construction and operation to ensure that all measures are provided as intended, and to determine whether the environment is protected as envisaged. This will include observations on and off site, document checks, and interviews with workers and beneficiaries, and any requirements for remedial action will be reported to the IPMU.

B. Recommendations

160. 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:

- All mitigation, compensation and enhancement measures proposed in this IEE report and in the Resettlement Framework for the RUSDIP are implemented in full, as described in these two documents;
- The Environmental Monitoring Plan proposed in Section VII.C of this report and the internal and external monitoring proposed in the Resettlement Framework is also implemented in full.

X. CONCLUSIONS

161. The environmental status of the proposed improvements in urban transport and road sector in Sikar 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.

162. 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.

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

Photographs

Annexure– I

Public Consultation

Public Consultation Near Geeta Press on 5 March, 2012

Public Consultation Near Shitla Chowk on 5 March, 2012

Public Consultation Near Shramdan Marg on 5 March, 2012

Public Consultation Near Shitla Chowk on 5 March, 2012

	
Public Consultation near Daak Bungalow, 31.05.2010	**Public Consultation near Daak Bungalow, 31.05.2010**
	
Public Consultation near Daak Bungalow, 31.05.2010	**Public Consultation near Daak Bungalow, 31.05.2010**

Annexure- II: RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST

Instructions:

(i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (RSES), for endorsement by Director, RSES and for approval by the Chief Compliance Officer.

(ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.

(iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title:	India/Rajasthan Urban Sector Development Investment Program
Sector Division:	Widening and strengthening of roads at Sikar

Screening Questions	Yes	No	Remarks
A. PROJECT SITING **IS THE PROJECT AREA ADJACENT TO OR WITHIN ANY OF THE FOLLOWING ENVIRONMENTALLY SENSITIVE AREAS?**			
▪ **CULTURAL HERITAGE SITE**		√	NO
▪ **PROTECTED AREA**		√	NO
▪ **WETLAND**		√	NO
▪ **MANGROVE**		√	NO
▪ **ESTUARINE**		√	NO
▪ **BUFFER ZONE OF PROTECTED AREA**		√	NO
▪ **SPECIAL AREA FOR PROTECTING BIODIVERSITY**		√	NO
B. POTENTIAL ENVIRONMENTAL IMPACTS **WILL THE PROJECT CAUSE…**			

Screening Questions	Yes	No	Remarks
▪ encroachment on historical / cultural areas; disfiguration of landscape by road embankments, cuts, fills, and quarries?		√	There are few schools, temples and hospitals) i.e Islamia College, Gayatri Mandir, Balika School, S.K.Govt. College, Medicine Market and Sabitri College etc. near the site. All precautionary measures will be taken during construction work to avoid any damage to these public utilities.
▪ encroachment on precious ecology (e.g. sensitive or protected areas)?		√	There is no encroachment on precious ecology in this area. Our project area is along the road.
▪ alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction site?		√	There is no surface water resources exist in the vicinity of our project area.
▪ deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?		√	There is no surface water resources exist in this area.
▪ increased local air pollution due to rock crushing, cutting and filling works, and chemicals from asphalt processing?	√		During construction phase there will be increased air pollution due to asphalt processing and rock cutting. The location of asphalt processing and rock cutting machinery will be established far from human settlements and any environmental sensitive location to avoid impacts from increased air pollution.
▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation during project construction and operation?		√	No
▪ noise and vibration due to blasting and other civil works?		√	No blasting work will be involved in our project.
▪ dislocation or involuntary resettlement of people?	√		Some venders are there along the project area, they are to be shifted to another location for some time.

Screening Questions	Yes	No	Remarks
▪ dislocation and compulsory resettlement of people living in right-of-way?		√	There is no settlement in Right of way (ROW) hence there is no need of compulsory resettlement. Only venders and temporary shops fall in ROW will be impacted.
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		√	No
▪ other social concerns relating to inconveniences in living conditions in the project areas that may trigger cases of upper respiratory problems and stress?		√	Some encroachers were there along the proposed road, they have already been shifted from their places.
▪ hazardous driving conditions where construction interferes with pre-existing roads?		√	Contractor will provide alternate road during construction phase and will maintain traffic management to avoid any hazardous driving condition.
▪ poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases (such as STI's and HIV/AIDS) from workers to local populations?		√	Local labor will be employed for this work if required then contractor will provide all necessary facilities in workers camp to avoid any sanitation and solid waste disposal problem.
▪ creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents?		√	Climate of this area is dry and desert. Also this is a water scare area. There are no chances of creation of temporary breeding habitat for mosquito vectors during construction phase of Road project.
▪ accident risks associated with increased vehicular traffic, leading to accidental spills of toxic materials?		√	There are no chances of increase in traffic .During construction period contractor will take all precaution to avoid any accidental spill as per Environmental Management Plan.
▪ increased noise and air pollution resulting from traffic volume?	√		Some air and noise pollution may be there due to operation of construction machinery for very short period but preventive measures will be adopted.
▪ increased risk of water pollution from oil, grease and fuel spills, and other materials from vehicles using the road?		√	There is no surface and ground water resource in this area.
▪ social conflicts if workers from other regions or countries are hired?		√	Local labor will be employed

Screening Questions	Yes	No	Remarks
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√	No
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		√	No
▪ community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning.		√	No

Climate Change and Disaster Risk Questions The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.	Yes	No	REMARKS
• Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes (see Appendix I)	√		As per Rajasthan Earthquake Zoning Map Sikar Falls under low damage risk zone – II. The area is less prone to earthquake as it is located on stable geological plains.
▪ Could changes in temperature, precipitation, or extreme events patterns over the Project lifespan affect technical or financial sustainability (eg., increased erosion or landslides could increase maintenance costs, permafrost melting or increased soil moisture content could affect sub0-grade).		√	No such possibility
▪ Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (eg., high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?		√	Proposed project will not impact any marginalized population, rural-urban migrants, illegal settlement etc.
▪ Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., by encouraging settlement in areas that will be more affected by floods in the future, or encouraging settlement in earthquake zones)?		√	No such possibility of vulnerability Increase of the surrounding area.

Note: Hazards are potentially damaging physical events.

Annexure- III

PUBLIC CONSULTATION- ENVIRONMENT (For ST-02)

Roads at Sikar

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 if any

Date & time of Consultation **31.05.2010, 4:30 PM**

Location **NEAR DAAK BUNGALOW, SIKAR**

Table: issues of the Public Consultation- Design Phase

Sr. No.	Key issues/Demands	Perception of community	Action to be Taken
1.	Awareness of the project – including Project Coverage area	People are not aware of the Project	An NGO is appointed for awareness programme in this town
2.	In what way they may associate with the project	They want to engage with the project as a labour	Contractor will engage 50 % labour from the nearby location
3.	Presence of any forest, wild life or any sensitive/ unique environmental components nearby the project	There is no such environmental sensitive components in the vicinity of project area	
4	Presence of historical/cultural/ religious sites nearby	There is one Bala Ji Temple and one Shiv Shankar Temple nearby the proposed project. Because project alignment is along the existing road no impact expected	All preventive measures will be taken to avoid damage to such sensitive sites.
5	Un favorable climatic condition	Sikar is dry area with very high temperature during summer creating unfavorable condition for work	Contractor should make the working schedule as per climatic conditions of

			the area
6	Occurrence of flood	No flood is reported in this town till date	
7	Drainage and sewerage problem facing	Drainage and Sewerage are major problems in this area. These should be sort out immediately.	Sewerage problem will be solved because this project is already been taken in the scope.
8	Present drinking water problem- quantity and quality	Present water supply is from tube wells. The quality of water is poor, fluoride and TSS content is high.	The Water Supply project is proposed in this town and scarcity of water will be solved after completion of this project.
9	Present solid waste collection and disposal problem	Solid waste collection facility is poor in this area, Line department is not serious about the solid waste collection in this area	Solid Waste project has been taken in RUIDP scope
10	Availability of Labour during construction time	Sufficient labour is available in nearby communities.	Contractor will engage 50 % labour from nearby community.
11	Access road to project site	The proposed project is along the existing road	
12	Perception of villagers on tree felling and a forestation	People are against the tree felling	There will be no need of tree cutting but if it happens then 3 trees will planted at cost of one tree.
13	Dust and noise pollution and disturbances during construction work	This is the congested area of this town contractor should adopt the low noise producing machinery and control the dust formation by sprinkling water over the generated dust during construction phase	All preventive measures will be taken to control dust and noise during construction phase. Regular maintenance of Noise producing machinery will be done.
14	Setting up worker camp site within the village/ project locality	The area is very congested there is no space for establishment of camp site, the contractor have to establish labour camp to nearby locality	The locals will provide land for temporary set up of labour camp if necessary.
15	Safety of residents during construction phase and applying of vehicle for construction activities	The contractor should take care of the safety arrangement during construction phase and should provide traffic diversion routes to avoid the vehicle congestion	Contractor should appoint a safety officer for looking after the Safety aspects during construction work.
16	Requirement of enhancement of other facilities	The locals feels that Parks, and Community halls are required in this town in addition to additional traffic management system	
17	Whether local people agreed to sacrifice their lands (cultivable of not) for beneficial project after getting proper compensation	Locals are not agree to sacrifice their land for benefits of the project if needed	

NAME AND POSITION OF PERSONS CONSULTED

Sr. No.	Name	Occupation	Location
1.	Gulam Mohmmad	Student	Near Daak Bungalow
2.	Rahim Khan	Student	Near Daak Bungalow
3.	Dinesh Kumar	Vendor	Near Daak Bungalow
4.	Lun Daan	Student	Near Daak Bungalow
5.	Ramsaroop Singh	Vendor	Near Daak Bungalow
6.	Birzu Ram	Vendor	Near Daak Bungalow
7.	Ravta Ram	Vendor	Near Daak Bungalow
8.	Wazir Khan	Vendor	Near Daak Bungalow
9.	Bhanwar Singh	Vendor	Near Daak Bungalow
10.	Raj Kamal	Vendor	Near Daak Bungalow
11.	Multa Ram	Business Man	Near Daak Bungalow
12.	Chandan	Labour	Near Daak Bungalow
13.	Khet Singh	Labour	Near Daak Bungalow
14.	Kripal Singh	Vendor	Near Daak Bungalow
15.	Hanif Khan	Labour	Near Daak Bungalow

Summary of out come

Locals are not aware of the project. The Sikar Town is heavily developed with industries & infrastructure facilities so population of this town is increasing. This results in heavy vehicle congestion in town. The old city area is very congested and traffic is mostly light vehicle. The proposed project is a need to this town. Locals are very much in favor of the project and they wants that this should be completed as early as possible. These local people are suffering from present water supply, sewerage and solid waste disposal management in this town. The quality and quantity of present water supply is very poor. People are ready to extend all types of support to during execution of the project. The other major problems of this town are water supply, sewerage, drainage and solid waste collection; all these projects are taken up in RUIDP Phase II. The local people in favour all type of co-operation for concerned project which should be finish as early as possible.

PUBLIC CONSULTATION- ENVIRONMENT

(For Enhanced scope under package ST-04 and ST-05)

Date & time of Consultation: **05.03.2012, 12:30 PM**

Location: **Near Shitla Chowk, Sharamdin Marg and Geeta Press, SIKAR**

Table: Issues of the Public Consultation- Design Phase

Sr. No.	Key issues/Demands	Perception of community	Action to be Taken
1.	Awareness of the project – including Project Coverage area	Some People are aware of the Project	An NGO is appointed for awareness programme in this town
2.	In what way they may associate with the project	They want to engage with the project as a job source	Contractor will engage 50 % labour from the nearby location
3.	Presence of any forest, wild life or any sensitive/ unique environmental components nearby the project	There is no such environmental sensitive components in the vicinity of project area	
4	Presence of historical/cultural/ religious sites nearby	There are few schools, temples and hospitals) i.e Islamia College, Gayatri Mandir, Balika School, S.K.Govt. College, Medicine Market and Sabitri College etc. near the site. Because project alignment is along the existing road no impact expected	All preventive measures will be taken to avoid damage to such sensitive sites.
5	Un favorable climatic condition	Sikar is dry area with very high temperature during summer creating unfavorable condition for work	Contractor should make the working schedule as per climatic conditions of the area
6	Occurrence of flood	No flood is reported in this town till date	
7	Drainage and sewerage problem facing	Drainage and Sewerage are major problems in this area. These should be sort out immediately.	Sewerage problem will be solved because this project is already been taken in the scope.
8	Present drinking water problem- quantity and quality	Present water supply is from tube wells. The quality of water is poor, fluoride and TSS content is high.	The Water Supply project is proposed in this town and scarcity of water will be solved after completion of this project.
9	Present solid waste collection and disposal problem	Solid waste collection facility is poor in this area, Line department is not serious about the solid waste collection in this area	Solid Waste project has been taken in RUIDP scope
10	Availability of Labour during construction time	Sufficient labour is available in nearby communities.	Contractor will engage 50 % labour from nearby community.
11	Access road to project site	The proposed project is along the existing roads	

12	Perception of villagers on tree felling and a forestation	People are against the tree felling	There will be no need of tree cutting but if it happens then 3 trees will planted at cost of one tree.
13	Dust and noise pollution and disturbances during construction work	The proposed project is in congested streets of this town contractor should adopt the low noise producing machinery and control the dust formation by sprinkling water over the generated dust during construction phase	All preventive measures will be taken to control dust and noise during construction phase. Regular maintenance of Noise producing machinery will be done.
14	Setting up worker camp site within the village/ project locality	The area is very congested there is no space for establishment of camp site, the contractor have to establish labour camp to nearby locality	The locals will provide land for temporary set up of labour camp if necessary.
15	Safety of residents during construction phase and applying of vehicle for construction activities	The contractor should take care of the safety arrangement during construction phase and should provide traffic diversion routes to avoid the vehicle congestion	Contractor should appoint a safety officer for looking after the Safety aspects during construction work.
16	Requirement of enhancement of other facilities	The locals feels that Parks, and Community halls are required in this town in addition to traffic management system	
17	Whether local people agreed to sacrifice their lands (cultivable of not) for beneficial project after getting proper compensation	No need of land acquisition because of the nature of the project	

NAME AND POSITION OF PERSONS CONSULTED

Sr. No.	Name	Occupation	Location
1.	Guman Singh	Service	Near Shitla Chowk
2.	Ram Gopal Sharma	Service	Near Shitla Chowk
3.	Saitan Singh	Service	Near Shitla Chowk
4.	Mehfooz	Student	Near Shitla Chowk
5.	Veer Singh	Vendor	Geeta Press
6.	Arjun Singh	Vendor	Geeta Press
7.	Megh Raj	Vendor	Geeta Press
8.	Kabir	Vendor	Geeta Press
9.	Deewan	Vendor	Geeta Press
10.	Khanzu	Vendor	Geeta Press

Summary of out come

Some Locals are aware of the project. The Sikar Town is heavily developed with industries & infrastructure facilities so population of this town is increasing. This results in heavy vehicle congestion in town. The old city area is very congested and traffic is mostly light vehicle. The proposed project is a need to this town. Locals are very much in favor of the project and they wants that this should be completed as early as possible. People are ready to extend all types of support to during execution of the project. The proposed project is a need to this town. These local people are suffering from present water supply, sewerage and solid waste disposal management in this town. The quality and quantity of present water supply is very poor. Projects of Water Supply, Wastewater, Railway Over Bridge, Road and improvement of solid waste collection have been taken under RUIDP project. According to locals' contractor should inform to them well in advance before start of construction work. The proposed road projects will improve the traffic congestion problem in the city.

Annexure IV
Recommended Contract Clauses

A. Sources of Materials

(i) Use quarry sites and sources permitted by government;
(ii) Verify suitability of all material sources and obtain approval of IPIU;
(iii) If additional quarries will be required after construction has started, obtain written approval from IPMU; and;
(iv) Submit to DSC on a monthly basis documentation of sources of materials.

B. Air Quality

(i) Consult with IPIU/DSC on the designated areas for stockpiling of clay, soils, gravel, and other construction materials;
(ii) Excavate the bridge foundations at the same time as the access roads are built so that dug material is used immediately, avoiding the need to stockpile on site;
(iii) Damp down exposed soil and any stockpiled on site by spraying with water when necessary during dry weather;
(iv) Measurement of air quality at heritage site as per EMP
(v) Use tarpaulins to cover sand and other loose material when transported by trucks; and
(vi) Fit all heavy equipment and machinery with air pollution control devices which are operating correctly.

C. Surface Water Quality

(i) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;
(ii) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with IPIU/DSC on designated disposal areas;
(iii) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;
(iv) Place storage areas for fuels and lubricants away from any drainage leading to water bodies;
(v)Dispose any silt, debris, and other materials collected from dewatering and cleaning activities;
(vi)Dispose any wastes generated by construction activities in designated sites; and
(vii)Prevent at all times chemical contamination of surface water bodies and lakes;
(viii)Dispose any wastes generated by construction activities in designated sites
(ix)Conduct surface quality inspection according to the Environmental Management Plan (EMP).

D. Noise Levels

(i) Plan activities in consultation with IPIU/DSC so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance;
(ii) Require horns not be used unless it is necessary to warn other road users or animals of the vehicle's approach;
(iii) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and portable street barriers the sound impact to surrounding sensitive receptor; and
(iv) Maintain maximum sound levels not exceeding 80 decibels (dbA) when measured at a distance of 10 m or more from the vehicle/s.
(v) Measurement of noise level at sub-project locations as per EMP

E. Existing Infrastructure and Facilities

(i) Obtain from IPIU and/or DSC the list of affected utilities and operators;
(ii) Prepare a contingency plan to include actions to be done in case of unintentional interruption of services; and
(iii) Develop and implement an Asbestos Cement Pipes Management Plan

F. Accessibility

(i) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites;
(ii) Schedule transport and hauling activities during non-peak hours;
(iii) Locate entry and exit points in areas where there is low potential for traffic congestion;
(iv) Keep the site free from all unnecessary obstructions;
(v) Drive vehicles in a considerate manner;
(vi) Coordinate with Traffic Office for temporary road diversions and with for provision of traffic aids if transportation activities cannot be avoided during peak hours; and
(vii) Notify affected sensitive receptors by providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints.

G. Landscape and Aesthetics

(i) Prepare and implement Waste Management Plan;
(ii) Recover used oil and lubricants and reuse or remove from the sites;
(iii) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
(iv) Remove all wreckage, garbage from lake, silt, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and
(v) Request IPIU/DSC to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.

H. Socio-Economic – Income

(i) Leave spaces for access between mounds of soil;
(ii) Provide walkways and metal sheets where required to maintain access across trenches for people and vehicles;
(iii) Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools;
(iv) Consult businesses and institutions regarding operating hours and factoring this in work schedules; and
(v) Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.

I. Socio-Economic – Employment

(i) Employ at least 50% of the labour force, or to the maximum extent, local persons within the 2-km immediate area if manpower is available; and
(ii) Secure construction materials from local market.

J. Occupational Health and Safety

(i) Develop and implement site-specific Health and Safety (H and S) Plan which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use Personal Protective Equipment; (c) H and S Training for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents;
(ii) Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;
(iii) Provide medical insurance coverage for workers;
(iv) Secure all installations from unauthorized intrusion and accident risks;
(v) Provide supplies of potable drinking water;

(vi) Provide clean eating areas where workers are not exposed to hazardous or noxious substances;
(vii) Provide H and S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers;
(viii) Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted;
(ix) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;
(x) Ensure moving equipment is outfitted with audible back-up alarms;
(xi) Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and
(xii) Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.
(xii) Use of Personal Protective Equipments (PPEs) like helmet, gumboots and gloves

K. Asbestos Cement Pipes

(i) Train all personnel (including manual labourers) to enable them to understand the dangers of AC pipes and to be able to recognise them in situ;
(ii) Report to management immediately if AC pipes are encountered;
(iii) Develop and apply AC Management Plan.

L. Community Health and Safety.

(i) Plan routes to avoid times of peak-pedestrian activities.
(ii) Liaise with IPIU/DSC in identifying high-risk areas on route cards/maps.
(iii) Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.
(iv) Provide road signs and flag persons to warn of dangerous conditions and barricading.

M. Work Camps

(i) Consult with IPIU/DSC before locating project offices, sheds, and construction plants;
(ii) Minimize removal of vegetation and disallow cutting of trees;
(iii) Provide water and sanitation facilities for employees;
(iv) Prohibit employees from poaching wildlife and cutting of trees for firewood;
(v) Train employees in the storage and handling of materials which can potentially cause soil contamination;
(vi) Recover used oil and lubricants and reuse or remove from the site;
(vii) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
(viii) Remove all wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and
(ix) Request IPIU/DSC to report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work.

N. Social and Cultural Resources

(i) Strictly follow the protocol for chance finds in any excavation work;
(ii) Request IPIU/DSC or any authorized person with archaeological field training to observe excavation;
(iii) Stop work immediately to allow further investigation if any finds are suspected; and
(iii) Inform IPIU/DSC if a find is suspected, and take any action they require ensuring its removal or protection in situ.

ANNEXURE V

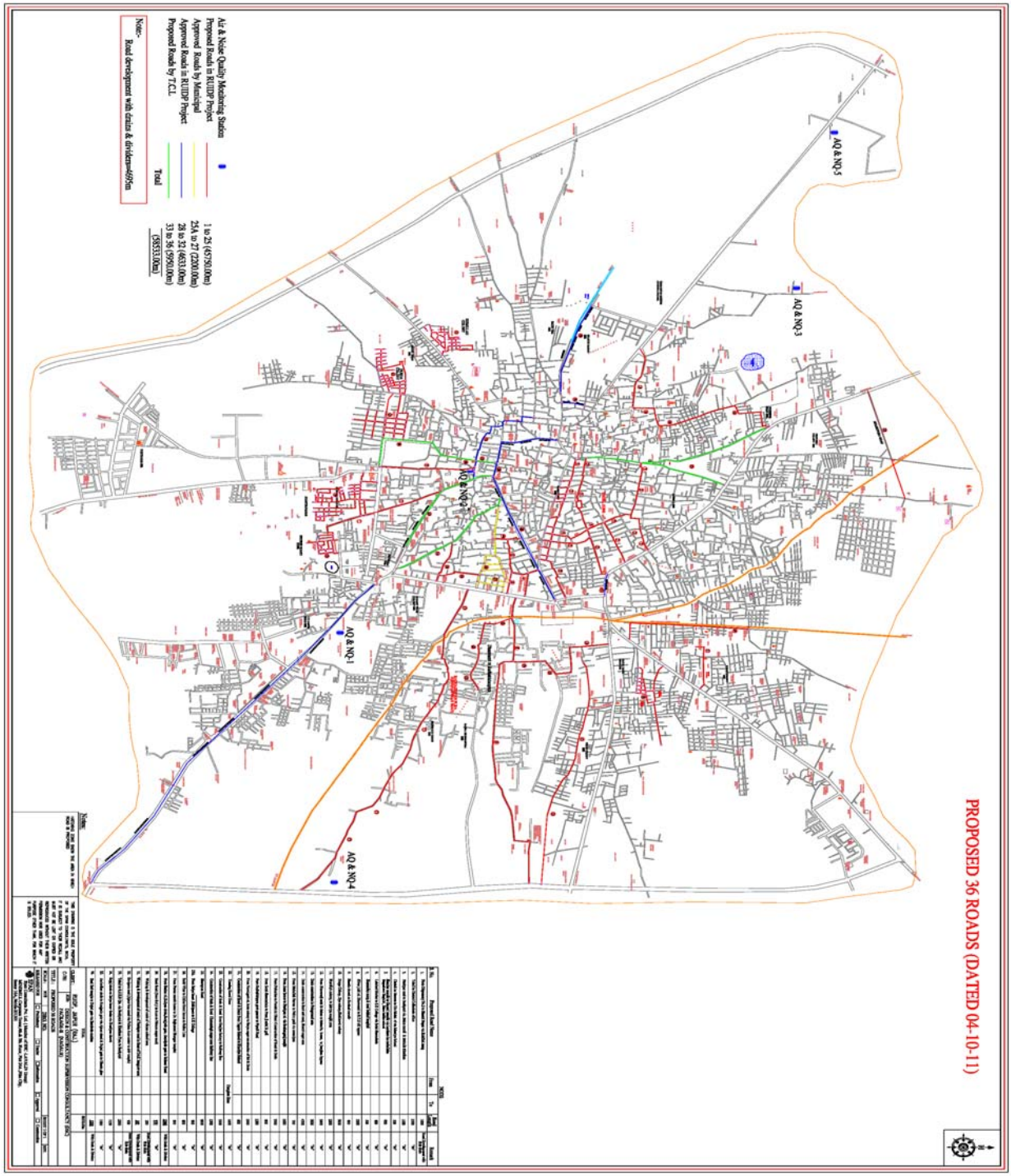
LIST OF ENVIRONMENTALLY SENSITIVE RECEPTORS

Road No.	PARTICULAR	Sensitive Area (School, College, Hosipitals, Temple, Dargah, Historical Monuments etc.)
Roads under Package ST / 02		
1	Fatehpur Road	Mahavir School, Sikar College, Shops
2	Beed Road	NA
3	Devipura Road	Bala Ji Temple
4	Station Road	Shops on both side
5	Salasar Road	Shops on both side
Roads under Package ST / 05		
1	From Ajit Computers to Housing Board colony	One Small Shop, Govt. School and Hanuman Temple.
2	Tehsil to District Collectrate office	Shops Vardman School, One Temple, Digamber Jain School, Bindal Hospital, Charak Hospital, Rotary Club, Goyal Hospital.
3	Fatehpur road to Buchyani via ,Bakra mandi & Mohalla Khatikan	Many Budar Shops inside, Bakra Mandi.
4	Chokdi ka bhawan to Din Mohd. rd via Islamiya School	Islamabad Collage, Pink House Road.
5	Shanitar mandir to Gayatri mandir via kumharo ka mohallaha Nageshwar Bagichi , Maru balika school	Gyatri Mandir, Balika School
6	Lakshmi Market to S.K College via Saini dharmshala	S. K. Govt. Collage
7	Sharamdan marg & road behind hospital	Back side of S. K. Govt Hospital, Medicine Market
8	Silver jubli rd. Dhanvantri to R.T.O till bypass	Sabitri - Collage (Basic Trainaing) Near RTO
9	Sheetla chowk to Ranisati mandir	Sheetla Mandir, Some Small Shop
10	Durga Colony, Jiya colony, Shekhawat colony	.-N.A.-
11	Bismillah colony, in Jakriya masjid area	.-N.A.-

12	From Bhanwarji saini ki dukan to bidami's house, to jhunjhnu bypass	Residential Colony
13	Pologround area	Bhart Bharti School, Small Shops
14	Rani sati road, Shastri nagar area	Rani Sati Temple
15	From Mohallah Narvan to Nehru park via swamiyan	Nehru Park, Temple away from site, near shiv temple, chota talab, chatri
16	From Asrar house to Fatehpur rd. via Roshangunj masjid	One School, masjid (Roshanganj)
17	From Police line to Purohit ki Dhani	School Building, One Temple
18	From Saini dharamshala to Prem ji saini ki gali	Vidya Bharti School, Saini Dharamshalla
19	From Radhakishpura govt quarter to Piprali Road	Govt. Colony, Krishan Hospital
20	From Nawalgarh rd, Janta colony to Surya nagar construction of Rd & Drain	.-N.A.- Colony
21	From Tagore School to Bhartiya School	Tagor School, Hanuman Temple, Hinglaj Temple, Bhartiya School
22	Housing Board Zone	Temple Hanuman ji & One Small shop
23	Erom bhujiya factory to Railway line	School, Govt. Sec. School, Radhakrishanpura
24	Charansingh nagar near Railway line	.-N.A.-
25	Bharupura Road (New)	.-N.A.-
Roads under Package ST / 04		
1	Jhunjhunu by pass to Bus stand	.-N.A.-

ANNEXURE VI

MAP SHOWING THE LOCATIONS FOR AIR AND NOISE MONITORING



ANNEXURE VII

SITE PHOTOGRAPHS

Proposed Road-From Bus Stand to Jhunjhunu By Pass Road